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SRB TECHNOLOGIES (CANADA) INC.

Preliminary Decommissioning Plan

Submission Date: November 13, 2014

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Signature

EXECUTIVE SUMMARY

REVIEW DATE	REVIEWED BY	REVISION REQUIRED
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 SRB 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 SRB letter dated June 15, 2007 tilted "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 SRB 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 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 15, 2014.
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.

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1. BACKGROUND

On March 14, 2006 SRB Technologies (Canada) Inc. (SRB) 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 SRB comments on the Preliminary Decommissioning Plan [1]. SRB addressed these comments in a letter [3] dated January 30, 2007.

In a letter[4] dated February 23, 2007 CNSC Staff provided SRB additional comments specifically on the cost estimate included in the Decommissioning Plan[1]. SRB addressed these comments in a letter[5] to CNSC Staff dated June 15, 2007.

As reported in CNSC Staff 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 for the Safe State of Closure of the facility.

In a Record of Proceedings, Including Reasons for Decision[7] released on October 23, 2007 after the Hearing the Commission accepted the Financial Guarantee provided by SRB for the safe state of closure of its facility.

In a letter[8] dated June 11, 2008 SRB provided CNSC Staff a proposal for funding of the full value of the financial guarantee. CNSC Staff subsequently reviewed SRB'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 financial guarantee.

In a Record of Proceedings, Including Reasons for Decision [10] released on June 26, 2008 after the Hearing the Commission accepted the Financial Guarantee provided by SRB for the full value of the financial guarantee.

On June 23, 2013 SRB Technologies (Canada) Inc. (SRB) submitted to the Canadian Nuclear Safety Commission (CNSC) Staff a revised Preliminary Decommissioning Plan [11].

In a letter [12] dated September 17, 2013 CNSC Staff provided SRB comments on the Preliminary Decommissioning Plan [11]. SRB addressed these comments in a letter [13] dated November 19, 2013.

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

SRB then hired consultants Doug McNab of D&J Consulting and Terry Donahue of RadSafe Canada Ltd., to revise SRB'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 recently directly involved in the full Decommissioning of Shield Source Inc. which was a CNSC licensed facility with operations very similar to that of SRB.

On June 20, 2014 SRB Technologies (Canada) Inc. submitted to CNSC Staff this revised Preliminary Decommissioning Plan [15] which addresses the CNSC comments from letters dated September 17, 2013[12] and January 15, 2014[14].

On August 22, 2014[16] CNSC staff provided comments on the review of SRB's revised Preliminary Decommissioning Plan and Financial Guarantee [15] dated June 20, 2014.

In a response[17] dated September 21, 2014, SRB 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 SRB had addressed all comments but not enough justification was given for decreasing the contingency from 25% to 15%.

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

In a letter[20], dated November 7, 2014, CNSC Staff provided SRB a response accepting SRB's 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.

2. INTRODUCTION

SRB Technologies (Canada) Inc. is a small company that has been in Pembroke since 1990 manufacturing gaseous tritium light sources. SRB 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 SRB

The products that SRB manufactures which use these light sources are crucial to ensure the safety and security of people all over the world, including most NATO 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 Global Warming.

Figure 2: VARIOUS TYPES OF PRODUCTS PRODUCED BY SRB

SRB is licensed by the Canadian Nuclear Safety Commission under Nuclear Substance Processing Facility Operating Licence number NSPFOL-13.00/2015[21] for the purpose of manufacturing gaseous tritium light sources.

The requirements for such a license are described in the General Nuclear Safety and Control Regulations [22] and the Class 1 Nuclear Facility Regulations [23]. In particular, Section 3(k) of the Class 1 Nuclear Facilities Regulations requires that every application for a license 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.

SRB's Preliminary Decommissioning Plan has been prepared in accordance with the requirements of the Nuclear Safety and Control Act and the CNSC's Regulatory Guide G-219[24] "*Decommissioning Planning for Licensed Activities*". The goal of this Preliminary Decommissioning Plan is to establish feasible decommissioning envelopes that can be accomplished with low risk to the health and safety of the decommissioning personnel, the public, and the environment. In addition, the Preliminary Decommissioning Plan must propose financial guarantees in accordance with the CNSC Preliminary Decommissioning Plan Regulatory Guide G-206[25] "*Financial Guarantees for the Decommissioning of Licensed Activities, G-206*".

This Preliminary Decommissioning Plan, in accordance with CNSC Regulatory Guide G-219[24] "*Decommissioning Planning for Licensed Activities*", specifically section 6.1.2, includes the following:

1. a brief description of, and diagram showing, the various areas, components and structures to be decommissioned;
2. an overview of the principal radiological, chemical and physical conditions predicted to exist at the end of operations;
3. a discussion of the general types of hazards, associated with the above conditions, that could be encountered during decommissioning;
4. identification of any features of the surrounding natural and social environment that could be significantly affected by the decommissioning process;
5. a statement of, and rationale for, the preferred strategic approach to decommissioning within each planning envelope;
6. a statement of the final end-state objectives in each planning envelope;
7. a description of the main decommissioning work packages envisioned in each planning envelope; including for each work package:
    a. the general technical approach;
    b. any principal hazards anticipated;
    c. the general strategy(ies) for ensuring the protection of decommissioning workers, the public and the environment; and
    d. the approximate type, quantity and disposition of wastes arising.
8. a conceptual schedule showing the approximate duration and sequencing of work packages;
9. reasonably conservative cost estimates (based on the work packages) for labour, materials, equipment, waste management, environmental assessment, monitoring, and administration (e.g., training, safety, licensing, project management, government and public liaison);
10. the proposed financial guarantee arrangements; and

11. a description of the facility operational records that will be maintained for the purpose of both periodically updating the preliminary plan, and preparing the detailed decommissioning plan.

The development of this Preliminary Decommissioning Plan is based on the advice provided in Canadian Nuclear Safety Commission Regulatory Guide G-219[24] and in Annex A of Canadian Standards Association document CSA N294-09[26].

3. SCOPE

This document describes the preliminary plan for the decommissioning of the SRB 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 License 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 this Plan. The Plan will be reviewed

- Every five years, and
- Following any substantive remodeling of the facility or modification of the operations carried out within the facility, and revised as necessary.

This Preliminary Decommissioning Plan is intended for the purposes described in the introduction only and will be used as the basis for developing the Detailed Decommissioning Plan. A Detailed Decommissioning Plan will be prepared prior to the permanent shutdown of the facility and submitted to the Canadian Nuclear Safety Commission (and any other appropriate regulatory agency) in support of an application for a License to Decommission.

4. GEOGRAPHIC DESCRIPTION

4.1. Location

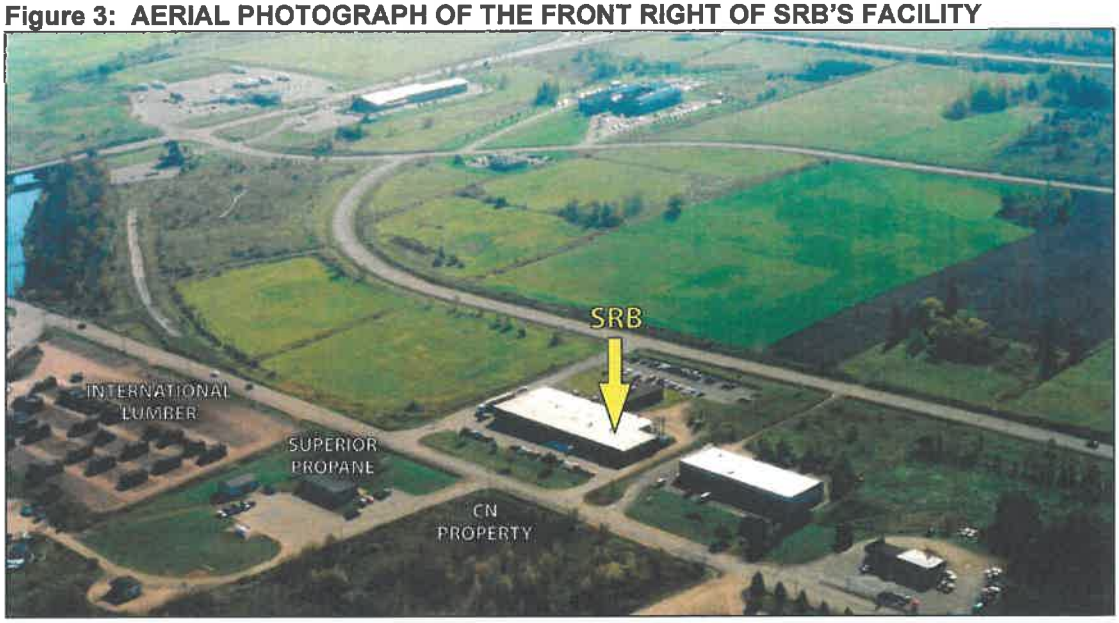
SRB is situated at 320-140 Boundary Road, Pembroke, Ontario. Pembroke is located approximately 150 km northwest of Ottawa on the south shore of the Ottawa River at the mouth of the Muskrat River. The Muskrat River runs from south to north past Boundary Road approximately 500 meters to the east of SRB and eventually discharges in the Ottawa River.

The SRB facility is located in an industrial park in the southern part of the city of Pembroke near the intersection of Boundary Road and Bennett Street (refer to Figure 5 for a map of Pembroke). Boundary Road is lined mostly with industrial and commercial facilities from Bennett Street east to Paul Martin Drive. To the west of Bennett Street is a mix of industrial, commercial and residential land. To the south of SRB (between International Street and the

Trans-Canada Highway) is undeveloped land that is proposed for development as an industrial park. To the north of SRB the land ranges from industrial to commercial to residential land the farther away you get from the facility.

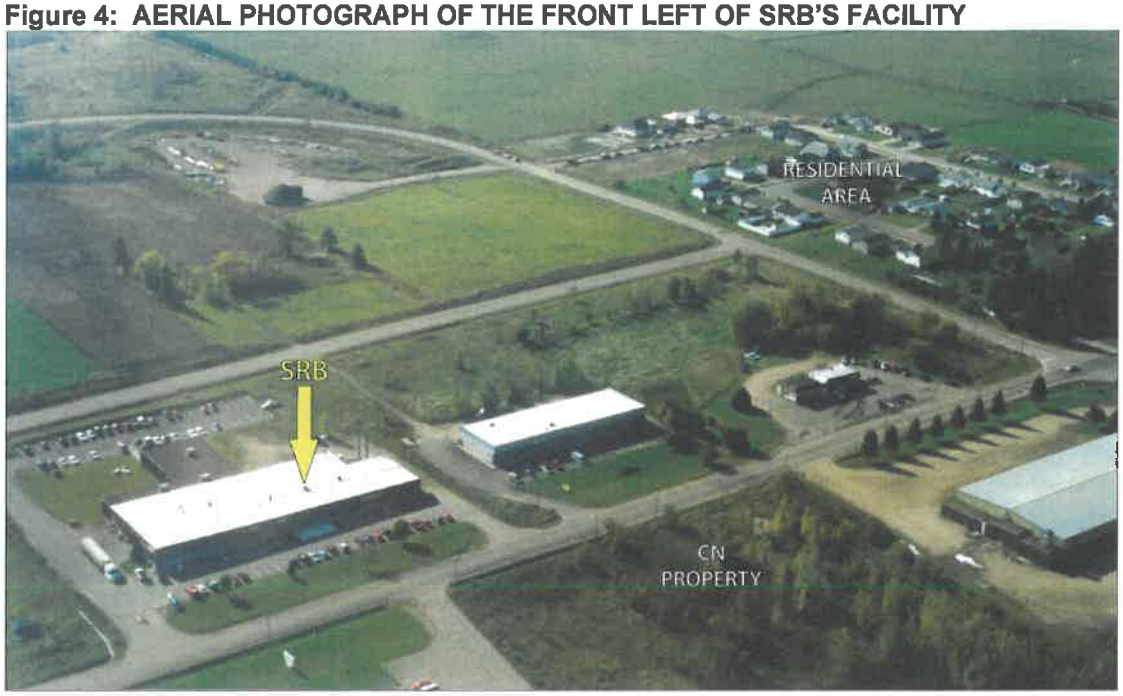
The SRB facility is housed in a three-unit Butler Building complex. Two other industrial buildings are located within 100-200 meters to the north and to the west. The Pembroke and Area Community Center is located to the northeast. The closest residences to the SRB facility are located in a small residential area to the southwest of the intersection of Bennett Street and Boundary Road. The closest residences are approximately 240 meters to the west and north-west of the SRB facility. The SRB facility is situated on high ground relative to the main part of the city of Pembroke. The surrounding buildings are at approximately the same physical height as the facility. Currently, the underdeveloped land surrounding the facility is cleared of trees.

Figure 3: AERIAL PHOTOGRAPH OF THE FRONT RIGHT OF SRB'S FACILITY



The Township of Laurentian Valley is located in the area south of the Trans-Canada Highway and east and west of the city of Pembroke's boundaries. The land in those areas is mainly used for agricultural and rural purposes.

Figure 4: AERIAL PHOTOGRAPH OF THE FRONT LEFT OF SRB'S FACILITY



4.2 Environment

The population of Pembroke is approximately 16,200 people. SRB is situated between the Muskrat River, the Indian River, and the Ottawa River. The topography of the area shows sloping towards the three rivers; therefore, the direction of groundwater flow is towards these rivers. The most common fish found in the Ottawa River is walleye, followed by channel catfish and lake sturgeon. Walleye, pike, smallmouth bass, and rock bass yellow perch are some of the fish found in the Indian River. The Muskrat River is home to walleye, sturgeon, small and large mount bass, pike, etc. The Mud Lake Wetland is located about 9 km south-east of SRB and is about 783 hectares. Many species breed at the Wetland including river otter, marsh wren, northern harrier, northern pintail, and osprey. In terms of fauna, there are many deer in the area; however, the closest significant deer habitat is located approximately 9 km away from the SRB facility. Grasses, shrubs, and individual trees typical in urban, commercial and residential land development make up the vegetation of Pembroke. Most of the agricultural crops in the area consist of pasture, corn, and some market garden vegetables. Across the Trans-Canada Highway there are several dairy cattle farms. The closest one is the Saar Dairy Farm.

