United States Department of Energy

Savannah River Site

Interim Record of Decision
Remedial Alternative Selection for the
E-Area Low-Level Waste Facility, 643-26E
(Slit Trench Disposal Units 1 and 2) (U)

CERCLIS Number: 86

SRNS-RP-2009-00538

Revision 1

November 2009

Prepared by:
Savannah River Nuclear Solutions, LLC
Savannah River Site
Aiken, SC 29808

Prepared for U.S. Department of Energy under Contract No. DE-AC09-08SR22470

DISCLAIMER

This document was prepared in conjunction with work accomplished under Contract No. DE-AC09-08SR22470 with the U.S. Department of Energy.

This work was prepared under an agreement with and funded by the U.S. Government. Neither the U.S. Government or its employees, nor any of its contractors, subcontractors or their employees, makes any express or implied: 1. warranty or assumes any legal liability for the accuracy, completeness, or for the use or results of such use of any information, product, or process disclosed; or 2. representation that such use or results of such use would not infringe privately owned rights; or 3. endorsement or recommendation of any specifically identified commercial product, process, or service. Any views and opinions of authors expressed in this work do not necessarily state or reflect those of the United States Government, or its contractors, or subcontractors.

Printed in the United States of America

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

INTERIM RECORD OF DECISION
REMEDIAL ALTERNATIVE SELECTION (U)

E-Area Low-Level Waste Facility, 643-26E

(Slit Trench Disposal Units 1 and 2) (U)

CERCLIS Number: 86

SRNS-RP-2009-00538
Revision 1

November 2009

Savannah River Site
Aiken, South Carolina

Prepared by:

Savanna River Nuclear Solutions, LLC
for the
U. S. Department of Energy under Contract DE-AC09-08SR22470
Savannah River Operations Office
Aiken, South Carolina

This page was intentionally left blank.

DECLARATION FOR THE INTERIM RECORD OF DECISION

Unit Name and Location

E-Area Low-Level Waste Facility, 643-26E (Slit Trench Disposal Units 1 and 2)

Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS) Identification Number: OU-86

Savannah River Site (SRS)

Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) Identification Number: SC1 890 008 989

Aiken, South Carolina

United States Department of Energy (USDOE)

The E-Area Low-Level Waste Facility, 643-26E (Slit Trench Disposal Units 1 and 2) (E-Area LLWF) is listed as a CERCLA regulated unit in Appendix C of the Federal Facility Agreement (FFA) for the SRS. The E-Area LLWF Slit Trench Disposal Units are below-grade earthen trenches used for disposal of CERCLA regulated low-level radioactive waste and other USDOE operational low-level waste.

The FFA is a legally binding agreement between regulatory agencies [United States Environmental Protection Agency (USEPA) and South Carolina Department of Health and Environmental Control (SCDHEC)] and regulated entities (USDOE) that establishes the responsibilities and schedules for the comprehensive remediation of SRS.

The E-Area LLWF is a CERCLA regulated unit only and is not identified as a Solid Waste Management Unit under the Resource Conservation and Recovery Act (RCRA). Therefore, an SRS RCRA permit modification is not required.

Statement of Basis and Purpose

This decision document presents the selected interim remedy for the E-Area LLWF for Slit Trench Disposal Units 1 and 2, at the SRS, in Aiken, South Carolina, which was chosen in accordance with CERCLA, as amended by the Superfund Amendments

Reauthorization Act, and, to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan. This decision is based on the information contained in the Administrative Record File for this site.

The USEPA, SCDHEC and USDOE concur with the selected interim remedy.

Assessment of the Site

The E-Area LLWF was not part of the 1993 FFA because the USDOE operates the facility under the authority of the Atomic Energy Act (AEA) and in accordance with USDOE Order 435.1, *Radioactive Waste Management.* In 1996, the E-Area Slit Trench Disposal Units were approved to receive CERCLA waste per the CERCLA Off-Site Rule (OSR), 40 Code of Federal Regulations § 300.440. However, in February 2007, the 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 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 Performance Assessment (PA), and no exceedence of the USDOE Order 435.1 performance measures had occurred. In July 2007, representatives from the USDOE, USEPA, and the SCDHEC met and resolved issues concerning the disposal of CERCLA waste in the E-Area LLWF Slit Trench Disposal Units. As part of this agreement, the USDOE placed the entire E-Area LLWF on the FFA Appendix C, *RCRA/CERCLA Units.* Placing the E-Area LLWF on Appendix C satisfies the OSR requirement 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 Slit Trench Disposal Units that have reached operational design capacity as an interim remedial action to 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 determined using a sum-of-fractions technique to ensure each radionuclide remains below the disposal limit established by the PA for that radionuclide. This interim remedial action will increase the protection of human health and the environment by adding additional barriers to water infiltration and will significantly reduce the migration of tritium in the vadose zone. The interim remedial action would serve as an enhancement to the current protective measures under USDOE Order 435.1 and will be documented in this Interim Record of Decision (IROD). In addition, the agreement to place the E-Area LLWF in the FFA increases regulatory participation in the final closure decisions for the entire E-Area LLWF. In all other respects, the USDOE will continue to operate the E-Area LLWF under its AEA authority. The entire E-Area LLWF is currently in the operational phase.

The response action selected in this IROD will enhance protection of public health or welfare and the environment from actual or threatened releases of hazardous substances into the environment.

Description of the Selected Remedy

The selected interim action remedy for the E-Area LLWF Slit Trench Disposal Units 1 and 2 is Alternative A-2, Install Operational Stormwater Runoff Covers. When compared to the No Action alternative, Alternative A-2 was selected because the operational stormwater runoff covers are more protective by reducing infiltration into the disposal trenches during the remainder of the E-Area LLWF operational phase. The current land use for the E-Area LLWF is industrial. The E-Area LLWF is currently in the operational phase and access is controlled by SRS facility security and administrative controls. The future land use is reasonably anticipated to remain industrial with DOE maintaining

control of the land. The Land Use Control Implementation Plan (LUCIP) will be deferred until final closure of the entire E-Area LLWF.

Construction of the operational stormwater runoff covers will involve the placement of grading fill and structural fill over the operational soil cover, which will be graded to promote even greater drainage off the trenches. The runoff barrier cover will consist of a low-permeability, geosynthetic material. Sloping under and around the cover material will be adequate to ensure cover stability and optimize drainage. A soil layer will not be installed over the barrier cover material; this will allow visual inspection during both the construction and operational period. The exposed geosynthetic layer will allow for easier and faster detection of damage to the cover system and allow for immediate visual detection of inefficient drainage (e.g., standing water). The stormwater runoff cover will be protected from equipment and vehicle traffic as waste disposal operations continue in the E-Area LLWF. Warning barricades, including sign postings and chains, will be installed around the covered areas. The estimated time to implement the remedy is six (6) months.

Statutory Determinations

The selected interim action alternative, Alternative A-2, Install Operational Stormwater Runoff Covers, is applied as an enhancement to the current protective measures required by USDOE Order 435.1. USDOE agreed to the installation and maintenance of operational stormwater runoff covers for Slit Trench Disposal Units 1 and 2 during the remainder of the E-Area LLWF operational period as an interim remedial action to further reduce stormwater infiltration.

This interim action enhances protection of human health and the environment, complies with Federal and State requirements that are legally applicable or relevant and appropriate to the limited-scope interim remedial action (unless justified by a waiver), and is cost-effective. This action is interim and is not intended to utilize permanent solutions and alternative treatment (or resource recovery) technologies to the maximum

extent practicable for the E-Area LLWF (Slit Trench Disposal Units 1 and 2). Because this action does not constitute the final remedy for the E-Area LLWF, the statutory preference for remedies that employ treatment that reduces toxicity, mobility, or volume as a principal element will be addressed by the final response action. A final remedial action will be evaluated and conducted in the future for the entire E-Area LLWF according to the requirements of the FFA.

Although the interim remedial action will enhance current protective measures, hazardous substances, pollutants, or contaminants will still remain on-site above levels that allow for unlimited use and unrestricted exposure. Therefore, a statutory review will be conducted within five years after initiation of the interim remedial action to ensure that the remedy is and will continue to be protective of human health and the environment. Because this is an IROD, review of the E-Area LLWF (Slit Trench Disposal Units 1 and 2) interim remedy will be ongoing as USDOE continues to develop final remedial alternatives for the E-Area LLWF.

Data Certification Checklist

This IROD provides the following information:

- Because of ongoing operations, a CERCLA risk assessment has not been conducted and is not required to support this interim action. In accordance with USDOE Order 435.1 requirements, the expected migration of radionuclides must be shown in the PA to be protective of groundwater resources. Vadose zone monitoring confirms that migration of radionuclides is within the PA predictions and not expected to exceed drinking water standards at the E-Area LLWF boundary.

- Since this is an interim action, quantitative remediation goals (i.e., site-specific concentrations used as cleanup criteria) are not specified.

- The current land use for the E-Area LLWF is industrial. The E-Area LLWF is currently in the operational phase and access is controlled by SRS facility security

and administrative controls. Additional controls are not part of this interim action. A final remedial action will be evaluated and conducted in the future for the entire E-Area LLWF according to the requirements of the FFA. The LUCIP will be deferred until final closure of the entire E-Area LLWF.

- The selected interim action remedy for the E-Area LLWF (Slit Trench Disposal Units 1 and 2) is Alternative A-2, Install Operational Stormwater Runoff Covers. The estimated capital, operation and maintenance (O&M), and total present worth (PW) cost are presented in the table below.

Cost and Operating Time

Parameter	Alternative A-2
PW Capital Cost	$2,093,215 - $2,323,045
PW O&M Costs	$632,889
Total Estimated Cost	$2,726,104 - $2,955,934
Estimated Time to Implement	6 months
Operating Time	25 years

A range of total estimated costs was provided because three types of geosynthetic material were considered. The type of geosynthetic material will be determined during the design phase and documented in the Interim Remedial Action Implementation Plan.

12/21/09
Date

Helen Belencan
Deputy Assistant Manager for Closure Project
U. S. Department of Energy
Savannah River Operations Office

1-7-10
Date

Franklin E. Hill
Director
Superfund Division
U. S. Environmental Protection Agency - Region 4

1/13/10
Date

Daphne G. Neel
Bureau Chief
Bureau of Land and Waste Management
South Carolina Department of Health and Environmental Control

This page was intentionally left blank

DECISION SUMMARY
IINTERIM REMEDIAL ALTERNATIVE SELECTION (U)

CERCLIS Number: 86

SRNS-RP-2009-00538
Revision 1

November 2009

Savannah River Site
Aiken, South Carolina

Prepared By:

Savannah River Nuclear Solutions, LLC
for the
U. S. Department of Energy under Contract DE-AC09-96SR18500
Savannah River Operations Office
Aiken, South Carolina

This page was intentionally left blank

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF APPENDICES

LIST OF ACRONYMS AND ABBREVIATIONS

ACRONYM	Meaning
AEA	Atomic Energy Act
ARAR	applicable or relevant and appropriate requirement
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CERCLIS	Comprehensive Environmental Response, Compensation, and Liability Information System
CFR	Code of Federal Regulation
E-Area LLWF	E-Area Low-Level Waste Facility, 643-26E (Slit Trench Disposal Units 1 and 2)
EIA	Ethylene Interpolymer Alloy
ESD	Explanation of Significant Differences
FFA	Federal Facility Agreement
ft	Foot or feet
ft^3	Cubic feet
GSA	General Separations Area
HDPE	High Density Polyethylene
IAPP	Interim Action Proposed Plan
IRAIP	Interim Remedial Action Implementation Plan
IROD	Interim Record of Decision
km	kilometer
km^2	square kilometers
LLC	Limited Liability Company
LUCIP	Land Use Controls Implementation Plan
m	meter
m^3	Cubic meters
mi	miles
mi^2	square miles
mrem	millirem
msl	mean sea level
MWMF	Mixed Waste Management Facility
NESHAP	National Emissions Standards for Hazardous Air Pollutants
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NOU	Notice of Unacceptability
NPDES	National Pollutant Discharge Elimination System
NPL	National Priorities List
O&M	operations & maintenance
ORWBG	Old Radioactive Waste Burial Ground
OSR	Off-site rule
PA	Performance Assessment
PM	particulate matter
PW	present worth

LIST OF ACRONYMS AND ABBREVIATIONS (continued)

ACRONYM	Meaning
RAO	remedial action objective
RCRA	Resource Conservation and Recovery Act
RFI	RCRA Facility Investigation
SC	South Carolina
SCDHEC	South Carolina Department of Health and Environmental Control
SRNS	Savannah River Nuclear Solutions, LLC
SRS	Savannah River Site
µg	microgram
USDOE	United States Department of Energy
USEPA	United States Environmental Protection Agency
WSRC	Washington Savannah River Company, LLC
yr	year

I. SAVANNAH RIVER SITE AND OPERABLE UNIT NAME, LOCATION, AND DESCRIPTION

Unit Name, Location, and Brief Description

E-Area Low-Level Waste Facility, 643-26E (Slit Trench Disposal Units 1 and 2)

Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS) Identification Number: OU- 86

Savannah River Site (SRS)

Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) Identification Number: SC1 890 008 989

Aiken, South Carolina (SC)

United States Department of Energy (USDOE)

The SRS occupies approximately 803 km^2 (310 mi^2) of land adjacent to the Savannah River, principally in Aiken and Barnwell counties of SC (Figure 1). SRS is located approximately 40.2 km (25 mi) southeast of Augusta, Georgia, and 32.2 km (20 mi) south of Aiken, SC.

