



**Savannah River
Remediation**

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ARP/MCU Operating Performance & Next Generation Solvent (NGS) Outage



**Presented to the SRS Citizens Advisory Board
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- To satisfy Waste Management Committee Work Plan by:
 - 1) Providing update to CAB 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)”
 - 2) Providing update on outage preparations to demonstrate performance of the Next Generation Solvent (NGS) for the ARP/MCU process

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- Acronym List
- Savannah River Site Waste and Material Flow Path
- Process Overview
- ARP/MCU Operational Performance
- ARP/MCU Lifecycle Enhancements
- Summary

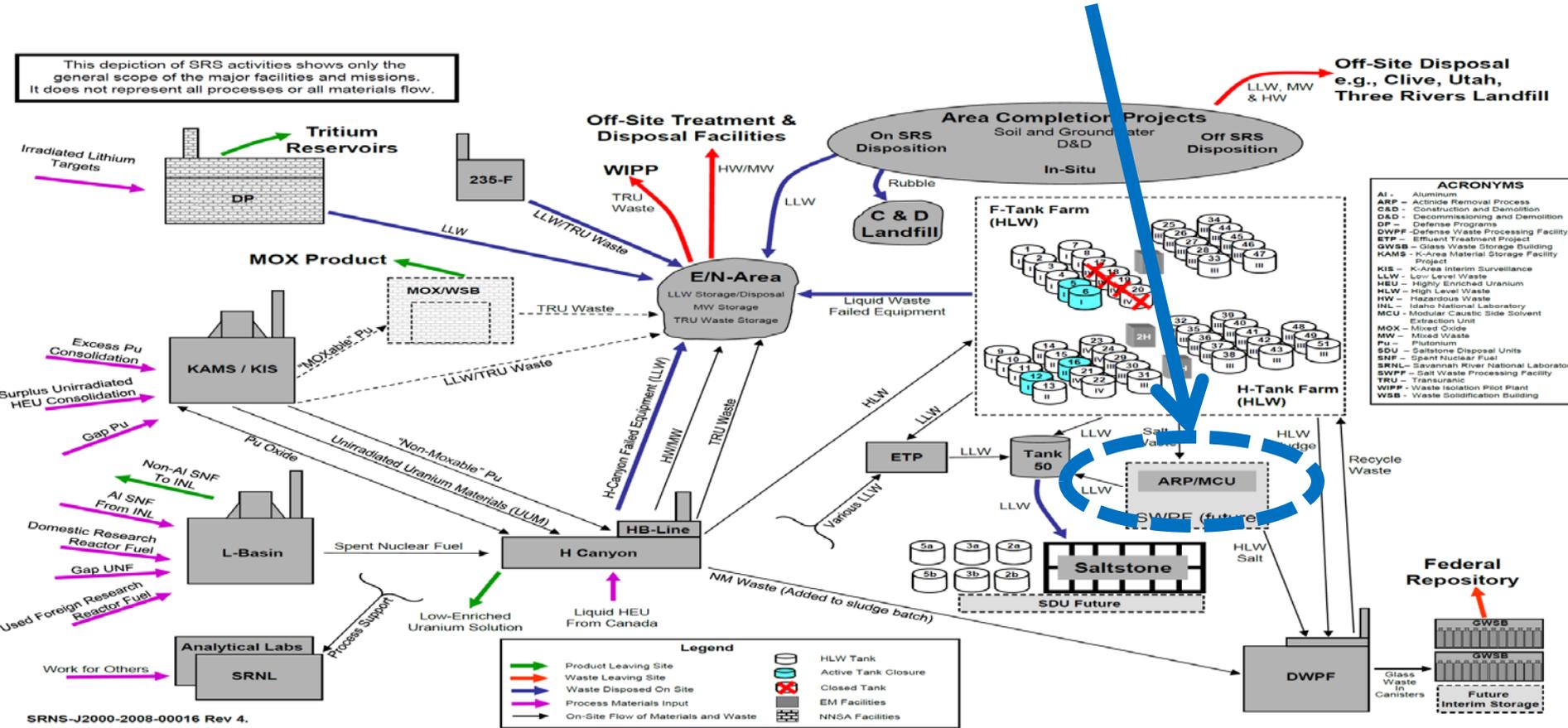
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ANL	Argonne National Lab
ARP	Actinide Removal Process
CSSX	Caustic Side Solvent Extraction
DSS	Decontaminated Salt Solution
DWPF	Defense Waste Processing Facility
GWSB	Glass Waste Storage Building
MCU	Modular Caustic Side Solvent Extraction Unit
NGS	Next Generation Solvent
ORNL	Oak Ridge National Lab
SRNL	Savannah River Nuclear Laboratory
SRR	Savannah River Remediation
SRS	Savannah River Site
SWPF	Salt Waste Processing Facility

