SAVANNAH RIVER SITE
SALT WASTE DISPOSAL
NRC Onsite Observation Visit
September 17, 2019

Larry Romanowski
Waste Disposal Authority
# Agenda: 09/17/2019

**NRC Salt Waste Disposal Onsite Observation**

**Tuesday, September 17, 2019**

<table>
<thead>
<tr>
<th>Start</th>
<th>End</th>
<th>Topic</th>
<th>Location</th>
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<tbody>
<tr>
<td>8:00</td>
<td>8:30</td>
<td>Badging/Travel</td>
<td>Meet 703-46A</td>
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<tr>
<td>8:30</td>
<td>8:45</td>
<td>Inbrief</td>
<td>705-1C, Room 34 A-B</td>
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<td>8:45</td>
<td>9:15</td>
<td>Saltstone Facility Status</td>
<td>705-1C, Room 34 A-B</td>
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<td></td>
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<td>- Operating Status</td>
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<tr>
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<td>- Disposal Unit Status</td>
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<tr>
<td>9:15</td>
<td>11:15</td>
<td>SDF Tour</td>
<td>Z-Area</td>
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<td></td>
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<td>- SDU 7/8 Construction</td>
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<td>- Z-Area Perimeter</td>
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<td>11:15</td>
<td>11:30</td>
<td>NRC/SCDHEC Internal Review</td>
<td>705-1C, Room 34 A-B</td>
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<td>12:00</td>
<td>Outbrief</td>
<td>705-1C, Room 34 A-B</td>
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<td>12:00</td>
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<td>Travel/NRC Depart</td>
<td>703-46A</td>
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Activities

- Discuss recent operations, including saltstone disposal volumes and inventory, the leak detection system, and worker dose.

- Discuss construction activities related to the SDF, including: Saltstone Disposal Structures (SDS) 7, SDS 8, and the Salt Waste Processing Facility

- Tour the site, including:
  - Construction of SDS 7 and SDS 8
  - Z-Area Perimeter (from vehicle on perimeter road)
Technical Discussions:

- Saltstone operations / Saltstone Disposal Unit (SDU) operational status
- SDU construction status
- Update status of Routine Documentation/Action Items
Saltstone Facility Status

- Saltstone Production Facility operational status

- SDU operational status
  - SDU 2
  - SDU 3
  - SDU 5
  - SDU 6

- Worker dose
Operational Status

As of 9/12/2019

All processing sent to SDU 6 since 7/2018 NRC visit
Operational Status:
SPF Operations FY2018

Salt Solution Processed

Processed 385,259 gallons from Tank 50 in FY2018

7/9-11/2018 NRC Visit
Operational Status: SPF Operations FY2019

Salt Solution Processed

Processed 703,300 gallons from Tank 50 in FY2019

Discontinued ARP/MCU Operations May 2019

As of 9/12/2019
Operational Status:
SPF Operations 8/2018

Salt Solution Processed

Processed 8,531 gallons from Tank 50

Disposal Unit 6
Operational Status: SPF Operations 9/2018

Salt Solution Processed

Processed 108,344 gallons from Tank 50

Disposal Unit 6

Gallons Processed

Date
Operational Status:
SPF Operations 10/2018

Salt Solution Processed

Processed 101,724 gallons from Tank 50

Disposal Unit 6
Operational Status:
SPF Operations 12/2018

Salt Solution Processed

Processed 40,429 gallons from Tank 50

Disposal Unit 6
Operational Status:
SPF Operations 2/2019

Salt Solution Processed

Processed 81,395 gallons from Tank 50

Disposal Unit 6
Operational Status:
SPF Operations 3/2019

Salt Solution Processed

Processed 385,211 gallons from Tank 50

Disposal Unit 6
Operational Status:
SPF Operations 4/2019

Salt Solution Processed

Processed 9,832 gallons from Tank 50
Operational Status:
SPF Operations 5/2019

Salt Solution Processed

Processed 84,709 gallons from Tank 50

Date

Gallons Processed

Disposal Unit 6
Operational Status: Current SPF Operations

As of 9/12/2019

Current Status
- SPF in planned ELAWD outage
- ~315,000 gallons of salt solution currently available for processing
- ARP/MCU shutdown for Liquid Waste System transition to SWPF operations

Salt Solution

Tank 50

Saltstone Production Facility

SDU 3A, 3B, 6

Current Level = ~5.25 feet SDU 3A
= ~0 feet SDU 3B
= ~5.0 feet SDU 6

Space available for ~4.9 million gallons of saltstone in SDU 3 and ~31.5 million gallons in SDU 6

