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MEMORANDUM TO: Stephen Koenick, Chief  
Low Level Waste and Projects Branch  
Division of Decommissioning, Uranium Recovery  
and Waste Programs

FROM: Harry Felsher Sr. Project Manager */RA/*  
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SUBJECT: PERIODIC MONITORING REPORT FOR THE  
U.S. DEPARTMENT OF ENERGY NON-HIGH-LEVEL WASTE  
DISPOSAL ACTIONS FOR CALENDAR YEAR 2014 THROUGH  
CALENDAR YEAR 2018 (REVISION 6)

This is the U.S. Nuclear Regulatory Commission's (NRC) seventh Waste Incidental to Reprocessing (WIR) Periodic Monitoring Report (PMR). It summarizes the WIR monitoring activities covering Calendar Year (CY) 2014 through CY 2018 at the U.S. Department of Energy Idaho National Laboratory Idaho Nuclear Technology and Engineering Center Tank Farm Facility, Savannah River Site (SRS) Saltstone Disposal Facility, and SRS Tank Farms (i.e., F-Tank Farm and H-Tank Farm) under the Ronald W. Reagan National Defense Authorization Act for Fiscal Year 2005 Section 3116(b). The previous six PMRs were issued as NUREG-1911, Revision 0 through Revision 5. In the future, the NRC intends to periodically update the NRC Public Website with links to this information. Note that each NRC monitoring activity is individually documented, assigned an NRC Agencywide Documents Access and Management System accession number, and is considered an official Agency record.

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**DATE October 21, 2019**

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NDAA WIR Periodic Monitoring Report, Revision 6

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U.S. Nuclear Regulatory Commission  
Periodic Monitoring Report for the  
U.S. Department of Energy  
Non-High-Level Waste Disposal  
Actions (Revision 6) (formerly, NUREG-1911)

Report for Calendar Year 2014  
through Calendar Year 2018

October 21, 2019

Enclosure

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## ABBREVIATIONS AND ACRONYMS

ITEM	MEANING
ADAMS	Agencywide Documents Access and Management System
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CNWRA	Center for Nuclear Waste Regulatory Analyses
CY	Calendar Year
DOE	U.S. Department of Energy
DRR	Data Review Report
EPA	U.S. Environmental Protection Agency
ESOP	Environmental Surveillance and Oversight Program
FFA	Federal Facility Agreement
ft.	Feet
FTF	F-Tank Farm
FUAI	Follow-Up Action Item
FY	Fiscal Year
GCL	Geosynthetic Clay Liner
GSA	General Separations Area
HDPE	High Density Polyethylene
HLW	High-Level Waste
HTF	H-Tank Farm
ID	Idaho
IDEQ	Idaho Department of Environmental Quality
INL	Idaho National Laboratory
INTEC TFF	Idaho Nuclear Technology and Engineering Center Tank Farm Facility
$K_d$	Distribution Coefficient
km	Kilometer
KMA	Key Monitoring Area
LLW	Low-Level Waste
m	Meter
MA	Monitoring Area
MF	Monitoring Factor
mi	Mile
NDAA	Ronald W. Reagan National Defense Authorization Act for Fiscal Year 2005
NPO	Non-Compliant Performance Objective
NTF	Note-to-File
NRC	U.S. Nuclear Regulatory Commission
OOV	Onsite Observation Visit
PA	Performance Assessment
PMR	Periodic Monitoring Report
PO	Performance Objective
RAI	Request for Additional Information
SC	South Carolina
SCDHEC	South Carolina Department of Health and Environmental Control
SDF	Saltstone Disposal Facility
SDS	Saltstone Disposal Structure
SRNL	Savannah River National Laboratory

<b>ITEM</b>	<b>MEANING</b>
SRS	Savannah River Site
Tc	Technetium
TER	Technical Evaluation Report
TFs	Tank Farms
TRR	Technical Review Report
U.S.	United States
WD	Waste Determination
WIR	Waste Incidental to Reprocessing

NOTE: There is no Glossary in this WIR PMR because each of the three current NRC NDAA WIR monitoring plans have their own glossaries with their own terms and definitions.

## EXECUTIVE SUMMARY

The U.S. Nuclear Regulatory Commission (NRC) staff's Waste Incidental to Reprocessing (WIR) Periodic Monitoring Report (PMR) catalogues the monitoring activities of the U.S. Department of Energy (DOE) non-high-level waste disposal actions at Idaho National Laboratory (INL) and the Savannah River Site (SRS) from Calendar Year (CY) 2014 through CY 2018 under Section 3116(b) of the Ronald W. Reagan National Defense Authorization Act for Fiscal Year 2005 (NDAA).

NDAA Section 3116(a) includes the requirement that the DOE consult with the NRC on the DOE non-high-level waste determinations in the NDAA-Covered States of Idaho (ID) and South Carolina (SC). NDAA Section 3116(b) includes the requirement that the NRC, in coordination with the NDAA-Covered States of ID and SC, monitor the DOE disposal actions to assess the DOE compliance with Title 10 of the Code of Federal Regulations, Part 61, "Licensing Requirements for Land Disposal of Radioactive Waste," Subpart C, "Performance Objectives."

This is the seventh NDAA WIR PMR, and it covers the NDAA WIR monitoring activities for CY 2014 through CY 2018. The previous six PMRs were issued as NUREG-1911, Revision 0 through Revision 5. The format of this PMR has been modified from the format of the previous versions of the PMR in that it represents a catalogue of the NDAA Section 3116(b) monitoring activities from CY 2014 through CY 2018. In the future, the NRC intends to periodically update the NRC Public Website with links to this information. Note that each NRC monitoring activity is individually documented, assigned an NRC Agencywide Documents Access and Management System (ADAMS) accession number, and is considered an official Agency record.

Section 1 of this PMR contains general information about NDAA Section 3116(b) monitoring. Section 2 contains information about NDAA Section 3116(b) monitoring at the Idaho National Laboratory (INL) Idaho Nuclear Technical and Engineering Center Tank Farm Facility (INTEC TFF). Section 3 contains information about NDAA Section 3116(b) monitoring at the Savannah River Site (SRS) Saltstone Disposal Facility (SRS SDF). Section 4 contains information about NDAA Section 3116(b) monitoring at the SRS Tank Farms (TFs) (i.e., both F-Tank Farm (FTF) and H-Tank Farm (HTF)). Section 5 contains the references. Appendix A contains a summary of the NDAA Section 3116(b) Monitoring Process. Appendix B contains a summary of the NDAA Section 3116(a) major activities. Appendix C contains a summary of the NDAA Section 3116(b) major activities. Note that the citation for the full text of NDAA Section 3116 is: *U.S. Congress, Public Law 108-375, Ronald W. Reagan National Defense Authorization Act for Fiscal Year 2005, Section 3116, Defense Site Acceleration Completion, October 2004.*

### **Summary of Major NRC NDAA-WIR Monitoring Activities from CY 2014 through CY 2018:**

For the INL INTEC TFF:

- The NRC issued one letter that supplemented Revision 0 of the NRC monitoring plan (i.e., closed Key Monitoring Area (KMA) 3 (Hydrological Uncertainties)).
- The NRC issued two technical review reports (TRRs).
- The NRC issued reports for two onsite observation visits (OOVs).

For the SRS SDF:

- The NRC issued four letters that supplemented Revision 1 of the NRC monitoring plan (i.e., provided clarifying information and changed priority, closed, modified, or opened monitoring factors), including one letter that supplemented both Rev. 1 of the NRC SRS SDF Monitoring Plan and Rev. 0 of the NRC SRS TFs Monitoring Plan.
- The NRC issued Rev. 0 of the NRC/DOE Joint Plan for resolving the NRC 2012 Type-IV Letter of Concern.
- The NRC issued two requests for additional information on two DOE documents that supplemented the DOE 2009 performance assessment.
- The NRC issued ten TRRs, including one that covered both the SRS SDF and the SRS TFs (see Section 3.3.28 for the TRR issued on December 23, 2016).
- The NRC issued reports for six OOVs.
- The NRC issued four summaries of teleconference calls.

For the SRS TFs:

- The NRC issued Rev. 0 of the SRS TFs monitoring plan (i.e., replaced Rev. 0 of the SRS F-Tank Farm monitoring plan).
- The NRC issued one letter that supplemented the NRC SRS TFs Monitoring Plan, Rev. 0 (i.e., provided clarifying information).
- The NRC issued comments on three DOE documents, including closure modules for two tanks.
- The NRC issued ten TRRs, including one that covered both the SRS SDF and the SRS TFs (see Section 3.3.28 for the TRR issued on December 23, 2016).
- The NRC issued reports for four OOVs, including one report issued in 2019 for an OOV that took place in 2018.
- The NRC issued two summaries of teleconference calls.

### **NRC Conclusions:**

For the INL INTEC TFF:

- There is no change in the overall conclusions from the NRC 2006 Technical Evaluation Report (TER) for the INL INTEC TFF (ADAMS Accession No. ML062490142).
- There are no Notification Letters and there are no Open Issues.
- Four of the five key monitoring areas remain open. See Appendix A (Section A.4) for an overview of the NRC staff's key monitoring areas.

For the SRS SDF:

- There is no change in the overall conclusions from the NRC 2012 TER for the SRS SDF (ADAMS Accession No. ML121170309).
- The NRC 2012 Type-IV Notification Letter (ADAMS Accession No. ML120650576) remains open and the NRC issued Rev. 0 of the NRC/DOE Joint Plan (ADAMS Accession No. ML18235A068) to resolve the NRC technical concerns in the Notification Letter.
- There are no Open Issues.
- All 11 monitoring areas remain open and 37 of the 42 monitoring factors remain open. See Appendix A (Section A.5) for a table of the NRC staff's prioritization of all the monitoring factors.

For the SRS TFs:

- There is no change in the overall conclusions from the two NRC SRS TFs TERs (i.e., NRC 2011 TER for the SRS FTF (ADAMS Accession No. ML112371715) and NRC 2014 TER for the SRS HTF (ADAMS Accession No. ML14094A514).
- There are no Notification Letters and there are no Open Issues.
- All eight monitoring areas remain open and all 26 monitoring factors remain open. See Appendix C (Section A.6) for a table of the NRC staff's prioritization of some of the monitoring factors.

## 1.0 PURPOSE OF THIS PERIODIC MONITORING REPORT (PMR)

The purpose of this U.S. Nuclear Regulatory Commission (NRC) Periodic Monitoring Report (PMR) is to summarize publicly available information about monitoring of the U.S. Department of Energy (DOE) non-high-level waste disposal actions from Calendar Year (CY) 2014 through CY 2018 under Section 3116(b) of the Ronald W. Reagan National Defense Authorization Act for Fiscal Year 2005 (NDAA). The NDAA WIR PMR is not required by the NDAA. However, it is intended to be consistent with the NRC policy on openness. As such, the NRC seeks to keep the public, the NDAA-Covered States, and the U.S. Department of Energy (DOE) informed about the NDAA Section 3116(b) monitoring activities. In the future, the NRC intends to periodically update the NRC Public Website with links to information about the history and current status of WIR monitoring activities.

The DOE, on its own initiative, occasionally consults with the NRC on its non-High-Level Waste (HLW) determinations at the Hanford Site location in the State of Washington and at the West Valley Demonstration Project location in the State of New York. However, neither the State of Washington nor the State of New York are NDAA-Covered States. Therefore, the NRC does not have a monitoring role at those two DOE locations under NDAA Section 3116(b) and this PMR does not address those two DOE locations further.

### 1.1 Background

The NDAA allows the Secretary of Energy to determine whether radioactive waste resulting from the reprocessing of spent nuclear fuel is not HLW and, if so, then it may be managed as low-level waste (LLW) and identified as Waste Incidental to Reprocessing (WIR). Note that the citation for the full text of NDAA Section 3116 is: *U.S. Congress, Public Law 108-375, Ronald W. Reagan National Defense Authorization Act for Fiscal Year 2005, Section 3116, Defense Site Acceleration Completion, October 2004.*

NDAA Section 3116(a) includes that the DOE consult with the NRC on the DOE non-HLW determinations and plans. The last DOE action under an NDAA Section 3116(a) activity is for the DOE Secretary to sign the Final Waste Determination (WD) and the DOE to issue that Final WD document with the supporting Basis document. See Appendix B for a summary of major activities when the DOE consulted with the NRC on the DOE non-HLW determinations and plans under NDAA Section 3116(a).

NDAA Section 3116(b) includes that the NRC, in coordination with the NDAA-Covered State, monitor the DOE disposal actions to assess compliance with the NRC regulations in Title 10 of the *Code of Federal Regulations (10 CFR) Part 61, "Licensing Requirements for Land Disposal of Radioactive Waste," Subpart C, "Performance Objectives (POs)."*<sup>1</sup> The NDAA-Covered States are currently Idaho (ID) and South Carolina (SC). See Appendix C for a summary of major activities when the NRC, in coordination with the NDAA-Covered State, monitored DOE disposal actions under NDAA Section 3116(b).

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<sup>1</sup> As indicated in the NRC Staff Requirements Memorandum for SECY-05-0073, "Implementation of New U.S. NRC Responsibilities under the National Defense Authorization Act [for Fiscal Year] 2005 in Reviewing Waste Determinations for the U.S. DOE," dated June 30, 2005, the dose standard in §61.41 is comparable to 25 millirem total effective dose equivalent using the methodology of the International Commission on Radiological Protection, Publication 26 entitled, "Recommendations of the International Commission on Radiological Protection."

As of December 31, 2018, the NRC is performing NDAA Section 3116(b) monitoring, in coordination with the NDAA-Covered States of ID and SC, of the DOE disposal actions at the following DOE locations:

- Idaho National Laboratory (INL) Idaho Nuclear Technology and Engineering Center Tank Farm Facility (INTEC TFF);
- Savannah River Site (SRS) Saltstone Disposal Facility (SDF); and
- SRS Tank Farms (TFs), which includes both the SRS F-Tank Farm (FTF) and the SRS H-Tank Farm (HTF).

The NRC began NDAA Section 3116(b) monitoring at the DOE:

- INL INTEC TFF in November 2006;
- SRS SDF in January 2006; and
- SRS TFs, starting in March 2012 with the SRS FTF and fully in December 2014, when the NRC began monitoring at the SRS HTF.

