ARP/MCU
Operating Performance Status

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Waste Management Committee
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To satisfy The Waste Management Committee Work Plan by:

Providing an update on the operating performance of the “Salt Disposition Project (SDP)”, also known as the “Actinide Removal Process (ARP) / Modular Caustic Side Solvent Extraction Unit (MCU)”
Agenda

- Acronym List
- Process Overview
- Continued Operations Improvement Strategy
- ARP/MCU Operational Performance
- Summary
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<tr>
<th>Acronym</th>
<th>Definition</th>
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<tr>
<td>ARP</td>
<td>Actinide Removal Process</td>
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<tr>
<td>CSSX</td>
<td>Caustic Side Solvent Extraction</td>
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<tr>
<td>DSS</td>
<td>Decontaminated Salt Solution</td>
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<tr>
<td>DWPF</td>
<td>Defense Waste Processing Facility</td>
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<tr>
<td>DF</td>
<td>Decontamination Factor</td>
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<td>GWSB</td>
<td>Glass Waste Storage Building</td>
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<td>GPM</td>
<td>Gallons Per Minute</td>
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<td>MCU</td>
<td>Modular Caustic Side Solvent Extraction Unit</td>
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<tr>
<td>NGS</td>
<td>Next Generation Solvent</td>
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<td>SRNL</td>
<td>Savannah River Nuclear Laboratory</td>
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<td>SRR</td>
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<td>SRS</td>
<td>Savannah River Site</td>
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<td>SWPF</td>
<td>Salt Waste Processing Facility</td>
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Process Overview:
ARP/MCU Mission

- Process Salt Solution for Disposal Utilizing the ARP/MCU process:
  - Continuing to optimize the “First of a Kind” process

- Support Continued DWPF Vitrification Operations Until SWPF Start-up:

- Provide Operational Experience for the Salt Processing Program:
  - Continuing to gain process chemistry, equipment reliability and operational/maintenance knowledge and experience
Continued ARP/MCU Operations Improvement Strategy

Objectives:

- Extend the salt processing capability (life-cycle):
  - Replace high risk equipment
  - Improve equipment reliability and maintainability
  - Improve process operations and attainment

- Increase Attainment
- Optimize the Process Flow-sheet
- Upgrade Key Process Equipment to Improve Reliability
- Modify Equipment to Facilitate Routine Maintenance
- Improve MCU Performance (Cesium Removal)
- Improve Equipment Monitoring & Diagnostic Capability
- Increase Preventative Maintenance
- Procure Spare Parts & Equipment

ARP - Actinide Removal Process
Cs - Cesium
DWPF - Defense Waste Processing Facility
MST - Monosodium Titanate (Used for Actinide Removal)
MCU - Modular Caustic-Side Solvent Extraction Unit
SE - Strip Effluent (Concentrated Cesium Stream from MCU)
ARP/MCU Operational Performance

Project Baseline:
- ~4 years from Pre-Conceptual Design to Radiological Start-Up and Operation
- 3 year Operational Life (minimal capacitance and redundancy)
- 4.0 gpm nominal flow rate
- 12 DF (Cs 137)

FY14 (Historical):
- Completed implementation of the Next Generation Solvent (NGS)
  - The NGS continues to show improved hydraulic and DF performance.
  - NGS sets the stage for continued operation.

FY15 Performance - Best Ever:
- Completed process & equipment reliability improvements for continued operations.
- Ranged from 4.0 - 8.5 gpm processing rate
- Achieved > 40,000 DF (Cs 137) with the new process solvent (NGS)
- Achieved 31 day production record of 262 Kgal (2/15/15), previously 202 Kgal
- Achieved 60 day production record of 444 Kgal (3/11/15), previously 349 Kgal
- Achieved 90 day production record of 522 Kgal (3/29/15), previously 456 Kgal
- ~5.4 Mgal since start-up (4/08)
FY15/FY16 Improvements to Support Continued Operations

I. 512-S Filtration Improvements
   - Improve 512-S process controls / filter cleaning (COMPLETE)
   - Design and install a new “split-design” secondary filter (COMPLETE)
   - Design and fabricate an upgraded (spare) cross-flow filter (COMPLETE, Replace on Forward Fit)
   - Initiate filtration performance improvement demonstrations (FY16)

II. Reduce Impacts of Process Sampling Requirements
    - Complete “ARP/MCU Sample Cycle Time Improvement Team” Actions (COMPLETE)
    - Evaluate methods to reduce impacts of sampling at increased flow rates (FY16)

III. Implement MCU Equipment and Process Improvements
     - Upgrade the MCU Caustic Wash System (COMPLETE)
     - Upgrade the MCU DSS Hydraulic Accumulator Pump System (95% complete)
     - Upgrade Key Process Flow Control Instrumentation (Design Complete, Initial installation 99% complete)

V. Design and Fabricate “Robust” Spare MCU Process Pump Assemblies
   - Upgrade 3 spare pump assemblies to replace the less reliable sets (COMPLETE, Replace on Forward Fit)
   - Upgrade 5 spare pump assemblies to provide process improvements (COMPLETE, Replace on Forward Fit)
The ARP/MCU process continues to provide successful salt processing since start-up in 4/08:

- Helps reduce the lifecycle of the Salt Processing Program
- Helps bridge the gap until the Salt Waste Processing Facility starts up
- Enables continued optimization of the process flow-sheet
- Provides valuable process, equipment and operational experience for the Salt Processing Program.

The ARP/MCU equipment and process improvements set the stage for continued operations.