Evaluation and Impacts of Mercury in the SRS Liquid Waste System - Update

Presented by: Aaron Staub

Citizens Advisory Board Meeting
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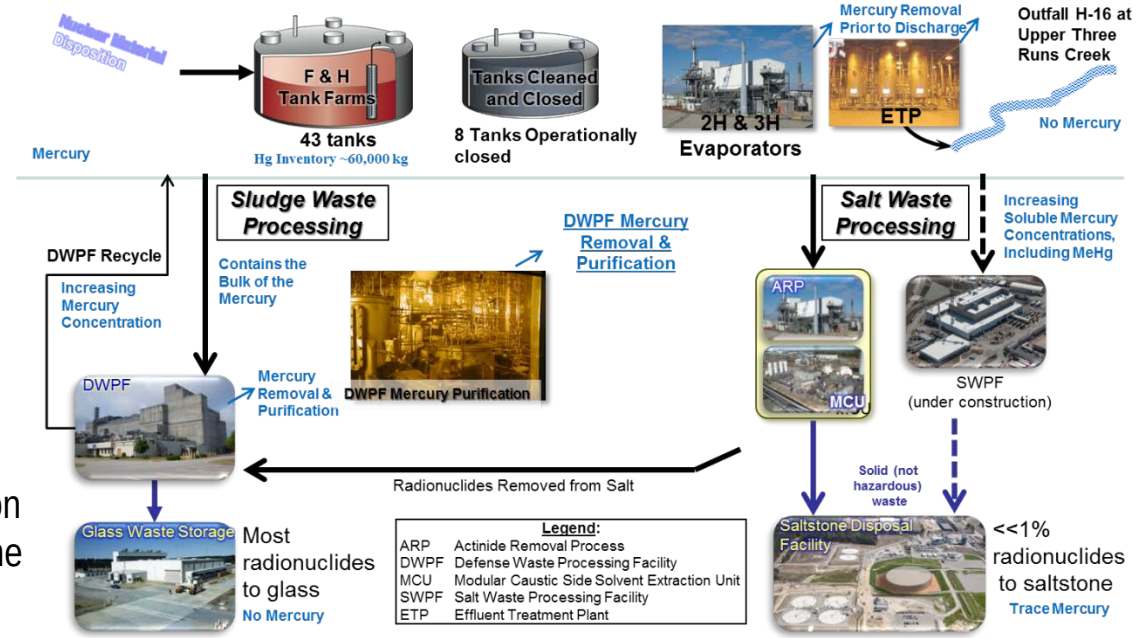
Mercury in SRS Liquid Waste System (LWS)

- Mercury from separations processes is present in the LWS and must be removed & dispositioned
- Current and future operations will continue to process waste containing higher levels of mercury from HM-PUREX sludge at H-Tank Farm
- Defense Waste Processing Facility (DWPF) is designed for mercury removal but this system is not functioning effectively due to chemistry and equipment issues
- Started to observe increased concentrations of organic mercury
- Organic mercury compounds must be managed throughout the LWS
  - Flammability
  - Saltstone mercury retention
  - Industrial hygiene and worker protection



Mercury in SRS LWS – Initial Items Addressed (2015)

- Industrial Hygiene and Worker Protection (Monitoring and Personal Protective Equipment)
  - Worker communications completed
  - Methylmercury permeability testing of latex gloves and other materials completed
  - Precautions, such as 'sniffers', are taken to detect mercury should it be present prior to performing work
- Tank Farm Safety Analysis
  - Safety Analysis changed, actions implemented, minor evaporator modifications completed
- Saltstone Safety Analysis
  - Safety Analysis changed to address mercury levels that affect worker/facility safety
- Saltstone Performance
  - Toxicity Characteristic Leaching Procedure (TCLP) particle size variability
  - Hazardous waste landfill disposal limit clarified
- Performance Assessment Impact (Tank Closure Grout and Saltstone)
  - Assessment completed and “No Impacts” documented

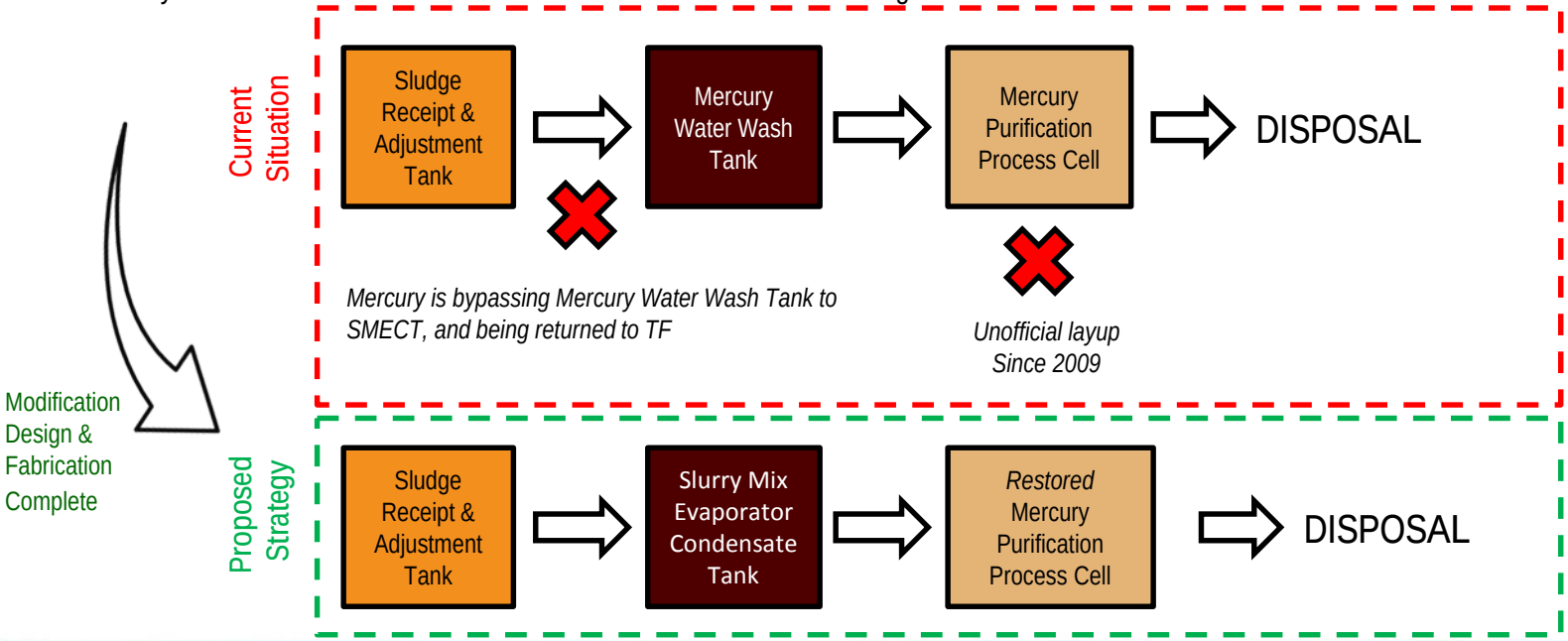
Long Term Mercury Management Plan (2016)

