



Fifth Five-Year Remedy Review Report for Savannah River Site Operable Units with Geosynthetic or Stabilization/Solidification Cover Systems (U)

Aiken, South Carolina

SRNS-RP-2016-00610

Redline Revision 1.1

August December 2017

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**Prepared for
U.S. Department of Energy
and
Savannah River Nuclear Solutions, LLC
Aiken, South Carolina**

**Fifth Five-Year Remedy Review Report for SRS OUs
with Geosynthetic or S/S Cover Systems (U)
Savannah River Site
~~August~~December 2017**

**SRNS-RP-2016-00610
Redline Rev. 1.1**

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**Fifth Five-Year Remedy Review Report for SRS OUs
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EXECUTIVE SUMMARY

This document presents the results of a technical evaluation of fifteen environmental remedies that implemented geosynthetic or stabilization/solidification cover systems at Savannah River Site (SRS). The remedies are evaluated to determine whether they are functioning as designed and whether they are protective of human health and the environment. This evaluation is required under Section 121 of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986. CERCLA requires that remedial actions that result in any hazardous substances, pollutants, or contaminants remaining at the site be subject to a remedy review every five years.

Previous five-year remedy review reports combined all SRS operable units (OUs) that had implemented a remedial action into a single document. A recommendation was made by SRS in the Fourth Five-Year Remedy Review Report that future reviews should be conducted in phases based on OU groupings with similar remedies. This phased approach not only reduces the volume of future remedy reports, but also is more effective in identifying and resolving issues for similar remedies. For this reason, the Fifth Five-Year Remedy Review Report will be conducted in five phases with OUs grouped by the following remedy types: (1) native soil covers and/or land use controls; (2) groundwater; (3) engineered cover systems; (4) geosynthetic or stabilization/solidification systems; and (5) operating equipment. This report presents the fourth phased review for fifteen SRS OUs that selected geosynthetic or stabilization/solidification cover systems as the final remedy.

According to the data reviewed and the site inspections, the fifteen remedies evaluated in this report are functioning as intended. The exposure assumptions, toxicity data, cleanup levels, and remedial action objectives used at the time of remedy selection are still valid. No new information has come to light that calls into question the protectiveness of any of the remedies evaluated. The fifteen remedies have been determined to be protective of human health and the environment.

This report presents the issues and recommendations that have resulted from the remedy review. SRS identified the following recommendation:

- SRS recommends redeveloping the BMW wells at B-Area OU prior to the next sampling event in order to decrease the turbidity in the wells and provide more accurate groundwater measurements, followed by filtering of samples and speciation as needed for radionuclides.
 - SRS recommends reevaluation of the installation and maintenance activities for stormwater runoff covers for the E-Area Low-Level Waste Facility (LLWF). Interim stormwater runoff covers at the E-Area LLWF slit trench disposal units are showing signs of wear that are likely to result in higher than anticipated maintenance costs and installation modifications for new covers in the future. Continued discussion with U.S. Environmental Protection Agency (USEPA) and South Carolina Department of Health and Environmental Control (SCDHEC) of how these activities impact future covers is needed.
 - SRS recommends reducing the analyte list for P-Area OU (PAOU) to radionuclides that have the fastest travel times as predicted by the model (i.e., carbon-14, chlorine-36, technetium-99). An evaluation of the contaminant migration constituents of concern (CMCOCs) that were included as part of the groundwater monitoring to verify the effectiveness of the in situ decommissioning remedy was conducted. Ten radionuclides and lead are identified as CMCOCs. However, none of these radionuclides are predicted to impact groundwater before the year 2230, and many are not predicted to impact groundwater over 1,000 years. Many of the radionuclides require specialized analytical methods. All results from the first quarter 2012 sampling event were non-detect. The change to the monitoring strategy will be documented in an addendum to the PAOU Effectiveness Monitoring Plan.
 - SRS recommends that Appendix A of the SRS Federal Facility Agreement (FFA) Annual Progress Report be revised to include the E-Area LLWF and F-Area Tank Farm OUs to demonstrate long term protectiveness through the SRS facility security and administrative controls. The report is required by the FFA and includes an annual certification by the U.S. Department of Energy SRS Site Manager that the listed OUs are in compliance with land use requirements.
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Five-Year Review Summary Form

SITE IDENTIFICATION		
Site Name: Savannah River Site		
EPA ID: SC1890008989		
Region: 4	State: SC	City/County: Aiken/Aiken
SITE STATUS		
NPL Status: Final		
Multiple OUs?: Yes	Has the Site achieved Construction Completion?: No	
REVIEW STATUS		
Lead Agency: Other Federal Agency If "Other Federal Agency" was selected above, enter Agency Name: U.S. Department of Energy		
Author Name (Federal or State Project Manager): N/A		
Author Affiliation: Savannah River Nuclear Solutions, LLC		
Review Period: May 1, 2016 – January 21, 2018 (Phase 4: SRS OUs with Geosynthetic or Stabilization/Solidification Cover Systems)		
Date of Site Inspections: August 2016 - November 2016 (Phase 4: SRS OUs with Geosynthetic or Stabilization/Solidification Cover Systems)		
Type of Review: Statutory		
Review Number: 5		
Triggering Action Date: January 21, 2014		
Due Date (Five Years after Triggering Action Date): January 21, 2019 (includes all 5 Phases)		
ISSUES/RECOMMENDATIONS		
OU(s) without Issues/Recommendations Identified in the Five-Year Review		
CERCLIS #: 16, 17, 23 , 32, 43, 55, 60, 65, 66, 67, 96		
Issues and Recommendations Identified in the Five-Year Review		
<u>OU(s):</u> 23	<u>Issue Category:</u> Reporting	
	<u>Issue:</u> Unit specific LUCs for the F-Area Tank Farm (FTF) OU (Waste Tanks 5, 6, 7, 17, 18, 19, and 20) have been deferred until final closure of the entire FTF OU. SRS facility security and administrative controls that restrict unauthorized access to the FTF OU were not previously recognized as part of the interim remedy. Therefore, the interim remedy was not considered as long-term protective.	
	<u>Recommendation:</u> Revise the FFA Annual Progress Report to include the FTF OU (Waste Tanks 5, 6, 7, 17, 18, 19, and 20) to recognize SRS facility security and administrative controls that restrict access as long-term protective. The USDOE Savannah River Site Manager will certify USDOE compliance with these controls.	

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Five-Year Review Summary Form (continued)

ISSUES/RECOMMENDATIONS				
Issues and Recommendations Identified in the Five-Year Review				
<u>Affect Current Protectiveness</u>	<u>Affect Future Protectiveness</u>	<u>Implementing Party</u>	<u>Oversight Party</u>	<u>Milestone Date</u>
No	No	Federal Facility	USEPA/SCDHEC	September 2018
OU(s): 48	Issue Category: Monitoring			
	Issue: Elevated gross alpha concentrations were detected in the BMW groundwater wells at the B-Area OU likely due to turbidity issues.			
	Recommendation: Redevelop the BMW wells prior to the next sampling event to reduce turbidity, followed by filtering the samples and speciation, as needed, for radionuclides.			
<u>Affect Current Protectiveness</u>	<u>Affect Future Protectiveness</u>	<u>Implementing Party</u>	<u>Oversight Party</u>	<u>Milestone Date</u>
No	No	Federal Facility	USEPA/SCDHEC	Third Quarter of 2021
OU(s): 86	Issue Category: Monitoring			
	Issue: Interim stormwater runoff covers at the E-Area LLWF slit trench disposal units are showing signs of wear that are likely to result in higher than anticipated maintenance costs and installation modifications for new covers in the future.			
	Recommendation: Reevaluate the installation and maintenance activities for stormwater runoff covers. Further discussion of how these issues impact future covers is needed with USEPA/SCDHEC.			
<u>Affect Current Protectiveness</u>	<u>Affect Future Protectiveness</u>	<u>Implementing Party</u>	<u>Oversight Party</u>	<u>Milestone Date</u>
No	No	Federal Facility	USEPA/SCDHEC	N/A
OU(s): 86	Issue Category: Reporting			
	Issue: Unit specific LUCs for the E-Area LLWF (Slit Trench Disposal Units 1-5) have been deferred until final closure of the entire E-Area LLWF. SRS facility security and administrative controls that restrict unauthorized access to the E-Area LLWF were not previously recognized as part of the interim remedy. Therefore, the interim remedy was not considered as long-term protective.			
	Recommendation: Revise the FFA Annual Progress Report to include the E-Area LLWF (Slit Trench Disposal Units 1-5) to recognize SRS facility security and administrative controls that restrict access as long-term protective. The USDOE Savannah River Site Manager will certify USDOE compliance with these controls.			
<u>Affect Current Protectiveness</u>	<u>Affect Future Protectiveness</u>	<u>Implementing Party</u>	<u>Oversight Party</u>	<u>Milestone Date</u>
No	No	Federal Facility	USEPA/SCDHEC	September 2018

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Five-Year Review Summary Form (continued)

Issues and Recommendations Identified in the Five-Year Review				
OU(s): 94	Issue Category: Monitoring			
	Issue: Ten radionuclides identified as CMCOCs for the P-Area OU are not predicted to impact groundwater before the year 2230. Many of these radionuclides require specialized analytical methods.			
	Recommendation: Reduce analyte list to radionuclides that have the fastest travel times as predicted by the groundwater model (i.e., carbon-14, chlorine-36, technetium-99).			
Affect Current Protectiveness	Affect Future Protectiveness	Implementing Party	Oversight Party	Milestone Date
No	No	Federal Facility	USEPA/SCDHEC	September 2018
PROTECTIVENESS STATEMENT(S)				
Operable Unit: B-Area Operable Unit (BAOU), CERCLIS #48		Protectiveness Determination: Protective		Addendum Due Date (if applicable): N/A
Protectiveness Statement: The remedy at the BAOU is protective of human health and the environment.				
Operable Unit: C-Area Reactor Seepage Basins (CRSB) (904-66G and 904-68G) OU, CERCLIS #60		Protectiveness Determination: Protective		Addendum Due Date (if applicable): N/A
Protectiveness Statement: The remedy at the CRSB OU is protective of human health and the environment.				
Operable Unit: D-Area Expanded Operable Unit (DEXOU) [Consisting of D-Area Ash Basin (488-D) and D-Area Rubble Pit (431-2D)], CERCLIS #67		Protectiveness Determination: Protective		Addendum Due Date (if applicable): N/A
Protectiveness Statement: The remedy at the DEXOU is protective of human health and the environment.				
Operable Unit: E-Area Low-Level Waste Facility (LLWF) (643-26E), CERCLIS #86		Protectiveness Determination: <u>Short-term</u> Protective		Addendum Due Date (if applicable): N/A
Protectiveness Statement: The remedy at the E-Area LLWF is protective of human health and the environment.				
Operable Unit: F-Area Retention Basin (FRB) (281-3F) OU, CERCLIS #23		Protectiveness Determination: Protective		Addendum Due Date (if applicable): N/A
Protectiveness Statement: The remedy at the FRB OU is protective of human health and the environment.				

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Five-Year Review Summary Form (continued/end)

PROTECTIVENESS STATEMENT(S)		
Operable Unit: F-Area Tank Farms (FTF) OU, CERCLIS #23	Protectiveness Determination: Short-term Protective	Addendum Due Date (if applicable): N/A
Protectiveness Statement: The remedy at the FTF OU (Waste Tanks 5, 6, 17, 18, 19, and 20) is protective of human health and the environment.		
Operable Unit: General Separations Area Consolidation Unit (GSACU) [Including Old Radioactive Waste Burial Ground (ORWBG) (643-E) and Old Solvent Tanks (OST) (650-1E through 650-22E)], CERCLIS #32	Protectiveness Determination: Protective	Addendum Due Date (if applicable): N/A
Protectiveness Statement: The remedy at the GSACU is protective of human health and the environment.		
Operable Unit: K-Area Reactor Seepage Basin (KRSB) OU (904-65G), CERCLIS #55	Protectiveness Determination: Protective	Addendum Due Date (if applicable): N/A
Protectiveness Statement: The remedy at the KRSB OU is protective of human health and the environment.		
Operable Unit: L-Area Oil And Chemical Basin (LAOCB) OU (904-83G and 904-79G), CERCLIS #17	Protectiveness Determination: Protective	Addendum Due Date (if applicable): N/A
Protectiveness Statement: The remedy at the LAOCB OU is protective of human health and the environment.		
Operable Unit: L-Area and C-Area Reactor Seepage Basins (LRSB and CRSB) OU (904-64G and 904-67G), CERCLIS #65, 60	Protectiveness Determination: Protective	Addendum Due Date (if applicable): N/A
Protectiveness Statement: The remedy at the LRSB and CRSB OU is protective of human health and the environment.		
Operable Unit: Old F-Area Seepage Basin (OFASB) OU (904-49G), CERCLIS #16	Protectiveness Determination: Protective	Addendum Due Date (if applicable): N/A
Protectiveness Statement: The remedy at the OFASB OU is protective of human health and the environment.		
Operable Unit: P-Area Operable Unit (PAOU), CERCLIS #94	Protectiveness Determination: Protective	Addendum Due Date (if applicable): N/A
Protectiveness Statement: The remedy at the PAOU is protective of human health and the environment.		

dates for the Fifth Five-Year Remedy Review Report during the transitional period will occur over a four-year period (2016 to 2019). The first five-year phased report for native soil covers and/or LUCs was issued in 2015 (SRNS 2015a). The second five-year phased report for groundwater remedial actions was issued in 2017 (SRNS 2015b). A more detailed discussion of the phased reviews and transition schedule are provided in Appendix A.

This report documents the Fifth Five-Year Remedy Review for the fourth grouping of OUs with geosynthetic or S/S cover systems selected as the remedy and includes a review of fifteen remedy decision documents for sixteen USEPA Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS) units at the SRS. CERCLIS is a database maintained by the USEPA as part of the Superfund program that assigns a unique tracking number to hazardous waste sites considered for cleanup under CERCLA. Remedy decision documents may include more than one CERCLIS unit and/or SRS OU. For this remedy review, the sixteen CERCLIS units are equivalent to the fifteen remedy decision documents reviewed.

The SRS OUs evaluated in this document were grouped together because of similar remedies. Table 1 identifies the OU name, CERCLIS number, remedial action(s), and issuance date of the remedy decision document for each of the OUs reviewed in this document. The issuance date represents the date the public was notified that the signed remedy decision document was available. Figure 1 identifies the location of the SRS OUs evaluated in this document. The data evaluation and visual inspections for the SRS OUs with geosynthetic or S/S cover system remedies were conducted from August 2016 through November 2016.

This report was prepared using the Comprehensive Five-Year Review Guidance (USEPA 2001) and is supplemented by the Recommended Evaluation of Institutional Controls: Supplement to the “Comprehensive Five-Year Review Guidance” (USEPA 2011a) and Clarifying the Use of Protectiveness Determinations for Comprehensive Environmental Response, Compensation, and Liability Act Five-Year Reviews (USEPA 2012). The updated USEPA 5-Year Review Summary Form was

implemented (USEPA 2011b). This report summarizes common elements for the entire SRS. The fifteen remedy reviews are included as Appendix C through Appendix Q.

II. SITE CHRONOLOGY

The National Resources Defense Council (NRDC) Consent Decree (Civil Action No. 1:85-2583-6) was an agreement between the NRDC and other interested parties, SCDHEC, and USDOE to amend Parts A and B of the Resource Conservation and Recovery Act (RCRA) Permit Application to include the Metallurgical Laboratory Basin (904-11G) and associated Carolina Bay, the Acid/Caustic Basin (904-74G, 904-75G, 904-78G, and 904-80G), and the Mixed Waste Management Facility (904-28G) to include closure, groundwater monitoring and post-closure activities. The Savannah River Laboratory Seepage Basins (904-53G, 904-54G, and 904-55G) and New TNX Basin (904-120G) were also included in the Consent Decree for closure in a RCRA-like manner. The Consent Decree was signed on May 26, ~~1998~~1988. On December 21, 1989, SRS was included on the National Priorities List (NPL). The inclusion created a need to integrate the established RCRA Facility Investigation program with CERCLA requirements to provide for a focused environmental program. In accordance with Section 120 of CERCLA 42 United States Code Section 9620, the USDOE has negotiated a Federal Facility Agreement (FFA) (FFA 1993) with the USEPA and the SCDHEC to coordinate remedial activities at SRS into one comprehensive program which fulfills these dual regulatory requirements. USDOE functions as the lead agency for remedial activities at SRS, with concurrence by the USEPA-Region 4 and the SCDHEC.