Further description can be found in the Canadian Environmental Assessment Agency (CEAA) document[27] based on the SRB facility that was produced in November 2000 by the CNSC and the Safety Analysis Report[28] produced by SRB in 2006.

Figure 5: MAP OF PEMBROKE

5. FACILITY DESCRIPTION

SRB is located in a Butler Building complex owned by 898702 Ontario Inc. of Pembroke, Ontario. The Butler Building complex is comprised of a steel frame with a metal and block exterior. The superstructure has a ceiling height of approximately 5.2 metres at the highest point. The best available information indicates that no asbestos, lead paint or other hazardous materials were used in the construction of the building.

The building is divided into three parts that are separated by cinderblock walls. SRB occupies the end unit at the north-western end of the building. At the present time, the other tenants of the building are:

- Med-Eng (formerly Allen-Vanguard), which manufactures Personal Protective Equipment to protect against blast, fragmentation, impact, heat and chemical/biological Agents; and
- Linde Canada (formerly BOC Edwards), which supplies a full range of liquid and compressed industrial and specialty gases, welding, cutting and scientific equipment, and safety products and accessories.

5.1. Facility Layout

A floor plan of the portion of the building occupied by SRB is shown Figure 6.

The SRB facility has a footprint of 1,186 m^2 . The interior areas of the facility are divided into three separate radiological Zones. The Zones are defined in the SRB Technologies (Canada) Inc. Radiation Safety Program [29] and briefly described in sections 5.1.1, 5.1.2 and 5.1.3 of this document.

5.1.1. Zone 1

Zone 1 consists of offices, hallways, lunchroom, glass shop, coating room, shipping and the storage area. Zone 1, is the largest zoned area in the facility with an area of 878 m^2. The ground floor area of this zone is approximately 650 m^2. The remaining area is that of the second floor mezzanine. Staff access to Zone 1 is unrestricted. The possibility of tritium contamination in Zone 1 is considered very remote.

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 the results are recorded. See typical results in **Appendix A**.

5.1.2. Zone 2

Zone 2 consists of the assembly room and silk screening room. The floor area of Zone 2 is approximately 180 m^2. All Zone 2 areas are approximately 3 metres in height and have gyproc ceilings. Staff access to Zone 2 areas is controlled. Minimum Personal Protective Equipment (PPE) for entry to Zone 2 is lab coat, shoe covers and safety glasses.

The possibility of tritium contamination is remote but possible due to the potential for breakage when handling filled gaseous tritium light sources (GTLS).

The administrative control limit for tritium contamination in Zone 2 is 4 Bq/cm^2 averaged over an area of 100 cm^2. Routine swipe samples are taken in Zone 2 every other day and the results are recorded. See typical results in **Appendix A**.

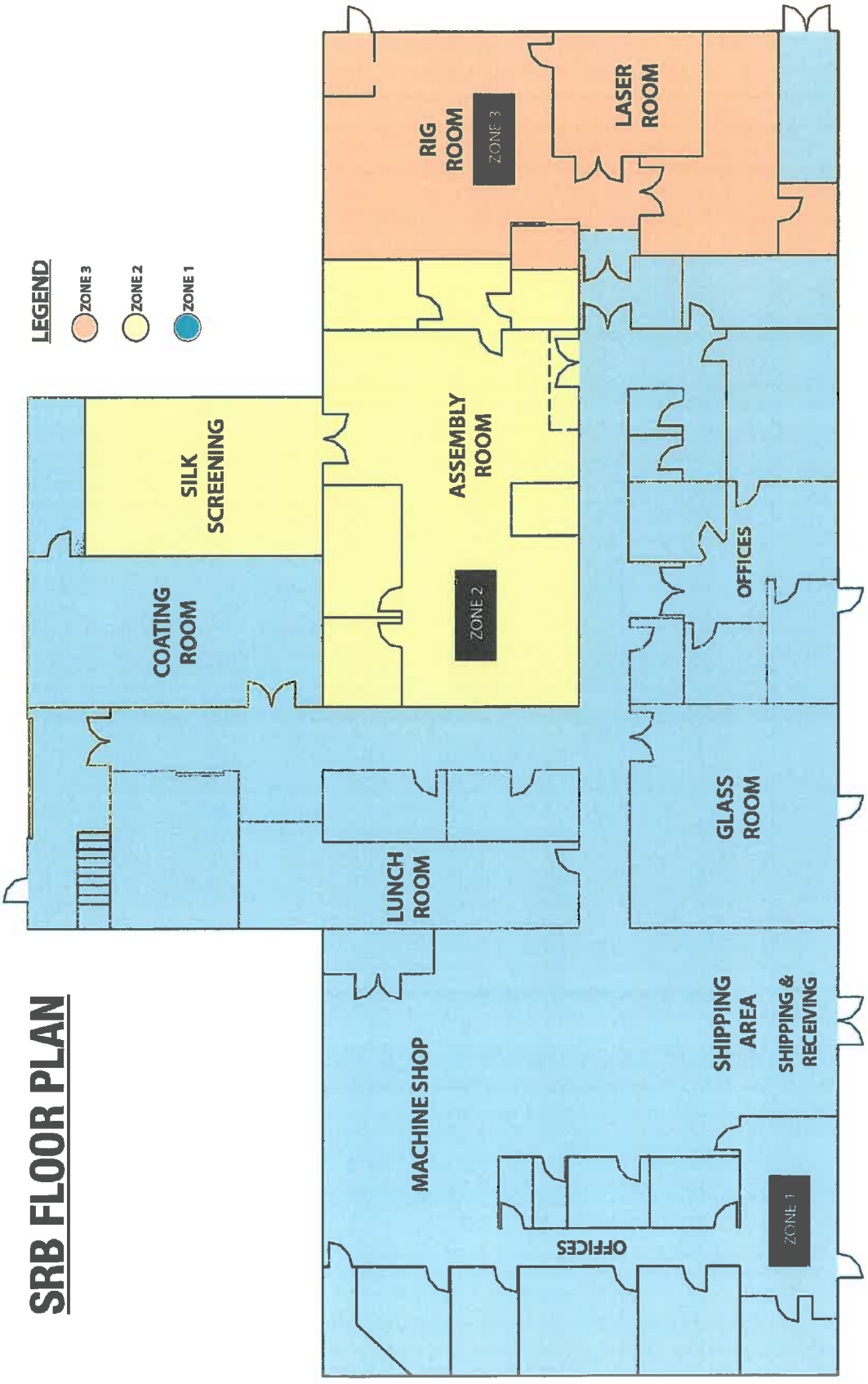
5.1.3. Zone 3

Zone 3 consists of the Rig Room, Laser Room, Tritium Lab (which includes the fume hoods, Bulk Splitter and Store Room. The floor area of Zone 3 is approximately 128 m^2.

Staff access to Zone 3 areas is controlled. 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. Minimum Personal Protective Equipment (PPE) for entry to Zone 3 is lab coat, shoe covers, safety glasses and gloves.

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 day of operation and results are recorded. Tritium in air concentrations are continuously monitored and recorded. See typical results in **Appendix A**.

Figure 6: SRB TECHNOLOGIES (CANADA) INC. FLOOR PLAN



5.2. Facility Equipment

The list of equipment located in Zones 1, 2 and 3 is detailed in **Appendix B**, List of Facility Equipment.

5.3. Radioactive And Hazardous Materials

This section describes the radioactive and hazardous materials that are currently stored within the SRB facility.

5.3.1. Radioactive Material

5.3.1.1. Tritium

Tritium gas is used to fill Gaseous Tritium Light Sources (GTLS). The Nuclear Substance Processing Facility Operating License[21] issued by the CNSC currently authorizes SRB to possess a maximum of 6,000 TBq of tritium at any time. During the five years of operation the tritium inventory has typically varied between 3,000 and 6,000 TBq and it has averaged 5,097 TBq. This quantity of tritium represents the typical amount on site at any one time. The tritium in the facility is generally contained in:

- Gaseous Tritium Light Sources (GTLS);
- Pyrophoric Uranium Tritium Traps (PUTTs); and/or
- Type B Package G.E. Healthcare 3605D.

5.3.1.2. Depleted Uranium

Depleted uranium is used in getter beds called 'Pyrophoric Uranium Tritium Traps' (PUTTs) that are used during the manufacturing process.

The inventory of depleted uranium on site typically ranges between 6 and 7 Kg, with approximately 3 to 4 kg in getter beds and the remainder in storage for use in PUTTs that will be manufactured at a later date.

The depleted uranium is obtained from Cameco Corp. in Port Hope, Ontario and stored in the Tritium Laboratory. All transfers of depleted uranium from the facility are reported to the CNSC.

5.3.1.3. Sealed Sources

Sealed sources are used as internal standards in the two Liquid Scintillation Counters. Each of the two Wallac 1409 Liquid Scintillation Counters has a 740kBq Eu-152 sealed source. External sources (sealed vials containing known tritium activities) are used to calibrate the Liquid Scintillation Counters.

5.3.2. Hazardous Material

Limited amounts of hazardous materials are used in various procedures within the SRB facility and these hazardous materials are listed in Table 1.

Table 1: Hazardous Materials Typically Used at SRB

Product	Quantity	Disposal
Acetone	40 L	Hazardous Waste Facility
LSC Cocktail	10 L	Hazardous Waste Facility
Propane	10 L	Returned to Supplier
Phosphoric Acid	2 L	Hazardous Waste Facility
Argon	100 L	Returned to Supplier
Oxygen	75 lbs	Returned to Supplier
Liquid Nitrogen	500 L	Returned to Supplier
Epoxy Thinner and Primer	7 L	Hazardous Waste Facility
Chloroform	4L	Hazardous Waste Facility
Epoxy Paint	4 L	Hazardous Waste Facility
Hydrofluoric Acid	4 L	Hazardous Waste Facility
Methyl Hydrate	8 L	Hazardous Waste Facility
Orthophosphoric Acid	1 L	Hazardous Waste Facility
Poly Thinner	20 L	Hazardous Waste Facility
Diethyl Ether	4 L	Hazardous Waste Facility
Poly Stripper and Thinner	25 L	Hazardous Waste Facility
Screen Printing Inks	50 L	Hazardous Waste Facility
Ethylene glycol	1 L	Hazardous Waste Facility
Ethanediol	4 L	Hazardous Waste Facility
Tensol-70	10 L	Hazardous Waste Facility
Trichloroethylene	4 L	Hazardous Waste Facility

6. DECOMMISSIONING STRATEGY

6.1. End State Objective

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

6.2. Strategy For The Decommissioning

A 'Prompt Removal' strategy will be adopted for the decommissioning of the nuclear material at SRB. In this approach, decommissioning begins immediately after the shutdown of the facility and continues, without interruption, until the decommissioning is complete.

Neither 'Deferred Removal' nor 'In-situ Confinement' is a practical decommissioning strategy for this facility:

- 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 confinement is not practical since the facility is housed in a leased building that must eventually be returned to the owner in a condition that permits the re-use or redevelopment of the property.

6.3. Planning Assumptions

Decommissioning of the SRB 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;
- Inventories of radioactive, hazardous and other materials will be reduced in the three month period preceding shutdown, any remaining inventory of these materials will be dispositioned in the first month following shutdown;
- The decommissioning work will only commence following CNSC issuance of a Licence to Decommission.
- 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 Canadian Nuclear Safety Commission;

- At the conclusion of the decommissioning, the CNSC will grant 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

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

After the decision to decommission is made, SRB 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 (6) 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 four main phases.
These are as follows:

1. Operating/Decommissioning Planning Phase;
2. Safe Shutdown Phase;
3. Decommissioning Phase; and
4. End State Phase

The 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 SRB management team. However, the activities as listed in the Safe Shutdown, Decommissioning and End State Phases could be implemented by either the SRB management team and/or a qualified third party.

The decommissioning cost estimate provided in this document is based upon a worst case scenario, where the termination of activities is due to unexpected events and all activities listed from line item 4-27 assume completion by a qualified third party. The funds allocated in the Financial Guarantee 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	√																	
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 Scoping Surveys: contamination assessments, core sampling													√					
8.	Sample Analysis (in house and 3rd party analysis)													√	√				
9.	Revision of Public Involvement Program													√					
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 Environmental Assessment Determination **(1 day estimated)**														√				
14.	CNSC Review of Decommissioning Licence Application and associated program review (including EA under the NSCA) **(40 days estimated)**													√	√				
15.	CNSC Licensing 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

The activities listed from 7.2.1 – 7.2.3 are operational activities that would be the first to be implemented following SRB's decision to cease production and prepare for decommissioning. It is SRB'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.

7.2.1 SRB commits to the provision of a minimum notice of 12 months when it has been decided to cease production activities and to prepare to decommission the SRB facility.

7.2.2 Once that decision has been made by SRB 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.

7.3. Safe Shutdown Phase

Safe Shutdown Phase (SSP) is the period where SRB has stopped sign production and is no longer receiving, nor processing tritium gas. In this phase all program reviews and licence applications are prepared to support a decommissioning licence.

7.3.1. SRB 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.

Pyrophoric Uranium Tritium Traps (PUTT)s 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.

