

SAVANNAH RIVER SITE SALT WASTE DISPOSAL NRC ONSITE OBSERVATION VISIT APRIL 19-21, 2016

SRR-CWDA-2016-00052, Revision 1





Savannah River Site Salt Waste Disposal NRC Onsite Observation Visit

We do the right thing.

April 19, 2016

SRR-CWDA-2016-00052, Revision 1

We do the right thing.

NRC Salt Waste Disposal Onsite Observation			
Tuesday, April 19, 2016			
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	<u>Saltstone Facility Status [5,7]</u> • Operating Status • Disposal Unit Status	705-1C, Room 34 A-B
9:30	10:15	<u>Monitoring Activities [F1]</u> • Routine Documentation • Action Item Status	705-1C, Room 34 A-B
10:15	11:00	<u>Technical Discussions [8,9]</u> • Blast Furnace Slag • Tank 50 WAC Documentation	705-1C, Room 34 A-B
11:00	12:30	Lunch	766-H
12:30	2:00	<u>SDF Tour [4a, 4b, 6]</u> • Z-Area Perimeter • McQueen Branch & UTR	Z-Area
2:00	4:00	<u>Technical Discussions [2a, 2b]</u> • Groundwater Monitoring Report • Groundwater Characterization Data	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
[ML16074A343]

We do the right thing.

NRC Salt Waste Disposal Onsite Observation			
Wednesday, April 20, 2016			
Start	End	Topic	Location
8:00	8:45	Travel	Meet 703-46A
8:45	9:00	Inbrief	705-1C, Room 34 A-B
9:00	11:00	<u>Technical Discussions [1]</u> • RAI Responses	705-1C, Room 34 A-B
11:00	12:30	Lunch	766-H
12:30	2:30	<u>Technical Discussions [1]</u> • RAI Responses	705-1C, Room 34 A-B
2:30	4:30	<u>SREL Tour [4c]</u> • Saltstone Property Testing	SREL
4:30	4:45	Travel/NRC Depart	703-46A

(#) - Activity number from
NRC Observation Guidance
[ML16074A343]

We do the right thing.

NRC Salt Waste Disposal Onsite Observation			
Thursday, April 21, 2016			
Start	End	Topic	Location
8:00	8:45	Travel	Meet 703-46A
8:45	9:00	Inbrief	705-1C, Room 34 A-B
9:00	11:00	<u>Research Results [3a,b,c]</u> <ul style="list-style-type: none"> • Saltstone Core Samples • SREL Doc No. R-15-0003 • SRRA042328-00004 	705-1C, Room 34 A-B
11:00	12:30	Lunch	766-H
12:30	2:00	<u>Follow-up Discussions</u> <ul style="list-style-type: none"> • As-Needed 	705-1C, Room 34 A-B
2:00	2:30	NRC/SCDHEC Internal Review	705-1C, Room 34 A-B
2:30	3:00	Outbrief	705-1C, Room 34 A-B
3:00	3:15	Travel/NRC Depart	703-46A

(#) - Activity number from
NRC Observation Guidance
[ML16074A343]

■ Activities

1. The NRC and DOE to selectively discuss the DOE Responses (not yet received by the NRC) to the *NRC Request for Additional Information* (ADAMS Accession No. ML15161A541) for the *DOE Fiscal Year 2014 Special Analysis for Saltstone Disposal Facility at the Savannah River Site* (SRR-CWDA-2014-00006, Rev. 2) (ADAMS Accession No. ML14316A586).
2. Update on Z-Area groundwater monitoring and characterization data, including:
 - a) Discuss certain results of *2015 Annual Groundwater Monitoring Report* (SRNL-TR-2015-003000).
 - b) Discuss *2016 Groundwater Characterization Data Report* (SRNS-RP-2015-00902), comparison of observed vs. as-modeled SDF hydrogeology, and potential effects on projected subsurface transport of radionuclides.

[*Onsite Observation Guidance for April 19-21, 2016, Monitoring Visit to the Savannah River Site, Saltstone Disposal Facility (Docket No. PROJ0734), ML16074A343.*]

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■ Activities (Cont'd)

3. Review recent research results developed since the previous onsite observation visit, including, but not limited to;
 - a) Laboratory testing of saltstone core samples.
 - b) *Chemical and Physical Properties of Tc-Spiked Saltstone as Impacted by Curing Duration and Leaching Atmosphere* (SREL Doc No. R-15-0003).
 - c) *Examination of Tc, S, and Fe Speciation within Saltstone* (SRRA042328-000004).
4. Tour the site, including:
 - a) View SDS 3A, SDS 3B, SDS 5A, and SDS 5B and view construction of SDS 6.
 - b) Z-Area perimeter and locations where the road intersects McQueen Branch and the Upper Three Runs.
 - c) Research and development activities being conducted at Savannah River Ecology Laboratory relating to saltstone cementitious property testing, including activities involving core samples extracted from SDS 2A.

[Onsite Observation Guidance for April 19-21, 2016, Monitoring Visit to the Savannah River Site, Saltstone Disposal Facility (Docket No. PROJ0734), ML16074A343.]

We do the right thing.

■ Activities (Cont'd)

5. Discuss the status of operations at SDF since last onsite observation visit, including volume of grout poured, current status of SDS 4, status of the leak detection system in SDS 3A, and any unusual occurrences (e.g., visual inspection results, production issues, worker protection).
6. If saltstone is being poured, then observe saltstone production facility operations.
7. Discuss SDS 6 construction and testing.
8. Discuss the DOE switch from Grade 100 to grade 120 slag as well as the DOE change in slag vendor.

[Onsite Observation Guidance for April 19-21, 2016, Monitoring Visit to the Savannah River Site, Saltstone Disposal Facility (Docket No. PROJ0734), ML16074A343.]

We do the right thing.

■ Activities (Cont'd)

9. The DOE to discuss changes to Tank 50 Waste Acceptance Criteria (WAC) sample documentation that are in progress, which will allow the DOE to get the sample analysis results to the NRC in a more timely fashion.

■ Follow-Up Action Items

1. The DOE will provide the NRC with information on SDS 3A, SDS 3B, SDS 5A, and SDS 5B fill height restrictions related to resolution of mercury Potential Inadequacy in Safety Analysis (SDF-CY15-02-001).

[Onsite Observation Guidance for April 19-21, 2016, Monitoring Visit to the Savannah River Site, Saltstone Disposal Facility (Docket No. PROJ0734), ML16074A343.]

Technical Discussions: 4/19/2016 (am)

- (5) - Saltstone Operations / Disposal Unit Status
- (7) - SDU 6 Construction / Testing Status
- (F1) - Update status of Routine Documentation/Action Items
- (8) - Discuss switch from Grade 100 to Grade 120 Slag
- (9) - Discuss changes to Tank 50 Waste Acceptance Criteria sample documentation

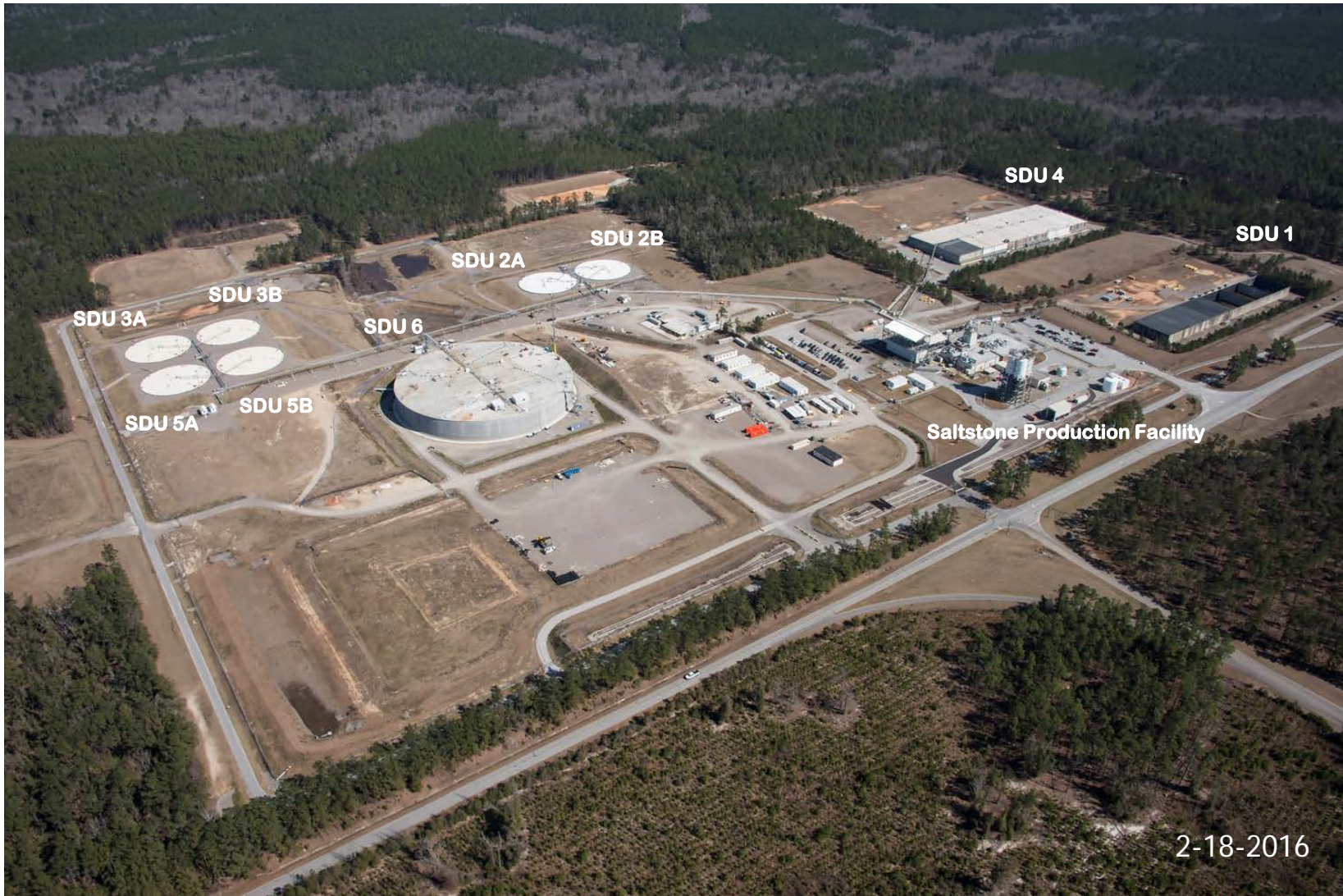
(#) - Activity number from
NRC Observation Guidance
[ML16074A343]

Saltstone Facility Status

- Operational Status
- Saltstone Disposal Unit (SDU) Status
 - SDU 2
 - SDU 3 & 5
 - SDU 6
 - SDU 4 (i.e., Vault 4)
 - Vault 4 Stabilization
- Worker Dose

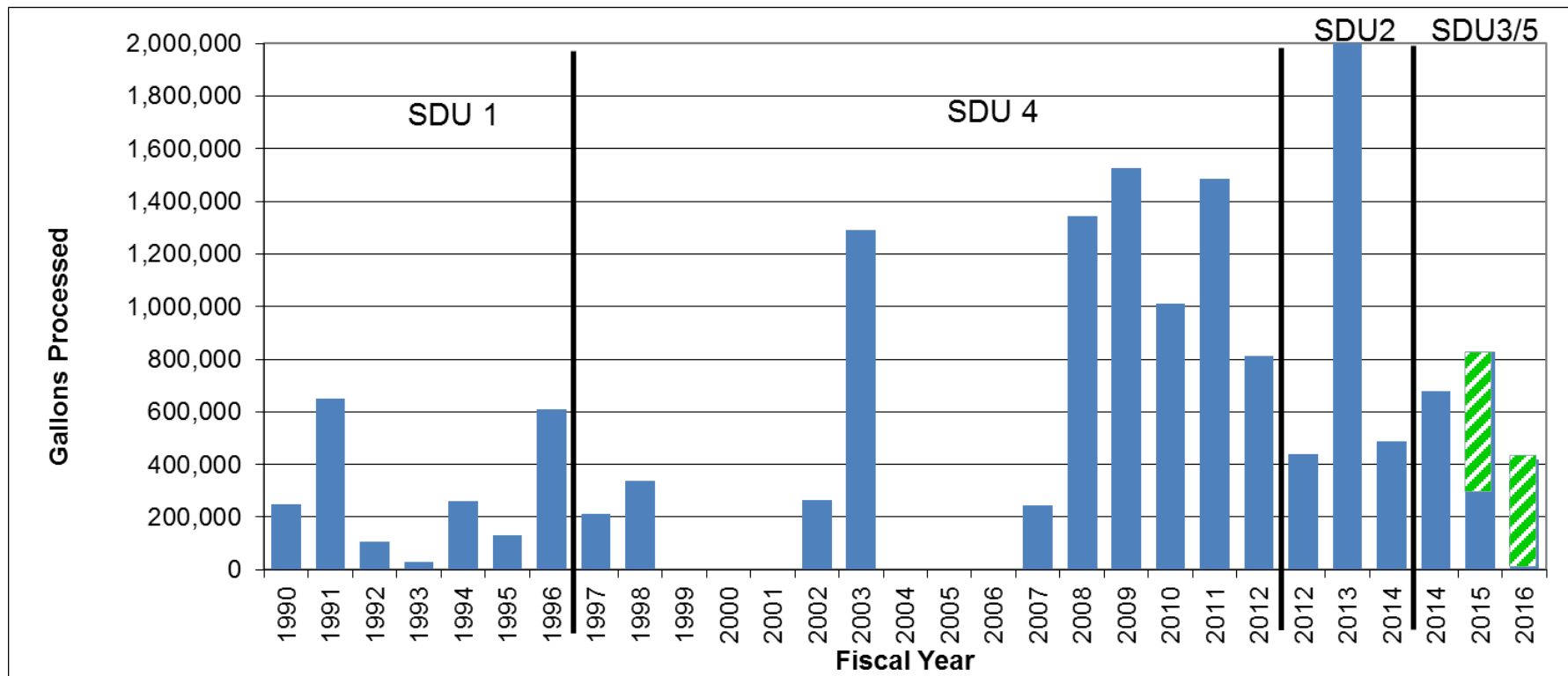
Saltstone Facility


We do the right thing.



We do the right thing.

