

November 2015

# MERCURY IN THE LIQUID WASTE SYSTEM

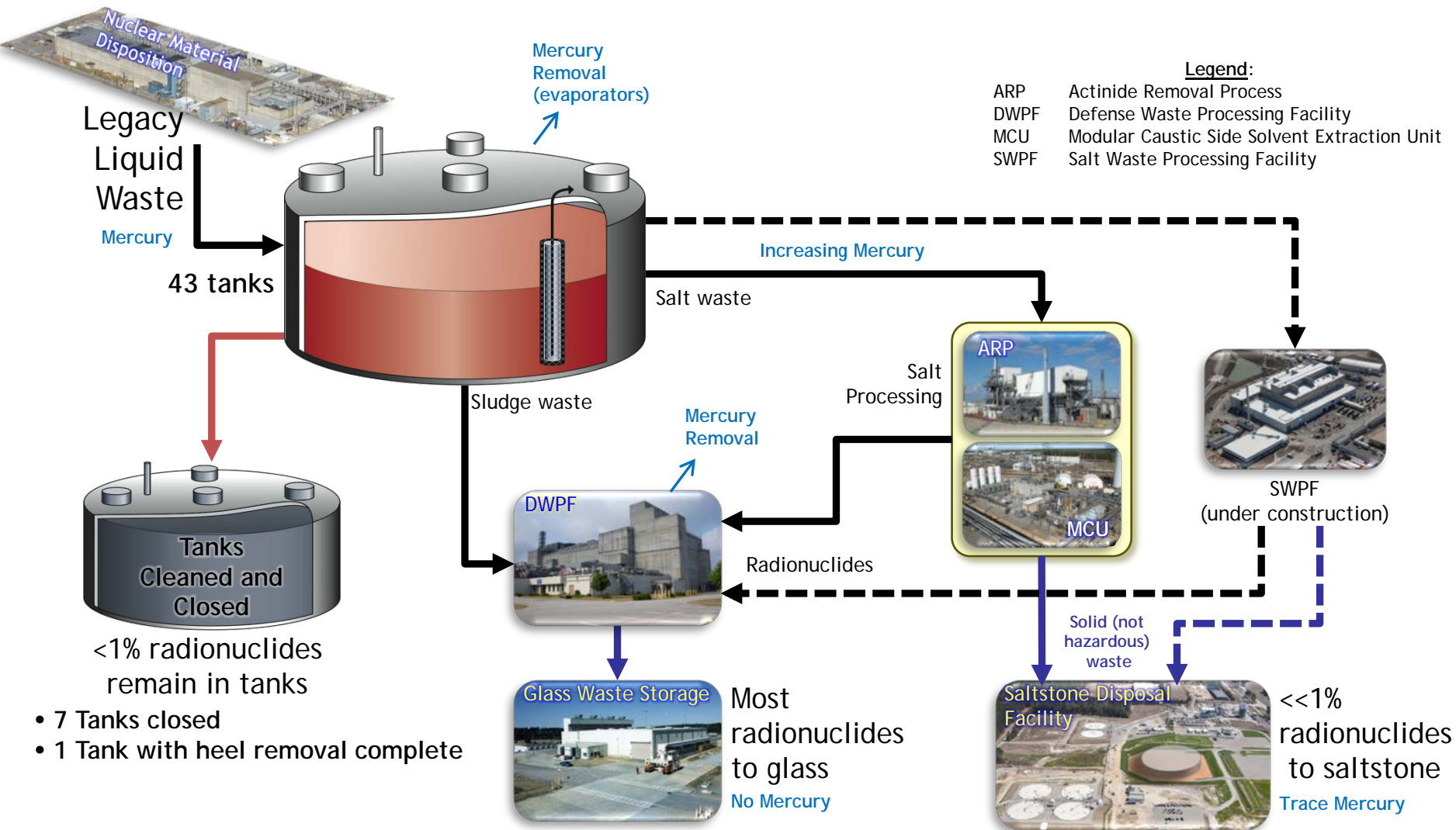
Presenters: Richard Edwards



- 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 - 4<sup>th</sup> 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 but well below the toxicity limit of 0.2 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

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## 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
  - Saltstone grout performance
  - Performance Assessment

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- **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)
- Increased the frequency of mercury removal from evaporators
- Evaluated potential processing impacts of increased concentrations of methyl mercury prior to facility resumption (following outage activities last Spring)
- Performing additional sampling throughout the Liquid Waste System to determine concentrations and chemical forms of mercury (sampling scheme is defined, prioritized, and in-progress)
  - Over 40 Samples analyzed for chemical form of mercury by commercial laboratory

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- **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
    - Mercury is recycling back to the tank farm because mercury recovery in DWPF is not working efficiently
- **Phase 1 Mercury behavior in liquid waste processing systems review completed**
- **Phase 2 Integrated Assessment Underway**
  - System Engineering Evaluations (SEE) completed
    - Re-Establish Mercury Removal Capability within DWPF
    - Determine Best Alternative Mercury Removal Location within Liquid Waste System
- **Developing long-term action plan to address overall mercury management and removal.**

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- 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