



**Savannah River
Remediation**

A URS COMPANY TEAMED
WITH BECHTEL | CH2M HILL | B&W | AREVA

We do the right thing.

ARP/MCU Operating Performance and Lifecycle Enhancements



**Presented to the SRS Citizens Advisory Board's
Waste Management Committee
November 13, 2010**

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SRR-TFO-2012-00092

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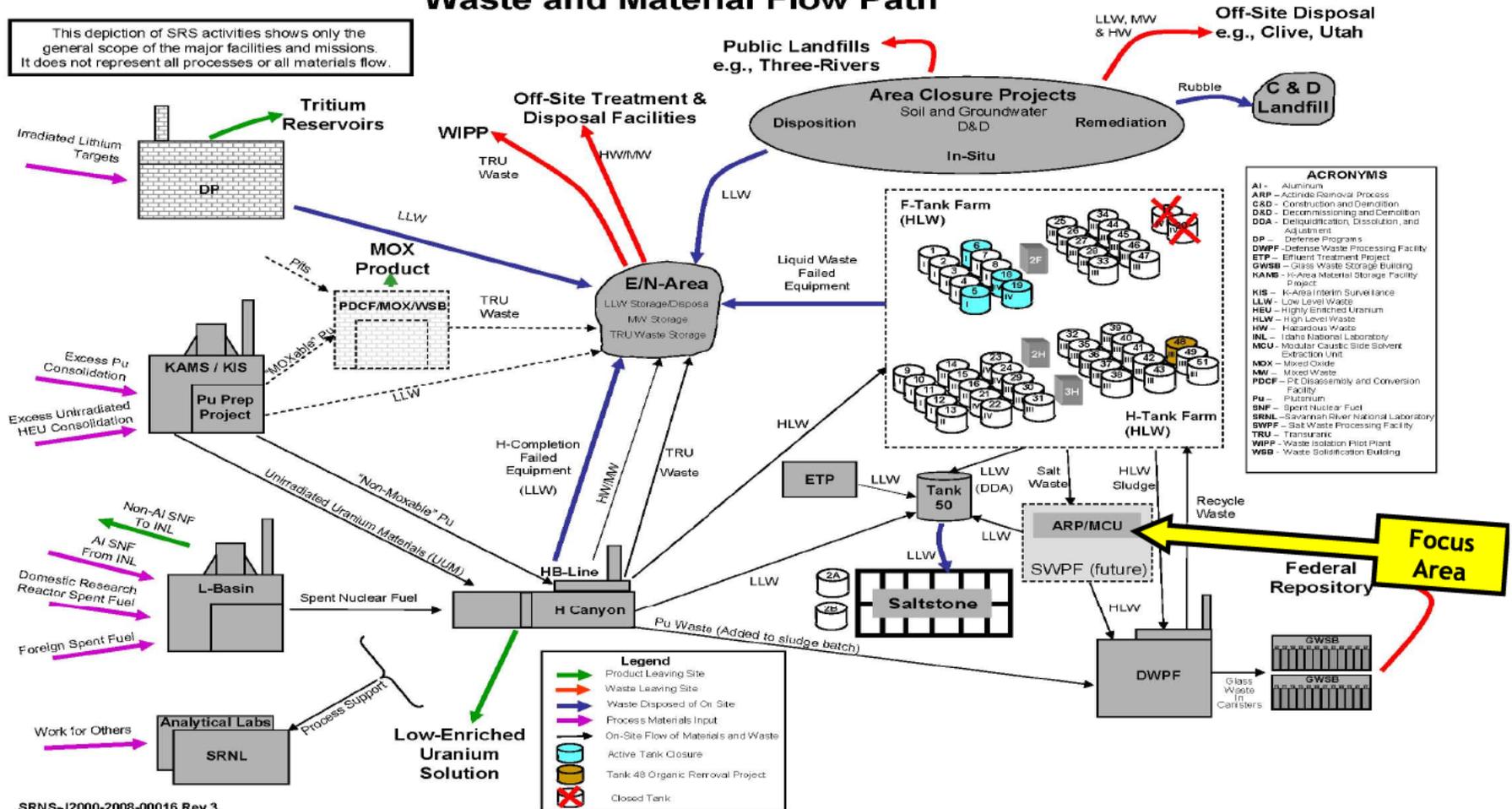
- Update the SRS Citizens Advisory Board’s Waste Management Committee regarding:
 - Operating Performance of the “Interim Salt Disposition Project (ISDP)”, also known as the “Actinide Removal Process (ARP) / Modular Caustic Side Solvent Extraction Unit (MCU)”
 - Lifecycle Enhancements to the ARP/MCU process

