



Radiological Sealed Source Library

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U.S. DEPARTMENT OF
ENERGY

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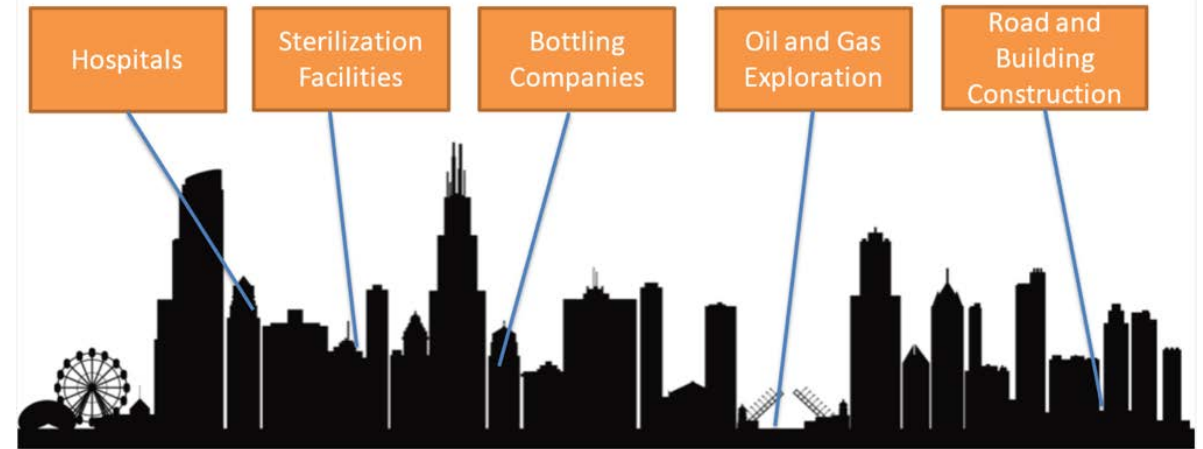
THREAT

Sealed radioactive sources are used worldwide for legitimate purposes.

Majority of thefts and losses reported involve radioactive sources for

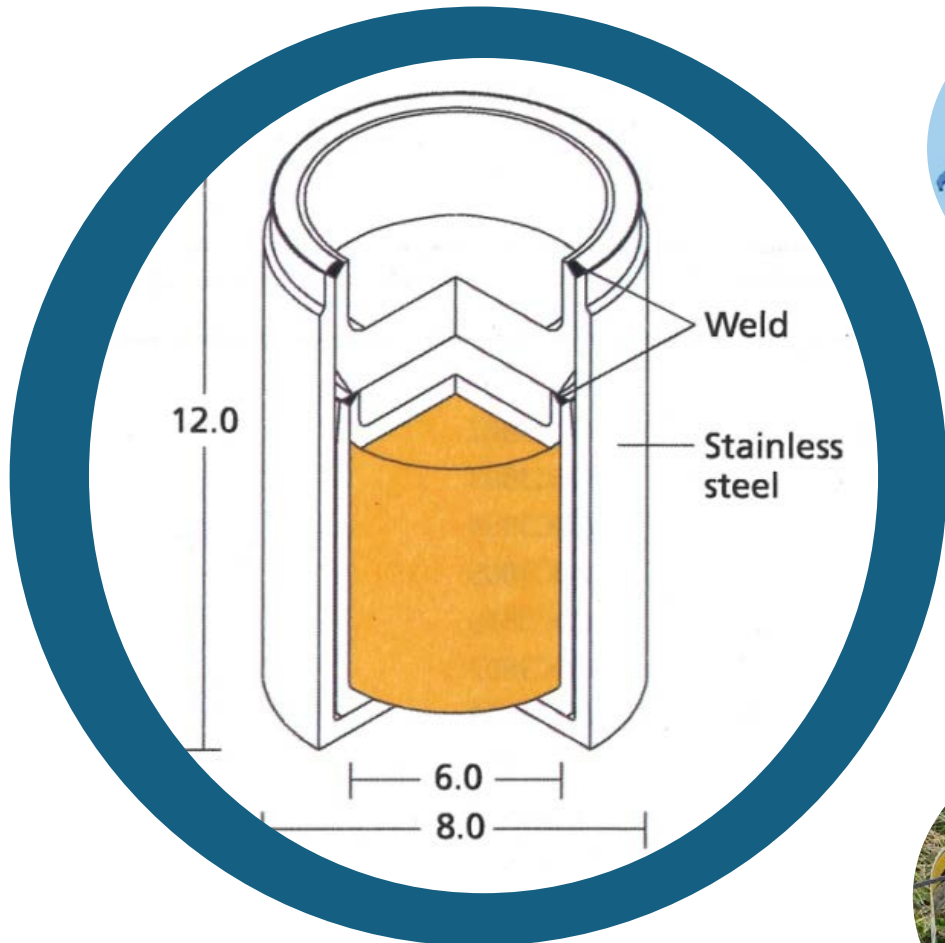
- medical
- industrial applications.

