
United States Department of Energy
Savannah River Site



**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) (U)**

CERCLIS Number: 86

SRNS-RP-2009-01128

Revision 1

January 2010

RECEIVED

APR 01 2010

**SITE ASSESSMENT
REMEDICATION &
REVITALIZATION**

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**

Table of Contents

<u>SECTION</u>	<u>PAGE</u>
I. INTRODUCTION.....	1
II. SITE HISTORY AND SELECTED REMEDY	2
III. BASIS FOR THE EXPLANATION OF SIGNIFICANT DIFFERENCE	5
IV. DESCRIPTION OF SIGNIFICANT DIFFERENCES	6
V. STATUTORY DETERMINATIONS	7
VI. PUBLIC PARTICIPATION.....	7
VII. REFERENCES.....	8

List of Figures

FIGURE 1. LOCATION OF THE E-AREA LLWF WITHIN THE GENERAL SEPARATIONS AREA AT THE SAVANNAH RIVER SITE.....	9
FIGURE 2. LOCATION OF THE SLIT TRENCH DISPOSAL UNITS FOOTPRINT WITHIN THE E-AREA LLWF	10
FIGURE 3. OPERATIONAL STORMWATER RUNOFF CONCEPTUAL DESIGN	11
FIGURE 4. INTERIM REMEDIAL ACTION SCHEDULE.....	12

List of Tables

TABLE 1. PRESENT VALUE COST ESTIMATE FOR SLIT TRENCH DISPOSAL UNITS 1 THROUGH 5 WITH EIA LINER CAP	14
---	----

LIST OF ACRONYMS AND ABBREVIATIONS

CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
cy	Cubic yards
ea	Each
EIA	Ethylene Interpolymer Alloy
ESD	Explanation of Significant Differences
FFA	Federal Facility Agreement
ft	feet
ft ³	Cubic feet
IRAIP	Interim Remedial Action Implementation Plan
IROD	Interim Record of Decision
It	Item
km ²	Square kilometer
LLWF	Low-Level Waste Facility
m	meter
m ³	Cubic meters
NOU	Notice of Unacceptability
O&M	Operation and Maintenance
OSR	Off-Site Rule
PA	Performance Assessment
PV	Present Value
RCRA	Resource Conservation and Recovery Act
SCDHEC	South Carolina Department of Health and Environmental Control
sf	Square feet
SRNS	Savannah River Nuclear Solutions, LLC
SRS	Savannah River Site
USDOE	United States Department of Energy
USEPA	United States Environmental Protection Agency
WSRC	Washington Savannah River Company LLC

I. Introduction

This Explanation of Significant Differences (ESD) is being issued by the United States Department of Energy (USDOE), the lead agency for the Savannah River Site (SRS) remedial activities, with concurrence by the U.S. Environmental Protection Agency (USEPA) – Region 4 and the South Carolina Department of Health and Environmental Control (SCDHEC). The purpose of this ESD is to announce the incorporation of Slit Trench Disposal Units 3, 4, and 5 into the interim remedial action selected in the *Interim Record of Decision for the E-Area Low-Level Waste Facility, 643-26E (Slit Trench Disposal Units 1 and 2) (U)* (SRNS 2009b).

Under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Section 117(c), SRS is required to publish an ESD whenever there is a significant change to a component of a remedy specified in a Record of Decision. Sections 300.435(c)(2)(i) and 300.825(a)(2) of the National Oil and Hazardous Substances Pollution Contingency Plan require the lead agency to provide an explanation of the difference and to make this information available to the public in the Administrative Record File and information repositories.

The E-Area Low-Level Waste Facility (LLWF) was not part of the 1993 Federal Facility Agreement (FFA) (FFA 1993) because the USDOE operates the facility under the authority of the Atomic Energy Act 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) (WSRC 2008) 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.

The Interim Record of Decision (IROD) selected the placement of operational stormwater runoff covers over Slit Trench Disposal Units 1 and 2

as an interim remedial action. The IROD also explained that additional Slit Trench Disposal Units were to be added to the FFA as they reached design capacity (i.e., operational closure) and an ESD would be used to incorporate the interim remedy selected in the IROD and detailed in the Interim Remedial Action Implementation Plan (IRAIP).

