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Second Five-Year Review Report for the Savannah River Site Aiken, South Carolina

WSRC-RP-2001-4163

Revision 1.1

September 2003

Prepared by:
Westinghouse Savannah River Company LLC
Savannah River Site
Aiken, SC 29808

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

10/17/03 — Date

Jeffrey M. Allison
for Manager
U. S. Department of Energy, Savannah River Operations Office

2/12/04 — Date

Winston A. Smith
Director
Waste Management Division
U. S. Environmental Protection Agency - Region 4

1/30/04 — Date

R. Lewis Shaw
Deputy Commissioner
Environmental Quality Control
South Carolina Department of Health and Environmental Control

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LIST OF ACRONYMS AND ABBREVIATIONS

ABRP	A-Area Burning/Rubble Pits (731-A/1A) and Rubble Pit (731-2A)
ARAR	applicable or relevant and appropriate requirement
AS	air sparging
BaP	benzo(a)pyrene
b/g	beta/gamma
bls	below land surface
BRA	baseline risk assessment
CBRP	C-Area Burning/Rubble Pit
CCAP	Conceptual Corrective Action Plan
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CERCLIS	Comprehensive Environmental Response, Compensation and Liability Information System
cfs	cubic feet per second
Ci	curie
cm/sec and cm/s	centimeter per second
CMCOC	contaminant migration constituent of concern
CMI/RAIP	Corrective Measures Implementation/Remediation Action Implementation Plan
CMI/RAR	Corrective Measures Implementation/Remedial Action Report
CMI/RD/RDR/RAWP	Corrective Measures Implementation/Remedial Design/Remedial Design Report/Remedial Action Work Plan
CMP	Chemicals, Metals, and Pesticides Pit (080-17G, -17.1G, -18G, -18.1G, -18.2G, -18.3G, -19G)
CMS/FS	Corrective Measures Study/Feasibility Study
COC	constituent of concern
CPRB	C-, F-, K-, and P-Area Coal Pile Runoff Basins (189-C, 289-F, 189-K, and 189-P)
CPT	cone penetrometer technology
CRSB	C-Area Reactor Seepage Basins (904-66G, -67G, -68G)
DBRP	D-Area Burning/Rubble Pits (431-D/1D)
DCE	dichloroethylene
DCM	dichloromethane
DDD	dichlorodiphenyl dichloroethane
DDE	dichlorodiphenyl dichloroethylene
DDT	dichlorodiphenyl trichloroethane
DNAPL	dense non-aqueous phase liquid
DOSB	D-Area Oil Seepage Basin (631-G)
dpm/mL	disintegrations per minute per milliliter
DWPF	Defense Waste Processing Facility
ESD	Explanation of Significant Difference
FBRP	F-Area Burning/Rubble Pits

FFA	Federal Facility Agreement
FIP	FFA Implementation Plan
FIPSL	F-Area Inactive Process Sewer Line
FPIT	FFA Process Improvement Team
FRB	F-Area Retention Basin (281-3F)
FRR	Final Remedial Report
ft	feet
ft^2	square feet
ft^3	cubic feet
gpm	gallons per minute
GWMZ	groundwater mixing zone
HGCA	hybrid groundwater corrective action
HI	hazard index
HQ	hazard quotient
HSWA	Hazardous and Solid Waste Amendment
HWMF	Hazardous Waste Management Facility
IAPP	Interim Action Proposed Plan
IAROD	Interim Action Record of Decision
ICMI/RAIP	Interim Corrective Measures Implementation/Remedial Action Implementation Plan
IRA	interim remedial action
IRAO	interim remedial action objective
IRG	interim remedial goal
KBPOP	K-Area Bingham Pump Outage Pit (643-1G)
KBRP	K-Area Burning/Rubble Pit (131-K)
km	kilometer
KRP	K-Area Rubble Pile (631-20G)
LAACB	L-Area Acid/Caustic Basin (904-79G)
L&P BPOP	L- and P-Area Bingham Pump Outage Pits (643-2G, 643-3G, and 643-4G)
LAOCB	L-Area Oil and Chemical Basin (904-83G)
LLWDF	Low-Level Waste Disposal Facility
LUCAP	Land Use Controls Assurance Plan
LUCIP	Land Use Controls Implementation Plan
m	meter
m^3	cubic meter
MCB/MBP	Miscellaneous Chemical Basin/Metals Burning Pit (731-4A/5A)
MCL	maximum contaminant level
µg/kg	microgram per kilogram
µg/L	micrograms per liter
mg/L	milligrams per liter
mg/kg	milligram per kilogram
MNA	monitored natural attenuation
mR/hr	milliRoentgen per hour
MWMF	Mixed Waste Management Facility (643-28E)

msl	mean sea level
MZCL	mixing zone concentration limit
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NPDES	National Pollution Discharge Elimination System
NPL	National Priorities List
NTSB	New TNX Seepage Basin
O&M	operating & maintenance
OCDD	octachlorodibenzo-p-dioxin
OFASB	Old F-Area Seepage Basin
ORWBG	Old Radioactive Waste Burial Ground (643-E)
OST	Old Solvent Tank
OTSB	Old TNX Seepage Basin
OU	operable unit
PAH	polycyclic aromatic hydrocarbon
PCB	polychlorinated biphenyl
PCE	tetrachloroethylene, perchloroethylene, tetrachloroethene
pCi/g	pico curies per gram
pCi/L	pico curies per liter
PCR	Post-Construction Report
ppb	parts per billion
ppm	parts per million
ppmv	parts per million vapor
PSVE	passive soil vapor extraction
PTSM	principal threat source material
RAO	remedial action objective
RBC	risk-based concentration
RCRA	Resource Conservation and Recovery Act
RDR/RAWP	Remedial Design Report/Remedial Action Work Plan
RFI	RCRA Facility Investigation
RG	remedial goal
RI	Remedial Investigation
RME	reasonable maximum exposure
ROD	Record of Decision
RQ	result qualifier
RSER/WCP	Removal Site Evaluation Report/Wastewater Closure Plan
SB/PP	Statement of Basis/Proposed Plan
SCDHEC	South Carolina Department of Health and Environmental Control
SDWA	Safe Drinking Water Act
SRLSB	SRL Seepage Basins (904-53-G1, -53G2, -54G, and –55G)
SRS	Savannah River Site
SRWU	Silverton Road Waste Unit (731-3A)
S/S	stabilization/solidification
SVE	soil vapor extraction

TBC	to-be-considered
TBG	TNX Burying Ground
TCE	trichloroethylene, trichloroethene
TNXGW	TNX Groundwater
TNXOD	TNX Outfall Delta
USDOE	United States Department of Energy
USEPA	United States Environmental Protection Agency
UTR	Upper Three Runs
VC	vinyl chloride
VOC	volatile organic compound
WSRC LLC	Westinghouse Savannah River Company, Limited Liability Company
yd^3	cubic yards

SAVANNAH RIVER SITE SUMMARY

I. INTRODUCTION

The purpose of five-year reviews is to determine whether the remedy at an operable unit (OU) is protective of human health and the environment. The methods, findings, and conclusions of reviews are documented in Five-Year Review reports. In addition, Five-Year Review reports identify issues found during the review, if any, and recommendations to address them.

On December 21, 1989, Savannah River Site (SRS) was included on the National Priorities List (NPL). The inclusion created a need to integrate the established RCRA Facility Investigation (RFI) program with Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) requirements to provide for a focused environmental program. In accordance with Section 120 of CERCLA 42 United States Code Section 9620, the United States Department of Energy (USDOE) has negotiated a Federal Facility Agreement (FFA) (1993) with United States Environmental Protection Agency (USEPA) and South Carolina Department of Health and Environmental Control (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 IV and the SCDHEC.

The first five-year review was issued in June 1997. All subsequent reviews will be issued every five years thereafter. The USEPA, SCDHEC, and USDOE recognized that multiple Records of Decision would be issued for the SRS. The Parties determined that it would be more cost effective to review all applicable remedies listed in the RODs on the same five-year cycle and they initiated the cycle with the issuance of the first report in 1997.

The USDOE is preparing this five-year review pursuant to CERCLA §121 and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). CERCLA §121 states:

> *If the President selects a remedial action that results in any hazardous substances, pollutants, or contaminants remaining at the site, the President shall review such remedial action no less often than each five years after the initiation of such remedial action to assure that human health and the environment are being protected by the remedial action being implemented. In addition, if upon such review it is the judgement of the President that action is appropriate at such site in accordance with section [104] or [106], the President shall take or require such action. The President shall report to the Congress a list of facilities for which such review is required, the results of all such reviews, and any actions taken as a result of such reviews.*

The agency interpreted this requirement further in the NCP; 40 CFR §300.430(f)(ii) states:

> *If a remedial action is selected that results in hazardous substances, pollutants, or contaminants remaining at the site above levels that allow for unlimited use and unrestricted exposure, the lead agency shall review such action no less often than every five years after the initiation of the selected remedial action.*

All reviews were conducted from August 2001 through September 2001. This report documents the results of the reviews.

This is the second five-year review for SRS. SRS contains a number of OUs that may contain hazardous substances, pollutants, or contaminants. By agreement with USEPA and SCDHEC, SRS shall prepare one five-year review for all of the appropriate OUs at SRS that have issued Records of Decision (RODs), at the time

of issuance of this review report, that required any remedial action. A table listing the OUs included with this report is included in Appendix A. This table summarizes the remedy used at each OU, indicates if the remedy was interim or final, or if final remediation was turned over to RCRA.

II. SITE CHRONOLOGY

Table 1 lists the chronology of the issuance of RODs and Explanations of Significant Difference (ESDs) for SRS.

Table 1. Chronology of the Issuance of RODs and ESDs at SRS

Event	Date
NPL listing	December 21, 1989
Federal Facility Agreement Declared Effective	August 16, 1993
TNX Groundwater Operable Unit, Interim Action ROD (and ESD)	November16, 1994 (ESD 1997)
Par Pond (685-G), Interim Action ROD	February 16, 1995
D-Area Oil Seepage Basin (631-G), ROD	March 6, 1995
Old Radioactive Waste Burial Ground (643-E), Interim Action ROD	June 18, 1996
D-Area Burning/Rubble Pits (431-D, 431-1D), ROD	April 22, 1997
F-Area Burning/Rubble Pits (231-F, 231-1F, and 231-2F), ROD	April 22, 1997
Silverton Road Waste Unit (713-3A), ROD	April 22, 1997
Old F-Area Seepage Basin (904-49G), ROD	June 19, 1997
L-Area Oil and Chemical Basin and L-Area Acid/Caustic Basin (904-83G, -79G), ROD	January 5, 1998
K-Area Bingham Pump Outage Pit (643-1G), ROD	April 14, 1998
F-Area Retention Basin (281-3F), ROD	October 19, 1998
C-, F-, K-, and P-Area Coal Pile Runoff Basins (189-C, 289-F, 189-K, 189-P), ROD	November 10, 1998
C Area Burning/Rubble Pit (131-C), Interim Action ROD	March 4, 1999
Chemicals, Metals, and Pesticides Pit (080-17G, -17.1G, -18G, -18.1G, -18.2G, -18.3G, -19G), Interim Action ROD	November 29, 1999
SRL Seepage Basins (904-51G1, -52G2, -52G, -55G), ROD	March 15, 2000
C Reactor Seepage Basins (904-66G, -67G, -68G), Plug-In ROD, ESD	August 3, 2000
L & P Bingham Pump Outage Pits (643-2G, -3G, -4G), ROD	August 31, 2000
A-Area Burning/Rubble Pits (731-A/1A) and Rubble Pit (731-2A), Interim Action ROD	November 17, 2000
Miscellaneous Chemical Basin/Metals Burning Pit (731-4A/5A), Interim Action ROD	December 6, 2000
K-Area Burning/Rubble Pit (131-K & 631-20G), ROD	August 20, 2001

Event	Date
ORWBG Old Solvent Tanks, Interim Action ROD	September 14, 2001
Previous Five-Year Reviews	June 30, 1997

Key:

Consent Decree – Date a consent decree (enforcement document from the court system) was issued for the operable unit.

Corrective Action start – Date the corrective (remedial) action was initiated (under RCRA).

ESD Issuance - Date all three parties (USDOE, USEPA, and SCDHEC) signed the Explanation of Significant Difference used to significantly modify the remedy selected in the Record of Decision.

Final or Interim ROD issuance – Date the three parties (USDOE, USEPA, and SCDHEC) signed the Record of Decision.

Federal Facility Agreement Declared Effective - Date the Federal Facility Agreement formalized the integration of CERCLA and RCRA in remediation activities at SRS.

NPL listing – Date the entire SRS was added to EPA's National Priorities List.

Previous Five-Year Reviews – Date of any previous five year reviews of remedy for the operable unit.

RCRA Closure Certified – Date the three parties (USDOE, USEPA, and SCDHEC) certified that the operable unit had been remediated and closed under the Resource Conservation and Recovery Act.

RCRA Closure Plan Approved – Date the three parties (USDOE, USEPA, and SCDHEC) approved the closure plan for the operable unit under Resource Conservation and Recovery Act.

Remedial Action start/complete – Date the remedial action (final or interim) was initiated/completed (under CERCLA).

Removal Action – Date contaminated media was removed from the operable unit (not associated with the ROD).

RFI/RI start/complete - Date the remedial investigation (sampling) was initiated/completed for the operable unit.

ROD Amendment Issuance - Date the three parties (USDOE, USEPA, and SCDHEC) signed the Record of Decision Amendment used to change the remedy selected in the original Record of Decision.

III. BACKGROUND

SRS occupies approximately 310 square miles of land adjacent to the Savannah River, principally in Aiken and Barnwell counties of South Carolina (Figure 1). SRS is located approximately 25 miles southeast of Augusta, Georgia, and 20 miles south of Aiken, South Carolina. 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 the CERCLA, are currently present in the environment at SRS.

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,

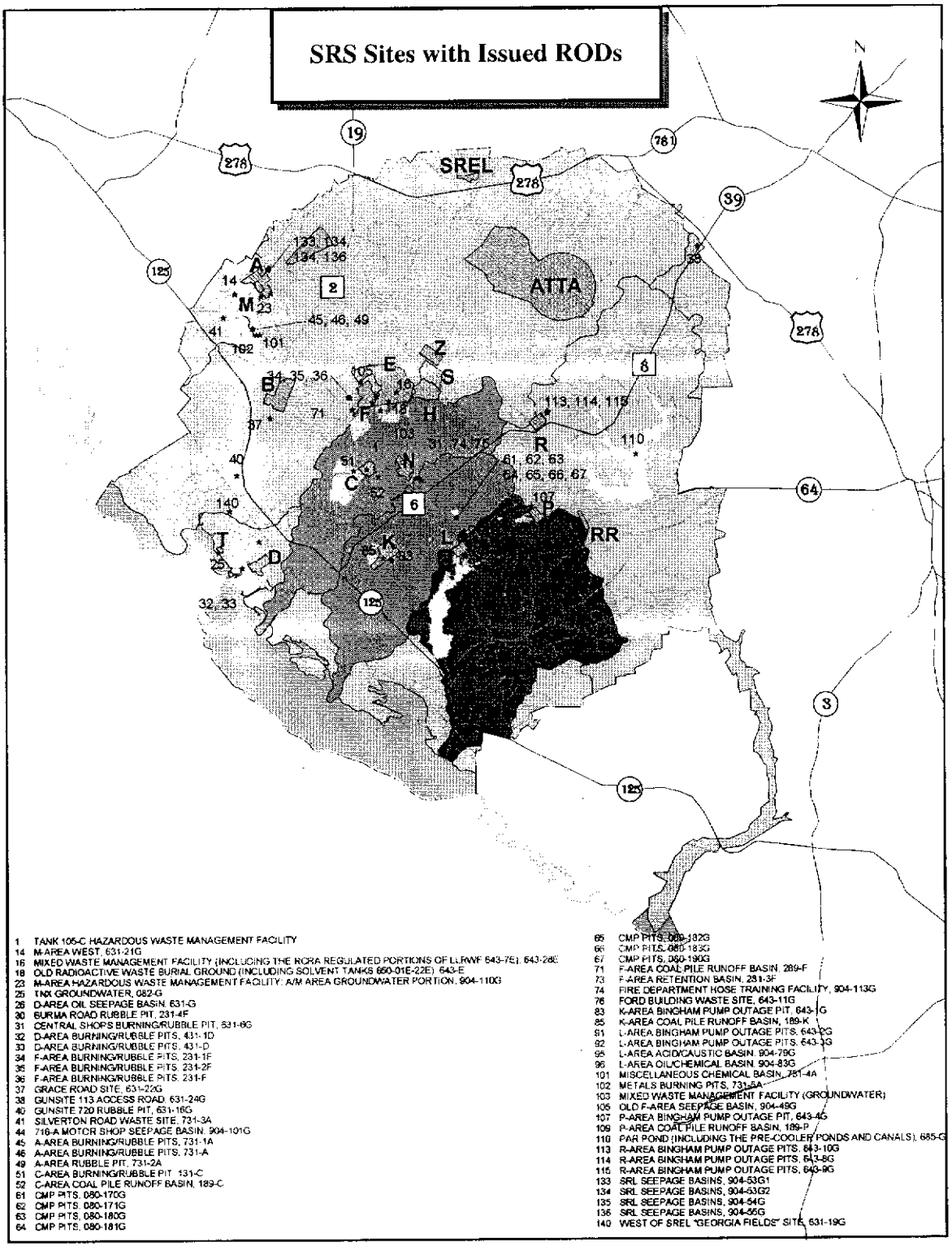


Figure 1. Map of SRS Showing the Location of OUs with Issued RODs

industrial, and research efforts up to the present. Chemical and radioactive wastes are byproducts 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.

Hazardous waste materials handled at SRS are managed under RCRA, a comprehensive law requiring responsible management of hazardous waste. Certain SRS activities require SCDHEC operating or post-closure permits under RCRA. SRS received a RCRA hazardous waste permit from the SCDHEC, which was most recently renewed on September 5, 1995. Module IV of the Hazardous and Solid Waste Amendments (HSWA) portion of the RCRA permit mandates corrective action requirements for non-regulated solid waste management units subject to RCRA 3004(u).

On December 21, 1989, SRS was included on the National Priorities List (NPL). The inclusion created a need to integrate the established 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 (1993) with 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 IV and SCDHEC.

IV. REMEDIAL ACTIONS

The remedial actions for the OU's are described within Section IV of each specific OU. A summary of the remedial actions employed at the OUs is given in Table 2.

Table 3 lists the annual post-ROD total costs for maintaining the OUs at SRS. No breakdown by individual OU is available.

Table 2. Summary of Remedial Actions Used at the OUs at SRS

Operable Unit	Remedial Action
Final RODs and ESDs	
C Reactor Seepage Basins (904-66G, -67G, -68G)	In Situ S/S (Plug-In), Soil Cover, Institutional Controls
C-, F-, K-, and P-Area Coal Pile Runoff Basins (189-C, 289-F, 189-K, 189-P)	No Further Action for Soil, Groundwater Monitoring
D-Area Burning/Rubble Pits (431-D, 431-1D)	Institutional Controls
D-Area Oil Seepage Basin (631-G)	No Further Action for Soil (Removal), Institutional Controls, Mixing Zone
F-Area Burning/Rubble Pits (231-F, 231-1F, and 231-2F)	Institutional Controls
F-Area Retention Basin (281-3F)	In Situ S/S, Soil Cover, Institutional Controls
K-Area Bingham Pump Outage Pit (643-1G)	Institutional Controls
K-Area Burning/Rubble Pit (131-K & 631-20G)	Soil Cover, Monitored Natural Attenuation
L & P Bingham Pump Outage Pits (643-2G, -3G, -4G)	Institutional Controls
L-Area Oil and Chemical Basin and L-Area Acid/Caustic Basin (904-83G, -79G)	In Situ S/S, Soil Cover, Institutional Controls
Old F-Area Seepage Basin (904-49G)	In Situ S/S, Institutional Controls, Mixing Zone
Silverton Road Waste Unit (713-3A)	Institutional Controls
SRL Seepage Basins (904-51G1, -52G2, -52G, -55G)	Soil Excavation, Offsite Disposal, Institutional Controls
Interim Action RODs and ESDs	
A-Area Burning/Rubble Pits (731-A/1A) and Rubble Pit (731-2A)	Soil Cover, Institutional Controls, PSVE (Barbell™), Air Sparging
C-Area Burning/Rubble Pit (131-C)	Soil Cover, SVE, Air Sparging
Chemicals, Metals, and Pesticides Pit (080-17G, -17.1G, -18G, -18.1G, -18.2G, -18.3G, -19G)	Soil Excavation, Offsite Disposal, SVE, Air Sparging
Miscellaneous Chemical Basin/Metals Burning Pit (731-4A/5A)	Soil Excavation, Offsite Disposal, Institutional Controls, SVE (active & passive), Air Sparging, Groundwater Monitoring
Old Radioactive Waste Burial Ground (643-E)	Soil Cover
Old Radioactive Waste Burial Ground Old Solvent Tanks	S/S Tanks In Situ
Par Pond (685-G)	Repair Dam
TNX Groundwater Operable Unit	SVE (had recirculation wells but this was dropped)

Table 3. Annual System Operations/O&M Costs

Dates		Total Cost rounded to nearest $1000
From	To	
10/1/96	9/30/97	$1,214,000
10/1/97	9/30/98	$1,407,000
10/1/98	9/30/99	$1,579,000
10/1/99	9/30/00	$1,770,000
10/1/00	9/30/01	$1,623,000

In addition to the actions, listed above, to perform the five-year review, the following actions were also taken:

- USDOE provided the Revision.0 and Revision.1 Reports to USEPA and SCDHEC for review and comment
- USDOE addressed the comments received and provided a Revision.1.1 for USEPA and SCDHEC approval
- After USEPA and SCDHEC approval, the Report was routed through the three Parties for signature
- After all signatures were obtained, copies of the Report were made available to the public
- Notices of the availability of the Report were issued in local newspapers and through the SRS Environmental Bulletin.

V. PROGRESS SINCE LAST REVIEW

There were no recommendations made in the 1997 SRS Five-Year Review.

VI. FIVE-YEAR REVIEW PROCESS

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

- Reviewed appropriate documents such as RODs, annual groundwater monitoring reports, etc.
- Confirmed implementation of the remedial actions

- Inspected the units (other than the No Action OUs or OUs being remediated under RCRA) to confirm protectiveness of the remedial action

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

- Interviewed cognizant personnel for currently operating remedial systems

The review was specifically looking for remedies that were not performing to the standards prescribed in their respective RODs. The review was also looking for any changes in standards or to-be-considered guidance that would call into question whether the prescribed remedy meets the newer standards or guidance. Any problems or discrepancies were reported in the Technical Assessment and Recommendations Sections of the Five-Year Review for a specific OU.

VII. TECHNICAL ASSESSMENT

The technical assessment was made by answering the following three questions:

- Question A: Is the remedy functioning as intended by the decision documents?

- Question B: Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives (RAOs) used at the time of remedy selection still valid?

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

Each question, and the information associated with it, is presented in the Technical Assessment section for each OU.

Summary

The remedies selected for all of the OUs at SRS that were included in this report are functioning as intended by the decision documents except for those identified in Section VIII, Issues. The exposure assumptions, toxicity data, cleanup levels, and remedial action objectives used at the time of remedy selection are still valid for all of the OUs included in this report. Additional information that has come to light that could call into question the protectiveness of any of the selected remedies is discussed in Section VIII, Issues.

VIII. ISSUES

The Issues section addresses OU operations, conditions, or activities, if any, that currently prevent the remedy from being protective. Table 4 summarizes the issues found in this Five-Year Review.

Table 4. Issues Affecting the Current or Future Protectiveness

Issues	Affects Current Protectiveness (Y/N)	Affects Future Protectiveness (Y/N)
1) A-Area Burning/Rubble Pits (731-A/1A) and Rubble Pit (731-2A) OU. The A-Area Ash Pile (788-2A) may be incorporated into the OU in the future. Characterization data found TCE and PCE in the vadose zone beneath this ash pile. USDOE, USEPA, and SCDHEC must come to agreement on what to do with the ash pile in the future.	N	Y
2) Chemicals, Metals, and Pesticides Pit (080-17G, -17.1G, -18G, -18.1G, -18.2G, -18.3G, -19G) OU.–Later investigation discovered the presence of Silvex in the contaminated Ballast Area soil and DNAPL in the vadose zone. There has been a decrease in the water level to below the low-permeability clay layer.	Y	Y
3) D-Area Oil Seepage Basin (631-G) – the Annual Mixing Zone Monitoring Report stated that the 1Q 00 sampling for total-1,2-dichloroethene in DOB-15A was 140 µg/L which is above the MCL and MZCL of 70 µg/L. The values set for the MZCL were to be based on the maximum values reported in the RFI/RI/BRA. There was a problem in the sample analysis in that all isomers of DCE were not sampled in every well. The value of 140 µg/L is actually below the maximum value of 457 µg/L reported in the RFI/RI/BRA for cis-1,2-dichloroethene. Therefore, the MZCL should be readjusted to read 457 µg/L for cis-1,2-DCE and then the value of 140 µg/L would not trigger an exceedance.	Y	Y
4) Old F-Area Seepage Basin (904-49G) OU. The MCLs for iodine-129, nitrate-nitrite, strontium-90, and/or tritium have been exceeded at three wells (FNB-13, FNB-14, and FNB-15) along the compliance boundary. The pattern of exceedances suggests that an upgradient source other than OFASB may be involved, and additional characterization was performed. The Core Team agreed that the OFASB groundwater should be considered part of a larger F-Area groundwater OU. It was agreed that a ROD amendment will be issued to make this change.	Y	N

IX. RECOMMENDATIONS AND FOLLOW-UP ACTIONS

The recommendations and follow-up actions are the required and suggested improvements to current site operations, activities, remedies, or conditions. Table 5 summarizes the recommendations and follow-up actions for this Five-Year Review.

Table 5. Recommendations and Follow-up Actions

Issue	Recommendations and Follow-up Actions	Party Responsible	Oversight Agency	Milestone Date	Affects Protectiveness (Y/N)	
					Current	Future
1	Meeting to discuss the future of the Ash Basin.	USDOE	USEPA, SCDHEC	None, currently an active OU	N	Y
2	IAROD Amendment will resolve the Silvex issue, final ROD will deal with the vadose zone and groundwater.	USDOE	USEPA, SCDHEC	IROD issued 3/8/02	Y	Y
3	Meeting to discuss the changes needed in the Mixing Zone application.	USDOE	USEPA, SCDHEC	None	Y	Y
4	Issue a ROD amendment to remove the groundwater from the OFASB.	USDOE	USEPA, SCDHEC	None	Y	Y

Issue 1 (A-Area Burning/Rubble Pits (731-A/1A) and Rubble Pit (731-2A) OU) cannot be resolved while the Ash Basin remains an active solid waste management unit. Issue 2 (Chemicals, Metals, and Pesticides Pit (080-17G, -17.1G, -18G, -18.1G, -18.2G, -18.3G, -19G) OU) is being partially resolved through an IROD amendment issued on 3/8/02. Issue 3 (D-Area Oil Seepage Basin (631-G) OU) has been discussed with USEPA and SCDHEC; however, no final course of action has been determined. An additional meeting with the decision-makers from the three Parties (USDOE, USEPA, and SCDHEC) is recommended. Issue 4 (Old F-Area Seepage Basin [904-49G] OU) will require an additional meeting with the decision-makers from the three Parties (USDOE, USEPA, and SCDHEC) to determine the plan of action.

X. PROTECTIVENESS STATEMENT(S)

A protectiveness statement was included for each OU reviewed where the remedial action has begun. The following OUs are currently being remediated and could not make a definitive protectiveness statement; however, exposure pathways that could lead to unacceptable risk are being controlled through institutional controls. Institutional controls include: (1) physical access controls to prevent unauthorized entry to SRS (fences, guards, security patrols, etc.); (2) administrative controls that maintain this site for industrial use only (SRS is a secured government facility with land use restrictions); and (3) warning signs and land use controls (SRS Site Use/Site Clearance Program).

- A-Area Burning/Rubble Pits and Rubble Pit – soil vapor extraction (SVE) and air sparging
- C-Area Burning/Rubble Pit – SVE and air sparging
- Chemicals, Metals, and Pesticides Pit – SVE and air sparging
- Miscellaneous Chemical Basin/Metals Burning Pit – SVE and air sparging
- Old Radioactive Waste Burial Ground (ORWBG) Old Solvent Tanks – stabilization/solidification (S/S) tanks in situ
- TNX Area Groundwater – SVE

The ORWBG soil cover and the PAR Pond dam repair are both providing protection, but are only interim actions.

For all other OUs, the remedy was found to be protective.

XI. NEXT REVIEW

The next Five-Year Review is scheduled for June 30, 2007.

XII. OU-SPECIFIC FIVE-YEAR REVIEW REPORTS

A/M Groundwater Operable Unit

I. Introduction

The review for this unit is conducted under the SRS RCRA program. The CERCLA review requirements are met by the RCRA program, therefore a separate review of the RCRA Corrective Action is not duplicated in this document. This is the second such five-year review for the A/M Area Groundwater Operable Unit (OU). This review was conducted from August 2001 through September 2001. This report documents the results of the review.

II. Site Chronology

Table 1 lists the chronology of site events for the A/M Area Groundwater OU.

III. Background

The A/M Area Groundwater OU is a media-specific OU within the Upper Three Runs Watershed. As a result of past waste disposal practices, the groundwater beneath A/M Area has been contaminated with organic solvents, primarily trichloroethylene (TCE) and tetrachloroethylene (perchloroethylene; PCE). Total plume size beneath the A/M Area, as currently defined, is approximately 1,200 acres. This plume has not migrated beyond the SRS boundaries. The contamination in the A/M Area groundwater and the overlying unsaturated zone (vadose zone) appears to be associated with releases from the following A/M Area source units: the A-014 Outfall, the M-Area Settling Basin/Lost Lake, the (M-Area Hazardous Waste Management Facility (HWMF)), the M-Area HWMF Process Sewer, and the Building 321-M Solvent Storage Area.

The groundwater beneath A/M Area has been contaminated with the organic solvents TCE and PCE in both the dissolved state and, in limited occurrences, as concentrated Dense Non-Aqueous Phase Liquids (DNAPLs). These DNAPLs consist of concentrated, undissolved accumulations of chlorinated solvents.

Table 1. Chronology of Site Events

Event	Date
RCRA Corrective Action Plan Approved	1983
Corrective Action start	1983
Consent Decree, Civil Action No. 1:85-2583-6	1988
Interim ROD issuance	June 29, 1992
Previous Five-Year Reviews	June 30, 1997

Key:

Consent Decree – Date a consent decree (enforcement document from the court system) was issued for the operable unit.

Corrective Action start – Date the corrective (remedial) action was initiated (under RCRA).

ESD Issuance - Date all three parties (USDOE, USEPA, and SCDHEC) signed the Explanation of Significant Difference used to significantly modify the remedy selected in the Record of Decision.

Final or Interim ROD issuance – Date the three parties (USDOE, USEPA, and SCDHEC) signed the Record of Decision.

Federal Facility Agreement Declared Effective - Date the Federal Facility Agreement formalized the integration of CERCLA and RCRA in remediation activities at SRS.

NPL listing – Date the entire SRS was added to EPA's National Priorities List.

Previous Five-Year Reviews – Date of any previous five year reviews of remedy for the operable unit.

RCRA Closure Certified – Date the three parties (USDOE, USEPA, and SCDHEC) certified that the operable unit had been remediated and closed under the Resource Conservation and Recovery Act.

RCRA Closure Plan Approved – Date the three parties (USDOE, USEPA, and SCDHEC) approved the closure plan for the operable unit under Resource Conservation and Recovery Act.

Remedial Action start/complete – Date the remedial action (final or interim) was initiated/completed (under CERCLA).

Removal Action – Date contaminated media was removed from the operable unit (not associated with the ROD).

RFI/RI start/complete - Date the remedial investigation (sampling) was initiated/completed for the operable unit.

ROD Amendment Issuance - Date the three parties (USDOE, USEPA, and SCDHEC) signed the Record of Decision Amendment used to change the remedy selected in the original Record of Decision.

From 1952 to 1981, an estimated 13 million pounds of chlorinated solvents were used in the A/M Area. An estimated 50 to 90 percent of the solvents evaporated during use. The remaining solvents were discharged as waste to the process sewer system. Additionally, significant quantities of chlorinated solvents were inadvertently spilled during handling and storage.

The waste was piped, via a process sewer system, from the fuel tube processing facility to two primary locations: A-014 Outfall and the M-Area Settling Basin. As a result of this disposal practice and leakage within the process sewer line leading to the settling basin, four locations have been identified as potential sources for significant groundwater contamination by TCE and PCE. The Metallurgical Laboratory Basin and Building 313-M, a solvent transfer station, both of which probably have impacted groundwater, also exist in A Area.

IV. Interim Remedial Actions

The selected interim remedy for this unit as identified in the Record of Decision under CERCLA is groundwater recovery with treatment by air stripping.

The goals of the remedial action are to (1) prevent further groundwater plume migration and initiate groundwater restoration while risk assessment activities are being planned and conducted, and (2) obtain further information about the response of the aquifer to remediation. The ultimate goal of remediation will be determined in a final remedial action for this OU.

Groundwater recovery with treatment by air stripping was implemented in 1985 as a Corrective Action Program. In the general M Area, the treatment system consists of 11 groundwater recovery wells and a full-scale production air stripper with an air blower, effluent pumps, instrument air system, and control building. The 11 recovery wells were installed from 1982 to 1985. A zero-leakage drainline constructed to transfer treated groundwater from the air stripper to the A-014 Outfall is also included. The A-014 Outfall is permitted by SCDHEC to receive this treated water.

In the northeastern sector of A/M Area, a groundwater recovery and air stripper system has been installed near the Savannah River Technology Center (SRTC). A zero-leakage drainline to carry treated liquid from the air stripper to a nearby permitted outfall is also part of the system.

Treated groundwater is discharged to permitted outfalls within SRS. Discharges of this type are regulated under the Clean Water Act and the South Carolina National Pollutant Discharge Elimination System (NPDES) Permit Regulations. Treated water must meet the discharge limits of the permitted outfall unless a permit modification is obtained. The systems are permitted through the SCDHEC Air Quality Control Program and the Clean Water Act (wastewater treatment discharge permit) rather than through RCRA.

SCDHEC has approved the existing A/M Area Groundwater Corrective Action Program as an intermediate step leading toward a complete RCRA corrective action program. The final action for this media-specific OU will be documented by modifications to the RCRA permit.

V. Progress Since Last Review

This is the second 5-year review for this OU. Since the previous review in June of 1997, the following actions were completed:

- Continued operation of the groundwater removal and treatment system

VI. Five-Year Review Process

The following tasks were performed as part of the review:

- Reviewed the documents listed in Attachment 1
- Confirmed the implementation of the remedial action
- Assured that all actions required under the RCRA Permit were implemented

VII. Technical Assessment

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

VIII. Issues

There are no issues for this OU.

IX. Recommendations and Follow-up Actions

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

X. Protectiveness Statement(s)

The remedy of groundwater removal and treatment under CERCLA is expected to be protective of human health and the environment upon completion, and in the

interim, exposure pathways that could result in unacceptable risks are being controlled through institutional controls. Institutional controls include: (1) physical access controls to prevent unauthorized entry to SRS (fences, guards, security patrols, etc.); (2) administrative controls that maintain this site for industrial use only (SRS is a secured government facility with land use restrictions); and (3) warning signs and land use controls (SRS Site Use/Site Clearance Program).

XI. Next Review

The next five-year review is scheduled for June 30, 2007.

Attachment 1

List of Documents Reviewed

WSRC, 1992. *Interim Action Record of Decision Remedial Alternative Selection, A/M area Groundwater Operable Unit (U),* WSRC-RP-92-744, Revision 0, June 25, 1992, Westinghouse Savannah River Company, Aiken, SC.

A-Area Burning/Rubble Pits (731-A/1A) and Rubble Pit (731-2A) (ABRP) Operable Unit (INTERIM ACTION)

I. Introduction

This is the first five-year review for the A-Area Burning/Rubble Pits (731-A/1A) and Rubble Pit (731-2A) (ABRP) Operable Unit (OU). Although entitled an Interim Action Record of Decision (IAROD), the document was a combined final and interim action Record of Decision (ROD). The final action was for the surface soils and the interim action was for the groundwater, as described below. This five-year review addresses the final portion of this ROD with a summary of the interim actions to date. This review was conducted from August 2001 through September 2001.

The scope of the ABRP five-year IAROD will provide a status of remedial construction activities to date. At this time, the ABRP five-year IAROD review cannot directly determine whether the remedy at the site is protective of human health and the environment because construction of the remedial system is not complete. It is, however, progressing on an agreed-to schedule for completion and turnover to operations in calendar year 2001.

II. OU Chronology

Table 1 lists the chronology of site events for the ABRP.

III. Background

The ABRP is located in the northwest portion of Savannah River Site (SRS), approximately 1.5 miles south of AM Area operations and 3 miles east of the SRS boundary. The ABRP is located in the Upper Three Runs Creek Watershed and is situated on the west side of Roads D and C-1 (see Figure 1). Based on a Threatened, Endangered, and Sensitive (TES) species survey performed in 1994,

Table 1. Chronology of OU Events

Event	Date
Remedial Investigation complete	January 20, 1997
ROD issuance	May 15, 2000
Remedial Action start/complete	September 28, 2000/ongoing

Key:

Consent Decree – Date a consent decree (enforcement document from the court system) was issued for the operable unit.

Corrective Action start – Date the corrective (remedial) action was initiated (under RCRA).

ESD Issuance - Date all three parties (USDOE, USEPA, and SCDHEC) signed the Explanation of Significant Difference used to significantly modify the remedy selected in the Record of Decision.

Final or Interim ROD issuance – Date the three parties (USDOE, USEPA, and SCDHEC) signed the Record of Decision.

Federal Facility Agreement Declared Effective - Date the Federal Facility Agreement formalized the integration of CERCLA and RCRA in remediation activities at SRS.

NPL listing – Date the entire SRS was added to EPA's National Priorities List.

Previous Five-Year Reviews – Date of any previous five year reviews of remedy for the operable unit.

RCRA Closure Certified – Date the three parties (USDOE, USEPA, and SCDHEC) certified that the operable unit had been remediated and closed under the Resource Conservation and Recovery Act.

RCRA Closure Plan Approved – Date the three parties (USDOE, USEPA, and SCDHEC) approved the closure plan for the operable unit under Resource Conservation and Recovery Act.

Remedial Action start/complete – Date the remedial action (final or interim) was initiated/completed (under CERCLA).

Removal Action – Date contaminated media was removed from the operable unit (not associated with the ROD).

RFI/RI start/complete - Date the remedial investigation (sampling) was initiated/completed for the operable unit.

ROD Amendment Issuance - Date the three parties (USDOE, USEPA, and SCDHEC) signed the Record of Decision Amendment used to change the remedy selected in the original Record of Decision.

it was concluded that the north edge of the OU is a potential habitat for TES species. No other unique or sensitive ecosystems were noted within the area of analysis. TES species have not been observed at the ABRP OU. Therefore, the site is not located in or near an environmentally sensitive area. The area is unpopulated. Due to the receipt of waste from the A/M Area, the ABRP is being addressed in the SRS Resource Conservation and Recovery Act/Comprehensive Environmental Response, Compensation and Liability Act (RCRA/CERCLA) program.

The ABRP includes two burning/rubble pits (731-A/1A), which are approximately 22 feet wide, 9 to 10 feet deep and 250 feet in the length. A third rubble pit (731-2A) is approximately 40 feet in width and 650 feet in length; depth is unknown but is suspected to be up to 20 feet. It is located immediately adjacent and to the west of 731-A/1A (see Figure 2). The Pits Area, defined as

Pits 731-A/1A and 731-2A, is surrounded by gravel access roads and a mix of relatively flat grassy and wooded terrain. Groundwater beneath the OU is also included as a subunit of the ABRP.