Process Overview: Waste and Material Flow

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Savannah River Site Waste and Material Flow Path

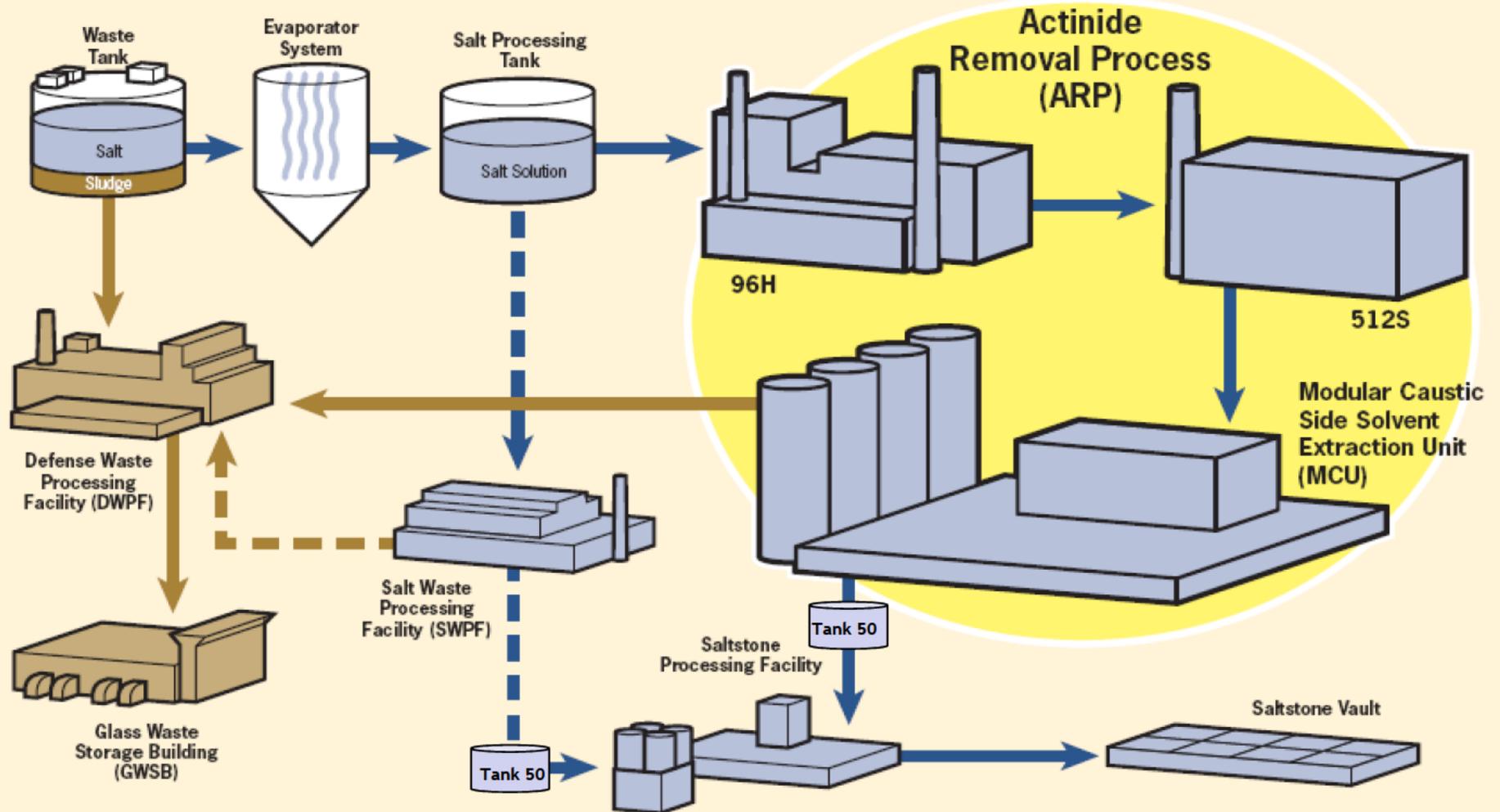
This depiction of SRS activities shows only the general scope of the major facilities and missions. It does not represent all processes or all materials flow.