### **1.1.1 NDAA Section 3116(b) – The NRC Monitoring of the DOE Disposal Actions**

When the DOE issues a Final WD (along with the Basis document) with the DOE Secretary determination that the radioactive waste resulting from reprocessing of spent nuclear fuel can be managed as LLW and is identified as WIR at a specific DOE location, then:

- the DOE consultation with the NRC for that specific DOE location under NDAA Section 3116(a) has ended and will never be re-started; and
- the NRC monitoring, in coordination with the NDAA-Covered State, of the DOE disposal actions for the purpose of assessing compliance with the 10 CFR Part 61, Subpart C POs for that specific DOE location under NDAA Section 3116(b) has started and will continue in perpetuity.

Under NDAA Section 3116(b), the first monitoring activity is the development of the NRC monitoring plan for that specific DOE location. That NRC monitoring plan will be based on: (i) the NRC Technical Evaluation Report (TER) issued under NDAA Section 3116(a) for that specific DOE location, (ii) the DOE Final Basis document for the Final WD for that specific DOE location (e.g., including based on the performance assessment (PA)), and (iii) other appropriate information provided by the DOE, NRC, or the NDAA-Covered State after the DOE Final WD was issued.

The NRC will coordinate with the NDAA-Covered State in the preparation of the initial NRC monitoring plan, any revised NRC monitoring plan, and any supplement to an NRC monitoring plan for that specific DOE location. The NRC will issue and use an NRC monitoring plan (with any supplement) for that specific DOE location until that NRC revises that NRC monitoring plan.

The NRC expects to supplement an NRC monitoring plan (e.g., via letter to DOE) for a specific DOE location when there are: (i) changes in priority or description of existing important

technical topics, (ii) newly determined important technical topics; or (iii) other new aspects. The NRC expects to issue a revised monitoring plan for a specific DOE location after the NRC issues a revised TER for that specific DOE location.

## **1.2 Roles And Responsibilities**

Under NDAA Section 3116(b), only the DOE, the NRC, and the NDAA-Covered States of ID and SC have roles and responsibilities.

In ID at the INL, the NRC leverages Idaho Department of Environmental Quality (IDEQ) reviews by not performing similar reviews. For example, the NRC may be able to rely upon the IDEQ review of environmental data for assessing whether there have been releases to the environment or exposures to offsite members of the public. However, the NRC may still need to review some environmental data for other purposes. The IDEQ review of that data should allow the NRC to reduce the scope and level of its review.

In SC at the DOE SRS, the SRS Federal Facility Agreement (FFA) provides a role for the U.S. Environmental Protection Agency (EPA) when the DOE intends to close an entire SRS tank farm, whether or not the tank farm is under the NDAA. The SRS FFA is a formal agreement between the DOE, the EPA Region 4, and the South Carolina Department of Health and Environmental Control (SCDHEC) that specifies the order and time in which the SRS TF tanks (i.e., in both FTF and HTF) are closed. The NRC is not a party to the SRS FFA.

### **1.2.1 The DOE Roles and Responsibilities**

The DOE will, pursuant to its authority, pursue closure of the specific site and monitor its own activities to ensure compliance with all requirements. The DOE relevant authority stems from the Atomic Energy Act of 1954, as amended, and applicable DOE orders, manuals, and policies. Furthermore, the DOE uses a documented process to review and resolve any disposal questions and develop any mitigation measures, as appropriate.

The DOE roles and responsibilities under NDAA monitoring are to respond to the NRC and to the covered State NDAA monitoring activities. Examples include the following: (i) providing fact check input on the NRC monitoring plans and the NRC onsite observation visit (OOV) reports; (ii) participating in the NRC OOVs, teleconference calls, and meetings; and (iii) in a timely manner, communicating to the NRC and IDEQ any concerns about the NDAA monitoring activities.

Note that for the SRS TFs, tank waste storage and removal operations are governed by an SCDHEC industrial wastewater construction permit. The DOE will carry out removal from service and stabilization of the waste tanks and ancillary structures pursuant to a SC-approved FTF General Closure Plan (LWO-RIP-2009-00009, Rev. 3) and HTF General Closure Plan (SRR-CWDA-2011-00022, Rev. 0). A specific Closure Module for each waste tank, ancillary structure, or groupings of waste tanks and/or ancillary structures will be developed and submitted to SC for approval. Final waste tank stabilization activities shall not proceed until SC grants approval.

### **1.2.2 The NRC Roles and Responsibilities**

The NRC oversight role in monitoring the DOE activities related to NDAA Section 3116(b). The NRC, in coordination with the NDAA-Covered State of ID through IDEQ and with the NDAA-

Covered State of SC through the SCDHEC monitors the DOE disposal actions to assess compliance with the POs in 10 CFR Part 61.

Examples of the NRC roles and responsibilities under NDAA monitoring include the following: (i) drafting and finalizing the NRC monitoring plans, incorporating IDEQ/SCDHEC input and the DOE fact check input; (ii) drafting and finalizing the NRC guidance memoranda for the NRC OOVs, including incorporating IDEQ/SCDHEC input; (iii) leading the NRC OOVs, including inviting IDEQ/SCDHEC to attend and coordinating with the DOE on agenda, access, personnel, and documentation; (iv) drafting and finalizing the NRC OOV reports, including incorporating IDEQ/SCDHEC input and the DOE fact check input; (v) performing the NRC technical reviews and data reviews; (vi) drafting and finalizing the NRC TRRs and data review reports (DRRs); (vii) leading interactions with IDEQ/SCDHEC and the DOE, including meetings and teleconference calls; (viii) in a timely manner, communicating to IDEQ/SCDHEC and the DOE any NRC concerns about the DOE not meeting the POs; and (ix) notifying Congress if the NRC determines that the DOE is not in compliance with the POs. Note that the NRC has never done a separate data review or issued a separate DRR. All NRC data reviews were incorporated into OOV Reports or TRRs.

The NRC staff consulted with the NDAA-Covered State of ID/SC during the preparation of the individual monitoring plans. The NRC leads an OOV and invites IDEQ/SCDHEC to participate in an OOV. IDEQ/SCDHEC participates in an OOV when possible. Following an OOV, the NRC incorporates IDEQ/SCDHEC input into the OOV Report. The NRC keep IDEQ/SCDHEC informed of the status of NDAA monitoring, including any potential findings of the DOE non-compliance that require a notification letter to Congress. Further, if the NRC needs to issue a notification letter to Congress, it will do so in coordination with IDEQ/SCDHEC.

### **1.2.3 NDAA-Covered State Roles and Responsibilities**

#### **1.2.3.1 IDEQ at the INL INTEC TFF**

The IDEQ oversight role in monitoring the DOE activities to pursue closure of the INL INTEC TFF derives from NDAA Section 3116(b). IDEQ performs activities to coordinate with the NRC. Examples of IDEQ roles and responsibilities under NDAA monitoring include the following: (i) providing input to the NRC monitoring plans; (ii) providing input to the NRC guidance memoranda for the NRC OOVs; (iii) if possible, then attending and participating in the NRC OOVs; (iv) providing input to the NRC OOV reports; (v) performing IDEQ data reviews; (vi) drafting and finalizing IDEQ DRRs; (vii) participating in interactions with the NRC and the DOE, including meetings and teleconference calls; and (viii) in a timely manner, communicating to the NRC and the DOE any IDEQ concerns about the DOE not meeting the POs. Note that IDEQ has never done a separate data review or issued a separate DRR for the INL INTEC TFF.

IDEQ is the primary regulator of the DOE tank closure activities at INL and has two primary regulatory responsibilities related to the INL INTEC TFF: (i) Resource Conservation and Recovery Act closure under the Hazardous Waste Management Act; and (ii) Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) regulatory activities associated with historical releases from ancillary equipment associated with the INL INTEC TFF that resulted in soil and groundwater contamination.

IDEQ participates in a wide variety of non-regulatory sampling activities at INL. A division of IDEQ, INL Oversight, performs various activities, including environmental surveillance; impact assessment; emergency planning and response; and risk communication. INL Oversight

maintains an independent environmental surveillance program (e.g., air, surface water, groundwater, soil) that verifies and supplements the DOE monitoring programs at INL. The environmental surveillance data collected by INL Oversight can be accessed through the IDEQ website. INL Oversight uses specifically designed data collection to: (i) assess background radiation levels, (ii) determine the impact of radioactivity releases from facilities on the environment, and (iii) provide valuable information regarding contaminant transport in the environment and potential pathways of exposure to human and ecological receptors. INL Oversight maintains real-time radiological and meteorological information to assist responders in the event of an emergency. INL Oversight publishes technical reports and a newsletter to let the public know how INL affects the environment.

#### 1.2.3.2 SCDHEC at both the SRS SDF and the SRS TFs

The SCDHEC oversight role in monitoring the DOE activities to perform saltstone disposal actions and to pursue closure of the SRS TFs (i.e., FTF, HTF) as well as tanks derives from NDAA Section 3116(b). SCDHEC coordinates with the NRC and performs activities under the SC Environmental Surveillance and Oversight Program (ESOP). Examples of SCDHEC roles and responsibilities under NDAA monitoring include the following: (i) providing input to the NRC monitoring plans; (ii) providing input to the NRC guidance memoranda for the NRC OOVs; (iii) if possible, then attending and participating in the NRC OOVs; (iv) providing input to the NRC OOV reports; (v) performing SCDHEC data reviews; (vi) drafting and finalizing SCDHEC DRRs; (vii) participating in interactions with the NRC and the DOE, including meetings and teleconference calls; and (viii) in a timely manner, communicating to the NRC and the DOE any SCDHEC concerns about the DOE not meeting the POs. Note that SCDHEC has never done a separate data review or issued a separate DRR for the SDF or TFs.

The SC ESOP supports and complements the SCDHEC comprehensive regulatory program at SRS by focusing on those activities not supported or covered through the normal regulatory framework. The primary function of the SC ESOP is to evaluate the effectiveness of the DOE monitoring activities at SRS. SCDHEC accomplishes that by: (i) conducting non-regulatory monitoring activities on and around SRS; (ii) conducting evaluations of the monitoring program at SRS; and (iii) providing an independent source of information for the public pertaining to levels of contaminants in the environment from historical and current SRS operations. SC ESOP monitoring activities include: air; groundwater; drinking water; radiological surface water; non-radiological surface water; soil and sediment; milk; vegetation; and fish and game. Each year, SCDHEC conducts a critical pathway/dose assessment to calculate the potential exposure or dose to the public within 50 miles of an SRS center point. SCDHEC emergency preparedness personnel maintain the capability to assess radiological incidents and communicate regularly with DOE to be aware of current issues at SRS.

SCDHEC is the primary regulator of the DOE tank closure activities at SRS. The TFs (i.e., FTF, HTF) waste storage and removal operations are governed by an industrial wastewater construction permit. SCDHEC issued that permit under the authority of the South Carolina Pollution Control Act (State of SC, 1985, Section 48-1-10) and all applicable regulations implementing that Act. SC has authority for approval of wastewater treatment facility operational closure under Chapter 61, Articles 67 and 82 of the SCDHEC Regulations.

Both the FTF General Closure Plan and HTF General Closure Plan address SC's regulatory authority relevant to removing SRS TFs waste tanks and ancillary equipment from service and set forth the general protocol by which the DOE intends to do that to protect human health and the environment. SCDHEC will review and approve a specific Closure Module for each waste

tank, ancillary structure, or groupings of waste tanks and/or ancillary structures before the DOE final waste tank stabilization activities may proceed.

### **1.3 The NRC NDAA WIR Periodic Monitoring Report**

The NRC may decide to issue an NDAA WIR Periodic Monitoring Report (PMR) that provides a summary of the already existing public information about the NDAA Section 3116(b) monitoring activities during one or more calendar years. This is the seventh NDAA WIR PMR and it covers the NDAA WIR monitoring activities for CY 2014 through CY 2018.

The previous six PMRs were issued as NUREG-1911, Revision 0 through Revision 5:

- Revision 0 – PMR for CY 2007 (ADAMS Accession No. ML082280145)
- Revision 1 – PMR for CY 2008 (ADAMS Accession No. ML091400501)
- Revision 2 – PMR for CY 2009 (ADAMS Accession No. ML101950385)
- Revision 3 – PMR for CY 2010 (ADAMS Accession No. ML111890412)
- Revision 4 – PMR for CY 2011 (ADAMS Accession No. ML12234A576)
- Revision 5 – PMR for CY 2012 and CY 2013 (ADAMS Accession No. ML15363A354)

This PMR is not being issued as a NUREG; but, it is publicly available. The format of this PMR has been modified from the format of the previous versions of the PMR in that it represents a catalogue of the NDAA Section 3116(b) monitoring activities from CY 2014 through CY 2018. In the future, if the NRC issues a PMR, then it will be publicly available; otherwise, the NRC intends to periodically update the NRC Public Website with links to this information. Note that each NRC document will be assigned an NRC Agencywide Documents Access and Management System (ADAMS) accession number and is considered an official Agency record.

### **1.4 Document Organization**

Section 1 of this PMR contains general information about NDAA Section 3116(b) monitoring. Section 2 contains information about NDAA Section 3116(b) monitoring at the Idaho National Laboratory (INL) Idaho Nuclear Technical and Engineering Center Tank Farm Facility (INTEC TFF). Section 3 contains information about NDAA Section 3116(b) monitoring at the Savannah River Site (SRS) Saltstone Disposal Facility (SDF). Section 4 contains information about NDAA Section 3116(b) monitoring at the SRS Tank Farms (TFs) (i.e., both F-Tank Farm (FTF) and H-Tank Farm (HTF)). Section 5 contains the references. Appendix A contains a summary of the NDAA Section 3116(b) Monitoring Process. Appendix B contains a summary of the NDAA Section 3116(a) major activities. Appendix C contains a summary of the NDAA Section 3116(b) major activities. Note that the citation for the full text of NDAA Section 3116 is: *U.S. Congress, Public Law 108-375, Ronald W. Reagan National Defense Authorization Act for Fiscal Year 2005, Section 3116, Defense Site Acceleration Completion, October 2004.*

## **2.0 MONITORING AT THE IDAHO NATIONAL LABORATORY IDAHO NUCLEAR TECHNICAL AND ENGINEERING CENTER TANK FARM FACILITY (INL INTEC TFF): CY 2014 THROUGH CY 2018**

### **2.1 Introduction**

The INL Site is an approximately 2,305 square kilometer (km)<sup>2</sup> (890 mile<sup>2</sup>) location owned by the U.S. Government that is in southeastern ID. The INTEC is located approximately 29 km (18 miles) from the nearest INL Site boundary.