A "potential pit" area is located approximately 500 feet east of the Pits Area and was identified based on physical evidence (depression and subsidence) along the ground surface and interviews with SRS personnel. The "depressional area" is located approximately 300 feet east of the potential pit. No specific disposal records or historical use information is available for either area (Figure 2)

Two additional features are noted in close proximity to the ABRP but are not part of the OU. One is the A-Area Ash Pile (788-2A), which is an active unit located immediately to the east of the Pits Area. The unit is included on the Site Evaluation List (Appendix G-1 of the Federal Facility Agreement [FFA]) for future assessment (Figure 2).

Another feature to the west of the Pits Area includes two material storage areas used previously to temporarily store petroleum–contaminated soil. Soils were removed in 1996 and dispositioned as either a subtitle D landfill outside of SRS or a thermal desorption facility outside of SRS, depending on analytical results.

Land and Resource Use

Current land use at the ABRP is industrial although no workers are permanently located at this unit. The proximity of the ABRP to the A-Area Ash Pile, the two materials storage areas (temporarily stored petroleum-contaminated soil), and the A/M and B-Area industrial zones makes future industrial use the most likely scenario. Prior to SRS ownership, the ABRP was primarily used for industrial purposes.

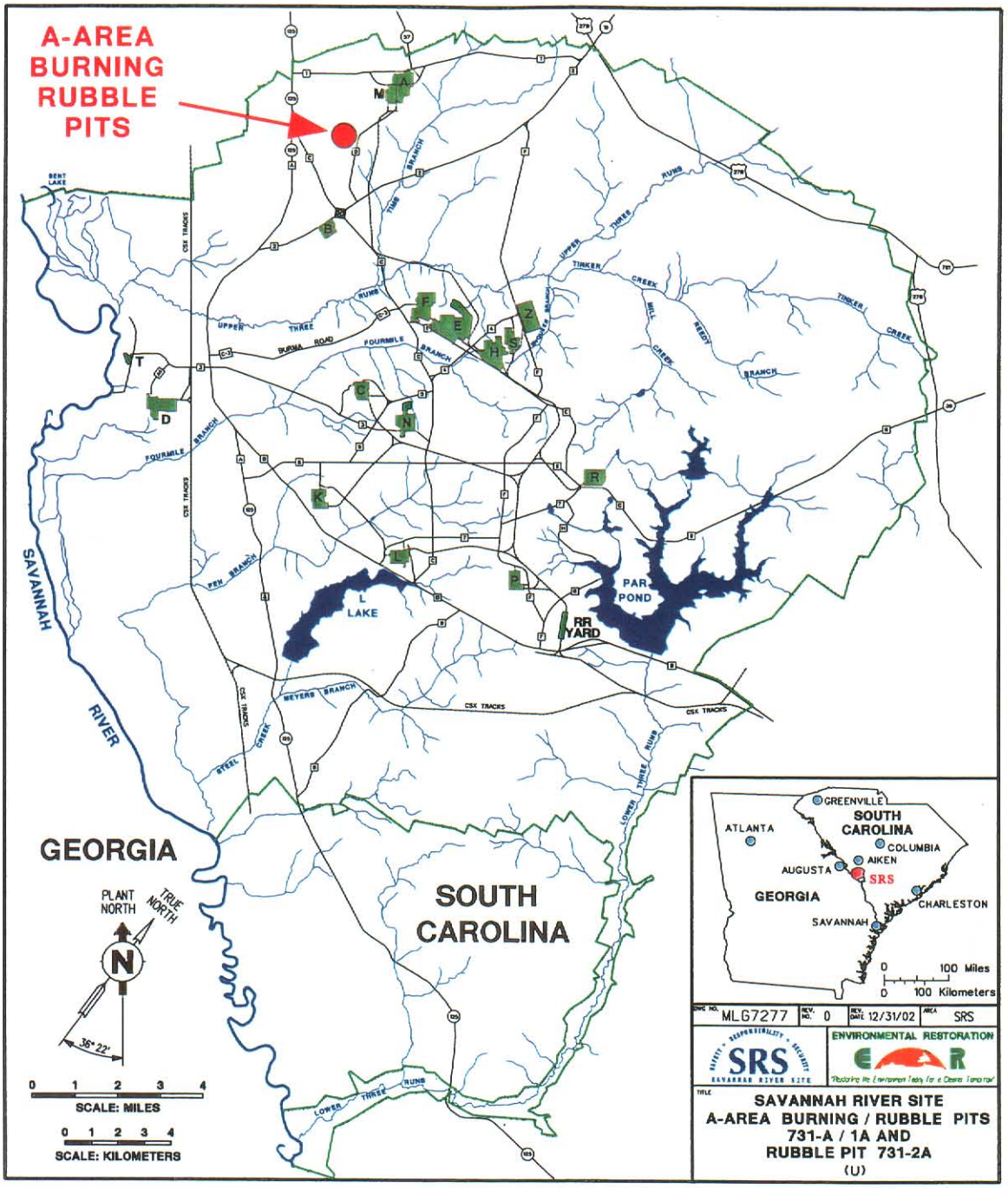


Figure 1. Location of ABRP at SRS

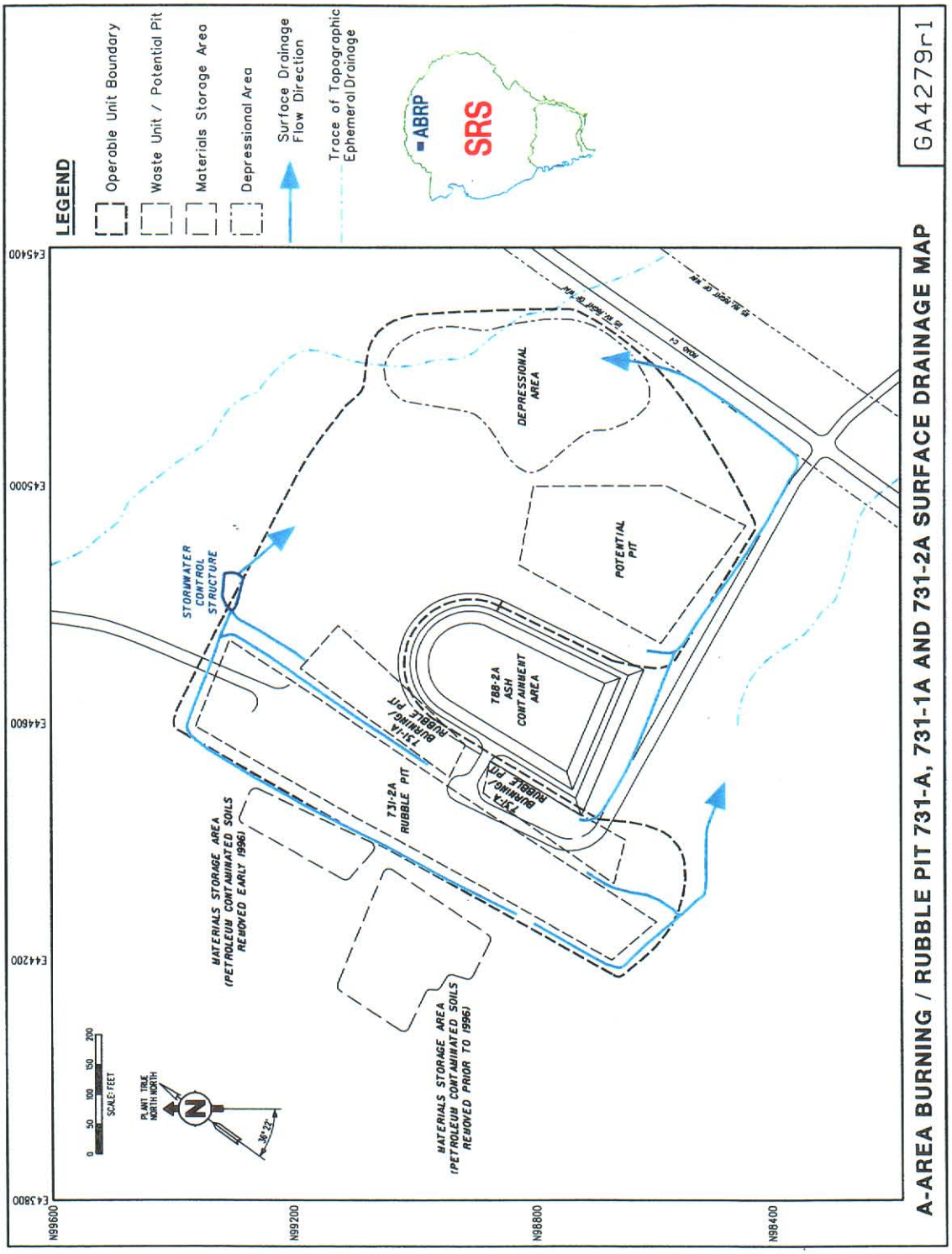


Figure 2. Surface Drainage Map of the ABRP

The ABRP is located on the northwest edge of a watershed that feeds Tims Branch (Figure 1). Two southeast-directed topographic drainages bound the ABRP OU on its northeast and southwest sides (Figure 2). These drainages are ephemeral, receiving only seasonal storm runoff. East of the OU, drainpipes beneath Road C direct the runoff to a free-flowing stream whose headwaters are located approximately 1500 feet southeast of Road C. The factors indicate that storm runoff from the ABRP OU area is not a potential drinking water source or ecological wetland. In addition, Tims Branch is not currently used as a source of drinking water, nor is it likely to be a future source.

Land use, at the time of this five-year review and in the foreseeable future, will be controlled by the United States Department of Energy (USDOE). Existing administrative controls will ensure that human health is protected. A land use control implementation plan (LUCIP), which provides details of the specific institutional controls necessary to achieve the remedial goals, has been prepared as part of the Interim Corrective Measures Implementation/Remedial Action Implementation Plan (ICMI/RAIP) and approved by USDOE, South Carolina Department of Health and Environmental Control (SCDHEC), and United States Environmental Protection Agency (USEPA) and will be appended to the SRS Land Use Assurance Plan (LUCAP).

History of the Operable Unit

Between 1951 and 1973, ABRP Pits 731-A and 731-1A were used to burn paper, plastic, wood, rubber, rags, cardboard, oil, degreasers, and solvents. Combustible materials were burned monthly. Pit 731-2A was only used as a rubble pit. After burning was discontinued in 1973, Pits 731-A and 731-1A were converted to rubble pits and used to dispose of concrete rubble, bricks, tile, asphalt, plastic, metal, wood products, and rubber. When the pits were filled to capacity, they were covered with compacted clay-rich native soils, and vegetation was established. The actual closing date is not recorded. However, the estimated time

is 1978. After the last use of Pit 731-2A in 1983, the area was backfilled and seeded.

The "potential pit" area is located approximately 500 feet east of the Pits Area and is identified based on physical evidence (depression and subsidence) along the ground surface and interviews with SRS personnel. No specific disposal records or historical use information is available.

The "depressional area" is located approximately 300 feet east of the potential pit. No specific disposal records or historical use information is available.

Characterization activities conducted from 1992 to the present include soil-gas and geophysical surveys, soil and groundwater sampling, and trenching. The RCRA Facility Investigation/Remedial Investigation/Baseline Risk Assessment (RFI/RI/BRA), completed in January 1997, concluded contamination was present in soils and groundwater.

Soil

The only constituent of concern (COC) identified for the soil (incorporating the results of sampling at 731-A, 731-1A, 731-2A, the potential pit, and the depressional area) is benzo(a)pyrene (BaP) in the surface soil (0 to 2 feet) of Pit 731-2A. The carcinogenic risk level to future industrial workers who could come in contact with this soil is 6×10^{-5}, which is greater than the acceptable risk level of 1×10^{-6}. This contaminant is widely dispersed with no discernible source. The maximum detection in the subsurface soil is 10,260 µg/kg at a depth of approximately 10 feet. Results from the leachability analysis indicate that none of the contaminants at ABRP will reach groundwater at concentrations that exceed their respective maximum contaminant levels (MCLs) or pose a risk to human health or the environment within a 1,000-year period.

Groundwater

The groundwater in the M-Area aquifer (water table aquifer) has been contaminated by three volatile organic compounds (VOCs) which exceed their respective MCLs for drinking water as established in the Clean Water Act. These VOCs are trichloroethylene (TCE) (maximum detection is 859 µg/L, MCL is 5 µg/L), tetrachloroethylene (PCE) (maximum detection is 35 µg/L, MCL is 5 µg/L), and methylene chloride (maximum detection is 196 µg/L, MCL is 5 µg/L).

IV. Remedial Actions

The IAROD for this OU was issued December 2, 1999. This IAROD addresses both the final action for the surface soils as well as the interim action for the groundwater.

Surface Soils (Final Action)

- Installation of a soil cover over Pit 731-2A (pit containing surface soils with BaP contamination) at a minimum thickness of one foot, compacted, and re-seeded (see Figure 2 for location of 731-2A). Three inches of topsoil will be added to promote the growth of a grass cover that will prevent erosion.

- Institutional controls, which include controlling access to the waste unit, posting signs in the area, field walkdowns for general site conditions, and deed notifications as required under CERCLA Section 120(h).

Groundwater (Interim Action)

A staged approach of active air sparging to strip VOCs from the groundwater and a passive soil vapor extraction (PSVE) system to remove the VOC vapors from the unsaturated soils above the groundwater to the atmosphere. The first stage will consist of 10 active air sparging wells, each with three BaroBall™ PSVE wells strategically positioned to address the "hot spot" area of the plume (>500 µg/L) (see Figure 3). The system will be operated for approximately 12 months,

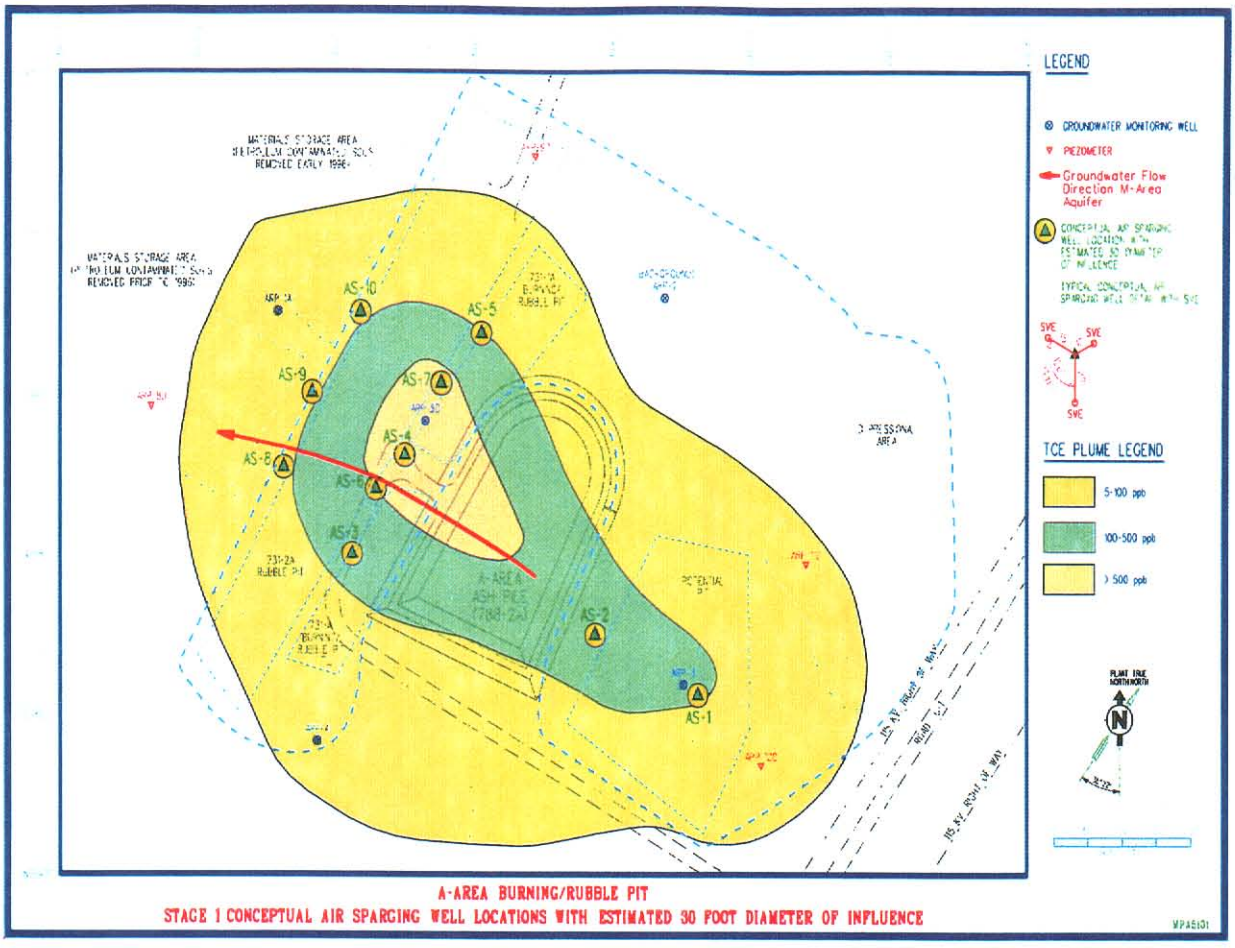


Figure 3. ABRP TCE Plume Map

and effectiveness monitoring data will be assessed prior to implementing the second stage. Should the PSVE well system prove to be inadequate, the system could be modified to become an active SVE system, as necessary.

Based on the RFI/RI/BRA, both interim remedial action objectives (IRAOs) and final remedial action objectives (RAOs) for the ABRP were identified. The IRAOs for groundwater are to mitigate any further plume growth; reduce concentration of the contaminant plume within the 100 µg/L VOC (i.e., TCE, PCE, and methylene chloride) contaminated plume isopleth; evaluate the effectiveness of the remedial system and its impact on the aquifer system; and reduce the uncertainty of commingling of plumes between the two aquifer systems. The ABRP OU IROD concluded that volatile organic compound (VOC) groundwater contamination is present in the shallow, water table aquifer beneath this OU, and VOC contamination may also be present here in the deeper, Lost Lake aquifer. The shallow, M-Area (water table) aquifer beneath the ABRP OU, is contaminated with three VOCs, which exceed their respective MCLs for drinking water as established in the Clean Water Act. These VOCs are trichloroethylene (TCE) (maximum detection is 859 µg/L, MCL is 5 µg/L), tetrachloroethylene (PCE), maximum detection is 35 µg/L, MCL is 5 µg/L), and methylene chloride (maximum detection is 196 µg/L, MCL is 5 µg/L).

The shallow, M-Area aquifer is separated from the underlying Lost Lake aquifer by a clayey unit designated the Green Clay confining layer. As was discussed in the IROD, the Lost Lake aquifer is known to be contaminated by VOCs sources upgradient in the A/M area. Data are lacking, however, to confirm that the leading edge of this plume has advanced into the vicinity of the ABRP OU. Regional groundwater modeling results suggest that the shallow ABRP OU VOC plume could have migrated down into the deeper Lost Lake aquifer. The net result could be commingling of two VOC plumes in the Lost Lake aquifer beneath and downgradient of the ABRP OU. Further investigation of potential

VOC impacts to the Green Clay and Lost Lake aquifer are being implemented in conjunction with interim remedial actions prescribed in the ABRP IROD.

Final RAOs and remedial goals for BaP in the ABRP surface soil have been identified. The final RAO for surface soil is to prevent direct contact with and ingestion of BaP-contaminated surface soil, which may cause a significant risk ($>1 \times 10^{-6}$ or hazard index (HI) =1) to current and future workers.

The final remedial goal (RG) for BaP in surface soil (200 µg/kg) was developed based on the assumption that the ABRP is designated for current and future industrial use. No COCs are identified in the RFI/RI/BRA that pose a threat to migrate to groundwater; therefore no RAO or RG is required for the vadose zone soil.

The final remedial objective for groundwater is to prevent exposure to contaminated groundwater above MCLs and to restore groundwater to its expected beneficial uses. The final remedial goal for groundwater is tentatively set at the MCLs for the respective COC. However, for any in situ groundwater treatment there is considerable uncertainty as to how well a specific remediation method will work at a given site. These uncertainties warrant additional evaluation during the interim action period, with the objective of defining a remedy that, with a high degree of confidence, will achieve final remedial goals. For this reason the interim groundwater RGs have been set at a level above the MCLs.

Groundwater sampling for the OU varies with each well. Some wells are scheduled to be sampled monthly while others are to be sampled either quarterly or semi-annually. The data results will be reported to the regulators annually in an Effectiveness Monitoring Report. This report is scheduled to be issued during the second quarter of 2003.

Achieving the final RGs will reduce risk to acceptable levels for human health.

No specific remedial goal is necessary to reduce ecological risks to the environment because the ABRP does not pose a risk to the environment.

An ICMI/RAIP for the ABRP was approved on September 18, 2000. The purpose of this document is to provide information about the design implementation of the selected remedies for the ABRP. The ICMI/RAIP documents design inputs and ensures that the remedial design requirements of the IAROD are incorporated into the remedial design.

Remedial actions (i.e., construction start date) began September 28, 2000, and are ongoing. The ABRP remedial construction is scheduled to be completed and enter the operations phase in fiscal year 2002. Table 2 provides the status of the key elements of the selected final remedial action for the ABRP.

Table 2. Status of Construction Activities for ABRP

ABRP Surface Soil	
Soil cover installation	Complete
Implement institutional controls, which include controlling access to the waste unit, posting signs in the area, field walkdowns for general site conditions, and deed modifications as required under CERCLA Section 120(H).	Ongoing
Groundwater	
Installation of air sparging wells	Construction complete
Installation of passive soil vapor extraction system	Construction complete
Startup testing of system and turnover to operations	Ongoing[1]
Installation of monitoring wells	Ongoing
Sampling of monitoring wells to monitor air sparging well performance	Sampling planned

Notes:
[1]The air sparging well system and the passive SVE system have been installed but have not undergone startup and turnover to operations, which is scheduled to occur in fiscal year 2002

System Operation and Maintenance

The ABRP remedy is not in the operation and maintenance phase.

V. Progress Since Last Review

This is the first review for this OU; therefore, this section does not apply.

VI. Five-Year Review Process

The following tasks were performed as part of the review:

- Reviewed the documents listed in Attachment 1
- Reviewed changes in standards and to-be-considered guidance

An inspection of the unit to confirm protectiveness of the remedial action cannot be completed at this time since construction of the remedy and turnover to operations is not complete. Inspection of the work completed to date by the subcontractor (soil cover and air sparge/soil vapor extraction (SVE) system) has verified that the system has been constructed as designed.

VII. Technical Assessment

Since startup and operation of the groundwater remedy has not begun, definitive data are not available to evaluate if the remedy is effective. The remedy for the surface soil and the groundwater are expected to be effective but until the PSVE systems, air sparging wells, and monitoring wells are operated and sampled, direct evidence will not be available to determine the effectiveness of these remedies.

The RAOs are still valid for this remedial action because the exposure assumptions, cleanup levels, and toxicity data have not changed since the remedy was selected. No other information has been identified that would negatively impact the effectiveness of the selected remedy.

Since system turnover to operations is not complete, no conditions or activities issues can be identified related to current site operations versus the protectiveness of the remedy. The selected remedy is expected to be completely protective of human health and the environment in the future upon operation. The selected remedy is currently protective of human health and the environment as institutional controls prevent contact with or ingestion of contaminated soil and groundwater.

- The remedy cannot yet be determined to be functioning as intended by the decision documents.

- The exposure assumptions, toxicity data, cleanup levels, and RAOs used at the time of remedy selection are still valid.

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

VIII. Issues

The ABRP was characterized beginning in 1992 and an RFI/RI/BRA was submitted in 1997. Recently released aerial photographs from the 1950's through the 1980's have revealed the presence of a suspect "trench/pit" underlying the A-Area Ash Pile (788-2A) and a suspect "ditch" to the north of the "trench/pit," both of which are located east of the ABRP OU.

SRS performed investigations of these areas as part of the ABRP OU. The Ash Pile is subject to permitting under South Carolina Regulation 61-70, Sanitary Landfill Design, Construction and Operation, and is not part of the CERCLA OU. Characterization data found TCE and PCE in the vadose zone beneath the A-Area Ash Pile (788-2A) that, if left untreated, may contaminate groundwater in the future. The A-Area Ash Pile is currently an active unit permitted under South Carolina Solid Waste Regulations. Analytical results will be used for delineation

of nature and extent of contamination, evaluation of primary source material, analysis of contaminant fate and transport, determination of the presence of principal threat source material (PTSM), and assessment of human health and ecological risk. Table 3 summarizes the issue.

Table 3. Issues Affecting the Current or Future Protectiveness

Issues	Affects Current Protectiveness (Y/N)	Affects Future Protectiveness (Y/N)
1) Characterization data found TCE and PCE in the vadose zone beneath the A-Area Ash Pile (788-2A). The A-Area Ash Pile is currently an active unit permitted under South Carolina Regulation 61-70, Sanitary Landfill Design, Construction and Operation. USDOE, USEPA, and SCDHEC must come to agreement on the administrative path for the permitted as pile.	N	Y

IX. Recommendations and Follow-up Actions

No specific required or suggested recommendations/improvements for the existing scope of the interim ROD have been identified as a result of this review because the selected interim remedies are not operational; however, the remedies are expected to be effective. Based on findings from the additional characterization of the suspect "trench/pit" underlying the ash pile, the core team has agreed to expand the IAROD through an Explanation of Significant Difference (ESD) to include PSVE in the vadose zone beneath, and adjacent to, the suspect "trench/pit". Table 4 summarizes the recommendations and follow-up actions.

Table 4. Recommendations and Follow-up Actions

Issue	Recommendations and Follow-up Actions	Party Responsible	Oversight Agency	Milestone Date	Affects Protectiveness (Y/N)	
					Current	Future
1	Meeting to discuss the future of the Ash Basin.	USDOE	USEPA, SCDHEC	None, currently an active OU	N	Y

X. Protectiveness Statement(s)

The interim remedy at ABRP is not fully protective of human heath and the environment because additional remedies will be necessary under a final ROD, including remediation of VOCs in the suspect trench/pit and land control use controls. In the interim, exposure pathways that could lead to unacceptable risk are being controlled through institutional controls. Institutional controls include: (1) physical access controls to prevent unauthorized entry to SRS (fences, guards, security patrols, etc.); (2) administrative controls that maintain this site for industrial use only (SRS is a secured government facility with land use restrictions); and (3) warning signs and land use controls (SRS Site Use/Site Clearance Program).

XI. Next Review

An additional five-year review will be prepared for the ABRP, which will be due on June 30, 2007. However, the interim action portion of the ROD may be replaced with a final ROD for the ABRP. In that case, an additional five-year review will be prepared for the ABRP, which will be due on June 30, 2007.

Attachment 1

List of Documents Reviewed

WSRC, 1999. *Interim Action Proposed Plan for the A-Area Burning/Rubble Pits (731-A/1A) and Rubble Pit (731-2A) Operable Unit (U)*, WSRC-RP-99-4014, Revision 1.1, November, Westinghouse Savannah River Company, Aiken, SC

WSRC, 2000a. *Interim Record of Decision Remedial Alternative Selection for the A-Burning/Rubble Pits (731-A/1A) and Rubble Pit (731-2A) (U)*, WSRC-RP-2000-4001, Revision 1, April, Westinghouse Savannah River Co., Aiken, SC

WSRC, 2000b. *Interim Corrective Measures Implementation/Remedial Action Implementation Plan (ICMI/RAIP) for the A-Area Burning/Rubble Pits (731-A/1A) and Rubble Pit (731-2A) (U)*, WSRC-RP-2000-4024, Revision 1, August, Westinghouse Savannah River Co., Aiken SC

C-Area Burning/Rubble Pit (CBRP) Operable Unit (131-C) (INTERIM ACTION)

I. Introduction

The final Record of Decision (ROD) for the C-Area Burning/Rubble Pit (CBRP) operable unit (OU) has not been issued. The following is a review of the interim action performed at the OU.

II. OU Chronology

Table 1 lists the chronology of site events for the CBRP OU.

Table 1. Chronology of OU Events

Event	Date
Interim ROD issuance	September 30,1998
Interim Remedial Action start	January 12, 1999

Key:

Consent Decree – Date a consent decree (enforcement document from the court system) was issued for the operable unit.

Corrective Action start – Date the corrective (remedial) action was initiated (under RCRA).

ESD Issuance - Date all three parties (USDOE, USEPA, and SCDHEC) signed the Explanation of Significant Difference used to significantly modify the remedy selected in the Record of Decision.

Final or Interim ROD issuance – Date the three parties (USDOE, USEPA, and SCDHEC) signed the Record of Decision.

Federal Facility Agreement Declared Effective - Date the Federal Facility Agreement formalized the integration of CERCLA and RCRA in remediation activities at SRS.

NPL listing – Date the entire SRS was added to EPA's National Priorities List.

Previous Five-Year Reviews – Date of any previous five year reviews of remedy for the operable unit.

RCRA Closure Certified – Date the three parties (USDOE, USEPA, and SCDHEC) certified that the operable unit had been remediated and closed under the Resource Conservation and Recovery Act.

RCRA Closure Plan Approved – Date the three parties (USDOE, USEPA, and SCDHEC) approved the closure plan for the operable unit under Resource Conservation and Recovery Act.

Remedial Action start/complete – Date the remedial action (final or interim) was initiated/completed (under CERCLA).

Removal Action – Date contaminated media was removed from the operable unit (not associated with the ROD).

RFI/RI start/complete - Date the remedial investigation (sampling) was initiated/completed for the operable unit.

ROD Amendment Issuance - Date the three parties (USDOE, USEPA, and SCDHEC) signed the Record of Decision Amendment used to change the remedy selected in the original Record of Decision.

III. Background

Figure 1 shows the location of the CBRP OU at Savannah River Site (SRS). Aerial photographs indicate the CBRP OU began operation during the early to

mid-1960s. During operation, the pit served as a repository for organic materials of unknown use and origin which included scrap lumber, rubber drive belts, waste oils, organic solvents, paper, and plastics. Disposal records, including composition, origin, and use of materials disposed, were not kept for this unit during its period of operation. The collected materials were burned periodically to reduce the overall waste volume. Disposal of combustible wastes in the pit was discontinued in 1973. At this time, the pit contents were covered with a thin layer of soil. The pit was then used for the disposal of inert rubble. When it became full, the pit was backfilled with soil to grade level. The CBRP OU is presently inactive and covered with a 1×10^{-5} cm/s soil cover. Aerial photographs indicated that an earlier CBRP OU (circa 1955) was located approximately 165 feet (ft) northeast of the current CBRP OU. It was closed prior to excavation of the C-Area retention basin, which removed approximately 70% of the pit footprint. No surface expression of the old CBRP OU remains. A study of the early CBRP OU is ongoing and its results will be reported in an addendum to the Resource Conservation and Recovery Act Facility Investigation/Remedial Investigation/Baseline Risk Assessment (RFI/RI/BRA).

A mounded area, approximately 30 ft high, is located directly north of the CBRP OU. This man-made mound apparently contains rubble from the construction of the C-Area Reactor. It is covered with soil from the excavation of the C Reactor retention basin, located to the east of the CBRP OU. This indicates the mound was created prior to the beginning of reactor operations. This mounded area was not used for burning, and no known hazardous materials were disposed in this area. It is, however, considered to be a subunit of the CBRP OU. In addition, soil adjacent to a concrete drainage ditch that may have carried overflow water from the CBRP OU was evaluated as part of the RFI/RI/BRA assessment. Groundwater beneath CBRP is included as a subunit of this OU.

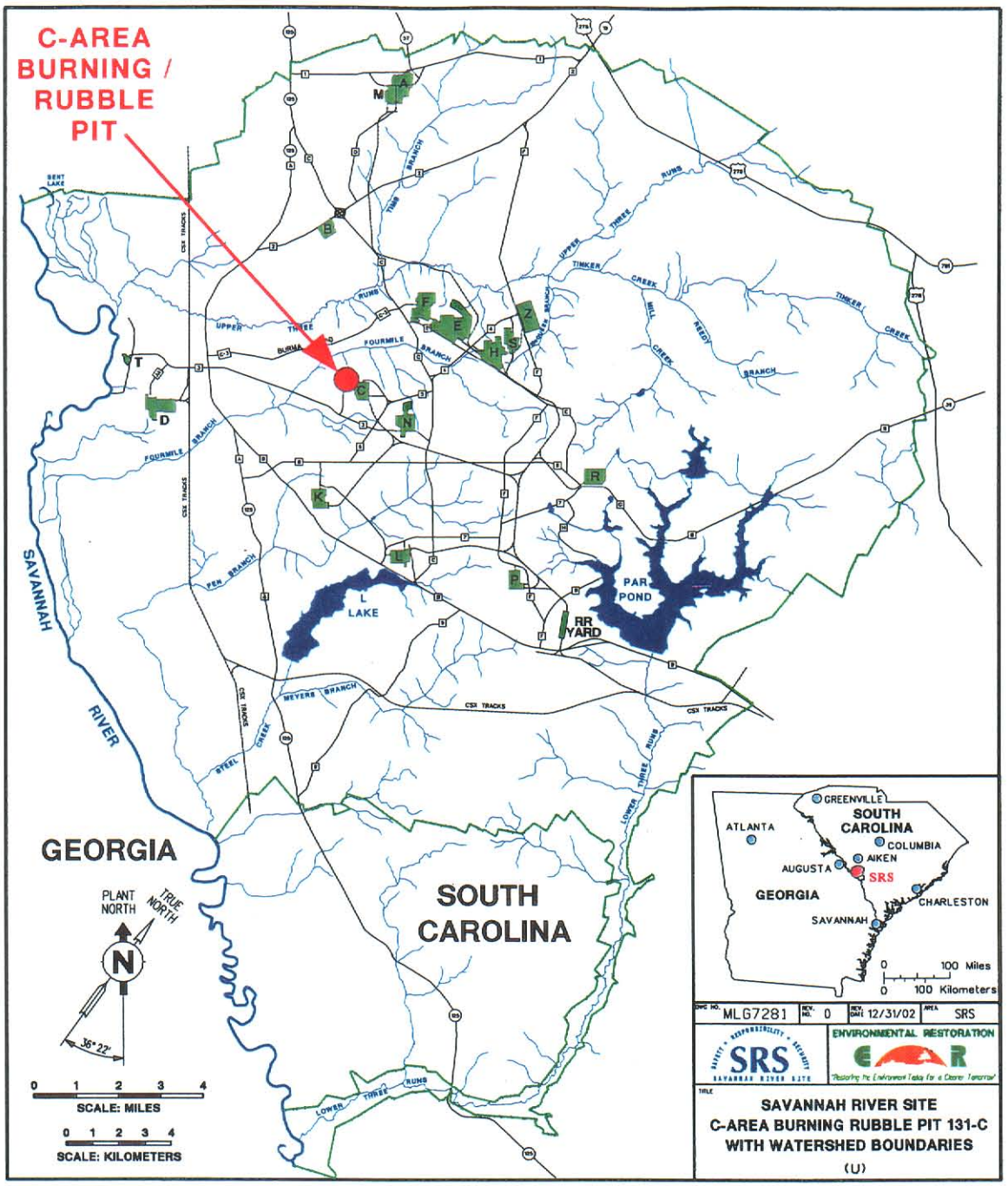


Figure 1. Location of C-Area Burning/Rubble Pit Operable Unit (131-C) at SRS

The current and future anticipated land use for CBRP OU is industrial.

IV. Remedial Actions

An interim action principally designed to control the migration of high concentrations of solvents in the saturated zone was selected for the CBRP OU. Specifically, the interim action had two main objectives:

- Prevent direct contact with constituent of concern- (COC-) contaminated soils and reduce infiltration to minimize further migration of contaminant migration (CM)COCs to the groundwater from soils within and beneath the CBRP OU through installation of a native soil cover; and

- Treat the area in the vicinity of the pit, extending over the 25,000 μg/L volatile organic compound (VOC) isoconcentration contour of the groundwater, with an objective to reduce concentrations and control the migration of VOCs from the 25,000 μg/L VOC contour through in situ soil vapor extraction (SVE).

The remedial action objectives (RAOs) for the interim action are being achieved by a soil cover over the source; performing SVE in the vadose zone beneath the pit; and performing air sparging (AS) (coupled with SVE) in the 25,000 μg/L contour of the groundwater plume.

Remedy Implementation

Implementation of the preferred alternatives required both near- and long-term actions. For the near term, surface and subsurface soil contamination was addressed by the installation of a native soil cover over the CBRP OU source unit. The soil cover was compacted to reduce infiltration, sloped to promote runoff, and has a layer of vegetation to prevent erosion. The soil cover will prevent future contact by workers, residents, and ecological receptors with the dioxin

contamination in the soil. The soil cover will also minimize further migration of contaminants from the soil to the groundwater by reducing infiltration. In addition to continued inspection and maintenance of the cover, signs will be posted at the CBRP OU to indicate that the area was used to dispose of hazardous substances, and existing SRS access controls will be used to maintain the OU for industrial use only.

Groundwater contamination is also being addressed through controlled sparging of air into the groundwater. The injected air volatilizes the organic compounds in the groundwater that will move into the vadose zone and also volatilizes the organic contaminants in the deep soil. Organic vapors from both the groundwater and deep soil are being extracted from the soil above the shallow groundwater aquifer using vacuum wells connected to the SVE system. The extracted soil - vapors are being processed through a liquid-phase separator to remove condensate. The offgas is being released into the atmosphere and meets permit requirements. Until the interim remedial action objectives (IRAOs) are achieved, groundwater monitoring will be performed.

V. Technical Assessment

The conclusions are as follows:

- The soil cover has been installed and prevents direct contact with COC-contaminated soils and reduces infiltration to minimize further migration of CMCOCs to the groundwater from soils within and beneath the CBRP OU.

- Inspection of the soil cover are being performed and indicate no problems have occurred.

- Institutional controls are in place and are being implemented to provide access control and prevent exposure as designed.

- The SVE system is operating as designed and has thus far removed over 1,500 pounds of tetrachloroethylene (TCE), thereby reducing the concentrations and controlling the migration of VOCs. The AS system began full-scale operation in June 2000.

- No new standards or "to-be-considered" (TBC) guidance has been identified that could call into question the protectiveness of the remedy. Land use, exposure pathways, COCs, and risk assessment methodologies have not changed in a way that affects the protectiveness of the remedy.

- No new information that affects the protectiveness of the remedy has come to light. The exposure assumptions, toxicity data, cleanup levels, and RAOs used at the time of remedy selection are still valid.

- The selected remedy is expected to remain protective of human health and the environment.

VI. Issues

There are no issues for this OU.

VII. Recommendations and Follow-up Actions

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

VIII. Protectiveness Statement(s)

The interim action of SVE for the vadose zone and air sparging with SVE for the groundwater is not fully protective of human health and the environment because the groundwater will not meet MCLs after completion of this interim remedial activity and land use controls through a LUCIP will not be achieved until a final ROD is issued. In the interim, exposure pathways that could lead to unacceptable risk are being controlled through the installation of a soil cover over the area to protect remedial workers from soil contaminants and institutional controls.

Institutional controls include: (1) physical access controls to prevent unauthorized entry to SRS (fences, guards, security patrols, etc.); (2) administrative controls that maintain this site for industrial use only (SRS is a secured government facility with land use restrictions); and (3) warning signs and land use controls (SRS Site Use/Site Clearance Program). Upon issuance of the final ROD, this interim measure will become part of a total remedial action, which is expected to be protective of human health and the environment.

