Low Level Radioactive and Mixed Waste Management Options

Prepared By ASME Radwaste Systems Committee

ASME RW Systems Committee RW Short Course - 1991
Low Level Radioactive and Mixed Waste Management Options

Radioactive Waste*

- Mixed Waste (MW)
- TSCA and Radioactive Waste (Asbestos, PCB's)
- Low-Level Radioactive Waste (LLRW)

*Greater than Class C (GTCC) and Spent Fuel are not within this chart's scope
<table>
<thead>
<tr>
<th>LLRW Processing Options</th>
<th>ATG</th>
<th>Duratek</th>
<th>US-Ecology</th>
<th>Race</th>
</tr>
</thead>
<tbody>
<tr>
<td>Incineration/Thermal</td>
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<td>Supercompaction</td>
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<td>Decontamination</td>
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<td>Solidification/</td>
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<td>Stabilization</td>
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<td>Metals Processing</td>
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<tr>
<td>Storage for Decay</td>
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*Repackaging*
Mixed Waste Treatment Options

Mixed Waste

- Short half-life
  - Yes → Decay
  - No → Scintillation vials

Scintillation vials

- Yes → C-14 or H-3 < 0.05 uCi/gram
  - Yes → NSSI
  - No → Perma-Fix

- No → Characteristic hazard only

Characteristic hazard only

- Yes → Listed Waste
  - ATG treat
  - NSSI treat
  - Perma-Fix treat
  - Orphan Waste Stored On-Site

- No → Treat on site
  - ATG treat
  - Envirocare treat
  - NSSI treat
  - Perma-Fix treat
  - WCS treat

Listed Waste

*PERMA-FIX = PermaFix Gainsville FL, DSSI, M&EC
TSCA Mixed Waste Treatment Options

Does Waste Contain PCB's?
- No: Treat as LLRW
- Yes:
  - Is PCB Contamination >50 ppm?
    - No: No Outlet Exists for Treatment/Disposal
    - Yes:
      - Is the Material Bulk Clean-Up Waste?
        - No: No Outlet Exists for Treatment/Disposal
        - Yes:
          - Is PCB Contamination from Coatings, Paint, Plastics, etc.?
            - No: Is PCB Contamination From a Spill?
              - Yes: Disposal at Envirocare
**LLRW and MW Disposal Options**

<table>
<thead>
<tr>
<th>Company</th>
<th>Details</th>
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</thead>
<tbody>
<tr>
<td><strong>Barnwell</strong></td>
<td>- Accessible to all generators for LLRW</td>
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<tr>
<td></td>
<td>- Can bury most LLRW waste streams</td>
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<td>- Highest cost option</td>
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<td></td>
<td>- By 2008 will only be available to Atlantic Compact Generators</td>
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<tr>
<td><strong>Envirocare</strong></td>
<td>- Difficult for small generators to deal with directly</td>
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<td>- Easily accessed through a waste processor</td>
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<td>- Only permitted mixed waste disposal in the U.S.</td>
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<tr>
<td><strong>US Ecology Richland</strong></td>
<td>- Can only bury LLRW from NW and Rocky Mountain Compacts</td>
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<td></td>
<td>- Can accept NORM/NARM from throughout the U.S.</td>
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<td>- Can accept certain sealed sources.</td>
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<tr>
<td><strong>Waste Control Specialists</strong></td>
<td>- Burial of NORM waste</td>
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<td></td>
<td>- May store LLRW for indefinite periods</td>
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<tr>
<td></td>
<td>- Treatment and storage of mixed and TSCA waste</td>
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<td>- Attempting to license LLRW disposal</td>
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</tbody>
</table>
LLRW Waste Management Options

Low-Level
Radioactive Waste

- DAW
- Biological
- Liquids or Evaporator Concentrates
- Soil / Concrete Rubble

Sealed Sources
Metal
Resins/Sludges
LLRW Waste Management Options for DAW

DAW

Short half-life

Yes

Store on site

No

Combustible

Yes

ATG or Duratek Thermal Processing

No

Commercial Disposal

Local landfill

GIC

Medical waste incinerator

Barnwell

Envirocare

Storage at WCS or Generator's Site

Supercompaction

ATG

Duratek

US Ecology

RACE
LLRW Waste Management Options for Sealed Sources

Sealed Sources

- Ra-226
  - Yes
    - <50 uCi
      - Yes → Barnwell
      - No → <100 mCi
        - Yes → USE Richland
        - No → Barnwell
  - No

- Transuranic
  - Yes
    - <50 uCi
      - Yes → Barnwell
  - No

- Other
  - Yes
    - <1 uCi/cc
      - Yes → Barnwell
      - No → Stabilize
LLRW Waste Management Options for Biological Waste

- **Biological**
  - **Short half-life**
    - Yes → Decay on site → Medical waste incinerator
    - No → **ATG or Duratek Thermal Treatment**
      - Yes → Envirocare
      - No → Barnwell
LLRW Waste Management Options for Metals

Metal

Decontaminate for free release

Yes → Scrap dealer

No

Metal Melt  
*Duratek*

Directed Disposal  
(GIC)

Volume Reduction

- ATG
- *Duratek*  
ESBC
- Storvik  
RACE
- Alaron  
TXCE

Yes → Envirocare
LLRW Waste Management Options for Liquids or Evaporator Concentrates

Evaporator Concentrates Processing
- Nukem or Duratek
- UF / RO Reject

LIQUID
- Sanitary Disposal
  - Yes → Sewer
  - No → Decay
    - Yes → Sewer
    - No → Solidification
      - Thermal Processing ATG or Duratek
        - Impact Services, Pemex NW
      - Disposal
        - Barnwell or Envirocare
LLRW Waste Management Options for Resins or Sludges

RESIN OR SLUDGES

GIC for Directed Disposal

Yes

Directed Disposal

No

Resin to Studsvik

Decay and/or Process for Disposal by Dewatering in a HIC or Solidification

Yes

Class A or below to Envirocare for Disposal

Yes

> Barnwell Disposal
LLRW Waste Management Options for Soils

Soil

- Less than truckload quantities
  - Yes
    - Overfill material at a waste processor facility
    - Disposal
  - No
    - Soil Washing Or Thermal Desorption (Organics)

- Profile for direct disposal

- Soil Washing

- Thermal Desorption (Organics)