There are 15 waste storage tanks at the INL INTEC TFF. Those include 11 tanks each that can hold a volume of 1,136 meter (m)<sup>3</sup> (300,000 gallons) and 4 tanks each that can hold a volume of 114 m<sup>3</sup> (30,000 gallons). In addition, there are interconnecting transfer piping, and secondary containment components for the transfer piping. Placed into service between 1953 and 1966, the 11 large tanks (i.e., designated WM-180 through WM-190) are approximately 15.2 m (50 feet (ft.)) in diameter and 6.4 m to 7.0 m (21 ft. to 23 ft.) in height. Nine of those large tanks are constructed of Type 304L stainless steel while the other two (i.e., WM-180 and WM-181) are constructed of Type 347 stainless steel. The four inactive and relatively small, stainless steel, below-grade storage tanks (i.e., WM-103 through WM-106) were constructed on reinforced concrete pads in 1954 and removed from service in 1983. Those four tanks are horizontal cylinders approximately 3.5 m (11.5 ft.) in diameter and 11.6 m (38 ft.) in length. All 11 of the large tanks are housed in concrete vaults approximately 13.7 m (45 ft.) below grade, while the 4 smaller tanks have no vaults.

The DOE began cleaning the tanks in 2002. Waste retrieval and grouting were completed for 7 of the 11 large tanks (i.e., WM-180 through WM-186), all 4 of the smaller tanks, and the associated ancillary equipment for those 11 cleaned-out tanks. Four of the large tanks (i.e., WM-187 through WM-190) have not yet been cleaned; however, the DOE assumed in the INL INTEC TFF PA that those four tanks will be cleaned as efficiently as the other seven large tanks were cleaned. Three of those four tanks are considered 100 percent (100%) full and one of those tanks is maintained as a spare and is considered about 20% full. After the bulk sodium-bearing waste is transferred from each of those four tanks, the DOE plans to initiate waste removal operations to reduce the residual tank waste heels to the maximum extent practical to satisfy the NDAA Section 3116(a) criteria. After cleaning activities are completed for all four of those tanks and their ancillary equipment, the DOE plans to stabilize the INL INTEC TFF by filling the tank system with grout and then closing the INL INTEC TFF at some future time.

### **2.2 The DOE Disposal Actions**

The DOE did not perform any significant disposal actions at the INL INTEC TFF in CY 2014 through CY 2018. This was due to the delays in the schedule for cleaning out the remaining four large tanks. That delay was due to the need for the DOE to redesign the Integrated Waste Treatment Unit (i.e., the process/equipment that will be used to clean out those tanks), which suffered damage during an over-pressurization event during testing in 2012. Note that an interim cover was placed on the original 7 large tanks to be closed.

## **2.3 The NRC And IDEQ Monitoring Activities**

### **2.3.1 Technical Review Reports (TRRs)**

- On April 15, 2014, the NRC issued a TRR entitled, “Technical Review: Environmental Monitoring Programs at the INL INTEC TFF” (Memorandum is ADAMS Accession No. ML14092A559 and technical review is ADAMS Accession No. ML14092A565). The NRC staff reviewed information regarding environmental monitoring activities conducted at INL INTEC and INL (in general) from January 2011 through September 2013. The TRR covered Key Monitoring Area (KMA) 4 (Monitoring during Operations).
- On May 19, 2014, the NRC issued a TRR entitled, “Technical Review: Hydrological Studies and Data for the INL INTEC TFF” (ADAMS Accession No. ML14113A278). The NRC staff reviewed the DOE documents regarding the hydrological system at INL INTEC TFF. The TRR covered KMA 3 (Hydrological Uncertainty).

### **2.3.2 Letter to the DOE**

- On June 9, 2014, the NRC issued a letter to the DOE (ADAMS Accession No. ML14149A337) that closed KMA 3 (Hydrological Uncertainty) in the NRC Monitoring Plan for the INL INTEC TFF. The letter was based on the May 19, 2014, NRC TRR (ADAMS Accession No. ML14113A278).

### **2.3.3 Onsite Observation Visit (OOV) Reports**

- On September 24, 2014, the NRC issued an OOV Report (ADAMS Accession No. ML14265A092) for an INL INTEC OOV that the NRC conducted on June 26, 2014. The focus of the OOV was to verify the DOE Radiation Protection Program and the DOE Environmental Monitoring Program.
- On December 5, 2017, the NRC issued an OOV Report (ADAMS Accession No. ML17265A574) for an INL INTEC OOV that the NRC conducted on June 6, 2017. The focus of the OOV was tour/technical discussion on Operating Status and other technical discussions focused on: (1) Radiation Protection Program; (2) Environmental Monitoring Program; and (3) Engineered Surface Barrier Construction Program.

## **2.4 Status of the NRC and IDEQ Monitoring Activities**

As of December 31, 2018, for the INL INTEC TFF:

- There is no change in the overall conclusions from the NRC 2006 TER for the INL INTEC TFF:
  - *The NRC concluded that there is reasonable assurance that the applicable criteria of the NDAA can be met for residual waste associated with the INL INTEC TFF.*
- There are no Notification Letters.
- There are no Open Issues.

- KMA 3 is Closed while the other four KMAs (i.e., 1, 2, 4, 5) are Open.
- There are no Open Follow-Up Action Items.

### **3.0 MONITORING AT THE SAVANNAH RIVER SITE SALTSTONE DISPOSAL FACILITY (SRS SDF): CY 2014 THROUGH CY 2018**

#### **3.1 Introduction**

The SRS is a 802 km<sup>2</sup> (310 mi<sup>2</sup>) facility located in south-central SC, which began operation in 1951 producing nuclear materials for national defense, research, medical, and space programs. Waste produced at the site from spent nuclear fuel reprocessing for defense purposes has been commingled with non-reprocessing waste resulting from the production of targets for nuclear weapons and production of material for space missions. Significant quantities of radioactive waste are currently stored onsite in large underground waste storage tanks, which were placed in operation between 1954 and 1986. The waste stored in the tanks is a mixture of insoluble metal hydroxide solids, referred to as sludge, and soluble salt supernate. The supernate volume has been reduced by evaporation, which also concentrates the soluble salts to their solubility limits. The resultant solution crystallizes as salts and the resulting solid is referred to as saltcake. The saltcake and supernate combined are referred to as salt waste. DOE removes the salt waste, treats it to remove highly radioactive radionuclides to the maximum extent practical, and disposes of the low activity fraction onsite in the SDF. The SDF is located in the SRS Z-Area, which is approximately 10 kilometers (6.2 miles) from the nearest SRS site boundary on a local topographic high.

#### **3.2 The DOE Disposal Actions**

The DOE was continuing the process to build disposal structures, fill disposal structures with saltstone, and close disposal structures at the SRS SDF from CY 2014 through CY 2018.

#### **3.3 The NRC And SCDHEC Monitoring Activities**

##### **3.3.1 Summary of Teleconference Calls (i.e., Telecons)**

- On January 2, 2014, the NRC issued a Summary of a Telecon with the DOE held on October 3, 2013 (ADAMS Accession No. ML13337A204). The purpose of the telecon was for the DOE to brief the NRC staff on recent activities at the SRS SDF.
- On March 14, 2014, the NRC issued a Summary of a Telecon with the DOE held on February 10, 2014 (ADAMS Accession No. ML14057A578). The purpose of the telecon was to discuss the NRC staff's initial review of DOE Fiscal Year (FY) 2013 SDF Special Analysis Document.
- On January 4, 2017, the NRC issued a Summary of a Telecon with the DOE held on November 14, 2016 (ADAMS Accession No. ML16354A116). The purpose of the telecon was to discuss the NRC review of two DOE documents: (1) SREL Doc. No. R-16-0003, Rev. 0, "Contaminant Leaching from Saltstone;" and (2) SRR-CWDA-2016-00051, Rev. 0, "Property Data for Core Samples Extracted from SDU Cell 2A."

- On February 7, 2017, the NRC issued a Summary of a Telecon with the DOE held on December 13, 2016 (ADAMS Accession No. ML17023A287). The purpose of the telecon was as a followup to the November 14, 2016, telecon and a discussion on a path forward with regards to dose and Technetium (Tc)-99 solubility for the SDF.
- On May 1, 2017, the NRC issued a Summary of a Telecon with the DOE held on February 28, 2017 (ADAMS Accession No. ML17072A500). The purpose of the telecon was, as NRC Management/DOE Management agreed in January 2017, for NRC staff/DOE staff to continue to work together and more specifically jointly develop a plan to address the issues related to iodine and Tc release from saltstone.

### **3.3.2 Request for Additional Information (RAI) Documents**

- On June 13, 2014, the NRC issued the NRC RAI Comments (ADAMS Accession No. ML14148A153) on the DOE SDF FY 2013 Special Analysis Document (SRR-CWDA-2013-00062, Rev. 2) (ADAMS Accession No. ML14148A153). The NRC RAI Comments addressed: Performance Assessment Methods, Saltstone Performance, Disposal Structure Performance, Far-Field Transport, Inadvertent Intrusion, Biosphere, and Clarifications.
- On June 26, 2015, the NRC issued the NRC RAI Questions (ADAMS Accession No. ML15161A541) on the DOE SDF FY 2014 Special Analysis Document (SRR-CWDA-2014-00006, Rev. 2) (ADAMS Accession No. ML15097A366). The NRC RAI Questions addressed: Performance Assessment Methods, Saltstone Performance, Infiltration and Erosion Control, Disposal Structure Performance, Far-Field Transport, and Clarifications.

### **3.3.3 Onsite Observation Visit (OOV) Reports**

- On August 28, 2014, the NRC issued an OOV Report (ADAMS Accession No. ML14199A219) for an SRS SDF OOV that the NRC conducted on May 27-29, 2014. The focus of the OOV were: tour of Construction of SDS 6, New Monitoring Wells, and Z-Area Sedimentation Basis; technical discussion/tour of Emplaced Saltstone Sampling with Tour of Mockup; and other technical discussions focused on: (1) Operating Status, Disposal Structure Status, and Monitoring Activity Status; (2) Highlights of the NRC RAI Comments on the DOE SDF FY 2013 Special Analysis Document; (3) First Year Results of the DOE Lysimeter Experiment; (4) the DOE Crosswalk of Select SDF Documents; (5) Information on Technetium Oxidation and Mobility; and (6) Groundwater Results and Retention Pond Data.
- On May 27, 2015, the NRC issued an OOV Report (ADAMS Accession No. ML15041A562) for an SRS SDF OOV that the NRC conducted on February 4-5, 2015. The focus of the OOV were: a tour of Construction of Saltstone Disposal Structure (SDS) 6, Saltstone Production Facility, New Monitoring Wells, and Outside of SDS 3A, SDS 3B, SDS 5A, and SDS 5B; and technical discussions on: (1) Operating Status and Disposal Structure Status; (2) Ongoing and Future NRC Research Activities by the Center for Nuclear Waste Regulatory Analyses (CNWRA); (3) The DOE Sampling and Analyses Plan Research Status; (4) iodine Sorption and Tc Solubility; (5) Tan Clay Confining Zone Structure and ZBG-2 Well Sample Results; (6) SDS 3A Sump Unreviewed Waste Disposal Question Evaluation; (7) PORFLOW Modeling for the DOE

SDF FY 2014 Special Analysis Document; and (8) GoldSim Modeling for the DOE SDF FY 2014 Special Analysis Document.

- On September 28, 2015, the NRC issued an OOV Report (ADAMS Accession No. ML15236A299) for an SRS SDF OOV that the NRC conducted on July 7-8, 2015. The focus of the OOV were: a tour of SDS 2A, SDS 2B, SDS 3A, SDS 3B, SDS 4, SDS 5A, SDS 5B, and Construction of SDS 6; a tour/discussion on Groundwater Monitoring; and other technical discussions on: (1) Operating Status and Disposal Structure Status; (2); DOE Research Update; (3) DOE Collection of Core Samples; (4) GoldSim Modeling; and (5) NRC RAI Questions on the DOE SDF FY 2014 Special Analysis Document.
- On July 15, 2016, the NRC issued an OOV Report (ADAMS Accession No. ML16147A197) for an SRS SDF OOV that the NRC conducted on April 19-21, 2016. The focus of the OOV was: a tour of SDS 3A, SDS 3B, SDS 5A, SDS 5B, Construction of SDS 6, Z-Area Perimeter, Intersection of the Road with McQueen Branch and Upper Three Runs, Saltstone Cementitious Property Testing at the Savannah River Ecology Laboratory (SREL); and technical discussions focused on: (1) Operating Status and Disposal Structure Status; (2) Groundwater Monitoring Report and Characterization Data; (3) Select DOE Responses to NRC RAI Questions on the DOE SDF FY 2014 Special Analysis Document; and (4) DOE Research Results Update.
- On May 5, 2017, the NRC issued an OOV Report (ADAMS Accession No. ML17054C453) for an SRS SDF OOV that the NRC conducted on January 25, 2017. The focus of the OOV was a tour of walk-down of portions of the Upper Three Runs and McQueen Branch near the SDF that focused on erosional and hydrogeological aspects. Specifically, the tour was conducted to examine indications of gully growth, areas that have a higher potential for producing seeps, and outcroppings of the Santee Formation.
- On November 1, 2018, the NRC issued an OOV Report (ADAMS Accession No. ML18219B859) for an SRS SDF OOV that the NRC conducted on July 9-11 2018. The focus of the OOV were: a tour of Construction of SDS 7 and the Z-Area Perimeter and technical discussions focused on: (1) Operating and Disposal Structure Status; (2) Recent DOE Research Involving Samples of Cores from SDS 2A; (3) Recent DOE Information on the Closure Cap; (4) Recent DOE Information on Features, Events, and Processes as well as the Conceptual Model for the Expected 2019 SDF Performance Assessment; (5) Recent DOE Reports about the Inventory of I-129 and Tc-99 Expected to be Placed in the SDF; and (6) NRC Technical Review Reports Issued Since April 2016.

### **3.3.4 Technical Review Reports (TRRs)**

- On June 4, 2015, the NRC issued a TRR entitled, "Technical Review: Oxidation of Reducing Cementitious Waste Forms" (ADAMS Accession No. ML15098A031). The NRC staff reviewed information in technical documents related to oxidation of reducing cementitious waste forms. The TRR covered Monitoring Area (MA) 5 (Waste Form Chemical Degradation) by Monitoring Factor (MF) 5.01 (Radionuclide Release from Field-Emplaced Saltstone), MF 5.02 (Chemical Reduction of Tc by Saltstone), MF 5.03 (Reducing Capacity of Saltstone) and MF 5.05 (Potential for Short-Term Rinse-Release from Saltstone).