Attachment 1

Documents Reviewed

WSRC, 1998. *Interim Record of Decision for the C-Area Burning/Rubble Pit Operable Unit (131-C) (U)*, WSRC-RP-98-4039, Revision 0, June, Westinghouse Savannah River Company, Aiken, SC

WSRC, 2000. *Post-Construction Report (PCR) for the C-Area Burning/Rubble Pit (U)*, WSRC-RP-2000-4094, Revision 0, July, Westinghouse Savannah River Company, Aiken, SC

Five-Year Review Site Inspection Checklist

I. SITE INFORMATION	
Site Name: C-Area Burning/Rubble Pit (131-C)	**Date of Inspection: 10/3/01**
Location and Region: Savannah River Site, USEPA IV	**EPA ID: CERCLIS OU# 31**
Agency, office, or company leading the five-year review: United States Department of Energy	**Weather/temperature: clear and sunny, 75 °F**

Remedy Includes: (Check all that apply)

- ☐ Landfill cover/containment
- ☐ Access controls
- ☒ Institutional Controls
- ☐ Groundwater pump and treatment
- ☐ Surface water collection and treatment
- ☒ Other Air Sparging and Soil Vapor Extraction
- ☐ Monitored Natural Attenuation
- ☐ Groundwater Containment
- ☐ Vertical Barrier Walls

_____

Attachments: ☐ Inspection team roster attached ☐ Site map attached

II. INTERVIEWS (Check all that apply)

1. **O & M site manager** _____ _____ _____
   Name Title Date

   Interviewed ☐ at site ☐ at office ☐ by phone Phone No. _____

   Problems, suggestions; ☐ report attached _____

   _____

2. **O & M staff** _____ _____ _____
   Name Title Date

   Interviewed ☐ at site ☐ at office ☐ by phone Phone No. _____

   Problems, suggestions; ☐ report attached _____

   _____

3. **Local regulatory authorities and response agencies** (i.e., State and tribal offices, emergency response office, police department, office of public health or environmental health, zoning office, recorder of deeds, or other city and county offices, etc.) Fill in all that apply.

Agency _____

Contact _____ _____ _____ _____
Name Title Date Phone No.

Problems; suggestions; ☐ Report attached _____

_____

Agency _____

Contact _____ _____ _____ _____
Name Title Date Phone No.

Problems; suggestions; ☐ Report attached _____

_____

Agency _____

Contact _____ _____ _____ _____
Name Title Date Phone No.

Problems; suggestions; ☐ Report attached _____

_____

4. **Other interviews** (optional) ☐ Report attached _____

III. ONSITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)

1. **O & M Documents**

☐ O & M Manual	☐ Readily available	☐ Up to date	☒ N/A
☒ As-built drawings	☒ Readily available	☒ Up to date	☐ N/A
☐ Maintenance Logs	☐ Readily available	☐ Up to date	☐ N/A

Remarks_____

_____

2. **Site-Specific Health and Safety Plan** ☒ Readily available ☒ Up to date ☐ N/A

☐ Contingency plan/emergency response plan ☐ Readily available ☐ Up to date ☒ N/A

Remarks_____

_____

3. **O & M and OSHA Training Records** ☒ Readily available ☒ Up to date ☐ N/A

Remarks_____

_____

4. **Permits and Service Agreements**

☑ Air discharge permit	☒ Readily available	☒ Up to date	☐ N/A
☐ Effluent discharge	☐ Readily available	☐ Up to date	☒ N/A
☐ Waste Disposal, POTW	☐ Readily available	☐ Up to date	☒ N/A
☐ Other permits	☐ Readily available	☐ Up to date	☒ N/A

Remarks_____

_____

5. **Gas Generation Records** ☐ Readily available ☐ Up to date ☒ N/A

Remarks_____

_____

6. **Settlement Monument Records** ☐ Readily available ☐ Up to date ☒ N/A

Remarks_____

_____

7. **Groundwater Monitoring Records** ☒ Readily available ☒ Up to date ☐ N/A

Remarks_____

_____

8. **Leachate Extraction Records** ☐ Readily available ☐ Up to date ☒ N/A

Remarks_____

_____

9. **Discharge Compliance Records**

☐ Air ☐ Readily available ☐ Up to date ☒ N/A

☐ Water (effluent) ☐ Readily available ☐ Up to date ☒ N/A

Remarks_____

_____

10. **Daily Access/Security Logs** ☐ Readily available ☐ Up to date ☒ N/A

Remarks_____

_____

IV. O & M Costs

1. **O & M Organization**

☐ State in-house ☐ Contractor for State

☐ PRP in-house ☐ Contractor for PRP

☐ Other_____

_____

2. **O & M Cost Records**

☐ Readily available ☐ Up to date

☐ Funding mechanism/agreement in place

☐ Other_____

_____

Total annual cost by year for review period if available

From_____ To_____ _____ ☐ Breakdown attached
Date Date Total cost

From_____ To_____ _____ ☐ Breakdown attached
Date Date Total cost

From_____ To_____ _____ ☐ Breakdown attached
Date Date Total cost

From_____ To_____ _____ ☐ Breakdown attached
Date Date Total cost

From_____ To_____ _____ ☐ Breakdown attached
Date Date Total cost

1. **Unanticipated or Unusually High O & M Costs During Review Period**

Describe costs and reasons: _____

_____

_____

_____

_____

V. ACCESS AND INSTITUTIONAL CONTROLS ☒ Applicable ☐ N/A

A. Fencing

1. **Fencing Damaged** ☐ Location shown on site map ☒ Gates secured ☐ N/A

Remarks_____

_____

B. Other Access Restrictions

1. **Signs and other security measures** ☒ Location shown on site map ☐ N/A

Remarks_____

_____

C. Institutional Controls

1. Implementation and enforcement

Site conditions imply ICs not properly implemented ☐ Yes ☒ No ☐ N/A

Site conditions imply ICs not being fully enforced ☐ Yes ☒ No ☐ N/A

Type of monitoring (e.g., self-reporting, drive-by) Groundwater Monitoring

Frequency Annually

Responsible party/agent_ DOE Savannah River Field Office

Contact	J. J. Nelson	Waste Area Group Manager	10/2/01	(803) 725-2687
	Name	Title	Date	Phone No.

Report is up-to-date ☒ Yes ☐ No ☐ N/A

Reports are verified by the lead agency ☒ Yes ☐ No ☐ N/A

Specific requirements in deed of decision documents have been met ☐ Yes ☐ No ☒ N/A

Violations have been reported ☐ Yes ☐ No ☒ N/A

Other problems or suggestions: ☐ Report attached

_____

_____

_____

_____

2. Adequacy ☒ ICs are adequate ☐ ICs are inadequate ☐ N/A

Remarks_____

_____

D. General

1. **Vandalism/trespassing** ☐ Location shown on site map ☒ No vandalism evident

   Remarks_____

2. **Land use changes onsite** ☒ N/A

   Remarks_____

3. **Land use changes offsite** ☒ N/A

   Remarks_____

VI. GENERAL SITE CONDITIONS

A. Roads ☒ Applicable ☐ N/A

1. **Roads damaged** ☒ Location shown on site map ☒ Roads adequate ☐ N/A

   Remarks_____

B. Other site Conditions

Remarks_____

VII. SOIL COVER ☒ Applicable ☐ N/A

A. CBRP Surface

1. **Settlement** (Low spots) ☐ Location shown on site map ☒ Settlement not evident

   Areal extent_____ Depth_____

   Remarks_____

2. **Cracks** ☐ Location shown on site map ☒ Cracking not evident

   Lengths_____ Widths_____ Depths_____

   Remarks_____

3. **Erosion** ☐ Location shown on site map ☒ Erosion not evident

Areal extent_____ Depth_____

Remarks_____

_____

4. **Holes** ☐ Location shown on site map ☒ Holes not evident

Areal extent_____ Depth_____

Remarks_____

_____

5. **Vegetative Cover** ☐ Grass ☐ Cover properly established ☒ No signs of stress

☐ Trees/shrubs (indicate size and location on a diagram)

Remarks_____

_____

6. **Alternative Cover (armored rock, concrete, etc.)** ☒ N/A

Remarks_____

_____

7. **Bulges** ☐ Location shown on site map ☒ Bulges not evident

Areal extent_____ Height_____

Remarks_____

_____

8. **Wet Areas/Water Damage** ☒ Wet areas/water damage not evident

☐ Wet Areas ☐ Location shown on site map Areal extent_____

☐ Ponding ☐ Location shown on site map Areal extent_____

☐ Seeps ☐ Location shown on site map Areal extent_____

☐ Soft subgrade ☐ Location shown on site map Areal extent_____

Remarks_____

_____

9. **Slope Instability** ☐ Slides ☐ Location shown on site map ☒ No evidence of slope instability

Areal extent_____

Remarks_____

_____

B. Benches ☐ Applicable ☒ N/A

(Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)

1. **Flows Bypass Bench** ☐ Location shown on site map ☐ N/A or okay

Remarks_____

_____

2. **Bench Breached** ☐ Location shown on site map ☐ N/A or okay

Remarks_____

_____

3. **Bench Overtopped** ☐ Location shown on site map ☐ N/A or okay

Remarks_____

_____

C. Letdown Channels ☐ Applicable ☒ N/A

(Channel lined with erosion control mates, riprap, grout bags, or gabions that descend down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)

1. **Settlement** ☐ Location shown on site map ☐ No evidence of settlement

Areal extent_____ Depth_____

Remarks_____

_____

2. **Material Degradation** ☐ Location shown on site map ☐ No evidence of degradation

Material type_____ Areal extent _____

Remarks_____

_____

3. **Erosion** ☐ Location shown on site map ☐ No evidence of erosion

Areal extent _____ Depth_____

Remarks_____

_____

4. **Undercutting** ☐ Location shown on site map ☐ No evidence of undercutting

Areal extent _____ Depth_____

Remarks_____

_____

5. **Obstructions** Type_____ ☐ No obstructions

☐ Location shown on site map Areal extent _____

Size _____

Remarks_____

_____

6. **Excessive Vegetative Growth** Type_____

☐ No evidence of excessive growth

☐ Vegetation in channels does not obstruct flow

☐ Location shown on site map Areal extent _____

Remarks_____

_____

D. Cover Penetrations ☐ Applicable ☒ N/A

1. **Gas Vents** ☐ Active ☐ Passive

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A

Remarks_____

_____

2. **Gas Monitoring Probes**

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A

Remarks_____

_____

3. **Monitoring Wells**

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A

Remarks_____

_____

4. **Leachate Extraction Wells**

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A

Remarks_____

_____

5. **Settlement Monuments** ☐ Located ☐ Routinely surveyed ☐ N/A

Remarks_____

_____

E. Gas Collection and Treatment ☐ Applicable ☒ N/A

1. **Gas Treatment Facilities**

☐ Flaring ☐ Thermal destruction ☐ Collection for reuse

☐ Good condition ☐ Needs Maintenance

Remarks_____

_____

2. **Gas Collection Wells, Manifolds and Piping**

☐ Good condition ☐ Needs Maintenance

Remarks_____

_____

3. **Gas Monitoring Facilities** (e.g., gas monitoring of adjacent homes or buildings)

☐ Good condition ☐ Needs Maintenance ☐ N/A

Remarks_____

_____

F. **Cover Drainage Layer**	☐ Applicable	☒ N/A
1. **Outlet Pipes Inspected**	☐ Functioning	☐ N/A
Remarks_____		
2. **Outlet Rock Inspected**	☐ Functioning	☐ N/A
Remarks_____		

G. Detention/sedimentation Ponds ☐ Applicable ☒ N/A

1. **Siltation** Areal extent_____ Depth_____ ☐ N/A

   ☐ Siltation not evident

   Remarks_____

2. **Erosion** Areal extent_____ Depth_____ ☐ N/A

   ☐ Erosion not evident

   Remarks_____

3. **Outlet Works** ☐ Functioning ☐ N/A

   Remarks_____

4. **Dam** ☐ Functioning ☐ N/A

   Remarks_____

H. Retaining Walls ☐ Applicable ☒ N/A

1. **Deformations** ☐ Location shown on site map ☐ Deformation not evident

   Horizontal displacement_____ Vertical displacement_____

   Rotational displacement_____

   Remarks_____

2. **Degradation** ☐ Location shown on site map ☐ Deformation not evident

   Remarks_____

I. Perimeter Ditches/Off-Site Discharge ☐ Applicable ☒ N/A

1. **Siltation** ☐ Location shown on site map ☐ Siltation not evident

   Areal extent_____ Depth_____

   Remarks_____

2. **Vegetative Growth** ☐ Location shown on site map ☐ Siltation not evident

☐ Vegetation does not impede flow

Areal extent_____ Type_____

Remarks_____

_____

3. **Erosion** ☐ Location shown on site map ☐ Erosion not evident

Areal extent_____ Depth_____

Remarks_____

_____

4. **Discharge Structure** ☐ Location shown on site map ☐ N/A

Remarks_____

_____

VIII. VERTICAL BARRIER WALLS ☐ Applicable ☒ N/A

1. **Settlement** ☐ Location shown on site map ☐ Settlement not evident

Areal extent_____ Depth_____

Remarks_____

_____

2. **Performance Monitoring** Type of Monitoring_____

☐ Performance not monitored

Frequency_____ ☐ Evidence of breaching

Head differential_____

Remarks_____

_____

IX. GROUNDWATER/SURFACE WATER REMEDIES ☒ Applicable ☐ N/A

A. Groundwater Extraction Wells, Pumps, and Pipelines ☐ Applicable ☒ N/A

1. **Pumps, Wellhead Plumbing, and Electrical**

☐ Good condition ☐ All required wells located ☐ Needs Maintenance ☐ N/A

Remarks_____

_____

2. **Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances**

☐ Good condition ☐ Needs Maintenance

Remarks_____

_____

3. **Spare Parts and Equipment**

☐ Readily available ☐ Good condition ☐ Requires upgrade ☐ Needs to be provided

Remarks_____

_____

B. Surface Water Collection Structures, Pumps, and Pipelines ☐ Applicable ☒ N/A

1. **Collection Structures, Pumps, and Electrical**

☐ Good condition ☐ Needs Maintenance

Remarks_____

_____

2. **Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances**

☐ Good condition ☐ Needs Maintenance

Remarks_____

_____

3. **Spare Parts and Equipment**

☐ Readily available ☐ Good condition ☐ Requires upgrade ☐ Needs to be provided

Remarks_____

_____

C. Treatment System ☒ Applicable ☐ N/A

1. **Treatment Train** (Check components that apply)

☐ Metals removal ☐ Oil/water separation ☐ Bioremediation

☐ Air stripping ☐ Carbon adsorbers

☒ Filters_____

☐ Additive (e.g., chelation agent, flocculent)_____

☐ Others_____

☒ Good condition ☐ Needs Maintenance

☐ Sampling ports properly marked and functional

☐ Sampling/maintenance log displayed and up to date

☒ Equipment properly identified

☐ Quantity of groundwater treated annually_____

☐ Quantity of surface water treated annually_____

Remarks_____

_____

2. **Electrical Enclosures and Panels** (properly rated and functional)

☐ N/A ☒ Good condition ☐ Needs Maintenance

Remarks_____

_____

3. **Tanks, Vaults, Storage Vessels**

☐ N/A ☒ Good condition ☐ Proper secondary containment ☐ Needs Maintenance

Remarks_____

_____

4. **Discharge Structure and Appurtenances**

☐ N/A ☒ Good condition ☐ Needs Maintenance

Remarks_____

_____

5. **Treatment Building(s)**

☒ N/A ☐ Good condition (esp. roof and doorways) ☐ Needs repair

☐ Chemicals and equipment properly stored

Remarks_____

_____

6. **Monitoring Wells**

☒ Properly secured/locked ☒ Functioning ☒ Routinely sampled ☒ Good condition

☒ All required wells located ☐ Needs Maintenance ☐ N/A

Remarks_____

_____

D. Monitoring Data ☒ Applicable ☐ N/A

1. Monitoring Data

☒ Is routinely submitted on time ☒ Is of acceptable quality

2 .Monitoring data suggests:

☐ Groundwater plume is effectively contained ☐ Contaminant concentrations are declining

E. Monitored Natural Attenuation ☐ Applicable ☒ N/A

1. **Monitoring Wells** (Natural attenuation remedy)

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ All required wells located ☐ Needs Maintenance ☐ N/A

Remarks_____

_____

X. OTHER REMEDIES

If there are remedies applied at the site, which are not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.

XI. OVERALL OBSERVATIONS

A. Implementation of the Remedy

Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emissions, etc.).

The DOE, EPA and SCDHEC have determined that an interim action principally designed to control the migration of high concentrations of solvents, in the saturated zone, is appropriate for the CBRP. Specifically, this interim action has two main objectives:

Prevent direct contact with COC contaminated soils and reduce infiltration to minimize further migration of CMCOCs to the groundwater from soils within and beneath the CBRP; and

Treat the area in the vicinity of the pit, within the 25,000 ug/L VOC isoconcentration contour within the groundwater, with an objective to reduce concentrations and control the migration of VOCs within the 25,000 ug/L VOC contour.

The remedial action objectives for the interim action will be achieved by installing a soil cover over the source; performing soil vapor extraction (SVE) in the vadose zone beneath the pit; and performing air sparging (coupled with SVE) in the 25,000 ug/L contour of the groundwater plume. All reports, data, and observations indicate that the SVE system is effectively removing TCE from the vadose zone and is functioning as designed. The AS system began full-scale operation recently and therefore its effectiveness has not been determined.

B. Adequacy of O & M

Describe issues and observations related to the implementation and scope of O & M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy.

C. Early Indicators of Potential Remedy Failure

Describe issues and observations such as unexpected changes in the cost or scope of O & M or a high frequency of unscheduled repairs that suggest that the protectiveness of the remedy may be compromised in the future.

D. Opportunities for Optimization

Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy.

C-Area Reactor Seepage Basins (904-66G, -67G, -68G) (CRSB) Operable Unit (OU)

I. Introduction

This is the first five-year review for the C-Area Reactor Seepage Basins (904-66G, -67G, -68G) (CRSB) Operable Unit (OU). This review was conducted from August 2001 through September 2001. This report documents the results of the review.

II. OU Chronology

Table 1 lists the chronology of site events for the CRSB OU.

Table 1. Chronology of OU Events

Event	Date
Removal actions (Vegetation)	July 28 to December 9, 1997
ROD issuance	August 31, 2000
ROD Amendment	November 11, 2002
Remedial Action start/complete	February 5, 2001/ongoing

Key:

Consent Decree – Date a consent decree (enforcement document from the court system) was issued for the operable unit.

Corrective Action start – Date the corrective (remedial) action was initiated (under RCRA).

ESD Issuance - Date all three parties (USDOE, USEPA, and SCDHEC) signed the Explanation of Significant Difference used to significantly modify the remedy selected in the Record of Decision.

Final or Interim ROD issuance – Date the three parties (USDOE, USEPA, and SCDHEC) signed the Record of Decision.

Federal Facility Agreement Declared Effective - Date the Federal Facility Agreement formalized the integration of CERCLA and RCRA in remediation activities at SRS.

NPL listing – Date the entire SRS was added to EPA's National Priorities List.

Previous Five-Year Reviews – Date of any previous five year reviews of remedy for the operable unit.

RCRA Closure Certified – Date the three parties (USDOE, USEPA, and SCDHEC) certified that the operable unit had been remediated and closed under the Resource Conservation and Recovery Act.

RCRA Closure Plan Approved – Date the three parties (USDOE, USEPA, and SCDHEC) approved the closure plan for the operable unit under Resource Conservation and Recovery Act.

Remedial Action start/complete – Date the remedial action (final or interim) was initiated/completed (under CERCLA).

Removal Action – Date contaminated media was removed from the operable unit (not associated with the ROD).

RFI/RI start/complete - Date the remedial investigation (sampling) was initiated/completed for the operable unit.

ROD Amendment Issuance - Date the three parties (USDOE, USEPA, and SCDHEC) signed the Record of Decision Amendment used to change the remedy selected in the original Record of Decision.

III. Background

Physical Characteristics

The CRSB OU is located in the central portion of Savannah River Site (SRS) in the western portion of C Area (Figure 1). Three unlined (earthen) basins (Figure 2) constructed in 1957 comprise the CRSB OU. The basins are in an open fenced area with sparse vegetative cover. None of the three basins have been backfilled to grade and all are currently open. The ground slopes southwestward toward an unnamed tributary of Fourmile Branch approximately 600 feet to SRS west. Groundwater beneath CRSB is not included as a subunit of this OU. Groundwater will be evaluated within the C-Area Groundwater Operable Unit.

Land and Resource Use

The unit is located adjacent to a nuclear facility and in an industrial zone. Anticipated future land use is also industrial.

History of Contamination

The basins were filled via a 3-inch diameter polyethylene underground process sewer line that is approximately 800 feet long and extends from the C-Area Reactor to Basin 1. From 1957 until 1970 and from 1978 until 1986, the process sewer line conveyed low-level radioactive purge water from the reactor to the seepage basins.

The C-Reactor process sewer line discharged to the southeastern end of basin #1. This L-shaped basin slopes to the north and west where a cascade overflow pipe connects it to basin #2. Basin #2 also has a similar cascade overflow into basin #3 at its southeastern corner. Flow between the basins was via the cascade overflow pipes positioned near the top of the basin walls. In addition to the process sewer line in Basin 1, a metal chute was placed at the northeastern bend of the basin during operation (Figure 2).

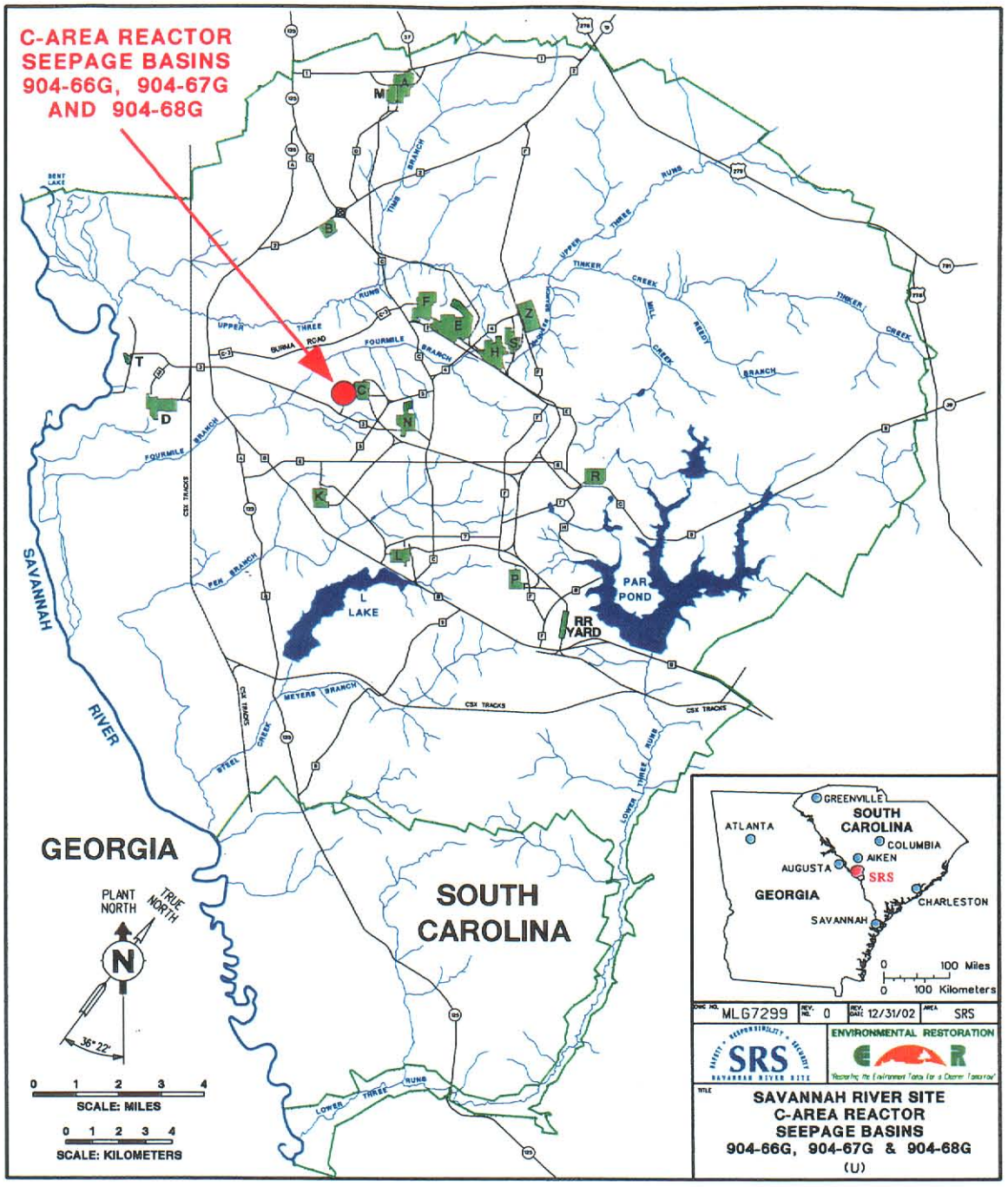


Figure 1. Location of the CRSB OU at SRS

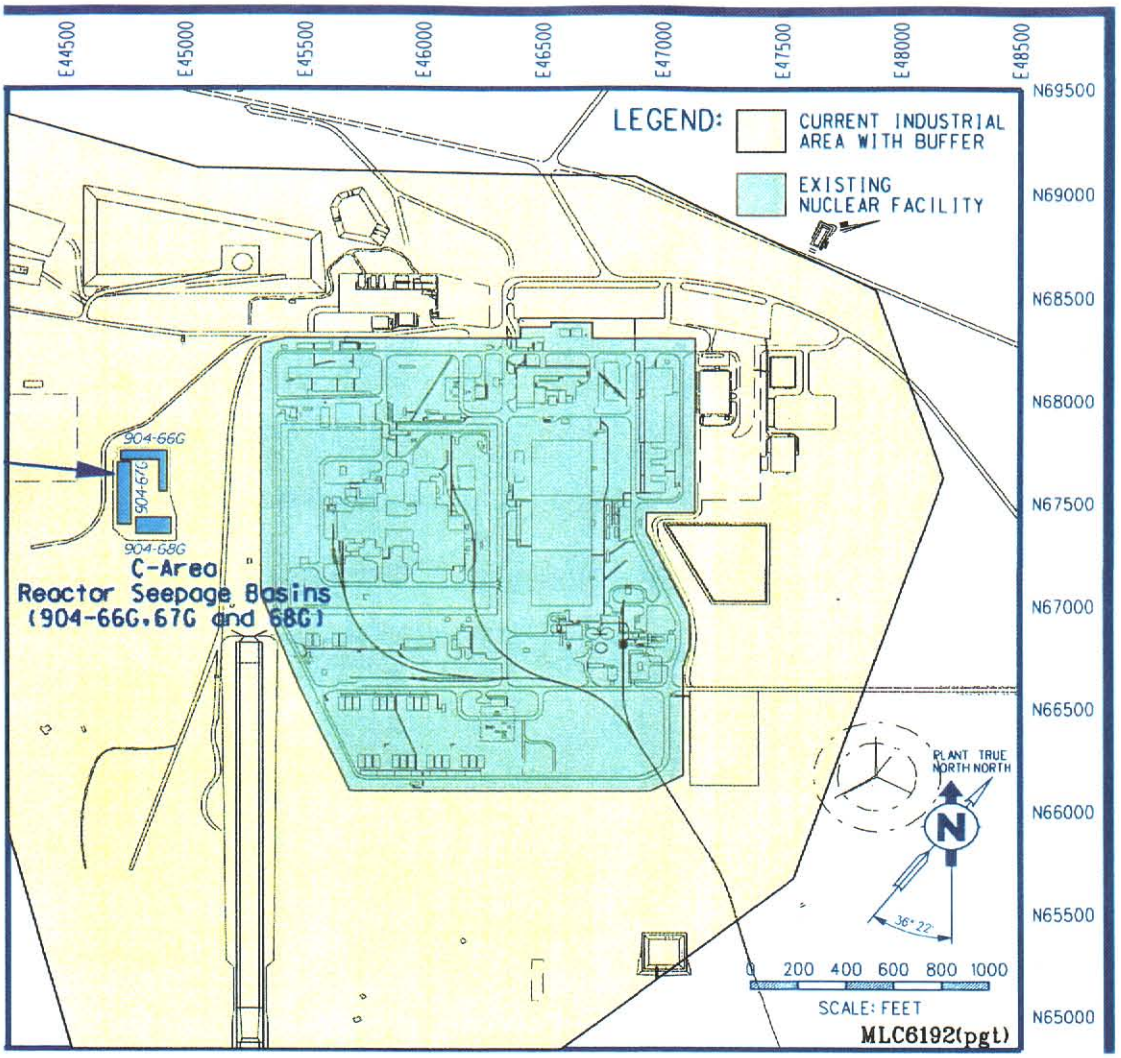


Figure 2. **Location of the C-Area Reactor Seepage Basins (904-66G, -67G, -68G) Operable Unit at SRS within the Industrial Buffer Zone**

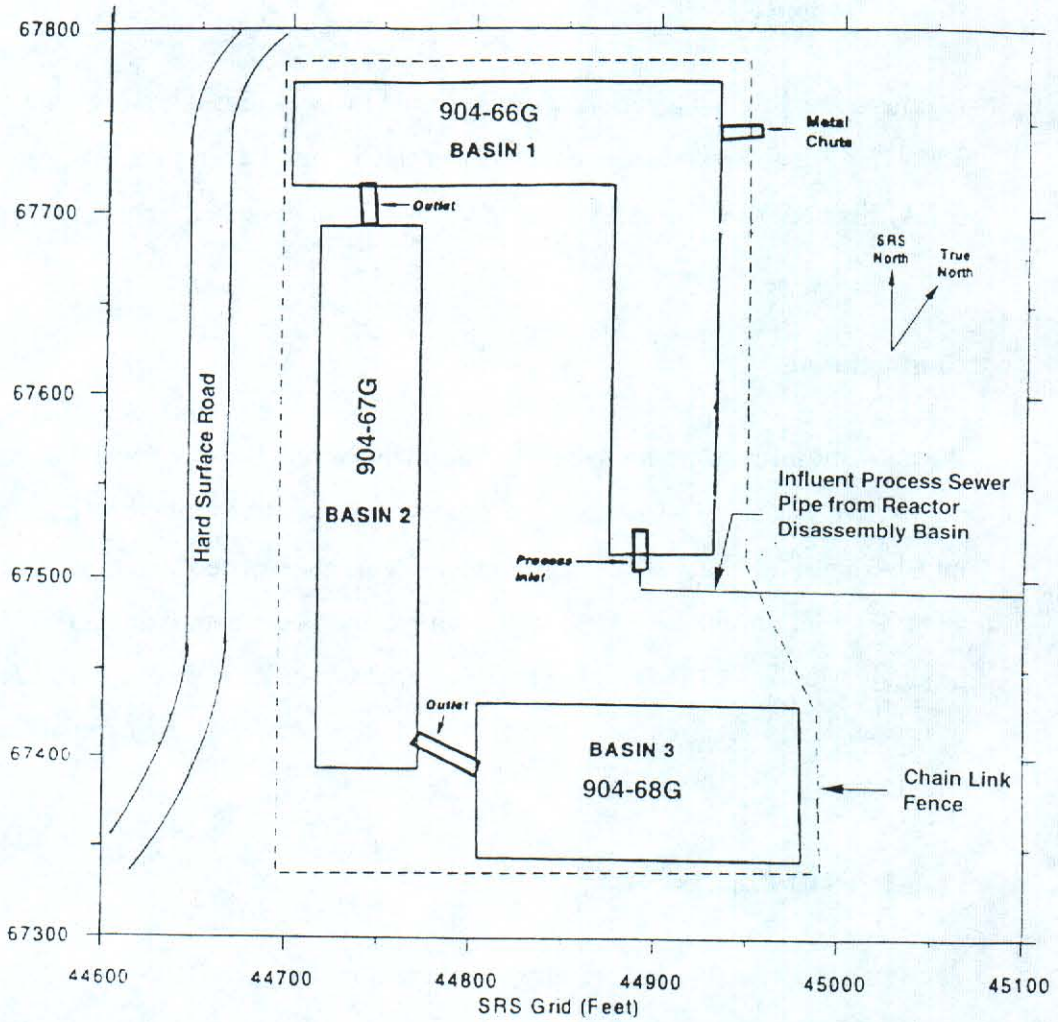


Figure 3. Layout of the C-Area Reactor Seepage Basins (904-66G, -67G, -68G) Operable Unit

Initial Response

A time-critical removal action was performed in 1997 in accordance with Section 300.415 of the National Contingency Plan (NCP) and Federal Facility Agreement (FFA) Section XIV to remove and dispose of contaminated vegetation from the unit.

Contaminants

Waste disposal records indicate that the main basin (Basin 1) received aqueous radioactive waste. The radioactive wastewater was transported to and emptied into basin #1 at the CRSB. Radionuclides in the wastewater drums included tritium, strontium-90, cobalt-60, cesium-137, and other beta-gamma (b/g) fission products. Cesium-137 was identified as principal threat source material (PTSM) in Basins 1 and 2. Figure 3 illustrates the extent of PTSM contamination at the CRSB.

Plug-In ROD Process

The Plug-In ROD Process presents a common remedy for high risk radioactively contaminated waste units with similar history of use, contaminants, risk, and location in current industrial areas. In situ stabilization of radiologically contaminated soil that represents PTSM was selected as the common remedy in the Plug-In ROD approved in September 1999 (WSRC 1999). An Explanation of Significant Difference to apply the Plug-In ROD remedy at the CRSB OU was approved in June 2000 (WSRC 2000a).

Following approval of the ESD, it was recognized that the risk from PTSM would be reduced over time due to radioactive decay to below the PTSM threshold (1×10^{-3}) in the year 2002 for basin #2 at the CRSB. The USDOE, USEPA, and SCDHEC agreed that the current access controls and site use controls at SRS

would effectively protect human health and the environment at least through 2002. Therefore, a low permeability soil cover would be an appropriate remedy and grouting would not be required for basin #2 at the CRSB.

The change to the remedy was a fundamental change in the remedy selected in the Plug-In ROD and a ROD amendment was necessary to comply with National Oil and Substance Pollution Contingency Plan (NCP) Section 300.435(c)(2)(ii) and CERCLA Section 117. An amended ROD was approved for the CRSB to not grout basin #2 in November 2002 (WSRC 2002). The amended ROD did not affect the Plug-In remedy for basins #1 and #3 at the CRSB.

IV. Remedial Actions

Remedy Selection

The remedial action objectives for the unit are as follows:

- Prevent human exposure to contaminated basin soils (PTSM) by performing stabilization treatment to the extent practicable and filling the basins. Reduce risks to the future worker from surface soils (0 to 1 foot) outside the basin by establishing remedial goals (RGs) for constituents of concern (COCs) at concentrations equivalent to 1×10^{-6} for carcinogens and a hazard quotient of 1 for noncarcinogens or background (where background levels of COCs exceed 1×10^{-6})

- Prevent the release of COCs in soil to groundwater beneath the unit above maximum contaminant levels (MCLs) or risk-based concentrations (RBCs) (when MCLs are not available). The soil RGs are back-calculated based on these values.

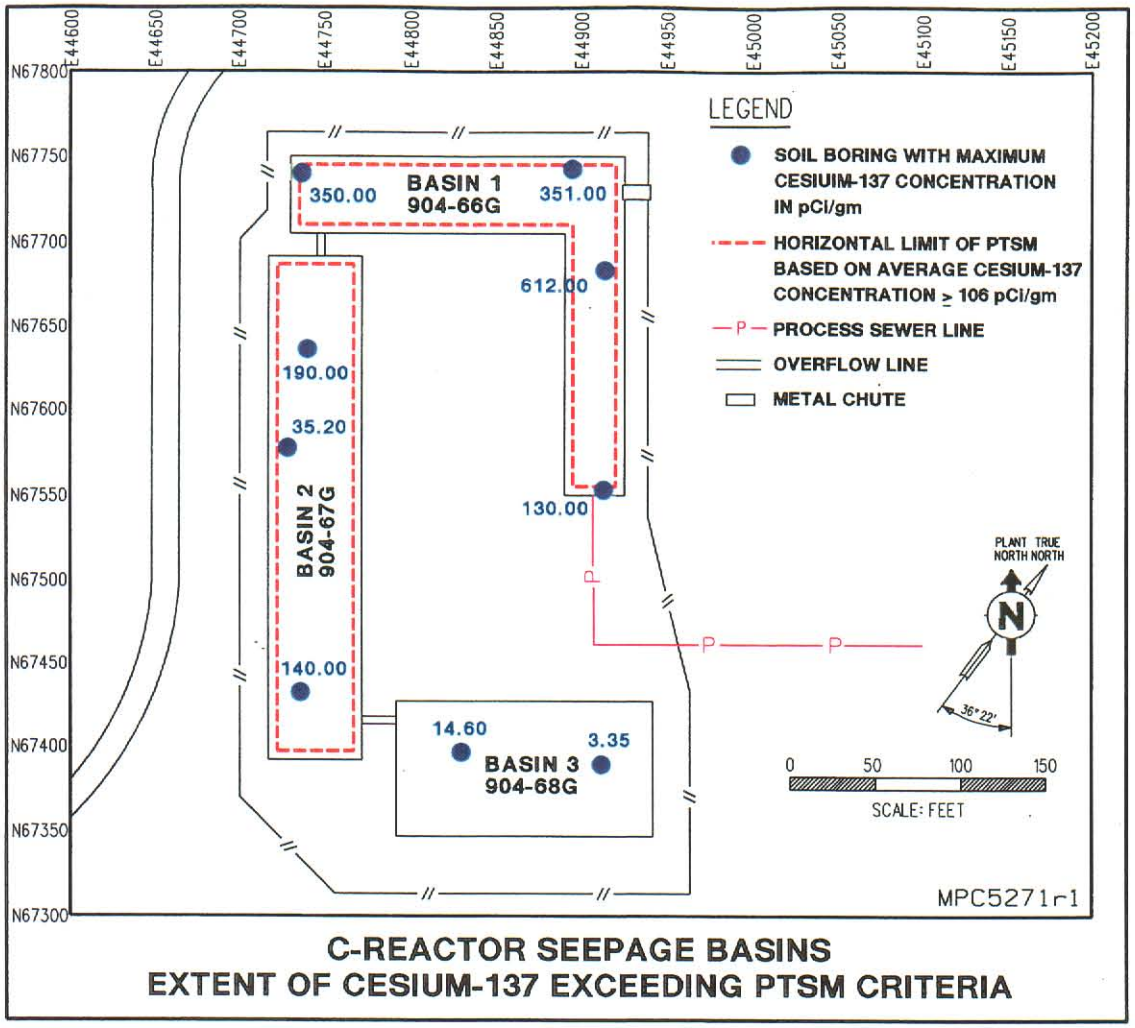


Figure 4 **Extent of Cesium-137 exceeding PTSM Criteria**

Protect the ecological receptors indigenous to the area by preventing or limiting contact with contaminated basin soil/pipelines and preventing plants and animals from bringing contaminants up towards the surface.

The selected remedy for basin #1 is in situ stabilization/solidification of the PTSM, a low permeability soil cover, and institutional controls. The selected remedy for basins #2 and #3 is a low permeability soil cover and institutional controls. Remedy Implementation

The remedial start was achieved on February 5, 2001, and is in progress.

System Operation and Maintenance

There are no System Operation requirements. There are no Annual System Operations. However, the following steps will be taken to maintain the soil cover as long as the waste remains a threat to human health or environment.

- Visual inspections for evidence of damage to the soil cover due to erosion or intrusion by burrowing animals will be performed annually as a minimum. The inspection will also address upkeep of the vegetative cover and access control barriers (e.g., the warning signs).

- Necessary repairs will be performed when required as identified during inspections.

- Institutional controls will be enforced.

V. Progress Since Last Review

This is the first review for this OU; therefore, this section does not apply.

VI. Five-Year Review Process

The following tasks were performed as part of the review:

- Reviewed the documents listed in Attachment 1
- Confirmed remedial action start
- Reviewed changes in standards and to-be-considered guidance
- Reviewed groundwater samples to confirm that contamination from the CRSB has not reached the groundwater.

VII. Technical Assessment

The conclusions for this review are as follows:

- The remedy will function as intended by the decision documents because stabilization will treat the PTSM, and a soil cover with institutional controls will provide access controls.
- The assumptions used at the time of the remedy selection are still valid.
- No other information has come to light that could call into question the protectiveness of the remedy.
- While installation of a low permeability soil cover is designed to protect the groundwater from future contamination from the CRSB, the groundwater is being investigated as part of the C-Reactor Groundwater Operable Unit.

VIII. Issues

There are no issues for this OU.

