Savannah River Remediation
AECOM | BECHTEL | CH2M | BWXT

SRR-CWDA-2018-00035, Revision 1

# SAVANNAH RIVER SITE SALT WASTE DISPOSAL

## NRC Onsite Observation Visit

### July 9-11, 2018

**Larry Romanowski**

**Waste Disposal Authority**

[Part 1, 7/9/2018]

Savannah River Remediation
AECOM | BECHTEL | CH2M | BWXT

*We do the right thing.*

# July 9, 2018

## Savannah River Site Salt Waste Disposal
## NRC Onsite Observation Visit

# Agenda: 07/09/2018

| NRC Salt Waste Disposal Onsite Observation | | | |
|---|---|---|---|
| **Monday, July 09, 2018** | | | |
| **Start** | **End** | **Topic** | **Location** |
| 8:00 | 8:45 | Badging/Travel | Meet 703-46A |
| 8:45 | 9:00 | Inbrief | 705-1C, Room 34 A-B |
| 9:00 | 9:30 | Saltstone Facility Status [1]<br>• Operating Status<br>• Disposal Unit Status | 705-1C, Room 34 A-B |
| 9:30 | 10:00 | Monitoring Activities [F1, F2]<br>• Routine Documentation<br>• Action Item Status | 705-1C, Room 34 A-B |
| 10:00 | 10:45 | Technical Discussions [5]<br>• FEPs Report<br>• SDF PA Conceptual Model | 705-1C, Room 34 A-B |
| 10:45 | 12:00 | Lunch | 766-H |
| 12:00 | 2:00 | SDF Tour [2a, 2b, 3]<br>• SDU 7 Construction<br>• Z-Area Perimeter<br>• SPF Operation | Z-Area |
| 2:00 | 4:00 | Technical Discussions [5]<br>• FEPs Report<br>• SDF PA Conceptual Model | 705-1C, Room 34 A-B |
| 4:00 | 4:15 | NRC/SCDHEC Internal Review | 705-1C, Room 34 A-B |
| 4:15 | 4:45 | Outbrief | 705-1C, Room 34 A-B |
| 4:45 | 5:00 | Travel/NRC Depart | 703-46A |

[#] - Activity number from NRC Observation Guidance (ML18155A389)

# Agenda: 07/10/2018

| NRC Salt Waste Disposal Onsite Observation | | | |
|---|---|---|---|
| **Tuesday, July 10, 2018** | | | |
| **Start** | **End** | **Topic** | **Location** |
| 8:00 | 8:30 | Badging/Travel | Meet 703-46A |
| 8:30 | 8:45 | Inbrief and Follow-up | 705-1C, Room 34 A-B |
| 9:00 | 11:00 | Technical Discussions [5]<br>• Closure Cap Report<br>• SDF PA Conceptual Model (Cont'd) | 705-1C, Room 34 A-B |
| 11:00 | 12:30 | Lunch | 766-H |
| 12:30 | 2:30 | Technical Discussions [4]<br>• R&D Discussion<br>• NRC R&D Update | 705-1C, Room 34 A-B |
| 2:30 | 4:00 | Technical Discussions [6a-h]<br>• NRC Technical Review Reports | 705-1C, Room 34 A-B |
| 4:00 | 4:15 | NRC/SCDHEC Internal Review | 705-1C, Room 34 A-B |
| 4:15 | 4:45 | Outbrief | 705-1C, Room 34 A-B |
| 4:45 | 5:00 | Travel/NRC Depart | 703-46A |

[#] - Activity number from NRC Observation Guidance (ML18155A389)

# Agenda: 07/11/2018

| NRC Salt Waste Disposal Onsite Observation | | | |
|---|---|---|---|
| **Wednesday, July 11, 2018** | | | |
| **Start** | **End** | **Topic** | **Location** |
| 8:00 | 8:30 | Badging/Travel | Meet 703-46A |
| 8:30 | 8:45 | Inbrief and Follow-up | 705-1C, Room 34 A-B |
| 8:45 | 11:00 | Technical Discussions [6a-h]<br>• NRC Technical Review Reports | 705-1C, Room 34 A-B |
| 11:00 | 12:30 | Lunch | 766-H |
| 12:30 | 1:30 | Follow-up Discussions<br>• As-Needed | 705-1C, Room 34 A-B |
| 1:30 | 2:00 | NRC/SCDHEC<br>Internal Review | 705-1C, Room 34 A-B |
| 2:00 | 2:30 | Outbrief | 705-1C, Room 34 A-B |
| 2:30 | 2:45 | Travel/NRC Depart | 703-46A |

- If time allotted for Technical Discussion is not required, Internal Review and/or Outbrief could occur earlier.

[#] - Activity number from NRC Observation Guidance 9ML18155A3890

# NRC Observation Guidance

- **Activities**

1. **Discuss recent operations, including saltstone disposal volumes and inventory, the leak detection system, and worker dose.**
2. **Tour the site, including:**
   a) Construction of Saltstone Disposal Structure (SDS) 7
   b) Z-Area Perimeter (from vehicle on perimeter road)
3. **If saltstone is being poured, then observe saltstone production facility operations.**
4. **Discuss recent DOE research with samples of cores from SDS 2A.**
5. **Discuss the DOE document: SRR-CWDA-2018-00006, Rev. 0, "Conceptual Model Development for the Saltstone Disposal Facility Performance Assessment," May 2018. (ML18143B265)**

[*Guidance for July 9-11, Monitoring Onsite Observation Visit to the Savannah River Site, Saltstone Disposal Facility,* **ML18155A389.**]

# NRC Observation Guidance

- **Activities (Cont'd)**

6. **Provide opportunity for the DOE to ask questions about the NRC TRRs issued since April 2016:**
   a) TRR: "Quality Assurance Documentation for the Cementitious Barriers Partnership Toolbox," August 2016. (ML16196A179);
   b) TRR: "Dose Calculation Methodology for Liquid Waste Performance Assessments at the Savannah River Site," December 2016. (ML16277A060);
   c) TRR: "Iodine Sorption Coefficients for Use in Performance Assessments for the Saltstone Disposal Facility," January 2017. (ML16342C575);
   d) TRR: "Saltstone Waste Form Hydraulic Performance," March 2017. (ML17018A137);
   e) TRR: "Performance of the High Density Polyethylene Layer, High Density Polyethylene/Geosynthetic Clay Liner Composite Layer, and the Lower Lateral Drainage Layer," April 2017. (ML17081A187);

[*Guidance for July 9-11, Monitoring Onsite Observation Visit to the Savannah River Site, Saltstone Disposal Facility,* **ML18155A389.**]

# NRC Observation Guidance

- **Activities (Cont'd)**

**6. Provide opportunity for the DOE to ask questions about the NRC TRRs issued since April 2016:**

f) TRR: "Hydraulic Performance and Erosion Control of the Planned Saltstone Disposal Facility Closure Cap and Adjacent Area," January 2018. (ML18002A545);

g) TRR: "Groundwater Monitoring at and Near the Planned Saltstone Disposal Facility," May 2018. (ML18117A494); and

h) TRR: "Update on Projected Technetium Release from Saltstone," May 2018. (ML18095A122).

[*Guidance for July 9-11, Monitoring Onsite Observation Visit to the Savannah River Site, Saltstone Disposal Facility,* **ML18155A389.**]

# Technical Discussion Topics

## Technical Discussions: 07/09/2018 (am)

- (1) – Saltstone Operations / Disposal Unit Status
- (1) – SDU Construction Status
- (F1,F2) – Update status of Routine Documentation/Action Items

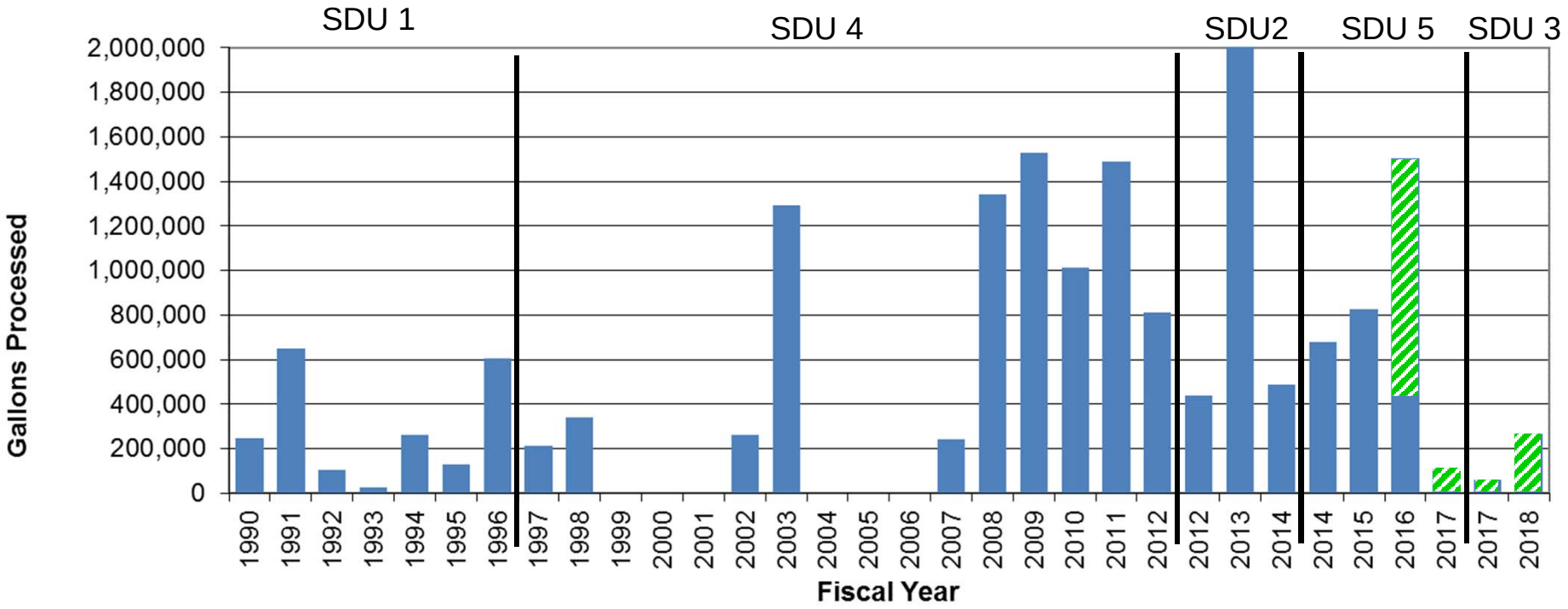
(#) - Activity number from NRC Observation Guidance [ML18155A389]

## Saltstone Facility Status

- Operational Status
- Saltstone Disposal Unit (SDU) Status
  - SDU 4 / SDU 1
  - SDU 2
  - SDU 3
  - SDU 5
  - SDU 6
- Worker Dose

# Operational Status

## Salt Solution Processed

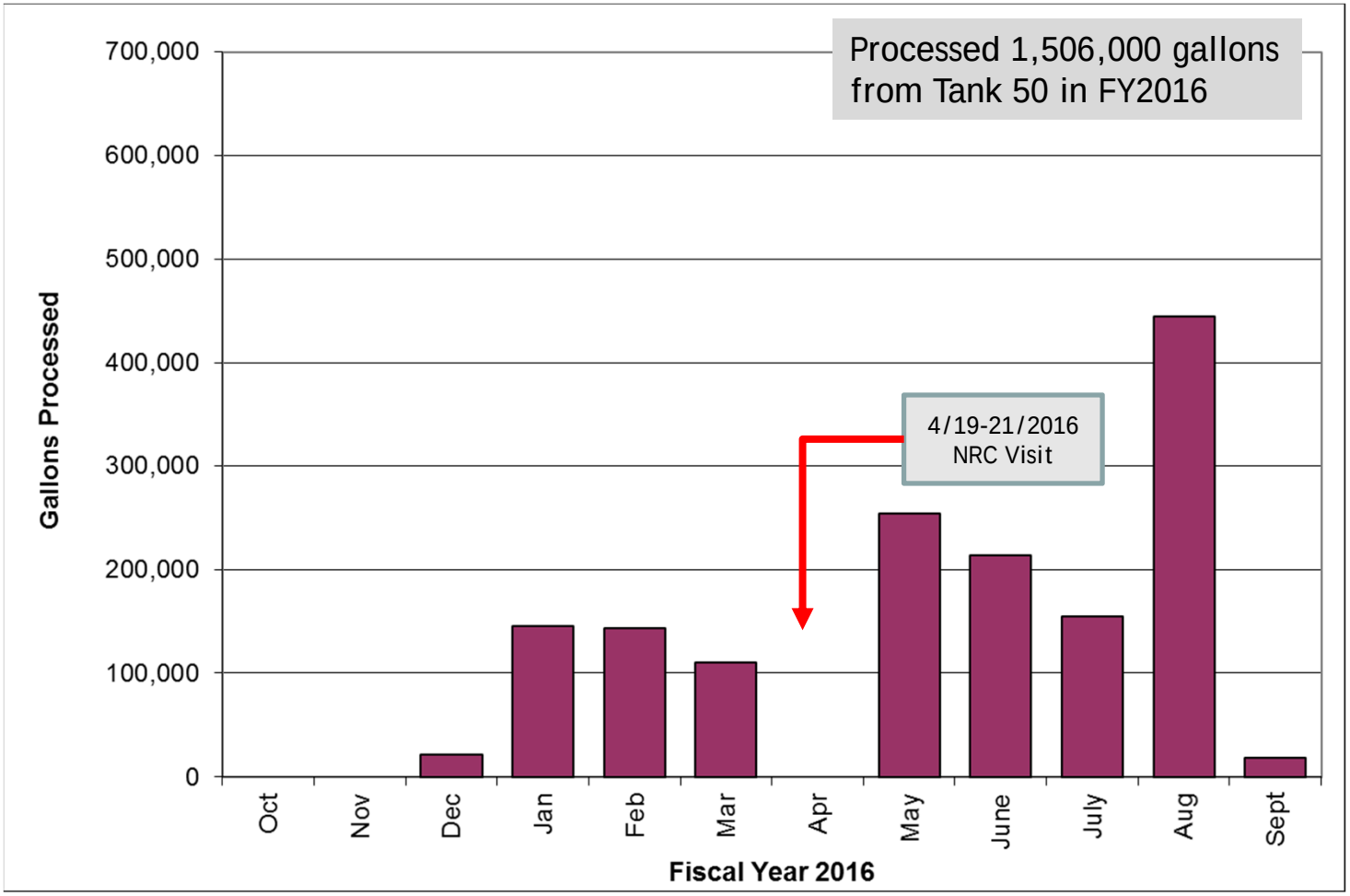



As of 6/30/2018

(SDU)-Saltstone Disposal Unit

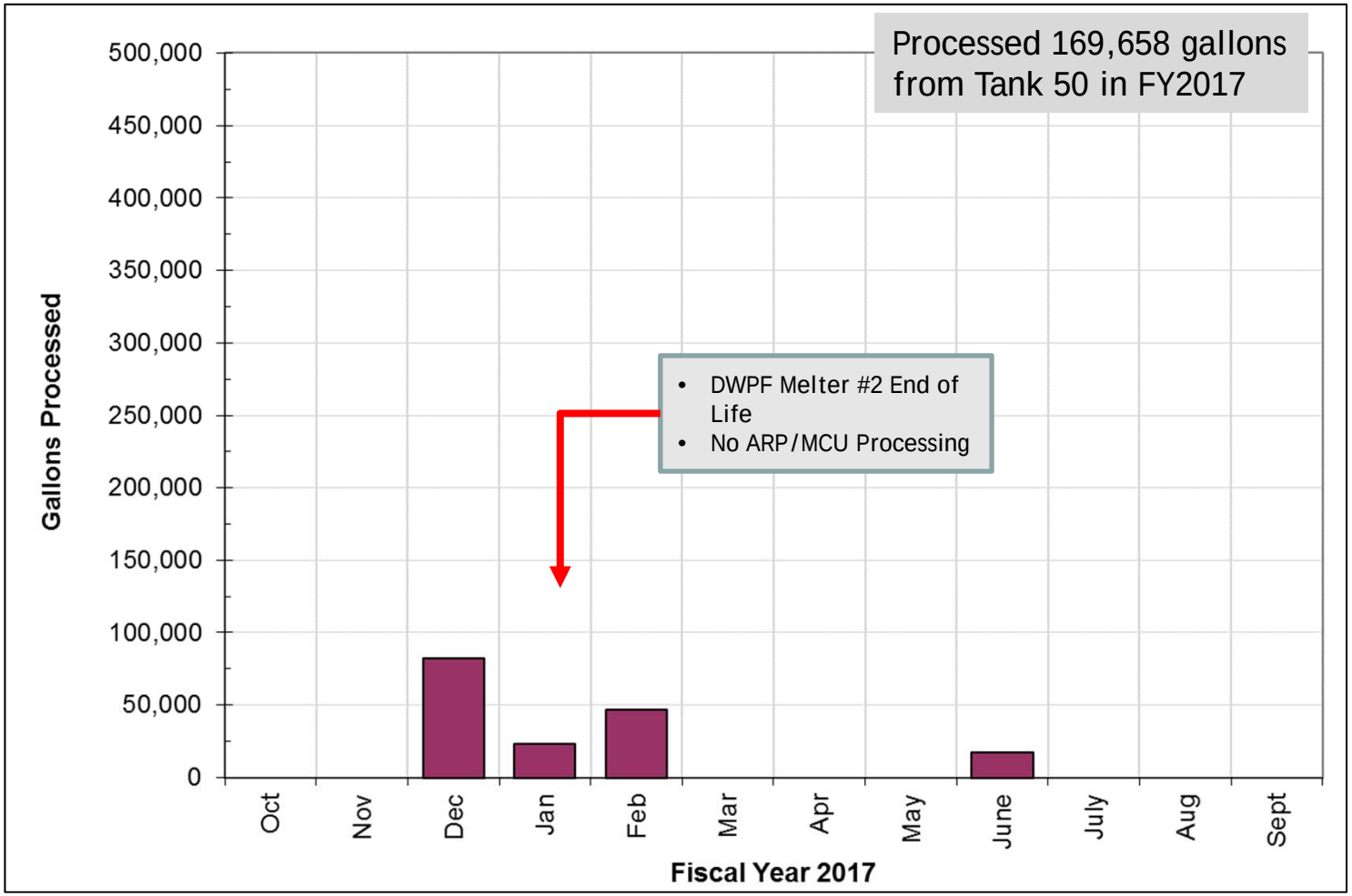
# Operational Status: SPF Operations FY2016

## Salt Solution Processed



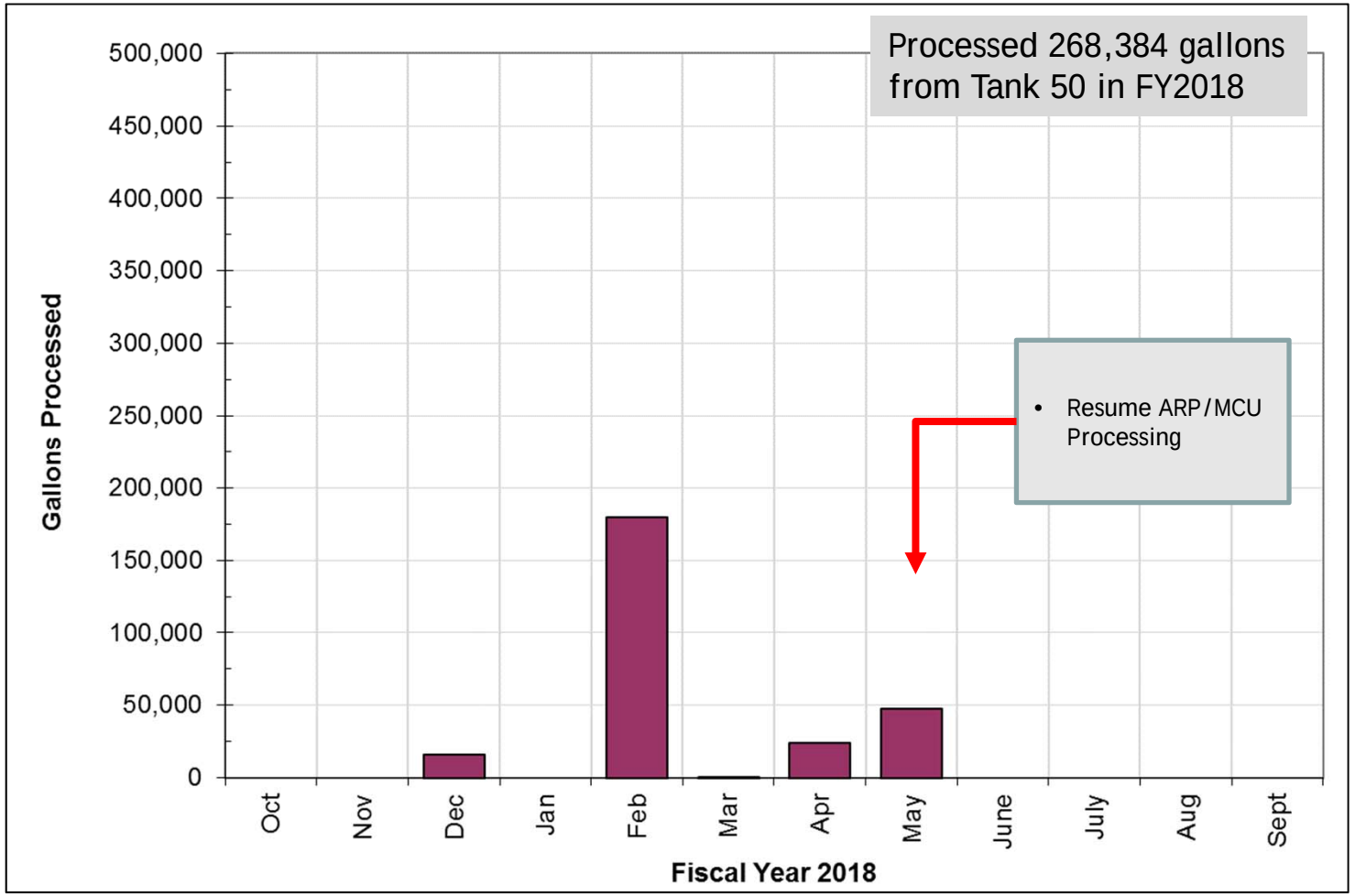
# Operational Status: SPF Operations FY2017

