

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

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Waste Disposal Authority



NRC Salt Waste Disposal Onsite Observation			
Tuesday, September 17, 2019			
Start	End	Topic	Location
8:00	8:30	Badging/Travel	Meet 703-46A
8:30	8:45	Inbrief	705-1C, Room 34 A-B
8:45	9:15	<u>Saltstone Facility Status</u> • Operating Status • Disposal Unit Status	705-1C, Room 34 A-B
9:15	11:15	<u>SDF Tour</u> • SDU 7/8 Construction • Z-Area Perimeter	Z-Area
11:15	11:30	NRC/SCDHEC Internal Review	705-1C, Room 34 A-B
11:30	12:00	Outbrief	705-1C, Room 34 A-B
12:00		Travel/NRC Depart	703-46A

■ 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)*

[*Guidance for the September 17, 2019, Monitoring Onsite Observation Visit to the Savannah River Site Saltstone Disposal Facility,* ML19219A043.]

Technical Discussions:

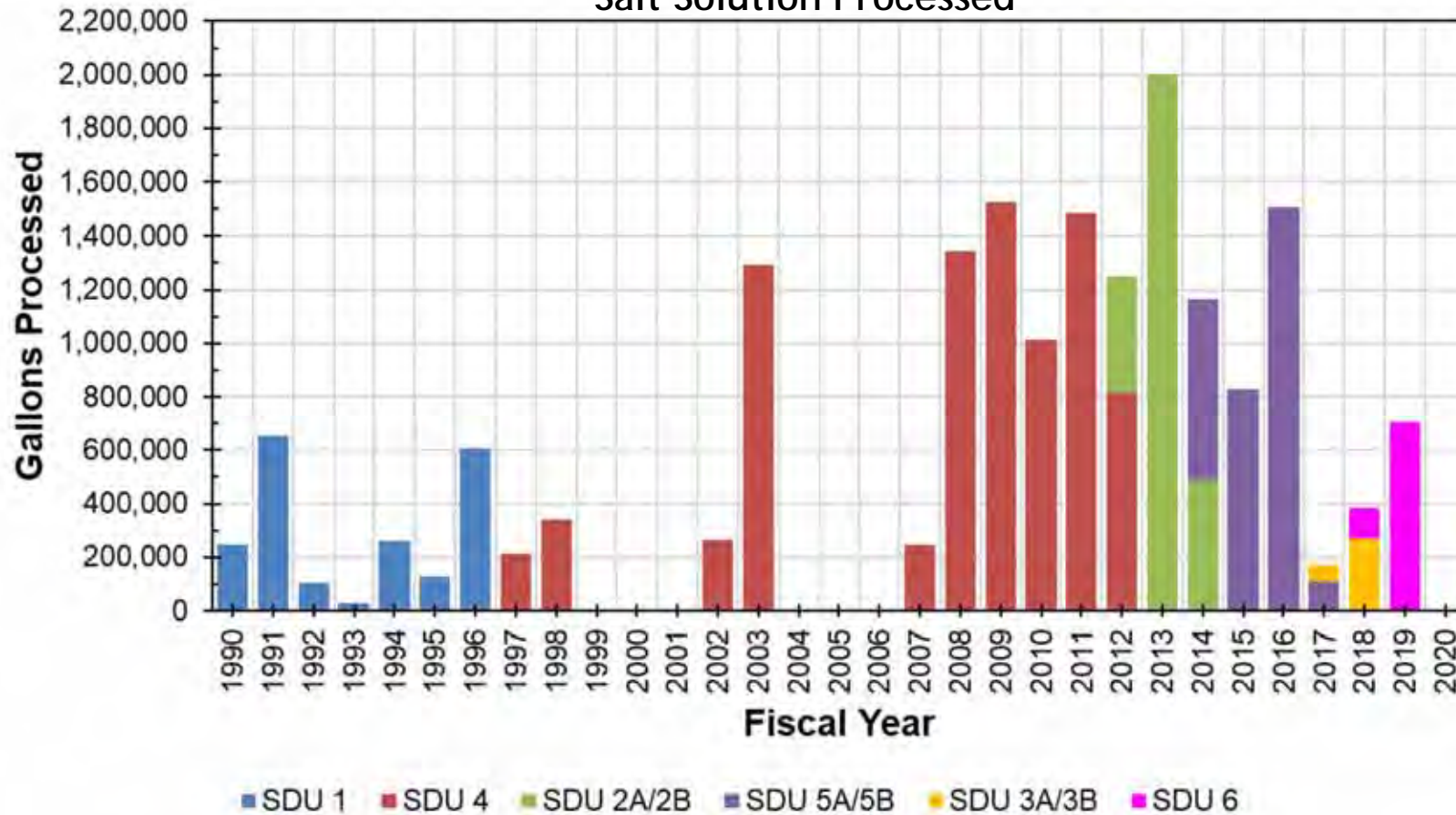
- Saltstone operations / Saltstone Disposal Unit (SDU) operational status
- SDU construction status
- Update status of Routine Documentation/Action Items

Saltstone Facility Status

- Saltstone Production Facility operational status
- SDU operational status
 - SDU 2
 - SDU 3
 - SDU 5
 - SDU 6
- Worker dose



