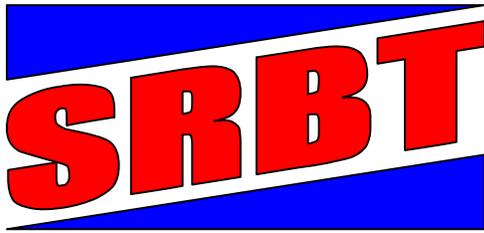




2002 Annual Compliance Report (Rev.1)

NSPFOL-13.00/2005



I S O 9 0 0 1

2002 Annual Compliance Report NSPFOL-13.00/2005

Table of Contents

<i>Heading</i>	<i>Page</i>
<i>Part A</i>	3
<i>Part B</i>	4
1. Operational Review	4
2. Production	4
3. Modifications	5
4. Health Physics	5
5. Environmental and Radiological Compliance	6
6. Facility Effluents	6
7. Waste Management	7
8. Facility Updates	7
9. Compliance with other Federal and/or Provincial Regulations	9
10. Public Information Initiatives	9
11. Forecast for Coming Years	10
<i>Part C</i>	11
<i>Appendices</i>	12
<i>Appendix A</i>	13
<i>Appendix B</i>	15

Part A

Facility: **SRB Technologies (Canada) Inc.**

License Number: **NSPFOL-13.00/2005**

Owner: **SRB Technologies Inc.**

Reporting Period: **January 1, 2002 through December 31, 2002**

Signing Authority: **K. K. Shane MacDougall**

Title: **Corporate Health Physicist, RSO**

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

Phone Number: **(613) 732-0055**

Facsimile Number: **(613) 732-0056**

E-mail: **shane@betalight.com**

Web Site: **www.betalight.com**

Part B

1. Operational Review

The facility described in the CNSC issued Nuclear Substance Processing Facility operating License; NSPFOL-13.00/2005 was expanded providing access to 3,000 sq. ft. of the existing building that was previously occupied by another tenant. The separation structures were enhanced to provide adequate separation consistent with the Ontario Building Code and National and Ontario Fire Code. The additional space provided for additional offices, a conference room, washrooms, relocation of the facility electrical room, machining and molding area, product packing and shipping area. CNSC staff was notified of the intent to expand the facilities in the event that the expansion may affect a CEAA review that was performed for the facility license in 2000.

The ventilation system, consisting of two Temprite heat recovery units with a total air moving capacity of 12,120 cfm, serving Zone 3 was serviced by 21 Degrees, a local company, to ensure effective exhaust and supply air to that area.

A Becton-Dickinson Model 955B tritium-in-air monitor was connected in parallel with the stack monitoring system already in place. The purpose of the installation was to provide a real time method of assessing tritium releases. The monitor was connected to a chart recorder to provide readily available information with respect to release rates. This installation was performed in accordance with what was stated by SRBT staff in a letter to Mr. R.A Chamberlain, Sr. LAO, AECSB.

2. Production

In accordance with Section IV of the Nuclear Substance Processing Facility Operating License-13.00/2005, SRBT:

- i) manufactured gaseous tritium light sources, which consist of tritium gas ($^3\text{H}_2$) sealed in borosilicate glass tubes, and incorporating the sources into devices as described in the Radiation Safety Program (Rev. III).
- 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 the safety of the operations. The maximum tritium activity possessed during 2002 did not exceed 5,550TBq, well below the possession limit of 11,000 TBq. At all times, unsealed source material was stored on uranium getter beds or in the handling volumes of the gas filling rigs. On August 28, 2002 the CNSC issued Radiation Device Certificates for all devices for sale within Canada.
- iii) At no time imported more than 37 TBq within any two year period without applying for and receiving permission to import tritium a license

issued by the CNSC to do so. During 2002 SRBT applied for and received 5 individual import licenses to import tritium for the purpose of reclaiming the residual tritium in time-expired tritium devices to manufacture gaseous tritium light sources.

