



SHIELD SOURCE INCORPORATED

**2005
ANNUAL COMPLIANCE REPORT**

CNSC LICENCE NSPFOL-12.01/2009

**Shield Source Incorporated
CNSC Licence NSPFOL-12.01/2009
Annual Compliance Report**

Year 2005

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-12.01/2009
Owner: Mr. R. White
Reporting Period: January 2005 through December 31, 2005
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-12.00/2009) 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 2005.

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

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-12.01/2009.

At no time through out 2005 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 fills rigs.

4. Administrative Changes

During 2005 there were no changes within the organization including administration and/or procedures that affected licensed activities.

5. Health Physics

During 2005, 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 12 individual staff members to the National Dose Registry in accordance to Section 19 of the Radiation Protection Regulations.

The minimum effective dose for 2005 was 0.02 mSv. The maximum effective dose was 1.93 mSv and the average for 2005 was 0.45 mSv.

Table 1 details the Average, Minimum, Maximum and Collective Annual Effective Dose for SSI staff for years 2000 through 2005.

Table 1: Annual Effective Dose Comparison

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

There was one incident however, in which the administrative limit of 100 Bq/mL and the Action Level of 500 Bq/mL per week was exceeded due to rig maintenance (see Table 2 and 3). Exposure levels were monitored in accordance with QMP2A, "QMS Appendix A, Action Levels and Administrative Limits". The operator was restricted from H³ operations for fourteen days and urine was sampled twice a week until the level reduced to less than 300 Bq/mL. The Committed Effective Dose was calculated and found to be less than the annual effective dose action level of 5.0 mSv/year.

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	Yes	No	No	No	No
No. of Times	1	-	-	-	-
Cause	Rig Maintenance	-	-	-	-

Table 3: Action Level Exceedence

Action Level	NEW		
	Week 500 Bq/mL	Quarter 2 mSv	Year 5 mSv
Exceeded	Yes	No	No
No. of Times	1	-	-
Cause	Rig Maintenanc e	-	-

A distribution of the annual effective doses for SSI workers for 2000 to 2005 is included in Table 4 below. In 2005, only operators had a dose exceeding 1 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
<0.5 mSv	9	8	8	4	9	8
0.5 – 1.0 mSv	1	1	0	3	0	2
1.0 – 2.0 mSv	2	2	3	3	3	2
2.0 – 3.0 mSv	1	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.

Environmental samples were collected monthly by SSI and sent to an external laboratory for analysis.

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 1.72×10^{13} Bq of Tritium Oxide and 1.04×10^{14} Bq of Tritium Gas were released to the atmosphere in 2005. 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 2005.

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

A total of 3.86×10^9 Bq 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 2005 there were 2 - shipments of tritium-contaminated waste transferred to a CNSC licensed waste disposal facility.

- Shipment 1 included:
 - Four drums containing tritium contaminated oil and filters packaged as Type A, Class 7, UN2915 having a total volume of 0.28 m³ and a total tritium activity of 8 TBq
 - Two boxes containing tritium safety signs packaged as Excepted Package, Articles UN2911, with a total volume of 0.18 m³ and a total tritium activity of 67.76 TBq.
- Shipment 2 included:
 - 1 drum of contaminated oil and filters packaged as Type A, Class 7, UN2915 containing a total volume of 0.07m³ and a total activity of 2.72 TBq.
 - 1 drum of contaminated glass (tube stubs), Excepted Packages UN2911, containing a total volume of 0.07 m³ and a total activity of 0.010 TBq.
 - 6 drums of compacted waste containing tritium contaminated gloves and paper products packaged as Surface Contaminated Objects (SCO-1), UN 2913, with a total volume of 90.54 m³ and a total tritium activity of 0.00010 TBq.

In 2005 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:
 - 5 drums containing a total volume of 0.35 m³ and a total activity of 0.003 TBq.

- Shipment 2 included:
5 drums containing a total volume of 0.35 m³ and a total activity of 0.0003 TBq.
- Shipment 3 included:
6 drums containing a total volume of 0.42 m³ and a total activity of 0.001 TBq.

In 2005 there were also 6 - Class 7, UN2915, Type A shipments of expired tritium light sources sold for reclamation.

- Shipment 1 included:
29 packages with a total volume of 1.74 m³ and a total activity of contained 1071.22 TBq.
- Shipment 2 included:
6 packages with a total volume of 0.36 m³ and a total activity of 225.08 TBq.
- Shipment 3 included:
8 packages with a total volume of 0.48 m³ and a total activity of 274.42 TBq.
- Shipment 4 included:
2 packages with a total volume of 0.12 m³ and a total activity of 53.39 TBq.
- Shipment 5 included:
1 package with a total volume of 0.06 m³ and a total activity of 53.38 TBq.
- Shipment 6 included:
19 packages with a total volume of 1.14 m³ and a total activity of 648.99 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

Health Safety

One portable tritium air monitor (Scintrex model 209E) was taken out of commission in 2005. A new portable Tritium monitor was ordered from Overhoff Technologies and put into service in January 2006.

Fire Safety

The Fire Safety Program Manual was revised to include a Document Number and Revision Number (PRO7.2-1), new document format, revised Hazardous Material List and an updated diagram of the Peterborough Airport Leased Land.

Section 7.4 of SSI's operating licence states that the licensee shall arrange for annual third-party reviews of compliance with the inspection requirements of the National Fire Code, 1995. Although SSI was aware of this license condition a third party review was not complete in 2005. This was due to the compliance requirements stated in the CNSC Type II Fire Protection Inspection, February 19, 2004. SSI began renovations in 2005 in order to comply with the Action Notices and Recommendations in the CNSC Fire Protection Inspection. However, the Fire Prevention Capitan of the Peterborough Fire Department did visit the SSI facility in September 2005 to assist in the compliance requirements. SSI's renovations are scheduled to be complete by the end of April 2006 at which time a third party review will be complete.

A correspondence letter regarding the Fire Safety Inspection, 2004 will be forwarded under separate cover when the renovations are complete.

A approved fume hood was installed in 2005 in order to comply with Directive SSI-200402-D104.

Security

A Security Inspection was completed by CNSC in 2005 indicating one action notice. The action notice was completed as requested.

Waste Management

In 2005 disposable overcoats and shoe covers were replaced with cloth coats and shoe covers for the operators in the Tritium Fill Room. A washer and dryer were installed in the facility in order to wash the protective clothing. This was done in order to reduce waste and to reduce contamination exposure.

Dosimetry

SSI's Class II Nuclear Facilities And Prescribed Equipment Licence for Dosimetry Service was renewed in June 2005

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 revised 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. Currently, this link only gives SSI contact information, however, SSI plans to expand this information in 2005 to include a brief summary of the SSI operation.

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

12. Future Outlook

SSI has begun the process of planning a new facility. Consultants have been hired to assist with building design, process design and set-up and regulatory approvals. Construction of the new facility will begin summer 2006. Initially the new facility will house non-tritium processes. These processes will not include Tritium manufacturing or assembly at this time. However, once these additional processes are implemented and all approvals are in place SSI plans to move the Tritium process to the new facility. SSI will be looking to CNSC for the guidance and assistance required to accomplish this task.

SSI plans to continue to research and develop new products in order to explore foreign markets.