Annual Compliance Report

2006

NSPFOL-13.00

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Part A

Facility:	**SRB Technologies (Canada) Inc.**
License Number:	**NSPFOL-13.00**
Owner:	**SRB Technologies Inc.**
Reporting Period:	**January 1, 2006 through December 31, 2006**
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Annual Compliance Report Requirement

During 2006, SRB Technologies (Canada) Inc. operated under Canadian Nuclear Safety Commission issued Nuclear Substance Processing Facility Operating License, NSPFOL-13.00/2006. License NSPFOL-13.00/2006 expired on November 30, 2006. Following 2 days of relicensing hearings that took place on October 25, 2006 (Day 1) and November 27, 2006 (Day 2), the CNSC 'Commission' extended the existing license until January 31, 2007, pending the decision on application for the renewal of the license.

Condition 6.4 of the Canadian Nuclear Safety Commission issued Nuclear Substance Processing Facility Operating License, NSPFOL-13.00/2006, reads:

"6.4 The licensee shall prepare and submit to the Commission or to a person authorized by the Commission by March 31 of each year, an Annual Compliance Report that covers the previous calendar year's operation prepared in accordance with Appendix E to this license."

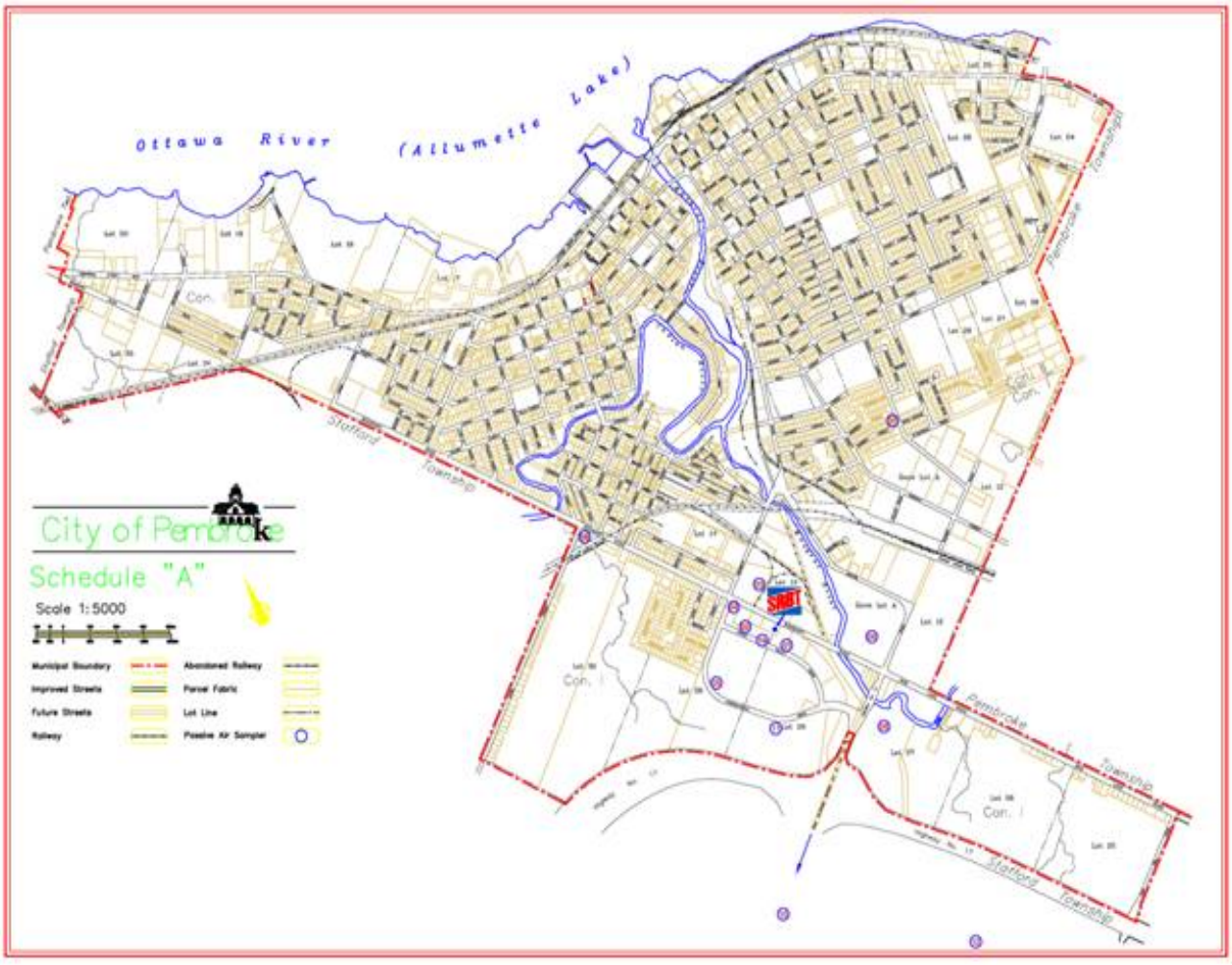
Appendix E
The following information shall be included:

1) Operational Review including equipment and facility performance and changes, significant events/highlights that occurred during the year.
2) Information on production including verification that limits specified in the license was complied with.
3) Modifications including changes in organization, administration and/or procedures that may affect licensed activities.
4) Health Physics information including operating staff radiation exposures including distributions, maxima and collective doses; review of action level or regulatory excedence(s) if any, historical trending where appropriate.
5) Environmental and Radiological Compliance including results from environmental and radiological monitoring, assessment of compliance with license limits, historical trending where appropriate, quality assurance/quality control results for the monitoring.
6) Facility Effluents including gaseous and liquid effluent releases of nuclear substances from the facility.

Part B

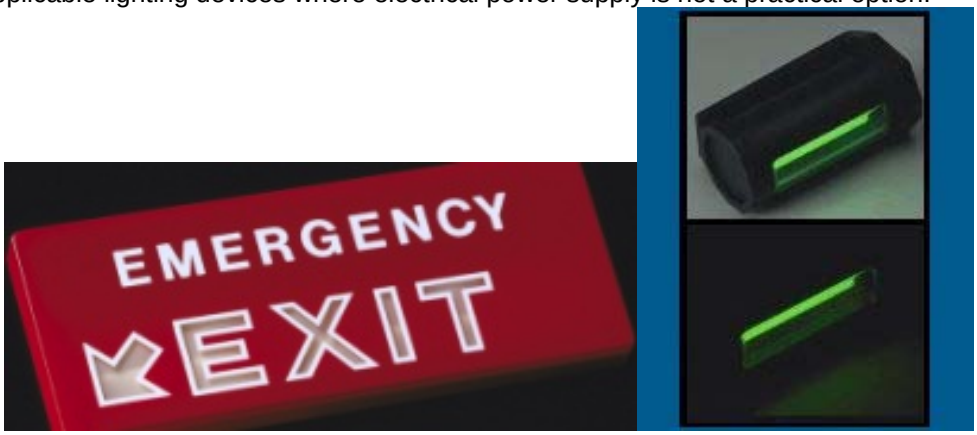
1. Operational Review

The facility described in the CNSC-issued Nuclear Substance Processing Facility Operating License; NSPFOL-13.00 includes approximately 1186 square meters of a Butler™ building located in a strip mall on the South edge of the city of Pembroke, Ontario.



Manufactured Products

The main product manufactured within the facility is gaseous tritium light sources that are used in gaseous tritium light devices to provide lighting without the requirement for an external source of power such as batteries, household electrical, etc. The gaseous tritium light sources may be placed in a device housing that makes up such devices as life-safety signs (exit and multi-purpose), safety aisle markers, special service lighting (aircraft dials and panels), special locators (personnel and route markers), and a variety of applicable lighting devices where electrical power supply is not a practical option.



EQUIPMENT MAINTENANCE PROGRAM

The main focus for radiation safety and protection is the handling of tritium gas (T_2). Tritium does not require shielding, as the decay of tritium poses only very low energy beta emissions and therefore does not present an external radiation hazard. Tritium only presents a very low radiological hazard upon inhalation, ingestion or absorption. For the purpose of providing a safe working environment, the most prominent protective element of the radiation protection system is the workplace ventilation system including the safety cabinets. The facility has several air-handling units that provide supply air and exhaust air for protective workplace ventilation.

Ventilation Systems

The facility air handling units, of which there are two main units, are maintained through contract maintenance and service program with local contract providers in conjunction whereby routine maintenance is performed by qualified staff as described in the Tables 1.1 and 1.2 below.

Table 1.1: Equipment Maintained

Qty	Type	Zone	Location
1	Heat Recovery unit	1	Mold area/Office
4	Unit heaters	1 & 3	Rig room, Glass shop, Molding area & office
4	A/C wall units	1 & 3	Rig room, Coating room, Glass shop & Laser room
2	Makeup air units	1 & 2	Coating room, Assembly room
4	Exhaust fans	1 & 2	Coating, Assembly, Glass room, Paint Booth
1	HRV with reheat	2	Assembly room
2	Fan coils	1	Office, Mold area/Office
2	Condenser	1	Mold area/Office
1	Mid efficient gas furnace & central air	1	Stores
1	Mid efficient gas furnace	1	Receiving
1	Air handling unit (Rig Room)	1	Compound
1	Air handling unit (Trit Lab)	1	Compound
2	Rig and Bulk AHU's Pitot Tubes	1	Compound

Table 1.2: 2006 Equipment Maintenance Information

Major maintenance carried out in 2006:	None
Quarterly Maintenance Schedule: **Contract:** Kool Temp/ Valley Refrigeration Ltd. **Contract Term:** Feb. 1/2006 to Jan. 31/2007	April 28, 2006 August 29, 2006 November 15, 2006 January 25, 2007
Monthly maintenance carried out in 2006: **Contract:** Kool Temp/ Valley Refrigeration Ltd. **Contract Term:** Feb. 1/2006 to Jan. 31/2007	January 26, 2006 February 28, 2006 March 30, 2006 April 27, 2006 May 31, 2006 June 29, 2006 July 26, 2006 August 31, 2006 September 29, 2006 October 31, 2006 November 16, 2006 December 21, 2006
Report of any weakening or possible failure of any components:	None

All ventilation systems were maintained in fully operational condition with no system failures during 2006. Equipment maintenance was performed under contract with a fully licensed maintenance and TSSA certified local HVAC contract provider.
The contract stipulates quarterly service and maintenance program.
All process equipment is serviced and maintained by qualified staff and through contract with companies that specialize in process control systems. All process equipment has been maintained in fully operational condition with no equipment failures during 2006.

Radiation Detection Equipment
The SRBT facility incorporates airborne tritium monitoring throughout the facility, as necessary, using stationary tritium-in-air monitors. There are five stationary tritium-in-air monitors available for airborne tritium monitoring. All tritium-in-air monitors are calibrated on an annual basis in accordance with the manufacturer's instructions to ensure continuous effectiveness of operation. The tritium-in-air monitors are located as described below:

Zone 3
Three monitors are strategically located in Zone 3; one in each of:

Rig Room where gaseous tritium light sources are filled and sealed, heat stress relieved, inspected and leak tested,

Laser Room where laser energy is used to cut and seal small gaseous tritium light sources and inspected, and,

Tritium Laboratory where tritium is transferred from bulk supply containers to filling containers, time-expired and QA rejected gaseous tritium light sources are prepared for reclamation and residual tritium is reclaimed for reuse.

Zone 2
One stationary tritium-in-air monitor is located in Zone 2:

Assembly Area, where gaseous tritium light sources are pre-packed in preparation for shipping or installed into device housings.

Zone 1
One stationary tritium-in-air monitor is located in Zone 1:

Shipping, where product is prepared for transport, is continuously monitored for airborne tritium.

Portable tritium-in-air monitors are maintained for Zones 2 and 3. The instruments are maintained by the supplier for repair and calibration.

Liquid Scintillation Counters
SRBT has on-site three liquid scintillation counters: 2 Wallac 1409's (one commissioned and one non-commissioned) and 1 Wallac 1215. The liquid scintillation counters are maintained under contract with an outside contract provider for preventative maintenance and repair service.

Stack Monitoring System Equipment
Stack monitoring equipment is incorporated for each of two main air-handling units; the Rig Stack and the Bulk Stack, which both serve Zone 3 for supply and exhaust air.
The monitoring equipment includes, for each air-handling unit, the following:

1. Calibrated real time tritium-in-air monitor, direct-connected to a recording device,
2. System for discriminately collecting HTO and HT (bubbler system),
3. Calibrated flow measurement device to indicate elapsed time, flow rate and volume, and
4. Back-up electrical power system in the event of a sustained power failure.

The stack monitoring systems are calibration checked by incorporating a comparison method by a contract provider in accordance with ANSI/HPS N13.1-1999, *Sampling and Monitoring Releases of Airborne Radioactive Substances form the Stacks and Ducts of Nuclear Facilities*.

The results of the calibration check performed in 2006 indicated the units to be well within the ANSI/HPS N13.1-1999 document requirements.

Significant Events

ORDER BY A DESIGNATED OFFICER UNDER PARAGRAPH 37(2)(f) AND SUBSECTION 35(1) OF THE NUCLEAR SAFETY AND CONTROL ACT
Based on sample results of gathered and analyzed for tritium content by SRB, on August 15, 2006, the CNSC issued a 'Designated Order' requiring SRBT to immediately cease tritium processing, and to submit a detailed report describing the specific actions and measures that will be taken to prevent or mitigate further direct contamination of the groundwater under the stacks and an implementation plan and schedule.
SRB had requested to be heard on the order and further requested that the order be revoked or amended to allow SRBT to operate under its licence while an "ACTION PLAN" be developed to address new CNSC concerns and continue the work it has already begun to further define groundwater conditions on site and implement recommendations on future testing or changes to prevent or mitigate further contamination of the groundwater under the stacks.
The Commission rendered its decision on September 5, 2006 requiring SRBT, by September 25, 2006, to submit, in writing to the Commission, for consideration, by the Commission, at the Day One Licensing hearing scheduled for October 25, 2006, a detailed report describing the specific actions and measures that will be taken to:

- identify all the sources of groundwater contamination;
- contain those sources of groundwater contamination;
- prevent or mitigate further direct contamination of the soil and groundwater under the stacks; and
- remediate the contaminated groundwater

and provide an implementation plan and schedule for the actions described in the report.

The report was filed with the Commission as part of our Day One licensing hearing submission on September 25, 2006 as per request.

2. Production

In accordance with Section IV of the Nuclear Substance Processing Facility Operating License-13.00/2006, SRBT:

i) Manufactured gaseous tritium light sources, which consist of tritium gas ($^3H_2$) sealed in borosilicate glass tubes, and incorporating the sources into devices as described in the SRBT Radiation Safety Program.

ii) Possessed, used, stored, and transferred nuclear substances necessary or incidental to the operations as described in i) above, that refers to Section N1, N2 and N3 of the license conditions.

Procedures were reviewed by management and amended as required to ensure effective and efficient operations with respect to safety.
The maximum tritium activity possessed during 2006 did not exceed 5.83 PBq, approximately 53% of the possession limit of 11.00 PBq. The month-end tritium activity levels are detailed in Table 2 below.
At all times, unsealed source material was stored on uranium getter beds or in the handling volumes of the gas filling rigs.

Table 2: Tritium Activity On-site during 2006

Month/ 2006	Month-end H-3 Activity On-site (PBq)	Percent of License Limit (%)
January	5.34	48.5
February	5.83	53.0
March	4.53	41.2
April	4.13	37.5
May	3.89	35.4
June	4.02	36.5
July	3.81	34.6
August	4.16	37.8
September	3.18	28.9
October	4.26	38.7
November	3.37	30.6
December	4.40	40.0
2006 Monthly Average	***4.24***	***38.5***

iii) at no time imported more than 37 TBq within any two year period without first applying for and receiving a license from CNSC staff to import tritium. During 2006, SRBT, applied for and received from CNSC, import licenses to import tritium for the purpose of reclaiming the residual tritium in time-expired tritium devices to manufacture gaseous tritium light sources.
SRBT applied for and received from CNSC export licenses for countries worldwide for the purpose of exporting and supplying GTLS's and GTLD's to customers.

Shipping Activities
In 2006, SRBT prepared, packaged and shipped, in accordance with CNSC regulatory document, SOR/2000-208, Packaging and Transport of Nuclear Substances Regulations, 584 consignments which were shipped to various customers in 16 countries around the world including Canada. No transport incidents occurred nor were reported during 2006.

3. Modifications

Organizational Structure
During 2006 there were only minor modifications in the SRBT organizational structure.
The Health Physics Technician position became vacant and was filled internally.

Program Modifications
The Corporate Health Physicist and the Health Physics Technician with the use of consultants, as required, have developed SRBT safety programs.
Recently, the company has worked to address a number of issues raised by CNSC staff. To address these items in a timely fashion, SRBT has allocated an increased amount of internal resources; and, has complimented this with the use of independent external resources, where required.
Programs are now and will continue to be developed by the Health Physics team; and, with the necessary involvement of external resources.
The Health Physics team includes the Corporate Health Physicist, Health Physics Technician, General Manager and President.
Corporate policies, programs and procedures are implemented by SRB's management and supervisory staff and audited by the Quality department, which is audited by the quality registrar, BSI Management Systems.

Operational Modifications
In 2006, modifications to the operational procedures were implemented for the purpose of complying with license restrictions that were intended to mitigate tritium impact on the environment.
In accordance with CNSC-issued license NSPFOL-13.00/2006 and NSPFOL-13.01/2006 CNSC staff agreed to SRBT proposals to operate under restricted conditions.
These restricted conditions included the following as per section 2.2 of NSPFOL-13.00/2006:

a) The processing of tritium shall only occur between the hours of 0700 and 1900;
b) The processing of tritium shall only occur if the effective stack heights are at least 27.8 meters;
c) The bulk splitting rig shall be operated only if the operator is in the presence of a qualified supervisor;
d) The bulk splitting operation shall occur when there is no other tritium gas processing being carried out;
e) The pyrophoric uranium tritium traps, excluding the bulk tritium cylinders, shall be loaded with no more than 111,000 GBq of tritium, at any time;
f) At any one time, the licensee shall only use one of the following units: the reclamation unit or a betalight production filling rig to process tritium;
g) Monthly maintenance of pitot tubes installed in the exhaust stacks performed by a third party;
h) Weekly verification of stack exhaust flow rates shall be performed by a third party;
i) All calculations related to the stack emissions shall be performed by a third party;
j) The licensee shall have all activities related to the Environmental Monitoring Program conducted by a third party;
k) The licensee shall submit on a monthly basis, the Environmental Monitoring Program results for the previous month, including all quality assurance and quality control records; and
l) Maintain a copy of documentation to ensure that the restrictions were followed.

