



SHIELD SOURCE INCORPORATED

**2003
ANNUAL COMPLIANCE REPORT**

CNSC LICENCE NSPFOL-12.01/2004

**Shield Source Incorporated
CNSC Licence NSPFOL-12.01/2004
Annual Compliance Report**

Year 2003

Submitted to:

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

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Reporting Period: January 2003 through December 31, 2003

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TABLE OF CONTENTS

<u>SECTION</u>	<u>PAGE</u>
1. Introduction	1
2. Operational Review	1
3. Production	1
4. Administrative Changes	2
5. Health Physics	2
6. Environmental and Radiological Compliance.....	2
7. Facility Effluents	3
8. Waste Management	3
9. Updates	4
10. Compliance With Other Regulations	5
11. Public Information Initiatives.....	5
12. Future Outlook	6

LIST OF TABLES

<u>TABLE</u>	<u>PAGE</u>
Table 1: Annual Effective Dose Comparison.....	2

1. Introduction

Shield Source Incorporated (SSI) is a Class 1B Nuclear Facility possessing a Nuclear Substance Processing Facility Operating Licence (NSPFOL-12.01/2004) issued by the Canadian Nuclear Safety Commission (CNSC). Condition R2 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 R2 of the above mentioned licence.

2. Operational Review

SSI's current operating licence NSPFOL-12.01/2004 expires July 31, 2004. SSI has worked extensively in 2003 to upgrade documentation in order to satisfy the Nuclear Safety and Control Act and its Regulations.

SSI requested an amendment to the operating licence under condition G2 of the licence to revise the Radiation Safety And Procedure Manual – Rev 9 to implement a wash procedure for protective clothing. In October 2003, CNSC approved the implementation of the new wash procedure for protective clothing.

In compliance with SSI's licence conditions, SSI reported a tritium oxide emission that exceeded the administrative limit of 0.99 TBq per week. The emission was caused by an improperly sealed container, which contained contaminated oil. The oil was emitting into the stack causing an increase in emission. The emission did not exceed the DRLs.

3. Production

In accordance with Section IV of the Nuclear Substance Processing Facility Operating Licence-12.01/2004m SSI:

- i) manufactured sealed sources consisting of tritium gas sealed in glass tubes, and incorporated these sources into devices in the manner described in the documents listed in Appendix A of the licence;
- ii) possessed, used, and transferred nuclear substances necessary or incidental to (i) above;
- iii) At no time imported more than 37 TBq within any two-year period without applying for and receiving permission to import tritium 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-12.01/2004.

At no time through out 2003 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 2003 there were no changes within the organization including administration and/or procedures that effected licensed activities.

5. Health Physics

During 2003, SSI maintained a Dosimetry Service License (DSL-1-9.1) for the purpose of providing dosimetry services for the staff and visitors of Shield Source Incorporated.

Dosimetry results were reported for 10 individual staff members to the National Dose Registry in accordance to Section 19 of the Radiation Protection Regulations. At no time in 2003 did an individual's effective dose exceed the regulatory (50 mSv) or administrative (30 mSv) dose limits causing restriction of duties. The minimum effective dose for 2003 was 0.04 mSv. The maximum effective dose was 1.57 mSv and the average for 2003 was 0.51 mSv.

Table 1 details the Average, Minimum and Maximum Annual Effective Dose for SSI staff for the current licensing period.

Table 1: Annual Effective Dose Comparison

	2000	2001	2002	2003
Average Dose (mSv)	0.49	0.47	0.44	0.51
Minimum Dose (mSv)	0.02	0.02	0.02	0.04
Maximum Dose (mSv)	2.59	1.88	1.74	1.57

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.

In August 2003 the revised Environmental Monitoring Program (Golder 2003) was reviewed and accepted by CNSC and in April 2003 the revised Derived Release Limits

for Tritium Based On Air Dispersion and Environmental Pathway Modelling was also reviewed and accepted by the CNSC.

As per CNSC request, SSI began implementing the proposed EMP sampling regime and protocol in January 2003. New sampling locations were commissioned and sampling, packaging and transporting methods were revised to follow the new EMP protocol.