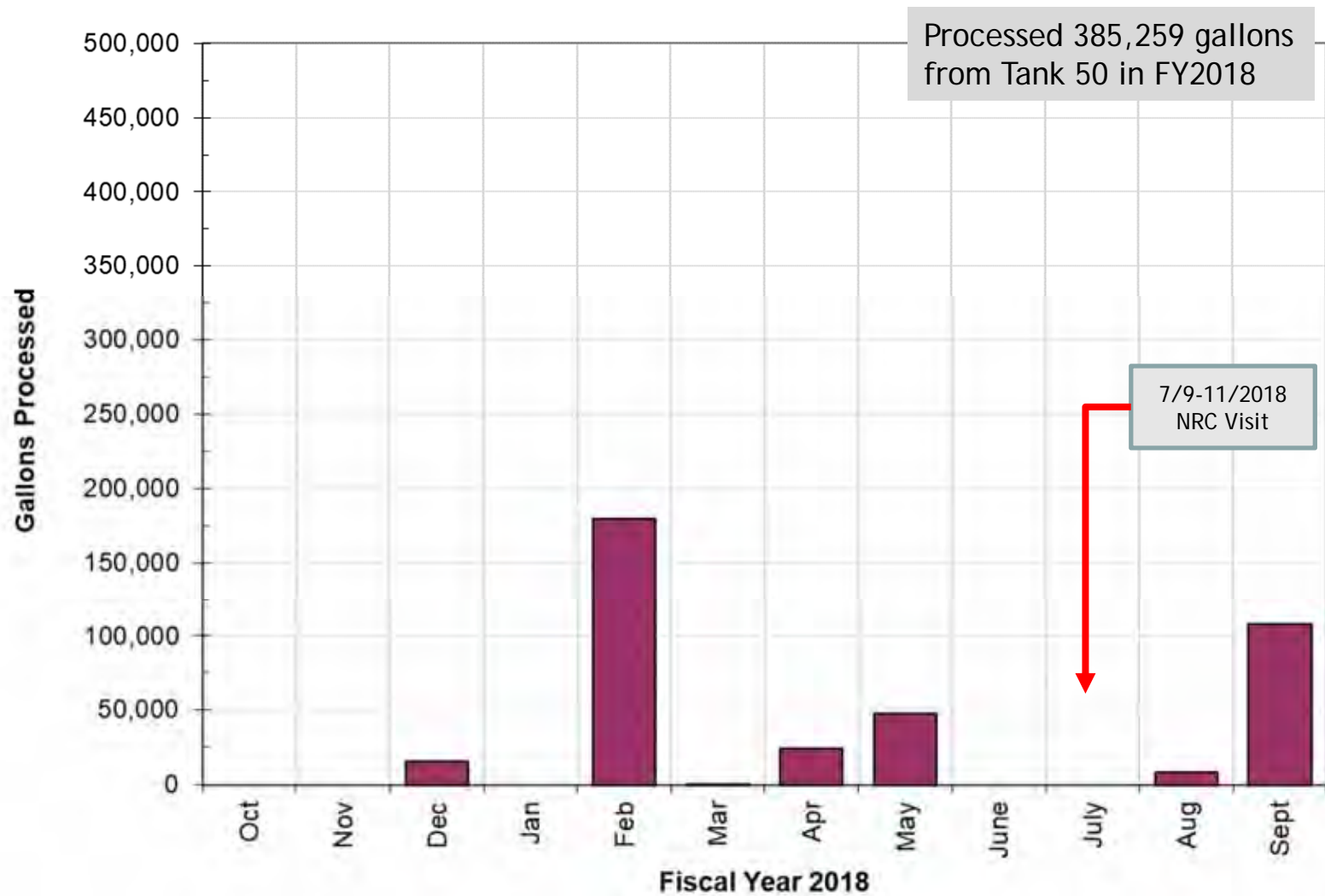
Salt Solution Processed



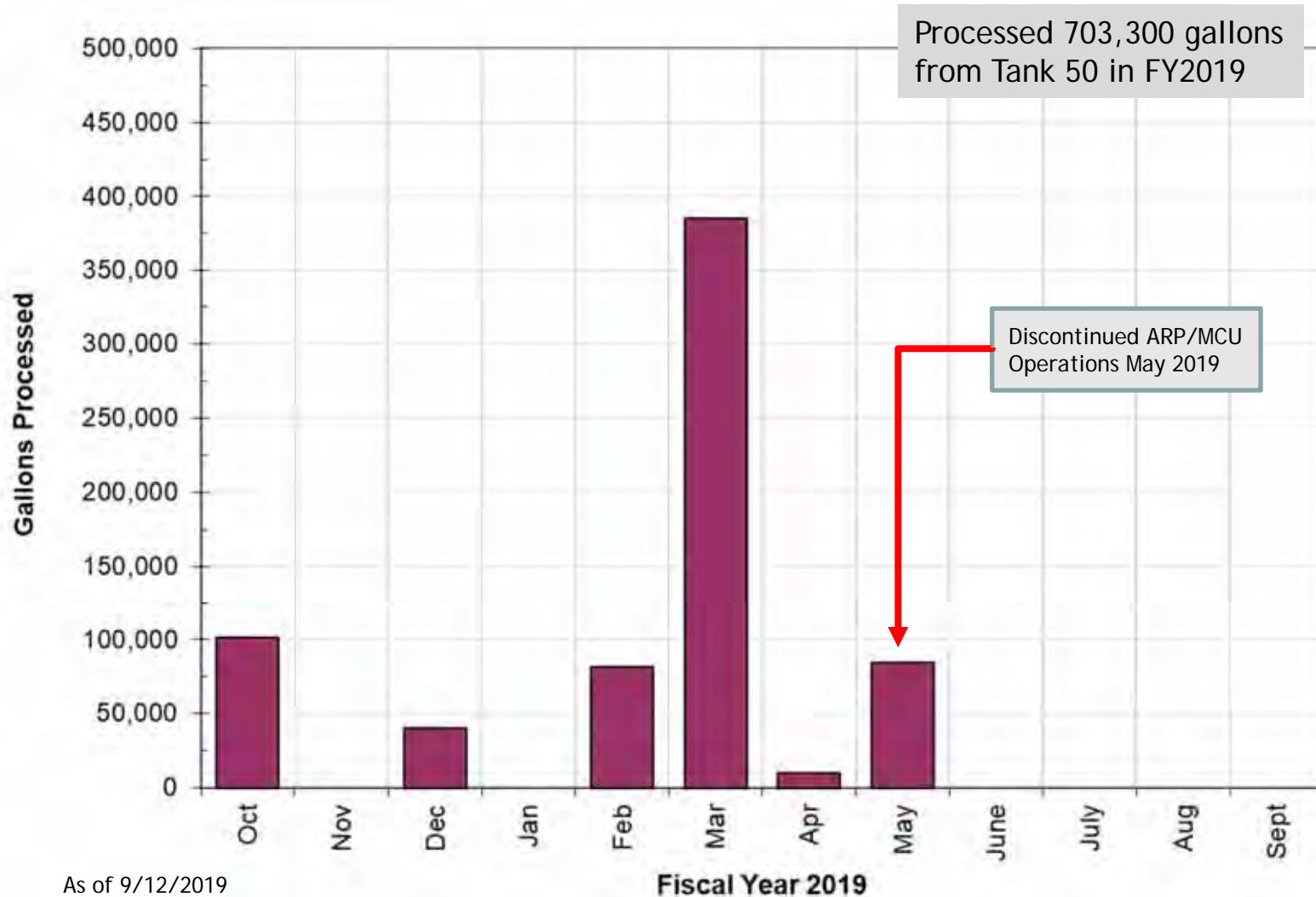
As of 9/12/2019

All processing sent to SDU 6 since 7/2018 NRC visit

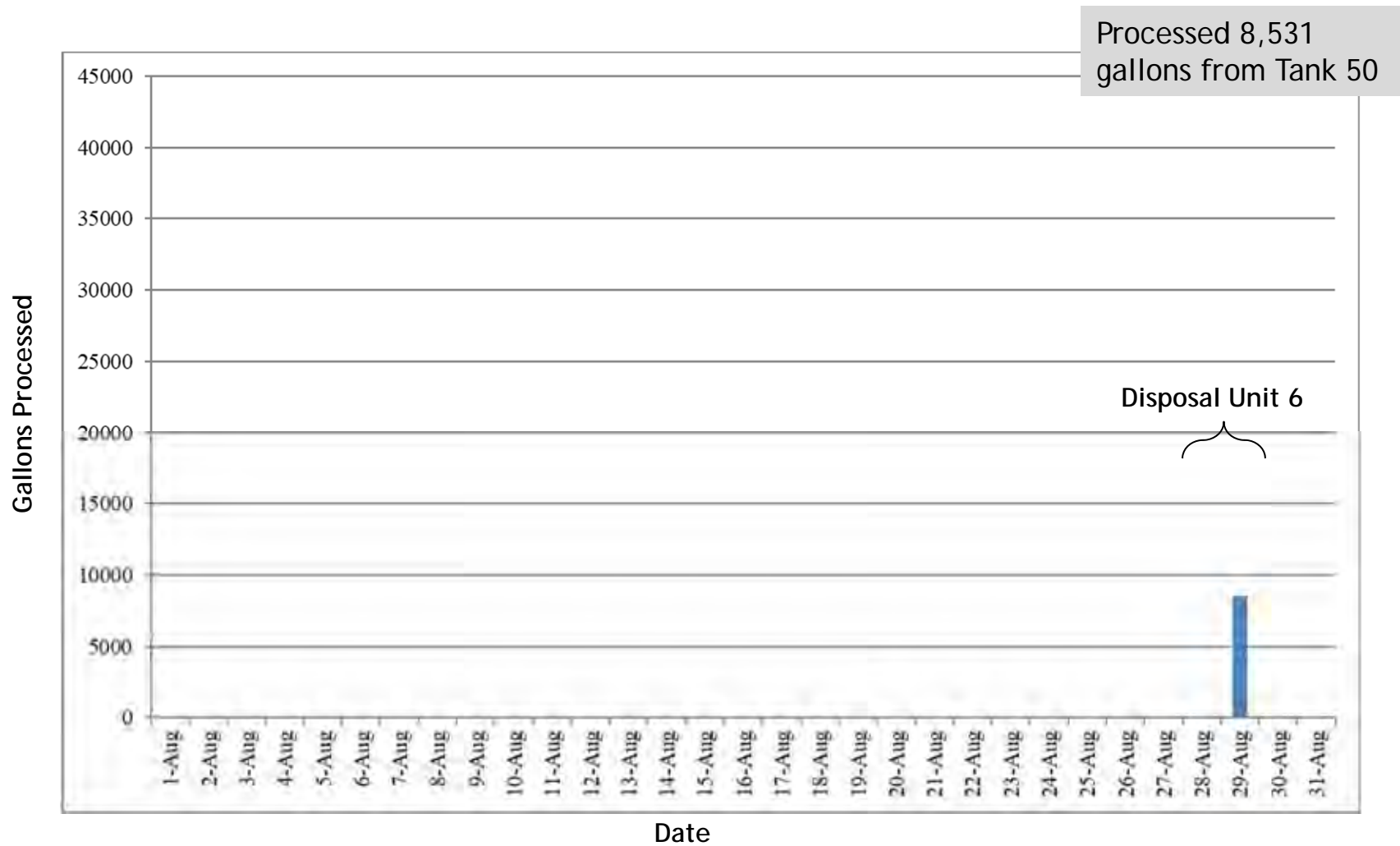
Salt Solution Processed



Salt Solution Processed

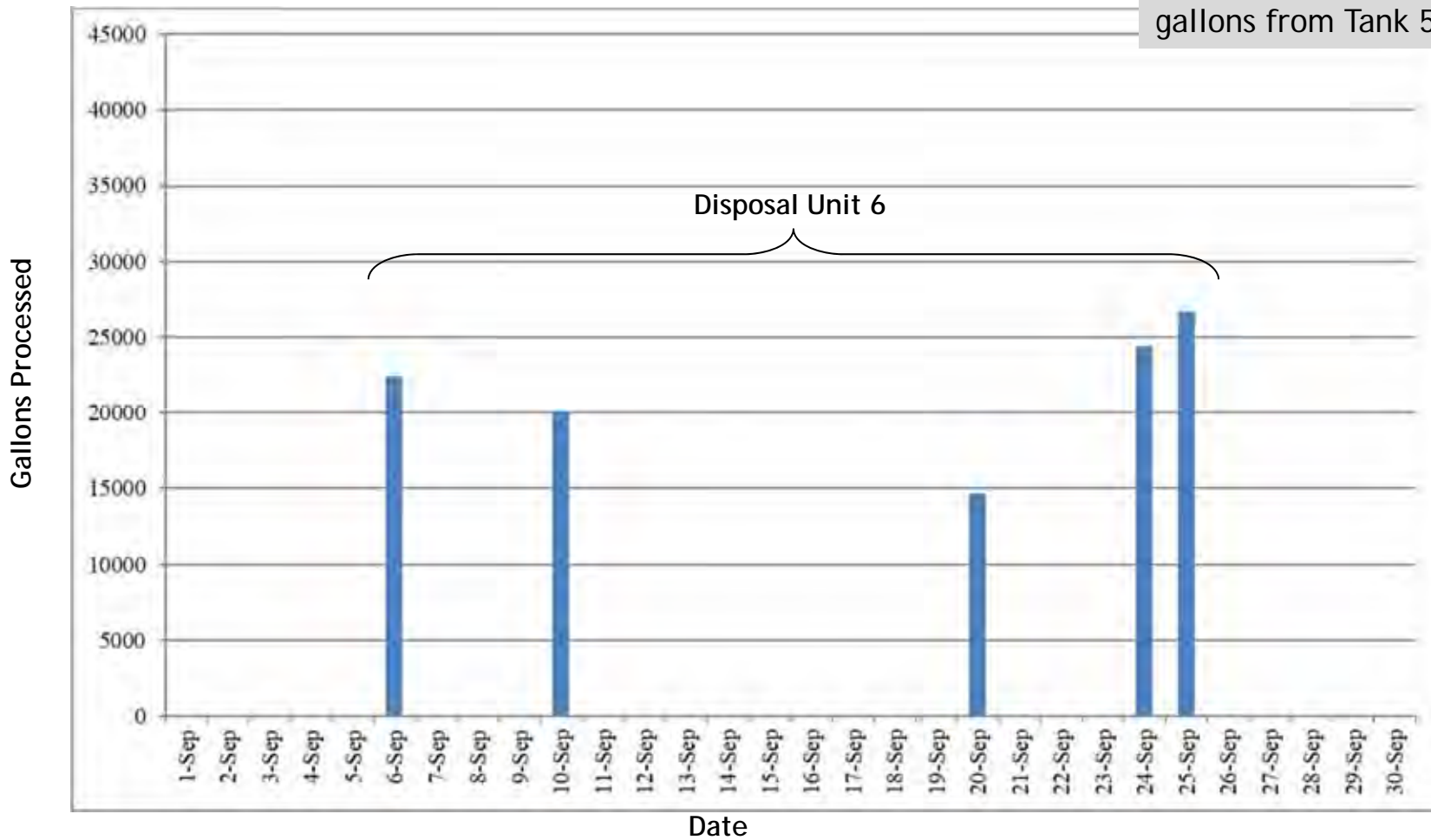


Salt Solution Processed

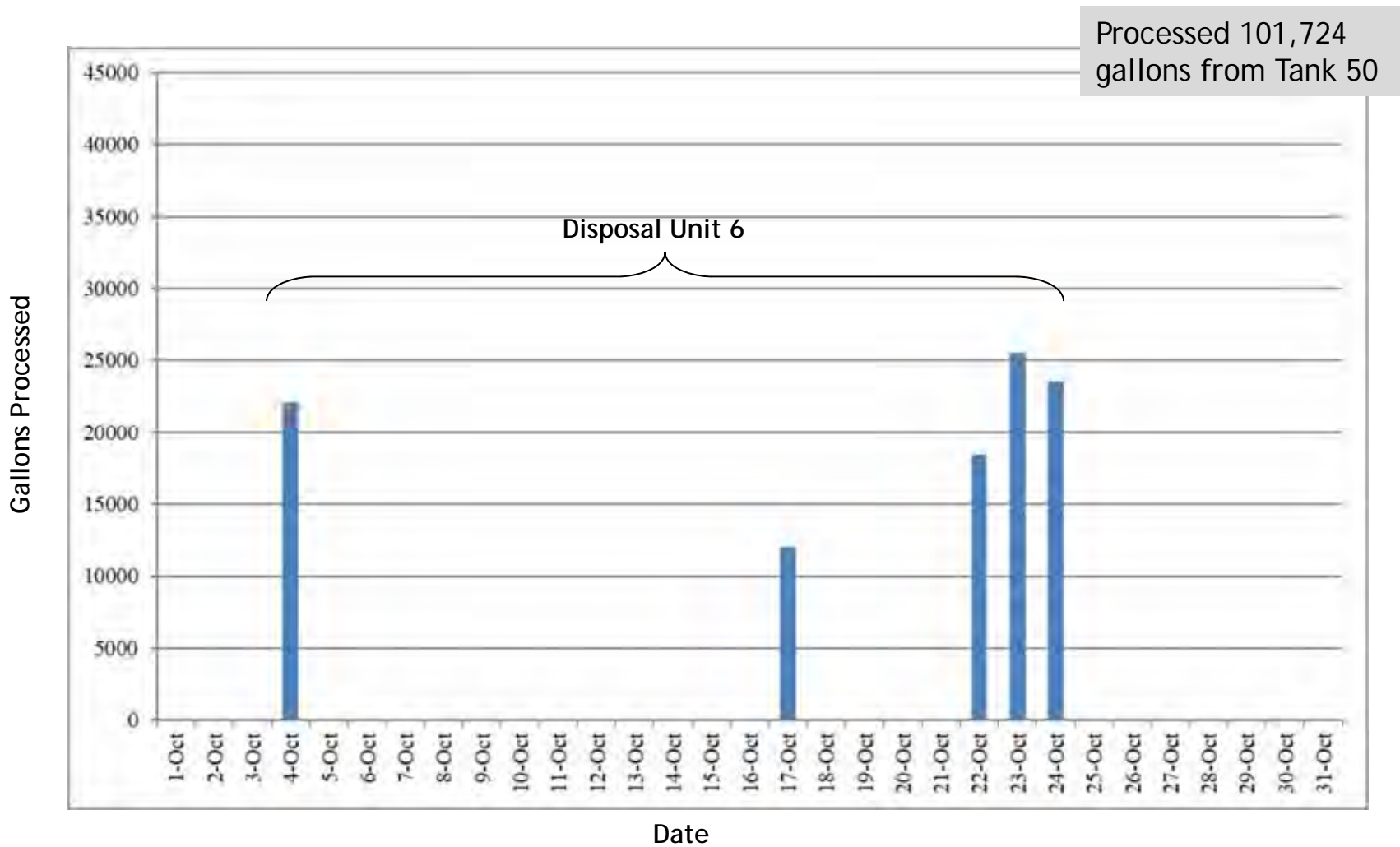


Salt Solution Processed

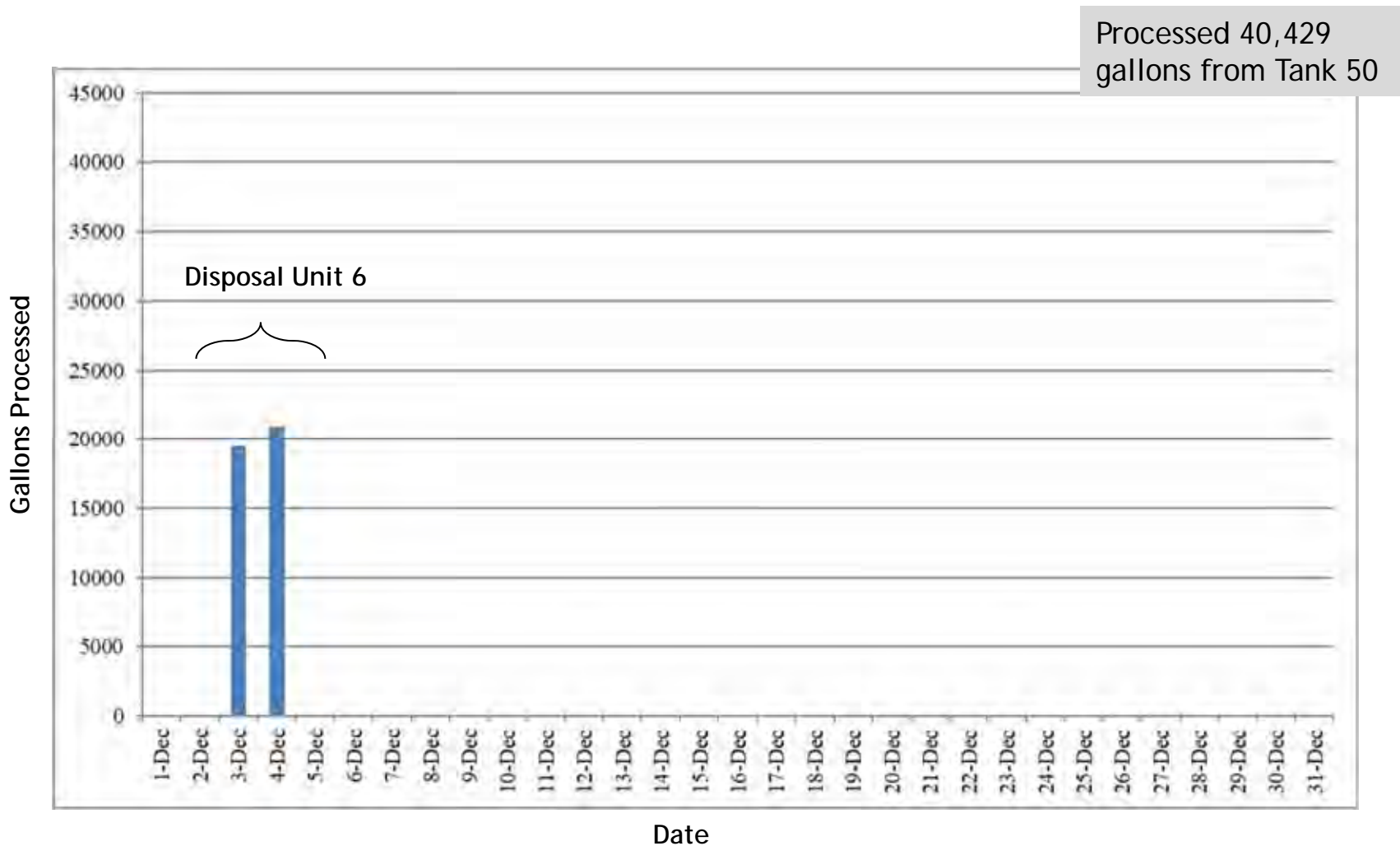
Processed 108,344
gallons from Tank 50