Subsequent to the public comment period and submittal of the Interim Action Proposed Plan (SRNS 2009a) Slit Trench Disposal Unit 5 became operationally closed. Slit Trench Disposal Units 3 and 4 are currently being filled and will be operationally closed prior to installation of the stormwater runoff covers. Therefore, the ESD for Slit Trench Disposal Units 3 through 5 is being developed at this time so that the IRAIP can be expanded to discuss Slit Trench Disposal Unit 1 through 5. The placement of stormwater runoff covers using a 30 mil (minimum thickness) Ethylene Interpolymer Alloy (EIA) liner cap over the Slit Trench Disposal Units 1 through 5 as an interim remedial action will occur during the E-Area LLWF operational period.

The ESD is part of the Administrative Record File and is available for public review during normal business hours at the following repositories.

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

II. Site History and Selected Remedy

This ESD documents the incorporation of Slit Trench Disposal Units 3, 4, and 5 into the selected interim remedial action for Slit Trench Disposal Units 1 and 2 as found in the IROD (SRNS 2009b).

The E-Area LLWF is located in the central region of the SRS known as the General Separations Area (Figure 1). Radioactive waste disposal operations at the E-Area LLWF began in 1994. The E-Area LLWF is comprised of 0.81 km² (200 acres), although only 0.40 km² (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 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.

These Slit Trench Disposal Units, which are located within the E-Area LLWF 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. 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. 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.

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, 2, 3 and 5, and the Naval Reactor Components Area (643-7E) which are operationally closed. When Slit Trench Disposal Unit 4 reaches design capacity, it will be operationally closed thereafter. The placement of operational stormwater runoff covers over Slit Trench Disposal Units 1 through 5 as an interim remedial action will occur during the ongoing E-Area LLWF operational period.

Operational closure will be conducted during an approximate 30-year operation period (approximately 25 years remaining) 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. 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. Each section of a Slit Trench Disposal Unit is typically filled to within 1.2 m (4 ft) of the ground surface with waste.

Once a section of the Slit Trench Disposal Unit is filled with waste, 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 the minimum 1.2 m (4 ft) thick clean soil cover (i.e., operational soil cover), it will be covered by variable thickness grading fill, then 15.2 cm (6-in) of structural soil fill, followed by the installation of the operational stormwater runoff cover.

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). The 100-year institutional control period is an estimated timeframe for metal container corrosion and subsequent strength loss of the containers to reduce void spaces and enhance compaction during subsidence treatment. 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 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.

The selected interim action remedy requires construction of the operational stormwater runoff

covers and involves 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 cover barrier will consist of a low-permeability, 30 mil (minimum thickness), EIA liner cap. 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 liner cap material; this will allow for visual inspection during both the construction and operational period. The exposed EIA liner cap 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 remedial 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 will be deferred until final closure of the entire E-Area LLWF.

III. Basis for the Explanation of Significant Difference

The purpose of this ESD is to document a post-IROD change by incorporating Slit Trench Disposal Units 3, 4, and 5 into the selected interim remedial action for Slit Trench Disposal Units 1 and 2 to install stormwater runoff covers as the disposal units reach design capacity.

Slit Trench Disposal Unit 3 has been filled with a disposal volume of 16,953 m³ (598,690 ft³) and total inventory of 125 curies. Slit Trench Disposal Unit 4 has an estimated disposal volume of 19,250 m³ (679,807 ft³) with an estimated total of 100 curies. The volume and curie inventory for Slit Trench Disposal Unit 4 is an estimated value because this disposal unit is currently being filled and will be operationally closed prior to installation of the stormwater runoff covers. Slit Trench Disposal Unit 5 has reached a total disposal volume of 28,125 m³ (993,225 ft³) and a total inventory of 1.27E+05 curies and is operationally closed.

The curie limit for each Slit Trench Disposal Unit is specific for each radionuclide and is determined using a sum-of-fractions technique prior to disposal 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. Therefore, the final curie inventory for Slit Trench Disposal Unit 4 will be at or below the disposal limits established by the PA at operational closure.