3. Modifications

During 2002 there were no modifications within the organization, administration and/or procedures that had any appreciable effect on licensed activities.

4. Health Physics

During 2002, SRBT maintained a Dosimetry Service License (DSL-1-1.0/2005) for the purpose of providing dosimetry services for the staff and visitors of SRB Technologies (Canada) Inc. The license was reviewed by staff of the CNSC and an Annual Compliance Report issued to the CNSC for the 2002 dosimetry year.

Dosimetry results were submitted to Health Canada for input to the National Dose Registry for 48 individual staff members.

The operating staff radiation exposure results were as follows:

Table: Annual Effective Whole Body Dose (mSv)

Year	Max.	Staff Average	Zone 3 Average	Zone 2 Average	Zone 1 Average	Admin. Average	Collective
2002	5.08	0.40	1.94	0.18	0.01	0.11	19.21
2001	3.11	0.30	1.70	0.09	0.01	0.26	13.65
2000	4.89	0.34	1.96	0.15	0.00	0.12	11.91
1999	3.48	0.46	1.88	0.16	0.01	0.60	13.47
1998	1.62	0.26	1.07	0.04	0.02	0.21	7.72
1997	3.55	0.56	2.12	0.05	0.08	0.61	14.99
1996	5.29	0.86	3.43	0.55	0.16	1.27	31.24
1995	4.29	0.68	1.72	0.34	0.12	1.78	16.37

During 2002 there were two instances whereby a staff member's tritium body burden exceeded the administrative limit of 1000 Bq/mL. In both cases the individuals were removed from Zone 2 and 3 activities until the body burdens were reduced to less than 500 Bq/mL. The activities of the individuals were reviewed to determine the causes and to initiate corrective actions to help minimize the recurrences of such uptakes.

In one of the instances it was determined that the committed effective dose due to uptake would exceed the administrative annual effective dose limit of 5.0 mSv/year. That individual was allowed to perform activities within Zone 2 upon a reduction in body burden to less than 500 Bq/ml until such time as the annual effective dose reached 5.0 mSv. At that point the individual was restricted to Zone 1 duties.

Both cases were reported to CNSC staff for review and comment.

5. **Environmental and Radiological Compliance**

Data from the Environmental Monitoring Program are shown in **Appendix A**. The sample locations are as described in the SRBT Environment Monitoring Program document.

Also shown are the tritium concentration results of locally grown vegetable and fruit samples and locally processed milk samples. The samples were submitted in September for analysis, therefore the 4th quarter milk sample results were not available.

In the table 'Special Samples' is the analysis result of a composite sample made up of an onion, small carrots, Tiny-Tim tomatoes, two apples and two rhubarb stalks. The samples were taken from a small garden of a local resident located on Boundary Road in Pembroke. Due to the size of the samples it was necessary to combine the items to produce a single composite sample for analysis.

All vegetable, fruit and milk samples were analyzed by Ontario Power Generation Laboratories.

6. **Facility Effluents**

During 2002 the Health Physics department instituted sampling of effluent waters. A new procedure was established and submitted to CNSC staff for review and comment.

Gaseous effluent samples were taken on a weekly basis in accordance with operational procedures. The results of the stack emission analysis are shown in **Appendix B**.

Tritium emissions from the facility are determined by taking a known portion of sample continuously from the exhaust of the ventilation systems and analyzing for tritium content. The results are assessed for emissions on a weekly basis to determine what percentage of the regulatory limit a member of the public defined as that person who is most likely to receive the highest exposure due to any releases. The derived release limit (DRL's) calculations for the facility were performed in accordance with CAN/CSA-N288.1-M, 'Guidelines for Calculating Derived Release Limits for Radioactive Material in Airborne and Liquid Effluents for Normal Operation of Nuclear Facilities'. The DRL's were calculated for adult workers, non-adult workers and infants within the public domain.

