



National Sealed Source Registry and Sealed Source Tracking System

Annual Report 2024



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National Sealed Source Registry and Sealed Source Tracking System Report for 2024

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This document can be viewed on the [CNSC website](#). To request a copy of the document in English or French, please contact:

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Cover images

From left to right: a screen capture of the Sealed Source Tracking System interface, a transport package, a sealed source next to a ruler to show that the sealed source has a length of 13.5 cm, a certified exposure device operator using an exposure device.

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Introduction

Sealed sources are radioactive nuclear substances encased in a sealed capsule or in a cover to which the substance is bonded. A source's capsule or cover is strong enough to prevent contact with, or dispersion of, the substance under the conditions for which the capsule or cover is designed. Sealed sources can be used for a variety of activities, including medical, industrial, commercial, and academic and research applications. An inventory of sealed sources within Canada is housed in the National Sealed Source Registry (NSSR), which was established in 2006 to conform to the International Atomic Energy Agency (IAEA) [Code of Conduct on the Safety and Security of Radioactive Sources](#). The NSSR is used to maintain an accurate and secure inventory of sealed sources in Canada, with a particular focus on those classified as high risk.

The [Sealed Source Tracking System \(SSTS\)](#) is a secure information-management system used in conjunction with the NSSR to track new and existing high-risk sources within Canada. Source transfers done online through the SSTS update and populate the NSSR so that the information is as current as the licence reporting allows. The timelines to report the receipt of a source (following either a domestic transfer or an import) is within 2 days of receipt. An export must be reported 7 days in advance of the export. A domestic transfer must be reported 24 hours prior to the transfer. The CNSC places particular emphasis on capturing data on high-risk sources, with the NSSR housing detailed information such as the source serial number, isotope, activity, and current location. Information on moderate- and low-risk sources is updated annually using the inventory data included in licensees' annual compliance reports (ACRs) and validated by the CNSC for accuracy and consistency.

Categories of sealed sources

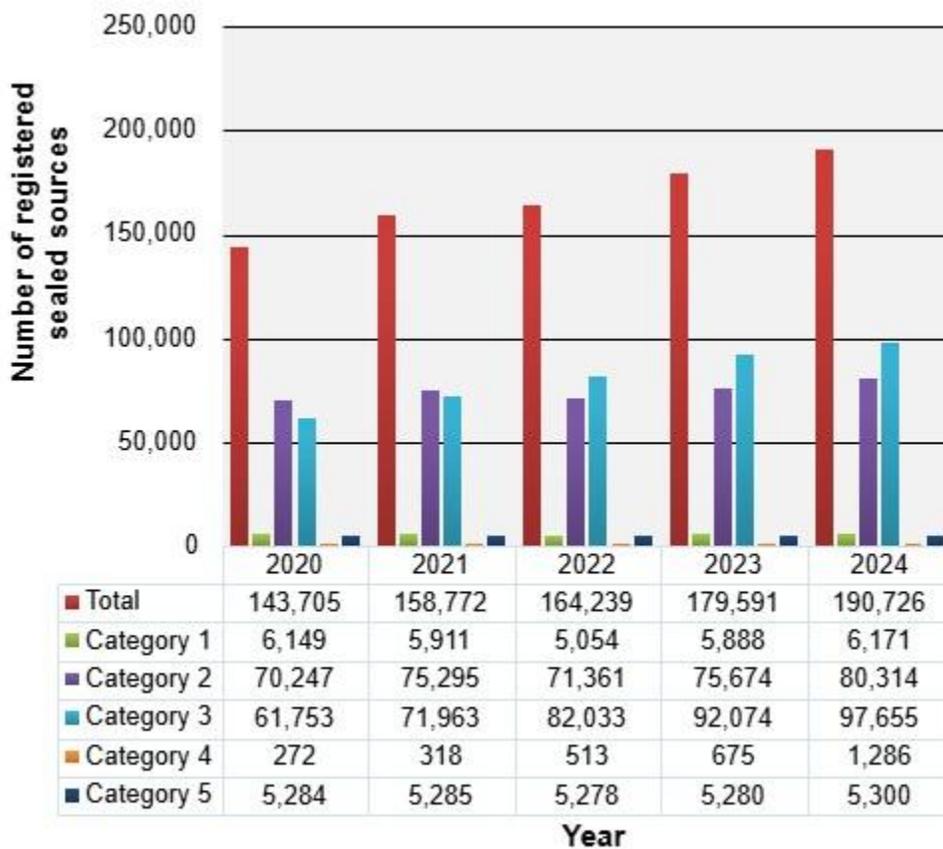
Sealed sources are classified by the IAEA into five different categories:

- Category 1: Very high risk (personally extremely dangerous)
- Category 2: High risk (personally very dangerous)
- Category 3: Moderate risk (personally dangerous)
- Category 4: Low risk (unlikely to be personally dangerous)
- Category 5: Very low risk (most unlikely to be personally dangerous)

For more information on how sealed sources are categorized, consult the [CNSC website](#).

By the end of 2024, the NSSR contained information on **190,726** radioactive sealed sources in Canada. The SSTS actively tracks Category 1 and 2 sources. In 2024, **6,171** Category 1 and **80,314** Category 2 sources were tracked. The remaining **104,241** sealed sources in the NSSR were Category 3, 4 or 5, which are not subject to mandatory tracking for every movement. Figure 1 shows the total number of sealed sources, as well as the number of sealed sources in each category, that were accounted for in Canada on December 31, 2024.

Figure 1. Breakdown of sealed sources in Canada on December 31, 2024



Performance measures and verification

To gauge the effectiveness of the SSTS and verify the accuracy of the data in the system, CNSC inspectors physically cross-reference SSTS data against licensees’ actual inventory of sealed sources. Routine CNSC compliance inspections include the verification of sealed source tracking information. Inconsistencies are immediately addressed to ensure accuracy in the data.

In 2024, CNSC inspectors verified licensees’ compliance with sealed source tracking requirements during 99 inspections. Of these, licensees were compliant in 97% of cases (96 inspections). One of the non-compliances was related to a reporting period issue and the other two were the result of a mismatch between the physical inventory and what was registered in the NSSR/SSTS. In all three cases, the licensees adequately addressed the issues.

For more information on inspection results of Canadian licensees using nuclear substances relative to doses to workers, radiation protection, operating performance and sealed source security, refer to the annual [Regulatory Oversight Report on the Use of Nuclear Substances in Canada](#).

Event mitigation

Licensees must immediately report lost or stolen nuclear substances to the CNSC and must also submit descriptions of any actions taken or proposed to recover missing nuclear substances. The CNSC investigates every such event and informs local, national, and international stakeholders who may assist with recovery. A list of events involving sealed sources can be found in the [Lost, Stolen and Found Sealed Sources and Radiation Devices Report](#).

The [International Nuclear and Radiation Events Scale](#) (INES) is a tool for communicating the safety significance of nuclear and radiological events to technical communities and the public. Every event reported from the commercial, academic and research, industrial, and medical sectors is classified in accordance with the INES, based on its safety significance rating. An event classified as level 0 (or “below scale”) has no safety significance, level 1 is an anomaly, level 2 is an incident, level 3 is a serious incident, level 4 is an accident with local consequences, level 5 is an accident with wider consequences, level 6 is a serious accident, and level 7 is a major accident. The levels, excluding level 0, are broken into 2 sections; levels 1, 2, and 3 are incidents while levels 4 through 7 are accidents. Four events involving lost, stolen, or found sources in 2024 were rated as INES Level 1. Nine events were rated as Level 0, which are considered below scale and have no safety significance.

A total of 54 sealed sources were involved in 13 events in 2024. Five Category 4 sources were recovered after having been lost or stolen, all of them within four days or less. Two Category 4 sources contained in a portable gauge were stolen but were not recovered. One Category 5 source was lost and recovered the following day, one Category 5 source was found at a metal recycling facility and 45 Category 5 sources were lost and not recovered, with one of these events involving the loss of 38 smoke detectors at a facility.