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- Process Overview
- Mission Timeline
- Integrated Processing Facilities
- Operational Performance
- Lifecycle Enhancements
- Summary

Process Overview: Interim Salt Disposition

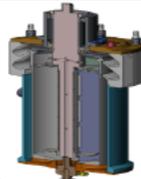


SRR Mission: Store, Treat and Stabilize Legacy of Radioactive Waste

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- Interim Process to Pretreat Salt Solution for Disposal:
 - Remove Actinides and Strontium through the Actinide Removal Process (ARP)
 - Remove Cesium with the Modular Caustic Side Solvent Extraction Unit (MCU)
- Extend Operational Life-Mitigate Impact of Delay in SWPF Start-up:
 - Implement Life Extension Modifications (complete)
 - Deploy The Next Generation Solvent in 2013
- Provide Operational Experience for the Salt Waste Processing Facility (SWPF):
 - Process Chemistry
 - Equipment Reliability
 - Operational/Maintenance Experience and Lessons Learned

ARP/MCU Mission Timeline



**DOE Directs
New
Technology**



Perform Excavation



**Initiate Site
Preparations**



**Equipment
Fabrication / Testing**



**Construct
Foundation**



**Construct Shielded
Structures**



**Install Key
Equipment**

Jan
2004

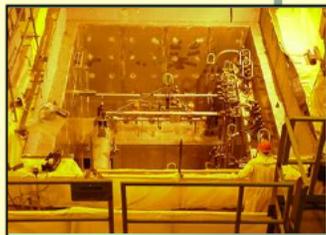
Aug
2004

Nov / Dec
2004

Jan
2005

2005

2006



**ARP-96H Cell
Preparations**



**Complete Saltstone
Modifications**

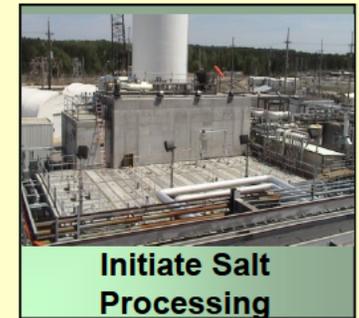
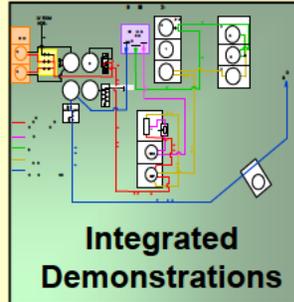


**Tie-in Transfer
Lines**



**Complete Tank
50 Modifications**

ARP/MCU Mission Timeline



Feb / Mar 2007

Jul 2007

Sep 2007

Dec 2007

Jan / Mar 2008

Mar 2008

Apr 2008



Integrated Processing Facilities



Actinide Removal Process (ARP)



Modular Caustic Side Solvent
Extraction Unit (MCU)