Salt Solution Processed



 Processed after 7/2015 NRC visit

As of 4/15/2016

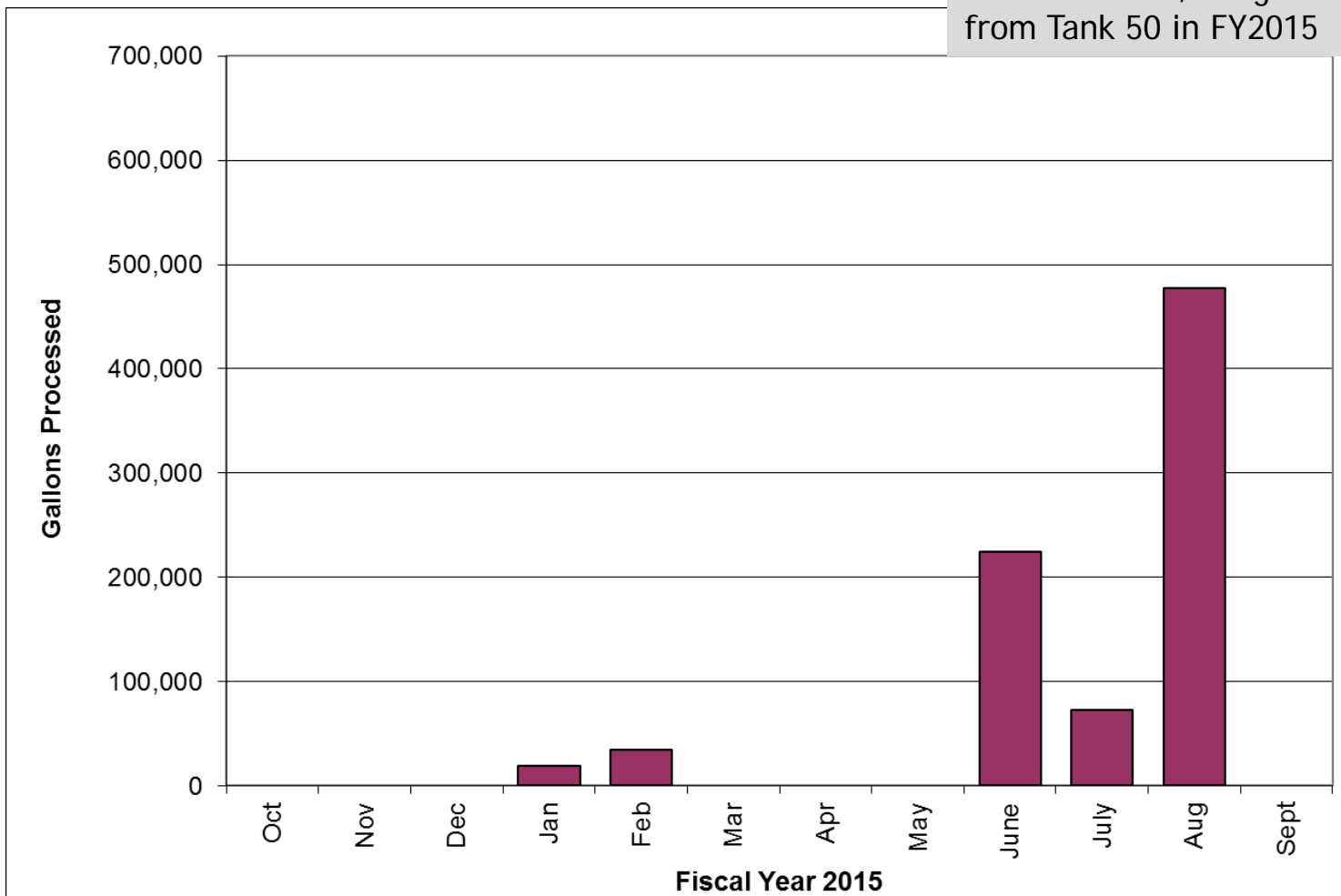
(SDU)-Saltstone Disposal Unit

Operational Status: SPF Operations FY2015

We do the right thing.

Salt Solution Processed

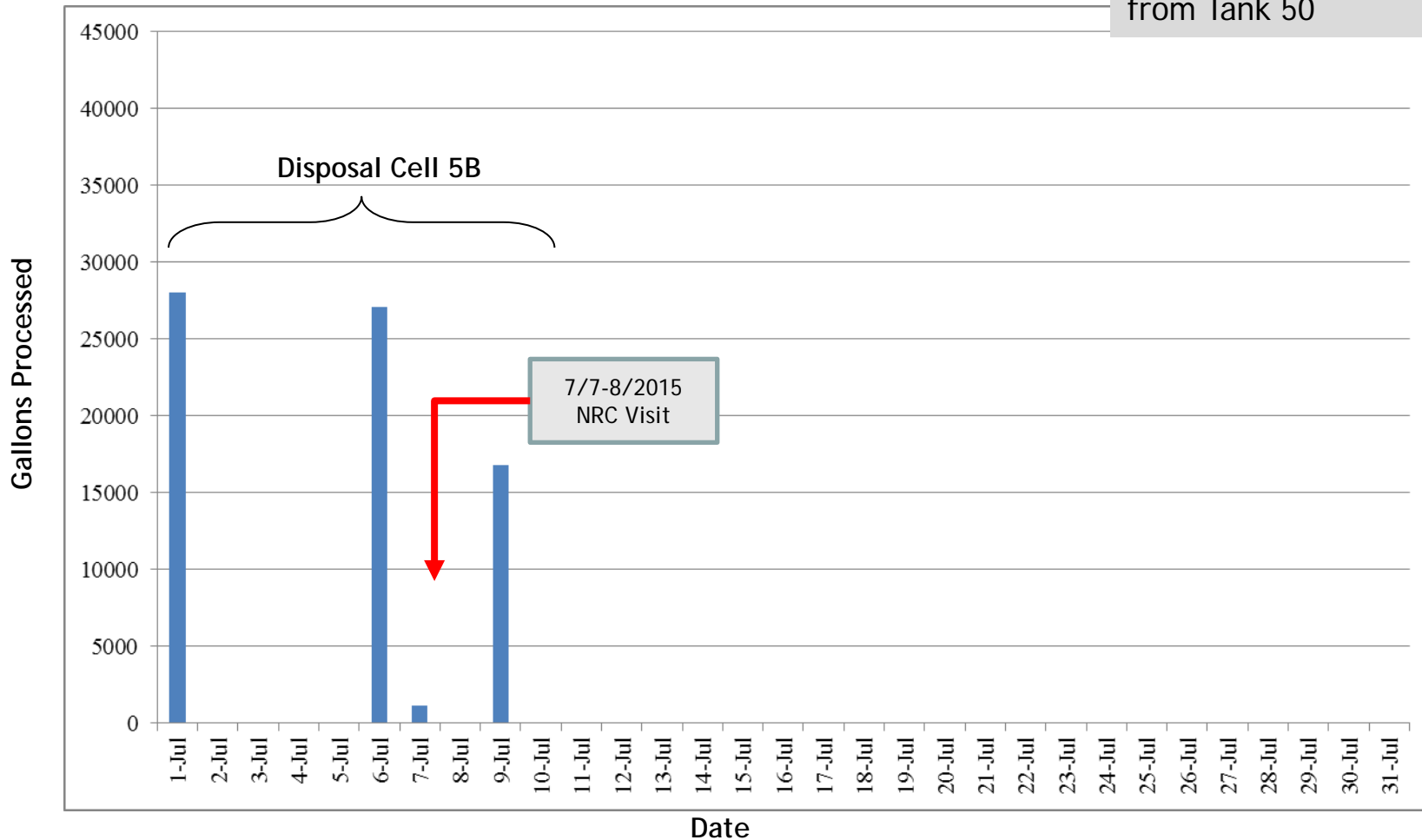
Processed 828,128 gallons
from Tank 50 in FY2015



We do the right thing.

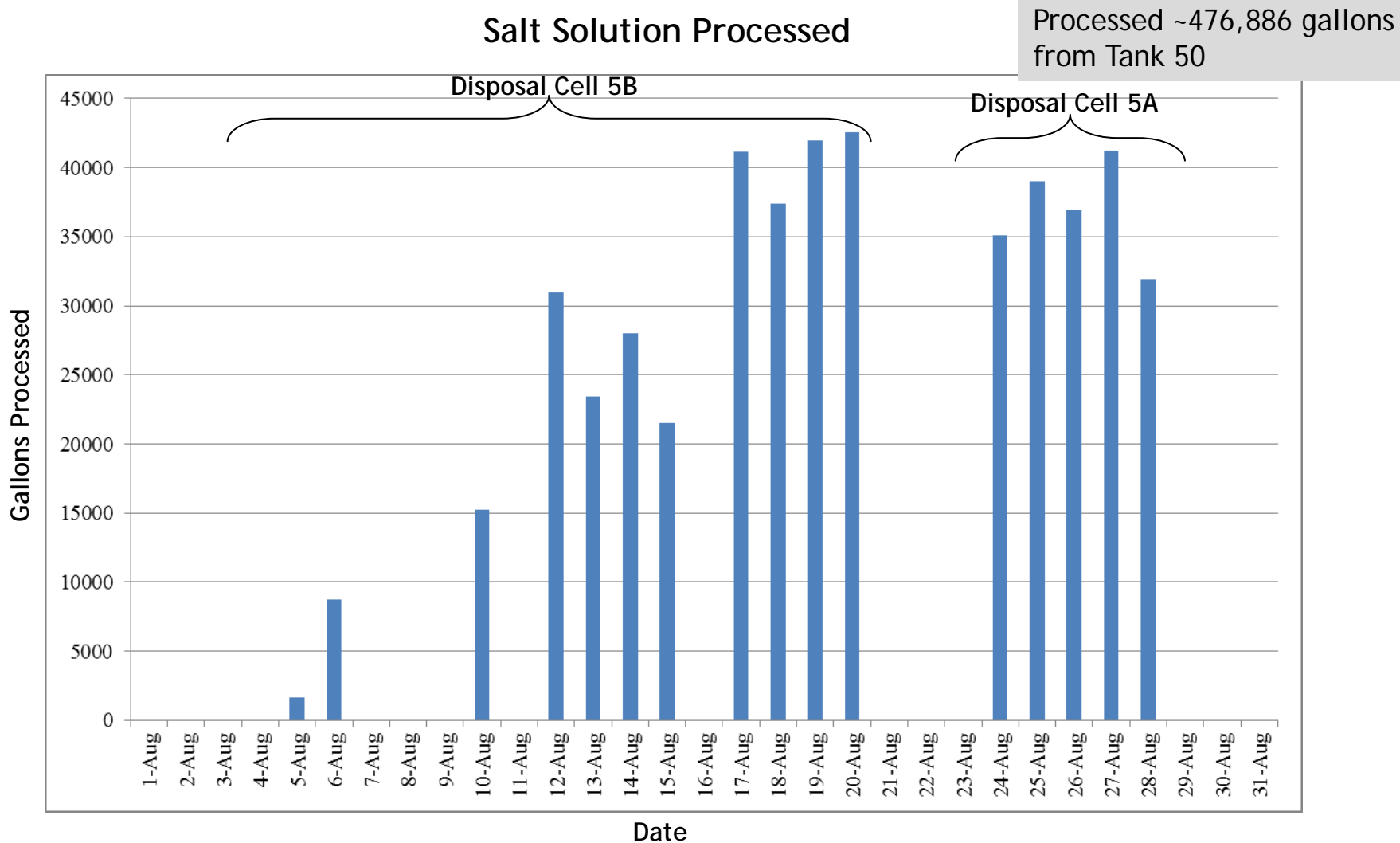
Salt Solution Processed

Processed ~73,114 gallons
from Tank 50



Operational Status: SPF Operations 8/2015

We do the right thing.

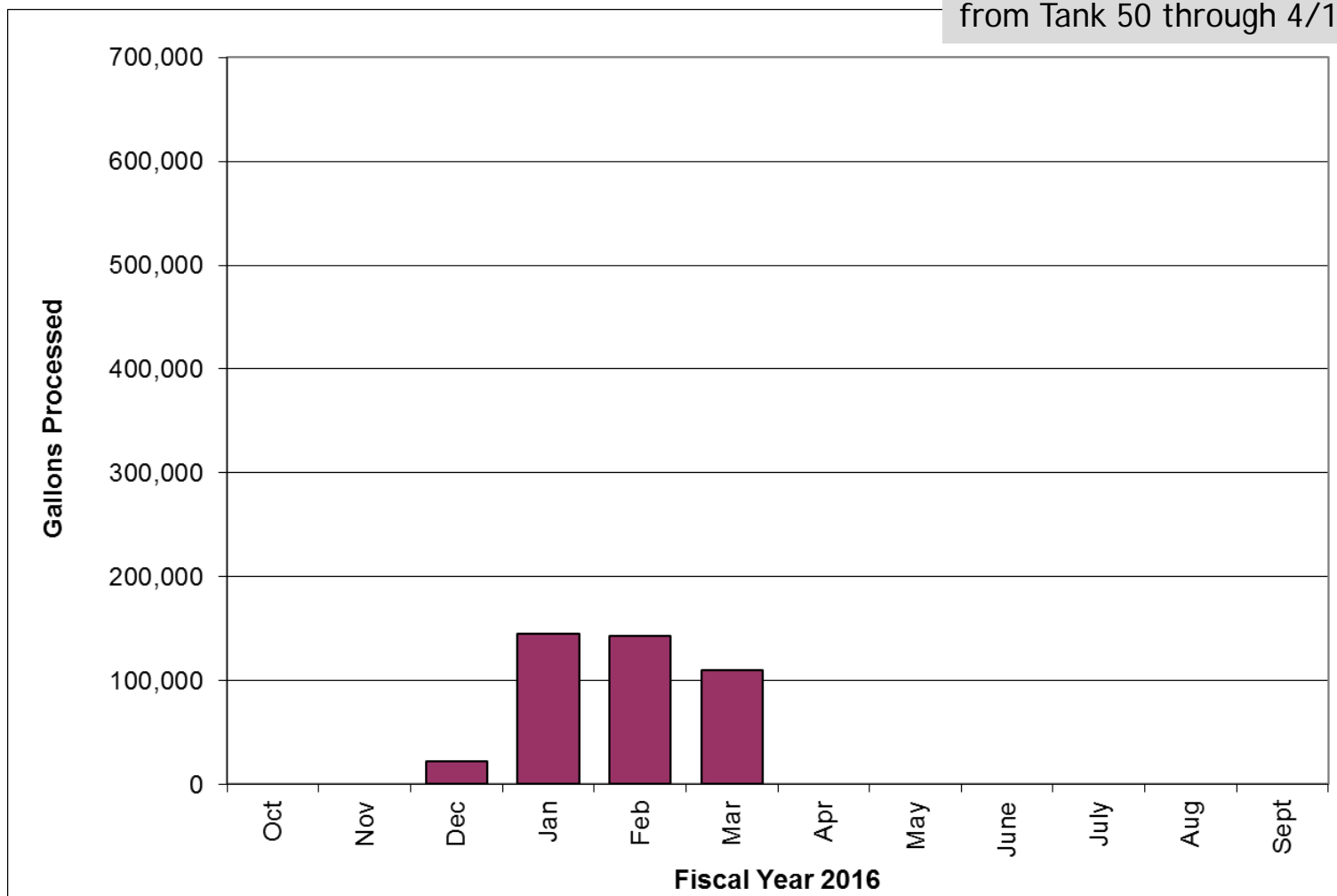


Operational Status: SPF Operations FY2016

We do the right thing.

Salt Solution Processed

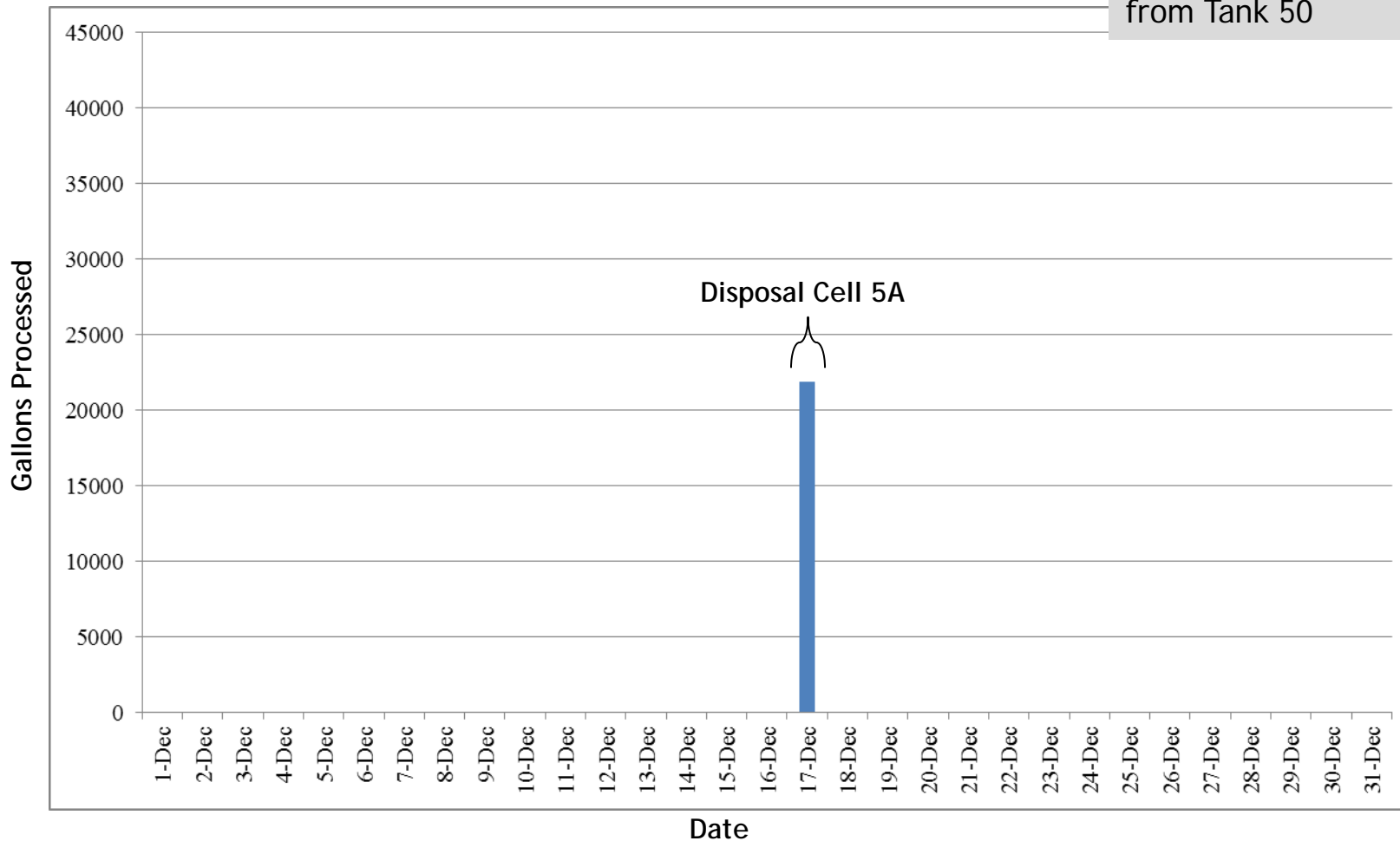
Processed ~420,470 gallons
from Tank 50 through 4/15/2016



We do the right thing.