Savannah River Site Waste and Material Flow Path

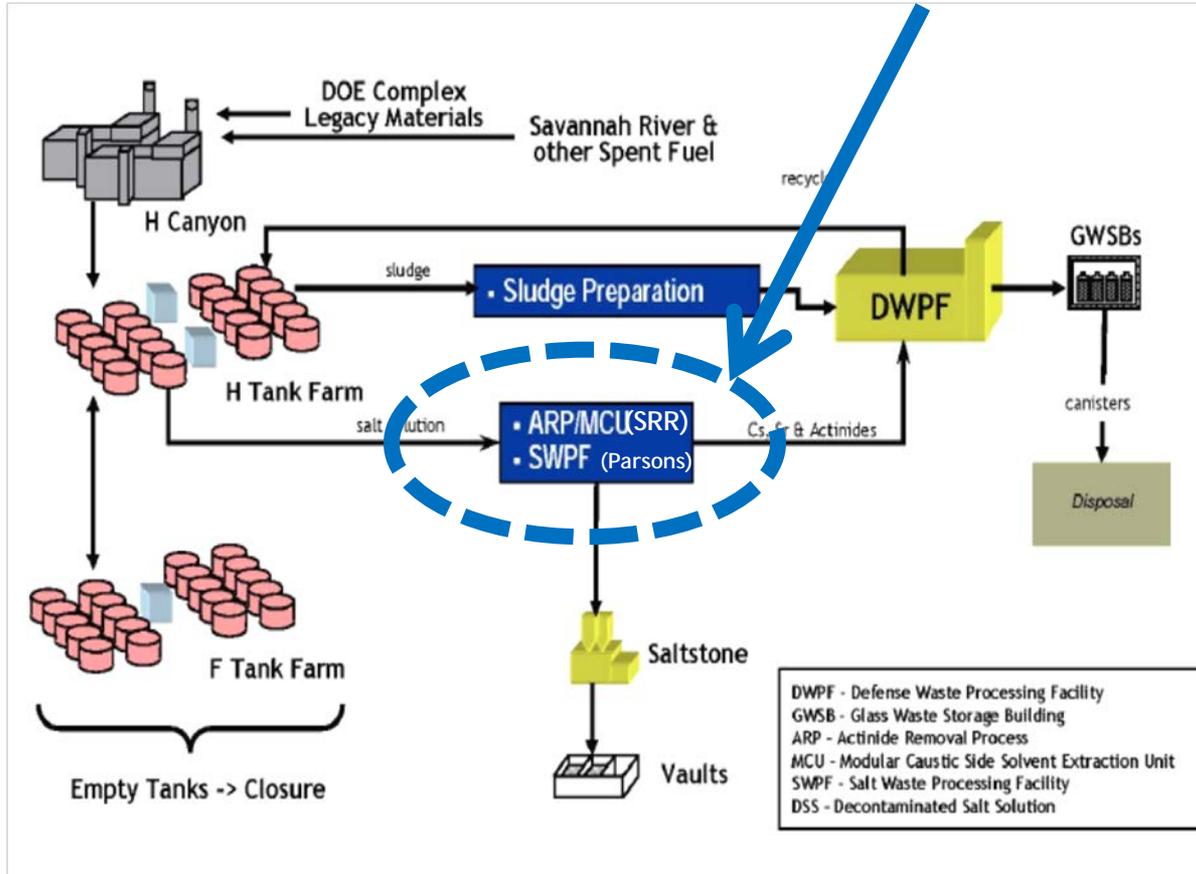
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This depiction of SRS activities shows only the general scope of the major facilities and missions. It does not represent all processes or all materials flow.