The USDOE owns SRS, which historically produced tritium, plutonium, and other special nuclear materials for national defense and the space program. Chemical and radioactive wastes are by-products of nuclear material production processes. Hazardous substances, as defined by CERCLA, are currently present in the environment at SRS.

This Interim Record of Decision (IROD) is being issued by the USDOE for the E-Area Low-Level Waste Facility, 643-26E (Slit Trench Disposal Units 1 and 2) (E-Area LLWF), with concurrence by the United States Environmental Protection Agency (USEPA) and the South Carolina Department of Health and Environmental Control (SCDHEC). The USDOE functions as the lead agency for SRS remedial activities. The Federal Facility Agreement (FFA) (FFA 1993) for SRS lists the E-Area LLWF, 643-26E (Slit Trench Disposal Units 1 and 2) as a CERCLA regulated unit requiring further evaluation.

The E-Area LLWF was not part of the 1993 FFA because the USDOE operates the facility under the authority of the Atomic Energy Act (AEA) and in accordance with USDOE Order 435.1, *Radioactive Waste Management.* In 1996, the E-Area Slit Trench Disposal Units were approved to receive CERCLA waste per the CERCLA Off-Site Rule (OSR), 40 Code of Federal Regulations (CFR) § 300.440. However, in February 2007, the 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 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 Performance Assessment (PA) (WSRC 2008b), and no exceedence of the USDOE Order 435.1 performance measures had occurred. In July 2007, representatives from the USDOE, USEPA, and the SCDHEC met and resolved issues concerning the disposal of CERCLA waste in the E-Area LLWF Slit Trench Disposal Units. As part of this agreement, the USDOE placed the entire E-Area LLWF on the FFA Appendix C, *RCRA/CERCLA Units*. Placing the E-Area LLWF on Appendix C satisfies the OSR requirement 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.

This IROD selects the placement of operational stormwater runoff covers over Slit Trench Disposal Units 1 and 2 as an interim action. Subsequent Slit Trench Disposal Units will be added to the FFA as they reach design capacity (i.e., operational closure) and will utilize an Explanation of Significant Differences (ESD) to adopt the remedy selected in the IROD and Interim Remedial Action Implementation Plan (IRAIP) for Slit Trench Disposal Units 1 and 2. The placement of stormwater runoff covers over Slit Trench Disposal Units 1 and 2 as an interim action will occur during the E-Area LLWF operational period.

II. SITE AND OPERABLE UNIT COMPLIANCE HISTORY

SRS Operational and Compliance History

The primary mission of SRS has been to produce tritium, plutonium, and other special nuclear materials for our nation's defense programs. Production of nuclear materials for the defense program was discontinued in 1988. SRS has provided nuclear materials for the space program, as well as for medical, industrial, and research efforts up to the present. Chemical and radioactive wastes are by-products of nuclear material production processes. These wastes have been treated, stored, and in some cases, disposed at SRS. Past disposal practices have resulted in soil and groundwater contamination.

On December 21, 1989, SRS was included on the National Priorities List (NPL). The inclusion created a need to integrate the established Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) program with CERCLA requirements to provide for a focused environmental program. In accordance with Section 120 of CERCLA 42 United States Code Section 9620, USDOE has negotiated a FFA (FFA 1993) with the USEPA and SCDHEC to coordinate remedial activities at SRS into one comprehensive strategy 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.

Operable Unit Operational and Compliance History

The E-Area LLWF is located in the central region of the SRS known as the General Separations Area (GSA) (Figure 1). Radioactive waste disposal operations at the E-Area LLWF began in 1994. The E-Area LLWF is comprised of 0.81 km^2 (200 acres), although only 0.40 km^2 (100 acres) have been developed for waste disposal. Over the life of the E-Area LLWF, additional disposal units will be constructed as needed.

USDOE Order 435.1 establishes requirements for the management of radioactive waste and requires that a PA (WSRC 2008b) be prepared and maintained for USDOE low-level waste disposed of after September 26, 1988. The PA must provide reasonable assurance that the facility design and method of disposal will comply with the performance objectives of the USDOE Order, which are concerned with protection of public health and safety in limiting doses to members of the public and limiting releases of radon. The PA is, therefore, used to determine the radionuclide concentrations and inventories allowed in all E-Area LLWF disposal units prior to disposal so that the performance measures are not exceeded.

This IROD is specific for the Slit Trench Disposal Units 1 and 2, which are located within the E-Area LLWF. Slit Trench Disposal Units are below-grade earthen disposal units used for disposal of low-level radioactive waste. Eight Slit Trench Disposal Units, designated Slit Trench Disposal Units 1 through 8, have been sited and waste has been placed within all eight units (Figure 2). 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 6.1 m (20 ft) deep, 6.1 m (20 ft) wide, and approximately 199.9 m (656 ft) long (Figure 3). 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 disposed waste.

The Slit Trench Disposal Units are designed to accept low-level radioactively contaminated soil, rubble, wood debris, concrete, equipment and job control waste (contaminated protective clothing, plastic sheeting, etc.). The waste may be disposed of as bulk waste or contained within B-25 boxes, B-12 boxes, 55-gallon drums, Sealand containers, and other metal containers. The Slit Trench Disposal Units have curie inventory limits established in the PA. Any waste that meets the

waste acceptance criteria is suitable for disposal in the E-Area LLWF Slit Trench Disposal Units.

Slit Trench Disposal Units 1 and 2 were determined operationally closed when the volume capacity for each disposal unit was reached. The volume capacity for each Slit Trench Disposal Unit will vary from the nominal capacity. Slit Trench Disposal Unit 1 reached a total disposal volume of 14,264 m^3 (503,728 ft^3) with a total inventory of 3.98E1 curies. Slit Trench Disposal Unit 2 reached a total disposal volume of 15,560 m^3 (549,496 ft^3) with a total inventory of 1.64E2 curies. There is no single total curie limit for a Slit Trench Disposal Unit. The curie limit for each Slit Trench Disposal Unit is specific for each radionuclide and is determined using a sum-of-fractions technique to ensure each radionuclide remains below the disposal limit established by the PA for that radionuclide. When a Slit Trench Disposal Unit has reached the curie disposal limit established by the PA, the trench is filled to the volume capacity with clean soil. Both Slit Trench Disposal Units 1 and 2 are below the PA curie inventory disposal limits.

Closure Activities under USDOE Order 435.1

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 and 2 and the Naval Reactor Components Area (643-7E), all other disposal facilities in the E-Area LLWF continue to receive waste. The placement of operational stormwater runoff covers on Slit Trench Disposal Units 1 and 2 as an interim action will occur during the E-Area LLWF operational period.

Operational closure will be conducted during an approximately 30-year operation period as E-Area LLWF disposal units are filled. 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 only 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. Figure 4 provides operational photographs of Slit Trench Disposal Units during disposal activities. 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 minimum 1.2 m (4 ft) soil cover, it is determined to be operationally closed by the USDOE.

The interim closure phase for the entire E-Area LLWF begins after all disposal operations in the E-Area LLWF have ceased and all disposal units are operationally closed. An interim low maintenance cover will be installed over all E-Area LLWF disposal units and maintained during the 100-year institutional control period (i.e., interim closure). Subsidence treatment consisting of static surcharging and/or dynamic compaction will be performed at the end of the 100-year institutional control period. Final closure of the Slit Trench Disposal Units will take place at final closure of the entire E-Area LLWF (i.e., at the end of the 100-year institutional control period). Final closure for the entire E-Area LLWF will consist of the installation of an integrated closure system designed to minimize moisture contact with the waste and to provide an intruder deterrent. The final integrated closure system will consist of one or more closure caps installed over all the E-Area LLWF disposal units and will include a new integrated drainage system.

Monitoring Activities under USDOE Order 435.1

A monitoring program for the E-Area LLWF is mandated under USDOE Order 435.1 and the performance measures established in the E-Area LLWF PA. The E-Area Monitoring Program has been in operation since 1999 and is designed to evaluate waste disposal operations relative to the criteria established by the PA. The E-Area Monitoring Program includes monitoring for both the vadose zone beneath and adjacent to the trenches and the groundwater bordering the E-Area LLWF. Provided below is a summary of the E-Area Monitoring Plan activities for the vadose zone and groundwater.

Media	Monitoring Location	Sampling Frequency	Constituent Monitored
Vadose Zone	Beneath and adjacent to trenches	Twice/yr	Tritium
Groundwater	BGX Well Series bordering the E-Area LLWF	Once/yr	Gross Alpha Nonvolatile Beta Tritium

Tritium was selected for monitoring in the vadose zone because its relative mobility makes it a good early indicator of contaminant movement. According to the PA modeling predictions, tritium is expected to be present in the vadose zone beneath the E-Area LLWF. Figure 5 shows the current vadose zone monitoring system in the E-Area LLWF. Since 1999, new lysimeters have been installed and sampled as new disposal areas were built in the E-Area LLWF. Groundwater is currently monitored at the E-Area LLWF by sampling from the BGX well series at the E-Area LLWF fence line (i.e., perimeter wells). The perimeter well samples are analyzed for gross alpha, nonvolatile beta, and tritium on an annual basis. Figure 6 shows the location of the BGX wells near the E-Area LLWF.

Monitoring data is evaluated annually against the performance objectives and measures established in the PA. Results and recommendations from data evaluation are reported and distributed in an annual review conducted through the PA/Composite Analysis maintenance program. The annual review (WSRC 2008a) is used to monitor trends in performance and to evaluate the need for action to ensure that the PA performance measures are not exceeded. This annual report is provided to the regulatory agencies for their information.

According to PA modeling predictions, elevated tritium concentrations are expected in the vadose zone beneath the Slit Trench Disposal Units. The tritium concentrations measured in the vadose zone are well within the PA model

predictions and below levels that would result in exceeding drinking water standards at the E-Area LLWF boundary.

III. HIGHLIGHTS OF COMMUNITY PARTICIPATION

CERCLA requires the public to be given an opportunity to review and comment on the proposed interim remedial alternative. Public participation requirements are listed in Sections 113 and 117 of CERCLA (42 United States Code Sections 9613 and 9617). These requirements include establishment of an Administrative Record File that documents the investigation and selection of the remedial alternative for reducing infiltration over the E-Area LLWF Slit Trench Disposal Units. The Administrative Record File must be established at or near the facility at issue.

The SRS FFA Community Involvement Plan (WSRC 2006) is designed to facilitate public involvement in the decision-making process for permitting, closure, and the selection of remedial alternatives. The SRS FFA Community Involvement Plan addresses the requirements of RCRA, CERCLA, and the National Environmental Policy Act, 1969. Section 117(a) of CERCLA, as amended, requires the advertisement of the notice of any proposed remedial action and requires that the public be provided an opportunity to participate in the selection of the remedial action. The *Interim Action Proposed Plan for the E-Area Low-Level Waste Facility, 643-26E (Slit Trench Disposal Units 1 and 2)* (SRNS 2009) is a part of the Administrative Record File and identifies the preferred interim remedial action for addressing the Slit Trench Disposal Units 1 and 2. The FFA Administrative Record File, which contains the information pertaining to the selection of the response action, is available at the following locations:

US Department of Energy
Public Reading Room
Gregg-Graniteville Library
University of South Carolina – Aiken
171 University Parkway
Aiken, South Carolina 29801
(803) 641-3465

Thomas Cooper Library
Government Documents Department
University of South Carolina
Columbia, South Carolina 29208
(803) 777-4866

The E-Area LLWF is a CERCLA regulated unit and is not identified as a Solid Waste Management Unit under RCRA. Therefore, an SRS RCRA permit modification is not required.

The public was notified of the public comment period through mailings of the *SRS Environmental Bulletin*, a newsletter sent to citizens in South Carolina and Georgia, and through notices in the *Aiken Standard*, the *Allendale Citizen Leader*, the *Augusta Chronicle*, the *Barnwell People-Sentinel*, and *The State* newspaper. The public comment period was also announced on local radio stations.

The Interim Action Proposed Plan (IAPP) 30-day public comment period began on June 1, 2009 and ended on July 1, 2009. A Responsiveness Summary, prepared to address any comments received during the public comment period, is provided in Appendix A of the IROD.

IV. SCOPE AND ROLE OF THE OPERABLE UNIT

Due to the complexity and size of multiple waste units in different areas, the SRS is divided into watersheds for the purpose of managing a comprehensive cleanup strategy. Waste units within a watershed are evaluated and remediated individually or grouped with other waste units and evaluated as part of a larger Area Operable Unit. The E-Area LLWF is located within the Upper Three Runs watershed.

