



SHIELD SOURCE INCORPORATED

**2006
ANNUAL COMPLIANCE REPORT**

CNSC LICENCE NSPFOL-12.02/2009

**Shield Source Incorporated
CNSC Licence NSPFOL-12.02/2009
Annual Compliance Report**

Year 2006

Submitted to:

**Canadian Nuclear Safety Commission
280 Slater Street, Ottawa, ON K1P 5S9**

Prepared by:

**Peggy Hirst
Radiation Safety Officer**

Approved By:

**Susanne J. Tanney
General Manager**

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Facility: Shield Source Incorporated
Licence No: NSPFOL-12.02/2009
Owner: Mr. R. White
Reporting Period: January 2006 through December 2006
Signing Authority: Peggy Hirst
Title: Radiation Safety Officer
Address: RR#5 Municipal Airport, Peterborough, On K9J 6X6
Phone Number: (705) 743-6146
Facsimile Number: (705) 743-2942
Email: phirst@shieldsource.com

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1. Introduction

Shield Source Incorporated (SSI) is a Class 1B Nuclear Facility possessing a Nuclear Substance Processing Facility Operating Licence (NSPFOL-12.02/2009) issued by the Canadian Nuclear Safety Commission (CNSC). Condition 8.4.1 of this licence requires SSI to prepare and submit to the Commission an annual report that summarizes SSI's facility and equipment performance, personnel radiation exposures, and any changes in SSI's organizational structure.

This report is written in order to satisfy Condition 8.4.1 of the above mentioned licence.

2. Operational Review

SSI operates a safe, clean work environment with trained staff using approved procedures and equipment to ensure the safety of the workers and the environment. The facility's ventilation system was maintained in full operational condition with no system failures during 2006.

All process equipment was maintained by qualified staff with no system failures.

However, on August 2, 2006 CNSC staff collected soil samples at and near the SSI Facility. The soil sample in the immediate vicinity of the SSI ventilation stack revealed contamination, which CNSC staff believed may result in groundwater contamination. Therefore on August 18, 2006 CNSC issued a Request Pursuant to Subsection 12(2) of the General Nuclear Safety and Control Regulation to install a monitoring well, collect precipitation under the ventilation stack and sample soil under and around the stack. SSI complied with this Request and decided to go beyond the requirements and drilled three additional wells in order give a more complete picture of SSI's impact to groundwater. SSI made reports to the CNSC as required in the Request of August 18, 2006.

Based on these findings, on December 22, 2006, CNSC issued a second Request to conduct an Optimization Study, to modify operational and maintenance activities and to perform additional sampling and monitoring. SSI complied with the Request to modify operational and maintenance activities to limit the tritium emissions to the environment and is currently conducting the Optimization Study and performing additional sampling and monitoring. A summary of all monitoring and sampling data shall be reported to CNSC by March 31, 2007, the Optimization Study will be reported by April 30, 2007, and a comprehensive summary and interpretation report of all monitoring and sampling data collected since 2005 shall be reported by July 31, 2007.

In April 2006, SSI submitted to CNSC an application to prepare and to construct a site for a new facility located at the Peterborough Airport. However in a letter, dated August 18, 2006 from CNSC Acting Director Dr. Patsy Thompson requesting SSI to perform groundwater monitoring at our current facility it was stated:

“Since SSI has applied at this time for a licence to prepare a site and to construct a new nuclear facility for the processing of tritium, it would be prudent to reconsider any activities relating to a new facility.”

Based on this letter, on September 19, 2006 SSI revoked the application to prepare site and construct a Class 1B Nuclear Substance Processing Facility for Tritium.

3. Production

In accordance with Section IV of the Nuclear Substance Processing Facility Operating Licence-12.01/2009 SSI:

- a) operated a nuclear substance processing facility in compliance with the documents in Appendix A of the licence;
- b) possessed, transferred, used, processed, managed, and stored nuclear substances that are required for, associated with or arise from the operation of the facility described in (a); and
- c) at no time imported more than 37 TBq without applying for a licence issued by the CNSC to do so.