7.3.4. Initial scoping surveys will be initiated to collect data to assist in the development of the detailed decommissioning plan. These surveys will include extensive contamination assessments following a Multi-Agency Radiation Site Survey Investigation Manual (MARSSIM)[31] approach to numbers and locations. These

scoping 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 Involvement Program will be based on the advice provided in the Canadian Nuclear Safety Commission Regulatory Guide G-217[30] titled "*Licensee Public Information Programs*". The purpose of this program is to allow the target audience to participate and be informed regarding decisions related to the decommissioning of SRB. The target audience for SRB includes, but is not limited to, the general public of the surrounding community, interested stakeholders, and local media.

The Public Involvement Program will include both information and consultation opportunities. In accordance with the Class I Nuclear Facilities Regulations[23], the surrounding community will be informed of the probable effects on the environment and health and safety of the people as a result of the decommissioning of the facility. The Public Involvement Program will be designed to involve a broad cross-section of the target audience using methods that will meet the needs of the participants and the objectives of SRB. The program will identify issues and concerns; provide opportunities for public involvement; ensure all input was considered in decommissioning planning and/or in the environmental assessment; and, include proper documentation of the process and results.

7.3.7. The SRB Radiation Protection Program[29] will be reviewed to ensure alignment of program requirements and the activities proposed in the Detailed Decommissioning Plan (DDP).

7.3.8. A DDP will be developed, supported by the results of the initial scoping survey. The information obtained during the initial scoping 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 the Regulatory Guide G-219[24] titled "*Decommissioning Planning for Licensed Activities*".

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 License to Decommission will be prepared in accordance with the regulations outlined in sections 3 and 7 of the Class I Nuclear Facilities

Regulations[23]. 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.

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. SRB 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

Decommissioning Phase describes the steps and activities to be taken to permanently retire the SRB 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 all of the zoned areas.

7.4.2. Decommissioning of the outside wells involves the removal of the well casings by a qualified third party contractor[17]. Air handling units will be decommissioned as part of the final decommissioning planning envelope.

7.4.3. Soil assessments will be conducted as part of the final clearance survey. See typical results in **Appendix C**, all results are below the Unconditional Clearance level of 100 Bg/g.

7.4.4. Radioactive waste shall be packaged and prepared for transport in accordance with applicable regulations (PTNS Regulations and Transport Canada). 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 Multi-Agency Radiation Site Survey and Investigation Manual (MARSSIM)[31] 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

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 Commission Member Document (CMD).

7.5.4. Licence to Abandon is approved.

Upon expiry of the Licence to Abandon, possession of the leased premises will be returned to the owner for future commercial or industrial use or redevelopment.

8. DECOMMISSIONING PLANNING ENVELOPES AND WORK PACKAGES

8.1. Overview

In order to adequately facilitate the SRB facility decommissioning requirements (as laid out by the CNSC), 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 SRB in the development of the planning envelopes and work packages within each envelope.

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.

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 The Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM)[31] guidelines. In this particular reference Classification is defined as "the process by which an area or survey unit is described according to radiological characteristics." The MARSSIM[31] describes areas with some potential for residual contamination as impacted areas.

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

- 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:

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

- 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:

    1. locations where radioactive materials were present in an unsealed form;
    2. potentially contaminated transport routes;

3. areas downwind from stack release points;
4. upper walls and ceilings of buildings or rooms subjected to airborne radioactivity;
5. areas handling low concentrations of radioactive materials; and
6. areas on the perimeter of former contamination control areas.

- 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:

  1. buffer zones around Class 1 or Class 2 areas, and
  2. 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[31] 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 SRB'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 & 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 3: Safe Shutdown Phase Planning Envelope

Planning Envelope	Work Package	Details
1	1. Notification to customers	7.3.1
1	2. Final shipment of all remaining product to customers	7.3.2
1	3. Removal of current inventory of nuclear waste	7.3.3
1	4. Removal of current inventory of hazardous materials	7.3.3
1	5. Complete facility scoping surveys	7.3.4
1	6. Sample analysis and environmental monitoring	7.3.5
1	7. Update Public Involvement Program	7.3.6
1	8. Prepare Detailed Decommissioning Plan	7.3.8
1	9. Mobilization	7.3.13

Table 4: 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. Decommissioning of Outside Test Wells (31)	15.1

8.3 Radiological Clearance Levels

SRB Technologies Licence Limits, Action Levels and Administrative Limits[32] 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 administrative limit will be adopted as the Radiological Clearance Level. All swipe samples will be averaged over 100 cm^2.

Table 5: Radiological Clearance Levels

Zone	Surface	Administrative Surface Contamination Limits
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	Radiological Clearance Levels for Decommissioning Activities
All zones	All surfaces	4.0 Bq/cm^2

Operating experience and historical data demonstrates that this clearance level can be achieved.

8.4 Principal Hazards Anticipated

Tritium is the only radiological hazard to be encountered during decommissioning activities at the SRB facility. In addition conventional, chemical, electrical, fire and security hazards will also be assessed in the development of each work package.

8.5 Health, Safety and Security

Health, Safety and Security program components will be considered in the development of the Detailed Decommissioning Plan.

8.5.1. Health

All workers involved in the decommissioning activities will be monitored for exposure to ionizing radiation in accordance with the existing SRB Radiation Safety Program[29] requirements.

SRB will maintain the Dosimetry License[33] required to perform bioassay measurements for decommissioning workers until the decommissioning is complete. The radiological exposure limits will be established as equivalent to those of a Nuclear Energy Worker (NEW) and all third party personnel involved with the decommissioning of the facility will classified as NEWs.

The administrative action level of 1.0 mSv/quarter year and bioassay action level of 1,000 Bq/ml for any period will be adopted for all personnel involved in the decommissioning activities.

8.5.1.1. Quality Assurance

SRB has implemented a Liquid Scintillation Quality Assurance Program[34] in accordance with the requirements of an ISO 9001 Quality Assurance system. SRB is currently certified under the ISO 9001 Quality Assurance system. During decommissioning, this Liquid Scintillation Quality Assurance Program[34] will remain in effect.

8.5.2. Safety

Work will be performed in accordance with the requirements of the Occupational Health and Safety Regulations and applicable CNSC Regulations. The SRB Radiation Safety Program[29] requirements will be reviewed for use during decommissioning. Any additional policies and procedures that may be required will be developed prior to decommissioning.

Engineering controls, safe work procedures and personal protective equipment will be used to protect workers from occupational safety hazards.

8.5.3. Security

During decommissioning, SRB will continue to maintain the security of the facility in accordance with the existing Facility Security Program[35]. The existing security arrangement will continue until modified or terminated by agreement with the CNSC.

8.6. Environmental Protection

SRB environmental monitoring procedures as documented in the SRB Environment Monitoring Program[36] will be followed during the decommissioning phase and will continue until monitoring is no longer required.

Stack emission action levels as specified in SRBT Licence Limits, Action Levels and Administrative Limits[32] will be adopted for all decommissioning activities.

Table 6: Stack Emission Weekly Action Levels

Nuclear Substance and Form	Weekly Action Level (GBq)
Tritium as tritium oxide (HTO)	840
Total tritium as HTO and tritium gas (HT)	7,753

8.7. Waste Management

All wastes will be prepared for shipment (packaged, labeled and surveyed for external contamination if necessary). Waste material that meets regulatory clearance levels will be handled and packaged appropriately, and sent to a recycling facility or municipal landfill. Waste that does not meet regulatory clearance levels will be properly packaged and shipped to a licensed radioactive waste handling facility such as Atomic Energy of Canada Limited.

All reasonable efforts will be made to:

- Recover as much material as possible for reuse or recycling;
- Minimize the volume of waste that is generated; and
- Avoid generating mixed wastes (wastes that contain both radioactive and hazardous materials).

8.7.1. Radioactive Waste

Radioactive wastes will include any materials that exceed the clearance levels and therefore cannot be cleared for release. The clearance levels will be those specified in the detailed decommissioning plan. They will be those prescribed by the Regulations applicable at the time of the decommissioning or established with the approval of the CNSC.

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.

8.7.2. Hazardous Waste

Hazardous wastes will include any materials defined as hazardous by the provincial 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 at 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.

8.7.3. 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, moulding 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 'Decontamination and Dismantling' work. These materials will be sent to an authorized facility for recycling.

8.7.4. Demolition Waste

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

8.8. Planning Envelope/Work Package Details

Decommissioning work activities will be conducted by a qualified third party contractor. The contractor will be required to follow the Detailed Decommissioning Plan, following its approval by the CNSC.

Each planning envelope and work package will address conditions identified in the Regulatory Guide G-219[24], identified below:

- 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 of 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, public and the environment
    - type, quantity and disposition of wastes generated
    - duration
    - cost

9. PLANNING ENVELOPE 1: SAFE SHUTDOWN PHASE

9.1. Work Package 1: Notification to Customers

Following the decision to decommission the facility SRB customers will be notified of this decision. The current process allows customers to return expired signs to SRB for dismantling and disposal. The purpose of the customer notification is to give the customers sufficient time to return any expired signs to SRB 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 7: Cost Summary Planning Envelope 1, Work Package 1

Activity	Quantity	Unit Cost ($)	Total
Notification to customers Person-day effort	20	200.00	$4,000.00
Total			**$4,000.00**

9.2. Work Package 2: Final Shipment of Remaining Product

Following the decision to decommission the facility SRB 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 this cost does not need to be 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 8: Cost Summary Planning Envelope 1, Work Package 2

Activity	Quantity	Unit Cost ($)	Total
Prepare and Ship Current Inventory Person-day effort	40	200.00	$8,000.00
Total			**$8,000.00**

9.3. Work Package 3: Removal of Radioactive Waste

A review of SRB's recent radioactive waste inventory determined that the maximum number of drums of waste (205 L) on hand at any time has not exceeded eight (8). This radioactive waste mainly consists of expired signs, tube stubs, and zone 3 waste. This volume of waste is less than 2 m^3. All waste is properly packaged, labelled and shipped to AECL Chalk River Laboratories for storage and disposal.

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 9: Cost Summary Planning Envelope 1, Work Package 3

Activity	Quantity	Unit Cost ($)	Total
Radioactive Waste	2 m^3	17,000.00	$34,000.00
Soil	0.25 m^3	1,000.00	$1,000.00
Prepare and Ship Radioactive Waste Person-day effort	10	200.00	$2,000.00
Total			**$37,000.00**

9.4. Work Package 4: Removal of Inventory of Hazardous Waste

Table 1, Section 5.3.2 identifies the hazardous materials currently in inventory at SRB. All of these materials can either be returned to supplier (gas cylinders) or disposed of at the 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

There are no direct costs associated with the disposal of hazardous waste but the costs listed here include packaging and transport of the hazardous waste.

Table 10: Cost Summary Planning Envelope 1, Work Package 4

Activity	Quantity	Unit Cost ($)	Total
Hazardous Waste	Current Inventory	500.00	$500.00
Prepare and Ship Hazardous Waste Person-day effort	10	200.00	$2,000.00
Total			**$2,500.00**

9.5. Work Package 5: Scoping Surveys

Scoping 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[31] approach to location and number of samples collected.

9.5.1. Duration

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

9.5.2. Cost

Table 11: Cost Summary Planning Envelope 1, Work Package 5

Activity	Quantity	Unit Cost ($)	Total
Scoping Surveys Person-day effort	5	1,200.00	$6,000.00
Core sampling[17]	16	50.00	$800.00
Core sample analysis[17]	16	125.00	$2,000.00
Core sample shipping[17]	16	25.00	$400.00
Total			**$9,200.00**

9.6. Work Package 6: Sample Analysis & Environmental Monitoring

Sample analysis describes the time allocated to analyze the contamination samples collected during the scoping 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 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 12: Cost Summary Planning Envelope 1, Work Package 6

Activity	Quantity	Unit Cost ($)	Total
Sample Analysis Person-day effort	2	1,200.00	$2,400.00
Environmental monitoring Person-day effort	5	1,200.00	$6,000.00
Total			**$8,400.00**

9.7. Work Package 7: Update Public Involvement Program

SRB has an established Public Involvement Program. The target audience for this program includes, but is not limited to, the general public of the surrounding community, interested stakeholders, and local media.

The Public Involvement Program will be updated prior to the commencement of decommissioning activities, ensuring that the target audience is fully informed of the planned decommissioning activities and has the opportunity for input. The program will allow for timely updates on the progress and status of the decommissioning activities.

9.7.1. Duration

Two person-days of effort are anticipated for the initial review and revision to 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 13: Cost Summary Planning Envelope 1, Work Package 7

Activity	Quantity	Unit Cost ($)	Total
Public Involvement Program Person-day effort	8	800.00	$6,400.00
Total			**$6,400.00**

9.8. Work Package 8: Prepare Detailed Decommissioning Plan

A detailed decommissioning plan is described "*as a plan setting out the detailed work program, safety and environmental protection procedures, and management systems will be followed in the decommissioning of a licensed activity/facility. Detailed decommissioning plans should evolve from the preliminary decommissioning plan.*"[24]

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 the CNSC Regulatory Guide G-219[24], "*Decommissioning Planning for Licensed Activities*".