Saltstone Facility



Tank Farm



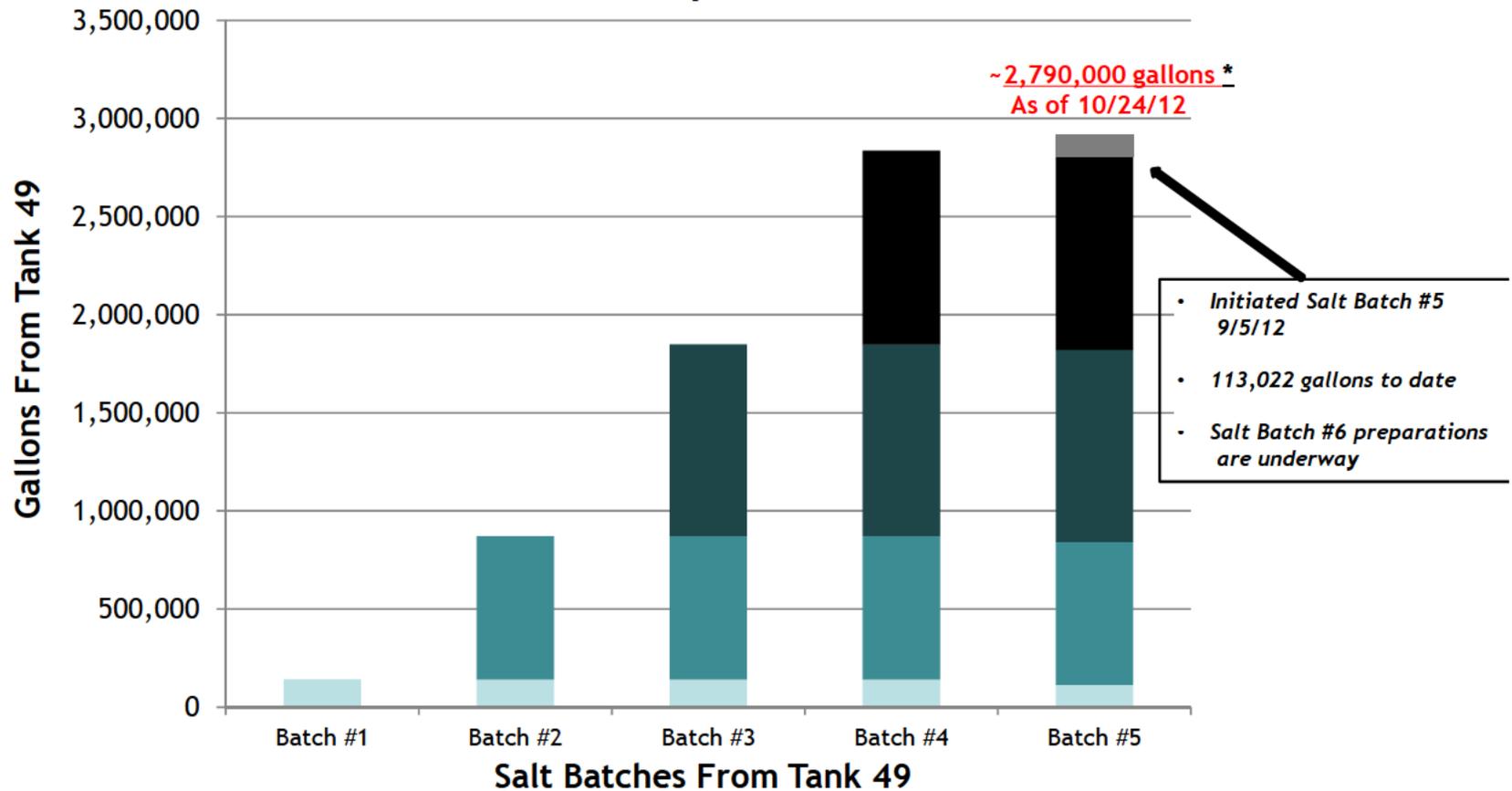
Evaporator



Defense Waste Processing Facility
(DWPF)

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Cumulative Gallons of Salt Processed From Tank 49 Since Start-up of ARP/MCU*



* Note: In addition to ~2,800,000 gallons of De-liquidification, Dissolution, and Adjustment (DDA)