Salt Solution Processed

Processed ~21,879 gallons
from Tank 50

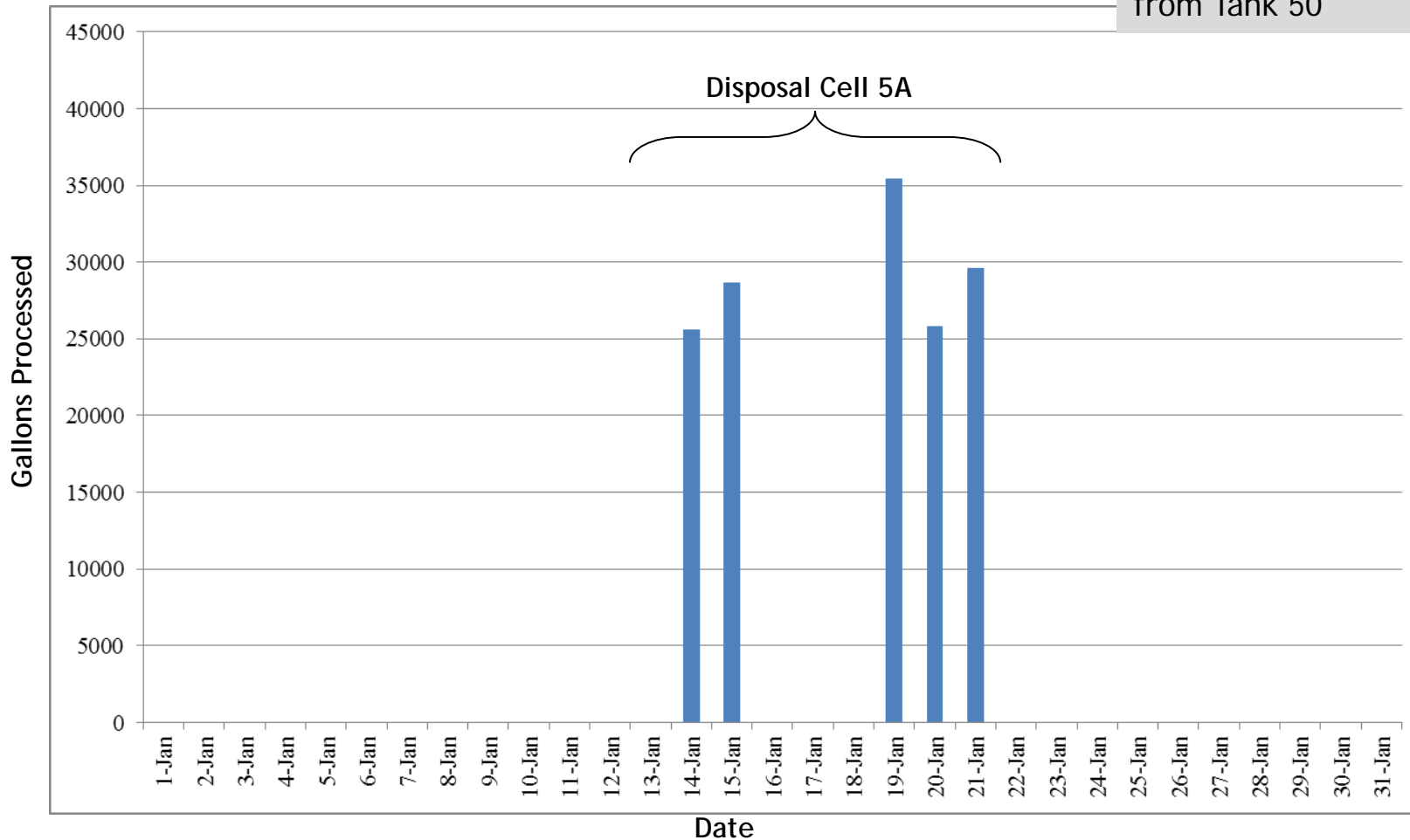


Operational Status: SPF Operations 1/2016

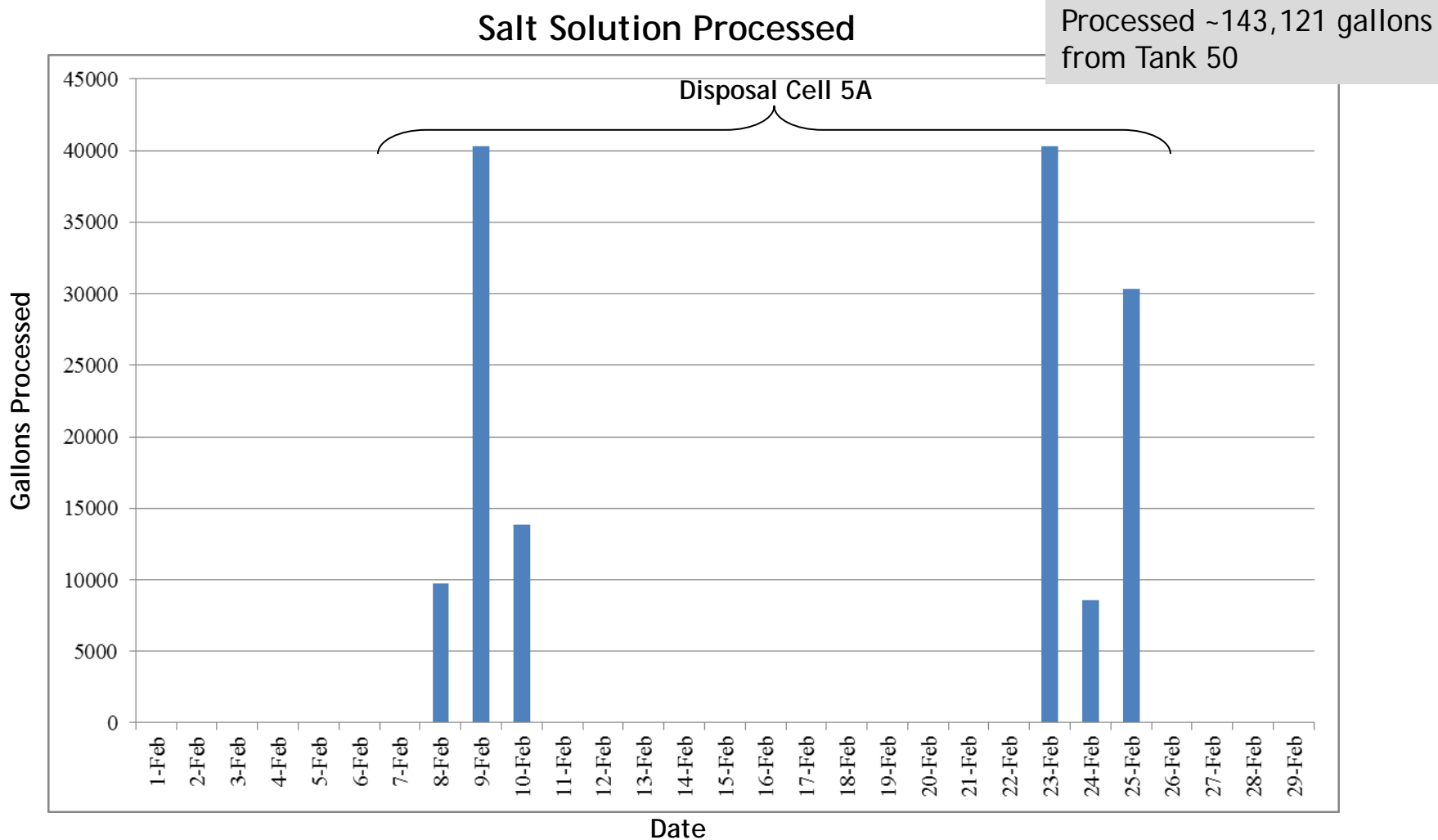
We do the right thing.

Salt Solution Processed

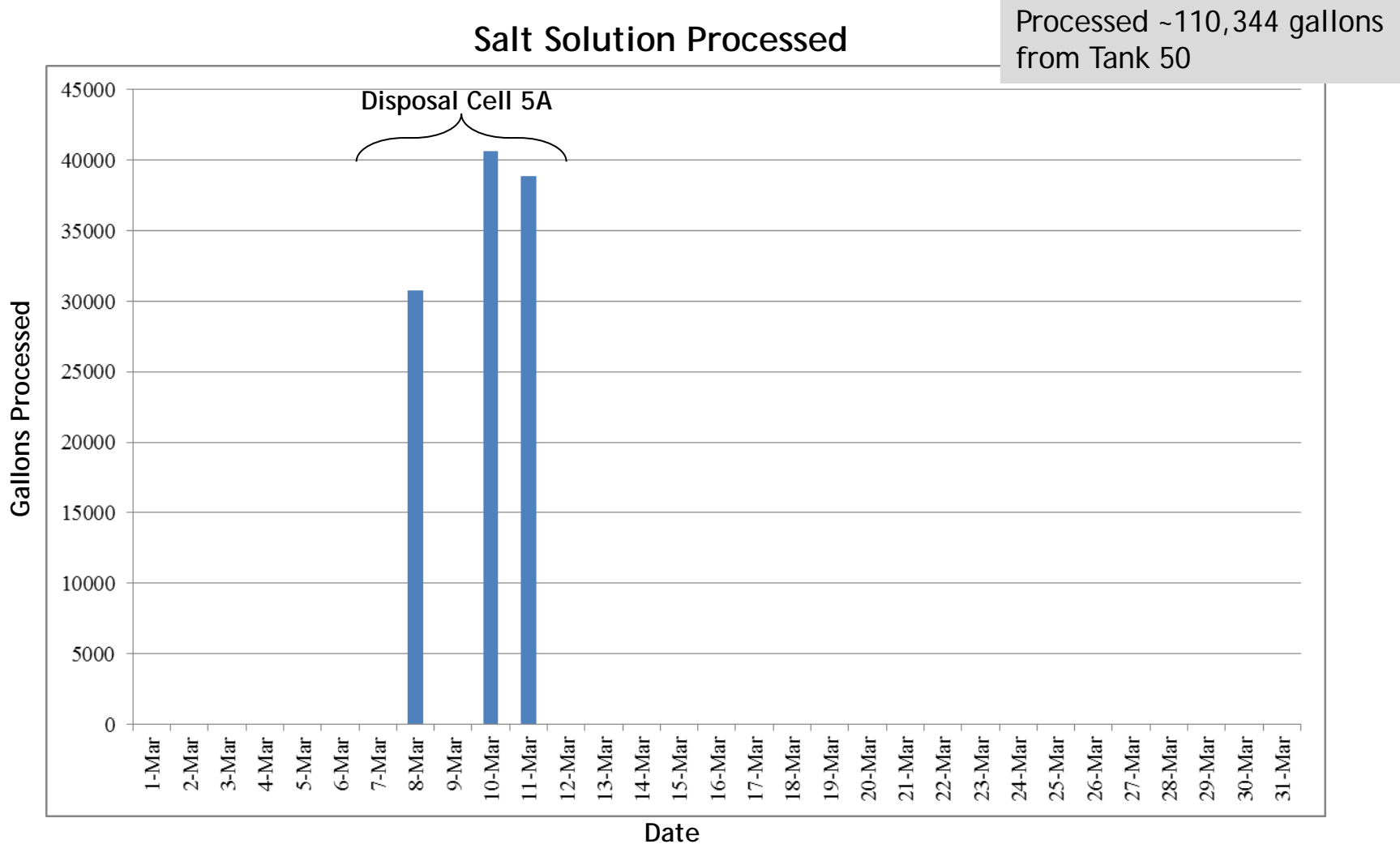
Processed ~145,126 gallons
from Tank 50



We do the right thing.

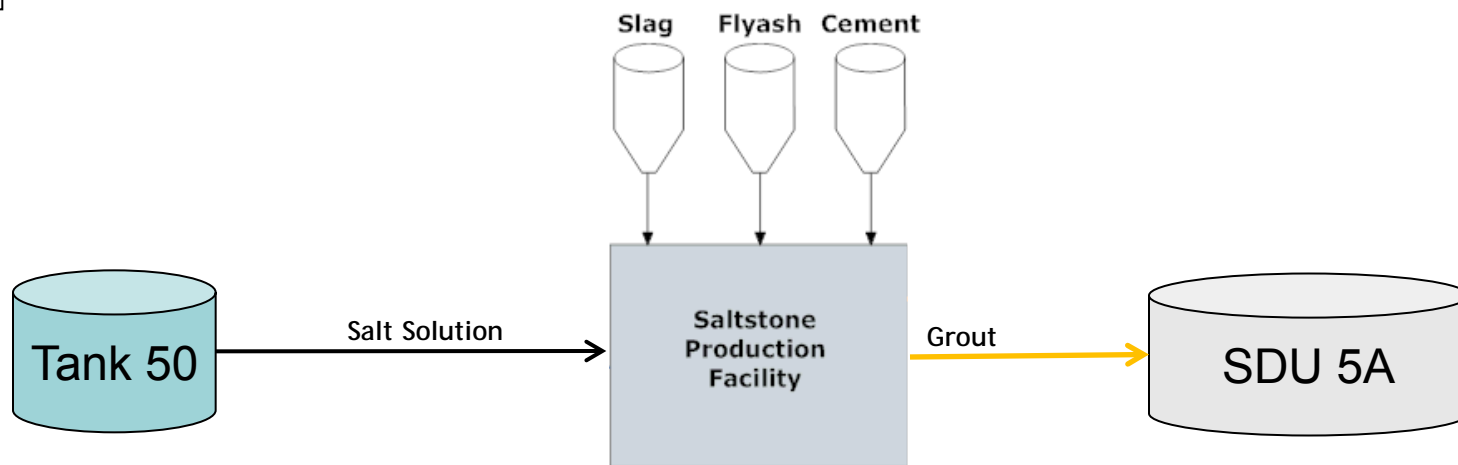


We do the right thing.



We do the right thing.

As of 4/15/2016



Current Status

- Plant in planned outage for Salt Solution Receipt Tank (SSRT) Readiness Assessment
- ~350,000 gallons of salt solution currently available for processing
- ARP/MCU processing Salt Batch 8

Current Level = ~8.5 feet
(space available for ~1.4 million gallons of grout)*

* - Beginning with the 6/24/2015 restart, the fill height for SDU 3 & 5 is currently limited to a height of 19 feet (previously 21.5 feet) pending further evaluation of potential impacts of mercury concentrations versus Documented Safety Analysis assumptions.

SDU 2 Status

- Cells 2A and 2B filled with grout in FY2014
 - ~2.6 million gallons of grout per cell
 - ~21.25 feet of grout per cell



We do the right thing.

