October 5, 2015

Ms. Jean Ridley, Director
Waste Disposition Programs Division
U.S. Department of Energy
Savannah River Operations Office
P.O. Box A
Aiken, SC 29802

SUBJECT: THE U.S. NUCLEAR REGULATORY COMMISSION JULY 28-29, 2015, ONSITE OBSERVATION VISIT REPORT FOR THE SAVANNAH RIVER SITE COMBINED F AND H-TANK FARM CLOSURE (DOCKET NO. PROJ0734)

Dear Ms. Ridley:

The enclosed Onsite Observation Visit (OOV) report describes the U.S. Nuclear Regulatory Commission (NRC) OOV on July 28-29, 2015, of Tank closure at the Savannah River Site (SRS) F and H-Tank Farms. That OOV was conducted in accordance with Section 3116(b) of the Ronald W. Reagan National Defense Authorization Act for Fiscal Year 2005 (NDAA), which requires the NRC to monitor certain disposal actions taken by the U.S. Department of Energy (DOE) for the purpose of assessing compliance with the performance objectives set out in Title 10 of the *Code of Federal Regulations* (CFR) Part 61, Subpart C. The OOV was the sixth such monitoring site visit since the program began in 2012.

This is the first onsite observation visit covering both F and H-Tank Farms. There were five previous NRC FTF onsite observation visits (see list below) and nine technical review reports.

1. Report for FTF Observation 2012-01 (June 12, 2012), (ML12191A210) with Guidance issued on June 4, 2012, (ML12135A666).

2. Report for FTF Observation 2012-02 (September 26-27, 2012), (ML12299A190) with Guidance issued on August 23, 2012, (ML12228A631).

3. Report for FTF Observation 2013-01 (March 27-28, 2013) (ML13113A322) with Guidance issued on February 25, 2013, (ML13046A374).

4. Report for FTF Observation 2013-02 (August 27-28, 2013), (ML13267A452) with Guidance issued on July 29, 2013, (ML13196A134).

5. Report for FTF Observation 2014-01 (March 26-27, 2014), (ML14106A573) with Guidance issued on February 26, 2014, (ML14045A215).

The main activities conducted during the July 2015 tank farm closure OOV were technical discussions of topics identified herein and a tour of field activities associated with ongoing grouting of Tank 16H and isolation activities associated with Tank 12H.

The OOV activities were consistent with those described in the NRC Observation Guidance Memorandum for the July 2015 SRS tank farm closure OOV (dated June 28, 2015), [available

via the NRC Agencywide Documents Access and Management System (ADAMS) at Accession No. ML15162B071]. That Guidance Memorandum was developed using the F-Tank Farm Monitoring Plan, Rev. 0 (January 2013) [ADAMS Accession No. ML12212A192]. The F-Tank Farm Monitoring Plan contains the monitoring areas and monitoring factors, which describe how the NRC will monitor the DOE tank farm actions to assess compliance with the performance Objectives. An updated monitoring plan that will combine monitoring activities for both F and H-Tank farm closures is being prepared by NRC in consultation with SCDHEC. The combined monitoring plan will be finalized in fall 2015.

The OOV included detailed discussions of the following topics:

1. Documentation for closing FTF-Tanks 5/6 (MFs 3.2, "Groundwater Conditioning"; 3.3, "Shrinkage and Cracking"; 3.4, "Grout Performance"; and 3.6, "Use of Stabilizing Grout (As it Pertains to ALARA)[1]") including NRC staff's Technical Review of Grout Documentation for FTF-Tanks 5/6. (ADAMS Accession No.ML14342A784);

2. Implementation of DOE's radiation protection program, including ALARA, air monitoring, and final radiological data for Tanks 5/6 grouting, and Tank 12 and 16 sampling and grout preparations. (MFs 7.1, "Protection of Workers During Operations"; 7.2, "Air Monitoring"; and 7.3, "ALARA");

3. Status of the high-level waste tank residual solids sample leaching experiments. (MFs 2.1, "Solubility-Limiting Phases/Limits and Validation", and 2.2, "Chemical Transitions Times";

4. Ongoing (DOE) research or analyses relevant to MFs listed in NRC staff's FTF monitoring plan (ADAMS) Accession No. ML12212A192;

5. Technical Review of Environmental Monitoring and Distribution Coefficient Reports. (ADAMS Accession No. ML12272A124) (MFs 4.1, "Natural Attenuation of Pu", and 4.3, "Environmental Monitoring");

6. Technical Review of Tank 16 and Tank 12 Closure Documentation. (Comments on the Tanks 16H and 12H Closure Modules were sent to SC DHEC via email on April 9, 2015, and June 24, 2015 (see ADAMS Accession Nos. ML15244A790 and ML15244A839)) (MFs 1.1, "Final Inventory and Risk Estimates"; 1.2, "Residual Waste Volume"; 1.3, "Residual Waste Volume"; and 1.5, "Waste Removal (As it Impacts ALARA)");

7. Questions related to site stability (MF 8.1, "Settlement").

8. Tank 16 Grouting Operations (MF 3.2 "Groundwater Conditioning", MF 3.3"Shrinkage and Cracking", MF 3.4 "Grout Performance", and MF 3.6, "Use of Stabilizing Grout (As it Pertains to ALARA)").

The NRC will not close any of the tank farm closure monitoring factors (specific to a specific performance objective) or change the NRC TER overall conclusions as a result of the July 2015 OOV. There were no tank farm closure Open Issues identified during the July 2015 OOV.

1 ALARA: As Low As Reasonably Achievable

During the OOV, NRC staff took the opportunity to highlight changes in the draft combined tank farm monitoring plan, DOE was provided a copy of the draft for a “fact check” review. NRC expects to finalize the combined monitoring plan by November 2015. Follow-Up Action Items identified during the OOV are specific short-term actions to be performed by the NRC or the DOE. It is anticipated that most, if not all, of those Follow-Up Action Items will be closed before the next OOV.

A main focus of the NRC staff performing an OOV under NDAA monitoring regarding tank closure are recommendations contained in the NRC Technical Evaluation Report (TER) for F-Tank Farm, October 2011 (ADAMS Accession No.ML112371751) and the NRC TER for H-Tank Farm, June 2014 (ADAMS Accession No. ML14094A496).

In accordance with the requirements of NDAA Section 3116(b), the NRC will continue to monitor the DOE tank farm closure activities SRS. The next tank farm OOV is tentatively scheduled for February 2016.

If you have any questions or need additional information regarding this onsite observation visit report, then please contact Jim Shaffner of my staff at James.Shaffner@nrc.gov or at (301) 415-5496.