* This volume represents the total capacity based on an SDU 3A/3B fill height of 21.25 feet and SDU 6 fill height of 41 feet. The fill heights for these SDUs are currently limited to lower values as a result of a Potential Inadequacy of the Safety Analysis (PISA) regarding the effects of organics on hydrogen generation rates within Liquid Waste facilities.
SDU 2 Status

- Cells 2A and 2B filled with grout in FY2014
  - Initially received saltstone FY2012
  - ~2.8 million gallons of saltstone per cell
  - ~21.25 feet of saltstone per cell
SDU 5 Status

- Cells 5A and 5B filled with saltstone in FY2017
  - Initially received saltstone FY2014
  - ~2.8 million gallons of saltstone per cell
  - ~21.25 feet of saltstone per cell
SDU 3 Status

- Cell 3A began receiving Saltstone 2/2017
  - Cell 3A has received a total of ~0.7 million gallons of saltstone
- Cell 3B has not received saltstone
- Total remaining space
  - ~4.9 million gallons @
  - ~2.8 million gallons per empty cell*

As of 9/12/2019

* This volume represents the total capacity based on an SDU 3A/3B fill height of 21.25 feet. The fill height for these SDUs are currently limited to lower values as a result of a Potential Inadequacy of the Safety Analysis (PISA) regarding the effects of organics on hydrogen generation rates within Liquid Waste facilities.
Disposal Unit Status: SDU 6

**SDU 6 Status**

- SDU 6 began receiving Saltstone 8/2018
  - SDU 6 has received a total of ~1.3 million gallons of saltstone
- **Total remaining space for saltstone**
  - ~31.5 million gallons*

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* This volume represents the total capacity based on an SDU 6 fill height of 41 feet. The fill height for SDU 6 is currently limited to a lower value as a result of a Potential Inadequacy of the Safety Analysis (PISA) regarding the effects of organics on hydrogen generation rates within Liquid Waste facilities.
SDU Status

- **SDU 7**
  - Cell construction in-progress

- **SDU 8**
  - Excavation Complete
  - Pouring of Lower Mud Mat in-progress

- **SDU 9**
  - Excavation in-progress

- **SDU 10-12**
  - Geotech (CPTs/Borings) complete
  - Geotech lab testing in-progress
**SDU 7 Status** (as of 9/12/2019)

- Excavation Initiated 6/2018
- Installation of Lower Mud Mat, GCL & HDPE, and Upper Mud Mat complete
- Cell construction in-process:
  - 14/14 floor sections complete
  - 22/25 of wall sections complete
  - 184/208 of columns complete
  - 3/7 of roof sections complete

HDPE - High Density Polyethylene
GCL - Geosynthetic Clay Liner
Radiological Exposure

- DOE dose limit and DOE/SRS Administrative Control Levels (ACLs) for whole body:
  - DOE annual limit - whole body 5,000 mrem/year
  - DOE ACL - whole body 2,000 mrem/year
  - SRS ACL - whole body 500 mrem/year
- No unexpected exposures
- No individual exposures above either regulatory limits or ACLs
Radiological Exposure

Saltstone/DWPF - Top 10 Individual Whole Body*

Calendar Year 2019 (Year-to-Date)

*Merged DWPF and Saltstone Staff in October 2013
## Routine Document List

<table>
<thead>
<tr>
<th>Topical Area</th>
<th>Document</th>
<th>Approximate Availability/Frequency</th>
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<tbody>
<tr>
<td><strong>Groundwater</strong></td>
<td>* SDF Annual Groundwater Report</td>
<td>January</td>
</tr>
<tr>
<td></td>
<td>* SDF Midyear-Groundwater Report</td>
<td>July</td>
</tr>
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<td></td>
<td>* SDF Performance Assessment Annual Review</td>
<td>March</td>
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<td></td>
<td>* SRS Annual Environmental Report</td>
<td>September</td>
</tr>
<tr>
<td><strong>Air Monitoring</strong></td>
<td>* SRS Annual Environmental Report</td>
<td>September</td>
</tr>
<tr>
<td><strong>Inventory</strong></td>
<td>* SDF Performance Assessment Annual Review</td>
<td>March</td>
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<tr>
<td></td>
<td>and Key Supporting Inventory References</td>
<td>Quarterly</td>
</tr>
<tr>
<td></td>
<td>* Saltstone Permit Website Reporting Data (<a href="http://sro.srs.gov/saltstone.htm">http://sro.srs.gov/saltstone.htm</a>)</td>
<td>As-Issued</td>
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<td></td>
<td>* Salt Batch Qualification Reports</td>
<td>Quarterly</td>
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<td></td>
<td>* Tank 50 WAC Sample Analysis</td>
<td>March</td>
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<tr>
<td><strong>Performance Assessment Maintenance</strong></td>
<td>* SRS Liquid Waste Facilities Performance Assessment Maintenance Annual Implementation Plan</td>
<td>March</td>
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<tr>
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<td>* SDF Performance Assessment Annual Review (includes the following):</td>
<td>March</td>
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<td>- Inventory</td>
<td>March</td>
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<td>- Unreviewed Waste Management Question Evaluations Performed</td>
<td>March</td>
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<td>- Research and Development Performed</td>
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<td>- Research and Development Planned</td>
<td>March</td>
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<tr>
<td><strong>Research and Development Testing/Studies</strong></td>
<td>Various Reports</td>
<td>As-issued (Typically, September through December)</td>
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**Note:** DOE anticipates providing NRC with Salt Batch Qualification Reports throughout the time period during which DOE has imposed lower Tc-99 limits on the salt solution which can be processed at SPF.