Salt Solution Processed

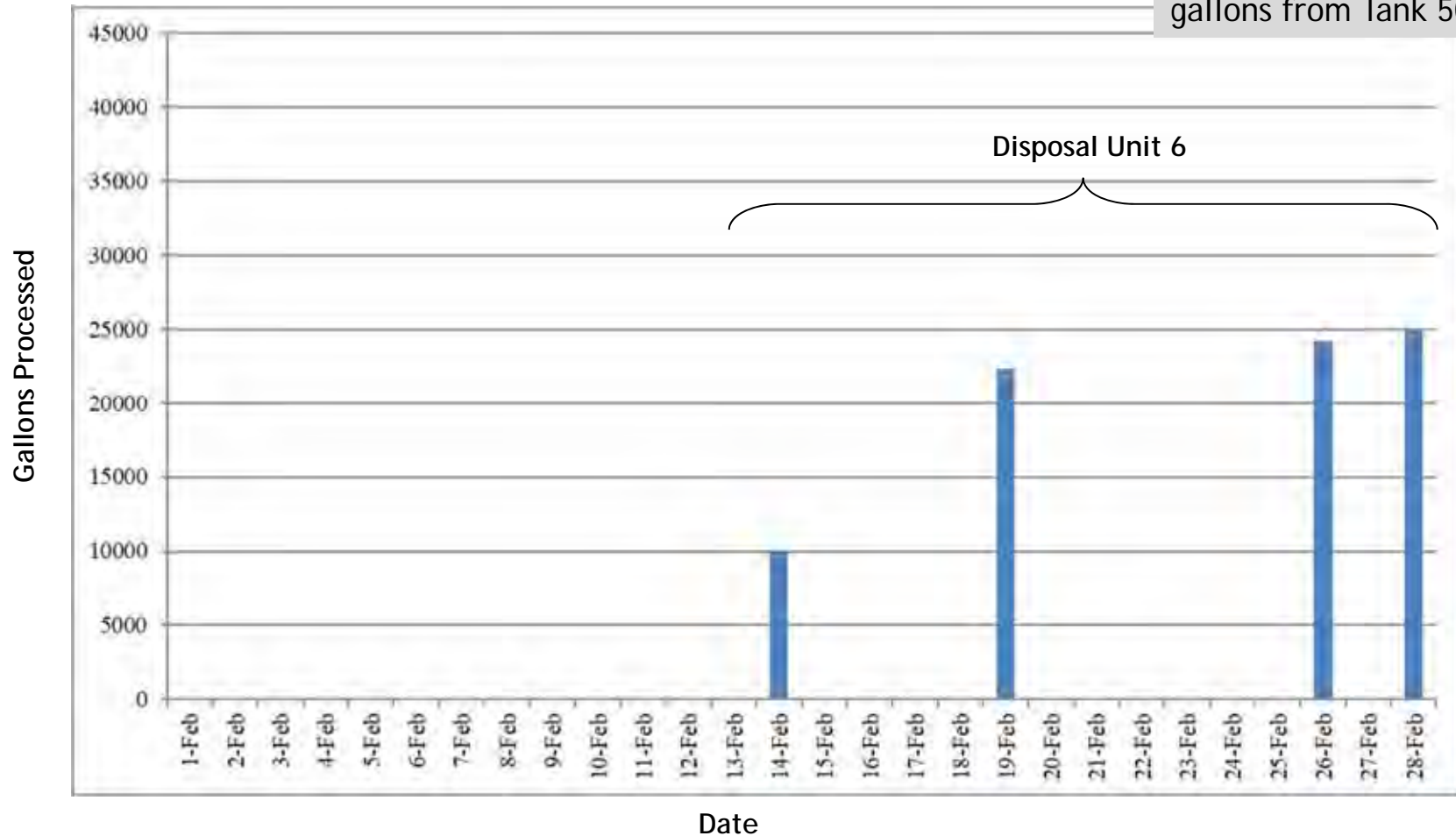


Salt Solution Processed



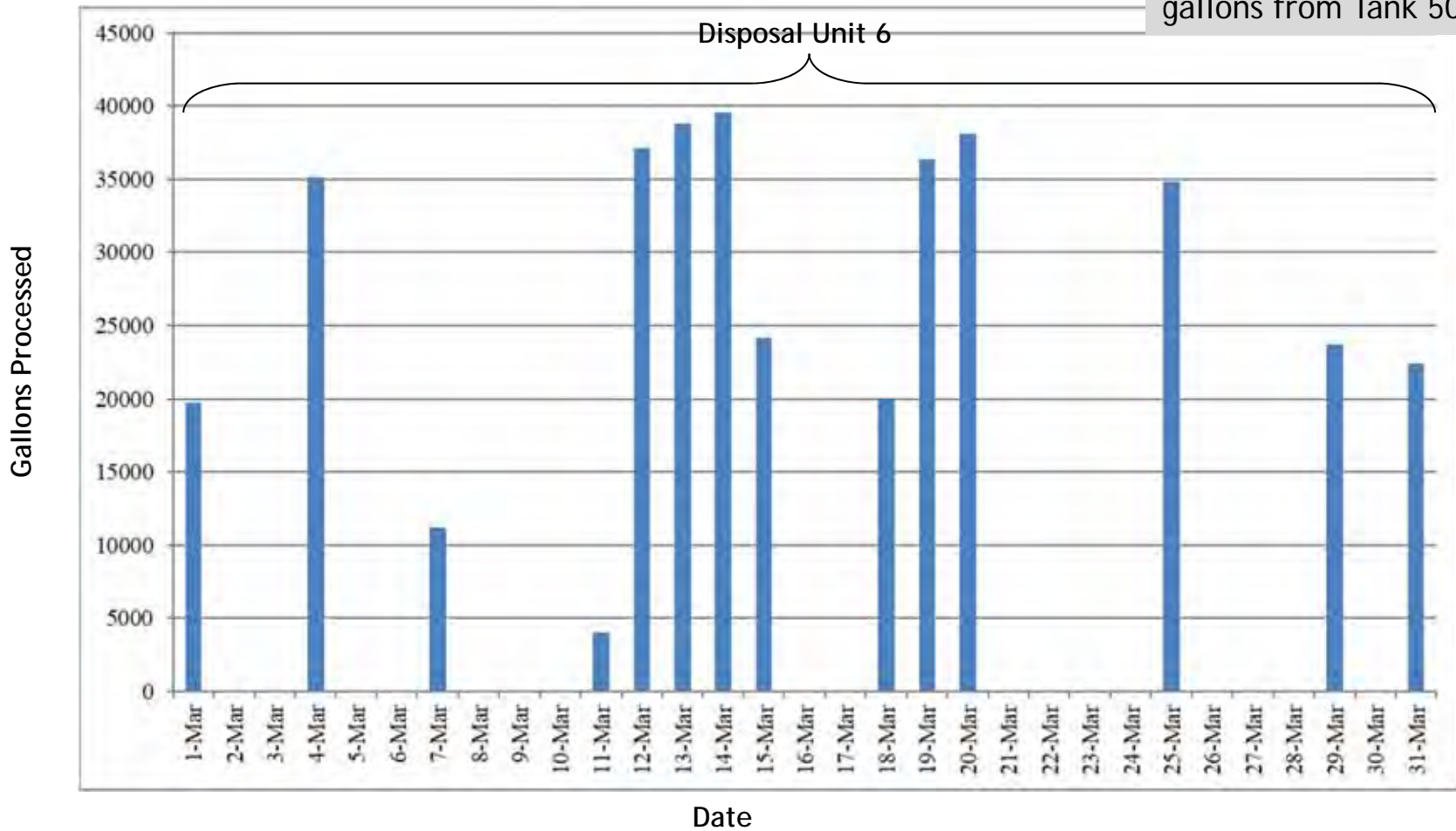
Salt Solution Processed

Processed 81,395
gallons from Tank 50

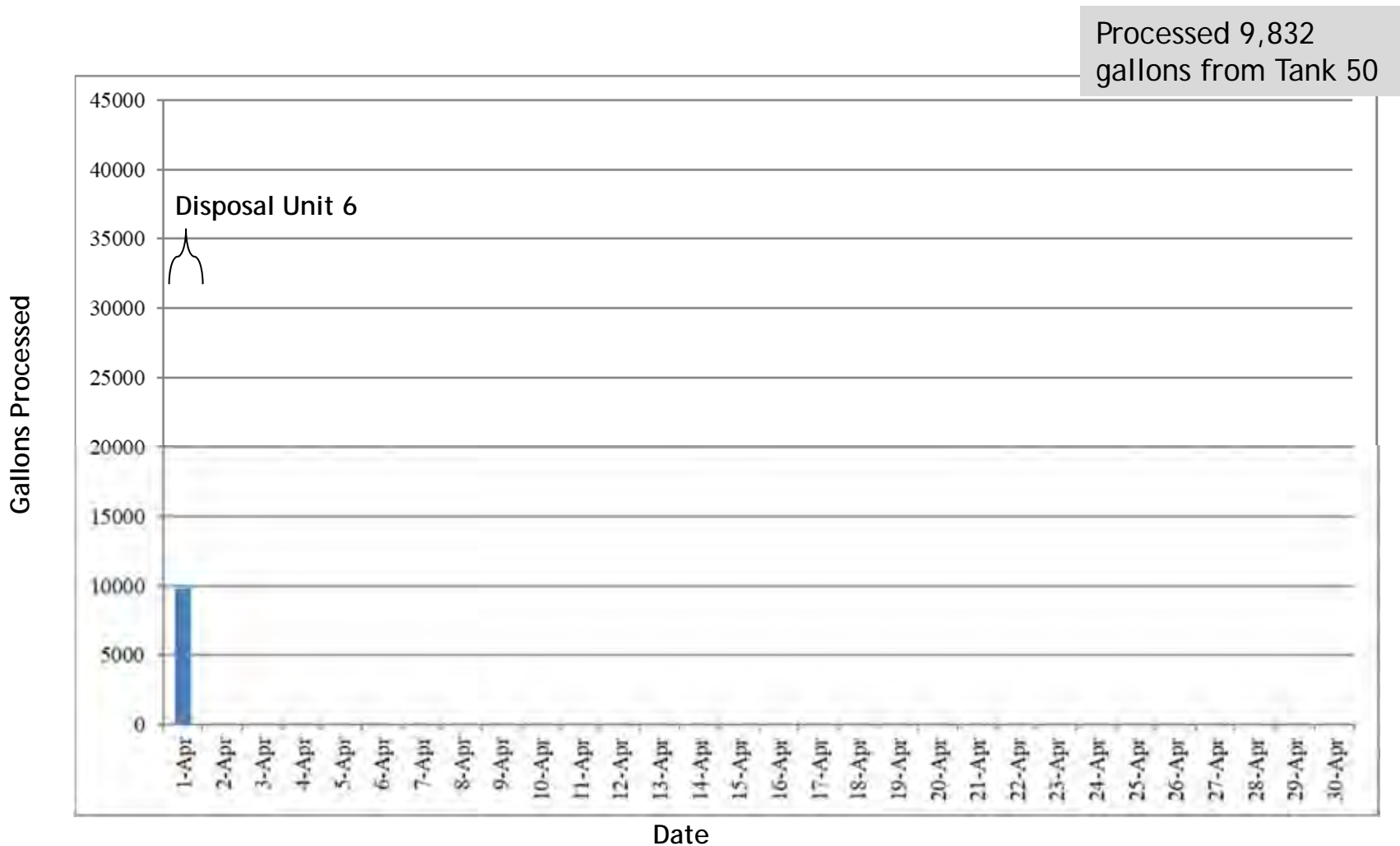


Salt Solution Processed

Processed 385,211
gallons from Tank 50

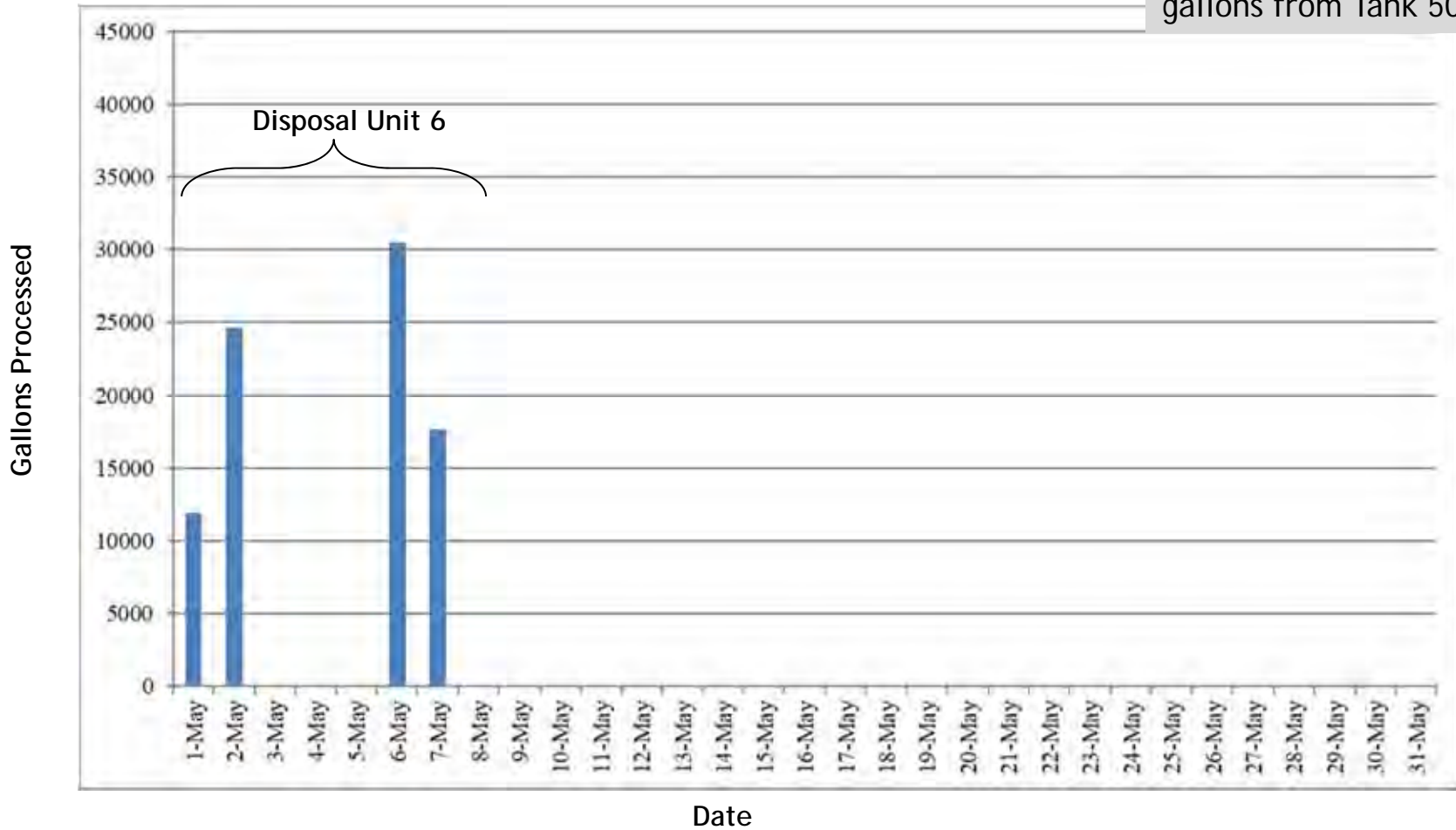


Salt Solution Processed

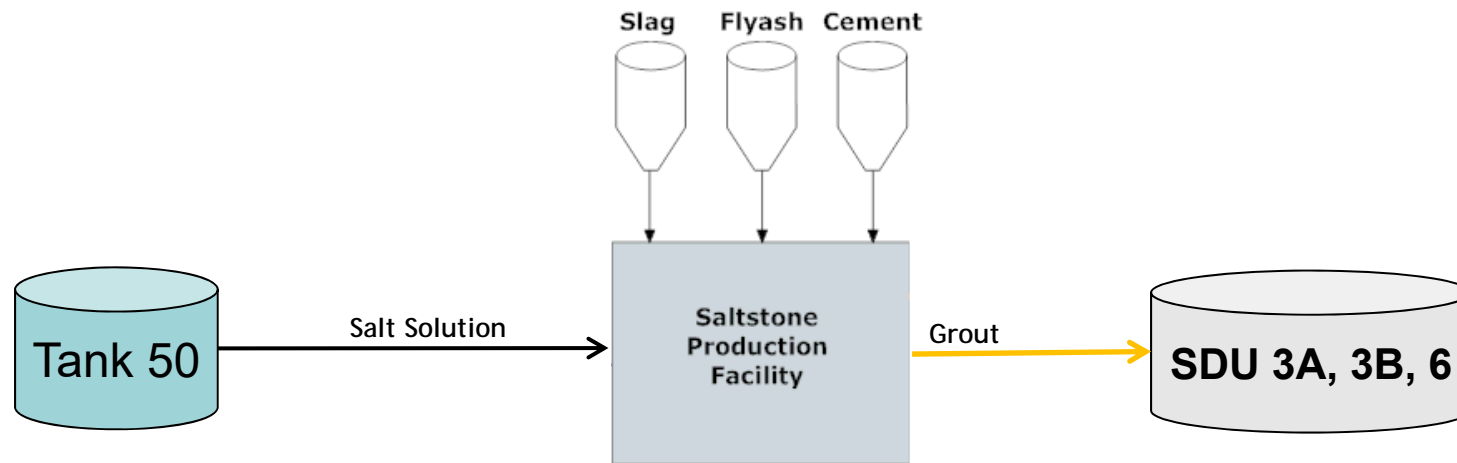


Salt Solution Processed

Processed 84,709
gallons from Tank 50