IX. Recommendations and Follow-up Actions

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

X. Protectiveness Statement(s)

The selected remedy continues to provide protection to human health and the environment at the CRSB OU.

XI. Next Review

The next five-year review is scheduled for June 30, 2007.

Attachment 1

Documents Reviewed

WSRC, 1997. *Removal Site Evaluation Report for the C-Reactor Seepage Basins (904-066, -067 and -68G) (U)*, WSRC-RP-97-132, Revision 0, July, Westinghouse Savannah River Company, Aiken, SC

WSRC 1999. *Plug-In Record of Decision for In Situ Stabilization with a Low Permeability Soil Cover System for Radiological Contaminants in Soil (U)*, WSRC-RP-98-4099, Revision 0, September, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

WSRC, 2000a. *Explanation of Significant Difference (ESD) for the Plug-In ROD for In Situ Stabilization with a Low Permeability Soil Cover System for Radiological Contaminants in Soil – C-Area Reactor Seepage Basin (U)*, WSRC-RP-2000-4032, Revision 0, March, Westinghouse Savannah River Company, Aiken, SC

WSRC, 2000b. *Remedial Action Implementation Plan (RAIP) for the C-Area Reactor Seepage Basin (U)*, WSRC-RP-99-4213, Revision 1, July, Westinghouse Savannah River Company, Aiken, SC

WSRC 2002. *Unit-Specific Plug-In Record of Decision Amendment for the C-Area Reactor Seepage Basin (904-67G) and L-Area Reactor Seepage Basin (904-64G) (U),* WSRC-RP-2002-4063, Revision 1, August, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

Attachment 2

Five-Year Review Site Inspection Checklist

Five-Year Review Site Inspection Checklist

I. SITE INFORMATION	
Site Name: C-Area Reactor Seepage Basins (904-66G, -67G, -68G)	**Date of Inspection: 10/29/01**
Location and Region: SRS, USEPA Region IV	**EPA ID: 60**
Agency, office, or company leading the five-year review: USDOE	**Weather/temperature: Clear, ~62°F**

Remedy Includes: (Check all that apply)

- ☒ Landfill cover/containment
- ☐ Access controls
- ☒ Institutional Controls
- ☐ Groundwater pump and treatment
- ☐ Surface water collection and treatment
- ☒ Other In Situ Stabilization
- ☐ Monitored Natural Attenuation
- ☐ Groundwater Containment
- ☐ Vertical Barrier Walls

Attachments: ☐ Inspection team roster attached ☒ Site map attached

II. INTERVIEWS (Check all that apply)

1. **O & M site manager** _____ (Name) _____ (Title) _____ (Date)
   Interviewed ☐ at site ☐ at office ☐ by phone Phone No. _____
   Problems, suggestions; ☐ report attached _____

2. **O & M staff** _____ (Name) _____ (Title) _____ (Date)
   Interviewed ☐ at site ☐ at office ☐ by phone Phone No. _____
   Problems, suggestions; ☐ report attached _____

3. **Local regulatory authorities and response agencies** (i.e., State and tribal offices, emergency response office, police department, office of public health or environmental health, zoning office, recorder of deeds, or other city and county offices, etc.) Fill in all that apply.

Agency _____

Contact _____ _____ _____ _____

Name Title Date Phone No.

Problems; suggestions; ☐ Report attached _____

_____

Agency _____

Contact _____ _____ _____ _____

Name Title Date Phone No.

Problems; suggestions; ☐ Report attached _____

_____

Agency _____

Contact _____ _____ _____ _____

Name Title Date Phone No.

Problems; suggestions; ☐ Report attached _____

_____

4. **Other interviews** (optional) ☐ Report attached _____

III. ONSITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)

1. **O & M Documents**

☐ O & M Manual	☐ Readily available	☐ Up to date	☒ N/A
☒ As-built drawings	☐ Readily available	☒ Up to date	☐ N/A
☐ Maintenance Logs	☐ Readily available	☐ Up to date	☒ N/A

Remarks_____

2. **Site-Specific Health and Safety Plan** ☒ Readily available ☒ Up to date ☐ N/A

☒ Contingency plan/emergency response plan ☒ Readily available ☒ Up to date ☐ N/A

Remarks CKHASP-2000 Revision 1

3. **O & M and OSHA Training Records** ☒ Readily available ☒ Up to date ☐ N/A

Remarks_____

4. **Permits and Service Agreements**

☐ Air discharge permit	☒ Readily available	☒ Up to date	☐ N/A
☐ Effluent discharge	☐ Readily available	☐ Up to date	☒ N/A
☐ Waste Disposal, POTW	☐ Readily available	☐ Up to date	☒ N/A
☐ Other permits	☐ Readily available	☐ Up to date	☒ N/A

Remarks_____

5. **Gas Generation Records** ☐ Readily available ☐ Up to date ☒ N/A

Remarks_____

6. **Settlement Monument Records** ☐ Readily available ☐ Up to date ☒ N/A

Remarks_____

7. **Groundwater Monitoring Records** ☐ Readily available ☐ Up to date ☒ N/A

Remarks_____

8. **Leachate Extraction Records**	☐ Readily available	☐ Up to date	☒ N/A	
Remarks_____				
9. **Discharge Compliance Records**				
☐ Air	☐ Readily available	☐ Up to date	☒ N/A	
☐ Water (effluent)	☐ Readily available	☐ Up to date	☒ N/A	
Remarks_____				
10. **Daily Access/Security Logs**	☒ Readily available	☒ Up to date	☐ N/A	
Remarks_____				

IV. O & M Costs

1. **O & M Organization**

☐ State in-house ☐ Contractor for State

☐ PRP in-house ☐ Contractor for PRP

☐ Other_____

_____

2. **O & M Cost Records**

☐ Readily available ☐ Up to date

☐ Funding mechanism/agreement in place

☐ Other_____

_____

Total annual cost by year for review period if available

From_____ To_____ _____ ☐ Breakdown attached
Date Date Total cost

From_____ To_____ _____ ☐ Breakdown attached
Date Date Total cost

From_____ To_____ _____ ☐ Breakdown attached
Date Date Total cost

From_____ To_____ _____ ☐ Breakdown attached
Date Date Total cost

From_____ To_____ _____ ☐ Breakdown attached
Date Date Total cost

1. **Unanticipated or Unusually High O & M Costs During Review Period**

Describe costs and reasons: _____

_____

_____

_____

_____

V. ACCESS AND INSTITUTIONAL CONTROLS ☒ Applicable ☐ N/A

A. Fencing

1. **Fencing Damaged** ☐ Location shown on site map ☐ Gates secured ☒ N/A

Remarks_____

_____

B. Other Access Restrictions

1. **Signs and other security measures** ☐ Location shown on site map ☒ N/A

Remarks_____

_____

C. Institutional Controls

1. Implementation and enforcement

Site conditions imply ICs not properly implemented ☐ Yes ☒ No ☐ N/A

Site conditions imply ICs not being fully enforced ☐ Yes ☒ No ☐ N/A

Type of monitoring (e.g., self-reporting, drive-by) Inspection (starts after remediation is completed)

Frequency semi-annual

Responsible party/agent WSRC

Contact	Michael Redd	Manager ER Maintenance	_____	952-6882
	Name	Title	Date	Phone No.

Report is up-to-date ☐ Yes ☐ No ☐ N/A

Reports are verified by the lead agency ☐ Yes ☐ No ☐ N/A

Specific requirements in deed of decision documents have been met ☐ Yes ☐ No ☐ N/A

Violations have been reported ☐ Yes ☐ No ☐ N/A

Other problems or suggestions: ☐ Report attached

Inspection data sheet attached

_____

_____

_____

2. Adequacy ☐ ICs are adequate ☐ ICs are inadequate ☒ N/A

Remarks To be implemented after completion of the remedial activity,

_____

D. General

1. **Vandalism/trespassing** ☐ Location shown on site map ☒ No vandalism evident

   Remarks_____

2. **Land use changes onsite** ☒ N/A

   Remarks_____

3. **Land use changes offsite** ☒ N/A

   Remarks_____

VI. GENERAL SITE CONDITIONS

A. Roads ☐ Applicable ☒ N/A

1. **Roads damaged** ☐ Location shown on site map ☐ Roads adequate ☐ N/A

   Remarks_____

B. Other site Conditions

Remarks_____

VII. LANDFILL COVERS ☒ Applicable ☐ N/A

A. Landfill Surface

1. **Settlement** (Low spots) ☐ Location shown on site map ☒ Settlement not evident

   Areal extent_____ Depth_____

   Remarks_____

2. **Cracks** ☐ Location shown on site map ☒ Cracking not evident

   Lengths_____ Widths_____ Depths_____

   Remarks_____

3. **Erosion** ☐ Location shown on site map ☒ Erosion not evident

Areal extent_____ Depth_____

Remarks_____

_____

4. **Holes** ☐ Location shown on site map ☒ Holes not evident

Areal extent_____ Depth_____

Remarks_____

_____

5. **Vegetative Cover** ☐ Grass ☐ Cover properly established ☒ No signs of stress

☐ Trees/shrubs (indicate size and location on a diagram)

Remarks_____

_____

6. **Alternative Cover (armored rock, concrete, etc.)** ☒ N/A

Remarks_____

_____

7. **Bulges** ☐ Location shown on site map ☒ Bulges not evident

Areal extent_____ Height_____

Remarks_____

_____

8. **Wet Areas/Water Damage** ☒ Wet areas/water damage not evident

☐ Wet Areas ☐ Location shown on site map Areal extent_____

☐ Ponding ☐ Location shown on site map Areal extent_____

☐ Seeps ☐ Location shown on site map Areal extent_____

☐ Soft subgrade ☐ Location shown on site map Areal extent_____

Remarks_____

_____

9. **Slope Instability** ☐ Slides ☐ Location shown on site map ☒ No evidence of slope instability

Areal extent_____

Remarks_____

_____

B. Benches ☐ Applicable ☒ N/A

(Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)

1. **Flows Bypass Bench** ☐ Location shown on site map ☐ N/A or okay

Remarks_____

2. **Bench Breached** ☐ Location shown on site map ☐ N/A or okay

Remarks_____

3. **Bench Overtopped** ☐ Location shown on site map ☐ N/A or okay

Remarks_____

C. Letdown Channels ☐ Applicable ☒ N/A

(Channel lined with erosion control mates, riprap, grout bags, or gabions that descend down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)

1. **Settlement** ☐ Location shown on site map ☐ No evidence of settlement

Areal extent_____ Depth_____

Remarks_____

2. **Material Degradation** ☐ Location shown on site map ☐ No evidence of degradation

Material type_____ Areal extent _____

Remarks_____

3. **Erosion** ☐ Location shown on site map ☐ No evidence of erosion

Areal extent _____ Depth_____

Remarks_____

4. **Undercutting** ☐ Location shown on site map ☐ No evidence of undercutting

Areal extent _____ Depth_____

Remarks_____

_____

5. **Obstructions** Type_____ ☐ No obstructions

☐ Location shown on site map Areal extent _____

Size _____

Remarks_____

_____

6. **Excessive Vegetative Growth** Type_____

☐ No evidence of excessive growth

☐ Vegetation in channels does not obstruct flow

☐ Location shown on site map Areal extent _____

Remarks_____

_____

D. Cover Penetrations ☐ Applicable ☒ N/A

1. **Gas Vents** ☐ Active ☐ Passive

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A

Remarks_____

_____

2. **Gas Monitoring Probes**

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A

Remarks_____

_____

3. **Monitoring Wells** (within surface area of landfill)

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A

Remarks_____

_____

4. **Leachate Extraction Wells**

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A

Remarks_____

_____

5. **Settlement Monuments** ☐ Located ☐ Routinely surveyed ☐ N/A

Remarks_____

_____

E. Gas Collection and Treatment ☐ Applicable ☒ N/A

1. **Gas Treatment Facilities**

☐ Flaring ☐ Thermal destruction ☐ Collection for reuse

☐ Good condition ☐ Needs Maintenance

Remarks_____

_____

2. **Gas Collection Wells, Manifolds and Piping**

☐ Good condition ☐ Needs Maintenance

Remarks_____

_____

3. **Gas Monitoring Facilities** (e.g., gas monitoring of adjacent homes or buildings)

☐ Good condition ☐ Needs Maintenance ☐ N/A

Remarks_____

_____

F. Cover Drainage Layer ☐ Applicable ☒ N/A

1.	**Outlet Pipes Inspected**	☐ Functioning	☐ N/A
	Remarks_____		
	_____		
2.	**Outlet Rock Inspected**	☐ Functioning	☐ N/A
	Remarks_____		
	_____		

G. Detention/sedimentation Ponds ☐ Applicable ☒ N/A

1. **Siltation** Areal extent_____ Depth_____ ☐ N/A

   ☐ Siltation not evident

   Remarks_____

2. **Erosion** Areal extent_____ Depth_____ ☐ N/A

   ☐ Erosion not evident

   Remarks_____

3. **Outlet Works** ☐ Functioning ☐ N/A

   Remarks_____

4. **Dam** ☐ Functioning ☐ N/A

   Remarks_____

H. Retaining Walls ☐ Applicable ☒ N/A

1. **Deformations** ☐ Location shown on site map ☐ Deformation not evident

   Horizontal displacement_____ Vertical displacement_____

   Rotational displacement_____

   Remarks_____

2. **Degradation** ☐ Location shown on site map ☐ Deformation not evident

   Remarks_____

I. Perimeter Ditches/Off-Site Discharge ☐ Applicable ☒ N/A

1. **Siltation** ☐ Location shown on site map ☐ Siltation not evident

   Areal extent_____ Depth_____

   Remarks_____

2. **Vegetative Growth** ☐ Location shown on site map ☐ Siltation not evident

☐ Vegetation does not impede flow

Areal extent_____ Type_____

Remarks_____

_____

3. **Erosion** ☐ Location shown on site map ☐ Erosion not evident

Areal extent_____ Depth_____

Remarks_____

_____

4. **Discharge Structure** ☐ Location shown on site map ☐ N/A

Remarks_____

_____

VIII. VERTICAL BARRIER WALLS ☐ Applicable ☒ N/A

1. **Settlement** ☐ Location shown on site map ☐ Settlement not evident

Areal extent_____ Depth_____

Remarks_____

_____

2. **Performance Monitoring** Type of Monitoring_____

☐ Performance not monitored

Frequency_____ ☐ Evidence of breaching

Head differential_____

Remarks_____

_____

IX. GROUNDWATER/SURFACE WATER REMEDIES ☐ Applicable ☒ N/A

A. Groundwater Extraction Wells, Pumps, and Pipelines ☐ Applicable ☐ N/A

1. **Pumps, Wellhead Plumbing, and Electrical**

☐ Good condition ☐ All required wells located ☐ Needs Maintenance ☐ N/A

Remarks_____

_____

2. **Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances**

☐ Good condition ☐ Needs Maintenance

Remarks_____

_____

3. **Spare Parts and Equipment**

☐ Readily available ☐ Good condition ☐ Requires upgrade ☐ Needs to be provided

Remarks_____

_____

B. Surface Water Collection Structures, Pumps, and Pipelines ☐ Applicable ☐ N/A

1. **Collection Structures, Pumps, and Electrical**

☐ Good condition ☐ Needs Maintenance

Remarks_____

_____

2. **Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances**

☐ Good condition ☐ Needs Maintenance

Remarks_____

_____

3. **Spare Parts and Equipment**

☐ Readily available ☐ Good condition ☐ Requires upgrade ☐ Needs to be provided

Remarks_____

_____

C. **Treatment System** ☐ Applicable ☐ N/A

1. **Treatment Train** (Check components that apply)

☐ Metals removal ☐ Oil/water separation ☐ Bioremediation

☐ Air stripping ☐ Carbon adsorbers

☐ Filters_____

☐ Additive (e.g., chelation agent, flocculent)_____

☐ Others_____

☐ Good condition ☐ Needs Maintenance

☐ Sampling ports properly marked and functional

☐ Sampling/maintenance log displayed and up to date

☐ Equipment properly identified

☐ Quantity of groundwater treated annually_____

☐ Quantity of surface water treated annually_____

Remarks_____

_____

2. **Electrical Enclosures and Panels** (properly rated and functional)

☐ N/A ☐ Good condition ☐ Needs Maintenance

Remarks_____

_____

3. **Tanks, Vaults, Storage Vessels**

☐ N/A ☐ Good condition ☐ Proper secondary containment ☐ Needs Maintenance

Remarks_____

_____

4. **Discharge Structure and Appurtenances**

☐ N/A ☐ Good condition ☐ Needs Maintenance

Remarks_____

_____

5. **Treatment Building(s)**

☐ N/A ☐ Good condition (esp. roof and doorways) ☐ Needs repair

☐ Chemicals and equipment properly stored

Remarks_____

_____

6. **Monitoring Wells** (pump and treatment remedy)

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ All required wells located ☐ Needs Maintenance ☐ N/A

Remarks_____

_____

D. Monitoring Data ☐ Applicable ☐ N/A

1. Monitoring Data

☐ Is routinely submitted on time ☐ Is of acceptable quality

2 Monitoring data suggests:

☐ Groundwater plume is effectively contained ☐ Contaminant concentrations are declining

E. Monitored Natural Attenuation ☐ Applicable ☐ N/A

1. **Monitoring Wells** (Natural attenuation remedy)

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ All required wells located ☐ Needs Maintenance ☐ N/A

Remarks_____

_____

X. OTHER REMEDIES

If there are remedies applied at the site which are not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.

XI. OVERALL OBSERVATIONS

A. Implementation of the Remedy

Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emissions, etc.).

Remedial activity (in situ stabilization with low permeability soil cover) is in process.

B. Adequacy of O & M

Describe issues and observations related to the implementation and scope of O & M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy.

C. Early Indicators of Potential Remedy Failure

Describe issues and observations such as unexpected changes in the cost or scope of O & M or a high frequency of unscheduled repairs, that suggest that the protectiveness of the remedy may be compromised in the future.

D. Opportunities for Optimization

Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy.

C-, F-, K-, and P-Area Coal Pile Runoff Basins (CPRB) (189-C, 289-F, 189-K, and 189-P) Operable Unit

I. Introduction

This is the first five-year review of the remedial actions implemented at the C-, F-, K-, and P-Area Coal Pile Runoff Basins (CPRB) (189-C, 289-F, 189-K, and 189-P) Operable Unit (OU) located at the Savannah River Site (SRS) in western South Carolina (Figures 1 through 4). This report documents the results of the review conducted from August 2001 through September 2001.

II. OU Chronology

Table 1 lists the chronology of site events for the CPRB.

III. Background

Physical Characteristics

The C-CPRB is located approximately 700 ft southeast of the limited area fence surrounding C Area (Figure 5) in northwestern Barnwell County, South Carolina. The C-CPRB is 170 x 170 x 4 ft; the pipeline from the coal pile storage area was 1,300 ft in length and 18 inches in diameter. Surface drainage in the area is southwest to an unnamed, intermittent tributary of Fourmile Branch. The water table at the C-CPRB is approximately 50 ft below surface, and the flow direction is to the southwest at a gradient of 1.3 ft per 100 ft.

The F-CPRB is located approximately 50 ft southeast of the limited area fence surrounding F Area (Figure 6) in southwestern Aiken County. The F-CPRB is 270 x 270 x 5 ft; the pipeline from the coal pile storage area was 900 ft in length and 30 inches in diameter. Surface drainage in southeastern F Area is toward the southeast to an unnamed tributary of Fourmile Branch. The water table at the

Table 1. Chronology of OU Events

Event	Date
Removal action start	April 25, 1997
RI complete	K-CPRB August 7, 1997
Remedial Action start/finish	C-CPRB May 20-August 1, 1997 F-CPRB May 13-July 18, 1997 K-CPRB May 20-September 3, 1997 P-CPRB May 26-August 19, 1997
ROD issuance	December 17, 1998

Key:

Consent Decree – Date a consent decree (enforcement document from the court system) was issued for the operable unit.

Corrective Action start – Date the corrective (remedial) action was initiated (under RCRA).

ESD Issuance - Date all three parties (USDOE, USEPA, and SCDHEC) signed the Explanation of Significant Difference used to significantly modify the remedy selected in the Record of Decision.

Final or Interim ROD issuance – Date the three parties (USDOE, USEPA, and SCDHEC) signed the Record of Decision.

Federal Facility Agreement Declared Effective - Date the Federal Facility Agreement formalized the integration of CERCLA and RCRA in remediation activities at SRS.

NPL listing – Date the entire SRS was added to EPA's National Priorities List.

Previous Five-Year Reviews – Date of any previous five year reviews of remedy for the operable unit.

RCRA Closure Certified – Date the three parties (USDOE, USEPA, and SCDHEC) certified that the operable unit had been remediated and closed under the Resource Conservation and Recovery Act.

RCRA Closure Plan Approved – Date the three parties (USDOE, USEPA, and SCDHEC) approved the closure plan for the operable unit under Resource Conservation and Recovery Act.

Remedial Action start/complete – Date the remedial action (final or interim) was initiated/completed (under CERCLA).

Removal Action – Date contaminated media was removed from the operable unit (not associated with the ROD).

RFI/RI start/complete - Date the remedial investigation (sampling) was initiated/completed for the operable unit.

ROD Amendment Issuance - Date the three parties (USDOE, USEPA, and SCDHEC) signed the Record of Decision Amendment used to change the remedy selected in the original Record of Decision.

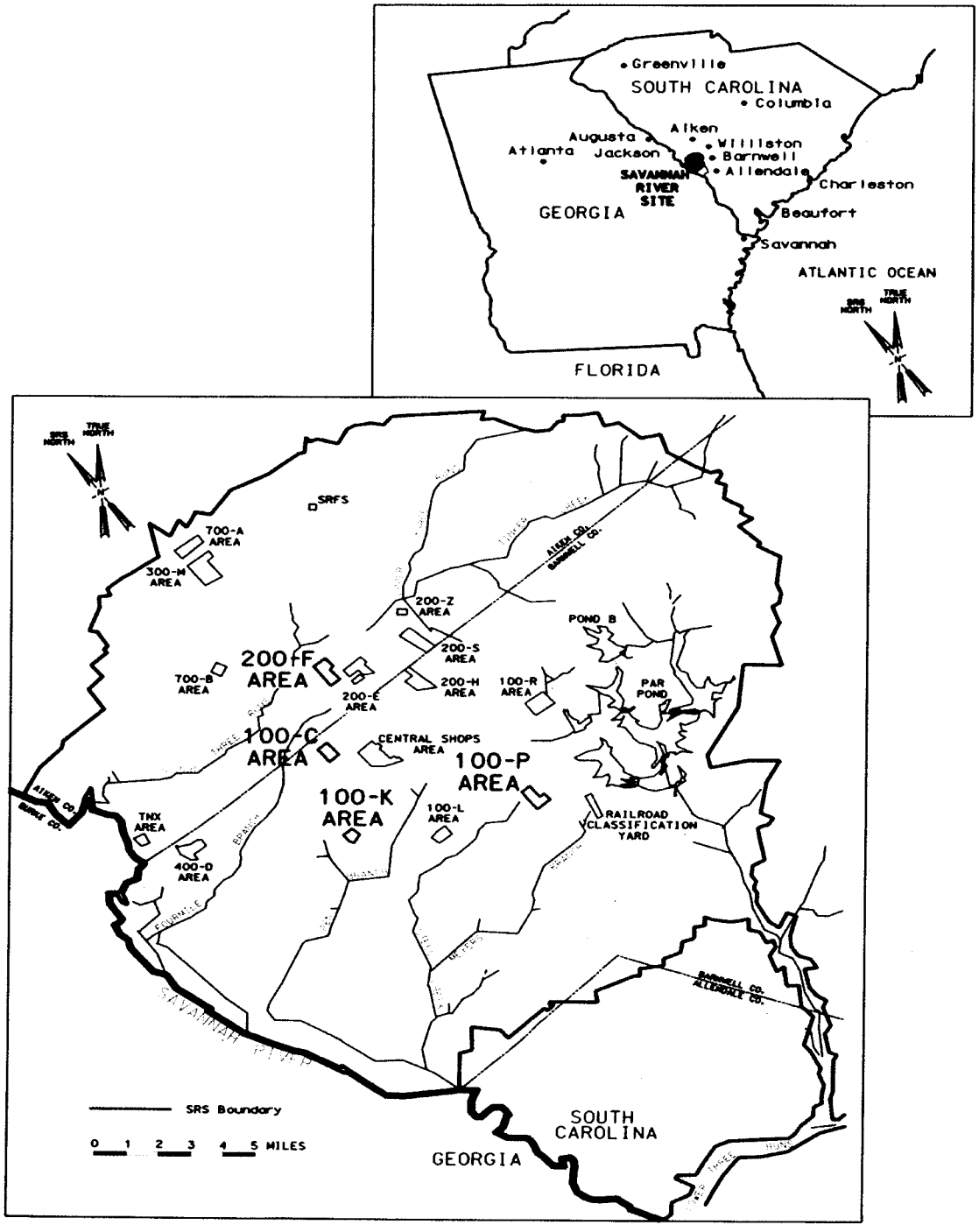


Figure 1. Savannah River Site Map showing the Locations of C, F, K, and P Areas and Other Major SRS Facilities

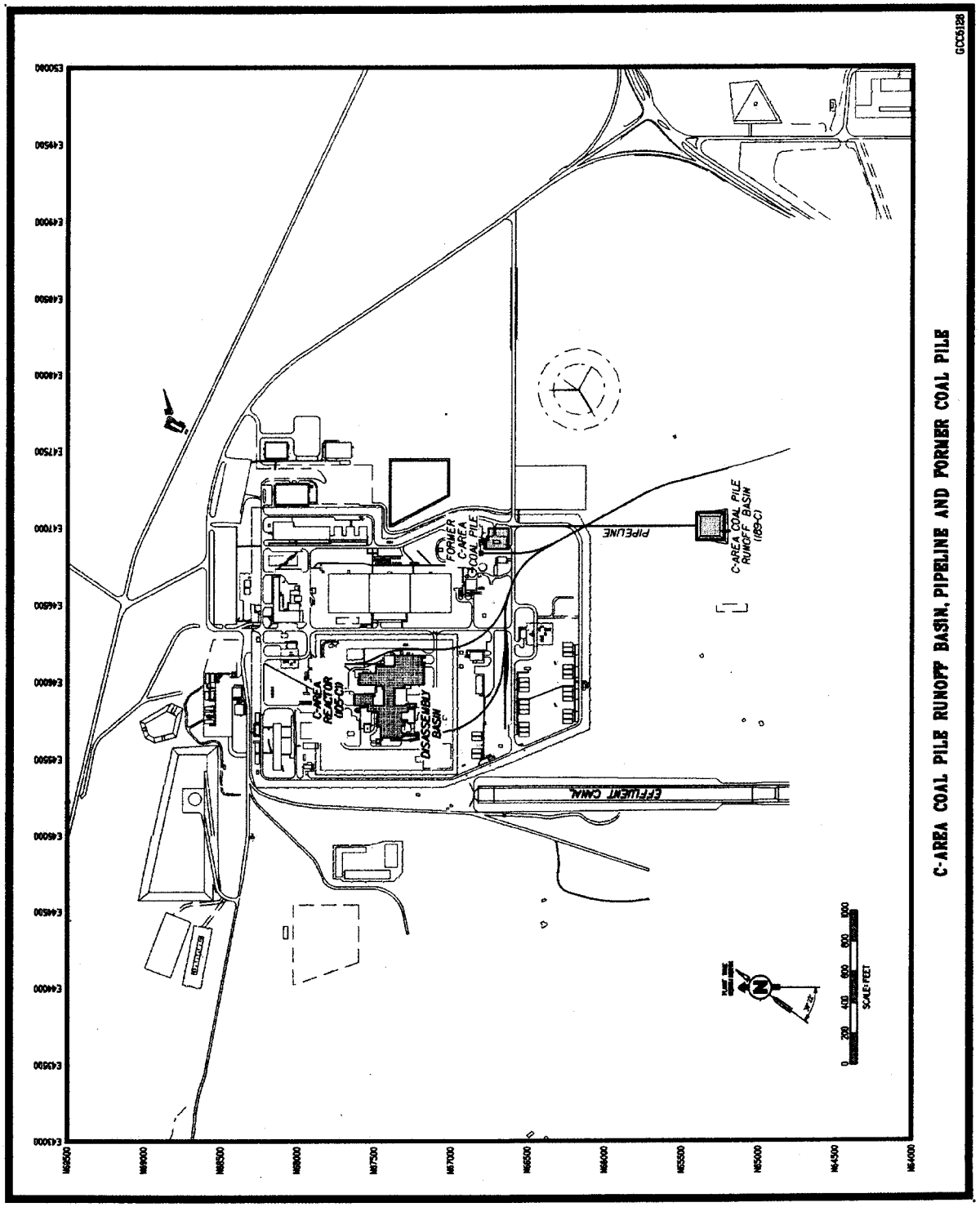


Figure 2. **Location of the C -Area Coal Pile Runoff Basin in Relation to the Host Area, Pipeline, and Coal Pile**

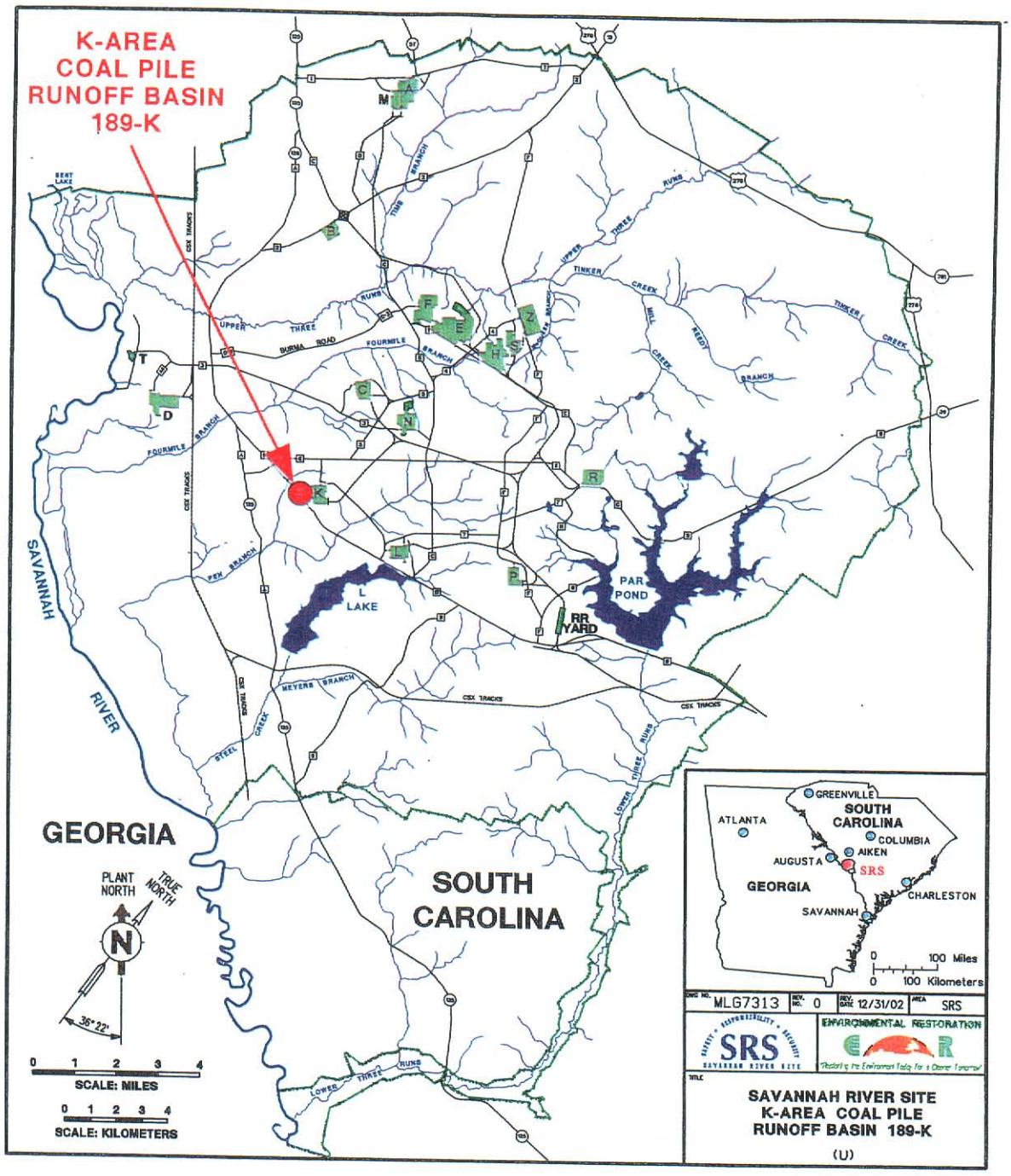


Figure 3. Location of the K-Area Coal Pile Runofff Basin (189-K) at SRS

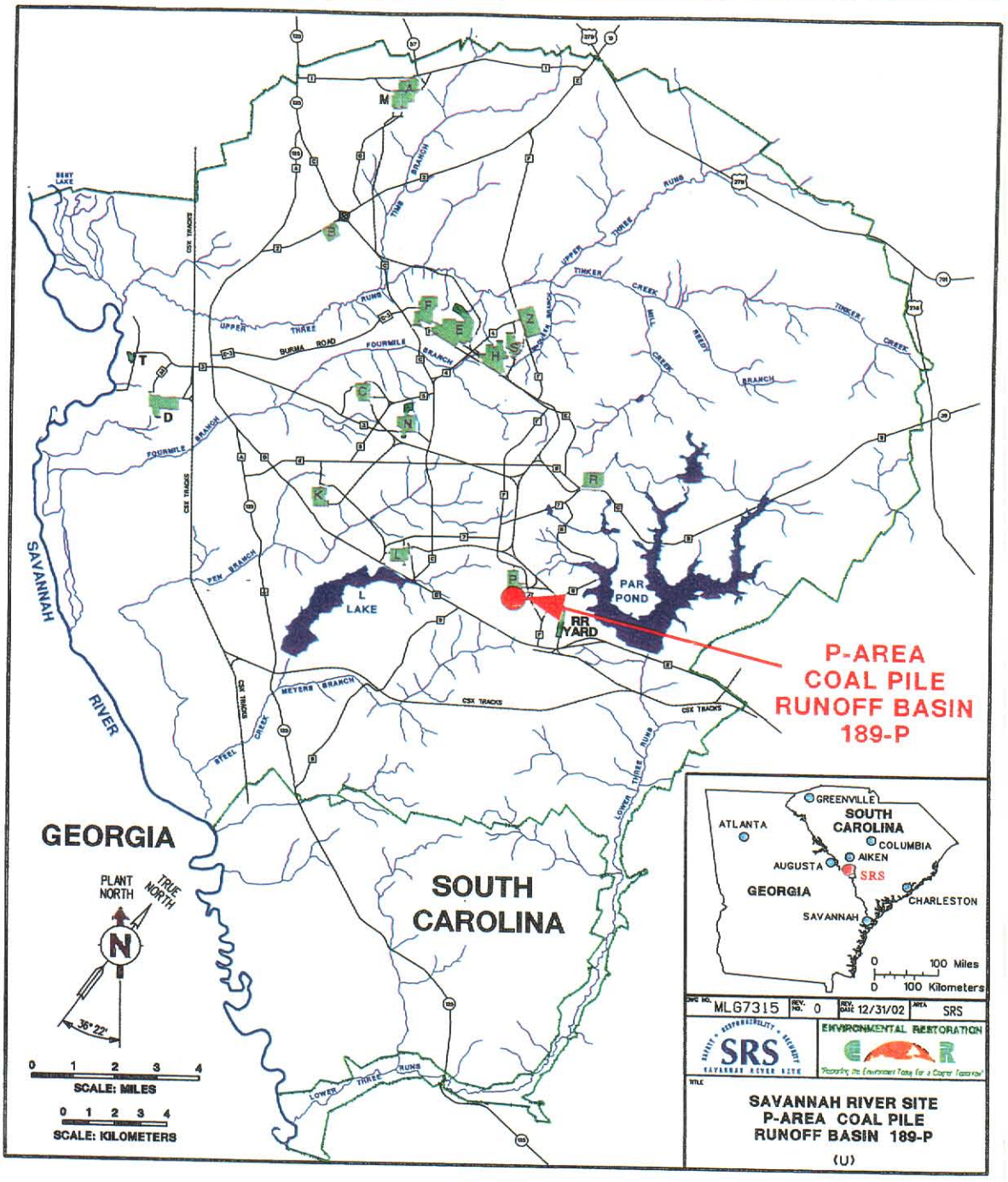


Figure 4. Location of the P-Area Coal Pile Runofff Basin (189-P) at SRS

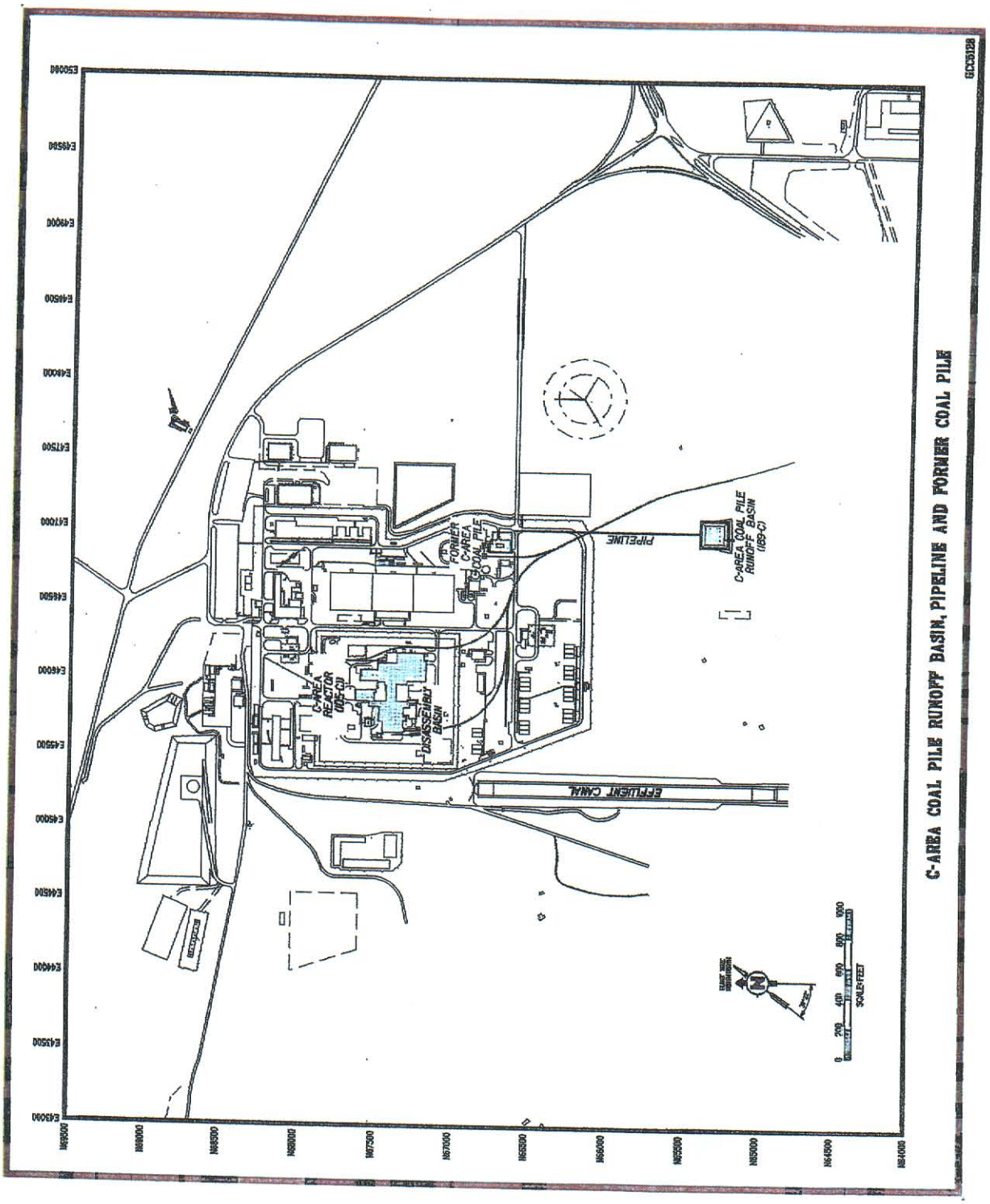


Figure 5. **Location of the C-Area Coal Pile Runoff Basin in Relation to the Host Area, Pipeline, and Coal Pile**

F-CPRB is approximately 80 ft below surface, and the flow direction is to the southeast at a gradient of 1.5 ft per 100 ft.