The scope of the interim remedial action will address the E-Area LLWF Slit Trench Disposal Units 1 and 2 specifically, both of which have been filled to

volume capacity limits and have been determined by USDOE to be operationally closed. A minimum 1.2 m (4 ft) operational soil cover was placed over both disposal units to meet the objectives of the PA and to be protective of human health and the environment. Although the operational soil cover is protective, stormwater will naturally infiltrate the soil column overlying the buried waste in the Slit Trench Disposal Units. As an enhancement to the current protective measures required by USDOE Order 435.1, the USDOE agreed to install and maintain operational stormwater runoff covers for Slit Trench Disposal Units 1 and 2 during the remainder of the E-Area LLWF operational period as an interim remedial action to further reduce stormwater infiltration.

The interim remedial action for the E-Area LLWF will be consistent with the final action selected for this facility.

V. OPERABLE UNIT CHARACTERISTICS

Site Characteristics

The elevation of the SRS ranges from 23.5 m (77 ft) above mean sea level (msl) at the Savannah River to about 119.2 m (391 ft) msl in the upper northwest portion of the site. The Pleistocene Coastal terraces and the Aiken Plateau form two distinct physiographic sub-regions at the SRS. The Pleistocene Coastal terraces are below 80.2 m (263 ft) in elevation, with the lowest terrace constituting the present floodplain of the Savannah River and the higher terraces characterized by gently rolling topography. The relatively flat Aiken Plateau occurs above 80.2 m (263 ft) and is dissected by numerous streams. Because of the large number of tributaries to small streams on the SRS, no location on the site is far from a flowing stream, most of which drain to the Savannah River.

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 northernmost corner. The site is bordered by three streams with several intermittent streams present within the area boundary (Figure 7). 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).

Operational Stormwater Runoff Cover Conceptual Model

As stated in the PA, the most significant pathway for release of contaminants is through the groundwater. During the operational phase, stormwater naturally infiltrates into the soil column overlying the buried waste and impacts the migration of tritium to groundwater.

VI. CURRENT AND POTENTIAL FUTURE SITE AND RESOURCE USES

Land Uses

The current land use for the E-Area LLWF is industrial. The E-Area LLWF is currently in the operational phase and access is controlled by SRS facility security and administrative controls. Additional controls are not part of this interim action. A final remedial action will be evaluated and conducted in the future for the entire E-Area LLWF according to the requirements of the FFA. The Land Use Control

Implementation Plan (LUCIP) will be deferred until final closure of the entire E-Area LLWF.

According to the Savannah River Site Future Use Project Report (USDOE 1996), residential uses of SRS land should be prohibited. The Savannah River Site Long Range Comprehensive Plan (USDOE 2000) designates the E-Area LLWF as being within a site industrial area. Therefore, industrial land use is the reasonably anticipated future land use scenario.

Groundwater Uses/Surface Water Uses

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.

VII. SUMMARY OF OPERABLE UNIT RISKS

Baseline Risk Assessment

The E-Area LLWF is located in an area designated exclusively for industrial use. The E-Area LLWF is currently in the operational phase. Because of ongoing operations, a CERCLA risk assessment has not been conducted and is not required to support this interim action. In accordance with USDOE Order 435.1 requirements, the expected migration of radionuclides must be shown in the PA to protect groundwater resources. Vadose zone monitoring confirms that migration of radionuclides is within the PA predictions and not expected to exceed drinking water standards at the E-Area LLWF boundary.

VIII. REMEDIAL ACTION OBJECTIVES AND REMEDIAL GOALS

Remedial action objectives (RAOs) are unit-specific goals that describe what the proposed action is expected to accomplish to be protective of human health and

the environment and to mitigate the effects of contamination. RAOs are based on an evaluation of applicable or relevant and appropriate requirements (ARARs) and to-be-considered requirements.

As stated in the PA, the most significant pathway for release of contaminants is through the groundwater. During the operational phase, stormwater naturally infiltrates into the soil column overlying the buried waste and impacts the migration of tritium to groundwater. The interim RAO established for this IROD is to:

- Further reduce stormwater infiltration for Slit Trench Disposal Units 1 and 2 by enhancing stormwater runoff during the E-Area LLWF operational period.

Table 1 summarizes potential ARARs for the interim action for Slit Trench Disposal Units 1 and 2. Since this is an interim action, quantitative remediation goals (i.e., site-specific concentrations used as cleanup criteria) are not specified.

IX. DESCRIPTION OF ALTERNATIVES

Remedy Components, Common Elements, and Distinguishing Features of Each Alternative

Alternatives considered for the E-Area LLWF were limited due to the scope of the action. The alternatives evaluated were:

Alternative 1 (A-1), No Action: The No Action alternative is required for all remedial evaluations by CERCLA and is provided as a baseline for comparison. As previously discussed, a minimum 1.2 m (4 ft) operational soil cover was placed over the waste in both disposal units during the operational period. Alternative A-1 assumes that no other action is performed during the remainder of the E-Area LLWF operational phase. There are no capital, construction or system operation and maintenance (O&M) costs for the No Action alternative. This

remedial alternative does not entail five-year remedy reviews. This alternative can be implemented immediately. No additional interim action is performed and no additional resources are expended. For this reason, there are no costs associated with the No Action remedial alternative.

Alternative 2 (A-2), Install Operational Stormwater Runoff Covers: The scope of the interim remedial action will address Slit Trench Disposal Units 1 and 2 specifically, both of which have been filled to volume capacity limits and have been determined by USDOE to be operationally closed. A minimum 1.2 m (4 ft) operational soil cover was placed over the waste in both disposal units to meet the objectives of the PA and to be protective of human health and the environment. Although the operational soil cover is protective, stormwater will naturally infiltrate the soil column overlying the buried waste in the Slit Trench Disposal Units.

As an enhancement to the current protective measures required by USDOE Order 435.1, the USDOE agreed to install and maintain operational stormwater runoff covers for Slit Trench Disposal Units 1 and 2 during the remainder of the E-Area LLWF operational period as an interim remedial action to further reduce stormwater infiltration.

Construction of the operational stormwater runoff covers will entail the placement of grading fill and structural fill over the operational soil cover and grading to promote even greater drainage off the trenches (Figure 8). The runoff cover barrier will consist of a low-permeability, geosynthetic material. Sloping under and around the cover material will be adequate to ensure cover stability and promote positive drainage. A soil layer will not be installed over the barrier cover material to allow for visual inspection during both the construction and operational period. The exposed geosynthetic layer will allow for easier and faster detection of damage to the cover system and for immediate visual detection

of inefficient drainage (e.g., standing water). The stormwater runoff cover will be protected from equipment and vehicle traffic as waste disposal operations continue in the E-Area LLWF. Warning barricades, including sign postings and chains, will be installed around the covered areas. Inadvertent intrusion into the Slit Trench Disposal Unit waste is not considered feasible during the operational closure period due to the facility security and administrative controls. Detailed design requirements for the operational stormwater runoff covers will be presented in the IRAIP. The operational stormwater runoff covers will be maintained and repaired, as necessary, for the remainder of the E-Area LLWF operational period.

Cost estimates are based on present worth (PW) analysis, which allows for cost comparisons of different remedial alternatives on the basis of a single cost value (i.e., present value). The estimated PW costs for Alternative A-2 are provided below and include the estimated capital installation costs, O&M costs, and total PW estimated costs. PW costs are based on 3.9% interest rates for projects with an operating time period of 11 years or longer.

The PW capital cost for installation of the low-permeability geosynthetic liner (including labor, equipment and material) depends on the type of geosynthetic material selected. The type of geosynthetic material will be determined during the design phase and documented in the IRAIP. Because capital costs will vary depending on the geosynthetic material selected, an estimated cost range is presented below for a lower cost high-density polyethylene (HDPE) 60 Mil liner, an ethylene interpolymer alloy (EIA) 30 Mil liner, and a higher cost EIA 20 Mil (chemical resistant) liner. O&M costs remain the same for the liner materials evaluated.

Parameter	Alternative A-2
PW Capital Cost	$2,093,215 - $2,323,045
PW O&M Costs	$632,889
Total Estimated Cost	$2,726,104 - $2,955,934
Estimated Time to Implement	6 months
Operating Time	25 years

The detailed cost estimates for the three types of geosynthetic material under consideration are provided in Appendix B.

X. COMPARATIVE ANALYSIS OF ALTERNATIVES

A set of nine criteria established by the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) is used to compare remedial alternatives. The criteria were derived from the statutory requirements of CERCLA Section 121. The NCP [40 CFR § 300.430 (e) (9)] sets forth the nine evaluation criteria that provide the basis for evaluating alternatives and selecting a remedy. The nine criteria are categorized into three groups: threshold criteria, primary balancing criteria, and modifying criteria. The threshold criteria must be satisfied in order for an alternative to be eligible for selection. The primary balancing criteria are used to weigh major tradeoffs among the alternatives. Generally, the modifying criteria are taken into account after public comment is received on the IAPP. The criteria are listed below:

Threshold Criteria

1. Overall protection of human health and the environment;

2. Compliance with ARARs;

Primary Balancing Criteria

3. Long-term effectiveness and permanence;

4. Reduction of toxicity, mobility, or volume through treatment;

5. Short-term effectiveness;

6. Implementability;

7. Cost;

Modifying Criteria

8. State acceptance (approval of the IROD will constitute approval of the selected alternative by the regulatory agencies);

9. Community acceptance.

The first seven criteria are used to evaluate the alternatives based on human health and environmental protection, cost, and feasibility issues (Table 2). The selected interim action alternative is further evaluated under the state acceptance and community acceptance criteria, based on comments during the public review period.

Overall Protection of Human Health and the Environment – The remedial alternatives are assessed to determine the degree to which each alternative eliminates, reduces, or controls threats to human health and the environment through treatment, engineering methods, or institutional controls.

Alternative A-1 is protective of human health and the environment under USDOE Order 435.1. Alternative A-2 is more protective by reducing infiltration and enhancing stormwater runoff for Slit Trench Disposal Units 1 and 2.

Compliance with ARARs – ARARs are federal and state environmental regulations that establish standards that remedial actions must meet unless waived consistent with the NCP. There are three types of ARARs: (1) chemical-specific, (2) location-specific, and (3) action-specific.

Chemical-specific ARARs are usually health- or risk-based levels or methodologies that, when applied to unit-specific conditions, result in the establishment of numerical values. Often these values are promulgated in federal and state regulations. There are no chemical-specific ARARs for Alternatives A-1 or A-2.

Location-specific ARARs are restrictions placed on the concentration of hazardous substances or the conduct of activities solely because they are in specific locations. Some examples of specific locations include floodplains, wetlands, historic places, and sensitive ecosystems or habitats. There are no location-specific ARARs for Alternatives A-1 or A-2.

Action-specific ARARs are usually technology- or remedial activity-based requirements or limitations on actions taken with respect to hazardous substances or unit-specific conditions. These requirements are triggered by the particular remedial activities selected to accomplish a remedy. Action-specific ARARs are not applicable to Alternative A-1 because no interim action is conducted, but are applicable to Alternative A-2. Alternative A-2 has the potential to generate particulates (dust) during installation of the stormwater runoff covers which would be controlled to meet SC regulations (SC R.61-62.6, Control of Fugitive Particulate Matter). Prior to construction activities, SC regulations (SC R.72-300, Standards for Stormwater Management and Sediment Reduction) may require a stormwater management and sediment control plan for Alternative A-2. In addition, any construction activities must ensure that radionuclide emissions to the ambient air do not exceed those amounts that would cause any member of the public to receive an effective dose equivalent of 10 mrem/yr to comply with the National Emissions Standards for Hazardous Air Pollutants (NESHAP) (40 CFR 61). A complete list of action-specific ARARs is provided in Table 1.

Long-term Effectiveness and Permanence – The remedial alternatives are assessed based on their ability to maintain reliable protection of human health and the environment after implementation. Alternative A-1 is protective because radioactivity in waste is modeled prior to disposal and disposal limits are established to meet USDOE Order 435.1 performance measures. Risk to groundwater is further reduced under Alternative A-2 by enhancing stormwater runoff. Neither alternative is permanent and the interim action is not designed or expected to be final.

Reduction of Toxicity, Mobility, or Volume Through Treatment – The remedial alternatives are assessed based on the degree to which they employ treatment that reduces toxicity (the harmful nature of the contaminants), mobility (the ability of the contaminants to move through the environment), or the volume of contaminants associated with the unit. Neither Alternative A-1 nor A-2 utilize treatment as a component of the interim action.

Short-Term Effectiveness – The remedial alternatives are assessed considering factors relevant to implementation of the remedial action, including risks to the community during implementation, impacts on workers, potential environmental impacts (e.g., air emissions), and the time until protection is achieved. Alternative A-1 meets the criteria to be effective in the short-term. Alternative A-1 would not pose a short-term risk to the community or workers, and it requires no time to implement. In addition, Alternative A-1 poses no short-term risk to the environment because groundwater is protected to meet USDOE Order 435.1 performance measures. Alternative A-2 poses no additional risks to the community and workers will be protected by health and safety plans and procedures. Alternative A-2 will achieve the interim RAO to enhance groundwater protection immediately following installation of the stormwater runoff covers.