A chronology of site events including the effective dates for the Consent Decree, the FFA, and the NPL Listing is provided in Appendix A. Table 1 provides a chronology of the decision documents for the SRS OUs with geosynthetic or S/S cover systems evaluated in this report. Chronologies of significant activities and regulatory milestones for individual OUs are included in the site specific remedy review reports (Appendix C through Appendix Q).

- Contaminated material has been excavated and consolidated or left in place under protective cover systems breaking the pathway for worker exposure and for the migration of contaminants to groundwater.
- The cover system maintenance program and LUCs have been effective in maintaining the integrity of the cover systems at SRS OUs. The inspection reports indicate no significant deficiencies.

Question B: Are the exposure assumptions, toxicity data, cleanup levels, and RAOs still valid?

The exposure assumptions, toxicity data, cleanup levels, and RAOs used at the time of remedy selection are still valid for all of the OUs included in this report. An evaluation of changes in chemical and radiological standards that were in place when the last five-year remedy review was initiated in 2012 to the standards applicable in 2016 was conducted to determine if there were any changes that would affect the protectiveness of the selected remedies. There were no changes in chemical and radiological specific standards that would affect the protectiveness of the remedies. There were no changes in action-specific or location-specific requirements that would impact any remedy. This evaluation is included in Appendix B and described in the OU-specific appendices.

Question C: Has any other information come to light that could call into question the protectiveness of the remedy?

No other information that could call into question the protectiveness of the selected remedies and no outstanding issues have been identified in this Fifth Five-Year Remedy Review. For all OUs, land use at SRS remains consistent with assumptions in the respective decision documents.

Technical Evaluation Summary

According to the data reviewed, the site inspections, and interviews, the remedies selected for the SRS OUs included in this report are functioning as intended by the decision documents. The exposure assumptions, toxicity data, cleanup levels, and RAOs used at the time of remedy selection are still valid for all of the OUs included in this report. No

new information has come to light that calls into question the protectiveness of the remedies.

VIII. ISSUES

Remedial actions evaluated in this Five-Year Remedy Review for SRS remain protective of human health and the environment and are functioning as intended.

Although the stormwater runoff covers at the E-Area LLWF continue to be protective, maintenance of the cover system continues to be problematic. Subsidence beneath the stormwater runoff covers at Slit Trench Disposal Units 4 and 5 and water pooling in these locations has been observed. During wind events, the covers have been observed to lift substantially, resulting in mechanical stresses to the cover materials. Subsidence and weathering of the stormwater runoff covers is anticipated to result in significant repairs, and the covers are not expected to meet the original project life of 25 years.

The E-Area LLWF and FTF OUs are currently in the operational phase and OU-specific LUCs have been deferred until final closure of the entire facilities. SRS facility security and administrative controls that restrict unauthorized access to the E-Area LLWF and FTF OUs are not part of the interim remedies and therefore not recognized as long-term protective.

IX. RECOMMENDATIONS AND FOLLOW-UP ACTIONS

SRS recommends redeveloping the BMW wells at B-Area OU prior to the next sampling event in order to decrease the turbidity in the wells and provide more accurate groundwater measurements, followed by filtering of samples and speciation as needed for radionuclides.

SRS recommends that the installation and maintenance activities for stormwater runoff covers at the E-Area LLWF be reevaluated because the current geosynthetic covers are not expected to meet the original project life of 25 years and high maintenance and replacement costs are anticipated. The USDOE recommends that discussions continue with the USEPA and SCDHEC on the type of cover system needed for future slit trench disposal units. No

new slit trench disposal units have been operationally closed since issuance of the previous five-year remedy review report (SRNS 2014).

SRS recommends reducing the analyte list for P-Area OU (PAOU) to radionuclides that have the fastest travel times as predicted by the model (i.e., carbon-14, chlorine-36, technetium-99). An evaluation of the contaminant migration constituents of concern (CMCOCs) that were included as part of the groundwater monitoring to verify the effectiveness of the in situ decommissioning remedy was conducted. Ten radionuclides and lead are identified as CMCOCs. However, none of these radionuclides are predicted to impact groundwater before the year 2230, and many are not predicted to impact groundwater over 1,000 years. Many of the radionuclides require specialized analytical methods. All results from the first quarter 2012 sampling event were non-detect. The change to the monitoring strategy will be documented in an addendum to the PAOU Effectiveness Monitoring Plan.

SRS recommends that Appendix A of the FFA Annual Progress Report be revised to include the E-Area LLWF and FTF OUs to demonstrate long term protectiveness through the SRS facility security and administrative controls. The report is required by the FFA and includes an annual certification by the USDOE SRS Manager that the listed OUs are in compliance with land use requirements

X. PROTECTIVENESS STATEMENT(S)

The protectiveness statements for each remedy are based on the recommended language from the *Comprehensive Five-Year Review Guidance* (USEPA 2001) and the supplemental guidance, *Clarifying the Use of Protectiveness Determinations for Comprehensive Environmental Response, Compensation, and Liability Act Five-Year Reviews* (USEPA 2012).

For the OUs evaluated in this Five Year Remedy Review, the geosynthetic or S/S cover system remedies have been determined to be protective of human health and the environment. LUCs are part of all final remedial actions where hazardous substances, pollutants, or contaminants remain on-site above levels that allow for unlimited use and

unrestricted exposure. For the OUs evaluated in this report, pathways for contaminants to reach human and ecological receptors have been successfully broken by the selected remedies including LUCs.

LUCs are not part of the interim remedial actions at the E-Area LLWF and the F-Area Tank Farm (FTF) OUs. Because the E-Area LLWF and FTF OUs are currently in the operational phase, unit specific LUCs have been deferred until final closure of these OUs. ~~However, access is controlled by SRS facility security and administrative controls~~The interim remedial actions at the E-Area LLWF and FTF OUs are currently protective of human health and the environment because access is controlled by SRS facility security and administrative controls. Long-term protectiveness will be achieved by revising the FFA Annual Progress Report to include the E-Area LLWF and FTF OUs and the SRS facility security and administrative controls that restrict unauthorized access. The report is required by the FFA and includes an annual certification by the USDOE Savannah River Site Manager that the listed OUs are in compliance with land use requirements.

A protectiveness statement for the OUs evaluated in this report is included in the OU-specific remedy review located in Appendix C through Appendix Q. The protectiveness statements are also provided in the Five-Year Review Summary Form located in the Executive Summary.

XI. NEXT REVIEW

As established in Section 121 of CERCLA, as amended by the SARA and the NCP, periodic reviews are required at least every five years for sites where hazardous substances, pollutants, or contaminants remain at the site above levels that allow for unlimited use and unrestricted exposure following the completion of all remedial actions. Barring a change in the governing laws, another review should be completed within five years from the signature date of this document. The Fifth Five-Year Remedy Review will be conducted in five phases. The final signature date for the last grouping of the Fifth Five-Year Remedy Review Report is due no later than January 21, 2019.

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Table A-3. Chronological Listing of SRS Issued Decision Documents (*continued/end*)

Document Title ^a	Document Number	Rev	Issuance Date ^b
Early Construction and Operational Disposal Site L-1, N-2, P-2, R-1A, R-1B, R-1C ROD	SRNS-RP-2009-00072	1	March 30, 2010
E-Area Low Level Waste Facility (Slit Trench Disposal Units 3 through 5) ESD to the IROD	SRNS-RP-2009-01128	1	April 22, 2010
P-Area Operable Unit ROD	SRNS-RP-2009-01368	1	July 22, 2010
Gunsite 218 Rubble Pile ROD	SRNS-RP-2010-00051	1	October 22, 2010
R-Area Operable Unit ROD	SRNS-RP-2010-01062	1	April 20, 2011
L-Area Northern Groundwater ROD	SRNS-RP-2011-00134	1	June 20, 2011
Gunsite 012 (including ECODS G-3) ROD	SRNS-RP-2010-01232	1	June 27, 2011
D-Area Operable Unit EAROD	SRNS-RP-2010-00162	1.2	September 26, 2011
PAR Pond Unit: Lower Three Runs IOU Tail Portion (Middle and Lower Subunits) ESD	SRNS-RP-2012-00121	1	September 13, 2012
B-Area Operable Unit ROD	SRNS-RP-2012-00354	1	April 16, 2013
F-Area Tank Farm (Waste Tanks 17 and 20) IROD	SRR-CWDA-2013-00111	1	April 30, 2013
TNX Area Operable Unit Second ESD to the ROD	SRNS-RP-2012-00205	1	June 12, 2013
F-Area Tank Farm (Tanks 18 and 19) ESD to the IROD	SRR-CWDA-2013-00007	1.1	September 23, 2013
<i>Fourth Five-Year Remedy Review</i>	<i>SRNS-RP-2012-00011</i>	<i>1.1</i>	<i>February 4, 2014</i>
Wetland Area at Dunbarton Bay in Support of Steel Creek IOU ROD	SRNS-RP-2013-00730	1	April 21, 2014 ^d
L-Area Southern Groundwater Operable Unit ESD to the ROD	SRNS-RP-2012-00736	1	September 10, 2014
F-Area Tank Farm (Tanks 5 and 6) ESD to the IROD	SRR-CWDA-2014-00008	1	September 11, 2014
C-Area Operable Unit EAROD	SRNS-RP-2014-00836	1	September 2, 2015
<i>Fifth Five-Year Remedy Review for SRS OUs with Native Soil Covers and/or LUCs</i>	<i>SRNS-RP-2014-00902</i>	<i>1</i>	<i>November 30, 2015</i>
H-Area Tank Farm (Waste Tank 16) IROD	SRR-CWDA-2015-00157	1	August 16, 2016
<i>Fifth Five-Year Remedy Review for SRS OUs with Groundwater Remedies</i>	<i>SRNS-RP-2015-00419</i>	<i>1</i>	<i>February 2, 2017</i>
H-Area Tank Farm (Waste Tank 12) ESD to the IROD	SRR-CWDA-2016-00107	0	April 20, 2017

- a Shaded text identifies the SRS OUs evaluated in this report for the fourth phase of the fifth five-year review (i.e., geosynthetic or stabilization/solidification cover systems).
- b Unless otherwise noted, the Issuance Date represents the date that the public was notified that the Three-Party signed document was available.
- c This is the last signature date instead of the Issuance Date.
- d Revision 1 ROD for the Wetland Area at Dunbarton Bay in Support of Steel Creek Integrator Operable Unit was approved on April 11, 2014 by SCDHEC and April 21, 2014 by USEPA. Date shown is for the last approval date because the ROD has not been issued.

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Table A-4. Summary of No Remedial Actions at SRS OUs

Operable Unit	Remedial Action
<i>No Action/No Further Action</i>	
211-FB Pu-239 Release (081-F)	No Action
716-A Motor Shops Seepage Basin (904-101G)	No Action
Burma Road Rubble Pit (231-4F)	No Action
Central Shops Burning/Rubble Pit (631-6G)	No Action
Central Shops Sludge Lagoon (080-24G)	No Action
C-, F-, K-, and P-Area Coal Pile Runoff Basins (189-C, 289-F, 189-K, and 189-P)	No Further Action
Fire Department Hose Training Facility (904-113G)	No Action
Ford Building Waste Site (643-11G)	No Further Action (Removal)
Grace Road Site (631-22G)	No Action
Gunsite 113 Access Road Unit (631-24G)	No Action
Gunsite 218 Rubble Pile (621-23G)	No Action
Gunsite 720 Rubble Pit Unit (631-16G)	No Action
Hydrofluoric Acid Spill (631-4G)	No Action
K-Area and PAR Pond Sludge Land Application Site (761-4G and 761-5G)	No Action
L-Area Hot Shop (717-G)	No Further Action
L-Area Northern Groundwater (NBN)	No Action
M-Area West Unit (631-21G)	No Action
R-Area Acid/Caustic Basin (904-77G)	No Action
Road A Chemical Basin (904-111G)	No Action
SRL Oil Test Site (080-16G)	No Action
West of SRL "Georgia Fields" Site (631-19G)	No Action
<i>No Action/No Further Action OUs Associated with OUs Requiring Remedial Action</i>	
108-4R Overflow Basin (108-4R) ¹	No Further Action
Central Shops Burning/Rubble Pit (631-5G) ²	No Action
ECODS B-3 and B-5 (NBN) ³	No Further Action
ECODS G-3 (Adjacent to Gunsite 012) (NBN) ⁴	No Action
Gas Cylinder Disposal Facility (131-2L) ⁵	No Action
L-Area Rubble Pile (131-3L) ⁵	No Action
L-Area Acid/Caustic Basin (904-79G) ⁶	No Action
Rubble Pile Across from Gunsite 012 (NBN) ⁴	No Action
<i>RCRA Units that are No Further Action under CERCLA</i>	
H-Area Hazardous Waste Management Facility (904-44G, 904-45G, 904-46G, and 904-56G)	No Further Action (Low Permeability Cap)
Tank 105-C Hazardous Waste Management Facility (NBN)	No Further Action
F-Area Hazardous Waste Management Facility (904-41G, 904-42G, and 904-43G)	No Further Action (Low Permeability Cap, In Situ S/S)
Mixed Waste Management Facility (643-28E)	No Further Action (Low Permeability Cap)

1 – Included with R-Reactor Seepage Basins (904-103G, 904-104G, 904-57G, 904-58G, 904-59G, 904-60G)

2 – Included with Heavy Equipment Wash Basin (NBN)

3 – Included with B-Area Operable Unit

4 – Included with Gunsite 012

5 – Included with L-Area Burning/Rubble Pit (131-L)

6 – Included with L-Area Oil and Chemical Basin (904-83G)

BMW002D and BMW003D. Tritium was detected in three of four wells (BMW001D, BMW003D, and BMW004D), but at concentrations below its MCL (20 pCi/mL).

The gross alpha results obtained since 2009 correlate with turbidity in the wells, and there is no elevated tritium or iodine-129 in groundwater. Therefore, there were no contaminant migration concerns from review of the groundwater data and no significant changes from 2010 to 2016 that would call into question the effectiveness of the in situ S/S and cover system remedy at HWCTR. Prior to the next sampling event, the BMW wells will be redeveloped to reduce the turbidity, followed by filtering of samples and speciation, as needed, for radionuclides.

Summary of Inspections and Interviews

Interviews were conducted with Richard Feagin, O&M staff member, and Steve Willingham, O&M Staff Member, on September 20, 2016 at the O&M organization offices. No issues were identified as an outcome of these interviews.

The BAOU was inspected by Savannah River Nuclear Solutions, LLC (SRNS) and USDOE personnel on December 8, 2016. Annual inspections since 2011 have documented the presence of small cracks in the surface of the concrete cover. Although small cracks were observed again in 2016, there is no infiltration of precipitation because the below-grade portions of the facility were grouted and sealed in place forming a stabilized structure. The conditions have not changed to the extent that would compromise the stabilization and containment of the residual waste left in place. Annual monitoring of the cap for crack growth and settlement will continue and repairs performed as needed. A site inspection was conducted by USEPA and SCDHEC personnel, accompanied by USDOE and SRNS personnel, on February 23, 2017. No problems regarding the protection of the remedy for this OU as implemented were identified during the inspection.

VII. Technical Assessment

Is the Remedy Functioning as Intended by the Decision Document?

