



Managing Disused Radioactive Sources A Global Perspective

Greg Fulford
Security of Disused Radioactive Sources
October 08-09, 2019
Vienna, Austria

ISSPA – Who We Are



The International Source Suppliers and Producers Association (ISSPA) is an association that is comprised of companies who are international industry leaders in the manufacture, production and supply of sealed radioactive sources and/or equipment that contain sealed radioactive sources as an integral component of the radiation processing or treatment system, device, gauge or camera.

WWW.ISSPA.COM

17 Members – 9 Countries



- Alpha Omega Services
- Berthold Technologies GmbH & Co. KG
- Best Theratronics Ltd
- Dioxitek S.A./CNEA
- Eckert & Ziegler Nuclitec GmbH
- Endress + Hauser GmbH + Co. KG
- Gamma-Service Recycling GmbH
- Hopewell Designs
- Institute of Isotopes, Co. Ltd.
- International Isotopes, Co. Ltd.
- Nordion Inc.
- NTP Radioisotopes
- QSA Global Inc
- Source Production & Equipment
- Studsvik
- Varian Brachytherapy
- RAIMS

ISSPA's Objectives



- Promote the beneficial use of sealed radioactive sources,
- Maintain a code of good practice amongst members regarding quality, safety and security,
- Provide technical and operational expertise to support the development and implementation of regulations and guidelines in regards to the safe and secure design, manufacture, use and supply of radioactive sources,
- Strive for continuous improvements in the safe and secure use, transport and end of life management of sealed sources.

Managing Disused Sources - Options



- Storage – Short term and Long term
- Transfer to another User (Reuse)
- Return to a supplier (Reuse/Recycle)
- Repatriation – (last resort)
- Disposal

In Use vs. Disused



In Use	Disused
Asset	Liability
Dynamic Environment	Static Environment
Routinely Accessed	Rarely Accessed
More procedural security measures	Less procedural security measures
Principal Risk	
Lost/Stolen	Orphaned

These differences play an important role in how the source is managed.

Financial Assurance for End of Life Management



- Mechanism is needed to ensure sufficient funds are available for end of life management of disused sources.
- The idea that the end of life management of sealed sources doesn't require funding is unrealistic.
- Backstop funding needed in case a source user goes bankrupt.
 - Insurance policy
 - Stand-by trusts

Options – Short Term Storage



- Storage at the End User's site (short term)
 - Enables consolidation of sources into fewer shipments.
 - Retrieval of source from device must be possible.
 - Some safety/security design controls can result in an adverse consequences for end of life management.
 - Physical protection requirements for the facility and storage location.

Options – Short Term Storage



- Storage at the End User's site
 - Regulatory Approval?
 - Time period?
 - Decay may ease transport and disposal requirements.
 - Long-term storage at an end user facility is not desirable, increases the likelihood of the sources falling outside of regulatory control.

Example of End-User Storage



Below grade storage vault: Secure - YES, Safe – in short-term YES,
Source retrievable – in short term YES.

Water infiltration in the long term could cause problems with source removal and possible contamination

Options – Longer Term Storage



- Transfer to Long-Term or Regional Storage Facility
 - Requires access to Long-Term Storage Facility
 - End user may need assistance in packaging, handling and shipping.
 - Transportation package needed or special authorization.
 - Transport security requirements.
 - Physical Protection requirements for the facility
 - Could be stored for decay and subsequent disposal
 - Could be transferred to another user
 - Long-term storage issues related to package and special form certifications.

Regional Storage Facility



- Indoors
- Physical security
- Safe work space
- Organized
- Devices unaltered
- Inventory



Manufacturer's Storage Facility



- Indoors
- Multiple layers of security
- Detailed Inventory



Options – Transfer for Reuse



Transfer directly to another user

- If another user can be identified.
- End user may need assistance in handling, packaging, and shipping.
- Authorized transportation package needed.
- Reuse of source could be for the same application or a different application.
 - Example of using for a different application – Disused Co-60 teletherapy source reused as a high activity calibration source.
- Concerns with reuse is loss of source pedigree and/or exceeding working life.

