Canadian Nuclear Safety Commission
Commission canadienne de sûreté nucléaire

Annual CNSC Staff Report for 2006 on the National Sealed Source Registry and the Sealed Source Tracking System

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Document Availability

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Executive Summary

This report describes developments in the Canadian Nuclear Safety Commission's (CNSC) National Sealed Source Registry (NSSR) and Sealed Source Tracking System (SSTS) for the period of January 1, 2006 to December 31, 2006. This is the first SSTS/NSSR annual report, and it documents the experience gained and lessons learned over the first year of operations, while also presenting a snapshot of the status of the program at the end of December 2006.

The CNSC developed the NSSR and SSTS to strengthen regulatory controls over high risk radioactive sealed sources, with the goal of improving safety and security for Canadians. The NSSR and the SSTS provide for a "cradle to grave" regulatory oversight of risk significant radioactive sources. The CNSC designed and implemented the NSSR and the SSTS in a manner consistent with the provisions of the International Atomic Energy Agency's (IAEA) *Code of Conduct on the Safety and Security of Radioactive Sources* (the Code). The IAEA divides radioactive sealed sources into five categories, of which Categories 1 and 2 are described as "high risk".

The CNSC began developing the NSSR and the SSTS in 2004. During 2005, the project team designed the system, developed software requirements and accumulated initial data about radioactive sealed sources in Canada. To implement the SSTS, the CNSC had to amend its licences, in order to make the reporting of radioactive source transactions mandatory. As a result, in mid-2005, CNSC staff asked the Commission to amend 278 licences listing high risk radioactive sealed sources. Licensees were notified and consulted. The Commission agreed to amend the licences, and source tracking became a legal requirement on January 1, 2006. New CNSC staff was hired to deal with the technical and administrative aspects of the program, and meet the anticipated increased workload.

The NSSR and the SSTS evolved throughout 2006. At the outset, licensees were required to report source transactions by letter, fax, or e-mail. Web-based source tracking was introduced in July 2006. Five compliance promotion meetings were held in Halifax, Laval, Toronto, Red Deer and Calgary, during the first half of 2006, to familiarize licensees and source distributors with the new regulatory requirements. Based on feedback from licensees, NSSR and SSTS documents were redesigned, making the forms more logical and clear. During the second half of 2006, CNSC staff worked on improvements to the Web interface and planned field verification activities.

Source tracking is mandatory for licensees with Category 1 and 2 sources. Throughout 2006, as licensees reported their source transactions, the amount of information in the NSSR increased. The NSSR is also being gradually populated with information about Category 3, 4 and 5 (moderate and low risk) sources. In the future, information about additional moderate and low risk sources will be added as part of the process whereby licensees who are not subject to mandatory tracking will be able to submit their annual compliance reports online.

By the end of December 2006, the NSSR had information about 7,150 radioactive sealed sources in Canada. Of these, the SSTS was tracking 1,638 Category 1 sources and 3,920 Category 2 sources. The other 1,592 sources in the NSSR were Category 3, 4 and 5 (moderate and low risk) and not subject to mandatory tracking. The SSTS registered over 30,000 source transactions of all types throughout the year.

1.0 From the past to the present

The Canadian Nuclear Safety Commission (CNSC) maintains a regulatory framework of specific licensing for all sealed sources and radiation devices. CNSC nuclear substances and radiation device licences state the specific source model, the radionuclide being used and the maximum quantity of radionuclide allowable for each type of licensed radiation device. However, according to a long-standing international and domestic practice, the serial numbers of each radiation device and the number of devices of each type held by a licensee are not specified on the licence. This practice avoids the need for the licence to be amended each time a licensee decides to buy one more of the same kind of radiation device(s) already listed on the licence.

Source inventories are regularly submitted to the CNSC as part of each licensee's Annual Compliance Report. These inventories are reviewed by CNSC staff, but information about the numbers of each type of radiation device and their serial numbers was not previously entered into a database. The CNSC does maintain a regulatory database containing a wide variety of administrative, licensing and compliance information about licensees. This database, however, did not originally contain data about the exact numbers of sealed sources and devices.

In 2004, the International Atomic Energy Agency (IAEA) published the *Code of Conduct on the Safety and Security of Radioactive Sources* (the Code). CNSC staff took part in meetings to draft the Code, and realized there were three major issues - source tracking, a national source registry and source export licensing - which had to be addressed in order to make Canadian practices conform to Code provisions. Consequently, CNSC staff began developing projects to address these gaps, beginning with the National Sealed Source Registry (NSSR) and Sealed Source Tracking System (SSTS), which were implemented in January 2006.