Implementability – The remedial alternatives are assessed by considering the difficulty of implementing the alternative, including technical feasibility, constructability, reliability of technology, ease of undertaking additional remedial actions (if required), monitoring considerations, administrative feasibility (regulatory requirements), and availability of services and materials. No implementation is associated with Alternative A-1. Alternative A-2 would be readily implementable since geosynthetic covers are a well demonstrated and commonly used technology at SRS. The ability to monitor the effectiveness of the remedy is achieved for Alternative A-2 through visual inspection of the cover barrier material during both the construction and operational periods.

Cost – The evaluation of remedial alternatives must include capital and O&M costs. Present value costs are estimated within +50/-30% according to USEPA guidance, with a graduated discount factor for increasing O&M time. There is no interim action cost incurred from Alternative A-1 because no additional action is taken. The cost estimate for Alternative A-2 was prepared from information available at the time of the estimate. The final costs of the project will depend on actual labor and material costs, actual site conditions, productivity, competitive market conditions, final project scope, final project schedule and other variable factors. As a result, the final project costs may vary from the estimates presented herein. The assumed time frame for O&M costs for Alternative A-2 is 25 years before the operational stormwater runoff covers are replaced with the E-Area LLWF interim phase cover.

XI. THE SELECTED REMEDY

Detailed Description of the Selected Remedy

The selected interim action alternative for Slit Trench Disposal Units 1 and 2 is Alternative A-2, Install Operational Stormwater Runoff Covers as an interim remedial action. When compared to the No Action alternative, Alternative A-2

was selected because the operational stormwater runoff covers are more protective by accelerating the reduction of infiltration into the disposal trenches during the remainder of the E-Area LLWF operational phase.

Construction of the operational stormwater runoff covers will involve the placement of grading fill and structural fill over the operational soil cover, which will be graded to promote even greater drainage off the trenches (Figure 8). The runoff cover barrier will consist of a low-permeability, geosynthetic material. Sloping under and around the cover material will be adequate to ensure cover stability and promote positive drainage. A soil layer will not be installed over the barrier cover material; this will allow for visual inspection during both the construction and operational period. The exposed geosynthetic layer will allow for easier and faster detection of damage to the cover system and allow for immediate visual detection of inefficient drainage (e.g., standing water). The stormwater runoff cover will be protected from equipment and vehicle traffic as waste disposal operations continue in the E-Area LLWF. Warning barricades, including sign postings and chains, will be installed around the covered areas.

The current land use for the E-Area LLWF is industrial with 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 controls are not part of this interim action. A final remedial action will be evaluated and conducted in the future for the entire E-Area LLWF according to the requirements of the FFA. The LUCIP will be deferred until final closure of the entire E-Area LLWF.

Based on information currently available, the lead agency believes the selected interim action provides the best balance of tradeoffs with respect to the evaluation criteria. The USDOE expects the selected interim action to satisfy the statutory requirements in CERCLA Section 121(b) to 1) be protective of human health and

the environment, 2) comply with ARARs (Table 1), and 3) be cost effective (Table 2). Subsequent Slit Trench Disposal Units will be added to the FFA as they reach design capacity and will utilize an ESD to adopt the remedy selected in the IROD and IRAIP for Slit Trench Disposal Units 1 and 2.

Cost Estimate for the Selected Remedy

The cost estimate information in Appendix B is based on the best available information regarding the anticipated scope of the interim remedial action. Changes in the cost elements are likely to occur as a result of new information and data collected during the engineering design of the remedial action. Major changes may be documented in the form of a memorandum in the Administrative Record File, an ESD, or a ROD amendment. This is an order-of-magnitude engineering cost estimate that is expected to be within +50 to –30 percent of the actual project cost.

XII. STATUTORY DETERMINATIONS

The selected interim action remedy, Alternative A-2, is applied as an enhancement to the current protective measures required by USDOE Order 435.1. USDOE has agreed to install and maintain operational stormwater runoff covers for Slit Trench Disposal Units 1 and 2 during the remainder of the E-Area LLWF operational period as an interim remedial action to further reduce stormwater infiltration.

The E-Area LLWF is currently in the operational phase and access is controlled by SRS facility security and administrative controls. Although the interim remedial action will enhance current protective measures, hazardous substances, pollutants, or contaminants will still remain on-site above levels that allow for unlimited use and unrestricted exposure. Therefore, a statutory review will be conducted within five years after initiation of the interim remedial action to

ensure that the remedy is and will continue to be protective of human health and the environment.

This interim action enhances protection of human health and the environment, complies with Federal and State requirements that are legally applicable or relevant and appropriate to the limited-scope interim remedial action (unless justified by a waiver), and is cost-effective. This action is interim and is not intended to utilize permanent solutions and alternative treatment (or resource recovery) technologies to the maximum extent practicable for this E-Area LLWF (Slit Trench Disposal Units 1 and 2). Because this action does not constitute the final remedy for the E-Area LLWF, the statutory preference for remedies that employ treatment that reduces toxicity, mobility, or volume as a principal element will be addressed by the final response action. A final remedial action will be evaluated and conducted in the future for the entire E-Area LLWF according to the requirements of the FFA.

XIII. EXPLANATION OF SIGNIFICANT CHANGES

The interim action remedy selected in this IROD does not contain any significant changes from the preferred alternative presented in the IAPP. No comments were received during the public comment period.

XIV. RESPONSIVENESS SUMMARY

The Responsiveness Summary is included as Appendix A of this document.

XV. POST-ROD DOCUMENT SCHEDULE AND DESCRIPTION

The interim remedial action schedule is provided in Figure 9. The Clean Version *Interim Action Proposed Plan for the E-Area LLWF, 643-26E (Slit Trench Disposal Units 1 and 2)* (SRNS 2009) was submitted to the regulatory agencies on May 29, 2009 ahead of schedule. This IROD is due after receipt of, and

response to, public and regulatory comments on the IAPP. The IROD is due to the regulatory agencies on July 30, 2009, with an issue IROD date of April 19, 2010. The IRAIP submittal date is November 4, 2009, and the remedial action start date is August 4, 2010.

XVI. REFERENCES

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

SRNS 2009. *Interim Action Proposed Plan for the E-Area Low-Level Waste Facility, 643-26E (Slit Trench Disposal Units 1 and 2) (U),* Revision 1, SRNS-RP-2008-01308, Savannah River Nuclear Solutions, Savannah River Site, Aiken, SC (April).

USDOE, 1996. *SRS Future Use Project Report*, Stakeholder Preferred Recommendations for SRS Land Use Facilities, United States Department of Energy, Savannah River Operations Office, Aiken, SC

USDOE, 2000. *Long Range Comprehensive Plan*, United States Department of Energy, Savannah River Operations Office, Aiken, SC.

WSRC 1999. *Land Use Control Assurance Plan for the Savannah River Site,* Revision 1.1, WSRC-RP-98-4125, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC (Updated January 2008)

WSRC 2006. *Savannah River Site Federal Facility Agreement Community Involvement Plan (U),* Revision 5, WSRC-RP-96-120, Savannah River Operations Office, Aiken, SC (July)

WSRC 2008a. *FY2007 Annual Review E-Area Low-Level Waste Facility Performance Assessment and Composite Analysis*, Rev. 0, WSRC-RP-2008-

00228, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC (February)

WSRC 2008b. *E-Area Low-Level Waste Facility USDOE 435.1 Performance Assessment,* Rev. 0, WSRC-STI-2007-00306, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC (March)

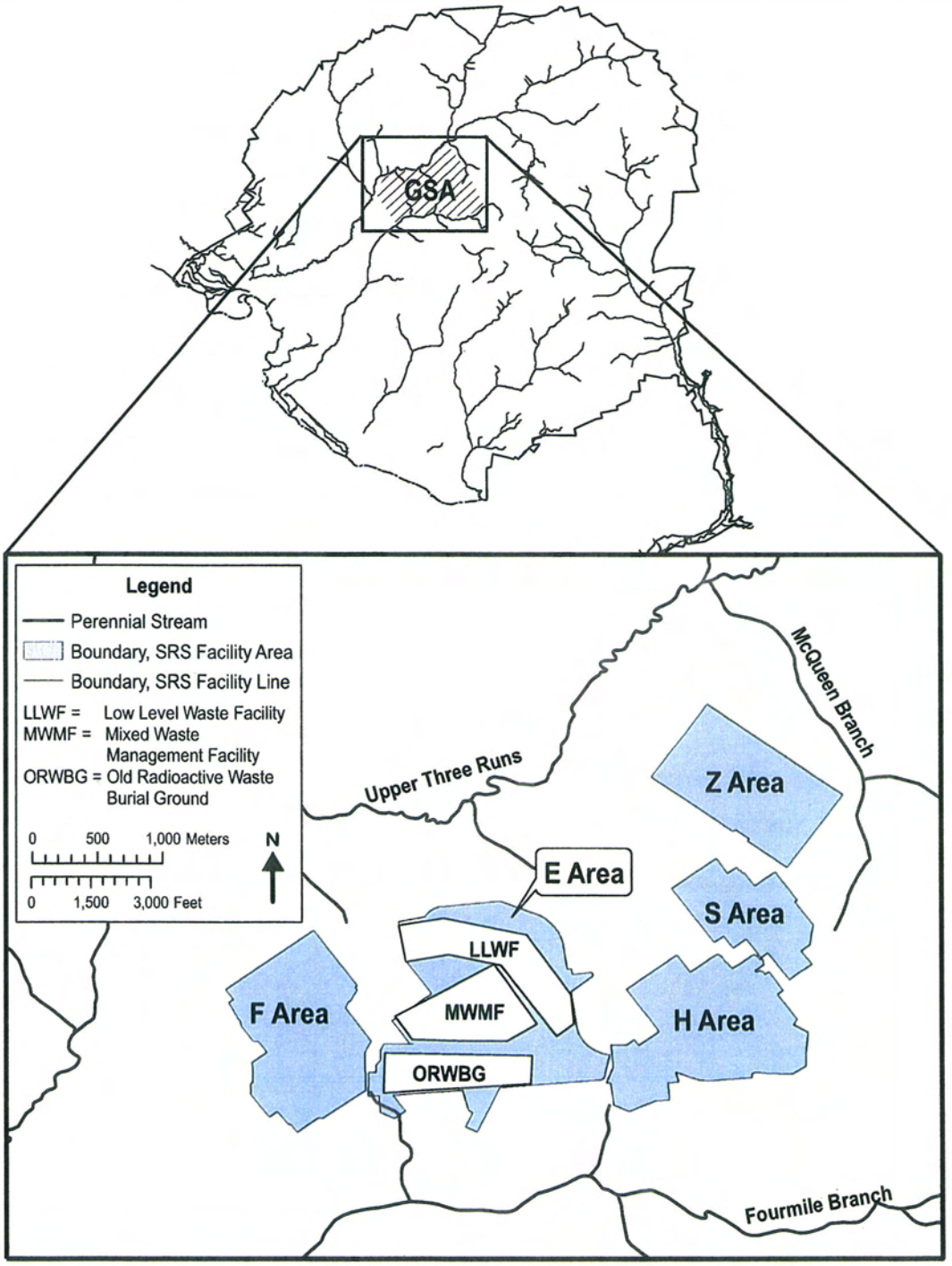

Figure 1. Location of the E-Area LLWF within the General Separations Area at the Savannah River Site