- On August 1, 2016, the NRC issued a TRR entitled, “Technical Review: Quality Assurance Documentation for the Cementitious Barriers Partnership Toolbox” (ADAMS Accession No. ML16196A179). The NRC staff reviewed quality assurance documentation related to Version 3.0 of the Cementitious Barriers Partnership Toolbox. The models in the Toolbox are used by the DOE to evaluate degradation of the saltstone and the disposal structures containing the saltstone.
- On December 23, 2016, the NRC issued a TRR entitled, “Technical Review: Dose Calculation Methodology for Liquid Waste Performance Assessments at the Savannah River Site” (ADAMS Accession No. ML16277A060). The NRC staff primarily reviewed the DOE document, SRR-CWDA-2013-00058, Rev. 1, “Dose Calculation Methodology for Liquid Waste Performance Assessments at the Savannah River Site”, July 2014. The TRR covered both the SRS SDF and the SRS TFs. For the SDF, the TRR covered MA 10 (Performance Assessment Model Revisions) by both MF 10.07 (Calculation of Build-Up in Biosphere Soil) and MF 10.08, (Consumption Factors and Uncertainty Distributions for Transfer Factors).
- On January 5, 2017, the NRC issued a TRR entitled, “Technical Review: Iodine Sorption Coefficients for Use in Performance Assessments for the Saltstone Disposal Facility” (ADAMS Accession No. ML16342C575). The NRC staff reviewed information in technical documents related to oxidation of reducing cementitious waste forms. The TRR covered: MA 5 (Waste Form Chemical Degradation) by MF 5.04, (Certain Risk-Significant  $K_d$  Values for Saltstone); MA 6 (Disposal Structure Performance) by MF 6.01 (Certain Risk-Significant  $K_d$  Values in Disposal Structure Concrete); MA 7 (Subsurface Transport) by MF 7.01 (Certain Risk-Significant  $K_d$  Values in Site Sand and Clay); and MA 10 (Performance Assessment Model Revisions) by MF 10.04 ( $K_d$  Values for Saltstone), MF 10.06 ( $K_d$  Values for Disposal Structure Concrete), and MF 10.09 ( $K_d$  Values for SRS Soil).
- On March 23, 2017, the NRC issued a TRR entitled, “Technical Review: Saltstone Waste Form Hydraulic Performance” (ADAMS Accession No. ML17018A137). The NRC staff reviewed information in technical documents related to saltstone waste form hydraulic performance, including such topics as: saturated hydraulic conductivity, moisture characteristic curves, and diffusivity. The TRR covered: MA 3 (Waste Form Hydraulic Performance) by MF 3.01 (Hydraulic Conductivity of Field-Emplaced Saltstone), MF 3.02 (Variability of Field-Emplaced Saltstone), MF 3.03 (Applicability of Laboratory Data to Field-Emplaced Saltstone), MF 3.04 (Effect of Curing Temperature on Saltstone Hydraulic Properties); and MA 10 (Performance Assessment Model Revisions) by MF 10.05 (Moisture Characteristic Curve).
- On April 12, 2017, the NRC issued a TRR entitled, “Technical Review: Performance of the High Density Polyethylene Layer, High Density Polyethylene Geosynthetic Clay Liner Composite Layer, and the Lower Lateral Drainage Layer” (ADAMS Accession No. ML17081A187). The NRC staff reviewed information in technical documents related to the performance of the high density polyethylene (HDPE) layer, HDPE geosynthetic clay liner (GCL) composite layer, and the lower lateral drainage layer (LLDL). The TRR covered: MA 6 (Disposal Structure Performance) by MF 6.03 (Performance of Disposal Structure Roofs and HDPE/GCL Layers) and MA 10 (Performance Assessment Model Revisions) by MF 10.02 (Defensibility of Conceptual Models).

- On January 31, 2018, the NRC issued a TRR entitled, “Technical Review: Hydraulic Performance and Erosion Control of the Planned Saltstone Disposal Facility Closure Cap and Adjacent Area” (ADAMS Accession No. ML18002A545). The NRC staff reviewed information in technical documents related to the performance of the engineered surface cover that the DOE plans to use to limit infiltration and control erosion at the SDF as well as address erosion process in the area immediately surrounding the SDF. The TRR covered: MA 2 (Infiltration and Erosion Control) by MF 2.01 (Hydraulic Performance of Closure Cap) and MF 2.02 (Erosion Protection); and MA 10 (Performance Assessment Model Revisions) by MF 10.02 (Defensibility of Conceptual Models).
- On May 17, 2018, the NRC issued a TRR entitled, “Technical Review: Groundwater Monitoring At and Near the Planned Saltstone Disposal Facility” (ADAMS Accession No. ML18117A494). The NRC staff reviewed information in technical documents related to the groundwater monitoring at the SDF. The TRR covered: MA 8 (Environmental Monitoring) by MF 8.02 (Groundwater Monitoring) and MA 10 (Performance Assessment Model Revisions) by MF 10.02 (Defensibility of Conceptual Models).
- On May 22, 2018, the NRC issued a TRR entitled, “Technical Review: Update on Projected Technetium Release from Saltstone” (ADAMS Accession No. ML18095A122). The NRC staff reviewed new research results based on cores of field-emplaced saltstone from SDS 2A and new modeling analyses conducted by the DOE to update the NRC position on the projected technetium release from saltstone. The TRR covered: MA 5 (Waste Form Chemical Performance) by MF 5.01 (Radionuclide Release from Field-Emplaced Saltstone), MF 5.02 (Chemical Reduction of [Technetium] by Saltstone), MF 5.03 (Reducing Capacity of Saltstone), and MF 5.05 (Potential for Short-Term Rinse-Release from Saltstone); MA 6 (Disposal Structure Performance) by MF 6.02 ([Technetium] Sorption in Disposal Structure Concrete); and MA 10 (Performance Assessment Model Revisions) by MF 10.02 (Defensibility of Conceptual Models).
- On June 29, 2018, the NRC issued a TRR entitled, “Technical Review: Summary of Activities Related to the Review of the U.S. Department of Energy Savannah River Site Fiscal Year 2013 and Fiscal Year 2014 Special Analysis Documents for the Saltstone Disposal Facility” (ADAMS Accession No. ML18158A172). The TRR provided a summary of the NRC staff activities related to the review of the DOE SDF FY 2013 and FY 2014 Special Analysis Documents and was related to all the monitoring areas and monitoring factors in the NRC 2013 SDF Monitoring Plan.

### **3.3.5 Letters Supplementing The NRC Monitoring Plan**

- On June 5, 2017, the NRC issued a letter to the DOE (ADAMS Accession No. ML17097A351) that supplemented the 2013 SDF Monitoring Plan. The NRC narrowed the scope of MF 3.03 (Applicability of Laboratory Data to Field-Emplaced Saltstone) and the NRC closed three SDF monitoring factors: (1) MF 3.01 (Hydraulic Conductivity of Field-Emplaced Saltstone); (2) MF 3.02 (Variability of Field-Emplaced Saltstone); and MF 3.04 (Effect of Curing Temperature on Saltstone Hydraulic Properties). The letter was based on the March 23, 2017, NRC TRR (ADAMS Accession No. ML17018A137).

- On March 1, 2018, the NRC issued a letter to the DOE (ADAMS Accession No. ML18033A071) that clarified the number of monitoring factors in both the NRC 2013 SDF Monitoring Plan and the NRC 2015 TFs Monitoring Plan. The NRC changed how it counted the number of monitoring factors since the 2013 SDF Monitoring Plan was issued to only count each monitoring factor once, even if that monitoring factor related to more than one 10 CFR Part 61 Performance Objective. As such, the count of the number of monitoring factors when the 2013 SDF Monitoring Plan was issued changed to 40. The NRC closed three SDF monitoring factors by letter dated June 5, 2017 (ADAMS Accession No. ML17097A351). Thus, at that time, there were 37 open SDF monitoring factors and three closed SDF monitoring factors.
- On June 29, 2018, the NRC issued a letter to the DOE (ADAMS Accession No. ML18107A161) that supplemented the NRC 2013 SDF Monitoring Plan. The NRC: (1) increased the priority of MF 2.01 (Hydraulic Performance of Closure Cap) from Low-Priority to Medium-Priority; (2) changed the title of MF 2.02 to “Erosion Control of the SDF Engineered Surface Cover and Adjacent Area;” and (3) opened a new High-Priority MF 10.02 (Defensibility of Conceptual Models) under MA 10 (Performance Assessment Model Revisions) under POs §61.41 and §61.42. The letter was based on the January 31, 2018, NRC TRR (ADAMS Accession No. ML18002A545). Thus, at that time, there were 38 open SDF monitoring factors and 3 closed SDF monitoring factors.
- On October 16, 2018, the NRC issued a letter to the DOE (ADAMS Accession No. ML18219B035) that supplemented the NRC 2013 SDF Monitoring Plan. The NRC: (1) opened a new High-Priority MF 8.03 (Identification and Monitoring of Groundwater Plumes in the Z-Area) under MA 8 (Environmental Monitoring) under the three POs §61.41, §61.42, and §61.43; (2) added MF 8.01 (Leak Detection) and MF 8.02 (Groundwater Monitoring) under PO §61.43; (3) lowered the priority of MF 5.02 (Chemical Reduction of Technetium by Saltstone) from High to Medium under both POs §61.41 and §61.42; (4) lowered the priority of MF 5.03 (Reducing Capacity of Saltstone) from Medium to Low under both POs §61.41 and §61.42; (5) closed MF 5.05 (Potential for Short-Term Rinse-Release from Saltstone) under both POs §61.41 and §61.42; and (6) closed MF 6.02 (Technetium Sorption in Disposal Structure Concrete) under both POs §61.41 and §61.42. The letter was based on the May 17, 2018, NRC TRR (ADAMS Accession No. ML18117A494), May 22, 2018, NRC TRR (ADAMS Accession No. ML18095A122), and July 2018 SDF OOV. Thus, at that time, there were 37 open SDF monitoring factors and 5 closed SDF monitoring factors.

### **3.3.6 Letter With The NRC/DOE Joint Plan**

- On October 23, 2018, the NRC issued the initial NRC/DOE Joint Plan (Rev. 0) (ADAMS Accession No. ML18235A068) that identifies what information is needed from the DOE (and when the DOE expects to provide that information to the NRC) to support an NRC finding of reasonable assurance that the DOE demonstrated meeting the POs at the SDF. Such an NRC finding would resolve the concerns in the NRC letter to the DOE dated April 30, 2012 (ADAMS Accession No. ML120650576). Note that the NRC/DOE Joint Plan includes that: “[if] any of the following occurs, then the NRC expects that either the risk-significance and prioritization of the SDF monitoring factors may be affected or new SDF monitoring factors may be created, which would need to be addressed by the DOE in order for the NRC to reach a finding of reasonable assurance and issue an NRC Type-V Letter of Resolution: (1) significant future changes in either

the DOE model or the DOE model assumptions; or (2) future research or future field observations that significantly increase uncertainty or demonstrate significantly worse than expected performance at the SDF.”

### **3.4 Status Of The NRC And SCDHEC Monitoring Activities**

As of December 31, 2018, for the SRS SDF

- There is no change in the overall conclusions from the NRC 2012 TER for the SRS SDF:
  - *The NRC concludes that it has reasonable assurance that waste disposal at the SRS SDF meets the 10 CFR 61 POs for protection of individuals against intrusion (§61.42), protection of individuals during operations (§61.43), and site stability (§61.44).*
  - *However, based on the NRC evaluation of the DOE results and independent sensitivity analyses conducted with the DOE models, the NRC no longer has reasonable assurance that the DOE disposal activities at the SRS SDF meet the PO for protection of the general population from releases of radioactivity (§61.41).*
  - *Although the NRC cannot conclude that the PO in §61.41 is met, based on the DOE results and the NRC own independent analyses, the potential dose to an off-site member of the public from the DOE disposal actions is still expected to be relatively low.*
- There is one Type-IV Notification Letter (ADAMS Accession No. ML120650576). To resolve the NRC technical concerns in the NRC Type-IV Notification Letter, the NRC issued a letter on October 23, 2018, to the DOE with Revision 0 of the NRC/DOE Joint Plan (ADAMS Accession No. ML18235A068).
- There are no Open Issues.
- All 11 monitoring areas (i.e., MA 1 through MA 11) are Open; the following five monitoring factors are closed: MF 3.01, MF 3.02, MF 3.04, MF 5.05, and MF 6.02; and the other 37 monitoring factors are Open, including new monitoring factors that were opened in FY 2018.

## **4.0 MONITORING AT THE SAVANNAH RIVER SITE TANK FARMS (SRS TFs): CY 2014 THROUGH CY 2018**

### **4.1 Introduction**

The SRS is an 802 km<sup>2</sup> (310 mi<sup>2</sup>) facility located in south-central SC that was developed in the 1950's as part of the United States' growing weapons program. Many activities took place at SRS, including the reprocessing of spent nuclear fuel in reinforced concrete buildings (i.e., canyons). The SRS TFs consists of the FTF and the HTF. Liquid waste managed from the reprocessing process involves 51 underground storage tanks contained in either the FTF or the HTF.

The FTF is a 0.089 km<sup>2</sup> (22 acre or 0.0343 mi<sup>2</sup>) site that is in the F-Area of the SRS General Separations Area (GSA). The FTF is located approximately 10 km (6.2 mi) from the nearest SRS site boundary. The FTF contains 22 of the 51 tanks in the SRS TFs. The HTF is a 0.182 km<sup>2</sup> (45 acre or 0.0703 mi<sup>2</sup>) site that is in the H-Area of the SRS GSA. The HTF is located near the center of the SRS site. The HTF contains 29 of the 51 tanks in the SRS TFs.

The FTF contains 22 below grade, carbon steel and reinforced concrete tanks that store or previously stored liquid radioactive waste generated from the chemical separations facility in the F-Canyon. The waste tanks consist of three basic types. Type-I tanks are the original tanks from the 1950's (i.e., 23 m (75 ft.) in diameter, 7.5 m (24.5 ft.) in height, capacity of 2,850 m<sup>3</sup> (750,000 gallons)). Type-IV tanks are from the late 1950's (i.e., 26 m (85 ft.) in diameter, 11 m (34.5 ft.) in height, capacity of 4,940 m<sup>3</sup> (1,300,000 gallons)). Type-III tanks are from 1969 to 1980 (i.e., 26 m (85 ft.) in diameter, 11 m (34.5 ft.) in height, capacity of 4,940 m<sup>3</sup> (1,300,000 gallons)).