Sincerely,

/RA/

Andrew Persinko, Deputy Director
Division of Decommissioning, Uranium Recovery,
and Waste Programs
Office of Nuclear Material Safety
and Safeguards

Enclosures:
1. NRC Onsite Observation Visit Report
2. SRR-CWDA-2015-00095, Rev. 1
3. SRNL-MS-2015-00116

cc w/Enclosures:
WIR Service List
WIR e-mail Contacts List

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Andrew Persinko, Deputy Director
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ADAMS Accession No.: ML15239A628

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U.S. NUCLEAR REGULATORY COMMISSION
JULY 28-29, 2015, ONSITE OBSERVATION VISIT REPORT FOR
THE SAVANNAH RIVER SITE FOR TANK FARM CLOSURE

EXECUTIVE SUMMARY

The U.S. Nuclear Regulatory Commission (NRC) staff conducted its sixth Onsite Observation Visit (OOV) related to tank closure at the Savannah River Site (SRS) on July 28-29, 2015. This was the first OOV that included both F and H-Tank farms. On every OOV to SRS, the NRC is focused on assessing compliance with four performance objectives in Title 10 of the *Code of Federal Regulations* (CFR) Part 61, Subpart C: (1) protection of the general population from releases of radioactivity (§61.41), (2) protection of individuals from inadvertent intrusion (§61.42), (3) protection of individuals during operations (§61.43), and (4) stability of the disposal site after closure (§61.44). Please see the attachment to this OOV report for the detailed technical information from this OOV.

For this OOV, the NRC focused on the monitoring areas and monitoring factors derived from the F-Tank Farm Monitoring Plan, January 2013 (ADAMS Accession No. ML12212A192). A combined monitoring plan, applicable to both the F and H-Tank farms is being developed and should be final in the fall 2015. The NRC performs monitoring activities in coordination with South Carolina, therefore the South Carolina Department of Health and Environmental Control (SCDHEC) staff also participated in the OOV and received the same information from the U.S. Department of Energy (DOE) as the NRC received from the DOE during the OOV.

As described in the Observation Guidance Memorandum for the OOV, the main activities conducted were tours and technical discussions between the DOE (i.e., includes DOE contractors throughout this OOV report), the NRC, and the SCDHEC. A tour focused on grouting of Tank 16H and isolation activities associated with Tank 12H. The other technical discussions focused on: (1) documentation on closure of FTF-Tanks 5 and 6; (2) implementation of DOE's radiation protection program; (3) status of HLW residual solids sample leaching experiments; (4) DOE research and analysis relevant to monitoring factors; (5) technical review of environmental monitoring and distribution coefficient reports; (6) technical review of Tank 12H and 16H closure documentation; and (7) site stability. This OOV report provides a description of the activities during the OOV, including observations made by the NRC.

The NRC received the updated DOE presentation (SRR-CWDA-2015-00095, Rev. 1) that pertained to the activities during the OOV. It includes action items and photographs arising from the OOV. That DOE presentation is accessible via the NRC Agencywide Documents Access and Management System (ADAMS), via Accession No. ML15239A622.

1.0 BACKGROUND

Section 3116(a) of the National Defense Authorization Act for Fiscal Year 2005 (NDAA) authorizes the DOE, in consultation with the NRC, to determine that certain radioactive waste related to the reprocessing of spent nuclear fuel is not high-level waste, provided certain criteria are met. NDAA Section 3116(b) requires the NRC to monitor the DOE disposal actions to assess compliance with the performance objectives in 10 CFR Part 61, Subpart C.

On September 30, 2010, DOE submitted to the NRC a draft waste determination titled, "Draft Basis for 3116 Determination for Closure of F-Tank Farm at the Savannah River Site," DOE/SRS-WD-2010-001 (ADAMS Accession No. ML102790078). The purpose of the draft waste determination was to demonstrate compliance with the criteria in Section 3116(a) of the NDAA, including compliance with the performance objectives in 10 CFR Part 61, Subpart C. In its consultation role, the NRC staff reviewed the draft waste determination and supporting performance assessment. In October 2011, NRC staff documented the results of its review in a Technical Evaluation Report (TER) (ADAMS Accession No. ML112371751). In the TER, NRC staff listed a number of recommendations for DOE to provide information NRC staff needs to assess compliance with the performance objectives. DOE considered the NRC staff TER observations and recommendations in finalizing its FTF waste determination (DOE-WD-2012-001) and basis document (DOE/SRS-WD-2012-001, Rev. 0) in March 2012. (ADAMS Accession Nos.ML121140043 and ML121140051).

On February 6, 2013, DOE submitted to the NRC a draft waste determination titled, "Draft Basis for Section 3116 Determination for Closure of H-Tank Farm at the Savannah River Site," DOE/SRS-WD-2013-001, Rev. 0 (ADAMS Accession No. ML13045A504). The purpose of the draft waste determination was to demonstrate compliance with the criteria in Section 3116(a) of the NDAA, including compliance with the performance objectives in 10 CFR Part 61, Subpart C. In its consultation role, the NRC staff reviewed the draft waste determination and supporting performance assessment. In June 2014, NRC staff documented the results of its review in a TER (ADAMS Accession No.ML14094A496). Similar to the process for FTF, NRC staff listed a number of recommendations in its HTF TER for DOE to provide information that NRC staff needs to assess compliance with the performance objectives. Many of the recommendations listed in the HTF TER are similar to those made in the FTF TER. DOE considered the NRC staff TER observations and recommendations in finalizing its HTF waste determination (DOE-WD-2014-001) and basis document (DOE/SRS-WD-2014-001, Rev. 0) in December 2014 (ADAMS Accession nos. ML15051A352 and ML15051A353).

To carry out its monitoring responsibility under NDAA Section 3116(b), the NRC, in coordination with SCDHEC, performs three activities: (1) technical reviews, (2) OOVs, and (3) data reviews. Those activities focus on both: (1) key modeling assumptions identified in the NRC F-Tank Farm Monitoring Plan, Rev. 1; and (2) the DOE disposal actions. Specifically, technical reviews generally focus on reviewing information generated to provide support for key assumptions that the DOE made in the tank farm PA or special analysis documents. OOVs generally focus on either: (1) observing the collection of data and reviewing the data to assess consistency with assumptions made in the tank farm final Waste Determination; or (2) observing key disposal or closure activities related to technical review areas. Data reviews generally focus on supplementing technical reviews by focusing on monitoring data that may indicate future system performance or reviewing records or reports that can be used to directly assess compliance with the performance objectives.

2.0 NRC ONSITE OBSERVATION VISIT ACTIVITIES

On June 26, 2015, the NRC issued the Observation Guidance [ADAMS Accession No. ML15162B071] for the July 28-29, 2015, OOV. Observation Guidance is a plan for what NRC expects to cover during an OOV, which may be changed based on what happens during the OOV.

The OOV began with a short briefing on the agenda presented by the DOE contractor, Savannah River Remediation (SRR) that was attended by representatives from the DOE, the NRC, SCDHEC, and U.S. Environmental Protection Agency (EPA). The main activities conducted were technical discussions between the DOE (i.e., includes DOE contractors throughout this OOV report), the NRC, the EPA and the SCDHEC. The OOV also included a brief tour focused on grouting of Tank 16H and isolation activities associated with Tank 12H. The technical discussions focused on: (1) documentation on closure of FTF-Tanks 5 and 6; (2) implementation of DOE's radiation protection program; (3) status of HLW residual solids sample leaching experiments; (4) DOE research and analysis relevant to monitoring factors; (5) technical review of environmental monitoring and distribution coefficient reports; (6) technical review of Tank 12H and 16H closure documentation; and (7) site stability. This OOV report provides a description of the activities during the OOV, including observations made by the NRC

2.1 TECHNICAL DISCUSSION – DOCUMENTATION FOR CLOSING FTF-TANKS 5/6

2.1.1 OBSERVATION SCOPE

The technical discussion supported the NRC monitoring of the DOE disposal actions to assess compliance with 10 CFR 61.41, 10 CFR 61.42 and 10 CFR 61.43. The technical discussion was most relevant to the following monitoring areas (MAs) and monitoring factors (MFs) in FTF Monitoring Plan, Rev. 0: (MFs 3.2, "Groundwater Conditioning"; 3.3, "Shrinkage and Cracking"; 3.4, "Grout Performance"; and 3.6, "Use of Stabilizing Grout (As it Pertains to ALARA)[2]") including NRC staff's Technical Review of Grout Documentation for FTF-Tanks 5/6 (ML14342A784).