Radioactive Sources can be attractive to a potential thief as they may be perceived to have a high resale or scrap metal value.



Radiological Sealed Source Library

Radiological Component of U.S. National Nuclear Forensics Library Infrastructure



Global Distribution and Supply Chain



Manufacturing Processes and Signatures



Legitimate Use Devices

Radiological Sealed Source Library

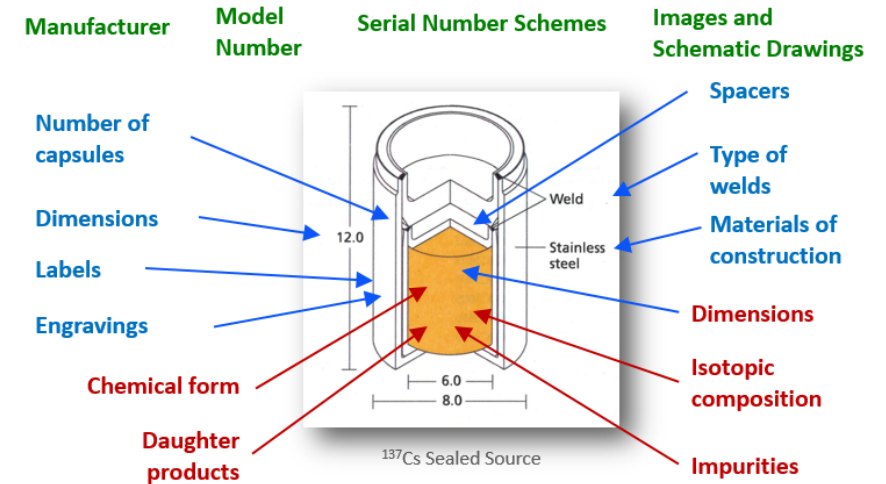
MISSION:

To identify the origin of radiological materials that could potentially be used in a Radiological Dispersal Device (RDD) or a Radiological Exposure Device (RED).

APPROACH:

- Comprehensive library of radioactive sealed source, manufacturers and distribution pathways.
- Close relationships with major manufacturers and distributors through Non-Disclosure Agreements
- Data Validation through radiochemical analysis of pedigreed sealed sources

WHAT FORENSIC SIGNATURES ARE COLLECTED?