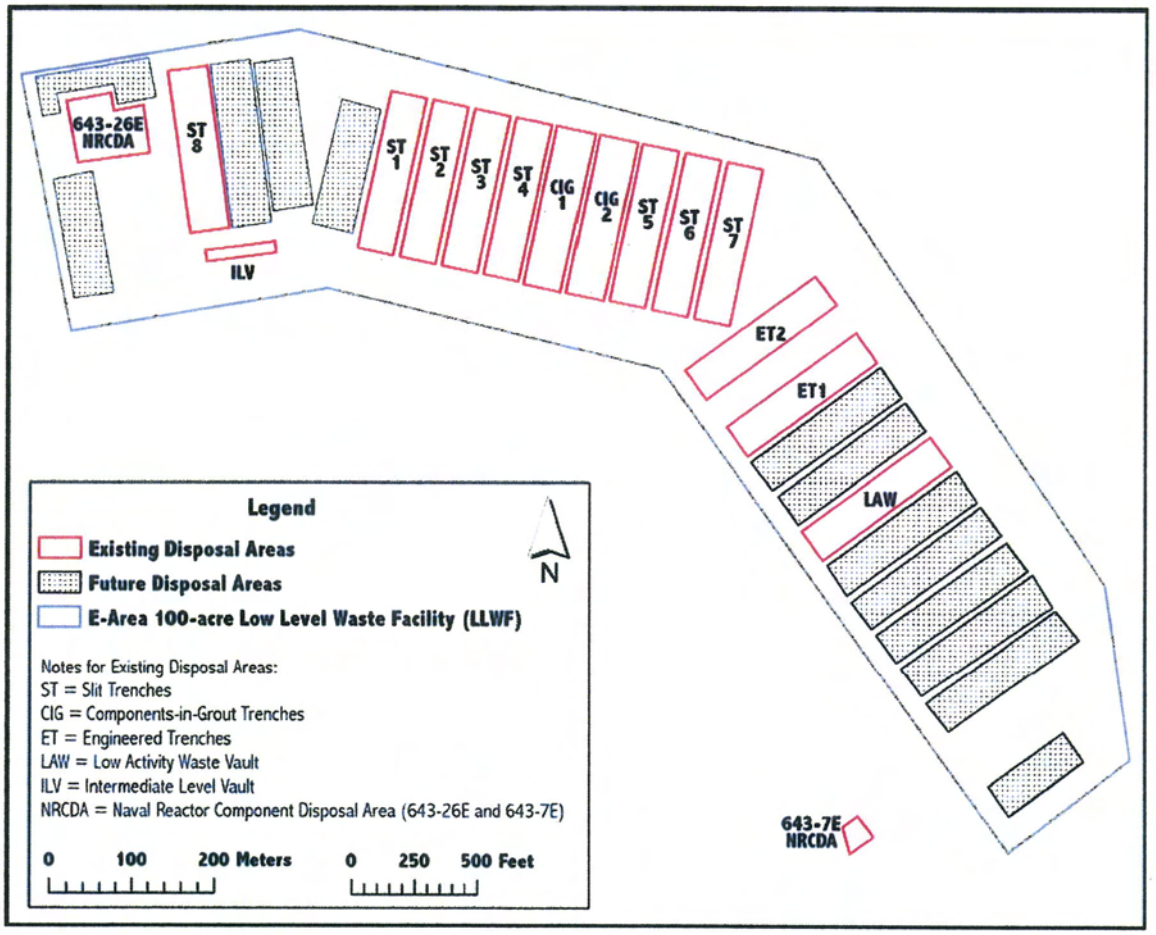

Figure 2. **Location of the Slit Trench Disposal Units Footprint within the E-Area LLWF**