A stipulated condition in the license supercedes the 1996 DRL. In license NSPFOL-13.00/2006, CNSC staff imposed a weekly release limit for tritium gas (HT) and tritium oxide (HTO).
In order to accommodate this imposed condition, SRBT modified the weekly emissions monitoring program report to indicate releases of HT and HTO as a percent of the weekly release limit.

Procedural Implementations
SRBT instituted two new procedures to comply with the Order by a Designated Officer dated August 15, 2006.
The two procedures were:

ENG-015 CHART RECORDER July 18. 2006
This procedure is to ensure that the chart recorder is monitored regularly by staff to ensure a chart recorder reading equal to or exceeding 10,000 uCi/m3 is identified by staff and that necessary actions are taken including reporting as necessary.
ENG 016 NO TRITIUM PROCESSING DURING PRECIPITATION Sept. 6, 2006
This procedure is to ensure that the processing of tritium does not occur during any type of precipitation. Precipitation includes rain, drizzle, freezing drizzle, freezing rain, hail and snow.

Facility Modifications
With respect to the SRBT facility, several modifications were employed, as they were deemed significant with respect to worker and environmental protection.
These modifications include:

- Installation of a fire sprinkler system throughout the SRBT facility,
- Installation of ventilation system alarms to warn workers of system flow failure,
- Installation of a precipitation sensor to alert Zone 3 workers to cease tritium handling procedures as required,
- Installation of inert gas purging system on tritium production equipment to dispel tritium and thus prevent the oxidation of elemental tritium gas before it reaches the air handling units.

Operational Alarm Systems
Alarm units were installed on the following components as indicated in Table 3.1.

Table 3.1 Alarm Units

Item	Description	Type of Alarm
1. *	Coating Room	Audio/Visual
2. *	Silk Screening Operations Room	Audio/Visual
3. *	Paint Hood	Audio/Visual
4. *	Rig Air Handling Unit	Audio/Visual
5. *	Bulk Air Handling Unit	Audio/Visual
6. **	Stack Monitoring Equipment	Audio/Visual
7. ***	Precipitation Monitor	Audio/Visual

*The alarms for items 1-5 are set to indicate low flow for each of the systems as both audible and visual alarms.
**The alarm for item 6 indicates that there is, or has been, a power failure.
***The alarm for item 7 indicates that there is precipitation in the form of snow or rain.

4. Health Physics

Dosimetry Services
During 2006, SRBT maintained a Dosimetry Service License, 11341-3-10.0, for the purpose of providing in-house dosimetry services for the staff of SRB Technologies (Canada) Inc. and contract workers performing services for SRBT where there existed potential exposure for uptake of tritium.
Dosimetry results were submitted on a quarterly basis to Health Canada in a timely fashion for input to the National Dose Registry for 38 individual staff members.

SRBT participated in the Annual Bioassay Intercomparison Analysis program sponsored by the National Calibration Reference Centre for Bioassay, Radiation Surveillance and Health Assessment Division, Radiation Protection Bureau of Health Canada. The participation is a regulatory requirement for Dosimetry Service Providers.
SRBT received the Certificate of Achievement for successful participation in the Tritium Urinalysis Intercomparison Program National Calibration Reference Centre for Bioassay and In Vivo Monitoring for the year 2006.

SRBT submits, to the CNSC, an annual compliance report (ACR) for Dosimetry Service License, 11341-3-10.0.

Staff Annual Dose Report
SRBT, through the Dosimetry Service License, 11341-3-10.0, assesses the radiation dose to its employees and to contract workers who may have exposure to tritium that might pose a significant uptake.
For SRBT staff members, all are classified as Nuclear Energy Workers. All staff members participate in the dosimetry program. Persons who work in Zones 1 and 2 provide bioassay samples for tritium concentration assessment on a bi-weekly frequency due to the very low probability of uptake of tritium. Persons assigned to work in Zone 3 provide bioassay samples on a weekly frequency due to the significant probability of uptake of tritium.
Uptake of elemental tritium (HT); therefore, lung dose is controlled through the continuous monitoring for airborne tritium and the very low alarm threshold settings for the tritium in air monitors in the working zones; 10 uCi/m3 in Zone 3 and 5 uCi/m3 in Zone 2.
The assessment of dose to personnel, due to tritium uptake, is performed in accordance with the Health Canada document, 83-EHD-87, Bioassay Guideline 2, Guidelines for Tritium Bioassay.
The maximum annual dose received by any person employed by SRBT is well within the regulatory limit for a nuclear energy worker, which is 50.0 mSv per calendar year. The maximum annual staff dose of **3.35 mSv** represents only 6.7% of the annual NEW dose limit.

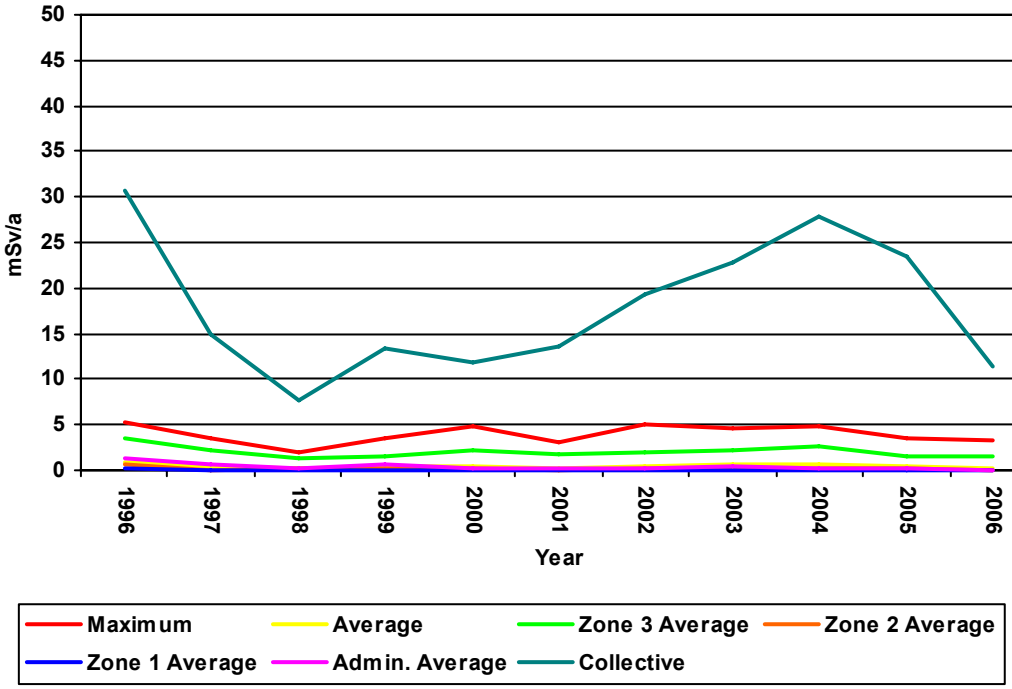
Table 4.1 and Chart 4.1 show the data for staff dose and provide a comparison of dosimetry results for the years 1996 to 2006. The dosimetry results indicate that the trend in Annual Collective Dose has been increasing until 2004 and then decreases in 2005 and 2006. It is believed that the decommissioning of the oil-sealed high-vacuum pumps has contributed to the reduction in the collective annual effective dose and the Zone 3 and Administrative staff annual average effective dose. Also, to be taken into account is that SRBT ceased production for most of the month of December which would have a downward influence on personnel dose overall. Staff members also show a higher level of diligence when handling tritium-contaminated items.

The annual effective dose for SRBT staff in 2006 indicates a significant downward trend despite a decrease in total number of staff members from 47 to 38. As can be seen in Table 4.1, the annual effective dose values in all listings are well below the average. SRBT continues to strive to maintain ALARA, taking into account social and economic factors.

Table 4.1: SRBT Radiological Annual Dose Data (1996 – 2006)

Annual Dose (mSv/a)	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	Ave.
Maximum	5.29	3.55	1.91	3.48	4.89	3.11	5.08	4.54	4.90	3.61	3.35	**3.97**
Average	0.88	0.52	0.24	0.46	0.38	0.29	0.40	0.55	0.67	0.50	0.30	**0.47**
Average Zone 3	3.43	2.12	1.26	1.62	2.30	1.70	1.94	2.22	2.58	1.61	1.57	**2.03**
Average Zone 2	0.55	0.07	0.12	0.11	0.15	0.08	0.18	0.16	0.18	0.12	0.07	**0.16**
Average Zone 1	0.17	0.08	<0.01	<0.01	<0.01	0.01	0.01	0.01	0.02	<0.01	<0.01	**0.03**
Average Admin.	1.26	0.61	0.17	0.60	0.12	0.31	0.11	0.39	0.24	0.12	0.09	**0.36**
Collective	30.69	15.01	7.72	13.47	11.91	13.65	19.21	22.91	27.75	23.50	11.34	**17.92**
Dosimetry Range												**Ave.**
0.00 – 0.99	29	23	29	28	33	43	43	39	30	39	34	**34**
1.00 – 1.99	0	4	3	4	1	4	2	0	5	3	3	**3**
2.00 – 2.99	3	1	0	0	1	1	2	3	2	3	0	**2**
3.00 – 3.99	1	1	0	2	1	1	0	2	2	2	1	**1**
4.00 – 4.99	2	0	0	0	1	0	0	1	2	0	0	**1**
> 5.00	1	0	0	0	0	0	1	0	0	0	0	**0**
> 50.00	0	0	0	0	0	0	0	0	0	0	0	**0**
Staff Members (no.)	36	29	32	34	37	49	48	45	41	47	38	**40**

Chart 4.1: SRBT Radiological Annual Dose Data (1996 – 2006)



Administrative Staff Dose Limit Excedences

The *action level* for body burden based on a weekly frequency for bioassay for NEW's is 1000 Bq/mL, and the *administrative limit* is 500 Bq/mL for Zone 3 workers, and 100 Bq/mL for Zones 1 and 2 workers. There were no instances whereby a staff member's tritium body burden exceeded the action level of 1000 Bq/mL.

Two (2) weekly bioassay results were recorded in excess of the administrative limit for Zone 3 workers (500 Bq/mL). The Quality Assurance department issued non-conformance reports and the Health Physics department performed investigations. In each case the bioassay result was less than 1000 Bq/mL. Corrective actions were recommended that would prevent future exposures of such nature.

One weekly bioassay sample was recorded for a Zone 2 worker in excess of 100 Bq/mL, but less than 500 Bq/mL.

At no time did Zone 1 staff bioassay sample results exceed the administrative limit of 100 Bq/mL.

License Release Limits

The Canadian Nuclear Safety Commission issued to SRB Technologies (Canada) Inc. license NSPFOL-13.00/2006 that included in 'Appendix C' the following 'Release Limits to Atmosphere and Sewer System':

To Atmosphere:

Nuclear Substance and Form	Limits (Bq/week)
Tritium as Tritium Oxide (HTO)	2.9E+13
Tritium as Tritium Gas (HT)	1.8E+15

To Sewer System:

Nuclear Substance and Form	Limit (GBq/year)
Tritium-water soluble	200

Reported Atmospheric and Liquid Effluent Releases

Stack release values based on weekly sampling and analysis for tritium oxide (HTO) and elemental tritium (HT) indicate that, on average, the emissions of HTO was maintained at 4.75% and the emissions of HT was maintained at 0.23% of the license limit. Liquid effluent releases for tritium oxide was 43.2GBq, 21.6% of the license annual release limit. A comparison of release limits and actual releases to atmosphere and sewer system are shown in the table below.

SRBT Releases to Atmosphere and Sewer System:

Nuclear Substance and Form	**Limit (Bq/week)**	**Actual Release (Bq/week)**	**Percent of License Limit**
Tritium as Tritium Oxide (HTO)	2.9E+13	1.38E+12	4.75%
Tritium as Tritium Gas (HT)	1.8E+15	4.10E+12	0.23%
Nuclear Substance and Form	**Limit (GBq/year)**	**Actual Release (GBq/year)**	
Tritium-water soluble (HTO)	200	43.2	21.6%

Contamination Control

Tritium contamination control is maintained by assessment of non-fixed tritium contamination levels throughout the facility by means of swipe method and liquid scintillation counting of the swipe material.
Swipes are taken in Zone 1, an uncontrolled access area once per week.
Swipes are taken in Zone 2, a controlled access area usually every second day.
Swipes are taken in Zone 3, a controlled access area usually on a daily basis.
The administrative limit for non-fixed contamination in Zones 1 and 2 is 4 Bq/cm2, averaged over 100 square centimeters. For Zone 3 the administrative limit is 40 Bq/cm2, averaged over 100 square centimeters.
A record of swipe results for the purpose of providing data for the Annual Compliance Report was commenced on July 31, 2006 at the request of CNSC staff.
The data collected shows that in Zone 1, commencing July 31, 2006, of the 336 swipe assessments taken, 328 passed; 97.6% pass rate.
The data for Zone 2 indicates for 1130 swipe assessments, 1041 passed; 92.1% pass rate.
The data for Zone 3 indicates for 2544 swipe assessments, 2127 passed; 83.6% pass rate.
All swipe results are reported to the area supervisors. The area supervisor would review the results to determine where extra cleaning effort is necessary.

5. Environmental and Radiological Compliance

SRB Technologies (Canada) Inc. developed an environmental monitoring program that provides data for site-specific determination of tritium concentrations along the various pathways for exposure probabilities to the public due to the activities of the operations.

PASSIVE AIR SAMPLERS

The Passive Air Samplers represent tritium exposure pathways for inhalation (P(i)19 and skin absorption (P(e)19.

41 passive air samplers are located throughout a 2-kilometer radius from the SRBT facility, in 8 sectors, ranging in distance at 250, 500, 1000, and 2000 meters. Several duplicate samplers are included for quality assurance purposes. Several samplers from the previous sampling array remain in place to provide comparison data to the previous program results. Several samplers are located specifically to provide data for assessment of the defined critical group members.

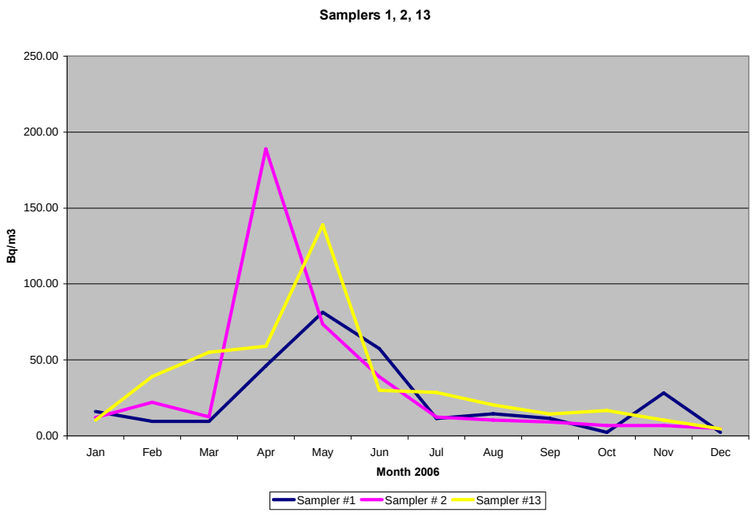
Passive air samplers provide data as to the concentration of HTO at the sampling site for the duration of the sampling. The concentration of tritium collected during the term of sampling is representative of the airborne concentration of tritium oxide in air at that sample point. The result for tritium oxide in air concentration is a function of tritium activity per volume of air sampled given as Bq/m^3.

Table 5.1 contains the Passive Air Sampler results acquired during 2006 for the 41 samplers. Chart 5.1 shows the HTO concentrations for the samplers located in each of the 8 compass sectors are shown. The correlation for the results of the samplers as they increase in distance from the facility is quite evident. The pattern of the lines are very similar in most cases.

Chart 5.2 shows the tritium oxide in air concentrations for each month (Jan., Feb., Mar., Apr., May, Jun., Jul., Aug., Sep., Oct., Nov., and Dec.) of 2006 for each of 8 compass sectors (N, NW, W, SW, S, SE, E, and NE) and for each of the distances (250, 500, 1000, and 2000 meters) from the facility.