## Salt Solution Processed



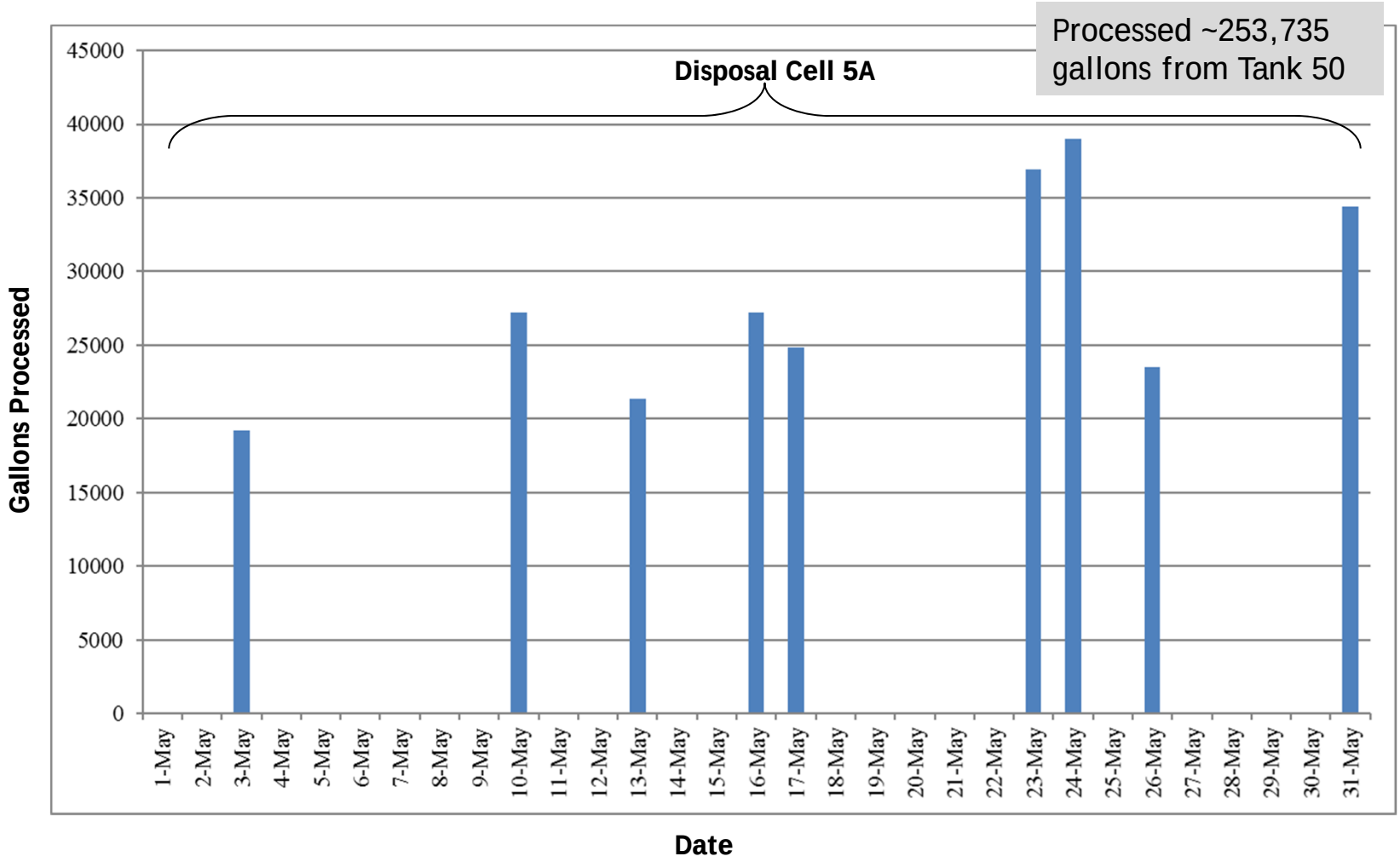
# Operational Status: SPF Operations FY2018

## Salt Solution Processed



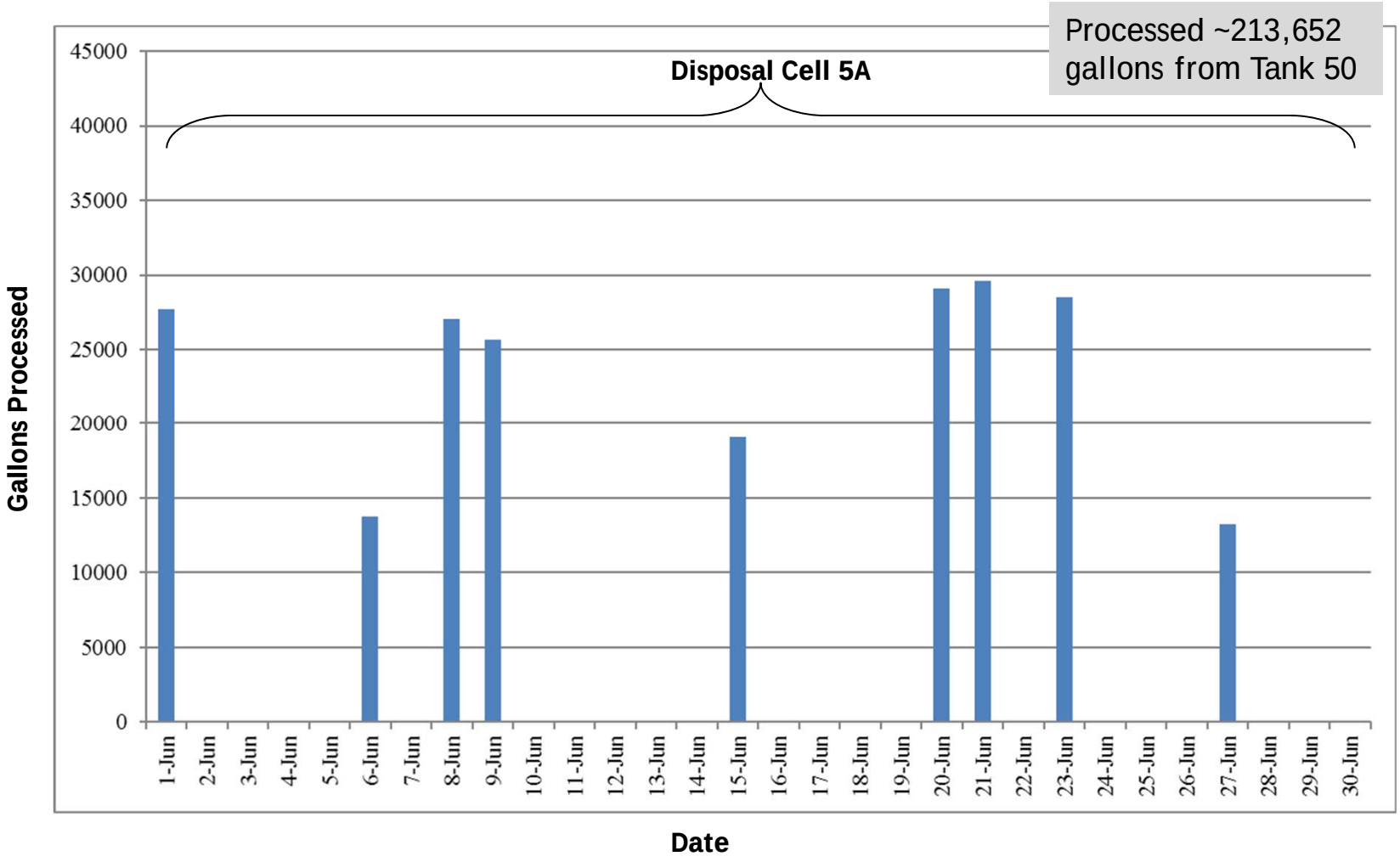
# Operational Status: SPF Operations 5/2016

## Salt Solution Processed



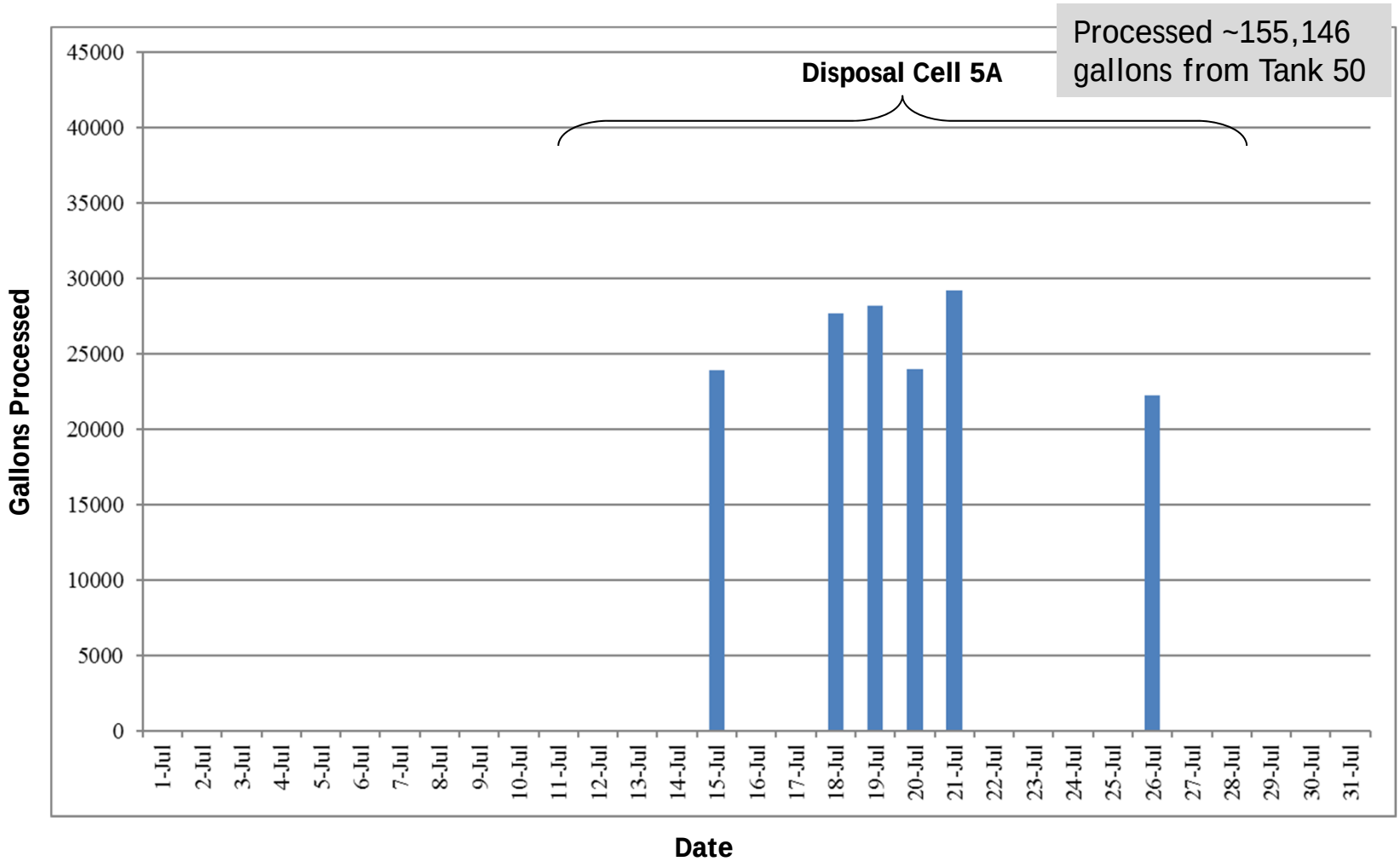
# Operational Status: SPF Operations 6/2016

## Salt Solution Processed



# Operational Status: SPF Operations 7/2016

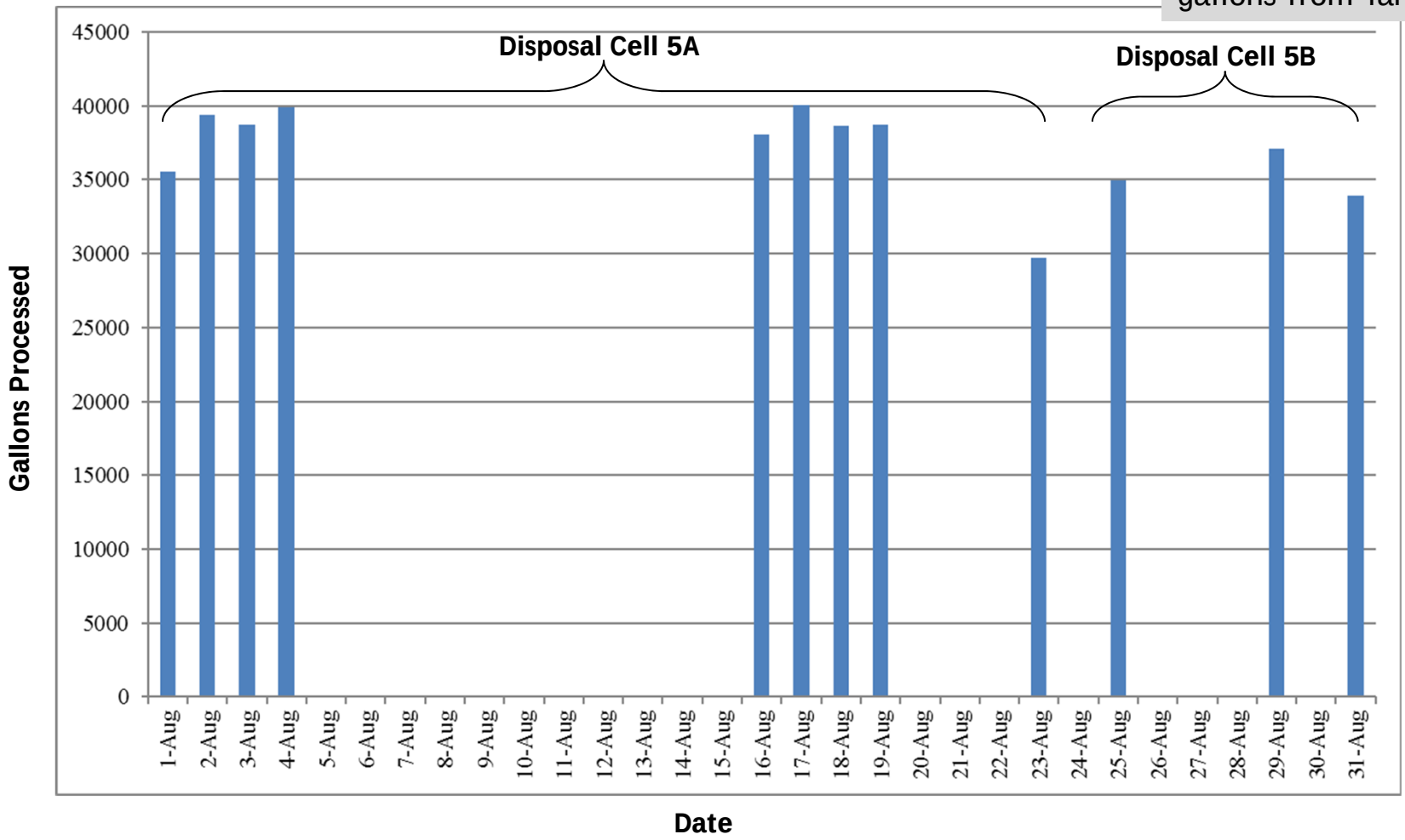
## Salt Solution Processed



# Operational Status: SPF Operations 8/2016

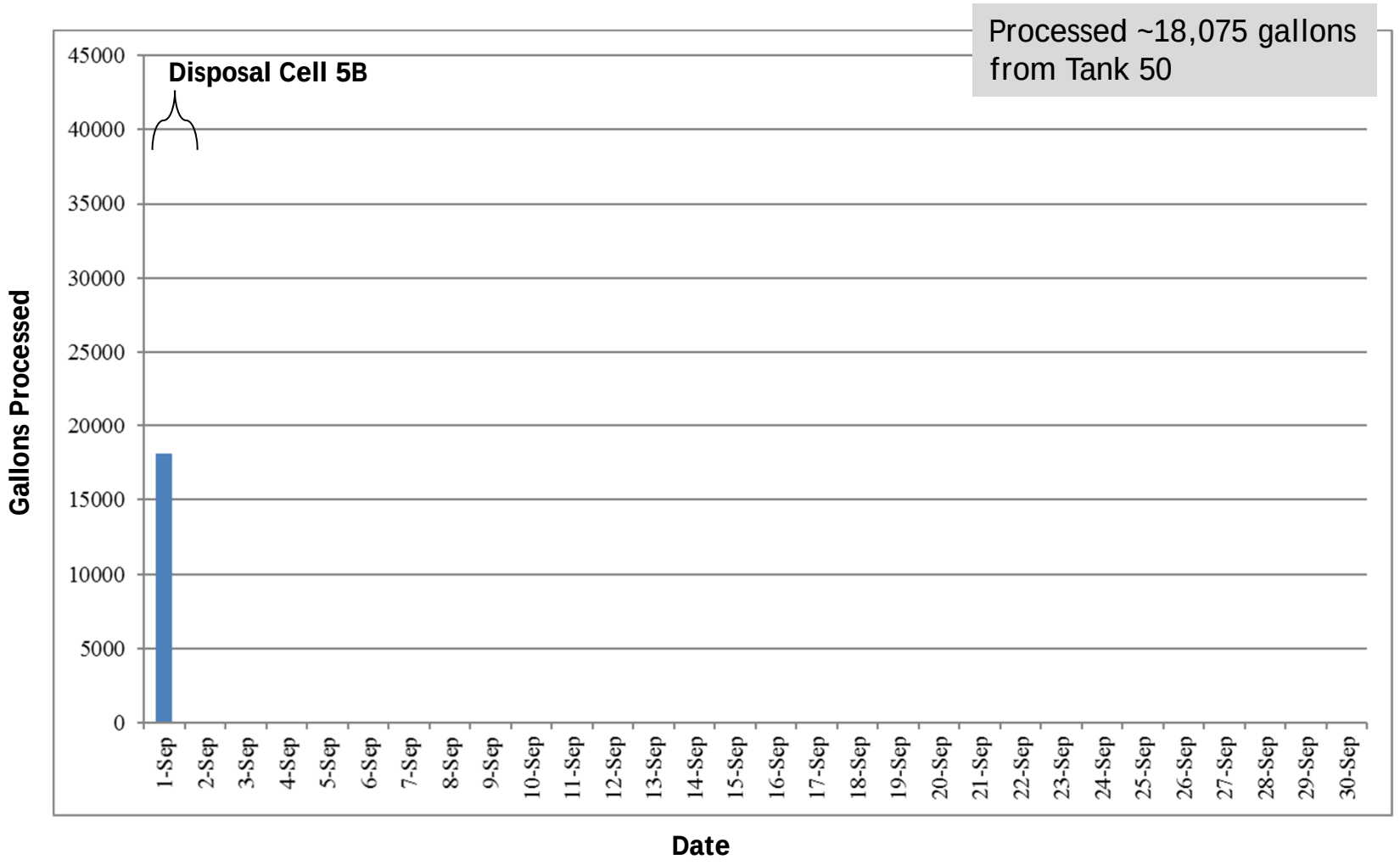
## Salt Solution Processed

Processed ~444,932 gallons from Tank 50



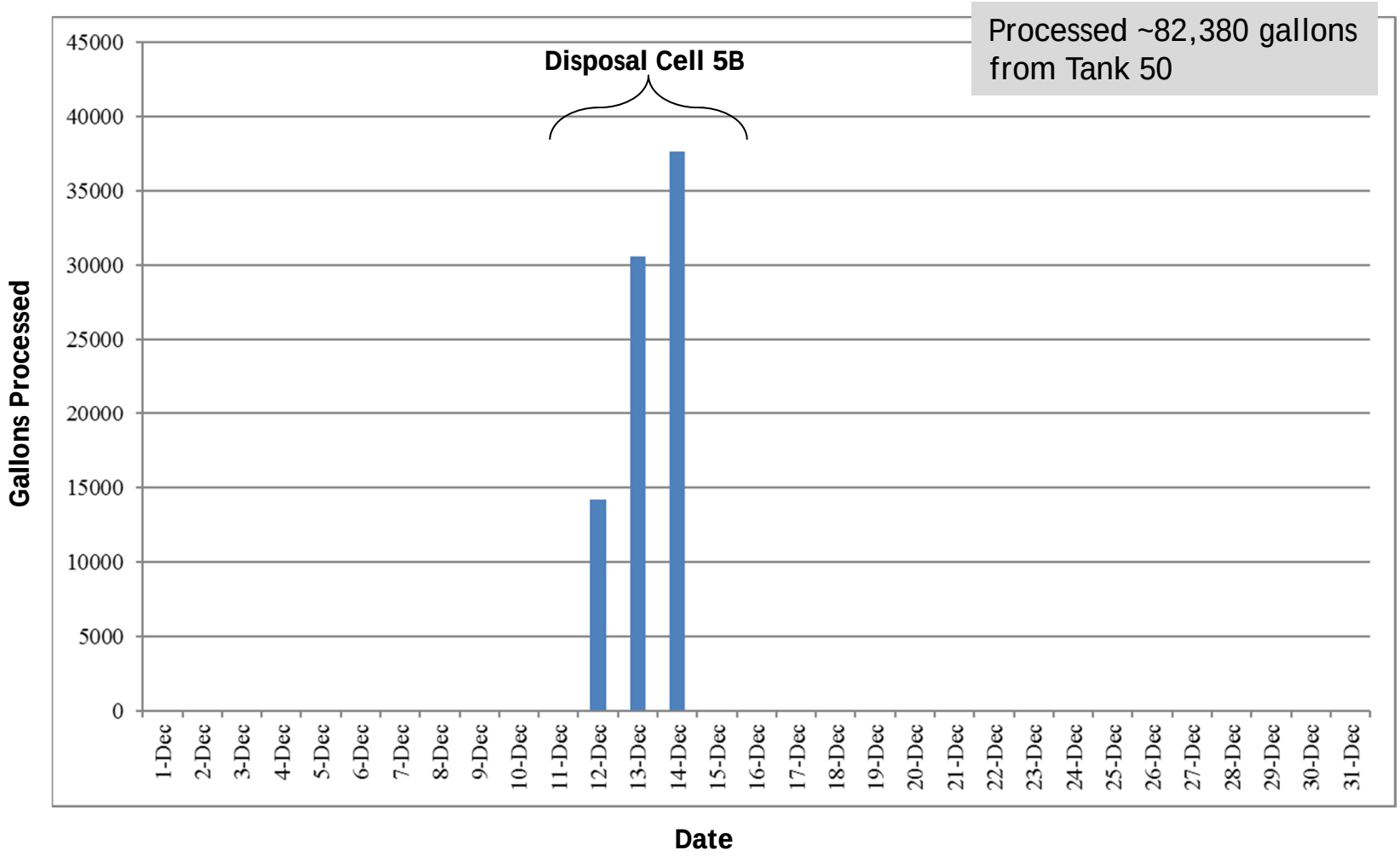
# Operational Status: SPF Operations 9/2016