Final volume and curie values for Slit Trench Disposal Unit 4 will be published in the IRAIP or the Interim Post Construction Report.

IV. Description of Significant Differences

The interim remedial action to install operational stormwater runoff covers over Slit Trench Disposal Units 1 and 2 was documented in the approved IROD (SRNS 2009b) and does not change with this ESD. The significant differences are that Slit Trench Disposal Units 3, 4, and 5 at the E-Area LLWF are now incorporated into the same interim remedial action selected for Slit Trench Disposal Units 1 and 2.

Figure 3 illustrates the conceptual stormwater runoff cover design for Slit Trench Disposal Units 1 through 5. 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 cover will consist of a low-permeability, 30 mil (minimum thickness), EIA cap liner. 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 geomembrane liner 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 present value (PV) cost estimate for implementing the interim remedial action (i.e., install operational stormwater runoff covers with low permeability, 30 mil (minimum thickness), EIA liner cap) for the E-Area LLWF Slit Trench Disposal Units 1 through 5 is presented in the table below. Since Slit Trenches Disposal Units 1, 2, 3, and 4 will be under a single cover and Slit Trench Disposal Unit 5 will be under a separate cover, a comprehensive PV cost estimate for Slit Trench Disposal Units 1 through 5 is included as Table 1 and modifies the PV cost estimate in the IROD. The estimate includes direct and indirect capital costs, and direct and indirect operation and maintenance (O&M) costs which include annual and periodic maintenance activities.

The project duration of 25 years used in the cost estimate is based on the estimated service life of the stormwater runoff cover and for the time required to maintain its effectiveness including access controls, annual inspection, repair of the cover system (if needed), and 5 year remedy reviews.

The interim remedial action schedule for the E-Area LLWF Slit Trench Disposal Units 1 through 5 is provided in Figure 4.

**Present Value Cost Estimate to Implement
 Interim Action Remedy**

Capital Cost	\$6,331,899
PV O&M Costs @ 2.7% Discount	\$994,358
Total Estimated Cost	\$7,326,257
Estimated Time to Implement	13 months
Project Duration	25 years

V. Statutory Determinations

The same interim action remedy selected for Slit Trench Disposal Units 1 and 2 is applied to Slit Trench Disposal Units 3, 4, and 5 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 through 5 during the remainder of the E-Area LLWF operational period as an interim remedial action to further reduce stormwater infiltration.

The addition of Slit Trenches Disposal Units 3, 4, and 5 to the interim remedial 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 through 5). Because the ESD does not fundamentally change the interim remedy, the Applicable or Relevant and Appropriate Requirements discussion presented in the IROD is not reevaluated in this ESD. This interim remedial action does not constitute the final remedy for the E-Area LLWF and 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.

VI. Public Participation

The public will be informed of the changes to the selected interim remedy as specified in this ESD through the *SRS Environmental Bulletin*, a newsletter sent to approximately 3,500 citizens in South Carolina and Georgia, and through the

Aiken Standard, the *Allendale Citizen Leader*,
the *Barnwell People Sentinel*, *The State*, and the
Augusta Chronicle newspapers.

Solutions, LLC, Savannah River Site, Aiken, SC
(November)

To obtain more information concerning this
ESD, contact:

Paul Sauerborn
Savannah River Nuclear Solutions, LLC
Public Involvement
Savannah River Site
Building 730-1B
Aiken, South Carolina 29808
1-803-952-6658
paul.sauerborn@srs.gov

VII. References

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

WSRC 2008. *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)

SRNS 2009a. *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, LLC, Savannah River
Site, Aiken, SC (April)

SRNS 2009b. *Interim Record of Decision for the
E-Area Low-Level Waste Facility, 643-26E (Slit
Trench Disposal Units 1 and 2) (U)*, Revision 1,
SRNS-RP-2009-00538, Savannah River Nuclear