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 includes 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 2.18×10^{13} Bq of Tritium Oxide and 6.97×10^{13} Bq of Tritium Gas were released to the atmosphere in 2003. These quantities did not exceed the yearly DRLs or Administrative Limits (ALs) calculated by Twin Oaks Consulting (currently on the Operating Licence) or the new revised DRLs calculated by Golder. The environmental monitoring program annual report summarizes stack emission for 2003.

Wastewater from decontamination processes was collected into two holding tanks, analyzed and then discharged into the sewer system in accordance with the Waste Water Disposal Procedure in the Radiation Safety and Procedure Manual.

A total of 7.56×10^8 Bq of wastewater was released from the SSI holding tanks, which was well below SSI's liquid effluent release limit of 100 GBq of tritium.

8. Waste Management

In 2003 there were three shipments of tritium-contaminated waste transferred to a CNSC licensed waste handling facility.

- Shipment 1 included two drums, Class 7, UN2915, Type A, containing tritium contaminated oils and liquids absorbed in clay material, spent tritium parts from tritium process equipment with a total volume of 0.24 m³ and a total tritium activity of 30 TBq.

- Shipment 2 included twenty-five drums, Excepted Packages, UN2910, Limited Quantity of Material, containing tritium contaminated glass tubes stubs with a total volume of 1.75 m³ and a total tritium activity of 0.002 TBq.
- Shipment 3 included seven, Class 7, UN2915 Type A cartons of sealed light sources with a total volume of 0.21 m³ and a total activity of 123 TBq and 13 Excepted Packages, UN2911, Articles containing tritium safety signs with a total activity volume of 0.39 m³ and a total tritium activity of 123 TBq.

In 2003 there were also 3 shipments of expired tritium light sources sold for reclamation.

- Shipment 1 included 15 Class 7, UN2915, Type A packages with a total volume of 0.93 m³ and a total activity of contained 594 TBq.
- Shipment 2 included 32 Class 7, UN2915, Type A packages with a total volume of 2.0 m³ and a total activity of 971 TBq.
- Shipment 3 included 43 Class 7, UN2915, Type A packages with a total volume of 2.7 m³ and a total activity of 1279 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

SSI continued to revise the documentation supporting the operation of the facility in 2003. The revised documents included the: Safety Analysis Report, Quality Management Guide and the Quality Management Systems that included the quality management program, the environmental protection program, the radiation protection program, the training program, the emergency response program and fire safety program, the preliminary decommissioning plan, the occupational health and safety program and the public information program. These program were submitted to CNSC in December 2003. CNSC has reviewed the documents and has made comments on the quality management program, the radiation protection program, the emergency response program, the preliminary decommissioning plan and the public information program. SSI is in the process on incorporating these comments into the related documents.

The Proposed Environmental Monitoring Program (EMP) was reviewed by CNSC and approved in April 2003 and the subsequent Derived Release Limits (DRLs) were reviewed and approved by CNSC in August 2003.

The Safety Analysis Report was developed and submitted for CNSC review in December 2003. CNSC has commented and a final Safety Analysis Report was submitted to CNSC in March 2004.

A Security Compliance Inspection conducted by CNSC staff was performed in January 2003. There were four action notices that CNSC required SSI to respond to. SSI completed the action notices in March 2003.

Enhanced security measures were implemented in 2003 due to the Iraq Invasion. SSI's security was not breached and no attempts to breach the security occurred at anytime.

A compliance inspection by CNSC occurred in June 2003. There were 3 action notices and 3 recommendations made by CNSC. SSI corrected the action notices by August 2003.

There were two action notices that remained open from the Fire Safety Audit, which occurred in 2002. The first action notice regarding implementing a fire-rated exit from the second floor of the SSI facility was complete. However the 2nd action notice requesting the storage of oxidizing substances and flammable substances to be separated in accordance with Section 3.3.4.1 (2) of the National Fire Code was not complied with. According to the National Fire Code the quantities that SSI use and store are exempt for dangerous goods, therefore section 3.3.4.3 (2) does not apply. SSI has submitted their explanation for non-compliance and is waiting response from CNSC.

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

The revised SSI Public Information Program Manual was submitted for approval to CNSC in December 2003. This document has been reviewed by CNSC and has been accepted.

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 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. SSI plans to implement the revised program by June 1, 2004.

12. Future Outlook

A plant expansion is being assessed once again to include additional processes and storage. Preliminary costs are being reviewed to expand the existing building where SSI is located. 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.