## Salt Solution Processed



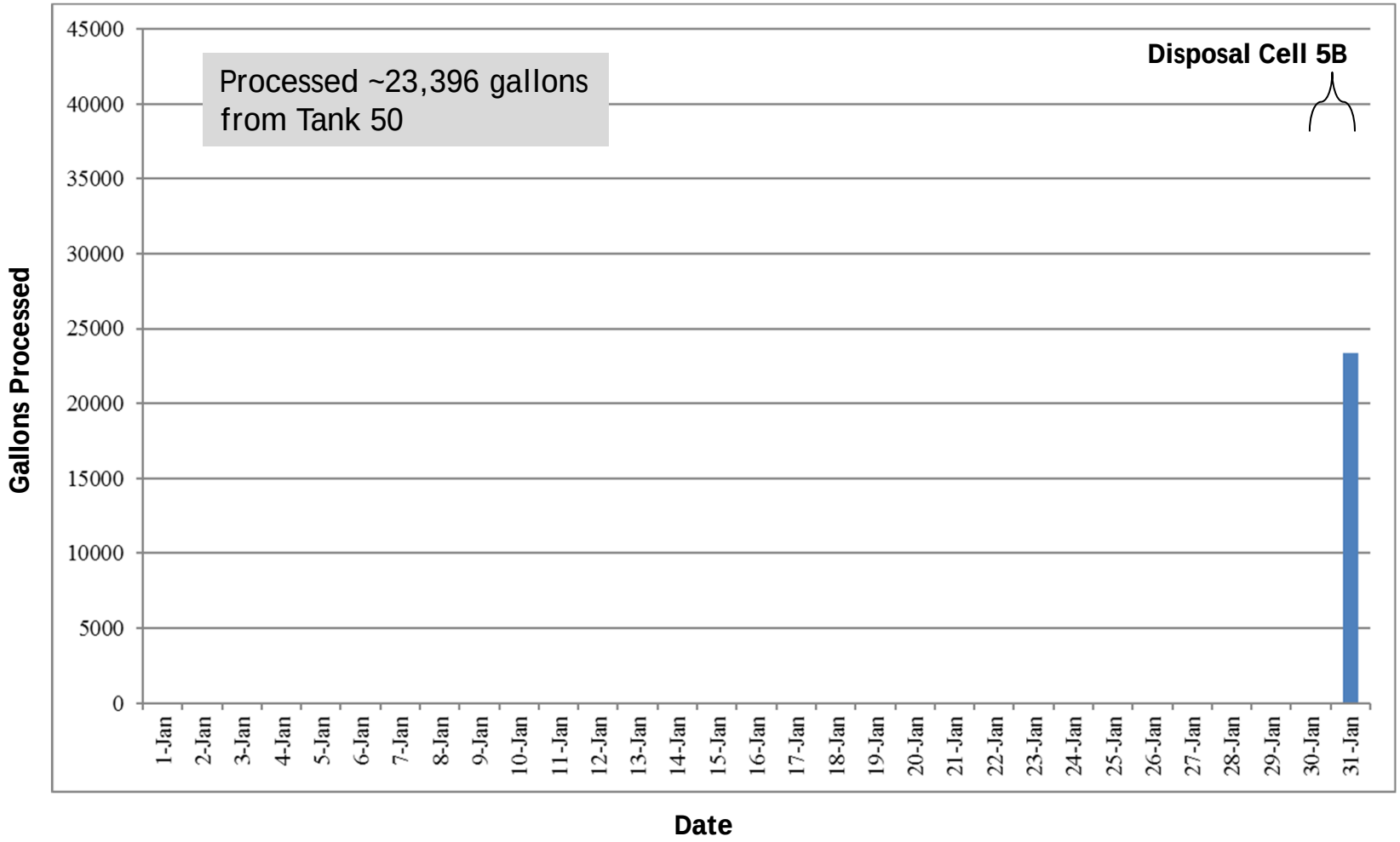
# Operational Status: SPF Operations 12/2016

## Salt Solution Processed



# Operational Status: SPF Operations 1/2017

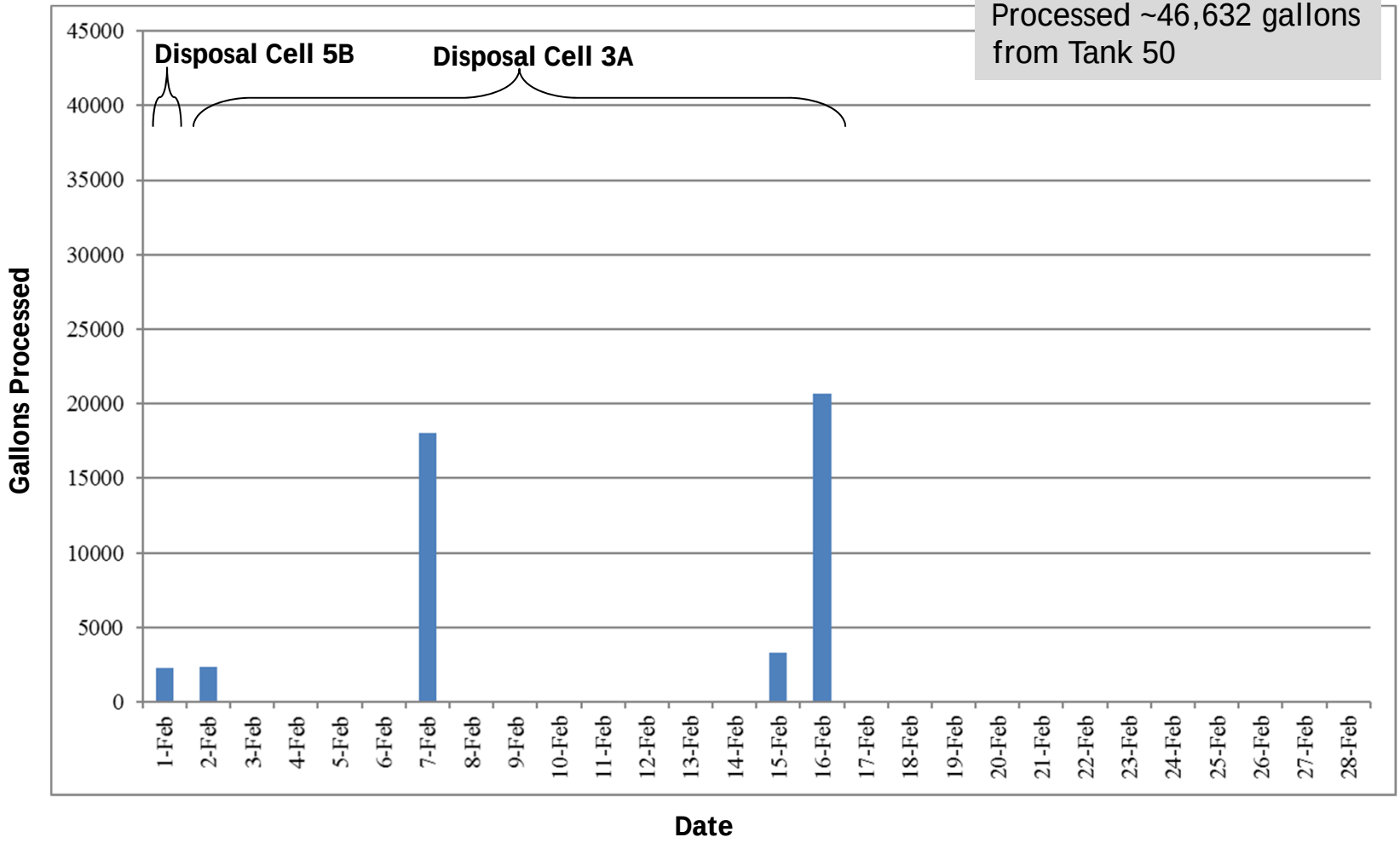
## Salt Solution Processed



# Operational Status: SPF Operations 2/2017

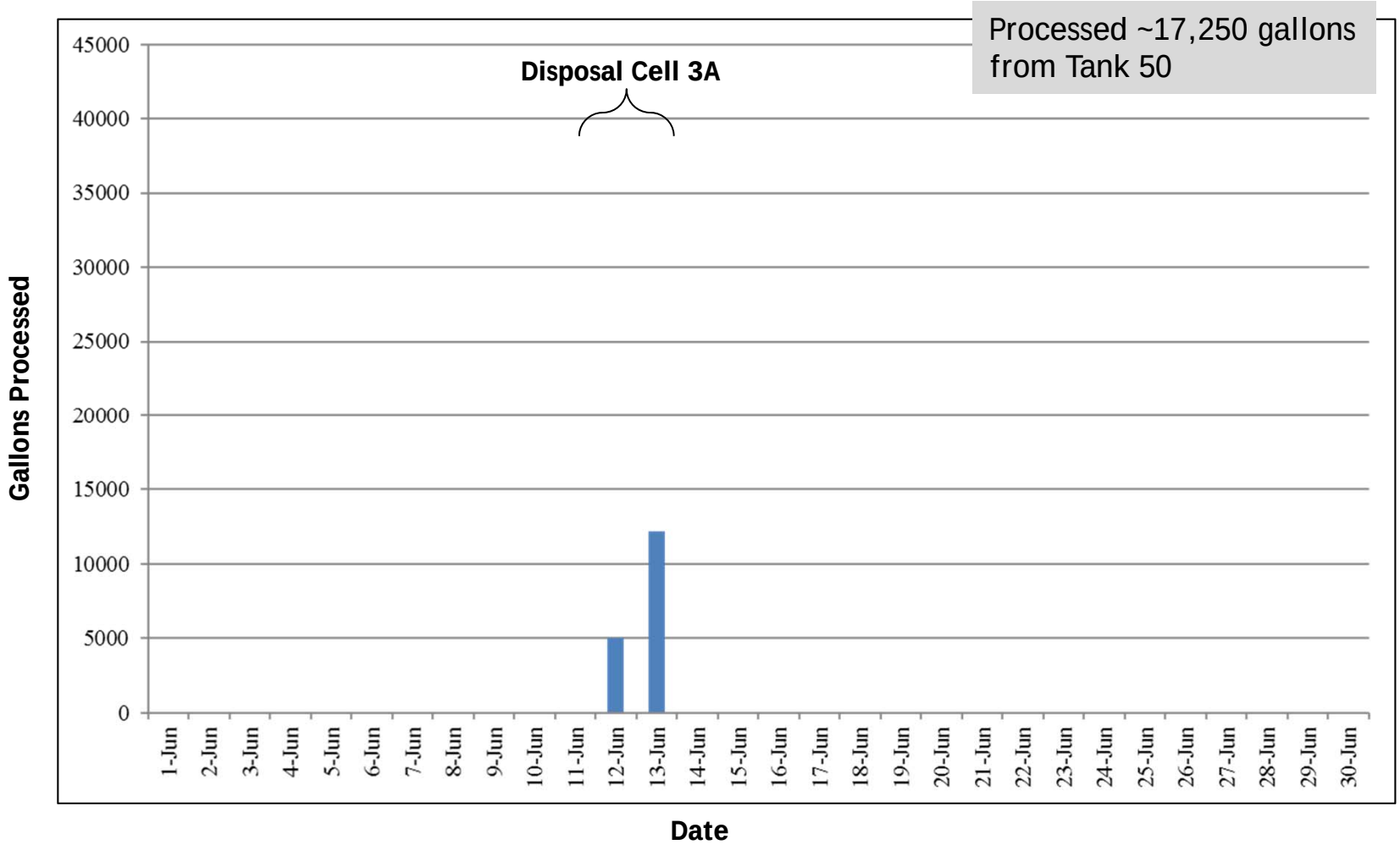
## Salt Solution Processed

Processed ~46,632 gallons from Tank 50



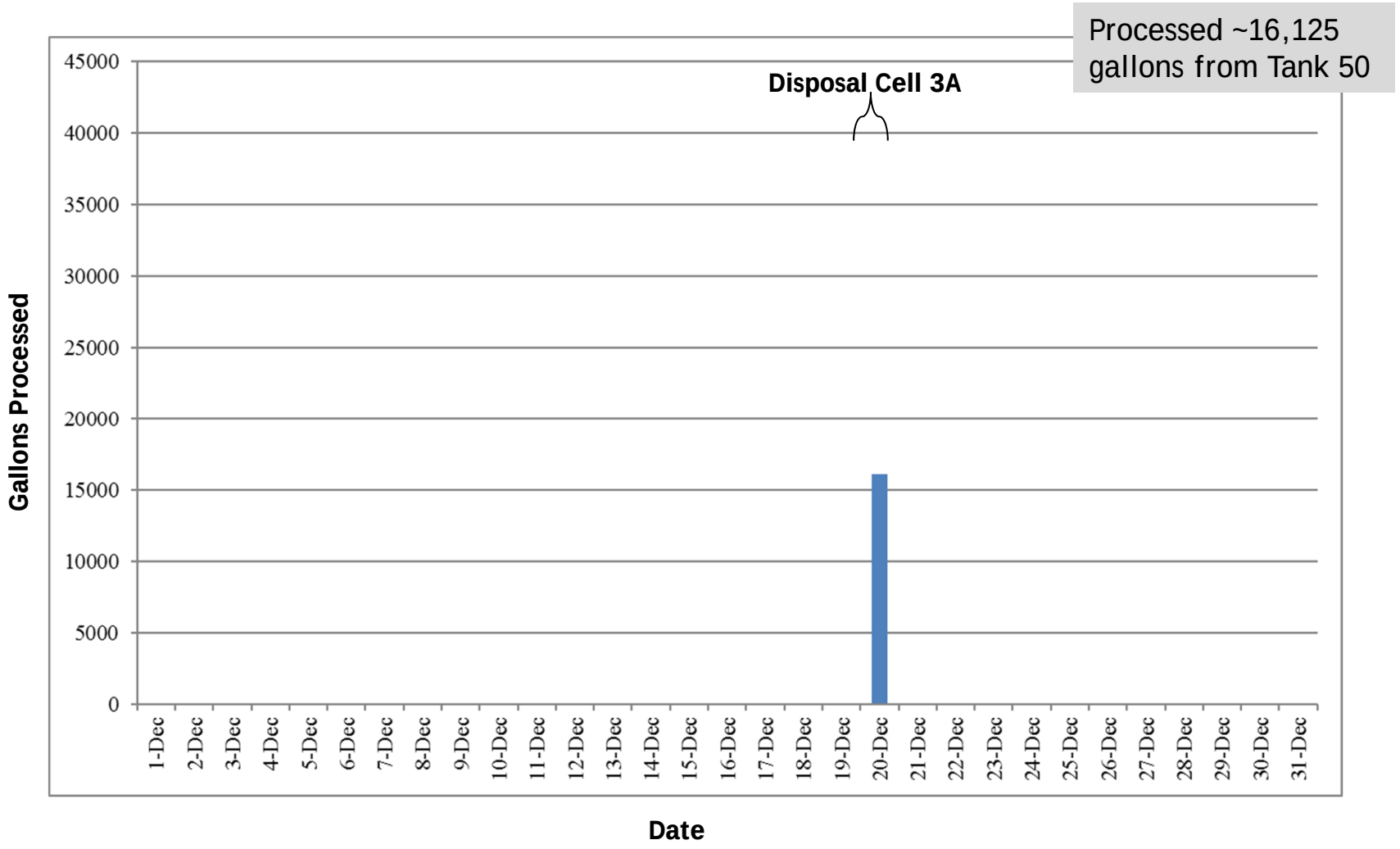
# Operational Status: SPF Operations 6/2017

## Salt Solution Processed



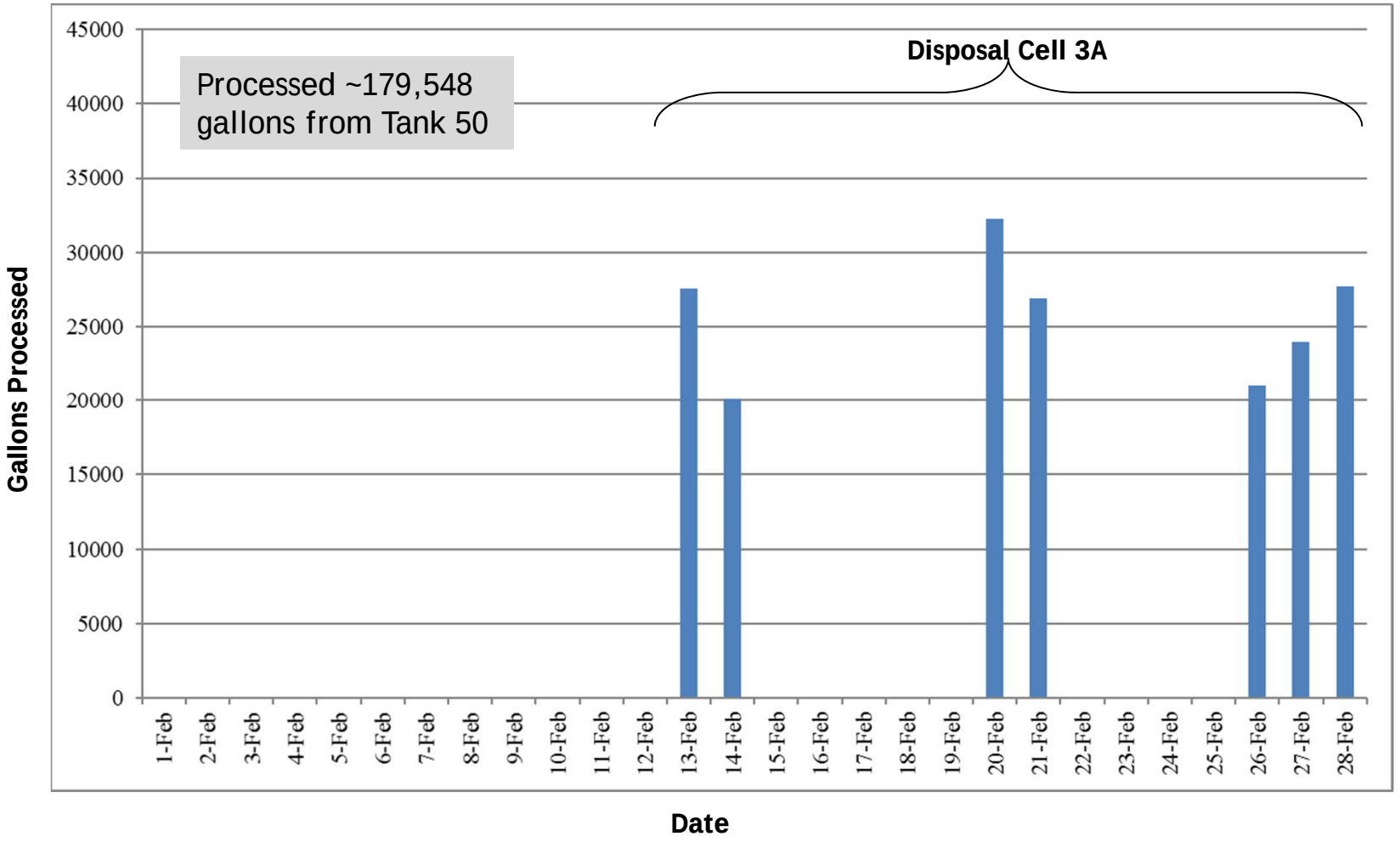
# Operational Status: SPF Operations 12/2017