The HTF contains 29 below-grade, carbon steel and reinforced concrete tanks that store or previously stored liquid radioactive waste generated primarily from the chemical separations facility in the H-Canyon. The waste tanks consist of four basic types (i.e., Type-II and same three types as in the FTF). Type-I tanks are the original tanks from the 1950's. Type-II tanks are from 1955-1956 (i.e., 26 m (85 ft.) in diameter, 8.3 m (27 ft.) in height, capacity of 3,914 m<sup>3</sup> (1,030,000 gallons)). Type-III tanks are from 1966-1981. Type-IV tanks are from 1958-1962.

HTF has many similarities to the FTF. Tank types, sizes, and supporting infrastructure are largely the same. However, HTF contains four Type-II tanks while there are no Type-II tanks in FTF. In addition, HTF includes tanks that are either fully- or partially-submerged in the groundwater. While bottoms of several FTF tanks (i.e., Type-IV) are in the zone of water table fluctuation, no tanks have historically been fully submerged. Also, in HTF there were several instances where primary containment leakage has resulted in significant contamination reaching tank annuli. Additionally, Tank 16 released waste from partial secondary containment into the soil immediately surrounding the tank.

In the 1990's, prior to implementation of the NDAA, the DOE closed two FTF tanks with approval of SCDHEC. The DOE is engaged in an expansive campaign to clean, stabilize, and close the other underground waste storage tanks under the NDAA. The DOE cleanup activities also include cleaning out the supporting ancillary structures (i.e., evaporators, pump pits, pump tanks, diversion boxes, transfer valve boxes, piping) used to process and transfer generated waste. The waste tanks and ancillary structures are several decades old. The original service life for those tanks was projected as 40 years; however, several of the aging waste tanks are approaching 70 years of service life. Given the inherent risks of exhuming the aging waste tanks and disposing them as HLW, the DOE plans to clean, grout, and close the waste tanks and ancillary structures in place to reduce the risks to the workers, the public, and the environment. The DOE intends to close geographic sections of the SRS TFs in stages. Following closure of a geographic section, the area will be left in an interim closure state in preparation for final closure of an entire tank farm (i.e., FTF and HTF).

The tank waste is a mixture of relatively insoluble metal hydroxide solids, referred to as sludge, and soluble salt supernate. In the tank closing process, the supernate volume is reduced by evaporation, which also concentrates the soluble salts to their solubility limits. The resultant solution crystallizes as salts and the resulting solid is referred to as saltcake. The saltcake and supernate combined are referred to as salt waste. The DOE removes the salt waste, treats it to

remove Highly Radioactive Radionuclides to the maximum extent practical, and disposes of the low activity fraction in the SRS SDF (see Section 3.0 of this PMR).

As of December 31, 2018, six FTF tanks have been closed: Tank 17 and Tank 20 in the 1990's before the NRC monitoring activities under NDAA Section 3116(b); Tank 18 and Tank 19 in 2012; and Tank 5 and Tank 6 in 2013.

## **4.2 The DOE Disposal Actions**

The DOE was continuing the process to clean and close tanks at the SRS TFs from CY 2014 through CY 2018.

## **4.3 The NRC And SCDHEC Monitoring Activities**

### **4.3.1 Technical Review Reports (TRRs)**

- On April 21, 2014, the NRC issued a TRR entitled, "Technical Review: Documentation Related to Features, Events, and Processes in the F-Tank Farm Performance Assessment" (ADAMS Accession No. ML13277A063). The NRC staff reviewed information from DOE that addressed the NRC comments in the NRC 2012 TER for the FTF related to the documentation of scenario analysis for the DOE FTF PA. The TRR covered MA 6 (Performance Assessment Maintenance) by MF 6.1 (Scenario Analysis).
- On December 16, 2014, the NRC issued a TRR entitled, "Technical Review: Documentation Related to Tanks 5 and Tank 6 Final Configurations with an Emphasis on Grouting from Recommendations and Testing to Final Specifications and Procedures" (ADAMS Accession No. ML14342A784). The NRC staff reviewed several DOE documents that provided information on closure of Tank 5 and Tank 6 with an emphasis on grout formulations, testing, placement procedures, and final configurations. The TRR covered MA 3 (Cementitious Material Performance), by MF 3.3 (Shrinkage and Cracking) and MF 3.4 (Grout Performance).
- On March 31, 2015, the NRC issued a TRR entitled, "Technical Review: Environmental Monitoring and Site-Specific Distribution Coefficient Reports" (ADAMS Accession No. ML12272A124). The NRC staff reviewed the DOE environmental monitoring and site-specific distribution coefficient reports prepared to support FTF closure. The TRR covered MA 4 (Environmental Monitoring) by MF 4.1 (Natural Attenuation of Plutonium) and MF 4.3 (Environmental Monitoring).
- On November 6, 2015, the NRC issued a TRR entitled, "Technical Review: Final Inventory Documentation for Tank 16" (ADAMS Accession No. ML15301A830). The NRC staff reviewed the DOE documents that detailed development of the final inventory for Tank 16 at the SRS. The TRR covered MA 1 (Inventory) by MF 1.1 (Final Inventory and Risk Estimates), MF 1.2 (Residual Waste Sampling), and MF 1.3 (Residual Waste Volume).
- On November 10, 2015, the NRC issued a TRR entitled, "Technical Review: Tank 16 Special Analysis Document for the Performance Assessment for the H-Tank Farm" (ADAMS Accession No. ML15301A710). The NRC staff reviewed several DOE

documents that the DOE used to support Tank 16 closure at the SRS. The TRR covered MA 1 (Inventory) by MF 1.1 (Final Inventory and Risk Estimates).

- On September 6, 2016, the NRC issued a TRR entitled, “Technical Review: Documentation Related to Tank 16 and Tank 12 Grouting Operations with Emphases on Specifications, Testing, Recommendations, and Placement Procedures” (ADAMS Accession No. ML16231A444). The NRC staff reviewed several DOE documents that provided information on grouting and closure of Tank 16 in 2015 and Tank 12 in early 2016. The TRR covered MA 3 (Cementitious Material Performance) by MF 3.2 (Groundwater Conditioning via Reducing Grout), MF 3.3 (Shrinkage and Cracking of Reducing Grout), and MF 3.4 (Grout Performance).
- On December 23, 2016, the NRC issued a TRR entitled, “Technical Review: Dose Calculation Methodology for Liquid Waste Performance Assessments at the Savannah River Site” (ADAMS Accession No. ML16277A060). The NRC staff primarily reviewed the DOE document, SRR-CWDA-2013-00058, Rev. 1, “Dose Calculation Methodology for Liquid Waste Performance Assessments at the Savannah River Site”, July 2014. The TRR covered both the SRS SDF and the SRS TFs. For the TFs, the TRR covered MA 6 (PA Maintenance) by MF 6.2 (Model and Parameter Support).
- On January 8, 2018, the NRC issued a TRR entitled, “Technical Review: Final Inventory and Special Analysis Documentation for Tank 12” (ADAMS Accession No. ML17277B235). The NRC staff reviewed several DOE documents that detailed the development of both the Tank 12 final inventory and the Tank 12 Special Analysis Document. The TRR covered MA 1 (Inventory) by MF 1.1 (Final Inventory and Risk Estimates), MF 1.2 (Residual Waste Sampling), and MF 1.3 (Residual Waste Volume).
- On April 20, 2018, the NRC issued a TRR entitled, “Technical Review: Environmental Monitoring Reports for the F-Tank Farm and H-Tank Farm” (ADAMS Accession No. ML18051B009). Note that the Enclosure is undated; but, Final (ADAMS Accession No. ML18051B153). The NRC staff reviewed several DOE environmental monitoring reports prepared to support FTF and HTF closure at the SRS. The TRR covered MA 4 (Natural System Performance) by MF 4.3 (Environmental Monitoring).
- On September 21, 2018, the NRC issued a TRR entitled, “Technical Review: Real Waste Release Testing Results for Tank 18 and Associated Performance Assessment Documentation for the F-Tank Farm and H-Tank Farm” (ADAMS Accession No. ML18242A259). The NRC staff reviewed results of experiments designed to study the release behavior of residual wastes stored in high-level waste tanks at the SRS and supporting documentation that studied the impact of the real waste release testing results on both the FTF and HTF PAs. The TRR covered MA 1 (Inventory) by MF 1.1 (Final Inventory and Risk Estimates); MA 2 (Waste Release) by MF 2.1 (Solubility-Limiting Phases/Limits and Validation) and MF 2.2 (Chemical Transition Times); MA 3 (Cementitious Material Performance) by MF 3.2 (Groundwater Conditioning via Reducing Grout); and MA 6 (Performance Assessment Maintenance) by MF 6.3 (TFs Performance Assessment Revisions).

#### **4.3.2 Onsite Observation Visit (OOV) Reports**

- On May 21, 2014, the NRC issued an OOV Report (ADAMS Accession No. ML14106A573) for an SRS FTF OOV that the NRC conducted on March 26-27, 2014. The focus of the OOV was technical discussion on the topics of: (1) Closing of Tank 5 and Tank 6, (2) Implementation of the Radiation Protection Program, (3) Status of Tank Residual Solids Sample Leaching Experiments, (4) Two NRC TRRs and the Environmental Monitoring Program, and (5) Earthquakes and Other Impacts on Site Stability.
- On October 5, 2015, the NRC issued an OOV Report (ADAMS Accession No. ML15239A628) for an SRS TFs OOV that the NRC conducted on July 28-29, 2015. The focus of the OOV were: a tour of Grouting of Tank 16 and Isolation Activities associated with Tank 12; and technical discussions focused on: (1) Documentation on Closure of Tank 5 and Tank 6; (2) Implementation of the DOE Radiation Protection Program; (3) Status of HLW Residual Solids Sample Leaching Experiments; (4) Ongoing DOE Research and Analysis; (5) DOE Environmental Monitoring Program and Distribution Coefficient Reports; (6) Tank 12 and Tank 16 Closure Documentation; (7) Site Stability, and (8) New NRC TFs Monitoring Plan.
- On May 17, 2016, the NRC issued an OOV Report (ADAMS Accession No. ML16111B174) for an SRS TFs OOV that the NRC conducted on February 2-3, 2016. The focus of the OOV were: a tour/technical discussion about Tank 12 and Tank 16 Grouting Operations; and other technical discussions focused on: (1) Followup of Handling of Tank 6 Grout Truck with Out-of-Specification Grout; (2) "Tank 16 Inventory Documentation" TRR (3) Ongoing DOE Research or Analyses; (4) NRC Contractor Experiments; (5) "Tank 16 Special Analysis Document" TRR and (6) Tank 12 Closure Module Addendum and Special Analysis Document.
- On February 6, 2019, the NRC issued an OOV Report (ADAMS Accession No. ML18311A184) for an SRS TFs OOV that the NRC conducted on August 13-14, 2018. The focus of the OOV were: a tour of the GSA Streams and technical discussions focused on the: (1) Tank Closure Status; (2) Tank 12 and Tank 18 Waste Release Testing; (3) GSA PORFLOW Model; (4) "Tank 12 and Tank 16 Grouting" TRR; (6) "Tank 12 Inventory and Special Analysis Document" TRR; (7) "TFs Environmental Monitoring" TRR; and (8) The DOE and NRC Contractor Research.

#### **4.3.4 Summary of Teleconference Calls (i.e., Telecons)**

- On December 30, 2014, the NRC issued a Summary of a Telecon with the DOE held on October 29, 2014 (ADAMS Accession No. ML14330A037). The purpose of the telecon was to discuss the NRC staff questions related to Tank 5 and Tank 6 grouting operations and documentation that were provided to the DOE in July 2014 in advance of the telecon. Many of the areas of interest in the questions related to FUAIs from the March 2014 OOV.
- On July 18, 2016, the NRC issued a Summary of a Telecon with the DOE held on May 17, 2016 (ADAMS Accession No. ML16167A238). The purpose of the telecon was to discuss the NRC staff questions related to Tank 12 and Tank 16 grouting operations and

documentation that were provided to the DOE in February 2016 in advance of the telecon.

#### **4.3.5 Comments on SCDHEC Tank Closure Documents**

- On April 10, 2015, the NRC provided SCDHEC with NRC staff comments (ADAMS Accession No. ML15103A413) on SRR-CWDA-2013-00091, Rev. 0, "Industrial Wastewater Closure Module for the Liquid Waste Tank 16 H-Area Tank Farm, Savannah River Site," dated February 2015.
- On June 24, 2015, the NRC provided SCDHEC with NRC staff comments (ADAMS Accession No. ML15181A389) on SRR-CWDA-2014-00086, Rev. 0, "Industrial Wastewater Closure Module for the Liquid Waste Tank 12H H-Area Tank Farm, Savannah River Site," dated May 2015.

#### **4.3.9 Memorandum Issuing the New SRS TFs Monitoring Plan**

- On October 6, 2015, the NRC issued a Memorandum (ADAMS Accession No. ML15237A425) that issued Rev. 0 of the SRS TFs Monitoring Plan (ADAMS Accession No. ML15238A761).

#### **4.3.10 Comments on DOE Documents**

- On January 14, 2016, the NRC provided the DOE with the NRC staff comments (ADAMS Accession No. ML16015A078) on the DOE document SRNL-STI-2015-00446, Rev. 0, "Determining the Release of Radionuclides from Tank Waste Residual Solids: FY 2015 Report," dated September 2015 (ADAMS Accession No. ML15324A143).

#### **4.3.11 Letter Supplementing 2015 TFs Monitoring Plan**

- On March 1, 2018, the NRC issued a letter to the DOE (ADAMS Accession No. ML18033A071) that clarified the number of monitoring factors in both the NRC 2013 SDF Monitoring Plan and the NRC 2015 TFs Monitoring Plan. There was no change to the NRC count of 26 monitoring factors in the 2015 TFs Monitoring Plan.

#### **4.4 Status Of The NRC And SCDHEC Monitoring Activities**

As of December 31, 2018, for the SRS TFs:

- There is no change in the overall conclusions from the two SRS TFs NRC TERs (i.e., NRC 2011 TER for the SRS FTF and NRC 2014 TER for the SRS HTF) that:
  - The NRC did not make a conclusion on the ability of the DOE to meet the requirements of the POs in 10 CFR Part 61, Subpart C due to uncertainty in the final inventories for the remaining tanks.
- There are no Notification Letters.
- There are no Open Issues.

- All eight monitoring areas (i.e., MA 1 through MA 8) are Open and all 26 monitoring factors are Open.

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\_\_\_\_\_ Technical Review: Groundwater Monitoring at and Near the Planned SRS Saltstone Disposal Facility, May 2018. ML18117A494.