Salt Disposition Process Overview

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- Process 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)
- Continued Operations - Mitigate Impact of Delay in SWPF Start-up:
 - Implement FY12 Continued Operations Improvements (Complete)
 - Implement FY13 Reliability Improvements (In Progress)
 - Deploy/demonstrate the MCU- Next Generation Solvent (In Progress)
- Provide Operational Experience for the Salt Processing Program:
 - Process Chemistry
 - Equipment Reliability
 - Operational/Maintenance Experience and Lessons Learned

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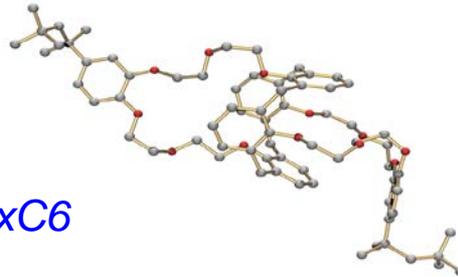
- For FY13:
 - Set weekly processing record of >83,500 gal in a week on 3/12/13.
 - Set new salt processing record with over 1,320,000 gals in FY13 to date.
 - Processed over 4,073,000 gallons since initial start-up.

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- For FY13 (continued):
 - Continuing to optimize the “First of a Kind” process
 - Continuing to gain process chemistry, equipment reliability and operational/maintenance knowledge and experience
 - Executing the FY13/14 “Integrated Process Outage”:
 - Completed introducing Next Generation Solvent (NGS) into MCU
 - Completed preparations for the FY14 ARP/MCU NGS process demonstration
 - Implementing process reliability improvements
- For FY14:
 - Initiate the ARP/MCU NGS process demonstration and operation

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- Initial History of CSSX Chemistry:
 - 1996 CSSX invented, (Extractant BOBCalixC6)
 - 1999 CSSX made robust
 - 2001 ANL and SRNL perform CSSX demonstrations
 - 2001 DOE-EM selects CSSX for SWPF
 - 2004 DOE-EM directs SRS to develop Salt Process using CSSX technology (MCU)



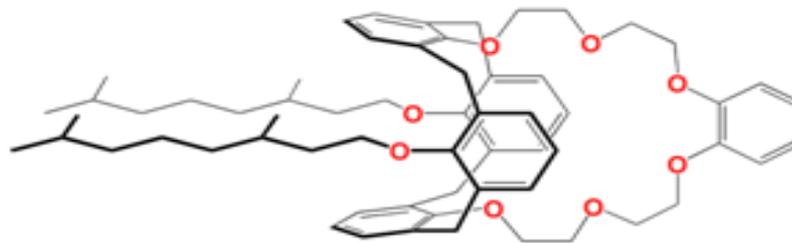
BOBCalixC6

- Making History:
 - April 2008: successfully initiated ARP/MCU radiological process operations
 - Continue to develop/refine the Next Generation Solvent (NGS) in parallel with ARP/MCU operation

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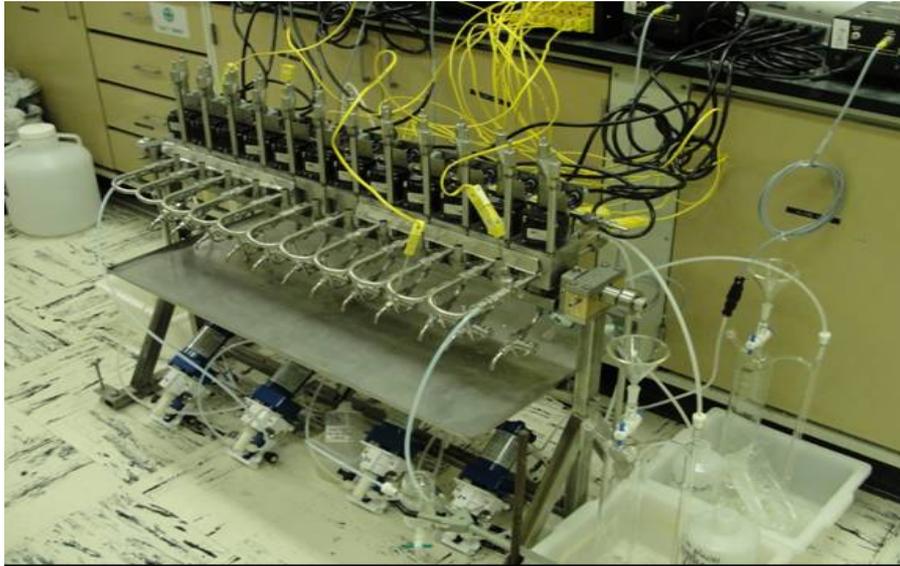
- The NGS solvent shows improved performance:
 - Includes a modified extractant (MaxCalix) which is more soluble in an improved 4 component solvent.
 - Improves organic-aqueous phase separation in the process (more efficient and equipment neutral)
- Numerous hours of NGS testing (ORNL, SRNL, MCU, SWPF) demonstrate significant improvement potential in the removal of cesium for MCU.
- NGS sets the stage for increased MCU throughput (with minor modifications and additional funding)