## Salt Solution Processed



# Operational Status: SPF Operations 2/2018

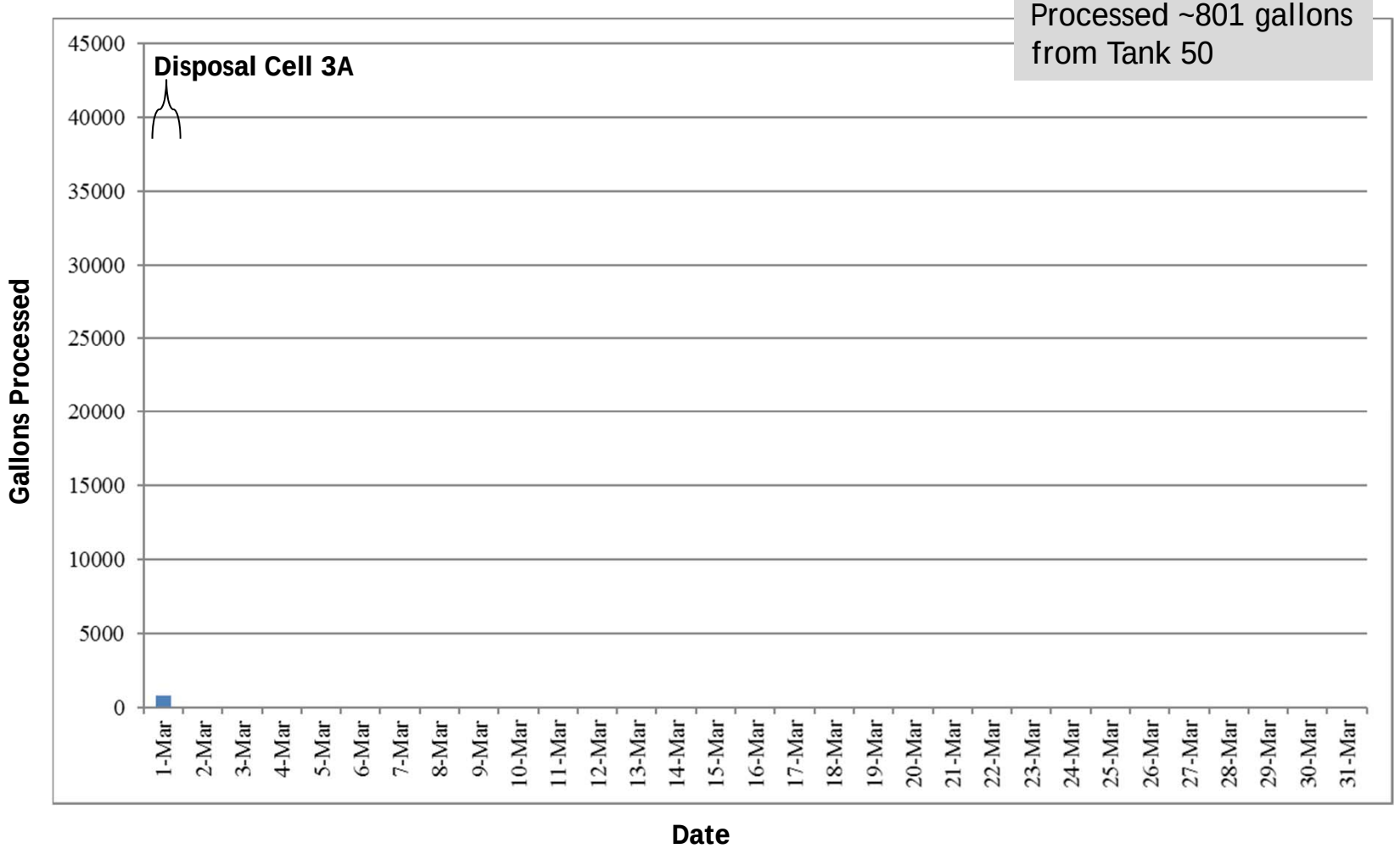
## Salt Solution Processed



# Operational Status: SPF Operations 3/2018

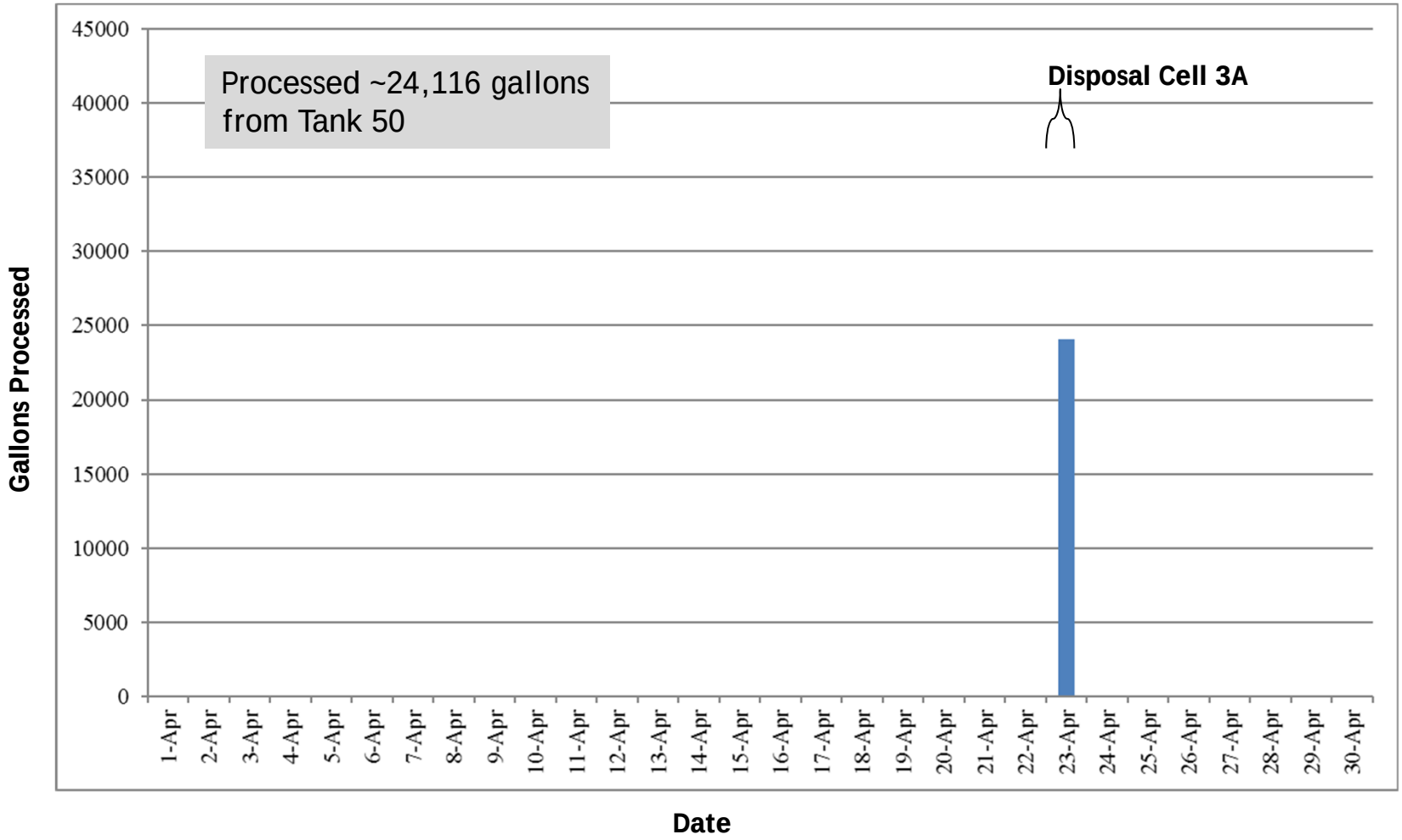
## Salt Solution Processed

Processed ~801 gallons from Tank 50



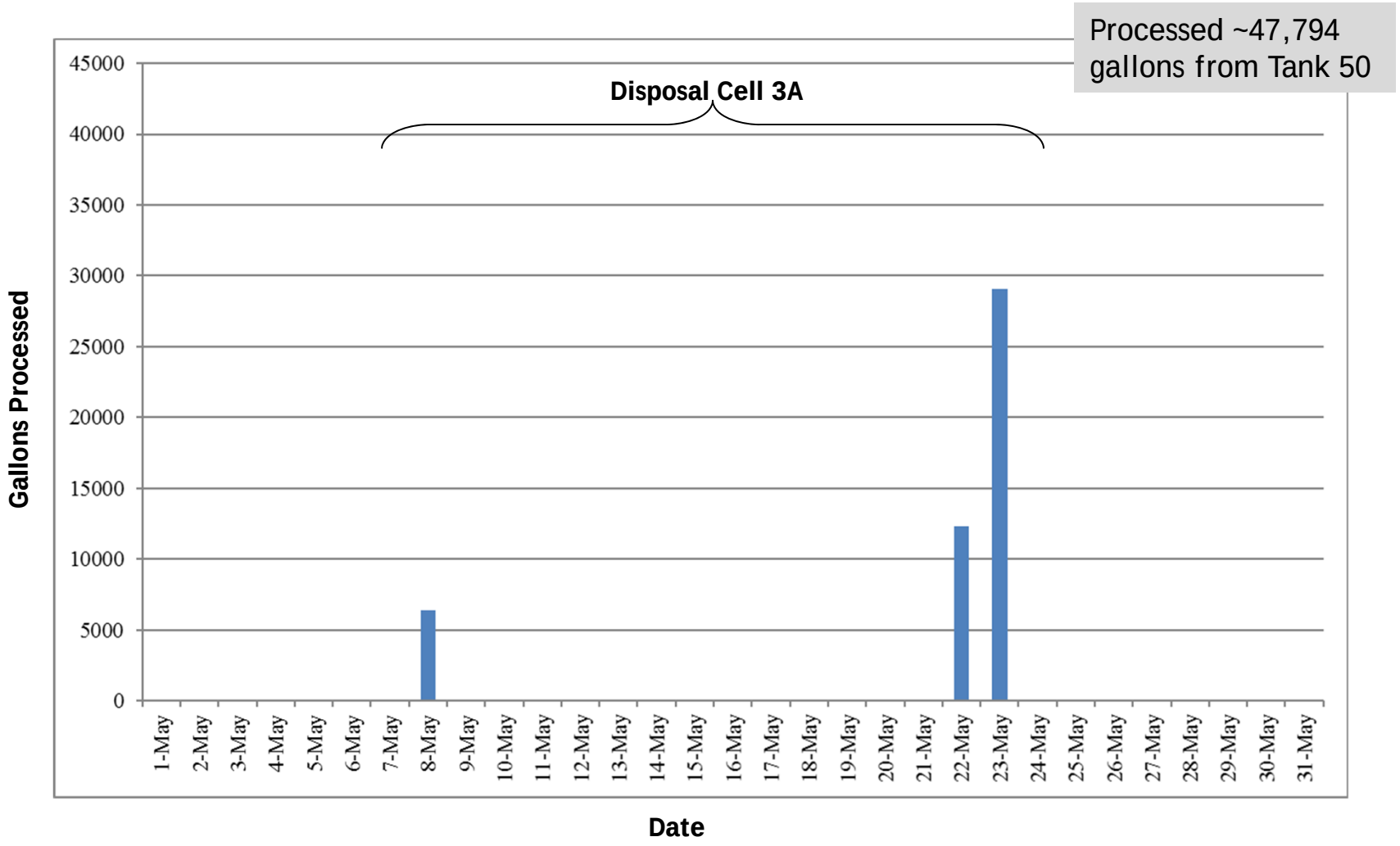
# Operational Status: SPF Operations 4/2018

## Salt Solution Processed



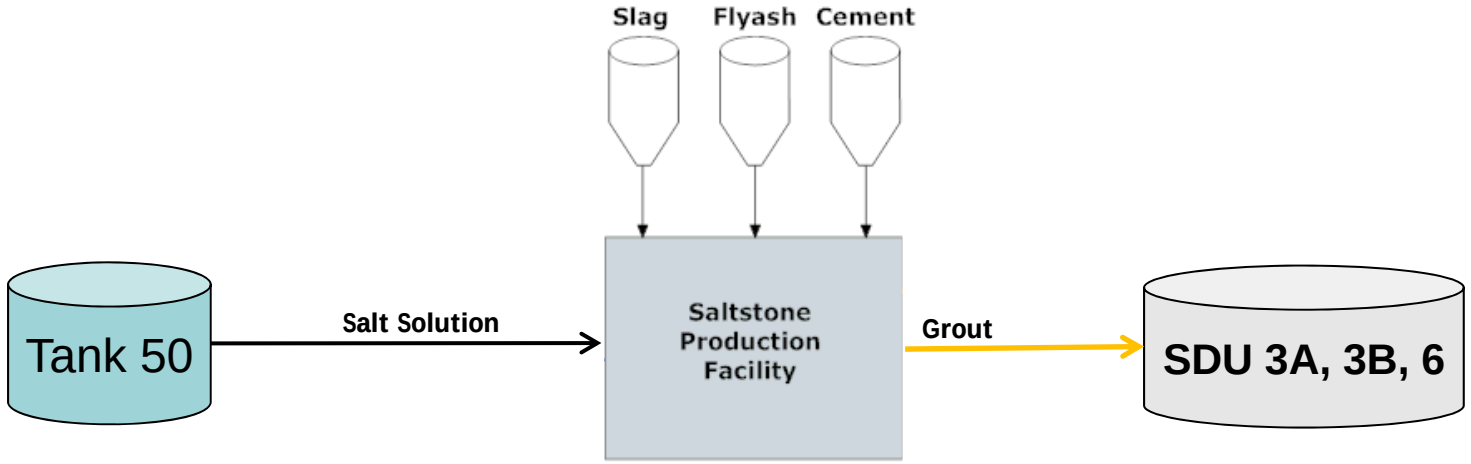
# Operational Status: SPF Operations 5/2018

## Salt Solution Processed



# Operational Status: Current SPF Operations

As of 6/30/2018




## Current Status

- Plant in planned outage for Tank 50 Valve Box valve repair
- ~275,000 gallons of salt solution currently available for processing
- ARP/MCU processing Salt Batch 10

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

space available for ~4.9 million gallons of grout in SDU 3 and ~32.8 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.

# Disposal Unit Status: SDU 2

## SDU 2 Status

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

# Disposal Unit Status: SDU 5

## SDU 5 Status

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

# Disposal Unit Status: SDU 3

## SDU 3 Status

As of 6/30/2018

- **Cell 3A began receiving Saltstone 2/2017**
  - Cell 3A has received a total of ~0.7 million gallons of grout @ grout height ~5.25 feet)
- **Cell 3B has not received grout**
- **Total remaining space for grout**
  - ~4.9 million gallons @

    ~2.8 million gallons per empty cell*


* 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.

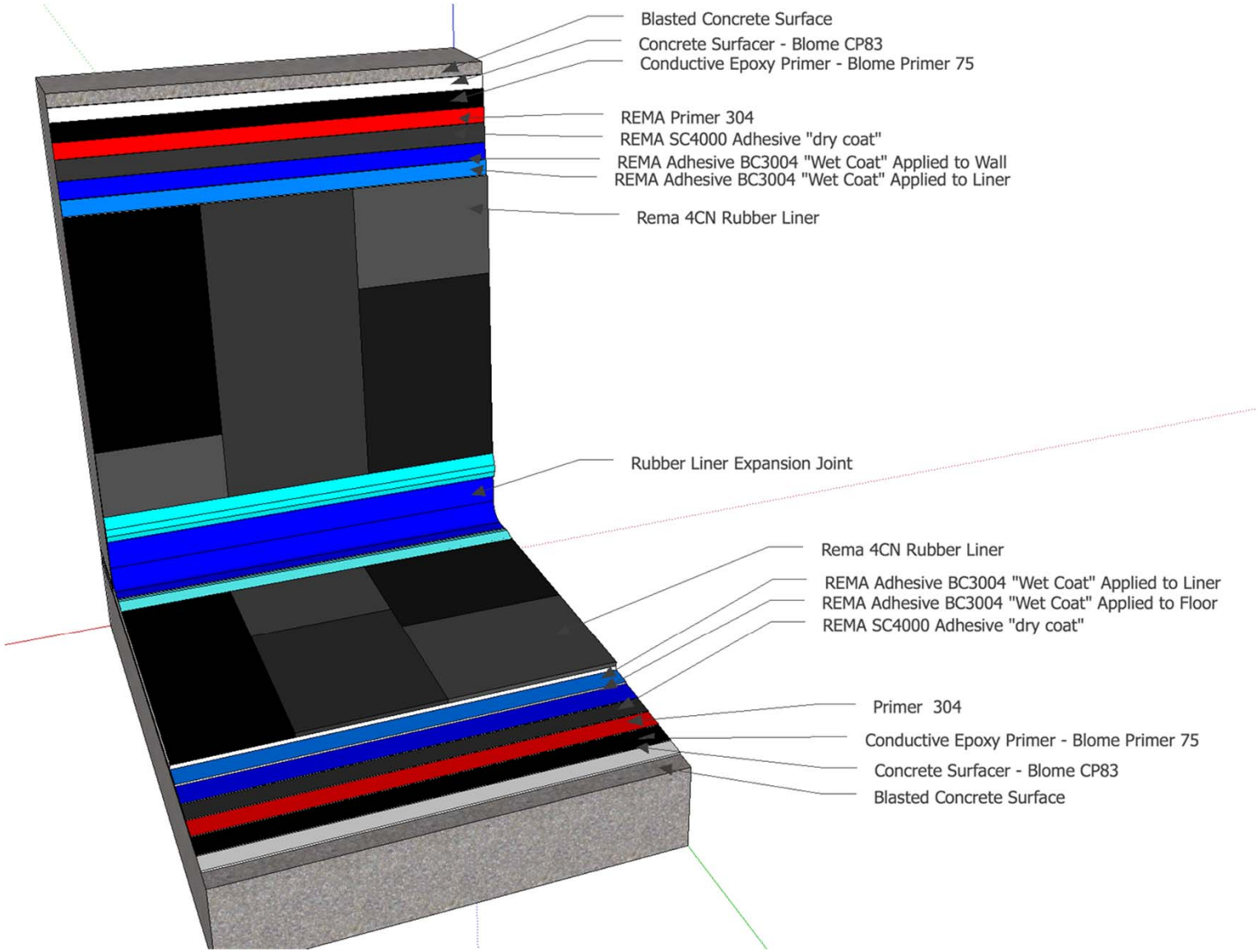
# Disposal Unit Status: SDU 6

## SDU 6 Status

- **Initial leak check 11/2015 not acceptable**
- **Systems Engineering Evaluation 2/2016-3/2016**
- **Interior Liner System Evaluation/Installation 4/2016-12/2016**
- **Leak check 12/2016 acceptable**
- **Clean Cap Run 3/2017**
- **Project Completed 7/2017**
- **Anticipate routine pouring 3Q/2018**
- **Total remaining space for grout**
  - ~32.8 million gallons*

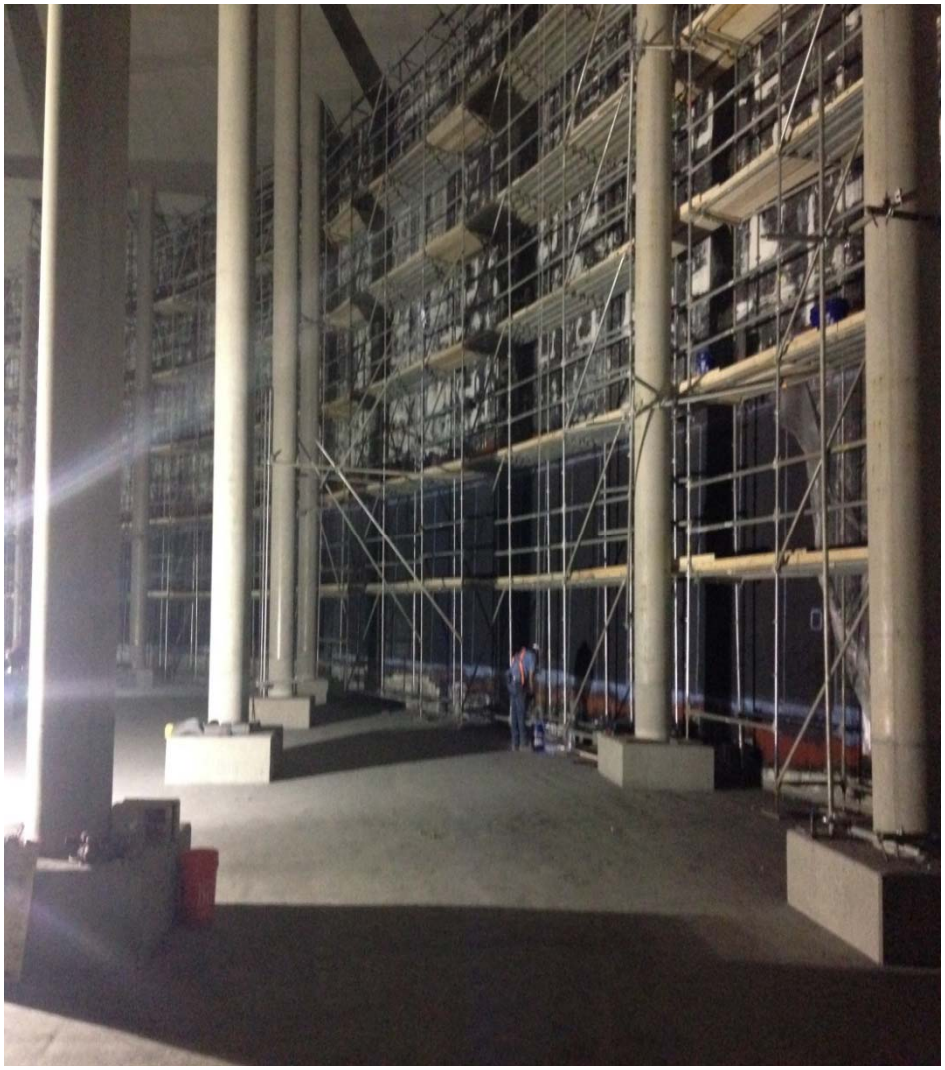
* This volume represents the total capacity based on an SDU 6 fill height of 41 feet. The fill height for SDU 6 is currently limited to a lower value as a result of a Potential Inadequacy of the Safety Analysis (PISA) regarding the effects of organics on hydrogen generation rates within Liquid Waste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

# Liner System



# SDU 6: Preparing for Liner Installation

# SDU 6:Liner Installation in Progress

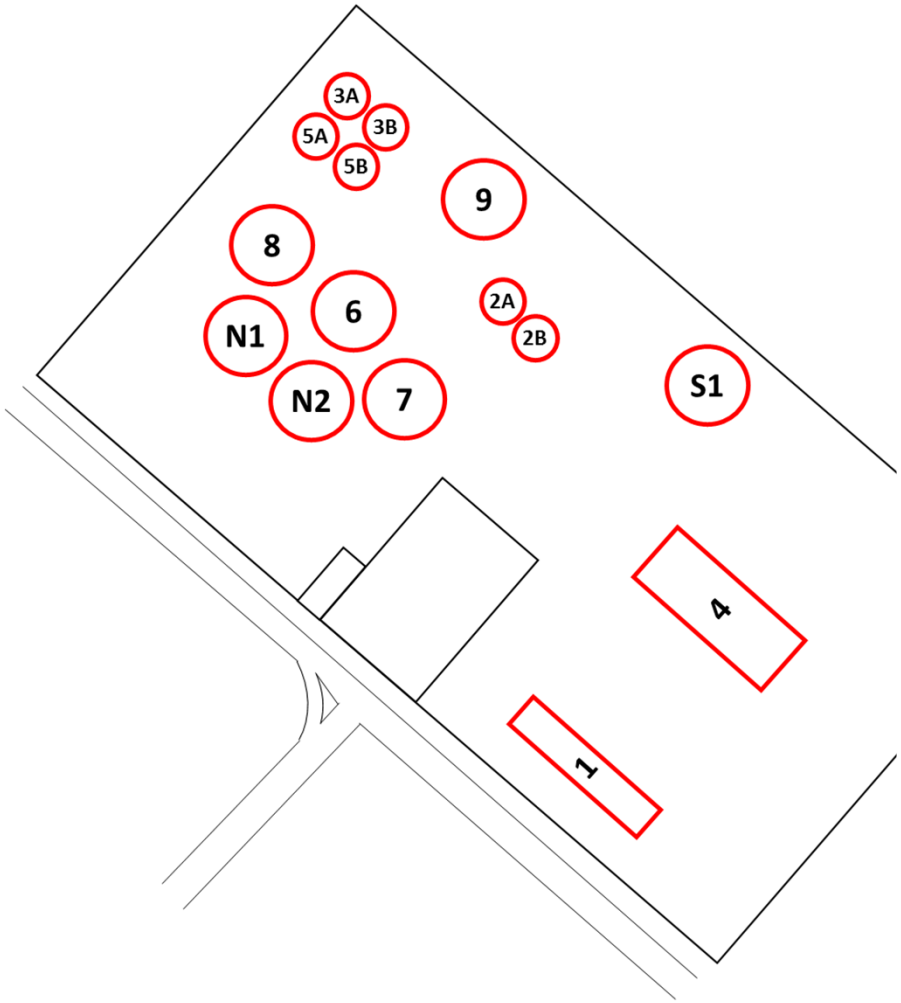


# SDU 6: Liner Installed

# Disposal Unit Status: Future SDUs

## SDU Status

- **SDU 7**
  - Excavation in-process
  - HDPE Subcontract awarded
  - Cell Vendors preparing proposals
- **SDU 8-9**
  - Conceptual Design Report complete
- **SDU 10-12**
  - Conceptual Design Report in-process