2.0 Description of the National Sealed Source Registry and the Sealed Source Tracking System

The Sealed Source Tracking System (SSTS) is a tool used to populate the National Sealed Source Registry (NSSR), the CNSC's database of radioactive sealed sources. Licensees may report source transactions by mail, e-mail or fax to the NSSR/SSTS administrators at the CNSC. Alternatively, licensees may use a CNSC-issued authorization code on a computer with Internet access to log in to the SSTS and update source data. The information becomes current within the reporting time frames required by the licence (e.g., reporting within two days of receipt and seven days in advance of any transfer).

When fully populated, the NSSR will contain information about the numbers and types of all radioactive sealed sources and radiation devices and Class II prescribed equipment in Canada. All sealed sources are classified by the IAEA into one of five categories, with categories 1 and 2 being deemed as "high risk". Examples of high risk sources are Cobalt-60 sources, used for radiation therapy for cancer treatment, and Iridium-192 sources, used for industrial radiography. Category 3 and 4 sources are deemed "moderate risk" and Category 5 sources are "low risk".

The CNSC has focused its efforts on the high risk (or risk-significant) sources first. At the end of December, 2006, the NSSR contained data about all the Category 1 and 2 sources in Canada, as well as some Category 3, 4 and 5 sources that have been voluntarily reported. Additional information about all moderate and low risk sources will be included by 2009 as licensees submit their annual compliance reports.

3.0 Major developments in 2006

3.1 January 2006: Paper launch

The Sealed Source Tracking System (SSTS) program was officially launched on January 1, 2006. Licensees began reporting their transactions by fax, e-mail, and regular mail, using forms that were distributed in December 2005.

3.2 March 2006: Revision of reporting forms and inventory request

A major revision of reporting forms was distributed to all SSTS licensees in March 2006. At the same time, an inventory request was also made in order to bring the NSSR data up to date.

3.3 April to June 2006: Outreach program

Between April and June 2006, five regional meetings were held to address licensees' questions regarding the SSTS program. Four meetings took place with radiography licensees in Red Deer, Laval, Mississauga and Halifax. Another meeting was held in Calgary with logging industry licensees. One of the main objectives was to ensure that licensees understood that the system is needed for safety and security reasons. Training on the reporting process was provided, along with a demonstration of the NSSR and the pre-release version of the Web interface.

Individual meetings were also held with major distributors of sealed sources, to discuss issues pertaining specifically to their special role in both the industry and the SSTS program.

3.4 July 2006: Web launch of the SSTS

The SSTS Web system was launched on July 10, 2006. The online portal uses the Government of Canada's ePass system for secure login, so that licensees can only access their own information. To announce the availability of the Web interface, an information package (consisting of a letter, a demo CD and security authorization codes) was sent to each SSTS licensee in June. Although reporting on the Web is optional, the intent of the initiative is to reduce paper consumption and improve efficiency.

3.5 Information sharing with United States Nuclear Regulatory Commission and the Swedish Radiation Protection Institute

On August 22, 2006, a one-day meeting was arranged with visitors from the United States Nuclear Regulatory Commission to provide an overview of the SSTS program and to allow both sides to exchange information about the tracking of high risk sealed sources.

On November 8, 2006, an overview of the SSTS was presented as part of a one-day meeting with visitors from the Swedish Radiation Protection Institute.

4.0 Challenges and lessons learned

4.1 Paper forms

Some radiography licensees indicated that the reporting forms sent to them at the end of December 2005 did not fully address their reporting needs. To resolve the situation, the forms were redesigned by incorpo rating the terms displayed in Section IV of licences, and by using terms that the licensees were more familiar with. The new forms were distributed in March 2006.

4.2 Reporting deadlines

Due to the nature of their business, some licensees stated that the seven day advance reporting deadline for transfers (as stipulated in licence conditions) was causing problems. Licensees stated that sometimes sources must be transferred on short notice, and having to comply with the seven day wait period may bring financial losses. To overcome this difficulty, licensees can now apply for a 24-hour waiver by writing to their CNSC licensing contact.