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 14: Cost Summary Planning Envelope 1, Work Package 8

Activity	Quantity	Unit Cost ($)	Total
Detailed Decommissioning Plan Person-day effort	8	1,600.00	$12,800.00
Total			**$12,800.00**

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 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
- Ordering approved shipping containers for radioactive waste

9.9.1. Duration

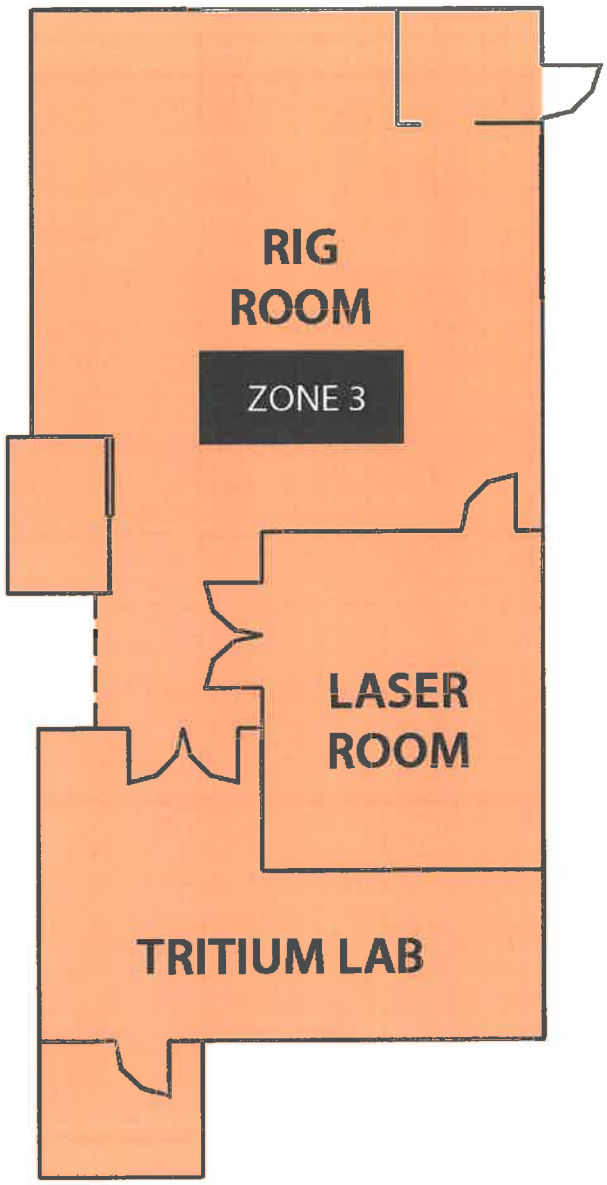
Three person-days of effort are estimated to complete this work package.

9.9.2. Cost

Table 15: Cost Summary Planning Envelope 1, Work Package 9

Activity	Quantity	Unit Cost ($)	Total
Mobilization Person-day effort	3	1,200.00	$3,600.00
Total			**$3,600.00**

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 components:

- Bulk Splitter and Fume Hood
- Secondary Fume Hood
- Tritium Reclaim Rig (not in service)
- Storage Room (Depleted Uranium PUTTs)

10.1.2. Principal Radiological, Chemical and Physical Conditions During Decommissioning

10.1.2.1. Bulk Splitter

1. Tritium is the only radiological hazard present in the Bulk Splitter. Tritium gas will be drawn down from the volumetric cylinders to the PUTTs. Residual tritium contamination may be present in the internal components.
2. There are no chemical hazards associated with this unit.
3. Electrical power supply will be disconnected.
4. There are no other physical or industrial hazards associated with the Bulk Splitter.

10.1.2.2. Secondary Fume Hood

1. Low levels of residual tritium contamination may be present on the interior of the fume hood structure.
2. There are no chemical hazards associated with this unit.
3. Electrical power supply will be disconnected.
4. There are no other physical or industrial hazards associated with this fume hood.

10.1.2.3. Tritium Reclaim Rig

1. Tritium is the only radiological hazard present in the reclaim rig. This rig has been out of service for approximately 10 years. Residual tritium contamination may be present in the internal components.
2. There are no chemical hazards associated with this unit.
3. Electrical power supply will be disconnected.
4. There are no other physical or industrial hazards associated with the Reclaim Rig.

10.1.2.4. Storage Room

1. All expired gaseous tritium light sources will be removed from this room. Low potential exists for tritium contamination in this room. Depleted uranium PUTTs stored in this area will be disposed of as radioactive waste. Low potential exists for DU contamination.
2. There are no chemical hazards associated with this room.
3. There is no electrical hazard associated with the assessment of this room.
4. There are no other physical or industrial hazards associated with this room.

10.1.3. Principal Radiological, Chemical and Physical Conditions After Decommissioning

10.1.3.1. Bulk Splitter

1. Bulk Splitter will have been properly dismantled, packaged and shipped to a licenced waste management facility for disposal. Therefore no radiological hazards will exist after decommissioning.
2. There will be no chemical hazards present after decommissioning.
3. Electrical power supply will be disconnected.
4. There are no other physical or industrial hazards associated with the Bulk Splitter.

10.1.3.2. Secondary Fume Hood

1. Secondary fume hood will be dismantled, decontaminated, packaged and shipped for disposal.
2. There will be no chemical hazards present after decommissioning.
3. Electrical power supply will be disconnected.
4. There are no other physical or industrial hazards associated with this fume hood.

10.1.3.3. Tritium Reclaim Rig

1. The Tritium Reclaim Rig will have been properly dismantled, packaged and shipped to a licenced waste management facility for disposal. Therefore no radiological hazards will exist after decommissioning.
2. There will be no chemical hazards present after decommissioning.
3. Electrical power supply will be disconnected.
4. There are no other physical or industrial hazards associated with the Tritium Reclaim Rig.

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.

10.1.6. Technical Approach to Decommissioning

The Bulk Splitter and the Tritium Reclaim 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 and therefore identified as "N/A" in the applicable tables.

Appendix A lists routine contamination survey results for equipment and materials in all zoned areas. Contamination clearance levels are seldom exceeded and operating experience has demonstrated that items exceeding contamination clearance levels can be easily decontaminated.

Surveys will include indirect measurements (swipe) and direct measurements for fixed and removable tritium activity using a portable survey instrument (Tyne Engineering Surface Activity Monitor, Model 7001) that works on any flat, conducting surface.

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 Personal Protective Equipment (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.
- Action levels for decommissioning activities shall be established.

10.1.8. Type, Quantity and Disposition of Wastes Generated

Table 16: Waste Summary Planning Envelope 2, Work Package 1

Component or Item	Volume (m^3)	Disposition
Bulk Splitter header, tubing, cylinders	0.03	Radioactive Waste
Bulk Splitter fume hood structure	N/A	Non-radioactive Waste
Secondary fume hood structure	N/A	Non-radioactive Waste
Reclaim rig gas cylinders	0.03	Radioactive Waste
Reclaim rig assembly	0.12	Radioactive Waste
DU PUTTS	0.02	Radioactive Waste
Reclaim rig scroll pump	0.03	Radioactive Waste
Reclaim rig fume hood materials	0.12	Radioactive Waste
Work Package Total Volume	**0.35**	**Radioactive Waste**

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 17: Cost Summary Planning Envelope 2, Work Package 1

Activity	Quantity	Unit Cost ($)	Total
Radioactive Waste Disposal	0.49 m^3	17,000.00	$8,330.00
Prepare and Ship Radioactive Waste Person-day effort	5	1,200.00	$6,000.00
Work Package Cost			**$14,330.00**

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 three (3) separate laser cutting units, used to cut tritium gas light tubes. These laser units are contained within a fume hood connected to active exhaust. In addition there is a stainless steel work station connected to active exhaust and one metal storage cabinet which is also connected to the active exhaust system.

10.2.2. Principal Radiological, Chemical and Physical Conditions During Decommissioning

1. Tritium contamination is the only radiological hazard anticipated in the Laser Room. Based on previous experience, it is anticipated that the pressurized cutting chambers are likely to be contaminated to such an extent that decontamination is not practical while the other components can be decontaminated for release.
2. There are no chemical hazards associated with this unit.
3. Electrical power supply will be disconnected.
4. Pressurized air supply to the lasers will be disconnected.
5. There are no other physical or industrial hazards associated with the Laser Room.

10.2.3. Principal Radiological, Chemical and Physical Conditions After Decommissioning

1. The laser cutters will have been properly dismantled, packaged and shipped to a licenced waste management facility for disposal. Therefore no radiological hazards will exist after decommissioning.
2. There will be no chemical hazards present after decommissioning.
3. Electrical power supply will be disconnected.
4. There are no other physical or industrial hazards associated with the Laser Room.

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.

10.2.6. Technical Approach to Decommissioning

The laser cutters, work stations and the storage cabinet will be dismantled. Based on operating experience, the laser cutting heads 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.

Appendix A lists routine contamination survey results for equipment and materials in all zoned areas. Contamination clearance levels are seldom exceeded and operating experience has demonstrated that items exceeding contamination clearance levels can be easily decontaminated.

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.

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 Personal Protective Equipment (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.
- Action levels for decommissioning activities shall be established.

10.2.8. Type, Quantity and Disposition of Wastes Generated

Table 18: Waste Summary Planning Envelope 2, Work Package 2

Component or Item	Volume (m^3)	Disposition
Laser cutting heads (3)	0.12	Radioactive Waste
Laser cutter containment structure	N/A	Non-radioactive Waste
Stainless steel work station	N/A	Non-radioactive Waste
Metal storage cabinet	N/A	Non-radioactive Waste
Work Package Total Volume	**0.12**	**Radioactive Waste**

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 19: Cost Summary Planning Envelope 2, Work Package 2

Activity	Quantity	Unit Cost ($)	Total
Rad waste disposal	0.12 m^3	17,000.00	$2,040.00
Person-day effort	2	1,200.00	$2,400.00
Work Package Cost			**$4,440.00**

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 and consists of the following components:

- 8 separate tritium gas fill heads installed in 4 separate rigs, and scroll pumps
- 1 glass tube crusher
- 1 fume hood bank comprised of 3 separate stations: muffle, wash and glass crusher fume hoods
- 2 self-contained drying ovens (non-active use only)

10.3.2. Principal Radiological, Chemical and Physical Conditions During Decommissioning

10.3.2.1. Tritium Fill Rigs

1. Tritium is the only radiological hazard present in the rigs. Tritium gas **will** be drawn down from the fill heads to the PUTTs. Residual tritium contamination may be present in the internal components. Tritium contamination may be encountered on the rig structure surface areas during disassembly.
2. Liquid Nitrogen supply will be disconnected. There are no other chemical hazards associated with this unit.
3. Electrical power supply will be disconnected.
4. There are no other physical or industrial hazards associated with the Tritium Fill Rigs.

10.3.2.2. Glass Tube Crusher

1. Residual tritium contamination may be present in the internal components.
2. There are no chemical hazards associated with this unit.
3. Electrical power supply will be disconnected.
4. There are no other physical or industrial hazards associated with the glass tube crusher.

10.3.2.3. Fume Hood Bank

1. Residual tritium contamination may be present on the interior surfaces.
2. There are no chemical hazards associated with this unit.
3. Electrical power supply will be disconnected.
4. There are no other physical or industrial hazards associated with the fume hood bank.

10.3.2.4. Drying Ovens

1. There is no radiological hazard associated with the drying ovens. The ovens are used to dry new glass tubes before they are attached to the gas fill heads.
2. There are no chemical hazards associated with this unit.
3. Electrical power supply will be disconnected.
4. There are no other physical or industrial hazards associated with the drying ovens.

10.3.3. Principal Radiological, Chemical and Physical Conditions After Decommissioning

10.3.3.1 Tritium Fill Rigs

1. Eight tritium gas fill heads will have been properly disconnected and capped, packaged and shipped to a licenced waste management facility for disposal. Scroll pumps will have been disconnected and packaged for radioactive disposal and shipped. Rig structures will have been disassembled and decontaminated as required; therefore no radiological hazards will exist after decommissioning.
2. There will be no chemical hazards present after decommissioning.
3. Electrical power supply will be disconnected.
4. There are no other physical or industrial hazards associated with the Tritium Fill Rigs.

10.3.3.2 Glass Tube Crusher

1. The Glass Tube Crusher will have been properly dismantled, packaged and shipped to a licenced waste management facility for disposal. Therefore no radiological hazards will exist after decommissioning.
2. There will be no chemical hazards present after decommissioning.
3. Electrical power supply will be disconnected.
4. There are no other physical or industrial hazards associated with the Glass Tube Crusher.

10.3.3.3 Fume Hood Bank

1. The fume hoods will be dismantled, decontaminated, packaged and shipped for disposal.
2. There will be no chemical hazards present after decommissioning.
3. Electrical power supply will be disconnected.
4. There are no other physical or industrial hazards associated with this fume hood bank.

10.3.3.4 Drying Ovens

1. There is no radiological hazard associated with the drying ovens. The ovens are used to dry new glass tubes before they are attached to the gas fill heads.
2. There are no chemical hazards associated with this unit.
3. Electrical power supply will be disconnected.
4. There are no other physical or industrial hazards associated with the drying ovens.

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.

10.3.6. Technical Approach to Decommissioning

The Tritium Fill Rigs and the Glass Tube Crusher will be dismantled. Based on operating experience, the scroll pumps, stainless steel tubing, fittings and valves from the Tritium Fill Rigs and Glass Tube Crusher 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 disassembled, decontaminated and surveyed to confirm that they meet regulatory clearance levels.

Appendix A lists routine contamination survey results for equipment and materials in all zoned areas. Contamination clearance levels are seldom exceeded and operating experience has demonstrated that items exceeding contamination clearance levels can be easily decontaminated.

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.

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 Personal Protective Equipment (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.
- Action levels for decommissioning activities shall be established.

