

Current Issues with Shipment and Disposal of Large Activity Radiation Sources

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Overview

- ⇒ Type A Containers
- ⇒ Type B Containers
- ⇒ Type B Container Cost of Entry
- ⇒ Irradiator Manufacturer Issues
- ⇒ Source Disposal Options
- ⇒ Recommendations
- ⇒ Comments / Questions

Shipment of Type A Quantity Sources

⇒ Type A Container Requirements

- Meet 49 CFR 173
- Have lower source activities
- Some testing or analysis required
- Container documentation required and reasonable



⇒ Type A Shipments require planning and coordination but are straightforward



Shipment of Type B Quantity Sources

⇒ Type B Container Requirements

- Meet 10 CFR 71
- Have higher source activities
- Testing and analysis is required
- NRC approval is required
- Use of container fully defined at registration application
- Changes to use, activity, type, require NRC review

Shipment of Type B Quantity Sources

⇒ Type B Container Requirements

- Examples of larger containers – Energy Solutions



10-160B cask



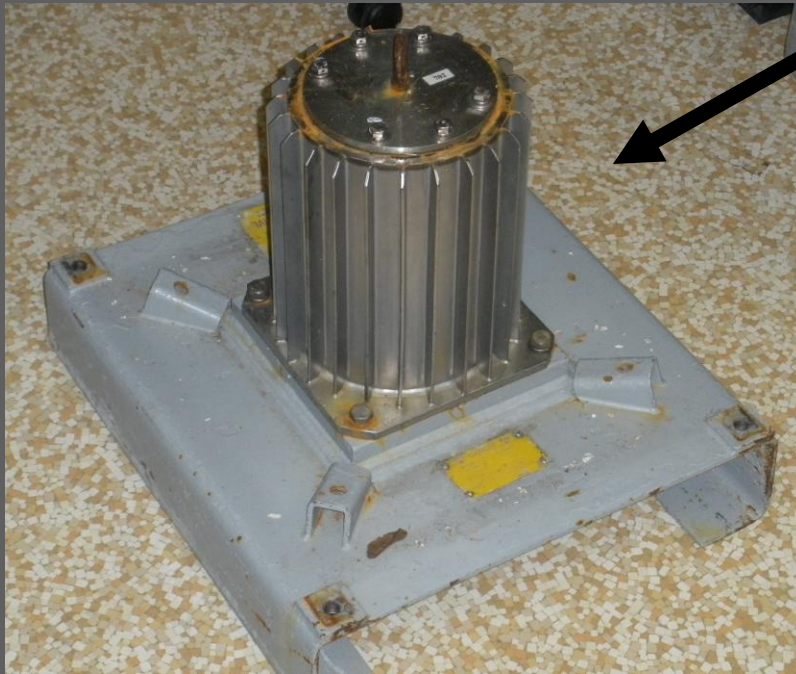
8-120B cask

Shipment of Type B Quantity Sources

- ⇒ Type B Container Availability – Irradiator Sources
 - More than 80 registered containers for use in USA
 - Most are for nuclear fuel shipments
 - Of the rest, about ten are allowed to ship Cs-137 or Co-60
 - Of those ten:
 - 3 are over-packs directly tied to equipment
 - 2 are very large and not feasible for shipment of only 2000 Ci or less
 - 2 are for specific form factors of medical isotopes
 - Leaving two containers as reasonable options for shipping irradiator type source configurations

Shipment of Type B Quantity Sources

⇒ Type B Containers – Two we use often.



QSA 702 – good to 500 Ci Cs-137, no Co-60, works 80% of the time for HDI.



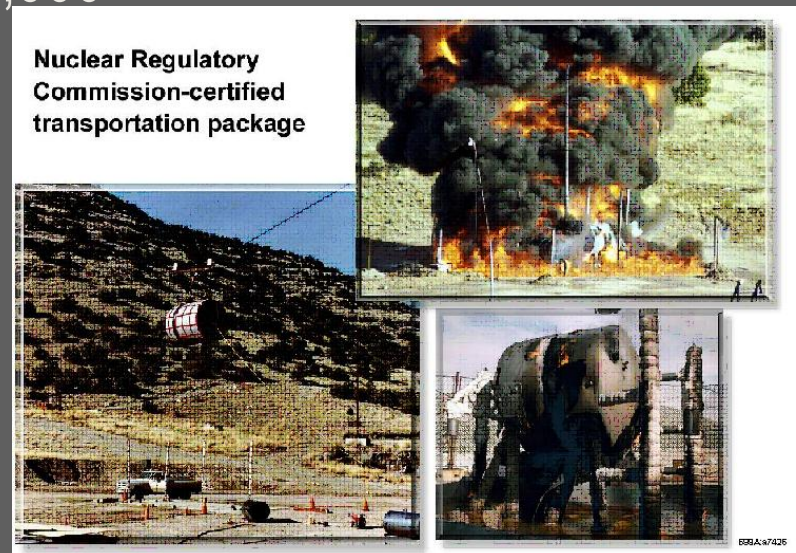
Reviss 3300 – good to 30k Ci Cs-137, and 15k Ci Co-60. Limited availability. Can't ship within USA.