SSI has operated in compliance with the conditions set out in Section V of the Nuclear Substance Processing Facility Operating Licence-12.02/2009.

At no time through out 2006 did SSI possess more than 18,500 TBq of tritium in the form of sealed or unsealed source material. Unsealed source material was stored on the uranium beds and/or in the handling volumes of the gas fill rigs.

4. Administrative Changes

During 2006 there were no changes within the organization including administration and/or procedures that affected licensed activities.

5. Health Physics

During 2006, SSI maintained a Dosimetry Service License (08785-6-10.0) for the purpose of providing dosimetry services for the staff and visitors of Shield Source Incorporated.

Dosimetry results were reported for 15 individual staff members to the National Dose Registry in accordance to Section 19 of the Radiation Protection Regulations.

The minimum effective dose for 2006 was 0.03 mSv. The maximum effective dose was 0.76 mSv and the average for 2006 was 0.19 mSv.

Table 1 details the Average, Minimum, Maximum and Collective Annual Effective Dose for SSI staff for years 2000 through 2006.

Table 1: Annual Effective Dose Comparison

	2000	2001	2002	2003	2004	2005	2006
Average Dose (mSv)	0.49	0.47	0.44	0.51	0.44	0.45	0.19
Minimum Dose (mSv)	0.02	0.02	0.02	0.04	0.04	0.02	0.03
Maximum Dose (mSv)	2.59	1.88	1.74	1.57	1.63	1.93	0.76
Collective Annual Dose (mSv)	4.546	4.800	4.810	5.135	5.257	5.406	2.875

There were no incidents in which the administrative limit of 100 Bq/mL or the Action Level of 500 Bq/mL per week was exceeded.

Table 2: Administrative Limit Exceedence

Action Level	NEW	Administration/Assembly		Operators	
	Week 100 Bq/mL	Quarter 0.5 mSv	Year 1mSv	Quarter 1mSv	Year 3 mSv
Exceeded	No	No	No	No	No
No. of Times	-	-	-	-	-
Cause	-	-	-	-	-

Table 3: Action Level Exceedence

Action Level	NEW		
	Week 500 Bq/mL	Quarter 2 mSv	Year 5 mSv
Exceeded	No	No	No
No. of Times	-	-	-
Cause	-	-	-

A distribution of the annual effective doses for SSI workers for 2000 to 2006 is included in Table 4 below. In 2006, only two operators and one maintenance personnel had a dose exceeding 0.5 mSv, all other workers remained below 0.5 mSv.

Table 4: Distribution of Annual Affective Doses

Annual Dose	No. Of Workers						
	2000	2001	2002	2003	2004	2005	2006
<0.5 mSv	9	8	8	4	9	8	12
0.5 – 1.0 mSv	1	1	0	3	0	2	3
1.0 – 2.0 mSv	2	2	3	3	3	2	0
2.0 – 3.0 mSv	1	0	0	0	0	0	0

6. Environmental and Radiological Compliance

SSI has an environmental protection program that includes continuous stack monitoring of airborne releases to the environment and an Environmental Monitoring Program (EMP) to measure the effects of those releases on the environment.

Surface Water, Ambient Air and Milk samples were collected monthly by SSI and sent to an external laboratory for analysis. Vegetation samples were collected during harvest time.

The annual EMP report is attached under separate cover for review. This report contains a summary of the environmental monitoring results, including emissions data and critical group dose calculations.

7. Facility Effluents

Radiological releases from SSI operations to the environment include airborne releases (stack emissions) and contaminated aqueous effluent (wastewater).

Tritium emissions from the facility are measured continuously. A total of 1.33×10^{13} Bq of Tritium Oxide and 9.64×10^{13} Bq of Tritium Gas were released to the atmosphere in 2006. These quantities did not exceed the Derived Release Limits (DRLs) as calculated by Golder Associates, SSI’s Action Levels (ALs) or SSI’s Administrative Limits (AdminLs). The environmental monitoring program annual report summarizes stack emission for 2006.

Wastewater from decontamination processes was collected into two holding tanks, analyzed and then discharged in accordance with the procedure EM2.2, “Effluent Monitoring”.