2.1.2 OBSERVATION RESULTS

The major points from the technical discussion were the following:

1. One of the issues identified in the Tanks 5 and 6 TRR was related to the use of Slick Willie during grouting operations. During Tanks 5 and 6 grouting, Slick Willie accumulated at the surface of the grout and there was a concern that incorporation of the excess liquid would adversely affect tank performance. DOE indicated that it is not using Slick Willie for Tank 16 grouting. Instead, DOE is using a small quantity of water to prime the pump and lubricate the line. Approximately 5 to 7 gallons of water is being used depending on length of the slick line. DOE considered whether Slick Willie has detrimental chemical effects on the grout and although no issues have been identified, DOE is attempting to limit use of Slick Willie and the quantity of liquid added to the tank as it is no longer thought to be necessary.
2. NRC and DOE also discussed issues with one instance of placement of poor quality grout (a portion of one truckload) in Tank 6. DOE clarified in the OOV that the grout placed in Tank 6 did not have any aggregate in it. DOE investigated the issue with the grout contractor, Argos, and made changes to procedures to make sure that the placement of poor quality grout did not occur in the future.

2 ALARA: As Low As Reasonably Achievable

3. NRC inquired if DOE had any plans for testing of shrinkage and shrinkage compensating formulas. DOE indicated it has no current plans due to lack of funding.
4. DOE informed NRC staff that there are no active plans to include thermal trees to better understand temporal and spatial thermal gradients in the tanks.
5. NRC staff indicated that Center for Nuclear Waste Regulatory Analysis (CNWRA) staff was performing experiments to study conditioning of groundwater from interaction witH-Tank grout. DOE inquired what the chemistry of the water was. NRC indicated that it was an SRS synthetic groundwater, because it was supposed to reflect fracture flow. DOE indicated that we should also look at flow through cementitious materials with higher pH. NRC indicated that the closed loop system would recirculate water around the core to reflect higher residence times through the core and greater interaction with the grout. CNWRA also performed static tests with cubed tank grout specimens and after 1 day the Eh went to -200 mV. CNWRA is preparing fresh grout samples with current formulations. The results of the experiments will be documented in a status report at the end of the FY.
6. NRC also discussed CNWRA research on acoustic emission work to study cracking behavior in cementitious waste forms. NRC will also send DOE the status report when it is completed at the end of the fiscal year.
7. There was also discussion regarding location of leak sites in tanks, and how the location of the leak site impacts groundwater conditioning. If the leak site is high, water will accumulate in the tank and then flow out of the high leak site.
8. There was also discussion regarding the risk-significance of shrinkage for Type IV tanks versus Type I, II, and III tanks with cooling coils. Shrinkage away from cooling coils will increase interaction of groundwater with the tank grout and lead to greater conditioning compared to a case where shrinkage away from the wall directed all the flow.

2.1.3 **CONCLUSIONS AND FOLLOW-UP ACTION ITEMS**

The NRC staff will continue to monitor the DOE tank farm closure activities. The following Follow-Up Action Items resulted from the technical discussion:

1. DOE to provide information on lessons learned/procedure changes relative to the rejected Tank 6 grout truck.
2. DOE to provide the NRC a copy of the Grout Drop Testing Report.
3. NRC to set up a teleconference to discuss ongoing NRC grout testing relative to Tank Farm Grout.

2.2 **TECHNICAL DISCUSSION – IMPLEMENTATION OF DOE'S RADIATION PROTECTION PROGRAM**

2.2.1 OBSERVATION SCOPE

The technical discussion supported the NRC monitoring of the DOE disposal actions to assess compliance with 10 CFR 61.43. The technical discussion of the implementation of DOE's radiation protection program, including ALARA, air monitoring, and final radiological data for Tanks 5/6 grouting, and Tank 12 and 16 sampling and grout preparations. (MFs 7.1, "Protection of Workers during Operations"; 7.2, "Air Monitoring"; and 7.3, "ALARA")

2.2.2 OBSERVATION RESULTS

The major points from the technical discussion were the following:

1. DOE and NRC discussed the need for NRC to obtain certain types of radiation protection documents and the manner in which radiation protection documents would be shared with the NRC.

2. DOE indicated that there was no post-job ALARA review for Tanks 5 and 6 grouting because doses were low for the bulk-fill. In some unique cases DOE will generate a post-job ALARA review, but these reports are not always required if doses are low.

3. DOE pointed out some of the air monitoring stations and area radiation monitors during the tour.

4. NRC requested the F and H-Tank Farm Facility Annual Review of Monitoring Systems (FARMS) reports. NRC has not yet received a FARM report for H-Tank Farm and DOE indicated that the F-Tank Farm FARMS report had been revised primarily for formatting.

2.2.3 CONCLUSIONS AND FOLLOW-UP ACTION ITEMS

The NRC staff will continue to monitor the DOE Tank Farm activities.

1. DOE to provide NRC latest revisions of H- and F-Tank Farm FARMS reports.

2.3 STATUS OF THE HIGH-LEVEL WASTE TANK RESIDUAL SOLIDS SAMPLE LEACHING EXPERIMENTS

2.3.1 OBSERVATION SCOPE

The discussion supported the NRC monitoring of the DOE disposal actions to assess compliance with 10 CFR 61.41 and 10 CFR 61.42. It centered around MFs 2.1, "Solubility-Limiting Phases/Limits and Validation", and 2.2, "Chemical Transitions Times";

2.3.2 **OBSERVATION RESULTS**

The major points of discussion were the following:

1. With regard to the high-level waste testing, since the last update provided in the March 2014 OOV (ML14106A573) DOE indicated that it has begun using various reductants and oxidants to achieve Eh endpoints—and are now closer to target values.
2. Nonetheless, researchers were unable to achieve endpoints assumed in DOE's PA modeling, particularly on the reducing end. It is not clear to SRNL why the as-modeled reducing conditions (i.e., -0.47V) were not achieved. More oxidizing conditions have been achieved with bottle venting (within 50 mV of target for ORII). More extreme oxidants for ORIII and reductants may be required.
3. DOE wanted feedback on the targeted chemical conditions. DOE discussed that the Eh and pH conditions assumed in the performance assessment are the extremes to show what could happen and to see what the consequences are. NRC indicated that reasonable endpoints should be targeted so we are not left wondering if the solubility could be higher if the chemical conditions were different. If the solubility is not risk-significant at the endpoints, then no further work may be needed.
4. If the solubility is risk-significant at the targeted endpoints, then DOE may want to explore under what conditions solubility is risk-significant (e.g., determine a threshold Eh for solubility increase for Pu). The difficulty is that there is a large, realistic range of Eh/pH that could be explored. To make the problem more manageable, DOE should understand the sensitivity of each key radionuclide solubility to Eh/pH to determine the most optimal experimental variables given limited resources to conduct the experiments. If most of the key radionuclides are redox sensitive, then Eh may be the key experimental variable for most key radionuclides, thereby simplifying the problem.
5. If key radionuclide solubility is found to be risk-significant under certain conditions, DOE will need to consider under what circumstances those conditions may exist and how likely they are. For example, DOE may need to determine how the groundwater will be conditioned via the grout under various flow conditions, including flow through gaps and cracks.
6. DOE made the comment that it may be difficult to get representative results in testing actual tank waste. For example, because the waste had been in an oxidizing environment for a long period of time, you may get higher leach rates than what would occur in the field when running low Eh groundwater through the system.
7. NRC also indicated that Oxidized Region II and III leaching results may also not be representative, because the actual waste may have aged for long periods of time and leached for hundreds of pore water replacements prior to transition to these chemical states.
8. NRC staff inquired as to whether or not the Geochemists Workbench model results for Eh and pH were compared against the OLI thermodynamic model results. DOE stated that the model results were not used for that purpose (DOE's presentation indicated that the model was used to calculate pore water compositions for target conditions).

9. It is not clear what the chemical forms of the residual solids are and how they may differ from the surrogate solids. DOE clarified that the actual waste was highly washed in tank and has been stored under air in a shielded cell.

2.3.3 CONCLUSIONS AND FOLLOW-UP ACTION ITEMS

The NRC staff will continue to monitor the DOE tank farm closure activities. The following Follow-Up Action Item resulted from the discussion:

1. DOE to provide NRC an electronic copy of Release of Radionuclides from Tank Waste Residual Solids, SRNL-MS-2015-00116.
2. DOE to provide NRC a copy of the FY2015 summary report on tank waste residual solids testing when available.
3. DOE would like to have comments on updated TTQAP as quickly as possible. NRC staff requested early notice about when we will be receiving the TTQAP, so that we can provide comments in a timely fashion. DOE can decide how long before work begins that it needs comments from NRC.

2.4 ONGOING DOE RESEARCH OR ANALYSES

2.4.1 OBSERVATION SCOPE

The technical discussion supported the NRC monitoring of the DOE research and analysis relevant to MFs listed in NRC staff's FTF monitoring plan to assess compliance with 10 CFR 61.41 and 10 CFR 61.42, (MFs 4.1, "Natural Attenuation of Pu", and 4.3, "Environmental Monitoring").

2.4.2 OBSERVATION RESULTS

Regarding Lysimeter/Kd studies:

1. DOE continues to collect quarterly samples from the Lysimeter.
2. DOE plans to issue a FY2015 Lysimeter report later this year.
3. In early FY16, Dan Kaplan from SRNL is expected to complete an update to the SRS geochemical report (the date of issuance of the report is subject to funding).
4. Lysimeter results will be considered in updated geochemical report.

2.4.3 CONCLUSIONS AND FOLLOW-UP ACTION ITEMS

The NRC staff will continue to monitor the DOE tank closure activities. The following Follow-Up Action Items resulted from the tour and technical discussion:

DOE is to provide NRC a copy of the FY2015 summary report on Lysimeter testing when available.

3.5 TECHNICAL DISCUSSION – ENVIRONMENTAL MONITORING AND KD REPORTS

2.5.1 OBSERVATION SCOPE

The technical discussion supported the NRC monitoring of the DOE disposal actions to assess compliance with 10 CFR 61.41, 10 CFR 61.42, and 10 CFR 61.43. The discussion included technical review of Environmental Monitoring and Distribution Coefficient Reports. (ADAMS Accession No. ML12272A124) (MFs 4.1, "Natural Attenuation of Pu", and 4.3, "Environmental Monitoring")

2.5.2 OBSERVATION RESULTS

The major points of the technical discussion were the following:

1. As indicated in the TRR (ML12272A124), it is not clear to NRC staff that the contamination observed in monitoring well FTF28 is from the F-Area Inactive Process Sewer Line (FIPSL), because the well is screened in the lower portion of the Upper Three runs aquifer in close proximity to the source. NRC staff were also unclear on arguments made in the Tank Farm monitoring report regarding the correlation between pH and manganese. NRC staff suggested that DOE perform backwards particle tracking to identify the source of contamination in that well.
2. In a previous onsite observation, DOE contractors indicated that the location of F-Tank Farm monitoring wells were based on PA modeling. NRC compared the vertical location of the well screens against the PORFLOW predicted centerline plume locations when various F-Tank Farm sources are simulated. Based on this comparison, it appears that many F-Tank Farm monitoring wells could be screened in a more optimal location to detect releases from the F-Tank Farm facility. NRC staff suggested that PORFLOW simulations inform the selection of well locations in the future, or that DOE provide supporting rationale for the selection of well locations if the modeling simulations are not expected to be reflective of reality.
3. NRC staff reviewed K_d reports and discussed the need for additional support for the niobium K_d (i.e., to show that Nb was not solubility limited in the experiments). NRC staff also indicated that additional support was needed for cement leachate impact factors. NRC also discussed the need for site specific studies. NRC staff is particularly concerned about K_ds assigned to Pu and U. Additionally, the averaging of K_ds for Pu species is not appropriate. DOE discussed that they may need to model Pu as two separate species (e.g., Pu-1 and Pu-2) to investigate risk from two different Pu fractions.
4. DOE discussed that the monitoring well network is approved by DHEC and EPA. DOE is looking at the cost to update the GSA database and then inform monitoring well network based on revised PORFLOW modeling.
5. Hydraulic conductivity adjustments were made during the PORFLOW model calibration process near H-Tank Farm facility with no supporting physical basis for the adjustments. Improvements could be made to the PORFLOW model including use of more recently collected monitoring well data. Additional data collection to supplement the GSA database, is supported by NRC staff to increase confidence in the far-field model predictions.

2.5.3 CONCLUSIONS AND FOLLOW-UP ACTION ITEMS

The NRC staff will continue to monitor DOE environmental monitoring and K_d results. As noted above, in early FY16, Dan Kaplan from SRNL is expected to complete an update to the SRS geochemical report (the date of issuance of the report is subject to funding).

2.6 TECHNICAL REVIEW OF-TANK 16 AND TANK 12 CLOSURE DOCUMENTATION

2.6.1 OBSERVATION SCOPE

The technical discussion supported the NRC monitoring of the DOE disposal actions to assess compliance with 10 CFR 61.41 and 10 CFR 61.43. Discussions included Technical Review of Tank 16 (and Tank 12) Closure Documentation. (Comments on the Tanks 16H and 12H Closure Modules were sent to SC DHEC via email on April 9, 2015 and June 24, 2015 (ADAMS Accession nos.ML15244A790 and ML15244A839) (MFs 1.1, “Final Inventory and Risk Estimates”; 1.2, “Residual Waste Volume; ” 1.3, “Residual Waste Volume”; and 1.5, “Waste Removal (As it Impacts ALARA)”).