Table 5.1: P(i)19 and P(e)19: 2006 Passive Air Sampler Results

2006 Environment Monitoring Program																
Passive Air Sampling System																
Passive Air Sampler Information				(Bq/m3)												Average
Sampler No.	Sampler ID	Location	Dist. to SRBT	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	(Bq/m3)
1	N250	N 45º 48.486' W 077º 07.092' Elev. 137m	322m	4.10	5.30	4.30	9.40	21.20	27.20	25.00	4.40	7.22	8.46	13.00	7.46	11.42
2	N500	N 45º 48.572' W 077º 07.008' Elev. 134m	493m	3.50	5.70	2.40	3.22	9.60	14.20	15.10	2.60	3.76	5.00	5.02	5.59	6.31
3	N1000	N 45º 48.869' W 077º 06.997' Elev. 135m	1040m	1.20	3.50	0.70	2.00	4.40	5.00	4.90	0.99	1.63	1.37	2.20	1.90	2.48
4 (PAS #4)	NW250	N 45º 48.412' W 077º 07.189' Elev. 137m	222m	11.80	6.72	10.10	56.40	52.10	31.60	20.40	3.90	14.33	9.70	5.50	6.10	19.05
5	NW500	N 45º 48.577' W 077º 07.382' Elev. 134m	615m	5.00	3.68	6.90	15.80	14.60	13.90	5.60	1.62	5.46	4.10	2.98	5.20	7.07
6 (PAS # 8)	NW1000	N 45º 48.754' W 077º 07.599' Elev. 130m	1050m	3.90	3.67	2.90	7.20	6.50	5.10	2.38	0.90	2.23	2.30	1.30	2.68	3.42
7	NW2000	N 45º 49.141' W 077º 08.090' Elev. 139m	2000m	2.52	2.10	2.20	3.70	4.50	2.50	1.40	0.70	1.77	1.56	1.28	2.22	2.20
8	W250	N 45º 48.300' W 077º 07.323' Elev. 138m	297m	32.40	18.60	5.20	54.50	43.90	15.50	3.74	4.60	3.00	3.10	6.15	0.80	15.96
9	W500	N 45º 48.288' W 077º 07.393' Elev. 137m	389m	20.90	13.30	2.80	26.50	24.20	7.70	2.51	2.60	2.35	1.50	4.37	0.60	9.11
10	W1000	N 45º 48.306' W 077º 07.630' Elev. 134m	691m	22.20	10.70	2.50	14.20	10.10	2.70	1.50	1.30	0.11	1.57	2.60	0.72	5.85
11	SW250	N 45º 48.251' W 077º 07.204' Elev. 136m	183m	5.90	7.80	2.18	10.10	30.10	6.70	4.01	5.90	3.20	1.37	12.80	0.65	7.56
12	SW500	N 45º 47.896' W 077º 07.307' Elev. 148m	839m	0.51	1.00	2.30	2.50	1.94	1.98	0.75	0.83	0.75	0.48	0.80	0.11	1.16
13	SW1000	N 45º 47.599' W 077º 07.543' Elev. 149m	1470m	1.04	0.36	0.92	0.84	0.92	0.91	0.28	0.43	0.46	0.11	0.51	0.09	0.57
14	SW2000	N 45º 47.408' W 077º 07.866' Elev. 155m	2110m	0.61	0.30	0.45	0.55	0.60	0.58	0.32	0.30	0.34	0.09	0.44	0.09	0.39
15	S250	N 45º 48.129' W 077º 07.014' Elev. 131m	356m	9.80	35.80	35.10	19.70	38.60	9.50	8.00	5.90	5.23	2.07	7.50	4.20	15.12
16	S500	N 45º 48.029' W 077º 07.110' Elev. 143m	532m	3.00	3.47	5.70	7.00	7.20	4.90	1.90	2.55	1.91	2.04	1.64	0.30	3.47
17 (PAS # 12)	S1000	N 45º 46.466' W 077º 07.441' Elev. 158m	1450m	0.30	0.16	0.30	0.29	0.64	0.43	0.19	0.32	0.18	0.13	0.29	0.09	0.28
18	SE250	N 45º 48.251' W 077º 07.204' Elev. 136m	365m	31.00	66.00	74.30	24.60	70.00	31.90	20.27	5.05	12.78	9.87	12.30	9.70	30.65
19	SE500	N 45º 48.108' W 077º 06.783' Elev. 123m	554m	15.00	30.23	31.50	12.10	31.60	13.60	9.80	2.71	6.07	4.40	5.00	3.70	13.81
20	SE1000	N 45º 47.894' W 077º 06.501' Elev. 120m	1090m	4.80	6.00	8.10	4.10	10.90	4.10	3.70	1.17	1.99	1.14	2.23	0.92	4.10
21	SE2000	N 45º 47.505' W 077º 05.978' Elev. 137m	2080m	1.90	2.12	3.30	2.50	4.80	1.70	1.14	0.72	0.85	0.43	1.53	0.26	1.77
22	E250	N 45º 48.234' W 077º 06.807' Elev. 131m	401m	27.00	36.45	57.70	14.32	31.10	26.70	15.50	6.30	12.17	9.20	12.10	8.90	21.45
23	E500	N 45º 48.333' W 077º 06.693' Elev. 132m	520m	6.90	6.40	7.20	5.80	8.80	13.60	9.00	2.50	5.24	2.29	1.30	2.90	5.99
24	E1000	N 45º 48.303' W 077º 06.260' Elev. 143m	1080m	4.50	4.20	3.80	3.20	5.90	5.59	4.53	1.77	3.00	1.10	1.07	1.24	3.33
25	NE250	N 45º 48.251' W 077º 07.204' Elev. 136m	198m	14.60	31.80	22.10	16.70	29.05	78.80	55.90	12.60	9.87	13.40	4.76	24.10	26.14
26	NE500	N 45º 48.421' W 077º 06.732' Elev. 131m	508m	5.20	9.80	5.20	3.70	10.20	15.60	10.93	2.40	3.01	3.51	0.90	7.30	6.48
27	NE1000	N 45º 48.683' W 077º 06.441' Elev. 148m	1100m	2.70	3.80	2.70	4.00	3.90	6.70	8.30	2.70	2.40	1.19	1.03	1.72	3.43
28	NE2000	N 45º 49.116' W 077º 05.843' Elev. 156m	2200m	2.10	3.10	1.90	1.00	1.87	2.80	2.53	1.16	0.85	0.57	0.68	0.92	1.62
Pre-Sample Points																
BOC Gas (PAS #1)		N 45º 48.287' W 077º 07.123' Elev. 129m	94.1m	16.00	9.50	9.60	46.00	81.40	57.50	11.50	14.50	11.48	2.30	28.30	2.40	24.21
Brewer's Edge (PAS #2)		N 45º 48.325' W 077º 07.132' Elev. 132m	52.8m	12.00	22.10	12.60	189.00	73.60	38.90	12.40	10.50	9.18	6.80	6.90	4.90	33.24
Med-Eng (PAS #13)		N 45º 48.262' W 077º 07.093' Elev. 132m	61.5m	10.40	39.14	55.10	59.00	139.00	30.00	28.69	20.30	14.41	16.70	10.50	4.62	35.66
Replicates																
4-2	NW250	N 45º 48.412' W 077º 07.189' Elev. 137m	222m	11.40	5.40	9.74	55.70	52.00	31.30	20.30	3.56	13.36	9.60	5.20	6.00	18.63
11-2	SW250	N 45º 48.251' W 077º 07.204' Elev. 136m	183m	5.60	7.80	1.80	9.10	27.10	6.60	3.79	5.90	2.94	1.07	11.70	0.63	7.00
18-2	SE250	N 45º 48.251' W 077º 07.204' Elev. 136m	365m	29.20	49.00	60.70	22.40	65.90	31.60	20.00	4.80	12.33	9.04	11.70	7.00	26.97
25-2	NE250	N 45º 48.251' W 077º 07.204' Elev. 136m	198m	11.70	31.70	14.90	15.60		75.80	55.10	12.11	8.58	11.50	3.80	19.10	23.63
Background Samples																
Maika (PAS # 10)	SW	N 45º 46.367' W 077º 11.447' Elev. 149m	6690m	0.08	0.16	0.10	0.18	0.20	0.13	0.20	0.12	0.11	0.09	0.19	0.09	0.14
Maika	Duplicate	Same as above	6690m	0.20	0.20	0.14	0.15	0.20	0.14	0.11	0.08	0.11	0.09	0.16	0.09	0.14
Fitzpatrick	SE	N 45º 44.818' W 076º 59.822' Elev. 159m	11400m	0.30	0.40	0.41	0.22	0.49	0.33	0.30	0.09	0.16	0.09	0.12	0.09	0.25
Petawawa	NW	N 45º 51.497' W 077º 12.828' Elev. 149m	9480m	0.40	0.53	0.30	0.68	0.85	0.34	0.39	0.19	0.25	0.16	0.28	0.21	0.38
Farm	NE	N 45º 53.071' W 076º 56.768' Elev. 142m	16000m	0.41	0.44	0.70	0.46	0.49	0.57	0.57	0.36	1.65	0.09	0.12	0.13	0.50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Bq/m3
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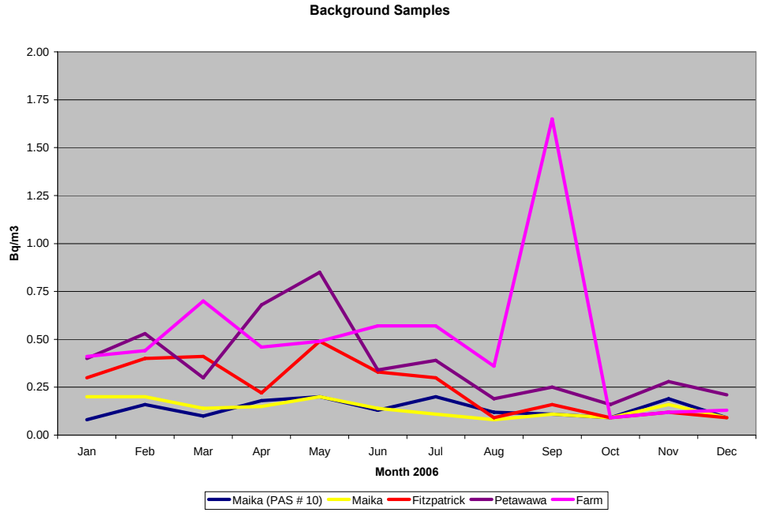
200.00
150.00
100.00
50.00
0.00
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Month 2006
Sampler #1
Sampler # 2
Sampler #13


Background Samples
Bq/m3
2.00
1.75
1.50
1.25
1.00
0.75
0.50
0.25
0.00
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Month 2006
Maika (PAS # 10)
Maika
Fitzpatrick
Petawawa
Farm

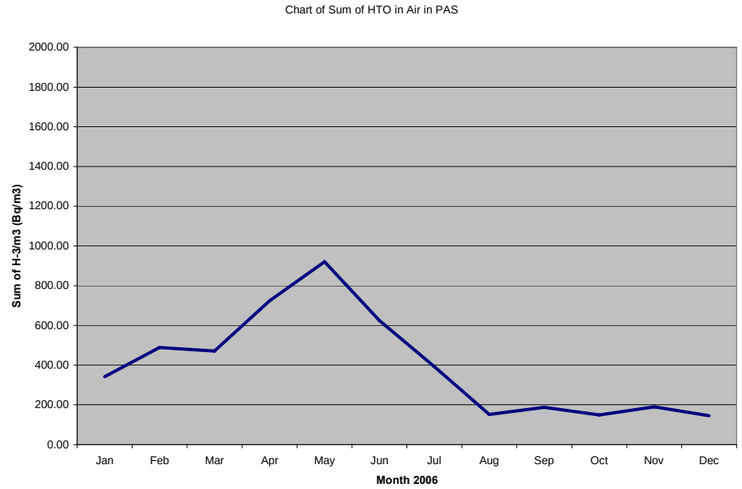
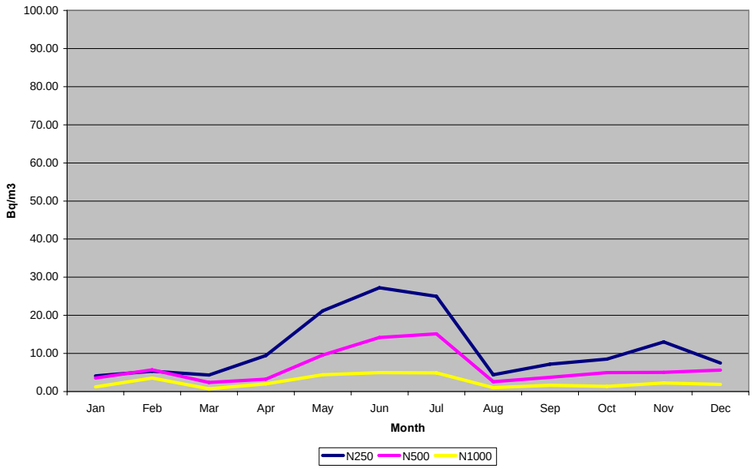


Chart of Sum of HTO in Air in PAS
Sum of H-3/m3 (Bq/m3)
2000.00
1800.00
1600.00
1400.00
1200.00
1000.00
800.00
600.00
400.00
200.00
0.00
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Month 2006


North PAS's
Bq/m3
100.00
90.00
80.00
70.00
60.00
50.00
40.00
30.00
20.00
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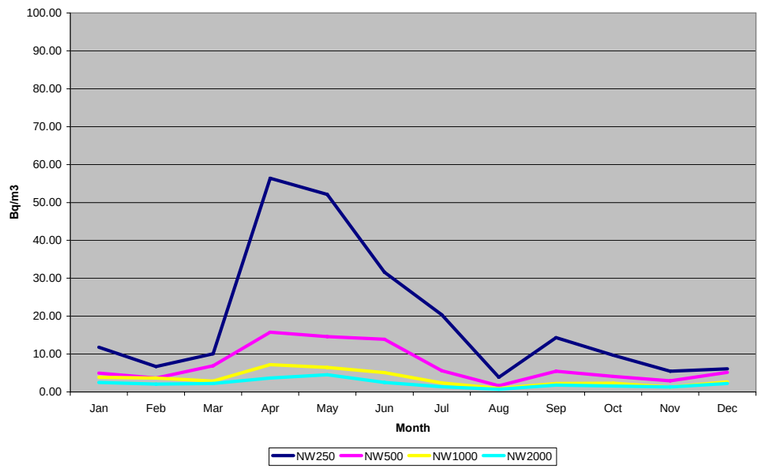
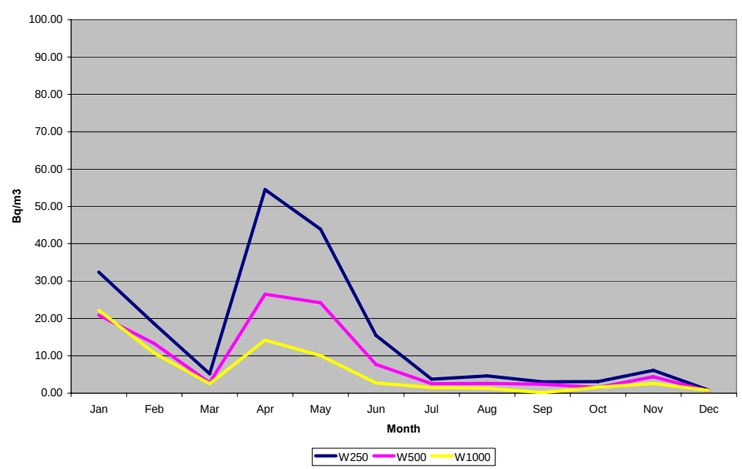
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Month
N250
N500
N1000


NW PAS's
Bq/m3
100.00
90.00
80.00
70.00
60.00
50.00
40.00
30.00
20.00
10.00
0.00
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Month
NW250
NW500
NW1000
NW2000


West PAS's
Bq/m3
100.00
90.00
80.00
70.00
60.00
50.00
40.00
30.00
20.00
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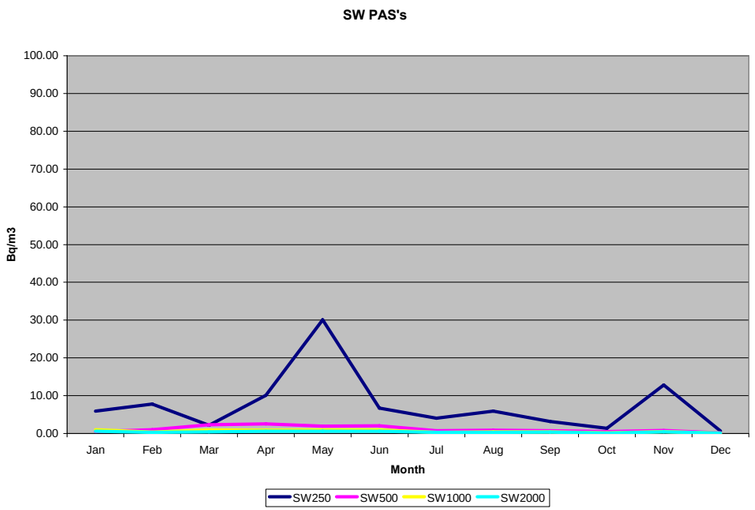
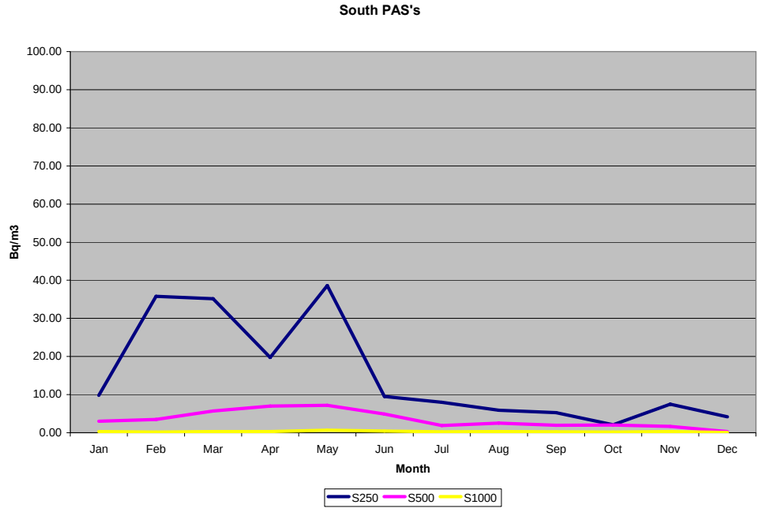
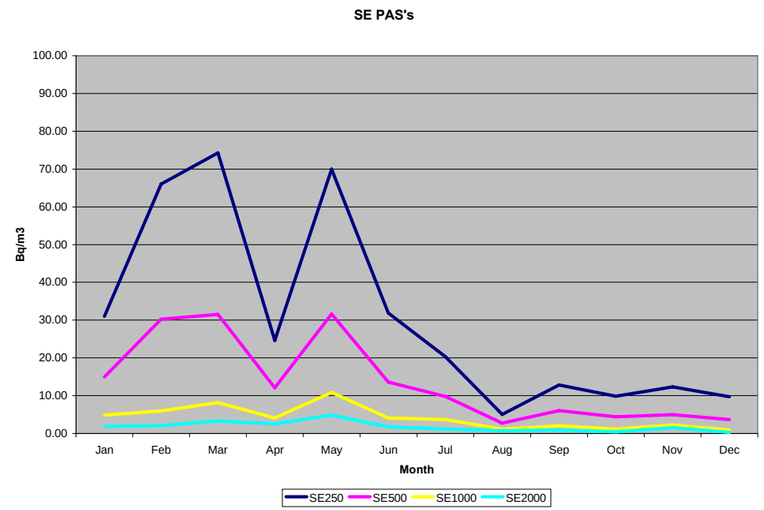
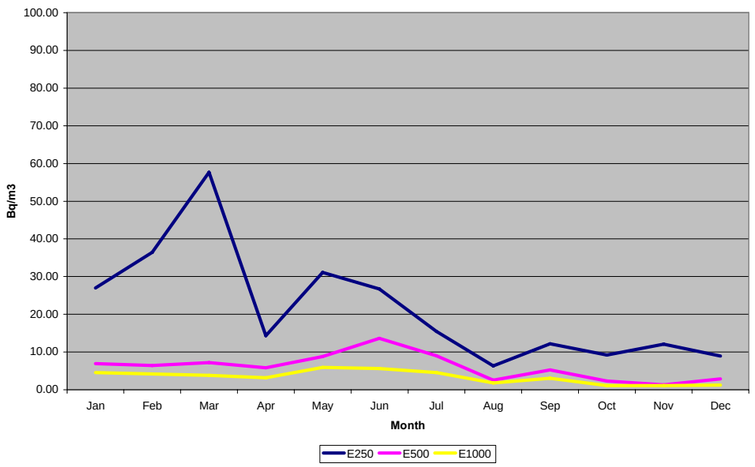
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Month
W250
W500
W1000