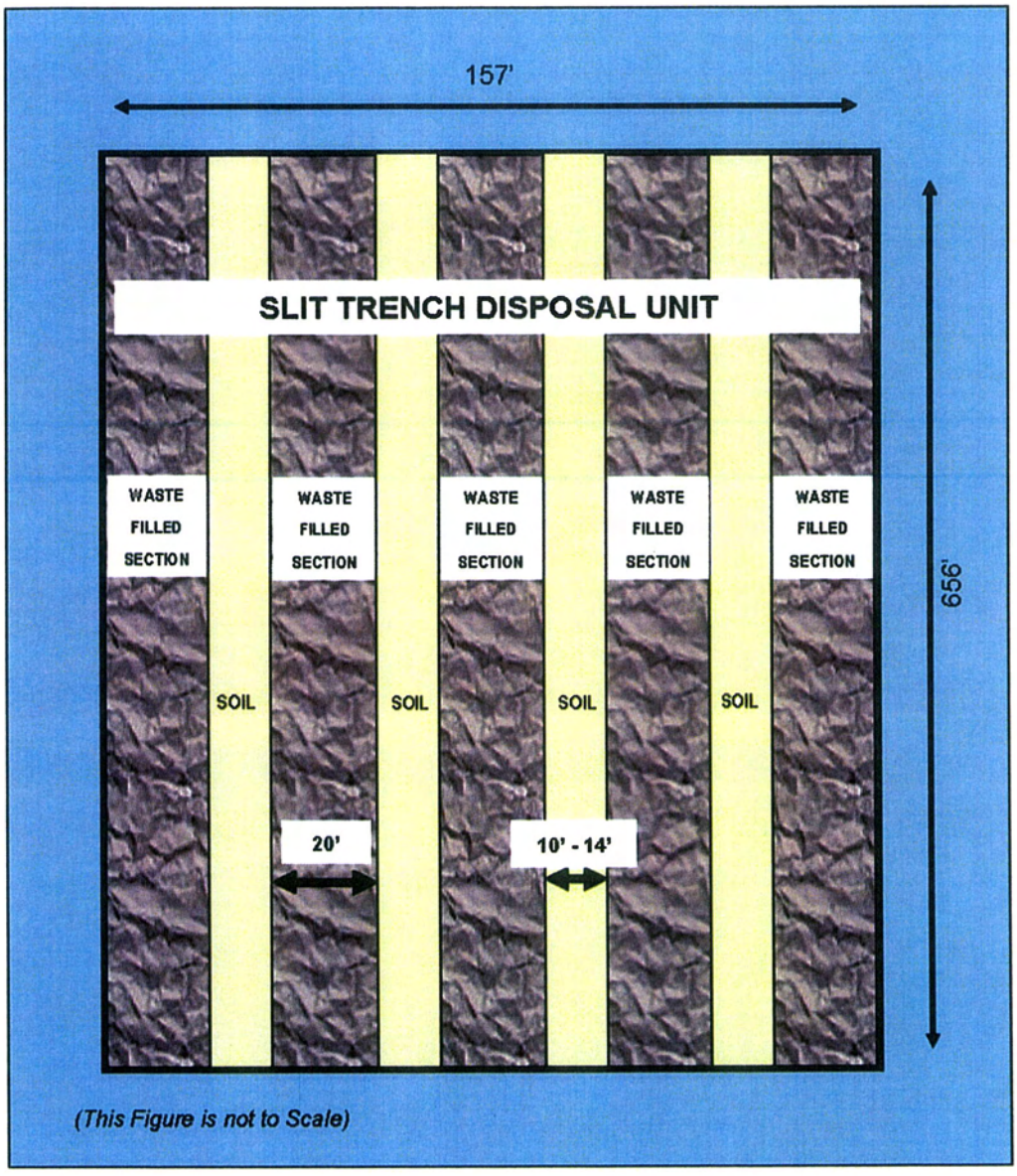

Figure 3. Typical Slit Trench Disposal Unit Layout

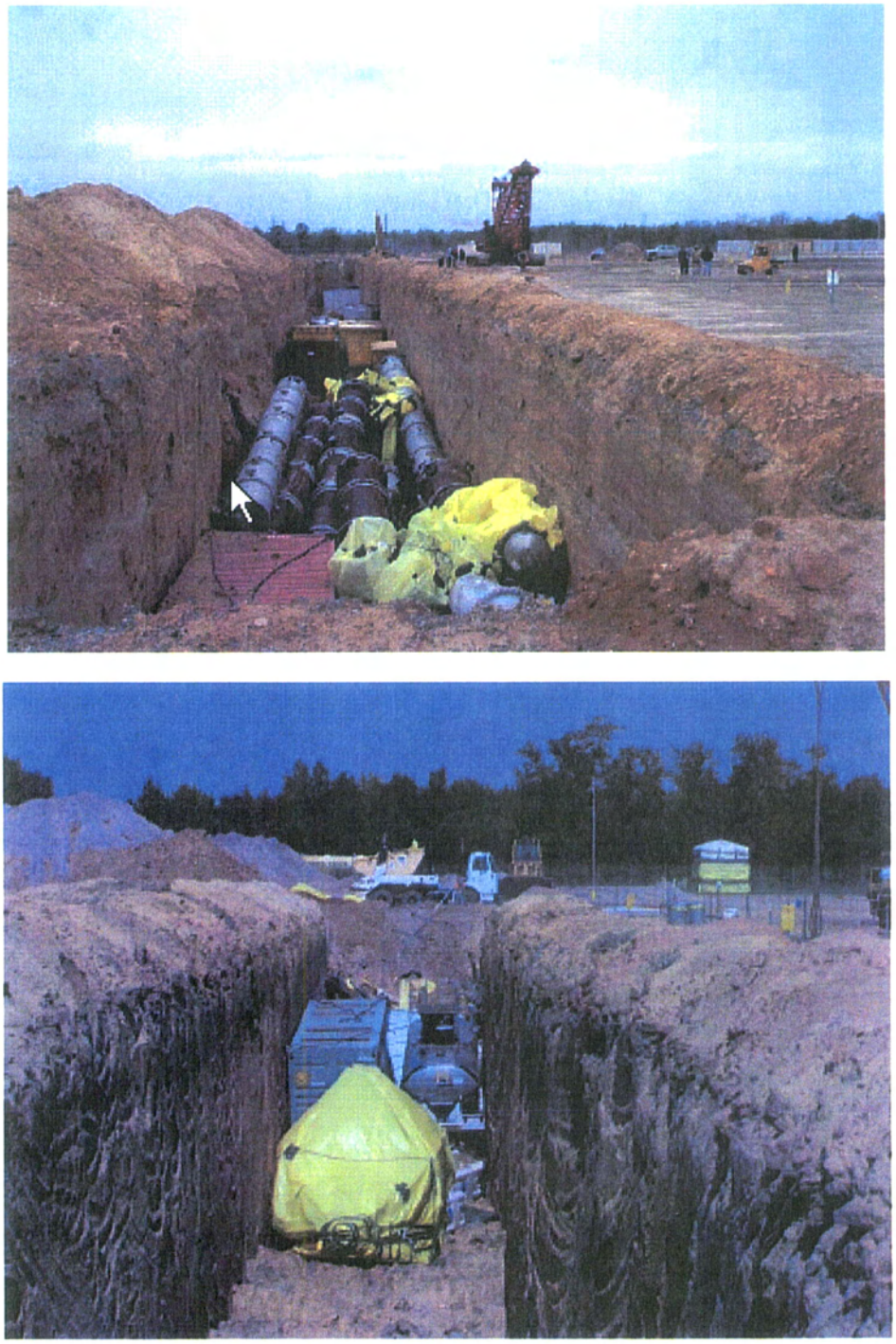

Figure 4. Slit Trench Disposal Unit Operations

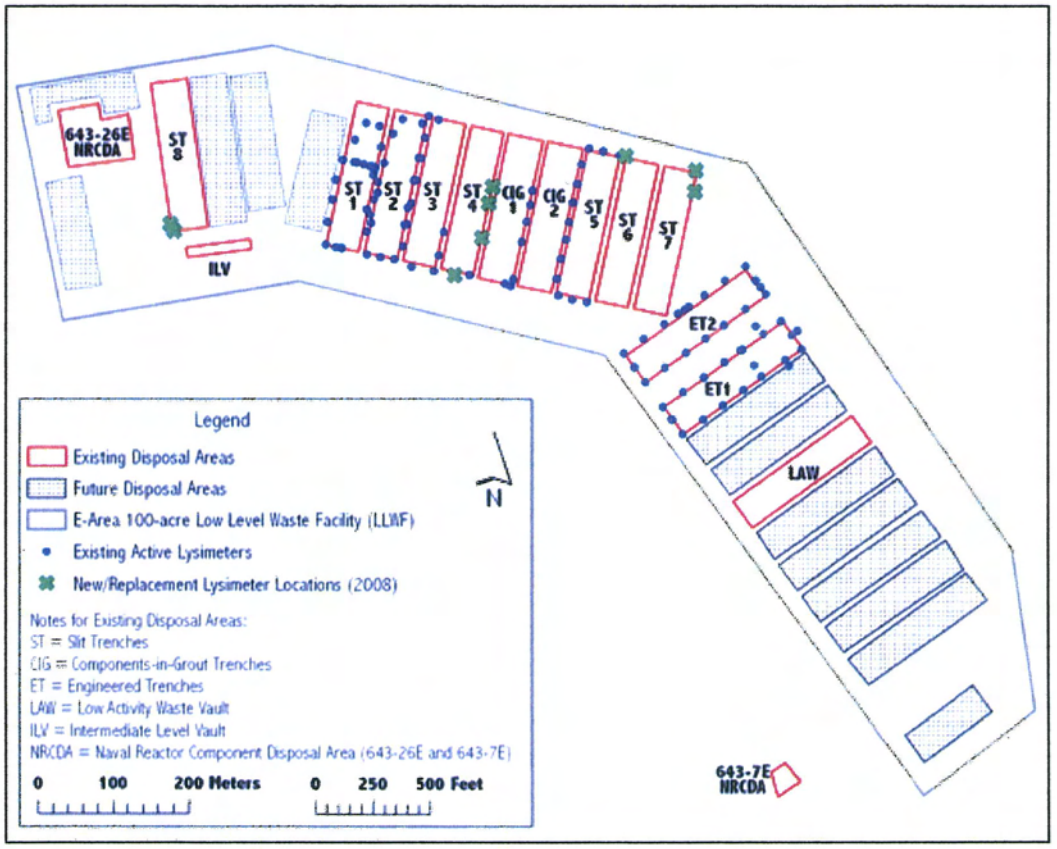

Figure 5. Location of Lysimeters for the Vadose Zone Monitoring System in E-Area

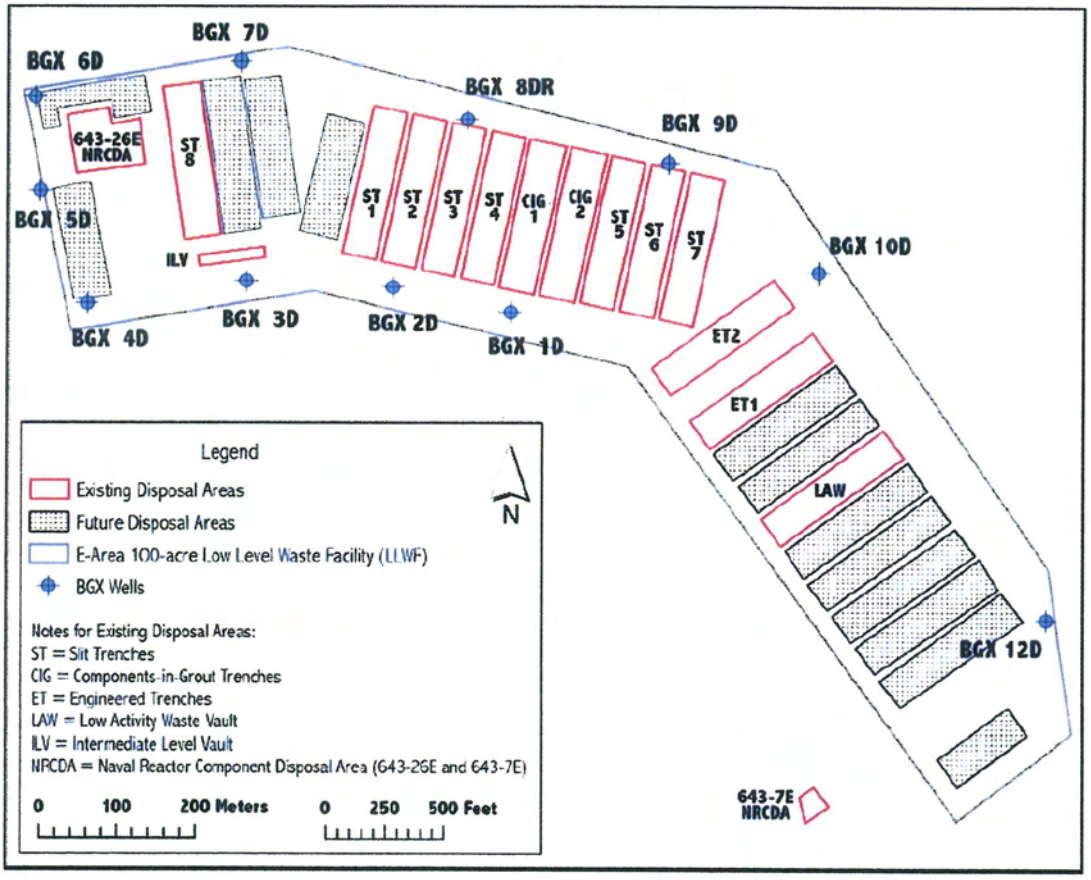

Figure 6. Location of BGX Perimeter Wells for Groundwater Monitoring in E-Area

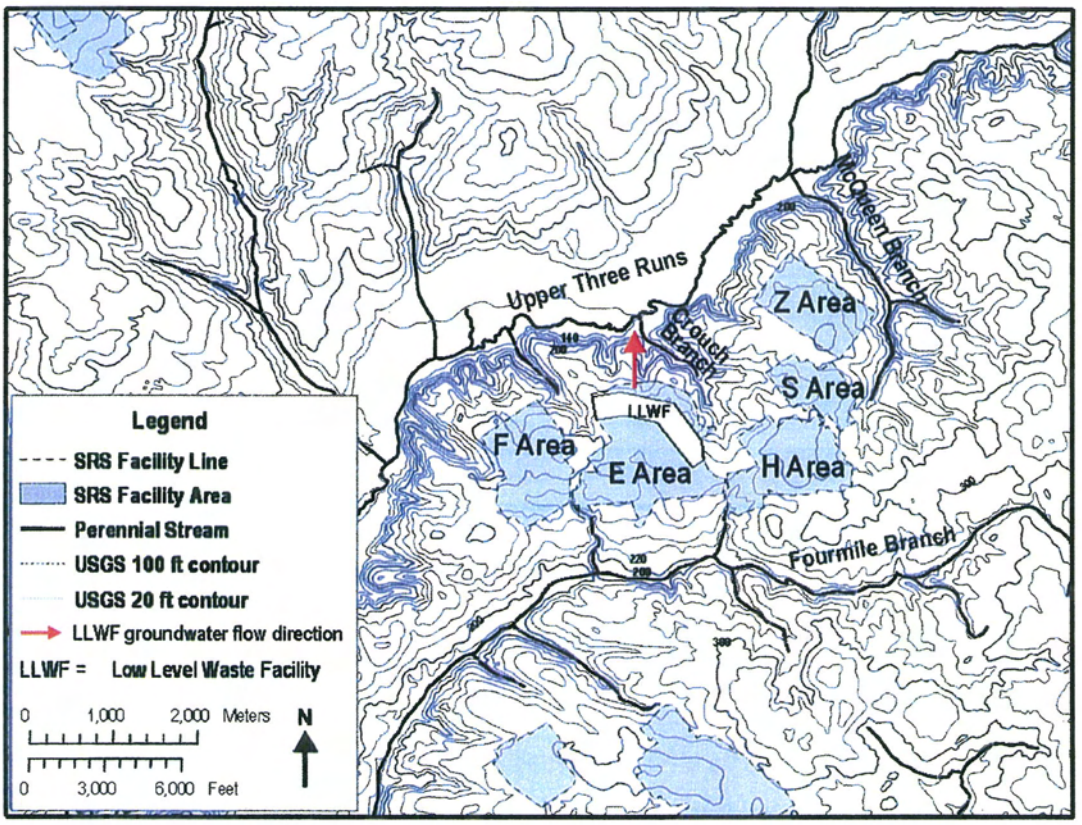

Figure 7. Upper Three Runs Watershed Stream Locations

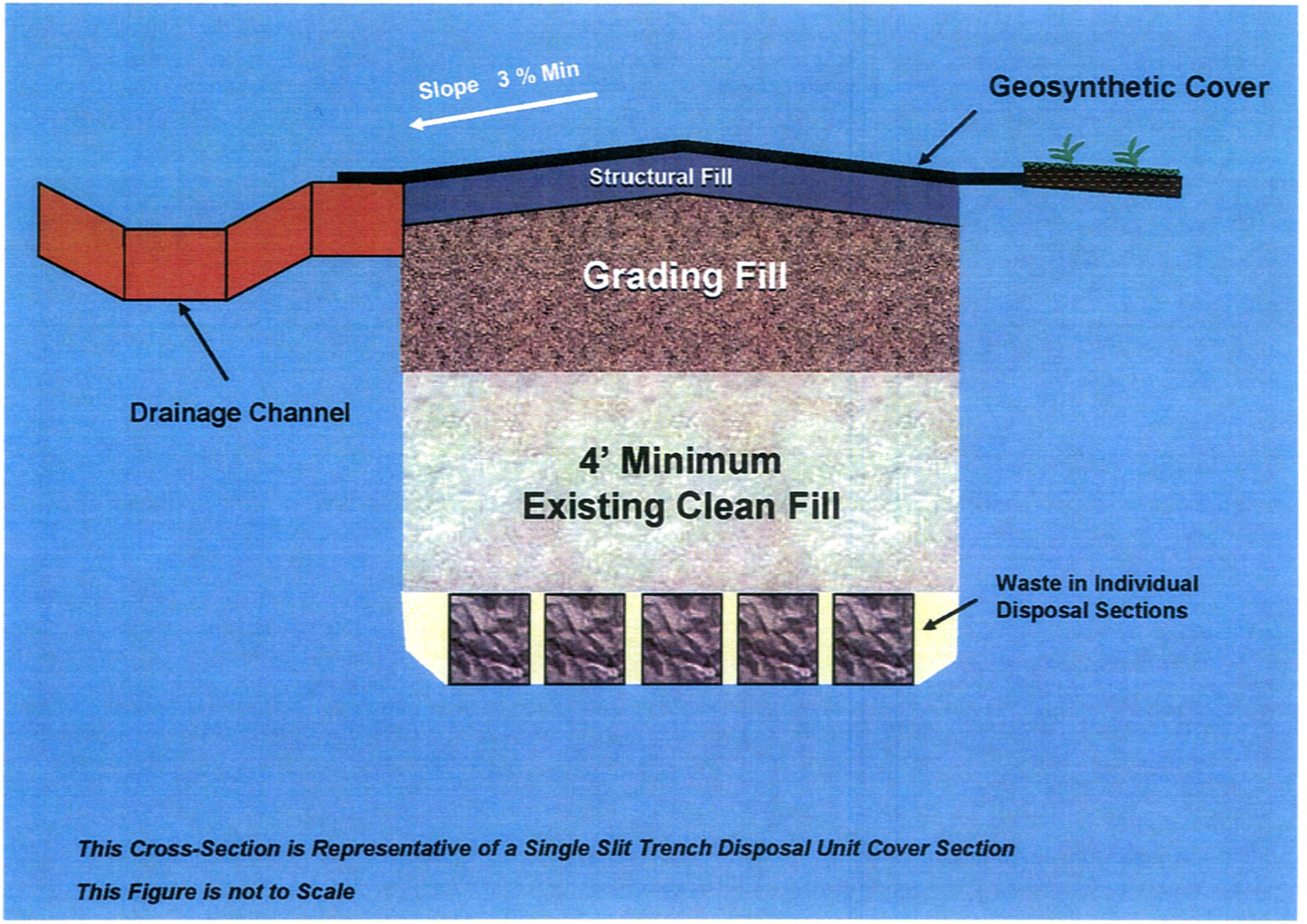

Figure 8. Operational Stormwater Runoff Cover Conceptual Design

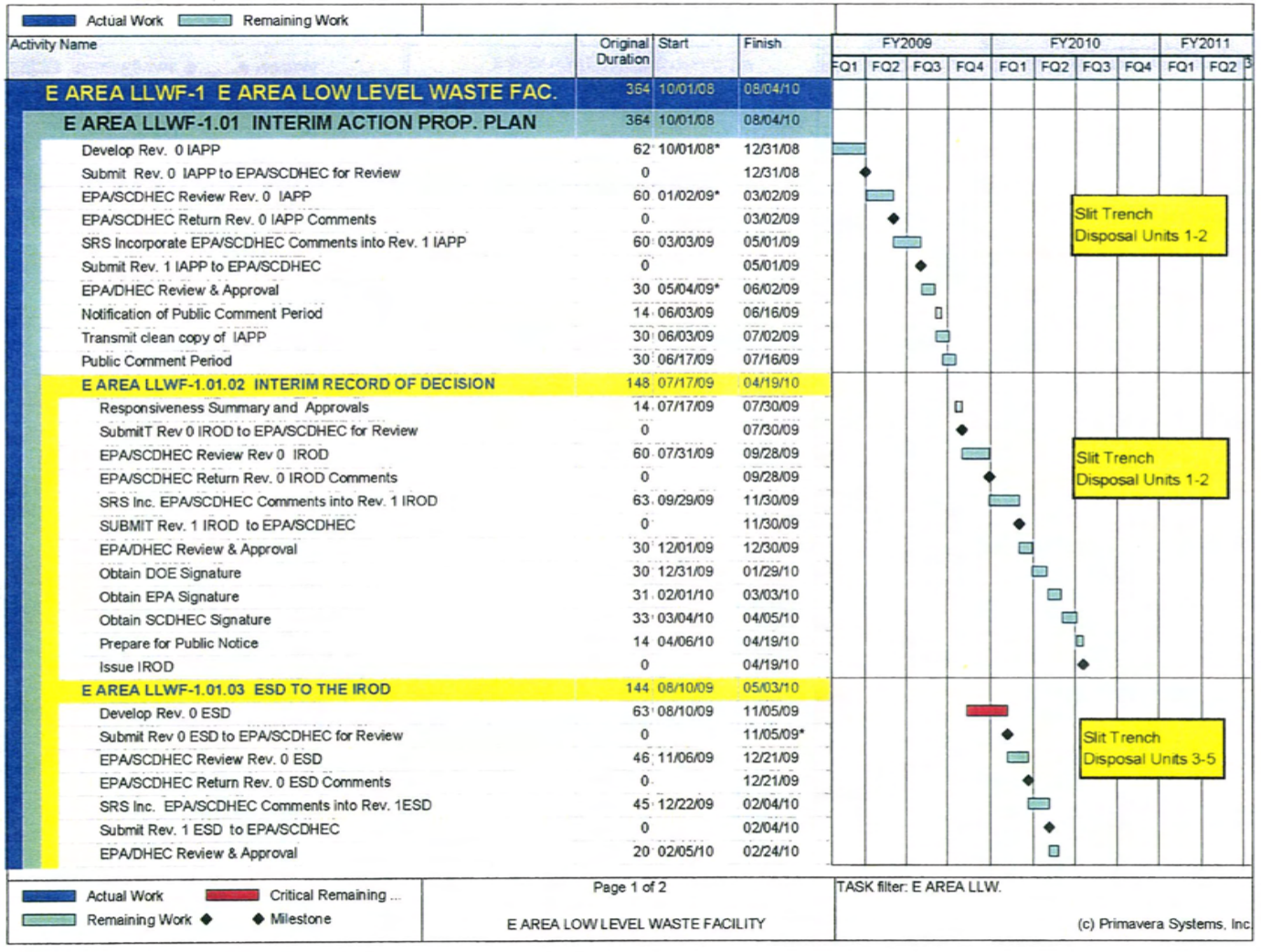

Figure 9. Interim Action Schedule

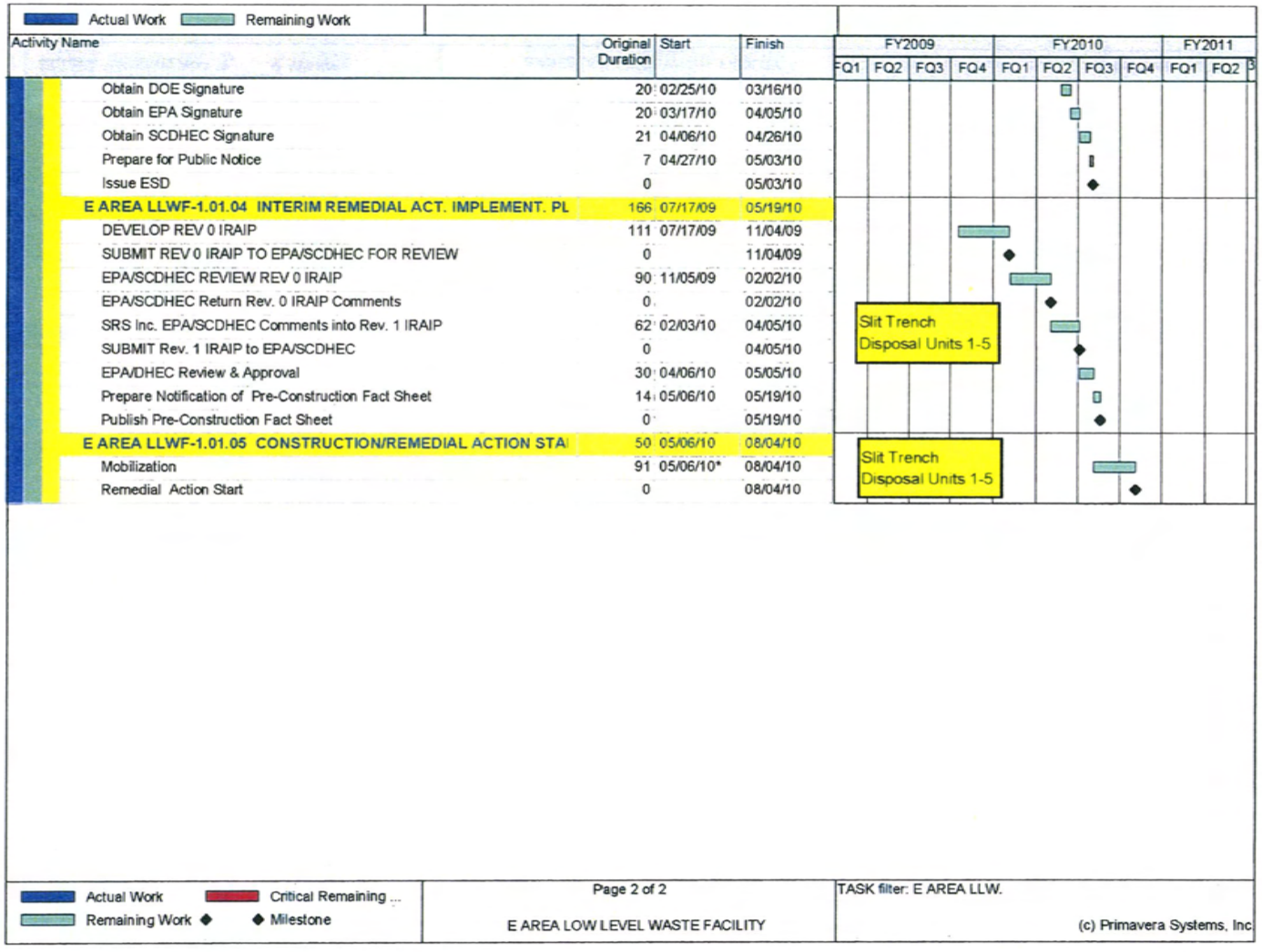

Figure 9. Interim Action Schedule (continued)

Table 1. Summary of the Potential ARARs for the Interim Action for Slit Trench Disposal Units 1 and 2

Chemical-Specific ARARs			
Citation	**Status**	**Requirement Summary**	**Reason for Inclusion**
Not applicable	Not applicable	Not applicable	Not applicable
Action-Specific ARARs			
Citation	**Status**	**Requirement Summary**	**Reason for Inclusion**
40 CFR 61.92 National Emissions Standards for Hazardous Air Pollutants (NESHAP)	Applicable	Emissions of radionuclides to the ambient air from USDOE facilities shall not exceed those amounts that would cause any member of the public to receive in any year an effective dose equivalent of 10 mrem/yr.	Disposal of waste could generate airborne radionuclides.
10 CFR 835 Occupational Radiation Protection	Applicable	Establishes radiation protection standards, limits, and program requirements for protecting individuals from ionizing radiation resulting from the conduct of USDOE activities. 10 CFR 835.1001 mandates As Low As Reasonably Achievable principles.	Establishes dose limits for employees, members of the public during direct on-site access. Establishes monitoring requirements, posting and labeling requirements.
40 CFR 50.6 SC R.61-62.5 Standard Number 2-Ambient Air Quality Standard	Applicable	The concentration of particulate matter (PM_{10}) in ambient air shall not exceed 50 $\mu g/m^3$ (24-hour average concentration).	Earth-moving activities will generate airborne dust that has the potential to exceed the levels specified. Dust suppression will likely be required to minimize dust emissions.
SC R.61-62.6 Control of Fugitive Particulate Matter	Applicable	PM_{10} must be controlled in such a manner and to the degree that it does not create an undesirable level of air pollution.	Applicable during construction activities.
SC R.61-9 National Pollutant Discharge Elimination System Permit SCR 1000	Applicable	Requirements for control of stormwater discharges.	Any stormwater discharges from demolition activities must meet these standards.
SC R.72-300 Standards for Stormwater Management and Sediment Reduction	Applicable	Stormwater management and sediment control plan for land disturbances.	Applicable during construction activities.
Location-Specific ARARs			
Not applicable	Not applicable	Not applicable	Not applicable

Table 2. Comparison of Slit Trench Disposal Units 1 and 2 Alternatives against the Nine Evaluation Criteria

Criterion	Alternative A-1 No Action (Minimum 1.2 m [4 ft] Soil Cover)	Alternative A-2 Operational Stormwater Runoff Cover
Overall Protectiveness		
Human Health	Protective under USDOE Order 435.1	More protective by accelerated infiltration reduction
Environment	Protective under USDOE Order 435.1	More protective by accelerated infiltration reduction
Chemical-specific	Not applicable	Not applicable
Location-specific	Not applicable	Not applicable
Action-specific	Not applicable	Construction must comply with NESHAP and SC regulations for fugitive particulate matter and stormwater management.
Long-Term Effectiveness and Permanence		
Magnitude of residual risk	Infiltration through waste is modeled and disposal limits set to meet USDOE Order 435.1 requirements	Risk to groundwater is reduced through enhanced infiltration control
Adequacy of controls	Adequate	Adequate
Permanence	Not permanent	Not permanent (25-yr estimated service life of runoff cover with maintenance)
Reduction of Toxicity, Mobility or Volume Through Treatment		
Treatment process used and materials treated	No treatment	No treatment
Degree of expected reduction in toxicity, mobility, or volume	No treatment	No treatment
Amount of hazardous materials destroyed or treated	No treatment	No treatment