2.6.2 OBSERVATION RESULTS

The major points of the technical discussion were the following:

1. At the time of the OOV, DOE indicated that Tank 12 had been isolated, grout preparations were underway, and they were in the process of setting slick lines and setting up equipment for grouting. Tank 12 grouting is expected to begin in January 2016.
2. DOE indicated it was pulling a slurry pump out of Riser 3 in Tank 15.
3. DOE indicated that it was putting 2 slurry pumps in Tank 26, an evaporator feed tank, as well as removing a pump and educator assembly.
4. DOE will likely not continue to obtain ground blast furnace slag (GBFS) from Holcim in the long-term. Holcim plans to use a new grade of 120, which is finer than the old grade of 100, necessitating the change in the supplier of GBFS.
5. Argos supplies the slag used for tank grouting while DOE SRS procures slag directly from the vendor for saltstone.

Tank 16 Update:

1. At the time of the OOV, DOE indicated that grout was about 1-2 foot from the top of Tank 16H. Contractors were preparing to perform equipment and cooling coil grouting. Tank 16H grout formulation is the same grout formulation used in Tanks 5 and 6.
2. The closure assurance plan for Tank 16 was provided to the NRC and provides a checklist for grouting operations.
3. Tank 16 formulation is the same as Tanks 5F and 6F (see Tank 5F and 6F grout documentation). Difference between 18F/19F and Tanks 5F/F6 and 16H is the slump of

26-30 inches. Slightly higher slump compared to Tanks 18F/19F due to cooling coils. Equipment fill grout formula same as used for all tanks.

4. Small batches of equipment grout are measured and mixed on site and metered into the equipment using gravity driven flow through a funnel. A high point on the equipment is used to vent while grouting and verify when grouting is complete. The closure module has a table that lists equipment to be grouted (Table 7.2-1, 7.2-2). DOE indicated that inspection ports 42 and 59 were being grouted the day of the OOV.
5. For cooling coils, a pre-blended dry grout mixture is prepared off-site and delivered in a Super Sack where it is mixed with water using a commercial grout skid. A pump is used to meter the grout into the cooling coils. DOE grouts the in-tact cooling coils from the supply side to the discharge side, adding an additional grout volume beyond the volume necessary to fill the coil to ensure that it is completely filled. The grout/cooling coil flush water interface volume is collected in totes, solidified, and disposed of. Failed coils are grouted from both ends. After NRC inquired about the success of failed cooling coil grouting, DOE indicated that one coil was blocked and one coil was fractured low.
6. Two annulus risers, the east and west risers, were used to grout the Tank 16 annulus. Grout was not injected through the ventilation inlet until the end of grouting. Grout must, therefore, enter the ventilation duct registers from the outside of the duct.
7. The risers used to fill the primary of Tank 16 are Risers 2, 3, 6, and 8.
8. Fewer lifts are being used to grout Tank 16 compared to Tanks 5 and 6; DOE reduced the number of lifts to 6 (instead of 10 lifts in 5 and 6). Tank grout can be 8 ft. higher than the annulus grout level, and the annulus grout level can be 6 ft. higher than tank grout level for structural stability.
9. As of 7/29/2015, DOE indicated that the primary was 94 percent complete, the annulus was 68 percent complete, 5 failed cooling coils had been grouted. DOE indicated that coil 12 was blocked and about 6 gallons of grout were injected in each leg. As a point of reference, the total volume of a cooling coil is approximately 75 and 115 gallons.
10. DOE indicated that it had experienced grout mounding issues near risers 2, 6 and 8. Mounding of grout near the risers could block the flow of grout into the tank and leave void volumes at the top of the tank. DOE indicated that grout mounding is believed to have occurred due to the high environmental temperatures. The grout starting setting quickly before DOE realized the grout was not being spread from the entry point. In addition to Risers 2, 6, and 8, DOE indicated that grout can also be delivered through the “3 ft. six-inch riser” (see page 32 of DOE’s OOV presentation for location of riser). DOE indicated that there was less height or head on risers compared to other tanks (about 7 ft. on Tank 16 risers and about 12 ft. on Type IV tank risers). DOE indicated that one could still visualize the grout surface from Riser 3 where there was 2 ft. of space remaining between the grout and the top of the tank. Mounds are inches from the tank top in other risers. DOE also indicated that directional tremies could be used in riser 3 to deliver grout at an angle (hard pipe also used on Tank 19 to assist with filling top). Tank 18/19 had very significant mounding due to use of central riser. DOE did not have to use the directional tremie on Tanks 5 and 6.
11. With respect to annulus grouting, the ventilation inlet was not used to grout the duct. Grout had to flow into registers to fill the duct. DOE visually confirmed entry of grout into

the duct. DOE cannot evaluate grout uptake in the duct, because the duct volume was an insignificant volume compared to the bulk annulus fill.

12. Approximately 4 cubic yards is needed to fill the inlet of the duct.
13. A TK 70 pump is used to deliver 75 yards of grout into the tank per hour. A 42 inch television screen is used to visualize grouting in the command center.
14. DOE indicated that no low quality grout has been observed to enter the hopper thus far. Only nonconformance report thus far was curing room temperature was outside of specifications.
15. DOE discussed methods of it could take to keep grout cooler to prevent early curing and ensure flowability. DOE could keep temperature of grout lower (use cooling water), or make slick line adjustments to keep it from hardening. The key lesson learned, however, is to forego grouting when temperatures exceed a certain value.

Tank 16 Removal Report:

1. DOE indicated that the removal reports provide more pertinent information on MEP compared to the closure modules.
2. During the OOV, NRC provided verbal comments on the Tank 16 Removal Report. NRC staff indicated that DOE's calculation of collective dose is not appropriate. DOE considered dose to an individual for 50 years in calculating collective dose to compare to the $2000/person-rem metric. NRC commented that releases are simulated to occur over long periods of time in DOE's PA and could affect a larger population of people for a longer period of time, although the affected population would be difficult to project over long time periods.
3. Due to issues associated with calculation and discounting of collective dose for the long time frames considered for decommissioning (or low-level waste) problems, NUREG 1854 does not recommend use of collective dose for waste-incidental-to-reprocessing, applications and provides guidance on other methods to consider the costs and benefits of additional radionuclide removal.
4. NRC staff also indicated that NUREG/BR-00058 cited Rev. 2 which is not the current version. Rev. 4 indicates that impacts to future generations be evaluated through a sensitivity analysis on discounting rates (below 3 and 7 percent) including consideration of no discounting.

Tank 16 Special Analysis:

1. *Inventory*
   - NRC staff inquired about the cause of the significantly under-estimated inventories of Sr-90 and I-129 in Tank 16, and whether the inventories of these constituents are now expected to be under-predicted in other tanks. DOE responded that I-129 was previously considered to be soluble, but appears to be in a less mobile form in the tank. DOE stated that it could be that the iodine is complexed and in a less mobile form or the cleaning process could have rendered the iodine to be oxidized to iodate,

which is less soluble. The possibility exists that it was taken up by silver or mercury. It is not clear what chemical state the iodine may exist in under grouted conditions, even though it appears to be less mobile than assumed in the PA.

- DOE indicated that Tank 16 is the only tank with Sr-90 expected to be present in the annulus at such a high inventory, because the waste in the annulus was due to a direct, early leak from the primary. DOE indicated that it could take months for Sr to precipitate as insoluble carbonates in the tank but it would eventually settle out as sludge.
- In response to an NRC staff inquiry, DOE indicated that acid cleaning was expected to affect the rheology of the waste, thereby facilitating mechanical cleaning. But DOE indicated that the acid cleaning was not itself directly responsible for much of the volume removal of the waste.