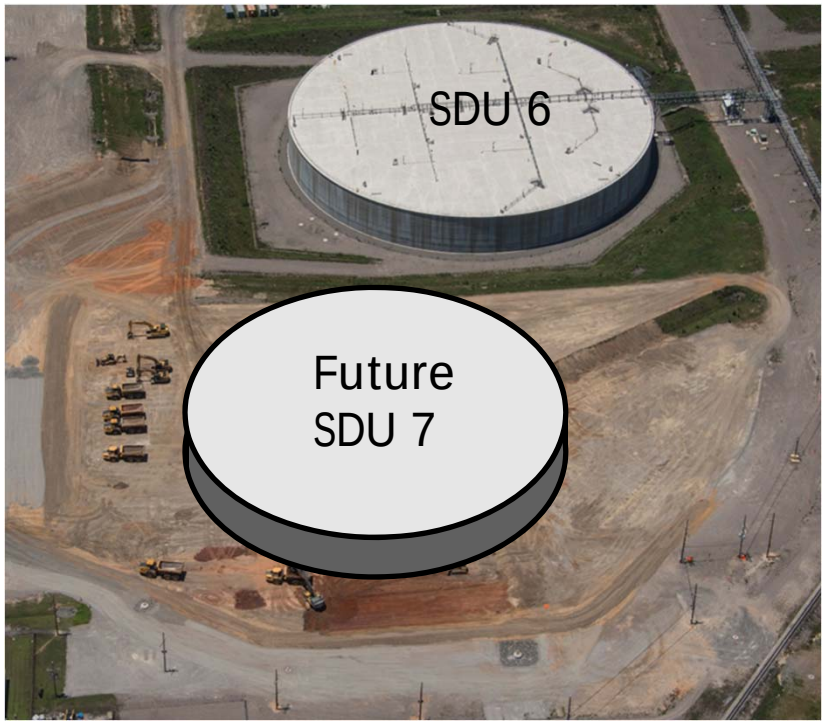



HDPE – High Density Polyethylene

# Disposal Unit Status: SDU 7

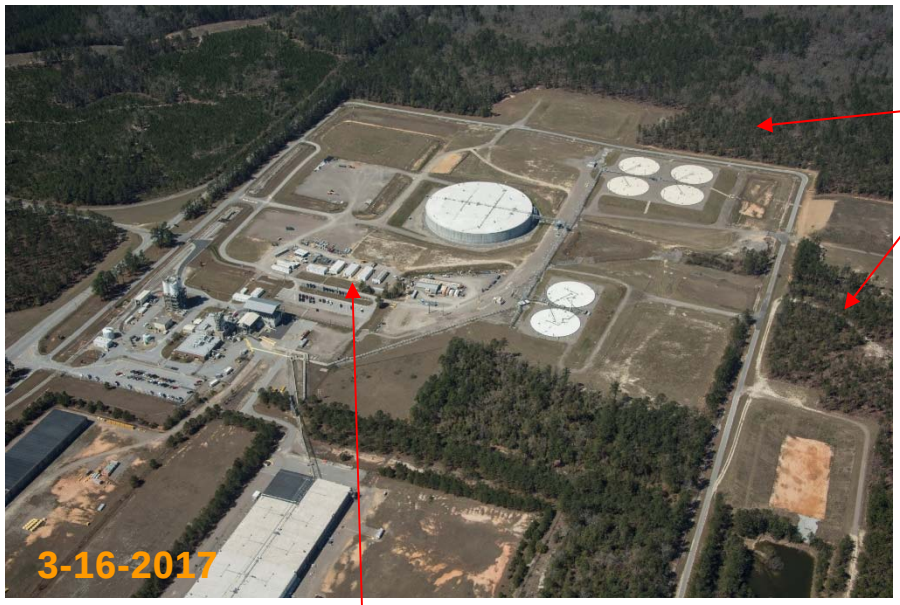
## SDU 7 Status

- **Excavation Initiated 6/2018**
- **Install Lower Mud Mat, GCL & HDPE Beginning 3Q/2018**
- **Initiate Cell construction 4Q/2018**




HDPE – High Density Polyethylene
GCL – Geosynthetic Clay Liner

# SDU 7 Preparation




Clearing/Grading for new spoils piles

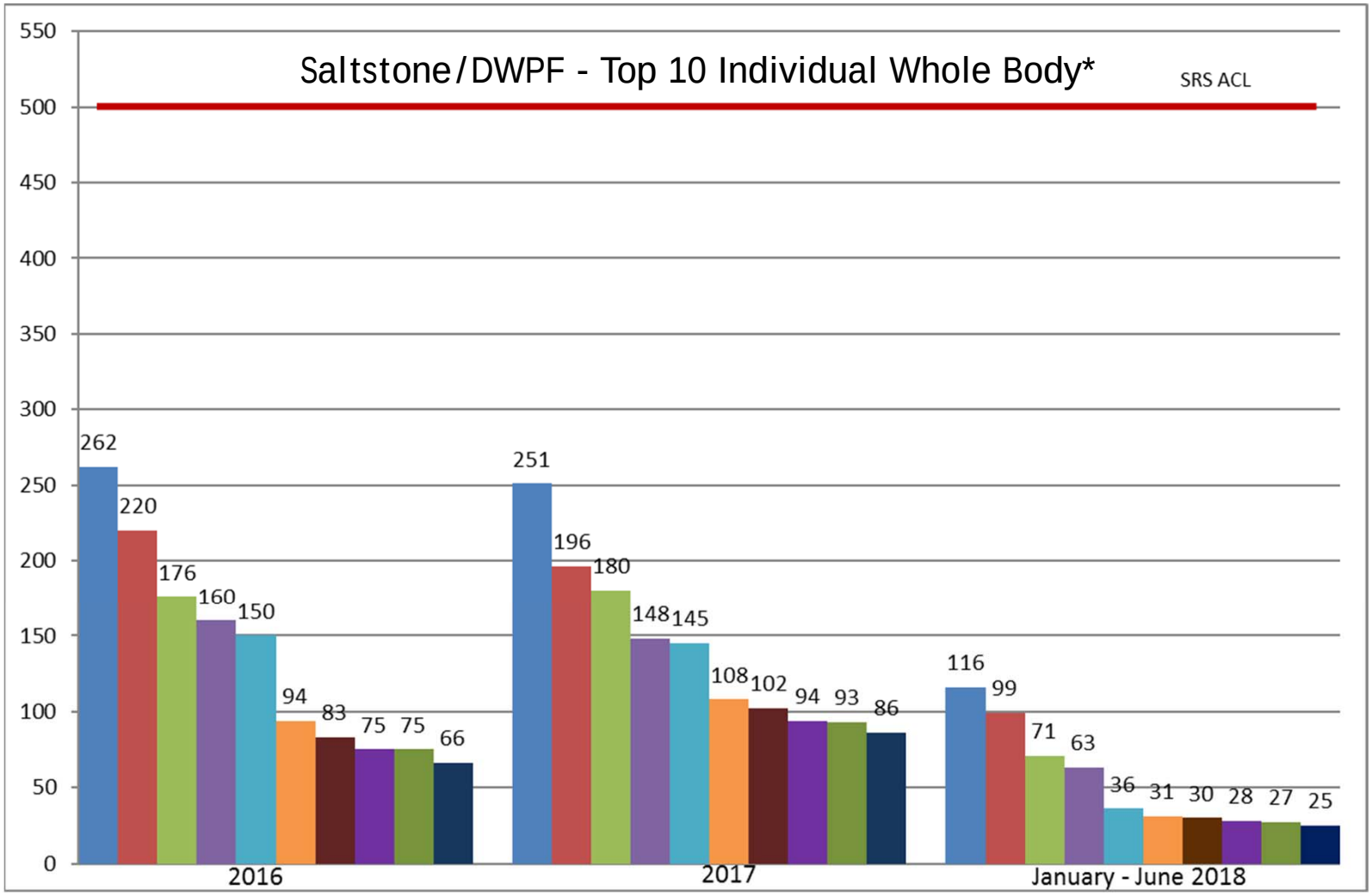
New Basin for SDU Construction

Construction Trailers Removed/Relocated

# Radiological Exposure

- **DOE and 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 SRS ACLs**

# Radiological Exposure




*Merged DWPF and Saltstone Staff in October 2013

# Routine Document List

| Topical Area | Document | Approximate Availability/Frequency |
|---|---|---|
| Groundwater | * SDF Annual Groundwater Report<br>* SDF Midyear-Groundwater Report<br>* SDF Performance Assessment Annual Review<br>* SRS Annual Environmental Report | January<br>July<br>March<br>September |
| Air Monitoring | * SRS Annual Environmental Report | September |
| Inventory | * SDF Performance Assessment Annual Review and Key Supporting Inventory References<br>* Saltstone Permit Website Reporting Data (http://sro.srs.gov/saltstone.htm)<br>*Salt Batch Qualification Reports#<br>* Tank 50 WAC Sample Analysis | March<br>Quarterly<br>As-Issued<br>Quarterly |
| Performance Assessment Maintenance | * SRS Liquid Waste Facilities Performance Assessment Maintenance Annual Implementation Plan<br>*SDF Performance Assessment Annual Review (includes the following):<br>-Inventory<br>-Unreviewed Waste Management Question Evaluations Performed<br>-Research and Development Performed<br>-Research and Development Planned | March<br>March |
| Research and Development Testing/Studies | Various Reports | As-issued (Typically, September through December) |

*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.*

2016 Summary

SRNS-TR-2016-00110 (Midyear 2016)
SRNS-TR-2016-00312 (Annual 2016)

***

(2015 Environmental Report)
http://www.srs.gov/general/pubs/ERsum/er15/index.html

***

SRR-CWDA-2016-00113 (FY2016)
SRR-CWDA-2016-00111 (FY2016 Inventory)

http://sro.srs.gov/saltstone.**html**

SRNL-L3100-2016-00069 (1Q-2016)
SRNL-L3100-2016-00124 (2Q-2016)
SRNL-L3100-2016-00173 (3Q-2016)
SRNL-L3100-2016-00229 (4Q-2016)

SRR-CWDA-2015-00152 (FY2016)

***

SRNL-STI-2009-00473-R1, *Geochemical Data Package for Performance Assessment Calculations Related to the Savannah River Site*
SREL Doc. R-15-0003, *Chemical and Physical Properties of Tc-Spiked Saltstone as Impacted by Curing Duration and Leaching Atmosphere*
SREL Doc. R-16-0003, *Contaminant Leaching from Saltstone*
SRR-CWDA-2016-00051, Property Data for Core Samples Extracted from SDU Cell 2A*Contaminant Leaching from Saltstone*
SRRA021685SR-2016, *Determination of Constituent Concentrations in Field Lysimeter Effluents; FY16 Final Report*

# Routine Document List

| Topical Area | Document | Approximate Availability/Frequency |
|---|---|---|
| Groundwater | * SDF Annual Groundwater Report<br>* SDF Midyear-Groundwater Report<br>* SDF Performance Assessment Annual Review<br>* SRS Annual Environmental Report | January<br>July<br>March<br>September |
| Air Monitoring | * SRS Annual Environmental Report | September |
| Inventory | * SDF Performance Assessment Annual Review and Key Supporting Inventory References<br>* Saltstone Permit Website Reporting Data (http://sro.srs.gov/saltstone.htm)<br>*Salt Batch Qualification Reports#<br>* Tank 50 WAC Sample Analysis | March<br>Quarterly<br>As-Issued<br>Quarterly |
| Performance Assessment Maintenance | * SRS Liquid Waste Facilities Performance Assessment Maintenance Annual Implementation Plan<br>*SDF Performance Assessment Annual Review (includes the following):<br>-Inventory<br>-Unreviewed Waste Management Question Evaluations Performed<br>-Research and Development Performed<br>-Research and Development Planned | March<br>March |
| Research and Development Testing/Studies | Various Reports | As-issued (Typically, September through December) |

*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.*

2017 Summary

SRNS-TR-2017-00227 (Midyear 2017)
SRNS-TR-2017-00387 (Annual 2017)

***

(2016 Environmental Report)
http://www.srs.gov/general/pubs/ERsum/er16/index.html

SRR-CWDA-2017-00078 (FY2017)
SRR-CWDA-2017-00079 (FY2017 Inventory)

***

http://sro.srs.gov/saltstone.**html**

SRNL-L3100-2017-00033 (1Q-2017)
SRNL-L3100-2017-00076 (2Q-2017)
SRNL-L3100-2017-00116 (3Q-2017)
No Sample taken 4Q-2017

SRR-CWDA-2016-00119 (FY2017)

***

SREL Doc. R-17-0004, *Impacts of Cementitious Material Leachate on Iodine Partitioning*
SREL Doc. R-17-0005, *Contaminant Leaching from Saltstone*
SRR-CWDA-2017-00085, *Dynamic Leaching Method for Intact Saltstone Samples*
SRRA021685-000008, *Determination of Constituent Concentrations in Field Lysimeter Effluents; FY17 Final report*
SRRA021685-000009, *Analysis of Plutonium Soil Concentrations in Field Lysimeter Experiments*

# Status 4/2016 Salt Waste Disposal Visit: Action Items

- **Action Items** **(NRC OOV Report ADAMS #ML16147A197)**
  1. **DOE to provide NRC an electronic copy of presentation material including action items and attendance rosters. [SRR-CWDA-2016-00052, Revision 1]** **Complete**
  2. **DOE to provide NRC the following documents** **[NRC AI # SDF-CY-16-01-001] Complete**
     - *Annual Review Saltstone Disposal Facility (Z Area) Performance Assessment* [SRR-CWDA-2015-00163]
     - *Results for the First, Second, and Third Quarter Calendar Year 2015 Tank 50H WAC Slurry Samples* [SRNL-STI-2015-00313]
     - *Results for the Fourth Quarter Calendar Year 2015 Tank 50H Salt Solution Sample* [SRNL-L3100-2015-00227]
  3. **DOE to provide NRC an electronic copy of presentation** *Research Results/Status- Savannah River Site Salt Waste Disposal NRC Onsite Observation Visit April 21, 2016*. **[SRR-CWDA-2016-00053, Revision 1]** **[NRC AI # SDF-CY-16-01-002] Complete**

# Status 4/2016 Salt Waste Disposal Visit: Action Items

- **Action Items**

4. **DOE to provide NRC with SDU 6 settlement marker elevation data.** [NRC AI # SDF-CY-16-01-005] Complete: K-ESR-Z-00006
5. **DOE to provide NRC pictures of SDU 6 from SDF Tour and pictures from the SREL tour.** [NRC AI # SDF-CY-16-01-006] Complete: Slides 77-83 of SRR-CWDA-2016-00052 Rev. 1
6. **DOE to provide NRC an electronic copy of document VSL report VSL15R3740-1.** [NRC AI # SDF-CY-16-01-003] Complete
7. **DOE to provide NRC a revised version of CAB slide "Saltstone Timeline" with the addition of timing for leaking of SDU 4 Cell G and clean-up of material.** [NRC AI # SDF-CY-16-01-007] Complete: Slide 84 of SRR-CWDA-2016-00052 Rev. 1
8. **DOE to provide NRC a reference document showing locations of the 2014 DPT locations adjacent to SDU 4.** [NRC AI # SDF-CY-16-01-008] Complete: Slide 85 of SRR-CWDA-2016-00052 Rev. 1
9. **DOE to provide NRC the USGS Regional Groundwater Model covering CSRA/SRS.** [NRC AI # SDF-CY-16-01-009] Complete: WRIR-98-4062 available at http://pubs.usgs.gov/wri/wri98-4062

# Status 4/2016 Salt Waste Disposal Visit: Action Items

- **Action Items**

10. **DOE to provide NRC a copy of the existing report on E-Area closure cap impact on groundwater.** **[NRC AI # SDF-CY-16-01-010] Complete: SRT-EST-98-154**
11. **DOE to provide NRC a copy of Z-Area slides provided by G. Flach during Far Field RAI discussions.** **[NRC AI # SDF-CY-16-01-011] Complete: Slides 86-90 of SRR-CWDA-2016-00052 Rev. 1**
12. **DOE to provide NRC plots for specific time periods related to DSP-11.** **[NRC AI # SDF-CY-16-01-012] Complete: SRR-CWDA-2016-00060**
    - 0; 5,000; 10,000 &20,000 years
    - Include close-ups for top of disposal units/saltstone (cylindrical units)
13. **DOE to provide NRC a velocity field and cross-section through Z-Area.** **[NRC AI # SDF-CY-16-01-013]**
14. **DOE to provide NRC clarification of "HDPE/GCL Degradation" within DSP-8 and provide an update to Figure 4.2-42 (pg 217 of the SDF PA)** **[NRC AI # SDF-CY-16-01-016] Complete: SRR-CWDA-2016-00060**

# Status 4/2016 Salt Waste Disposal Visit: Action Items

- **Action Items**

15. **DOE to provide NRC a chart showing Ra-226 levels corresponding to Figure 2.1-8 in SRR-CWDA-2014-00095.** [NRC AI # SDF-CY-16-01-017] Complete: SRR-CWDA-2016-00060
16. **DOE to provide NRC information on which parameters fall under the sixth bullet in RAI Response CC-2.** [NRC AI # SDF-CY-16-01-018] Complete: SRR-CWDA-2016-00060
17. **DOE to provide NRC information on what radionuclides are driving doses in realizations shown in Figure 6.5-1 of the SDF FY2014 Special Analysis for doses > 500.** [NRC AI # SDF-CY-16-01-019] Complete: SRR-CWDA-2016-00060
18. **DOE to provide additional information explaining impact of reducing capacity (most conservative value) on figures in SP-2 vs. SP-8.** [NRC AI # SDF-CY-16-01-020] Complete: SRR-CWDA-2016-00060
19. **DOE to investigate if any additional information is available regarding oxygen levels in soil and provide to NRC.** [NRC AI # SDF-CY-16-01-021] Complete: SRR-CWDA-2016-00060

# Status 4/2016 Salt Waste Disposal Visit: Action Items

- **Action Items**

20. **DOE to provide NRC a sensitivity analysis for selenium Kd in Far Field (i.e., SP-11 including Far Field selenium Kd) (DSP-9, FFT-5).** [NRC AI # SDF-CY-16-01-022] Complete: SRR-CWDA-2016-00060
21. **DOE to provide NRC additional information on the basis of cement leachate factors from SRNL-STI-2009-00473.** [NRC AI # SDF-CY-16-01-023] Complete: SRR-STI-2009-00473 Revision 1
22. **DOE to provide NRC a copy of the SDU 2A Core analysis report when available.** [NRC AI # SDF-CY-16-01-014] Complete: SRR-CWDA-2016-00051 & SRNL-STI-2016-00106
23. **DOE to provide NRC results of vault concrete testing (SIMCO & SRS) when available.** [NRC AI # SDF-CY-16-01-015] Complete: SREL Doc No R-17-0002
24. **DOE to provide NRC information regarding grinding of blast furnace slag in VSL experiments (VSL15R3740-1).** [NRC AI # SDF-CY-16-01-004] Complete: SRR-CWDA-2016-00060

# Status 1/2017 Salt Waste Disposal Visit: Action Items

- **Action Items** (NRC OOV Report ADAMS #ML17054C453)
  1. DOE to provide NRC an electronic copy of presentation material including action items and attendance rosters. [SRR-CWDA-2017-00007, Revision 1] Complete
  2. DOE to attach any requested pictures from the walk-down, including a time stamp, to Revision 1 of this presentation. [NRC AI # SDF-CY-17-01-001] Complete: slides 12-64 of SRR-CWDA-2017-00007 Rev. 1
  3. DOE to provide a map identifying the locations for the pictures from the walk-down. [NRC AI # SDF-CY-17-01-002]

# Technical Discussion Topics

## Technical Discussions: 07/09/2018 (am)

- **(5) – Discuss the DOE document: SRR-CWDA-2018-00006, Rev. 0, "Conceptual Model Development for the Saltstone Disposal Facility Performance Assessment," May 2018. (ML18143B265)**

  - *Briefing to NRC: FEPs and Conceptual Model for the 2019 SDF PA*, SRR-CWDA-2018-00034

(#) - Activity number from NRC Observation Guidance [ML18155A389]

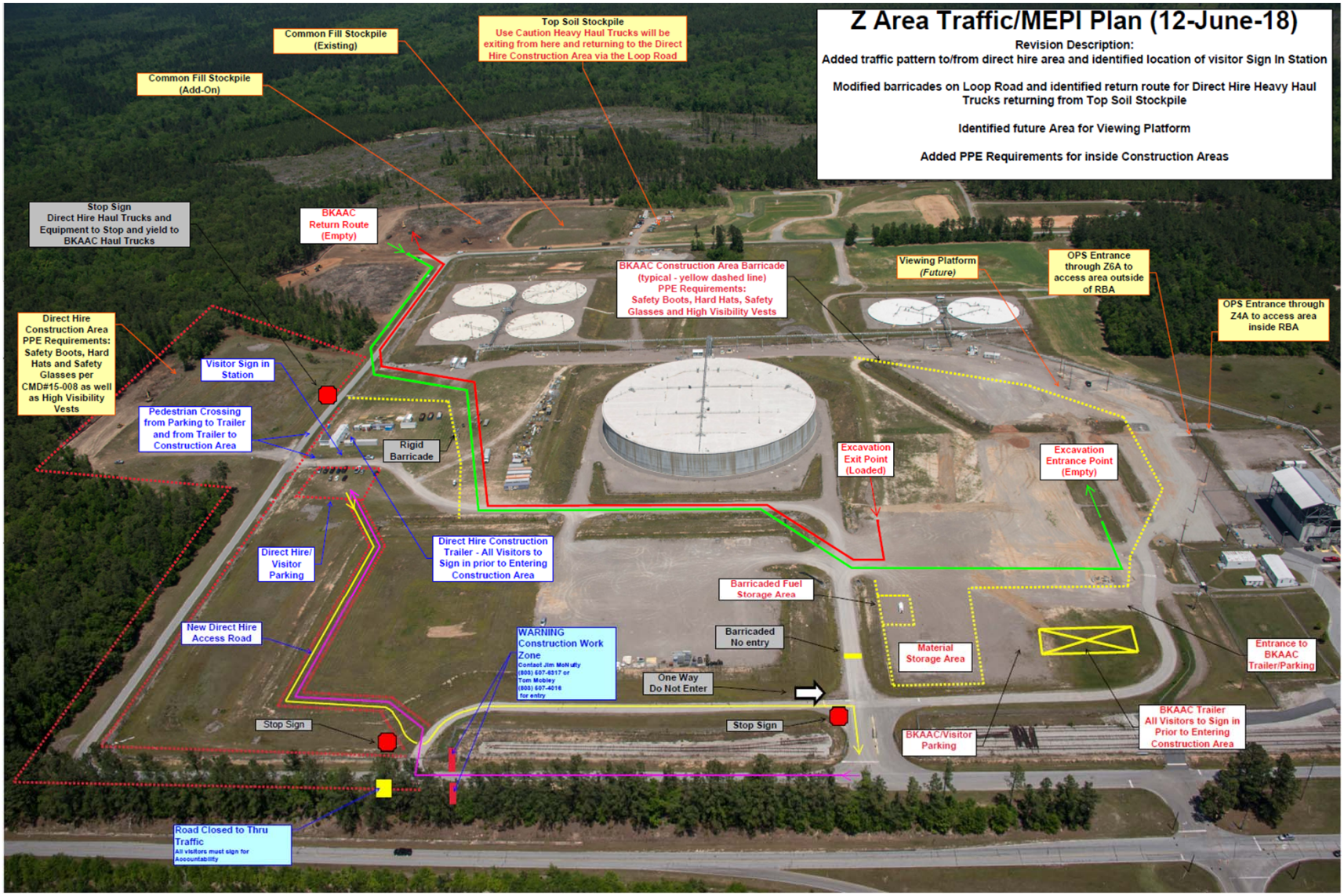
# Saltstone Disposal Facility Field Observation