Task: Conduct *an integrated, system-wide evaluation of mercury* behavior in the LWS; *develop a long-term action plan* to address overall mercury management and removal

- Two Phase Assessment Approach:
  - Phase 1: Review Liquid Waste inventory and chemical processing behavior
    - System-by-system review
    - Gap analyses
  - Phase 2: Integrated Assessment
    - Extensive Sampling and Mercury Speciation Effort
    - DWPF Mercury Removal Systems Engineering Evaluation
    - Alternate Liquid Waste Mercury Removal Systems Engineering Evaluation
    - Overall Systems Reviews
      - DWPF
      - Salt processing
      - Evaporators
    - Comprehensive Action Plan (approved – actions underway)
- Established:
  - Mercury Expert Advisory Panel
  - AECOM Mercury Issue Coordination Team to integrate mercury related efforts between SRS and Oak Ridge
- Integrated with:
  - EM-1 Mercury Technology Challenges Team

Long Term Mercury Management (Ongoing)

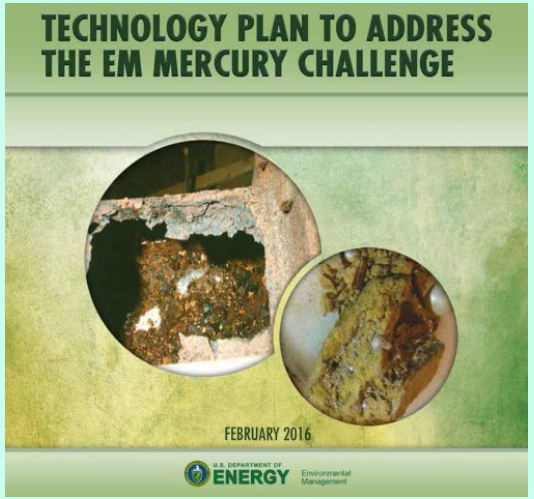
- DWPF Mercury Removal – System Engineering Evaluation Recommendations
  1. *Raise pH in Slurry Mix Evaporator Condensate Tank (SMECT) to collect additional Mercury (complete)*
  2. *Reestablish/repair Mercury Purification Process Cell operation (ongoing)*
- Facility Implementation Plans Ongoing - Initial Operations Targeted for 2017
  - Design work complete / jumpers fabricated
  - Physical mods / install coordinated with melter and SWPF tie-in outages



Long Term Mercury Management

- Alternate Liquid Waste Mercury Removal – Systems Engineering Evaluation Recommendations
  1. *Removal of ionic mercury via reductant with a chemical additive to the 2H Evaporator system to enhance current mercury removal (underway)*
  2. *Pursue removal of organic mercury via photoreaction (Tank 50) in parallel with enhanced retention of mercury in saltstone (underway)*
  3. *Develop methods to measure mercury in sludge (complete)*
  4. *Target process vessels for mechanical removal of mercury (opportunistic)*
- All Recommendations Involve Varying Levels of Technology Development, Deployment, and Maturation
- Additional, SRNL has recently established capability to measure Methylmercury in Radioactive Samples (complete)

Input



FY16 and FY17 - $1.5M in funding for DOE-EM for Alternate Mercury Removal Technology Allocation; Task Performance by Savannah River National Laboratory (SRNL)

Summary

- Mercury is pervasive throughout the LWS
- Represents both a current and a long-term challenge to Liquid Waste processing
- DWPF Mercury Removal System is a key technology challenge
  - Modification design changes & fabrication are complete
- Several technology initiatives for removal of mercury from the LWS (other than DWPF) are complete and a number of others are underway
- Ongoing actions
  - Process adjustments
  - Facility modifications
  - Technology development

Acronyms

ARP – Actinide Removal Process
DWPF – Defense Waste Processing Facility
EM – DOE Environmental Management
ETP – Effluent Treatment Facility
HM-PUREX – H-Canyon Modified – Plutonium Uranium Reduction Extraction
LWS – Liquid Waste System
MCU – Modular Caustic Side Solvent Extraction Unit
SMECT – Slurry Mix Evaporator Condensate Tank
SRNL – Savannah River National Laboratory
SWPF – Salt Waste Processing Facility
TCLP – Toxicity Characteristic Leaching Procedure