Options – Return to Supplier / Manufacturer



- Transfer to authorized manufacturer for End of Life Management
 - May be identified in Take Back Agreement
 - Expertise and facilities necessary to handle, process and store high activity sources
 - Manufacturer Capabilities
 - Reuse by over encapsulation
 - Reuse by extending the working life
 - Recycle by recovering radioactive material OR other precious metals
- May have direct access to disposal facilities.

Options – Return to Supplier / Manufacturer



- Ideally a new-for-old exchange.
- Transfer to ANY source manufacturer or supplier
 - Capable of managing
 - Authorized to accept it.
- End User expected to be responsible for the costs.
- Country of Origin import restriction?
- End User should compare costs of all the End of Life Management Options the End User has at their disposal.

ISSPA – Articles of Incorporation



The ISSPA Articles of Incorporation include a list objectives, some of which are relevant to the management of disused sources, these are:

- To establish, implement, and maintain a Code of Good Practice for source manufacturers and suppliers that will contribute to enhancing safety and security of sources throughout their life cycle.
- To provide technical expertise to assist and facilitate the management of disused sources.

ISSPA – Code of Good Practice



Good practices supporting the return of disused sources to the supplier

User support

- apply appropriate record retention to facilitate source life cycle management

Source life cycle management

- assist the user where needed, in managing disused sources (e.g. returning to manufacturer, recycling, and access to approved storage or disposal facilities)
- provide competent technical assistance, when requested, with the management of disused sources, including orphan sources

The Code of Good Practice does not address Take back agreements. This is something that could be added into the “Sales” Principal Area but may not be necessary as it seems to be market driven.

End of Life Management Agreements



Take Back Agreements:

- Take back agreements between Manufacturer/Supplier and End User as part of a sales agreement becoming more and more routine.
- These agreements have not normally included costs. Difficult to accurately estimate what the costs may be 5, 10, 20+ years after the purchase.
- Many unknowns:
 - Package licensing and availability, special form certification
 - Transport route restrictions,
 - New regulations that may result in additional costs
 - Disposal pathways and costs
 - Condition of disused source at time of return

Options - Repatriation



Return to country of origin

- Government to government transaction.
- Should not be relied on as an end of life management option.
- For many disused sources the end user may no longer exist or may be insolvent.
- Going forward, financial assurance requirements coupled with take back agreements may alleviate the need for repatriation.

Options - Disposal



Transferring to Disposal Facility

- Requires access to a disposal facility.
 - Limited number of disposal facilities for radioactive waste, including sources available world-wide.
 - Radioactive waste disposal policies vary widely, based largely in politics and not in science.
- May be cost prohibitive for high activity source.
- Type B quantities require specialized transportation package designed for waste.
- Final step in the end of life management

Challenges



- Not many Type B Packages for disused radioactive sources.
- Loss of special form certification complicates transport.
- Still a lot of disused sources lingering in storage.
- Removal of sources from devices.
- Disposal is cost prohibitive and, in some cases unavailable.
- Financial assurance requirements to manage disused sources inconsistent and lack of funds at end of life for proper management may still be a problem.

Improvements



- NNSA developed new Type B packages to support disused source recovery, the 435-B and 380-B.
- Take back agreements becoming fairly common industry practice without regulatory driver.
- Code of Conduct – Guidance on the Management of Disused Radioactive Sources published in 2018.
- Guidance revised for transport security and facility security, NSS No. 9 and No.11 awaiting publication.

Conclusions



- Management of disused sources continues to pose challenges for the industry.
- Cost effective disposal options could simplify end of life management.
- Minimum financial assurance requirements could prevent disused sources from becoming orphaned.
- Consistent implementation of the CoCs Guidance on the Management of Disused Radioactive Sources is necessary to ensure the beneficial use of radioactive sources continues.

Questions