4.3 Data standardization issues

During the first weeks of program operation, several data mismatches on radiography sealed source assemblies were discovered. For example, the transfer of a sealed source assembly model “A424-9” to a licence displaying “A4249” would fail because of the missing hyphen, even though they had the same assembly model number. Reports were generated in March 2006, to identify any further inconsistencies. Once the variations were identified, the data was adjusted.

Another concern occurred due to inconsistency on licensee names and titles (e.g. J. Smith versus John Smith, Mr. versus Dr.), causing the possibility of multiple Web authorization codes being generated for one individual.This issue was promptly addressed and resolved.

4.4 Activity and data mismatch

A number of licensees were unable to transfer and receive some sources because the reference date and activity data they attempted to record on the Web did not correspond exactly to the data in the National Sealed Source Registry. For example, if a source was listed as 3,000 GBq and transferred to a licensee who attempted to receive it as 2,999 GBq, the transaction was rejected. The system was upgraded to allow entries within an acceptable range of ± 3%.

4.5 Device certification amendments and revisions

A problem arose when, for financial reasons, a manufacturer requested the amalgamation of three radiography device certificates for three different cameras of similar design into one certificate. In the database, assembly fields were modified to include the device model. For example, an assembly model previously known as “A424-9” was changed to also include the device model “Delta” (thereby becoming “(Delta) A424-9”) in order to correctly identify the equipment on the licence. Licensees were no longer able to transact in the system because of this change. To address the situation, software tools were developed to allow the reassignment of sources to the correct device model in the National Sealed Source Registry.

5.0 National Sealed Source Registry and Sealed Source Tracking System status

5.1 Sealed source inventory

In December 2006, at the end of one year of accumulating source data in the National Sealed Source Registry (NSSR), the number of Category 2 sources was 3,920 and the number of Category 1 sources was 1,638 for a total of 5,558 high risk sources. These numbers are expected to vary from year to year as licensees change their source inventories. The NSSR is continuously updated as licensees report their source transactions to the SSTS.

5.2 Development of IT tools

IT tools, such as those to create Web authorization codes and audit reports, were built and assist CNSC staff in the daily management of the program.

5.3 Internal CNSC documentation

Several Sealed Source Tracking System (SSTS) procedures were prepared and made available to CNSC staff on the CNSC internal network. These include:

- Data entry procedures for the National Sealed Source Registry (NSSR);
- NSSR overdue transfer procedure;
- NSSR procedures for generating source and transaction history reports;
- New authorization code for sealed source tracking on the Internet;
- Administrative procedures for the release of SSTS authorization codes;
- NSSR procedure for generating licence expiry reports.

The procedures have also been compiled as part of the SSTS/NSSR Manual, which contains all relevant information about the SSTS program. The manual is available to any CNSC staff member upon request.

5.4 CNSC staff training

Assigned CNSC staff is trained to use the SSTS system and to generate reports as required.

5.5 Web interface usage

Some licensees actively use the Web interface, but most still report on paper. Web reporting reached a maximum of 16% in October 2006.

6.0 Forthcoming improvements and objectives

6.1 Updates and improvements to National Sealed Source Registry and the Web Sealed Source Tracking System

Several information technology issues were identified in 2006, and CNSC staff is working to resolve them. For example, licensees have complained that too much information has to be keyed into the SSTS Web pages, making Web sessions tedious and error prone. In fact, the SSTS Web interface was deliberately designed to require that source data be keyed in, so as to ensure consistency for the clear identification of the sources being transfered between licensees. However, this design was approved before the CNSC decided to adopt the Government of Canada's ePass secure log-in technology to access the SSTS. With ePass, security is strengthened - and IMTD staff is now modifying the Web interface to offer drop down menus and pick lists, thereby making the Web interface more user-friendly.

6.2 SSTS licensee survey

A survey of SSTS licensees is being planned. Licensees will be asked to provide feedback on the current program and to highlight the elements of the program that could be improved.

6.3 Training on new and current tools

CNSC staff is being trained on new information technology NSSR/SSTS tools as they are developed and modified.

6.4 On-going documentation

As tools are created and modified, procedures will be written, revised, and included as part of a CNSC staff manual.

6.5 Compliance verification

Type II inspection worksheets used by CNSC staff were modified to include the SSTS tracking requirment. Training will be scheduled for each regional office, so that inspectors can begin to use SSTS data in their inspection visits.