\_\_\_\_\_ Technical Review: Update on Projected Technetium Release from Saltstone, May 2018. ML18095A122.

\_\_\_\_\_ Technical Review: Summary of Activities Related to the Review of the U.S. DOE Savannah River Site Fiscal Year 2013 and Fiscal Year 2014 Special Analysis Documents for the Saltstone Disposal Facility, June 2018. ML18158A172.

\_\_\_\_\_ Technical Review: Real Waste Release Testing Results for Tank 18 and Associated Performance Assessment Documentation for SRS Tank Farms, September 2018. ML18242A259.

\_\_\_\_\_ Report for the July 9 – 11, 2018, Onsite Observation Visit to the SRS Saltstone Disposal Facility, November 2018. ML18219B859.

\_\_\_\_\_ Report for the August 13 – 14, 2018, Onsite Observation Visit to the SRS Tank Farms, February 2019. ML18311A184.

WSRC-OS-94-42, Federal Facility Agreement for the Savannah River Site, Administrative Document Number 89-05-FF, August 1993.

## **APPENDIX A: NDAA SECTION 3116(b) MONITORING PROCESS**

NDAA Section 3116(b) monitoring is an on-going process, including technical reviews, data reviews, and onsite observation visits (OOVs) of the U.S. Department of Energy (DOE) disposal activities related to the U.S. Nuclear Regulatory Commission, in coordination with the NDAA-Covered State, assessing the DOE compliance with the 10 CFR Part 61 Performance Objectives (POs). The NRC uses the information gathered from the DOE and other publicly available sources. Many of the DOE documents, including the Performance Assessment (PA) and environmental monitoring reports, are written to satisfy DOE internal requirements or other regulatory requirements for the DOE regulators (e.g., DOE, U.S. Environmental Protection Agency (EPA), NDAA-Covered State). The NRC will continue to leverage that already existing information during monitoring.

The NDAA Section 3116(b) monitoring process has changed since 2006 when the NRC, in coordination with the NDAA-Covered State, began monitoring. In 2006, the NRC documented the overall approach to monitoring in Chapter 10 of NUREG-1854. Through use and improvements in risk-informed review methods, the NRC refined its approach to monitoring. This appendix discusses the refined approach that the NRC uses where the focus of the monitoring is on a site-specific basis and those elements that drive the risk at the site. In each NRC monitoring plan, the NRC identifies a hierarchy of elements defining the overall scope of monitoring at each specific DOE location. A revision to an NRC monitoring plan during monitoring is based on activities during monitoring at that specific DOE location, including any new DOE documents and any new NRC documents, such as a new NRC Technical Evaluation Report (TER).

The NRC expects to change a DOE location-specific monitoring plan based on the results of the NRC and NDAA-Covered State monitoring of the DOE disposal actions at that location. The NRC and NDAA-Covered State monitoring continues in perpetuity. However, the NRC expects that how the monitoring occurs will change over time because monitoring will be done in a risk-informed and performance-based manner.

### **A.1 History Of The NRC Monitoring Plans**

#### **A.1.1 Initial 2007 Versions of an NRC Monitoring Plan**

In May 2007, the NRC issued Revision 0 of the NRC Monitoring Plan for the Savannah River Site (SRS) Saltstone Disposal Facility (SDF) (ADAMS Accession No. ML070730363), which was based on the NRC December 2005 TER for the SRS SDF (ADAMS Accession No. ML053010225). In January 2006, the DOE issued the Final Waste Determination (WD) for the SRS SDF (ADAMS Accession No. ML17136A069) with Basis (ADAMS Accession No. ML102850319) after taking into consideration the assumptions, conclusions, and recommendations documented in the NRC December 2005 TER for the SRS SDF. In the NRC December 2005 TER for the SRS SDF, the NRC identified key factors or assumptions that were important to assessing the DOE compliance with the 10 CFR Part 61, Subpart C POs. In Revision 0 of the NRC Monitoring Plan for the SRS SDF, the NRC indicated that it planned to perform two types of monitoring activities (i.e., technical review, OOV) for both environmental monitoring and the factors related to the SRS SDF.

In April 2007, the NRC issued Revision 0 of the NRC Monitoring Plan for the Idaho National Laboratory (INL) Idaho Nuclear Technology and Engineering Center Tank Farm Facility (INTEC TFF) (ADAMS Accession No. ML070650222), which was based on the NRC October 2006 TER for the INL INTEC TFF (ADAMS Accession No. ML062490142) and the DOE November 2006 Final WD for the INL INTEC TFF (ADAMS Accession No. ML17136A118) with Basis (ADAMS Accession No. ML14317A056). The DOE issued the Final WD for the INL INTEC TFF after taking into consideration the assumptions, conclusions, and recommendations documented in the NRC October 2006 TER for the INL INTEC TFF. In the NRC October 2006 TER for the INL INTEC TFF, the NRC identified key attributes of the disposal facility, or key monitoring areas, which were important to either mitigating releases of radioactivity to the environment or otherwise important to the DOE demonstration of compliance with 10 CFR Part 61, Subpart C POs. In Revision 0 of the NRC Monitoring Plan for INL INTEC TFF, the NRC indicated that it planned to perform three types of monitoring activities (i.e., technical review, data review, OOV) for the key monitoring activities related to the INL INTEC TFF.

#### A.1.2 Change in Future NRC Monitoring Process/Monitoring Plan

Based on the NRC experience of NDAA Section 3116(b) monitoring since 2006, the NRC changed the monitoring process and template for a monitoring plan in 2013 when the NRC issued two new monitoring plans.

### **A.2 Current 2013 Version Of Monitoring Process/Monitoring Plan**

#### A.2.1 Revised 2013 Version of an NRC Monitoring Plan

In January 2013, the NRC issued Revision 0 of the NRC Monitoring Plan for the SRS FTF (ADAMS Accession No. ML12212A192), which was based on both the NRC October 2011 TER for the SRS FTF (ADAMS Accession No. ML112371715) and the DOE March 2012 Final WD for the SRS FTF (ADAMS Accession No. ML121140043) with Basis (ADAMS Accession No. ML121140051). In the NRC October 2011 TER for the SRS FTF, the NRC provided a series of comments and recommendations. In Revision 0 of the NRC Monitoring Plan for the SRS FTF, the NRC used the 2013 version of a monitoring plan.

In September 2013, the NRC issued Revision 1 of the NRC Monitoring Plan for the SRS SDF (ADAMS Accession No. ML13100A113), which was based on the NRC April 2012 TER for the SRS SDF (ADAMS Accession No. ML121170309), the DOE October 2009 PA for the SRS SDF (ADAMS Accession No. ML101590008), and monitoring at the SRS SDF since 2006. In the April 2012 NRC TER for the SRS SDF, the NRC identified factors that were important to assessing the DOE compliance with the 10 CFR Part 61, Subpart C POs. Based on monitoring at the SRS SDF since 2006, the NRC had identified three Open Issues that were still open in 2013. In Revision 1 of the NRC Monitoring Plan for the SRS SDF, the NRC considered both the factors from the April 2012 TER for the SRS SDF and the three Open Issues. The NRC linked those concerns (i.e., factors, Open Issues) to the appropriate monitoring area and monitoring factors that the NRC determined were important to the DOE compliance with the 10 CFR Part 61 POs. The three Open Issues were closed because they were addressed in the new monitoring areas and monitoring factors. In Revision 1 of the NRC Monitoring Plan for the SRS SDF, the NRC used the 2013 version of a monitoring plan. Note that Revision 1 of the NRC Monitoring Plan for the SRS SDF superseded Revision 0 of the NRC Monitoring Plan for the SRS SDF.

In October 2015 the NRC issued Revision 0 of the NRC Monitoring Plan for the SRS TFs (i.e., covering both FTF and HTF) (ADAMS Accession No. ML15238A761), which was based on the NRC June 2014 TER for the SRS HTF (ADAMS Accession No. ML14094A514), the DOE December 2014 Final WD for the SRS HTF (ADAMS Accession No. ML17136A091) with Basis (ADAMS Accession No. ML15051A353), and monitoring at the SRS FTF since 2012. In the NRC June 2014 TER for the SRS HTF, the NRC provided a series of comments and recommendations. In Revision 0 of the NRC Monitoring Plan for the SRS TFs, the NRC used the 2013 version of a monitoring plan. Note that Revision 0 of the NRC Monitoring Plan for the SRS TFs superseded Revision 0 of the NRC Monitoring Plan for the SRS FTF.

#### A.2.2 Comparing 2007 Version to 2013 Version of Monitoring Process/Monitoring Plan

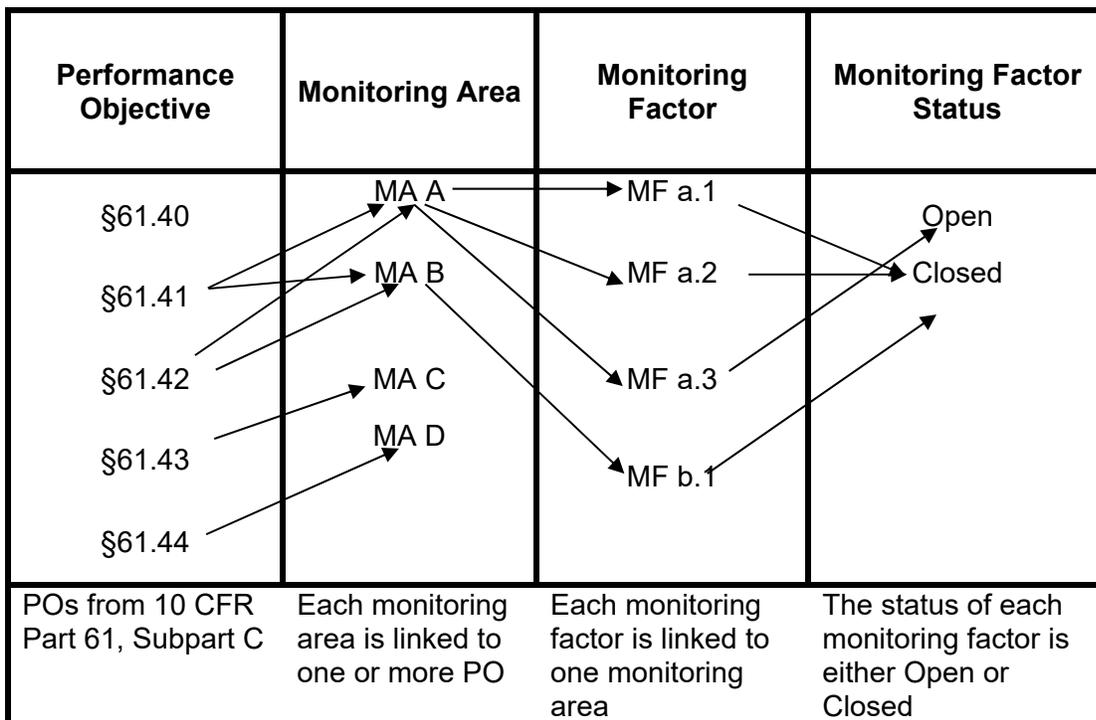
The key changes for NDAA Section 3116(b) monitoring under the 2013 monitoring process/monitoring plan from the 2007 monitoring process/monitoring plan were the following:

- if the NRC determined that the DOE met the §61.41 PO, §61.42 PO, §61.43 PO, and §61.44 PO, then the NRC would determine that the DOE met the §61.40 PO;
- the NRC would identify monitoring areas (i.e., general features) rather than either key factors for SRS or key monitoring areas for INL relating to the DOE demonstration of meeting the 10 CFR POs
- the NRC would identify monitoring factors (i.e., specific features) under those monitoring areas) relating to the DOE demonstration of meeting the 10 CFR Part 61 POs;
- the NRC would link each PO to one more monitoring area and each monitoring area to one or more monitoring factors;
- the NRC would link each monitoring factor to only one monitoring area;
- the NRC would prioritize each monitoring factor and, if needed in the future, then would modify the priority for a monitoring factor;
- the NRC would keep track of the status (i.e., Open or Closed) of each monitoring area and each monitoring factor;
- the NRC would, if needed in the future, then open a new monitoring area or a new monitoring factor;
- the NRC would, if needed in the future, then modify a monitoring area or a monitoring factor;
- the NRC would include in the description of each monitoring factor how the NRC expected to close that monitoring factor;
- the NRC would perform three types of NDAA-monitoring activities (i.e., technical review, data review, OOV);
- in addition to its own regulatory role, the NDAA-Covered State would perform one type of NDAA-monitoring activity on its own (i.e., data review);

- the NRC would identify Follow-Up Action Items (FUAs) from a meeting/teleconference, a technical review, a data review, and an OOV; and
- the NRC would keep track of the status (i.e., Open or Closed) of FUAs from each meeting/teleconference, each technical review, each data review, and each OOV.

A.2.3 Graphic about 2013 Version of a Monitoring Plan

Figure A-1 below illustrates the hierarchy of elements in a 2013 version of a monitoring plan with a hypothetical example of the relationship among the 10 CFR Part 61 POs, monitoring areas in a monitoring plan, monitoring factors in a monitoring plan, and status of the monitoring factors for a specific DOE location.



**Figure A-1: Hypothetical Example of the Relationships between Monitoring Plan Elements under the 2013 Version of the Monitoring Process**

A.2.3 Monitoring Activities in All Current Versions of a Monitoring Plan

The three monitoring activities in all current versions of a monitoring plan (i.e., Rev. 0 for INL INLTEC TFF, Rev. 1 for SRS SDF, Rev. 0 for SRS TFs) are: (i) technical review, (ii) data review, and (iii) OOV.

Technical Review

A technical review by the NRC focuses on the review and evaluation of analyses conducted by the DOE or others related to one or more aspects of a DOE location performance. A technical review is generally used to evaluate new information to assess assumptions, made by the DOE in a PA, which are considered important to the DOE demonstration of meeting the 10 CFR

Part 61 POs. The NRC will document each technical review, which will be publicly available. That NRC document may be something like a TRR, part of an OOV Report, or a Note-to-File (NTF).

### Data Review

A data review by the NRC or the NDAA-Covered State focuses on real-time monitoring data that may indicate future system performance or a review of records or reports that can be used to directly assess compliance with 10 CFR Part 61 POs (e.g., review of radiation records). The NRC or NDAA-Covered State will document each data review, which will be publicly available. That NRC or NDAA-Covered State document may be something like a DRR, part of a TRR, part of an OOV Report, or a NTF.