SDU 3/5 Status

As of 4/15/2016

- **Construction complete and ready for disposal operations**
 - Cell 5B has received a total of ~1,324,000 gallons salt solution (~2.4 million gallons @ grout height ~18 feet)
 - Cell 5A has received a total of ~605,000 gallons salt solution (~1.1 million gallons @ grout height ~8.5 feet)
 - Cells 3A & 3B have not received material
- **Total remaining space for grout**
 - ~6.5 million gallons @
2.5 million gallons per empty cell*

* - Beginning with the 6/24/2015 restart, the fill height for SDU 3 & 5 is currently limited to a height of 19 feet (previously 21.5 feet) pending further evaluation of potential impacts of mercury concentrations versus Documented Safety Analysis assumptions.



We do the right thing.

SDU 6 Status

- The Lower Mud Mat, HDPE/GCL, Upper Mud Mat and floor are complete
- 25 of 25 wall sections complete
- 208 of 208 column footers complete
- 208 of 208 columns complete
- 10 of 10 roof sections complete
- Installation of tension wires (~289 miles) and shotcrete complete
- Initial leak check not acceptable, repair options under evaluation

HDPE - High Density Polyethylene
GCL - Geosynthetic Clay Liner



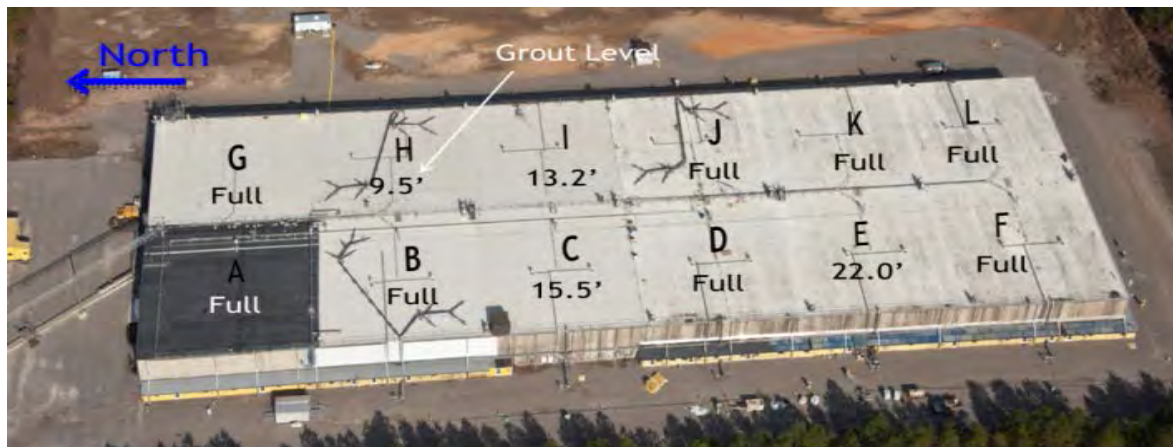
We do the right thing.



We do the right thing.

Vault 4 Stabilization

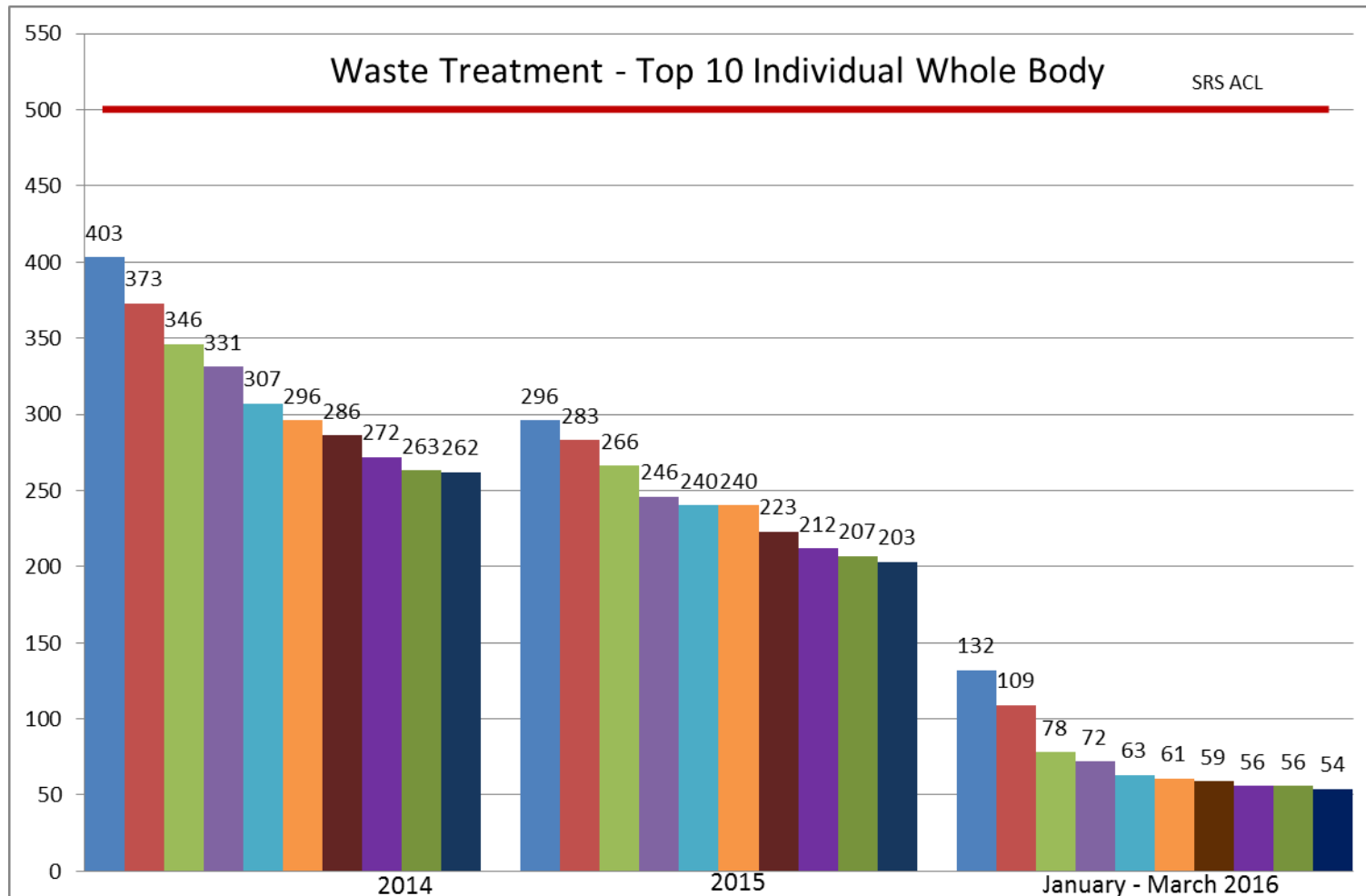
- DOE has completed the Vault 4 Stabilization Plan
 - Eliminates rain infiltration
 - Reduces environmental risk
- Roof coating applied on six cells (D, E, F, J, K & L)
- North six cells previously coated/sealed
- Clean cap added to seven cells (D, E, F, H, J, K & L)



We do the right thing.

- 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

We do the right thing.



*Merged DWPF and Saltstone Staff in October 2013

Routine Document List

We do the right thing.

Topical Area	Document	Approximate Availability/Frequency	Status Since Last Visit
Groundwater	* SDF Annual Groundwater Report * SDF Midyear-Groundwater Report * SDF Performance Assessment Annual Review * SRS Annual Environmental Report	January July March September	<div> <div> SRNS-TR-2015-00132 (Midyear 2015) SRNS-TR-2015-00300 (Annual 2015) SRNS-RP-2015-00902 (Characterization Data) </div> <div> *** (2014 Environmental Report) http://www.srs.gov/general/pubs/ERsum/er14/index.html </div> </div>
Air Monitoring	* SRS Annual Environmental Report	September	
Inventory	* SDF Performance Assessment Annual Review and Key Supporting Inventory References * Saltstone Permit Website Reporting Data (http://sro.srs.gov/saltstone.htm) * Salt Batch Qualification Reports# * Tank 50 WAC Sample Analysis	March Quarterly As-Issued Quarterly	<div> <div> SRR-CWDA-2015-00163 (FY2015) SRR-CWDA-2015-00149 (FY2015 Inventory) </div> <div> *** http://sro.srs.gov/saltstone.html </div> </div>
Performance Assessment Maintenance	* SRS Liquid Waste Facilities Performance Assessment Maintenance Annual Implementation Plan * SDF Performance Assessment Annual Review (includes the following): -Inventory -Unreviewed Waste Management Question Evaluations Performed -Research and Development Performed -Research and Development Planned	March March	<div> <div> SRNL-STI-2014-00492 (3Q-2014) SRNL-STI-2015-00060 (4Q-2014) SRR-L3100-2015-00227 (4Q-2015) SRR-CWDA-2015-00152 (FY2016) </div> <div> *** </div> </div>
Research and Development Testing/Studies	Various Reports	As-issued (Typically, September through December)	<div> <div> SREL Doc. R-15-0003, <i>Chemical and Physical Properties of Tc-Spiked Saltstone as Impacted by Curing Duration and Leaching Atmosphere</i> SRR042328-000004, <i>Examination of Tc, S, and Fe Speciation within Saltstone</i> SRR021685-000007, <i>Determination of Constituent Concentrations in Field Lysimeter Effluents</i> </div> <div> </div> </div>
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.			

- Documents noted in black text provided/available
- Red text indicates items not yet provided/added as Action Items

We do the right thing.

- Action Items (NRC OOV Report ADAMS #ML15236A299)
 1. DOE to provide NRC an electronic copy of presentation material including action items and attendance rosters. [SRR-CWDA-2015-00086, Revision 1] **Complete** (ML15223B096)
 2. DOE to provide NRC the 2015 midyear groundwater monitoring report when available. **Complete** (SRNL-TR-2015-00132, ML15223B075)
 3. DOE to provide NRC an electronic copy of *FY2015 Saltstone Core-Drilling Mock-up Summary*, SRR-CWDA-2015-00002. **Complete** (ML15223B095)
 4. DOE to provide NRC an electronic copy of *Saltstone Disposal Facility SDU Cell 2A Core Drill Summary*, SRR-CWDA-2015-00087. **Complete** (ML15223B099)
 5. DOE to provide NRC an electronic copy of *Summary of Saltstone Disposal Unit Cell 2A Core Drill Activities*, SRR-CWDA-2015-00066. **Complete** (ML15223B078)
 6. DOE to provide NRC an electronic copy of *Determination of SDF Inventories through 9/30/2014*, SRR-CWDA-2014-00124. **Complete** (ML15223B076)

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■ Action Items

7. DOE to provide NRC information on water tank (Syracuse) used as model for SDU 6. **Complete** (SRR-CWDA-2015-00097, ML15232A372)
8. DOE to provide NRC SDU 5B inventory through 6/30/2015. **Complete** (SRR-CWDA-2015-00149-R1, ML15342A044)
9. DOE to provide NRC an electronic copy of photographs from SDF/SPF tour on 7/7/2015. **Complete** (SRR-CWDA-2015-00086_R1, Slides 56-62, ML15223B096)
10. DOE to provide NRC a listing of existing papers relative to technetium reduction/solubility. **Complete** (SRR-CWDA-2015-00097, ML15232A372)
11. DOE to provide NRC an electronic copy of *SDU 2A Core Sample Test Designation*, SRNL-L3100-2015-00108. **Complete** (ML15223B072)
12. DOE to provide NRC information on SDU 3 and SDU 5 fill height restrictions related to resolution of mercury PISA. **(Open)**
13. DOE to provide NRC information available on production well (SDU 6) depth and potential impact on surface settlement. **Complete** (SRR-CWDA-2015-00086_R1, Slides 65-66, ML15223B096)

We do the right thing.

■ Action Items

14. DOE to Provide NRC documentation on how locations along the 100-meter boundary were determined for the GoldSim model. **Complete** (SRR-CWDA-2015-00097, ML15232A372)
15. DOE to provide NRC documentation on how to set up computer for a GoldSim run. **Complete** (SRR-CWDA-2015-00097, ML15232A372)

■ Specification

- *Specification for Procurement of Slag for the SPF*
[X-SPP-Z-00003, Revision 2, ML14002A083]
 - No change to the specification, both Grade 100 and 120 included
 - ASTM C989
 - Sulfur content per X-SPP-Z-00003 = 0.5% - 2.5%
(ASTM C989 < 2.5%)

- **Problem:** Historic Ground Granulated Blast Furnace Slag (GGBFS) supplier no longer available to SRR
- **Evaluation:** Performance and processing properties of the historic and four alternate GGBFS suppliers
- **Result:** One alternate supplier was determined viable and three alternate suppliers for additional evaluation

- **Evaluation for alternative GGBFS suppliers**
 - Alternative suppliers showed higher availability of GGBFS Grade 120
 - Slag grades vary in particle size, chemistry, reactivity, and compressive strength
 - Safety and processing considerations
 - Evaluated if slag grades offer acceptable variability
 - Concerns outside of ASTM C989 performance on saltstone properties
 - Slag Grinding Agent
 - Slag Reduction Capacity
 - Saltstone Plastic Viscosity
 - Saltstone Yield Stress
 - Saltstone Gel Time
 - Saltstone Heat of Hydration

We do the right thing.

- **Slag Grinding Agent**
 - Flammability concern
 - Utilized by slag industry during ball milling to reduce particle size
 - Typical aids are triethanoamines and glycols
 - Potentially impacts the SDUs
 - Information provided by supplier

- **Slag Reduction Capacity**
 - Performance concern
 - Measure of a material to supply electrons for reducing redox sensitive components
 - Potentially impacts the ability to immobilize redox sensitive radionuclides

- **Saltstone Plastic Viscosity**
 - Processing concern
 - Resistance to fluid flow
 - Potentially impacts the ability to pump material

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■ Saltstone Yield Stress

- Processing concern
- Amount of stress to initiate fluid flow
- Potentially impacts the ability to pump material and flow of saltstone in SDU

■ Saltstone Gel Time

- Processing concern
- Amount of time for calcium silicate hydrate gel to form
- Potentially impacts the ability to pump material and recover from process upsets

■ Saltstone Heat of Hydration

- Performance and processing concern
- Exothermic reaction
- Potentially impacts temperature, saltstone quality, volatilization of flammables in saltstone, saltstone pouring schedule

We do the right thing.

- Testing was conducted by Vitreous State Laboratories (VSL) at Catholic University of America
 - Slag and simulate saltstone samples for each supplier
 - Historical
 - Alternate 1
 - Alternate 2
 - Alternate 3
 - Alternate 4
- Testing began in Spring 2015 and completed in Summer 2015

Selection and Validation Process

We do the right thing.

	Historical	Alternate 1	Alternate 2	Alternate 3	Alternate 4
Grade	100	120	120	120	100
ASTM 989C	Yes	Yes	Yes	Yes	Yes
Grinding Agent	Amine/Glycol	None	Further Eval.	None	None
Reduction Capacity (µeq/g)	722	537	740	812	831
Plastic Viscosity (cP)	67.8	55.6	71.7	57.7	50.7
Yield Stress (Pa)	7.1	5.5	7.1	7.7	3.2
Gel Time (min)	50	45	50	55	40
Heat Release 12 day (J/g)	60.6	68.9	79.7	65.2	86.7

We do the right thing.

■ Slag Grinding Agents

- Alternate 2 utilizes additional glycol and amounts added were not specified from supplier

■ Slag Reduction Capacity

- Alternate 1 lower reduction capacity may decrease duration that contaminants remain immobile

■ Saltstone Heat of Hydration

- Compared to the Historic Supplier Heat Release, temperatures below the SDU limit of 95 °C
- Amount Greater than Historical Supplier Heat Release
 - Alternate 1: 11% - qualitative reasonable margin
 - Alternate 2: 32%
 - Alternate 3: 8% - qualitative reasonable margin
 - Alternate 4: 43%

We do the right thing.