The K-CPRB is located approximately 500 ft west of the limited area fence surrounding K Area (Figure 4) in northwestern Barnwell County. The K-CPRB is 290 x 300 x 4 ft; the pipeline from the coal pile storage area was 1,000 ft in length and 30 inches in diameter. Surface drainage is toward the west-southwest to an unnamed tributary of Indian Grave Branch. The water table is approximately 50 ft below surface, and the flow direction is to the west-southwest at a gradient of 0.6 ft per 100 ft.

The P-CPRB is located approximately 330 ft southeast of the limited area fence surrounding P Area (Figure 5) in northwestern Barnwell County. The P-CPRB is 290 x 290 x 4 ft; the pipeline from the coal pile storage area was 530 ft in length and 36 inches in diameter. Surface drainage is toward the southeast to Meyers Branch. The water table is approximately 25 ft below surface, and the flow direction is to the southeast at a gradient of 1.88 ft per 100 ft.

Groundwater beneath each of the basins is included in the OU.

Land and Resource Use

The current and future anticipated land use for each of the four CPRBs is an inactive industrial site.

History of Contamination

Originally coal-fired power plants in the reactor and separations areas produced steam and electricity for SRS activities. Stoking coal was stored in unsheltered stockpiles at each of the power plants. Bituminous coal contains concentrations of naturally occurring radionuclides, metals, and polycyclic aromatic hydrocarbons (PAHs). Many of the metals are present in sulfide minerals, which

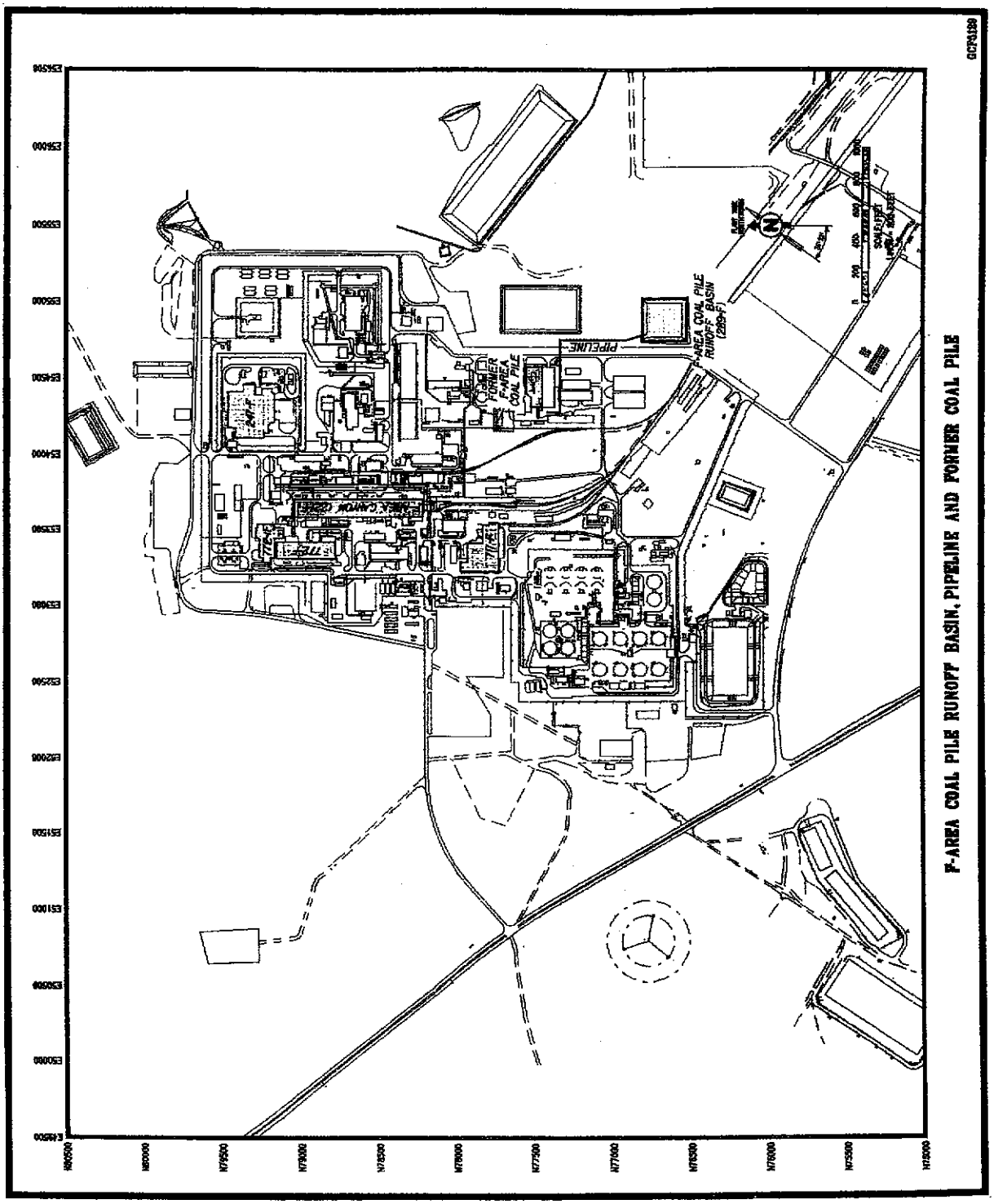


Figure 7. Location of the F-Area Coal Pile Runoff Basin in Relation to the Host Area, Pipeline, and Coal Pile

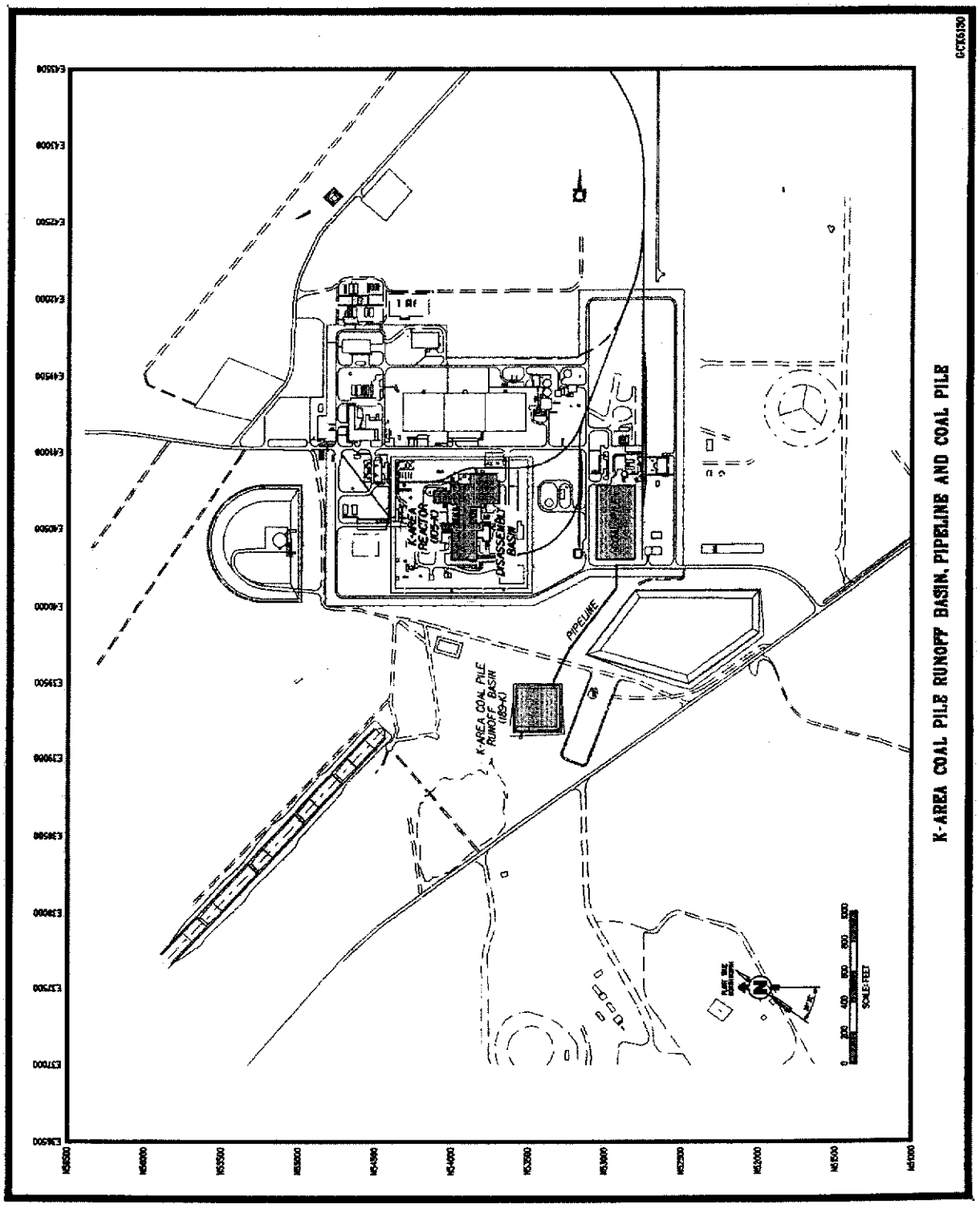


Figure 7. **Location of the K-Area Coal Pile Runoff Basin in Relation to the Host Area, Pipeline, and Coal Pile**

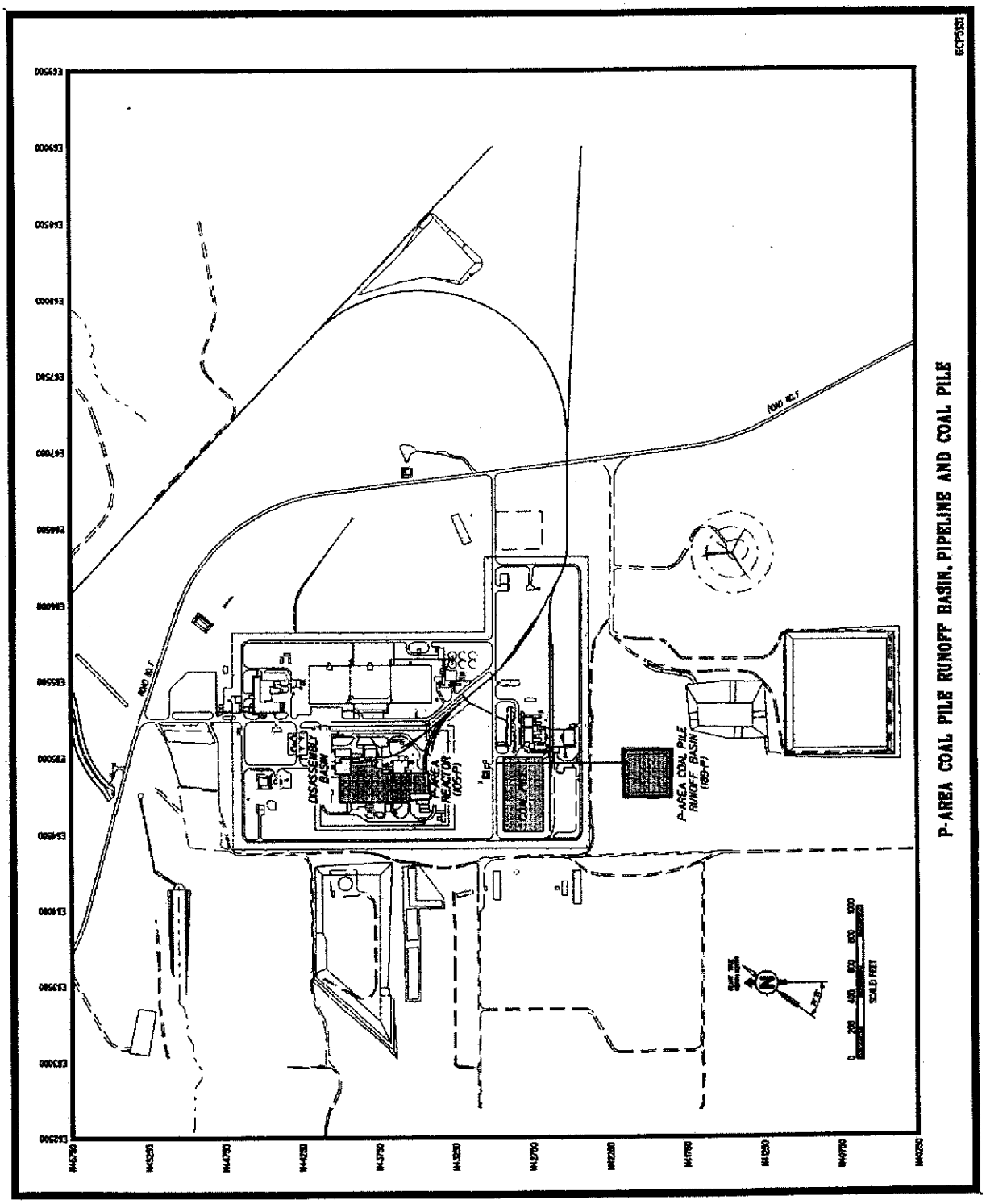


Figure 8. **Location of the P-Area Coal Pile Runoff Basin in Relation to the Host Area, Pipeline, and Coal Pile**

weather to produce sulfuric acid. CPRBs were constructed in 1981 at C, F, K, and P Areas to protect surface water from coal pile contaminants such as suspended solids, sulfuric acid, metals, radionuclides, and PAHs. The power plants at C, F, K, and P Areas were shut down in 1985 (C and F Areas) and 1997 (K and P Areas).

Initial Response

A Resource Conservation and Recovery Act (RCRA) Facility Investigation/Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) Remedial Investigation (RFI/RI) characterization, conducted at K-CPRB in 1994 and 1995, demonstrated that toxic metals, radionuclides, and PAHs were largely confined to the 0.0-1.0 ft interval of coal-laden sediments and soils within the basin (WSRC 1997a). The Corrective Measures Study/Feasibility Study (CMS/FS) (WSRC 1997c), prepared for the K-CPRB in 1996 and approved August 7, 1997, identified removal of the coal for resource recovery and groundwater monitoring as the lowest cost alternative that could result in future unrestricted use of the basins. Coal from the same sources was used in the C-, F-, K-, and P-Area power plants. The CPRBs were all located in similar upland soils containing similar contaminant suites with similar distributions. The associated risks and hazards attributed to these contaminants were also similar. The *Removal Site Evaluation Report/Wastewater Closure Plan for the C-, F-, K-, and P-Area Coal Pile Runoff Basins (189-C, 289-F, 189-K, and 189-P) (U)* (WSRC 1997b) (RSER/WCP) combined the C-, F-, K-, and P-CPRBs into a single OU with K-CPRB as the lead site.

The coal-laden sediments and shallow soils were identified as low level threat source materials because the material represented relatively low risks to humans and the ecology, had a low to moderate potential for migration, and was easily contained or removed. Specifically, the risk assessment concluded that the

contaminants found in the 0.0 to 1.0 ft interval of basin sediments and soils contributed to a carcinogenic risk of 6.0×10^{-5} to possible future on-unit residents via the shallow soil ingestion pathway at the K-CPRB. Based on the unit soil and groundwater data, the carcinogenic risks to future on-unit residents from the contaminants in the coal-laden sediments via the groundwater ingestion pathway were calculated to be 7.0×10^{-6}.

Since the coal-laden sediments at the K-CPRB were determined to be the source of gross alpha contamination to the shallow groundwater, and the coal-laden sediments at the other basins were determined to be potential sources of groundwater contamination, it was appropriate to remove these low level threat source materials. In addition to mitigating groundwater contamination, the removal reduced the risk associated with exposure to sediment and near surface soils in accordance with the statutory preference for treatment and a desire to alleviate or minimize the need for engineering/institutional controls.

Working under the RSER/WCP, during the summer of 1997, SRS removed the coal-laden sediments and soils in the C-, F-, K-, and P-CPRBs. Figure 9 shows photographs of a typical basin (K-CPRB) before, during, and after the removal action. The 13,100 tons of coal, coal-laden sediment, and soils removed from the four basins were transported to Southeastern Soil Recovery, Inc. where the material was thermally treated. This facility was approved under the CERCLA Offsite Rule. The residual material was used for road base.

The C-, F-, K-, and P-CPRBs were cleaned out to a planar surface at least four feet below the proposed final grade. All coal was removed from the C-, F-, K-, and P-CPRBs. This eliminated the source of potential exposure to shallow soils for future industrial workers and on-unit residents and the source of potential groundwater contamination at the C-, F-, and P-CPRBs. The groundwater at the K-CPRB exhibits elevated gross alpha attributed to the operation of the basin. The action completely removed at least the 0-1 ft interval, which contained the



K Area Basin (CPRB) - before



K Area Basin (CPRB) - during





K Area Basin (CPRB) - after

Figure 9. K-Area Coal Pile Basin Before, During, and After the 1997 Removal Action

highest concentrations of the constituents of concern (COCs) in the CPRBs. The basins were backfilled with a minimum of four feet of clean native soil, eliminating the potential for exposure of future workers and on-unit residents during future excavation activities. The backfill was graded to minimize ponding and to reduce infiltration and the potential for erosion; a vegetative cover was established to prevent erosion.

IV. Remedial Actions

Remedy Selection

The investigation of the C-, F-, K-, and P-CPRB OU found no retained COCs (WSRC 1997a and 1997d). This investigation includes the RFI/RIs at C- and K-CPRBs in 1994 and 1995, samples collected below the proposed clean-out level in the F- and P-CPRBs in February 1997, and samples collected from all of the CPRBs in 1988 (summarized in the *Removal Site Evaluation Report/Wastewater Closure Plan for the C-, F-, K-, and P-Area Coal Pile Runoff Basins (189-C, 289-F, 189-K and 189-P) (U) (WSRC 1997b)*). The shallow soils were completely removed from all of the CPRBs and all contaminant concentrations remaining in the basins were below 2 times background or RBCs. The basins were backfilled to grade with at least four feet of clean soil, which provided a further barrier to exposure to remaining sub-basin soils. No Further Action with confirmatory groundwater monitoring at K-CPRB was selected as the remedial action at this unit.

Remedy Implementation

The No Further Action ROD (WSRC 1998) provided for an annual groundwater monitoring program at the K-CPRB because it is the only CPRB where impacts on local groundwater quality due to the operation of the basin exceeded maximum contaminant levels (MCLs). SRS is conducting the annual groundwater

monitoring and reporting program at the K-CPRB. The following list of analytes has been monitored in wells KCB 1, 3, 5, and 6 during the second calendar quarter of each year since 1998:

- beryllium
- bis(2-ethylhexyl) phthalate
- chromium VI
- gross alpha
- radium-226
- radium-228
- pH

A summary report, including the data and interpretation, is submitted to South Carolina Department of Health and Environmental Control (SCDHEC) and United States Environmental Protection Agency (USEPA) during the first calendar quarter of the year following each monitoring event. If none of these constituents exceeds its MCL during five consecutive monitoring and reporting cycles, SRS will request SCDHEC and USEPA concurrence with suspending the monitoring program and decommissioning the wells or dispositioning them to other programs. SRS will notify SCDHEC and USEPA within 30 days of the second consecutive exceedance of MCLs by any of the analytes.

System Operation Maintenance

The KCB monitoring wells are inspected annually. There are no System Operation requirements. There are no annual system operations.

V. Progress Since Last Review

The groundwater monitoring history and post-ROD monitoring results for gross alpha at the K-CPRB are summarized in Figure 10. Gross alpha was selected as

the appropriate indicator species because it was the only analyte that has consistently exceeded its MCL in the KCB groundwater monitoring history. Gross alpha in well KCB 3 has been decreasing since the removal action; none of the analytes exceeded MCLs in the 2000-monitoring event.

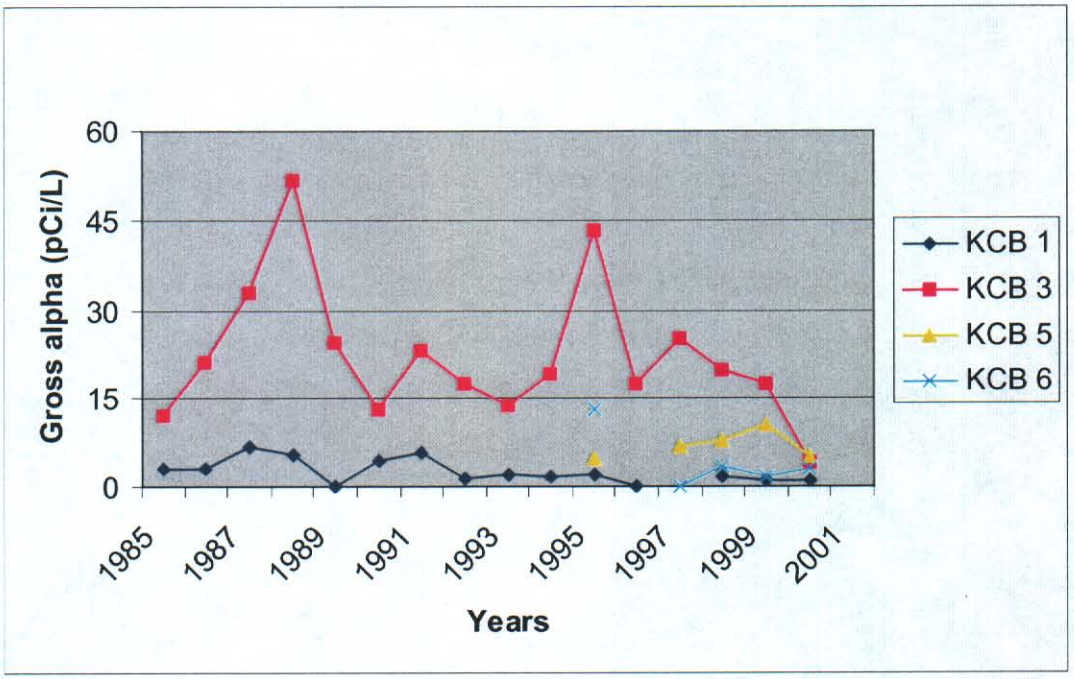


Figure 10. Gross Alpha in KCB Wells

The MCL for gross alpha is 15 pCi/L. KCB 1 is the upgradient well; KCB 3, 5, and 6 are downgradient of the K-CPRB.

VI. Five-Year Review Process

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

- Reviewed the documents listed in Attachment 1
- Reviewed changes in MCLs

VII. Technical Assessment

This section is not applicable because there were no COCs found at this OU.

VIII. Issues

There are no issues for this OU.

IX. Recommendations and Follow-up Actions

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

X. Protectiveness Statement(s)

The No Action remedy continues to provide protection to human health and the environment.

XI. Next Review

The results of additional groundwater monitoring events will be presented in the next Five-Year Review scheduled for June 30, 2007.

Attachment 1

Documents Reviewed

WSRC, 1997a. *RCRA Facility Investigation/Remedial Investigation Report with the Baseline Risk Assessment for K-Area Coal Pile Runoff Basin (189-K) (U).* WSRC-RP-96-125, Revision 1.3, February, Westinghouse Savannah River Company, Aiken, South Carolina

WSRC, 1997b. *Removal Site Evaluation Report/Wastewater Closure Plan for the C-, F-, K-, and P-Area Coal Pile Runoff Basins (189-C, 289-F, 189-K, and 189-P) (U).* WSRC-RP-96-897, Revision 1, April, Westinghouse Savannah River Company; Aiken, South Carolina

WSRC, 1997c. *Corrective Measures Study/Feasibility Study for the K-Area Coal Pile Runoff Basin (189-K) (U).* WSRC-RP-96-869, Revision 1.1, July, Westinghouse Savannah River Company; Aiken, South Carolina.

WSRC, 1997d. *Post Removal Action/Remedial Investigation Report for the C-, F-, K-, and P-Area Coal Pile Runoff Basins (189-C, 289-F, 189-K, and 189-P) (U).* WSRC-RP-97-931, Revision 0, November, Westinghouse Savannah River Company; Aiken, South Carolina

WSRC, 1998. *Record of Decision/Remedial Alternative Selection for the C-, F-, K-, and P-Area Coal Pile Runoff Basins (189-C, 289-F, 189-K, and 189-P) (U),* WSRC-RP-97-850, Revision 1, July, Westinghouse Savannah River Company; Aiken, South Carolina

WSRC, 1999. *Second Quarter 1998 Post-ROD Groundwater Monitoring Report for the K-Area Coal Pile Runoff Basin (189-K) (U).* WSRC-TR-99-00070, March, Westinghouse Savannah River Company; Aiken, South Carolina.

WSRC 2000. *Second Quarter 1999 Post-ROD Groundwater Monitoring Report for the K-Area Coal Pile Runoff Basin (189-K) (U).* WSRC-TR-2000-00027, March) Westinghouse Savannah River Company; Aiken, South Carolina

WSRC, 2001. *Second Quarter 2000 Post-ROD Groundwater Monitoring Report for the K-Area Coal Pile Runoff Basin (189-K) (U).* WSRC-TR-2001-00034, March, Westinghouse Savannah River Company; Aiken, South Carolina

Attachment 2

Five-Year Review Site Inspection Checklist for the K-Area Coal Pile Runoff Basin Only

Five-Year Review Site Inspection Checklist

I. SITE INFORMATION	
Site Name: K-Area Coal Pile Runoff Basin (189-K)	**Date of Inspection: September 5, 2001**
Location and Region: Savannah River Site, EPA IV	**EPA ID: CERCLIS OU# 52**
Agency, office, or company leading the five-year review: DOE-Savannah River Field Office	**Weather/temperature: NA**

Remedy Includes: (Check all that apply)

- ☐ Landfill cover/containment
- ☐ Access controls
- ☒ Institutional Controls
- ☐ Groundwater pump and treatment
- ☐ Surface water collection and treatment
- ☐ Monitored Natural Attenuation
- ☐ Groundwater Containment
- ☐ Vertical Barrier Walls
- ☒ Other **Confirmatory Groundwater Monitoring**

Attachments: ☐ Inspection team roster attached ☐ Site map attached **See Attached 5-year Review Report**

II. INTERVIEWS (Check all that apply)

1. **O & M site manager** **M. O. Redd** (Name) **Manager ER Maintenance** (Title) **October 1, 2001** (Date)

   Interviewed ☐ at site ☒ at office ☐ by phone Phone No. **952-6882**

   Problems, suggestions; ☐ report attached

2. O & M staff **W. M. Smith** (Name) **Monitoring Well Inspections** (Title) **October 1, 2001** (Date)

   Interviewed ☐ at site ☒ at office ☐ by phone Phone No. **952-6441**

   Problems, suggestions; ☐ report attached

3. **Local regulatory authorities and response agencies** (i.e., State and tribal offices, emergency response office, police department, office of public health or environmental health, zoning office, recorder of deeds, or other city and county offices, etc.) Fill in all that apply.

Agency _____

Contact _____ _____ _____ _____
Name Title Date Phone No.

Problems; suggestions; ☐ Report attached _____

_____

Agency _____

Contact _____ _____ _____ _____
Name Title Date Phone No.

Problems; suggestions; ☐ Report attached _____

_____

Agency _____

Contact _____ _____ _____ _____
Name Title Date Phone No.

Problems; suggestions; ☐ Report attached _____

_____

4. **Other interviews** (optional) ☐ Report attached _____

III. ONSITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)

1. **O & M Documents**

☐ O & M Manual	☐ Readily available	☐ Up to date	☐ N/A
☐ As-built drawings	☐ Readily available	☐ Up to date	☐ N/A
☒ Maintenance Logs	☒ Readily available	☒ Up to date	☐ N/A

Remarks_____

2. **Site-Specific Health and Safety Plan** ☐ Readily available ☐ Up to date ☒ N/A

☐ Contingency plan/emergency response plan ☐ Readily available ☐ Up to date ☒ N/A

Remarks **Potential health and safety issues for closed-wastesite inspections are covered by SRS Procedures and Work Clearance Permits.**

3. **O & M and OSHA Training Records** ☒ Readily available ☒ Up to date ☐ N/A

Remarks_____

4. **Permits and Service Agreements**

☐ Air discharge permit	☐ Readily available	☐ Up to date	☒ N/A
☐ Effluent discharge	☐ Readily available	☐ Up to date	☒ N/A
☐ Waste Disposal, POTW	☐ Readily available	☐ Up to date	☒ N/A
☐ Other permits	☐ Readily available	☐ Up to date	☒ N/A

Remarks_____

5. **Gas Generation Records** ☐ Readily available ☐ Up to date ☒ N/A

Remarks_____

6. **Settlement Monument Records** ☐ Readily available ☐ Up to date ☒ N/A

Remarks_____

7. **Groundwater Monitoring Records** ☒ Readily available ☒ Up to date ☐ N/A

Remarks_____

8. **Leachate Extraction Records** ☐ Readily available ☐ Up to date ☒ N/A

Remarks_____

_____

9. **Discharge Compliance Records**

☐ Air ☐ Readily available ☐ Up to date ☒ N/A

☐ Water (effluent) ☐ Readily available ☐ Up to date ☒ N/A

Remarks_____

_____

10. **Daily Access/Security Logs** ☐ Readily available ☐ Up to date ☒ N/A

Remarks_ _____

_____

IV. O & M Costs

1. **O & M Organization**

☐ State in-house ☐ Contractor for State

☐ PRP in-house ☒ Contractor for PRP

☐ Other_____

_____

2. **O & M Cost Records**

☐ Readily available ☐ Up to date

☐ Funding mechanism/agreement in place

☐ Other_____

_____

Total annual cost by year for review period if available

From_____ To_____ _____ ☐ Breakdown attached
Date Date Total cost

From_____ To_____ _____ ☐ Breakdown attached
Date Date Total cost

From_____ To_____ _____ ☐ Breakdown attached
Date Date Total cost

From_____ To_____ _____ ☐ Breakdown attached
Date Date Total cost

From_____ To_____ _____ ☐ Breakdown attached
Date Date Total cost

1. **Unanticipated or Unusually High O & M Costs During Review Period**

Describe costs and reasons: _____

_____

_____

_____

_____

V. ACCESS AND INSTITUTIONAL CONTROLS ☐ Applicable ☒ N/A

A. Fencing

1. **Fencing Damaged** ☐ Location shown on site map ☐ Gates secured ☐ N/A

Remarks_____

_____

B. Other Access Restrictions

1. **Signs and other security measures** ☐ Location shown on site map ☐ N/A

Remarks_____

_____

C. Institutional Controls

1. **Implementation and enforcement**

Site conditions imply ICs not properly implemented ☐ Yes ☒ No ☐ N/A

Site conditions imply ICs not being fully enforced ☐ Yes ☒ No ☐ N/A

Type of monitoring (e.g., self-reporting, drive-by) **Groundwater Monitoring**

Frequency **Annually**

Responsible party/agent **DOE-Savannah River Field Office**

Contact **J. J. Nelsen** (Name) **DOE-Waste Area Group Manager** (Title) _____ (Date) **725-2587** (Phone No.)

Report is up-to-date ☒ Yes ☐ No ☐ N/A

Reports are verified by the lead agency ☒ Yes ☐ No ☐ N/A

Specific requirements in deed of decision documents have been met ☒ Yes ☐ No ☐ N/A

Violations have been reported ☒ Yes ☐ No ☐ N/A

Other problems or suggestions: ☐ Report attached

_____

_____

_____

_____

2. **Adequacy** ☒ ICs are adequate ☐ ICs are inadequate ☐ N/A

Remarks **Present institutional controls will remain in place through the period of confirmatory monitoring.**

D. General

1. **Vandalism/trespassing** ☐ Location shown on site map ☒ No vandalism evident

   Remarks_____

2. **Land use changes onsite** ☒ N/A

   Remarks_____

3. **Land use changes offsite** ☒ N/A

   Remarks_____

VI. GENERAL SITE CONDITIONS

A. Roads ☐ Applicable ☒ N/A

1. **Roads damaged** ☐ Location shown on site map ☐ Roads adequate ☐ N/A

   Remarks_____

B. Other site Conditions

Remarks_____

VII. LANDFILL COVERS

A. Landfill Surface ☒ NA

1. **Settlement** (Low spots) ☐ Location shown on site map ☐ Settlement not evident

   Areal extent_____ Depth_____

   Remarks_____

2. **Cracks** ☐ Location shown on site map ☐ Cracking not evident

   Lengths_____ Widths_____ Depths_____

   Remarks_____

3. **Erosion** ☐ Location shown on site map ☐ Erosion not evident

Areal extent_____ Depth_____

Remarks_____

_____

4. **Holes** ☐ Location shown on site map ☐ Holes not evident

Areal extent_____ Depth_____

Remarks_____

_____

5. **Vegetative Cover** ☐ Grass ☐ Cover properly established ☐ No signs of stress

☐ Trees/shrubs (indicate size and location on a diagram)

Remarks_____

_____

6. **Alternative Cover (armored rock, concrete, etc.)** ☐ N/A

Remarks_____

_____

7. **Bulges** ☐ Location shown on site map ☐ Bulges not evident

Areal extent_____ Height_____

Remarks_____

_____

8. **Wet Areas/Water Damage** ☐ Wet areas/water damage not evident

☐ Wet Areas ☐ Location shown on site map Areal extent_____

☐ Ponding ☐ Location shown on site map Areal extent_____

☐ Seeps ☐ Location shown on site map Areal extent_____

☐ Soft subgrade ☐ Location shown on site map Areal extent_____

Remarks_____

_____

9. **Slope Instability** ☐ Slides ☐ Location shown on site map ☐ No evidence of slope instability

Areal extent_____

Remarks_____

_____

B. Benches ☐ Applicable ☒ N/A

(Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)

1. **Flows Bypass Bench** ☐ Location shown on site map ☐ N/A or okay

Remarks_____

_____

2. **Bench Breached** ☐ Location shown on site map ☐ N/A or okay

Remarks_____

_____

3. **Bench Overtopped** ☐ Location shown on site map ☐ N/A or okay

Remarks_____

_____

C. Letdown Channels ☐ Applicable ☒ N/A

(Channel lined with erosion control mates, riprap, grout bags, or gabions that descend down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)

1. **Settlement** ☐ Location shown on site map ☐ No evidence of settlement

Areal extent_____ Depth_____

Remarks_____

_____

2. **Material Degradation** ☐ Location shown on site map ☐ No evidence of degradation

Material type_____ Areal extent _____

Remarks_____

_____

3. **Erosion** ☐ Location shown on site map ☐ No evidence of erosion

Areal extent _____ Depth_____

Remarks_____

_____

4. **Undercutting** ☐ Location shown on site map ☐ No evidence of undercutting

Areal extent _____ Depth_____

Remarks_____

_____

5. **Obstructions** Type_____ ☐ No obstructions

☐ Location shown on site map Areal extent _____

Size _____

Remarks_____

_____

6. **Excessive Vegetative Growth** Type_____

☐ No evidence of excessive growth

☐ Vegetation in channels does not obstruct flow

☐ Location shown on site map Areal extent _____

Remarks_____

_____

D. Cover Penetrations ☐ Applicable ☒ N/A

1. **Gas Vents** ☐ Active ☐ Passive

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A

Remarks_____

_____

2. **Gas Monitoring Probes**

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A

Remarks_____

_____

3. **Monitoring Wells** (within surface area of landfill)

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A

Remarks_____

_____

4. **Leachate Extraction Wells**

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A

Remarks_____

_____

5. **Settlement Monuments** ☐ Located ☐ Routinely surveyed ☐ N/A

Remarks_____

_____

E. Gas Collection and Treatment ☐ Applicable ☒ N/A

1. **Gas Treatment Facilities**

☐ Flaring ☐ Thermal destruction ☐ Collection for reuse

☐ Good condition ☐ Needs Maintenance

Remarks_____

_____

2. **Gas Collection Wells, Manifolds and Piping**

☐ Good condition ☐ Needs Maintenance

Remarks_____

_____

3. **Gas Monitoring Facilities** (e.g., gas monitoring of adjacent homes or buildings)

☐ Good condition ☐ Needs Maintenance ☐ N/A

Remarks_____

_____

F. **Cover Drainage Layer**	☐ Applicable	☒ N/A
1. **Outlet Pipes Inspected**	☐ Functioning	☐ N/A
Remarks_____		
2. **Outlet Rock Inspected**	☐ Functioning	☐ N/A
Remarks_____		

G. Detention/sedimentation Ponds ☐ Applicable ☒ N/A

1. **Siltation** Areal extent_____ Depth_____ ☐ N/A

   ☐ Siltation not evident

   Remarks_____

2. **Erosion** Areal extent_____ Depth_____ ☐ N/A

   ☐ Erosion not evident

   Remarks_____

3. **Outlet Works** ☐ Functioning ☐ N/A

   Remarks_____

4. **Dam** ☐ Functioning ☐ N/A

   Remarks_____

H. Retaining Walls ☐ Applicable ☒ N/A

1. **Deformations** ☐ Location shown on site map ☐ Deformation not evident

   Horizontal displacement_____ Vertical displacement_____

   Rotational displacement_____

   Remarks_____

2. **Degradation** ☐ Location shown on site map ☐ Deformation not evident

   Remarks_____

I. Perimeter Ditches/Off-Site Discharge ☐ Applicable ☒ N/A

1. **Siltation** ☐ Location shown on site map ☐ Siltation not evident

   Areal extent_____ Depth_____

   Remarks_____

2. **Vegetative Growth** ☐ Location shown on site map ☐ Siltation not evident

☐ Vegetation does not impede flow

Areal extent_____ Type_____

Remarks_____

_____

3. **Erosion** ☐ Location shown on site map ☐ Erosion not evident

Areal extent_____ Depth_____

Remarks_____

_____

4. **Discharge Structure** ☐ Location shown on site map ☐ N/A

Remarks_____

_____

VIII. VERTICAL BARRIER WALLS ☐ Applicable ☒ N/A

1. **Settlement** ☐ Location shown on site map ☐ Settlement not evident

Areal extent_____ Depth_____

Remarks_____

_____

2. **Performance Monitoring** Type of Monitoring_____

☐ Performance not monitored

Frequency_____ ☐ Evidence of breaching

Head differential_____

Remarks_____

_____

IX. GROUNDWATER/SURFACE WATER REMEDIES ☒ Applicable ☐ N/A

A. Groundwater Extraction Wells, Pumps, and Pipelines ☐ Applicable ☒ N/A

1. **Pumps, Wellhead Plumbing, and Electrical**

☐ Good condition ☐ All required wells located ☐ Needs Maintenance ☐ N/A

Remarks_____

_____

2. **Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances**

☐ Good condition ☐ Needs Maintenance ☐ NA

Remarks_____

_____

3. **Spare Parts and Equipment**

☐ Readily available ☐ Good condition ☐ Requires upgrade ☐ Needs to be provided

Remarks_____

_____

B. Surface Water Collection Structures, Pumps, and Pipelines ☐ Applicable ☒ N/A

1. **Collection Structures, Pumps, and Electrical**

☐ Good condition ☐ Needs Maintenance

Remarks_____

_____

2. **Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances**

☐ Good condition ☐ Needs Maintenance

Remarks_____

_____

3. **Spare Parts and Equipment**

☐ Readily available ☐ Good condition ☐ Requires upgrade ☐ Needs to be provided

Remarks_____

_____

C. Treatment System ☐ Applicable ☒ N/A

1. **Treatment Train** (Check components that apply)

☐ Metals removal ☐ Oil/water separation ☐ Bioremediation

☐ Air stripping ☐ Carbon adsorbers

☐ Filters_____

☐ Additive (e.g., chelation agent, flocculent)_____

☐ Others_____

☐ Good condition ☐ Needs Maintenance

☐ Sampling ports properly marked and functional

☐ Sampling/maintenance log displayed and up to date

☐ Equipment properly identified

☐ Quantity of groundwater treated annually_____

☐ Quantity of surface water treated annually_____

Remarks_____

_____

2. **Electrical Enclosures and Panels** (properly rated and functional)

☐ N/A ☐ Good condition ☐ Needs Maintenance ☐ NA

Remarks_____

_____

3. **Tanks, Vaults, Storage Vessels**

☐ N/A ☐ Good condition ☐ Proper secondary containment ☐ Needs Maintenance

Remarks_____

_____

4. **Discharge Structure and Appurtenances**

☐ N/A ☐ Good condition ☐ Needs Maintenance

Remarks_____

_____

5. **Treatment Building(s)**

☐ N/A ☐ Good condition (esp. roof and doorways) ☐ Needs repair

☐ Chemicals and equipment properly stored

Remarks_____

_____

6. **Monitoring Wells** (pump and treatment remedy)

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ All required wells located ☐ Needs Maintenance ☐ N/A

Remarks_____

_____

D. Monitoring Data

1. Monitoring Data

☒ Is routinely submitted on time ☒ Is of acceptable quality

2 .Monitoring data suggests:

☒ Groundwater plume is effectively contained ☒ Contaminant concentrations are declining

E. Monitored Natural Attenuation

1. **Monitoring Wells** (Natural attenuation remedy)

☒ Properly secured/locked ☒ Functioning ☒ Routinely sampled ☒ Good condition

☒ All required wells located ☐ Needs Maintenance ☐ N/A

Remarks **Well KCB 2 is not included in the confirmatory monitoring program, but is inspected with the other KCB wells. During the latest inspection the 0.25" sample valve KCB 2 was found to be broken and was replaced. The electrical power supply cord on well KCB 5 was found to be too long and has been scheduled for repair, this condition does not compromise health or safety conditions or the suitability of the data for confirmatory monitoring.**

X. OTHER REMEDIES

If there are remedies applied at the site which are not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.