The remedy is functioning as intended as demonstrated below:

- The removal and disposal action of the contaminated sediment in ECODS B-3 and B-5 proved to be successful in preventing further leaching of contaminants into the soil. The potential for exposure to asbestos in the subsurface has been eliminated by virtue of the removal action. An evaluation of the analytical results from the clean fill material indicated that ECODS B-3 and B-5 met the requirements for an unrestricted (residential) land use scenario.
- The removal and disposal of the reactor vessel, steam generators, steel containment dome, and all above-grade components of the facility (with the exception of the transfer coffin refueling machine) eliminated exposure of radioactive or chemical contamination posing human health risks exceeding 1E-06 in media or structures associated with the HWCTR facility. These contaminated components were properly disposed of and NFA was necessary for this equipment.
- The removal action of in-situ grouting and stabilization of the HWCTR was effective in eliminating or controlling all routes of exposure to residual below grade radioactive or chemical contamination posing human health risk exceeding 1E-06 in media or structures associated with the HWCTR facility. Annual inspection and maintenance data do not indicate a history of remedy problems or potential remedy failure, which could place protectiveness at risk.

Following completion of the removal actions, the selected remedy for HWCTR of LUCs and groundwater monitoring is effective in preventing exposure to radioactive or chemical contamination posing human health risk exceeding 1E-06 and the potential migration of residual radionuclides and chemicals constituents remaining below grade to groundwater above MCLs. The four BAOU monitoring wells provide additional assurance regarding the effectiveness of the in situ S/S remedy. A review of the annual inspection reports, which began in 2011 after completion of the removal action, identified no issues that required corrective action.

The Land Use Control Implementation Plan for BAOU governs LUC implementation, maintenance, monitoring, reporting, and enforcement (SRNS 2014). All LUC objectives are being met.

and B-5 Operable Unit (OU) (U), Revision 1, SRNS-RP-2009-01443, Savannah River Nuclear Solutions, LLC, Savannah River Site, Aiken, SC

SRNS, 2011a. Removal Action Report (RAR) for the Early Construction and Operational Disposal Sites (ECODS) B-3 and B-5 Operable Unit (OU) (U), SRNS-RP-2011-00210, Revision 1, Savannah River Nuclear Solutions, LLC, Savannah River Site, Aiken, SC

SRNS, 2011b. Removal Action Report (RAR) for the Heavy Water Components Test Reactor (770-U) (U), SRNS-RP-2011-01213, Revision 1, Savannah River Nuclear Solutions, LLC, Savannah River Site, Aiken, SC

SRNS, 2013. Record of Decision Remedial Alternative Selection for the B-Area Operable Unit (U), SRNS-RP-2012-00354, Revision 1, Savannah River Nuclear Solutions, LLC, Savannah River Site, Aiken, SC

SRNS, 2014. Land Use Control Implementation Plan (LUCIP) for the B-Area Operable Unit, SRNS-RP-2013-00113, Revision 1, Savannah River Nuclear Solutions, LLC, Savannah River Site, Aiken SC

SRNS, 2015. Corrective Measures Implementation Report (CMIR)/ Remedial Action Completion Report (RACR) for B-Area Operable Unit (U), SRNS-RP-2014-00517, Revision 1, Savannah River Nuclear Solutions LLC, Savannah River Site, Aiken, SC

USDOE, 1996. Savannah River Site Future Use Project Report, U.S. Department of Energy, Savannah River Operations Office, Savannah River Site, Aiken, SC

WSRC, 1999. Land Use Control Assurance Plan for the Savannah River Site, WSRC-RP-98-4125, Revision 1.1, latest update, Savannah River Nuclear Solutions, LLC Savannah River Site, Aiken, SC

Various - Inspection Data Sheets – Field Inspection Checklist B-Area Operable Unit, (U), ER-IDS-019-056, Inspection period 2012 through 2016 (annually)

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- Consolidation of contaminated soil outside of the basins and around the pipelines into the basins;
- In situ stabilization through grouting to treat PTSM soil in the basin;
- Low permeability soil cover system over the in situ stabilized soil to prevent exposure to radionuclides in the stabilized soil;
- Grouting the pipeline to prevent exposure to borrowing animals; and
- Land use controls (LUCs), including an OU-specific perimeter fence around the basins, to prevent disturbance of the cover system and prohibit residential or agricultural use of the area.

Remedy Implementation

Implementation of the selected remedy included the following:

- Consolidation of contaminated soil outside the basins exceeding PTSM criteria, leachability RGs, or surficial exposure RGs. In accordance with the Unit-Specific Plug-In TER (WSRC 2000b), this action was not performed because the contaminated soil outside the basins did not exceed PTSM criteria, leachability RGs or surficial exposure RGs;
 - In situ stabilization by grouting was used to address long-term PTSM soil that posed a risk in excess of 1E-03 for future industrial workers;
 - Installation of a 1.8-m (6-ft) minimum thick low permeability soil cover system over the basins to reduce water infiltration and to provide shielding to potential receptors on the surface (WSRC 2003). Although no CM COCs were identified that could impact groundwater in the future (1,000 years), the soil cover system was designed with a 0.6 m (2-ft) minimum thick low permeability soil layer;
 - Grouting of process piping to stabilize any potential contamination left inside and prevent access by small animals; and
 - Establishment of institutional controls (i.e., LUCs) to include the following:
-

- SRS boundary security gates to prevent exposure to intruders;
- Visible warning signs located at the most probable access points requiring contact of the custodian prior to entry to the OU;
- Site controls and land use restrictions (i.e., OU-specific perimeter fencing and warning signs) via the Site Use/Site Clearance Program to prevent excavation in the area of the pipeline or cover system and restrict invasive and permanent installation activities at the CRSB OU; and
- ~~Evaluation of the need for a~~Deed notification/restrictions if the property is ever transferred to non-federal ownership.

System Operations/Operation and Maintenance

There are no system operation requirements. However, the following maintenance activities are ongoing:

- Site inspections for evidence of damage to the cover system due to erosion or intrusion by burrowing animals and to address upkeep of the cover and access control barriers (e.g., the warning signs) are performed annually; and
- Necessary repairs (repair of erosion damage, cover maintenance, OU-specific warning signs and perimeter fence) are performed as required.

Table D-2 compares the actual operation and maintenance (O&M) costs for the five-year remedy review period to the estimated direct O&M costs from the ROD Amendment (WSRC 2002). The estimated O&M cost for Fiscal Year (FY) 2012 to FY2016 was \$47,505 for annual inspections and maintenance. The actual O&M cost for FY2012 to FY2016 is \$67,454. The actual O&M costs for the CRSB OU are higher than expected because the cost for access controls was not included in the original estimate.

V. Progress since Last Review

The previous protectiveness statement concluded that the remedy of soil stabilization and a low permeability cover system with institutional controls (i.e., LUCs) at the CRSB OU is protective of human health and the environment.

There were no recommendations or follow-up actions from the last five-year review.

VI. Five-Year Review Process

The following tasks were performed as part of the review:

- Reviewed the documents listed in Section XII. Documents Reviewed;
- Confirmed implementation of the remedial action;
- Inspected the OU, interviewed maintenance personnel and documented the results on the Inspection Checklist provided in Attachment D-1 with the purpose of assessing the protectiveness of the remedy and the functionality of the access controls; and
- Reviewed changes in standards and to-be-considered guidance.

Data Review

~~The Post Construction Report (PCR) (WSRC 2003) documents that contaminated soils associated with the CRSB OU were excavated and placed within the basins. The consolidation minimized the lateral extent of contaminated soils. The soil stabilization within Basins 1 and 3 followed by placement of a low permeability cover resulted in eliminating the exposure pathway for humans or ecological receptors. Review of maintenance inspection reports conducted from FY2012 through FY2016 and a visual inspection of the CRSB OU indicate the structural integrity of the cover system is intact and providing protection to human and ecological receptors. Groundwater associated with the CRSBs will be addressed as part of the C-Area Groundwater OU.~~

Summary of Inspections and Interviews

Interviews were conducted with Richard Feagin, O&M staff member, and Steve Willingham, O&M staff member, on September 20, 2016 at the O&M organization offices. No issues were identified as an outcome of these interviews.

The CRSB OU was inspected by Savannah River Nuclear Solutions, LLC (SRNS) and USDOE personnel on November 4, 2016. No issues were identified for the CRSB OU during this inspection. A site inspection was conducted by USEPA and SCDHEC personnel, accompanied by USDOE and SRNS personnel, on February 23, 2017. No significant problems regarding this OU were identified during the inspection.

Scheduled annual site inspections conducted from FY2012 through FY2016 identified signs that needed to be replaced, active ant mounds, and overgrown vegetation. These findings were documented on the field inspection checklist and resolved soon after discovery.

VII. Technical Assessment

Is the Remedy Functioning as Intended by the Decision Document?

The remedy is functioning as intended as demonstrated below:

- The cover system and soil stabilization are effective in preventing human and ecological receptor exposure to contaminated basin soils (PTSM). The cover system maintenance program and LUCs have been effective in maintaining the integrity of the cover system. The annual inspection reports indicate no visible signs of erosion, signs are legible, and administrative controls are in place.

The Land Use Control Implementation Plan for the CRSB OU is located in Appendix A of the Post Construction Report~~PCR~~ and governs LUC implementation, maintenance, monitoring, reporting, and enforcement (WSRC 2003). All LUC objectives are being met.

- A containment remedy was selected for 488-DAB to address the PTSM in the ash and coal within the basin, which consisted of the following activities:
 - Consolidating the coal rejects and impacted soils and sediment from the 488-DAB exterior subunit within the 488-DAB basin interior;
 - Installing a low permeability geosynthetic cover system at 488-DAB interior subunit;
 - Placing 0.3 m (1 ft) of clean fill over excavated areas with the 488-DAB exterior subunit;
 - Implementing institutional controls; and
 - Groundwater monitoring to evaluate long-term effectiveness of the remedy. Groundwater monitoring is conducted under the D-Area Groundwater OU.
- Institutional controls and monitoring will be performed per the SRS LUCAP (WSRC 1999) and site-specific Land Use Control Implementation Plan.

The following land use control (LUC) objectives for the DEXOU are necessary to ensure protectiveness of the selected remedy:

- Prevent contact, removal or excavation of waste left in place [debris, coal, and coal rejects]; and
- Preclude residential use of the property.

Remedy Implementation

The following actions were conducted for the DRP and 488-DAB source units as final actions (WSRC 2008). Figure E-4 presents photographs of the DEXOU in the current condition.

- The remedial activities for the DRP included:
 - Removing approximately 56.6 m³ (2,000 ft³) of PCB-contaminated soil ~~at a concentration greater than 1 mg/kg by excavating, packing and shipping to an~~

~~approved off-SRS disposal facility and transporting to the 488-DAB.~~ The area was sampled for confirmation that PCBs were removed to meet the RG.

- Consolidated approximately 45,900 m³ (60,000 yd³) of soil and coal reject materials containing unacceptable levels of arsenic to visual extent of coal within the DRP and along the adjacent road by excavating and transporting to 488-DAB.
 - Backfilled the DRP to a minimum of 0.09 m (0.3 ft), graded, and vegetated to minimize erosion.
 - The remedial activities for the 488-DAB included:
 - Consolidating approximately 38,250 m³ (50,000 yd³) of material containing coal rejects at the 488-DAB Exterior Subunit by excavating to a minimum depth of 0.3 m (1 ft) and transporting to 488-DAB. Backfilling, regrading, and seeding all excavated areas. The portion of the DSWA delineated as a wetland (approximately 0.4 hectares [1 acre]) was replaced either through the site wetland bank or reconstruction of a wetland at another location. After excavating and removing waste from 488-DAB exterior, a permanent berm was installed for the new sedimentation basin, and the overflow detention basin was constructed to the north of the sedimentation basin with a 90-cm (36-inch) corrugated drainage pipe leading to the detention basin to drain the stormwater collected in the sedimentation basin from the engineered cover system.
 - Consolidating approximately 84.2 m³ (110 yd³) of soil from the bottom and sides of the drainage ditch at the west end of the 488-DAB by excavating to a depth of approximately 0.3 m (1 ft) and transporting to 488-DAB. Removed the section of the overflow drain pipe, which ran between the 488-DAB and the drainage ditch. The remaining section of the pipe, which was within the basin, was sealed with low strength concrete. Backfilled, regraded, and seeded all excavated areas.
 - Managing pooled water on the west side of the basin through evaporation or discharge to the land surface based on pH level. Installed erosion/sediment control
-

V. Progress since Last Review

The previous protectiveness statement concluded that the remedy (i.e., excavation and removal of contaminated media, backfilling excavated areas, and implementing institutional controls [i.e., LUCs] to prevent exposure to or ingestion of contaminated soil and sediment) at the DEXOU is protective of human health and the environment.

There were no recommendations or follow-up actions from the last five-year review.

VI. Five-Year Review Process

The following tasks were performed as part of the five-year review:

- Reviewed the documents listed in Section XII. Documents Reviewed;
- Confirmed implementation of the remedial action;
- Inspected the OU, interviewed maintenance personnel, and documented the results on the Inspection Checklist provided in Attachment E-1 with the purpose of assessing the protectiveness of the remedy and the functionality of the access controls; and
- Reviewed changes in standards and to-be-considered guidance.

Data Review

Confirmatory sampling of soils associated with the removal of the PCB contaminated soils was conducted on March 7, 2006. The results of the two samples collected indicated that only Aroclor 1254 was detected and at concentrations well below the RG of 1 mg/kg (0.081 and 0.045 mg/kg).

Summary of Inspections and Interviews

Interviews were conducted with Richard Feagin, O&M staff member, and Steve Willingham, O&M staff member, on September 20, 2016 at the O&M organization offices. No issues were identified as an outcome of these interviews.

The DEXOU was inspected by Savannah River Nuclear Solutions, LLC (SRNS) and USDOE personnel on November 8, 2016. During this inspection, a few depressions and a

bare patch were noticed. These findings were repaired by SRS maintenance. A site inspection was conducted by USEPA and SCDHEC personnel, accompanied by USDOE and SRNS personnel, on February 28, 2017. No significant problems regarding this OU were identified during the inspection.

Scheduled annual site inspections conducted from FY2012 through FY2016 have identified overgrown vegetation, active ant mounds, and hog damage. These findings were documented on the field inspection checklists and resolved soon after discovery.

VII. Technical Assessment

Is the Remedy Functioning as Intended by the Decision Document?

The remedy is functioning as intended as demonstrated below:

The removal actions for the DRP and 488-DAB exterior subunit, as well as the cover system maintenance program and LUCs for the 488-DAB interior subunit, are effective in preventing exposure of industrial workers and ecological receptors because the actions have broken the pathway to the receptors.

The Land Use Control Implementation Plan for the DEXOU governs LUC implementation, maintenance, monitoring, reporting, and enforcement (WSRC 2005). All LUC objectives are being met.

Are Exposure Assumptions, Toxicity Data, Cleanup Levels, and Remedial Action Objectives still valid?

The exposure assumptions, toxicity data, and cleanup levels used at the time of remedy selection are still valid. There have been no changes in physical conditions at the DEXOU that would affect the protectiveness of the remedy.