The average weekly DRL results for 2002, based on weekly assessment, were as follows:

Adult Worker	0.37% DRL
Adult Non-worker	0.33% DRL
Infant	0.22% DRL

The SRBT action level is 2.5% DRL the administrative level is 5.0% DRL. Liquid effluent analysis procedures have been developed and issued to the CNSC for review and comment. Sampling of liquid effluent has been commenced to show that the liquid effluent pathway is not a significant pathway for tritium. Daily analysis of liquid effluent from stack sampling water, wash water, betalight scintillation water, and any other contribution to liquid effluent emissions are recorded and charted.

7. **Waste Management**

In 2002 there were two (2) shipments of Class 7, UN2915, Type A packages and Class 7, UN2913, SCO-I packages transferred to a CNSC licensed waste handling facility for decay storage.

Shipment WM-2002-001 included 11 x 200L drums of tritium contaminated crushed glass and 18 x 200L drums of surface contaminated objects with a total tritium activity of 44.0 TBq.

Shipment WM-2002-002 included 9 x 200L drums of tritium contaminated crushed glass, 3 x 70L drums of vacuum pumps with tritium contaminated pump oil, and 7 x 200L drums of surface contaminated objects with a total tritium activity of 36.2 TBq.

All shipments were prepared in conformance with the requirements of the IAEA Safety Standards Series, Regulations for the Safe Transport of Radioactive Material, 1996 Edition (revised).

8. **Facility Updates**

The facility was expanded during 2002 with the occupation of an additional 3000 square feet of existing building space. The additional space usage is described in Section 1 (above).

Due to the expansion, the **Fire Safety Plan** was revised to include the additional space showing the locations of the additional fire extinguishers, emergency lighting devices, the electrical panel, security system additions and routes of egress.

The Pembroke Fire Department visited the site to perform a fire safety inspection. The inspection pointed out the requirement for relocation of several fire extinguishers to more visible positions, the placement of two more exit signs, and the installation of an emergency lighting device. All items were completed to the satisfaction of the inspector.

The **security program** for the facility has been reviewed by management taking into consideration the Designated Officer Order 01-D1. The Vulnerability Analysis and Threat Risk Assessment was submitted to CNSC staff for review and comment. 'The Vulnerability Analysis and Threat Risk Assessment' was deemed to be acceptable by CNSC staff. All appropriate security precautions were performed for staff and contractors.

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. The completed quality manual (QM-01) is to be submitted to CNSC staff for review and acceptance in March, 2003.

SRBT has been **researching** the use of an oil-free high vacuum pump. The pump is capable of achieving extremely low pressures, however, not as low as what can be achieved using an oil-sealed rotary vacuum pump.

Several staff members have been in contact with the supplier and manufacturer of pyrophoric uranium tritium traps (PUTT's) to ensure that the traps are able to withstand specified pressures as well as the vacuum pressure usually exerted on the traps.

Waste management activities are described in Section 7 (above). The CNSC licensed waste handling facility has made changes to the method in which it handles low level waste material. In doing so there has been a tremendous increase in costs. SRBT has reviewed the waste management program to determine the most efficient and effective method of preparing waste materials.

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, safety features within the facility, a briefing on TDG regulations, and open dialogue with a question and answer session.

An SRBT site study was performed by CNSC staff on July 9-10, 2003. The study reviewed such items as:

- Production Operations
- Ventilation System and Stack Emissions Monitoring
- Environmental Monitoring
- Health Physics Procedures

The study report made several recommendations to enhance the operations for production and health physics:

- Develop a more intricate tritium balance system
- Review process system components
- Review maintenance procedures
- Review and document ventilation systems
- Review the Environment Monitoring Program
- Review the stack monitoring system

SRBT has presented to CNSC staff a schedule by which it is intended to satisfy the recommendations and actions as described in the report.

