WM '11 Disposition of DOE
High Activity Mixed Waste

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Current DOE Problematic Wastes

- Problematic wastes are those either without a current treatment or disposal path, have no available funding for disposition, or have not yet been generated.
- DOE EM’s WIMs Database identifies MLLW with yellow or red status flags indicating problem for disposition:
  - High activity MLLW (> Class A or RH);
  - Labpacks
  - Sealed Sources
  - Reactives
  - Gloveboxes with high SCO (GTCC);
  - PCBs;
  - Sodium bearing wastes.
- EFCOG WM Working Group is working with DOE and site generators to ensure that there is an exchange of information for these wastes.
Problematic Wastes - Factors Affecting Acceptance at Perma-Fix

- Radioactive Materials License Capacity:
  - Special Nuclear Material gram limitations
  - Transuranic isotopes/radionuclide concentration limitations
  - Dose rate & contamination control limitations
- RCRA and TSCA Permit Limitations:
  - Codes and/or concentrations authorized
  - Waste matrices
- Available Processes and Time Needed to Treat:
  - How many processes needed to meet regulatory standards and disposal criteria
  - Waste matrices and complications of making the constituents “available” for treatment
- Personnel and Equipment
  - Training
  - Capital investment for new equipment
Problematic Wastes - Factors Affecting Acceptance at Perma-Fix

• Characterization
  – Is there ample information available to ship and accept? Process Knowledge adequate?
  – If sampling is needed, are there resources available at generator site?
  – Availability of qualified/approved Laboratories

• Transportation
  – Logistics (rail vs truck)
  – Container and conveyance needs/availability

• Disposal Sites
  – Can waste be treated to meet appropriate disposal WAC?
  – Profile approval process – information needed, approval time
  – Capacity and work load at disposal site
Problematic Wastes Received at Perma-Fix in 2010

• TRU wastes;
• 10 – 100 nCi/g wastes;
• High Activity and High Dose Wastes;
• PCBs;
• “Special” Mixed Wastes:
  – Labpacks;
  – Sodium bearing wastes;
  – Pyrophorics (e.g., DU/Th chips)
  – Mercury wastes
TRU Waste Repackaging

• Perma-Fix can receive TRU (>100 nCi/g) wastes for cutting/sizing, sorting and repackaging into WIPP acceptable containers, however there are challenges:
  – Rad license limits – TRU isotopes are limiting for acceptance;
  – Contamination control;
  – Personnel protection;
  – WIPP requirements and documentation.
High Tritium Containing Wastes

- Perma-Fix can combust high curie content H3 waste at DSSI;
- This can be challenging due to:
  - Hazardous constituents (metals, Hg)
  - Legacy waste with minimal information requires sampling/verification;
  - Wide range of H3 concentrations;
  - Sealed containers;
  - Contamination control
Equipment Containing High H3

• Perma-Fix had to build capability (H3 Capture System) to manage high H3 wastes (lithium metal, gold traps, zeolite beds, pumps).

• Challenges included:
  – Characterization
  – Preventing Tritium Release
  – Removal of RCRA constituents (e.g., Elemental Hg) for treatment
Tritium Capture System

- HEPA filtration system to remove particulates
- Carbon bed to remove hydrocarbons/mercury
- Catalyst bed to convert \( \text{H}_2/\text{H}_3 \) molecules to water
- Condenser to remove bulk water from the air
- Air released through TEG bubbler drums to remove residual tritium
- Majority of air recycled back to glovebox
- Double containment (Glovebox and enclosure at negative pressure)
High Activity & High Dose Wastes

- Controlling the spread of contamination in the facility and protecting personnel (mobile TRU radionuclides, Tc99);
- Use remote cutting and handling equipment and shielding for contamination control and minimization of employee exposure
- High Activity labpacks have also been dispositioned typically using our DSSI Combustion Facility.
Summary

• The market place will add technologies and capabilities to address most problematic MLLW but will funding be available for low volume/high cost wastes?

• There are still some problematic MLLW that represent a challenge (e.g., Sodium and other reactives, dioxins/furans, etc.) that collaboration between generators and processors may be able to address;

• The EFCOG WM Working Group can be a resource to generators with these wastes so please contact us if we can help facilitate resolution. Renee Echols – rechols@perma-fix.com, 865-599-4064.