MaxCalix

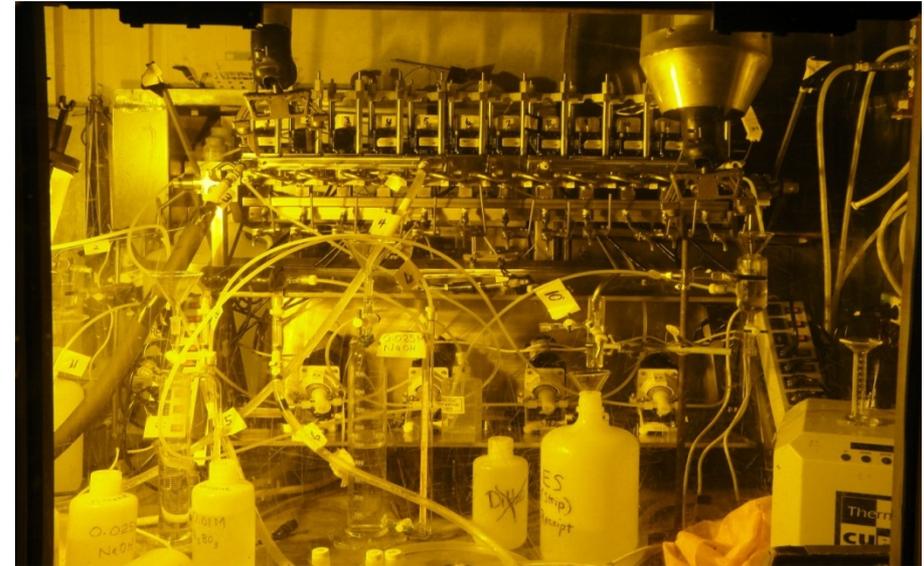


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Small Scale (2cm) Contactor Testing at SRNL -12 (5 extraction, 2 scrub, 5 strip)



Non-radioactive testing



Radioactive testing

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“Full Scale” MCU V10
Test Contactor at SRNL

“Full Scale” MCU V5 Test
Contactor at SRNL

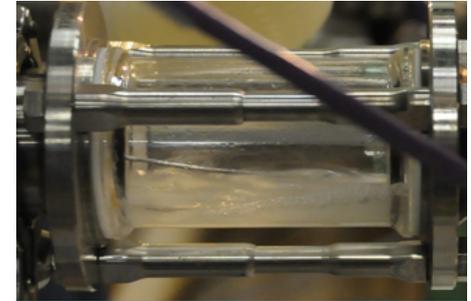
Hydraulic Viewport →

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MCU NGS Testing In Progress
at SRNL

Site Glasses for
Testing



NGS Process Testing

NGS Solvent Recovery System
"Coalescer" Testing



Internal Contactor
Bowl Inspections

FY14: Initiate the ARP/MCU NGS Demonstration and Operation



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- All FY13 DOE NGS milestones met on/ahead of schedule:
 - Completed approval of the facility “Documented Safety Analysis”
 - Developed and submitted the “Technology Maturation Plan” for MCU NGS demonstration
 - Procured/received operational solvent components
 - Completed charging the NGS chemicals into the MCU process
- Completed activities to introduce NGS:
 - Prepare chemical feed tanks
 - Deliver/add NGS solvent to the process
 - Deliver/add new process chemicals to the process
 - Replace process equipment field labels
 - Revise operating and maintenance procedures
 - Complete facility personnel training

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- 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 lifecycle enhancements set the stage for continued ARP/MCU operations
- Implementation of the MCU-“Next Generation Solvent” will:
 - Provide a lower curie cesium waste stream to Saltstone for the continued operational life of MCU.
 - Sets the stage for increased throughput (with additional funding)