Degree to which treatment is irreversible	No treatment	No treatment
Types and quantities of residuals remaining after treatment	No treatment	No treatment
Short-term effectiveness		
Risks to workers	None	Protection of workers required during cover installation
Risk to community	None	None
Risk to environment	Groundwater is protected to meet USDOE Order 435.1 performance measures.	Risk to groundwater is reduced through enhanced infiltration control
Time to achieve remedial action objectives (RAO)	RAO is not achieved	Immediate following cover installation

Table 2. Comparison of Slit Trench Disposal Units 1 and 2 Alternatives against the Nine Evaluation Criteria – continued

Criterion	Alternative A-1 No Action (Minimum 4 ft Soil Cover)	Alternative A-2 Operational Stormwater Runoff Cover
Implementability		
Availability of materials, equipment, skilled labor	Not applicable	Readily available
Ability to construct and operate technology	Not applicable	Geosynthetic covers are a well demonstrated and commonly used technology at SRS.
Ability to obtain permits/approvals from other agencies	Not applicable	Readily implemented
Ability to monitor effectiveness of remedy	Not applicable	Visual inspection of cover barrier material possible during both construction and operation.
Ease of undertaking additional actions (if necessary)	Not applicable.	Not incompatible
Time to implement	No applicable since no additional work is required.	6 months to install cover
Cost[1]		
Present Worth Capital Cost	$0	$2,093,215 - $2,323,045
Present Worth O&M Cost	$0	$632,889
Total Present Worth Cost	$0	$2,726,104 - $2,955,934
State and Community Acceptance		
State Acceptance	This criterion will be completed following review by the appropriate regulatory agencies.	This criterion will be completed following review by the appropriate regulatory agencies
Community Acceptance	This criterion will be completed following public review.	This criterion will be completed following public review.

[1]Cost – Alternative A-2 cost is dependent on the geosynthetic liner material selected. The cost range is presented for the lower cost high-density polyethylene (HDPE) 60 Mil liner to the higher cost ethylene interpolymer alloy (EIA) 30 Mil (chemical resistant) liner. The actual liner material selected will be documented in the IRAIP.

This page was intentionally left blank

APPENDIX A – RESPONSIVENESS SUMMARY

This page was intentionally left blank

Responsiveness Summary

The 30-day public comment period for the IAPP for the E-Area LLWF, 643-26E (Slit Trench Disposal Units 1 and 2) began on June 1, 2009 and ended on July 1, 2009.

Public Comments

No comments were received from the public during the 30-day public comment period.

This page was intentionally left blank

APPENDIX B - COST ESTIMATES

This page was intentionally left blank

Alternative A-1
No Action
Slit Trench Disposal Units 1 & 2 Closure
Savannah River Site

Item	Quantity	Units	Unit Cost	Total Cost
Direct Capital Costs				
No Action				
Subtotal - Direct Capital Cost				$0 *
Mobilization/Demobilization	10%	of subtotal direct capital		$0 *
Site Preparation/Site Restoration	10%	of subtotal direct capital		$0 *
Total Direct Capital Cost		(sum of * items)		**$0**
Indirect Capital Costs				
Engineering & Design	15%	of direct capital		$0
Project/Construction Management	25%	of direct capital		$0
Health & Safety	5%	of direct capital		$0
Overhead	30%	of direct capital		$0
Contingency	20%	of direct capital		$0
Total Indirect Capital Cost				**$0**
Total Estimated Capital Cost				**$0**
Direct O&M Costs	3.9%	discount rate for costs > 30 years duration		
Annual Costs (Existing System during Post-ROD Design & Const)	30	year O&M period		*Years 2008 - 2038*
Subtotal - Annual Costs				$0
Present Worth Annual Costs				$0
Five Year Costs	0			
Remedy Review	0	ea	$15,000	$0
Subtotal - Five Year O&M Costs				$0
Present Worth Five Year Costs				$0
Total Present Worth Direct O&M Cost				**$0**
Indirect O&M Costs				
Project/Admin Management	40%	of direct O&M		$0
Health & Safety	10%	of direct O&M		$0
Overhead	30%	of direct O&M		$0
Contingency	15%	of direct O&M		$0
Total Present Worth Indirect O&M Cost				**$0**
Total Estimated Present Worth O&M Cost				**$0**
TOTAL ESTIMATED COST				**$0**

There are no O&M or 5-year review costs for the No Action alternative, as per EPA-540-R-98-031 guidance

Alternative A-2 (a)
High Density Polyethylene (HDPE) 60 Mil Liner Cap
Slit Trench Disposal Units 1 & 2 Closure
Savannah River Site