XI. OVERALL OBSERVATIONS

A. Implementation of the Remedy

Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emissions, etc.).

Originally coal-fired power plants in the reactor and separations areas produced steam and electricity for SRS activities. Stoking coal was stored in unsheltered stockpiles at each of the power plants. Coal Pile Runoff Basins (CPRBs) were constructed at SRS in 1981 to protect surface water from coal pile contaminants such as suspended solids, metals, radionuclides, and PAHs, which are natural constituents of bituminous coal. The coal contained metal-sulfide minerals, which weather to produce sulfuric acid.

The RFI/RI characterization, conducted at K-CPRB in 1994 and 1995, demonstrated that toxic metals, radionuclides, and PAHs were largely confined to the 0.0-1.0 ft interval of coal-laden sediments and soils within the basin. The coal-laden sediments and shallow soils were identified as low level threat source materials because the material represented relatively low risks to humans ($6.0x10^{-5}$ via soil ingestion to possible future on-unit residents) and the ecology; had a low to moderate potential for migration; and was easily contained or removed. In 1997, the CMS/FS identified removal of the coal for resource recovery and groundwater monitoring as the lowest cost alternative that could result in future unrestricted use of the basin.

During the summer of 1997, SRS removed the coal-laden sediments and soils from the CPRBs. The coal, coal-laden sediment, and soils were transported to an offsite facility for thermal treatment and subsequent use as road base. In addition to mitigating groundwater contamination, the removal action reduced the risk from exposure to sediment and near surface soils and was consistent with the statutory preference for treatment and desire to alleviate or minimize the need for engineering/institutional controls. The CPRBs were cleaned out to a depth of at least four feet below the proposed final grade and were backfilled with a minimum of four feet of clean native soil, eliminating the potential for human and ecological exposure.

The 1998 No Further Action ROD provided for an annual groundwater monitoring program at the K-CPRB for beryllium, bis(2-ethylhexyl) phthalate, chromium VI, gross alpha, radium-226, radium-228, and pH. Gross alpha was selected as the appropriate indicator species for the 5-year review, because it was the only analyte that has consistently exceeded its MCL in the KCB groundwater monitoring history. Gross alpha in downgradient well KCB 3 has been decreasing since the 1997 removal action; none of the analytes exceeded MCLs in the 2000 monitoring event.

B. Adequacy of O & M

Describe issues and observations related to the implementation and scope of O & M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy.

C. Early Indicators of Potential Remedy Failure

Describe issues and observations such as unexpected changes in the cost or scope of O & M or a high frequency of unscheduled repairs, that suggest that the protectiveness of the remedy may be compromised in the future.

D. Opportunities for Optimization

Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy.

Chemicals, Metals, and Pesticides Pits (CMP Pits) (080-17 G, -17.1 G, -18 G, -18.1 G, -18.2 G, -18.3 G, and -19G) Operable Unit (INTERIM ACTION)

I. Introduction

This is the first five-year review for the Chemicals, Metals, and Pesticides Pits (CMP Pits) Operable Unit (OU). Although entitled an Interim Action Record of Decision (IAROD), the document was a combined final and interim action ROD. The final action was for the surface soils and the interim action was for the groundwater, as described below. The final action for the soils could not be completed due to the discovered presence of Silvex and the lack of a suitable off-site disposal site. This five-year review addresses the final portion of this ROD with a summary of the interim actions to date. This review was conducted from August 2001 through September 2001.

II. OU Chronology

Table 1 lists the chronology of site events for the CMP Pits OU.

III. Background

The CMP Pits OU is located in the central portion of the Savannah River Site (SRS) in Barnwell County more than seven miles from the site boundary and is approximately 5,200 feet north of the L-Area perimeter fence (Figure 1). The OU consists of the pit area, ballast area, vadose zone, groundwater hot spot, and distal portion of the groundwater plume (distal plume). There pit area comprises seven unlined pits, placed in two rows, that are 10 to 15 feet wide, 45 to 70 feet long, and 10 to 15 feet deep. The ballast area is located at the northern edge of the knoll and extends down the side slope of the knoll for a distance of 20 to 30 feet. The groundwater hot spot includes the water table in and around the pit area within the 1,000 µg/L volatile organic compound (VOC) isoconcentration contour.

Table 1. Chronology of OU Events

Event	Date
Removal Action (Soil Excavation)	1984
Remedial Investigation complete	10/1/97
Interim ROD issuance	10/12/99
Interim Remedial Action start	12/10/99

Key:

Consent Decree – Date a consent decree (enforcement document from the court system) was issued for the operable unit.

Corrective Action start – Date the corrective (remedial) action was initiated (under RCRA).

ESD Issuance - Date all three parties (USDOE, USEPA, and SCDHEC) signed the Explanation of Significant Difference used to significantly modify the remedy selected in the Record of Decision.

Final or Interim ROD issuance – Date the three parties (USDOE, USEPA, and SCDHEC) signed the Record of Decision.

Federal Facility Agreement Declared Effective - Date the Federal Facility Agreement formalized the integration of CERCLA and RCRA in remediation activities at SRS.

NPL listing – Date the entire SRS was added to EPA's National Priorities List.

Previous Five-Year Reviews – Date of any previous five year reviews of remedy for the operable unit.

RCRA Closure Certified – Date the three parties (USDOE, USEPA, and SCDHEC) certified that the operable unit had been remediated and closed under the Resource Conservation and Recovery Act.

RCRA Closure Plan Approved – Date the three parties (USDOE, USEPA, and SCDHEC) approved the closure plan for the operable unit under Resource Conservation and Recovery Act.

Remedial Action start/complete – Date the remedial action (final or interim) was initiated/completed (under CERCLA).

Removal Action – Date contaminated media was removed from the operable unit (not associated with the ROD).

RFI/RI start/complete - Date the remedial investigation (sampling) was initiated/completed for the operable unit.

ROD Amendment Issuance - Date the three parties (USDOE, USEPA, and SCDHEC) signed the Record of Decision Amendment used to change the remedy selected in the original Record of Decision.

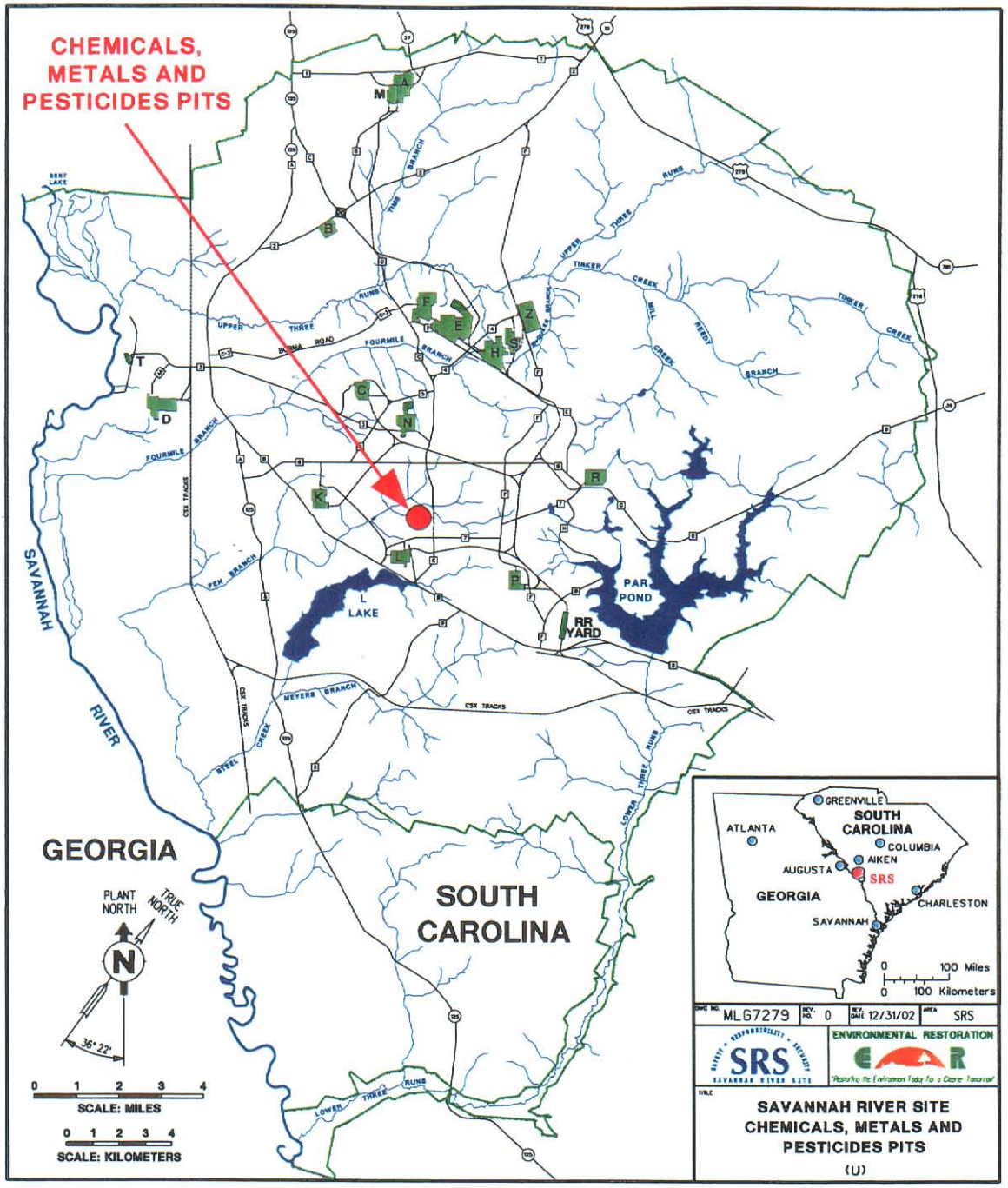


Figure 1. Location of the CMP Pits OU at SRS

The ballast area surface soil and the pit area perimeter surface soil near the ballast area were found to be contaminated with similar contaminants. Because of this circumstance, the pit area perimeter surface soil contamination is considered a single area of contamination primarily associated with the ballast area. The two areas are referred to as the "ballast area."

Although the future land use of this area is designated as a residential use area, its proximity to other industrial areas and its location at the site interior at considerable distance from any site boundaries further supports consideration of future industrial use of this area. The CMP Pits were used to dispose of waste (chemicals, metals, and pesticides) and it is unlikely that the area will support unrestricted land use. Remedial goals were developed based on the industrial worker because it is unlikely that the land will be available for unrestricted use.

The CMP Pits were placed in operation in August 1971. Formal disposal records were not maintained so the volume and content of the wastes disposed in some of the pits were not recorded. The pits were designated to receive pesticides, chemicals and metals. There is evidence that fluorescent light ballasts containing polychlorinated biphenyls (PCBs) were disposed during April 1979. Partial disposal records for these pits indicate disposal of trichloroethylene (TCE), tetrachloroethylene (PCE), lighting ballasts and pesticides. Operations ceased and the pits were backfilled in December 1979.

Groundwater monitoring indicated the presence of TCE and PCE in the water table in 1981. Soil samples taken during the installation of additional monitoring wells indicated that soils adjacent to the unit were also contaminated with volatile organic compounds to a depth of approximately 65 feet. SRS initiated a remedial action in 1984 with the concurrence of South Carolina Department of Health and Environmental Control (SCDHEC) and excavated the contents of all of the pits. Pesticides and drums of buried chemicals were removed from the CMP Pits OU.

Contaminated soil was excavated until total VOC concentrations were less than 100 mg/kg and pesticide concentrations were less than 25 mg/kg. However, elevated levels of some constituents remain at the CMP Pits OU. Soil, drums and other containers removed were managed consistent with existing regulations and subsequently identified as Resource Conservation and Recovery Act (RCRA)-listed wastes (F, D, P and U codes).

The pits were backfilled with clean soil that was compacted to approximately 4 feet below the existing ground surface. A low infiltration cap consisting of 80-mil high-density polyethylene was installed and covered with approximately 3 feet of clean soil fill and 1 foot of topsoil. A 1- to 2- foot drainage ditch outside of the capped area was excavated around the entire OU and lined with gravel. Following completion of the drainage ditch, the OU was seeded. The CMP Pits OU early closure was not formally performed under any regulatory program; however, SCDHEC inspections occurred routinely throughout the entire closure.

The ballast area originally contained lighting ballasts that were removed during the characterization activities in 1995. The contamination in this area is thought to be related to the 1984 drum and soil excavation at the pits. Specifically, it is believed that the soil contamination relates directly to excavated soils that were misapplied to this area as if it were clean fill. The lighting ballasts observed at or near the surface were removed from the area and disposed of as potential PCB-contaminated waste material in keeping with all applicable federal, state and local government regulations and guidelines.

In 1996, a maintenance activity was undertaken by SRS in the ballast area to minimize erosion of surface soil by stormwater runoff. Approximately 6 inches of clean soil was spread over the entire ballast area, perimeter drainage was channeled to drainage pipes placed in the former gullies, and erosion control stabilization measures (riprap, reseeding, and erosion protection fabric) were applied to the ground surface.

Characterization and assessment performed in support of the Baseline Risk Assessment indicated that exposure to soil erosion (gully area) did not result in exposure of human health or ecological receptors above acceptable levels. Table 1 summarizes the total media human health risk/hazard index and total cumulative risk for each exposure group for the various land uses.

- There are no primary soil contaminants of concern (COCs) identified for the industrial worker.

- The ballast area surface soil and the pit area perimeter surface soil near the ballast area were found to be contaminated with similar contaminants.

Table 1. Operable Unit Total Media Risk/Hazard Index*

Exposure Group	Land Use	Total Media Risk/Hazard Index			Total Cumulative Risk
		Soil	Produce	Groundwater	
Ballast Area	Current Worker	Risk – 1E-05	NA	NA	1E-05
	Future Resident	HI – 0.8	HI – 2	HI – 0.6	
		Risk – 6E-05	Risk – 2E-04	Risk – 5E-05	3E-04
	Future Worker	Risk – 1E-05	NA	Risk – 1E-05	2E-05
Pits Area (area adjacent to ballast area)	Future Resident	HI – 0.9	HI– 9	HI– 0.6	
		Risk – 5E-05	Risk – 1E-03	Risk – 5E-05	1E-03
	Future Worker	Risk – 1E-05	NA	Risk – 1E-05	2E-05

* HI – Hazard Index

- The ballast area has been shown to have potential produce ingestion risks above 1 x 10^{-4} for the hypothetical future resident.

- The vadose zone poses a threat to groundwater quality because of potential leaching from soil to groundwater, resulting in groundwater concentrations exceeding maximum contaminant levels (MCLs). Primary contributors to this pathway are VOCs (i.e., dichloromethane (DCM), PCE, and TCE). These

constituents have been identified as the only contaminant migration COCs in the soil.

- The final ecological COCs in the ballast area soil are dichlorodiphenyldichloroethane (DDD), dichlorodiphenyldichloroethylene (DDE), dichlorodiphenyltrichloroethane (DDT), dieldrin, endrin, and aroclor-1248. These COCs may impact the environment for both soil-dwelling and non-soil-dwelling ecological receptors.

- Due to the nature of the soil contamination, it is anticipated that the CMP Pits OU area will be a limited-use area with restrictions. Although the CMP Pits OU area is located outside of an Industrial use zone defined by Figure 3-3 of the Federal Facility Agreement (FFA) Implementation Plan (FIP), recommended remedial goals (RGs) are based upon being protective of the industrial worker. Figure 1 illustrates the relationship between the CMP Pits OU area and the other reactor areas designated as future heavy industrial (nuclear) areas. Although, this area has not been designated a future industrial use area, its proximity to other industrial areas and its location at the site interior at considerable distance from any site boundaries further supports consideration of future industrial use of this area.

A review of the contamination present within the soils and groundwater at the CMP Pits OU indicates that the wastes represent principal source threats due to the high concentrations of contaminants. The ballast area, vadose zone and groundwater hot spot contamination can be categorized as follows.

- High concentrations of PCB (aroclor-1248) and pesticides (DDD, DDE, and DDT) represent a principal source threat in the ballast area. Maximum concentrations of aroclor-1248 (15,300 µg/kg), DDD (1,870 µg/kg), DDE (1,340 µg/kg), and DDT (115,000 µg/kg) significantly exceed the recommended RGs (Table 2).

- High concentrations of DCM (296,000 µg/kg), PCE (6,980,000 µg/kg), and TCE (31,000 µg/kg) in the vadose zone represent a principal source threat.

- High concentrations of DCM (560 µg/L), PCE (6,950 µg/L), and TCE (1,600 µg/L) in the aquifer sediments within the groundwater hot spot area represent a principal source threat.

IV. Remedial Actions

Ballast Area (Interim Action)

The ballast area interim remedial action objective (RAO) is as follows:

- Prevent direct contact with PCB and pesticides contaminated surface soils, such that the COCs are not a continued significant risk to human health or the ecology. The RGs for removal of these soils are 1 mg/kg aroclor-1248, 490 µg/kg heptachlor, 50 µg/kg dieldrin, 60 µg/kg endrin, 10 µg/kg DDD, 20 µg/kg DDE, and 60 µg/kg DDT. The RGs requiring Land Use Controls are 180 µg/kg heptachlor and 47 µg/kg dieldrin.

The ballast area interim remedial action is as follows:

- Excavate the ballast area soils, dispose offsite, and backfill to grade

Approximately 256 yd^3 of contaminated soil have been excavated. The following conditions led to an amended interim ROD:

Forty yd^3 of the excavated soil have been found to contain Silvex (a herbicide). Currently no treatment and disposal facilities in the United States can accept Silvex. In addition, Silvex has been detected in ballast area soils that were slated for excavation. Excavation has stopped until a final disposition for the soils can be identified.

- Data collected to support the excavation work indicate that the total volume of contaminated soil is in excess of 4000 yd^3. This is significantly greater than originally estimated.

The amended ROD proposed the following change:

- Eliminate further action as part of the interim remedial action. Evaluate technologies for on-unit treatment in a feasibility study and propose an alternative remedial action for the contaminated soils as part of the final action.

Vadose Zone (Interim Action)

The vadose zone interim RAOs are as follows:

- Treat the vadose zone soils beneath the pits where the combined PCE and TCE concentrations exceed 2,000 µg/kg, with active treatment techniques as long as effective, with an overall objective to reduce the potential migration of solvents to the water table that result in contamination concentrations exceeding the MCL.

- Continue to provide infiltration control with a cover system in the vadose zone treatment area, to reduce the potential migration of solvents from the vadose zone to the water table.

The vadose zone interim remedial actions are as follows:

- Installation of an soil vapor extraction (SVE) remediation system to remove VOCs from the vadose zone is nearly complete. Startup of the system is planned for 2001.

- Installation of an SVE remediation system to remove VOCs from the vadose zone is complete. The system is in operation. The following conditions led to an amended IAROD.

Data collected to support the installation of the SVE system indicates dense non-aqueous phase liquids (DNAPLs) may be present. More characterization is needed.

The amended ROD proposed the following change:

- Eliminate installation of an asphalt cover as part of the interim action to allow further characterization work in the pit area. Proceed with the operation of the SVE system and evaluate additional remedies, such as a cover system, as part of the final action.

Groundwater Hot Spot (Interim Action)

The groundwater hot spot interim RAO is as follows:

- Treat the water table in the vicinity of the pits, within the 1,000 µg/L total VOC isoconcentration contour, with an objective to reduce concentrations and control migration of VOCs within the 1,000 µg/L contour.

The groundwater hot spot remedial actions are as follows:

- Conduct SVE in the vadose zone and install asphalt cover to provide infiltration control

- Conduct air sparging (AS) in the groundwater hot spot with SVE

The SVE portion of the remedial system has been installed. The following conditions led to an amended interim ROD:

The water table in the vicinity of the CMP Pits OU has dropped significantly (over ten feet in some locations) since the characterization of the site and the selection of the interim remedy. The combination of decreased water levels and the presence of a low permeability clay layer make it infeasible to air sparge. However, SVE well screens have been installed into the portion of the vadose zone that was previously saturated. This will allow any residual contamination that was stranded in this zone by the falling water table to be addressed by SVE.

Data collected to support the installation of the SVE system indicates that the hot spot plume is larger and deeper than originally thought. More characterization is needed to fully define the plume.

The amended ROD proposed the following change:

- Eliminate AS as part of the Interim Action. Complete characterization of the groundwater plume. Evaluate alternatives for groundwater remediation as part of a feasibility study. Propose a remedy as part of the OU final action.

Due to the drop in the water level, groundwater monitoring and remediation are deferred to the final remedy.

V. Progress Since Last Review

No recommendations or follow-up actions have been identified.

VI. Five-Year Review Process

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

- Reviewed the documents listed in Attachment 1

- Confirmed implementation of the remedial action

- Inspected the unit to confirm protectiveness of the remedial action

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

VII. Technical Assessment

- The remedies selected in the IAROD are not functioning as intended. Excavation of contaminated soil in the ballast area soil was not completed due to the presence of Silvex that prevented treatment (incineration). Air sparging in the groundwater was not implemented due to the combination of a decreased water level (over ten feet in some locations) and the presence of a low permeability clay layer, which makes it unfeasible to air sparge.

- The exposure assumptions, toxicity data, cleanup levels, and remedial action objectives used at the time of remedy selection are still valid.

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

VIII. Issues

Table 7. Issues Affecting the Current or Future Protectiveness

Issues	Affects Current Protectiveness (Y/N)	Affects Future Protectiveness (Y/N)
1. Presence of Silvex in contaminated ballast area soil	Y	Y
2. Presence of DNAPL in the vadose zone	Y	Y
3. Decrease in water level to below low permeability clay layer	Y	Y

IX. Recommendations and Follow-up Actions

Table 8. Recommendations and Follow-up Actions

Issue	Recommendations and Follow-up Actions	Party Responsible	Oversight Agency	Milestone Date	Affects Protectiveness (Y/N)	
					Current	Future
1	Identify alternative ballast area soil remedial actions	USDOE	USEPA, SCDHEC	IAROD public comment period ends 11/10/01	Y	Y
2	Investigate vadose zone for presence of DNAPL	USDOE	USEPA, SCDHEC	Final ROD	Y	Y
3	Identify alternative groundwater remedial actions	USDOE	USEPA, SCDHEC	Final ROD	Y	Y

X. Protectiveness Statement(s)

The interim action is not fully protective of human health and the environment because soil contaminated with PCBs and Silvex will remain on site, the groundwater will not meet MCLs after completion of the SVE operation, and land use controls through a LUCIP will not be achieved until a final ROD is issued. In the interim, exposure pathways that could lead to unacceptable risk are being controlled through institutional controls. Institutional controls include: (1) physical access controls to prevent unauthorized entry to SRS (fences, guards, security patrols, etc.); (2) administrative controls that maintain this site for industrial use only (SRS is a secured government facility with land use restrictions); and (3) warning signs and land use controls (SRS Site Use/Site Clearance Program). Upon issuance of the final ROD, this interim measure will become part of a total remedial action, which is expected to be protective of human health and the environment.

The following actions need to be taken 1) perform feasibility study to identify remedial alternatives that will ensure protectiveness of human health and the environment and 2) perform final action.

XI. Next Review

The next five-year review is scheduled for June 30, 2007.

Attachment 1

List of Documents Reviewed

WSRC, 1999. *Interim Record of Decision for the Chemicals, Metals and Pesticides (CMP) Pits (080-170G, 080-171G, 080-180G, 080-181G, 080-182G, 080-183G, 080-190G), (U)*, WRSC-RP-98-4192, Revision 1.1, August, Westinghouse Savannah River Company, Aiken, SC

WSRC, 2001. *Interim Record of Decision Amendment for the Chemicals, Metals, and Pesticides Pits (080-170G, 080-171G, 080-180G, 080-181G, 080-182G, 080-183G, 080-190G)*, WSRC-RP-2000-4158, Redline Revision 1.1, July, Westinghouse Savannah River Company, Aiken, SC

Five-Year Review Site Inspection Checklist

I. SITE INFORMATION	
Site Name: Chemicals, Metals, and Pesticides Pit	**Date of Inspection: 10/29/01**
Location and Region: SRS, USEPA Region IV	**EPA ID: 24**
Agency, office, or company leading the five-year review: USDOE	**Weather/temperature: Clear ~62°F**

Remedy Includes: (Check all that apply)

- ☐ Landfill cover/containment
- ☐ Access controls
- ☒ Institutional Controls
- ☐ Groundwater pump and treatment
- ☐ Surface water collection and treatment
- ☒ Other soil vapor extraction (SVE)
- ☐ Monitored Natural Attenuation
- ☐ Groundwater Containment
- ☐ Vertical Barrier Walls

Attachments: ☐ Inspection team roster attached ☐ Site map attached

II. INTERVIEWS (Check all that apply)

1. **O & M site manager** _____ _____ _____
   Name Title Date
   Interviewed ☐ at site ☐ at office ☐ by phone Phone No. _____
   Problems, suggestions; ☐ report attached _____

2. **O & M staff** _____ _____ _____
   Name Title Date
   Interviewed ☐ at site ☐ at office ☐ by phone Phone No. _____
   Problems, suggestions; ☐ report attached _____

3. **Local regulatory authorities and response agencies** (i.e., State and tribal offices, emergency response office, police department, office of public health or environmental health, zoning office, recorder of deeds, or other city and county offices, etc.) Fill in all that apply.

Agency _____

Contact _____ _____ _____ _____

Name Title Date Phone No.

Problems; suggestions; ☐ Report attached _____

_____

Agency _____

Contact _____ _____ _____ _____

Name Title Date Phone No.

Problems; suggestions; ☐ Report attached _____

_____

Agency _____

Contact _____ _____ _____ _____

Name Title Date Phone No.

Problems; suggestions; ☐ Report attached _____

_____

4. **Other interviews** (optional) ☐ Report attached _____

III. ONSITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)

1. ***O & M Documents***

☐ O & M Manual	☐ Readily available	☐ Up to date	☒ N/A
☐ As-built drawings	☐ Readily available	☐ Up to date	☒ N/A
☐ Maintenance Logs	☐ Readily available	☐ Up to date	☒ N/A

Remarks_____

2. **Site-Specific Health and Safety Plan** ☒ Readily available ☒ Up to date ☐ N/A

☐ Contingency plan/emergency response plan ☐ Readily available ☐ Up to date ☒ N/A

Remarks_____

3. **O & M and OSHA Training Records** ☐ Readily available ☐ Up to date ☒ N/A

Remarks_____

4. **Permits and Service Agreements**

☒ Air discharge permit	☒ Readily available	☒ Up to date	☐ N/A
☐ Effluent discharge	☐ Readily available	☐ Up to date	☒ N/A
☐ Waste Disposal, POTW	☐ Readily available	☐ Up to date	☒ N/A
☒ Other permits	☒ Readily available	☒ Up to date	☐ N/A

Remarks UIC Permit #1483, Grading Permit 99-12-G-9

5. **Gas Generation Records** ☐ Readily available ☐ Up to date ☒ N/A

Remarks_____

6. **Settlement Monument Records** ☐ Readily available ☐ Up to date ☒ N/A

Remarks_____

7. **Groundwater Monitoring Records** ☐ Readily available ☐ Up to date ☒ N/A

Remarks_____

8. **Leachate Extraction Records** ☐ Readily available ☐ Up to date ☒ N/A

Remarks_____

_____

9. **Discharge Compliance Records**

☐ Air ☐ Readily available ☐ Up to date ☒ N/A

☐ Water (effluent) ☐ Readily available ☐ Up to date ☒ N/A

Remarks_____

_____

10. **Daily Access/Security Logs** ☐ Readily available ☐ Up to date ☒ N/A

Remarks_____

_____

IV. O & M Costs

1. **O & M Organization**

☐ State in-house ☐ Contractor for State

☐ PRP in-house ☐ Contractor for PRP

☐ Other_____

_____

2. **O & M Cost Records**

☐ Readily available ☐ Up to date

☐ Funding mechanism/agreement in place

☐ Other_____

_____

Total annual cost by year for review period if available

From_____ To_____ _____ ☐ Breakdown attached
Date Date Total cost

From_____ To_____ _____ ☐ Breakdown attached
Date Date Total cost

From_____ To_____ _____ ☐ Breakdown attached
Date Date Total cost

From_____ To_____ _____ ☐ Breakdown attached
Date Date Total cost

From_____ To_____ _____ ☐ Breakdown attached
Date Date Total cost

1. ***Unanticipated or Unusually High O & M Costs During Review Period***

Describe costs and reasons: _____

_____

_____

_____

_____

V. ACCESS AND INSTITUTIONAL CONTROLS ☒ Applicable ☐ N/A

A. Fencing

1. **Fencing Damaged** ☐ Location shown on site map ☐ Gates secured ☒ N/A

Remarks_____

_____

B. Other Access Restrictions

1. **Signs and other security measures** ☐ Location shown on site map ☒ N/A

Remarks_____

_____

C. Institutional Controls

1. Implementation and enforcement

Site conditions imply ICs not properly implemented ☐ Yes ☒ No ☐ N/A

Site conditions imply ICs not being fully enforced ☐ Yes ☒ No ☐ N/A

Type of monitoring (e.g., self-reporting, drive-by) Inspection (to start after remediation is completed)

Frequency semi-annual

Responsible party/agent WSRC

Contact	Michael Redd	Manager ER Maintenance	10/29/01	952-6882
	Name	Title	Date	Phone No.

Report is up-to-date ☐ Yes ☐ No ☐ N/A

Reports are verified by the lead agency ☐ Yes ☐ No ☐ N/A

Specific requirements in deed of decision documents have been met ☐ Yes ☐ No ☐ N/A

Violations have been reported ☐ Yes ☐ No ☒ N/A

Other problems or suggestions: ☐ Report attached

Inspection data sheet attached

_____

_____

_____

2. Adequacy ☐ ICs are adequate ☐ ICs are inadequate ☒ N/A

Remarks Unit is in remediation.

_____

D. **General**

1. **Vandalism/trespassing** ☐ Location shown on site map ☒ No vandalism evident

Remarks_____

2. **Land use changes onsite** ☒ N/A

Remarks_____

3. **Land use changes offsite** ☒ N/A

Remarks_____

VI. GENERAL SITE CONDITIONS

A. **Roads** ☒ Applicable ☐ N/A

1. **Roads damaged** ☐ Location shown on site map ☒ Roads adequate ☐ N/A

Remarks_____

B. **Other site Conditions**

Remarks_____

VII. LANDFILL COVERS ☒ Applicable ☐ N/A

A. **Landfill Surface**

1. **Settlement** (Low spots) ☐ Location shown on site map ☒ Settlement not evident

Areal extent_____ Depth_____

Remarks_____

2. **Cracks** ☐ Location shown on site map ☒ Cracking not evident

Lengths_____ Widths_____ Depths_____

Remarks_____

3. **Erosion** ☐ Location shown on site map ☒ Erosion not evident

Areal extent_____ Depth_____

Remarks_____

_____

4. **Holes** ☐ Location shown on site map ☒ Holes not evident

Areal extent_____ Depth_____

Remarks_____

_____

5. **Vegetative Cover** ☐ Grass ☒ Cover properly established ☒ No signs of stress

☐ Trees/shrubs (indicate size and location on a diagram)

Remarks_____

_____

6. **Alternative Cover (armored rock, concrete, etc.)** ☒ N/A

Remarks_____

_____

7. **Bulges** ☐ Location shown on site map ☒ Bulges not evident

Areal extent_____ Height_____

Remarks_____

_____

8. **Wet Areas/Water Damage** ☒ Wet areas/water damage not evident

☐ Wet Areas ☐ Location shown on site map Areal extent_____

☐ Ponding ☐ Location shown on site map Areal extent_____

☐ Seeps ☐ Location shown on site map Areal extent_____

☐ Soft subgrade ☐ Location shown on site map Areal extent_____

Remarks_____

_____

9. **Slope Instability** ☐ Slides ☐ Location shown on site map ☒ No evidence of slope instability

Areal extent_____

Remarks_____

_____

B. Benches ☐ Applicable ☒ N/A

(Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)

1. **Flows Bypass Bench** ☐ Location shown on site map ☐ N/A or okay

   Remarks_____

2. **Bench Breached** ☐ Location shown on site map ☐ N/A or okay

   Remarks_____

3. **Bench Overtopped** ☐ Location shown on site map ☐ N/A or okay

   Remarks_____

C. Letdown Channels ☐ Applicable ☒ N/A

(Channel lined with erosion control mates, riprap, grout bags, or gabions that descend down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)

1. **Settlement** ☐ Location shown on site map ☐ No evidence of settlement

   Areal extent_____ Depth_____

   Remarks_____

2. **Material Degradation** ☐ Location shown on site map ☐ No evidence of degradation

   Material type_____ Areal extent _____

   Remarks_____

3. **Erosion** ☐ Location shown on site map ☐ No evidence of erosion

   Areal extent _____ Depth_____

   Remarks_____

4. **Undercutting** ☐ Location shown on site map ☐ No evidence of undercutting

Areal extent _____ Depth_____

Remarks_____

_____

5. **Obstructions** Type_____ ☐ No obstructions

☐ Location shown on site map Areal extent _____

Size _____

Remarks_____

_____

6. **Excessive Vegetative Growth** Type_____

☐ No evidence of excessive growth

☐ Vegetation in channels does not obstruct flow

☐ Location shown on site map Areal extent _____

Remarks_____

_____

D. Cover Penetrations ☐ Applicable ☒ N/A

1. **Gas Vents** ☐ Active ☐ Passive

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A

Remarks_____

_____

2. **Gas Monitoring Probes**

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A

Remarks_____

_____

3. **Monitoring Wells** (within surface area of landfill)

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A

Remarks_____

_____

4. **Leachate Extraction Wells**

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A

Remarks_____

_____

5. **Settlement Monuments** ☐ Located ☐ Routinely surveyed ☐ N/A

Remarks_____

_____

E. Gas Collection and Treatment ☒ Applicable ☐ N/A

1. **Gas Treatment Facilities**

☐ Flaring ☐ Thermal destruction ☐ Collection for reuse

☒ Good condition ☐ Needs Maintenance

Remarks_____

_____

2. **Gas Collection Wells, Manifolds and Piping**

☒ Good condition ☐ Needs Maintenance

Remarks_____

_____

3. **Gas Monitoring Facilities** (e.g., gas monitoring of adjacent homes or buildings)

☐ Good condition ☐ Needs Maintenance ☒ N/A

Remarks_____

_____

F. **Cover Drainage Layer**	☐ Applicable	☒ N/A
1. **Outlet Pipes Inspected**	☐ Functioning	☐ N/A
Remarks_____		
2. **Outlet Rock Inspected**	☐ Functioning	☐ N/A
Remarks_____		

G. Detention/sedimentation Ponds ☐ Applicable ☒ N/A

1. **Siltation** Areal extent_____ Depth_____ ☒ N/A

   ☐ Siltation not evident

   Remarks_____

2. **Erosion** Areal extent_____ Depth_____ ☒ N/A

   ☐ Erosion not evident

   Remarks_____

3. **Outlet Works** ☐ Functioning ☐ N/A

   Remarks_____

4. **Dam** ☐ Functioning ☐ N/A

   Remarks_____

H. Retaining Walls ☐ Applicable ☒ N/A

1. **Deformations** ☐ Location shown on site map ☐ Deformation not evident

   Horizontal displacement_____ Vertical displacement_____

   Rotational displacement_____

   Remarks_____

2. **Degradation** ☐ Location shown on site map ☐ Deformation not evident

   Remarks_____

I. Perimeter Ditches/Off-Site Discharge ☒ Applicable ☐ N/A

1. **Siltation** ☐ Location shown on site map ☐ Siltation not evident

   Areal extent_____ Depth_____

   Remarks_____

2. **Vegetative Growth** ☐ Location shown on site map ☒ Siltation not evident

☒ Vegetation does not impede flow

Areal extent_____ Type_____

Remarks_____

_____

3. **Erosion** ☐ Location shown on site map ☒ Erosion not evident

Areal extent_____ Depth_____

Remarks_____

_____

4. **Discharge Structure** ☐ Location shown on site map ☒ N/A

Remarks_____

_____

VIII. VERTICAL BARRIER WALLS ☐ Applicable ☒ N/A

1. **Settlement** ☐ Location shown on site map ☐ Settlement not evident

Areal extent_____ Depth_____

Remarks_____

_____

2. **Performance Monitoring** Type of Monitoring_____

☐ Performance not monitored

Frequency_____ ☐ Evidence of breaching

Head differential_____

Remarks_____

_____

IX. GROUNDWATER/SURFACE WATER REMEDIES ☒ Applicable ☐ N/A

A. Groundwater Extraction Wells, Pumps, and Pipelines ☒ Applicable ☐ N/A

1. **Pumps, Wellhead Plumbing, and Electrical**

☒ Good condition ☐ All required wells located ☐ Needs Maintenance ☐ N/A

Remarks_____

2. **Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances**

☒ Good condition ☐ Needs Maintenance

Remarks_____

3. **Spare Parts and Equipment**

☒ Readily available ☐ Good condition ☐ Requires upgrade ☐ Needs to be provided

Remarks_____

B. Surface Water Collection Structures, Pumps, and Pipelines ☐ Applicable ☒ N/A

1. **Collection Structures, Pumps, and Electrical**

☐ Good condition ☐ Needs Maintenance

Remarks_____

2. **Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances**

☐ Good condition ☐ Needs Maintenance

Remarks_____

3. **Spare Parts and Equipment**

☐ Readily available ☐ Good condition ☐ Requires upgrade ☐ Needs to be provided

Remarks_____

C. Treatment System ☒ Applicable ☐ N/A

1. **Treatment Train** (Check components that apply)

☐ Metals removal ☐ Oil/water separation ☐ Bioremediation

☒ Air stripping ☐ Carbon adsorbers

☐ Filters_____

☐ Additive (e.g., chelation agent, flocculent)_____

☐ Others_____

☐ Good condition ☐ Needs Maintenance

☐ Sampling ports properly marked and functional

☐ Sampling/maintenance log displayed and up to date

☐ Equipment properly identified

☐ Quantity of groundwater treated annually_____

☐ Quantity of surface water treated annually_____

Remarks_____

_____

2. **Electrical Enclosures and Panels** (properly rated and functional)

☐ N/A ☒ Good condition ☐ Needs Maintenance

Remarks_____

_____

3. **Tanks, Vaults, Storage Vessels**

☒ N/A ☐ Good condition ☐ Proper secondary containment ☐ Needs Maintenance

Remarks_____

_____

4. **Discharge Structure and Appurtenances**

☒ N/A ☐ Good condition ☐ Needs Maintenance

Remarks_____

_____

5. **Treatment Building(s)**

☒ N/A ☐ Good condition (esp. roof and doorways) ☐ Needs repair

☐ Chemicals and equipment properly stored

Remarks_____

_____

6. **Monitoring Wells** (pump and treatment remedy)

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ All required wells located ☐ Needs Maintenance ☒ N/A

Remarks_____

_____

D. Monitoring Data ☐ Applicable ☒ N/A

1. Monitoring Data

☐ Is routinely submitted on time ☐ Is of acceptable quality

2 Monitoring data suggests:

☐ Groundwater plume is effectively contained ☐ Contaminant concentrations are declining

E. Monitored Natural Attenuation ☐ Applicable ☒ N/A

1. **Monitoring Wells** (Natural attenuation remedy)

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ All required wells located ☐ Needs Maintenance ☒ N/A

Remarks_____

_____

X. OTHER REMEDIES

If there are remedies applied at the site, which are not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.

