



SHIELD SOURCE INCORPORATED

RADIATION SAFETY ANNUAL REPORT

YEAR 2002

Submitted to:

**Canadian Nuclear Safety Commission
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**Radiation Safety
2002 Annual Report
Shield Source Incorporated
Licence Number: NSPFOL-12.00/2003**

Introduction:

Shield Source Incorporated (SSI) is a Class 1B Nuclear Facility possessing a Nuclear Substance Processing Facility Operating Licence issued by the Canadian Nuclear Safety Commission (CNSC). As a licence condition SSI is required to prepare and submit to the Commission an annual report. This report is written in order to satisfy this requirement.

Operational Review:

SSI worked extensively with CNSC in 2002 to develop and modify manuals and radiation safety documents in order to satisfy the new Nuclear Safety and Control Act and Regulations. As a result SSI's Operating Licence NSPFOL-12.00/2003 was amended to extend the licence period to July 31, 2004. This extension was requested in order to provide time to improve licensing documentation to more fully support SSI's application for license renewal. CNSC approved the licence extension and issued a new licence, Licence Number NSPFOL-12.01/2004, amending the following:

- 1) Appendices of the license were updated to reference a new waste disposal Procedure in SSI's Radiation Safety & Procedure Manual,
- 2) Condition R6 of the current licence was deleted from the licence. This condition was fully complied with and no longer applied to this licence.

SSI will continue to work closely with CNSC to complete documentation in 2003.

Production:

Shield Source fills phosphor coated borosilicate glass tubes with tritium gas and manufactures safety signs.

At no time through out 2002 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 at all times.

Administrative Changes:

No changes occurred in the organization that affected licensed activities.

Health Physics:

Personal radiation exposures for all employees were below both regulatory and administrative dose limits. Table 1 summarizes the personal radiation exposures for SSI employees. As shown, the dose levels ranged from 0.017 mSv to 1.743 mSv. The dose level for employees is directly related to the amount of time worked and the type of duties performed. At no time were action levels exceeded causing restriction of duties.

**Table 1
Personal Radiation Exposures 2002**

JOB CLASSIFICATION	JOB DESCRIPTION	Total Dose (mSv)
0002	Office	0.029
0048	Office/Maintenance	1.743
0048	Machine Operator	1.374
0003	Office	0.069
0002	Office	0.095
0002	Office	0.027
0048	Assembly	0.017
0048	Assembly	0.023
0002	Office	0.025
0048	Machine Operator	1.073
0048	Machine Operator	0.362

Environmental Monitoring Program (EMP):

SSI submitted two documents to CNSC entitled "Proposed Environmental Monitoring Program" and "Air Dispersion and Environmental Pathway Modeling" written by Golder Associates in July 2001. CNSC reviewed the documents and forwarded their comments to SSI in a letter dated August 12, 2002. CNSC concluded that SSI/Golder Associates updated the proposed EMP document and have appropriately updated the DRL document in light of CNSC comments. While many of the elements of the proposed EMP were acceptable, CNSC staff found several presentational deficiencies. SSI was requested to submit revised EMP and DRL documents for CNSC approval. Further, CNSC recommended SSI to commence, without delay, the preparation of a formal training program and to implement the proposed EMP sampling regime.

In November 2002 SSI submitted to the CNSC two revised documents entitled "Proposed Environmental Monitoring Program" and "Air Dispersion and Environmental Pathway Modeling" written by Golder Associates. These documents included the changes

recommended by CNSC staff in a letter dated August 2002. These documents currently remain under review by CNSC.

Environmental samples were collected monthly by SSI and sent to Monserco Laboratories 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 and a summary of local land usage, meteorological data and unusual releases.

Also in November 2002, Golder Associates provided a training seminar for SSI employees to review sampling protocol for environmental monitoring. In January 2003 the proposed sampling regime was implemented.

Facility Effluents:

A total of 2.70×10^{13} Bq of Tritium Oxide and 1.05×10^{14} Bq of Tritium Gas were released to the atmosphere. These quantities were well below both the derived release limits calculated by Golder Associates and SSI administrative emission limits. The environmental monitoring program annual report summarizes stack emission for 2002.

Wastewater from decontamination processes was collected into two holding tanks, analyzed and then discharged into the septic system until December 2002. The septic tank was pumped out weekly and its contents were land spread according to the Waste Water Disposal Procedure in the Radiation Safety and Procedure Manual.