6.6 Performance measures

In order to gauge the effectiveness of the SSTS program and the accuracy of the data in the system, a performance measures project will be implemented. The framework for the project was drafted in late 2006 and is now under review by CNSC management.

6.7 Import/Export Program

CNSC staff is working on implementing a more rigorous import/export licensing program, as mandated by the IAEA *Code of Conduct on the Safety and Security of Radioactive Sources*. The program will impact licensees permitted to possess Category 1 and 2 sources.

7.0 Statistics

7.1 Licences

- Number of licences amended to require SSTS reporting as of January 1, 2006: **278**
- Number of 24-hour waivers granted: **40**

7.2 National Sealed Source Registry statistics

National Sealed Source Registry (NSSR) statistics encompass the entire source tracking program and include all sources reported by mail, fax and e-mail as well as Web Sealed Source Tracking System (Web SSTS) transactions. The statistics include all types of transactions (transfers, receipts, imports, exports, cancellations, changes, and creations).

Note	NSSR Statistics at Dec. 31, 2006	
A	Number of NSSR transactions in 2006	**30,167**
B	Number of sources in NSSR (all categories) in Canada	**7,150**
C	Number of Category 1 and 2 sources tracked in Canada on Dec. 31, 2006	**5,558**

Notes:

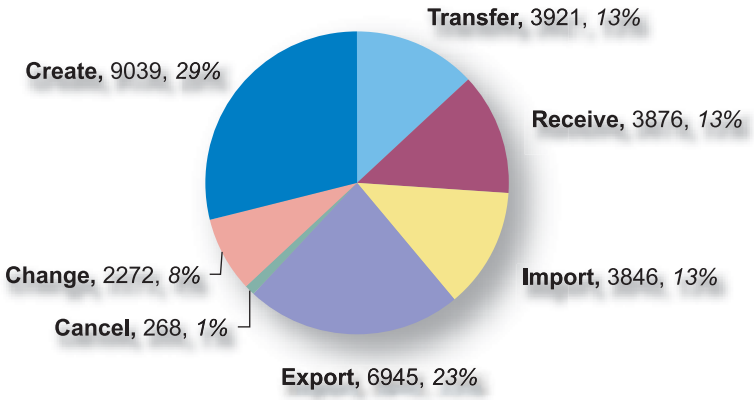
A The total number of transactions in 2006 is the sum of all transactions identified in Figure 1: NSSR Transactions by Type, January to December, 2006

B Figure 2 represents the total number of sources in phase I of the NSSR/SSTS. This figure includes all Category 1 and 2 sources that are subject to mandatory source tracking and certain Category 3, 4 and 5 sources that have been reported by licensees as an integral part of their overall inventory. Phase II of NSSR/SSTS will integrate the sources in the current CNSC licensing database for Category 3, 4, 5. This integration will take place in the next two years.

C The number of Category 1 and 2 sources tracked in Canada on Dec. 31 is the sum of these two categories of sources shown in the Figure 2.

Figure 1

NSSR Transactions by Type, January to December 2006

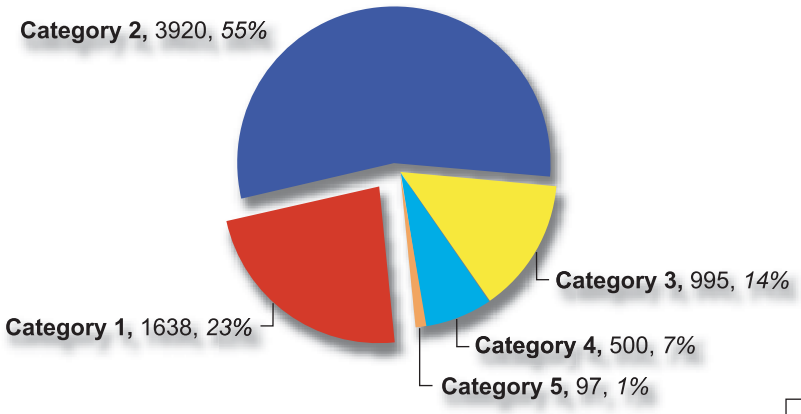


Create:	the manufacturing of a new sealed source in Canada.
Transfer:	shipment of a sealed source from one location to another, within Canada.
Receive:	reception of a sealed source transfer at its intended destination, within Canada.
Import:	receipt of a sealed source from outside the country.
Export:	transfer of a sealed source to outside the country.
Change:	modification to transfer or export data.
Cancel:	cancellation of a transfer or export.