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

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

As of 9/12/2019

- 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*



* 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.

As of 9/12/2019

SDU 6 Status

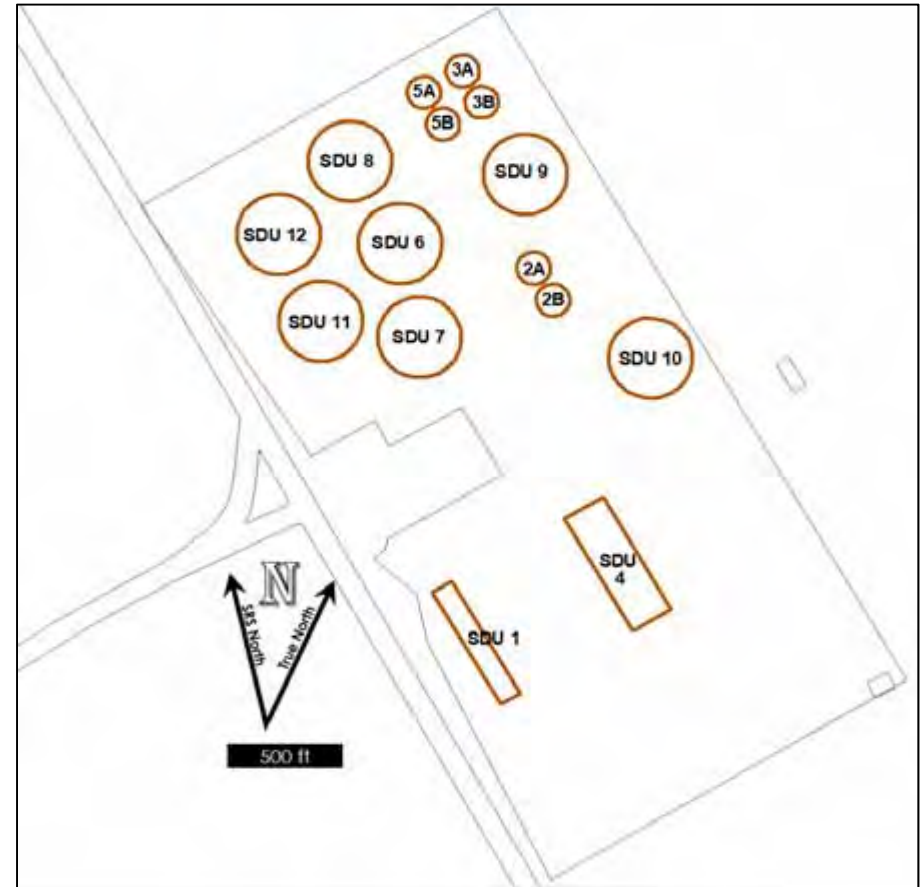
- SDU 6 began receiving Saltstone 8/2018
 - SDU 6 has received a total of ~1.3 million gallons of saltstone
- Total remaining space for saltstone
 - ~31.5 million gallons*