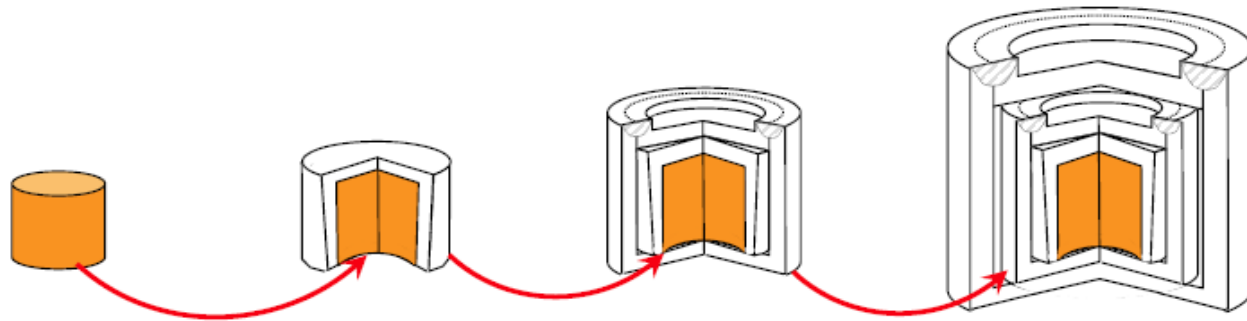


WHERE IS DATA COLLECTED?



Encapsulation

- Encapsulation design can be a highly discriminating signature
- The second and third encapsulations are typically designed for end use within a device.



*Radioactive Material
(pellets, powder, slugs)*

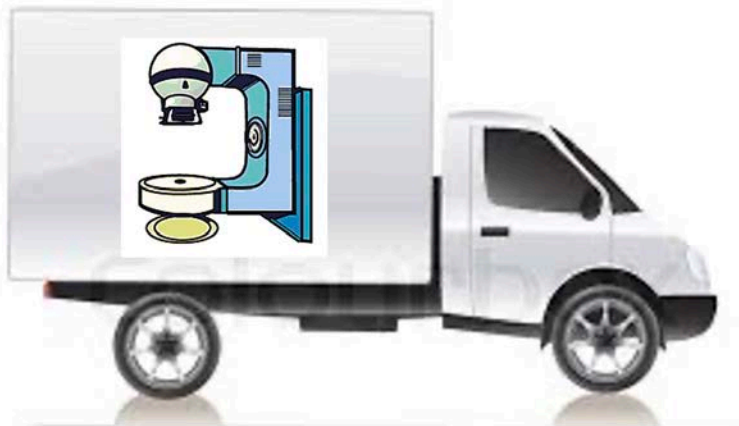


Material Out of Regulatory Control & Investigative Questions



Types of Investigative Questions

- Is the material consistent with the State's holdings?
- Who is the manufacturer of this material?
- What is the intended use of the material?
- What is the material and what threat does it pose?
 - Dispersibility
 - Material Form
 - Material Size
 - # of Pellets, Slugs, Powder etc.
- Is there more material missing?
- What facilities are associated with the manufacture, use, or storage of the material?
- Is this material consistent with material from another case?



Importance of Regulation

In the IAEA Code of Conduct on the Safety and Security of Radioactive Sources:

- “...ineffective, interrupted or sporadic regulatory or management control of radioactive sources has led to serious accidents, or malicious acts, or to the existence of orphan sources...”
- “...the need for effective and continuous regulatory control, in particular to reduce the vulnerability of radioactive sources during transfers, within and between States...”



Source Licensing System

- A sealed radioactive source licensing system may include the following data fields

Source Information	Device Association	Source History
<ul style="list-style-type: none">• Registry Number• Serial Number• Radionuclide• Activity• Activity Date• Model• Manufacturer• Owner• Photos of shielding containers	<ul style="list-style-type: none">• Device Registry Number• Date Source into Device• Date Source removed from Device	<ul style="list-style-type: none">• Status Date• Licensee• Department

- In some cases, not all fields that are available in the tracking system are complete
- Photos are typically of the shielding containers or the device, not the sealed radioactive source.

Summary

- There is a legitimate threat of sealed radioactive sources going outside of regulatory control
- The radiological materials component of an NNFL contains forensic signatures of sealed radioactive sources
- A national nuclear forensics library and a regulatory national registry are different but complementary
- A sealed radioactive source component to a National Nuclear Forensics Library can be useful to answer investigative questions and assist in the generation of investigation leads.