Figures 2 and 3 present data on lost and stolen sources in Canada from 2020 to 2024.

Figure 2. Number of reported events involving lost, stolen and found sealed sources from 2020 to 2024

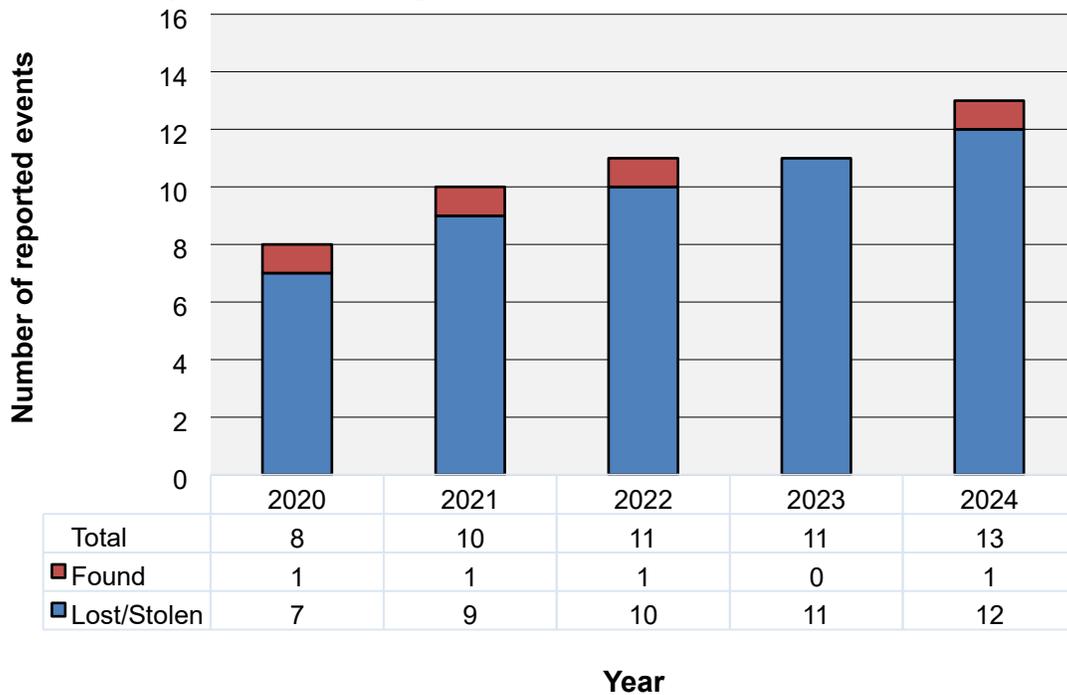
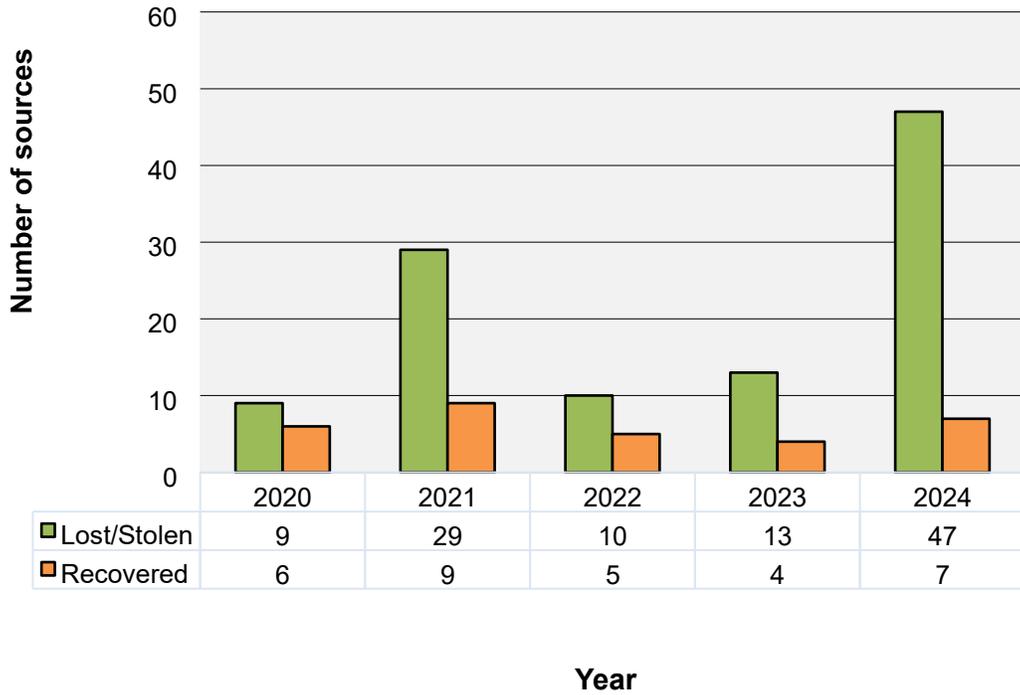