Type B Container Certifications

⇒ Cost of Type B Container Certification and Registration

- Design - \$2000 to \$20,000
- Fabrication - \$20,000 to \$200,000
- Testing and Analysis - \$200,000 to \$500,000
- Report Preparation - \$5000 to \$10,000
- NRC Review - \$150,000 to \$200,000

- Total - \$400,000 to \$1,000,000
- Time Frame – 1 to 3 years



Type B Container Certifications

⇒ Cost of Type B Container Certification and Registration

- On decommissioning projects, if new container is required, cost and time of registration are not large percentage of total project time or cost.
- On large irradiator project, cost of container registration can be made up over several projects.
- On medium or small irradiator projects, it could take hundreds of projects to recover the cost of the container registration.

Irradiator Manufacturer Issues

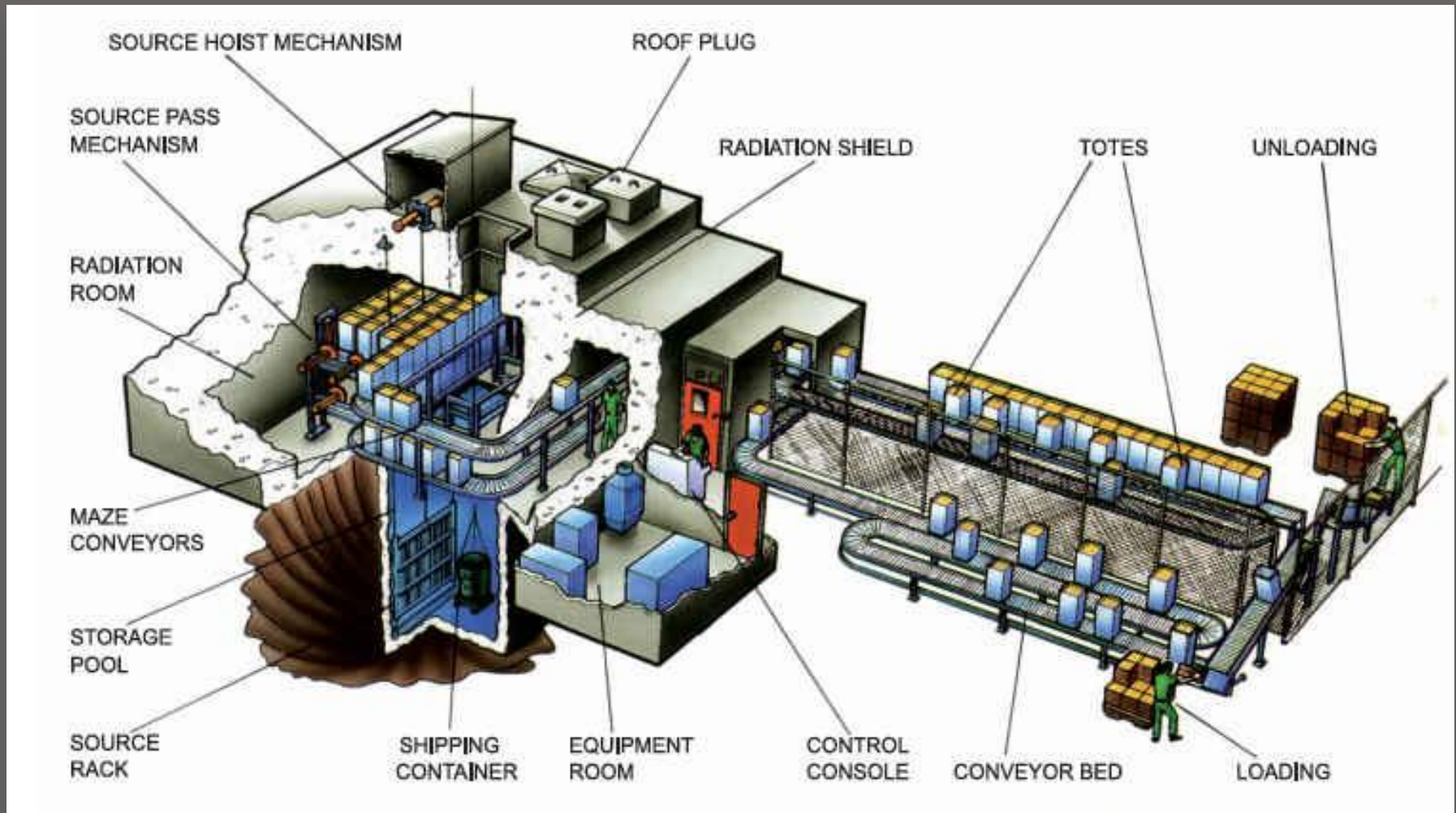
⇒ Irradiator Types and Approach to Shipping