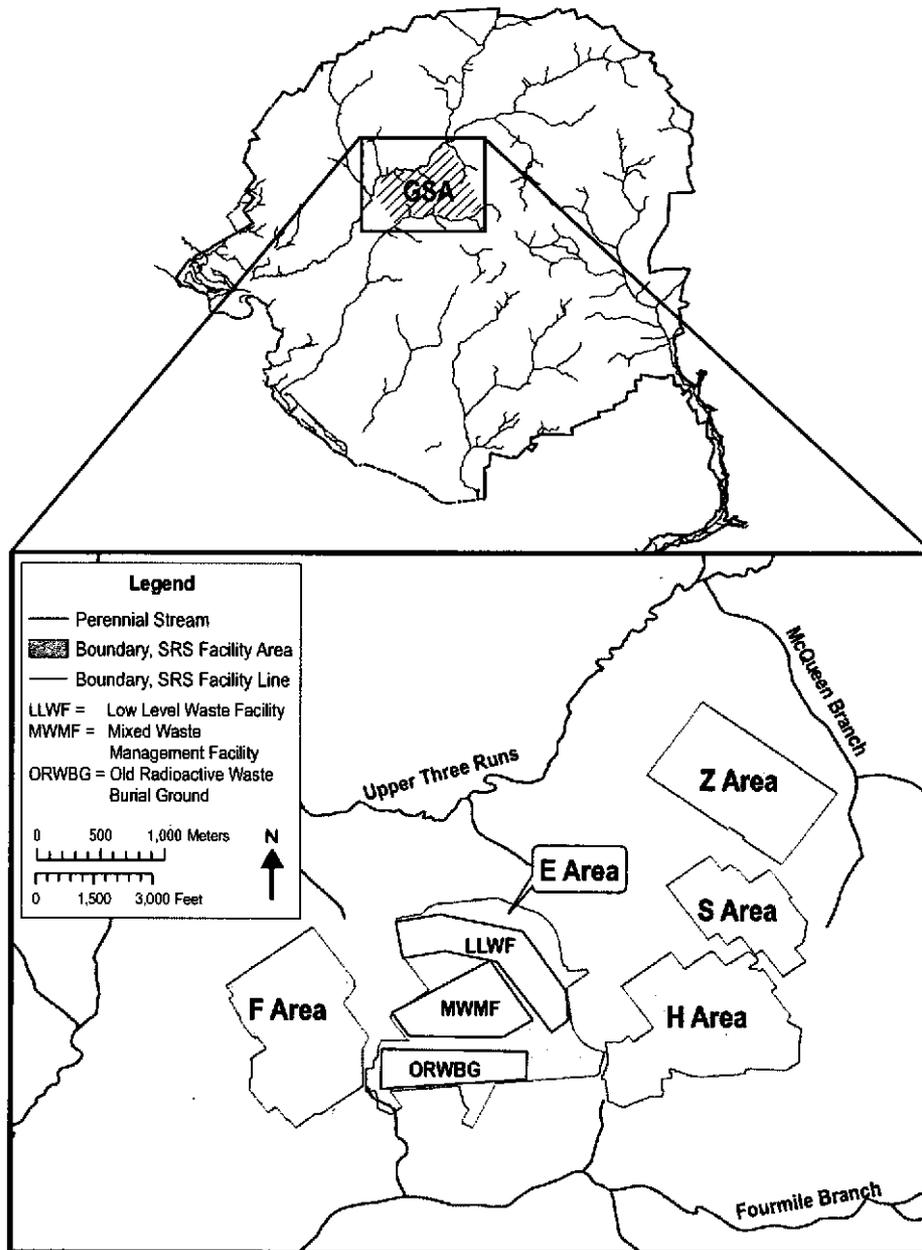


Figure 1. Location of the E-Area LLWF within the General Separations Area at the Savannah River Site

