Sealed Sources: Life Cycle Management & Interim Storage Program
Best Theratronics
Mojgan Soleimani, M.Sc.
BTL Introduction

- Manufacturer of:
  - Cs137 Blood irradiators
  - Co60 Teletherapy units
- We are the major exporter, in the world, of high activity radioactive sealed sources for Medical/Research use
• Manufacturer of Special From Sources:
  • Co60 therapy sources
  • Cs137 irradiator sources
• Best Theratronics as a supplier of sealed sources is committed to the safety and security of sealed sources throughout their life cycle and have developed a ‘cradle to grave’ sealed source program.
Life Cycle Management

- **Isotope delivery and Source Fabrication**: maintain safety and security of materials during manufacturing cycle
- **Sales**: know the customer, verify legitimacy of customers and their authorization to possess the sealed source
- **Transportation**: maintain safety and security during transit and verify timely receipt at the intended destination
- **Tracking**: maintain enough information and make this information available as required to regulators
- **After sales support**: provide maintenance instructions that includes safety and security information
- **End of life management program**:
BTL End of Life Management Program:

• Assist the end-user in managing disused sources

• Assist the end-user to identify financial provision options for managing disused sources

• Provide technical assistance, as needed, with the management of orphaned sources
BTL Life Cycle Management Program
Cobalt Sources

CO-60 from the Reactor

Under BTL license

BTL Sealed Source Fabrication

Source Serial Numbers are registered with CNSC under NSSR

- Receive Import Permit
- Receive Site License
- Apply for Export Permit

As per Code of Conduct Competent authorities communicate

Export permit is issued

Customer

Useful life span is 5-10 years

BTL Ottawa Interim Storage
CS-137 Sealed Source Supplier

Under BTL license

Source Serial Numbers are Reported to CNSC under NSSR

- Receive Import Permit
- Receive Site License
- Apply for Export Permit

As per Code of Conduct Competent authorities communicate

Export permit is issued

Customer

Useful life span is ~30 years

BTL Ottawa Interim Storage
Interim Storage = End-of-Life Management
Interim Storage ≠ Storage prior to final disposal

- Reuse
- Recycle (recover material)
- Re-encapsulate
- Transfer to other manufacturer
- Dispose

Not the first but the last option
BTL Overview

- More than 1000 active cobalt teletherapy units installed worldwide
- More than 1900 Gammacells® installed worldwide

Since 1960’s

~4300 Co-60 sources
~2000 Cs-137 sources
Interim Storage

- 4300 co-60 sources
- 2000 Cs-137 sources
- 75 sources per container
- 40 sources per container

Floorspace required?

58 containers

One bedroom apartment

1100 Sq Ft

50 containers
• Sources are returned to BTL and stored in pools or containers for end-of-life management.
• Sources are continuously “managed”
• Sources are maintained under BTL license:
  • Total number of sources and their activities are reported on a regular bases
  • Financial Guarantees requirement
  • Security requirement
  • Regular audits from regulators
• Legacy Sources
• Competitor Source
• Special form certification
• Financial Guaranties
• Security
Interim Storage
Financial Guarantees

• Tangible commitment by licensee that funds will be available to safely terminate activities
• Would only be used by the authorities if a licensee is unable to terminate its own activities

The Goal is to minimize risk to government and public

FG Criteria:
• Liquidity
• Certainty of value
• Adequacy of value
• Continuity of value

FG examples:
- Trust funds
- Letter of Credit
- Bonds
- Insurance
- Government Commitment
Interim Storage
Security Measures

- Access control
- Intrusion detection system
- Perimeter and or physical barrier
- Security of storage
- Response protocol
- Maintenance and testing
- Facility security plan
- Personal trustworthiness or background checks
- Information security
- Security awareness program

CNSC-RegDoc –2.12.3
US-NRC Regulations (10CFR)-Part 73
• A comprehensive life cycle management that ensures effective control throughout the life span of sealed sources, is a key consideration of a vibrant safety and security culture

• An effective End of Life management program is key component of a Comprehensive Life Cycle management

• A commitment by a responsible sealed source supplier to take back sealed sources at the end of their useful life is essential in End of Life Management Programs
Conclusion

• A returned source should not be categorized as waste by default
• Industry preferred strategies for returned sources are recycling and reutilization
• Source manufacturers have robust security controls so interim storage at the source manufacturer facility is feasible
• Liability issues associated with storage of sealed sources is mitigated by implementation of financial guaranties
• Despite all the challenges, Interim Storage of Sealed Sources is a viable End-of-Life Management program and can be and is being successfully done