* 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 Construction



SDU 7 Construction

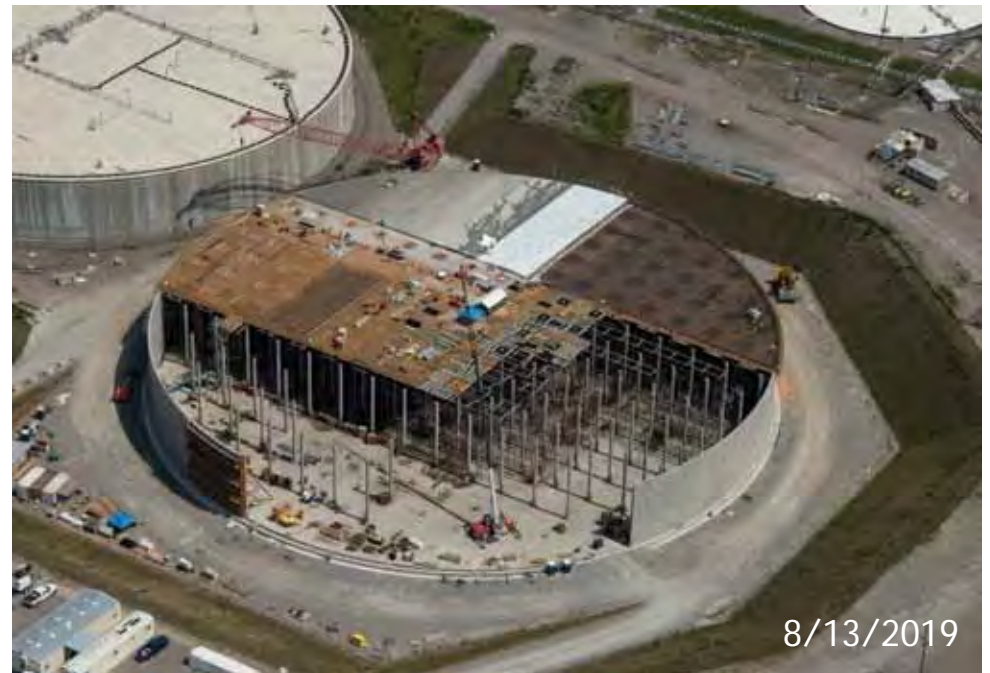
SDU 8 Excavation



New Trailers / Construction Facilities

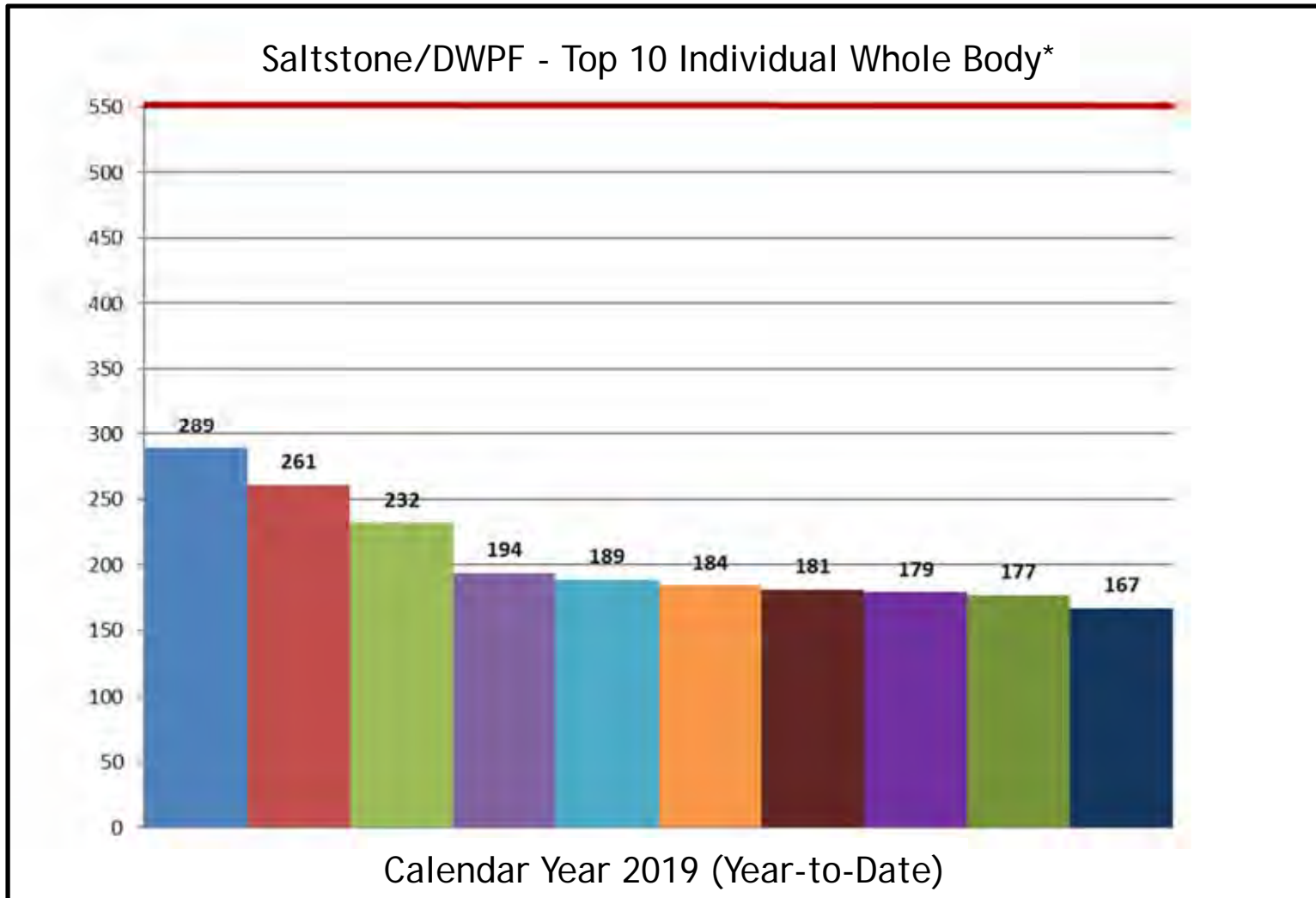
SDU 7 Status (as of 9/12/2019)

- 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

- 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



*Merged DWPF and Saltstone Staff in October 2013

Routine Document List

2018 Summary

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

SRNS-TR-2018-00140 (Midyear 2018)
SRNS-TR-2018-00292 (Annual 2018)

(2017 Environmental Report)
<http://www.srs.gov/general/pubs/ERsum/er17/index.html>

SRR-CWDA-2018-00085 (FY2018)
SRR-CWDA-2018-00072 (FY2018 Inventory)

<http://sro.srs.gov/saltstone.html>

SRNL-STI-2018-00204 (1Q-2018)
SRNL-STI-2018-00499 (2Q-2018)
SRNL-STI-2018-00650 (3Q-2018)
SRNL-STI-2019-00148 (4Q-2018)

SRR-CWDA-2017-00096 (FY2018)

SREL-R-18-0006, *Contaminant Leaching from Saltstone Simulants for 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*

Routine Document List

2019 Summary

Topical Area	Document	Approximate Availability/Frequency	
Groundwater	* SDF Annual Groundwater Report	January	← SRNS-TR-2019-00137 (Midyear 2019)
	* SDF Midyear-Groundwater Report	July	
	* SDF Performance Assessment Annual Review	March	
	* SRS Annual Environmental Report	September	
Air Monitoring	* SRS Annual Environmental Report	September	
Inventory	* SDF Performance Assessment Annual Review and Key Supporting Inventory References	March	← http://sro.srs.gov/saltstone.html
	* Saltstone Permit Website Reporting Data (http://sro.srs.gov/saltstone.htm)	Quarterly	
	*Salt Batch Qualification Reports#	As-Issued	
	* Tank 50 WAC Sample Analysis	Quarterly	
Performance Assessment Maintenance	* SRS Liquid Waste Facilities Performance Assessment Maintenance Annual Implementation Plan	March	← SRNL-STI-2019-00033 (1Q-2019)
	*SDF Performance Assessment Annual Review (includes the following): -Inventory -Unreviewed Waste Management Question Evaluations Performed -Research and Development Performed -Research and Development Planned	March	
Research and Development Testing/Studies	Various Reports	As-issued (Typically, September through December)	← SRR-CWDA-2018-00092 (FY2019)

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.

■ 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**

■ 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

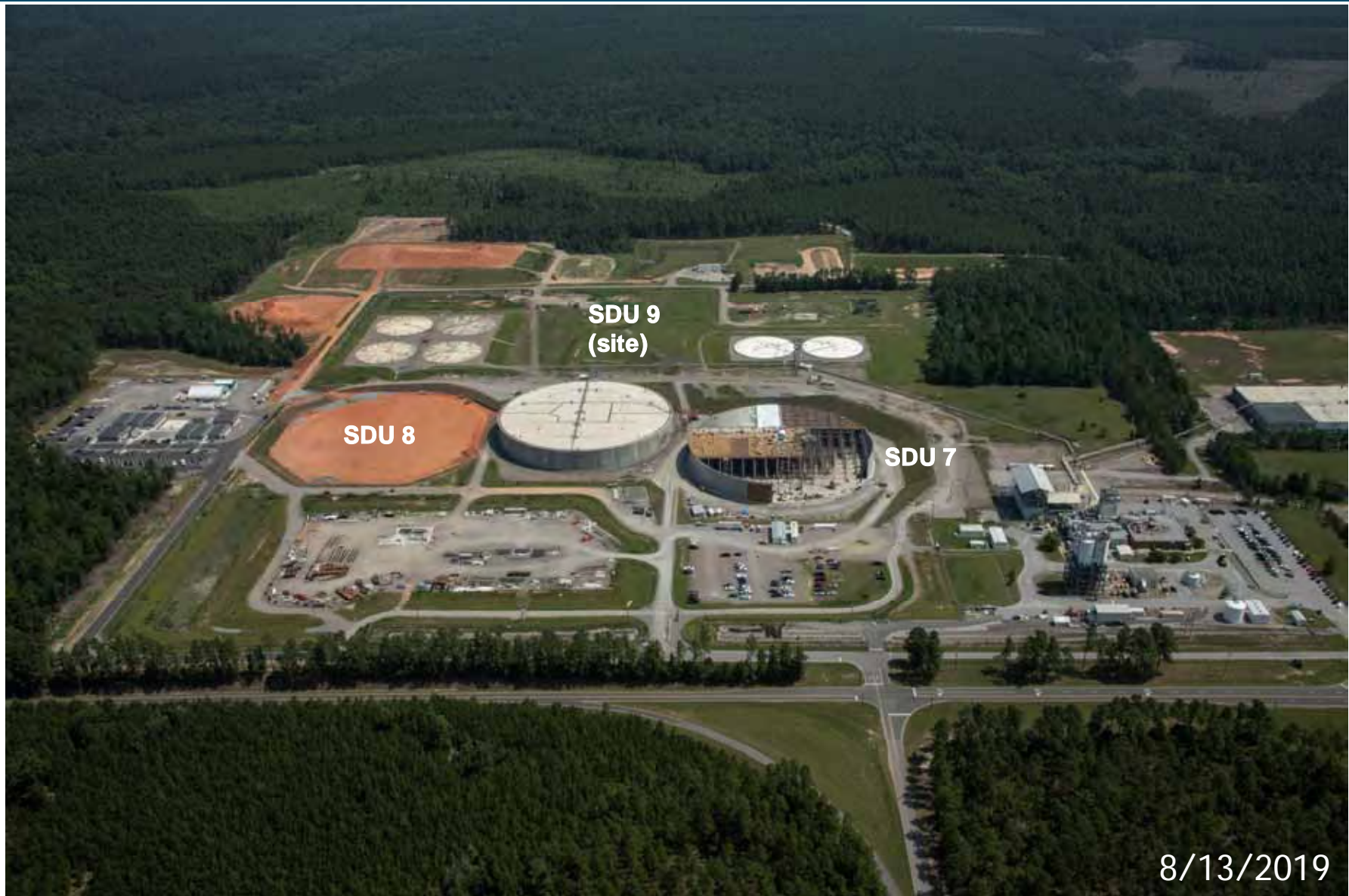
- DOE to provide NRC a velocity field and cross-section through Z-Area. [NRC AI # SDF-CY-16-01-013]
 - Requested information will be provided in the SDF Performance Assessment revision.
 - Anticipated to be provided to NRC in the first quarter of calendar year 2020.