On October 22, 2003, CNSC staff performed a site inspection. In the report it was indicated that no items of non-conformance were observed. Several actions were requested of SRBT by CNSC staff due to the site inspection:

- ✍ Prepare and maintain an inventory of all nuclear substances, other than tritium that are used on site.
- ✍ Submit an investigation report of the incident.
- ✍ Secure a copy of the CNSC licensed waste handling facility.
- ✍ Submit TSSA documentation for pressure systems.
- ✍ Submit swipe test results for October 1 and 2, 2002.
- ✍ Review and update on Action Notices as per document of Oct., 2001.

All actions were completed to the satisfaction of CNSC staff.

9. **Compliance with other Federal and/or Provincial Regulations**

As a member of the manufacturing community, SRBT must maintain 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.

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 in place and maintained in accordance with the Ontario Occupational Health and Safety Act and WHMIS Regulation. The committee consists of an employee representative and an employer representative. All staff members have received WHMIS training which includes pertinent information with respect to Material Safety Data Sheets.

10. **Public Information Initiatives**

SRBT has established a website, www.betalight.com, which contains pertinent information with respect to product, people, services and environmental issues with respect to the operation of the facility.

SRBT has sampled and submitted vegetable and fruit samples from the garden of one of the members of the public. The samples were submitted for tritium concentration assessment and the results were reported to the member of the public and to the CNSC staff. The results are shown in the table 'Special Samples'.

SRBT has in the past opened the doors of the facility to visitors who wish to view the operations. However, in light of security issues following the September 11, 2001 terrorist actions that took place in the USA and further action taken by the USA and national and international authorities, tours of the facility have been preempted at the request of the CNSC staff.

SRBT continues to participate in community events and to support needs of the community with involvement in service groups, charitable organizations, and specialty group organizations. In our involvement we take the opportunity to relate the benefits of the life-safety products that we manufacture.

Staff members are active within nuclear science organizations and national and international organizations such as the Pembroke and Area chamber of Commerce, Canadian Radiation Protection Association, Canadian Nuclear Society, Health Physics Society, Bioassay and Analytical Environmental Radiochemistry, Measurements and Radiochemical Committee, Institute of Environmental Sciences and Technology, Ottawa Valley Manufacturers' Alliance, Canadian Nuclear Association, Canadian Manufacturers' & Exporters' Network, etc.

11. **Forecast for Coming Years**

As the population becomes more educated we hope for acceptance of the value of the products we manufacture, similar to the acceptance of smoke detectors and other devices that use nuclear material.

The products we manufacture are all related to life-safety whether it is used to provide access to a safe exit during extreme life threatening situations or to provide illumination specific for military activities, it is to provide a life-safety aspect with the intent of saving lives.

It is our goal to continue to foster a trusting relationship with the vast majority of the public.

Part C

I hereby certify that I have reviewed the documents referred to in the Appendix A of the license and the facility has been operating in compliance with the license except as noted here:

Signature:

Date: 2003 March 25

Name (print): K.K. Shane MacDougall

Title: Corporate Health Physicist, RSO

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

Phone Number: (613) 732-0055

Fax Number: (613) 732-0056

E-mail: shane@betalight.com

Appendices

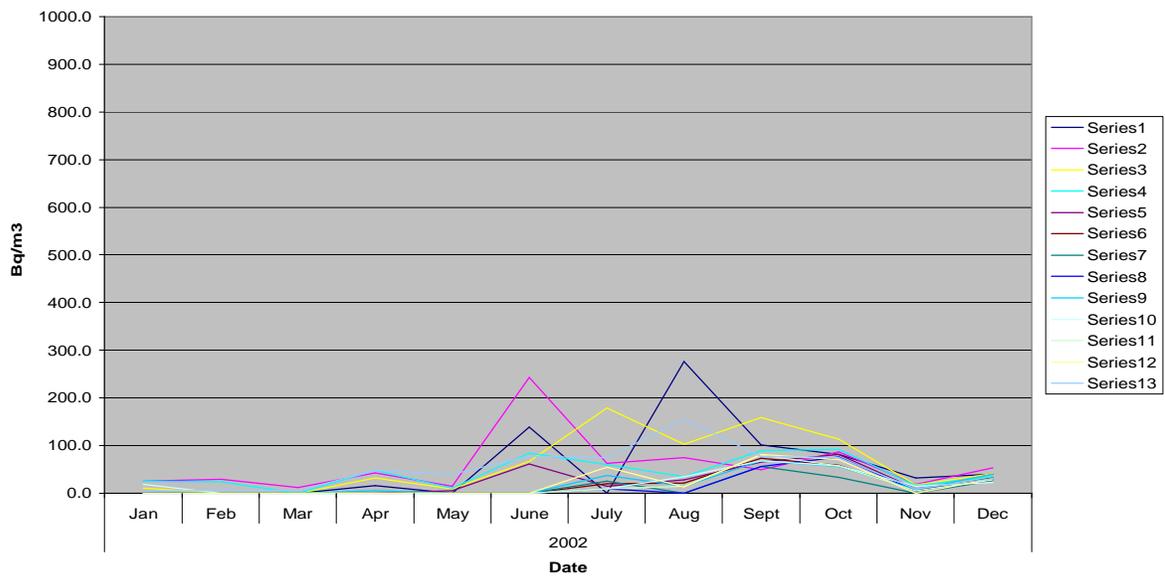
Appendix A: Environment Monitoring Program

Appendix B: Stack Emission Analysis Results

Appendix A: Environment Monitoring Program

SRBT Environment Monitoring Program Results												
Monitor	Analysis Results (Bq/M3)											
Year	2002 Note: Blank spaces indicate that no sample was available for analysis.											
Month	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
1 BOC Gas	<0.6	<0.6	<0.6	16.0	<0.6	137.9		276.4	101.4	80.6	31.6	39.3
2 Brewer's Edge	24.7	28.6	11.6	42.7	14.5	242.8	63.1	74.6	49.3	85.8	18.7	52.9
3 Pem-Ice II	10.3	<0.6	<0.6	32.0	9.7	66.2	178.3	102.8	158.6	113.5	17.4	40.6
4 400 Boundary Rd	24.7	22.8	<0.6	48.0	10.3	82.8	59.4	33.9	88.6	90.9	16.1	34.8
5 SW Int'l St.	<0.6	<0.6	<0.6	<0.6	5.4	60.7	14.6	27.1	64.3	81.3	8.4	29.0
6 Irving Stn.		<0.6		<0.6	<0.6	<0.6	19.4	20.4	72.8	58.1	5.2	31.0
7 206 Market St.	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	24.3	<0.6	55.7	32.9	<0.6	26.4
8 DMV Bureau	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	9.1	<0.6	55.7	75.5	5.2	27.7
9 KI Pembroke	<0.6	<0.6	<0.6	5.3	<0.6	<0.6	36.6	13.6	67.8	55.5	7.1	40.0
10 RR1, Hwy. 41	18.0	<0.6	<0.6	<0.6	<0.6	<0.6	9.1	33.9	67.8	56.8	13.6	22.6
11 RCHU	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	9.2	13.6	80.0	56.8	5.2	27.7
12 Saar Farm	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	54.0	12.8	80.7	71.0	<0.6	29.7
13 Med-Eng	3.3	5.7	5.2	48.0	38.8	77.2	73.5	154.3	76.4	73.6	9.0	30.3

SRBT-EMP



2002 SRBT EMP

Vegetation Samples (Bq/L)

Sample #	Sample Description	Q1	Q2	Q3	Q4
0203001A	Zucchini			2911.8	
0203002A	Cucumber			105.6	
0203003A	Tomato			61.9	

Milk Samples (Bq/L)

Sample #	Sample Description	Q1	Q2	Q3	Q4
0201001B	Milk	4350.3			
0202001B	Milk		36.6		
0203001B	Milk			33.0	