The USEPA standards and toxicity values have been updated since the last five-year remedy review as shown in Appendix B. The changes to the values for COCs at the DEXOU were not significant, and the RAOs continue to be met by the remedial action. No

WSRC, 2004b. *Monitoring Work Plan for the D-Area Groundwater Operable Unit (U)*;
WSRC-RP-2003-4150, Revision 1, Westinghouse Savannah River Company, Savannah
River Site, Aiken, SC

WSRC, 2005. *Land Use Control Implementation Plan (LUCIP) for the D-Area Expanded
Operable Unit (DEXOU) (U)*, WSRC-RP-2004-4065, Revision 1, Westinghouse Savannah
River Company, Savannah River Site, Aiken, SC

WSRC, 2008. *Post-Construction Report/Corrective Measures Implementation
Report/Remedial Action Completion Report for the D-Area Expanded Operable Unit (U)*,
WSRC-RP-2007-4041, Revision 1, Washington Savannah River Company, Savannah
River Site, Aiken, SC

Various - *Inspection Data Sheets – Field Inspection Checklist, D-Area Rubble Pit
(431-2D) (U)*, ER-IDS-019-038, Inspection period 2012 through 2016 (annually)

Various - *Inspection Data Sheets – Field Inspection Checklist, D-Area Ash Basin (488-D)
(U)*, ER-IDS-019-041, Inspection period 2012 through 2016 (annually)

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Attachment E-1. Five-Year Review Site Inspection Checklist – D-Area Expanded Operable Unit (D-Area Ash Basin [488-D] and D-Area Rubble Pit [431-2D]) (continued)

III. ONSITE DOCUMENTS & RECORDS VERIFIED (Continued)			
2. Health and Safety Plans (HASPs):			
<input type="checkbox"/> Site-Specific Health and Safety Plans	<input type="checkbox"/> Readily Available	<input type="checkbox"/> Up to Date	<input checked="" type="checkbox"/> N/A
<input type="checkbox"/> Contingency Plan/Emergency Response Plan	<input type="checkbox"/> Readily Available	<input type="checkbox"/> Up to Date	<input checked="" type="checkbox"/> N/A
Remarks: <u>Routine O&M activities do not require a SSHASP under 29 CFR 1910.1201, HAZWOPER.</u>			
3. O&M and OSHA Training Records:			
	<input checked="" type="checkbox"/> Readily Available	<input checked="" type="checkbox"/> Up to Date	<input type="checkbox"/> N/A
Remarks: <u>Training Records are complete and up to date per EC&ACP training matrix.</u>			
4. Permits and Service Agreements:			
<input type="checkbox"/> Air Discharge Permit	<input type="checkbox"/> Readily Available	<input type="checkbox"/> Up to Date	<input checked="" type="checkbox"/> N/A
<input type="checkbox"/> Effluent Discharge	<input type="checkbox"/> Readily Available	<input type="checkbox"/> Up to Date	<input checked="" type="checkbox"/> N/A
<input type="checkbox"/> Waste Disposal; POTW	<input type="checkbox"/> Readily Available	<input type="checkbox"/> Up to Date	<input checked="" type="checkbox"/> N/A
<input type="checkbox"/> Other Permits	<input type="checkbox"/> Readily Available	<input type="checkbox"/> Up to Date	<input checked="" type="checkbox"/> N/A
Remarks: _____			
5. Gas Generation Records:			
	<input type="checkbox"/> Readily Available	<input type="checkbox"/> Up to Date	<input checked="" type="checkbox"/> N/A
Remarks: _____			
6. Settlement Monument Records:			
	<input type="checkbox"/> Readily Available	<input type="checkbox"/> Up to Date	<input checked="" type="checkbox"/> N/A
Remarks: _____			
7. Groundwater Monitoring Records:			
	<input type="checkbox"/> Readily Available	<input type="checkbox"/> Up to Date	<input checked="" type="checkbox"/> N/A
Remarks: _____			
8. Leachate Extraction Records:			
	<input type="checkbox"/> Readily Available	<input type="checkbox"/> Up to Date	<input checked="" type="checkbox"/> N/A
Remarks: _____			
9. Discharge Compliance Records:			
<input type="checkbox"/> Air	<input type="checkbox"/> Readily Available	<input type="checkbox"/> Up to Date	<input checked="" type="checkbox"/> N/A
<input type="checkbox"/> Water (Effluent)	<input type="checkbox"/> Readily Available	<input type="checkbox"/> Up to Date	<input checked="" type="checkbox"/> N/A
Remarks: _____			
10. Daily Access/Security Logs:			
	<input type="checkbox"/> Readily Available	<input type="checkbox"/> Up to Date	<input checked="" type="checkbox"/> N/A
Remarks: _____			

Attachment E-1. Five-Year Review Site Inspection Checklist – D-Area Expanded Operable Unit (D-Area Ash Basin [488-D] and D-Area Rubble Pit [431-2D]) (continued)

IV. O&M COSTS			
1. O&M Organization:			
<input type="checkbox"/> State In-House	<input type="checkbox"/> Contractor for State		
<input type="checkbox"/> PRP In-House	<input type="checkbox"/> Contractor for PRP		
<input checked="" type="checkbox"/> Other: <u>SRS</u>			
2. O&M Cost Records:			
<input type="checkbox"/> Readily Available	<input type="checkbox"/> Up to Date	<input type="checkbox"/> Funding mechanism/agreement in place	
<input type="checkbox"/> Other: <u>Project cost data is summarized in Section IV of this OU-specific review</u>			
Total annual cost by year for review period, if available			
From: _____ (Date)	To: _____ (Date)	_____ (Total Cost)	<input type="checkbox"/> Breakdown attached
From: _____ (Date)	To: _____ (Date)	_____ (Total Cost)	<input type="checkbox"/> Breakdown attached
From: _____ (Date)	To: _____ (Date)	_____ (Total Cost)	<input type="checkbox"/> Breakdown attached
From: _____ (Date)	To: _____ (Date)	_____ (Total Cost)	<input type="checkbox"/> Breakdown attached
From: _____ (Date)	To: _____ (Date)	_____ (Total Cost)	<input type="checkbox"/> Breakdown attached
3. Unanticipated or Unusually High O&M Costs During Review Period			
Describe costs and reasons: _____ _____ _____			
V. ACCESS AND INSTITUTIONAL CONTROLS <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A			
A. Fencing			
1. Fencing Damage: <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> Gates secured <input checked="" type="checkbox"/>			
N/A			
Remarks: <u>OU-specific perimeter fencing is not required by the remedial action.</u>			

B. Signs			
1. Signs and Other Security Measures: <input type="checkbox"/> Location shown on site map <input type="checkbox"/> N/A			
Remarks: <u>Signs are in good condition</u>			

E-AREA LOW LEVEL WASTE FACILITY (643-26E) OPERABLE UNIT

I. Introduction

This report is the second five-year review for E-Area Low Level Waste Facility (LLWF) (643-26E) (Slit Trench Disposal Units 1 - 5) Operable Unit (OU). This review was conducted from August 2016 through November 2016. Contaminants have been left in place and radiological contaminated waste has been disposed at the E-Area LLWF (Slit Trench Disposal Units 1 – 5) at levels that do not allow for unlimited use and unrestricted exposure. The purpose of this review is to determine whether the remedy in place at the E-Area LLWF (Slit Trench Disposal Units 1 – 5) is protective of human health and the environment. This report documents the results of the review.

II. OU Chronology

Table F-1 lists the chronology of site events for the E-Area LLWF (Slit Trench Disposal Units 1 – 5).

III. Background

~~The E-Area LLWF is listed as a Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) regulated unit in Appendix C of the Federal Facility Agreement (FFA) for Savannah River Site (SRS) (FFA 1993). The E-Area LLWF is not identified as a Solid Waste Management Unit under the Resource Conservation and Recovery Act (RCRA). Therefore, an SRS RCRA permit modification was not required.~~

The E-Area LLWF was not part of the 1993 Federal Facility Agreement (FFA) for Savannah River Site (SRS) (FFA 1993) because the U.S. Department of Energy (USDOE) operates and maintains the facility under the authority of the Atomic Energy Act (AEA) and in accordance with USDOE Order 435.1, *Radioactive Waste Management*. However, the U.S. Environmental Protection Agency (USEPA), South Carolina Department of Health and Environmental Control (SCDHEC), and USDOE reached an agreement in 2007

to include the E-Area LLWF as a Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)-regulated unit listed in Appendix C of the FFA. The E-Area LLWF is not identified as a Solid Waste Management Unit under the Resource Conservation and Recovery Act (RCRA). Therefore, an SRS RCRA permit modification was not required.”

Physical Characteristics

The E-Area LLWF OU is located in the central region of the SRS known as the General Separations Area, approximately 9.6 km (6 mi) from the nearest site boundary, as shown in Figure F-1. The E-Area LLWF is comprised of 81 hectares (200 acres), although only 40.5 hectares (100 acres) have been developed for waste disposal. Over the life of the E-Area LLWF, additional disposal units will be constructed as needed.

The E-Area LLWF is located in an area with low to moderate topographic relief and is drained by several perennial streams. The Slit Trench Disposal Units are remote from standing groundwater and conducive to controlled surface water runoff during storm events. The area slopes from an elevation of about 85.9 m (282 ft) in the southernmost corner to an elevation of 74.4 m (244 ft) in the northern most corner. The site is bordered by three streams with several intermittent streams present within the area boundary (Figure F-2). Runoff is to the north toward Upper Three Runs, to the east toward Crouch Branch, and to the west toward an unnamed branch. Crouch Branch and the unnamed branch discharge into Upper Three Runs. Upper Three Runs is approximately 743.1 m (2,438 ft) north of the facility boundary. The nearest perennial stream is approximately 361.8 m (1,187 ft) northeast of the boundary.

The E-Area LLWF is located along a topographic ridge near a groundwater divide. Shallow groundwater beneath the E-Area LLWF flows northerly, toward Upper Three Runs. The average depth from land surface to the water table beneath the Slit Trench Disposal Units is 16.8 m (55 ft) to 19.8 m (65 ft).

The Slit Trench Disposal Units are below-grade earthen disposal units that are used for disposal of USDOE low-level radioactive waste and may be used for disposal of CERCLA regulated low-level radioactive waste.

Five Slit Trench Disposal Units, designated Slit Trench Disposal Units 1 – 5, have been filled to design capacity and have stormwater runoff covers installed. Five other disposal units, designated Slit Trench Disposal Units 6 – 9 and 14, have been sited and waste has been placed within all five of these units. The Slit Trench Disposal Units are identified in Figure F-3. Each Slit Trench Disposal Unit is approximately 6.1 m (20 ft) deep, 47.9 m (157 ft) wide, and 199.9 m (656 ft) long, and is separated into five individual sections. Each individual section is approximately 6.1 m (20 ft) deep, 6.1 m (20 ft) wide and 199.9 m (656 ft) long (Figure F-4). Approximately 3 m (10 ft) to 4.3 m (14 ft) of undisturbed soil separates each individual disposal section from the next. The excavated soil generated during disposal trench construction is stockpiled for later placement over the disposed waste.

Land and Resource Use

The current land use for the E-Area LLWF is industrial. According to the *Savannah River Site Future Use Project Report* (USDOE 1996), residential uses of the SRS land should be prohibited. The future land use for the E-Area LLWF is reasonably anticipated to remain industrial with the USDOE maintaining control of the land.

The E-Area LLWF is currently in the operational phase and access is controlled by SRS facility security and administrative controls. Additional land use controls (LUCs) are not part of the interim remedial action. ~~A~~The final Record of Decision (ROD) remedial action ~~will be evaluated and conducted in the future for the entire E-Area LLWF according to the requirements of the FFA~~is currently scheduled for issuance in March 2063. The Land Use Control Implementation Plan will be deferred until final closure of the entire E-Area LLWF.

There is no current or projected future use of the groundwater or surface water as a drinking water source at the E-Area LLWF. According to the Land Use Control Assurance Plan (WSRC 1999), SRS property is to be owned and institutionally controlled by USDOE.

History of Contamination (Slit Trench Disposal Units Operations)

Radioactive waste disposal operations at the E-Area LLWF began in 1994. The first Slit Trench Disposal Unit received waste in December 1995. The Slit Trench Disposal Units receive low-level radioactively contaminated soil, rubble, wood debris, concrete, equipment, and job control waste (e.g., contaminated protective clothing, plastic sheeting). The waste is disposed of as bulk waste or contained within B-25 boxes, B-12 boxes, 55-gallon drums, Sealand containers and other metal containers. Figure F-5 depicts waste being placed in an open Slit Trench Disposal Unit during active operation.

The Slit Trench Disposal Units have curie inventory limits established in the Performance Assessment (PA), prepared in accordance with USDOE Order 435.1, *Radioactive Waste Management*. When a Slit Trench Disposal Unit reaches the disposal limit established by the PA (either by the sum of fractions of the curie limit to the actual curie inventory or waste volume), the trench is filled with clean soil. There is no single curie limit for a Slit Trench Disposal Unit. The curie limit for each Slit Trench Disposal Unit is specific for each radionuclide and is controlled using a sum-of-fractions technique to ensure each radionuclide remains below the disposal limit established by the PA for that radionuclide. Radionuclide inventory in a Slit Trench Disposal Unit is controlled by waste acceptance criteria and active management of waste receipts to ensure that limits are never exceeded.

Slit Trench Disposal Units 1 – 5 were determined to be operationally closed when the volume or inventory capacity for each disposal unit was reached. The volume capacity for each Slit Trench Disposal Unit will vary from the nominal capacity. Table F-2 provides the date each Slit Trench Disposal Unit was operationally full, the total volume disposed, the total radionuclide inventory, and the sum-of-fractions.

Initial Response

In accordance with USDOE Order 435.1, the E-Area LLWF is designed, operated, and maintained in a manner that is protective of human health and the environment. Closure of the E-Area LLWF under USDOE Order 435.1 will be conducted in three phases: operational closure, interim closure, and final closure. The E-Area LLWF is currently in the operational period and waste disposal is ongoing. With the exception of Slit Trench Disposal Units 1 – 5 and the Naval Reactor Components Disposal Area (643-7E), all other disposal facilities in the E-Area LLWF continue to receive waste.

Operational closure will be conducted at the end of the Slit Trench Disposal Units operation period. Currently, the USDOE is projecting that operational closure for the Slit Trench Disposal Units will begin after completion of operations in the year 2065. Operational closure for the Slit Trench Disposal Units occurs in stages. During disposal activities, trench excavation begins at one end of the trench section and generally proceeds as needed toward the other end of the trench section in order to minimize the time the trench section is open. Waste placement begins at one end of the trench section and proceeds toward the other end. Bulk waste is pushed into the trench section from one end. Containerized waste and large equipment are typically placed in one end of the trench section with a crane. Eventually, containerized waste areas of the trench section are filled in with either bulk waste or clean soil to fill the voids between adjacent containers and the trench section wall. Slit Trench Disposal Units are typically filled to within 1.2 m (4 ft) of the ground surface with waste and backfilled with soil to grade.

Once a section of the Slit Trench Disposal Unit is filled, the clean soil stockpiled during trench section construction is bulldozed in a single lift over that section to produce a minimum 1.2 m (4 ft) thick clean soil layer over the waste (i.e., operational soil cover). The operational soil cover is graded to provide positive drainage off and away from the disposal operation. Subsequent trench sections are filled with waste, covered with an operational soil cover, and graded to promote positive drainage until the entire trench section is filled and covered. The only mechanical compaction that the soil and waste in the trench section receive is from the bulldozer and other heavy equipment moving over

the top of a completely backfilled trench. Once a Slit Trench Disposal Unit (i.e., set of five individual sections in the approximately 47.9 m [157 ft] wide by 199.9 m [656 ft] long footprint) has been filled to curie or volume capacity limits and completely covered with a nominal 1.2 m (4 ft) soil cover, it is determined to be operationally closed

Basis for Taking Action

The E-Area LLWF Slit Trench Disposal Units were approved in 1996 to receive CERCLA waste per the CERCLA Off-Site Rule (OSR), 40 Code of Federal Regulations § 300.440. However, in February 2007, the ~~U.S. Environmental Protection Agency (USEPA)~~ sent a Notice of Unacceptability (NOU) to the USDOE making the E-Area Slit Trench Disposal Units unacceptable for the receipt of CERCLA waste. The USEPA's NOU stated that through reviews and communications, it was determined that tritium had migrated from the Slit Trench Disposal Units into the vadose zone beneath the disposal units. The USDOE, however, determined that the tritium migration was expected and consistent with predictions made by the PA, and no exceedance of the USDOE Order 435.1 performance measures had occurred. In July 2007, representatives from the USDOE, USEPA and ~~South Carolina Department of Health and Environmental Control (SCDHEC)~~ met and resolved issues concerning the disposal of CERCLA waste in the Slit Trench Disposal Units. As part of the agreement, the USDOE placed the entire E-Area LLWF on the FFA Appendix C list (satisfying the OSR provision for inclusion in an enforceable agreement). Consequently, the USEPA restored the OSR Acceptability for the Slit Trench Disposal Units, allowing the disposal units to receive CERCLA waste.

