Office of Environmental Management
Savannah River Site

Salt Waste Processing Initiatives

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Overview

• Current SRS Liquid Waste System status
• Opportunity to accelerate salt processing – transformational technologies
  – Rotary Microfiltration (RMF) and Small Column Ion Exchange (SCIX)
  – Actinide Removal Process/Modular Caustic Side Solvent Extraction (ARP/MCU) extension with next generation extractant
  – Salt Waste Processing Facility (SWPF) performance enhancement
  – Saltstone enhancements
• Life-cycle impacts and benefits
SRS Liquid Waste

51 Waste Tanks
- 24 “Old-Style” tanks
  - 2 operationally closed
  - 15 in closure process
- Minimal reuse of “Old-Style” tanks
- Storage / processing in “New-Style” tanks
- Objective is to empty, clean and close all tanks to reduce risk and meet commitments
- Sludge processing since 1996 - over 3,000 canisters of waste vitrified
- Salt waste processing is the key enabler for tank closure
SRS Salt Processing Status

- ARP/MCU started operations in 2008
  - Original design target
    • Throughput: 1 million gallons per year (Mgal/yr)
    • Decontamination Factor (DF): 12
  - Current ARP/MCU operations
    • Throughput: 1.0 Mgal/yr
    • DF: 200
  - Purpose:
    • Bridge the gap prior to startup of SWPF
    • Pilot plant to inform SWPF operations

- Saltstone currently operating to support ARP/MCU processing

- SWPF
  - Needed to complete processing of salt waste
  - Project remains on schedule and within cost
    • Construction: ~30% complete
    • Overall project: ~50% complete
  - Current liquid waste planning basis assumes mid-2014 startup
  - Expected nominal operations
    • Throughput: 6 Mgal/yr
    • DF: 40,000
Result of Processing Within Current Configuration

- Federal Facility Agreement commitments met
- Site Treatment Plan commitments at risk
- Supplemental salt processing initiatives will:
  - Eliminate salt only canisters
  - Mitigate risk of delayed SWPF startup
  - Accelerate completion
Sludge Processing Accelerated with Technology

- Melt Rate increased Sept 2010
  - Four bubblers installed
  - No longer Melt Rate limited
  - > 50 can/year increase

- Future technology insertions 2014
  - Streamline feed preparation
  - Reduce water additions
SRS Salt Processing Initiatives

Legend:
ARP - Actinide Removal Process
Cs - Cesium
DSS - Decontaminated Salt Solution
DWPF - Defense Waste Processing Facility
GWSB - Glass Waste Storage Building
MCU - Modular Caustic Side Solvent Extraction Unit
RMF - Rotary Microfilter
SCIX - Small Column Ion Exchange
Sr - Strontium
SWPF - Salt Waste Processing Facility

H Tank Farm
Saltstone Enhancements

H Canyon

F Tank Farm
Empty Tanks -> Closure

DOE Complex Legacy Materials
Savannah River & other Spent Fuel

Recycle

GWSBs
Canisters
Disposal

At-Tank Treatment RMF/SCIX

Sludge Preparation

• ARP/MCU
• Extension
• Next Generation Cs Extractant
• SWPF: Next Generation Cs Extractant

Salt Solution

DSS

CS, Sr & Actinides

Vaults

Em Environmental Management
www.em.doe.gov
SRS Salt Processing Initiatives
RMF/SCIX

- Deploy transformational at-tank treatment technologies
  - Rotary Microfilter
  - Small Column Ion Exchange
  - Spent Resin Disposal
- Provide additional salt processing capability
- Support accelerated SRS waste retrieval and tank closures
- Leverage synergy between SRS and Hanford

Operational Expectations
- Throughput: 2.5 Mgal/yr
- DF: ~40,000 (equivalent to SWPF)
- Low level output to Saltstone for disposal
**SRS Salt Processing Initiatives**

**NGS in ARP/MCU**

- **Extend operations**
  - Provide flexibility to process salt waste if SWPF is delayed
  - Regulatory permitting in place

- **Enhance Performance:**
  - Next Generation Solvent (NGS)
    - Higher solubility isomer of BOBCalix
    - Enhanced stripping methodology
    - DF: ~40,000, equivalent to current SWPF design basis
    - Fewer radionuclides sent to Saltstone Disposal Facility
    - Demonstrate significantly increased throughput
    - Prove technology for introduction into SWPF
SRS Salt Processing Initiatives

NGS in SWPF

• Expected nominal operations
  – Throughput: 6 Mgal/yr
  – DF: 40,000

• NGS deployed in SWPF…
  – Increase throughput: 7.2 Mgal/yr
  – Same DF: 40,000

• Allows SWPF to operate at 20% higher throughput with minimal design/hardware changes

• Shortens planned SWPF operating life by 20%

• Yields significant life-cycle benefits
Saltstone Capacity Enhancements

- Enhancements needed to meet the required capacity with supplemental salt processing initiatives deployed
  - Equipment Upgrades
    - Dry Feed Control System
    - Salt feed pump
    - Hopper redesign
    - Air compressors
    - Grout mixture optimization
  - Support 24/7 operations
Results

Current Configuration

- DWPF Sludge Processing
- ARP/MCU
- Tank Cleaning and Closure

with Transformational Technology

- DWPF Sludge Processing
- ARP/MCU
- Tank Cleaning and Closure

- Eliminates salt-only campaign
- Accelerates the SRS Salt Life Cycle completion date by 6 years
- Avoids Life Cycle cost of $3.25 billion

STP commitment for completion of waste removal
FFA commitment for closure of old style tanks

All tanks closed in F and H Tank Farms
### Tank Closures

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**Legend:**
- SWPF Delay Impact
- LW System Plan – Revision 15
- LW System Plan – Revision 16
- FFA Commitment

**Notes:**
- Type I, II, & IV
- Type III/IIIA
ACCELERATE SALT PROCESSING

• Small Column Ion Exchange (SCIX)
  - Deploy Small Column Ion Exchange (2M gals/yr) supplementing SWPF resulting in acceleration of 6 years
  - SWPF (6M gals/yr) salt processing baseline results in program completion by 2030
  - Current salt processing through ARP/MCU (1M gals/yr)

• Enhanced Low Activity Waste Disposition Project (ELAWD)
  - Enhance existing Saltstone Production Facility (SPF) to support both SCIX and SWPF
MODULAR SALT PROCESSING
Transformational Technologies

Spent Resin Disposal Module (Grinder)

- Provides additional salt processing capability utilizing ion exchange technology to supplement the capacity provided by the SWPF
- Leverage potential synergies between SR and ORP
- Start operation in 2013