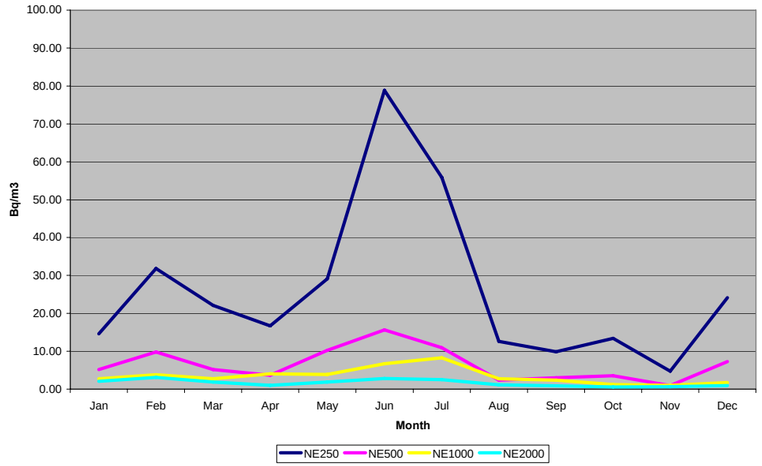
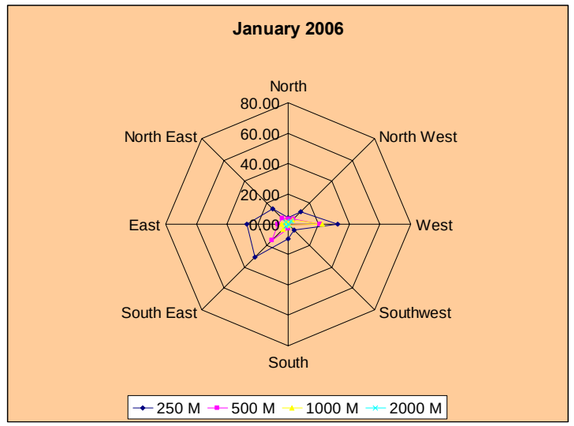
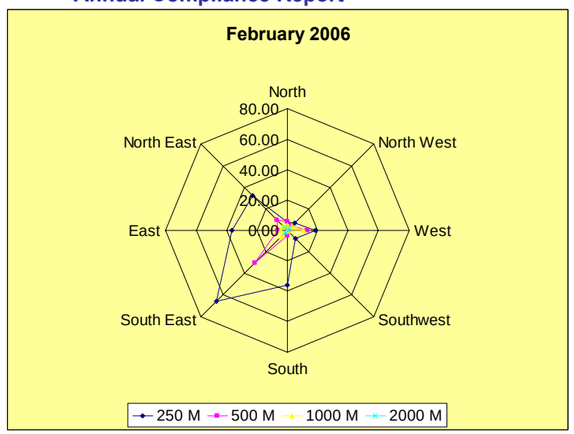
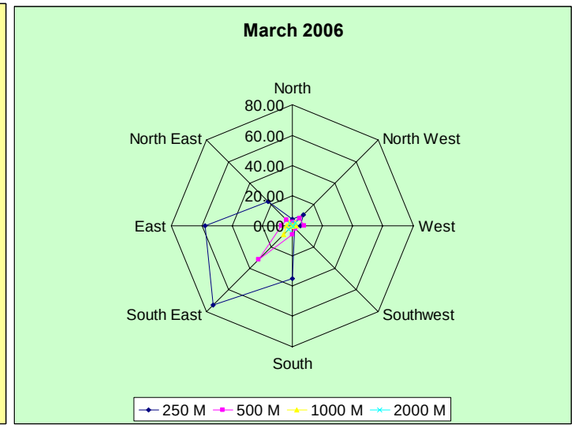
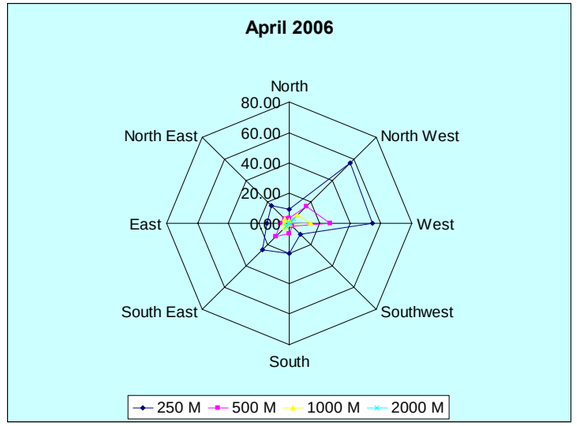


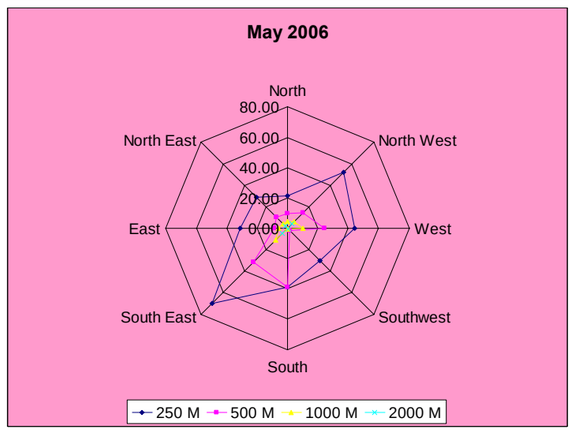
Chart 5.1: Passive Air Sampler Results

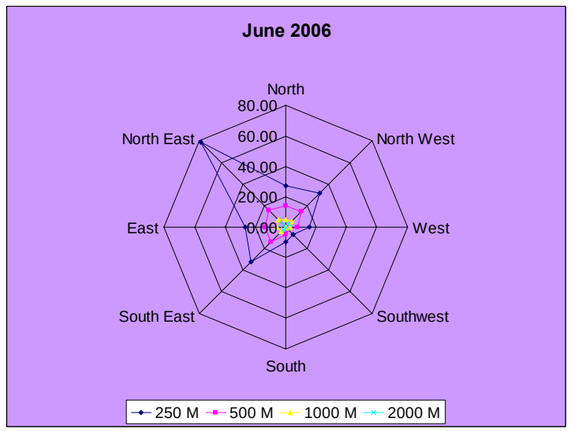


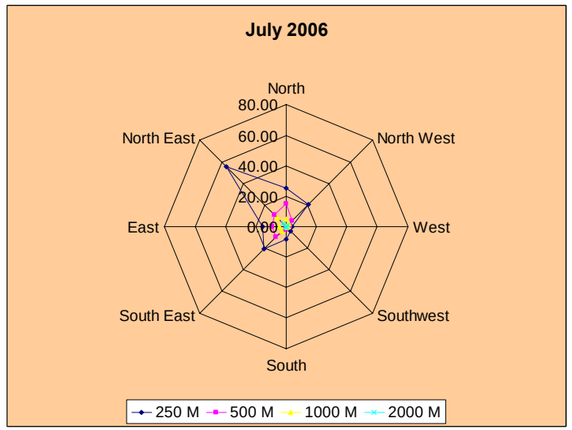


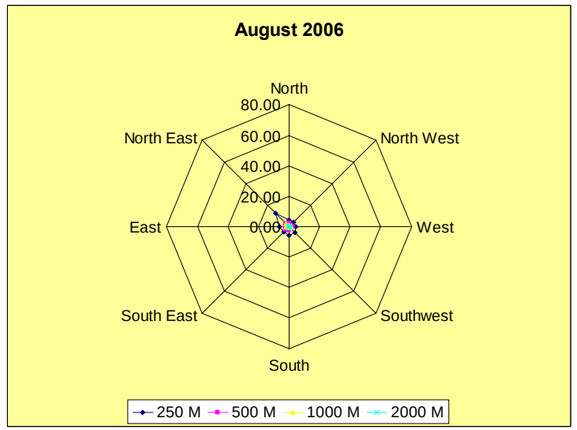


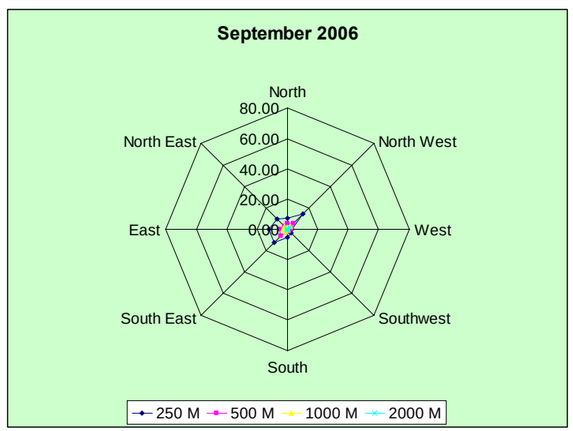


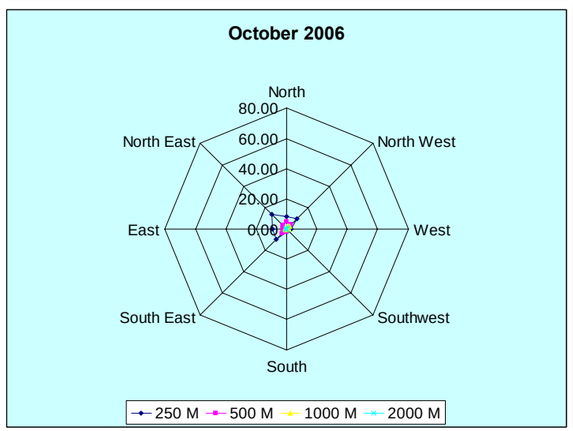


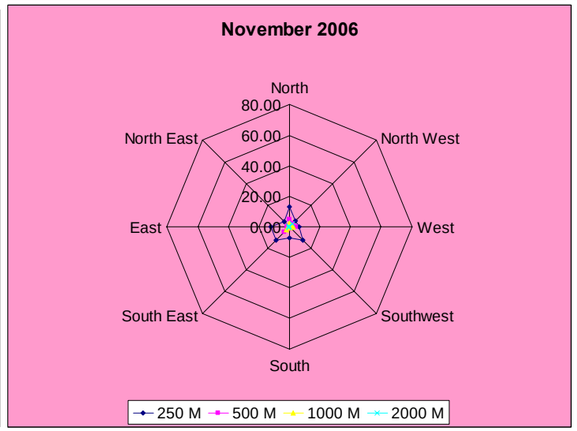












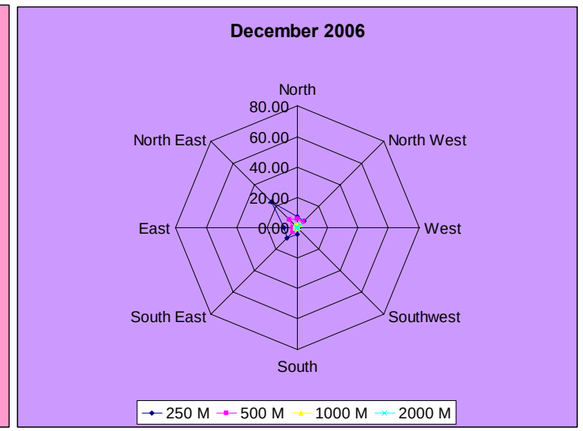


Chart 5.2: Monthly Passive Air Sample Results

2006 Estimated Effective Annual Public Dose for 'Critical Group'

The calculation method used to determine the dose to the 'Critical Group' as defined in the SRBT Environment Monitoring Program is described in the EMP document. The pathways used in the 1996 DEL calculations for the SRBT facility were based on the Canadian Standards Association CAN/CSA-N288.1-M87, *Guidelines for Calculating Derived Release Limits for Radioactive Material in Airborne and Liquid Effluents for Normal Operation of Nuclear Facilities*.
The dose assessed for the Critical Group is a summation of:

a) For the Adult non-worker, the Adult worker for time at residence, and the infant resident; dose due to the tritium exposure (inhaled and absorbed through skin) is deemed to occur at the place of residence for the time period allocated (128 hours/week for worker, 168 hours/week other), ($P_{(i)19}$ and $P_{(e)19}$),
b) For the adult worker, tritium uptake is deemed to occur at the worksite (40 hours/week), ($P_{(i)19}$ and $P_{(e)19}$), and
c) For all members of the Critical Group, tritium uptake due to consumption of produce (P_{49}) and dairy products (P_{59}), and
d) Tritium uptake due to consumption of well water (P_{29}) at place of residence (Not considered in 1996 DEL calculations).

Tritium in Air Concentration at Passive Air Sampler NW250 (previously PAS #4), $P_{(i)\&(e)19}$

Passive air samplers are replaced and analyzed monthly. Each sampler has an affinity to trap tritium in the oxide form. The passive air sampler allows air to diffuse through the orifice at a rate of about 5 liters per day. The tritium oxide contained in the air is absorbed into the liquid contained within the sampler. This liquid is a 50/50 mixture of lab grade glycol and water. Glycol reduces the evaporation of sampling medium during the hot season and freezing during the cold season. At the end of the sampling period, the collection liquid is sampled and analyzed for tritium content. The tritium content is then used to determine the tritium oxide in air concentration at the sample point.
Passive air sampler NW250 is located approximately 220 meters from the point of release for tritium in gaseous and oxide forms. The closest residence to Passive Air Sampler NW250 is located at the intersection of Boundary Road and International Drive at approximately 240 meters from the point of release.
The 2006 average concentration of tritium oxide in air at Passive Air Sampler NW250 has been determined to be **19.05Bq/m3**.

PAS 1, 2, and 13

Three passive air samplers are located close to the SRBT facility and represent the tritium oxide in air ($P_{(i)19}$ and $P_{(e)19}$) concentrations for the critical group member (adult worker) at samplers 1, 2, and 13. The sampler indicating the highest tritium oxide in air concentration is used to calculate the P19 dose values while at work. The highest average result for 2006 for PAS's 1, 2, and 13 is **35.66Bq/m^3** at PAS #13.

Adult Worker $P_{(i)19}$ and $P_{(e)19}$

$P_{(i)19}$: Adult Worker Dose Due to Tritium Oxide Inhaled at Place of Residence

The average value for tritium oxide in air for the sampler representing the place of residence for the defined critical group equals **19.05Bq/m^3**.

$$\mathbf{P_{(i)19r}} = [H\text{-}3_{air}]\ (Bq/m^3) \times Time\ (h/a) \times Breathing\ Rate\ (m^3/h) \times DCF\ for\ H\text{-}3\ (uSv/Bq)$$

$$19.05Bq/m^3 \times 6{,}400h/a \times 1.2m^3/h \times 1.8E\text{-}05uSv/Bq = \mathbf{2.6E+00uSv/a}$$

$P_{(i)19}$: Adult Worker Dose Due to Uptake of Tritium at Place of Work

The highest average for tritium oxide concentration for Passive Air Samplers #1, 2, and 13 equals **35.66Bq/m^3**.

$$\mathbf{P_{(i)19w}} = [H\text{-}3_{air}]\ (Bq/m^3) \times Time\ (h/a) \times Breathing\ Rate\ (m^3/h) \times DCF\ for\ H\text{-}3\ (uSv/Bq)$$

$$35.66Bq/m3 \times 2{,}000\ h/a \times 1.2m3/h \times 1.8E\text{-}05uSv/Bq = \mathbf{1.5E+00uSv/a}.$$

$P_{(e)19}$: Adult Worker Dose Due to Tritium Oxide Immersion at Place of Work and Residence
The value used for $P_{(e)19}$ for the Adult Worker while at work and at the place of residence is set equal to the values for $P_{(i)19}$.

Therefore, the $P_{(e)19}$ value for the Adult Worker is **$P_{(i)19r}$ + $P_{(i)19w}$ = 4.1E+00uSv/a**.

Adult Resident $P_{(i)19}$ and $P_{(e)19}$

$P_{(i)19}$: Adult Resident Dose Due to Tritium Uptake at Place of Residence
The average value for tritium oxide in air for the sampler representing the place of residence for the defined critical group equals **19.05Bq/m^3**.

$P_{(i)19}$ = [H-3_{air}] (Bq/m^3) x Time (h/a) x Breathing Rate (m^3/h) x DCF for H-3 (uSv/Bq)

19.05Bq/m^3 x 8760h/a x 1.2m^3/h x 1.8E-05uSv/Bq = **3.6E+00uSv/a**

$P_{(e)19}$: Adult Resident Dose Due to Tritium Oxide Immersion at Place of Residence
The value used for $P_{(e)19}$ for the Adult Resident while at place of residence is set equal to the value for $P_{(i)19}$.

Therefore, the $P_{(e)19}$ value for the Adult Resident is **3.6E+00uSv/a**.

Infant Resident $P_{(i)19}$ and $P_{(e)19}$

$P_{(i)19}$: Infant Resident Dose Due to Tritium Uptake at Place of Residence
The average value for tritium oxide in air for the sampler representing the place of residence for the defined critical group equals **19.05Bq/m^3**.

$P_{(i)19}$ = [H-3_{air}] (Bq/m^3) Breathing Rate (m^3/a) x DCF for H-3 (uSv/Bq)

19.05Bq/m^3 1.4E+03m^3/a x 6.4E-05uSv/Bq = **1.71E+00uSv/a**

$P_{(e)19}$: Infant Resident Dose Due to Tritium Oxide Immersion at Place of Residence
The value used for $P_{(e)19}$ for the Infant Resident while at place of residence is set equal to the value for $P_{(i)19}$.

Therefore, the $P_{(e)19}$ value for the Infant Resident is **1.71E+00uSv/a**.

P_{49}: Dose Due to Consumption of Produce

The tritium uptake due to consumption of produce, both locally purchased and home grown is calculated as follows:

a) the average tritium concentration for locally grown fruit and vegetables purchased from the local market and consuming 90% of the annual total;
b) the average tritium concentration for home grown produce and consuming 10% of the annual total; and
c) the annual consumption rate for produce (M_{prod}) of 200kg/a for adults and 84kg/a for infants,
d) produce is described as above ground leafy fruit and vegetables (AGLV), above ground non-leafy fruit and vegetables (AGNV), and below ground vegetables (BGV).