A total of 2.37×10^9 Bq (2.37 GBq) of wastewater was released from the SSI holding tanks, which was well below SSI's liquid effluent release limit of 100 GBq (1×10^{11} Bq) of tritium.

8. Waste Management

In 2006 there was 1 shipment of tritium-contaminated waste transferred to a CNSC licensed waste disposal facility. The shipment contained seven boxes of compacted waste containing tritium contaminated gloves and paper products packaged as Excepted Package – Limited quantity of Material, UN2910 with a total volume of 0.42 m³ and a total tritium activity of 1.40×10^7 Bq.

In 2006 there were 3 - Excepted Package-Limited Quantity of Material, UN2910 shipments of contaminated glass tube stubs to a CNSC licensed waste handling facility to be crushed and transferred to a CNSC licensed waste disposal facility.

- Shipment 1 included:
6 drums containing a total volume of 0.42 m³ and a total activity of 7.98×10^{-4} TBq.
- Shipment 2 included:
20 drums containing a total volume of 1.4 m³ and a total activity of 2.07×10^{-3} TBq.
- Shipment 3 included:
6 drums containing a total volume of 0.42 m³ and a total activity of 1.04×10^{-4} TBq.

In 2006 there was also 1 - Class 7, UN2915, Type A shipments of expired tritium light sources sold for reclamation. This included 17 packages with a total volume of m³ and a total activity of 604.05 TBq.

All shipments were packaged, stored and shipped in accordance with the Transport of Dangerous Goods Regulations, IAEA Safety Standards Series and Regulations for the Safe Transport of Radioactive Material.

9. Updates

Fire Safety

The annual third-party review of compliance with the inspection requirements of the National Fire Code, 1995 was complete by [REDACTED] Fire Prevention Captain, City of Peterborough Fire Department on May 16, 2006. As required the findings of this review was submitted to the CNSC in a letter dated July 31, 2006.

The results of the review included a recommendation to install additional smoke alarms to the 2nd floor lunchroom, Kadex storage room and in the exit stair well, interconnecting them with each other and with the lower floor alarms.

In reviewing our current system, it was determined that an entire new system would be required to be able to interconnect the alarms. Therefore as an alternative, SSI installed two audible horns, one on the main floor and the second in the 2nd floor hallway. These horns will sound in the event of any of the alarms being triggered. This alternative was reviewed by [REDACTED] and accepted. The additional smoke detectors and horns were installed by Trent Security on July 13, 2006.

SSI also installed a 412 series regulator on each of three oxygen tanks to ensure that the pressure in the oxygen piping system is maintained below 15 psi (TSSA Regulations Exemption Quantity).

Waste Management

SSI continued to use washable protective clothing for operators, thus reducing the amount of disposable clothing in the waste stream.

10. Compliance With Other Regulations

SSI must maintain compliance with not only the CNSC regulations, but also several international, federal, and provincial regulations.

SSI must comply with the requirements of the Transportation of Dangerous Goods Regulations (TDG), IAEA Safety Standard Series, Regulations for the Safe Transport of Radioactive Material, IATA Dangerous Goods Regulations. 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 management.

11. Public Information Initiatives

SSI has continued to provide information to the public upon request. Area residents continue to assist with the SSI environmental monitoring program by providing samples, such as well water, vegetation and milk. SSI also continues to participate in community events and local charitable organizations in order to educate the public regarding the benefits of the products.

The PIP program utilizes an information pamphlet to be distributed to area residents and workers in and around the Airport Complex. No public concerns have been discussed at this point.

SSI is also linked to the City of Peterborough Web Site www.city.peterborough.on.ca through Business and Industry, Chamber of Commerce www.peterboroughchamber.ca.

SSI launched their website in 2005 www.shieldsource.com . The website has provided feedback regarding sales and product information.

12. Future Outlook

Although SSI revoked the licence application to prepare and construct a site, the plan to build a new Class 1 B Nuclear Processing Facility located at the Peterborough Airport remains in focus. A revised application will be submitted to CNSC in 2007.