Savannah River Remediation
AECOM | BECHTEL | CH2M | B&W | AREVA

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MERCURY IN THE LIQUID WASTE SYSTEM

Presenters: Richard Edwards

Purpose

- **Mercury has long been a consideration in the Liquid Waste System, both from a hazard and a processing perspective**
- **There have been no exposures, no releases, and all waste treatment complies with requirements**
- **However, there have been several recent examples of new information related to mercury in the Liquid Waste System**
  - January 7, 2015 - Larger than expected amount of mercury collected from the 3H evaporator
  - February 3, 2015 – DOE requested SRR to conduct an evaluation of mercury through the entire Liquid Waste System
  - February 3, 2015 – 4th quarter 2014 TCLP (Toxic Characteristic Leaching Procedure) result for Saltstone grout (sample taken October 2, 2014) above the LDR (Land Disposal Restriction) control limit of 0.025 mg/L
  - April 1, 2015 – Special analysis of a sample from Tank 50 (feed to Saltstone) showed higher than expected amounts of mercury in the form of mono-methyl mercury (~50 ppm vs. ~1 ppm)
- **This presentation provides an overview of this new information and the near and long term actions related to mercury**

Mercury in Liquid Waste

We do the right thing.

SRR Liquid Waste Program
(with current status)

Legacy Liquid Waste
Mercury

43 Tanks

Mercury Removal (evaporators)

Legend:

ARP	Actinide Removal Process
BWRE	Bulk Waste Removal Efforts
DWPF	Defense Waste Processing Facility
MCU	Modular Caustic Side Solvent Extraction Unit
SWPF	Salt Waste Processing Facility

Operational Goals
- ✓Radionuclides to glass
- ✓Chemicals to Saltstone
- ✓Tanks cleaned and operationally closed

Increasing Mercury

Salt waste

Sludge waste

Salt Processing

SWPF
(under construction)

Mercury Removal

Radionuclides

Solid (not hazardous) waste

<1% radionuclides remain in tanks

6 Tanks closed
2 Tanks heel removal complete

Most radionuclides to glass

No Mercury

<<1% radionuclides to saltstone

Trace Mercury

Mercury in Liquid Waste

Mercury

- **Originated from decades of canyon processing (used to aid reactor fuel dissolution)**
- **Is present throughout the liquid waste system (~60 metric tons)**
- **Is not a new issue**
  - Removed at evaporators
  - Stripped and removed at DWPF
  - Removed at Effluent Treatment Plant
  - DOE approved an SRR plan to look for mercury accumulation in DWPF systems in FY2014 (identified that some mercury was being recycled to the tank farms)
  - Will need to remove about one 55-gal drum of mercury from the Liquid Waste System every year for the remaining life of the program
- **But the issue is changing**
  - Higher mercury concentrations in H-area waste (H-area Tank Farm contains ~96% of the mercury)
  - Some amount of mercury recycling from DWPF
  - Chemical forms of mercury may be changing (increases in soluble mercury and methylated mercury)
- **Poses several challenges to waste processing**
  - Equipment impacts
  - Potential flammability of certain chemical forms
  - Saltstone grout performance
  - Performance Assessment

Near-Term Issues / Actions

- **Industrial hygiene and worker protection actions**
  - Most radiological work practices also protect from mercury
  - Training conducted on methyl mercury hazards
  - As a precaution, prescribed use of nitrile gloves for all radiological work pending permeability testing of latex gloves and other materials (testing completed last week; removing this control)
  - Offer workers voluntary medical screening

- **Increased frequency of mercury removal from evaporators**

- **Evaluating possible processing impacts of increased concentrations of methyl mercury prior to facility resumption (following outage activities)**

- **Performing additional sampling throughout the Liquid Waste System to determine concentrations and chemical forms of mercury (sampling scheme is defined, prioritized, and in-progress)**

Long-Term Mercury Management

We do the right thing.

- **An integrated, system-wide evaluation of mercury behavior in the Liquid Waste System to identify**
  - The inventory and chemical form of mercury throughout the Liquid Waste System
  - The chemical processing behavior and accumulation of mercury in the liquid waste facilities
  - The impacts of mercury, including worker safety and equipment degradation
  - Mercury removal and disposal alternatives
- **Established Mercury Expert Advisory Panel**
  - Panel Members:
    - Dr. Lou Papouchado, Retired SRS/SRNL Chemistry Expertise
    - Dr. Eric Pierce, ORNL Mercury Expert
    - Mandi Richardson, AECOM Mercury Consultant
    - Dr. Eric Prestbo, Tekran Corp. Chief Scientist, Mercury Behavior & Speciation Expert
  - First review May 13 &14
    - SRR's near-term approach and sampling schemes appear to be sound
- **Developing long-term action plan to address overall mercury management and removal.**

Summary

- **Mercury is pervasive throughout the Liquid Waste System**
- **This is not a new issue, but we are seeing elevated levels**
- **There is no risk to the public or the environment**
- **Represents both a current and a long term challenge to liquid waste processing**
- **Worker safety continues to be a priority, worker protection continues to be effective, and conservative actions have been taken in response to new information**
- **Long term action plan under development**