However, a sewer system was connected to the SSI facility in December 2002. SSI requested that the Radiation Safety and Procedure Manual be amended to include a revised Waste Disposal Procedure. The CNSC determined that a federal environmental assessment was required before the CNSC could approve SSI's request. CNSC staff conducted a screening environmental assessment and prepared a screening report on the disposal of tritiated aqueous waste to the City of Peterborough sewer system. CNSC concluded that the project was not likely to cause significant adverse environmental effects, when taking into account the appropriate mitigation measures. Therefore the Waste Disposal Procedure was amended to reflect the change. The septic system was disconnected and the wastewater was released into the sewer system from the holding tanks.

A total of 4.52×10^8 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.

Waste Management:

The cost of waste disposal at Atomic Energy of Canada Limited in Chalk River (AECL) increased dramatically in 2002. Therefore SSI began segregating waste in order to reduce costs. All radioactive solid waste continued to be packaged and stored for disposal at AECL. However, all non-radioactive waste from the assembly areas, lunchroom and offices were released to the municipal garbage system. In prior years some of this waste did go to AECL for disposal due to lack of segregation and the unavailability of a municipal waste disposal site. SSI continued to recycle all non-radioactive materials, such as cardboard, plastic and metal.

Table 2 summarizes the waste generated at SSI in 2002. Due to the high cost of disposal and a decrease in sales most of the waste generated remains in storage at SSI. This waste is planned for disposal early in 2003.

Table 2
SSI Waste Generated In 2002

TYPE	PACKAGE TYPE	VOLUME (m3)	ACTIVITY (Bq)	METHOD OF STORAGE	METHOD OF DISPOSAL
filter columns, oil, rig filters, rags, gloves	drums	0.24	3.7E+12	metal cans in vented storage cabinet then placed in metal drums	shipped to AECL
glass stubs	drums	1.00	1.0E+09	metal cans in vented storage cabinet then placed in metal drums	not shipped yet
compact waste	cardboard boxes	0.54	4.8E+08	compacted, placed in cardboard boxes	not shipped yet
light sources	metal cans	3.00	1.1E+15	plastic containers in vented storage cabinet then wrapped in foam, placed in metal cans and placed in boxes	sold for reclamation

Updates:

Safety - Safety procedures are reviewed regularly through radiation safety meetings. Although the Radiation Protection documents are in the process of being revised there were no changes to the safety procedures during 2002 other than the Waste Disposal Procedure previously mentioned.

Fire Protection - In December 2002, CNSC completed the review of the SSI's response to the Fire Safety Audit conducted in March 2001. There were three recommendations made that SSI questioned. All other recommendations were completed and confirmed by letter. By request, the Peterborough Fire Department (PFD) reviewed the three items in dispute and also disagreed with the recommendations made by CNSC. The PFD issued two letters to SSI stating the reason for their disagreement. These letters were forwarded to CNSC in January 2003 and remain under review.

Security - On November 16, 2001 the Director General of the Directorate of Fuel Cycle and materials Regulation, issued Order Number 01-D1 requiring SSI to comply with specific actions and measures identified in Annex A of the Order and since then a number of security issues have been dealt with, such as Facility-Access Security Clearances, Escort Requirements, Vulnerability Analysis and Threat Risk Assessment. The Security Program Manual has been updated to reflect these changes and has been sent to CNSC under separate cover for review.

Quality Assurance - The Quality Assurance Program manual has undergone preliminary review. It was recommended that the information in all our manuals be incorporated into a two or three tiered document system in which the QA manual, representing the top tier, would contain a brief description of the company management system containing all the measures now described in the various manuals. SSI is still working with CNSC to complete this change in order to meet the regulations.

Training - Security procedures were reviewed with all employees. Training was required for the new security measures implemented as a result of the Designated Order Number 01-D1. All other training was due to normal review of operations.

Compliance With Other Regulations:

The changes in the Transportation of Radioactive Materials Regulations were implemented and complied with.

Public Information Initiatives:

The SSI Public Information Program Manual was submitted for approval to CNSC in December 2002. This document remains under review with the CNSC. SSI will commence the public information program upon approval.

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.

Future Outlook:

A plant expansion is being assessed once again to include glass forming and phosphor coating of the SSI Gaseous Tritium Light Sources. Preliminary costs are being reviewed to build a new plant that would accommodate the expansion. Guidance and assistance from CNSC will be much appreciated.

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