2. *Annulus Waste Release*

- NRC inquired as to the technical basis for not considering a continuous fast pathway through the grouted annulus, which was discussed by NRC staff in HTF TER. NRC discussed that grouting of the annulus will not necessarily preclude the presence of fast pathways due to shrinkage of the grout.
- NRC indicated that DOE's assumption that the annulus grout had a low hydraulic conductivity would limit flow through the system even with a high hydraulic conductivity construction joint, because flow through the construction joint and annulus grout occurred in series and flow was thus, controlled by the resistive barrier.
- DOE discussed that short-lived radionuclides are more risk significant in the near term, but the closure cap could limit their release if water table drops during early times.
- NRC discussed that it will provide a cartoon of the annulus waste release scenario it was envisioning.
- DOE discussed that the annulus waste release scenario is a test case for ASCEM.
- NRC staff inquired if additional information is available from the studies discussed in SRR-CWDA-2014-00060, which stated that additional studies indicate that even if a totally continuous zone of high conductivity could occur, its exposure area to the source would have to be unrealistically large to produce releases large enough to allow the tank releases to dominate over the garden soil releases.
- DOE considered lateral flow through the grouted tank system with a 1% hydraulic gradient. NRC staff referred to Section 4.2.9.3 of the HTF TER, which states that "If the possibility of rise and fall of the water table in the vicinity of the Type I and II tanks cannot be excluded, DOE should evaluate a scenario where water drains from any gaps in the annulus and sand pad regions." NRC staff believe that rise and fall of the water table with a hydraulic gradient of 1 is the limiting release scenario.
- NRC inquired as to the adequacy of the GoldSim model in accurately simulating the impact of preferential pathways through the engineered system without additional PORFLOW analysis and abstraction. DOE stated that PORFLOW simulations

helped inform the GoldSim model, although flow information was not directly used in the GoldSim calculations. Spreadsheet calculations were used in the GoldSim calculations.

3. *Probabilistic Modeling*

   - With regard to the probabilistic modeling, NRC staff indicated that it is not clear if the tank grout controls the chemistry of infiltrating groundwater, or if the chemistry of the infiltrating groundwater remains largely unchanged due to limited interaction with the tank grout. In deterministic Cases C and E, cases which include preferential pathways through the tank (Case C) or tank and basemat (Case E), the tank grout is assumed to degrade slowly, and therefore, groundwater is assumed to flow primarily through the higher hydraulic conductivity preferential pathways and not through the tank grout. Because flow is primarily through the preferential pathways and not the low conductivity grout, the tank grout is not assumed to condition infiltrating groundwater to low Eh and high pH, which is beneficial in maintaining key radionuclide solubility to low values. Although DOE retains Cases C and E in the probabilistic model, DOE does not constrain the grout degradation times for each of these cases, making the conceptual model for Case C and E unclear (i.e., it is not clear if groundwater is assumed to be conditioned via flow through Tank grout or if groundwater is assumed to by-pass the tank grout).

4. *Natura*l *System*

   - NRC staff noted that the updated I-129 sorption in the natural environment appeared to consider iodate versus iodide, which may be due to interaction with organic matter. NRC also pointed out that it is not clear how this could impact the sorption of other radionuclides (e.g., plutonium). DOE discussed that they are working on an update to a site-wide K_d report, which will also include data from the Lysimeter study.

Tank 16 Closure Module Questions:

1. NRC inquired about changes to the waste over time that made it more difficult to remove (i.e., DOE speculated that it was the freshness of the Tank 16 waste, compared to other tanks, that made it easier to remove with limited accumulation over short period of time). DOE discussed that they used a very large volume of acid (i.e., much larger than anything that would be used today). The acid was also heated in Tank 16.
2. Previous cleaning did not have cameras. They had to estimate original volumes based on mirrors and optics and may have overestimated the original volume.
3. DOE also indicated that there was not a safety basis back then (i.e., not as worried about waste aerosolization) and so they could operate their pumps at much lower liquid levels. DOE previously pressurized the tank during cleaning and they were allowed to be much more aggressive during cleaning operations.
4. DOE indicated that the acid modifies the waste rheology, although with some conflicting evidence. Sludge beds tend to become compacted and less vulnerable to removal. Aluminum beds are finer particles. F-Area are more like coffee grounds and easier to suspend.

5. NRC staff inquired whether oxalic acid make the waste more amenable to removal. DOE responded that the oxalic acid wash changed the rheology. It was also discussed that the oxalic acid wash was hotter (90^{o}C).
6. Potential for release into environment from cleaning F-Tank 16H annulus was discussed. There is a large aerosolization potential due to high pressure spray.
7. NRC staff inquired whether the inventory revision from 3300 to 1900 gal was based on visual observation, sampling or both. DOE informed NRC that the original 3300 gal estimate was based on video observation looking down into the annulus with no good landmarks. Well beams and cooling coils work well for interior, but depth perception is difficult in the annulus. The same engineers were on both teams for the 3300 and 1900 gal volume estimates. The 1900 gal estimate was based on measured solids heights using an auger tool. The solids height was determined by the difference in heights between the auger touching the top of the solids and the floor. There were 9 measured heights outside of the duct and 6 measured heights inside the duct. Linear interpolation was conducted between sample locations. DOE then went back and looked at video and photographic evidence to see if the linear interpolation was reasonable. Seldom did DOE have to revise the interpolation. DOE has more confidence in the heights determined from sampling tools compared to visual observations.
8. DOE indicated that it was easy to tell when the top of the waste had been reached by the auger because the waste was hard.
9. DOE indicated that a single height was assumed for each radial location, although the surface was not even across the radius.
10. DOE discussed that conducting samples in triplicate did not drive the costs. The costs are driven by the number of samples that needed to be processed and digested.

Tank 12 Closure Module Comments:

1. Question (Q) 4[3] – DOE responded that Low Temperature Aluminum Dissolution (LTAD) was primarily used to affect the rheology of the waste and facilitate mechanical removal of the waste. The removal of aluminum from the sludge is also needed to get an appropriate Al-Fe ratio for sludge batches going to the Defense Waste Processing Facility (or DWPF).
2. NRC staff inquired how the decision was made to terminate LTAD operations in Tank 12H. DOE indicated they had a plan that they followed, and based on diminishing returns and the limited remaining amount of aluminum that could be removed, they decided to cease operations.
3. NRC inquired if LTAD was run to the maximum extent practical (MEP). DOE responded that it was not necessarily run to the MEP. The primary purpose of LTAD was to remove aluminum and not necessarily key radionuclides. LTAD was used to get the sludge volume low enough to perform acid cleaning (i.e., LTAD was used to limit the quantity of acid required for additional chemical cleaning).