XI. OVERALL OBSERVATIONS

A. Implementation of the Remedy

Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emissions, etc.).

The interim action (SVE) is proceeding.

B. Adequacy of O & M

Describe issues and observations related to the implementation and scope of O & M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy.

C. Early Indicators of Potential Remedy Failure

Describe issues and observations such as unexpected changes in the cost or scope of O & M or a high frequency of unscheduled repairs that suggest that the protectiveness of the remedy may be compromised in the future.

D. Opportunities for Optimization

Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy.

D-Area Burning/Rubble Pits (431-D And 431-1D) Operable Unit

I. Introduction

This is the second five-year review for the D-Area Burning/Rubble Pits (DBRP) (431-D and 431-1D) Operable Unit (OU). This review was conducted from August 2001 through September 2001. This report documents the results of the review.

II. OU Chronology

Table 1 lists the chronology of site events for the DBRP OU.

Table 1. Chronology of OU Events

Event	Date
RFI/RI start	1993
ROD issuance	April 22, 1997
RA start	May 12, 1998
Previous Five-Year Reviews	June 30, 1997

Key:

Consent Decree – Date a consent decree (enforcement document from the court system) was issued for the operable unit.

Corrective Action start – Date the corrective (remedial) action was initiated (under RCRA).

ESD Issuance - Date all three parties (USDOE, USEPA, and SCDHEC) signed the Explanation of Significant Difference used to significantly modify the remedy selected in the Record of Decision.

Final or Interim ROD issuance – Date the three parties (USDOE, USEPA, and SCDHEC) signed the Record of Decision.

Federal Facility Agreement Declared Effective - Date the Federal Facility Agreement formalized the integration of CERCLA and RCRA in remediation activities at SRS.

NPL listing – Date the entire SRS was added to EPA's National Priorities List.

Previous Five-Year Reviews – Date of any previous five year reviews of remedy for the operable unit.

RCRA Closure Certified – Date the three parties (USDOE, USEPA, and SCDHEC) certified that the operable unit had been remediated and closed under the Resource Conservation and Recovery Act.

RCRA Closure Plan Approved – Date the three parties (USDOE, USEPA, and SCDHEC) approved the closure plan for the operable unit under Resource Conservation and Recovery Act.

Remedial Action start/complete – Date the remedial action (final or interim) was initiated/completed (under CERCLA).

Removal Action – Date contaminated media was removed from the operable unit (not associated with the ROD).

RFI/RI start/complete - Date the remedial investigation (sampling) was initiated/completed for the operable unit.

ROD Amendment Issuance - Date the three parties (USDOE, USEPA, and SCDHEC) signed the Record of Decision Amendment used to change the remedy selected in the original Record of Decision.

III. Background

The DBRP OU is located in the western part of the Savannah River Site (SRS) in Barnwell County, approximately 3,000 feet east of the Savannah River and 1.6 miles west of state Highway 125 (Figure 1) in D Area. The topography of the unit is flat with a surface elevation of 130 feet above mean sea level (msl) and 45 feet above the Savannah River. The water table is approximately 10 feet below ground surface in the area of the unit. Surface drainage is to the west-southwest toward a nearby ephemeral tributary of the Savannah River.

The OU consists of two contiguous waste pits designated as 431-D and 431-1D, which cover a total area of 0.54 acre. Approximate dimensions of 431-D are 257 x 46 x 10 feet, and the dimensions of 431-1D are 229 x 36 x 10 feet. The two pits are separated by a 150-foot wide berm of undisturbed soil. The pits have been backfilled with soil, and vegetation has been established on the resulting surface. The pit cover is raised above the surrounding terrain to enhance drainage.

Between 1951 and 1973, burning pits were used at SRS to burn various hazardous and non-hazardous waste. The disposed waste's chemical composition and volumes are unknown. Combustible materials (paper, plastics, wood, rubber, rags, cardboard, oil, degreasers, and spent organic solvents) were burned monthly and no known or suspected radioactive materials were allowed in the burning pits. In October 1973, burning of the waste was discontinued. A layer of soil was placed over the residue in the pits and afterwards the pits were used as rubble pits. In 1983, a 1 to 3 foot layer of clayey soil was placed over the contents and the surface was compacted and mounded above the surrounding terrain. Vegetation was established to reduce erosion.

Soils and groundwater were investigated in two phases of sampling between 1989 and 1993. A Remedial Investigation (RI) Report and baseline risk assessment (BRA) were completed in 1998. The soils analytical data indicate that little or no contamination of the soil outside of the OU has taken place. In the BRA, the

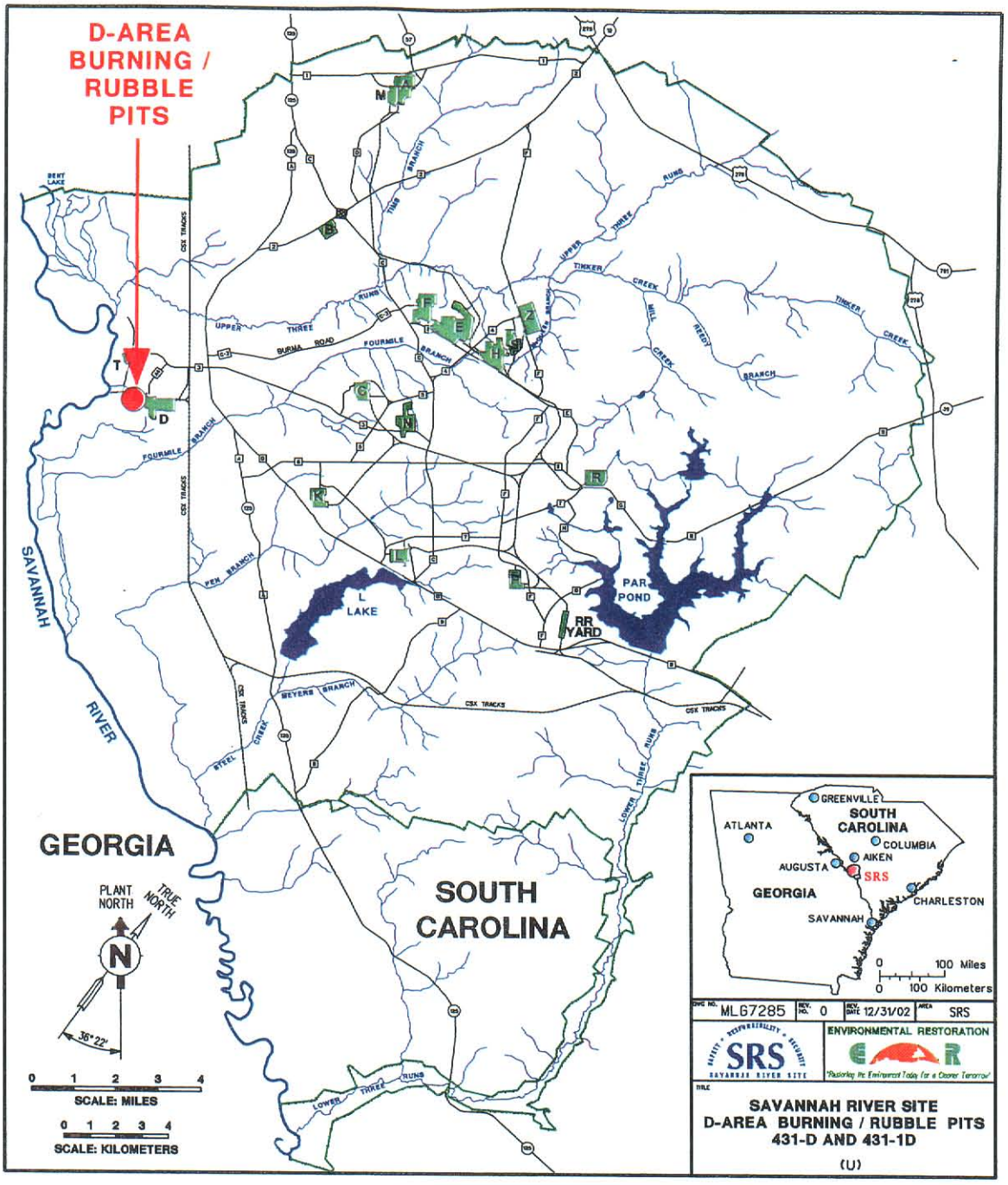


Figure 1. Location of the D-Area Burning/Rubble Pits (431-D and 431-1D) OU

analytical data from the 1993 soil samples identified the following constituents of concern (COCs): arsenic, benzo (a) pyrene, chromium, manganese, octachlorodibenzo-p-dioxin, aroclor-1260 [a polychlorinated biphenyl (PCB)] and total alpha-emitting radium. Aroclor-1260 is the primary risk driver, contributing to a carcinogenic risk of 1×10^{-5} to a future resident ingesting soil. The maximum concentration of 3.39 mg/kg is also greater than the toxic substance control value of 1 mg/kg established for high occupancy areas. The current and future anticipated land use for this OU is industrial.

Soil-to-groundwater modeling indicated that the COCs may migrate to groundwater in the future and pose risks to someone using the groundwater. However, the modeling was conservative, and more of these constituents have been detected in groundwater due to the fact that they have very low solubility in aqueous systems and tend to be strongly adsorbed to clays and humates in the soil.

Groundwater monitoring data indicate that no significant release of hazardous substances to groundwater from the OU has occurred. Risk evaluation indicates a groundwater ingestion risk of 3.0×10^{-4} for future workers and 1.0×10^{-3} for future residents due to arsenic. However, the level of arsenic found, 44 µg/L, is less than the maximum contaminant level (MCL) of 50 µg/L (note: the MCL for arsenic has recently been changed to 10 µg/L). Arsenic was detected in 1993 at a concentration of 44 µg/L in the groundwater. In 12 subsequent sampling events, arsenic has never been detected. Iron and manganese were detected above secondary MCLs.

While groundwater is included as a subunit for this OU, the water table aquifer in D Area is not used for drinking or hygienic purposes.

IV. Remedial Actions

Remedial action objectives (RAOs) specify unit-specific contaminants, media of concern, potential exposure pathways and remediation goals. The RAOs are based on the nature and extent of contamination, threatened resources and the potential for human and environmental exposure.

The remedial action for the OU is institutional controls with groundwater monitoring. The OU is located in an area that has been recommended for industrial use. Under this land use scenario, the risks to future industrial workers are acceptable ($1x10^{-6}$).

Signs have been posted signifying that this area was used to manage hazardous materials. In adjunction, existing SRS access controls are being used to maintain this area for industrial use only.

If the property is transferred to non-federal ownership for the long-term institutional controls, the U.S. Government will create a deed for the new property owner in accordance with Section 120 (h) of Comprehensive Environmental Response, Compensation and Liability Act (CERCLA). The deed will include disclosing former waste management and disposal activities, results from groundwater monitoring, and remedial actions taken on the site. The deed notification will, indefinitely, notify any potential purchaser that the property has been used for the management and disposal of non-hazardous, inert construction debris and that wastes containing hazardous substances were also managed on the site. The deed will also prevent residential use of the property. The need for deed restrictions may be re-examined at the time of transfer in the event that contamination no longer poses an unacceptable risk under residential use.

A period of confirmatory annual groundwater monitoring will be conducted at the five wells located at the DBRP OU. The samples will be analyzed for the following constituents:

- aroclor-1260
- arsenic
- benzene
- benzo(a)anthracene
- benzo (b)pyrene
- benzo (b)fluoranthene
- benzo (k)fluoranthene
- chromium
- chrysene
- 1,2 -dichloroethane
- dichloromethane
- endrin
- manganese
- octachlorodibenzo-p-dioxin
- total radium
- 1,1,2-trichloroethane
- tritium

The monitoring strategy is discussed in detail in the Corrective Measures Implementation/Remedial Action Report (CMI/RAR). The CMI/RAR outlines the monitoring report submittal schedule and describes the contents of the monitoring reports. As an example, the monitoring reports will consist of data analysis, a summary of conclusions drawn from the data, and any recommendations for modifying the monitoring program.

The DBRP is a source control OU located within the Savannah River Floodplain Swamp Watershed. Within this watershed several source control and groundwater OUs are being evaluated to determine impacts, if any, to associated streams and wetlands. The action for the DBRP OU is a final action. Upon disposition of all source control and groundwater OUs within this watershed, a final, comprehensive ROD for the watershed will be performed.

V. Five-Year Review Process

The following tasks were performed as part of the review:

- Reviewed documents listed in Attachment 1

- Reviewed the groundwater monitoring data

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

VI. Technical Assessment

The conclusions for this review are as follows:

- The institutional control remedy is functioning as intended by the decision documents. Groundwater monitoring results (Attachment 2) indicate that there is a general decreasing trend of concentration for the tested constituents in each of the wells, except for manganese. No results exceeded the primary MCLs of the National Primary Drinking Water Regulations. Manganese exceeded a secondary MCL, which serves only as a guideline for cosmetic and aesthetic effects such as taste, color, and odor.

- The exposure assumptions, toxicity data, cleanup levels, and RAOs used at the time of remedy selection are still valid except for the MCL for arsenic. At the time of ROD issuance, the MCL for arsenic in groundwater was 50 μg/L. This has recently been changed to 10 μg/L.

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

VII. Issues

There are no issues for this OU.

VIII. Recommendations and Follow-up Actions

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

IX. Protectiveness Statement(s)

The remedy is protective of human health and the environment. Institutional controls to maintain future industrial land use only are in place. Annual groundwater monitoring has continued to show no exceedances of primary MCLs. The level of manganese has exceeded a secondary MCL which serves only as a guideline for cosmetic and ascetic effects such as color, taste, and odor.

X. Next Review

The next five-year review is scheduled for June 30, 2007.

Attachment 1

Documents Reviewed

WSRC, 1997. *Record of Decision Remedial Alternative Selection for the D-Area Burning/Rubble Pits (431-d and 431-1D) (U)*, WSRC-RP-96-867, Revision 1, February, Westinghouse Savannah River Company, Aiken, SC

WSRC, 1997. *Savannah River Site Five-Year Review of Records of Decision Report (U)*, WSRC-RP-97-403, Revision 0, June, Westinghouse Savannah River Company, Aiken, SC

Attachment 2

Summary of Monitoring Well Sampling for the Second Quarter 2001

Monitoring wells DBP -1, -2, -3, -4 and -5 were sampled in the second quarter of 2001 as per the Final Remediation Report for the D-Area Burning/Rubble Pits. Table A2-1 provides a summary of these results. Over all there is a general decreasing trend in each of the wells. No results exceeded the primary maximum contaminant levels (MCLs) of the National Primary Drinking Water Regulations. However, as in previous years, monitoring wells DBP-2 and DBP-4 downgradient of the D-Area Burning/Rubble Pits exhibited elevated concentrations of manganese that exceeded the secondary MCL. Secondary standards serve only as guidelines for cosmetic and aesthetic effects such as taste, color, and odor. Groundwater quality data for these wells will continue to be monitored to identify trends.

Table A2-1 Monitoring Well Results, DBRP, Second Quarter 2001

STATION ID	DATE	ANALYTE NAME	RQ*	RESULT	RESULT UNITS	MCL
DBP 1	18-May-01	1,1,2-TRICHLOROETHANE	U	1	µg/L	5
DBP 1	18-May-01	ARSENIC	U	5	µg/L	5
DBP 1	18-May-01	BENZENE	U	1	µg/L	5
DBP 1	18-May-01	BENZO(A)ANTHRACENE	U	1	µg/L	
DBP 1	18-May-01	BENZO(A)PYRENE	U	1	µg/L	0.2
DBP 1	18-May-01	BENZO(B)FLUORANTHENE	U	1	µg/L	
DBP 1	18-May-01	BENZO(K)FLUORANTHENE	U	1	µg/L	
DBP 1	18-May-01	CHROMIUM	U	5	µg/L	100
DBP 1	18-May-01	CHRYSENE	U	1	µg/L	
DBP 1	18-May-01	DICHLOROMETHANE (METHYLENE CHLORIDE)	U	5	µg/L	5
DBP 1	18-May-01	ENDRIN	U	0.0396	µg/L	2
DBP 1	18-May-01	MANGANESE		20.7	µg/L	50
DBP 1	18-May-01	OCTACHLORODIBENZO-P-DIOXIN	U	0.01	µg/L	
DBP 1	18-May-01	PCB 1260	U	0.1	µg/L	0.5
DBP 1	18-May-01	RADIUM, TOTAL ALPHA-EMITTING	J	0.308	PCL	5
DBP 1	18-May-01	TRITIUM	U	650	PCL	20,000
DBP 2	18-May-01	1,1,2-TRICHLOROETHANE	U	1	µg/L	5
DBP 2	18-May-01	ARSENIC	U	5	µg/L	5
DBP 2	18-May-01	BENZENE	U	1	µg/L	5
DBP 2	18-May-01	BENZO(A)ANTHRACENE	U	1	µg/L	
DBP 2	18-May-01	BENZO(A)PYRENE	U	1	µg/L	0.2
DBP 2	18-May-01	BENZO(B)FLUORANTHENE	U	1	µg/L	
DBP 2	18-May-01	BENZO(K)FLUORANTHENE	U	1	µg/L	
DBP 2	18-May-01	CHROMIUM	U	5	µg/L	100
DBP 2	18-May-01	CHRYSENE	U	1	µg/L	
DBP 2	18-May-01	DICHLOROMETHANE (METHYLENE CHLORIDE)	U	5	µg/L	5
DBP 2	18-May-01	ENDRIN	U	0.04	µg/L	2
DBP 2	18-May-01	MANGANESE		254	µg/L	50
DBP 2	18-May-01	OCTACHLORODIBENZO-P-DIOXIN	U	0.01	µg/L	
DBP 2	18-May-01	PCB 1260	U	0.1	µg/L	0.5
DBP 2	18-May-01	RADIUM, TOTAL ALPHA-EMITTING		1.3	PCL	5
DBP 2	18-May-01	TRITIUM	J	1250	PCL	20,000
DBP 3	22-May-01	1,1,2-TRICHLOROETHANE	U	1	µg/L	5
DBP 3	22-May-01	ARSENIC	U	5	µg/L	5
DBP 3	22-May-01	BENZENE	U	1	µg/L	5
DBP 3	22-May-01	BENZO(A)ANTHRACENE	U	0.99	µg/L	
DBP 3	22-May-01	BENZO(A)PYRENE	U	0.99	µg/L	0.2
DBP 3	22-May-01	BENZO(B)FLUORANTHENE	U	0.99	µg/L	
DBP 3	22-May-01	BENZO(K)FLUORANTHENE	U	0.99	µg/L	
DBP 3	22-May-01	CHROMIUM	J	1.48	µg/L	100
DBP 3	22-May-01	CHRYSENE	U	0.99	µg/L	
DBP 3	22-May-01	DICHLOROMETHANE (METHYLENE CHLORIDE)	J	1.74	µg/L	5
DBP 3	22-May-01	ENDRIN	U	0.04	µg/L	2
DBP 3	22-May-01	MANGANESE		11	µg/L	50
DBP 3	22-May-01	PCB (AROCLOR-1260)	U	0.1	µg/L	0.5
DBP 3	22-May-01	RADIUM, TOTAL ALPHA-EMITTING	JU	0.424	PCL	5

STATION ID	DATE	ANALYTE NAME	RQ*	RESULT	RESULT UNITS	MCL
DBP 3	22-May-01	RADIUM, TOTAL ALPHA-EMITTING	JU	0.514	PCL	5
DBP 3	22-May-01	TRITIUM	U	342	PCL	20,000
DBP 4	18-May-01	1,1,2-TRICHLOROETHANE	U	1	µg/L	5
DBP 4	18-May-01	1,1,2-TRICHLOROETHANE	U	1	µg/L	5
DBP 4	18-May-01	1,1,2-TRICHLOROETHANE	U	5	µg/L	5
DBP 4	18-May-01	ARSENIC	U	40	µg/L	5
DBP 4	18-May-01	ARSENIC	U	5	µg/L	5
DBP 4	18-May-01	ARSENIC	U	5	µg/L	5
DBP 4	18-May-01	BENZENE	U	1	µg/L	5
DBP 4	18-May-01	BENZENE	U	1	µg/L	5
DBP 4	18-May-01	BENZENE	U	5	µg/L	5
DBP 4	18-May-01	BENZO(A)ANTHRACENE	U	1	µg/L	
DBP 4	18-May-01	BENZO(A)ANTHRACENE	U	1	µg/L	
DBP 4	18-May-01	BENZO(A)ANTHRACENE	U	10.2	µg/L	
DBP 4	18-May-01	BENZO(A)PYRENE	U	1	µg/L	0.2
DBP 4	18-May-01	BENZO(A)PYRENE	U	1	µg/L	0.2
DBP 4	18-May-01	BENZO(A)PYRENE	U	10.2	µg/L	0.2
DBP 4	18-May-01	BENZO(B)FLUORANTHENE	U	1	µg/L	
DBP 4	18-May-01	BENZO(B)FLUORANTHENE	U	1	µg/L	
DBP 4	18-May-01	BENZO(B)FLUORANTHENE	U	10.2	µg/L	
DBP 4	18-May-01	BENZO(K)FLUORANTHENE	U	1	µg/L	
DBP 4	18-May-01	BENZO(K)FLUORANTHENE	U	1	µg/L	
DBP 4	18-May-01	BENZO(K)FLUORANTHENE	U	10.2	µg/L	
DBP 4	18-May-01	CHROMIUM	JU	0.7	µg/L	100
DBP 4	18-May-01	CHROMIUM	U	5	µg/L	100
DBP 4	18-May-01	CHROMIUM	U	5	µg/L	100
DBP 4	18-May-01	CHRYSENE	U	1	µg/L	
DBP 4	18-May-01	CHRYSENE	U	1	µg/L	
DBP 4	18-May-01	CHRYSENE	U	10.2	µg/L	
DBP 4	18-May-01	DICHLOROMETHANE (METHYLENE CHLORIDE)	U	5	µg/L	5
DBP 4	18-May-01	DICHLOROMETHANE (METHYLENE CHLORIDE)	U	5	µg/L	5
DBP 4	18-May-01	DICHLOROMETHANE (METHYLENE CHLORIDE)	U	5	µg/L	5
DBP 4	18-May-01	ENDRIN	U	0.0396	µg/L	2
DBP 4	18-May-01	ENDRIN	U	0.04	µg/L	2
DBP 4	18-May-01	ENDRIN	U	0.102	µg/L	2
DBP 4	18-May-01	ENDRIN	U	0.102	µg/L	2
DBP 4	18-May-01	MANGANESE		399	µg/L	50
DBP 4	18-May-01	MANGANESE		399	µg/L	50
DBP 4	18-May-01	MANGANESE		400	µg/L	50
DBP 4	18-May-01	OCTACHLORODIBENZO-P-DIOXIN	U	0.01	µg/L	
DBP 4	18-May-01	OCTACHLORODIBENZO-P-DIOXIN	U	0.01	µg/L	
DBP 4	18-May-01	OCTACHLORODIBENZO-P-DIOXIN	U	1.6	NGL	
DBP 4	18-May-01	OCTACHLORODIBENZO-P-DIOXIN	U	1.6	NGL	
DBP 4	18-May-01	PCB (AROCLOR 1260)	U	0.1	µg/L	0.5
DBP 4	18-May-01	PCB (AROCLOR 1260)	U	0.1	µg/L	0.5
DBP 4	18-May-01	PCB (AROCLOR 1260)	U	1.02	µg/L	0.5
DBP 4	18-May-01	PCB (AROCLOR 1260)	U	1.02	µg/L	0.5
DBP 4	18-May-01	RADIUM, TOTAL ALPHA-EMITTING		0.789	PCL	5
DBP 4	18-May-01	RADIUM, TOTAL ALPHA-EMITTING		0.833	PCL	5

STATION ID	DATE	ANALYTE NAME	RQ*	RESULT	RESULT UNITS	MCL
DBP 4	18-May-01	TRITIUM	J	710	PCL	20,000
DBP 4	18-May-01	TRITIUM	U	372	PCL	20,000
DBP 4	18-May-01	TRITIUM	U	255	PCL	20,000
DBP 5	18-May-01	1,1,2-TRICHLOROETHANE	U	1	µg/L	5
DBP 5	18-May-01	ARSENIC	U	5	µg/L	5
DBP 5	18-May-01	BENZENE	U	1	µg/L	5
DBP 5	18-May-01	BENZO(A)ANTHRACENE	U	1	µg/L	
DBP 5	18-May-01	BENZO(A)PYRENE	U	1	µg/L	0.2
DBP 5	18-May-01	BENZO(B)FLUORANTHENE	U	1	µg/L	
DBP 5	18-May-01	BENZO(K)FLUORANTHENE	U	1	µg/L	
DBP 5	18-May-01	CHROMIUM	U	5	µg/L	100
DBP 5	18-May-01	CHRYSENE	U	1	µg/L	
DBP 5	18-May-01	DICHLOROMETHANE (METHYLENE CHLORIDE)	U	5	µg/L	5
DBP 5	18-May-01	ENDRIN	U	0.0396	µg/L	2
DBP 5	18-May-01	MANGANESE	U	10	µg/L	50
DBP 5	18-May-01	OCTACHLORODIBENZO-P-DIOXIN	U	0.01	µg/L	
DBP 5	18-May-01	PCB (AROCLOR 1260)	U	0.1	µg/L	0.5
DBP 5	18-May-01	RADIUM, TOTAL ALPHA-EMITTING		0.773	PCL	5
DBP 5	18-May-01	TRITIUM	J	2020	PCL	20,000

*Result Qualifier

Attachment 3

Five-Year Review Site Inspection Checklist

Five-Year Review Site Inspection Checklist

I. SITE INFORMATION	
Site Name: D-Area Burning Rubble Pit	**Date of Inspection: 9/14/01**
Location and Region: SRS, USEPA Region IV	**EPA ID:**
Agency, office, or company leading the five-year review: USDOE	**Weather/temperature: mid 80's**

Remedy Includes: (Check all that apply)

- ☐ Landfill cover/containment
- ☐ Access controls
- ☒ Institutional Controls
- ☐ Groundwater pump and treatment
- ☐ Surface water collection and treatment
- ☒ Other Groundwater Monitoring
- ☐ Monitored Natural Attenuation
- ☐ Groundwater Containment
- ☐ Vertical Barrier Walls

Attachments: ☐ Inspection team roster attached ☐ Site map attached

II. INTERVIEWS (Check all that apply)

1. **O & M site manager** _____ (Name) _____ (Title) _____ (Date)
   Interviewed ☐ at site ☐ at office ☐ by phone Phone No. _____
   Problems, suggestions; ☐ report attached _____

2. **O & M staff** _____ (Name) _____ (Title) _____ (Date)
   Interviewed ☐ at site ☐ at office ☐ by phone Phone No. _____
   Problems, suggestions; ☐ report attached _____

3. **Local regulatory authorities and response agencies** (i.e., State and tribal offices, emergency response office, police department, office of public health or environmental health, zoning office, recorder of deeds, or other city and county offices, etc.) Fill in all that apply.

Agency _____

Contact _____ _____ _____ _____
Name Title Date Phone No.

Problems; suggestions; ☐ Report attached _____

_____

Agency _____

Contact _____ _____ _____ _____
Name Title Date Phone No.

Problems; suggestions; ☐ Report attached _____

_____

Agency _____

Contact _____ _____ _____ _____
Name Title Date Phone No.

Problems; suggestions; ☐ Report attached _____

_____

4. **Other interviews** (optional) ☐ Report attached _____

III. ONSITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)

1. **O & M Documents**

☒ O & M Manual ☒ Readily available ☐ Up to date ☐ N/A

☒ As-built drawings ☒ Readily available ☐ Up to date ☐ N/A

☒ Maintenance Logs ☒ Readily available ☐ Up to date ☐ N/A

Remarks_____

_____

2. **Site-Specific Health and Safety Plan** ☒ Readily available ☐ Up to date ☐ N/A

☒ Contingency plan/emergency response plan ☒ Readily available ☐ Up to date ☐ N/A

Remarks_____

_____

3. **O & M and OSHA Training Records** ☐ Readily available ☐ Up to date ☒ N/A

Remarks_____

_____

4. **Permits and Service Agreements**

☐ Air discharge permit ☐ Readily available ☐ Up to date ☒ N/A

☐ Effluent discharge ☐ Readily available ☐ Up to date ☒ N/A

☐ Waste Disposal, POTW ☐ Readily available ☐ Up to date ☒ N/A

☐ Other permits ☐ Readily available ☐ Up to date ☒ N/A

Remarks_____

_____

5. **Gas Generation Records** ☐ Readily available ☐ Up to date ☒ N/A

Remarks_____

_____

6. **Settlement Monument Records** ☐ Readily available ☐ Up to date ☒ N/A

Remarks_____

_____

7. **Groundwater Monitoring Records** ☒ Readily available ☐ Up to date ☐ N/A

Remarks_____

_____

8. **Leachate Extraction Records** ☐ Readily available ☐ Up to date ☒ N/A

Remarks_____

_____

9. **Discharge Compliance Records**

☐ Air ☐ Readily available ☐ Up to date ☒ N/A

☐ Water (effluent) ☐ Readily available ☐ Up to date ☒ N/A

Remarks_____

_____

10. **Daily Access/Security Logs** ☒ Readily available ☐ Up to date ☐ N/A

Remarks_____

_____

IV. O & M Costs

1. **O & M Organization**

☐ State in-house ☐ Contractor for State

☐ PRP in-house ☐ Contractor for PRP

☐ Other_____

_____

2. **O & M Cost Records**

☐ Readily available ☐ Up to date

☐ Funding mechanism/agreement in place

☐ Other_____

_____

Total annual cost by year for review period if available

From_____ To_____ _____ ☐ Breakdown attached
Date Date Total cost

From_____ To_____ _____ ☐ Breakdown attached
Date Date Total cost

From_____ To_____ _____ ☐ Breakdown attached
Date Date Total cost

From_____ To_____ _____ ☐ Breakdown attached
Date Date Total cost

From_____ To_____ _____ ☐ Breakdown attached
Date Date Total cost

1. **Unanticipated or Unusually High O & M Costs During Review Period**

Describe costs and reasons: _____

_____

_____

_____

_____

V. ACCESS AND INSTITUTIONAL CONTROLS ☒ Applicable ☐ N/A

A. Fencing

1. **Fencing Damaged** ☐ Location shown on site map ☐ Gates secured ☒ N/A

Remarks _____

_____

B. Other Access Restrictions

1. **Signs and other security measures** ☐ Location shown on site map ☒ N/A

Remarks _____

_____

C. Institutional Controls

1. **Implementation and enforcement**

Site conditions imply ICs not properly implemented ☐ Yes ☒ No ☐ N/A

Site conditions imply ICs not being fully enforced ☐ Yes ☒ No ☐ N/A

Type of monitoring (e.g., self-reporting, drive-by) Walk down

Frequency _____

Responsible party/agent ER Operations

Contact	Michael Redd	Manager ER Maintenance	_____	_____
	Name	Title	Date	Phone No.

Report is up-to-date ☒ Yes ☐ No ☐ N/A

Reports are verified by the lead agency ☒ Yes ☐ No ☐ N/A

Specific requirements in deed of decision documents have been met ☒ Yes ☐ No ☐ N/A

Violations have been reported ☐ Yes ☐ No ☒ N/A

Other problems or suggestions: ☒ Report attached

ERD Inspection Data Sheet for D-Area Burning/Rubble Pits (U) Document Number ER-IDS-019-003, Rev. 4

_____

_____

_____

2. **Adequacy** ☒ ICs are adequate ☐ ICs are inadequate ☐ N/A

Remarks _____

_____

D. General

1. **Vandalism/trespassing** ☐ Location shown on site map ☒ No vandalism evident

Remarks_____

_____

2. **Land use changes onsite** ☒ N/A

Remarks_____

_____

3. **Land use changes offsite** ☒ N/A

Remarks_____

_____

VI. GENERAL SITE CONDITIONS

A. Roads ☒ Applicable ☐ N/A

1. **Roads damaged** ☐ Location shown on site map ☒ Roads adequate ☐ N/A

Remarks_____

_____

B. Other site Conditions

Remarks_____

_____

_____

_____

_____

VII. LANDFILL COVERS ☐ Applicable ☒ N/A

A. Landfill Surface

1. **Settlement** (Low spots) ☐ Location shown on site map ☐ Settlement not evident

Areal extent_____ Depth_____

Remarks_____

_____

2. **Cracks** ☐ Location shown on site map ☐ Cracking not evident

Lengths_____ Widths_____ Depths_____

Remarks_____

_____

3. **Erosion** ☐ Location shown on site map ☐ Erosion not evident

Areal extent_____ Depth_____

Remarks_____

_____

4. **Holes** ☐ Location shown on site map ☐ Holes not evident

Areal extent_____ Depth_____

Remarks_____

_____

5. **Vegetative Cover** ☐ Grass ☐ Cover properly established ☐ No signs of stress

☐ Trees/shrubs (indicate size and location on a diagram)

Remarks_____

_____

6. **Alternative Cover (armored rock, concrete, etc.)** ☐ N/A

Remarks_____

_____

7. **Bulges** ☐ Location shown on site map ☐ Bulges not evident

Areal extent_____ Height_____

Remarks_____

_____

8. **Wet Areas/Water Damage** ☐ Wet areas/water damage not evident

☐ Wet Areas ☐ Location shown on site map Areal extent_____

☐ Ponding ☐ Location shown on site map Areal extent_____

☐ Seeps ☐ Location shown on site map Areal extent_____

☐ Soft subgrade ☐ Location shown on site map Areal extent_____

Remarks_____

_____

9. **Slope Instability** ☐ Slides ☐ Location shown on site map ☐ No evidence of slope instability

Areal extent_____

Remarks_____

_____

B. Benches ☐ Applicable ☒ N/A

(Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)

1. **Flows Bypass Bench** ☐ Location shown on site map ☐ N/A or okay

Remarks_____

_____

2. **Bench Breached** ☐ Location shown on site map ☐ N/A or okay

Remarks_____

_____

3. **Bench Overtopped** ☐ Location shown on site map ☐ N/A or okay

Remarks_____

_____

C. Letdown Channels ☐ Applicable ☒ N/A

(Channel lined with erosion control mates, riprap, grout bags, or gabions that descend down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)

1. **Settlement** ☐ Location shown on site map ☐ No evidence of settlement

Areal extent_____ Depth_____

Remarks_____

_____

2. **Material Degradation** ☐ Location shown on site map ☐ No evidence of degradation

Material type_____ Areal extent _____

Remarks_____

_____

3. **Erosion** ☐ Location shown on site map ☐ No evidence of erosion

Areal extent _____ Depth_____

Remarks_____

_____

4. **Undercutting** ☐ Location shown on site map ☐ No evidence of undercutting

Areal extent _____ Depth_____

Remarks_____

_____

5. **Obstructions** Type_____ ☐ No obstructions

☐ Location shown on site map Areal extent _____

Size _____

Remarks_____

_____

6. **Excessive Vegetative Growth** Type_____

☐ No evidence of excessive growth

☐ Vegetation in channels does not obstruct flow

☐ Location shown on site map Areal extent _____

Remarks_____

_____

D. Cover Penetrations ☐ Applicable ☒ N/A

1. **Gas Vents** ☐ Active ☐ Passive

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A

Remarks_____

_____

2. **Gas Monitoring Probes**

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A

Remarks_____

_____

3. **Monitoring Wells** (within surface area of landfill)

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A

Remarks_____

_____

4. **Leachate Extraction Wells**

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A

Remarks_____

_____

5. **Settlement Monuments** ☐ Located ☐ Routinely surveyed ☐ N/A

Remarks_____

_____

E. Gas Collection and Treatment ☐ Applicable ☒ N/A

1. **Gas Treatment Facilities**

☐ Flaring ☐ Thermal destruction ☐ Collection for reuse

☐ Good condition ☐ Needs Maintenance

Remarks_____

_____

2. **Gas Collection Wells, Manifolds and Piping**

☐ Good condition ☐ Needs Maintenance

Remarks_____

_____

3. **Gas Monitoring Facilities** (e.g., gas monitoring of adjacent homes or buildings)

☐ Good condition ☐ Needs Maintenance ☐ N/A

Remarks_____

_____

F. Cover Drainage Layer ☐ Applicable ☒ N/A

1.	**Outlet Pipes Inspected**	☐ Functioning	☐ N/A
	Remarks_____		
	_____		
2.	**Outlet Rock Inspected**	☐ Functioning	☐ N/A
	Remarks_____		
	_____		

G. Detention/sedimentation Ponds ☐ Applicable ☒ N/A

1. **Siltation** Areal extent_____ Depth_____ ☐ N/A

   ☐ Siltation not evident

   Remarks_____

2. **Erosion** Areal extent_____ Depth_____ ☐ N/A

   ☐ Erosion not evident

   Remarks_____

3. **Outlet Works** ☐ Functioning ☐ N/A

   Remarks_____

4. **Dam** ☐ Functioning ☐ N/A

   Remarks_____

H. Retaining Walls ☐ Applicable ☒ N/A

1. **Deformations** ☐ Location shown on site map ☐ Deformation not evident

   Horizontal displacement_____ Vertical displacement_____

   Rotational displacement_____

   Remarks_____

2. **Degradation** ☐ Location shown on site map ☐ Deformation not evident

   Remarks_____

I. Perimeter Ditches/Off-Site Discharge ☐ Applicable ☒ N/A

1. **Siltation** ☐ Location shown on site map ☐ Siltation not evident

   Areal extent_____ Depth_____

   Remarks_____

2. **Vegetative Growth** ☐ Location shown on site map ☐ Siltation not evident

☐ Vegetation does not impede flow

Areal extent_____ Type_____

Remarks_____

_____

3. **Erosion** ☐ Location shown on site map ☐ Erosion not evident

Areal extent_____ Depth_____

Remarks_____

_____

4. **Discharge Structure** ☐ Location shown on site map ☐ N/A

Remarks_____

_____

VIII. VERTICAL BARRIER WALLS ☐ Applicable ☒ N/A

1. **Settlement** ☐ Location shown on site map ☐ Settlement not evident

Areal extent_____ Depth_____

Remarks_____

_____

2. **Performance Monitoring** Type of Monitoring_____

☐ Performance not monitored

Frequency_____ ☐ Evidence of breaching

Head differential_____

Remarks_____

_____

IX. GROUNDWATER/SURFACE WATER REMEDIES ☒ Applicable ☐ N/A

A. Groundwater Extraction Wells, Pumps, and Pipelines ☐ Applicable ☒ N/A

1. **Pumps, Wellhead Plumbing, and Electrical**

☐ Good condition ☐ All required wells located ☐ Needs Maintenance ☐ N/A

Remarks_____

_____

2. **Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances**

☐ Good condition ☐ Needs Maintenance

Remarks_____

_____

3. **Spare Parts and Equipment**

☐ Readily available ☐ Good condition ☐ Requires upgrade ☐ Needs to be provided

Remarks_____

_____

B. Surface Water Collection Structures, Pumps, and Pipelines ☐ Applicable ☒ N/A

1. **Collection Structures, Pumps, and Electrical**

☐ Good condition ☐ Needs Maintenance

Remarks_____

_____

2. **Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances**

☐ Good condition ☐ Needs Maintenance

Remarks_____

_____

3. **Spare Parts and Equipment**

☐ Readily available ☐ Good condition ☐ Requires upgrade ☐ Needs to be provided

Remarks_____

_____

C. Treatment System ☐ Applicable ☒ N/A

1. **Treatment Train** (Check components that apply)

☐ Metals removal ☐ Oil/water separation ☐ Bioremediation

☐ Air stripping ☐ Carbon adsorbers

☐ Filters_____

☐ Additive (e.g., chelation agent, flocculent)_____

☐ Others_____

☐ Good condition ☐ Needs Maintenance

☐ Sampling ports properly marked and functional

☐ Sampling/maintenance log displayed and up to date

☐ Equipment properly identified

☐ Quantity of groundwater treated annually_____

☐ Quantity of surface water treated annually_____

Remarks_____

_____

2. **Electrical Enclosures and Panels** (properly rated and functional)

☐ N/A ☐ Good condition ☐ Needs Maintenance

Remarks_____

_____

3. **Tanks, Vaults, Storage Vessels**

☐ N/A ☐ Good condition ☐ Proper secondary containment ☐ Needs Maintenance

Remarks_____

_____

4. **Discharge Structure and Appurtenances**

☐ N/A ☐ Good condition ☐ Needs Maintenance

Remarks_____

_____

5. **Treatment Building(s)**

☐ N/A ☐ Good condition (esp. roof and doorways) ☐ Needs repair

☐ Chemicals and equipment properly stored

Remarks_____

_____

6. **Monitoring Wells** (pump and treatment remedy)

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ All required wells located ☐ Needs Maintenance ☐ N/A

Remarks_____

_____

D. Monitoring Data ☒ Applicable ☐ N/A

1. Monitoring Data

☒ Is routinely submitted on time ☒ Is of acceptable quality

2 .Monitoring data suggests:

☐ Groundwater plume is effectively contained ☐ Contaminant concentrations are declining

E. Monitored Natural Attenuation ☐ Applicable ☒ N/A

1. **Monitoring Wells** (Natural attenuation remedy)

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ All required wells located ☐ Needs Maintenance ☐ N/A

Remarks_____

_____

X. OTHER REMEDIES

If there are remedies applied at the site, which are not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.

