Tank Closure Cesium Removal (TCCR) Technology Demonstration Update

Jeffrey Bentley
Waste Disposition Programs Division, Savannah River Operations Office

Pen Mayson
Senior Project Manager, TCCR, Savannah River Remediation, Inc

Status Update
November 14, 2017
Objectives

- Design a modular, at-tank, ion exchange (IX) technology demonstration designed that can:
  - Treat salt waste by removing cesium
  - Increase salt processing capability
  - Enhance bulk waste removal efforts
  - Be operated by Site staff once complete
- Leverage commercial supplier expertise and contemporary Fukushima experience
- Improve flexibility by exploring alternatives for off-site disposition of used resin
- Address the Dispute Resolution Agreement with the State of South Carolina, dated October 31, 2016
- Achieve completion of Tank 10 Bulk Waste Removal Efforts under the Federal Facility Agreement
Technology Demonstration

- Demonstration planned for May – Aug 2018.
- Will treat approx 750 kgal (~0.16 Ci/gal) from Tank 10.
- Each IX Column will be loaded with approx 25k Curies.
- Will demonstrate a decontamination factor ≥ 1000.
- Gather actual processing data during treatment:
  - Effectiveness of pre-filtration
  - Variations in processing rate
  - Measurement of real rad rates
  - Optimize feed control strategy
- Evaluate technical feasibility and economic efficiency report by September 30, 2019 for continued operations and additional TCCR.
  - Decontamination Factor
  - Worker and public safety, Compliance with applicable regulations
  - Ability to result in beneficial (accelerated) liquid waste disposition
TCCR Unit 1: Conceptual Process Diagram

**Systems, structures, and components inside the dashed line (including containment) by Supplier**

Utilities (by SRR) (i.e., electricity, water)

Salt Dissolution Unit (by SRR)

Pre-filter flush return

Transfer pump and line to flange connection (by SRR)

Dissolved Salt

Dissolved salt

Dissolved Salt

Decontaminated Salt Solution

Effluent line to Tank 11H from flange connection (by SRR)

Cs-rich media & vessels

Tank Closure Cesium Removal (TCCR) Unit

Systems, structures, and components inside the dashed line (including containment) by Supplier

Saltstone Production Facility

Utilities (by SRR)

Interim Safe Storage System

Tank Closure

Cesium Removal (TCCR) Unit

Utilities (by SRR) (i.e., electricity, water)

Interim Safe Storage
(at SRS)

Tank 10H

Tank 11H

Tank 50H

TCCR Concept – Tank 10 Demonstration Operations Diagram
SRS - H-Area Tank Farm Layout

CTS – Concentrate Transfer System
H-Area Tank Farm TCCR Unit 1 Layout
Tank Closure Cesium Removal Status

**Project Status**
- A design/build contract to Westinghouse Electric Company was awarded in July 2016
- TCCR unit fabrication is complete
  - *Process Skid*
  - *Ventilation Skid*
  - *Control Skid*
- System assembly is complete
- System testing is in progress
- Delivery of TCCR Unit to SRS is expected in late November
- SRR Balance of Plant (BOP)/utility activities are ongoing
- Safety Basis development is in progress
- Regulatory approvals progressing
  - Received DOE-HQ concurrence for post-SWPF operations on August 10, 2017
  - Transmitted letter to SCDHEC to add TCCR stream to Saltstone disposal permit
  - Construction permit approved by SCDHEC on October 31, 2017
  - Feasibility study to follow demonstration (due September 30, 2019)
TCCR Equipment Modular Units

Process Enclosure

Ventilation Skid

Process Enclosure Internals

Control Skid
IX Columns and Shield Assemblies
TCCR Benefits/Opportunities

- Increase salt throughput and accelerate waste removal from old style tanks.
- Enable salt waste treatment when SWPF is down.
- Demonstrates deployment of modularized, targeted treatment capability.
- Large-scale radioactive test bed to demonstrate related technologies (e.g., elutable resins).
- Capability to treat unfavorable waste streams anticipated at the end of the program, in lieu of SWPF.
  - Could eliminate DWPF recycle returns to the Tank Farm.
- **Applicability to other DOE complex sites.**
  - Interest from Low Activity Waste- Pre-treatment at Hanford