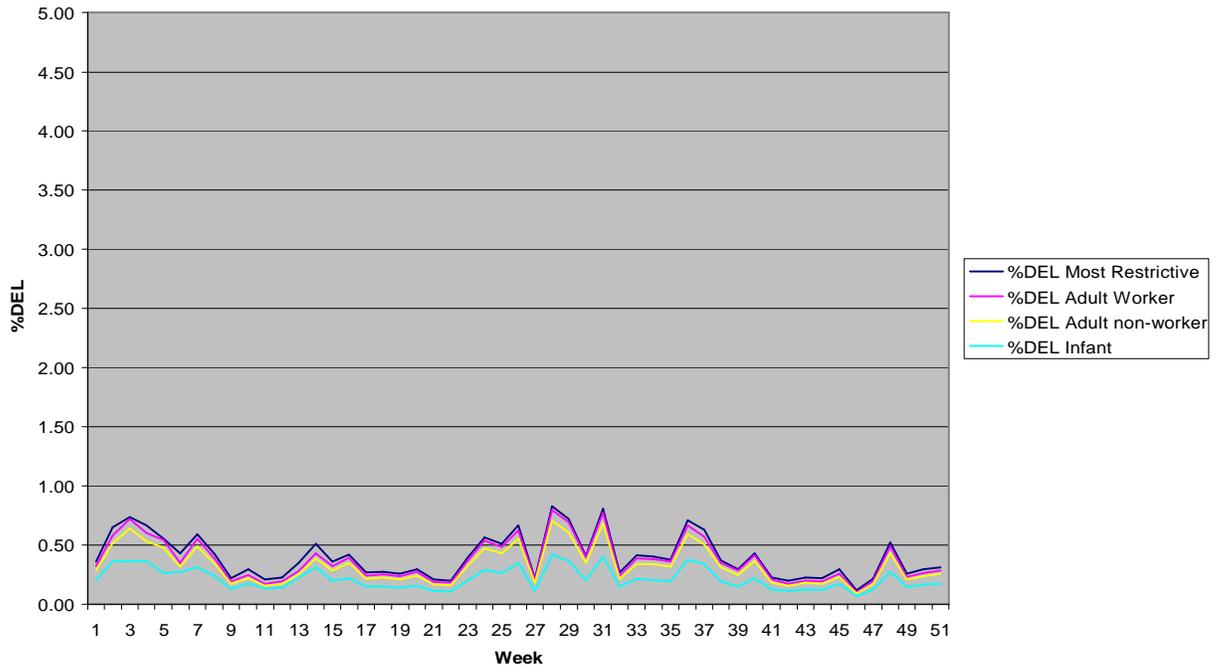
Special Samples (Bq/L)

Sample #	Sample Description	Result
NA	Composite sample from Ms. B. Beiderman garden	35.8