- **Alternative Supplier 3 selected and validated for saltstone production**
 - Equivalent chemical, physical, processing properties to the Historical Supplier

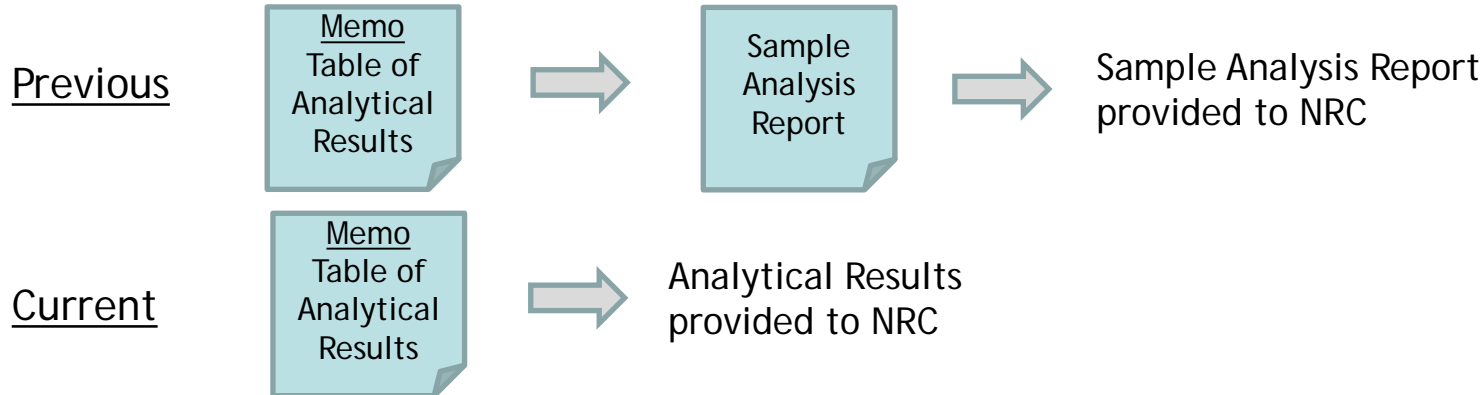
- **Additional areas of opportunity for other alternative suppliers**
 - Slag Grinding Agents
 - Equivalents and amounts

 - Slag Reduction Capacity
 - Performance Assessment Modeling for contamination transportation

 - Saltstone Heat of Hydration
 - Thermal Modeling development for temperatures and curing impacts

Tank 50 Waste Acceptance Criteria (WAC) Sampling Documentation

We do the right thing.



	Memo	Report
4Q2014	SRNL-L3100-2014-00279, Rev. 0 January 2015	SRNL-STI-2015-00060, Rev. 0 September 2015
1Q2015	SRNL-L3100-2015-00065, Rev. 1 May 2015	SRNL-STI-2015-00313, Rev. 0 March 2016
2Q2105	SRNL-L3100-2015-00107, Rev. 0 July 2015	
3Q2015	SRNL-L3100-2015-00178, Rev. 0 October 2015	
4Q2015	SRNL-L3100-2015-00227, Rev. 0 January 2016	N/A - Reports no longer required per Task Technical Request to SRNL
1Q2016	Draft out for internal review	N/A

Note: Documents noted in red have not been provided to NRC, added as Action Items.

Field Observation

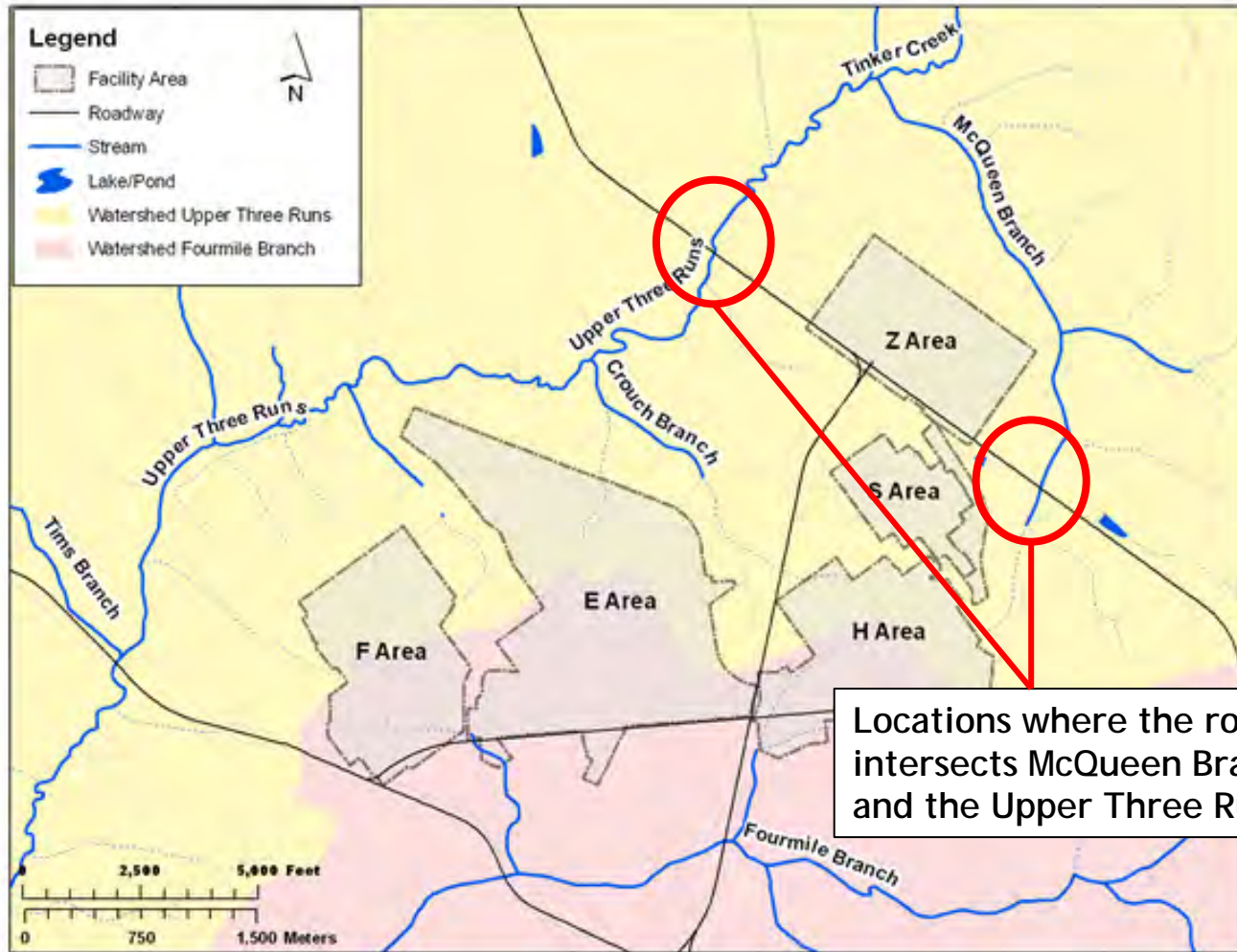
- (4a) - View SDS 3A, SDS 3B, SDS 5A, and SDS 5B and view construction of SDS 6
- (4b) - Z-Area perimeter and locations where the road intersects McQueen Branch and the Upper Three Runs
- (6) - If saltstone is being poured, then observe saltstone production facility operations
 - **SPF not operating, Salt Solution Receipt Tank (SSRT) Readiness Assessment**

(#) - Activity number from
NRC Observation Guidance
[ML16074A343]

We do the right thing.



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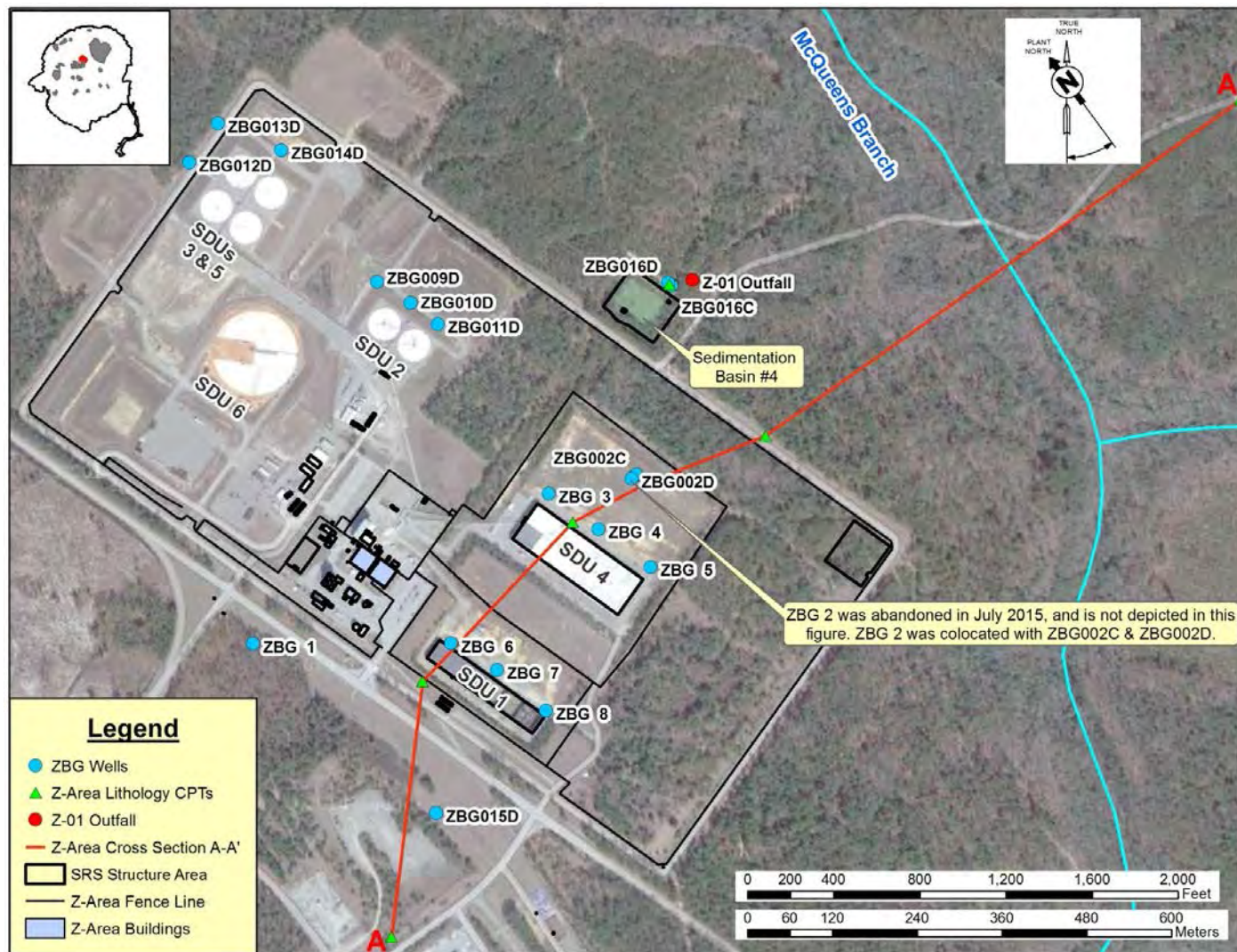
Technical Discussions: 4/19/2016 (pm)

- (2) - Update on Z-Area groundwater monitoring and characterization data:
 - Annual Groundwater Monitoring Report
 - 2016 Groundwater Characterization Data Report

(#) - Activity number from
NRC Observation Guidance
[ML16074A343]

- *Z-Area Saltstone Disposal Facility Groundwater Monitoring Midyear Report for 2015*
[SRNS-TR-2015-00132, ML15223B075]
- *Z-Area Saltstone Disposal Facility Groundwater Monitoring Report for 2015*
[SRNS-TR-2015-00300, ML16057A150]
- *Z-Area Groundwater Characterization Data Report*
[SRNS-RP-2015-00902, ML16057A135]

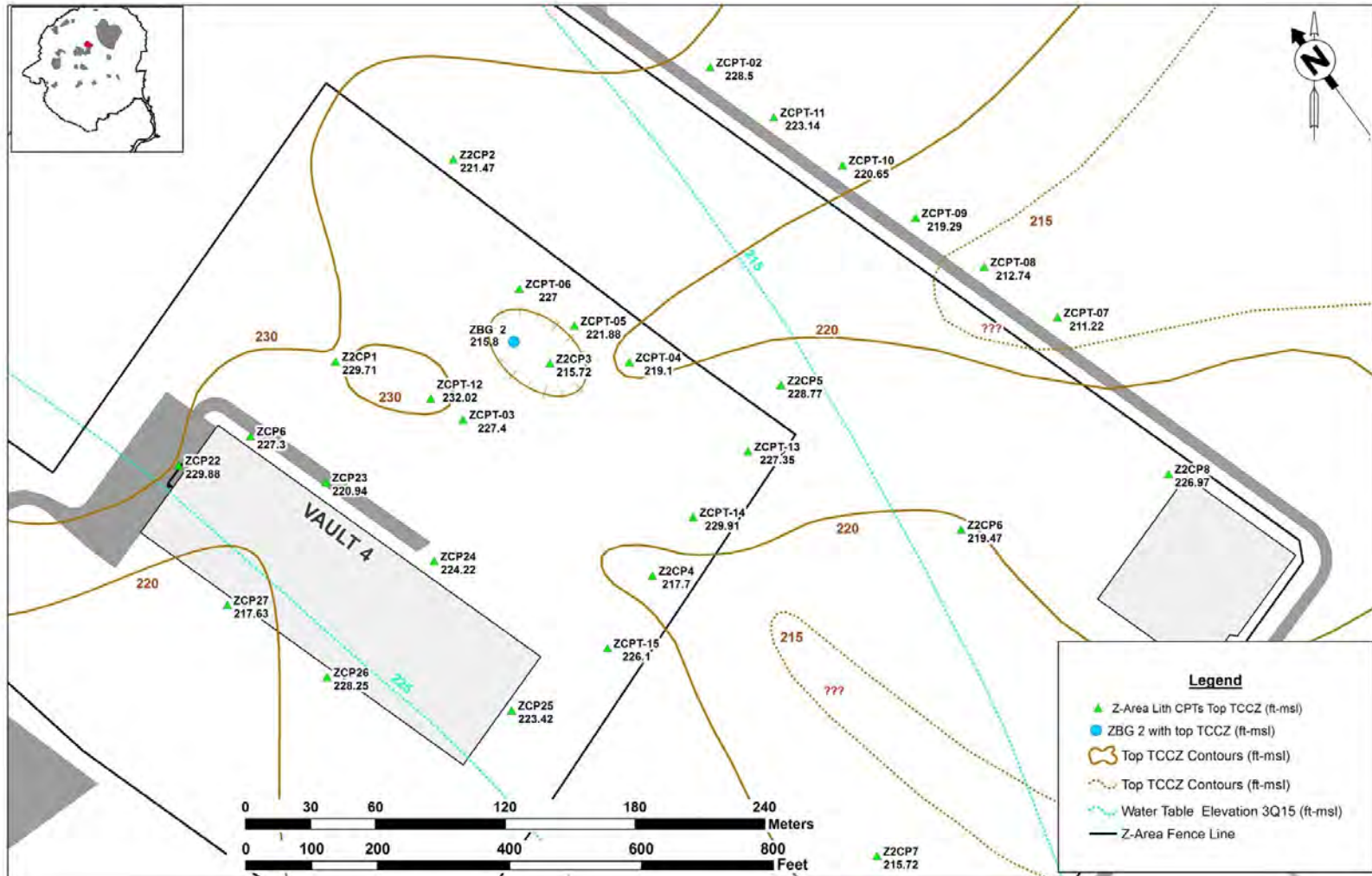
We do the right thing.