Table 5.2: P_{49}: Produce Tritium Concentration

Location/ Description	Food/ Type	Tritium Concentration (Bq/kg) assume Bq/L = Bq/kg		
		AGLV	AGNV	BGV
711 Bruham/ Market	Cucumber/AGNL		121	
	Onion/BGV			143
	Tomato/AGNL		163	
Boudens Gardens/ Market	Cucumber/AGNL		160	
	Lettuce/AGLV	113		
	Tomato/AGNV		146	
	Zucchini/AGNV		140	
Market Average [H-3]		**113.0**	**146.0**	**143.0**
Overall Market Average [H-3]			**140.8**	
416 Boundary/ Local	Potato/BGV			500
	Carrot/BGV			949
	Bean/AGNV		766	
408 Boundary/ Local	Cucumber/AGNV		271	
	Onion/BGV			692
	Tomato/AGNV		598	
413 Boundary/ Local	Apple/AGNV		1257	
414 Boundary/ Local	Cucumber/AGNV		310	
366 Chamberlain/ Local	Tomato/AGNV		80	
	Carrot/BGV			59
	Cucumber/AGNV		83	
	Potato/BGV			53
	Red beet/BGV			75
Local Garden Average [H-3]		**-**	**480.7**	**388.0**
Overall Local Garden Average [H-3]			**437.9**	

P_{49}: Adult Dose Due to Consumption of Produce
Using the data in Table P49, we can estimate the tritium uptake due to consumption of produce for adults as follows:

$$\mathbf{P_{49}} = H_{prod} = [[\mathbf{H_{prod,market}}] + [\mathbf{H_{prod,res}}]] \times 1.8E\text{-}05uSv/Bq$$

$$[[H\text{-}3_{veg}]\ (Bq/kg) \times M_{prod}\ (kg) \times 0.9] + [H\text{-}3_{veg}]\ (Bq/kg) \times M_{prod}\ (kg) \times 0.10]] \times 1.8E\text{-}05uSv/Bq$$

$$[[140.8Bq/kg \times 200kg/a \times 0.9] + [437.9Bq/kg \times 200kg/a \times 0.1]] \times 1.8E\text{-}05uSv/Bq = \mathbf{6.1E\text{-}01uSv/a}$$

P_{49}: Infant Dose Due to Consumption of Produce
Using the data in Table P49, we can estimate the tritium uptake due to consumption of produce for infants as follows:

$$\mathbf{P_{49}} = H_{prod} = [[\mathbf{H_{prod,market}}] + [\mathbf{H_{prod,res}}]] \times 5.8E\text{-}05uSv/Bq$$

$$[[H\text{-}3_{veg}]\ (Bq/kg) \times M_{prod}\ (kg) \times 0.9] + [H\text{-}3_{veg}]\ (Bq/kg) \times M_{prod}\ (kg) \times 0.10]] \times 5.8E\text{-}05uSv/Bq$$

$$[[140.8Bq/kg \times 84kg/a \times 0.9] + [437.9Bq/kg \times 84kg/a \times 0.1]] \times 5.8E\text{-}05uSv/Bq = \mathbf{8.3E\text{-}01uSv/a}$$

P_{59}: Dose Due to Consumption of Dairy

The average tritium concentration for locally produced milk procured (**13.0Bq/L x 0.97L/kg = 12.6Bq/kg**) from the local market and using the adult daily average consumption rate of 0.3L/da., we can calculate

$$\mathbf{P_{59}} = H_{dairy} = [H\text{-}3]_{dairy} \times M \times 1.8E\text{-}05uSv/Bq;$$
where adult dairy consumption rate is 120kg/a

$$[12.6Bq/kg] \times 120kg/a \times 1.8E\text{-}05uSv/Bq = \mathbf{2.7E\text{-}02uSv/a}$$

for the resident infant,

$\mathbf{P_{59}} = H_{dairy} = [H\text{-}3]_{dairy} \times M \times 5.8E\text{-}05uSv/Bq;$
where the annual dairy consumption rate is 220 kg/a
[12.6Bq/kg] x 220kg/a x 5.8E-05uSv/Bq = **1.6E-01uSv/a**

P_{29}: Dose Due to Consumption of Well Water

P_{29} was not considered in the 1996 DEL calculations as information provided by the municipality in Pembroke indicated that all residences on Boundary Road were on municipal water and sewer. This information was true; however, at or around 1980, Boundary Road was altered and; thus, came to include several residential properties that previously were listed as outside of the city of Pembroke. These residential properties became part of the city of Pembroke, but were not connected to the city water and sewer systems.
These residences and businesses include the following:

- 204 Boundary Road (Performance Wood Burning)
- 206 Boundary Road (Residence)
- 208 Boundary Road (Residence)
- Superior Propane (Office)
- Superior Propane (Truck Wash)
- International Lumber (Office)

Also included in the well water sampling:

- 40925 Highway 41 (Reiche Home Hardware)
- 40987 Highway 41 (Residence)
- 711 Bruham Avenue (Residence)
- 171 Sawmill Road (Residence)
- 183 Mud Lake Road (Residence)
- 185 Mud Lake Road (Residence)
- 413 Boundary Road (Residence)

Several values for tritium concentration in well water have been displayed in Table 5.3.

Table 5.3: P_{29}

Well Description	Sample Date and Tritium Activity (Bq/L)										
	1/5/6	1/12/6	19/1/6	26/1/6	2/2/6	2/15/6	2/24/6	10/13/6	10/26/6	11/15/6	**Ave.**
413 Boundary	1872	1915	1895	1902	1900	1826	2061	1626			**1874**
183 Mud Lake	331	397	411	437	423		481	366			**406**
185 Mud Lale	354	388		362				313			**354**
171 Sawmill		13		18			15	14			**15**
711 Bruham		3	2	4	2	3	2	4			**3**
40925 Hwy 41								90			**90**
40987 Hwy 41							77	67			**72**
204 Boundary									260		**260**
206 Boundary										455	**455**
208 Boundary										7	**7**
Superior (Office)									1264		**1264**
Superior Truck Wash									2145		**2145**
International Lumber										15	**15**

The well at 413 Boundary Road at 1874 Bq/L was also analyzed for various ion contents. The results indicated the possibility of a breach in the well casing that would allow the infiltration of surface water. Such a well would not meet with Ontario Ministry of the Environment requirements for a well as a potable water source. Such a well would also not be indicative of a typical well that would be approved for use in a new construction.
One well at the Superior Propane property services the office and the other is for truck washing.
The well value deemed most appropriate for assessment is located at 206 Boundary Rd. with 455 Bq/L.

If we use the well at 206 Boundary Road with a value of 455 Bq/L, we can calculate the probable annual effective dose to the critical group member other than the infant due to consumption as:

$$\mathbf{P_{29}} = [H\text{-}3]_{well} \times M \times 1.8E\text{-}05 uSv/Bq;$$

where M = mass of water consumer per year = 700L/a

$$P_{29} = 455\ Bq/L \times 700L/a \times 1.8E\text{-}05 uSv/Bq = \mathbf{5.7uSv/a}$$

For the **resident infant** consuming 300L of water per year at a concentration of 405Bq/L. the probable annual effective dose due to consumption is:

$$\mathbf{P_{29}} = [H\text{-}3]_{well} \times M \times 5.8E\text{-}05 uSv/Bq;$$

where M = mass of water consumer per year = 300L/a

$$P_{29} = 455Bq/L \times 300L/a \times 5.8E\text{-}05 uSv/Bq = \mathbf{7.9uSv/a}$$

Defined Critical Group Annual Dose Due to Tritium Uptake

The annual dose (P_{total}) due to tritium uptake from inhalation and immersion in tritium (skin absorption) in the air at or near the home; at the workplace; from consumption of locally grown fruit and vegetables, locally produced milk, and well water consumption equates to approximately **14.5uSv** to an adult worker, a member of the defined critical group as per estimates in the SRBT environmental monitoring program.

The estimated dose to a member of the critical group is determined by the following equation:

$$P_{total} = P_{(i)19} + P_{(e)19} + P_{29} + P_{49} + P_{59}$$

The highest critical group member dose is based on a hypothetically derived individual who:

- ($\mathbf{P_{(i)19}}$ and $\mathbf{P_{(e)19}}$)works at or near the SRBT facility for 2000 hours of the year,
- ($\mathbf{P_{(i)19}}$ and $\mathbf{P_{(e)19}}$)resides at 400 Boundary Road for the remainder of the 8760 hours of the year,
- ($\mathbf{P_{49}}$)consumes 200 kilograms of produce per year, whereby 10% comes from a garden at the place of residence and 90% is purchased from a local market,
- ($\mathbf{P_{29}}$)drinks only water provided through a well, and
- ($\mathbf{P_{59}}$)drinks only milk provided by local manufacturers and producers.

Table 5.4: Annual Dose Due to Uptake of Tritium

Dose Contributor		Adult Worker Annual Dose (uSv/a)	Adult Resident Annual Dose (uSv/a)	Infant Resident Annual Dose (uSv/a)
Annual dose due to inhalation of HTO at work	$\mathbf{P_{(i)19}}$	2.6	-	-
Annual dose due to skin absorption of HTO at work	$\mathbf{P_{(e)19}}$	2.6	-	-
Annual dose due to inhalation of HTO at residence	$\mathbf{P_{(i)19}}$	1.5	3.6	1.7
Annual dose due to skin Absorption of HTO at residence	$\mathbf{P_{(e)19}}$	1.5	3.6	1.7
Annual dose due to consumption of well water	$\mathbf{P_{29}}$	5.7	5.7	7.9
Annual dose due to consumption of produce	$\mathbf{P_{49}}$	0.6	0.6	0.9
Annual dose due to dairy consumption	$\mathbf{P_{59}}$	0.03	0.03	0.1
Total Annual Dose due to Tritium Uptake	$\mathbf{P_{total}}$	**14.5**	**11.5**	**12.3**

6. Facility Effluents

Liquid Effluent
In the CNSC issued license, NSPFOL-13.00/2006, in Appendix C, the limit for release of HTO to the municipal sewer system is regulated at 200 GBq per year.
SRBT monitors the liquid effluent in accordance with operational procedure RSO-013. The procedure includes the sampling and assessment for HTO concentration and volume for the waters used in the betalight scintillation assessments, emissions monitoring assessments, and cleaning wash waters.
SRBT has assessed the liquid effluent concentrations and has determined that the total activity released to the municipal effluent system during 2006 was approximately 43.2GBq, or about 21.6% of the 200GBq per year limit as per Table 6.1.

Table 6.1: Liquid Effluent Release of HTO for 2006

Description	Quantity Liquid Effluent
Liquid Effluent to Municipal Sewer	43.2 GBq, equals 21.6% of Annual Limit (200 GBq/a)

Downstream Liquid Assessment
SRBT has assessed the concentration of HTO in waters downstream of the SRBT facility such as the Waste Water Treatment Plant located on Rankin Street, the Pump-up Lift Station located on Bennett Street, and along the Ottawa River downstream from the effluent of the Waste Water Treatment Plant (WWTP).
Results were reported to the following:

- City of Pembroke Waste Water Treatment Plant staff,
- Ontario Ministry of the Environment, and
- Canadian Nuclear Safety Commission staff.

Tritium in water concentration results at the WWTP indicate less than 2% of the Ontario Interim Drinking Water Guideline of 7000 Bq/L. The results at the Townline Lift Station indicate less than 4%. Water samples taken along the Ottawa River, downstream of Pembroke, show results around the detectable capabilities for analysis as per Table 6.2.

Table 6.2: Waste Water Treatment Plant (WWTP) Sample Analysis for H-3 in Water

Sample Date	Sample Description	Sample Result (Bq/L)
	Ontario Drinking Water Standard	7000
Oct. 13, 2006	WWTP/ Water	139
Oct. 24 – 31, 2006	WWTP/ Water	143
Oct. 31 – Nov. 7, 2006	WWTP/ Water	124
Nov. 7 – 14, 2006	WWTP/ Water	137
Nov. 14 – 21, 2006	WWTP/ Water	129
Nov. 21 – 28, 2006	WWTP/ Water	145
Nov. 28 – Dec. 5, 2006	WWTP/ Water	112
Dec. 6 – 12, 2006	WWTP/ Water	109
Dec. 13 – 19, 2006	WWTP/ Water	118
Dec. 20 – Jan. 2, 2007	WWTP/ Water	124
	Average	**128**
Other Sampling Analysis		
Oct. 31, 2006	WWTP/ Sludge	258
Nov. 15, 2006	Townline Lift Station/ Water	282
Dec. 10, 2006	Ottawa River @ Westmeath	5
Dec. 9, 2006	Ottawa River @ Arnprior	<3
Dec. 9, 2006	Madawaska River @ Arnprior	4

Gaseous Effluent
Gaseous effluent samples were taken on a weekly basis in accordance with operational procedure RSO-006. Tritium emissions from the facility are determined by continuously drawing a known volume of sample from the known volume of exhaust gas released through the two main air handling units for Zone 3 and then analyzing for tritium content in the samples.

Emissions Data
In 1996 SRBT provided, to the AECB (now CNSC), derived emission limit (DEL) calculations for the assessment of annual dose to the defined critical group. The 1996 DEL calculations were based on the CSA document, Guidelines for Calculating Derived Release Limits for Radioactive Material in Airborne and Liquid Effluent for Normal Operation of Nuclear Facilities (CAN/CSA-N288.1-M87), which remains the standard for calculation of DRL's.
In January 2006 SRBT provided, to the CNSC, derived release limit (DRL) calculations for the assessment of annual dose to the defined critical group. The January 2006 DRL calculations were based on the CANDU Owners Group document, Derived Release Limits Guidance, 2005.
CNSC staff did not accept the January 2006 DRL submissions.
In September 2006 SRBT provided, to the CNSC, derived release limit (DRL) calculations for the assessment of annual dose to the defined critical group. The September 2006 DRL calculations were based on a culmination of the CANDU Owners Group document, Derived Release Limit Guidance, 2005, along with recommendations of CNSC staff.

Chart 6.1 below shows the graph of the weekly gaseous emissions calculations as a percent of the License Condition Weekly Release Limit for the year 2006.

Chart 6.1: 2006 Emissions Monitoring

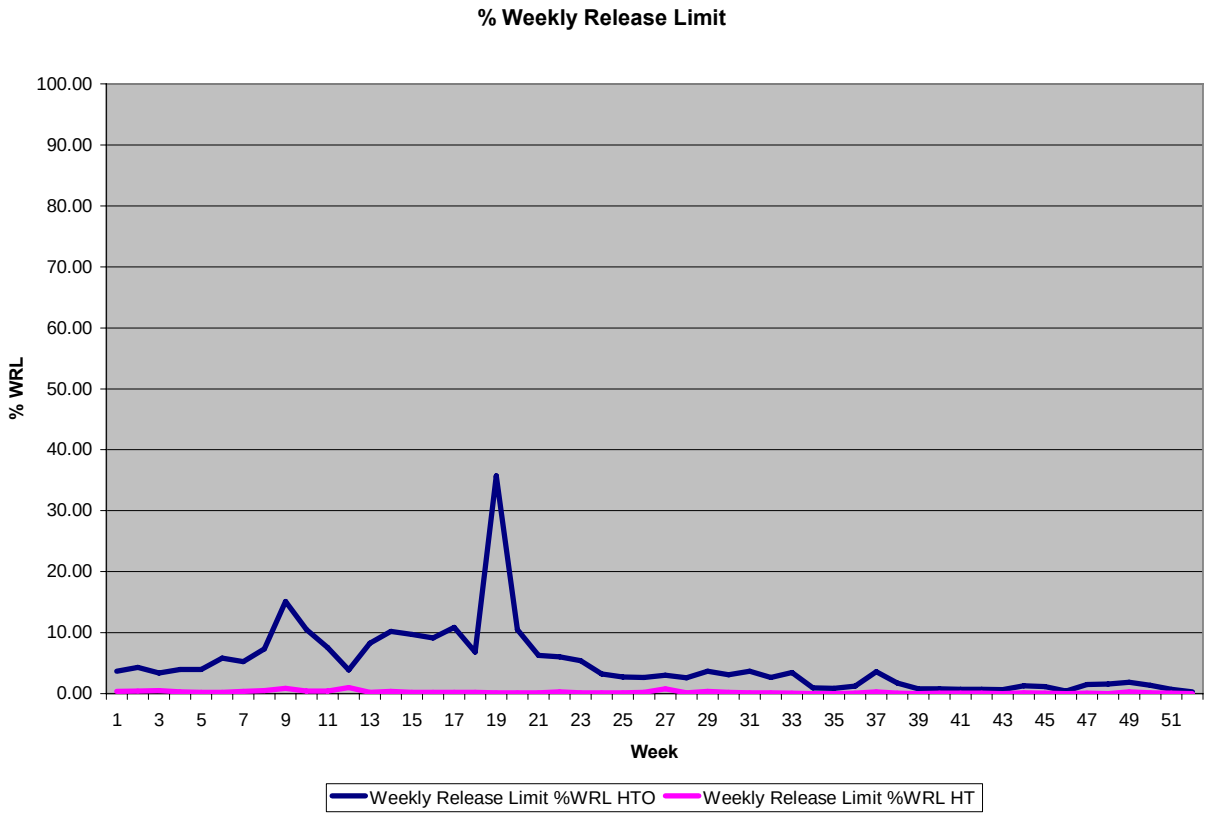
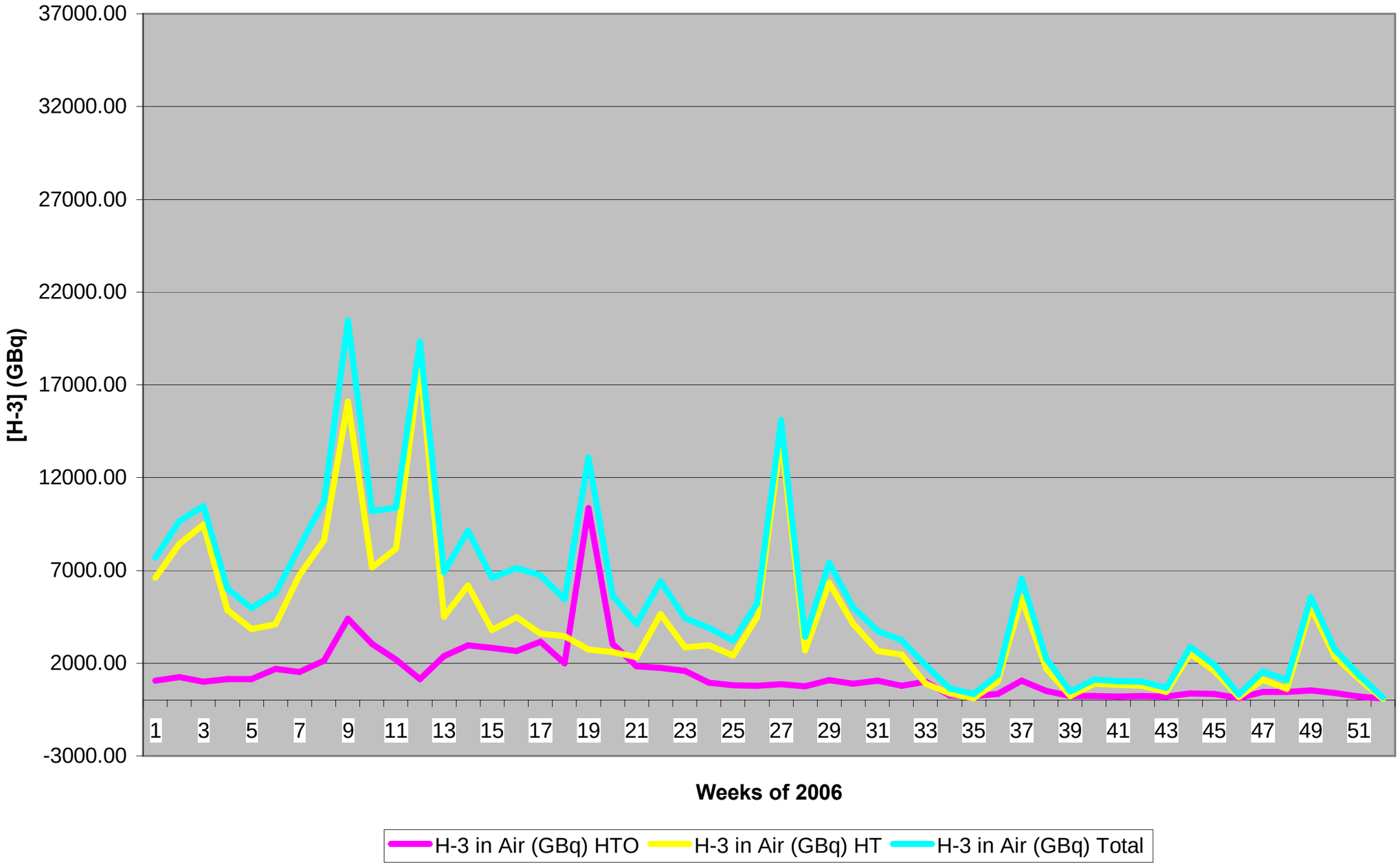