Figure 3: Number of lost or stolen and found or recovered sealed sources from 2020 to 2024

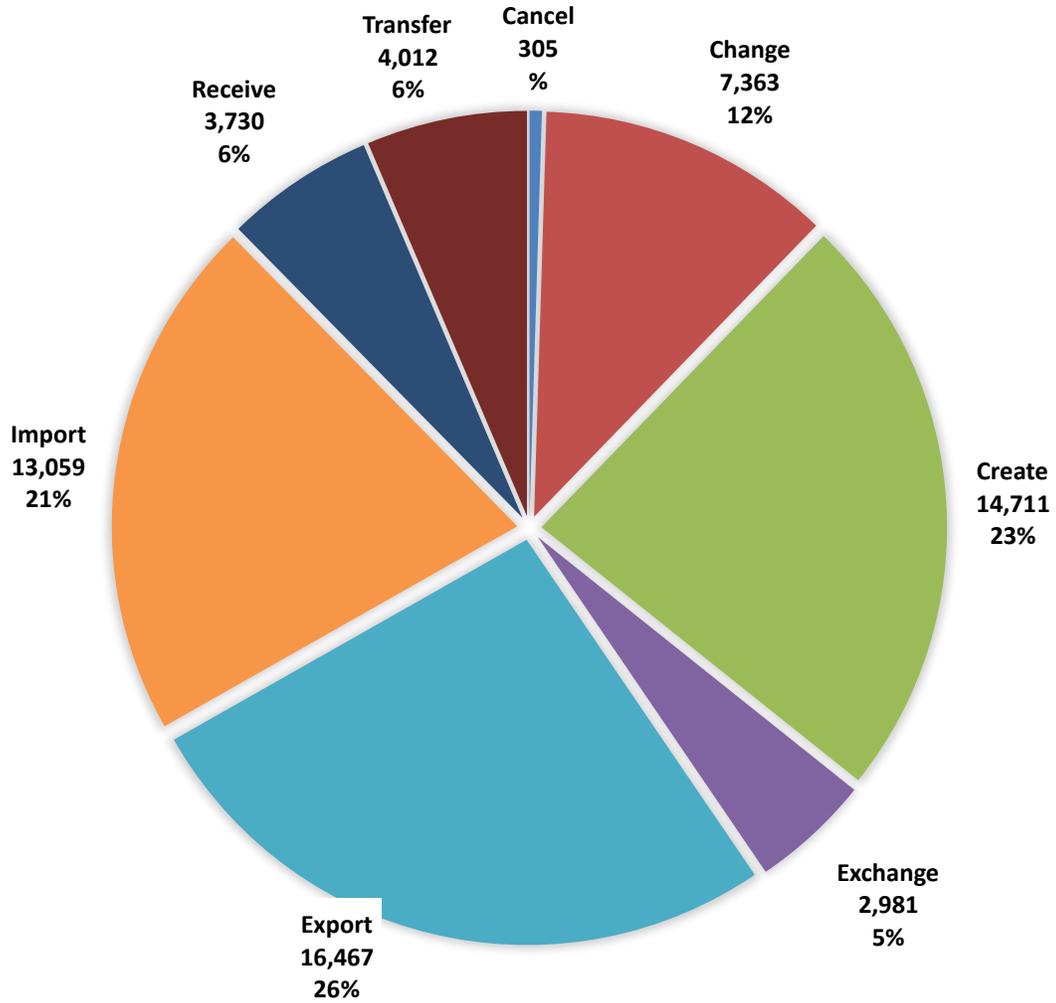


Transaction statistics

The NSSR is populated by licensees reporting their transactions via the online SSTS interface or by other means such as fax or email. Figures 4, 5, and 6 show transactions entered in the SSTS in 2024, statistics for import and export of sealed sources, and the percentage of online SSTS transactions from 2020 to 2024, respectively. The CNSC publishes [SSTS transaction data](#) as part of the Government of Canada’s Open Data initiative.

Figure 4. SSTS transactions in 2024

TOTAL: 62,628

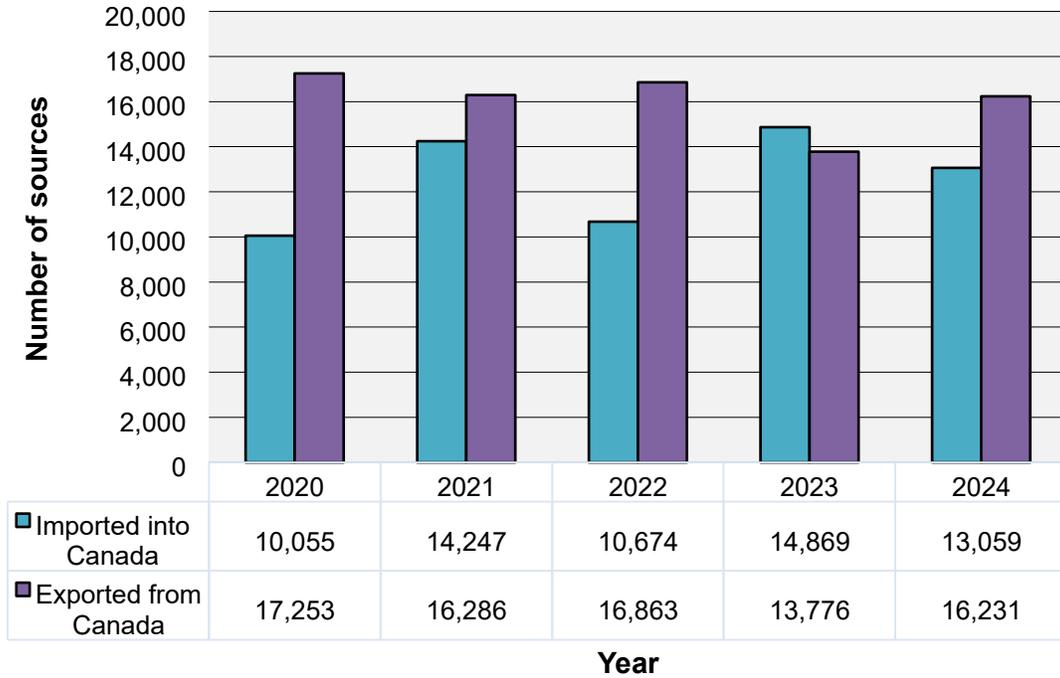


Create	Exchange	Export	Import
<ul style="list-style-type: none"> • Creation of a new source manufactured in Canada 	<ul style="list-style-type: none"> • Replacement of one source with another in a radiation device or Class II prescribed equipment at a licensed location 	<ul style="list-style-type: none"> • Transfer of a sealed source from Canada to a foreign destination 	<ul style="list-style-type: none"> • Transfer of a sealed source into Canada from a foreign location
Receive	Transfer	Change	Cancel
<ul style="list-style-type: none"> • Reception of sources by licensees at licensed locations 	<ul style="list-style-type: none"> • A change in possession of a sealed source, from one licensee to another where both licensees are located within 	<ul style="list-style-type: none"> • Transaction date change or correction 	<ul style="list-style-type: none"> • Cancellation of transaction due to unforeseen circumstances (e.g., export and shipment)