In accordance with USDOE Order 435.1, the E-Area LLWF is designed, operated, and maintained in a manner that is protective of human health and the environment. As part of the regulatory agreement for receipt of CERCLA waste, USDOE agreed to evaluate placement of operational stormwater runoff covers over the Slit Trench Disposal Units that have reached operational design capacity as an interim remedial action to further mitigate the tritium migration. Design capacity is determined when the curie limit or volume capacity for each Slit Trench Disposal Unit is reached. The curie limit for a Slit Trench Disposal Unit is specific for each radionuclide and is controlled using a sum-of-fractions

available. However, there have been no repairs performed on the E-Area LLWF (Slit Trench Disposal Units 1 – 5) stormwater runoff covers during FY2012 to FY2016 and estimated costs are considered fairly accurate estimates for the actual costs. Based on the observed lifting of the covers during wind events and weathering due to sun exposure, it is anticipated that the covers will not be intact for the original project duration of 25 years without substantial repair and rework. The observed subsidence has not compromised the integrity of the covers; however, it is anticipated that with time and additional settlement, rework of the soil beneath the covers will be necessary if positive drainage off the disposal units is to be maintained. As such, the future O&M costs are expected to be significantly higher than originally estimated based on the anticipated condition of the stormwater runoff covers and the soil and material beneath the covers.

V. Progress since Last Review

The previous protectiveness statement concluded that the interim remedy at the E-Area LLWF (Slit Trench Disposal Units 1 – 5) is protective of human health and the environment. The interim remedy enhances the protective measures currently in place and reduces storm water infiltration through the Slit Trench Disposal Units 1 – 5. Because the E-Area LLWF is currently in the operational phase, unit specific ~~land use control~~ LUCs have been deferred until final closure of the entire E-Area LLWF. However, access is controlled by SRS facility security and administrative controls.

VI. Five-Year Review Process

The following tasks were performed as part of the review:

- Reviewed the documents listed in Section XII. Documents Reviewed;
 - Confirmed the implementation of the interim remedial action;
 - Evaluated the effectiveness of the interim remedial action;
-

- Inspected the E-Area LLWF (Slit Trench Disposal Units 1 – 5), conducted site interviews, and documented the results on the Inspection Checklist provided in Attachment F-1 with the purpose of assessing the protectiveness of the remedy and the functionality of the access controls; and
- Reviewed changes in standards and to-be-considered guidance.

Data Review

Based on the FY2015 PA Annual Review (SRNL 2016), operations, disposal activities and vadose zone monitoring results indicate that the conclusions of the PA remain valid with reasonable expectation that the E-Area LLWF will meet the performance objectives delineated in DOE Order 435.1.

Summary of Inspections and Interviews

Interviews were conducted with Don Sink, Solid Waste Management (SWM) Engineering, and Sarita Berry, the SWM Environmental Compliance Authority (ECA), on September 21, 2016 at the SWM Facility. No issues were identified for the E-Area LLWF during these interviews.

The E-Area LLWF was inspected by Savannah River Nuclear Solutions, LLC (SRNS) and USDOE personnel on November 22, 2016. No issues were identified for the E-Area LLWF (Slit Trench Disposal Units 1 – 5) during this inspection. A site inspection was conducted by USEPA and SCDHEC personnel, accompanied by USDOE and SRNS personnel, on February 22, 2017. No significant problems regarding this OU were identified during the inspection.

Quarterly site inspections conducted during FY2012 and FY2016 noted two depressions in the surface of the E-Area LLWF (Slit Trench Disposal Units 4 and 5) cover that were also noted in the Fourth Five-Year Remedy Review Report (SRNS 2014). Surface depressions at E-Area LLWF are not unexpected, and these subsidence areas are monitored to verify the cover is not compromised. Additionally, the release of the cover anchor strip fasteners has been observed on occasion. The anchor strips remained intact and the fasteners are replaced as needed.

VII. Technical Assessment

Is the Remedy Functioning as Intended by the Decision Document?

The remedy is functioning as intended as demonstrated below:

The stormwater runoff covers (intact though localized subsidence is noted as discussed in Section VIII) are operating as designed to effectively drain stormwater runoff away from the buried trench material significantly reducing infiltration. Based on the FY2015 PA Annual Review (SRNL 2016), vadose zone monitoring indicates that migration of radionuclides remain within the PA predictions and continue to meet the performance objectives.

The E-Area LLWF is currently in the operational phase and access is controlled by SRS facility security and administrative controls. OU-specific LUCs have been deferred until final closure of the entire E-Area LLWF.

Are Exposure Assumptions, Toxicity Data, Cleanup Levels, and Remedial Action Objectives still valid?

Because of ongoing operations, a CERCLA risk assessment has not been conducted at the E-Area LLWF and is not required to support the interim action. In accordance with USDOE Order 435.1 requirements, the expected migration of radionuclides is evaluated in the PA to ensure protection of groundwater resources. There have been no changes in cleanup levels, standards, or to-be-considered guidance that would alter the conclusions of the PA that call into question the protectiveness of the interim remedy.

Has any Other Information Come to Light that Could Call into Question the Protectiveness of the Strategy?

The following information should be considered in the overall protectiveness of the strategy:

- The E-Area LLWF PA, as required by USDOE Order 435.1, evaluates the migration of radionuclides and determines the potential impacts to groundwater resources. The E-Area LLWF PA determines acceptable disposal limits for radioactive low-level

- waste based on key inputs and assumptions associated with the conditions of the waste and disposal facility, including expected releases of radionuclides from the disposal units. The acceptable disposal limits are set at levels that ensure protection of human health and the environment. The annual review of the PA for the E-Area LLWF documents the full assessment of the E-Area LLWF O&M activities. Based on the FY2015 PA (SRNL 2016), vadose zone monitoring indicates that migration of radionuclides is within the PA predictions and is not expected to exceed the drinking water standards beyond a 100-m (328-ft) buffer zone surrounding the disposed waste (USDOE Order 435.1 point of compliance).
- Installation of stormwater runoff covers over the Slit Trench Disposal Units 1 – 5 was not analyzed in the E-Area LLWF 2008 PA (WSRC 2008). Subsequent analysis (SRNS 2011) indicated that use of the stormwater runoff covers over the Slit Trench Disposal Units 1 – 5 would allow significantly (over two orders of magnitude) greater tritium disposal limits for the Slit Trench Disposal Units. Tritium is highly mobile with a relatively short half-life. The increase in the tritium disposal limit is due to the reduction in the anticipated controlled release of tritium from the disposal unit prior to placement of the interim closure cover (i.e., the tritium is held up in the waste zone and decays significantly before the assumed failure of the final cover).
 - Since infiltration is significantly reduced with the stormwater runoff covers, long-lived radionuclides, and their daughter products are expected to buildup beneath the cover. This buildup of long-lived radionuclides is expected to result in an increase in the total projected long-term doses to the off-SRS resident; however, the doses are still below the performance objectives of USDOE Order 435.1. The increase in dose is due to the eventual flushing of long-lived parents and their daughters (all held up initially by the stormwater runoff cover, then by the interim and final covers), that get flushed out with the eventual failure of the final cover.

VIII. Issues

The following issues have been identified during this remedy review:

- Maintenance of the stormwater runoff covers continues to be problematic. Since the only mechanical compaction that the placed soil and disposed waste receives is from bulldozer usage and other heavy equipment moving over the top of a completely backfilled trench, significant subsidence as soil settles in and around waste containers is expected during subsequent years after placement of the soil cover. Placing the stormwater runoff covers immediately upon reaching design capacity does not allow for the early settlement to be backfilled. Subsidence beneath the stormwater runoff covers at Slit Trench Disposal Units 4 and 5, and water pooling in these locations was observed and reported in the Fourth Five-Year Remedy Review (SRNS 2014). The FY2015 inspections determined that these two depressions have not changed in size or depth (see Figures F-7 and F-8). The covers were still intact with no fatigue issues above the depressions. The observed subsidence has not compromised the integrity of the covers, but it is anticipated that substantial rework of the soil beneath the covers will be required if positive drainage off the disposal units is to be maintained. No corrective actions are required at this time.
 - During wind events, the covers have been observed to lift substantially, resulting in mechanical stresses to the cover materials. Sandbags are placed as needed on the covers during high winds to mitigate damage. Though the anchor strips are still intact and functioning as designed, the fasteners for the stainless steel anchor strips come off routinely and are replaced with more durable fasteners. With the additional weathering due to sun exposure, the covers are not expected to meet the original project life of 25 years.
 - Subsidence and weathering of the stormwater runoff covers is anticipated to result in significant repairs prior to the end of the design life of the covers. Use of a vegetated soil cover was initially planned since the anticipated subsidence would be readily accessible for maintenance. This cost-effective option was considered in the PA to be adequate for meeting the PA objectives.
 - The E-Area LLWF is currently in the operational phase and access is controlled by SRS facility security and administrative controls. OU-specific LUCs have been
-

deferred until final closure of the entire E-Area LLWF. Since the SRS facility security and administrative controls that restrict unauthorized access to the E-Area LLWF were not recognized as part of the interim remedy, the interim remedy was not considered as long-term protective in previous five-year remedy reviews.

IX. Recommendations and Follow-up Actions

The recommendation from the Fourth Five-Year Remedy Review Report (SRNS 2014) identified the need for further discussion with the USEPA and SCDHEC on the installation and maintenance activities for stormwater runoff covers. A meeting and field walkdown was held on December 6, 2013 with the USDOE, USEPA, and SCDHEC to discuss the maintenance issues and a path forward for installation of future stormwater runoff covers. USDOE recommended that the need for stormwater runoff covers be evaluated on an as-needed basis depending on the waste type or curie content. In lieu of a low permeability membrane, USDOE recommended that soil covers and/or vegetative covers that are graded for positive flow or other low permeability materials with less maintenance issues be considered. No new slit trench disposal units have been operationally closed since issuance of the previous five-year remedy review report (SRNS 2014).

Table F-3 presents the recommendations for the E-Area LLWF Slit Trench Disposal Units 1 - 5. The USDOE recommends that discussions continue with the USEPA and SCDHEC on the type of cover system needed for future slit trench disposal units. Additionally, the USDOE recommends revising the FFA Annual Progress Report to include the E-Area LLWF to recognize SRS facility security and administrative controls that restrict access as long-term protective. The USDOE Savannah River Site Manager will certify USDOE compliance with these controls. Further discussion is needed with USEPA and SCDHEC to reach agreement on the revised text and table in the FFA Annual Progress Report.

X. Protectiveness Statement(s)

The interim remedy at the E-Area LLWF (Slit Trench Disposal Units 1 – 5) is currently protective of human health and the environment because access is controlled by SRS facility security and administrative controls.

The interim remedy enhances the current protective measures required by USDOE Order 435.1 and reduces stormwater infiltration through the Slit Trench Disposal Units 1 – 5. Because the E-Area LLWF is ~~currently~~ in the operational phase, unit specific ~~land use controls~~ LUCs have been deferred until final closure of the entire E-Area LLWF. The final ROD for E-Area LLWF is scheduled for issuance in March 2063. However, ~~access is controlled by SRS facility security and administrative controls.~~

Long-term protectiveness will be achieved by including E-Area LLWF and the SRS facility security and administrative controls that restrict unauthorized access in the FFA Annual Progress Report. The report is required by the FFA and includes an annual certification by the USDOE Savannah River Site Manager that the listed OUs are in compliance with land use requirements.

XI. Next Review

The Fifth Five-Year Remedy Review Report and subsequent reports will be segregated into five phases. As shown in Appendix A, Table A-1, the next five-year review for SRS OUs with Geosynthetic or Stabilization/Solidification Cover Systems is scheduled for January 2023.

XII. Documents Reviewed

FFA, 1993. *Federal Facility Agreement for the Savannah River Site*, Administrative Docket No. 89-05-FF (Effective Date: August 16, 1993)

SRNL, 2016. *FY2015 Performance Assessment Annual Review for the E-Area Low-Level Waste Facility*, SRNL-STI-2015-00691, Revision 0, Savannah River National Laboratory, Savannah River Site, Aiken, SC

SRNS, 2009. *Interim Record of Decision Remedial Alternative Selection for the E-Area Low-Level Waste Facility, 643-26E (Slit Trench Disposal Units 1 and 2)*, SRNS-RP-2009-00538, Revision 1, Savannah River Nuclear Solutions, LLC, Savannah River Site, Aiken, SC

SRNS, 2010a. *Explanation of Significant Differences (ESD) for the Revision 1 Interim Record of Decision Remedial Alternative Selection for the E-Area Low-Level Waste Facility, 643-26E (Slit Trench Disposal Units 1 and 2)*, SRNS-RP-2009-01128, Revision 1, Savannah River Nuclear Solutions, LLC, Savannah River Site, Aiken, SC

SRNS, 2010b. *Interim Remedial Action Implementation Plan for the E-Area Low-Level Waste Facility, 643-26E (Slit Trench Disposal Units 1 - 5)*, SRNS-RP-2009-01213, Revision 1, Savannah River Nuclear Solutions, Savannah River Site, Aiken, SC

SRNS, 2011. *FY 2010 Annual Review - E-Area Low-Level Waste Facility Performance Assessment and Composite Analysis*, SRNS-STI-2011-00024, Revision 0, Savannah River Nuclear Solutions, LLC, Savannah River Site, Aiken, SC

SRNS, 2012. *Interim Post-Construction Report (IPCR) for the E-Area Low-Level Waste Facility, 643-26E (Slit Trench Disposal Units 1 – 5)*, SRNS-RP-2011-00996, Revision 1, Savannah River Nuclear Solutions, LLC, Savannah River Site, Aiken, SC

SRNS, 2014. *Fourth Five-Year Remedy Review Report for the Savannah River Site (U) Aiken, South Carolina*, SRNS-RP-2012-00011, Revision 1.1, Savannah River Nuclear Solutions, LLC, Savannah River Site, Aiken, SC

USDOE, 1996. *Savannah River Site Future Use Project Report*, U.S. Department of Energy, Savannah River Operations Office, Savannah River Site, Aiken, SC

WSRC, 1999. *Land Use Control Assurance Plan for the Savannah River Site*, WSRC-RP-98-4125, Revision 1.1, latest revision, Savannah River Nuclear Solutions, LLC, Savannah River Site, Aiken, SC

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with Geosynthetic or S/S Cover Systems (U)
E-Area Low Level Waste Facility (643-26E)
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Table F-3. Recommendations and Follow-up Actions for the E-Area LLWF (Slit Trench Disposal Units 1 – 5)

Issues	Recommendations / Follow-up Actions	Party Responsible	Oversight Agency	Milestone Date	Follow-up Actions: Affects Protectiveness (Y/N)	
					Current	Future
Reevaluation of the installation and maintenance activities (for stormwater runoff covers). The current geosynthetic covers are not expected to meet the original project life of 25 years, and therefore carry anticipated high maintenance and replacement costs.	Further discussion of how these issues impact future covers is needed with USEPA/ SCDHEC.	USDOE	USEPA/ SCDHEC	Not Applicable	N	N
<u>Unit specific LUCs for the E-Area LLWF (Slit Trench Disposal Units 1-5) have been deferred until final closure of the entire E-Area LLWF. SRS facility security and administrative controls that restrict unauthorized access to the E-Area LLWF were not previously recognized as part of the interim remedy. Therefore, the interim remedy was not considered as long-term protective.</u>	<u>Revise the FFA Annual Progress Report to include the E-Area LLWF (Slit Trench Disposal Units 1-5) to recognize SRS facility security and administrative controls that restrict access as long-term protective. The USDOE Savannah River Site Manager will certify USDOE compliance with these controls. Further discussion is needed with USEPA/SCDHEC to reach agreement on the revised text and table in the FFA Annual Progress Report.</u>	<u>USDOE</u>	<u>USEPA/ SCDHEC</u>	<u>September 2018</u>	<u>N</u>	<u>N</u>

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Table F-4. Actual versus Estimated O&M Costs

	FY2012	FY2013	FY2014	FY2015	FY2016	5-Year Total
Total Actual O&M Costs (\$)	*	*	*	*	*	*
Total IROD Estimated Direct O&M Costs** (\$)	30,500	15,500	15,500	15,500	15,500	92,500

* Actual O&M costs for maintaining the covers are not available.