Table 6.3 below shows the annual dose in microseiverts per year (uSv/a) for the various members of the defined critical group based on the above mentioned 1996 DEL and 2006 DRL submissions.

Table 6.3: Gaseous Emissions Data and Calculated Results

Stack Release Data								1996 SRBT DEL %DEL			Weekly Release Limit %WRL		2006 SRBT DRL % DRL				
Week	Date		H-3 in Air (GBq)			(GBq)											
	Initial	Final	HTO	HT	Total	∑(HTO)	∑(HTO + HT)	Adult Resident	Infant Resident	Adult Worker	HTO	HT	Adult Resident	Infant Resident	Nursing Infant	Nursing Mother	Adult Worker
1	1/5/2006	1/12/2006	1063.50	6612.40	7675.90	1063.50	7675.90	0.22	0.14	0.25	3.67	0.37	0.78	0.60	1.29	0.80	0.76
2	1/12/2006	1/19/2006	1259.90	8412.80	9672.70	2323.40	17348.60	0.26	0.17	0.30	4.34	0.47	0.94	0.73	1.55	0.97	0.92
3	1/19/2006	1/26/2006	990.90	9468.90	10459.80	3314.30	27808.40	0.21	0.14	0.24	3.42	0.53	0.81	0.63	1.36	0.84	0.79
4	1/26/2006	2/2/2006	1148.50	4872.50	6021.00	4462.80	33829.40	0.24	0.14	0.27	3.96	0.27	0.79	0.60	1.28	0.81	0.77
5	2/2/2006	2/9/2006	1138.50	3845.50	4984.00	5601.30	38813.40	0.23	0.14	0.26	3.93	0.21	0.75	0.57	1.22	0.77	0.74
6	2/9/2006	2/16/2006	1685.60	4096.30	5781.90	7286.90	44595.30	0.34	0.19	0.39	5.81	0.23	1.08	0.81	1.73	1.11	1.05
7	2/16/2006	2/22/2006	1529.20	6727.80	8257.00	8816.10	52852.30	0.32	0.19	0.36	5.27	0.37	1.05	0.81	1.72	1.08	1.03
8	2/22/2006	3/2/2006	2126.00	8607.30	10733.30	10942.10	63585.60	0.44	0.26	0.50	7.33	0.48	1.44	1.10	2.35	1.48	1.41
9	3/2/2006	3/9/2006	4391.20	16080.10	20471.30	15333.30	84056.90	0.90	0.53	1.02	15.14	0.89	2.94	2.24	4.77	3.02	2.88
10	3/9/2006	3/16/2006	3040.50	7156.90	10197.40	18373.80	94254.30	0.62	0.35	0.70	10.48	0.40	1.94	1.46	3.11	1.99	1.89
11	3/16/2006	3/23/2006	2196.70	8171.70	10368.40	20570.50	104622.70	0.45	0.26	0.51	7.57	0.45	1.47	1.12	2.39	1.51	1.44
12	3/23/2006	3/27/2006	1135.50	18192.50	19328.00	21706.00	123950.70	0.25	0.19	0.29	3.92	1.01	1.11	0.89	1.91	1.15	1.09
13	3/27/2006	4/3/2006	2391.40	4514.80	6906.20	24097.40	130856.90	0.49	0.27	0.55	8.25	0.25	1.49	1.13	2.39	1.53	1.46
14	4/3/2006	4/10/2006	2958.30	6177.60	9135.90	27055.70	139992.80	0.60	0.34	0.68	10.20	0.34	1.86	1.41	2.99	1.91	1.82
15	4/10/2006	4/17/2006	2827.60	3775.10	6602.70	29883.30	146595.50	0.57	0.31	0.65	9.75	0.21	1.73	1.30	2.75	1.77	1.69
16	4/17/2006	4/24/2006	2658.80	4464.70	7123.50	32542.10	153719.00	0.54	0.30	0.61	9.17	0.25	1.65	1.24	2.63	1.69	1.61
17	4/24/2006	5/1/2006	3160.50	3589.80	6750.30	35702.60	160469.30	0.64	0.35	0.72	10.90	0.20	1.92	1.44	3.05	1.96	1.87
18	5/1/2006	5/8/2006	1993.70	3446.60	5440.30	37696.30	165909.60	0.40	0.22	0.46	6.87	0.19	1.24	0.93	1.98	1.27	1.21
19	5/8/2006	5/15/2006	10350.50	2731.50	13082.00	48046.80	178991.60	2.07	1.11	2.36	35.69	0.15	6.05	4.50	9.54	6.20	5.91
20	5/15/2006	5/23/2006	3049.80	2589.90	5639.70	51096.60	184631.30	0.61	0.33	0.70	10.52	0.14	1.83	1.37	2.90	1.87	1.79
21	5/23/2006	5/29/2006	1817.90	2311.00	4128.90	52914.50	188760.20	0.37	0.20	0.42	6.27	0.13	1.11	0.83	1.76	1.14	1.08
22	5/29/2006	6/5/2006	1743.57	4649.81	6393.38	54658.07	195153.58	0.36	0.20	0.40	6.01	0.26	1.12	0.85	1.81	1.15	1.10
23	6/5/2006	6/12/2006	1576.06	2835.14	4411.20	56234.13	199564.78	0.32	0.18	0.36	5.43	0.16	0.98	0.74	1.57	1.01	0.96
24	6/12/2006	6/19/2006	939.52	2969.85	3909.37	57173.65	203474.15	0.19	0.11	0.22	3.24	0.16	0.62	0.47	1.00	0.63	0.60
25	6/19/2006	6/26/2006	793.45	2418.27	3211.72	57967.10	206685.87	0.16	0.09	0.18	2.74	0.13	0.52	0.39	0.84	0.53	0.51
26	6/26/2006	7/4/2006	767.45	4466.79	5234.24	58734.55	211920.11	0.16	0.10	0.18	2.65	0.25	0.55	0.43	0.91	0.57	0.54
27	7/4/2006	7/10/2006	872.93	14230.45	15103.38	59607.48	227023.49	0.20	0.15	0.22	3.01	0.79	0.86	0.69	1.48	0.89	0.84
28	7/10/2006	7/17/2006	756.56	2676.26	3432.82	60364.04	230456.31	0.16	0.09	0.18	2.61	0.15	0.50	0.38	0.82	0.52	0.49
29	7/17/2006	7/24/2006	1071.18	6321.53	7392.71	61435.22	237849.02	0.22	0.14	0.25	3.69	0.35	0.78	0.60	1.28	0.80	0.76
30	7/24/2006	7/31/2006	888.03	4123.07	5011.10	62323.25	242860.12	0.18	0.11	0.21	3.06	0.23	0.62	0.47	1.01	0.63	0.60
31	7/31/2006	8/8/2006	1058.81	2665.35	3724.16	63382.06	246584.28	0.22	0.12	0.24	3.65	0.15	0.68	0.51	1.09	0.70	0.66
32	8/8/2006	8/14/2006	771.33	2455.18	3226.51	64153.39	249810.79	0.16	0.09	0.18	2.66	0.14	0.51	0.39	0.82	0.52	0.50
33	8/14/2006	8/21/2006	992.09	882.01	1874.10	65145.48	251684.89	0.20	0.11	0.23	3.42	0.05	0.60	0.45	0.94	0.61	0.58
34	8/21/2006	8/28/2006	265.94	373.67	639.61	65411.42	252324.50	0.05	0.03	0.06	0.92	0.02	0.16	0.12	0.26	0.17	0.16
35	8/28/2006	9/5/2006	240.92	107.42	348.34	65652.34	252672.84	0.05	0.03	0.05	0.83	0.01	0.14	0.11	0.22	0.15	0.14
36	9/5/2006	9/11/2006	350.35	1007.37	1357.72	66002.69	254030.56	0.07	0.04	0.08	1.21	0.06	0.23	0.17	0.37	0.23	0.22
37	9/11/2006	9/18/2006	1041.65	5511.79	6553.44	67044.34	260584.00	0.22	0.13	0.25	3.59	0.31	0.74	0.57	1.21	0.76	0.72
38	9/18/2006	9/25/2006	508.49	1720.53	2229.02	67552.83	262813.02	0.10	0.06	0.12	1.75	0.10	0.34	0.26	0.55	0.35	0.33
39	9/25/2006	10/2/2006	234.34	239.81	474.15	67787.17	263287.17	0.05	0.03	0.05	0.81	0.01	0.14	0.11	0.22	0.14	0.14
40	10/2/2006	10/8/2006	219.84	898.56	1118.40	68007.01	264405.57	0.05	0.03	0.05	0.76	0.05	0.15	0.11	0.24	0.15	0.15
41	10/8/2006	10/16/2006	210.96	829.87	1040.83	68217.97	265446.40	0.04	0.03	0.05	0.73	0.05	0.14	0.11	0.23	0.15	0.14
42	10/16/2006	10/22/2006	215.85	791.75	1007.60	68433.82	266454.00	0.04	0.03	0.05	0.74	0.04	0.14	0.11	0.23	0.15	0.14
43	10/22/2006	10/30/2006	198.25	459.44	657.69	68632.07	267111.69	0.04	0.02	0.05	0.68	0.03	0.13	0.10	0.20	0.13	0.12
44	10/30/2006	11/6/2006	365.44	2514.39	2879.83	68997.51	269991.52	0.08	0.05	0.09	1.26	0.14	0.27	0.21	0.45	0.28	0.27
45	11/6/2006	11/13/2006	338.77	1585.14	1923.91	69336.28	271915.43	0.07	0.04	0.08	1.17	0.09	0.24	0.18	0.38	0.24	0.23
46	11/13/2006	11/20/2006	125.71	175.02	300.73	69461.99	272216.16	0.03	0.01	0.03	0.43	0.01	0.08	0.06	0.12	0.08	0.08
47	11/20/2006	11/27/2006	435.77	1121.87	1557.64	69897.76	273773.80	0.09	0.05	0.10	1.50	0.06	0.28	0.21	0.45	0.29	0.27
48	11/27/2006	12/4/2006	451.53	618.92	1070.45	70349.29	274844.25	0.09	0.05	0.10	1.56	0.03	0.28	0.21	0.44	0.28	0.27
49	12/4/2006	12/11/2006	534.96	5024.38	5559.34	70884.25	280403.59	0.11	0.08	0.13	1.84	0.28	0.43	0.34	0.73	0.45	0.43
50	12/11/2006	12/18/2006	389.79	2358.79	2748.58	71274.04	283152.17	0.08	0.05	0.09	1.34	0.13	0.28	0.22	0.47	0.29	0.28
51	12/18/2006	12/23/2006	200.55	1151.92	1352.47	71474.59	284504.64	0.04	0.03	0.05	0.69	0.06	0.14	0.11	0.24	0.15	0.14
52	12/23/2006	1/2/2007	87.82	52.82	140.64	71562.41	284645.28	0.02	0.01	0.02	0.30	0.00	0.05	0.04	0.08	0.05	0.05
Annual	**Total**		71562.41	213082.87	284645.28			**Average % DEL**			**Average %WRL**		**Average % DRL**				
Weekly	**Average**		1376.20	4097.75	5473.95			0.28	0.16	0.32	4.75	0.23	0.90	0.68	1.45	0.92	0.88
				(Bq/a)	% Release Limit			**Dose (uSv/a)**					**Dose (uSv/a)**				
Proposed Release Limit:		**HTO**		**1.35E+14**	53.01			2.81	1.62	3.19			8.97	6.81	14.49	9.22	8.78
		HTO + HT		**5.21E+14**	54.63			**Adult Resident**	**Infant Resident**	**Adult Worker**	**HTO**	**HT**	**Adult Resident**	**Infant Resident**	**Nursing Infant**	**Nursing Mother**	**Adult Worker**
Derived Weekly HTO Release/Emission Limit (GBq/week)								**5.00E+05**	**9.40E+05**	**4.40E+05**	**2.90E+04**	**NA**	**1.73E+05**	**2.33E+05**	**1.10E+05**	**1.69E+05**	**1.77E+05**
Derived Weekly HT Release/ Emission Limit (GBq/week)								**6.60E+07**	**2.70E+07**	**6.40E+07**	**NA**	**1.80E+06**	**4.02E+06**	**4.52E+06**	**2.07E+06**	**3.80E+06**	**4.07E+06**

Emissions Data



The most limiting annual dose is highlighted for each derivation. The estimated doses are based on average weekly emissions of **HTO at 1.3E+12Bq** and **HT at 4.0E+12Bq** as per Table 6.4.

Table 6.4 Critical Group Member Dose Derivations

Comparison of Release Limit Derivations for 2006 Emissions (uSv/a)				
Adult Resident	**Infant Resident**	**Nursing Infant**	**Nursing Mother**	**Adult Worker**
1996 DEL Calculations based on CAN/CSA-N288.1-M87				
2.81	1.62	NA	NA	**3.19**
Sept. 2006 DRL Calculations based on COG document OPG DRL Guidance, 2005				
8.97	6.81	**14.49**	9.22	8.78

Discussion:
The environmental monitoring program (EMP) data shows the annual dose value for the Adult Worker at about 14.5uSv. The Adult Worker result from the EMP compares favourably with the highest value determined through the gaseous emissions data for the September 2006 DRL Calculations; however, the DRL calculations show that the Nursing Infant is the most exposed member of the Critical Group.

Several items to take into consideration when using the data from the EMP include the following:

- Ontario Power Generation indicated in the 2005 Annual Compliance Report that they found the Passive Air Samplers showed values twice that of the active air samplers. If such was true, the values for P(e)19 and P(i)19 would be half of the calculated values shown.
- The well sample value P29 uses the highest value assessed for residential wells (455 Bq/L) used for drinking water. Other wells in the general area were assessed to have tritium concentrations at 3, 7, 15, 72, 90, 260, 354, and 406 Bq/L.
- The value used for consumption of well water (P29) for the Infant Resident was taken from CAN/CSA-N288.1-M87 as 300 L/a, based on an infant drinking reconstituted powdered milk. Otherwise the volume of liquid consumed per year would be 90 L/a, decreasing the P29 value to 30% of the value used in this dose assessment.

Hazardous Substance Releases

Ontario Ministry of the Environment Certificate

The Ontario Ministry of the Environment (MOE) issued to SRB Technologies (Canada) Inc., in accordance with Section 9 of the Ontario Environment Protection Act, a 'Certificate of Approval (Air), Number 5310-4NJQE

7. Waste Management

Waste Management Program

SRBT has developed the waste management program to include all waste handling activities on site and not solely the handling of radioactive materials for transfer to a waste management facility. The Waste Management Program was submitted to the CNSC for review and comment on April 14, 2006.

Radioactive Consignments to a CNSC Licensed Waste Management Facility

In 2006 there were two (2) shipments of waste material identified as Class 7, UN2915, Type A packages that were transferred to a CNSC licensed waste handling facility for decay storage.

WM-2006-001: Ship Date: January 10, 2006

Shipment WM-2006-001 included 18 x 200-L drums of tritium contaminated crushed glass. Total H-3 activity of the consignment was 72.0-TBq.

WM-2006-002: Ship Date: May 5, 2006

Shipment WM-2006-002 included 2 x 200-L drums of tritium contaminated crushed glass. Total H-3 activity was stated as 8.0-TBq.

The above consignments were prepared in conformance with the requirements of the CNSC regulatory document, Packaging and Transport of Nuclear Substances Regulations, which refers to the IAEA Safety Standards Series, Regulations for the Safe Transport of Radioactive Material, 1996 Edition (Rev.1), TS-R-1.

Low Level Radioactive Material Contaminated Items

Items such as lab coats, shoe covers, gloves, and cleaning cloths that are assessed to have, on non-fixed swipe, less than 4.0 Bq/cm^2, averaged over 100 square centimeters, have been placed in 200-L steel drums and sealed. The drums are assessed for external non-fixed contamination and integrity prior to being assigned to storage in the locked compound at the rear of the facility. The drums have been placed on pallets to raise them up from the ground and covered to protect them from inclement weather conditions. The drums have been inspected monthly for potential off-gassing and container integrity.