Figure 2

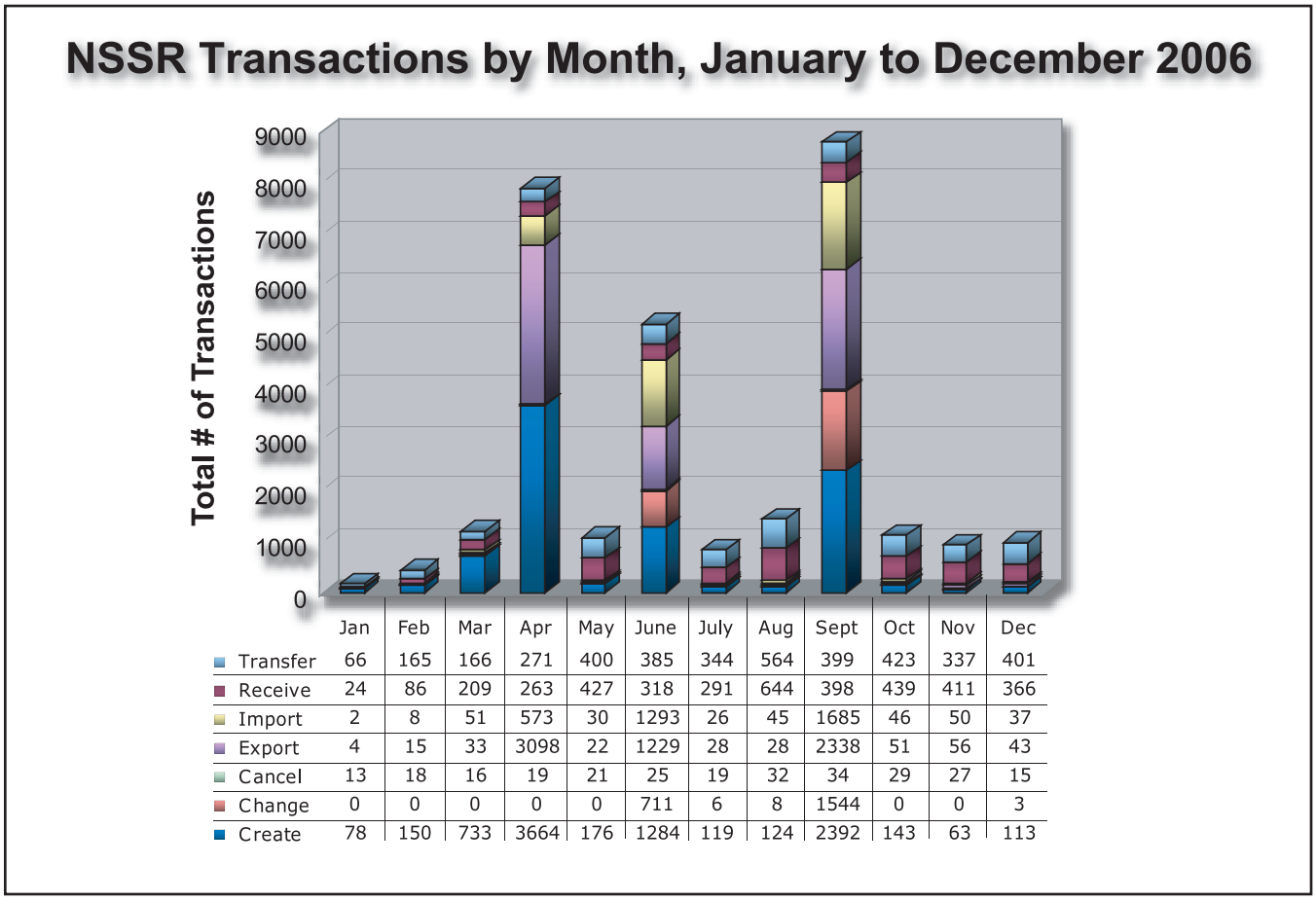
Number of Sources by Category, as of December 31, 2006

(Not including Exported sources)



Total: 7150

Figure 3



	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
Transfer	66	165	166	271	400	385	344	564	399	423	337	401
Receive	24	86	209	263	427	318	291	644	398	439	411	366
Import	2	8	51	573	30	1293	26	45	1685	46	50	37
Export	4	15	33	3098	22	1229	28	28	2338	51	56	43
Cancel	13	18	16	19	21	25	19	32	34	29	27	15
Change	0	0	0	0	0	711	6	8	1544	0	0	3
Create	78	150	733	3664	176	1284	119	124	2392	143	63	113