10.3.8. Type, Quantity and Disposition of Wastes Generated

Table 20: Waste Summary Planning Envelope 2, Work Package 3

Component or Item	Volume (m^3)	Disposition
8 fill heads, scroll pumps	0.50	Radioactive Waste
Glass tube crusher	0.10	Radioactive Waste
Fume hood contaminated components	0.15	Radioactive Waste
Drying Ovens	N/A	Non-radioactive Waste
Work Package Total Volume	**0.75**	**Radioactive Waste**

10.3.9. Duration

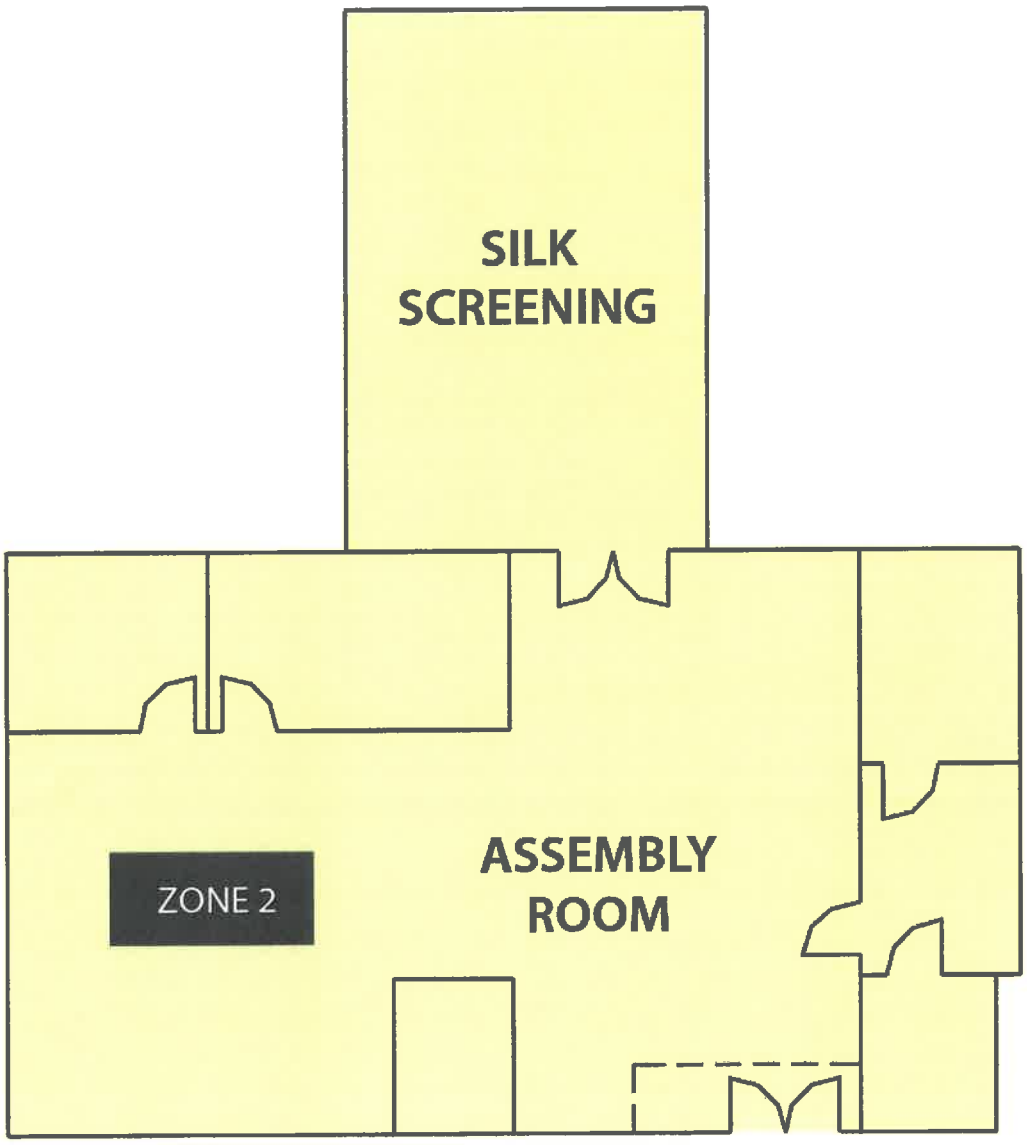
18 person-days of effort are estimated for this work package. This effort includes radiological assessments, dismantling, decontamination and packaging activities.

10.3.10. Estimated Cost

Table 21: Cost Summary Planning Envelope 2, Work Package 3

Activity	Quantity	Unit Cost ($)	Total
Rad waste disposal	0.75 m^3	17,000.00	$12,750.00
Purchase 8 Type A drums	8	125.00	$1,000.00
Transportation costs	1	450.00	$450.00
Person-day effort	18	1,200.00	$21,600.00
Work Package Cost			**$35,800.00**

11. PLANNING ENVELOPE 3: ZONE 2 WORK AREAS



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 Room	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

11.1.2.1 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.

11.1.2.2 Any chemical/hazardous materials will have been transferred to a Hazardous Waste Facility, if required.

11.1.2.3 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

11.1.3.1. There will be no radiological hazards remaining in this area after decommissioning.

11.1.3.2. There will be no chemical hazards remaining in this area after decommissioning.

11.1.3.3. The Assembly 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.

Once the area is cleared of equipment and furniture a MARSSIM[31] 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 NEWs.
- A bioassay program shall be established for the decommissioning contractor personnel.
- Ongoing contamination assessments shall be carried out in the work areas.
- Normal Zone 3 Personal Protective Equipment (PPE) shall be the minimum requirement (lab coat, booties, safety glasses and gloves) and upgraded should monitored conditions require enhanced levels of protection.
- Real-time stack monitoring shall continue to operate.
- Action levels for decommissioning activities shall be established.

11.1.8. Type, Quantity and Disposition of Wastes Generated

Table 22: Waste Summary Planning Envelope 3, Work Package 1

Component or Item	Volume (m^3)	Disposition
Stack monitoring piping & tubing	0.03	Radioactive Waste
Metal shelving	N/A	Non-radioactive Waste
Work tables	N/A	Non-radioactive Waste
Chairs, cabinets	N/A	Non-radioactive Waste
Work Package Total Volume	**0.03**	**Radioactive Waste**

11.1.9. Duration

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

11.1.10. Estimated Cost

Table 23: Cost Summary Planning Envelope 3, Work Package 1

Activity	Quantity	Unit Cost ($)	Total
Rad waste disposal	0.03 m^3	17,000.00	$510.00
Person-day effort	4	1,200.00	$4,800.00
Work Package Cost			**$5,310.00**

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 speciality light frames are built and painted before the installation of GTLS tubes. No radioactive materials are routinely handled in this room. The room does contain numerous metal drying racks and work tables that will require clearance surveys and dismantling.

11.2.2. Principal Radiological, Chemical and Physical Conditions During Decommissioning

11.2.2.1. There exists limited potential for tritium contamination in this area because no radioactive materials are routinely handled or stored in this area.

11.2.2.2. Any chemical/hazardous materials, including paint products, will have been transferred to a Hazardous Waste Facility, if required.

11.2.2.3. 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

11.2.3.1. There will be no radiological hazards remaining in this area after decommissioning.

11.2.3.2. There will be no chemical hazards remaining in this area after decommissioning.

11.2.3.3. The Silk Screening Room will be cleared of all work tables, 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 equipment, shelving, work tables and any 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.

Once the area is cleared of equipment and furniture a MARSSIM[31] based radiological clearance survey will be completed of the walls and floors to ensure that clearance levels are met.

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 3 Personal Protective Equipment (PPE) shall be the minimum requirement (lab coat, booties, safety glasses and gloves) and upgraded should monitored conditions require enhanced levels of protection.
- Real-time stack monitoring shall continue to operate.
- Action levels for decommissioning activities shall be established.

11.2.8. Type, Quantity and Disposition of Wastes Generated

Table 24: Waste Summary Planning Envelope 3, Work Package 2

Component or Item	Volume (m^3)	Disposition
Metal shelving	N/A	Non-radioactive Waste
Work tables	N/A	Non-radioactive Waste
Chairs, cabinets	N/A	Non-radioactive Waste

The items as listed are of value and are re-usable and will be donated, therefore no disposition costs are incurred.

11.2.9. Duration

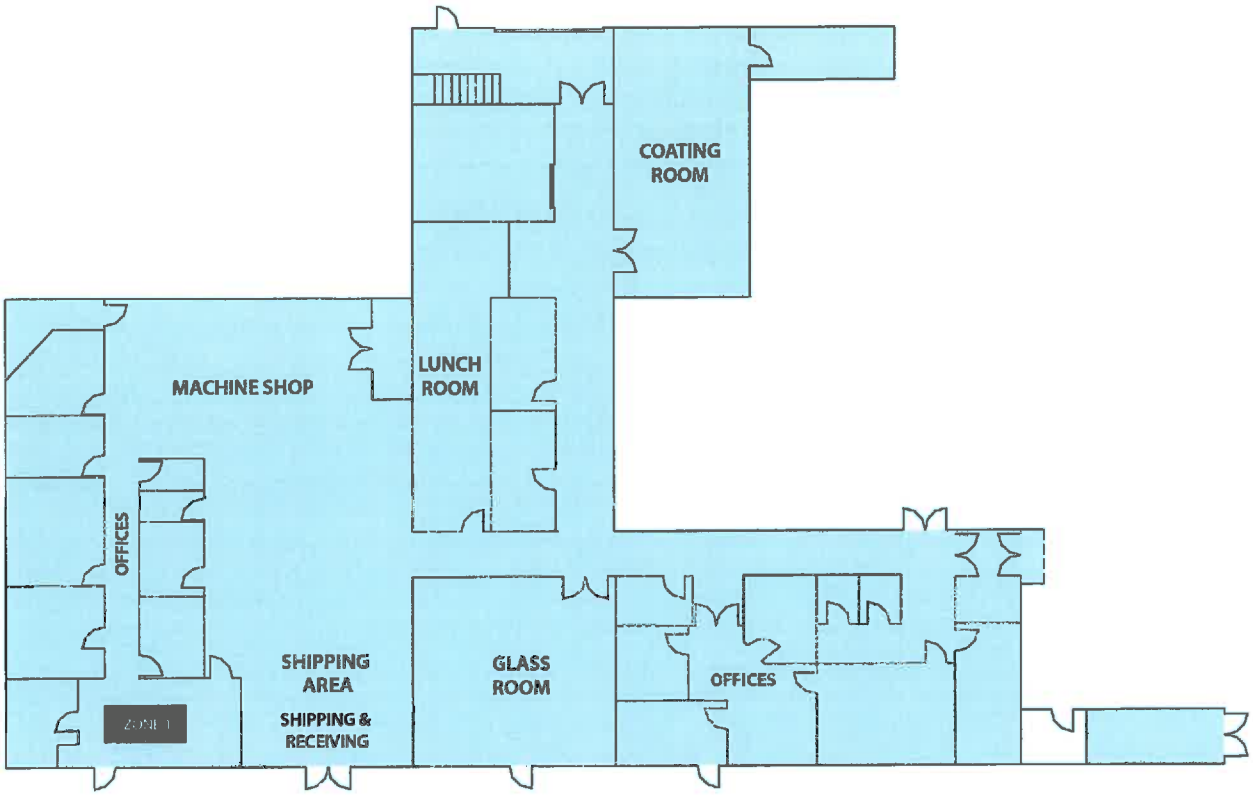
2 person-days of effort are estimated for this work package. This effort includes radiological assessments, dismantling and removal.

11.2.10. Estimated Cost

Table 25: Cost Summary Planning Envelope 3, Work Package 2

Activity	Quantity	Unit Cost ($)	Total
Person-day effort	2	1,200.00	$2,400.00

12. PLANNING ENVELOPE 4: ZONE 1 WORK AREAS



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	650	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

12.1.2.1. The potential for tritium contamination in this Zone is extremely low. GTLS tubes handled in this area are all packaged items ready for shipment.

12.1.2.2. Any chemical/hazardous materials will have been transferred to a Hazardous Waste Facility, if required.

12.1.2.3. 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

12.1.3.1. There will be no radiological hazards remaining in this area after decommissioning.

12.1.3.2. There will be no chemical hazards remaining in this area after decommissioning.

12.1.3.3. The Zone 1 Area will be cleared of all work stations, furniture, shelving and other associated components. The rooms 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 area 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.

Once the area is cleared of equipment and furniture a MARSSIM[31] 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 NEWs.
- A bioassay program shall be established for the decommissioning contractor personnel.
- Ongoing contamination assessments shall be carried out in the work areas.
- Real-time stack monitoring shall continue to operate.
- Action levels for decommissioning activities shall be established.

12.1.8. Type, Quantity and Disposition of Wastes Generated

Table 26: Waste Summary Planning Envelope 4, Work Package 1

Component or Item	Volume (m^3)	Disposition
Metal shelving	N/A	Non-radioactive Waste
Work tables	N/A	Non-radioactive Waste
Chairs, cabinets	N/A	Non-radioactive Waste

The items as listed are of value and are re-usable and will be donated therefore no disposition costs are incurred.

12.1.9. Duration

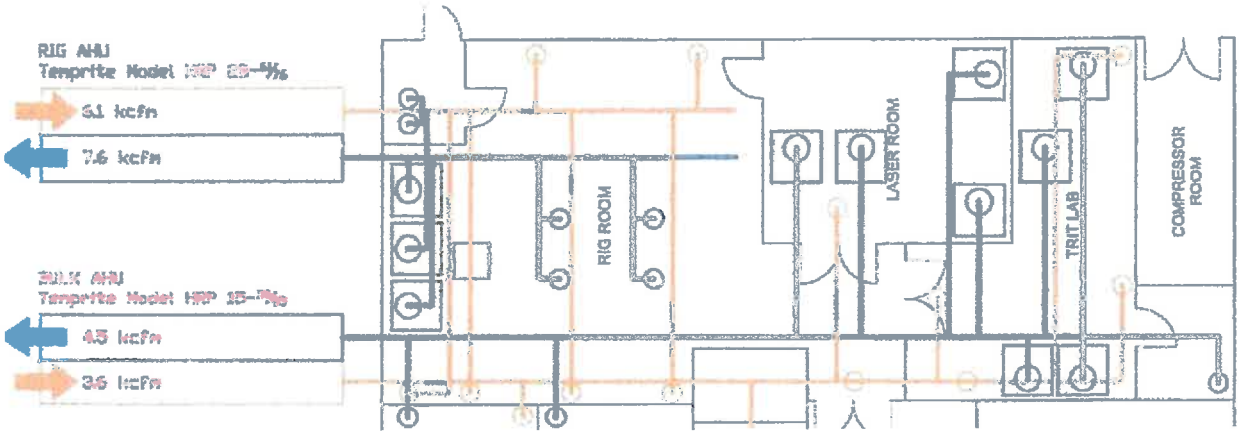
10 person-days of effort are estimated for this work package. This effort includes radiological assessments, dismantling and removal of all equipment and furniture.