3 Question numbers refer to the closure module comment/question numbers (see ML033430553).

4. Q6 – It was not clear to NRC staff how DOE arrived at the decision to terminate Bulk Oxalic Acid (BOA) operations. DOE indicated that the low volume of waste was one of the factors. DOE engineers erred on the high side in estimating the 2000 gallons of residual waste reported in the closure module, but later estimates were around 1000 gallons of residual waste.
5. Q7 – NRC inquired if use of commercial Submersible Mixing Pumps (SMPs) and technologies were driven by logistics. DOE responded that there are situations where some technologies work better than others. There are some technical issues, but it is a combination of many things: cost, schedule, and dose to workers. Installing and removing failed equipment results in a large dose to workers.
6. Q9 – NRC staff inquired as to how the cooling coils were cleaned? DOE responded that the cooling coils were water washed in Tanks 5 and 6 and walls were spray washed with water in Tanks 18 and 19. DOE believed that water washing would not significantly remove waste from the cooling coils, and DOE did not know that there was residue on Tank 12 cooling coils, which resembled “barnacles”. DOE indicated that the cooling coils do not have a significant inventory of radionuclides, and residue on the cooling coils is primarily mercury.
7. Q10 – DOE discussed that modifications to the BOA cleaning is moving forward. DOE stated that their goal is to eliminate use of oxalic acid due to its high cost. Additional safety equipment on tanks and downstream oF-Tanks treated with BOA is required. DOE would prefer to use mechanical cleaning without an acid wash, as the oxalic acid is difficult to remove from the tank farm (e.g., the oxalic acid gets stuck in evaporator system). DOE also mentioned that nitric and glycolic acid cleaning may be effective alternatives for waste removal.
8. DOE had to use LTAD in Tank 12H because slurry pumps were not sufficient to clean the tank. SMPs are being used in Tank 15H with higher horse power, and DOE is hoping that LTAD will not be necessary in this tank. Commercial, oil cooled pumps, that are expected to be superior to current pumps (e.g., impervious to cavitation) are currently being developed, and DOE plans to use the new pumps on Tank 26F. To date, 2 of 4 of the new pumps have been installed. DOE plans to operate the commercial pumps in FY2017. The 4 operable pumps used in Tank 12 were moved to Tank 11.
9. DOE discussed that in Tank 12 the residual waste on the coils was very different from the floor. Accordingly, DOE did not composite coil residue or liquid phase from floor material. The coil material was several orders of magnitude lower in inventory.

2.6.3 **CONCLUSIONS AND FOLLOW-UP ACTION ITEMS**

The NRC staff will continue to monitor the DOE tank farm activities. The following Follow-Up Action Items resulted from the technical discussion:

1. DOE to provide the NRC with responses to Tank 16 Closure Module comments related to NRC General Comment #5 (Inventory).

2. DOE to provide NRC information on how pore water chemistry is assigned to case selection (GoldSim Probabilistic).

2.7 TECHNICAL DISCUSSION-SITE STABILITY

2.7.1 OBSERVATION SCOPE

NRC staff discussed its review and comments on DOE's structural analyses under MF 8.1, "Settlement" (see ML15244A905).

2.7.2 OBSERVATION RESULTS

1. NRC staff and its contractor's from the Center for Nuclear Waste Regulatory Analyses (CNWRA) provided a review of structural assessment comments previously provided to DOE (see ML15244A905).
2. NRC staff clarified that the consequences of the structural analysis are related to compliance with 10 CFR 61.41 and 10 CFR 61.42, in addition to 10 CFR 61.44. NRC staff does not believe that cracking, could result in significant subsidence. However, separation and cracking could result in a greater likelihood of bypass flow and limited conditioning of groundwater by reducing grout.
3. NRC indicated that DOE attempted to perform a bounding analysis, but assumed that the grouted tank system was a solid monolith, thereby taking credit for a nearly rigid body. DOE's current analysis appears optimistic, because the grout is not expected to bond well with the tank components with net shrinkage expected to occur and corrosion of steel components embedded in the grout leading to cracking. While DOE assumed a strength lower than the strength of reinforced concrete, the net impact of this conservative assumption may not compensate for optimistic assumptions regarding the stiffness of the structure. CNWRA staff suggested that a bounding structural analysis might include the mass of grout, but consider the stiffness of an un-grouted tank.

2.7.3 CONCLUSIONS AND FOLLOW-UP ACTION ITEMS

The NRC staff will continue to monitor the DOE tank closure activities. There were no Follow-Up Action Items that resulted from the technical discussion.

2.8 WALK DOWN TANK 16

2.8.1 OBSERVATION SCOPE

Staff escorted NRC on a tour of surface facilities and command center associated with grouting of Tank 16H and isolation of Tank 12H

2.8.2 OBSERVATION RESULTS

1. During a walk-down of H-Tank Farm, NRC staff viewed in-tank grout mounds through a camera installed on Riser 3.
2. NRC staff also discussed grouting operations with the operator in the command center.

3. NRC observed segregation or excess water in Tank 16H when reviewing the display in the command center. In previous tank grouting operations, excess water entered the riser and would either be incorporated into the system, evaporated or would be pumped out of the riser. Although a work order was in place to remove excess water from Tanks 5F and 6F, in the end, DOE did not need to pump the water out of Tanks 5F and 6F, because the water was either incorporated into the tank grout or had evaporated.
4. NRC staff noted discoloration in the annulus grout, or dark grey regions that potentially indicated segregation of grout components. The DOE operator indicated that there were shadows around the edges of flow lobes but not necessarily cracks. The DOE operator did note that surficial micro-cracks were sometimes observed on the grout surface.
5. DOE also provided an update on testing of higher drop heights up to 42 feet at Energy Solutions in Barnwell. No impacts of higher drop heights were observed when the grout was dropped on a flat unyielding surface. However, some impact was observed when grout was dropped onto standing water. DOE agreed to send NRC the reference. No change in drop heights has been proposed at this time. DOE continued to use tremies in Tank 16H.
6. NRC staff requested video documentation of grout mounding. DOE will note instances where mounding occurred, view of grout going into registers, and laser estimation of grout heights.

2.8.3 **CONCLUSION AND FOLLOW UP**

1. DOE to provide NRC video/photos of in-tank evaluation to determine placement locations for final bulk fill of primary tank and associated lessons learned.
2. DOE to provide NRC video of grout flow into annulus duct inlet ventilation ports.
3. DOE to include photos from Tank 16/12 field observation in Revision 1 of this presentation.
4. DOE to provide NRC video of F-Tank 16 grout operations (full video).

2.9 **MONITORING PLAN**

2.9.1 **SCOPE**

NRC went over changes that were made to the F-Tank Farm monitoring plan to incorporate H-Tank Farm into the plan and include findings from F-Tank Farm monitoring activities performed since development of the Plan.

2.9.2 **RESULTS**

1. NRC staff added information on H-Tank Farm parallel to information presented on F-Tank Farm. Examples include the following:
    - New figure showing H-Tank Farm compliance points, including new on-site well locations for intruder assessment.
    - New figure showing H-Tank Farm monitoring well locations.

- New tables comparing steel liner failure times for F-Tank Farm and H-Tank Farm; and chemical transition times for F-Tank Farm and H-Tank Farm.
- Revised Table A-1 to include all H-Tank Farm TER recommendations and cross-walked to MFs discussed in the plan.