■ Sterilization Irradiators

- Use millions of curies of activity
- Manufacturers design, build, and register containers for their products
- Container registration is small fraction of irradiator cost and is reasonably recoverable
- Time for container registration is lengthy and prohibitive to project if new container is needed, but can be overcome with proper planning

Irradiator Manufacturer Issues

Sterilization Irradiators



Irradiator Manufacturer Issues

⇒ HDI Irradiator Types and Approach to Shipping

■ Research and Blood Irradiators

- Use thousands of curies
- Currently use existing shipping containers for source capsule, and do hot transfers on site
- Current shields are expiring and no longer allowed
- Lack of shipping containers makes it difficult / impossible to reload older irradiators
- Difficult to recover cost of creating and registering a shipping new container for these products

Irradiator Manufacturer Issues

Research and Blood Irradiators



Irradiator Manufacturer Issues

⇒ HDI Irradiator Types and Approach to Shipping

■ Calibration Irradiators

- Use hundreds of curies
- Use existing containers, but containers have high use rate and limited availability
- Few shield available that are cost effective for this activity
- Existing container have only room for source capsule
- Requires transfer and loading tools for onsite source loading
- Difficult to recover cost of creating and registering a shipping container for these products

Irradiator Manufacturer Issues

Calibration Irradiators



Source Disposal Options

- ⇒ Two registered sealed source disposal sites in US
 - Barnwell, SC
 - Richland, WA

 - Each require state and compact agreements

- ⇒ 36 states have no method to “dispose” of sealed sources

Source Disposal Options

⇒ What do we do?

■ Recycle

- When ever possible we use old sources for new projects
- Could be difficulty with old source capsule registrations

■ On Site Storage

- Store entire irradiator on site until site demolition occurs
- Disassemble irradiator and store only sources

■ Central Storage

- Ship to central storage area on-site or off-site
- May require Type B Container

⇒ Still doesn't result in ***disposal***, only delays the problem

LANL Off-Site Source Recovery Project



➡ Mission: to remove excess, unwanted, abandoned, or orphan radioactive sealed sources that pose a potential risk to health, safety, and national security

➡ Website: osrp.lanl.gov

OSRP Overview

- ⇒ Recovered 22,800 sources from more than 800 sites
- ⇒ United States and international work
- ⇒ Focus is on large activity (>200 Ci) sources
- ⇒ Register with OSRP to dispose of sources
- ⇒ OSRP can offer guidance on commercial disposal, long term storage

Recommendations

⇒ Shipping Containers

- Is there a way to work with regulators to “fast-track” new Type B containers used for shipping Special Form source capsules?
 - ◆ This would reduce certification time and cost
 - ◆ The capsules are already certified
 - ◆ Three years approval time is detrimental
- Can we have an intermediate category that is somewhere between Type A and Type B that has medium level requirements?
 - ◆ Does a pencil source of Co-60 need the same shipping requirements as a fuel bundle?

Recommendations

⇒ Disposal

- Reuse is great when practical.
- When sealed sources decay to less than Type A quantities, it is cheaper to buy a new one than to try to reuse it.
- At this point an ***economical*** disposal path is needed.
- Cost to decommission an irradiator can be as much or more than a new irradiator

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⇒ Questions or Comments