12.1.10. Estimated Cost

Table 27: Cost Summary Planning Envelope 4, Work Package 1

Activity	Quantity	Unit Cost ($)	Total
Person-day effort	10	1,200.00	$12,000.00
Work Package Cost			**$12,000.00**

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 System consists of two separate series of ductwork. The Bulk Air Handling Unit (located outside the facility) supplies and exhausts the Tritium Lab, Laser Room, Storage Room and the two fume hoods adjacent to the Zone 2 Assembly Room.

The Rig Air Handling Unit (located outside the facility) is a dedicated supply and exhaust system to the tritium gas fill rigs located in the Zone 3 Rig Room.

Decommissioning of the Air Handling Units is a separate planning envelope (Planning Envelope 6).

The ductwork is a combination of round, flexible metal ductwork and sheet metal rectangular ductwork. All ductwork is located above a false ceiling and the ceilings will be removed to facilitate the removal.

Removal of all ductwork should begin from the furthest downstream location. The respective air handling units shall continue to operate during the removal of the associated ductwork.

Removal of ventilation ductwork will only commence after the removal of all other equipment in Zone 3.

13.1.2. Principal Radiological, Chemical and Physical Conditions During Decommissioning

13.1.2.1. Residual tritium contamination will be present on the interior surfaces of the ductwork.

13.1.2.2. Any chemical/hazardous materials will have been transferred to a Hazardous Waste Facility, if required.

13.1.2.3. There are no electrical or pressurized systems in this area that require disconnecting or depressurizing to facilitate decommissioning activities.

13.1.2.4. Working at height safety practices should be considered for this activity.

13.1.3. Principal Radiological, Chemical and Physical Conditions After Decommissioning

13.1.3.1. There will be no radiological hazards remaining in this area after decommissioning.

13.1.3.2. There will be no chemical hazards remaining in this area after decommissioning.

13.1.3.3. Following removal of the ductwork the Zone 3 rooms the 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 rooms 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 free release these materials. Characterization surveys will be completed to determine the total package activity. This information is required for radioactive waste acceptance at a licensed radioactive waste facility. 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.

Volume reduction practices will be employed, where practicable.

Once the area is cleared of all ductwork a MARSSIM[31] 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 Personal Protective Equipment (PPE) enhanced levels of protection, including respiratory protection is recommended. Radiological conditions measured at the time of removal should be the determining factor.
- Contamination control practices shall be employed during removal.
- Real-time stack monitoring shall continue to operate.
- Action levels for decommissioning activities shall be established.

13.1.8. Type, Quantity and Disposition of Wastes Generated

The ventilation ductwork is light gauge sheet metal. The bulk air handling exhaust header and associated runs are rectangular. The dimensions for the bulk header and runs are: 6,300 cm (total length) x 8 cm x 4 cm.

The rig air handling exhaust header and associated runs are also rectangular. The dimensions for the rig room header and runs are: 1,800 cm (total length) x 8 cm x 6.4 cm.

Volume reduction techniques will be applied to these headers and associated runs.

Table 28: Waste Summary Planning Envelope 5, Work Package 1

Component or Item	Volume (m^3)	Disposition
Bulk header and runs (compacted)	1.0	Radioactive Waste
Rig room header and runs (compacted)	0.4	Radioactive Waste
Flex runs (compacted)	0.1	Radioactive Waste
Work Package Total Volume	**1.5**	**Radioactive Waste**

13.1.9. Duration

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

13.1.10. Estimated Cost

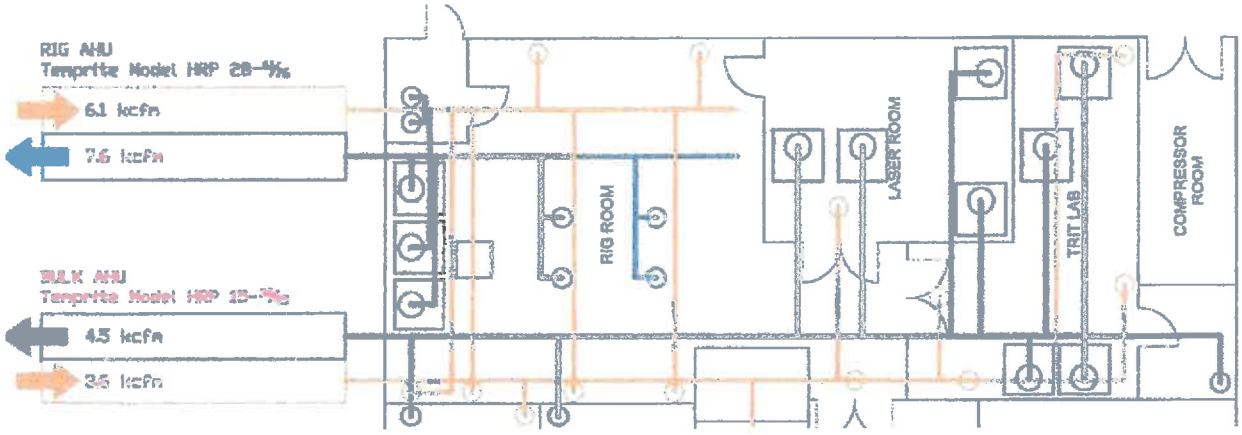
Table 29: Cost Summary Planning Envelope 5, Work Package 1

Activity	Quantity	Unit Cost ($)	Total
Rad waste disposal	1.5 m^3	17,000.00	25,500.00
Person-day effort	10	1,200.00	12,000.00
Work Package Subtotal			**$37,500.00**

Equipment/Transport	Quantity	Unit Cost ($)	Total
Purchase Type A B-25	1	3,750.00	$3,750.00
Equipment Total			**$3,750.00**

Work Package Total			**$41,250.00**

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

There are two separate air handling units and two separate stacks located outside the facility in a fenced enclosure.

The Bulk Air Handling Unit and stack (located outside the facility) supplies and exhausts the Tritium Lab, Laser Room, Storage Room and the two fume hoods adjacent to the Zone 2 Assembly Room.

The Rig Air Handling Unit and stack (located outside the facility) supplies and exhausts the tritium gas fill rigs located in the Zone 3 Rig Room.

14.1.2. Principal Radiological, Chemical and Physical Conditions During Decommissioning

14.1.2.1. Residual tritium contamination will be present on the interior surfaces of the air handling units and stacks.

14.1.2.2. Any chemical/hazardous materials will have been transferred to a Hazardous Waste Facility, if required.

14.1.2.3. The electrical power supply to the air handling units will be disconnected prior to decommissioning activities.

14.1.2.4. Working at height safety practices will be employed for this activity, including training and qualifications for operating the hoisting equipment.

14.1.3. Principal Radiological, Chemical and Physical Conditions After Decommissioning

14.1.3.1. There will be no radiological hazards remaining in this area after decommissioning.

14.1.3.2. There will be no chemical hazards remaining in this area after decommissioning.

14.1.3.3. Following removal of the air handling units and stacks the 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 its release 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 free release these materials. Characterization surveys will be completed to determine the total package activity. This information is required for radioactive waste acceptance at a licensed radioactive waste facility. 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.

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.
- Contamination control practices shall be employed during removal.

- Fire protection practices will be employed during cutting activities.
- Hoisting, cutting and other equipment used in this work package will be operated by qualified personnel only.

14.1.8. Type, Quantity and Disposition of Wastes Generated

The stacks are light gauge sheet metal. Each stack is approximately 6 m in height and 20 cm in diameter.

The Bulk Air Handling Unit has an estimated mass of 2,200 kg (4,800 pounds). The Rig Air Handling Unit has an estimated mass of 3,000 kg (6,600 pounds).

Physical dimensions of the air handling units are approximately 4.2 metres in length, 1.5 metres in height and 2.5 metres in width. Engineered lifting lugs are attached to each unit.

The composition of these units (steel) and the estimated total radiological activity facilitates the disposition of these units at a licensed metal melt facility operated by Energy Solutions. This facility has accepted and processed millions of pounds of radioactive waste generated at licensed facilities in Canada. Preliminary discussions have confirmed that this waste satisfies the waste acceptance criteria for this facility.

Table 30: Waste Summary Planning Envelope 6, Work Package

Component or Item	Mass (lbs)	Disposition
Bulk air handling unit	4,800	Radioactive Waste
Rig air handling unit	6,600	Radioactive Waste
Stacks	500	Radioactive Waste
Work Package Total Volume	**11,900**	**Radioactive Waste**

14.1.9. Duration

4 person-days of effort are estimated for this work package. This effort includes radiological assessments, dismantling, hoisting and packaging activities.

14.1.10. Estimated Cost

Table 31: Cost Summary Planning Envelope 6, Work Package 1

Activity	Quantity	Unit Cost ($)	Total
Rad waste disposal	11,900	4.00	47,600.00
Person-day effort	4	1,200.00	4,800.00
Work Package Subtotal			**$52,400.00**

Equipment/Transport	Quantity	Unit Cost ($)	Total
Crane Rental	1	1,000.00	1,000.00
Geni-boom (stack)	1	550.00	550.00
Transportation	1	8,000.00	8,000.00
Equipment Total			**$9,550.00**

Work Package Total			**$61,950.00**

15. PLANNING ENVELOPE 7: DECOMMISSIONING OF OUTSIDE TEST WELLS (31)

15.1. WORK PACKAGE 1: REMOVAL OF 31 OUTSIDE TEST WELLS

15.1.1. Description of Areas and Components to be Decommissioned

There are 31 separate drilled wells, with casings, located on the grounds surrounding the facility. These wells are used for routine environmental monitoring purposes.

They will be removed by a qualified 3rd party contractor[17].

15.1.2. Principal Radiological, Chemical and Physical Conditions During Decommissioning

15.1.2.1. There are no radioactive hazards associated with this activity.

15.1.2.2. There are no chemical hazards associated with this activity.

15.1.2.3. There is no electrical or other physical hazard associated with this activity.

15.1.3. Principal Radiological, Chemical and Physical Conditions After Decommissioning

15.1.3.1. There will be no radiological hazards remaining in this area after decommissioning.

15.1.3.2. There will be no chemical hazards remaining in this area after decommissioning.

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 its release from any further regulatory control by the CNSC.

15.1.6. Technical Approach to Decommissioning

This work package will be completed by a qualified well drilling contractor who has the experience and equipment to perform this activity.

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

The only waste generated will be carbon steel well casings that can be recycled.

15.1.9. Duration

A qualified contractor has provided an estimate based on per unit removal.

15.1.10. Estimated Cost

Table 32: Cost Summary Planning Envelope 7, Work Package 1

Activity	Quantity	Unit Cost ($)	Total
Well removal	31	150.00	$4,650.00
Work Package Cost			**$4,650.00**

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 and Dismantling' and 'Waste Management' work is complete. The final radiological survey will apply MARSSIM[31] methodology in the procedures that will be described in the Detailed Decommissioning Plan. 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 SRB 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 redevelopment.

18. DECOMMISSIONING REPORT

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

- All decommissioning work that was completed under the Detailed Decommissioning Plan 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 Decommissioning 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 License 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 the Environmental Assessment[27] performed by the CNSC in November 2000. The Environmental Assessment[27] included the environmental effects of the project, including those that may occur from malfunctions or accidents at the facility, and from the future decommissioning of the plant. The CNSC concluded that the decommissioning and subsequent release of the site for other use is not likely to cause significant adverse environmental effects.

20.2. SOCIO-ECONOMIC

There is expected, however, 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 employment due to the loss of operations and employment at the facility

20.3. WASTE

Currently, the SRB facility disposes of non-hazardous waste at the local municipal landfill. The waste disposed of at that site may include: cardboard, paper, gloves, cleaning material, and plastic components. No significant impacts are expected to occur from the non-hazardous waste due to decommissioning. SRB will dispose of hazardous and radioactive waste at a licensed waste management facility. Therefore, no adverse environmental impacts are expected.

It is planned that all hazardous wastes will be removed prior to decommissioning.

21. DOCUMENTATION

SRB will maintain the following documents for use in the development of the detailed decommissioning plan:

- Design descriptions of the custom built Filling Rigs, Laser Cutting Systems, Reclaim Rig and Bulk Splitter;
- Results of the routine radiation survey and environmental monitoring programs;
- Details of any spills of hazardous materials or releases of radioactive materials that may have occurred over the operating life of the facility.

22. DECOMMISSIONING COST ESTIMATE

The facility and the equipment used in the facility have remained relatively unchanged in comparison to what was described in the previous version of the Preliminary Decommissioning Plan[1] which was issued in 2006. No significant pieces of equipment have been purchased but a few have been disposed of.

A thorough review of the activities that were described in the previous version of the Preliminary Decommissioning Plan[1] which was issued in 2006 was conducted which confirmed that these activities continue to be accurate and represent the activities that would have to be performed should the facility be decommissioned in the future.

It should be noted that conservatism is introduced in the estimates that were used in 2006 as operations have improved significantly in the last 6 years:

- The possession limit has since been reduced from 11,000 TBq in 2006 to 6,000 TBq in 2012 (reduction of 45%);
- Total emissions have reduced from 5.48 TBq per week in 2006 to 0.58 TBq per week in 2012 (reduction of 89%);
- Average dose to staff have reduced from 0.30 mSv in 2006 to 0.11 mSv in 2012 (reduction of 63%).