### 2018 Summary

- SRNS-TR-2018-00140 (Midyear 2018)
- SRR-CWDA-2018-00085 (FY2018)
- SRR-CWDA-2018-00072 (FY2018 Inventory)
- SRNL-STA-2018-00520 (1Q-2018)
- SRNL-STA-2018-00521 (2Q-2018)
- SRNL-STA-2018-00522 (3Q-2018)
- SRR-CWDA-2017-00096 (FY2018)
- SREL-R-18-0004, Technetium Solubility in Saltstone as Function of pH and Eh: Summary of Modeling Efforts
- SRRA021685-000010, Analysis of Plutonium Soil Concentrations in Field Lysimeter Experiments FY18 Reports
- SRRA021685-000011, Determination of Constituents Concentrations in Field Lysimeter Effluents FY18 Report
- SRRA107772-000009, Predicting Long-Term Percolation from the SDF Closure Cap
- SRRA10110-000004, Predicting the Hydraulic Conductivity Over Time for Degrading Saltstone Vault Concrete
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Note: DOE anticipates providing NRC with Salt Batch Qualification Reports throughout the timeperiod during which DOE has imposed lower Tc-99 limits on the salt solution which can be processed at SPF.

2019 Summary

- SRNL-STI-2019-00033 (1Q-2019)
- SRR-CWDA-2018-00092 (FY2019)
### Action Items

1. DOE to provide NRC an electronic copy of the general presentation material including action items and attendance rosters.  
   [SRR-CWDA-2018-00035, Revision 1] Complete - ML#18205A653

2. DOE to provide NRC an electronic copy of other presentations provided during the NRC Onsite Observation Visit. Complete
   - *Briefing to NRC: FEPs and Conceptual Model for the 2019 SDF PA*, [SRR-CWDA-2018-00034] ML#18198A088
   - *Briefing to NRC: Inventory Reports for I-129 and Tc-99*, [SRR-CWDA-2018-00038] ML#18198A140
   - *Briefing to NRC: Research Results/Status*, [SRR-CWDA-2018-00039] ML#18198A210

3. DOE to provide NRC copies of the photos taken during the SDF tour on 7/9/2018. Complete, slides 96-97 of SRR-CWDA-2018-00035, R1 ML#18205A653
Action Items

4. DOE to provide NRC an electronic copy of graphic SRR-CWDA-2018-00020_Rev. 1, Overview of Activities to Support Development of the Compliance Model for the Saltstone Disposal Facility (SDF) Performance Assessment (PA). Complete - ML#18198A368

5. DOE to provide NRC an electronic copy of the Vanderbilt University degradation report SRRA110110-000004, Predicting the Hydraulic Conductivity Over Time for Degrading Saltstone Vault Concrete. Complete - ML#18198A437

6. DOE to provide NRC electronic copies of the reference documents for SRRA1077772-000009, Predicting Long-Term Percolation from the SDF Closure Cap. Complete - ML#18215A277

7. DOE to provide NRC an electronic copy of graphic SRR-CWDA-2018-00043, depicting revisions to the SDF monitoring factors. Complete - ML#18199A085
Requested SDU 7 Construction Photos

- Action Items
  - Provided electronic copy of SRR-CWDA-2018-00078, *SDU 7 Excavation / Lower Mud Mat HDPE-GCL / Upper Mud Mat* and DVD with .jpeg files of pictures [ML#18338A189]
  - Provided electronic copy of SRR-CWDA-2019-00019, *SDU 7 Floor Slab Details* and DVD with .jpeg files of pictures [ML#19085A069]
  - Provided electronic copy of SRR-CWDA-2019-00067, *Wall and Column Details* and DVD with .jpeg files of pictures [ML#19241A310]
  - Photographs of roof construction in-process
Action Items from Previous OOVs, TRRs, or Teleconference Calls

- **DOE to provide NRC a velocity field and cross-section through Z-Area.** [NRC AI # SDF-CY-16-01-013]
  - Requested information will be provided in the SDF Performance Assessment revision.
  - Anticipated to be provided to NRC in the first quarter of calendar year 2020.