Lithology CPT Locations

(Figure 19, SRNS-RP-2015-00902)

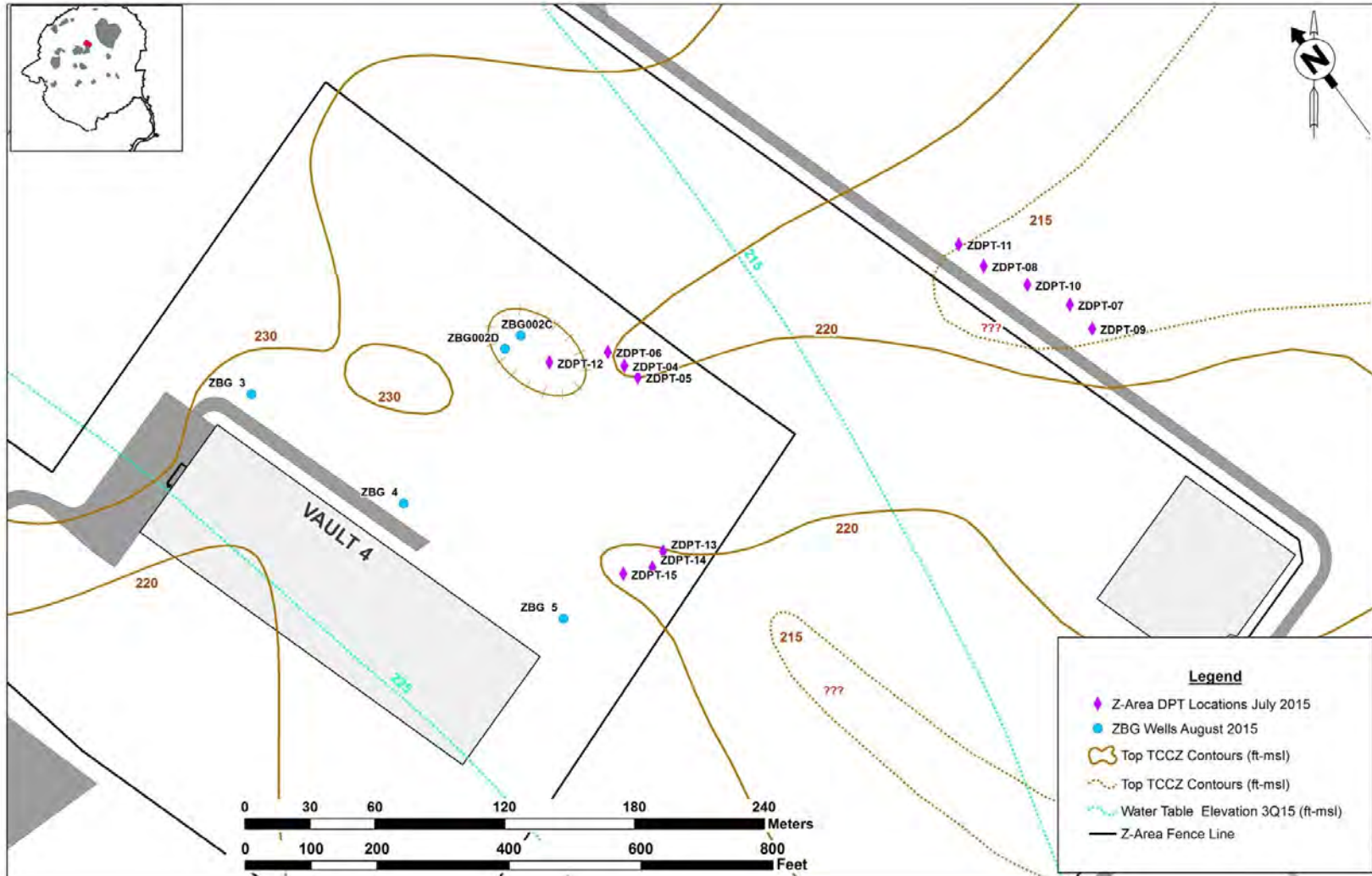
We do the right thing.



DPT Sample Locations

(Figure 20, SRNS-RP-2015-00902)

We do the right thing.



We do the right thing.

NRC Daily Outbrief

- NRC Staff Outbrief
- Action Items captured



Savannah River Site Salt Waste Disposal NRC Onsite Observation Visit

We do the right thing.

April 20, 2016

SRR-CWDA-2016-00052, Revision 1

We do the right thing.

NRC Salt Waste Disposal Onsite Observation			
Wednesday, April 20, 2016			
Start	End	Topic	Location
8:00	8:45	Travel	Meet 703-46A
8:45	9:00	Inbrief	705-1C, Room 34 A-B
9:00	11:00	<u>Technical Discussions [1]</u> • RAI Responses	705-1C, Room 34 A-B
11:00	12:30	Lunch	766-H
12:30	2:30	<u>Technical Discussions [1]</u> • RAI Responses	705-1C, Room 34 A-B
2:30	4:30	<u>SREL Tour [4c]</u> • Saltstone Property Testing	SREL
4:30	4:45	Travel/NRC Depart	703-46A

(#) - Activity number from
NRC Observation Guidance
[ML16074A343]

Technical Discussions: 4/20/2016

- (1) - Discuss the DOE Responses to the NRC Request for Additional Information for the Fiscal Year 2014 Special Analysis for Saltstone Disposal Facility.

(#) - Activity number from
NRC Observation Guidance
[ML16074A343]

We do the right thing.

- *FY2014 Special Analysis for the Saltstone Disposal Facility at the Savannah River Site [SRR-CWDA-2014-00006, Rev. 2]*
 - Provided to NRC November, 2014
- *Comment Response Matrix for U. S. Nuclear Regulatory Commission Staff Request for Additional Information on the Fiscal Year 2013 Special Analysis for the Saltstone Disposal Facility at the Savannah River Site [SRR-CWDA-2014-00099, Rev. 1]*
 - Provided to NRC January, 2015
- *U. S. Nuclear Regulatory Commission Staff Request for Additional Information on the “Fiscal Year 2014 Special Analysis for the Saltstone Disposal Facility at the Savannah River Site,” SRR-CWDA-2014-0006, Revision 2 [ML15161A541]*
 - Provided to DOE June, 2015

We do the right thing.

- *Comment Response Matrix for U. S. Nuclear Regulatory Commission Staff Request for Additional Information on the Fiscal Year 2014 Special Analysis for the Saltstone Disposal Facility at the Savannah River Site [SRR-CWDA-2016-00004, Rev. 1]*
 - Provided to NRC March/April, 2015

Field Observation

- (4c) - Research and development activities being conducted at Savannah River Ecology Laboratory relating to saltstone cementitious property testing, including activities involving core samples extracted from SDS 2A.

(#) - Activity number from
NRC Observation Guidance
[ML16074A343]

Field Observation

- SDU Cell 2A Core Sample Analysis
- Technetium Leaching Characteristics From Saltstone
 - Dynamic Leaching
 - EPA Method 1315
- SDU Coatings Tests

(#) - Activity number from
NRC Observation Guidance
[ML16074A343]



Savannah River Site Salt Waste Disposal NRC Onsite Observation Visit

We do the right thing.

April 21, 2016

SRR-CWDA-2016-00052, Revision 1

We do the right thing.

NRC Salt Waste Disposal Onsite Observation			
Thursday, April 21, 2016			
Start	End	Topic	Location
8:00	8:45	Travel	Meet 703-46A
8:45	9:00	Inbrief	705-1C, Room 34 A-B
9:00	11:00	<u>Research Results [3a,b,c]</u> <ul style="list-style-type: none"> • Saltstone Core Samples • SREL Doc No. R-15-0003 • SRR042328-00004 	705-1C, Room 34 A-B
11:00	12:30	Lunch	766-H
12:30	2:00	<u>Follow-up Discussions</u> <ul style="list-style-type: none"> • As-Needed 	705-1C, Room 34 A-B
2:00	2:30	NRC/SCDHEC Internal Review	705-1C, Room 34 A-B
2:30	3:00	Outbrief	705-1C, Room 34 A-B
3:00	3:15	Travel/NRC Depart	703-46A

(#) - Activity number from
NRC Observation Guidance
[ML16074A343]

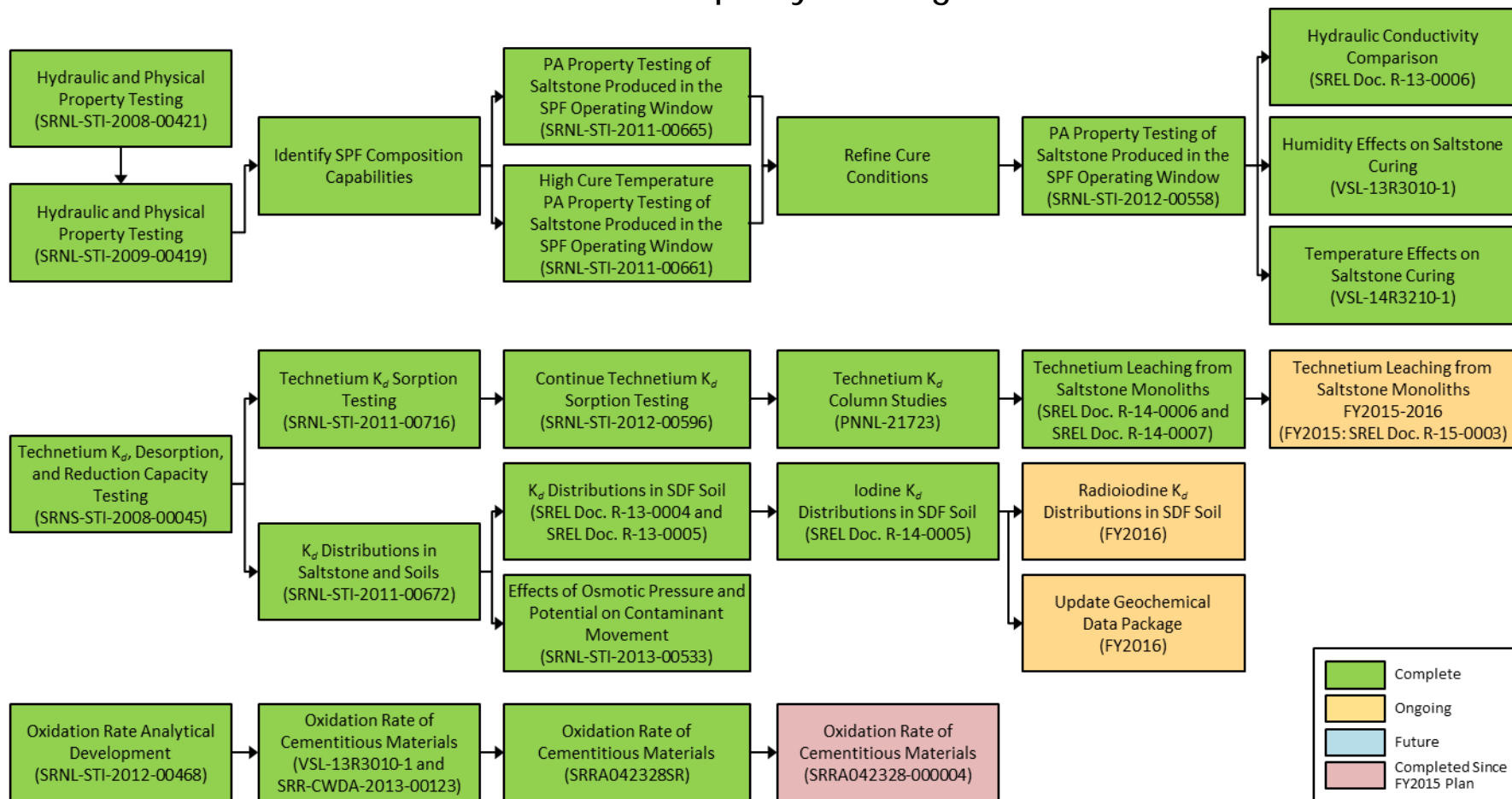
Technical Discussions: 4/21/2016

- (3) - Review recent research results developed since the previous onsite observation visit, including, but not limited to;
 - (a) - Laboratory testing of saltstone core samples.
 - (b) - *Chemical and Physical Properties of Tc-Spiked Saltstone as Impacted by Curing Duration and Leaching Atmosphere* (SREL Doc No. R-15-0003).
 - (c) - *Examination of Tc, S, and Fe Speciation within Saltstone* (SRRA042328-000004).

(#) - Activity number from
NRC Observation Guidance
[ML16074A343]

- *Savannah River Site Liquid Waste Facilities
Performance Assessment Maintenance Program
FY2016 Implementation Plan*
[SRR-CWDA-2015-00152, Rev. 0]
 - Provided to NRC January, 2016