8. Facility Updates

Health and Safety
The industrial Health and Safety Program for the SRBT facility is compliant with the requirements of the Ontario Ministry of Labour, Occupational Health & Safety Act, RSO 1990, Chapter 01, and WHMIS Regulation.

Ontario Ministry of Labour
During 2006 there were no facility visits by a representative of the Ministry of Labour.

SRBT Joint Health & Safety Committee
The SRBT Joint Health & Safety Committee met quarterly during 2006 to discuss health and safety issues and facility inspections.
During 2006 there were 33 minor incidents reported to the SRBT Joint Health & Safety Committee, as shown in Table 8.1. Of the 33 incidents, 4 individuals were taken to the outpatient department at the local hospital for precautionary assessment. Accident and incident results of the quarterly Joint Health and Safety Committee meetings is shown in Table 8.1.
The one reported lost time incident was due to a chemical burn (HF_{aq}) incident that occurred on February 8, 2006.

Table 8.1: Accident/Incident Synopsis for 2006:

Description	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.
Minor accidents involving cuts or burns:	13	10	3	4
Minor injuries such as pulled muscles, etc.	2	0	0	1
Incidents whereby persons were sent to outpatients	2	0	1	1
Lost time incident (days lost)	29	68	63	61

Security Review
CNSC staff has reviewed the security program for the SRBT facility.
Details of security for the SRBT facility are described in the SRBT document, Security Program.

Emergency Preparedness
SRB Technologies (Canada) Inc. has various components to deal with emergency situations with tritium incidents and fire scenarios. The details of emergency preparedness are described in the SRBT document, Emergency Program.

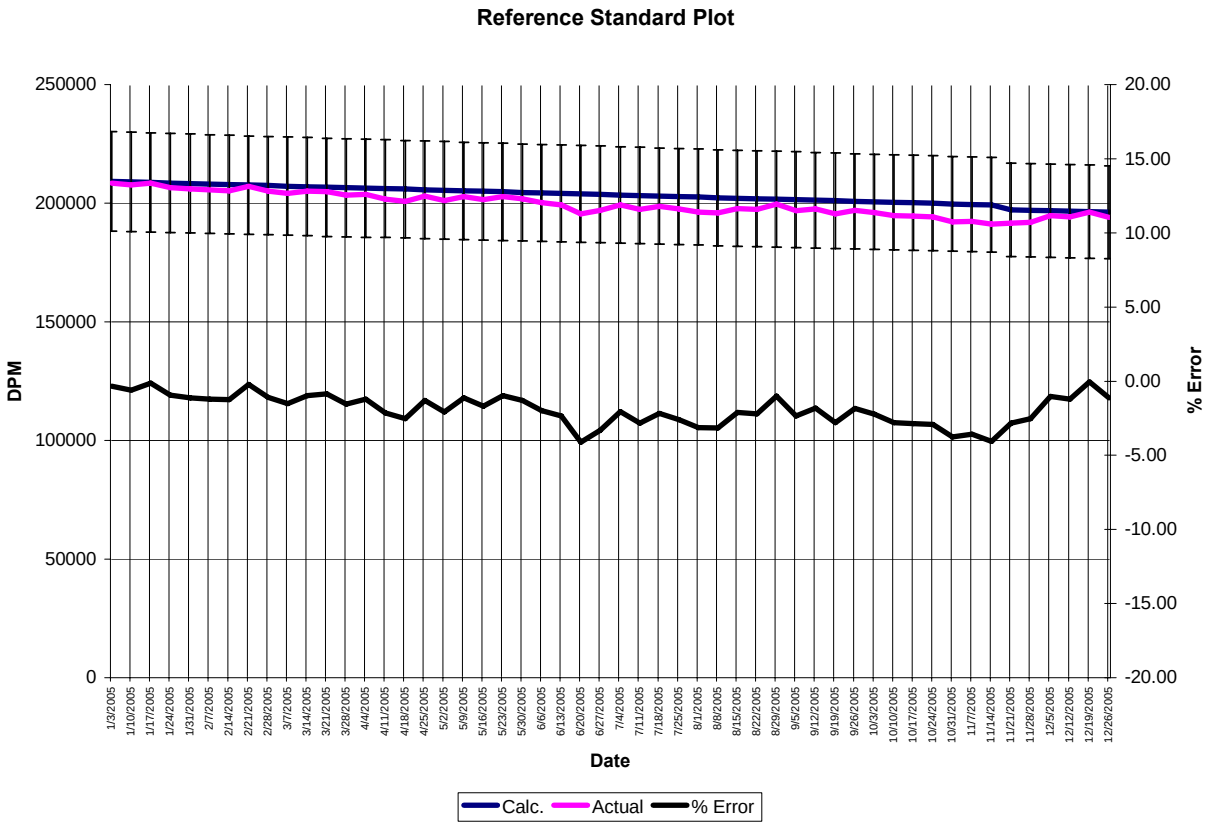
Quality Assurance
The quality assurance program has been submitted and reviewed by CNSC staff. Revisions have been made in accordance with a schedule as agreed between SRBT and CNSC staff.
SRBT has performed in-house audits of all processes in accordance with ISO9001:2000.

Results of the Liquid Scintillation Counting Quality Assurance Program
The LSC-QA program includes:
a) Weekly instrument efficiency checks using NIST traceable standards of a blank, H-3 and C-14 standards,
b) Analysis performance checks using NIST traceable reference standards set in a matrix similar to the samples prepared for analysis,
c) Annual preventative maintenance carried out as per contract provider for each LSC instrument: Wallac 1215 and Wallac 1409, and
d) Participation in the annual Health Canada, National Calibration Reference Centre for Bioassay, Tritium Urinalysis Intercomparison program.

The reference standard used in the analysis performance checks is Perkin-Elmer product number 1210-120 ^{3}H for Organic Solvents (^{3}H-O).
The absolute activity of the capsules is calibrated by comparison with the reference standards of tritiated toluene supplied by the National Institute of Standards and Technology (NIST), USA. The Standard Reference Material (SRM) is certified to have an estimated accuracy of ± 1.2%.

Chart 8.1 below shows the results of the weekly instrument performance assessment whereby the Wallac 1409 liquid scintillation counter performed well within the specified criteria.

Chart 8.1: 2006 Weekly Instrument Performance Report for Wallac 1409 LSC



Production Equipment
SRBT has replaced all oil-sealed high-vacuum pumps units with high-vacuum scroll type pumps. The scroll type pump does not contain oil that is capable of absorbing and containing tritium.

Inventory of oil-sealed high-vacuum pumps remaining on site:

Pump Description	Quantity	Summary of Oil Content
Oil-sealed high-vacuum	17	6 drained of oil 11 containing small quantity of oil
Oil diffusion	6	2 with ~75 ml of oil 4 with <75 ml of oil

Research and Development
All product sold by SRBT to end users in Ontario and Canada are not one-off custom designed and were originally designed in England many years ago and have since been certified by the CNSC pursuant to the Nuclear Safety and Control Act (NSC Act) and the Nuclear Substances

and Radiation Devices (NSRD) Regulations. The only modifications to product that take place are of an esthetic nature, for example changing the legend (face plate) of a sign, or the colour of components.
Changes of this nature do not require the use of engineering principles; and, are authorized by the President and other approved staff members.
Product sold in Canada to CNSC licensed facilities are manufactured to customer drawing requiring no engineering design from SRBT staff.
Products sold in the rest of the world are manufactured as per established design or customer requirement. Changes to designs are made taking into account the customer and relevant regulatory requirements.

Waste Management

Waste management activities are described in Section 7.

Fire Protection

In 2006, SRBT contracted to Drapeau for the installation of a fire sprinkler system to encompass the entire SRBT facility. With consulting services provided by Nadine International and the Pembroke Fire Department, the system was approved, installed and prepared for service.
The installed system meets the requirements of the National Building Code and NFPA 13 for a facility described as Ordinary Hazard, Group 2 Occupancy.
A monthly maintenance program is scheduled for the fire sprinkler system.

Inspections and Reviews

In 2006, both the Pembroke Fire Department and Nadine International Inc performed the yearly fire protection inspection.

Pembroke Fire Department

The Pembroke Fire Department performed an inspection on March 3, 2005 with a number of findings that were also rectified in 2005.

Nadine International Inc.

Nadine International Inc. also performed an inspection of the facility on November 27, 2005 with the main focus on providing recommendations in order to close all outstanding directives raised by the CNSC.

CNSC Fire Safety Inspections

CSNC staff did not perform an inspection for Fire Safety of the SRBT facility in 2006.

Fire Safety Training

SRBT and the Pembroke Fire Department cooperate to provide training to staff members for fire prevention and fire response.

Emergency Responder Training

Full time and volunteer personnel for the Pembroke Fire Department received training from SRBT on September 12, 2006 on how to address incident scenarios at our facility.

Fire Extinguisher Training for Staff

SRBT staff received fire extinguisher training by the Pembroke Fire Department.

Fire Protection Program

SRBT submitted to CNSC staff on October 26, 2005 an initial copy of our Fire Protection Program. On November 28, 2005 a draft copy of the review of the Fire Protection Program was presented to SRB by CNSC staff.
An emergency drill was performed on August 11, 2006 that involved the Pembroke Fire Department and SRBT staff members. A smoke generator was used to simulate a fire scenario, setting off the smoke alarm system in the Receiving Bay. SRBT staff members were observed as they rapidly but carefully evacuated the building and assembled in the marshalling area. Several recommendations were shared following the exercise.

Fire Safety Plan

On July 27, 2005 SRB submitted to CNSC staff and the Pembroke Fire Department a copy of the revised SRBT Fire Safety Plan.

DERIVED RELEASE LIMIT (DRL) REVIEW

CNSC staff requested that SRBT ensure that the Derived Release Limit (DRL) calculations for the facility be conservative.
As promised in the "ACTION PLAN", a revised DRL was finalized and submitted on January 31, 2006 to CNSC staff for review. This review included an analysis of the emission data, EMP data and re-assessment of dose to the members of the public.
On June 15, 2006 CNSC staff provided their review of the revised DRL.
In the review, CNSC staff stated that SRBT's submissions had addressed the major points raised by CNSC staff at an appropriate level of detail.
CNSC staff also concluded that the historical review and revision of the DRL had met overall staff expectations and only minor technical issues and points of clarification and/or correction remained.
ECOMETRIX INC. reviewed the comments of the CNSC and the final revision of the DRL incorporating CNSC staff comments was submitted to CNSC Staff on September 29, 2006.

ENVIRONMENTAL MONITORING PROGRAM (EMP) REVIEW

CNSC staff requested that SRBT ensure that the Environmental Monitoring Program (EMP) provides appropriate and adequate information for calculating the dose to the public.
As promised in the "ACTION PLAN" and based on the revised DRL submitted on January 31, 2006, a further revision of the EMP document was compiled by SRBT in conjunction with a third party and submitted to CNSC staff for review on February 28, 2006.
On June 23, 2006 CNSC staff provided their comments on the EMP. In their review staff provided a number of specific comments that should be addressed in the next revision of the EMP once the DRL document is revised and accepted.
Following submission of the final DRL and approval by the CNSC, SRBT will develop, in conjunction with ECOMETRIX INC., a final revision of the EMP incorporating CNSC staff comments.

RADIATION PROTECTION TRAINING

All staff members received Radiation Protection Training as part of the ongoing employee-training program. The training included information with respect to proper handling of tritium throughout the facility, WHMIS introduction, and safety features within the facility, a briefing on TDG regulations, and open dialogue with a question and answer session.
A written test was provided to all participants. The pass criterion for the test is 70%.
All participants had successful results.
New employees receive indoctrination-training prior to work in either Zone 2 or Zone 3. The training is a two-hour introduction to the SRBT facility, the responsibilities for employee and employer, and significant information with respect to Canadian Nuclear Safety Commission radiation protection requirements and information with respect to the SRBT radiation safety program.

PRELIMINARY DECOMMISSIONING PROGRAM

In order to expedite the completion of the PDP, SRBT hired CANDESCO RESEARCH CORPORATION, an independent third party with experience in providing advice in this field to CNSC licensees.
In accordance with the "ACTION PLAN" another revision of the document was submitted to CNSC staff by CANDESCO RESEARCH CORPORATION on March 14, 2006.
In a letter dated July 5, 2006 CNSC staff provided their review of the PDP and the associated cost estimate and financial guarantee. In the review CNSC staff concluded that the PDP was found to be acceptable. In their review CNSC staff also requested that a revised PDP cost estimate be provided based on the review comments. SRB was also requested to provide a proposed plan for funding the PDP activities and for the financial guarantee instrument.
SRBT has investigated a number of methods including all the methods for establishing a Financial Guarantee as outlined in Regulatory Guide G-206. SRBT attempted, for over a year, through its insurance broker, to find a product in the insurance industry to establish an insurance

policy that would pay for all, or part of the financial guarantee to no avail. Such a product currently does not exist.
Over several months SRBT attempted to establish with various financial institutions and banks a letter of credit that would pay for all, or part of the financial guarantee to no avail. SRBT offered various forms of collateral from receivables to equipment, or any other assets, but none proved to be acceptable.
In March 2006, SRBT created a decommissioning fund to which it has been making monthly contributions. SRBT is prepared to have this fund in a form that can be secured by the CNSC.
On August 7, 2006, SRBT provided to CNSC staff a plan for funding the decommissioning activities and a proposed agreement to formalize the Financial Guarantee based on the requirements of regulatory guide G-206.

STACK MONITORING VERIFICATION

The majority of equipment used in emissions monitoring has been upgraded to more modern standards in order to provide better assurance of accuracy.

Pitot Tubes

Pitot tubes have been installed on the stacks, and are monitored and maintained by a third party on a monthly basis to ensure stack airflow nears design requirements. This essentially allows for daily stack flow verification in addition to more detailed annual stack flow verification performed by an independent third party.

Digital Flow Meters

Calibrated digital flow meters have been installed on the bubbler system, with volume total capabilities. These units monitor the amount of stack emission gas being pulled through the sampling system, as well as ensuring that flow rates remain relatively constant over time. Actual measurements are then used in calculations to improve accuracy of results.

Maintenance

SRB has increased the rate of stack maintenance by an independent third party from quarterly to monthly, in order to ensure effective performance of the ventilation system and minimize airflow reductions from the beginning to the end of the maintenance cycle to ensure accuracy of results.

System Verification

On April 26, 2006 SRBT supplied CNSC staff with the emissions calculations for the existing bubbler and for the new bubbler system (OVERHOFF) for 10 sampling periods. The results indicated that the new bubbler (OVERHOFF) reported emissions more conservatively than the old bubbler system. SRBT and CNSC felt that the use of the new system (OVERHOFF) for the reporting of gaseous emissions would provide more conservative results.
On April 28, 2006 SRB then submitted a letter to the CNSC staff requesting that under section 1.2 of licence NSPFOL-13.00/2006 that the new system (OVERHOFF) replace our existing system as the primary means of measuring tritium emissions.
The CNSC then issued a letter on May 3, 2006 giving the approval to SRBT to enable the installation and operation of the new bubbler system (OVERHOFF) and the removal of the old system.
SRB then contracted AECL to install an independent bubbler monitoring system to allow the validation of the new bubbler system (OVERHOFF).
This comparison determined that the average SRB measurement of exhaust emissions was found to be 113.30% of that which was measured by AECL through their parallel system.
Based on the results and analysis SRB feels that the use of the new system (OVERHOFF) for the reporting of gaseous emissions provides an accurate and conservative method of measuring emissions which will further protect the public and the environment.
At least every two years SRB will contract an outside party to install an independent bubbler monitoring system to allow repeated validation of the new bubbler system.
The next system validation is scheduled to take place in December 2007.

TRITIUM MITIGATION TECHNOLOGY

As promised in the "ACTION PLAN" on May 30, 2006, SRBT provided a report to CNSC staff with further mitigation commitments that have been incorporated or will soon be by SRBT. The report provided an overview of the results and observations resulting from the introduction of various mitigation measures so far introduced. SRBT provided CNSC staff with other updates of mitigation initiatives on July 18, 2006 and September 15, 2006.

Mitigation Initiatives

Initiatives have been introduced to reduce emissions from the facility. These initiatives have resulted in a 43% reduction in emissions and a 25% reduction in staff dose. Data gathered was used to draw conclusions where possible and to help define further mitigation commitments that will be taken by SRB.

Some mitigating initiatives taken in 2006 include:

Operational Procedures

Operational procedures were improved over the years to reduce the releases of tritium in air.

Scroll Pumps

All oil pumps were removed from service gradually until completion in November 2005. Historically the use of oil pumps and their maintenance has proven to increase the dose to the staff in contact with these pumps. It can also be assumed that the elimination of oil pumps reduces the amount of tritium oxide released from the facility.

Tritium Oxide Trap (TOT)

Under advice from KINECTRICS INC. a third party with experience in tritium mitigation technology, SRB installed a tritium oxide trap for an 8 week period on one of our filling rigs. During its 8 weeks of operation a total of 9.7 Ci of HTO was collected by the TOT, capturing 0.18% of the tritium processed through the filling rig. The TOT did not collect an appreciable amount of tritium compared to other methods used to reduce emissions.

Inert Gas Purging

In order to prevent the generation of tritium oxide from the oxidation of stagnant tritium gas, SRB retrofitted the filling rigs with a system that allows inert gas to purge the exhaust of the equipment on July 10, 2006 oxide as recommended by third party KINECTRICS INC. This was performed ahead of the August 30, 2006 scheduled date identified in a May 30, 2006 letter to CNSC Staff.

Emission data collected since the implementation of the system has shown that this initiative has reduced the amount of tritium oxide emissions.

Pyrophoric Units (P.U.'S)

Based on our operational experience and observations, we have concluded that by further reducing the number of filling cycles of a PU would lead to a reduction in the quantity of tritium gas being released via the stacks.

In a May 30, 2006 letter to CNSC Staff, we stated that PU's still in circulation would be allowed to reach 20 filling cycles. This has since been reduced to 18 filling cycles. New PU's will only be allowed to undergo only 15 filling cycles.

Emission data collected since this implementation has showed that this initiative has reduced the amount of total tritium emissions.