### Onsite Observation Visit

An OOV is an opportunity for the NRC and the NDAA-Covered State to: (1) observe and review first-hand certain DOE operations as they are being performed, (2) discuss the results of the NRC or the DOE experiments, or (3) discuss a technical review or data review. An OOV may include a variety of specific activities that could be used to assess an aspect of current or future location performance. An OOV is generally performed to either: (1) ensure that data collected for a technical review are of sufficient quality; or (2) observe key disposal actions that are important to the DOE demonstration of compliance with the 10 CFR Part 61 POs.

Prior to each OOV, the NRC will prepare an OOV Guidance Memorandum that provides the scope and specific activities that will be monitored during the OOV. The activities will be based on many aspects, such as the issuance of DOE documents, emergent issues, timely DOE activities, availability of staff (i.e., NRC, DOE, NDAA-Covered State), availability of areas at the location, length of time since reviewing something previously, FUAIs that are Open, and available resources. The NRC will coordinate the development of the OOV Guidance Memorandum with the NDAA-Covered State to take into account their areas of interest and availability of their experts in those areas of interest. The NRC goal is to issue the publicly available OOV Guidance Memorandum no less than 30 calendar days prior to the start of an OOV.

During an OOV, the agenda may change based on what happens during the OOV (e.g., new areas of interest are identified) or unforeseen circumstances (e.g., weather). The NRC will document what happens at each OOV, which will be publicly available, as an OOV Report. The OOV Report will include, for the actual areas covered during the OOV (i.e., may not be the same as the areas of interest identified in the OOV Guidance Memorandum), specific activities, results of discussions, status of any Open Issue, status of FUAIs, and conclusions. The NRC goal is to issue the publicly available OOV Report no later than 60 calendar days after completing an OOV.

## **A.3 THE NRC NOTIFICATION LETTERS**

At times during the NRC NDAA monitoring, the NRC may decide to send a notification letter concerning the DOE non-compliance or the potential for the DOE non-compliance with the 10 CFR Part 61 POs. There are five types of notification letters. Three of the letters are non-compliance letters (i.e., Type-I, Type-II, Type-III) that the NRC developed to implement the

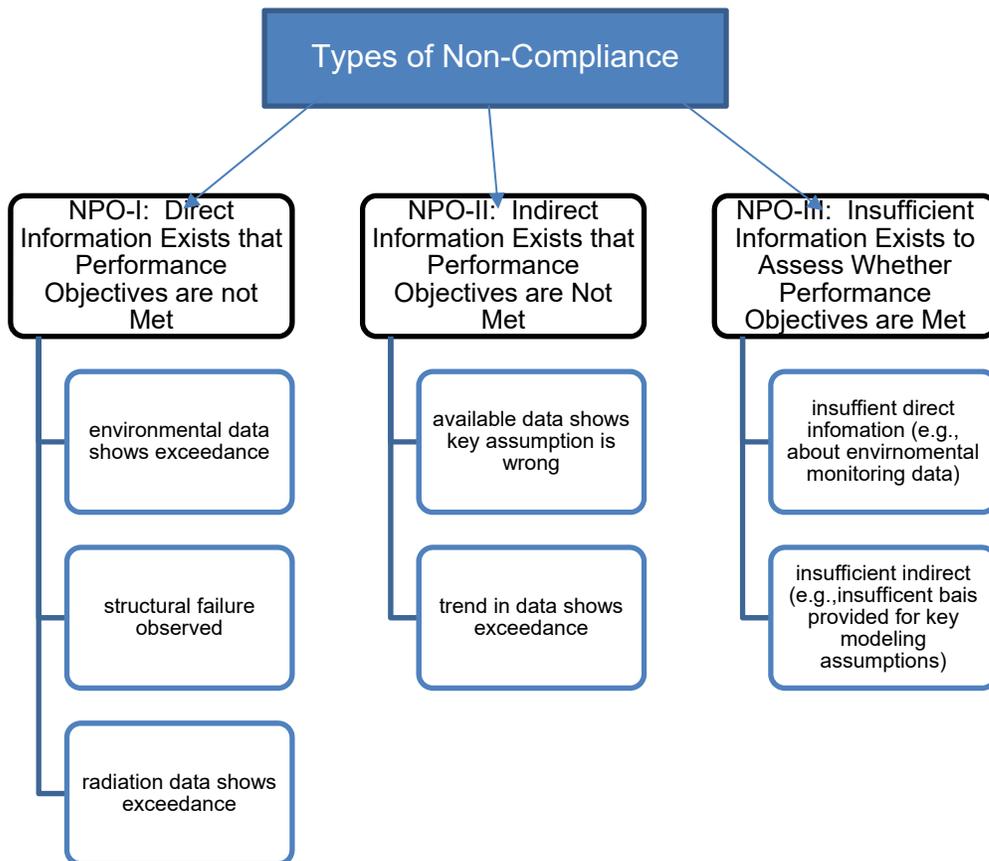
authority it has inferred from the statutory language in NDAA Section 3116(b). The NRC may issue the other two letters (i.e., Type-IV, Type-V) as an interim step.

The NRC expects to issue a Letter of Concern (i.e., Type-IV) to allow the DOE sufficient time to respond to the NRC concern before issuance of one of the three non-compliant notification letters (i.e., Type-I, Type-II, Type-III). However, that may not be possible or appropriate in all situations. For example, if a worker were overexposed in an accident (i.e., received greater than 5 rem exposure) and therefore, the NRC was going to issue a Type-I Letter of Non-Compliance, then the NRC may decide to send that Type-I notification letter to Congress, DOE, and the NDAA-Covered State, rather than first sending a Type-IV Letter of Concern to DOE and the NDAA-Covered State. The NRC would use other means of notification (e.g., telephone conferences, meetings) with both the DOE and the NDAA-Covered State before sending the Type-I Letter. Table A-2 describes each type of notification letter, including the NRC conclusion for issuing the letter, the NRC basis for issuing the letter, who at the NRC signs the letter, and who receives the letter. Figure A-2 provides a graphic of reasons for a Non-Compliance Letter.

**Table A-2: Types of Notification Letters**

Type	Notification	Signature	Distribution
<b>Non-Compliant Performance Objective (PO) Notification Letters</b>			
I	<p><u>Evidence PO Not Met:</u> The NRC concludes that direct evidence (e.g., environmental sampling data) exists that indicates the DOE disposal actions do not meet one or more POs in 10 CFR Part 61, Subpart C.</p> <p><u>Notification:</u> If the DOE cannot demonstrate that executed disposal actions currently meet the requirements specified in the PO, then the NRC will issue a Type-I Letter of Non-Compliance.</p>	The NRC Chairman	The DOE, NDAA-Covered State, and Congress
II	<p><u>Lack of Compliance Demonstration:</u> The NRC concludes that indirect evidence (e.g., data regarding key modeling assumptions) exists that indicates the DOE disposal actions do not meet one or more POs in 10 CFR Part 61, Subpart C.</p> <p><u>Notification:</u> If the DOE cannot adequately address the NRC technical concerns, then the NRC will issue a Type-II Letter of Non-Compliance.</p>	The NRC Chairman	The DOE, NDAA-Covered State, and Congress
III	<p><u>Insufficient Information:</u> The NRC concludes that insufficient information is available to assess whether the DOE disposal actions meet the POs in 10 CFR Part 61, Subpart C. It is not clear to the NRC that either the DOE: (i) has plans to, or (ii) is able to provide the information in a reasonable timeframe to allow the NRC to assess compliance.</p> <p><u>Notification:</u> If the DOE cannot adequately address the NRC technical concerns, then the NRC will issue a Type-III Letter of Non-Compliance.</p>	The NRC Chairman	The DOE, NDAA-Covered State, and Congress

Type	Notification	Signature	Distribution
"Other" Notification Letters			
IV	<p><u>Concern:</u> The NRC concludes that there are concerns with the DOE demonstration of meeting the POs in 10 CFR Part 61, Subpart C.</p> <p><u>Notification:</u> If the DOE cannot adequately address the NRC concerns, then the NRC will issue a Type-IV Letter of Concern.</p>	The NRC Management or the NRC Staff	The DOE and NDAA-Covered State
V	<p><u>Resolution:</u> The NRC concludes that the DOE has provided sufficient information to resolve the concerns in the Type-IV Letter of Concern regarding the DOE demonstration of meeting the POs in 10 CFR Part 61, Subpart C.</p> <p><u>Notification:</u> If the DOE adequately addresses the NRC concerns in a Type-IV Letter of Concern, then the NRC will issue a Type-V Letter of Resolution.</p>	The NRC Management or the NRC Staff	The DOE and NDAA-Covered State



**Figure A-2: Types of Non-Compliance**

#### **A.4 Monitoring At The INL INTEC TFF**

NDAA Section 3116(b) monitoring at the INL INTEC TFF began in November 2006. The NRC issued Revision 0 of the NRC Monitoring Plan for the INL INTEC TFF in April 2007 (ADAMS Accession No. ML070650222) and that is the monitoring plan that is currently still in use at the INL INTEC TFF. In 2014, the NRC closed Key Monitoring Area (KMA) 3 (Hydrological Uncertainties). The four KMAs that are open are: KMA 1 (Residual Waste Sampling), KMA 2 (Grout Formulation and Performance), KMA 4 (Monitoring During Operations), and KMA 5 (Engineered Surface Barrier/Infiltration Reduction).

The monitoring process that the NRC developed for Revision 0 of the NRC Monitoring Plan for the INL INTEC TFF continues to be used at the INL INTEC TFF. The NRC does not expect to revise the monitoring plan being used at the INL INTEC TFF based on the 2013 version of a monitoring plan because, after the DOE implements the new DOE process to clean out the last remaining INL INTEC TFF tanks, the NRC expects that closure of the INL INTEC TFF would proceed rapidly. However, the NRC expects to use the 2013 version of the monitoring process/monitoring plan at any other future NDAA INL location.

#### **A.5 Monitoring At The SRS SDF**

NDAA Section 3116(b) monitoring at the SRS SDF began in January 2006. The NRC issued Revision 0 of the NRC Monitoring Plan for the SRS SDF in May 2007 (ADAMS Accession No. ML070730363). The NRC issued Revision 1 of the NRC Monitoring Plan for the SRS SDF in September 2013 (ADAMS Accession No. ML13100A113), which is the monitoring plan that is currently in use at the SRS SDF, and that monitoring plan includes the 2013 version of a monitoring process/monitoring plan. The NRC issued the following supplements to the 2013 NRC Monitoring Plan for the SRS SDF:

- in the NRC letter dated June 5, 2017 (ADAMS Accession No. ML17097A351), the NRC closed MF 3.01, MF 3.02, and MF 3.04 under both POs §61.41 and §61.42;
- in the NRC letter dated March 1, 2018 (ADAMS Accession No. ML18033A071), the NRC clarified the number of monitoring factors in the 2013 SRS SDF Monitoring Plan and in the 2015 TFs Monitoring Plan, such that the total number of monitoring factors when the 2013 SDF Monitoring Plan was created was changed to 40;
- in the NRC letter dated June 29, 2018 (ADAMS Accession No. ML18107A161), the NRC opened the new MF 10.14 (Scenario Development and Defensibility) under both POs §61.41 and §61.42; and
- in the NRC letter dated October 16, 2018 (ADAMS Accession No. ML18219B035), the NRC opened the new MF 8.03 (Identification and Monitoring of Groundwater Plumes in the Z-Area) under POs §61.41, §61.42, and §61.43; and closed both MF 5.05 and MF 6.02 under both POs §61.41 and §61.42.

See below for the table of NRC staff's prioritization of SDF Monitoring Factors that was developed after the NRC/DOE Joint Plan (ADAMS Accession No. ML18235A068) was issued.

Monitoring Area 1 Inventory	Monitoring Area 2 Infiltration and Erosion Control	Monitoring Area 3 Waste Form Hydraulic Performance	Monitoring Area 4 Waste Form Physical Degradation	Monitoring Area 5 Waste Form Chemical Degradation	Monitoring Area 6 Disposal Structure Performance	Monitoring Area 7 Subsurface Transport	Monitoring Area 8 Environmental Monitoring	Monitoring Area 9 Site Stability	Monitoring Area 10 Performance Assessment Model Revisions	Monitoring Area 11 Radiation Protection Program
- 1.01 - Inventory in Disposal Structures §	- 2.01 - † Hydraulic Performance of Closure Cap ‡	- 3.01 - ± Hydraulic Conductivity of Field-Emplaced Saltstone	- 4.01 - Waste Form Matrix Degradation ±	- 5.01 - Radionuclide Release from Field-Emplaced Saltstone ±	- 6.01 - Certain Risk- Significant K <sub>d</sub> Values in Disposal Structure Concrete ‡	- 7.01 - Certain Risk- Significant K <sub>d</sub> Values in Site Sand and Clay ‡	- 8.01 - Leak Detection §	- 9.01 - Settlement Due to Increased Overburden ‡	- 10.01 - Implementation of Conceptual Models ± - 10.02 - Defensibility of Conceptual Models ±	- 11.01 - Dose to Individuals During Operations §
- 1.02 - Methods Used to Assess Inventory ‡	- 2.02 - Erosion Control of the SDF Engineered Surface Cover and Adjacent Area †	- 3.02 - ± Variability of Field-Emplaced Saltstone	- 4.02 - Waste Form Macroscopic Fracturing ±	- 5.02 - ± Chemical Reduction of Tc by Saltstone ‡	- 6.02 - ± Tc Sorption in Disposal Structure Concrete		- 8.02 - Groundwater Monitoring §	- 9.02 - Settlement Due to Dissolution of Calcareous Sediment ‡	- 10.03 - Diffusivity in Degraded Saltstone ‡ - 10.04 - K <sub>d</sub> Values for Saltstone †	- 11.02 - Air Monitoring
		- 3.03 - Applicability of Laboratory Data to Field-Emplaced Saltstone ± - 3.04 - ± Effect of Curing Temperature on Saltstone Hydraulic Properties		- 5.03 - ‡ Reducing Capacity of Saltstone †	- 6.03 - Performance of Disposal Structure Roofs and HDPE/GCL Layers ‡		- 8.03 - Identification and Monitoring of Groundwater Plumes in the Z Area ± *		- 10.05 - Moisture Characteristic Curves † - 10.06 - K <sub>d</sub> Values for Disposal Structure Concrete † - 10.07 - Calculation of Build-Up in Biosphere Soil † - 10.08 - Consumption Factors and Uncertainty Distributions for Transfer Factors ‡ - 10.09 - K <sub>d</sub> Values for SRS Soil † - 10.10 - Far-Field Model Calibration ‡ - 10.11 - Far-Field Model Source Loading Approach ‡ - 10.12 - Far-Field Model Dispersion ‡ - 10.13 - Impact of Calcareous Zones on Contaminant Flow and Transport † - 10.14 - Scenario Development and Defensibility ‡ *	
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <div style="display: flex; justify-content: space-between;"> <span>Original status and priority</span> <span>Current status and priority</span> </div> </div>										
§ Periodic monitoring factors (i.e., monitoring factors related to data that NRC staff expects to review periodically)										
† Low priority										
‡ Medium priority										
± High priority										
Closed										
* Added since 2013 (background color depends on priority)										

## **A.6 Monitoring At The SRS TFs**

NDAA Section 3116(b) monitoring at the SRS FTF began in March 2012. The NRC issued Revision 0 of the NRC Monitoring Plan for the SRS FTF in January 2013 (ADAMS Accession No. ML12212A192). NDAA Section 3116(b) monitoring at the SRS HTF began in December 2014. The NRC issued Revision 0 of the NRC Monitoring Plan for the SRS TFs (i.e., covering both FTF and HTF) in October 2015 (ADAMS Accession No. ML15238A761), which is the monitoring plan that is currently in use at the SRS TFs, and that monitoring plan includes the 2013 version of a monitoring process/monitoring plan.