All of the activities have been revised for this Preliminary Decommissioning Plan and their costs are current at the time of the PDP development.

Table 33: Cost To Achieve End State

SAFE SHUTDOWN PHASE			
DESCRIPTION OR ACTIVITY	**TOTAL**	**CONTINGENCY (%)**	**TOTAL WITH CONTINGENCY**
Cessation of accepting old signs: notification	$4,000.00	25	$5,000.00
Final shipment of remaining signs to customers	$8,000.00	25	$10,000.00
Removal of Nuclear Substances	$37,000.00	25	$46,250.00
Removal of Hazardous Substances	$2,500.00	25	$3,125.00
Scoping Surveys	$9,200.00	25	$11,500.00
Sample Analysis & Environmental Monitoring	$8,400.00	25	$10,500.00
Public Involvement Program	$6,400.00	25	$8,000.00
Detailed Decommissioning Plan	$12,800.00	25	$16,000.00
Mobilization	$3,600.00	25	$4,500.00
Running Costs (3 months)	$46,071.00	10	$50,678.10
SAFE SHUTDOWN PHASE COSTS	**$137,971.00**		**$165,553.10**

DECOMMISSIONING PHASE			
DESCRIPTION OR ACTIVITY	**TOTAL**	**CONTINGENCY (%)**	**TOTAL WITH CONTINGENCY**
Disassembly and decontamination	$66,000.00	25	$82,500.00
Radioactive disposal costs	$97,730.00	25	$122,162.50
Decommissioning of outside wells	$4,650.00	25	$5,812.50
Equipment, rentals and transportation	$13,750.00	25	$17,187.50
Final Surveys	$12,000.00	25	$15,000.00
Decommissioning Report	$16,000.00	25	$20,000.00
Building Repairs	$5,000.00	25	$6,250.00
Running Costs (3 months)	$46,071.00	10	$50,678.10
TOTAL COSTS DECOMMISSIONING PHASE	**$261,201.00**		**$319,590.60**

CNSC REVIEW AND ASSESSMENT FEES			
DESCRIPTION OR ACTIVITY	**TOTAL**	**CONTINGENCY (%)**	**TOTAL WITH CONTINGENCY**
CNSC EA Determination (1 day)	$1,912.50	25	$2,390.63
Review of Decommissioning Licence Application & associated program review (including EA under the NSCA) (40 days)	$76,500.00	25	$95,625.00
Licensing assessment and decisions process (20 days)	$38,250.00	25	$47,812.50
Review of Decommissioning Final Report (5 days)	$9,562.50	25	$11,953.13
CNSC review of Abandonment Licence Application and CMD development (4 days)	$7,650.00	25	$9,562.50
TOTAL: CNSC FEES	**$133,875.00**		**$167,343.76**

TOTAL COST TO ACHIEVE END STATE	**$652,488.00**

23. FUNDING

CNSC Regulatory Guide G-206 titled "*Financial Guarantees for the Decommissioning of Licensed Activities*"[25] provides guidance regarding the establishment and maintenance of measures to fund the decommissioning of activities licensed by the CNSC.

To be acceptable to the CNSC, a funding measure must provide assurance that adequate resources will be available to fund decommissioning activities based on information provided to the CNSC. The financial guarantee must be at arm's length from the licensee and the CNSC must be assured that it or its agents can, upon demand, access or direct adequate funds if a licensee is not available to fulfil its obligations for decommissioning.

23.1. CURRENT FUNDING

A Financial Guarantee was approved [10] by the Commission for this facility on June 26, 2008 based on the previous revision of the Preliminary Decommissioning Plan[1]. This financial guarantee of **$550,476.00** was funded by installments made to an Escrow account in October and April of each year with the last installment made in April 2014.

The amount of the installments was based on Financial Projections submitted to CNSC Staff. The value of the installments was established such that sufficient funds remained available to operate the facility in a manner that ensures the safety of the staff, public and the environment. An Escrow Agreement [37] and a Financial Security and Access Agreement[38] which have been approved by CNSC Staff provide access to these funds.

23.2. PROPOSED FUNDING

As part of revising the Preliminary Decommissioning Plan SRB further investigated methods for establishing a Financial Guarantee as outlined in Regulatory Guide G-206[25]. This review concluded that the method currently used to fund the Financial Guarantee which was approved[10] by the Commission for this facility in June 26, 2008 continues to be the only available method of funding for SRB. This method is appropriate to our individual situation as allowed in Regulatory Guide G-206[25].

SRB thereby proposes to fund the increase of **$102,012.00** to the revised Financial Guarantee of **$652,488.00** by making six equal installments of **$17,002.00**, in October and April of each year, over a three year period, to the Escrow Account. With the Commission's approval we propose that the first payment towards the revised Financial Guarantee begin in October 2015 with the renewal of the licence effective July 1, 2015.

SRB proposes to continue to use a revised Escrow Agreement and a revised Financial Security and Access Agreement to be approved by CNSC Staff to provide access to these funds.

Licence Conditions Handbook (LCH-SRBT-R000)[39] requires SRB to make payments to the CNSC in accordance with the payment schedule that the Commission has approved and is given in the table 'Annual Fee Adjustment and Financial Guarantee Payment Schedules.

SRB proposes to continue to follow this payment schedule as shown in the table below.

Table 34: Financial Guarantee Payment Schedules

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

23.3. ESCALATION FACTOR PER ANNUM

Historical annual inflationary indexes are typically below the annual accrued interest rate of the Escrow Account.

SRB proposes that all accrued interest in the existing Escrow Account remain in that account and be used to address inflationary indexing.

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] Canadian Nuclear Safety Commission, "Nuclear Substance Processing Facility Operating Licence", NSPFOL-13.00/2015.

[22] Canadian Nuclear Safety Commission, "Nuclear Safety and Control Regulations", May 31, 2000.

[23] Canadian Nuclear Safety Commission, "Class I Nuclear Facility Regulations", May 31, 2000.

[24] Canadian Nuclear Safety Commission, "The Regulatory Guide Decommissioning Planning For Licensed Activities", G-219, June 2000.

[25] Canadian Nuclear Safety Commission, "The Regulatory Standard on Financial Guarantees for the Decommissioning of Licensed Activities, G-206", June 2000.

[26] Canadian Standards Association, "Decommissioning of Facilities Containing Nuclear Substances", N294-09, July 2009.

[27] Canadian Nuclear Safety Commission, Canadian Environmental Assessment Act Screening Report, Operation of SRB Technologies (Canada) Inc., November 2000.

[28] SRB Technologies (Canada) Inc., "Safety Analysis Report", Revision II, dated July 4, 2006.

[29] SRB Technologies (Canada) Inc., "Radiation Safety Program", Revision X, May 25, 2012.

[30] Canadian Nuclear Safety Commission, "Regulatory Guide Licensee Public Information Programs", G-217, January 2004.

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

[32] SRB Technologies (Canada) Inc., "Licence Limits, Action Levels and Administrative Limits (Revision D), May 13, 2014

[33] Canadian Nuclear Safety Commission, "Dosimetry Service Licence", 11341-3-18.0, June 1, 2013.

[34] SRB Technologies (Canada) Inc., "Liquid Scintillation Counting Quality Assurance", LSC-QA, Revision F, November 9, 2010.

[35] SRB Technologies (Canada) Inc., "SRB Technologies (Canada) Inc. Facility Security Program", February 15, 2012.

[36] SRB Technologies (Canada) Inc., "Environment Monitoring Program",

[37] SRB Technologies (Canada) Inc., "Escrow Agreement", Revision 2, January 21, 2009.

[38] SRB Technologies (Canada) Inc., "Financial Security and Access Agreement", Revision 2, January 21, 2009.

[39] Licence Conditions Handbook (LCH-SRBT-R000) "Compliance Framework Document associated to the SRB Technologies (Canada) Inc. Nuclear Substance Processing Facility Operating Licence NSPFOL-13.00/2015" Effective: July 1, 2010

Appendix A
Routine Contamination Survey Results

Zone 1 First Quarter Summary 2014

Zone 1 Swipe Areas	No. of swipes	Average Value	Amount pass	Amount Fail	Average Pass
Lunch Room	11	0.11	11	0	100.00%
LSC Room	11	0.19	11	0	100.00%
Rig Room Ante Rm	11	0.46	11	0	100.00%
Rig Room Barrier	11	1.01	11	0	100.00%
Assembly Rm Barrier	11	0.73	11	0	100.00%
Random Offices	9	0.30	9	0	100.00%
Random Utility Carts	9	0.93	8	1	88.89%
Entrance Cabinet	2	0.01	2	0	100.00%
	75	0.47	74	1	98.67%

Zone 2 First Quarter Summary 2014

Zone 2 Swipe Areas	No. of swipes	Average Value	Amount pass	Amount Fail	Average Pass
Floor at Barrier	32	1.92	29	3	90.63%
Storage Room Floor	32	1.09	31	1	96.88%
WIP Shelving	32	2.06	29	3	90.63%
QA Shelving	32	2.82	28	4	87.50%
Reflector Shelving	32	1.34	30	2	93.75%
Shelving by Window	28	1.25	27	1	96.43%
Work Counters	32	0.39	31	1	96.88%
Counter @ Barrier	32	0.64	32	0	100.00%
Bubbler Fume hood	28	1.54	26	2	92.86%
Random Bins	28	1.42	26	2	92.86%
Inspection Prep counter	32	1.46	28	4	87.50%
Floor @ Assy Barrier	32	0.89	31	1	96.88%
Paint Room Floor	4	0.64	4	0	100.00%
Small Silkscreen	4	0.33	4	0	100.00%
Photometer Area	5	0.59	5	0	100.00%
	385	1.23	361	24	93.77%

Zone 3 First Quarter Summary 2014

Zone 3 Swipe Areas	No. of swipes	Average Value	Amount pass	Amount Fail	Average Pass
Floor @ Barrier	52	14.43	47	5	90.38%
Logbooks @ door	43	8.31	42	1	97.67%
Rig 7 Floor	52	23.03	44	8	84.62%
Rig 7	52	13.29	49	3	94.23%
Rig 1 Floor	52	29.16	46	6	88.46%
Rig 1	52	6.49	51	1	98.08%
Floor @ Rig 6	52	22.19	46	6	88.46%
Rig 6	52	6.40	52	0	100.00%
Floor @ Rig 8	52	25.20	45	7	86.54%
Rig 8	52	5.56	52	0	100.00%
Muffle F/H	52	8.81	51	1	98.08%
Nitrogen Area	43	9.59	42	1	97.67%
Waste Room Floor	43	13.59	42	1	97.67%
Laser Room Floor random	52	14.60	48	4	92.31%
EIP Area	52	5.36	51	1	98.08%
Laser Rm F/H	52	25.87	42	10	80.77%
Tritium Lab Floor random	52	19.32	46	6	88.46%
Shelf at Sink	52	4.20	52	0	100.00%
Disassembly Fume Hood	52	15.15	49	3	94.23%
Disassembly Fume Hood Cabinet	52	5.10	51	1	98.08%
Bulk Fume Hood	52	12.66	50	2	96.15%
Logbooks Tritium Lab	43	6.72	42	1	97.67%
Random Tools	43	25.52	36	7	83.72%
Storage Room Shelves	52	11.06	48	4	92.31%
Photometer Door	9	1.62	9	0	100.00%
Scintillation Table	9	3.43	9	0	100.00%
Waste Room Walls	9	2.52	9	0	100.00%
Handheld Monitors random	9	3.62	9	0	100.00%
Storage Room Floor	9	22.73	7	2	77.78%
	1248	12.60	1167	81	93.51%

Contamination Survey Results: Zone 3 Ventilation

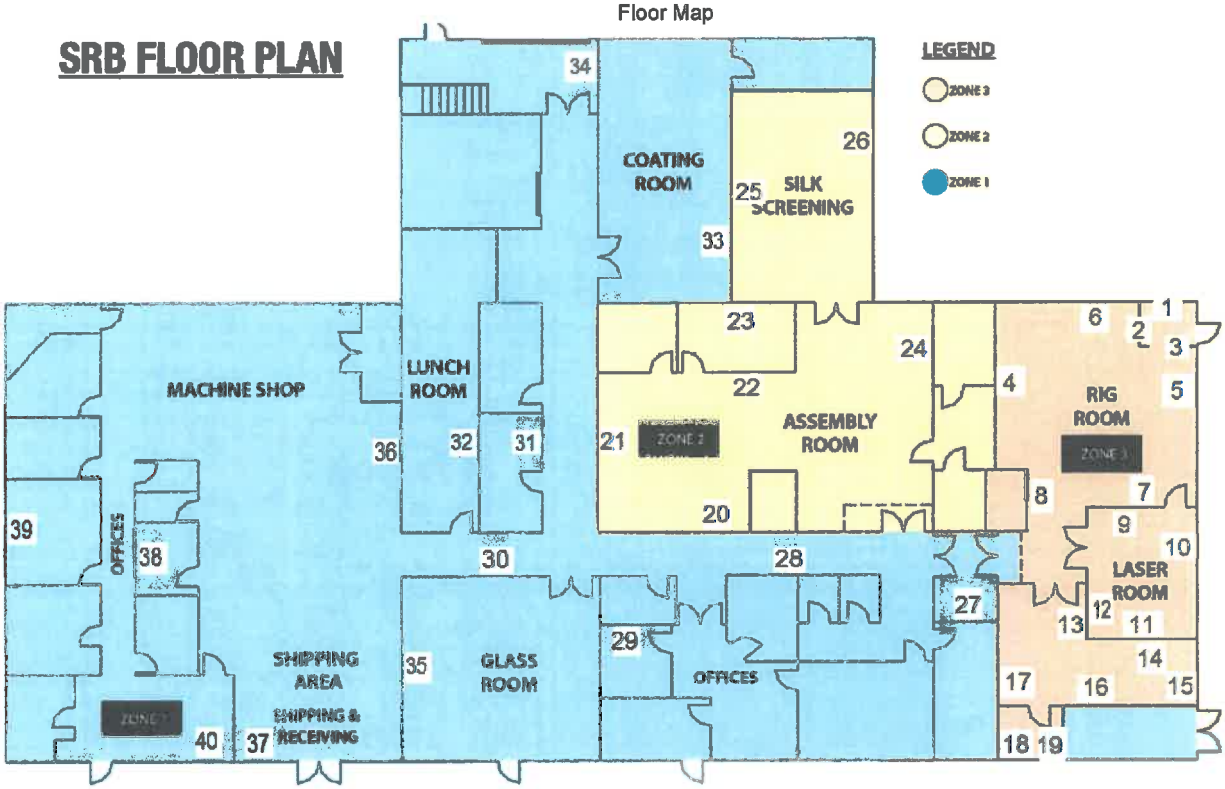
Sample ID	Component	Location	Results Bq/cm^2
D4	Rig 2	Upper ventilation areas	254.19
D5	Rig 2	Inside bottom access hatch	40.89
E4	Rig 4	Upper ventilation areas	27.38
E5	Rig 4	Inside bottom access hatch	557.74
F4	Rig 5	Upper ventilation areas	7.38
F5	Rig 5	Inside bottom access hatch	1.14
G4	Rig 7	Upper ventilation areas	40.25
G5	Rig 7	Inside bottom access hatch	4.29
H6	Culham Laser Cabinet	Ventilation inlet	239.34
I6	EIP Laser Cabinet	Ventilation inlet	570.59

General Assessment of Removable Tritium Contamination on Wall Surfaces
SRB Technologies (Canada) Inc.