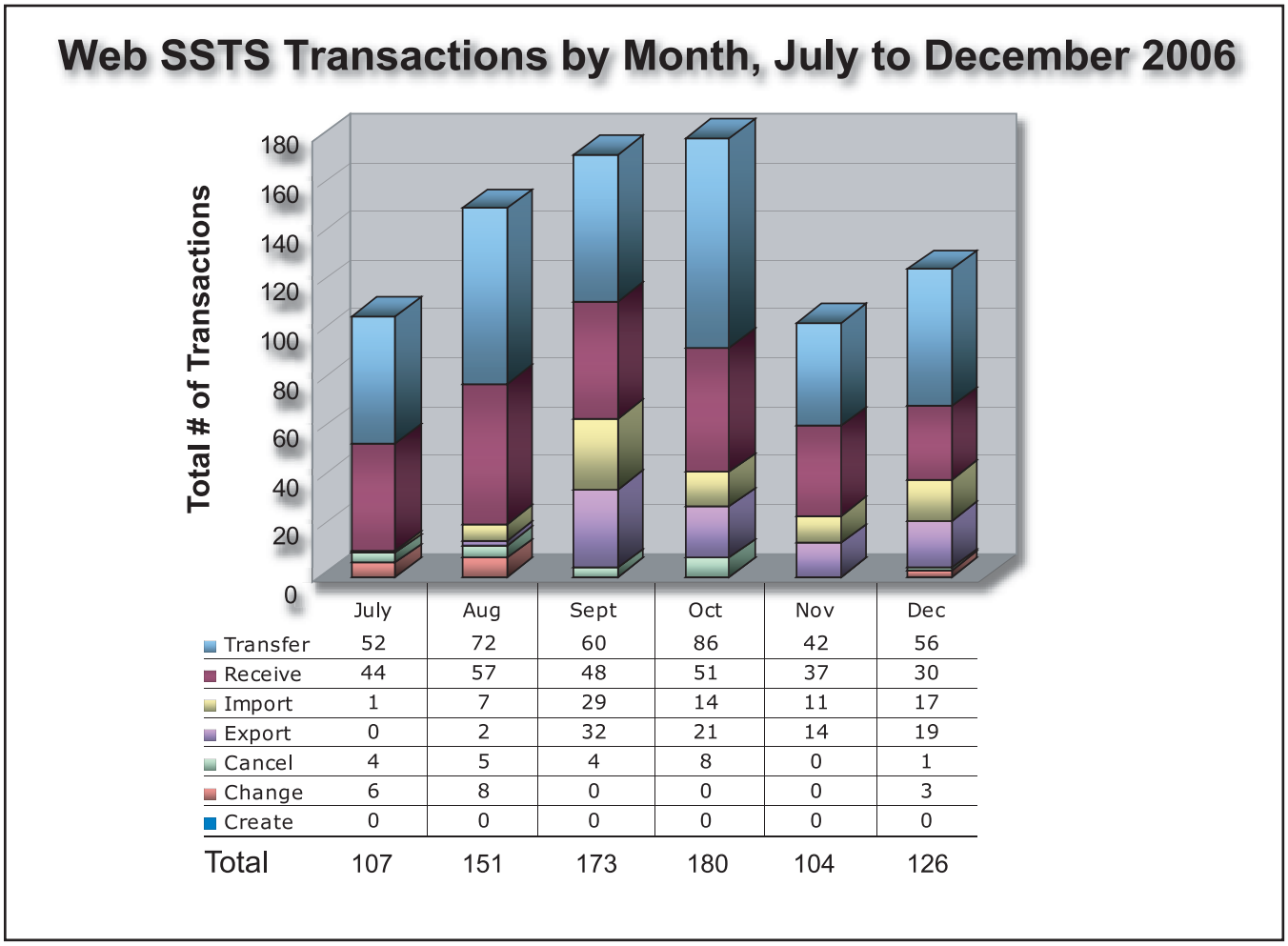
Figure 3: NSSR transactions by month, January to December 2006, show a significantly greater number of transactions in April, June, and September. The increased transactions in these months are due to imports or exports or both by a major source manufacturer. They represent not the timing of these kinds of transactions in the business year of the licensee, but the timing of the entry of the data into the NSSR by CNSC staff. Since these transactions are imports and exports, they do not have an impact on domestic source tracking.

