U.S. DEPARTMENT OF ENERGY

NNSA National Nuclear Security Administration
Defense Nuclear Nonproliferation

Global Threat Reduction Initiative (GTRI)

IAEA International Workshop on
"Sustainable Management of Disused Sealed Radioactive Sources"

GTRI Overview

MISSION

REDUCE AND PROTECT VULNERABLE NUCLEAR AND RADIOLOGICAL MATERIAL LOCATED AT CIVILIAN SITES WORLDWIDE.

GOALS

1. CONVERT
2. REMOVE
3. PROTECT

Convert

Convert research reactors and isotope production facilities from the use of highly enriched uranium (HEU) to low enriched uranium (LEU)

These efforts result in permanent threat reduction by minimizing and, to the extent possible, eliminating the need for HEU in civilian applications – each reactor converted or shut down eliminates a source of bomb material.

Remove

Remove and dispose of excess nuclear and radiological materials; and

These efforts result in permanent threat reduction by eliminating bomb material at civilian sites – each kilogram or curie of this dangerous material that is removed reduces the risk of a terrorist bomb.

Protect

Protect high priority nuclear and radiological materials from theft and sabotage

These efforts result in threat reduction by improving security on the bomb material remaining at civilian sites – each vulnerable building that is protected reduces the risk until a permanent threat reduction solution can be implemented.

Outline

1. GTRI
2. Challenge
3. Recovery of Disused Sources (GTRI Offsite Source Recovery Project)
4. Type B Containers
5. Secure Storage
6. Disposal Challenges in the United States (political challenges and path forward)

Challenge

The lack of disposal pathways for radioactive sealed sources, which make up less than 1% of all low level radioactive waste by volume and activity, poses a national security concern. During their service lives, these sources have numerous essential and beneficial medical, industrial and research applications. However due to their high activity and portability, some of these sources could be used, either individually or in aggregate, in radiological dispersal devices commonly referred to as "dirty bombs," resulting in economic impacts in the billions of dollars and significant social disruption. Every year, thousands of sources become disused and unwanted in the United States. While secure storage is a temporary measure, the longer sources remain disused or unwanted the chances increase that they will become unsecured or abandoned. Thus, permanent disposal is essential. However, only 14 States currently have commercial LLRW sealed source disposal access, and there are significant political, statutory and regulatory challenges associated with the creation of commercial disposal access for the remaining 36 States.

Off-Site Source Recovery Project (OSRP)

- Every year, thousands of sources become disused and unwanted in the United States.

- While secure storage is a temporary measure, the longer sources remain disused or unwanted the chances increase that they will become unsecured or abandoned. Thus, permanent disposal is essential.

- **OSRP - http://osrp.lanl.gov/**
  - To date, GTRI has recovered over 25,000 sources totaling over 779,000 Ci
  - GTRI primarily recovers Cs-137, Co-60, Sr-90, Am-241, Pu-238, Pu-239, Ra-226
  - Every potential recovery is different and must be considered and prioritized

Secure Storage

Domestically:

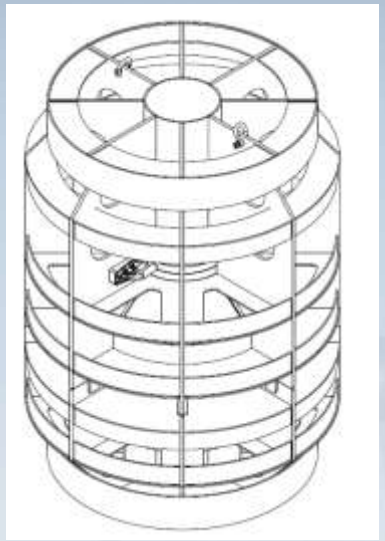
- On-site storage (NRC's Increased Controls for Cat. 1 and 2)
- Consolidated government storage pending disposal

Internationally:

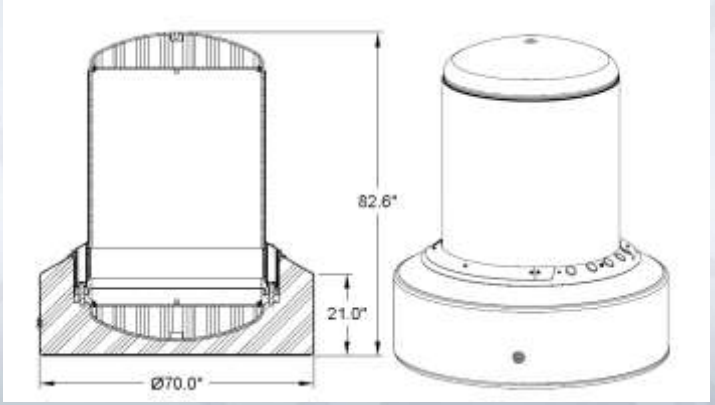
- Assists countries by providing funding to construct and secure source storage facilities
- Countries are responsible for site selection, land development, permits, building designs, environmental and other locally required assessments/studies

New Type B Container Designs

Container #1 –The container, itself, will not have shielding (in order to keep the size, weight and cost of the container down) so the shielding will come from either the devices/heads being recovered or, in cases where the mobile hot cell is used, from the LTSS.