- **DOE to provide a map identifying the locations for the pictures from the walk-down.** [NRC AI # SDF-CY-17-01-002]
  - Requested information being finalized, will be provided 10/2019.
Field Observation

- Tour the site, including:
  - Construction of Saltstone Disposal Structure (SDS) 7 and SDS 8
  - Z-Area Perimeter (from vehicle on perimeter road)
Saltstone Disposal Facility
Field Observation

8/13/2019
NRC Observation Visit Outbrief

- NRC Staff Outbrief
- Action Items Captured
- Closing Statements
Observation Visit Final Outbrief: Action Items

- **Action Items**

  1. DOE to provide NRC an electronic copy of the general presentation material including action items and attendance rosters.  
     [SRR-CWDA-2019-00079, Revision 1] -Complete

  2. DOE to provide NRC an electronic copy of *Future Saltstone Disposal Units Siting Systems Engineering Evaluation*.  
     [G-AES-S-00004] -Complete

  3. DOE to provide NRC an electronic copy of photographs from the SDU-7 field observation. -Complete (see slides 39-66)

  4. DOE to provide NRC photographs of the process for welding the HDPE layer located between the mud mats to the HDPE strip embedded in the SDU floor slab.
# Attendance Sheets

## NRC Salt Waste Disposal Monitoring Visit
**September 17, 2019**

<table>
<thead>
<tr>
<th>Name</th>
<th>Affiliation</th>
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<tbody>
<tr>
<td>Larry Romanoff</td>
<td>SRR</td>
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<tr>
<td>Justin Keen</td>
<td>SC DUHFL</td>
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<tr>
<td>Barbara Harris</td>
<td>SDHFL</td>
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<tr>
<td>A. Chisholm Ridge</td>
<td>NRC</td>
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<td>Tom ART</td>
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<td>Harry T.</td>
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<tr>
<td>Steve Thomas</td>
<td>SRR</td>
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<td>F. M. Smith</td>
<td>SRR</td>
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<tr>
<td>Steve Hommel</td>
<td>SRR</td>
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<tr>
<td>Greg Flesh</td>
<td>SRR</td>
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<tr>
<td>Aaron White</td>
<td>DEC-98</td>
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</tbody>
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Action Item #3

Photographs from the SDU-7
Field Observation
SDU-7 Wall Sections

During field observation, entry into SDU-7 was through Wall Section 9 location.
Action Item #3

At the time of the field observation, Roof Sections 1, 2 and 3 had been poured.

SDU-7 Roof Sections
Action Item #3

Wall Section 10

Wall Form Bracing
Action Item #3

Wall Section 10

- Bearing Pads
- Vertical Tensioning Channels
- Seismic Cables
Action Item #3

Shotcrete Piping - Exterior

Shotcrete Piping - Interior
Action Item #3

Shotcrete Piping - Interior

Wall Form Brace Footer
Action Item #3

Wall Section 8

Form Tie Holes

Epoxy Injection Tubing - Interior

Bearing Pad
Action Item #3

Wall Section 8

Epoxy Injection Port - Vertical Tensioning Channel
Action Item #3

Wall Section 8

Epoxy Injection Tubing

Water Stop

Wall Bearing Pads
Action Item #3

SDU 7 Interior Looking East
Action Item #3

SDU 7 Interior Looking East

Epoxy Injection Tubing - Floor
Action Item #3

SDU 7 Interior Looking West
Action Item #3

Roof Section 1
(Bottom Side)

Roof (concrete)

Roof Decking (concrete form)
Action Item #3

HDPE Embed - Floor Slab

Bearing Pad

Upper Mud Mat

Wall
Action Item #3

Epoxy Injection Tubing - Roof
Action Item #3

Roof Section 1

Roof Joint

Roof Section 2

Epoxy Injection Tubing

Roof Embeds
Action Item #3

Wall Thermocouple Channel

Roof Section 2

Roof Hatch

Roof Section 1
Action Item #3

Roof Section #3 Under Water Cure
Action Item #3

Roof Section 4

Reinforcing Bar Installation Over Column

Embed Installation
Roof - Column Reinforcing Bar Tie-In (Typical)

Roof Section 4
Action Item #3

Roof Section 2

Roof Joint Epoxy Injection Tubing

Roof Joint Water Stop

Roof Section 5

Roof Section 2

Roof Section 5
Action Item #3

Roof Section #4 Reinforcing Bar Installation

Roof Section #4

Roof Section #5
Action Item #3

Roof Section 5

Top of Columns
Action Item #3

Roof Section 5

Roof Forms with Embedded Water Stop
Action Item #3

SDU 9 Excavation
Action Item #3

SDU 6

Looking North from SDU 7 Roof

Looking North from SDU 7 Ground Level