7.3 Web Sealed Source Tracking System (SSTS) statistics

Web SSTS statistics are a subset of NSSR statistics and are available for July to December 2006.

- Number of licences issued Web SSTS authorization codes (as of December 31, 2006): **278**
- Number of licences that have logged in and performed at least one transaction: **57**
- Number of users that have logged in (registered users): **109**
- Total number of individual Web transactions between July 1, 2006 and December 31, 2006: **841**

Figure 4



	July	Aug	Sept	Oct	Nov	Dec
Transfer	52	72	60	86	42	56
Receive	44	57	48	51	37	30
Import	1	7	29	14	11	17
Export	0	2	32	21	14	19
Cancel	4	5	4	8	0	1
Change	6	8	0	0	0	3
Create	0	0	0	0	0	0
Total	107	151	173	180	104	126

Figure 5

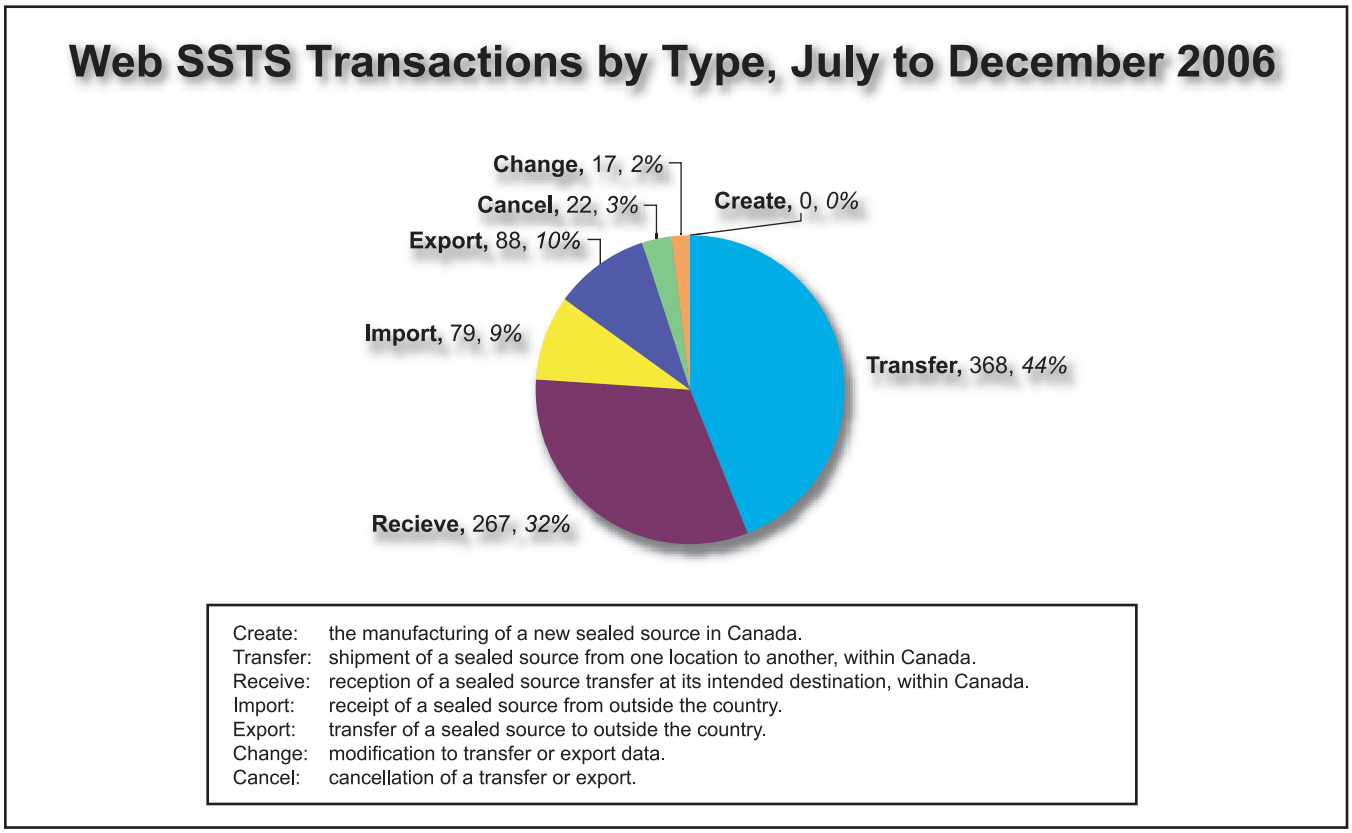