Container #2 – Shielded overpack



Three Challenges Defined by U.S. Working Group

1. Lack of disposal capability for high-activity beta/gamma sources (primarily cobalt-60, cesium-137 and strontium-90)

2. Thirty-six states do not have disposal access for lower-activity beta/gamma sources

3. Lack of near-term disposal capability for sealed sources using foreign-origin americium-241

Working Group Conclusions

- **Working group members considered a breadth of criteria, although two criteria emerged as particularly important: burden sharing and feasibility.**

- **None of the recommended options can be fully implemented by a single entity.**

- **Each of the recommended options can only be implemented through a series of actions involving decision makers at several levels of government and/or the private sector.**

- **A messaging strategy which speaks to all appropriate partners is important.**

- **Stakeholders issues are complex and deep seated.**

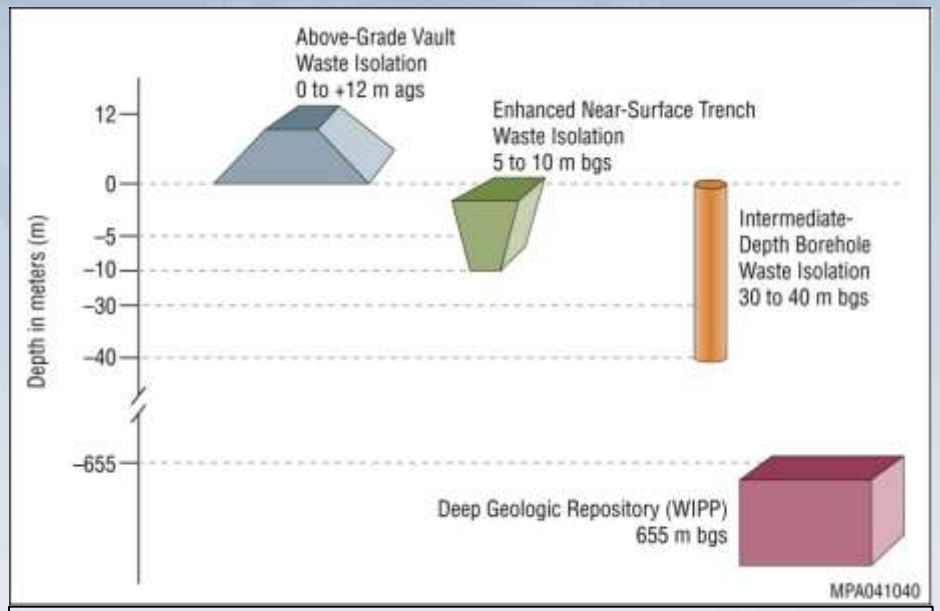
- **Historically, issues relating to the management and disposition of LLRW, including those related to disused sealed sources, have required coordination between Federal & State agencies, Compacts and industry.**

Greater Than Class C (GTCC) Disposal Study

- **Major study (Environmental Impact Statement [EIS]) is underway to evaluate alternatives for creating disposal capability for GTCC Low-Level Waste**
  - Comparable to IAEA Intermediate Level Waste
  - Includes most IAEA Category 1 and 2 disused sealed radioactive sources and a variety of other waste types
- **Analyzing a range of disposal methods across the U.S.:**
  - Deep geologic repository (Waste Isolation Pilot Plant)
  - Intermediate depth borehole
  - Enhanced near-surface trench
  - Above-grade vault
- **Draft EIS to be issued in early 2011 for public comment**
- **Final EIS and selection of disposal alternative(s) expected in 2012 with facility operational ~2020**
- **For additional information go to:** http://www.gtcceis.anl.gov/

Some sealed sources can be disposed of on a limited basis at the Waste Isolation Pilot Plant and existing near surface disposal facilities