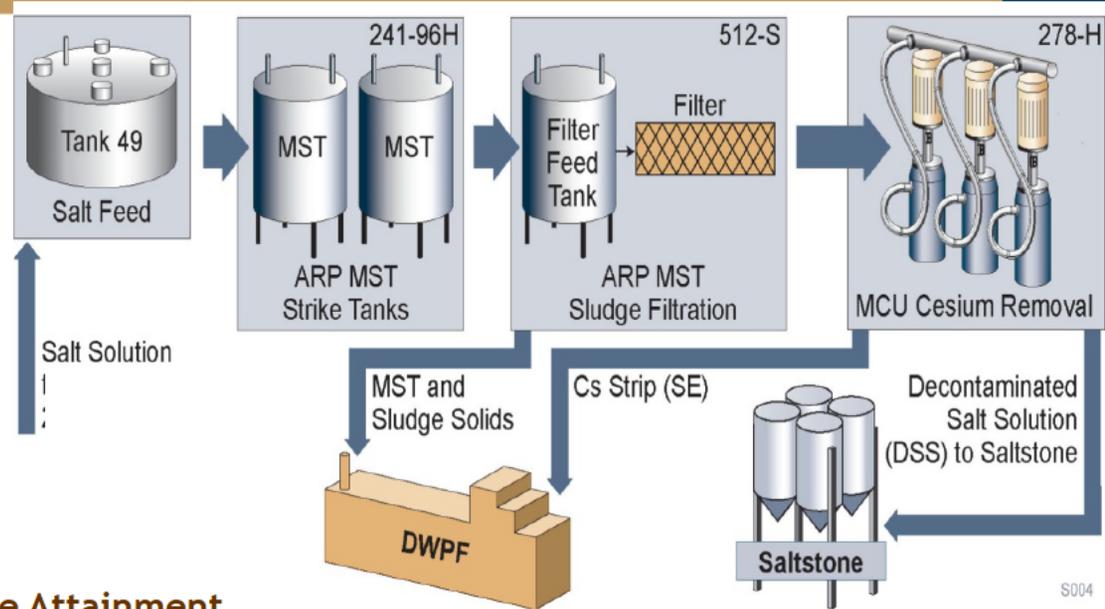
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- Better removal of cesium than the original design basis
- Salt Batch #1: improvements reduced precipitation of solids
- Salt Batch #2: increased salt feed flow rate, reduced ARP process cycle times by more than 50%
- Salt Batch #3: improved solvent monitoring, controls and process performance, reduced salt batch preparation cycle-time
- Salt Batch #4: improved the instantaneous salt feed flow rate by more than 2X , restored “used” solvent performance, increased process attainment, set processing records
- Salt Batch #5: Continuing to optimize the process and increase process attainment

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Objectives:

- Extend salt processing capability until the Salt Waste Processing Facility (SWPF) starts up:
 - Replace high risk equipment
 - Improve equipment reliability and maintainability
 - Improve process operations and attainment
 - Life-cycle savings



Increase Attainment

Optimize the Process Flow-sheet

Upgrade Key Process Pumps to Improve Reliability

Modify Equipment to Facilitate Routine Maintenance

Rebuild MCU Centrifugal Contactors (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)



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Lifecycle Enhancements: MCU Process

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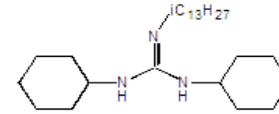
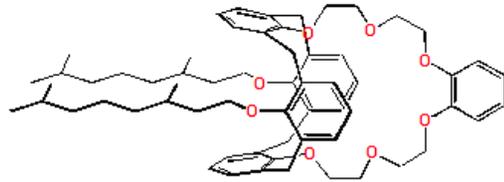
Lifecycle Enhancements: MCU Contactors

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MaxCalix



Guanidine

- DOE is pursuing the development of a modified extractant (MaxCalix) which is more soluble in an improved 4 component solvent.
- A significant amount of research, development, and testing has been completed (ORNL, SRNL, MCU, SWPF)
- The new solvent improves organic-aqueous phase separation in the process (more efficient and equipment neutral)
- Testing results show significant improvement in the removal of cesium (levels for MCU comparable to the Salt Waste Processing Facility)
- Sets the stage for potential increased throughput (with some facility modifications)
- Initiate scheduled outage (in 2013) to implement the “Next Generation Solvent” at MCU.

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- The ARP/MCU process continues to provide successful interim 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 flowsheet
 - Provides valuable process, equipment and operational experience for the Salt Waste Processing Facility
- The Lifecycle Enhancements sets the stage for extended ARP/MCU operations
- Implementation of the “Next Generation Solvent” at MCU will:
 - Provide a lower curie cesium waste stream (Salt Waste Processing Facility comparable) to Saltstone for the extended life of MCU.
 - Provide valuable experience to support implementation and subsequent lifecycle reductions for the Salt Waste Processing Facility.