Appendix B: Stack Emission Analysis Results

Stack Sampling							
Year: 2002							
Week #	HTO	HT	Total	%DEL			
	(GBq)	(GBq)	(GBq)	Most Restrictive	Adult Worker	Adult non-worker	Infant
1	1317.2	16176.1	17493.3	0.36	0.32	0.29	0.20
2	2334.7	32437.9	34772.6	0.65	0.58	0.52	0.37
3	3133.9	6434.3	9568.2	0.74	0.72	0.64	0.36
4	2445.7	29052.4	31498.1	0.66	0.60	0.53	0.37
5	2379.1	3526.1	5905.2	0.55	0.55	0.48	0.27
6	1298.7	37070.3	38369.0	0.43	0.35	0.32	0.28
7	2323.6	17667.5	19991.1	0.59	0.55	0.49	0.31
8	1583.6	18266.9	19850.5	0.43	0.39	0.34	0.24
9	751.1	13405.1	14156.2	0.22	0.19	0.17	0.13
10	958.3	20416.6	21374.9	0.29	0.25	0.22	0.18
11	614.2	19510.1	20124.3	0.21	0.17	0.15	0.14
12	721.5	16698.1	17419.6	0.23	0.19	0.17	0.14
13	1013.8	32911.5	33925.3	0.35	0.28	0.25	0.23
14	1639.1	37111.0	38750.1	0.51	0.43	0.38	0.31
15	1291.3	17589.8	18881.1	0.36	0.32	0.28	0.20
16	1639.1	12716.9	14356.0	0.42	0.39	0.35	0.22
17	976.8	12824.2	13801.0	0.27	0.24	0.21	0.15
18	1036.0	10811.4	11847.4	0.28	0.25	0.22	0.15
19	969.4	9908.6	10878.0	0.26	0.24	0.21	0.14
20	1124.8	10208.3	11333.1	0.29	0.27	0.24	0.16
21	765.9	8695.0	9460.9	0.21	0.19	0.17	0.11
22	769.6	6859.8	7629.4	0.20	0.19	0.16	0.11
23	1568.8	10500.6	12069.4	0.40	0.37	0.33	0.21
24	2257.0	13734.4	15991.4	0.56	0.53	0.47	0.29
25	2057.2	11610.6	13667.8	0.51	0.49	0.43	0.26
26	2615.9	19502.7	22118.6	0.67	0.62	0.55	0.35
27	869.5	4939.5	5809.0	0.22	0.21	0.18	0.11
28	3378.1	16561.2	19939.3	0.83	0.79	0.70	0.42
29	2946.0	13957.0	16903.0	0.72	0.69	0.61	0.37
30	1699.2	6417.4	8116.6	0.41	0.40	0.35	0.20
31	3324.2	13013.0	16337.2	0.80	0.78	0.68	0.40
32	987.7	11704.0	12691.7	0.27	0.24	0.22	0.15
33	1623.7	11617.4	13241.1	0.41	0.39	0.34	0.22
34	1627.8	8722.3	10350.1	0.40	0.38	0.34	0.21
35	1516.1	8263.2	9779.3	0.38	0.36	0.32	0.19
36	2793.3	20674.8	23468.1	0.71	0.67	0.59	0.37
37	2367.0	23843.3	26210.3	0.63	0.57	0.51	0.34
38	1490.6	8882.5	10373.1	0.37	0.35	0.31	0.19
39	1209.0	5413.1	6622.1	0.29	0.28	0.25	0.15
40	1749.3	9800.4	11549.7	0.43	0.41	0.36	0.22
41	853.0	9573.2	10426.2	0.23	0.21	0.19	0.13
42	697.8	10313.3	11011.1	0.20	0.17	0.16	0.11
43	822.7	10278.3	11101.0	0.23	0.20	0.18	0.13
44	793.6	9906.1	10699.7	0.22	0.20	0.17	0.12
45	1014.1	17998.7	19012.8	0.30	0.26	0.23	0.17
46	400.6	7119.5	7520.1	0.12	0.10	0.09	0.07
47	752.5	12220.6	12973.1	0.22	0.19	0.17	0.13
48	2039.7	15528.4	17568.1	0.52	0.49	0.43	0.27
49	947.7	11391.9	12339.6	0.26	0.23	0.21	0.14
50	1068.1	14769.5	15837.6	0.30	0.27	0.24	0.17
51	1182.4	11611.6	12794.0	0.31	0.29	0.25	0.17
52	0.0	0.0	0.0	0.00	0.00	0.00	0.00
	1524.3	14513.1	Ave. % DRL	0.40	0.37	0.33	0.22

2002 DEL's



The SRBT action level for emission of tritium based on stack sampling techniques performed on a weekly basis is 2.5% of the DRL. The DRL is calculated on the regulatory annual public dose limit of 1.0 mSv per year.

The SRBT administrative limit for emission of tritium based on stack sampling techniques performed on a weekly basis is 5.0% of the DRL.