## Field Observation

- (2) – Tour the site, including:
  - (a) Construction of Saltstone Disposal Structure (SDS) 7
  - (b) Z-Area Perimeter (from vehicle on perimeter road)
- (3) – If saltstone is being poured, then observe saltstone production facility operations
  - SPF not operating, Tank 50 Valve Box valve repair

(#) - Activity number from NRC Observation Guidance [ML18155A389]

# Saltstone Disposal Facility
# Field Observation



# Technical Discussion Topics

## Technical Discussions: 07/09/2018 (pm)

- **(5) – Discuss the DOE document: SRR-CWDA-2018-00006, Rev. 0, "Conceptual Model Development for the Saltstone Disposal Facility Performance Assessment," May 2018. (ML18143B265)**

  - *Briefing to NRC: FEPs and Conceptual Model for the 2019 SDF PA*, SRR-CWDA-2018-00034

(#) - Activity number from NRC Observation Guidance [ML18155A389]

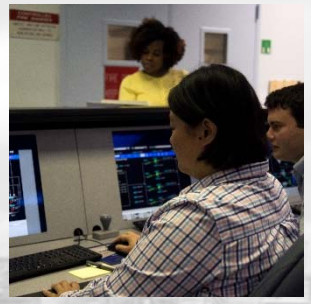
# Observation Visit Daily Outbrief: 07/09/2018

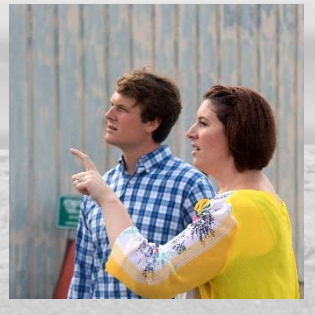
## NRC Daily Outbrief

- NRC Staff Outbrief
- Action Items captured

Savannah River Remediation
AECOM | BECHTEL | CH2M | BWXT

SRR-CWDA-2018-00035, Revision 1





# SAVANNAH RIVER SITE SALT WASTE DISPOSAL

## NRC Onsite Observation Visit

**July 9-11, 2018**

**Larry Romanowski**

**Waste Disposal Authority**

[Part 2, 7/10-11/2018]

Savannah River Remediation
AECOM | BECHTEL | CH2M | BWXT

*We do the right thing.*

# July 10, 2018

## Savannah River Site Salt Waste Disposal
## NRC Onsite Observation Visit

# Agenda: 07/10/2018

| NRC Salt Waste Disposal Onsite Observation | | | |
|---|---|---|---|
| **Tuesday, July 10, 2018** | | | |
| **Start** | **End** | **Topic** | **Location** |
| 8:00 | 8:30 | Badging/Travel | Meet 703-46A |
| 8:30 | 8:45 | Inbrief and Follow-up | 705-1C, Room 34 A-B |
| 9:00 | 11:00 | Technical Discussions [5]<br>• Closure Cap Report<br>• SDF PA Conceptual Model (Cont'd) | 705-1C, Room 34 A-B |
| 11:00 | 12:30 | Lunch | 766-H |
| 12:30 | 2:30 | Technical Discussions [4]<br>• R&D Discussion<br>• NRC R&D Update | 705-1C, Room 34 A-B |
| 2:30 | 4:00 | Technical Discussions [6a-h]<br>• NRC Technical Review Reports | 705-1C, Room 34 A-B |
| 4:00 | 4:15 | NRC/SCDHEC Internal Review | 705-1C, Room 34 A-B |
| 4:15 | 4:45 | Outbrief | 705-1C, Room 34 A-B |
| 4:45 | 5:00 | Travel/NRC Depart | 703-46A |

[#] - Activity number from NRC Observation Guidance (ML18155A389)

# Technical Discussion Topics

## Technical Discussions: 07/10/2018 (am)

- **(5) – Discuss the DOE document: SRR-CWDA-2018-00006, Rev. 0, "Conceptual Model Development for the Saltstone Disposal Facility Performance Assessment," May 2018. (ML18143B265)**

  - *Predicting Long-Term Percolation from the SDF Closure Cap*, SRRA107772-000009

  - Inventory Reports for I-129 and Tc-99

(#) - Activity number from NRC Observation Guidance [ML18155A389]

# Long-Term Percolation Rates for the Saltstone Disposal Facility Closure Cap

Craig H. Benson, PhD, PE, NAE

University of Virginia/CRESP

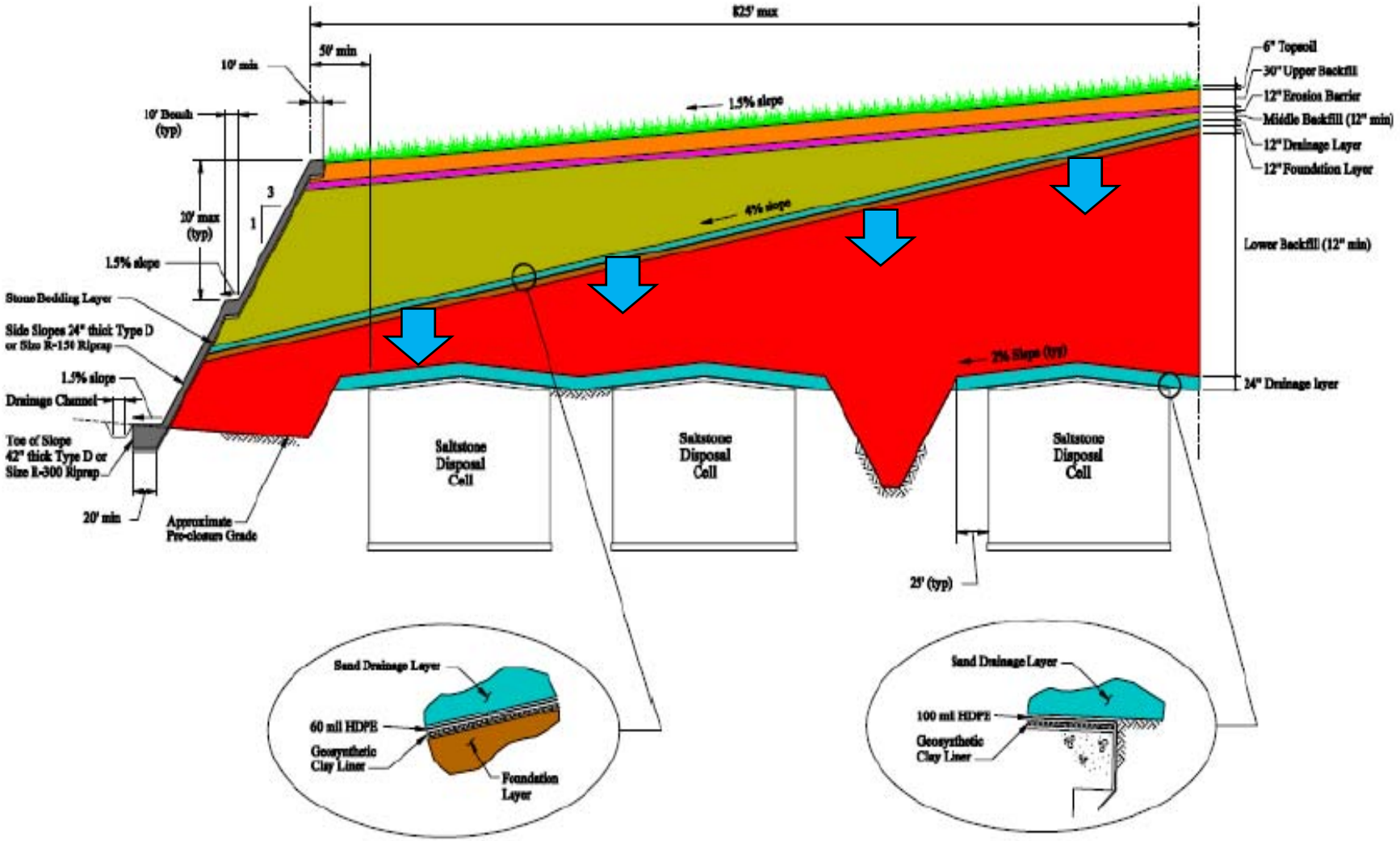
10 July 2018

# Objectives:

- Develop hydrologic model that physically represents hydrologic processes occurring in the Saltstone Disposal Facility (SDF) closure cap.
- Parameterize the model using latest knowledge and accepted practices for predicting the hydrology of final covers, including recommendations in the report NUREG CR-7028.
- Predict long-term percolation rates from SDF closure cap.

# Knowledge Gaps - Previous Performance Assessment (PA):

- Little information about oxidation of geomembranes and service life expectations – resolved through CRESP research.
- Little information on rooting structures in final cover systems and impact on geosynthetic clay liners (GCLs) – resolved via NRC/EPA/DOE research with CRESP.
- No analogs for drainage layer incorporated – resolved through Hanford research as well as studies in Korea and Japan on historical burial grounds.

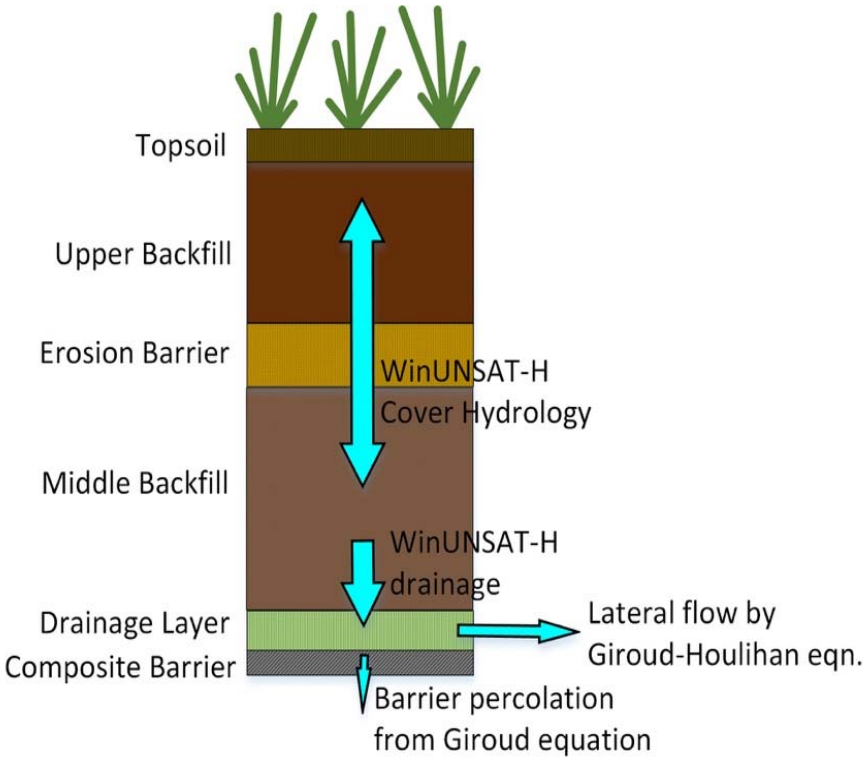



Note: Vertical Scale = 5 x Horizontal Scale

**Typical Saltstone Disposal Facility Closure Cap**

# Modeling Approach

Couple model to predict variably saturated flow in earthen layers above drain layer with analytical solution for flow in drainage layer and leakage from composite liner (geomembrane over GCL over fine-textured foundation layer).

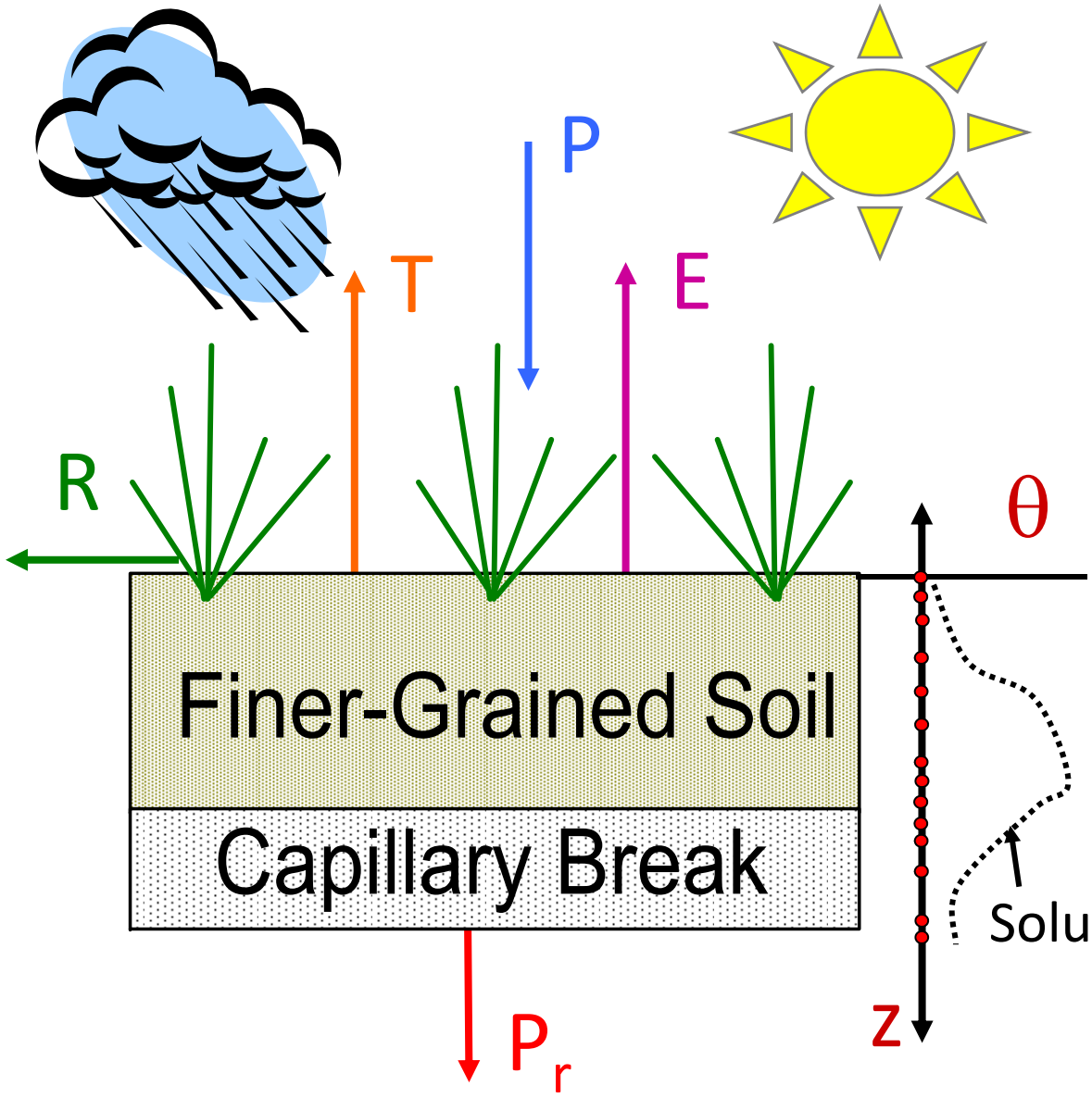



WinUNSAT-H: 1-D variably saturated flow code with atmospheric interaction to predict flow into drainage layer. Developed at PNNL for Hanford.

Analytical solution for drain flow and barrier leakage.

Modeling conducted in this study addressed flow from base of GCL. The **foundation layer and lower backfill were not included**, as the composite barrier formed by geomembrane and GCL provides the predominant resistance to flow at the base.

# WinUNSAT-H Conceptual Model (Above Drainage Layer)




P = precipitation
& solar radiation

R = runoff
T = transpiration
E = evaporation
$P_r$ = percolation

# WinUNSAT-H Input

Predict percolation into drainage layer for range of hydrologic settings using latest recommendations regarding model parameterization for long-term predictions from NUREG CR-7028.

## INPUT

**Meteorological Data:**

- Data from Jones and Phifer (1998).
- Supplemented with most recent data from SRR.
- Sparseness using Bareither et al. (2015).

**Soil Properties (fully weathered):**

- Surface layer - Jones and Phifer (1998), NUREG CR-7028.
- Erosion layer - NUREG CR-7028 with Bouwer-Rice adaptation following Bareither and Benson (2013). Assumed infill is fine-textured adjacent material (allows flow and out under unsaturated conditions).
- Middle backfill – NUREG CR-7028 (fully weathered) – even though likely protected by erosion layer.

# WinUNSAT-H Input - 2

**Vegetation:**

- Field data on root density function, growing season, and percent cover for North Georgia grassland from Khire et al. (1997).
- Neglects impact of long-term canopy for forested land (greater ET, interception).

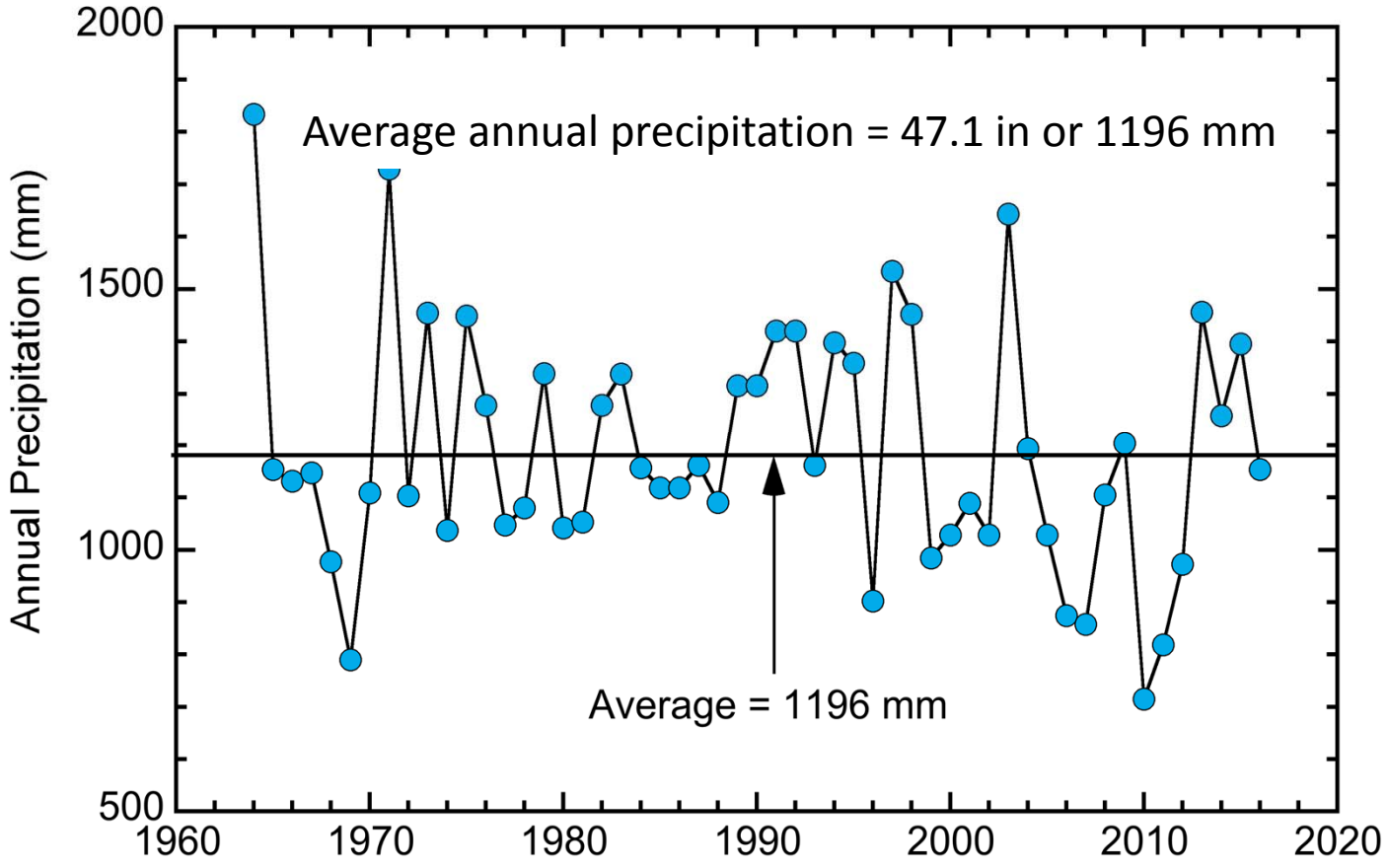
## APPROACH

- Evaluate how percolation rate into drainage layer varies along slope length.
- Simulate wettest 10-yr period in record to obtain upper bound on percolation rate into drainage layer.
- Simulate typical year to define reasonable initial conditions and to define typical long-term percolation rate into drainage layer.

## EXPECTATION

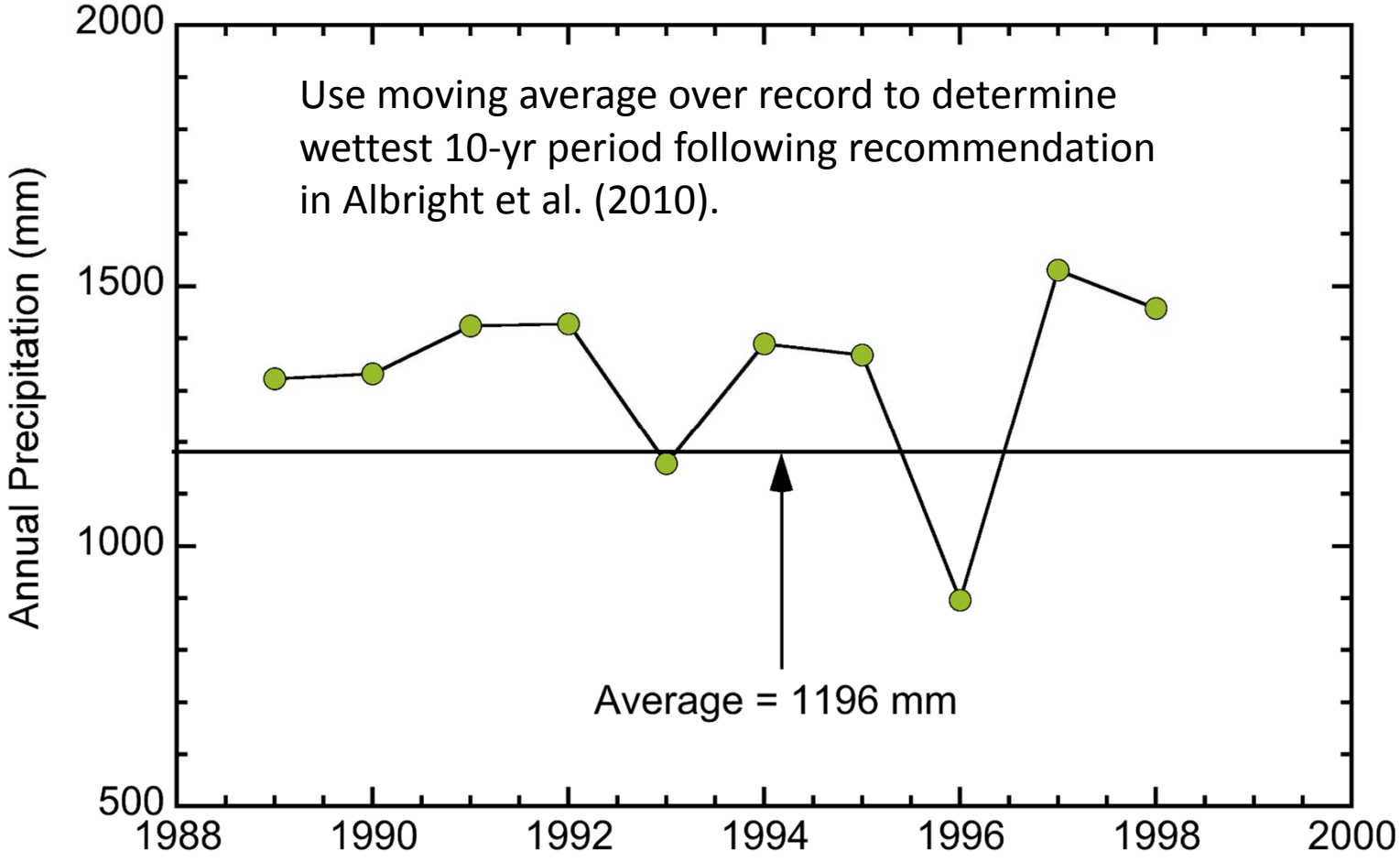
- Reasonable upper bound on peak percolation rate into drainage layer.
- Reasonable upper bound on average percolation rate into drainage layer.