Swipe tests were conducted on wall surfaces according to the map attached.
On August 29, 2014, two swipes were taken at each location, at 4 and 7 feet high. Swipes were 100 cm^2 in area. Decontamination was not performed before the area was tested. Those areas found > 4.0 Bq/cm^2 were decontaminated using a simple moist cloth and hand wiping action later the same day.
On September 4, 2014, any area previously assessed at > 4.0 Bq/cm^2 was reassessed.
A summary table is attached, including a description of the wall assessed.

Signed: _____ _____
Jamie MacDonald, Manager – Health Physics and Regulatory Affairs Sept. 5, 2014

Floor Map



Final Wall Assessment Results (all values in Bq/cm^2 averaged over 100 cm^2)

Number	Description	4 feet	Decon	7 feet	Decon
1	Zone 3: Waste Room Block Wall West	**4.52**	2.42	**4.99**	1.14
2	Zone 3: Waste Room Block Wall South	**4.18**	1.35	2.66	
3	Zone 3: Waste Room Block Wall East	2.86		2.72	
4	Zone 3: Rig Area Block Wall South	1.28		3.11	
5	Zone 3: Rig Area Block Wall North	1.85		2.08	
6	Zone 3: Rig Area Block Wall West	3.44		1.00	
7	Zone 3: Rig Area Drywall East	1.43		0.88	
8	Zone 3: Rig Area Drywall Photometer Room	1.12		2.10	
9	Zone 3: Laser Room Drywall West	0.85		0.66	
10	Zone 3: Laser Room Block Wall North	0.80		0.88	
11	Zone 3: Laser Room Drywall East	2.27		1.23	
12	Zone 3: Laser Room Drywall South	1.58		0.62	
13	Zone 3: Trit Lab Drywall by Double Doors	0.84		1.37	
14	Zone 3: Trit Lab Drywall West	**24.15**	0.79	1.27	
15	Zone 3: Trit Lab Block Wall North	2.14		**5.38**	0.65
16	Zone 3: Trit Lab Block Wall East	1.42		1.01	
17	Zone 3: Trit Lab Block Wall South	0.57		0.63	
18	Zone 3: Storage Room North	2.60		1.88	
19	Zone 3: Storage Room South	1.76		2.01	
20	Zone 2: General Assembly Drywall East	2.07		0.30	
21	Zone 2: General Assembly Drywall South	0.23		0.43	
22	Zone 2: General Assembly Drywall West	0.21		1.60	
23	Zone 2: Storage Room Drywall West	0.33		0.92	
24	Zone 2: Behind Sonic Welder	**6.12**	0.10	**6.31**	0.16
25	Zone 2: Silk Screening Drywall South	1.42		1.47	
26	Zone 2: Silk Screening Drywall North	1.23		3.73	
27	Zone 1: Ante Room Drywall East	0.18		0.25	
28	Zone 1: Hallway Drywall East	0.02		0.03	
29	Zone 1: Office Executive Assistant Drywall West	0.00		0.03	
30	Zone 1: Hallway Drywall East by Glass Room	0.01		0.02	
31	Zone 1: LSC Counting Lab Drywall North	0.01		0.01	
32	Zone 1: Lunch Room Drywall North	0.00		0.07	
33	Zone 1: Coating Room Drywall North	0.09		0.02	
34	Zone 1: Old Shipping / Receiving North	0.12		0.09	
35	Zone 1: Glass Room South Block Wall	0.01		0.03	
36	Zone 1: Machine Shop Area Block Wall	0.07		0.05	
37	Zone 1: Shipping / Receiving Block Wall	0.02		0.01	
38	Zone 1: Office Import / Export Manager Drywall	0.02		0.02	
39	Zone 1: Conference Room Drywall South	0.01		0.01	
40	Zone 1: Office Area Drywall East	0.03		0.01	

Appendix B
Facility Equipment

ZONE 1 EQUIPMENT

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

Front Offices
1- Konica Minolta Bizhub C224 fax/copy/printer
6- Panasonic Digital KX DT343 telephones
6- Executive Workstations
5- Lenovo Thinkcenters
1-Lenovo Thinkpad Laptop

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- Thermoplus Dehumidifier
1- Danby Premiere Dehumidifier
1- Fisher Scientific Isotemp Drying Oven
1- Baxter Tempcon Drying Oven
1- Lenovo computer

Liquid Scintillation Lab
2- Walac 1409 Liquid Scintillation Counters

Shipping
1- Pelouze weight scale model 4010
1- Lenovo Thinkpad Laptop

Back Offices
5- Lenovo Thinkpad Computers
2- Apple Computers
1- Epson model 1640XL scanner
1- Konica Minolta Bizhubc364
1- Laser Jet Pro CM1415FNW Color MFP
1- DuraBrand 11" Colour TV with VCR
6- Panasonic Digital KX-DT343 telephones
1- 1-DAHLE BS5498 Papercutter
1- Fellowes 225CI Shredder

Lunchroom
1- Sony Bravia TV
1- Pyramid Time Trax EZ
2- Sharp Carousel Microwaves

1- Newco Coffee Maker
2- Danby Designer Refrigerator

Machining Area
1- First Model LC-1 ½ TM Milling Machine
1- Parnavac Model SP4 MK5 molding machine
1- Manumold model MK3 Euromap 59/24 plastic injection mold press
1- Rigid model 16 gal. Shop vacuum
1- Target model TT-21 drill press
1- Delta 23-681 Benchgrinder
1- Mastercraft table saw
1- Lenovo Computer

Store Room
3- Fire safety storage cabinets
1- Corrosive storage cabinet

Building Ventilation
2- Make-up Air Supply Units
2- Area Heating and Air-conditioning Units
1- Area Air-conditioning Unit
4- Area Heating and Circulation Unit
2- Air/Heat Exchange Units
4- Wall-type Air-conditioner Units

Compressor Room
1- Compressor Unit and Accessories

ZONE 2 EQUIPMENT

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

Assembly
1- Branson Ultrasonic Welders
1- 4' x 4' Spray paint hood
1- UV Curing Oven
2- Photo Assessment Instruments (Photometer)
2- National Equipment XP500 Exposure unit
1- Overhoff model 357 tritium in air monitor
1- Scintrex portable tritium in air monitor
1- Lenovo Computer
1- Kyocera FS1370DN Printer

Silk Screening
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- Tritium-in-air monitor
2- Overhoff tritium air sample collectors (bubblers)
2- Omega flowmeter/totalizer
1- Linear Chart Recorder

ZONE 3 EQUIPMENT

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

Rig Room
8- Filling Rigs (including oil-free scroll pumps and stainless steel tubing and valves)
2- Vacuum thermal drying ovens
2- 6' Constant velocity Class I safety cabinets (manufactured from particle board)
1- 3' Variable flow Class I safety cabinet (manufactured from particle board)
1- Overhoff model 357 tritium in air monitor
1- Lenovo Computer

Laser Room
3- Laser cutting systems
1- 6' x 3' stainless steel fume hood
1- Overhoff model 357 tritium in air monitor

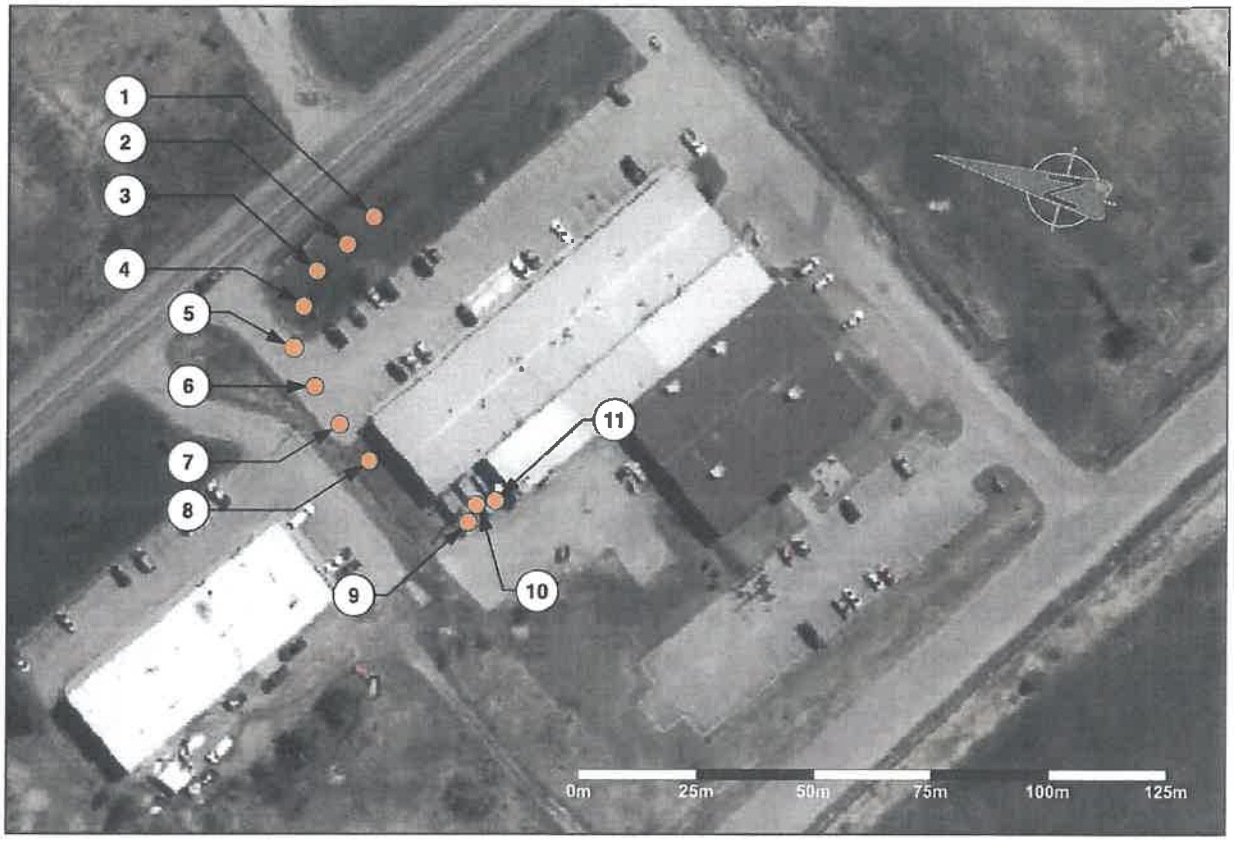
Tritium Lab
1- Custom Reclaim Rig (including an oil-free scroll pump and stainless steel tubing and valves)
1- Custom Bulk Splitter (including an oil-free scroll pump and stainless steel tubing and valves)
2- 4' Constant velocity Class I safety cabinets (manufactured from particle board)
1- 3' Variable flow Class I safety cabinet (manufactured from particle board)
1- Overhoff model 357 tritium in air monitor

Store Room
1- 3' x 5' Fire proof Vault

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

Appendix C: Soil Sample Results

SOIL SAMPLE LOCATIONS



Sample	HTO Free Water Tritium Concentration (Bq/L)	OBT/HTO Ratio[1]	Total Tritium (HTO + OBT) Bulk Specific Activity (Bq/g)	
			Highest	Lowest
1	662	10	1.4	0.5
2	2303	10	4.7	1.6
3	2343	10	4.8	1.6
4	356	10	0.7	0.2
5	736	10	1.5	0.5
6	471	10	1.0	0.3
7	384	10	0.8	0.3
8	842	10	1.7	0.6
9	1410	10	2.9	1.0
10	10977	10	22.6	7.6
11	518	10	1.1	0.4
12	28	10	0.1	0.0

Note: samples 9-11 (shaded) were collected within the fenced compound enclosure

[1] Organically Bound Tritium is not reported but is significant with respect to the release criteria

- Previous soil measurements at SRB have shown a ratio of OBT to HTO of 3.5 to 9.9
- OBT/HTO ratio of 10 is used as a conservative estimate