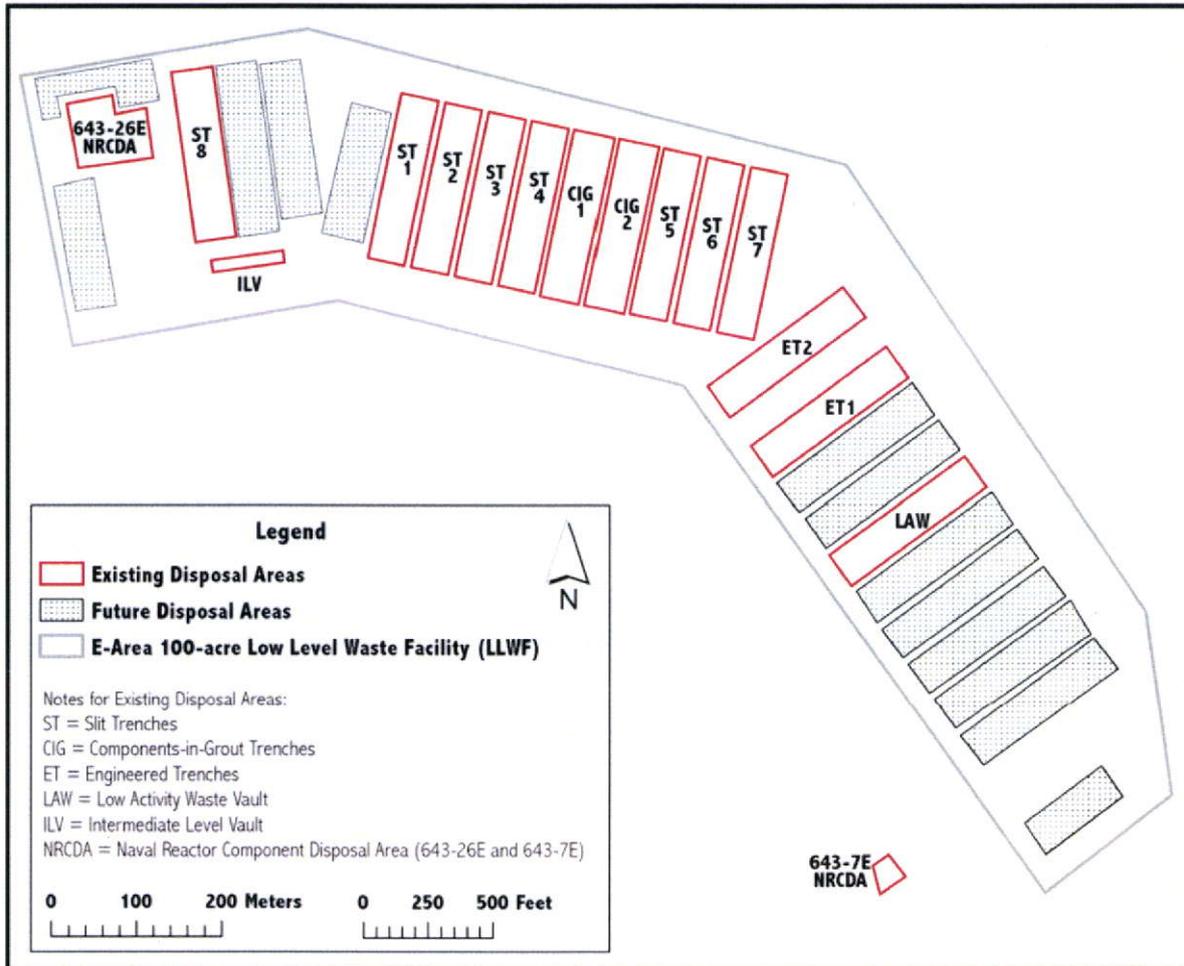


Figure 2. Location of the Slit Trench Disposal Units Footprint within the E-Area LLWF