- 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



Saltstone Disposal Facility Field Observation



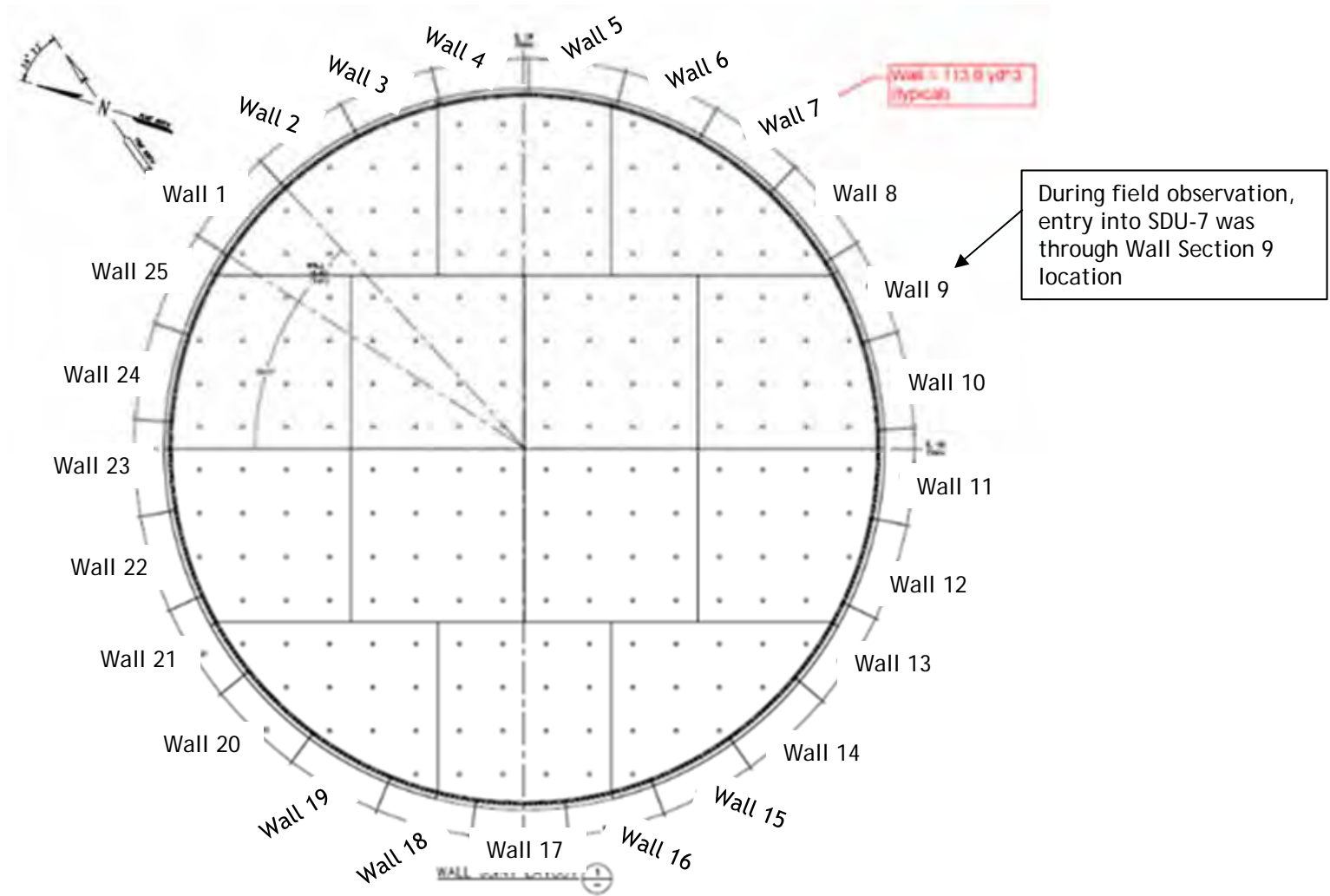
NRC Observation Visit Outbrief

- NRC Staff Outbrief
- Action Items Captured
- Closing Statements

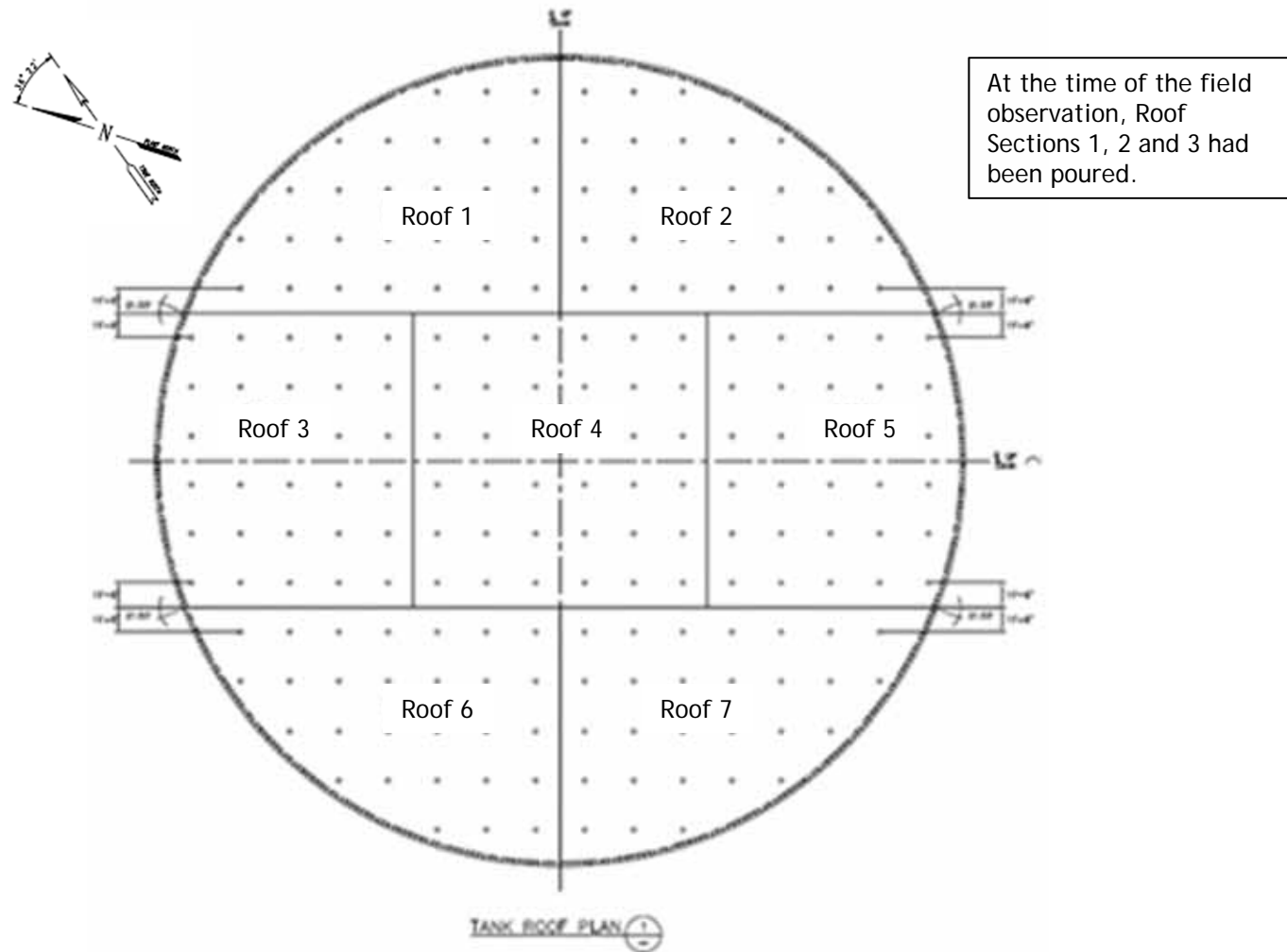
■ Action Items

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.

Photographs from the SDU-7 Field Observation

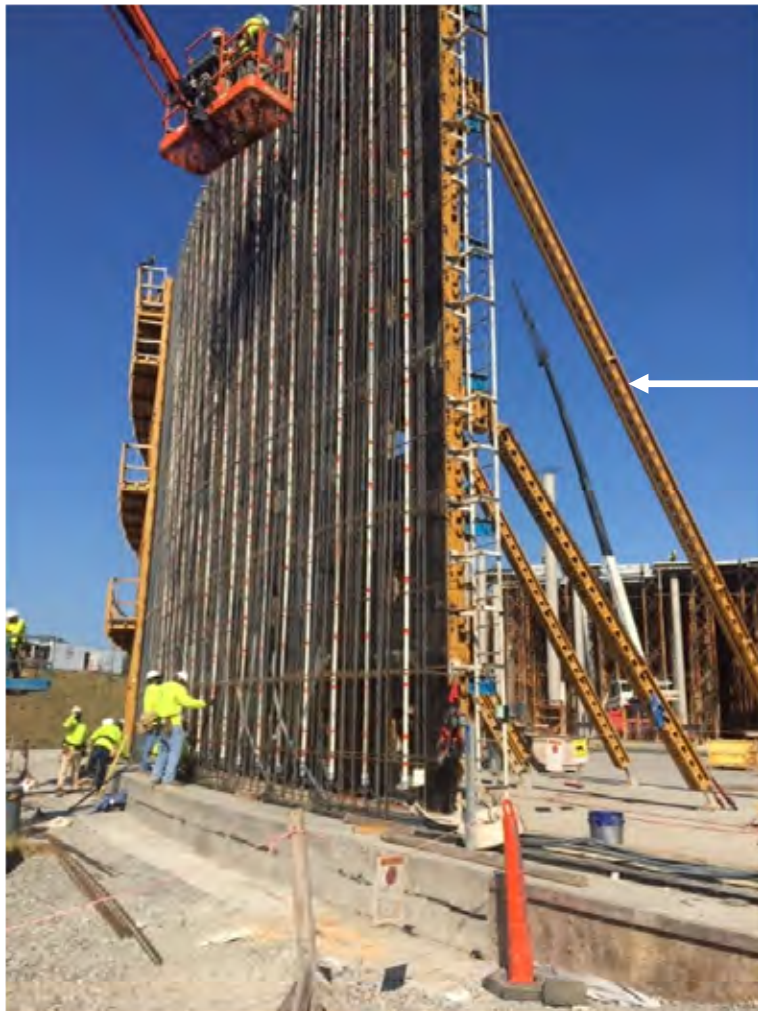


SDU-7 Wall Sections



SDU-7 Roof Sections

Wall Section 10



Wall Form
Bracing



Action Item #3



Bearing Pads

Vertical
Tensioning
Channels

Wall Section 10



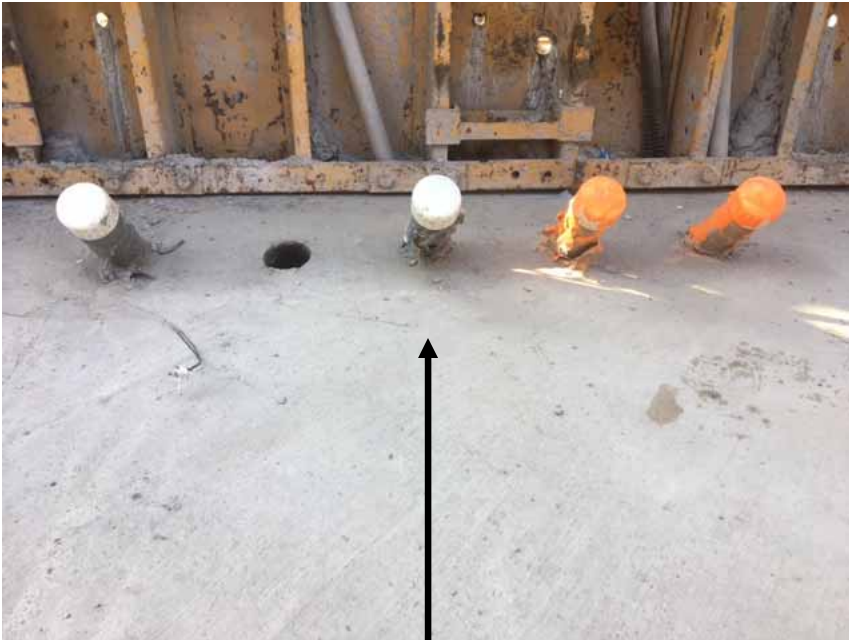
Seismic Cables



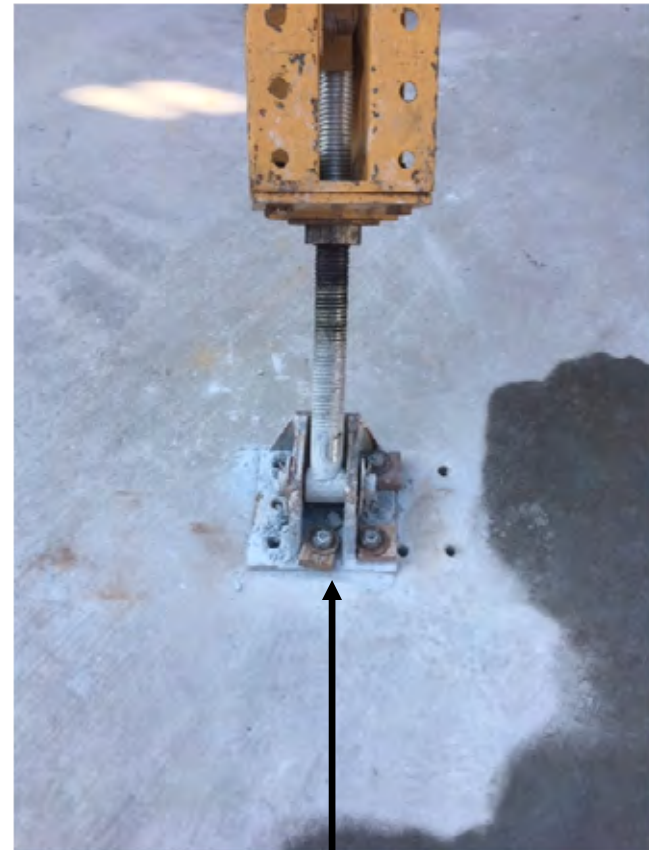
Shotcrete Piping - Exterior



Shotcrete Piping - Interior



Shotcrete Piping - Interior

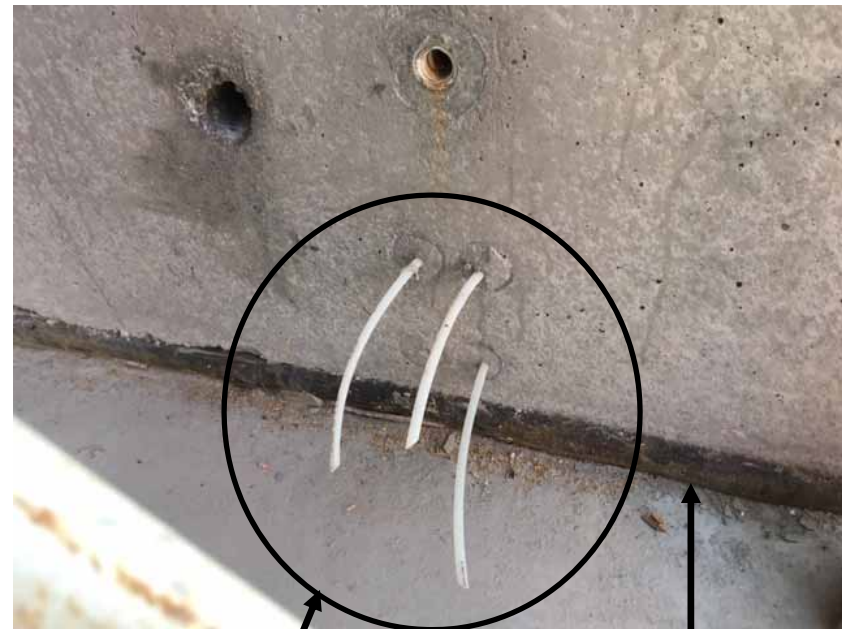


Wall Form Brace Footer



Form Tie Holes

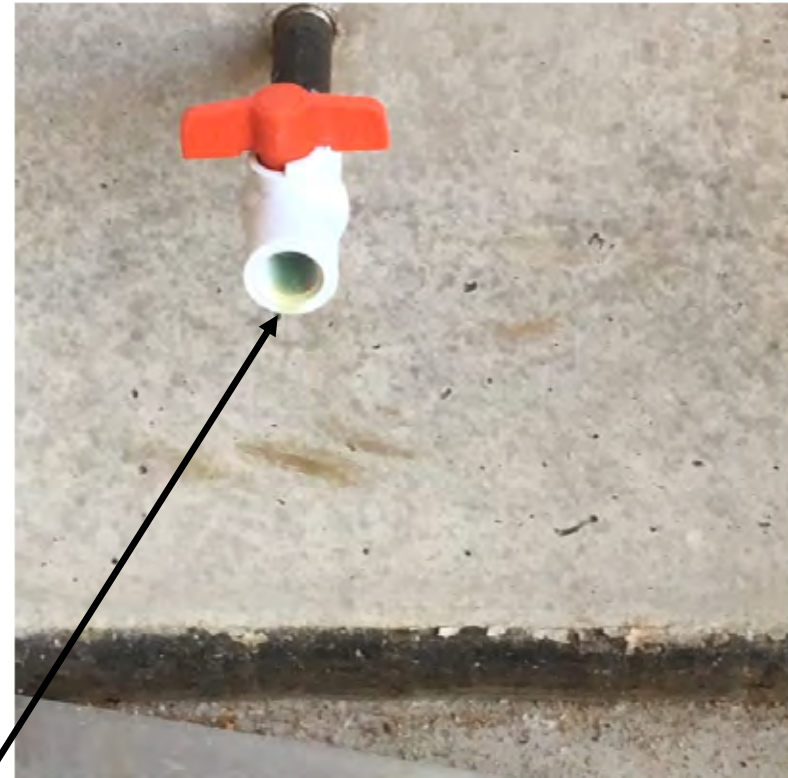
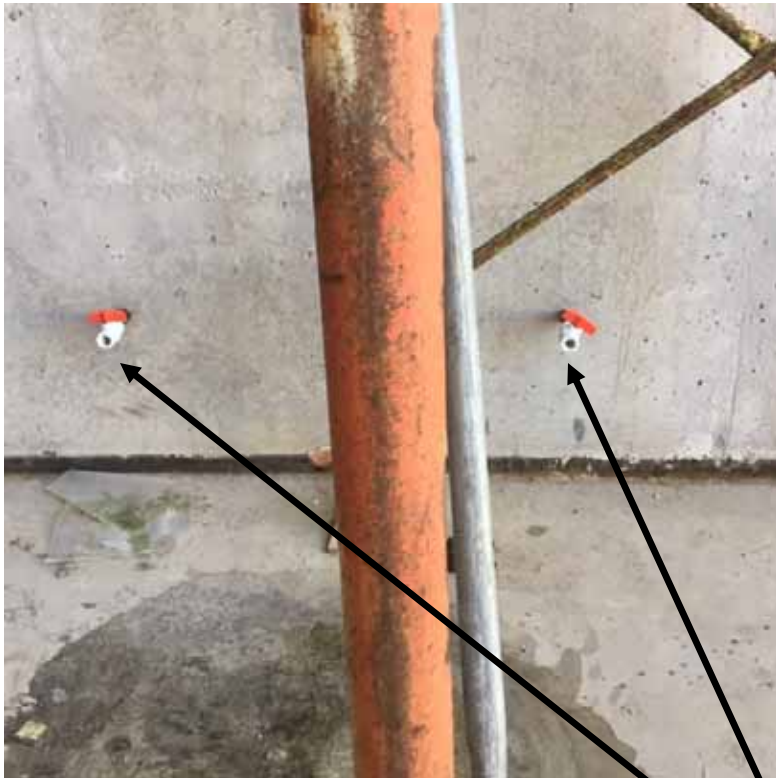
Wall Section 8