# Long-Term Precipitation Record



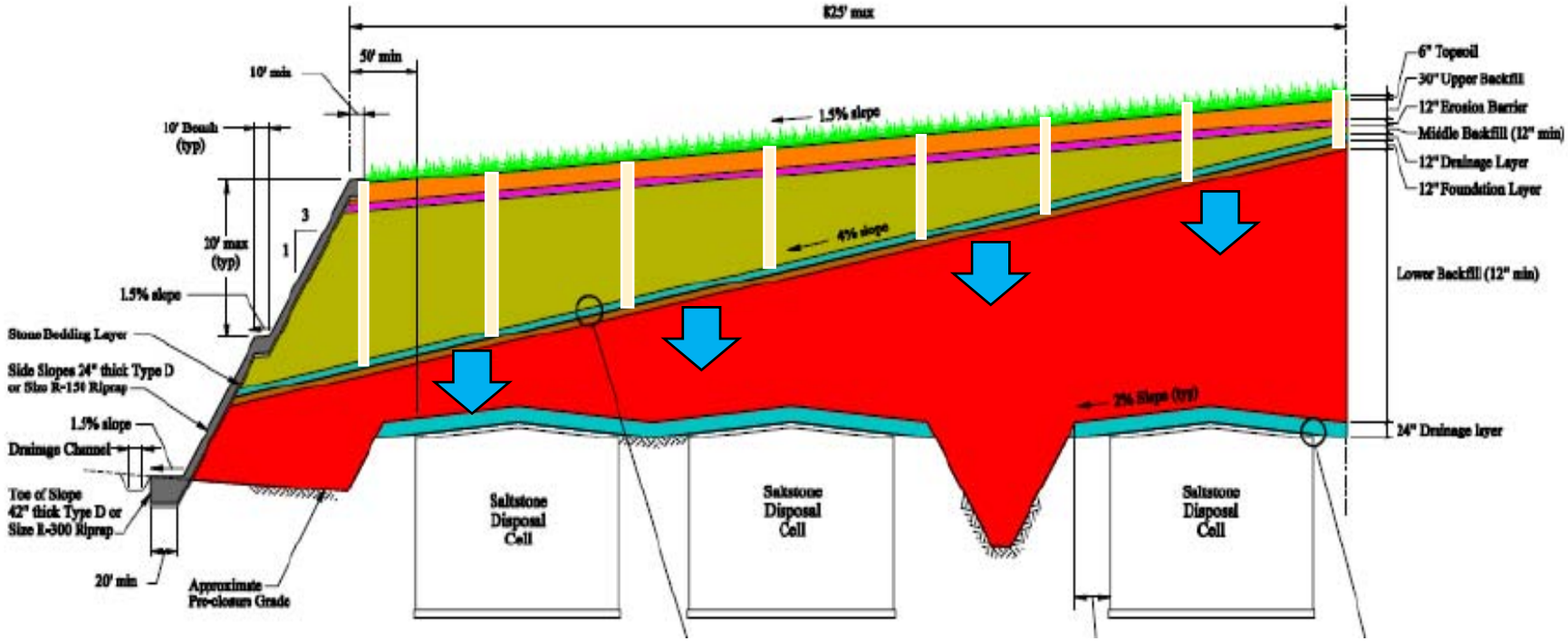

Typical year – select year from record that is close to average annual precipitation and has typical patterns (e.g., not dominated by one or two precipitation events – 1985, 1132 mm).

# Wettest 10-yr Period



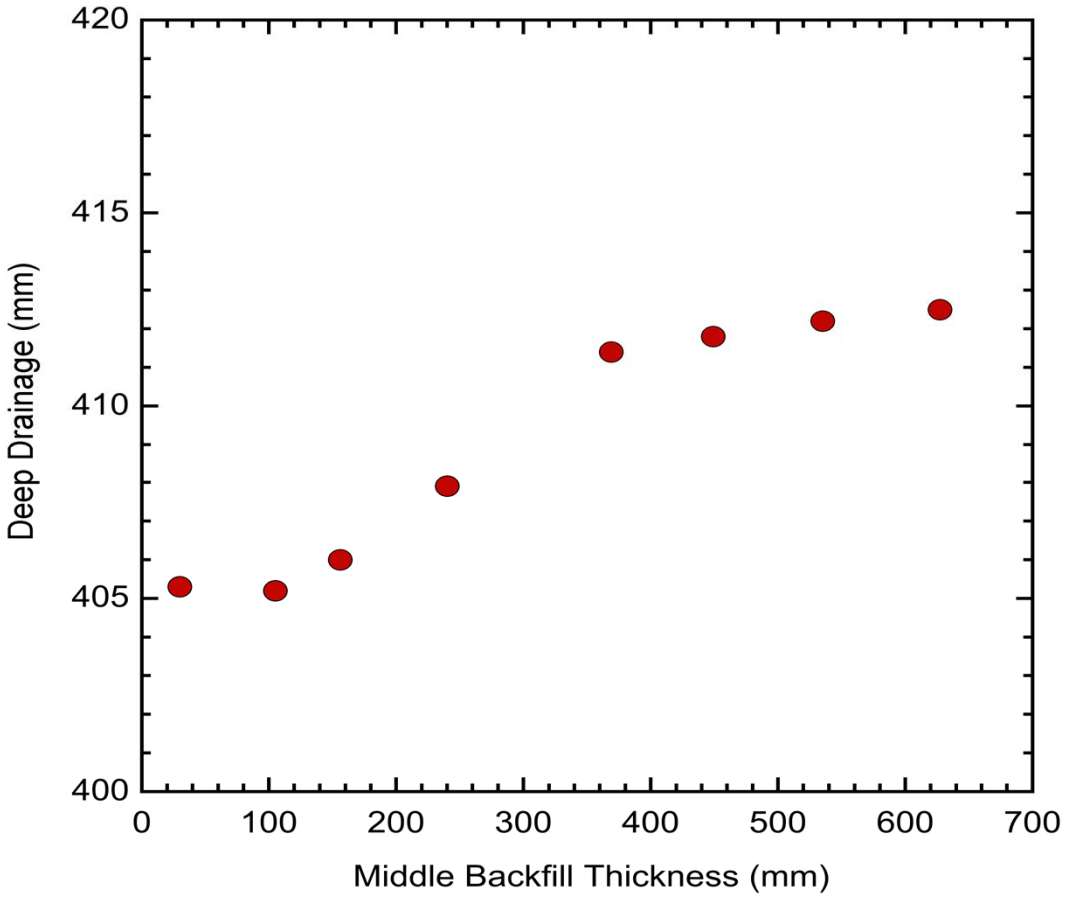

1989-1998 period consistently above average, 1993 and 1996 exceptions.

# Evaluate Impact of Middle Backfill Thickness



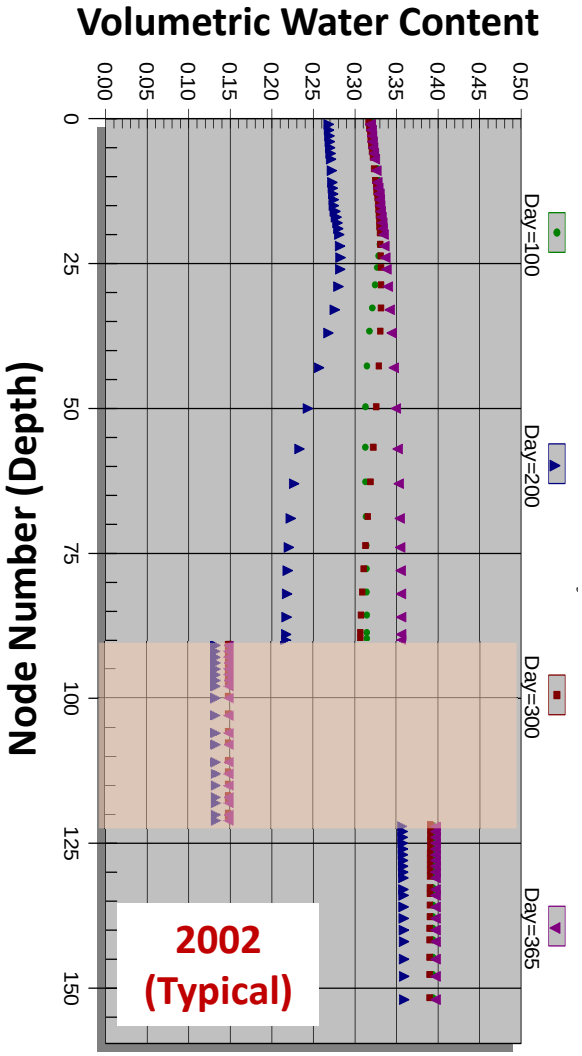

Do we need to evaluate multiple profiles along slope for all scenarios?

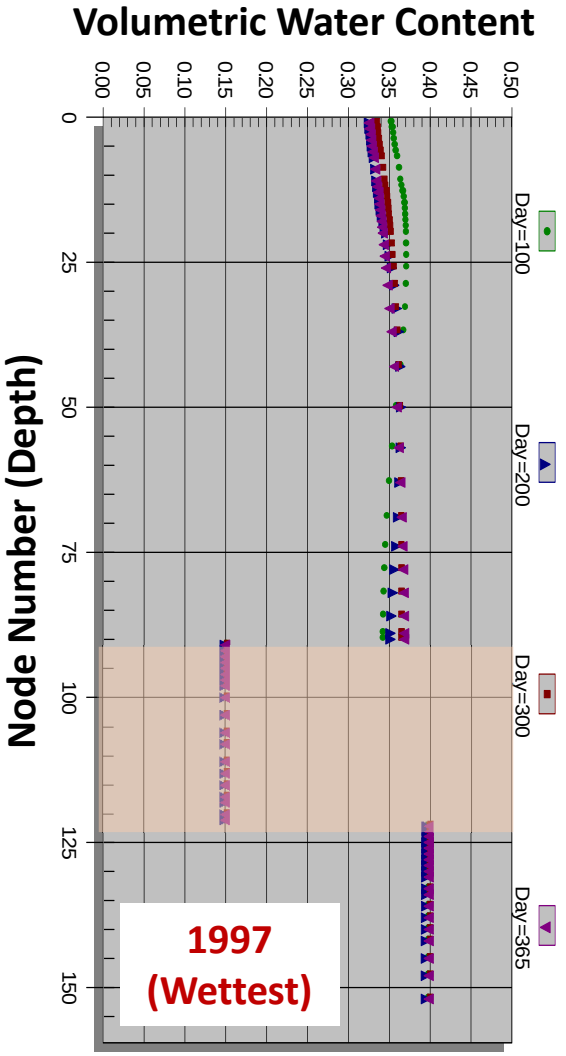
# Effect of Middle Backfill Thickness




- To illustrate trend, the **vertical scale has been exaggerated**.
- Used typical year to ensure variably saturated conditions would influence outcome.
- Percolation varies across thickness systematically, but variation is trivial relative to accuracy.
- Used single profile for all subsequent analyses.

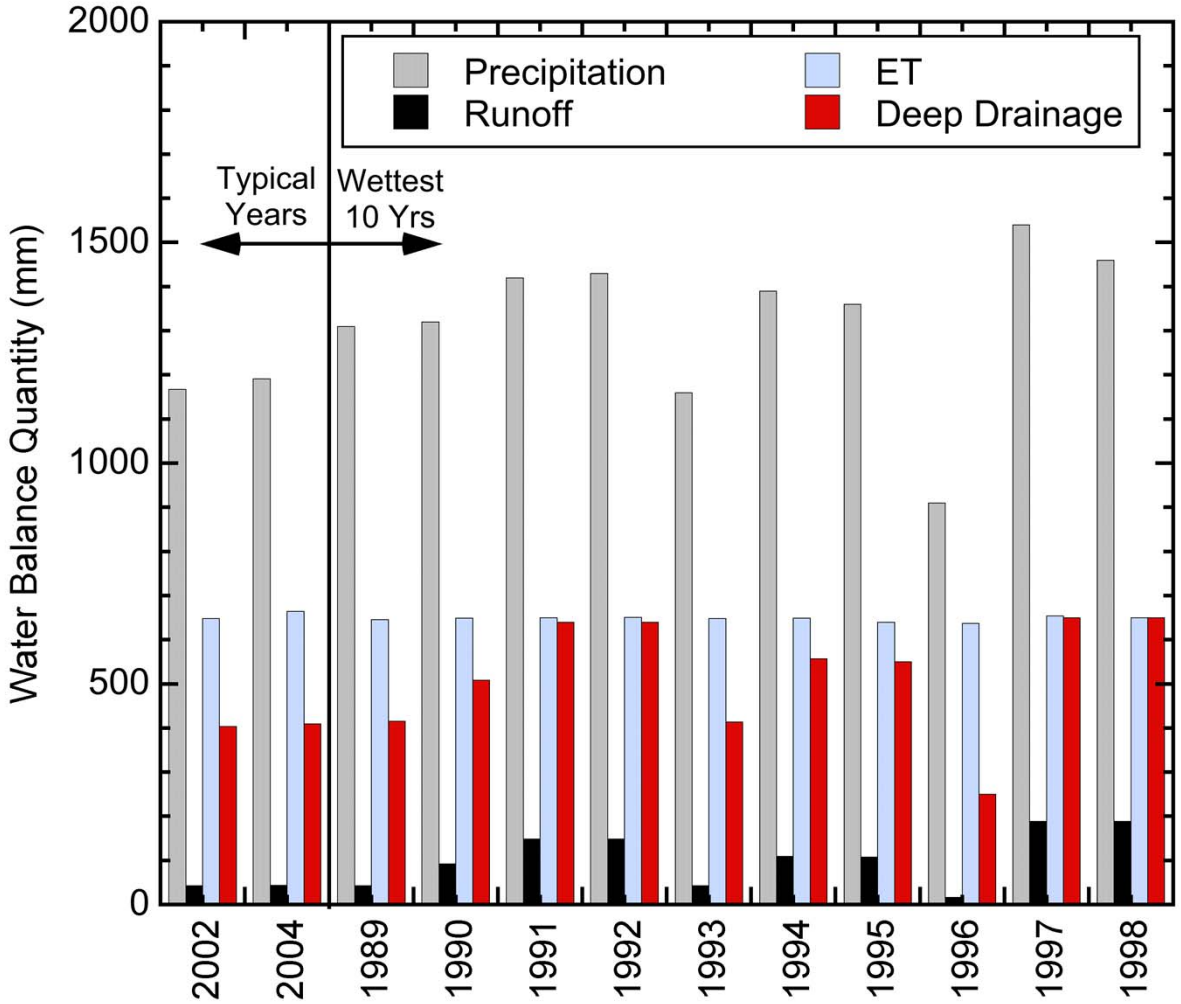
# Erosion Layer Creates Hydraulic Choke



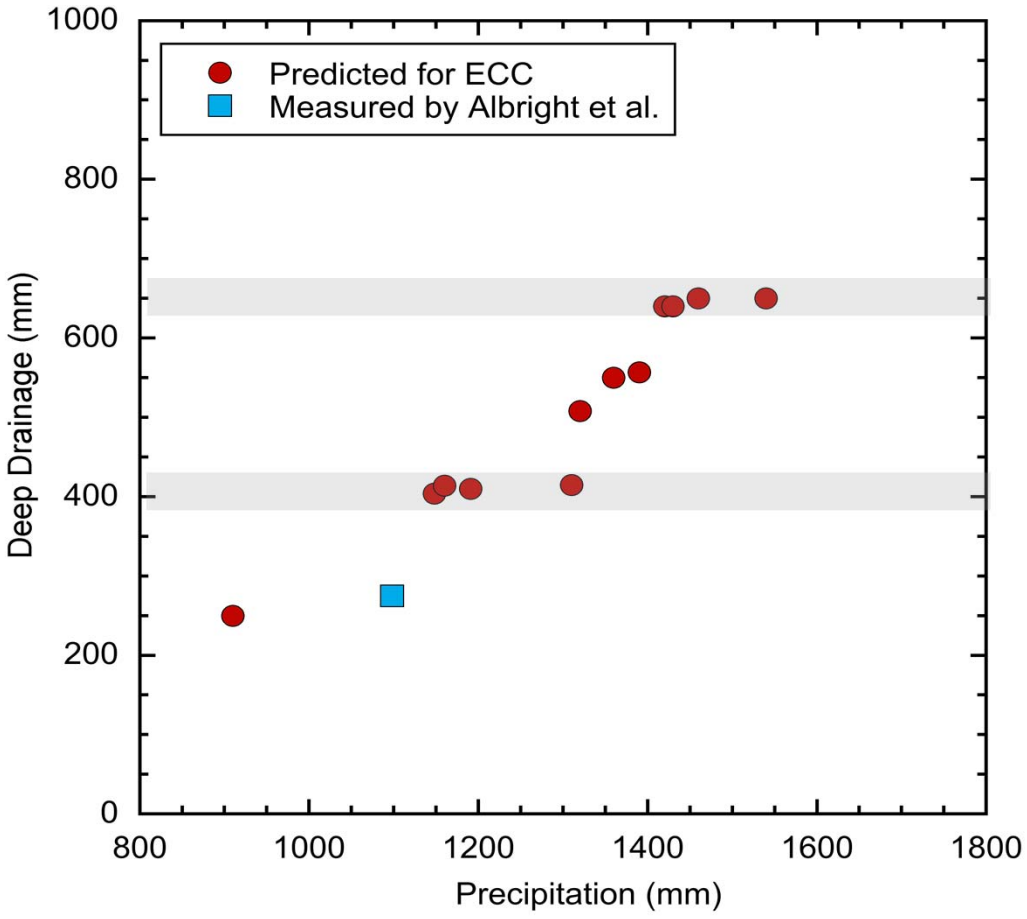

- Nearly saturated conditions maintained in middle backfill layer due to erosion barrier
- Unit gradient vertical flow beneath erosion layer.
- Render thickness of middle backfill layer unimportant ***hydraulically***.
- Could argue that middle backfill layer resistant to weathering. No data.

# Water Balance for Simulation Years




- Runoff modest component of water balance (< 12.3%).
- Evapotranspiration (ET) varies modestly due to humid climate and operating near potential ET (PET).
- Percolation varies with annual precipitation – more on wetter years (expected in humid climate).

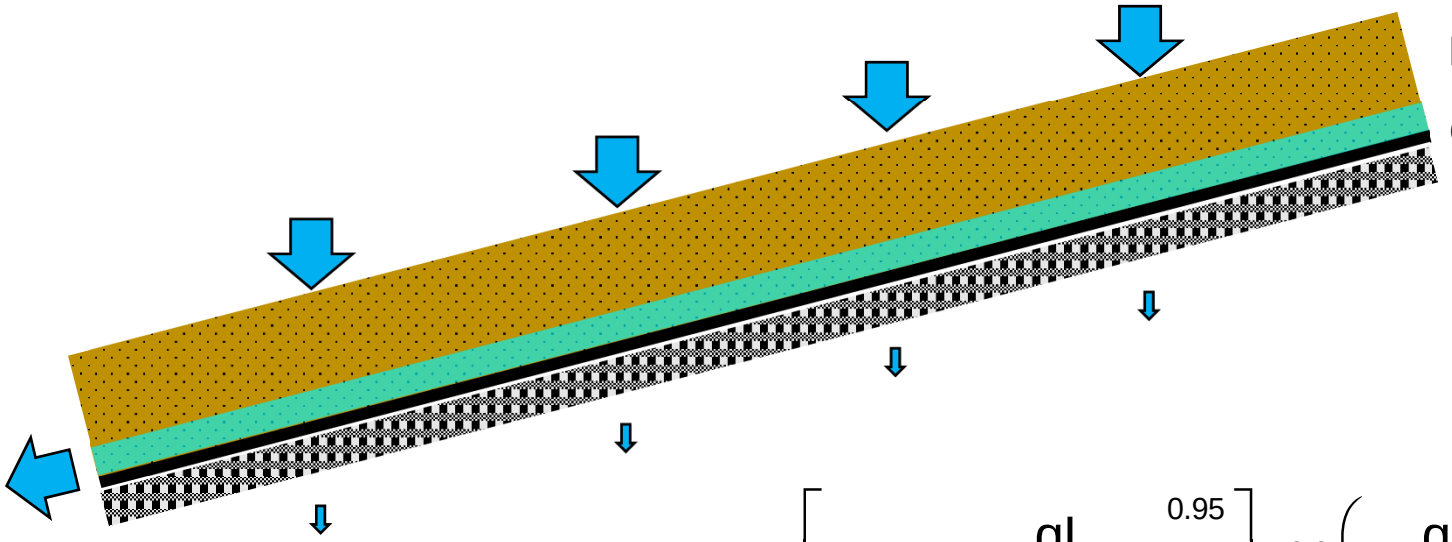
# Annual Percolation and Precipitation




- For typical conditions, annual percolation 400 mm/yr.
- For very wet conditions (consistent with climate change), percolation 650 mm/yr
- Percolation levels off at highest annual precip. (due to erosion layer)
- Compare with data from Albany, GA from Albright et al. (2006) – 275 mm/yr percolation with 1098 mm of precipitation (■).