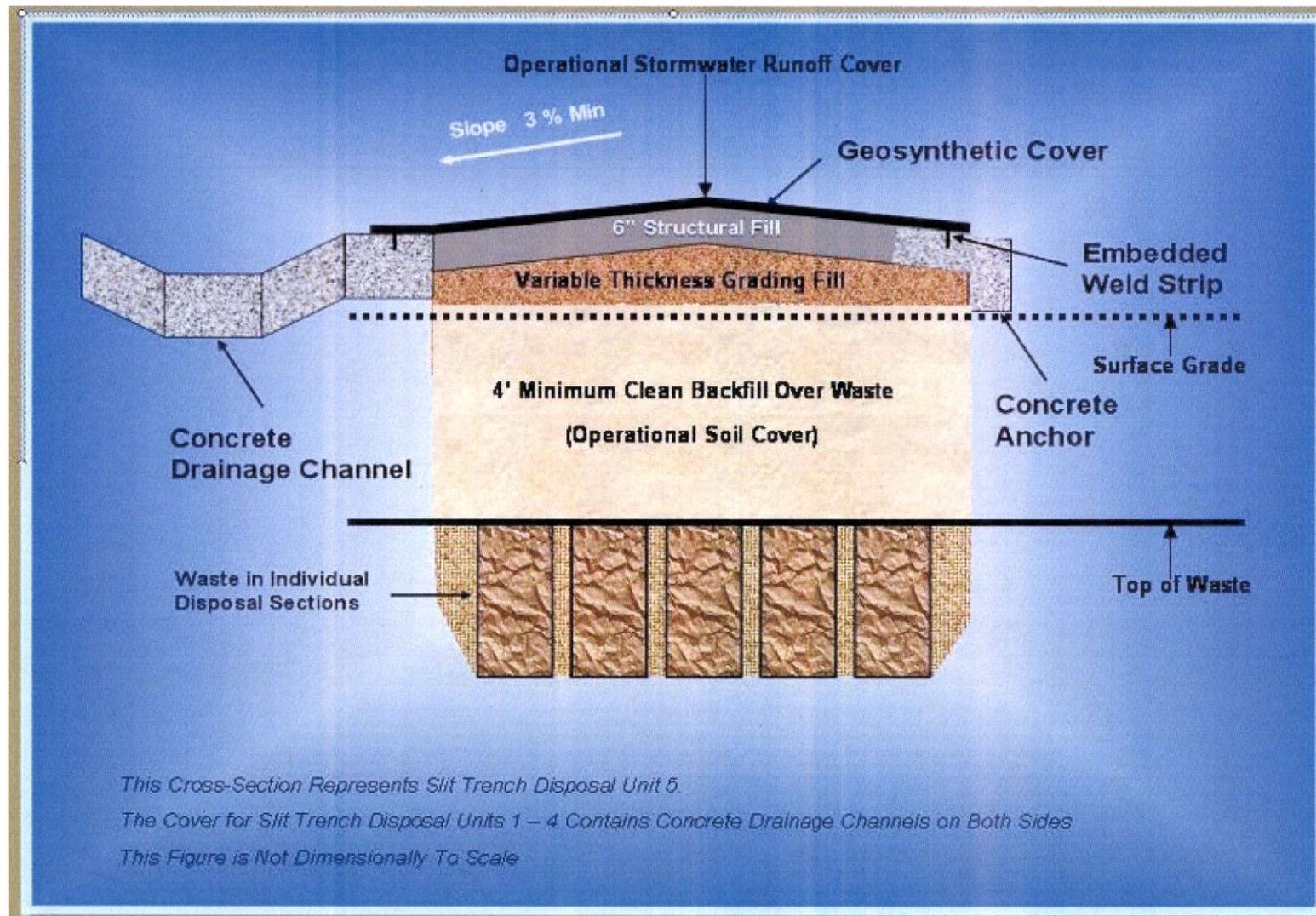


Figure 3. Operational Stormwater Runoff Conceptual Design

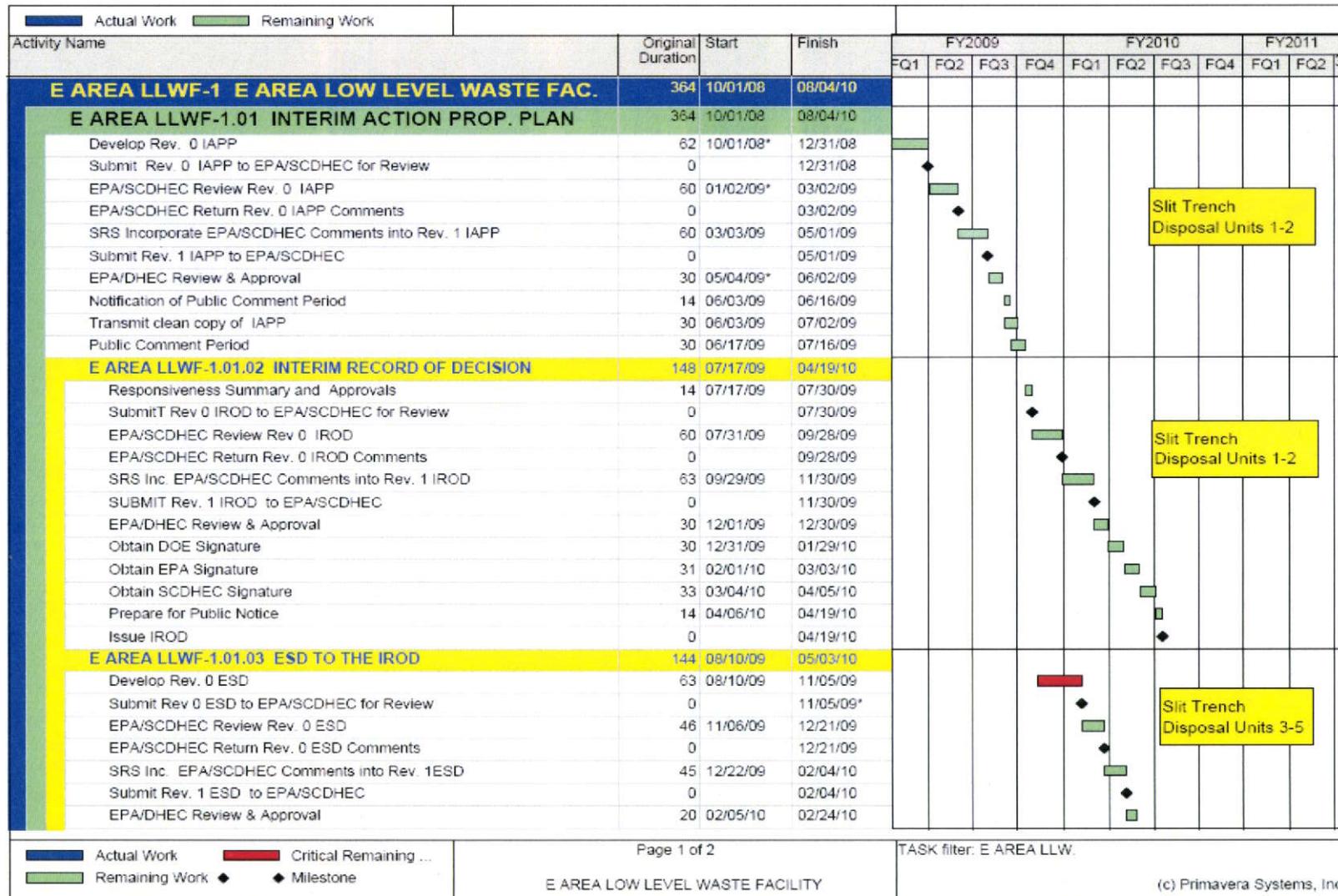


Figure 4. Interim Remedial Action Schedule

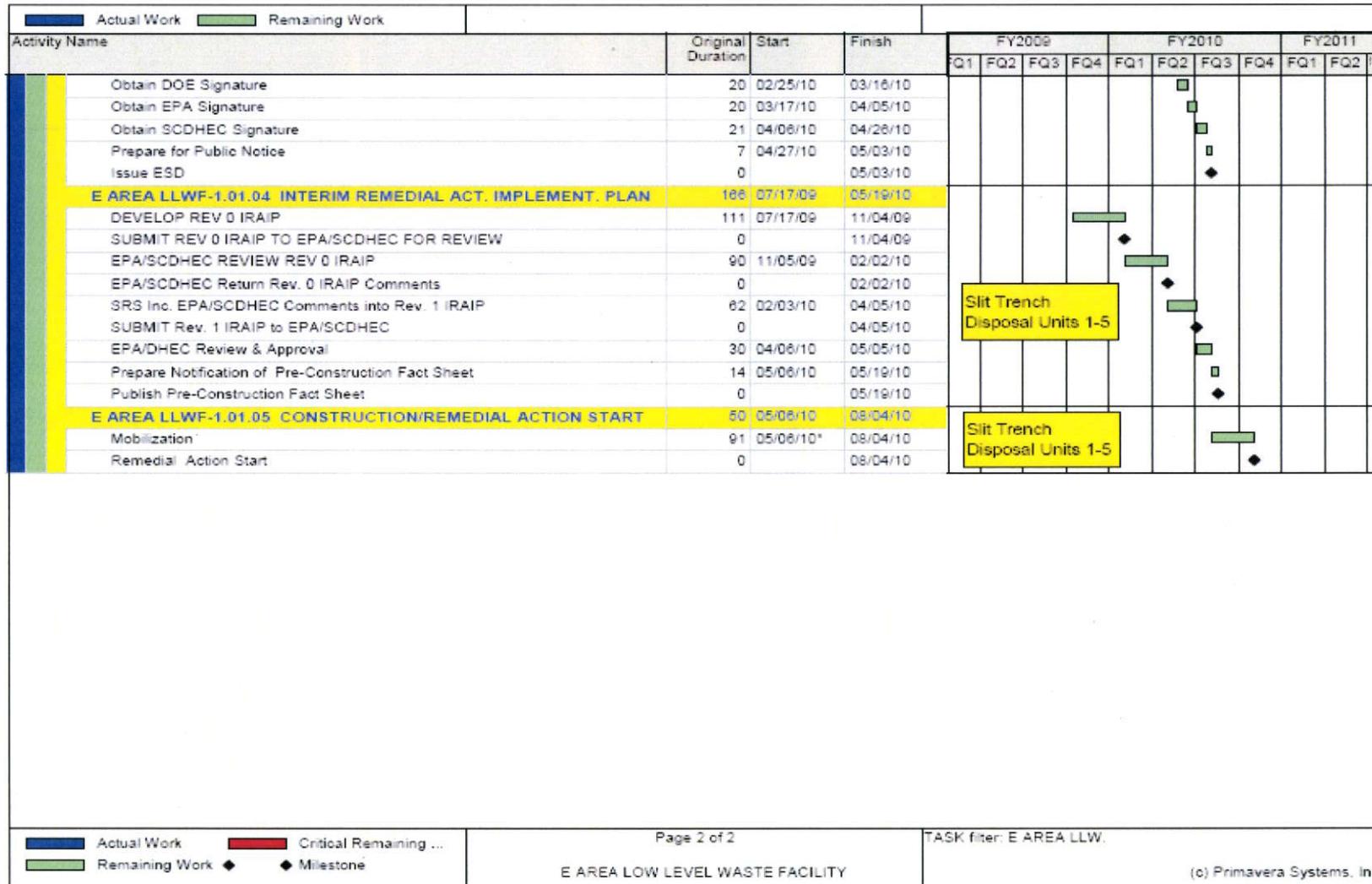


Figure 4. Interim Remedial Action Schedule (continued)

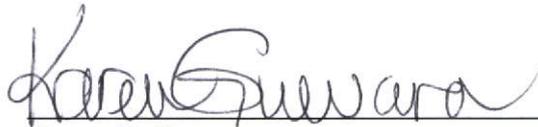
ESD for Rev. 1 IROD E-Area Low-Level Waste Facility, 643-26E
(Slit Trench Disposal Units 1 and 2) (U)
Savannah River Site
January 2010

SRNS-RP-2009-01128
Revision 1

Page 15 of 15

2/25/10

Date



Karen C. Guevara
Assistant Manager for Closure Project
U. S. Department of Energy
Savannah River Operations Office

3/31/10

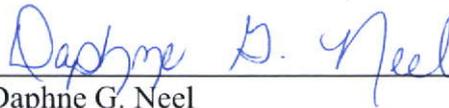
Date



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

4/5/10

Date



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