Volume of Release

During a run on a filling rig, as many as 100 lights are loaded and filled. The system, including light stubs, is opened to the Pyrophoric Unit to allow the elemental tritium to be recaptured. The volume is then evacuated to atmosphere using the high-vacuum pump system. The system is then isolated from the atmosphere by closing a series of valves. The Rig is then reloaded with unfilled light sources; the P.U. is heated to release tritium to fill the lights; the lights are sealed and then removed. The system remains closed to atmosphere during this process. The tritium in the closed system is then reabsorbed onto the P.U. as the PU temperature drops; however, a small amount of tritium gas remains in the system that cannot be reabsorbed by the P.U. The residual tritium is subsequently released when the system is evacuated. The amount of residual tritium gas in the system is proportional to the volume of the system. By reducing the volume, this would reduce

the amount of residual tritium in the system. A significant part of this volume is the glass stub. The stub is the part of the light that remains in the system after the light is sealed and removed.
Therefore, the smaller the volume of the stub, the smaller is the volume that contains the residual tritium gas.
The production of sign lights constitutes the majority of our tritium processing. Processing is a term that is used loosely; as what is taking place is the transfer of tritium from one volume to another under controlled conditions.
As part of the mitigation initiative, the length of the sign light stubs was reduced, thus reducing the "volume of release" by about 13.4%. This reduction in volume should result in the same reduction in total tritium emissions due to the filling of sign lights.
The production of other lights constitutes the minority of our tritium processing. As part of our initiative, the length of other light stubs was reduced to a minimum, thus reducing the "volume of release" by 6.2%. This should result in the same reduction in total tritium emissions from the processing of other lights.

Additional Pyrophoric Units (P.U.'S)

SRBT has determined that the introduction of an additional pyrophoric unit on its equipment may allow for further absorption of residual tritium. Single containers are currently used making inventory control management simple. Using two containers on a single piece of equipment will complicate this task and the problem must be addressed before this initiative is introduced.
The placement or location of the container within the equipment is also important and must also be further investigated for best results.

GROUNDWATER STUDY

On November 16, 2005 CNSC staff issued an order to SRBT to perform a ground water study. This Order was replaced by licence condition 12.2 in licence NSPFOL-13.00/2006 requiring SRBT to comply with specific actions and measures to have an independent third party:

- Define the extent and magnitude of groundwater contamination on and around the property where the licensed activity is carried out.
- Characterize and confirm all sources and causes of groundwater contamination by tritium.
- Identify any continuing sources of contamination.
- Assess the potential adverse impacts of the contaminated groundwater on human health, the environment and land use.

Background

SRBT hired an independent third party, ECOMETRIX INC., with expertise in performing assessments of nuclear and radiation issues, including assessments of tritium in groundwater, for other CNSC licensees (i.e.: Ontario Power Generation, Bruce Power, New Brunswick Power, Hydro Quebec and AECL). ECOMETRIX INC. prepared a detailed Terms of Reference (TOR) for the study, and submitted that TOR to CNSC staff for review prior to initiation of any study related tasks. Following discussion of the TOR between the CNSC, SRB and ECOMETRIX INC., the TOR was finalized following minor modifications. The study was initiated and ultimately completed in accordance with the final TOR. Progress reports were submitted to CNSC staff throughout the study.
No comment was provided from CNSC Staff.
SRBT hired Dr. Richard V. Osborne of RANASARA CONSULTANTS INC. to provide comments on the study and advice on future public interaction.

Results

The ground water study included the specific activities to provide a detailed and complete understanding of tritium in groundwater in the vicinity of the facility.
As part of the study, samples were collected and analyzed from the following sources:

- 12 monitoring wells (7 new and 5 existing wells)
- 7 residential wells

- Surface water in 2 local rivers
- Depth integrated soil samples
- Precipitation samples and snow packs

The concentration of tritium in all residential wells was well below the Ontario drinking water guideline of 7,000 Bq/L.
The concentration of tritium in the closest residential well to SRB facility was approximately 1,600 Bq/L. Chemical analysis of this well showed high levels of chloride, sodium, and nitrate. These results are indicative of surface water ingress.
The concentration of tritium in monitoring wells (MW) was well below the Ontario drinking water guideline of 7,000 Bq/L, except for monitoring well MW06-1.
The concentration of tritium in monitoring well MW06-1 was approximately 60,000 Bq/L. This well is located on the SRB site and is closer than any other well to the stacks of the facility.

Events Following Submission of the Groundwater Study
Following the review of the study, in a proactive manner SRB took several actions that were reported to CNSC staff in a letter dated May 15, 2006 where SRB would continue to gather data and supply CNSC staff with other sampling results. Sampling results included continued monthly testing of wells, routine monitoring of snow/ditch/surface water around the facility to determine the distribution in the environment and routine swipe measurements outside the facility. SRB reported that it would formalize these actions in a plan and provide CNSC staff by March 31, 2007 a comprehensive report of the testing results assess possible impacts on the environment and make recommendations on future changes or testing that may be required.
On June 30, 2006 CNSC staff provided their review of the study. Staff stated that the study had identified the magnitude and extent of groundwater contamination by tritium beyond the borders of the SRB facility's site and confirmed that there is no immediate health risk to persons living in the area. CNSC staff stated that the interpretations that stack emissions from SRBT is the source of off-site tritium contamination of groundwater for distances greater than 200 m from the facility was reasonable. CNSC staff stated that the possibility of a groundwater tritium plume of limited size leaving the facility could not be entirely rejected and that additional work had to be undertaken by SRB on site.
Following discussions with CNSC staff, it had been agreed on July 17, 2006 that SRB would formulate an "ACTION PLAN" by August 31, 2006 to perform additional work required by the CNSC in addition to the work that SRB had already initiated in April of 2006. SRB submitted to CNSC Staff this "ACTION PLAN" on August 31, 2006 as promised.
The additional work includes continuation of the testing that SRB initiated following review of the study in April additional to:

- Measurement of rates of infiltration at each well
- Measurement of water level rise and fall in response to infiltration events,
- Soil sampling survey.

This additional work should provide information that suggests the possible existence of a plume; or, that levels of tritium in groundwater in all wells on an around the SRB facility are solely reflective of an atmospheric influence. The work will also help determine if future-decommissioning implications would result from the findings.
On July 21, 2006 CNSC staff issued SRB a Request Pursuant to Section 12(2) of the General Nuclear Safety and Control Regulations to install 3 additional wells on the SRB site.
On July 26, 2006, as part of the work required in the June 30, 2006 letter, SRB submitted to CNSC staff detailed discussions on potential limitations on future use of land contaminated by tritium. These discussions confirmed that the City of Pembroke has a zoning By-Law requiring all buildings in Pembroke to be serviced by municipal water. In these discussions the City of Pembroke also confirmed that any development or redevelopment of property would require a Site Plan Agreement; and, if the property was to be developed in the future for a residential subdivision a rezoning of the site would be required, also requiring that an Environmental Site Assessment be conducted of the site and that all recommendations of the Environmental Site Assessment be followed prior to the issuance of a building permit. The landowner agreed in writing to these terms and conditions and was willing to sign an agreement that would restrict

excavation or modification of the site until an assessment was performed to ensure that the work undertaken would not result in a risk to any worker performing such work.
Based on the sampling results gathered by SRB on August 15, 2006, the CNSC issued a Designated Order requiring SRBT to immediately cease tritium processing, and to submit a detailed report describing the specific actions and measures that will be taken to prevent or mitigate further direct contamination of the groundwater under the stacks and an implementation plan and schedule.
SRBT requested to be heard on the order and requested that the order be revoked or amended to allow SRB to operate under its present licence conditions, during which an "ACTION PLAN" could be developed to address CNSC new concerns and continue the work already begun to further define groundwater conditions on site and implement recommendations on future testing or changes to prevent or mitigate further contamination of the groundwater under the stacks.
The Commission rendered its decision on September 5, 2006 requiring SRBT, by September 25, 2006, to submit, in writing, to the Commission for consideration by the Commission at the Day One Licensing hearing scheduled for October 25, 2006, a detailed report describing the specific actions and measures that will be taken to:

- Identify all the sources of groundwater contamination;
- Contain those sources of groundwater contamination;
- Prevent or mitigate further direct contamination of the soil and groundwater under the stacks; and
- Remediate the contaminated groundwater

and an implementation plan and schedule for the actions described in the report.

The report was filed with the Commission on September 25, 2006 as per request.

OTHER PROGRAMS AND DOCUMENTS

In the current licence period SRBT has improved various other programs and documents. These programs and documents will proactively continue to be improved in the future.

Maintenance Program

SRB developed a Maintenance Program on March 31, 2006 which SRB further improved and revised on June 20, 2006. Copies were sent to CNSC staff for review and comment.

Waste Management Program

On April 14, 2006 SRB submitted to CNSC staff for review a Waste Management Program.

Radiation Safety Program

On February 14, 2006 CNSC staff provided SRB their review of the Radiation Safety Program. On May 20, 2006 and again on June 26, 2006 SRB submitted to CNSC staff revisions of the Radiation Safety Program addressing the comments made by CNSC staff in their February 14, 2006 review.

Emergency Program

SRB developed a new Emergency Plan document dated July 1, 2006. A copy was sent to CNSC staff and the Pembroke Fire Department.

Safety Analysis Report

SRB updated and revised their Safety Analysis Report on July 4, 2006. A copy was sent to CNSC staff.

9. Compliance with other Federal and/or Provincial Regulations

As a member of the manufacturing community, SRBT maintains compliance with not only the CNSC regulations; but also several international, federal, and provincial regulations.

Internationally, federally, provincially and for the purpose of packaging and offering for transport, shipments of product designated as dangerous goods, SRBT must comply with the requirements of the Transport Canada Dangerous Goods Act and Regulations, the US code of Federal Regulations 49, Transportation, IAEA Safety Standard Series, Regulations for the Safe Transport of Radioactive Material, 1996 Ed. (Revised), and IATA Dangerous Goods Regulations, most current edition. Staff members involved with the packaging, offering for transport and receipt of dangerous goods are given training in accordance with the applicable regulations and are issued certificates by the employer.

Provincially and for the purpose of operating a business within Ontario the dangerous goods used in manufacturing procedures were evaluated by the Ontario Ministry of the Environment for potential release from the facility and deemed acceptable. In accordance with Section 9 of the Environmental Protection Act, SRBT applied for the approval for emissions and in 2000 received from the Ministry of the Environment, the Certificate of Approval for Air, number 5310-4NJQE2.

Provincially and for the purpose of operating a business within Ontario whereby the number of workers is twenty or more, a Joint Health & Safety had been established and maintained in accordance with the Ontario Occupational Health and Safety Act and WHMIS Regulation. The committee consists of one employee representative and one employer representative, each with Part I and II certification.
All staff members have received WHMIS training, which includes pertinent information with respect to Material Safety Data Sheets, and workplace hazardous material information system training.

10. Non-Radiological Health & Safety Activities

In accordance with Section 9 of the Ontario Occupational Health and Safety Act, SRB Technologies (Canada) Inc. maintains a Joint Health & Safety Committee.

Joint Health & Safety Committee
The committee is comprised of a representative on behalf of the workers and a representative on behalf of the employer. The representatives, both employer and employee, have received Part I and II certification.
The committee meets at least once every quarter.

Details with respect to injuries and accidents are detailed in Section 8.

11. Public Information Initiatives

PUBLIC INFORMATION PROGRAM

On April 7, 2006 CNSC staff provided their review of the PIP submitted by SRB on December 11, 2005. In their review staff stated that they were satisfied with the actions taken to date and that the proposed actions in the program addressed the requirements of the public information program for the facility. In this latest PIP, SRB expanded their target audience to include local special interest groups, local media, commercial neighbours, and local businesses.

Pamphlet

On June 29, 2006 a pamphlet designed by SRB and reviewed by CNSC staff and some members of the public were sent to approximately 12 000 Pembroke and surrounding area residences, businesses, educational facilities, health care establishments and other organizations. The intent of the first pamphlet was to introduce the company to members of the public who may not be aware of the company's existence and to provide some information on risks associated with emissions as well as providing clear contact information for an interested reader to acquire more detailed information.

Brochure

In 2006 our company has also developed a brochure with respect to the effects of the products on health and safety and on the environment. The brochure is an 8 page document that describes and explains the impact posed by the operations to the environment and health and safety of the workers and the public. It also includes a chart showing the tritium dose associated with SRB compared to doses from other known sources of radiation, a description of various products, contact information, and a one-page question and answer insert. This brochure is readily available to members of the public who express interest or concerns.

Annual Report to City Council

On October 3, 2006 the second of an annual report provided to City Council supported by a presentation at a session of Council open to the public was held. This presentation was advertised in advance in a local newspaper by SRB and was to be televised on local cable television. The report is publicly available through the City of Pembroke. The report and presentation provided City Council members and the public the following:

- Emissions from the facility for the year
- Environmental monitoring data for the year
- Public dose for the year
- General update on licensing activity
- Update on other business matters

Throughout 2006 SRB continued to provide the City of Pembroke information regarding its operations, re-licensing, the designated order and its releases to the sewer system.

Web Site

In 2006 SRB also re-designed and continued to modify a new web site providing the public information on:

- Community involvement.
- Download of Annual Compliance Reports and other reports.
- Public Notifications of any weekly emissions exceeding release limits and of major events, incidents or issues with the operations.
- Public Meeting notifications.
- Details of meetings with local interest groups.
- Download of Annual City Council Presentations.
- Details of presentations made to individuals, groups of individuals, organizations or companies who express concerns, support or interest for the operations.
- Download of SRBT pamphlet.
- Download of SRBT brochure.
- Links to third party web sites with information on tritium.
- A copy of Public Surveys held by SRBT.
- Company contact information.

INTERACTION WITH SPECIAL INTEREST GROUPS

Meetings

SRBT met with members of local special interest groups, the Concerned Citizens of Renfrew County and LEAD Environmental Awareness and Detection on May 19, 2006 to answer questions and to provide a tour of the facility.

Information

SRBT supplied various documents to local special interest groups upon request.

Public Information Session

On August 9, 2006 SRBT held the first annual public information session where all members of the public had the opportunity to ask questions of SRBT officials directly.

Environment Monitoring Results

SRBT sampled well water and garden produce from members of the public. The samples were submitted to a contract laboratory for tritium concentration assessment. The results were reported to the members of the public and posted on the web site.

This data was used in the calculations for critical group annual estimated dose for 2006.

Communication with Emergency Responders

In 2006, the company continued to communicate and maintain an effective rapport with emergency response personnel.

Participation in Community Events

SRBT continues to participate in community events and support charitable organizations. SRBT is one of the main sponsors for the United Way Starlite golf tournament. SRBT takes the opportunity to relate the benefits of the products and the effects on the health of the public and the environment caused by the operations through the distribution of the pamphlet to each and every participant.

Public Inquiries

In 2006, 32 inquiries for information were made by the public by 17 different individuals. This includes 13 public inquiries that were made by one specific individual representing a special interest group. Most inquiries were to request specific document or to voice concerns centered around the release to the Ottawa River associated with the proposed Precipitation Diversion System (PDS).

SRBT provided the information required 7.9 working days after the request was made.

Media Coverage

In 2006, according to record, 72 news stories appeared regarding SRBT in 16 different media outlets ranging from television, radio, print and online. This includes 17 that appeared in the Daily Observer, a Pembroke newspaper. Of these news stories 23 were in respect to the issuance of the Designated Order and a number were centered on coverage of the hearing and the release to the Ottawa River associated with the proposed Precipitation Diversion System (PDS).

Additionally, in 2006, according to record, 19 letters to the editor appeared in local newspapers that were written by members of the public regarding SRBT. Of these letters, 12 expressed concerns regarding SRBT; 4 in support of SRBT, and 3 were neutral.

Other Presentations and Plant Tours

In 2006, SRBT provided staff from the Pembroke Pollution Control Plant and staff from 2 neighbouring businesses plant tours and answered their questions. SRB also made a presentation to Kiwanis Club members regarding our operations and the circumstances associated with the issuance of the designated order and answered their questions.

12. Forecast for Coming Years

Overall Commitment In The Future
SRBT is committed to continue to work with the CNSC to have all programs and documentation exceed regulatory requirements and meet staff expectations.

SRBT will maintain this commitment to continuous improvement. We will strive to achieve higher grades with increasing trends in all areas and will not be satisfied until this is achieved.

It is clearly understood and recognized that the onus is on the licensee to analyze programs and identify deficiencies and be proactive and responsive to correct problems.

To achieve this goal, SRBT has increased the efforts and has allocated more internal resources in addition to the increased use of independent third parties and will continue to do so in the future to ease CNSC staff concerns and to allow reduction of regulatory oversight.

Environmental Protection
SRBT is committed to the achieving the CNSC approval of the DRL with the objective of protecting the environment and the public for possible conditions at present and into the future.

SRBT is committed to the continuous improvement of the Environmental Monitoring Program (EMP) to ensure that the EMP provides appropriate and adequate information for calculating the dose to the public. This will ensure that results are carefully analysed, interpreted and understood in relation to stack emissions and operational activities.

Periodic stack emission verification will be performed, where the entire system, rather than individual components will be assessed for measurement accuracy to ensure that air-monitoring data is conservative compared to the values predicted from atmospheric modeling used for the DRL calculation.

SRB has, and will continue to dedicate much time and effort to identify tritium mitigation measures that reduce tritium emissions and contribute to the reduction of the dose to the public while at the same time not imposing additional risks to staff at the facility.

Public Information Program (PIP)
SRBT will strive to have a proactive approach with the public and provide information on the operations as well as to reassure the public of their health and safety.

SRB will significantly increase its transparency, visibility and openness and will hold regular face-to-face meetings with the general public and special interest groups.

On an annual basis we will evaluate the effectiveness of the program and will amend the program to address specific area of concern.

Product Acceptance
The products manufactured by SRBT provide illumination to indicate a safe exit or for many other safety applications. We will attempt to educate the public to achieve acceptance of the value of the products we manufacture, similar to the acceptance of smoke detectors and other devices that use radioactive material.

Part C

I hereby certify that I have reviewed the documents referred to in Appendix E of license NSPFOL-13.00/2006 and do believe that SRB Technologies (Canada) Inc. has operated in compliance with the license conditions except as noted herein:

Signature:_____ Date:_____

Name (print): Stephane Levesque

Title: President

Address: 320-140 Boundary Road, Pembroke, Ontario, K8A 6W5

Phone Number: (613) 732-0055 Fax Number: (613) 732-0056

Other approvals, as required:

Name (Signature)	Title	Date
Ross Fitzpatrick	General Manager	
K.K. Shane MacDougall	Corporate Health Physicist	

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