# Drain and Barrier Layer Hydrology

Use Giroud's analytical solutions for lateral drain flow and composite liner leakage.




$$Q = 0.976\, C_{qo} \left[ 1 + 0.1 \frac{qL}{t_b K_d \sin\beta}^{0.95} \right] d^{0.2} \left( \frac{qL}{K_d \sin\beta} \right)^{0.9} K_b^{0.74}$$

- Q = leakage rate per GM hole
- $C_{qo}$ = contact factor = 0.21
- q = middle backfill percolation
- L = horiz. slope length (825 ft)
- $\beta$ = slope angle (4% slope)
- $K_d$ = hyd. cond. of drainage layer
- $K_b$ = hyd. cond. of GCL & foundation
- $t_b$ = thickness GCL
- d = geomembrane hole diameter

# Drain and Barrier Layer Hydrology - 2

**GCL Data:**

- Exhumations of GCLs from composite barriers in covers at eastern sites (e.g., Barnwell) indicate that $K_b = 1x10^{-11}$ m/s when under a GCL, even under significant distortion and full cation exchange.

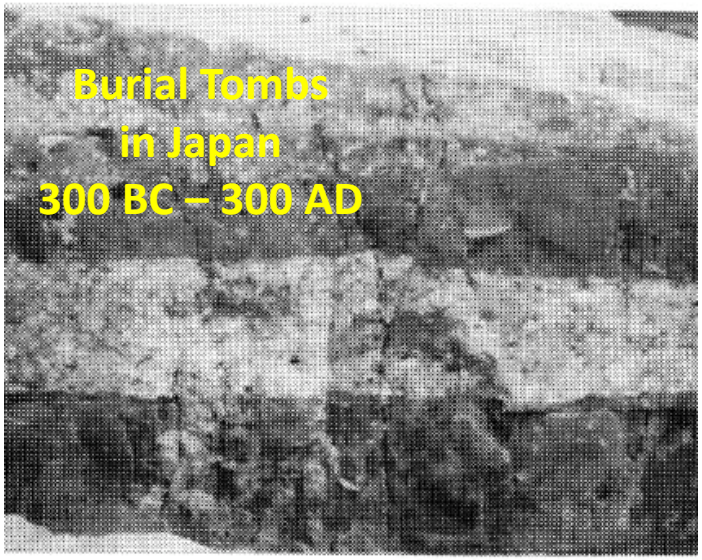
**GM Data:**

- LLW service life > 1970 yr from Tian et al. (2017) LLW study.
- Exhumations of GM over GCLs indicate no degradation (e.g., Barnwell) even under significant distortion.
- Hole frequency = 5 holes per hectare (Giroud and Bonaparte 1989).
- Hole diameter = 2 mm (performance) or 10 mm (design).

# Drain and Barrier Layer Hydrology - 3

**Drainage Layer:**

- Design requires hydraulic conductivity (K) > $5x10^{-2}$ cm/s. K controls rate of lateral flow, and head on composite barrier, affecting percolation rate. Higher K, higher lateral flow, lower head, and lower percolation rate.
- Cover exhumations indicate no fines migration into drainage layer **without** geotextiles. Fines reduce K, reducing lateral flow rate and increasing percolation rate.
- Historical exhumations in similar humid climates in Korea and Japan of layered fill indicate no blending of fine and coarse layers.
- **No evidence of fines ingress and no justification to use K < $5x10^{-2}$ cm/s.**

# Percolation Rate Matrix

| Percolation Rate into Drainage Layer (mm/yr) | Drainage Hydraulic Conductivity (cm/s) | Hole Diameter (mm) | Percolation Rate into Lower Backfill (mm/yr) | Comments |
|---|---|---|---|---|
| 650 | $5x10^{-2}$ | 10 | 0.4 | Most realistic long-term upper bound |
| 650 | $1x10^{-2}$ | 10 | 8.6 | Reasonable long-term upper bound |
| 650 | $1x10^{-3}$ | 10 | > 600 | Unrealistic, outside analysis |
| 650 | $5x10^{-2}$ | 2 | 0.3 | Most realistic near to mid-term upper bound |
| 650 | $1x10^{-2}$ | 2 | 6.2 | Reasonable mid-term upper bound |
| 650 | $1x10^{-3}$ | 2 | > 435 | Unrealistic, outside analysis |
| 400 | $5x10^{-2}$ | 10 | 0.2 | Most realistic long-term |
| 400 | $1x10^{-2}$ | 10 | 3.5 | Reasonable long-term |
| 400 | $1x10^{-3}$ | 10 | 244 | Unrealistic, outside analysis |
| 400 | $5x10^{-2}$ | 2 | 0.1 | Most realistic near to mid-term |
| 400 | $1x10^{-2}$ | 2 | 2.5 | Reasonable mid-term |
| 400 | $1x10^{-3}$ | 2 | 177 | Unrealistic, outside analysis |
| 400 | $1x10^{-2}$ | 10 | 19.7 | Long-term with GCL at CR-7028 |

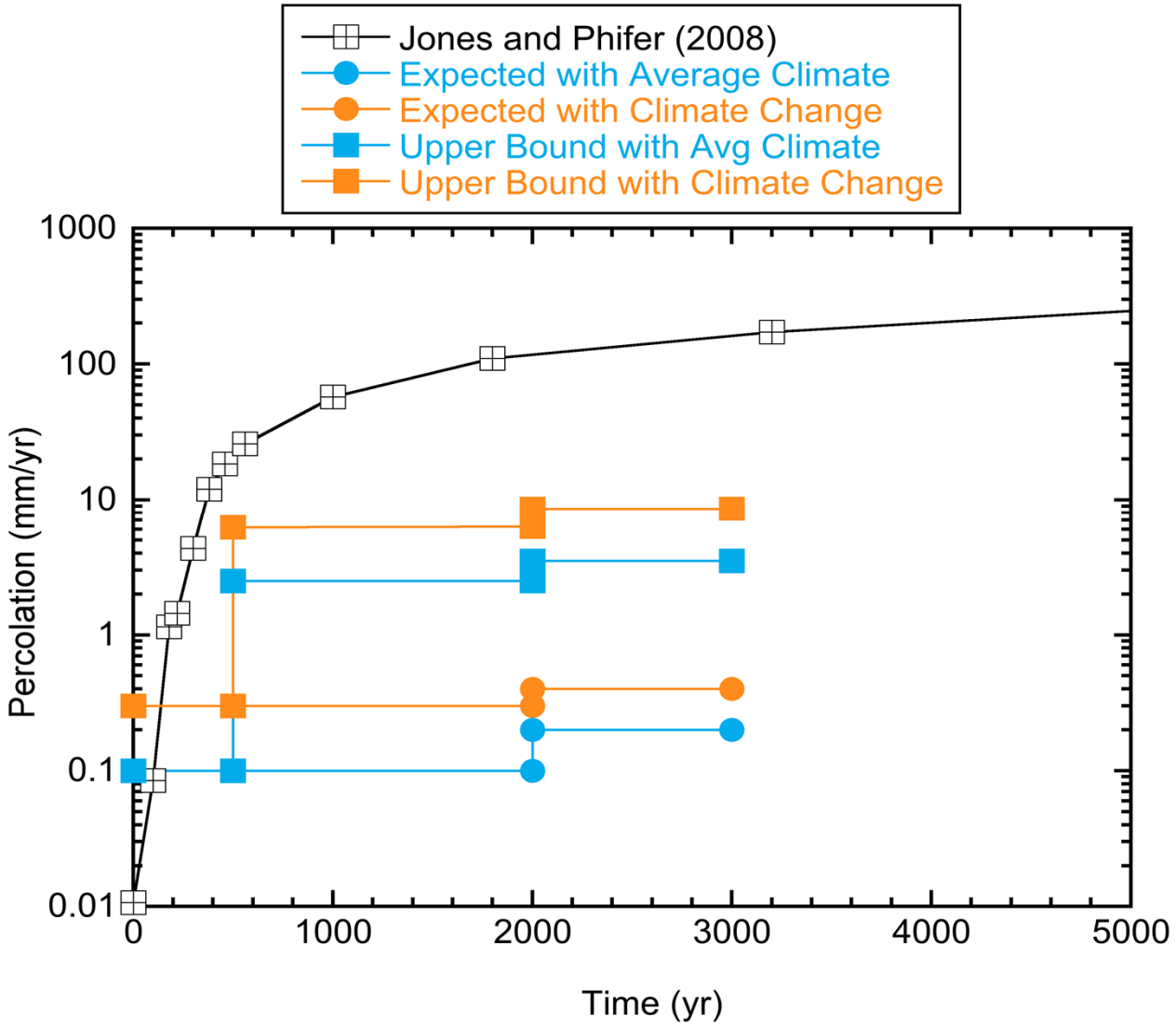
# Recommendations for Percolation Rates into Lower Backfill

| Time Frame (yr) | Percolation Rate into Drainage Layer (mm/yr) | Drainage Hydraulic Conductivity (cm/s) | Geom. Hole Diam. (mm) | Percolation Rate into Lower Backfill (mm/yr) | Comments |
|---|---|---|---|---|---|
| 0-500 | 400 | $5x10^{-2}$ | 2 | 0.1 | Most realistic |
| 500-2000 | 400 | $5x10^{-2}$ | 2 | 0.1 | Realistic mid-term |
| >2000 | 400 | $5x10^{-2}$ | 10 | 0.2 | Realistic long-term |
| 500-2000 | 400 | $1x10^{-2}$ | 2 | 2.5 | Reasonable mid-term |
| >2000 | 400 | $1x10^{-2}$ | 10 | 3.5 | Reasonable long-term |
| >2000 | 400 | $1x10^{-2}$ | 10 | 19.7 | GCL per CR-7028 |

**Justification for assumptions**

- Choke by erosion layer provides substantial protection of underlying layers – not considered in analysis.
- No evidence of drainage layer change without geotextiles cover (analogs).
- Separation by geotextile ignored. No mechanism for geotextile degradation.
- No basis to assume geomembrane will not function after 1970 yr.

# Comparison with Previous PA



# Inventory Reports

- *Briefing to NRC: Inventory Reports for I-129 and Tc-99,* **SRR-CWDA-2018-00038**
  - Inventory Reports for I-129 and Tc-99
    - *Evaluation of I-129 Concentration Data to Improve Liquid Waste Inventory Projections,* SRR-CWDA-2015-00077
    - *Evaluation of Tc-99 Concentration Data to Improve Liquid Waste Inventory Projections*, SRR-CWDA-2015-00123

# Technical Discussion Topics

## Technical Discussions: 07/10/2018 (pm)

- **(4) – Discuss recent DOE research with samples of cores from SDS 2A.**
  - *Briefing to NRC: Research Results/Status*, SRR-CWDA-2018-00039
  - Discussion NRC R&D Update

(#) - Activity number from NRC Observation Guidance [ML18155A389]

# Technical Discussion Topics

## Technical Discussions: 07/10/2018 (pm)

- **(6) – Provide opportunity for the DOE to ask questions about the NRC TRRs issued since April 2016:**
  a) TRR: "Quality Assurance Documentation for the Cementitious Barriers Partnership Toolbox," August 2016. (ML16196A179);
  b) TRR: "Dose Calculation Methodology for Liquid Waste Performance Assessments at the Savannah River Site," December 2016. (ML16277A060);
  c) TRR: "Iodine Sorption Coefficients for Use in Performance Assessments for the Saltstone Disposal Facility," January 2017. (ML16342C575);
  d) TRR: "Saltstone Waste Form Hydraulic Performance," March 2017. (ML17018A137);
  e) TRR: "Performance of the High Density Polyethylene Layer, High Density Polyethylene/Geosynthetic Clay Liner Composite Layer, and the Lower Lateral Drainage Layer," April 2017. (ML17081A187);
  f) TRR: "Hydraulic Performance and Erosion Control of the Planned Saltstone Disposal Facility Closure Cap and Adjacent Area," January 2018. (ML18002A545);
  g) TRR: "Groundwater Monitoring at and Near the Planned Saltstone Disposal Facility," May 2018. (ML18117A494); and
  h) TRR: "Update on Projected Technetium Release from Saltstone," May 2018. (ML18095A122).

(#) - Activity number from NRC Observation Guidance [ML18155A389]

# Technical Discussion Topics

## Technical Discussions: 07/10/2018 (pm)

- **(6) – Provide opportunity for the DOE to ask questions about the NRC TRRs issued since April 2016:**

  - Briefing provided by NRC*: Summary of NRC Staff Recommendations to Modify 2013 NRC Saltstone Disposal Facility Monitoring Plan Based on NRC Staff Technical review Reports,* ML18187A373

(#) - Activity number from NRC Observation Guidance [ML18155A389]

# Observation Visit Daily Outbrief: 07/10/2018

## NRC Daily Outbrief

- NRC Staff Outbrief
- Action Items captured

Savannah River Remediation
AECOM | BECHTEL | CH2M | BWXT

*We do the right thing.*

# July 11, 2018

## Savannah River Site Salt Waste Disposal
## NRC Onsite Observation Visit

# Agenda: 07/11/2018

| NRC Salt Waste Disposal Onsite Observation | | | |
|---|---|---|---|
| **Wednesday, July 11, 2018** | | | |
| **Start** | **End** | **Topic** | **Location** |
| 8:00 | 8:30 | Badging/Travel | Meet 703-46A |
| 8:30 | 8:45 | Inbrief and Follow-up | 705-1C, Room 34 A-B |
| 8:45 | 11:00 | Technical Discussions [6a-h]<br>• NRC Technical Review Reports | 705-1C, Room 34 A-B |
| 11:00 | 12:30 | Lunch | 766-H |
| 12:30 | 1:30 | Follow-up Discussions<br>• As-Needed | 705-1C, Room 34 A-B |
| 1:30 | 2:00 | NRC/SCDHEC<br>Internal Review | 705-1C, Room 34 A-B |
| 2:00 | 2:30 | Outbrief | 705-1C, Room 34 A-B |
| 2:30 | 2:45 | Travel/NRC Depart | 703-46A |

- If time allotted for Technical Discussion is not required, Internal Review and/or Outbrief could occur earlier.

[#] - Activity number from NRC Observation Guidance (ML18155A389)

# Technical Discussion Topics

## Technical Discussions: 07/11/2018 (am)

- **(6) – Provide opportunity for the DOE to ask questions about the NRC TRRs issued since April 2016:**

  - Briefing provided by NRC*: Summary of NRC Staff Recommendations to Modify 2013 NRC Saltstone Disposal Facility Monitoring Plan Based on NRC Staff Technical review Reports,* ML18187A373

(#) - Activity number from NRC Observation Guidance [ML18155A389]

# Technical Discussion Topics

**Table 3.** Status of Monitoring Factors in Monitoring Areas 1-6 (after NRC letters are issued)

| MA 1 Inventory | MA 2 Infiltration and Erosion Control | MA 3 Waste Form Hydraulic Performance | MA 4 Waste Form Physical Degradation | MA 5 Waste Form Chemical Degradation | MA 6 Disposal Structure Performance |
|---|---|---|---|---|---|
| - 1.01 - Inventory in Disposal Structures § | - 2.01 - Hydraulic Performance of Closure Cap ‡ | - 3.01 - Hydraulic Conductivity of Field-Emplaced Saltstone ± | - 4.01 - Waste Form Matrix Degradation ± | - 5.01 - Radionuclide Release from Field-Emplaced Saltstone ± | - 6.01 - Certain Risk-Significant $K_d$ Values in Disposal Structure Concrete ‡ |
| - 1.02 - Methods Used to Assess Inventory ‡ | - 2.02 - Erosion Control of the SDF Engineered Surface Cover and Adjacent Area.† | - 3.02 - Variability of Field-Emplaced Saltstone ± | - 4.02 - Waste Form Macroscopic Fracturing ± | - 5.02 - Chemical Reduction of Tc by Saltstone ± | - 6.02 - Tc Sorption in Disposal Structure Concrete ± |
| | | - 3.03 - Applicability of Laboratory Data to Field-Emplaced Saltstone ± | | - 5.03 - Reducing Capacity of Saltstone † | - 6.03 - Performance of Disposal Structure Roofs and HDPE/GCL Layers ‡ |
| | | - 3.04 - Effect of Curing Temperature on Saltstone Hydraulic Properties ± | | - 5.04 - Certain Risk-Significant $K_d$ Values for Saltstone ‡ | - 6.04 - Disposal Structure Concrete Fracturing ‡ |
| | | | | - 5.05 - Potential for Short-Term Rinse-Release from Saltstone ‡ | - 6.05 - Integrity of Non-cementitious Materials ‡ |

*§ Periodic Monitoring Factors (i.e., MFs related to data that NRC staff expects to review on a periodic basis)*
*† Low Priority*
*‡ Medium Priority*
*± High Priority*
*Closed*

**From:** *Technical Review: Summary of Activities Related to the Review of the U.S. Department of Energy Savannah River Site Fiscal Year 2013 and Fiscal Year 2014 Special Analysis Documents for the Saltstone Disposal Facility*, **ML18158A172.**

# Technical Discussion Topics

**Table 4.** Status of Monitoring Factors in Monitoring Areas 7-11 (after NRC letters are issued)

| MA 7 Subsurface Transport | MA 8 Environmental Monitoring | MA 9 Site Stability | MA 10 Performance Assessment Model Revisions | MA 11 Radiation Protection Program |
|---|---|---|---|---|
| - 7.01 - Certain Risk-Significant $K_d$ Values in Site Sand and Clay ‡ | - 8.01 - Leak Detection § | - 9.01 - Settlement Due to Increased Overburden ‡ | - 10.01 - Implementation of Conceptual Models ± | - 11.01 - Dose to Individuals During Operations § |
| | - 8.02 - Groundwater Monitoring § | - 9.02 - Settlement Due to Dissolution of Calcareous Sediment ‡ | - 10.02 - Defensibility of Conceptual Models ± | - 11.02 - Air Monitoring § |
| | | | - 10.03 - Diffusivity in Degraded Saltstone ‡ | |
| | - 8.03 - Identification and Monitoring of Groundwater Plumes in the Z Area ± | | - 10.04 - $K_d$ Values for Saltstone † | |
| | | | - 10.05 - Moisture Characteristic Curves † | |
| | | | - 10.06 - $K_d$ Values for Disposal Structure Concrete † | |
| | | | - 10.07 - Calculation of Build-Up in Biosphere Soil † | |
| | | | - 10.08 - Consumption Factors and Uncertainty Distributions for Transfer Factors ‡ | |
| | | | - 10.09 - $K_d$ Values for SRS Soil † | |
| | | | - 10.10 - Far-Field Model Calibration ‡ | |
| | | | - 10.11 - Far-Field Model Source Loading Approach ‡ | |
| | | | - 10.12 - Far-Field Model Dispersion ‡ | |
| | | | - 10.13 - Impact of Calcareous Zones on Contaminant Flow and Transport † | |
| | | | - 10.14 - Scenario Development and Defensibility ‡ | |

*§ Periodic Monitoring Factors (i.e., MFs related to data that NRC staff expects to review on a periodic basis)*
*† Low Priority*
*‡ Medium Priority*
*± High Priority*

**From:** *Technical Review: Summary of Activities Related to the Review of the U.S. Department of Energy Savannah River Site Fiscal Year 2013 and Fiscal Year 2014 Special Analysis Documents for the Saltstone Disposal Facility*, **ML18158A172.**

# Observation Visit Final Outbrief: 07/11/2018

## 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-2018-00035, Revision 1]** **Complete**
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]
   - *Briefing to NRC: Inventory Reports for I-129 and Tc-99,* [SRR-CWDA-2018-00038]
   - *Briefing to NRC: Research Results/Status,* [SRR-CWDA-2018-00039]
3. **DOE to provide NRC copies of the photos taken during the SDF tour on 7/9/2018.** **Complete, slides 96 & 97 of this presentation**
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**

# Observation Visit Final Outbrief: Action Items

- **Action Items**

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**
6. **DOE to provide NRC electronic copies of the reference documents for SRRA1077772-000009,** *Predicting Long-Term Percolation from the SDF Closure Cap.*
7. **DOE to provide NRC an electronic copy of graphic SRR-CWDA-2018-00043, depicting revisions to the SDF monitoring factors. Complete**

# Attendance Sheets

NRC Salt Waste Disposal Monitoring Visit
July 9, 2018

| Name | Affiliation | Phone |
|---|---|---|
| Larry Romanowski | SRR | |
| Justin Koon | DHEC | |
| Pat Suggs | DOE-SR | |
| Steve Thomas | SRR | |
| Steve Hommel | SRR | |
| Kent Rosenberger | SRR | |
| Lloyd Desotell | NRC | |
| Harry Felsher | NRC | |
| Karen Pinkston | NRC | |
| George Alexander | NRC | |
| A. Christianne Ridge | NRC | |
| Hans Arlt | NRC | |
| Chris McKenney | NRC | |
| David Watkins | SRR | |
| Dan Ferguson | DOE | |
| Marie McElmurray | SCDHEC - Aiken | |
| Tim Coffield | SRR | |

Page 1 of 1

NRC Salt Waste Disposal Monitoring Visit
July 10, 2018

| Name | Affiliation | Phone |
|---|---|---|
| Larry Romanowski | SRR | |
| Kent Rosenberger | SRR | |
| Dan Ferguson | DOE | |
| Lloyd Desotell | NRC | |
| Harry Felsher | NRC | |
| Karen Pinkston | NRC | |
| George Alexander | NRC | |
| Hans Arlt | NRC | |
| A. Christianne Ridge | NRC | |
| Chris McKenney | NRC | |
| Steve Hommel | SRR | |
| Pat Suggs | DOE-SR | |
| Tim Coffield | SRR | |
| Craig Benson | UVA | |
| David Watkins | SRR | |
| Steve Thomas | SRR | |
| Justin Koon | DHEC | |
| Jeremiah Mangold | SRR | |
| John Seaman | SREL | |
| Terry Killeen | SRNS | |
| Kerth Liner | SRR | |
| Scott Kirk | SRR | |
| Craig Benson (Telecon) | University of Virginia/CRESP | |

Page 1 of 1

# Attendance Sheets

NRC Salt Waste Disposal Monitoring Visit
July 11, 2018

| Name | Affiliation | Phone |
|---|---|---|
| LARRY ROMANOWSKI | SRR | |
| [illegible] | DOE / SR | |
| Kent Rosenberger | SRR | |
| Lloyd Desotell | NRC | |
| HARRY FELSNER | NRC | |
| Karen Pinkston | NRC | |
| George Alexander | NRC | |
| A. Christianne Ridge | NRC | |
| Hans ARLT | NRC | |
| CHRIS MCKENNEY | NRC | |
| Steve Hommel | SRR | |
| Pat Suggs | DOE - SR | |
| Steve Thomas | SRR | |
| Tim Coffield | SRR | |
| DAVID WATKINS | SRR | |
| Alan Rea | SCDHEC | |
| Justin Koon | SCDHEC | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |

Page 1 of 1

# Action Item #3: SDU 7 Excavation

# Action Item #3: SDU 7 Excavation