The NRC issued the following supplement to the 2013 NRC Monitoring Plan for the SRS TFs:

- in the NRC letter dated March 1, 2018 (ADAMS Accession No. ML18033A071), the NRC clarified the number of monitoring factors in the 2013 SRS SDF Monitoring Plan and in the 2015 TFs Monitoring Plan, such that the total number of monitoring factors when the 2015 TFs Monitoring Plan was created did not change and was still 26.

In the SRS TFs Monitoring Plan, Rev. 0 (ADAMS Accession No. ML15238A761), the NRC staff prioritized the monitoring factors that supported MA 1 (Inventory), MA 2 (Waste Release), MA 3 (Cementous Material Performance), MA 4 (Natural System Performance), and MA 5 (Closure Cap) (see table below).

The NRC staff did not prioritize the monitoring factors for MA 6 (Performance Assessment Maintenance) because those activities were considered to be of lower risk significance or longer-term monitoring activities. The NRC staff did not prioritize the monitoring factors for MA 7 (Protection Of Individuals During Operations) because the activities those activities were considered to be of a routine nature of low risk significance. The NRC staff did not prioritize the monitoring factors for MA 8 (Site Stability).

**Table ES-2. NRC Prioritization of Monitoring Factors That Support 10 CFR 61.41 and 61.42**

MA 1 Inventory	MA 2 Waste Release	MA 3 Cementitious Material Performance	MA 4 Natural System Performance	MA 5 Closure Cap
1.1— Final Inventory and Risk Estimates <sup>†</sup>	2.1— Solubility-Limiting Phases/Limits and Validation <sup>†</sup>	3.1— Hydraulic Performance of Concrete Vault and Annulus (As it Relates to Steel Liner Corrosion and Waste Release) <sup>‡</sup>	4.1— Natural Attenuation of Key Radionuclides <sup>†</sup>	5.1— Long-Term Hydraulic Performance <sup>§</sup>
1.2— Residual Waste Sampling <sup>†</sup>	2.2— Chemical Transition Times <sup>‡,  </sup>	3.2— Groundwater Conditioning via Reducing Grout <sup>‡,  </sup>	4.2— Calcareous Zone Characterization <sup>†</sup>	5.2— Long-Term Erosion Protection Design <sup>§</sup>
1.3— Residual Waste Volume <sup>†</sup>		3.3— Shrinkage and Cracking of Reducing Grout <sup>†</sup>	4.3— Environmental Monitoring <sup>*</sup>	5.3— Closure Cap Functions That Maintain Doses ALARA <sup>§</sup>
1.4— Ancillary Equipment Inventory <sup>§</sup>		3.4— Grout Performance <sup>†</sup>		
1.5— Waste Removal (As It Impacts ALARA) <sup>§</sup>		3.5— Vault and Annulus Sorption <sup>‡</sup>		
		3.6— Waste Stabilization (As It Impacts ALARA) <sup>§</sup>		

<sup>||</sup>In the FTF PA, certain HRRs such as technetium and plutonium, which are initially assumed to be in a low solubility state, are eventually assumed to be released at risk-significant solubilities that could exceed the performance objectives over long periods of time. Therefore, chemical transition times to a higher solubility, which are related to the extent of groundwater conditioning afforded by the reducing grout, are important to the compliance demonstration in the FTF PA. In contrast, chemical transitions to a higher, risk-significant solubility only occur in alternative cases in the HTF PA. Therefore, chemical transition times are less important to DOE's compliance demonstration in the HTF PA.

NRC = U.S. Nuclear Regulatory Commission, MA = Monitoring Areas, ALARA = As Low As Is Reasonably Achievable, DOE = U.S. Department of Energy, FTF = F-Area Tank Farm, PA = Performance Assessment, HRRs = Highly Radioactive Radionuclides, HTF = H-Area Tank Farm

<sup>§</sup>Lower Priority

<sup>†</sup>Medium Priority

<sup>†</sup>High Priority Recommended

<sup>‡</sup>High Priority Dependent or More Difficult (*The monitoring factors in orange<sup>‡</sup> are risk significant to the DOE performance assessment, but the need for their implementation may be dependent on results of other monitoring factors. Because the monitoring factors in orange<sup>‡</sup> are also expected to be more difficult to study or support, work on monitoring factors in red<sup>†</sup> are recommended first.*)

## **APPENDIX B: SUMMARY OF NDAA SECTION 3116(a) CONSULTATION MAJOR ACTIVITIES**

Under Section 3116(a) of the Ronald W. Reagan National Defense Authorization Act for Fiscal Year 2005 (NDAA), the U.S. Department of Energy (DOE) consultation with the U.S. Nuclear Regulatory Commission (NRC), the DOE will identify specific inventories of radioactive waste and associated facilities and equipment (e.g., tanks, piping, disposal structures) that are candidates for non-High-Level Waste (HLW) determinations along with the reasoning why it could be considered Waste Incidental to Reprocessing (WIR) (i.e., can be managed as low-level waste) because it meets the NDAA Section 3116(a) criteria. For example, the subject of the DOE Secretary determination may be: (1) residual radioactive waste remaining in a HLW storage tank; or (2) disposal structures built to retain the processed concrete-like material containing leftover waste.

The DOE and the NRC used the following process for the DOE consultation with the NRC under NDAA Section 3116(a) for each specific DOE location:

- (1) the DOE prepares and submits to the NRC the draft Basis for Waste Determination (WD), which describes the DOE analysis to determine whether a particular type of waste meets the NDAA Section 3116(a) criteria, along with the associated performance assessment (PA), which predicts long-term disposal location performance and other associated other documentation;
- (2) the NRC reviews the DOE provided information, including assumptions and parameters in the DOE draft Basis for WD, PA, and associated other documentation;
- (3) *as needed*: the NRC uses an interactive process with the DOE (e.g., meetings, telephone calls, documents), where the NRC asks questions of the DOE, provides comments to the DOE, or requests additional information from the DOE and then the DOE may respond to the NRC with information in response;
- (4) the NRC issues a Technical Evaluation Report (TER), which documents the NRC evaluation of all the DOE provided information using NRC-initiated analysis, against the NDAA Section 3116(a) criteria;
- (5) *optional*: the DOE updates the draft Basis for WD, perhaps with information from the NRC TER; and provides to the DOE Secretary the following two documents:
  - (i) Determination document for the DOE Secretary to sign, indicating whether or not the waste meets the NDAA Section 3116(a) criteria, and (ii) updated Basis for WD; and
- (6) *optional*: the DOE Secretary either decides that the NDAA Section 3116(a) criteria have not been met (i.e., waste is not WIR) or decides that the NDAA Section 3116(a) criteria have been met (i.e., waste is WIR), and then the DOE issues the DOE Secretary signed Final Determination document and DOE Final Basis for WD.

If the DOE Secretary signs the Final Determination document with the non-HLW determination that the waste is WIR, then:

- (1) NDAA Section 3116(a) DOE consultation with the NRC ends; and
- (2) NDAA Section 3116(b) NRC monitoring, in coordination with the NDAA-Covered State, of the DOE disposal actions for the purpose of assessing compliance with the 10 CFR Part 61, Subpart C Performance Objectives (POs) begins.

The NRC documented its NDAA Section 3116(a) reviews in the following TERs:

- DOE Savannah River Site (SRS) Saltstone Disposal Facility (SDF) in South Carolina (SC) – December 2005 – NRC TER, Rev. 0 (ADAMS Accession No. ML053010225);
- DOE Idaho National Laboratory (INL) Idaho Nuclear Technology and Engineering Center Tank Farm Facility (INTEC TFF) in Idaho (ID) – October 2006 – NRC TER, Rev. 0 (ADAMS Accession No. ML062490142);
- DOE SRS F-Tank Farm (FTF) in SC – October 2011 – NRC TER, Rev. 0 (ADAMS Accession No. ML112371715); and
- DOE SRS H-Tank Farm (HTF) in SC – June 2014 – NRC TER, Rev. 0 (ADAMS Accession No. ML14094A514).

As of December 31, 2018, in all four NDAA Section 3116(a) DOE consultations with the NRC, the DOE Secretary made the non-HLW Final Determination that the waste was WIR (i.e., could be managed as low-level waste):

- DOE SRS SDF in SC – January 2006 – Final Determination (ADAMS Accession No. ML17136A069) with Basis (ADAMS Accession No. ML102850319);
- DOE INL INTEC TFF in ID – November 2006 – Final Determination (ADAMS Accession No. ML17136A118) with Basis (ADAMS Accession No. ML14317A056);
- DOE SRS FTF in SC – March 2012 – Final Determination (ADAMS Accession No. ML121140043) with Basis (ADAMS Accession No. ML121140051); and
- DOE SRS HTF in SC – December 2014 – Final Determination (ADAMS Accession No. ML17136A091) with Basis (ADAMS Accession No. ML15051A353).

## **APPENDIX C: SUMMARY OF NDAA SECTION 3116(b) MONITORING MAJOR ACTIVITIES**

Under Section 3116(b) of the Ronald W. Reagan National Defense Authorization Act for Fiscal Year 2005 (NDAA), the U.S. Nuclear Regulatory Commission (NRC), in coordination with the NDAA-Covered State monitors the U.S. Department of Energy (DOE) disposal actions to assess compliance with the NRC regulations in Title 10 of the *Code of Federal Regulations* (10 CFR) Part 61, "Licensing Requirements for Land Disposal of Radioactive Waste," Subpart C, "Performance Objectives (POs)." The NDAA-Covered States are currently Idaho (ID) and South Carolina (SC).

For each specific DOE location, if the DOE issues a DOE Secretary signed Final Determination document and associated DOE Final Basis for Waste Determination indicating that the NDAA Section 3116(a) criteria have been met (i.e., waste is Waste Incidental to Reprocessing (WIR)) then:

- (1) the NRC, in coordination with the NDAA-Covered State, begins monitoring the DOE disposal actions, which will continue in perpetuity;
- (2) the NRC, in coordination with the NDAA-Covered State, develops the initial NRC monitoring plan;
- (3) the NRC issues the initial NRC monitoring plan;
- (4) the NRC follows the current NRC monitoring plan as well as any supplements to that NRC monitoring plan;
- (5) *as needed*: the NRC expects to issue supplements to the NRC monitoring plan; and
- (6) the NRC expects to issue a revised monitoring plan after the following occurs:
  - (a) the DOE issues a new performance assessment (PA);
  - (b) the NRC reviews that revised DOE PA (and related documentation); and
  - (c) the NRC issues a revised Technical Evaluation Report (TER), which may include the NRC assessment of the DOE compliance with the POs

As of December 31, 2018, the following are the major high-level NRC and DOE documents related to NDAA Section 3116(b) monitoring:

- For the DOE Idaho National Laboratory (INL) Idaho Nuclear Technology and Engineering Center Tank Farm Facility (INTEC TFF) in ID:
  - April 2007 – Initial NRC Monitoring Plan, Rev. 0 (ADAMS Accession No. ML070650222); and
  - June 2014 – NRC Letter to the DOE that supplemented the NRC Monitoring Plan by closing Key Monitoring Area 3 (Hydrological Uncertainty) (ADAMS Accession No. ML14149A337).

- For the DOE Savannah River Site (SRS) Saltstone Disposal Facility (SDF) in SC:
  - May 2007 – Initial NRC Monitoring Plan, Rev. 0 (ADAMS Accession No. ML070730363);
  - October 2009 – Revised DOE PA (ADAMS Accession No. ML101590008);
  - April 2012 – Revised NRC TER, Rev. 1 (ADAMS Accession No. ML121020140);
  - April 2012 – NRC Type-IV Letter of Concern to the DOE and SCDHEC (ADAMS Accession No. ML120650576);
  - September 2013 – Revised NRC Monitoring Plan, Rev. 1 (ADAMS Accession No. ML13100A113);
  - June 2017 – NRC Letter to the DOE that supplemented the NRC Monitoring Plan by closing Monitoring Factor (MF) 3.01, MF 3.02, and MF 3.04 (ADAMS Accession No. ML17097A351);
  - March 2018 – NRC Letter to the DOE that supplemented the NRC Monitoring Plan by clarifying the number of monitoring factors (ADAMS Accession No. ML18033A071);
  - June 2018 – NRC Letter to the DOE that supplemented the NRC Monitoring Plan by opening MF 10.14 (ADAMS Accession No. ML18107A161);
  - October 2018 – NRC Letter to the DOE that supplemented the NRC Monitoring Plan by: (1) closing both MF 5.05 and MF 6.02, (2) adding MF 8.03; and (3) modifying both MF 8.01 and MF 8.02 (ADAMS Accession No. ML18219B035); and
  - October 2018 – Initial NRC Letter to the DOE with NRC/DOE Joint Plan, Rev. 0 to Resolve the NRC Type-IV Letter of Concern (ADAMS Accession No. ML18235A068).
  
- For the DOE SRS Tank Farms (TFs) in SC:
  - January 2013 – Initial NRC Monitoring Plan for the SRS F-Tank Farm (FTF), Rev. 0 (ADAMS Accession No. ML12212A192);
  - October 2015 – Initial NRC Monitoring Plan for the TFs (i.e., both FTF and H-Tank Farm), Rev. 0 (ADAMS Accession No. ML15238A761); and
  - March 2018 – NRC Letter to the DOE that supplemented the NRC Monitoring Plan by clarifying the number of monitoring factors (ADAMS Accession No. ML18033A071).