Greater Than Class C (GTCC) Disposal Study



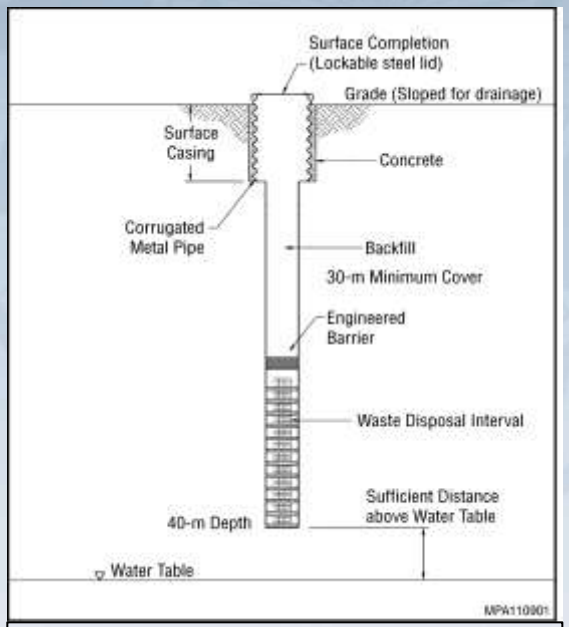
Disposal Methods Being Analyzed

- Combinations of disposal methods may be appropriate based on waste types and other considerations
- Factors to be considered in selecting method(s) include protection against inadvertent human intrusion, waste characteristics, post-closure care, cost, and other factors

Deep Geologic Repository (Waste Isolation Pilot Plant)

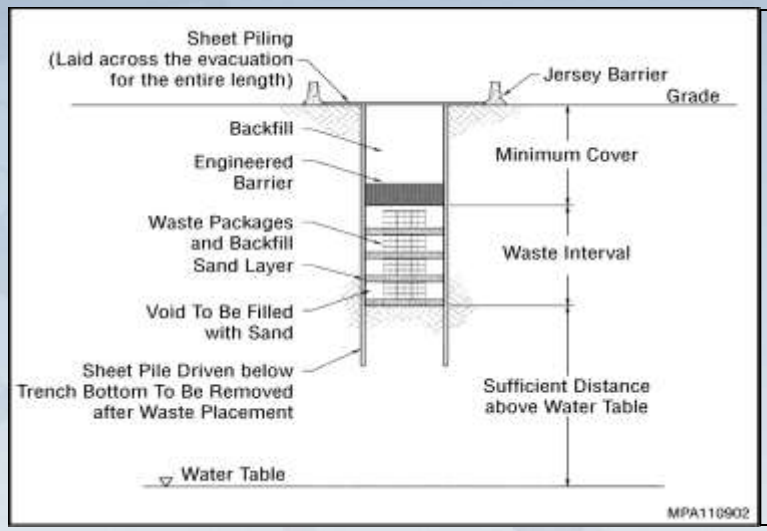
- Transuranic Waste (e.g., certain Am/Be sources) is currently disposed of in mined rooms 655m below ground
- Great depth and extensive, impermeable salt formation isolate waste from environment

Greater Than Class C (GTCC) Disposal Study



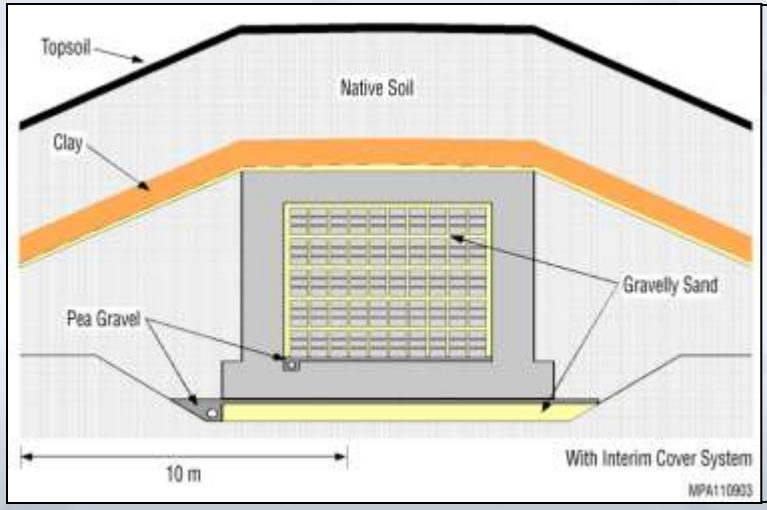
Intermediate Depth Borehole

- Borehole diameter (~2.5m) sized to accommodate variety of waste types
- Smaller diameter boreholes, similar to IAEA BOSS, would be used if method is limited to sealed sources
- Depth (>30 meters) could vary based on site conditions



Enhanced Near Surface Trench

Deep, narrow trench (3m wide x 11m deep x 100m long) with engineered barrier to minimize inadvertent intrusion



Above-Grade Vault

- 11m wide x 94m long x 7.9m tall
- Thick cover system and concrete walls/roof minimize potential for inadvertent intrusion