** Costs for preparation of the Fourth Five-Year Remedy Review were accounted for in FY2012.

well data for TCE was entered into the Monitoring and Remediation Optimization System for trend evaluation. The results of the evaluation indicated a probably decreasing trend in well FRB 1 and a decreasing trend in well FRB 2. ~~No~~The results were returned for well FRB 3 and well FRB 4 were non-detects.

Thus, the selected remedy of in situ stabilization and cover system is effective in preventing human exposure to COCs and preventing or mitigating leaching of PTSM to groundwater at levels that will cause the groundwater to exceed its MCL.

Summary of Inspections and Interviews

Interviews were conducted with Richard Feagin, O&M staff member and Steve Willingham, O&M Staff Member, on September 20, 2016 at the O&M Organization Offices. No issues were identified as an outcome of these interviews.

The FRB OU was inspected by Savannah River Nuclear Solutions, LLC (SRNS) and USDOE personnel on November 14, 2016. No issues were identified for the FRB OU during this inspection. A site inspection was conducted by USEPA and SCDHEC personnel, accompanied by USDOE and SRNS personnel, on February 22, 2017. No significant problems regarding the FRB OU were identified during the inspection.

Scheduled annual site inspections conducted from 2012 to 2016 identified: active ant mounts, overgrown vegetation, broken signage, downed trees, and evidence of hog rooting. These findings were documented on the field inspection checklists and resolved soon after discovery. Additionally, minor damage was identified on the road south of the cap. The road has since been repaired.

VII. Technical Assessment

Is the Remedy Functioning as Intended by the Decision Document?

Review of documents, applicable or relevant and appropriate requirements, risk assumptions, and the results of the site inspection indicates that the remedy is functioning as intended by the ROD. Placement and maintenance of a protective low permeability cover over the FRB OU breaks the contaminant migration pathway to the groundwater;

thus, facilitating meeting the RAOs to prevent physical exposure to the contaminants and to mitigate further migration of contaminants to the groundwater.

O&M of the cover system has been effective. Review of the annual inspection reports for the period 2012 through 2016 indicate the in-place remedy is functioning properly. Review of the inspection reports indicates the maintenance is operating effectively and efficiently.

The institutional controls (i.e., LUCs) that are in place include physical access controls to prevent unauthorized entry to SRS (fences, guards, security patrols, etc.); administrative controls that maintain the OU for industrial use only (SRS is a secured government facility with land use restrictions); and warning signs and use restrictions via the SRS Site Use/Site Clearance Program. No activities were observed that would have violated the institutional controls.

The Land Use Control Implementation Plan for the FRB OU is located in Appendix A of the CMIR/PCR/FRR and governs LUC implementation, maintenance, monitoring, reporting, and enforcement (WSRC 2001). All LUC objectives are being met.

Are the Exposure Assumptions, Toxicity Data, Cleanup Levels, and Remedial Action Objectives still Valid?

The exposure assumptions, toxicity data, and cleanup levels used at the time of remedy selection are still valid. There have been no changes in physical conditions at the FRB OU that would affect the protectiveness of the remedy. The remedy of grouting the pipeline and excavating soils with disposition in the basin followed by grouting basin soils with placement of a low permeability cover has eliminated the exposure pathway associated with soils and continues to provide protectiveness to humans by eliminating the exposure pathway.

The USEPA standards and toxicity values have been updated since the last five-year remedy review as shown in Appendix B. The changes to the values for COCs at the FRB OU were not significant, and the RAOs continue to be met by the remedial action. No new standards or to-be-considered guidance have been identified that call into question the protectiveness of the remedy.

support the roof. These columns are 1.27-cm (0.5-in) carbon steel pipes filled with concrete and have an outer diameter of 0.6 m (2 ft) and are welded to the top and bottom of the primary tank. Cooling coils in Type I waste tanks are configured in both a horizontal and vertical array, which creates obstacles to waste removal and other activities inside the waste tank. There are approximately 6,954 linear m (22,800 linear ft) of 5.1-cm (2-in) carbon steel pipe cooling coils in a Type I waste tank. Figure H-4 provides a cross-sectional view of a typical Type I waste tank.

Waste Tanks 17, 18, 19 and 20 are Type IV waste tanks constructed in the late 1950s. These waste tanks have a single carbon steel liner with a hemispherical reinforced concrete domed roof. Type IV waste tanks are 25.9 m (85 ft) in diameter and approximately 10.4 m (34 ft) high at the sidewall, with a nominal operating capacity of 4,921,035 L (1.3 million gal). There is no secondary containment structure for Type IV waste tanks. The concrete vault for Type IV waste tanks was built around the primary liner using a technique called "Shotcrete". The core wall was constructed of 1.9 cm (0.75 in) to 3.8 cm (1.5 in) thick layers of "Shotcrete". The core wall is 17.8 cm (7 in) thick at the top and 27.9 cm (11 in) at the bottom. Figure H-5 provides a cross-sectional view of a typical FTF Type IV tank.

Land and Resource Use

The current land use for the FTF is industrial. According to the *Savannah River Site Future Use Project Report* (USDOE 1996a), residential uses of the SRS land should be prohibited. The future land use for the FTF is reasonably anticipated to remain industrial with the U.S. Department of Energy (USDOE) maintaining control of the land.

The FTF is currently in the operational phase and access is controlled by SRS facility security and administrative controls. Additional land use controls (LUCs) are not part of the interim remedial action. ~~A-The final Record of Decision (ROD) remedial action will be evaluated and conducted in the future for the entire FTF OU according to the requirements of the FFA~~ is currently schedule for issuance in January 2042. The Land Use Control Implementation Plan (LUCIP) will be deferred until final closure of the entire FTF OU.

There is no current or projected future use of the groundwater or surface water as a drinking water source at the FTF. According to the Land Use Control Assurance Plan (WSRC 1999), SRS property is to be owned and institutionally controlled by USDOE.

History of Contamination

FTF was constructed to receive waste generated by various SRS production, processing, and laboratory facilities. In F Area, plutonium, uranium, and other radionuclides were separated from irradiated fuel and target assemblies using chemical separation processes. Since beginning operations in the early 1950s, FTF has treated and stored the liquid wastes generated from these processes that are contaminated with heavy metals and high levels of radioactivity.

The use of FTF allowed for isolation of these wastes from the environment, SRS workers, and the public. With FTF and its sister facility, H-Area Tank Farm, facilities are in place to pretreat the accumulated sludge and salt solutions (supernate) to enable the management and treatment of these wastes within other SRS facilities (i.e., Defense Waste Processing Facility and Saltstone Production Facility). These treatment facilities convert the sludge and supernate to more stable forms suitable for permanent disposal in a Federal Repository or the Saltstone Disposal Facility, as appropriate.

The USDOE intends to remove from service those waste tanks that do not meet the standards set forth in Appendix B (High Level Radioactive Waste Tank Systems) of the SRS FFA, pursuant to Section 120 of CERCLA and Sections 3008(h) and 6001 of RCRA, as amended by the Hazardous and Solid Waste Amendments of 1984 (hereafter jointly referred to as RCRA) and the Atomic Energy Act of 1954. It is recognized that the USDOE cannot practicably remove or decontaminate all structures and equipment. In May 2002, USDOE issued an Environmental Impact Statement (EIS) on waste tank cleaning and stabilization alternatives (USDOE 2002a). Evaluations described in the EIS showed the “Empty, clean and fill waste tank with grout” alternative to be the best approach to minimize human health and safety risks associated with closure of the waste tank (USDOE 2002b).

significant problems regarding this FTF Waste Tanks 5, 6, 17, 18, 19, and 20 were identified during the inspection.

VII. Technical Assessment

Is the Remedy Functioning as Intended by the Decision Document?

The interim remedy is functioning as intended as demonstrated below:

The interim remedy that includes annual inspections of the engineered barriers (i.e., visible grout) for physical integrity and inspection for excessive water accumulation is functioning as intended. Annual inspections serve to detect any conditions of the FTF waste tanks and ancillary structures, which have been operationally closed and removed from service, that would compromise stabilization and containment of residual waste and require maintenance actions during the interim period. Annual inspections began in FY2013 for FTF Waste Tanks 17, 18, 19, and 20 and in FY2014 for FTF Waste Tanks 5 and 6 and have been completed through FY2016.

The FTF OU is currently in the operational phase and access is controlled by SRS facility security and administrative controls. OU-specific LUCs have been deferred until final closure of the entire FTF OU.

Are Exposure Assumptions, Toxicity Data, Cleanup Levels, and Remedial Action Objectives still valid?

The FTF is currently in an operational phase. Because of ongoing operations, a CERCLA risk assessment has not been conducted and is not required to support this interim action. Pursuant to USDOE Order 435.1, a PA was prepared and determined that exposure to stabilized residual material in the waste tanks is unlikely during the interim period (SRR 2010). The potential risk lies in the premature degradation of the engineered barriers, which could increase the likelihood of exposure. Therefore, the interim RAO to conduct annual engineered barriers inspections and maintenance for the waste tanks that have been operationally closed and removed from service is still valid.

Following removal from service of all FTF waste tanks and ancillary structures, an evaluation will be conducted for all media (e.g., soils, structures, equipment) in the FTF OU and additional RAOs, as appropriate, will be established at that time.

Has any Other Information Come to Light that Could Call into Question the Protectiveness of the Strategy?

No other information has come to light that could call into question the protectiveness of the interim remedy.

VIII. Issues

The following issue has been identified during this remedy review:

- The FTF OU is currently in the operational phase and access is controlled by SRS facility security and administrative controls. OU-specific LUCs have been deferred until final closure of the entire FTF OU. Since the SRS facility security and administrative controls that restrict authorized access to the FTF OU were not recognized as part of the interim remedy, the interim remedy was not considered as long-term protective is previous five-year remedy reviews.~~There are no issues related to current site conditions that prevent the interim remedy for the FTF Waste Tanks 5, 6, 17, 18, 19, and 20 from being protective.~~

IX. Recommendations and Follow-up Actions

Table H-3 presents the recommendation for the FTF OU. The USDOE recommends revising the FFA Annual Progress Report to include the FTF OU to recognize SRS facility security and administrative controls that restrict access as long-term protective. The USDOE Savannah River Site Manager will certify USDOE compliance with these controls. Further discussion is needed with USEPA and SCDHEC to reach agreement on the revised text and table in the FFA Annual Progress Report.~~There are no recommendations or follow up actions for FTF Waste Tanks 5, 6, 17, 18, 19, and 20.~~

X. Protectiveness Statement(s)

The interim remedy at the FTF Waste Tanks 5, 6, 17, 18, 19, and 20 is currently protective of human health and the environment because access is controlled by SRS facility security and administrative controls.

Waste tanks and ancillary structures removed from service are cleaned and stabilized with grout to reduce the risk of a leak to the environment and to provide a stable waste form. Currently, annual visible inspections are conducted to ensure that the integrity of the stabilization actions for the closed tanks is protected from significant damage or deterioration during the interim period. The FTF PA (SRR 2010) determined that exposure to stabilized residual material in the waste tanks is unlikely during the interim period from the time the individual waste tanks are removed from service until final closure of the entire FTF OU under a final ROD. The final ROD for the FTF OU is scheduled for issuance in January 2042.

The land use for the FTF is industrial with USDOE maintaining control of the land. The FTF is currently in the operational phase and ~~access is controlled by SRS facility security and administrative controls.~~ unit-specific LUCs are not part of the interim action. A LUCIP will be deferred until final closure of the entire FTF OU.

Long-term protectiveness will be achieved by including the FTF OU and the SRS facility security and administrative controls that restrict unauthorized access in the FFA Annual Progress Report. The report is required by the FFA and includes an annual certification by the USDOE Savannah River Site Manager that the listed OUs are in compliance with land use requirements.

XI. Next Review

The Fifth Five-Year Remedy Review Report and subsequent reports will be segregated into five phases. As shown in Appendix A, Table A-1, the next five-year review for SRS OUs with Geosynthetic or Stabilization/Solidification Cover Systems is scheduled for January 2023.

XII. Documents Reviewed

FFA, 1993. *Federal Facility Agreement for the Savannah River Site*, Administrative Docket No. 89-05-FF (Effective Date: August 16, 1993)

SCDHEC, 1993. *Construction Permit #17,424-IW, SRS F/H-Area, Aiken and Barnwell County*, South Carolina Department of Health and Environmental Control, Columbia, SC

SRNS, 2011. *F-Area Tank Farm Groundwater Monitoring Plan*, SRNS-RP-2011-00995, Revision 0, Savannah River Nuclear Solutions, LLC, Savannah River Site, Aiken, SC

SRR, 1997a. *Industrial Wastewater Closure Module for the High-Level Waste Tank 20 System*, PIT-MISC-0002, Revision 1, Savannah River Remediation, LLC, Savannah River Site, Aiken, SC

SRR, 1997b. *Industrial Wastewater Closure Module for the High-Level Waste Tank 17 System*, PIT-MISC-0004, Revision 2, Savannah River Remediation, LLC, Savannah River Site, Aiken, SC.

SRR, 2010. *Performance Assessment for the F-Tank Farm at the Savannah River Site*, SRS-REG-2007-00002, Revision 1, Savannah River Remediation, LLC, Savannah River Site, Aiken, SC

SRR, 2011. *Industrial Wastewater General Closure Plan for F-Area Waste Tank Systems*, LWO-RIP-2009-00009, Revision 3, Savannah River Remediation, LLC, Savannah River Site, Aiken, SC

SRR, 2012a. *Industrial Wastewater Closure Module for the Liquid Waste Tanks 18 and 19*, SRR-CWDA-2010-00003, Revision 2, Savannah River Remediation, LLC, Savannah River Site, Aiken, SC

SRR, 2012b. *Interim Record of Decision Remedial Alternative Selection for the F-Area Tank Farm, Waste Tanks 17 and 20*, SRR-CWDA-2012-00111, Revision 1, Savannah River Remediation, LLC, Savannah River Site, Aiken, SC

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F-Area Tank Farm Operable Unit
~~August~~December 2017**

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Table H-2. Recommendations and Follow-up Actions for the FTF OU

<u>Issues</u>	<u>Recommendations / Follow-up Actions</u>	<u>Party Responsible</u>	<u>Oversight Agency</u>	<u>Milestone Date</u>	<u>Follow-up Actions: Affects Protectiveness (Y/N)</u>	
					<u>Current</u>	<u>Future</u>
<u>Unit specific LUCs for the FTF OU (Waste Tanks 5, 6, 7, 17, 18, 19, and 20) have been deferred until final closure of the entire FTF OU. SRS facility security and administrative controls that restrict unauthorized access to the FTF OU were not previously recognized as part of the interim remedy. Therefore, the interim remedy was not considered as long-term protective.</u>	<u>Revise the FFA Annual Progress Report to include the FTF OU (Waste Tanks 5, 6, 7, 17, 18, 19, and 20) to recognize SRS facility security and administrative controls that restrict access as long-term protective. The USDOE Savannah River Site Manager will certify USDOE compliance with these controls. Further discussion is needed with USEPA/SCDHEC to reach agreement on the revised text and table in the FFA Annual Progress Report.</u>	<u>USDOE</u>	<u>USEPA/ SCDHEC</u>	<u>September 2018</u>	<u>N</u>	<u>N</u>

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Attachment H-1. Five-Year Review Site Inspection Checklist – FTF OU (Waste Tanks 5, 6, 7, 17, 18, 19, and 20)