Epoxy Injection
Tubing- Interior

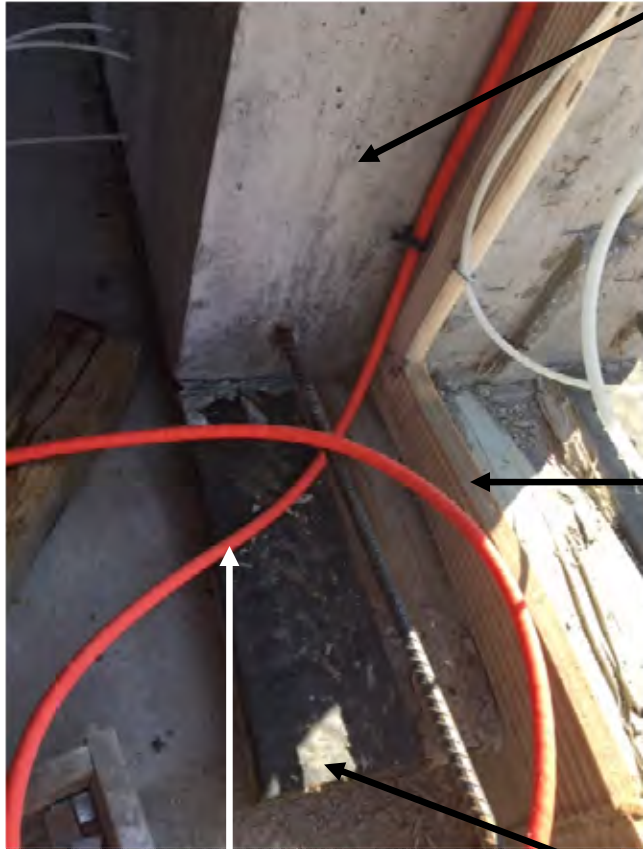
Bearing Pad

Wall Section 8



Epoxy Injection Port -
Vertical Tensioning Channel

Wall Section 8



Epoxy Injection Tubing



Water Stop

Wall Bearing Pads



SDU 7 Interior Looking East



SDU 7 Interior Looking East

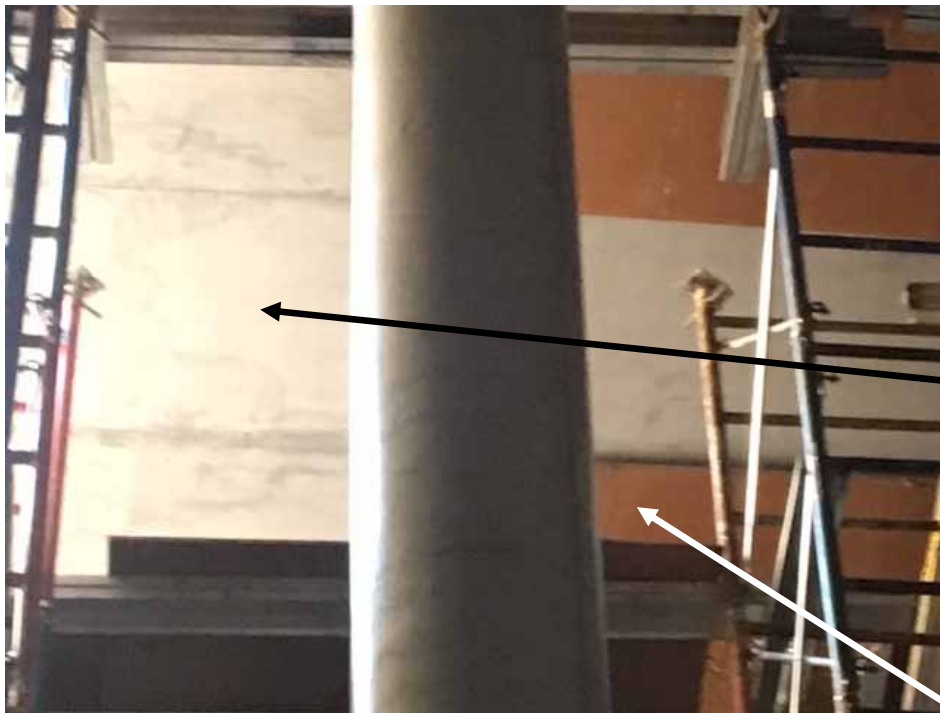


Epoxy Injection
Tubing - Floor



SDU 7 Interior Looking West

Roof Section 1 (Bottom Side)

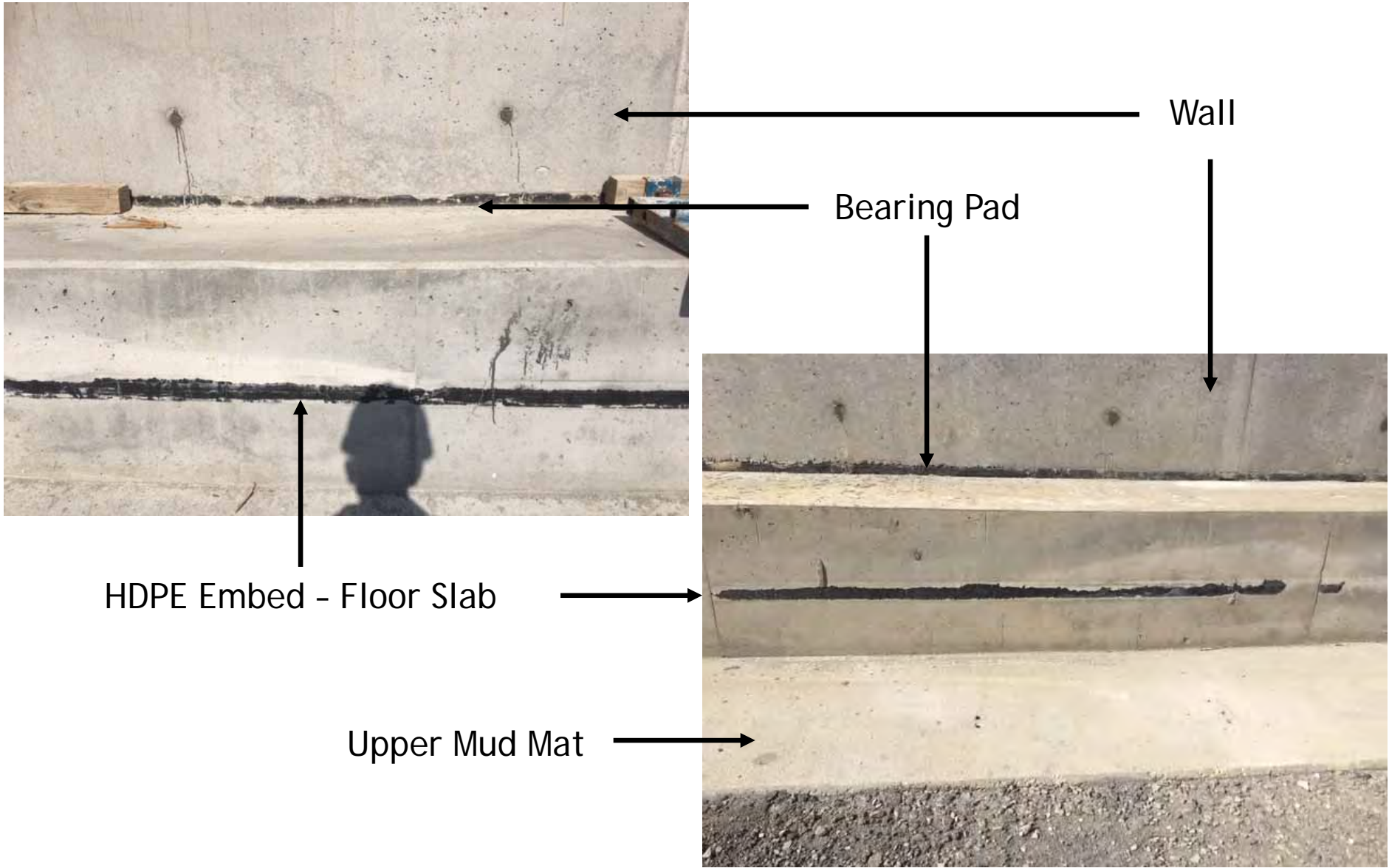


Roof
(concrete)

Roof Decking
(concrete form)