Item	Quantity	Units	Unit Cost	Total Cost	
Direct Capital Costs					
Slit Trench 1 & 2 HDPE 60 Mil Liner Cap					
Layout Survey	1	lt	$17,000	$17,000	
Excavate Slit Trench 2 overburden and distribute on Slit Trench 1 as backfill[1]	6800	cy	$7	$47,600	
Compact Backfill on Slit Trench 1	6800	cy	$1	$6,800	
Excavate Backfill at Site Borrow Pit (includes 20% compaction factor)	14320	cy	$2	$28,640	
Haul Backfill to Slit Trench 1 & 2 (includes 20% swell factor)	17184	cy	$13	$223,392	
Place Backfill at Slit Trench 1 & 2	14320	cy	$3	$42,960	
Compact Backfill on Slit Trench 1 & 2	14320	cy	$1	$14,320	
Backfill Constituent / Inplace Density Testing	30	ea	$250	$7,500	
Excavate Concrete Channel (Spoil will be used for stormwater control.)	3230	cy	$2	$6,460	
Concrete Channel (labor, equipment and material)	300	cy	$200	$60,000	
Excavate Concrete Liner Anchorage	150	cy	$2	$300	
Concrete Liner Anchorage (labor, equipment and material)	150	cy	$200	$30,000	
Geotextile Fabric, Non-woven, 100 lb Tensile Strength (labor and material)	261360	sf	$0.15	$39,204	
HDPE 60 Mil Liner (labor, equipment and material)	261360	sf	$1.00	$261,360	
Existing Monitoring Well Liner Penetrations (labor, equipment and material.)	47	ea	$250	$11,750	
Stormwater Control	1	lt	$15,000	$15,000	
Concrete Crossing Slab Over Concrete Channel at Roadway	2	ea	$5,000	$10,000	
Institutional Controls					
Posting of Warning Signs	100	ea	$50	$5,000	
Land Use Control Implementation Plan	1	ea	$5,000	$5,000	
Deed Restrictions	1	ea	$5,000	$5,000	
Subtotal - Direct Capital Cost				$837,286	*
Mobilization/Technical Requirements/Demobilization	15% of subtotal direct capital			$125,593	*
Site Preparation/Site Restoration	10% of subtotal direct capital			$83,729	*
Total Direct Capital Cost	(sum of * items)			**$1,046,608**	
Indirect Capital Costs					
Engineering & Design	18% of direct capital w/o waste			$188,389	
Project/Construction Management	25% of direct capital w/o waste			$261,652	
Health & Safety	7% of direct capital w/o waste			$73,263	
Overhead	30% of direct capital w/o waste			$313,982	
Contingency	20% of direct capital w/o waste			$209,322	
Total Indirect Capital Cost				**$1,046,608**	
Total Estimated Capital Cost				**$2,093,215**	
Direct O&M Costs	3.9% discount rate for costs > 30 years duration[2]				
Annual Costs (Existing System during Post-ROD Design & Const)	1 years O&M			*Years 2010*	
Access Controls	1	ea	$500	$500	
Subtotal - Annual Costs				$500	
Present Worth Annual Costs (2.1% Discount Rate)				$490	
Annual Costs	25 years O&M			*Years 2011 - 2035*	
Access Controls	1	ea	$500	$500	
Annual Inspections	1	ea	$5,000	$5,000	
Annual Liner Repairs	1	ea	$5,000	$5,000	
Subtotal - Annual Costs				$10,500	
Present Worth Annual Costs (3.7% Discount Rate)				$163,317	
Five Year Costs	6				
Remedy Review	1	ea	$15,000	$15,000	
Subtotal - Five Year O&M Costs				$15,000	
Present Worth Five Year Costs				$48,572	

Alternative A-2 (a)
High Density Polyethylene (HDPE) 60 Mil Liner Cap
Slit Trench Disposal Units 1 & 2 Closure
Savannah River Site

	Total Present Worth Direct O&M Cost		**$212,379**
Indirect O&M Costs			
Project/Admin Management		100% of direct O&M	$212,379
Health & Safety		53% of direct O&M	$112,561
Overhead		30% of direct O&M	$63,714
Contingency		15% of direct O&M	$31,857
	Total Present Worth Indirect O&M Cost		**$420,510**
	Total Estimated Present Worth O&M Cost		**$632,889**
	TOTAL ESTIMATED COST		**$2,726,104**

1. Excess excavated soil located on Slit Trench 2 that is not needed for backfill will be removed prior to cover placement.
2. Interest rate for costs with duration < 30 years (i.e., before 2034) is based on WSRC's 16 April 2002 Technical Memorandum.

Alternative A-2 (b)
Ethylene Interpolymer Alloy (EIA) 30 Mil Liner Cap
Slit Trench 1 & 2 Disposal Units Closure
Savannah River Site

Item	Quantity	Units	Unit Cost	Total Cost	
Direct Capital Costs					
Slit Trench 1 & 2 EIA 30 Mil Liner Cap					
Layout Survey	1	lt	$17,000	$17,000	
Excavate Slit Trench 2 overburden and distribute on Slit Trench 1 as backfill[1]	6800	cy	$7	$47,600	
Compact Backfill on Slit Trench 1	6800	cy	$1	$6,800	
Excavate Backfill at Site Borrow Pit (includes 20% compaction factor)	14320	cy	$2	$28,640	
Haul Backfill to Slit Trench 1 & 2 (includes 20% swell factor)	17184	cy	$13	$223,392	
Place Backfill at Slit Trench 1 & 2	14320	cy	$3	$42,960	
Compact Backfill on Slit Trench 1 & 2	14320	cy	$1	$14,320	
Backfill Constituent / Inplace Density Testing	30	ea	$250	$7,500	
Excavate Concrete Channel (Spoil will be used for stormwater control.)	3230	cy	$2	$6,460	
Concrete Channel (labor, equipment and material)	300	cy	$200	$60,000	
Excavate Concrete Liner Anchorage	150	cy	$2	$300	
Concrete Liner Anchorage (labor, equipment and material)	150	cy	$200	$30,000	
Geotextile Fabric, Non-woven, 100 lb Tensile Strength (labor and material)	261360	sf	$0.15	$39,204	
EIA 30 Mil Liner (labor, equipment and material)	261360	sf	$1.25	$326,700	
Existing Monitoring Well Liner Penetrations (labor, equipment and material.)	47	ea	$250	$11,750	
Stormwater Control	1	lt	$15,000	$15,000	
Concrete Crossing Slab Over Concrete Channel at Roadway	2	ea	$5,000	$10,000	
Institutional Controls					
Posting of Warning Signs	100	ea	$50	$5,000	
Land Use Control Implementation Plan	1	ea	$5,000	$5,000	
Deed Restrictions	1	ea	$5,000	$5,000	
Subtotal - Direct Capital Cost				$902,626	*
Mobilization/Technical Requirements/Demobilization	14%	of subtotal direct capital		$126,368	*
Site Preparation/Site Restoration	9%	of subtotal direct capital		$83,042	*
Total Direct Capital Cost	(sum of * items)			**$1,112,035**	
Indirect Capital Costs					
Engineering & Design	17%	of direct capital w/o waste		$189,046	
Project/Construction Management	25%	of direct capital w/o waste		$278,009	
Health & Safety	7%	of direct capital w/o waste		$74,506	
Overhead	30%	of direct capital w/o waste		$333,611	
Contingency	20%	of direct capital w/o waste		$222,407	
Total Indirect Capital Cost				**$1,097,579**	
Total Estimated Capital Cost				**$2,209,614**	
Direct O&M Costs	3.9%	discount rate for costs > 30 years duration[2]			
Annual Costs (Existing System during Post-ROD Design & Const)	1	years O&M		*Years 2010*	
Access Controls	1	ea	$500	$500	
Subtotal - Annual Costs				$500	
Present Worth Annual Costs (2.1% Discount Rate)				$490	
Annual Costs	25	years O&M		*Years 2011 - 2035*	
Access Controls	1	ea	$500	$500	
Annual Inspections	1	ea	$5,000	$5,000	
Annual Liner Repairs	1	ea	$5,000	$5,000	
Subtotal - Annual Costs				$10,500	
Present Worth Annual Costs (3.7% Discount Rate)				$163,317	
Five Year Costs	6				
Remedy Review	1	ea	$15,000	$15,000	
Subtotal - Five Year O&M Costs				$15,000	
Present Worth Five Year Costs				$48,572	

Alternative A-2 (b)
Ethylene Interpolymer Alloy (EIA) 30 Mil Liner Cap
Slit Trench 1 & 2 Disposal Units Closure
Savannah River Site

Total Present Worth Direct O&M Cost		**$212,379**
Indirect O&M Costs		
Project/Admin Management	100% of direct O&M	$212,379
Health & Safety	53% of direct O&M	$112,561
Overhead	30% of direct O&M	$63,714
Contingency	15% of direct O&M	$31,857
Total Present Worth Indirect O&M Cost		**$420,510**
Total Estimated Present Worth O&M Cost		**$632,889**
TOTAL ESTIMATED COST		**$2,842,503**

1. Excess excavated soil located on Slit Trench 2 that is not needed for backfill will be removed prior to cover placement.
2. Interest rate for costs with duration < 30 years (i.e., before 2034) is based on WSRC's 16 April 2002 Technical Memorandum.

Alternative A-2 (c)
Ethylene Interpolymer Alloy (EIA) 30 Mil (Chemical Resistant) Liner Cap
Slit Trench Disposal Units 1 & 2 Closure
Savannah River Site

Item	Quantity	Units	Unit Cost	Total Cost	
Direct Capital Costs					
Slit Trench 1 & 2 EIA 30 Mil (Chemical Resistant) Liner Cap					
Layout Survey	1	lt	$17,000	$17,000	
Excavate Slit Trench 2 overburden and distribute on Slit Trench 1 as backfill[1]	6800	cy	$7	$47,600	
Compact Backfill on Slit Trench 1	6800	cy	$1	$6,800	
Excavate Backfill at Site Borrow Pit (includes 20% compaction factor)	14320	cy	$2	$28,640	
Haul Backfill to Slit Trench 1 & 2 (includes 20% swell factor)	17184	cy	$13	$223,392	
Place Backfill at Slit Trench 1 & 2	14320	cy	$3	$42,960	
Compact Backfill on Slit Trench 1 & 2	14320	cy	$1	$14,320	
Backfill Constituent / Inplace Density Testing	30	ea	$250	$7,500	
Excavate Concrete Channel (Spoil will be used for stormwater control.)	3230	cy	$2	$6,460	
Concrete Channel (labor, equipment and material)	300	cy	$200	$60,000	
Excavate Concrete Liner Anchorage	150	cy	$2	$300	
Concrete Liner Anchorage (labor, equipment and material)	150	cy	$200	$30,000	
Geotextile Fabric, Non-woven, 100 lb Tensile Strength (labor and material)	261360	sf	$0.15	$39,204	
EIA 30 Mil Liner - Chemical Resistant (labor, equipment and material)	261360	sf	$1.50	$392,040	
Existing Monitoring Well Liner Penetrations (labor, equipment and material.)	47	ea	$250	$11,750	
Stormwater Control	1	lt	$15,000	$15,000	
Concrete Crossing Slab Over Concrete Channel at Roadway	2	ea	$5,000	$10,000	
Institutional Controls					
Posting of Warning Signs	100	ea	$50	$5,000	
Land Use Control Implementation Plan	1	ea	$5,000	$5,000	
Deed Restrictions	1	ea	$5,000	$5,000	
Subtotal - Direct Capital Cost				$967,966	*
Mobilization/Technical Requirements/Demobilization	13% of subtotal direct capital			$125,836	*
Site Preparation/Site Restoration	9% of subtotal direct capital			$84,213	*
Total Direct Capital Cost	(sum of * items)			**$1,178,015**	
Indirect Capital Costs					
Engineering & Design	16% of direct capital w/o waste			$188,482	
Project/Construction Management	25% of direct capital w/o waste			$294,504	
Health & Safety	6% of direct capital w/o waste			$73,037	
Overhead	30% of direct capital w/o waste			$353,404	
Contingency	20% of direct capital w/o waste			$235,603	
Total Indirect Capital Cost				**$1,145,030**	
Total Estimated Capital Cost				**$2,323,045**	
Direct O&M Costs	3.9% discount rate for costs > 30 years duration[2]				
Annual Costs (Existing System during Post-ROD Design & Const)	1 years O&M			*Years 2010*	
Access Controls	1	ea	$500	$500	
Subtotal - Annual Costs				$500	
Present Worth Annual Costs (2.1% Discount Rate)				$490	
Annual Costs	25 years O&M			*Years 2011 - 2035*	
Access Controls	1	ea	$500	$500	
Annual Inspections	1	ea	$5,000	$5,000	
Annual Liner Repairs	1	ea	$5,000	$5,000	
Subtotal - Annual Costs				$10,500	
Present Worth Annual Costs (3.7% Discount Rate)				$163,317	
Five Year Costs	6				
Remedy Review	1	ea	$15,000	$15,000	
Subtotal - Five Year O&M Costs				$15,000	
Present Worth Five Year Costs				$48,572	

Alternative A-2 (c)
Ethylene Interpolymer Alloy (EIA) 30 Mil (Chemical Resistant) Liner Cap
Slit Trench Disposal Units 1 & 2 Closure
Savannah River Site

Total Present Worth Direct O&M Cost		**$212,379**
Indirect O&M Costs		
Project/Admin Management	100% of direct O&M	$212,379
Health & Safety	53% of direct O&M	$112,561
Overhead	30% of direct O&M	$63,714
Contingency	15% of direct O&M	$31,857
Total Present Worth Indirect O&M Cost		**$420,510**
Total Estimated Present Worth O&M Cost		**$632,889**
TOTAL ESTIMATED COST		**$2,955,934**

1. Excess excavated soil located on Slit Trench 2 that is not needed for backfill will be removed prior to cover placement.
2. Interest rate for costs with duration < 30 years (i.e., before 2034) is based on WSRC's 16 April 2002 Technical Memorandum.

This page was intentionally left blank