I. SITE INFORMATION			
Site Name:	FTF OU (Waste Tanks 5, 6, 7, 17, 18, 19, and 20)	Date of Inspection:	10/18/2016
Location and Region	SRS, USEPA Region 4	EPA ID:	CERCLIS #23
Agency, Office, or Company leading the Five-Year Review	USDOE	Weather/ Temperature	Sunny 86°F
Remedy Includes: <i>(Click all that apply)</i>			
<input checked="" type="checkbox"/> Landfill Cover/Containment <input type="checkbox"/> Surface Water Pump and Treatment <input type="checkbox"/> Access Controls <input type="checkbox"/> Monitored Natural Attenuation <input type="checkbox"/> Institutional Controls <input type="checkbox"/> Groundwater Containment <input type="checkbox"/> Groundwater Pump and Treatment <input type="checkbox"/> Vertical Barriers <input type="checkbox"/> Other _____			
Attachments: <input type="checkbox"/> Inspection team roster attached <input type="checkbox"/> Inspection team roster attached			
II. INTERVIEWS <i>(Click all that apply)</i>			
1. SRR Staff:	<u>Mildred Jackson</u> (Name)	<u>Env. Compliance Authority</u> (Title)	<u>10/18/2016</u> (Date)
Interviewed:	<input checked="" type="checkbox"/> At Site <input type="checkbox"/> At Office	<input type="checkbox"/> By Phone	Phone No.: <u>(803)208-8686</u>
Problems/Suggestions:	<input type="checkbox"/> Report Attached		
2. SRR Staff:	<u>Bruce Martin</u> (Name)	<u>Waste Disposal Authority</u> (Title)	<u>10/18/2016</u> (Date)
Interviewed:	<input checked="" type="checkbox"/> At Site <input type="checkbox"/> At Office	<input type="checkbox"/> By Phone	Phone No.: <u>(803)557-9550</u>
Problems/Suggestions:	<input type="checkbox"/> Report Attached		

1.6 hectares (4 acres) in Warner's Pond for a total of 34.9 hectares (85.9 acres). LUCs include the following:

- Warning signs at the OU boundaries to alert on-site workers to the presence of hazardous substances and to prevent unauthorized entry and unrestricted uses.
- ~~Institutional-Site~~ controls (i.e., ~~administrative measures~~) and land use restrictions (i.e., OU-specific perimeter fencing and warning signs) ~~for on-site workers~~ via the Site Use/Site Clearance Program to restrict disturbance of the cover system and waste at each unit and to prevent drinking water use of contaminated groundwater. Other administrative controls to ensure worker safety include work controls, worker training, and worker briefings of health and safety requirements.
- SRS access controls to prevent exposure to trespassers, as described in the 2013 RCRA Permit Renewal Application, Volume I, Section F.1, which describes the security procedures and equipment, 24-hour surveillance system, artificial or natural barriers, control entry systems, and warning signs in place at the SRS boundary.

Figure I-5 presents current photographs of the GSACU OU.

System Operations / Operation and Maintenance

There are no system operational requirements. The following maintenance activities are being taken to maintain the cover systems as long as the waste remains a threat to human health or environment.

- Site inspections of HRB, HP-52 Ponds, Warner's Pond, and ORWBG for evidence of damage to the cover system due to erosion or intrusion by burrowing animals are being performed annually as a minimum. The inspections also address upkeep of the vegetative cover and access control barriers (e.g., the warning signs, fence).
 - Necessary repairs (e.g., replacing eroded or disturbed soil, ~~sign~~ repairing OU-specific warning signs and perimeter fence, etc.) and vegetation management (e.g., mowing, removal of larger vegetation, etc.) are being performed when required.
-

Table I-3 compares the actual operation and maintenance (O&M) costs for the five-year remedy review period to the estimated direct O&M costs from the ROD (WSRC 2002). The estimated O&M cost for FY2012 to FY2016 was \$195,750 for inspections and maintenance. The actual O&M cost for FY2012 to FY2016 is \$283,688. The actual O&M costs are higher than expected because costs for routine site maintenance and preparation of five-year remedy reviews were underestimated in the ROD.

V. Progress since Last Review

The previous protectiveness statement concluded that the remedy of excavation of contaminated soil and consolidation under a low permeability geosynthetic cover system with institutional controls (i.e., LUCs) is protective of human health and the environment.

In the fourth five-year remedy review, SRS recommended that the cover inspection frequency for the ORWBG be reduced to annual (SRNS 2014). This reduction would provide adequate monitoring and consistency since the majority of OU covers at SRS are currently inspected annually. On February 6, 2014, the USDOE submitted a letter (USDOE 2014) to USEPA and SCDHEC to reduce inspection frequencies from quarterly to annual for ORWBG. USEPA and SCDHEC approved the request on March 20, 2014 and March 7, 2014, respectively. Annual inspections for the ORWBG began in 2015.

VI. Five-Year Review Process

The following tasks were performed as part of the five-year review:

- Reviewed the documents listed in Section XII, Documents Reviewed;
 - Confirmed implementation of the remedial action;
 - Inspected the OU, interviewed maintenance personnel and documented the results on the Inspection Checklist provided in Attachment I-1 with the purpose of assessing the protectiveness of the remedy and the functionality of the access controls; and
 - Reviewed changes in standards and to-be-considered guidance.
-

Fact sheets provided on the USEPA webpage regarding emerging contaminants were reviewed for applicability to this site. None of the listed emerging contaminants were identified as applicable to this OU.

Has any Other Information Come to Light that Could Call into Question the Protectiveness of the Remedy?

No other information has come to light that could call into question the protectiveness of the remedy.

VIII. Issues

There are no issues related to current site conditions or activities that currently prevent the remedy from being protective.

IX. Recommendations and Follow-up Actions

There are no recommendations and follow-up actions concerning GSACU OU

X. Protectiveness Statement(s)

The remedy at the GSACU OU is protective of human health and the environment.

Exposure pathways that could result in unacceptable risks are controlled by the institutional controls (i.e., LUCs), environmental monitoring, site inspections and maintenance. All threats to contaminated media at the GSACU have been addressed through implementation of physical access controls to prevent unauthorized entry to SRS (fences, guards, security patrols, etc.), administrative controls that maintain this site for industrial use only, ~~and OU-~~specific perimeter fencing and warning signs, and ~~land-~~use restrictions via the SRS Site Use/Site Clearance Program.

XI. Next Review

The Fifth Five-Year Remedy Review Report and subsequent reports will be segregated into five phases. As shown in Appendix A, Table A-1, the next five-year review for SRS OUs with Geosynthetic or Stabilization/Solidification Cover Systems is scheduled for January 2023.

XII. Documents Reviewed

FFA, 1993. *Federal Facility Agreement for the Savannah River Site*, Administrative Docket No. 89-05-FF (Effective Date: August 16, 1993)

SRNS, 2014. *Fourth Five-Year Remedy Review Report for the Savannah River Site (U) Aiken, South Carolina*, SRNS-RP-2012-00011, Revision 1.1, Savannah River Nuclear Solutions, LLC, Savannah River Site, Aiken, SC.

USDOE, 1996. *Savannah River Site Future Use Project Report*, U.S. Department of Energy, Savannah River Operations Office, Savannah River Site, Aiken, SC

USDOE, 2014. Letter, B. T. Hennessey (DOE) to S. B. Fulmer (SCDHEC) and R. H. Pope (EPA), *Request to Change the Inspection Frequency for Operable Units Based on the Recommendation in the Fourth Five-Year Remedy Review Report for the Savannah River Site (SRNS-RP-2012-00011, Revision 1.1, November 2013)*, CERCLIS Numbers: 13, 14, 16, 17, 20, 23, 26, 32, 39, and 66, ACP-14-125, dated February 6, 2014, Department of Energy, Savannah River Operations Office, Aiken, SC

WSRC, 1996. *Interim Record of Decision Remedial Alternative Selection for the Old Radioactive Waste Burial Ground (643-E) (U)*, WSRC-RP-96-102, Rev. 0, March 1996, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

WSRC, 1999. *Land Use Control Assurance Plan for the Savannah River Site*, WSRC-RP-98-4125, Revision 1.1, latest revision, Savannah River Nuclear Solutions, LLC Savannah River Site, Aiken, SC

WSRC, 2001. *Interim Record of Decision for the Old Solvent Tanks at the Old Radioactive Waste Burial Ground*, WSRC-RP-2000-4193, Revision 1, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

WSRC, 2002. *Record of Decision Remedial Alternatives Selection for the General Separations Area Consolidated Unit*, WSRC-RP-2002-4002, Revision 0, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

WSRC, 2003. *Corrective Measures Implementation/Remedial Action Implementation Plan (CMI/RAIP) for the General Separations Area Consolidation Unit (U)*, WSRC-RP-

cobalt-60. Carbon-14 and strontium-90 were retained as final contaminant migration (CM) COCs as these contaminants were predicted to leach to groundwater and exceed maximum contaminant levels (MCLs) within 1,000 years. The human health and contaminant migration COCs and remedial goals (RGs) as developed in the RI/BRA for KRSB OU (WSRC 1998) are shown in Table J-2.

Tritium, gross alpha, and total radium were detected in groundwater near the KRSB OU at concentrations above maximum contaminant levels (MCLs) from 1992 to 1996. The groundwater has been identified as a separate OU and is, therefore, considered outside the scope of the KRSB OU remedial action. The groundwater will be investigated as part of the K-Area Groundwater OU.

IV. Remedial Actions

Remedy Selection

The plug-in Record of Decision (ROD) process was designed to present a common remedy for high-risk radioactively contaminated OUs at SRS with similarities in history of use, contaminants, risk, and location within current industrial areas. For radiologically contaminated soil that represents principal threat source material (PTSM), in situ stabilization was selected as the common remedy for open reactor seepage basin candidates in the *Plug-in Record of Decision for In Situ Stabilization With Low Permeability Soil Cover for Radiological Contaminants in Soil* approved in October 1999 (WSRC 1999b). A Technical Evaluation Report (TER) (WSRC 1999d) was prepared and verified that cesium-137 was present at high enough levels that the basin soils were considered PTSM and that KRSB OU met the plug-in ROD criteria. PTSM for the plug-in ROD remedy was defined as soil that poses a radiological (or cancer) risk to the future industrial worker equal to or greater than 1E-03.

In lieu of Proposed Plan and ROD documents, an Explanation of Significant Difference (ESD) document was submitted and was approved in March 2000 (WSRC 2000). The

approved ESD is the document that amends the approved plug-in ROD to include the KRSB OU.

As detailed in the Plug-In ROD, the remedial action objectives (RAOs) for the KRSB OU are as follows:

- Prevent human exposure to highly contaminated basin soils (PTSM) by performing stabilization treatment to the extent practicable and filling the basin. Reduce risks to the future worker from surface soils (0 to 0.3 m [0 to 1 ft]) outside the basin by establishing RGs for COCs at concentrations equivalent to 1E-06 for carcinogens and a hazard quotient of 1 for noncarcinogens or background (where background levels of COCs exceed 1E-06).
- Prevent the release of COCs in the soil to groundwater beneath the unit above MCLs or risk-based concentrations (when MCLs are not available). The soil RGs are back-calculated based on these values.
- Protect the ecological receptors indigenous to the area by preventing or limiting contact with contaminated basin soil/pipelines and preventing plants and animals from bringing contaminants up toward the surface.

Because the KRSB OU meets the plug-in ROD criteria, the remedy of in situ stabilization with a low permeability ~~membrane~~ soil cover system was the selected remedy for the KRSB OUs. As described in the ESD, the selected remedy consisted of the following components:

- In situ stabilization through grouting to treat PTSM soil in the basin;
 - Low permeability soil cover system over the in situ stabilized soil to reduce infiltration and prevent exposure to radionuclides in the stabilized soil;
 - Grouting the pipeline to prevent exposure to borrowing animals; and
 - Land use controls (LUCs) to prevent disturbance of the cover system and prohibit residential or agricultural use of the area.
-

The soil cover system was adequately sloped to reduce infiltration and prevent ponding/subsidence. The combination of the grout and constructed cover system effectively provides a barrier to human exposure to the PTSM.

- The soil solidification/stabilization and installation of a low permeability soil cover are designed to protect the groundwater from future contamination from KRSB OU by immobilizing the CM COCs (strontium-90 and carbon-14) and mitigating infiltration through the contaminated media. Results from the cores collected after grouting are reported in the PCR/FRR and show that the leachability index met the test objective for all tests.
 - Review of the cover system annual inspection records indicate that the cap is being maintained and continues to prevent human and ecological exposure to contaminants.
 - A review of the PCR/FRR determined that the solidification of the process sewer pipeline from the KRSB to the K-Reactor Disassembly Basin and removal of 12.3 linear m (41 linear ft) of the grouted pipeline was adequate to prevent ecological receptors from coming into contact with internal contamination. External soil contamination was found to be below the 1E-06 risk threshold; therefore, removal of this soil was not warranted. Some soil excavated to gain access to the process sewer pipeline was consolidated within the KRSB. The pipeline was cut into manageable pieces and grouted in a trench within the basin. The cover system over the basin provides an additional barrier to exposure, and annual inspection of this cover system provides verification that ecological receptors are not in contact with the contaminated process sewer line.
 - The Land Use Control Implementation Plan for the KRSB OU is located in Appendix A of the PCR/FRR and governs LUC implementation, maintenance, monitoring, reporting, and enforcement (WSRC 2002). All LUC objectives are being met.
-

Are Exposure Assumptions, Toxicity Data, Cleanup Levels, and Remedial Action Objectives still valid?

The exposure assumptions, toxicity data, and cleanup levels used at the time of remedy selection are still valid. There have been no changes in physical conditions at the KRSB OU that would affect the protectiveness of the remedy. Because the contaminants have been stabilized and exposure to the contaminated soil has been mitigated via the placement of a low permeability cover, changes in soil standards or to-be-considered guidance would not impact the risks associated with the KRSB OU.

The USEPA standards and toxicity values have been updated since the last five-year remedy review as shown in Appendix B. The changes to the values for COCs at the KRSB OU were not significant, and the RAOs continue to be met by the remedial action. No new standards or to-be-considered guidance have been identified that call into question the protectiveness of the remedy.

Fact sheets provided on the USEPA webpage regarding emerging contaminants were reviewed for applicability to this site. None of the listed emerging contaminants were identified as applicable to this OU.

Has any Other Information Come to Light that Could Call into Question the Protectiveness of the Remedy?

No other information has come to light that could call into question the protectiveness of the remedy.

VIII. Issues

There are no issues related to current site conditions or activities that currently prevent the remedy from being protective.

IX. Recommendations and Follow-up Actions

There are no recommendations or follow-up actions for this OU.

- Reviewed changes in standards and to-be-considered guidance.

Data Review

Two groundwater monitoring wells, LCO 2DL (upgradient of LAOCB) and LCO 6DL (downgradient of LAOCB) (Figure K-4), were sampled and analyzed in the third quarter of 2016 for the following constituents detected in LAOCB soils: carbon-14, cobalt-60, strontium-90, tritium, non-volatile beta, and gross-alpha. The sampling was initiated based on the recommendations and follow-up actions for the LASG OU during the fourth five-year remedy review. All results for both wells were either non-detect or below U.S. Environmental Protection Agency (USEPA) preliminary remediation goals (PRGs)/ maximum contaminant levels (MCLs), and are consistent with historical levels. The 2016 results are listed in Table K-4. These results indicate that the well abandonment and soil stabilization in LAOCB are preventing the migration and leaching of COCs to the groundwater.

Summary of Inspections and Interviews

Interviews were conducted with Richard Feagin, O&M staff member, and Steve Willingham, O&M Staff Member, on September 20, 2016 at the O&M organization offices. No issues were identified during this interview.

The LAOCB OU was inspected by Savannah River Nuclear Solutions, LLC (SRNS) and USDOE personnel on November 21, 2016. No issues were identified for the LAOCB OU during this inspection. A site inspection was conducted by USEPA and SCDHEC personnel, accompanied by USDOE and SRNS personnel, on February 23, 2017. No problems regarding the remedy of this OU were identified during the inspection.

Scheduled annual site inspections conducted from FY2012 through FY2016 active ant mounds, missing OU signs, and hog damage. These findings were documented on the field inspections checklists and resolved soon after discovery.