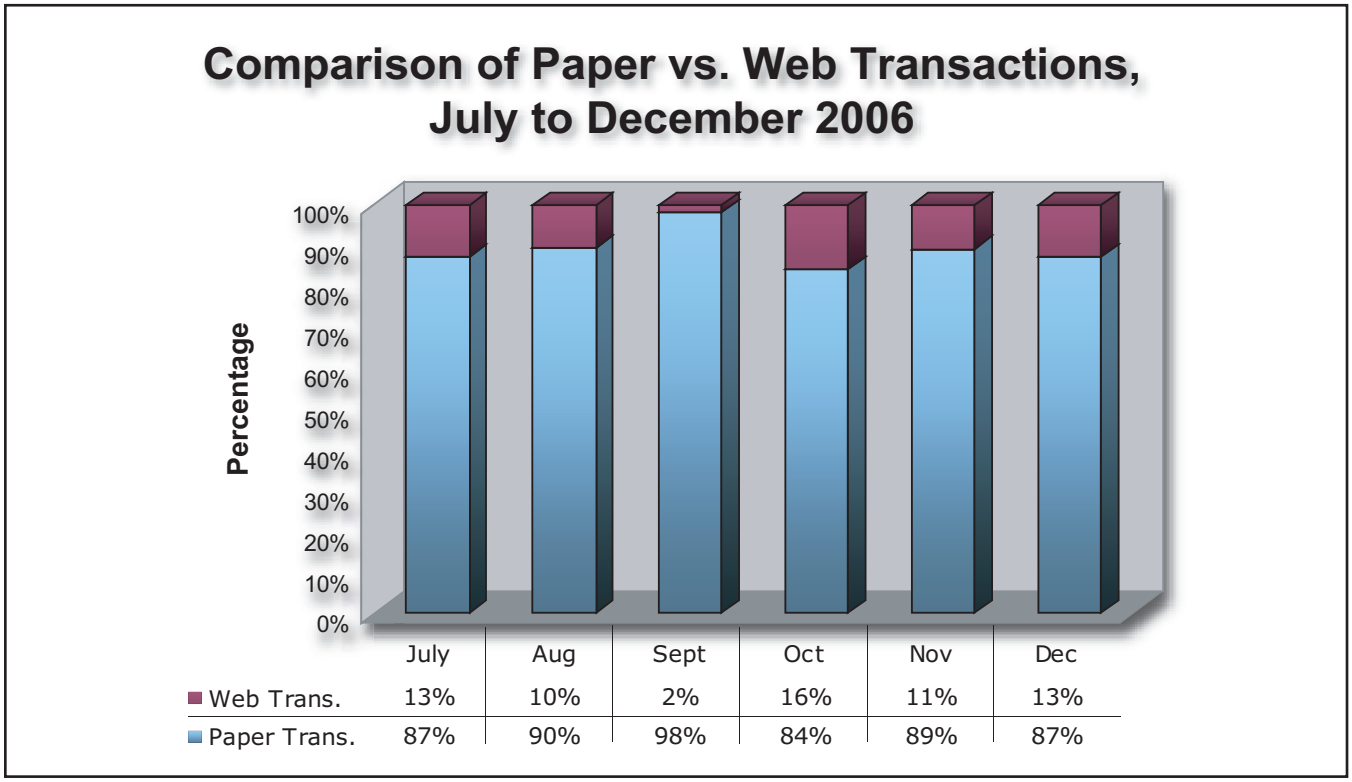


Figure 6



* For the month of September, "Paper Transactions" included batch transaction files.

8.0 Conclusion

The Canadian Nuclear Safety Commission is the first independent nuclear regulator among the G8 countries to implement a Web-based Sealed Source Tracking System and National Sealed Source Registry update. The tracking system contains information on the movement and location of high-risk radioactive sources in Canada, from their manufacture to their final disposition. This enhancement in Canadian Nuclear Safety Commission regulatory oversight provides assurances to Canadians that the CNSC exercises tight regulatory control by establishing and continuously improving a system with tough security requirements.