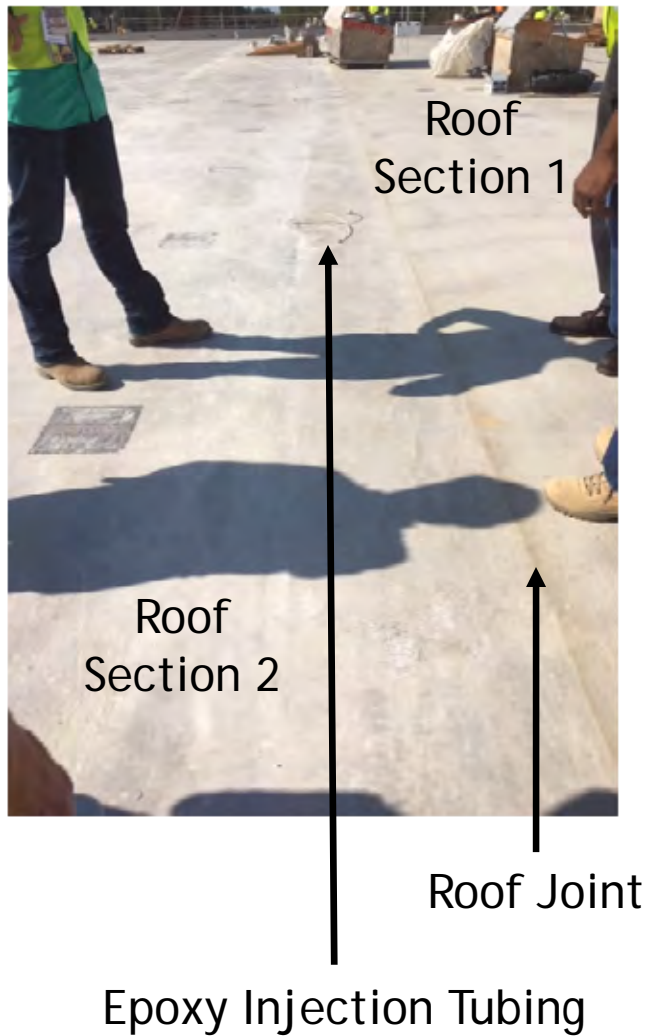


Action Item #3





Epoxy Injection Tubing - Roof





Roof Section 2

Wall Thermocouple
Channel



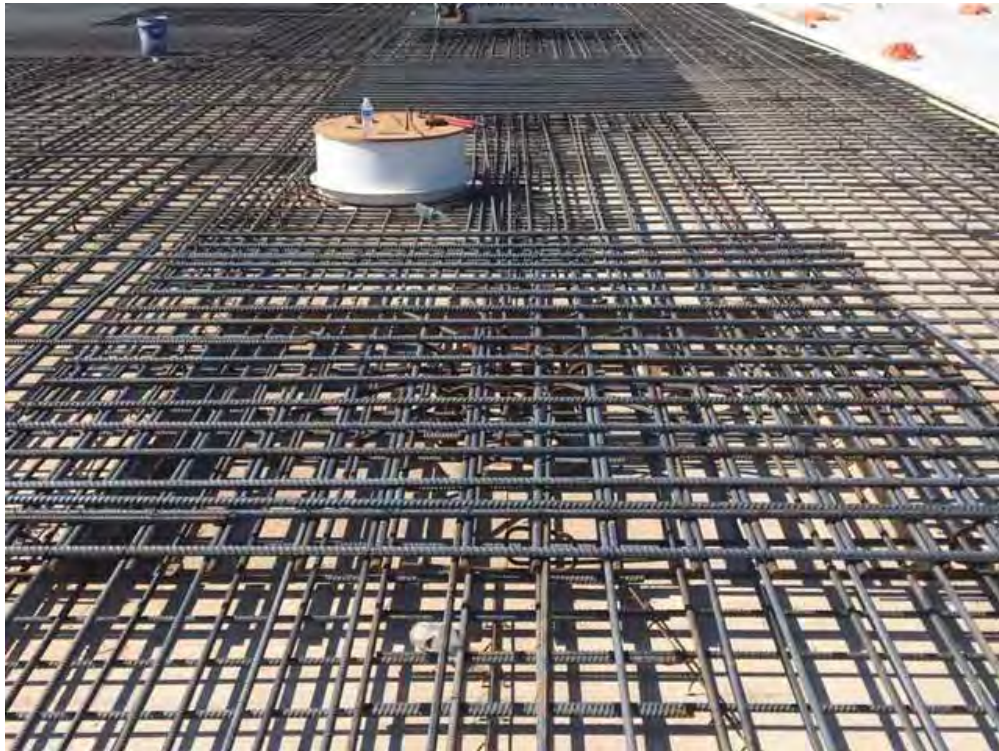
Roof Section 1

Roof Hatch

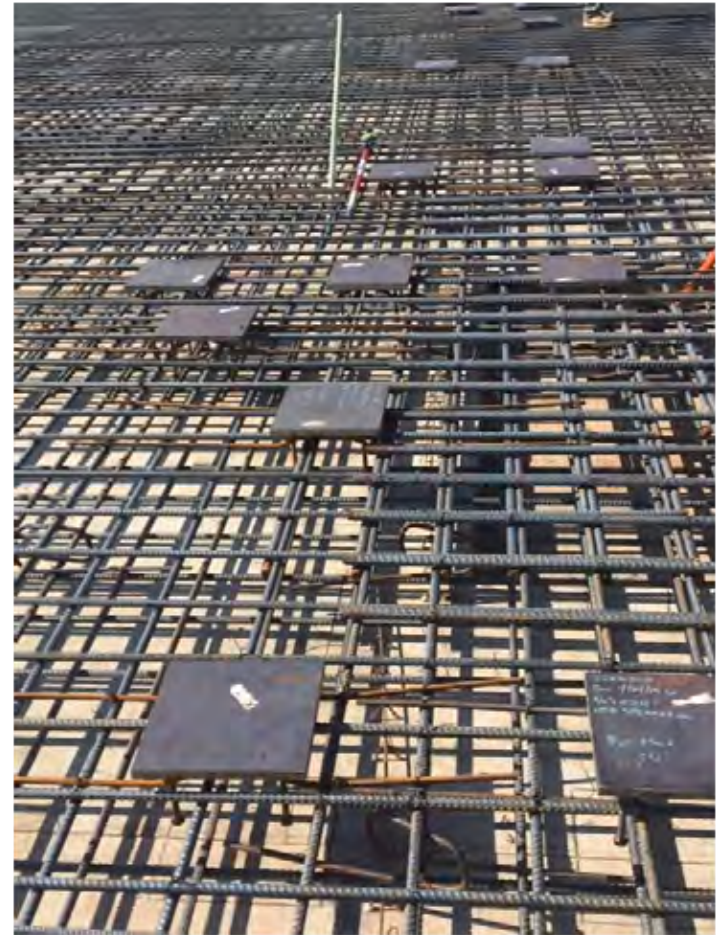


Roof Section #3 Under Water Cure

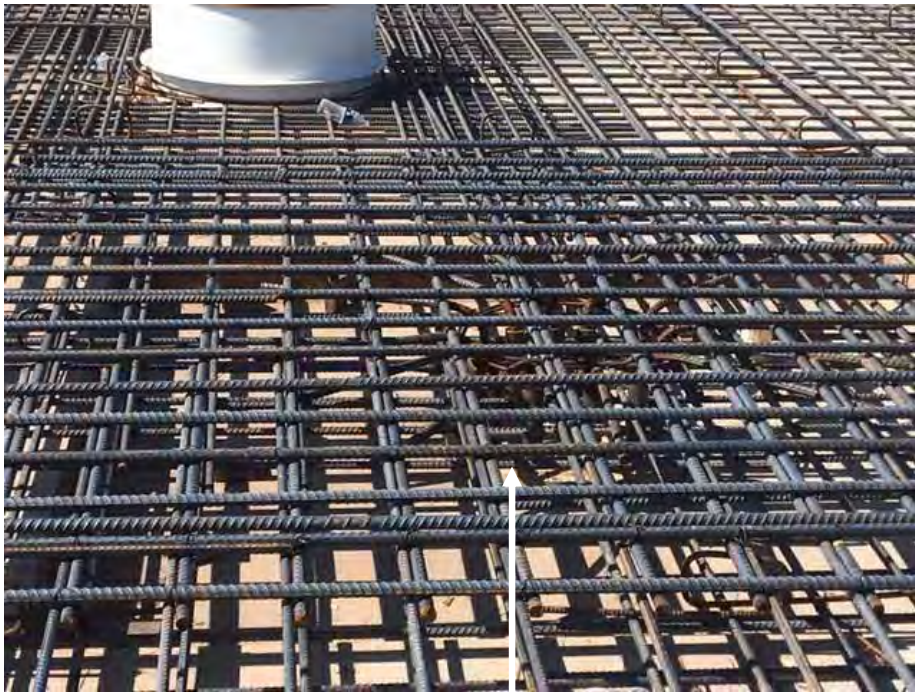
Roof Section 4



Reinforcing Bar Installation Over Column



Embed Installation



Roof - Column Reinforcing Bar Tie-In
(Typical)

Roof Section 4



Action Item #3



Roof Section 2

Roof Section 5

Roof Joint Water Stop

Roof Joint Epoxy
Injection Tubing



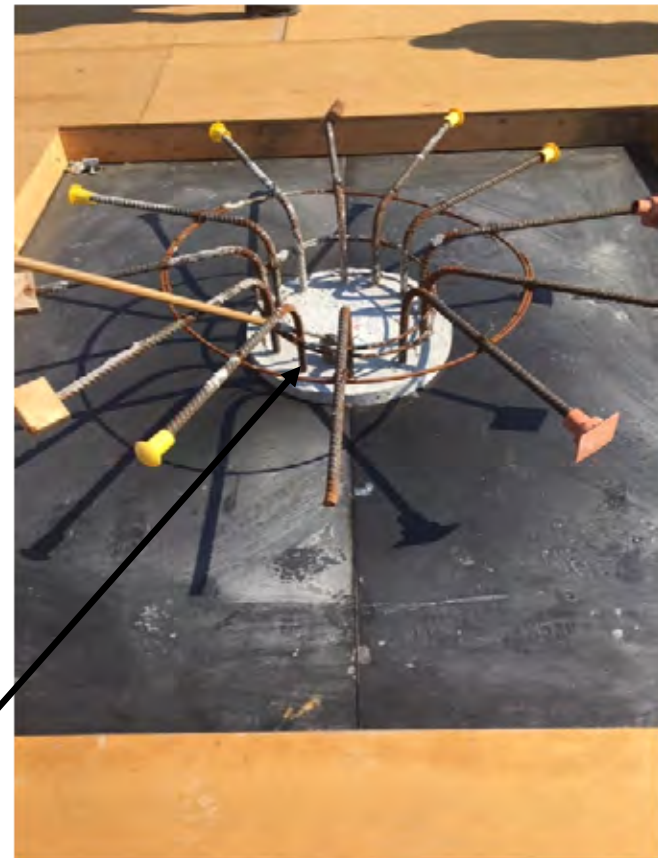
Roof Section 2

Roof Section 5



Roof Section #4 Reinforcing Bar
Installation

Roof Section 5



Top of Columns

Roof Section 5

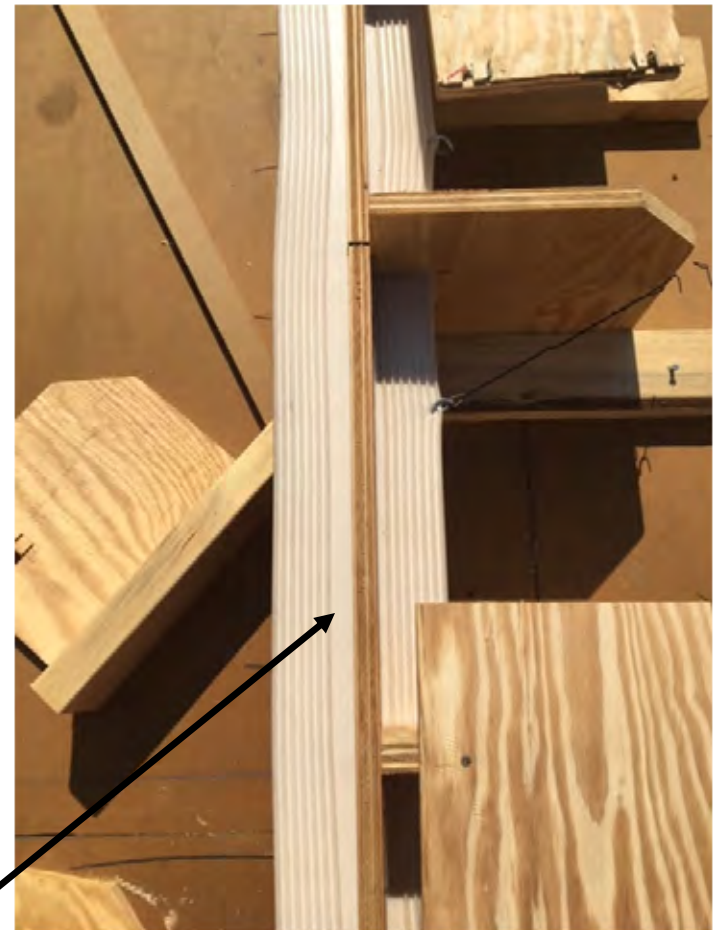
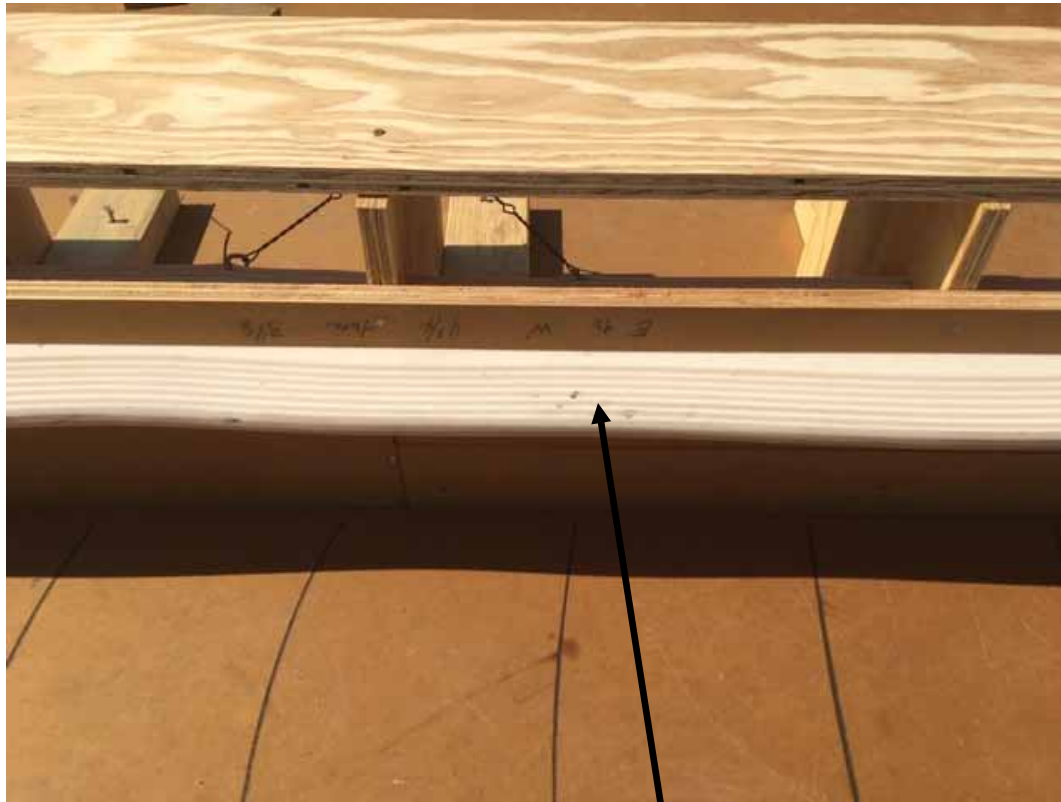


Pre-Tensioning Channel Caps



Water Stop at Edge of Roof

Roof Section 5



Roof Forms with Embedded Water Stop

SDU 9 Excavation



SDU 6



Looking North from SDU 7 Roof



Looking North from SDU 7 Ground Level