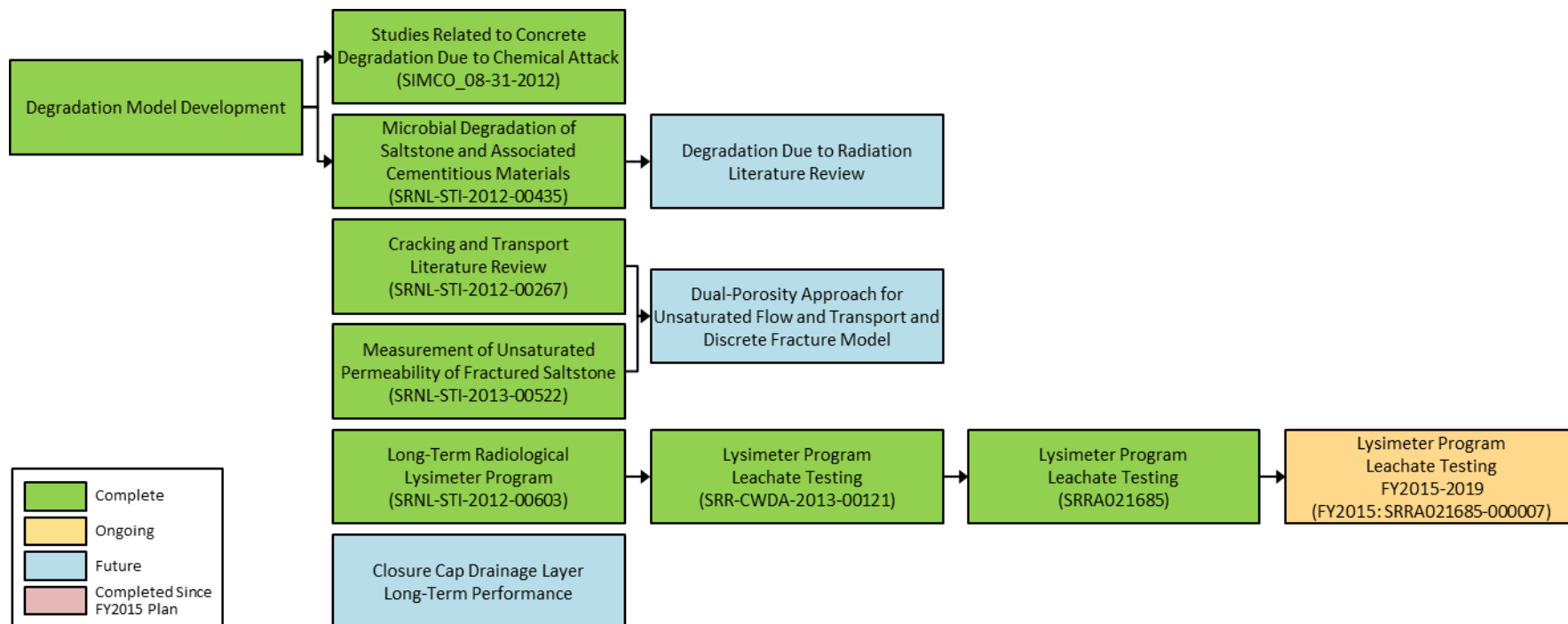
Critical Property Testing¹



¹ Figure 2.3-2 from SRR-CWDA-2015-00152

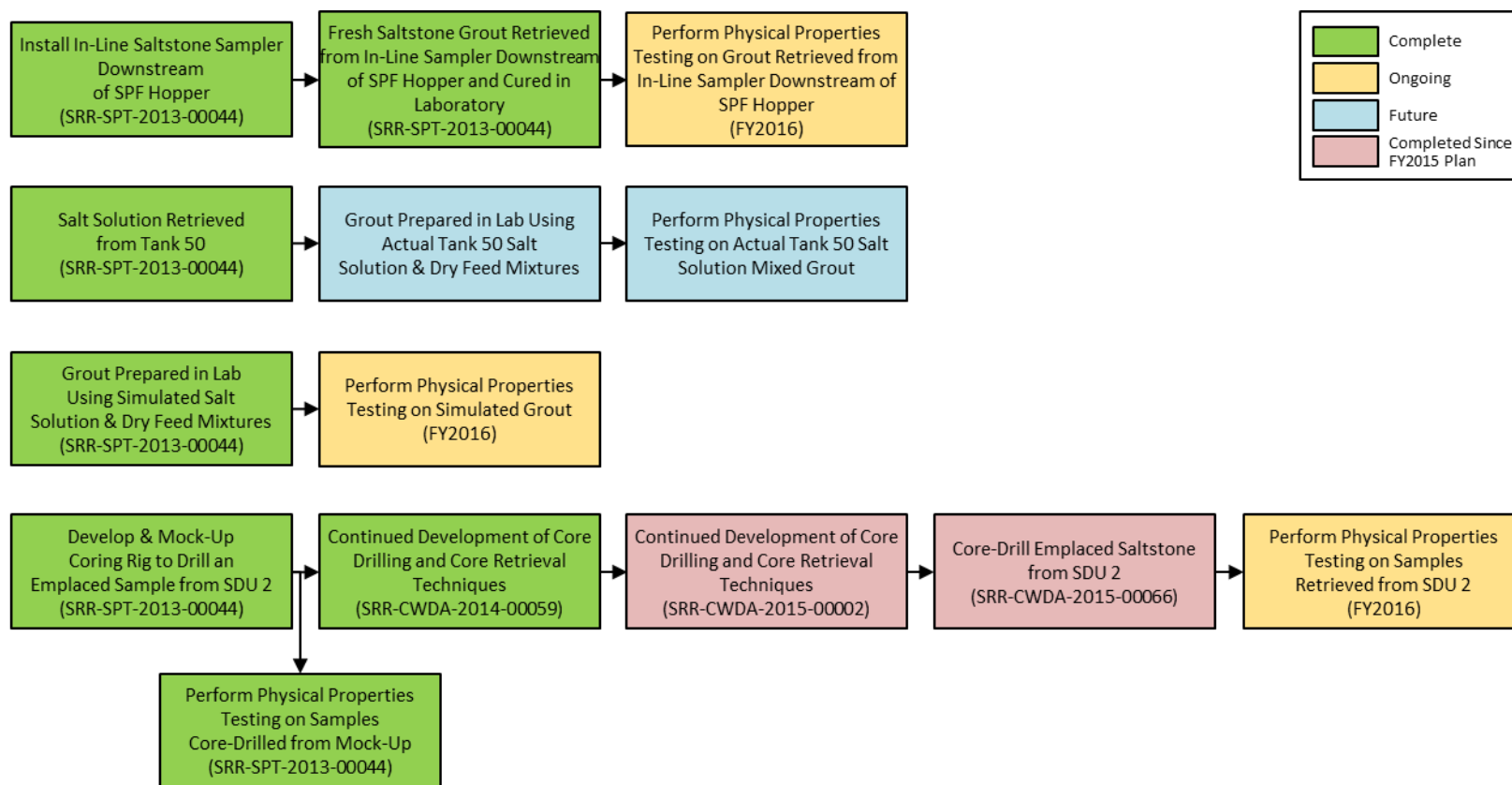
Degradation Studies

Degradation Studies¹



¹ Figure 2.3-3 from SRR-CWDA-2015-00152

Emplaced Saltstone Testing Strategy¹



¹ Figure 2.3-4 from SRR-CWDA-2015-00152

■ Status Update

- Presentation - *Research Results/Status- Savannah River Site Salt Waste Disposal NRC Onsite Observation Visit April 21, 2016, SRR-CWDA-2016-00053.*
 - SDU Cell 2A Core Sampling
 - Technetium Leaching Characteristics From Saltstone
 - Dynamic Leaching
 - EPA Method 1315

We do the right thing.

- **Update on NRC research activities**
 - Saltstone waste release experiments
 - Saltstone cracking
 - Acoustic emission

NRC Observation Visit Outbrief

- NRC Staff Outbrief
- Action Items Captured
- Closing Statements

We do the right thing.

■ Action Items

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
 - *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]

We do the right thing.

■ Action Items

4. DOE to provide NRC with SDU 6 settlement marker elevation data.
5. DOE to provide NRC pictures of SDU 6 from SDF Tour and pictures from the SREL tour. (Complete: Slides 77-83)
6. DOE to provide NRC an electronic copy of document VSL report VSL15R3740-1.
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. (Complete: Slide 84)
8. DOE to provide NRC a reference document showing locations of the 2014 DPT locations adjacent to SDU 4. (Complete: Slide 85)
9. DOE to provide NRC the USGS Regional Groundwater Model covering CSRA/SRS.

We do the right thing.

■ Action Items

10. DOE to provide NRC a copy of the existing report on E-Area closure cap impact on groundwater.
11. DOE to provide NRC a copy of Z-Area slides provided by G. Flach during Far Field RAI discussions. **(Complete: Slides 86-90)**
12. DOE to provide NRC plots for specific time periods related to DSP-11.
 - 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.
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)

We do the right thing.

■ Action Items

15. DOE to provide NRC a chart showing Ra-226 levels corresponding to Figure 2.1-8 in SRR-CWDA-2014-00095.
16. DOE to provide NRC information on which parameters fall under the sixth bullet in RAI Response CC-2.
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.
18. DOE to provide additional information explaining impact of reducing capacity (most conservative value) on figures in SP-2 vs. SP-8.
19. DOE to investigate if any additional information is available regarding oxygen levels in soil and provide to NRC .

We do the right thing.

■ 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).
- 21. DOE to provide NRC additional information on the basis of cement leachate factors from SRNL-STI-2009-00473.
- 22. DOE to provide NRC a copy of the SDU 2A Core analysis report when available.
- 23. DOE to provide NRC results of vault concrete testing (SIMCO & SRS) when available.
- 24. DOE to provide NRC information regarding grinding of blast furnace slag in VSL experiments (VSL15R3740-1).

Attendance Sheets (4/19/16 & 4/20/16)

We do the right thing.

NRC Salt Waste Disposal Monitoring Visit
April 19, 2016

Inbrief/Operation Status/SDF Tour/Technical Discussions

Name	Affiliation	Phone
Larry Romanowski	SRR	
Justin Koon	SC DHEC	
Dan Ferguson	DOE	
GREGORY OKUNIN	SC DHEC	
Scott L. Simons	SC DHEC - Aiken	
Kent Rosenberger	SRR	
Sherri R. Ross	DOE-SR	
Karen Pinkston	NRC	
A. Christianne Ridge	NRC	
George Alexander	NRC	
HARVEY FELSHER	NRC	
HANS ARLT	"	
Steve Hommel	SRR	
Steve Thomas	SRR	
CHRIS MCKENNEY	NRC	
Tim Coffield	SRR	
Kent Hines	SRR	
OWEN STEVENS	SRR	
Terry Piilken	SRNS	
Gerard C. Blount	SRNS	
DAVID WATKINS	SRR	
Greg Flach	SRNL	

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NRC Salt Waste Disposal Monitoring Visit
April 20, 2016

Inbrief/Technical Discussions/SREL Tour

Name	Affiliation	Phone
Larry Romanowski	SRR	
Kent Rosenberger	SRR	
Dan Ferguson	DOE	
Karen Pinkston	NRC	
A. Christianne Ridge	NRC	
George Alexander	NRC	
HARVEY FELSHER	NRC	
CHRIS MCKENNEY	NRC	
HANS ARLT	"	
STEVE HOMMEL	SRR	
STEVE THOMAS	SRR	
Sherri R. Ross	DOE-SR	
DAVID WATKINS	SRR	
Tim Coffield	SRR	
Justin Koon	SC DHEC	
GREGORY OKUNIN	SC DHEC	
Pat Suggs	DOE-SR	
Armanda Watson	DOE-SR	
John Seaman	SREL	

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We do the right thing.

NRC Salt Waste Disposal Monitoring Visit

April 21, 2016

Inbrief/Technical Discussions/Visit Outbrief

Name	Affiliation	Phone
LARRY Romanowski	SRR	
STEVE SIMMER	SRR	
Kent Rosenberger	SRR	
Sherri R. Ross	DOE-SR	
Don Ferguson	DOE	
Karen Pinkston	NRC	
A. Christanne Ridge	NRC	
George Alexander	NRC	
HARRY FELSNER	MCC	
CHRIS McKENNEY	NRC	
Pat Suggs	DOE	
Steve Thomas	SRR	
Tim Coffield	SRR	
Leslie Wooten	SRR	
JACOBAY O'QUINN	SCDHEC	
John Seaman	SREL	
Steve Hommel	SRR	
Kent Furtenberry	SRR	

Page 1 of 1

We do the right thing.

SDU 6

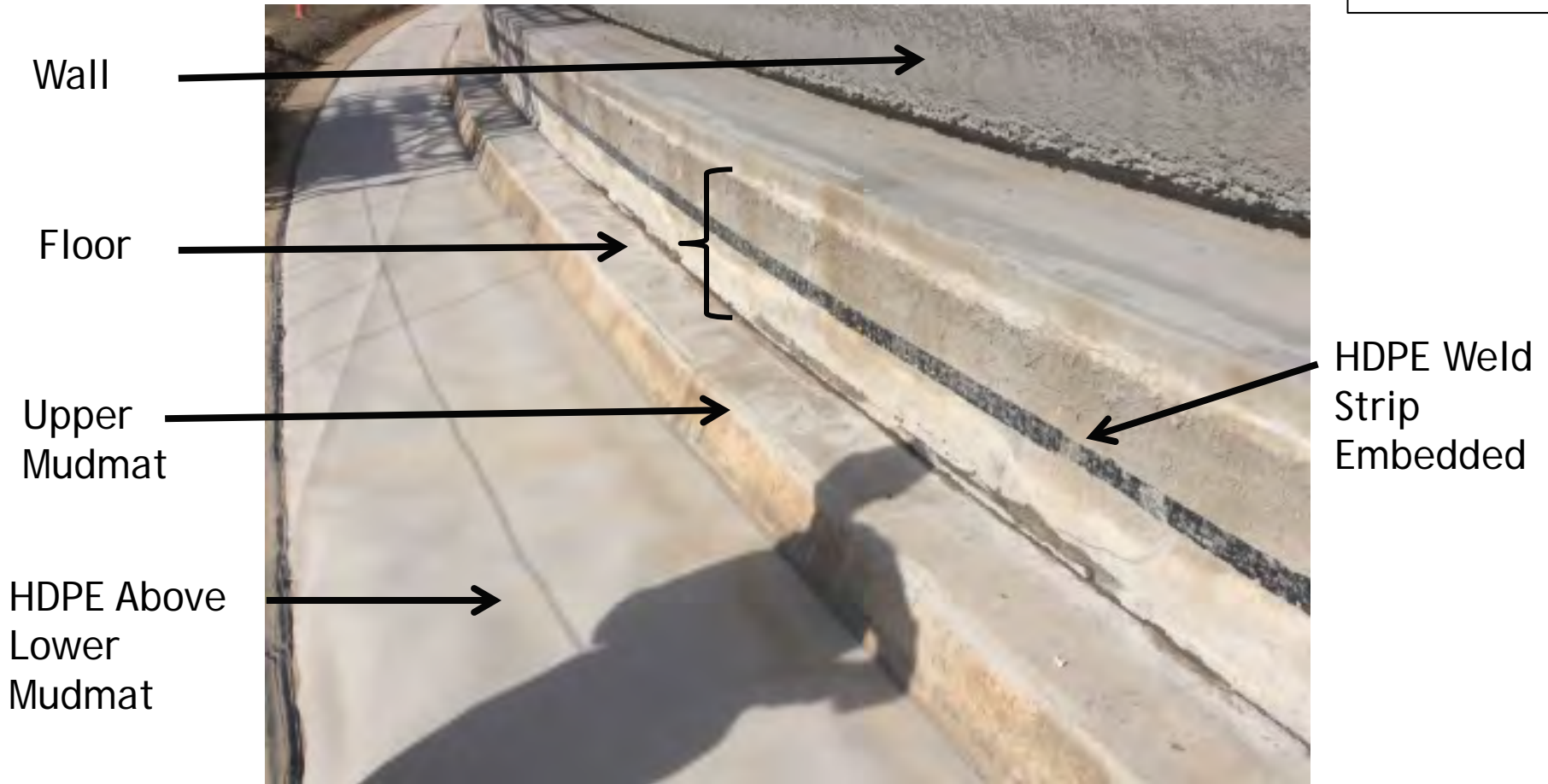


Close-up provided
on Slide 79



We do the right thing.

SDU 6



We do the right thing.



Dynamic Leaching Experiments



We do the right thing.



Dynamic Leaching Experiments

We do the right thing.



Dynamic Leaching Experiments

We do the right thing.



Dynamic Leaching Experiments

We do the right thing.



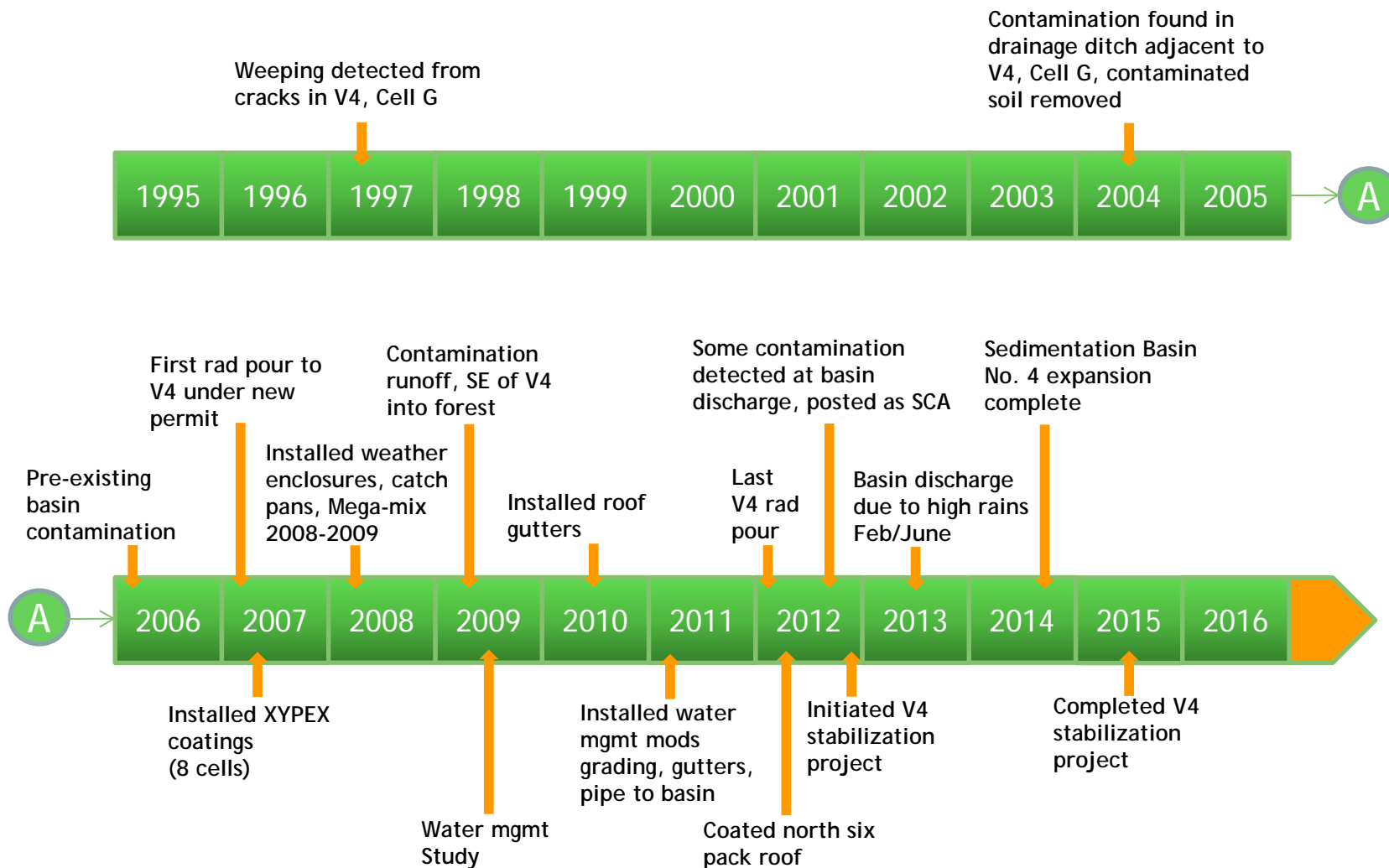
EPA Method 1315 Experiments



Saltstone Timeline

(Action Item #7)

We do the right thing.