	Canada, or the movement of a sealed source from one licensee's location to another, where both places are located within Canada.		cancellations, delayed transfers)
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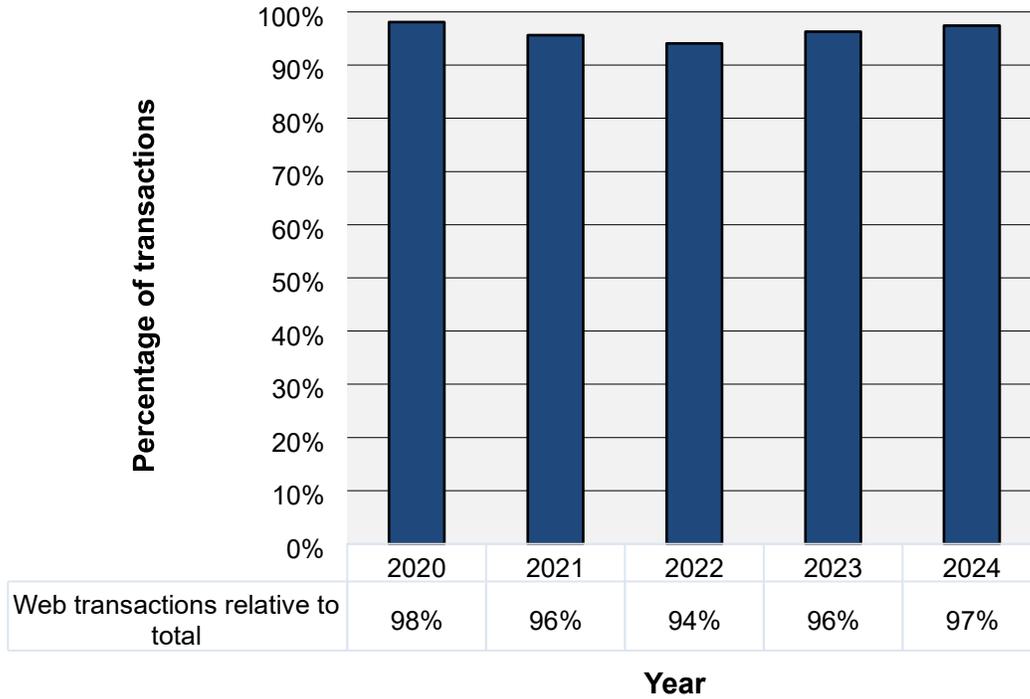
Users of nuclear substances in Canada routinely import and export sealed sources in accordance with their licences.

Figure 5. Number of sealed source imports and exports from 2020 to 2024



Licensees report transactions online (through the SSTS Web portal) or via email or fax to the CNSC. Transactions reported to the CNSC via email or fax are entered into the system by CNSC staff on behalf of the licensee.

Figure 6. Percentage of SSTS transactions completed online from 2020 to 2024



Conclusion

The licensees' continued use of the SSTS indicate that its implementation, as well as that of the NSSR, has been effective, and that Canada is maintaining its commitment to the Code of Conduct on the Safety and Security of Radioactive Sources.

Additional resources

- [Reports on Lost, Stolen and Found Sealed Sources and Radiation Devices](#)
- [Sealed Source Tracking System](#)
- [Class II Nuclear Facilities and Prescribed Equipment Regulations](#)
- [Nuclear Substances and Radiation Devices Regulations](#)
- [Sealed Source Tracking System Open Data](#)