VII. Technical Assessment

Is the Remedy Functioning as Intended by the Decision Document?

The remedy is functioning as intended as demonstrated below:

- The selected remedy of In-Situ Stabilization and Capping of the LAOCB soil and In-Situ Stabilization and Disposal of the LAOCB pipeline are effective in preventing exposure of human and ecological receptors to radiological constituents in the soil. Annual inspection and maintenance data do not indicate a history of remedy problems or potential remedy failure, which could place protectiveness at risk. Review of the site inspection reports from FY2012 through FY2016 identified active ant mounds, missing OU signs, and evidence of hog damage. These findings were resolved soon after discovery.
 - Consolidation of contaminated soil in the in situ grouted mass under a cover system is effective in eliminating the inhalation, ingestion, and direct exposure pathways associated with the LAOCB soils. Leachability and unconfined compressive strength (UCS) tests were performed on the stabilized material during the remedial action. The results as reported in the Post Construction Report (PCR) / Final Remediation Report (FRR) for the LAOCB, met the acceptance criteria (UCS \geq 50 psi and leachability index \geq 6.0) (WSRC 2001). As reported in the PCR, the low-permeability soil cover test results met the acceptance criteria for hydraulic conductivity ($< 1.0E-05$ cm/s).
 - The selected remedy of In-Situ Stabilization and Capping of the LAOCB soil and In-Situ Stabilization and Disposal of the LAOCB pipeline are effective in preventing the leaching and migration of COCs to the groundwater. Stabilization of the contaminated soil and the presence of a positive drainage soil cover over the stabilized soil reduce infiltration within the area of LAOCB and mitigate the potential for contaminants to migrate to the groundwater. Monitoring wells that were suspected of providing a conduit for contaminant transfer to the groundwater were appropriately abandoned during the remedial action.
-

- Monitoring the effectiveness of the soil stabilization and soil cover over LAOCB with respect to groundwater concentrations is being addressed in the LASG OU Monitored Natural Attenuation remedial action. The technical evaluation of the groundwater data indicates that the well abandonment and soil stabilization in LAOCB are preventing the migration and leaching of COCs to the groundwater (SRNS 2010, SRNS 2012).
- The Land Use Control Implementation Plan for LAOCB OU is located in Appendix A of the PCR/FRR and governs LUC implementation, maintenance, monitoring, reporting, and enforcement of LUCs (WSRC 2001). All LUC objectives are being met.

Are Exposure Assumptions, Toxicity Data, Cleanup Levels, and Remedial Action Objectives still valid?

The exposure assumptions, toxicity data, cleanup levels, and RAOs used at the time of remedy selection are still valid. There have been no changes in physical conditions at the LAOCB OU that would affect the protectiveness of the remedy. Because the contaminants have been stabilized and exposure to the contaminated soil has been mitigated via the placement of a low permeability cover, exposure pathways have been eliminated and the selected remedy continues to be protective. Based on this assessment and review of exposure assumptions, the RAOs used at the time of remedy selection are still valid.

The USEPA standards and toxicity values have been updated since the last five-year remedy review as shown in Appendix B. The changes to the values for COCs at the LAOCB OU were not significant, and the RAOs continue to be met by the remedial action. No new standards or to-be-considered guidance have been identified that call into question the protectiveness of the remedy.

Fact sheets provided on the USEPA webpage regarding emerging contaminants were reviewed for applicability to this site. None of the listed emerging contaminants were identified as applicable to this OU

Has any Other Information Come to Light that Could Call into Question the Protectiveness of the Remedy?

No new information has come to light that could call into question the protectiveness of the remedy.

VIII. Issues

There are no issues related to current site conditions or activities that currently prevent the remedy from being protective.

IX. Recommendations and Follow-up Actions

There are no recommendations or follow-up actions for the LAOCB OU.

X. Protectiveness Statement(s)

The remedy at the LAOCB OU is protective of human health and the environment.

Exposure pathways that could result in unacceptable risks are being controlled by stabilization and capping of contaminated soil, physical access controls to prevent unauthorized entry to SRS (fences, guards, security patrols, etc.), administrative controls that maintain the OU for industrial use only (SRS is a secured government facility with land use restrictions), and warning signs and land use restrictions via the SRS Site Use/Site Clearance Program.

Groundwater contamination associated with the LAOCB is co-mingled with contamination from other sources; therefore, the groundwater remediation is being addressed by the LASG OU and controls are in place to prevent exposure to or ingestion of contaminated groundwater.

XI. Next Review

The Fifth Five-Year Remedy Review Report and subsequent reports will be segregated into five phases. As shown in Appendix A, Table A-1, the next five-year review for SRS

- that the soil covers are in good condition with no evidence of erosion or subsidence. Active ant mounds are frequently observed and are treated upon discovery.
- The low permeability soil cover is effective in preventing the release of COCs in the soil to groundwater beneath the unit above MCLs or RBCs. A review of the Post Construction Report (PCR) / Final Remediation Report (FRR) for LRSB (WSRC 2004) provided evidence that the cover system met the low permeability performance requirements as follows: (1) minimum soil cover thickness is 1.8 m (6 ft) including a 0.6-m (2-ft) thick low permeability soil layer; (2) an 45 cm (18 inch) vegetative layer; and (3) a minimum slope of 3% to reduce infiltration.
 - There were no CM COCs associated with the CRSB OU; therefore, periodic groundwater monitoring for the effectiveness of the soil cover as part of the C-Area Groundwater OU is not required.
 - Groundwater monitoring data with respect to the performance of the cover system for the LRSB OU is collected as part of the L-Area Southern Groundwater OU monitoring program. The CM COC, strontium-90, remains non-detect in monitoring well LSB 4 during the third quarter 2016 sampling, demonstrating the effectiveness of the cover system in preventing migration of contaminants to the groundwater.

The Land Use Control Implementation Plans (LUCIP) for LRSB OU is located in Appendix A of the PCR/FRR for the LRSB OU (WSRC 2004), and the LUCIP for the~~and~~ CRSB Basin 2 govern~~is located in Appendix A of the PCR/FRR for the CRSB OU (WSRC 2003).~~ Both LUCIPs govern LUC implementation, maintenance, monitoring, reporting, and enforcement of LUCs ~~(WSRC 2004 and WSRC 2003, respectively).~~ All LUC objectives are being met.

Are Exposure Assumptions, Toxicity Data, Cleanup Levels, and Remedial Action Objectives still valid?

The exposure assumptions, toxicity data, and cleanup levels used at the time of remedy selection are still valid. There have been no changes in physical conditions at the LRSB OU or CRSB Basin 2 that call into question the protectiveness of the remedy.

The USEPA standards and toxicity values have been updated since the last five-year remedy review as shown in Appendix B. The changes to the values for COCs at the LRSB OU and CRSB Basin 2 were not significant, and the RAOs continue to be met by the remedial action. No new standards or to-be-considered guidance have been identified that call into question the protectiveness of the remedy.

Fact sheets provided on the USEPA webpage regarding emerging contaminants were reviewed for applicability to this site. None of the listed emerging contaminants were identified as applicable to this OU

Has any Other Information Come to Light that Could Call into Question the Protectiveness of the Remedy?

No new information has come to light that could call into question the protectiveness of the remedy.

VIII. Issues

There are no issues related to current site conditions or activities that currently prevent the remedy from being protective.

IX. Recommendations and Follow-up Actions

There are no recommendations or follow-up actions for this OU.

X. Protectiveness Statement(s)

The remedy at the LRSB and CRSB Basin 2 is protective of human health and the environment.

Exposure pathways that could result in unacceptable risks are being controlled by institutional controls (i.e., LUCs) to prevent exposure to or ingestion of contaminated media. All threats associated with exposure to contaminated soil have been addressed with the placement of a low permeability cover system, physical access controls to prevent

**Fifth Five-Year Remedy Review Report for SRS OUs
with Geosynthetic or S/S Cover Systems (U)
LRSB (904-64G) and CRSB (904-67G)
~~August~~December 2017**

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Attachment L-1. Five-Year Review Site Inspection Checklist – L-Area Reactor Seepage Basin (904-64G) Operable Unit (continued)

III. ONSITE DOCUMENTS & RECORDS VERIFIED (Continued)			
2. Health and Safety Plans (HASPs):			
<input type="checkbox"/> Site-Specific Health and Safety Plans	<input type="checkbox"/> Readily Available	<input type="checkbox"/> Up to Date	<input checked="" type="checkbox"/> N/A
<input type="checkbox"/> Contingency Plan/Emergency Response Plan	<input type="checkbox"/> Readily Available	<input type="checkbox"/> Up to Date	<input checked="" type="checkbox"/> N/A
Remarks: <u>Routine O&M activities do not require a SSHASP under 29 CFR 1910.1201, HAZWOPER.</u>			
3. O&M and OSHA Training Records:			
	<input checked="" type="checkbox"/> Readily Available	<input checked="" type="checkbox"/> Up to Date	<input type="checkbox"/> N/A
Remarks: <u>Training Records are complete and up to date per EC&ACP training matrix.</u>			
4. Permits and Service Agreements:			
<input type="checkbox"/> Air Discharge Permit	<input type="checkbox"/> Readily Available	<input type="checkbox"/> Up to Date	<input checked="" type="checkbox"/> N/A
<input type="checkbox"/> Effluent Discharge	<input type="checkbox"/> Readily Available	<input type="checkbox"/> Up to Date	<input checked="" type="checkbox"/> N/A
<input type="checkbox"/> Waste Disposal; POTW	<input type="checkbox"/> Readily Available	<input type="checkbox"/> Up to Date	<input checked="" type="checkbox"/> N/A
<input type="checkbox"/> Other Permits	<input type="checkbox"/> Readily Available	<input type="checkbox"/> Up to Date	<input checked="" type="checkbox"/> N/A
Remarks: _____			
5. Gas Generation Records:			
	<input type="checkbox"/> Readily Available	<input type="checkbox"/> Up to Date	<input checked="" type="checkbox"/> N/A
Remarks: _____			
6. Settlement Monument Records:			
	<input type="checkbox"/> Readily Available	<input type="checkbox"/> Up to Date	<input checked="" type="checkbox"/> N/A
Remarks: _____			
7. Groundwater Monitoring Records:			
	<input type="checkbox"/> Readily Available	<input type="checkbox"/> Up to Date	<input checked="" type="checkbox"/> N/A
Remarks: _____			
8. Leachate Extraction Records:			
	<input type="checkbox"/> Readily Available	<input type="checkbox"/> Up to Date	<input checked="" type="checkbox"/> N/A
Remarks: _____			
9. Discharge Compliance Records:			
<input type="checkbox"/> Air	<input type="checkbox"/> Readily Available	<input type="checkbox"/> Up to Date	<input checked="" type="checkbox"/> N/A
<input type="checkbox"/> Water (Effluent)	<input type="checkbox"/> Readily Available	<input type="checkbox"/> Up to Date	<input checked="" type="checkbox"/> N/A
Remarks: _____			
10. Daily Access/Security Logs:			
	<input type="checkbox"/> Readily Available	<input type="checkbox"/> Up to Date	<input checked="" type="checkbox"/> N/A
Remarks: _____			

Attachment L-1. Five-Year Review Site Inspection Checklist – L-Area Reactor Seepage Basin (904-64G) Operable Unit (continued)

IV. O&M COSTS			
1. O&M Organization:			
<input type="checkbox"/> State In-House	<input type="checkbox"/> Contractor for State		
<input type="checkbox"/> PRP In-House	<input type="checkbox"/> Contractor for PRP		
<input checked="" type="checkbox"/> Other: <u>SRS</u>			
2. O&M Cost Records:			
<input type="checkbox"/> Readily Available	<input type="checkbox"/> Up to Date	<input type="checkbox"/> Funding mechanism/agreement in place	
<input checked="" type="checkbox"/> Other: <u>Project cost data is summarized in Section IV of this OU-specific review.</u>			
Total annual cost by year for review period, if available			
From: _____ (Date)	To: _____ (Date)	_____ (Total Cost)	<input type="checkbox"/> Breakdown attached
From: _____ (Date)	To: _____ (Date)	_____ (Total Cost)	<input type="checkbox"/> Breakdown attached
From: _____ (Date)	To: _____ (Date)	_____ (Total Cost)	<input type="checkbox"/> Breakdown attached
From: _____ (Date)	To: _____ (Date)	_____ (Total Cost)	<input type="checkbox"/> Breakdown attached
From: _____ (Date)	To: _____ (Date)	_____ (Total Cost)	<input type="checkbox"/> Breakdown attached
3. Unanticipated or Unusually High O&M Costs During Review Period			
Describe costs and reasons: _____			

V. ACCESS AND INSTITUTIONAL CONTROLS <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A			
A. Fencing			
1. Fencing Damage: <input checked="" type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Gates secured <input type="checkbox"/> <input checked="" type="checkbox"/> N/A			
Remarks: <u>OU-specific perimeter fencing is required by the remedial action. Perimeter fencing is in good condition.</u>			

B. Signs			
1. Signs and Other Security Measures: <input type="checkbox"/> Location shown on site map <input type="checkbox"/> N/A			
Remarks: <u>Signs are in good condition.</u>			

Maintenance and inspection of the cover system has been effective. Review of the semiannual (annual as of 2015) inspection reports for the period 2012 through 2016 indicate the in-place remedy is functioning properly. The prevalent findings were active ant mounds and vegetation in drainage ditches in need of mowing which were addressed in an expedient manner. Review of the inspection reports indicates the maintenance is operating effectively and efficiently.

The institutional controls (i.e., LUCs) that are in place include physical access controls to prevent unauthorized entry to SRS (fences, guards, security patrols, etc.); administrative controls that maintain the OU for industrial use only (SRS is a secured government facility with land use restrictions); and fencing, warning signs and use restrictions via the SRS Site Use/Site Clearance Program. No activities were observed that would have violated the institutional controls.

The Land Use Control Implementation Plan for the OFASB OU is located in Appendix A of the Post-Construction Report and governs LUC implementation, maintenance, monitoring, reporting, and enforcement (WSRC 2001). All LUC objectives are being met.

Are the Exposure Assumptions, Toxicity Data, Cleanup Levels, and Remedial Action Objectives still Valid?

The exposure assumptions, toxicity data, and cleanup levels used at the time of remedy selection are still valid. There have been no changes in the physical conditions of the OFASB that would affect the protectiveness of the remedy. The remedy remains protective as the exposure pathways have been eliminated through in situ grouting of the contaminated materials (soil and vegetation) in the basin followed by placement of a low-permeability cover system.

The USEPA standards and toxicity values have been updated since the last five-year remedy review as shown in Appendix B. The changes to the values for COCs at the OFASB were not significant, and the RAOs continue to be met by the remedial action.

No new standards or to-be-considered guidance have been identified that call into question the protectiveness of the remedy.

Fact sheets provided on the USEPA webpage regarding emerging contaminants were reviewed for applicability to this site. None of the listed emerging contaminants were identified as applicable to this OU with the exception of further investigation needed for 1,4-dioxane.

Due to the widespread usage of chlorinated solvents at SRS and the use of 1,4-dioxane as a stabilizer in chlorinated solvents, paint strippers, greases, and waxes, SRS began sampling for this constituent at the OFASB as part of the GSA Western Groundwater OU groundwater evaluation in 2010. Fifty-one records were reviewed over the period 2010 through February 2012 representing five sampling events of five monitoring wells, three seepage piezometers, and two surface water sampling locations. All results were non-detects, which provides evidence that 1,4-dioxane is not a COC for the OFASB.

Has any Other Information Come to Light that Could Call into Question the Protectiveness of the Remedy?

No other information has come to light that could call into question the protectiveness of the remedy.

VIII. Issues

There are no issues related to current site operations, conditions, or activities that currently prevent the remedy from being protective.

IX. Recommendations and Follow-up Actions

There are no recommendations or follow-up actions for this OU.

X. Protectiveness Statement(s)

The remedy at the OFASB is protective of human health and the environment.

All threats posed by contamination at the OU have been addressed through in situ stabilization of the contaminated materials, a low permeability cover system, and