2014 Z-Area DPT Locations Adjacent to SDU 4 (Action Item #8)

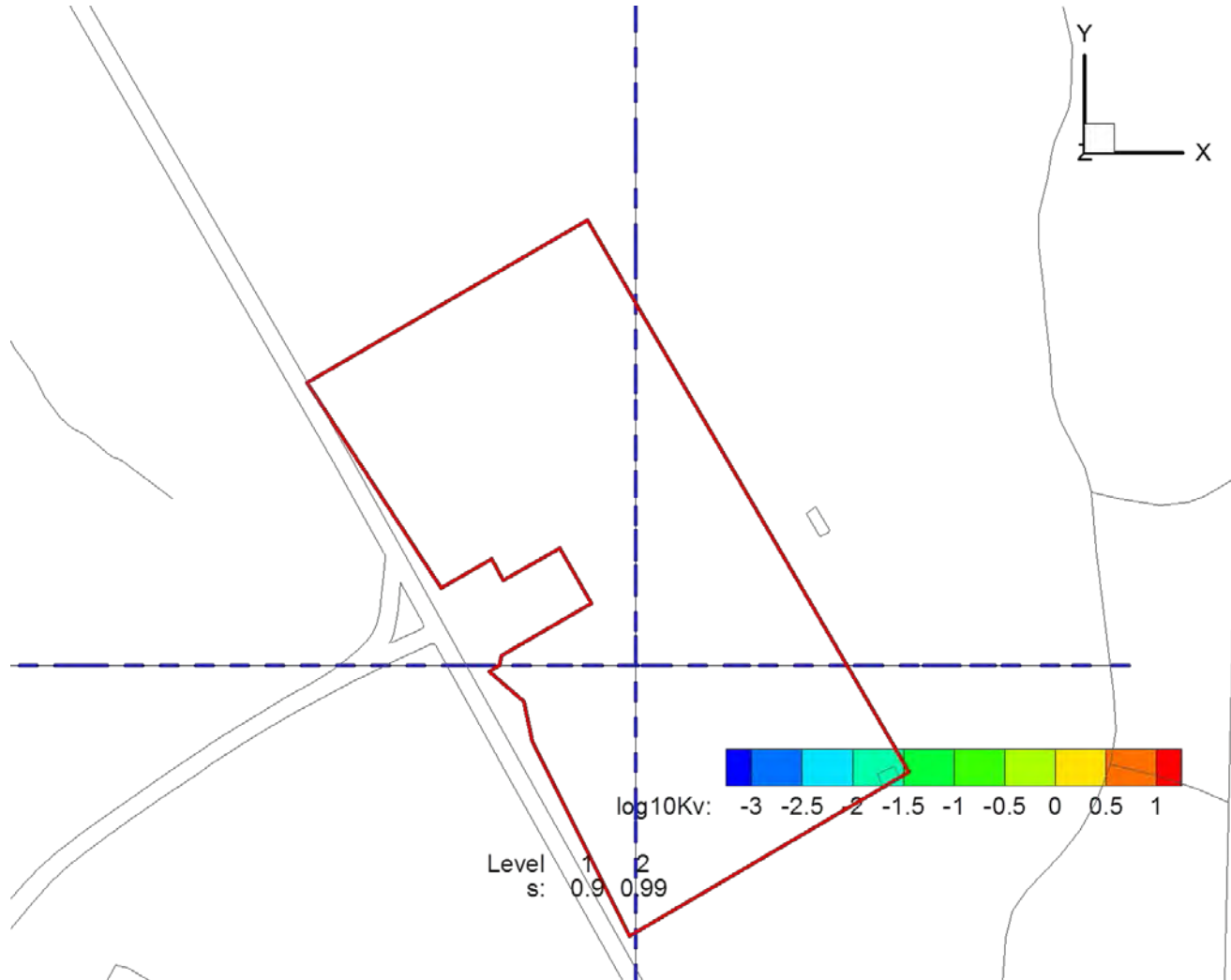
We do the right thing.



- Location of ZDPT-01, ZDPT-02, & ZDPT-03 shown adjacent to SDU 4

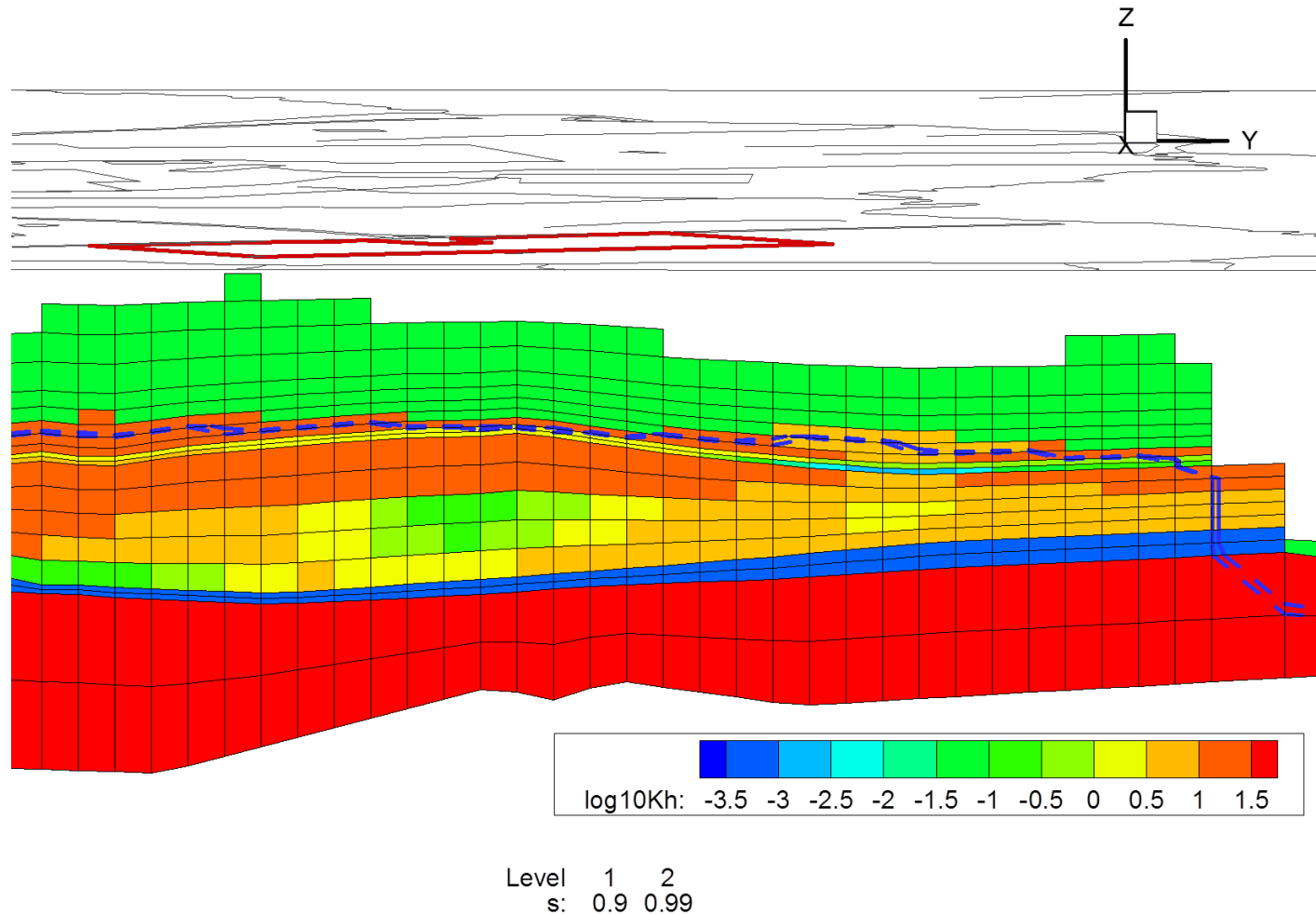
Figure originally provided during May 2014 NRC Onsite Observation Visit. Slide #22 of visit presentation [SRR-CWDA-2014-00054].

We do the right thing.



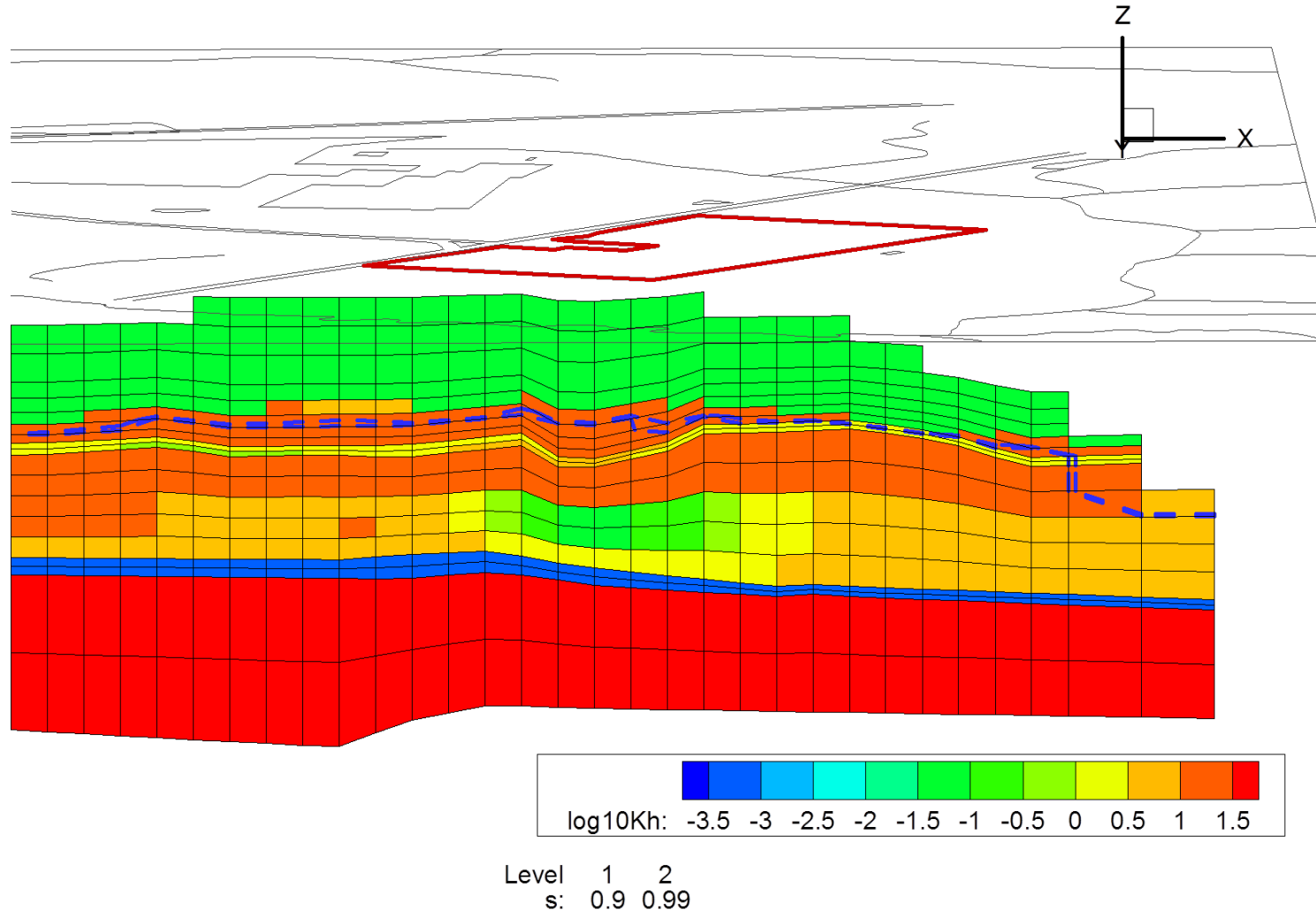
Slides Utilized During Far Field RAI Discussions (Action Item #11)

We do the right thing.



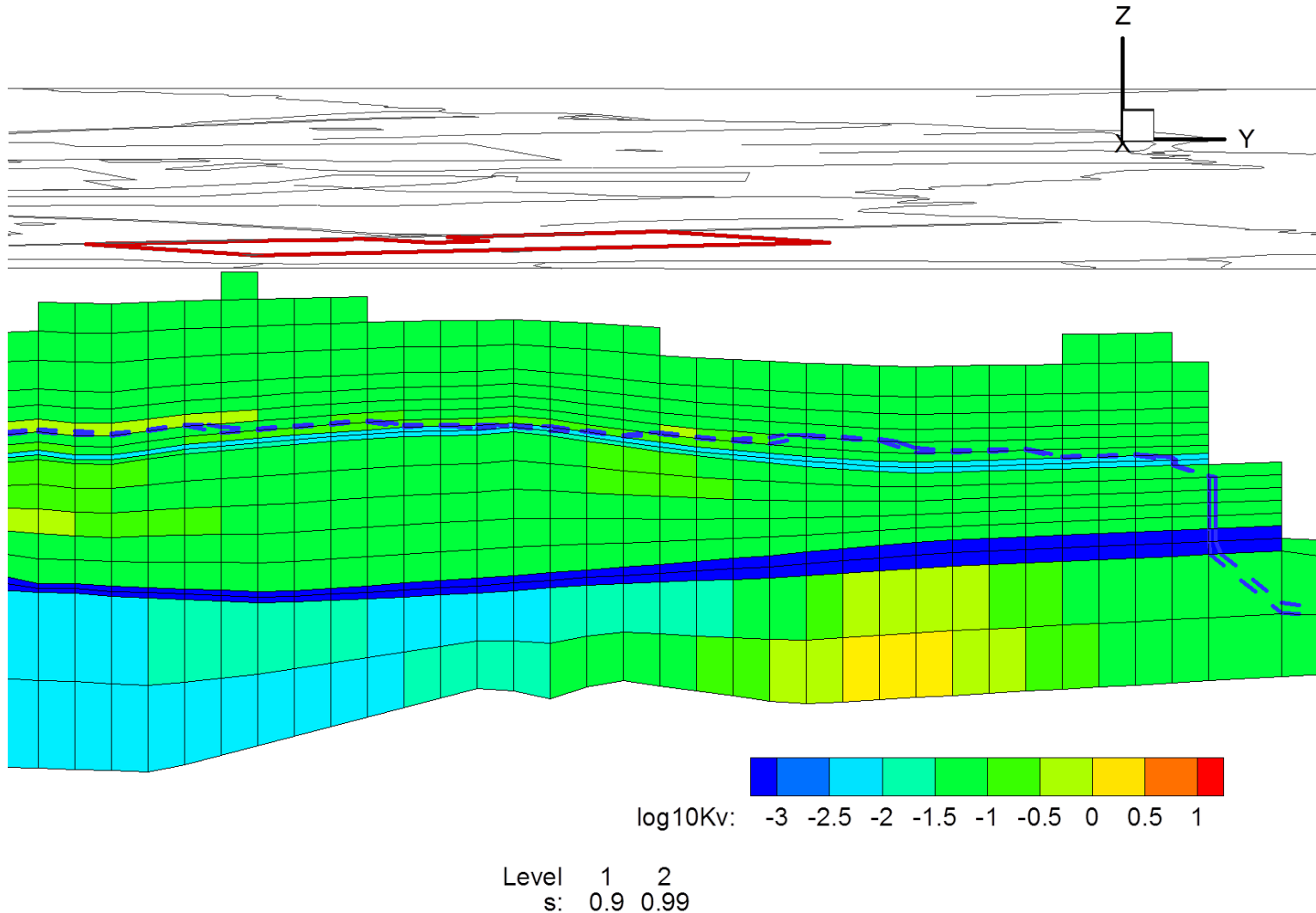
Slides Utilized During Far Field RAI Discussions (Action Item #11)

We do the right thing.



Slides Utilized During Far Field RAI Discussions (Action Item #11)

We do the right thing.



We do the right thing.