2. NRC staff provided summary of all monitoring activities and major findings from F-Tank Farm onsite observation visits, and technical reviews.
   - Added information in the main body and appendices where appropriate.
   - Added information in Appendix B table on major findings and follow-up actions.
3. NRC staff addressed all of DOE's comments received on the F-Tank Farm Monitoring Plan after its issuance.
4. NRC staff made changes for consistency with the Saltstone Disposal Facility Monitoring Plan. Examples include:
   - Non-compliance table—made it clear that we expect to issue a Type IV letter in advance of a letter of non-compliance.
   - Added table of periodic reports that we expect to obtain from DOE SRS specific to tank farm facilities.
   - Updated definitions to be consistent with Saltstone Disposal Facility with some exceptions.
5. NRC staff made edits to Monitoring Plan definitions for clarity.
6. Broadened a few of the MFs to address issues specific to H-Tank Farm or items identified in F-Tank Farm monitoring. Most notably:
   - Information on annular inventories and risk drivers for H-Tank Farm were added to MA 1 "Inventory".
   - Additional discussion regarding preferential pathways through the concrete vault was added to MA 3 "Cementitious Material Performance", MF 3.1 which was renamed "Hydraulic Performance of Concrete Vault and Annulus (As it relates to Steel Liner Corrosion and Waste Release)"[4] in light of significant annular inventories in HTF-Tanks. Also broadened MF 3.1 steel liner corrosion discussion to include issue with possibility of high corrosion rates even when oxidation and reduction reactions are macroscopically disconnected, if the system is electrically connected.
   - Added annular grout sorption concerns to MF 3.5 and renamed "Vault and Annulus Sorption".[5]
   - Broadened MF 4.1 to include other key radionuclide sorption in the natural system (renamed MF 4.1 to "Natural Attenuation of Key Radionuclides").[6]

- NRC staff added additional information on FY2015 CNWRA experiments.

4 MF 3.1 was previously named "Concrete Vault Performance (As It Relates to Steel Liner Performance)."

5 MF 3.5 was previously named "Basemat Performance."

6 MF 4.1 was previously named "Natural Attenuation of Pu."

- NRC staff added information on DOE's progress on Tank 18F waste release experiments.

2.9.3 CONCLUSIONS AND FOLLOW-UP ACTION ITEMS

The NRC staff will continue to monitor DOE Tank Farm activities. There were no new monitoring areas or monitoring factors. There is no change in prioritization of monitoring factors in the Executive Summary.

3.0 OVERALL CONCLUSIONS, STATUS OF MONITORING FACTORS, OPEN ISSUES, OPEN FOLLOW-UP ACTION ITEMS; AND ISSUANCE OF NRC TECHNICAL REVIEW REPORTS.

3.1 OVERALL CONCLUSIONS

The information gathered during tank farm closure Observation 2015-01 will be used for multiple NRC Technical Review Reports via memoranda, review of the DOE tank closure Special Analysis documentation, and future OOVs, based on the topics discussed. There is no change to the NRC staff overall conclusions from the F- and H-Tank Farm TERs regarding compliance of DOE disposal actions with the 10 CFR Part 61 performance objectives.

3.2 STATUS OF MONITORING FACTORS

The NRC staff did not close any monitoring factors during the OOV. Therefore, all monitoring factors remain open.

3.3 STATUS OF OPEN ISSUES FOR F- AND H-TANK FARM MONITORING

There are currently no open issues.

3.4 STATUS OF OPEN FOLLOW-UP ACTION ITEMS FROM PREVIOUS F- AND H-TANK FARM OOV REPORTS

1. Report for FTF Observation 2012-01 (June 12, 2012) (ML12191A210) with Guidance issued on June 4, 2012, (ML12135A666): **All Action Items completed**.

2. Report for FTF Observation 2012-02 (September 26-27, 2012) (ML12299A190) with Guidance issued on August 23, 2012, (ML12228A631): **All Action Items completed**.

3. Report for FTF Observation 2013-01 (March 27-28, 2013) (ML13113A322) with Guidance issued on February 25, 2013, (ML13046A374): **All Action Items completed.**

4. Report for FTF Observation 2013-02 (August 27-28, 2013) (ML13267A452) with Guidance issued on July 29, 2013, (ML13196A134): **All Action Items completed**.

5. Report for FTF Observation 2014-01 (March 26-27, 2014) (ML14106A573) with Guidance issued on February 26, 2014, (ML14045A215): **All Action Items completed**

   Questions re: residual waste testing-closed during current OOV

   Questions re: NRC on-going waste tank structural analysis calculations-closed during this OOV.

3.5 STATUS OF OPEN FOLLOW-UP ACTION ITEMS FROM CLARIFYING TELECONFERENCE CALLS

May 2013 teleconference DOE to provide response, in writing or another teleconference call, to NRC main points about water segregation and previously provided observations.

3.6 SUMMARY OF FOLLOW-UP ACTION ITEMS

The table below contains the 15 Follow-Up Action Items that were open during the Tank Farm Observation 2015-02, including a unique NRC identifier for each Follow-Up Action Item:

Unique Identifier	Follow-Up Action Item
TF CY15-01-001	DOE to provide NRC an Electronic copy of presentation material including action items and attendance rosters. [SRR-CWDA-2015-00095, Rev. 1] ***Complete***
TF CY15-01-002	DOE to provide NRC an electronic copy of *Release of Radionuclides from Tank Waste Residual Solids, SRNL-MS-2015-00116*
TF CY15-01-003	DOE to provide NRC a copy of FY2015 summary report on tank waste residual solids testing when available
TF CY15-01-004	DOE to provide NRC a copy of the FY2015 summary report on Lysimeter testing when available
TF CY15-01-005	DOE to provide NRC on lessons learned/procedure changes relative to the rejected Tank 6 grout
TF CY15-01-006	DOE to provide NRC a copy of the Grout Drop Testing Report
TF CY15-01-007	NRC to set up a telecom to discuss ongoing NRC grout testing relative to Tank Farm grout
TF CY15-01-008	DOE to provide SCDHEC with copies of the Tank 16 Grouting Strategy, Closure Assurance Plan, and Subcontractor Surveillance Plan
TF CY15-01-009	DOE to provide NRC with responses to Tank 16 Closure Module comments related to NRC General Comment #5 (Inventory)
TF CY15-01-010	DOE to provide NRC video/photos of in-tank evaluation to determine placement locations for final bulk fill of primary tank and associated lessons learned
TF CY15-01-011	DOE to provide NRC video of grout flow into annulus duct inlet ventilation ports
TF CY15-01-012	DOE to provide NRC information on how pore water chemistry is assigned to case selection (GoldSim Probabilistic)
TF CY15-01-013	DOE to include photos from Tank 16/12 field observation in Revision

	1 of this presentation. (Complete: slides 56-61)
TF CY15-01-014	DOE to provide NRC video of Tank 16 grout operations (full video)
TF CY15-01-015	DOE to provide NRC latest revisons of H- and F-Tank Farm FARMS reports

3.7 ISSUANCE OF NRC TECHNICAL REVIEW REPORTS

Between the previous OOV and tank farm Observation 2015-01, the NRC issued two Tank Farm Technical Review Reports via memorandum, "Technical Review: U.S. Department of Energy Documentation Related to Tanks 5F and 6F Final Configurations with an Emphasis on Grouting from Recommendations and Testing to Final Specifications and Procedures" and "Technical Review of Environmental Monitoring and Site-Specific Distribution Coefficient Reports." See "Reference" section for access information.

4.0 PARTICIPANTS

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