XI. OVERALL OBSERVATIONS

A. Implementation of the Remedy

Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emissions, etc.).

B. Adequacy of O & M

Describe issues and observations related to the implementation and scope of O & M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy.

C. Early Indicators of Potential Remedy Failure

Describe issues and observations such as unexpected changes in the cost or scope of O & M or a high frequency of unscheduled repairs that suggest that the protectiveness of the remedy may be compromised in the future.

D. Opportunities for Optimization

Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy.

D-Area Oil Seepage Basin (631-G) (DOSB) Operable Unit

I. Introduction

This is the second five-year review for the D-Area Oil Seepage Basin (DOSB) Operable Unit (OU). The first five-year review was based on an interim remedial action (IRA) that had just been completed. Since the first review, a final Record of Decision (ROD) has been signed and the final remedial action has started. This review was conducted from October 2001 through September 2001. This report documents the results of the review.

II. OU Chronology

Table 1 lists the chronology of site events for the DOSB OU.

III. Background

The DOSB OU is located within Savannah River Site (SRS) in a clearing between Roads A-4.4 and A-4.5, approximately 1 mile north of the coal-fired D-Area Powerhouse, and approximately 1.9 miles from the nearest SRS boundary (Figure 1). The groundwater beneath the DOSB is included in the OU. The DOSB OU is on the Ellenton Plain along the Savannah River at an elevation of 150 feet (ft) above mean sea level (msl) (Figure 2). Since closure and backfilling of the basin, there are four orange balls marking the corners of the unit and a perimeter fence.

The terrain is flat, with no discernible slope or relief, and is surrounded by a mature forest of hardwoods and softwoods. The water table ranges from approximately 4 to 16 ft below ground surface in the area of the DOSB OU (Figure 3). The water table aquifer system in this area is the Upper Three Runs.

Two weak aquitards in the Upper Three Runs aquifer divide the aquifer into three zones: AQ1, AQ2, and AQ3. Surface drainage is to the southwest, toward the Savannah River, which is at an elevation of 85 ft msl. The closest surface water

Table 1. Chronology of OU Events

Event	Date
Remedial Investigation complete	April 24, 1998
Interim ROD issuance	March 6, 1995
Interim Remedial Action start/complete	August 13, 1996 and December 31, 1999
Final ROD signature	March 4, 1999
Remedial Action start/complete	September 3, 1999/ January 13, 2000
Previous Five-Year Reviews	June 30, 1997

Key:

Consent Decree – Date a consent decree (enforcement document from the court system) was issued for the operable unit.

Corrective Action start – Date the corrective (remedial) action was initiated (under RCRA).

ESD Issuance - Date all three parties (USDOE, USEPA, and SCDHEC) signed the Explanation of Significant Difference used to significantly modify the remedy selected in the Record of Decision.

Final or Interim ROD issuance – Date the three parties (USDOE, USEPA, and SCDHEC) signed the Record of Decision.

Federal Facility Agreement Declared Effective - Date the Federal Facility Agreement formalized the integration of CERCLA and RCRA in remediation activities at SRS.

NPL listing – Date the entire SRS was added to EPA's National Priorities List.

Previous Five-Year Reviews – Date of any previous five year reviews of remedy for the operable unit.

RCRA Closure Certified – Date the three parties (USDOE, USEPA, and SCDHEC) certified that the operable unit had been remediated and closed under the Resource Conservation and Recovery Act.

RCRA Closure Plan Approved – Date the three parties (USDOE, USEPA, and SCDHEC) approved the closure plan for the operable unit under Resource Conservation and Recovery Act.

Remedial Action start/complete – Date the remedial action (final or interim) was initiated/completed (under CERCLA).

Removal Action – Date contaminated media was removed from the operable unit (not associated with the ROD).

RFI/RI start/complete - Date the remedial investigation (sampling) was initiated/completed for the operable unit.

ROD Amendment Issuance - Date the three parties (USDOE, USEPA, and SCDHEC) signed the Record of Decision Amendment used to change the remedy selected in the original Record of Decision.

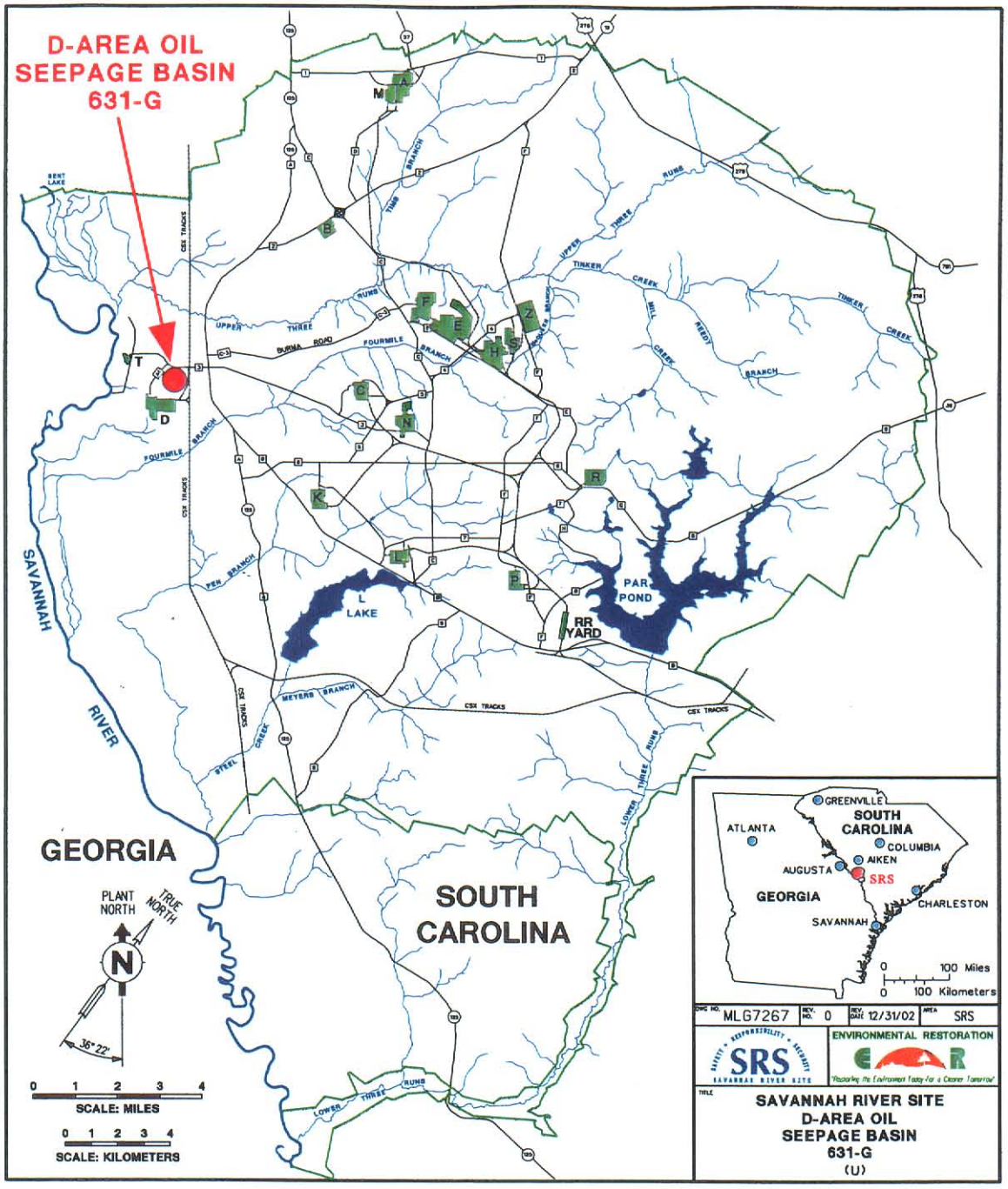


Figure 1. Location of the D-Area Oil Seepage Basin Operable Unit Within SRS

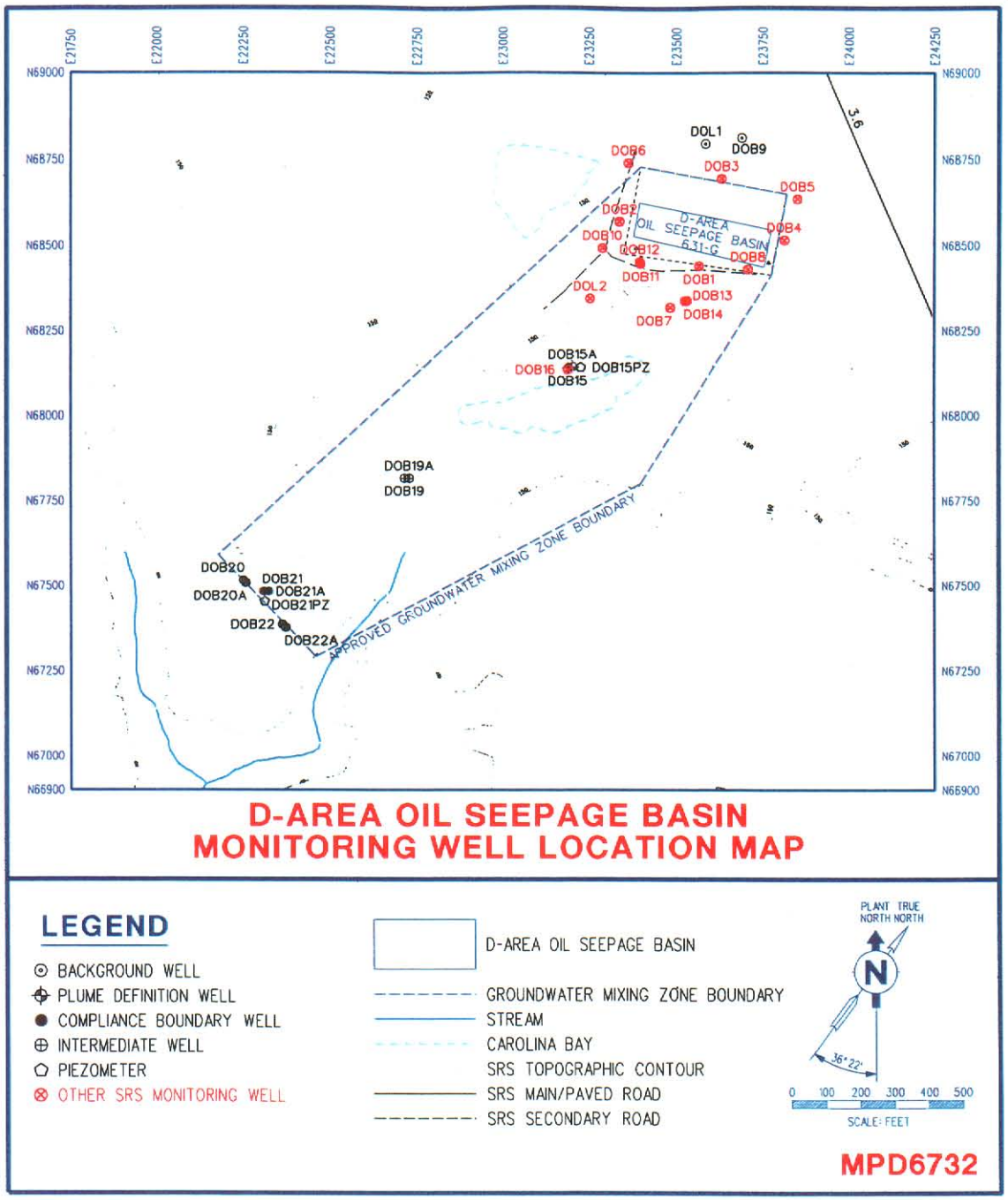


Figure 2. D-Area Oil Seepage Basin Monitoring Well Location Map

feature is a Carolina bay, a natural wetland located adjacent to the unit to the west (Figure 2). The Carolina bay appears to be dry during the summer months or periods of little to no precipitation, but may contain surface water during wet seasons. Other wetlands exist approximately 250 ft south of the unit (Figure 2). The major local surface water drainage system is the Savannah River and associated swamps, located approximately 1.6 miles to the west of the unit (Figure 1). Upper Three Runs Creek, a tributary to the Savannah River, is located 1.7 miles to the north-northwest, and Fourmile Branch, another tributary, is located 1.7 miles to the south-southeast (Figure 1).

Land and Resource Use

Prior to SRS ownership, the DOSB OU area was primarily used for agriculture. At the time of this five-year ROD review and for the foreseeable future, the land use will be controlled by the United States Department of Energy (USDOE). Existing administrative controls and existing physical barriers will ensure that human health is protected. A land use control implementation plan (LUCIP), which provides details of the specific institutional controls necessary to achieve the remedial goals has been prepared and approved by the Core Team [(i.e., USDOE, South Carolina Department of Health and Environmental Control (SCDHEC), and United States Environmental Protection Agency (USEPA)] and will be appended to the SRS Land Use Assurance Plan (LUCAP). While industrial land use is the current and future anticipated land use scenario, once the groundwater achieves MCLs, the OU will meet the requirements for unrestricted land use.

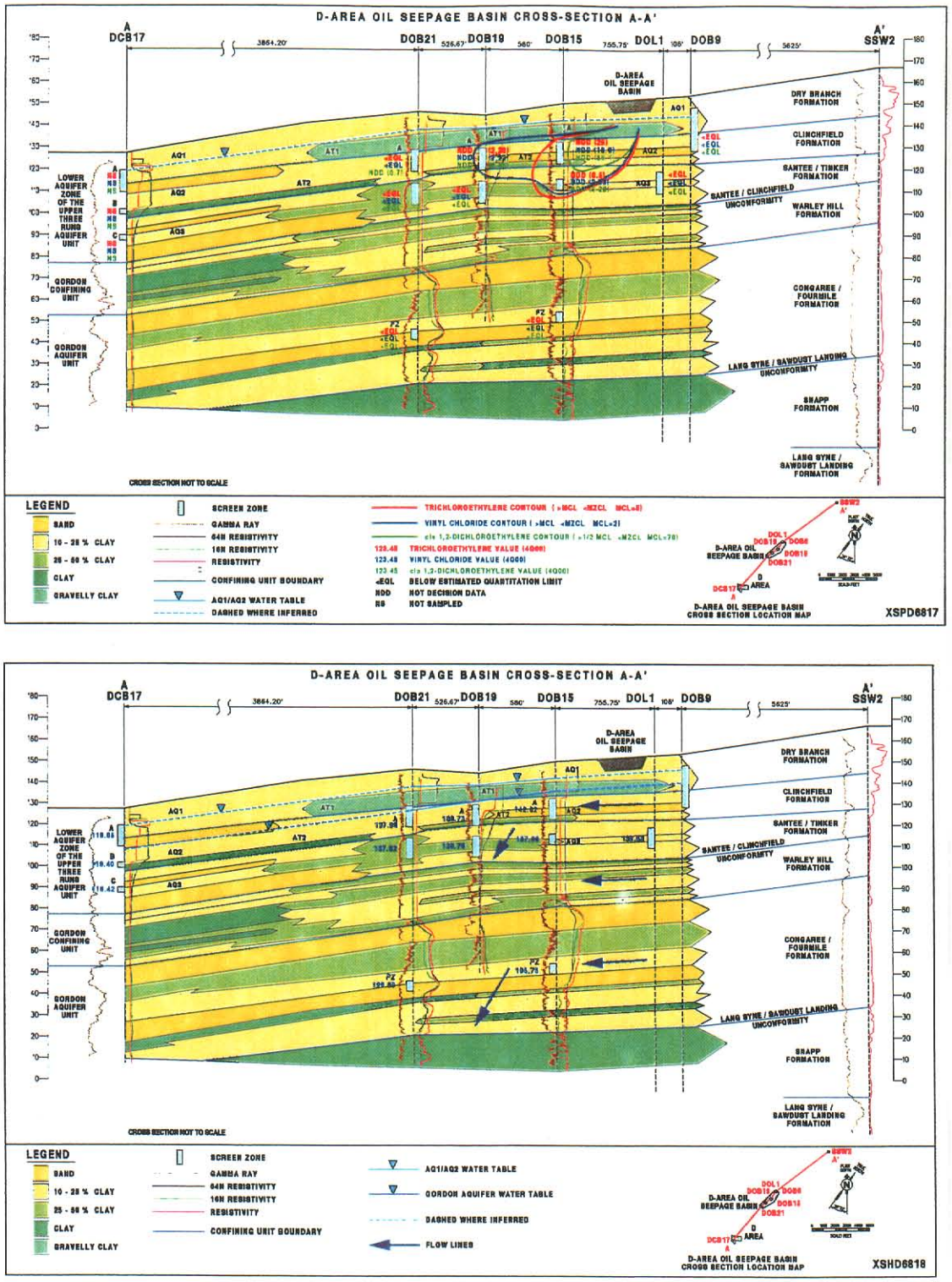


Figure 3. D-Area Oil Seepage Basin Cross Section

History of the Operable Unit

The DOSB OU was constructed in 1952 as a series of unlined trenches for disposal of waste oil products from A Area and other areas at SRS which were unacceptable for incineration in the 400-D powerhouse boilers. In 1975 the basin was removed from service and backfilled with soil. The DOSB OU is approximately 383 ft long by 108 ft wide and 8 ft deep. During an IRA conducted at the unit, the trenches were found to be continuous, without noticeable berms, and were constructed as a series of adjacent trenches along the back half of the clearing.

A preliminary unit evaluation and a unit reconnaissance were performed in August 1988. Since preliminary unit evaluation concluded that the unit had received hazardous substances, a unit screening investigation was implemented and field investigations conducted between 1988 and 1994. The field investigations involved soil borings, surface geophysics, well and piezometer installation, and groundwater sampling.

Groundwater and soil sampling was performed in 1996 as part of the RCRA Facility Investigation/Remedial Investigation (RFI/RI) Workplan. The investigation revealed soils contamination in the trenches and a plume of volatile organic constituents (VOCs) in the groundwater. The *RFI/RI and Baseline Risk Assessment for the D-Area Oil Seepage Basin (631-G)(U)* identified eight VOCs as final constituents of concern (COCs): benzene, 1,1-dichloroethylene (1,1-DCE), 1,2-dichloroethylene (1,2-DCE), cis-1,2-dichloroethylene, methylene chloride, tetrachloroethylene (PCE), trichloroethylene (TCE), and vinyl chloride (VC) (WSRC 1999a).

IV. Remedial Actions

An IRA was implemented in 1996 to remove drums, debris and principal threat source material. At the close of the IRA, the contractor installed two horizontally oriented, perforated pipes along the length of the former waste unit for technology (bioventing) testing. These pipes were used to introduce fresh air, nutrients and tracers into the soils at a depth of about 8 ft. The objective of the bioventing was to volatilize the constituents in the soil and enhance the aerobic degradation of the contaminants in the soil (WSRC 1999b). The last Interim Remedial Action Semi-Annual Groundwater Monitoring Report was submitted December 31, 1999, documenting the last sampling events in accordance with the Interim Action Record of Decision (IAROD).

Remedial alternatives were considered in the *Corrective Measures Study/Feasibility Study for the D-Area Oil Seepage Basin (631-G)(U)* (WSRC 1998a) and the *Groundwater Mixing Zone Application for the D-Area Oil Seepage Basin (631-G)(U)* (WSRC 1998c). These documents were submitted to and approved by SCDHEC and USEPA, and then the *Record of Decision, Remedial Alternative Selection for the D-Area Oil Seepage Basin (631-G)(U)* (WSRC 1998b) was approved. In accordance with the *SRS Public Involvement Plan* (USDOE 1994), the selection of the preferred alternative for this remedial action included a 45-day public comment period that began on May 1, 1998, and ended on June 14, 1998. No public comments were received during this period.

The selected remedy for the DOSB OU deep soils is no further action since remedial action objectives (RAOs) have been achieved by the IRA and bioventing testing.

The selected remedy for shallow soil, surface water, and sediment is no action because no COCs in those media were identified in the RFI/RI Report and Baseline Risk Assessment.

The selected remedy for DOSB OU groundwater is monitored natural attenuation/groundwater mixing zone with institutional controls. Under this alternative, natural attenuation mechanisms such as biodegradation, flushing, volatilization, adsorption, and hydrolysis would continue to reduce contaminant concentrations in the groundwater to acceptable levels. Results from the bioventing study indicate that the source of groundwater contamination (i.e., contaminants in the DOSB OU soil) was significantly reduced as a result of the combined IRA and biovent test and no longer contributes to groundwater contamination.

The RAOs developed for the groundwater at the DOSB OU are as follows:

- reduce risk to human health associated with dermal contact and ingestion of groundwater and inhalation of groundwater vapor and
- restore groundwater to achieve applicable or relevant and appropriate requirements (ARARs) and remedial goals (RGs).

RGs for groundwater COCs will be equivalent to their respective maximum contaminant level (MCL) values. The groundwater contaminants that will be addressed at the DOSB OU and their corresponding RGs are provided in Table 2.

Table 2. Final COCs with Selected RGs

Final COCs	Maximum Concentration Detected (μg/L)	Average Concentration in Groundwater (μg/L)	Selected RG (μg/L)
Tetrachloroethene	85	2.1	5.0
Trichloroethene	1151	8.0	5.0
cis-1,2-Dichloroethene	457	4.88	70.0
total-1,2-Dichloroethene	68.6	21.24	70.0
1,1-Dichloroethene	0.84	0.399	7.0
Vinyl Chloride	52	1.1	2.0
Benzene	6.2	0.22	5.0
Dichloromethane (Methylene Chloride)	9.5	0.16	5.0

A Corrective Measures Implementation/Remedial Design/Remedial Design Report/Remedial Action Work Plan (CMI/RD/RDR/RAWP) (WSRC 1999b) for the DOSB OU was prepared and submitted in accordance with the Federal Facility Agreement (FFA). The USEPA approved the Revision 1 document on August 5, 1999, and the SCDHEC approved the document on August 16, 1999. The purpose of this document is to provide information about the design implementation of the selected remedy for the DOSB OU. The CMI/RD/RDR/RAWP documents design inputs and ensures that the remedial design requirements of the ROD are incorporated into the remedial design.

There were no actual design activities associated with the remedial action since it was a mixing zone. The final remedial action construction activities consisted of installation of nine groundwater monitoring wells and hydrogeologic investigations. Remedial action (i.e., construction start date) started September 3, 1999, and well installation and development was completed by January 13, 2000.

A Post-Construction Report (PCR) (WSRC 2000) for the DOSB OU was prepared and submitted in accordance with the FFA. The USEPA approved the Revision 0 document of August 21, 2000, and the SCDHEC approved the

document on August 9, 2000. The purpose of this document is to provide information about the construction activities for the selected remedy for the DOSB OU. The project successfully installed nine new monitoring wells in accordance with the CMI/RD/RDR/RAWP. No major configuration changes were implemented (WSRC 2000).

The objective of compliance monitoring at the DOSB OU is to demonstrate compliance with MCLs at the compliance boundary and compliance with the mixing zone concentration limits (MZCLs) at the plume wells as required by the groundwater mixing zone (GWMZ) application and the ROD. Groundwater modeling was used to predict the MZCLs and the location of the compliance boundary. The compliance boundary is located approximately 1,650 ft downgradient of the southern perimeter of the unit (Figure 3). The MZCLs from the approved GWMZ application, along with the associated MCLs, are shown in Table 3. Section 3.2 of the Annual Mixing Zone Report for the D-Area Oil Seepage Basin (WSRC 2001) addresses the difficulty presented by the MZCL value for "Total 1,2-DCE" being less than the MZCL value for one of its isomers, cis-1,2-DCE.

Table 3. Listing of Comparison Criteria for the Constituents of Concern

Constituent of Concern	MZCL (μg/L)	Baseline Value From Background Well Data	MPV * 1.2 yrs (μg/L)	MPV 5.2 yrs (μg/L)	MPV 10 yrs (μg/L)	MCL (μg/L)
Tetrachloroethylene	85	<EQL	<5.0			5.0
Trichloroethylene	1,150	<EQL	194.00	23.20	4.12	5.0
Cis-1,2-Dichloroethylene	457	<EQL				70.0
1,1-Dichloroethylene	7.0	<EQL				7.0
Total 1,2-Dichloroethylene (sum of cis-1,2-DCE and trans-1,2-DCE)[a]	70.0	<EQL	12.67	0.01		70.0
Vinyl Chloride	32	<EQL	7.99	3.63	1.64	2.0
Benzene	6.2	<EQL				5.0
Methylene Chloride	9.5	<EQL				5.0

Notes: * MPV = Model Predicted Value: The Model Predicted Values are the 1.2 yr. concentrations predicted by the GWMZ scenario that assumed degradation and no pumping.

a : Total 1,2-Dichloroethylene is the sum of the isomers of 1, 2-dichloroethylene i.e. cis-1,2-Dichloroethylene and trans-1,2-Dichloroethylene.

The approved GWMZ application (WSRC 1998c) and ROD (WSRC 1998b) require monitoring of 12 wells for groundwater quality and indicator parameters. These include (1) two existing background wells; (2) two plume wells; (3) two intermediate wells; and (4) six compliance boundary wells. "Groundwater quality" parameters (VOCs) are monitored for compliance with MCLs and MZCLs, while "indicator parameters" are monitored to evaluate the natural attenuation processes occurring in the DOSB OU groundwater.

The background groundwater quality is used as a baseline to evaluate the extent of attenuation occurring in the plume. The terms "background" and "baseline" refer to the data collected from existing background wells DOB 9 and DOL 1.

The purpose of the plume wells is to verify that the contaminants do not exceed MZCLs. The location of the mixing zone compliance boundary was defined by fate and transport modeling as ~1,650 ft (~500 m) south of the DOSB OU, putting it slightly beyond the furthest modeled extent of the VOC plume above MCLs. If the MZCL or MCL for one of the contaminants is exceeded during a sampling event, the well(s) with the exceedance(s) will be resampled within 30 days of receipt of a valid data report to confirm this exceedance. In the event the MZCL or MCL is exceeded in the validated confirmation samples(s), SRS will notify the USEPA and SCDHEC and begin implementing the corrective action technology as outlined in Section 4.2 of the *Conceptual Corrective Action Plan Strategy* (CCAPS) *for the D-Area Oil Seepage Basin (631-G) (U)* (WSRC 1999a). The groundwater sampling requirements and comparison criteria for the groundwater mixing zone compliance are provided in Table 4.

The intermediate wells are required for validation of the groundwater model predictions. If the simulated concentration of any of the VOCs is exceeded during a sampling event, the intermediate wells will be resampled within 30 days of receipt of valid data report to confirm this exceedance. If the confirmed contaminant concentrations in the intermediate wells exceed modeled

concentrations, the model will be re-calibrated with the new data and the effects of the increased concentrations on the compliance boundary wells will be determined. If the recalibrated model indicates that the MCLs will be exceeded at the compliance boundary, then SRS will notify the USEPA and SCDHEC and begin implementing the corrective action strategy outlined in Section 4.2 of the CCAPS (WSRC 1999a).

Table 4. Monitoring Well Sampling

Well Identification	Constituents to be Analyzed	Comparison Criteria	Sample Frequency	Reporting Frequency
Background Wells DOB 9 DOL 1	COCs and Indicator Parameters	Baseline	Quarterly for the first year, semi-annually thereafter (subject to review every 5 years)	Annually
Plume Wells DOB 15 DOB 15A	COCs and Indicator Parameters	MZCLs (See Table 1) and Baseline	Quarterly for the first year, semi-annually thereafter (subject to review every 5 years)	Annually
Intermediate Wells DOB 19 DOB 19A	COCs and Indicator Parameters	Model Predictions and Baseline	Quarterly for the first year, semi-annually thereafter (subject to review every 5 years)	Annually
Compliance Boundary Wells DOB 20, DOB 20A DOB 21, DOB 21A DOB 22, DOB 22A	COCs and Indicator Parameters	MCLs (See Table 1) and Baseline	Quarterly for the first year, semi-annually thereafter (subject to review every 5 years)	Annually

Notes:

COCs Method 8260B for VOCs: benzene; PCE; TCE; 1,1-DCE; total 1,2-DCE; cis-1,2-DCE; trans-1,2-DCE; methylene chloride and VC

Indicator Parameters:

Field:
- pH
- specific conductance
- temperature
- turbidity
- dissolved oxygen
- oxidation/reduction potential
- water levels

Laboratory:
- total organic carbon
- nitrate
- iron (2+)
- sulfate
- chloride
- hydrogen
- ethane/ethene
- methane
- sulfide
- alkalinity

The year 2000 was the first year of monitoring under the approved mixing zone application (WSRC 1998c). The MZCL of 70.0 μg/L for total 1,2-

dichloroethylene was exceeded in aquifer zone 2 in one of the plume wells (DOB 15A, 140 μg/L) during the first quarter of 2000. Subsequent monitoring results were all below the MZCL, and showed a decreasing trend. The concentration of the 1,2-dichloroethylene isomer cis-1,2-dichloroethylene represented nearly 100% of the total 1,2-dichloroethylene concentration. The maximum cis-1,2-dichloroethylene concentration of 139.44 μg/L did not exceed its MZCL of 457 μg/L. No other COCs exceeded either MCLs, USEPA Primary Drinking Water MCLs, or fate and transport model predicted values for the 1.2 year scenario that assumed degradation and no pumping (WSRC 2001).

V. Progress Since Last Review

The previous five-year review was made for the interim action. Since that time, a final ROD was issued, as described in this report. The mixing zone that was established in the final ROD is currently being monitored for the groundwater COCs.

VI. Five-Year Review Process

The following tasks were performed as part of the review:

- Reviewed documents listed in Attachment 1
- Reviewed the groundwater data to determine the suitability of the mixing zone
- Reviewed changes in standards and to-be-considered guidance

VII. Technical Assessment

The conclusions for this review are as follows:

- The first year of monitoring data (2000) appears to be consistent with the modeling predictions from the GWMZ application. The concentrations should continue to decrease within the heart of the plume over the next nine

years (by the year 2010) through natural attenuation to levels at or below MCLs. Based on the monitoring data collected to-date, the remedy is functioning as intended in the final ROD. All indications are that the mixing zone is protective of human health and the environment, to date, and is expected to remain protective in the future.

- The RAOs are still valid for this remedial action because the exposure assumptions, cleanup levels, and toxicity data have not changed since the remedy was selected.

- No other information has been identified that would negatively impact the effectiveness of the selected remedy.

VIII. Issues

The only issue noted was discussed in detail in the Annual Mixing Zone Monitoring Report (WSRC 2001). This issue concerned the anomalous monitoring result during 1Q00 sampling for total-1,2-dichloroethene in DOB-15A. The result was reported at 140 μg/L, above the MCL of 70 μg/L and the MZCL of 70 μg/L. As a part of the evaluation for this first "exceedance" of MZCLs, the rationale behind the derivation of the MZCLs was examined so as to better determine the impact and response to this "exceedance."

The DOSB OU mixing zone application (WSRC 1998c) defined the MZCLs for a number of COCs. Among those were cis-1,2-dichloroethene (cis-1,2-DCE) and total 1,2-dichloroethene (referred to as "1,2-DCE" in Table 5-1 of the mixing zone application) as follows:

COC	MZCL (μg/L)	MCL (μg/L)
cis-1,2-DCE	457	70
total-1,2-DCE	70	70

As it currently stands, the cis-1,2-DCE MZCL would never be a factor in the mixing zone monitoring because the total-1,2-DCE MZCL would always "trigger" first.

As stated in the mixing zone application (Section 5.1.2) (WSRC 1998c), the MZCLs were based on the maximum concentration reported in the RFI/RI/BRA (WSRC 1997) analytic data. For cis-1,2-DCE, the maximum reported value was 457 μg/L for sample E-003 (10-12 ft) (see page 4-247) and for 1,2-DCE (total), the maximum reported value was 68.6 μg/L for sample DOB-15 (01/22/96). The MZCL for (total) 1,2-DCE was therefore set to the MCL of 70 μg/L.

However, examination of the analytical data shows that not all samples were analyzed for all DCE isomers and for total DCE -- some samples were only analyzed for cis-1,2-DCE and trans-1,2-DCE. As a result, the maximum total-1,2-DCE reported in the analytical data tables did not necessarily represent the maximum total-1,2-DCE. The maximum total-1,2-DCE should have been determined by examining not only the reported total-1,2-DCE values, but also the calculated totals for those samples that only had cis-1,2-DCE and trans-1,2-DCE analyzed (but not total). Under that process, the maximum (total) 1,2-DCE should have been determined to be (from the E-003 (10-12 ft) sample) 457.1 + 2.6 ~= 460 μg/L, and the MZCL set accordingly.

Therefore, the only exceedance of MZCLs in the year 2000 (the 1Q00 sample result for total-1,2-dichloroethene in DOB-15A of 140 μg/L) should not be considered a problem warranting action. In addition, subsequent monitoring samples (2Q00 through 4Q00) for total-1,2-dichloroethene in DOB-15A have been below the MZCL of 70 μg/L (WSRC 2001). Table 5 summarizes the issue.

Table 5. Issues Affecting the Current or Future Protectiveness

Issues	Affects Current Protectiveness (Y/N)	Affects Future Protectiveness (Y/N)
1) D-Area Oil Seepage Basin (631-G) – the Annual Mixing Zone Monitoring Report stated that the 1Q 00 sampling for total-1,2-dichloroethene in DOB-15A was 140 μg/L which is above the MCL and MZCL of 70 μg/L. The values set for the MZCL were to be based on the maximum values reported in the RFI/RI/BRA. There was a problem in the sample analysis in that all isomers of DCE were not sampled in every well. The value of 140 μg/L is actually below the maximum value of 457 μg/L reported in the RFI/RI/BRA for cis-1,2-dichloroethene. Therefore, the MZCL should be readjusted to read 457 μg/L for cis-1,2-DCE and then the value of 140 μg/L would not trigger an exceedance.	Y	Y

IX. Recommendations and Follow-up Actions

The only suggested recommendation is to change the MZCL for total-1,2-dichloroethylene to 460 mg/L since total-1,2-dichloroethylene cannot be less than the total of isomers (i.e., cis-1,2-dichloroethylene and trans-1,2-dichloroethylene). The remedy is still expected to be effective. Table 6 summarizes the recommendations and follow-up actions.

Table 6. Recommendations and Follow-up Actions

Issue	Recommendations and Follow-up Actions	Party Responsible	Oversight Agency	Milestone Date	Affects Protectiveness (Y/N)	
					Current	Future
1	Meeting to discuss the changes needed in the Mixing Zone application.	USDOE	USEPA, SCDHEC	None	Y	Y

X. Protectiveness Statement(s)

The remedy is expected to be protective of human health and the environment upon attainment of groundwater cleanup goals through natural attenuation/groundwater mixing zone. Groundwater cleanup is projected to be complete in 2010 based on approval and implementation of the Groundwater Mixing Zone Application. In the interim, exposure pathways that could result in unacceptable risks are being controlled through the site use/site clearance program

as well as security measures, which prevent exposure to, or the ingestion of, contaminated groundwater.

XI. Next Review

The next five-year review is scheduled for June 30, 2007.

Attachment 1

Documents Reviewed

WSCR, 1997. *RCRA Facility Investigation/Remedial Investigation Report and the Baseline Risk Assessment for the D-Area Oil Seepage Basin (631-G) (U)*, WSRC-RP-96-00154, Revision 1.1, May, Westinghouse Savannah River Company, Aiken, SC

WSRC, 1998a. *Corrective Measures Study/Feasibility Study for the D-Area Oil Seepage Basin (631-G) (U)),* WSRC-RP-97-167, Revision 1.1, April, Westinghouse Savannah River Company, Aiken, SC

WSRC, 1998b. *Record of Decision Remedial Alternative Selection for the D-Area Oil Seepage Basin (631-G) (U),* WSRC-RP-97-402, Revision 1, August, Westinghouse Savannah River Company, Aiken, SC

WSRC, 1998c., *Groundwater Mixing Zone Application for the D-Area Oil Seepage Basin (631-G) (U),* WSRC-RP-97-422, Revision 1.1, April, Westinghouse Savannah River Company, Aiken, SC

WSRC, 1999a, *Conceptual Corrective Action Plan Strategy for the D-Area Oil Seepage Basin (631-G) (U),* WSRC-RP-99-4007, Revision 1, August, Westinghouse Savannah River Co., Aiken, SC

WSRC, 1999b, *Corrective Measures Implementation/Remedial Design/Remedial Design Report/Remedial Action Work Plan for the D-Area Oil Seepage Basin (631-G) (U),* WSRC-RP-99-4006, Revision 1, August, Westinghouse Savannah River Co., Aiken, SC

WSRC, 2000, *Post Construction Report (PCR) for the D-Area Oil Seepage Basin (631-G) (U),* WSRC-RP-2000-4071, Revision 0, June , Westinghouse Savannah River Co., Aiken, SC

WSRC, 2001, *Annual Mixing Zone Monitoring Report for the D-Area Oil Seepage Basin (631-G) (U),* WSRC-RP-2001-4046, Revision 0, July, Westinghouse Savannah River Co., Aiken, SC

Attachment 2

Five-Year Review Site Inspection Checklist

Five-Year Review Site Inspection Checklist

I. SITE INFORMATION	
Site Name: D-Area Oil Seepage Basin	**Date of Inspection: 9/14/01**
Location and Region: SRS/USEPA IV	**EPA ID:**
Agency, office, or company leading the five-year review: USDOE	**Weather/temperature: mid 80's**

Remedy Includes: (Check all that apply)

- ☐ Landfill cover/containment
- ☐ Access controls
- ☒ Institutional Controls
- ☐ Groundwater pump and treatment
- ☐ Surface water collection and treatment
- ☒ Other **Mixing Zone, No Further Action**
- ☒ Monitored Natural Attenuation
- ☐ Groundwater Containment
- ☐ Vertical Barrier Walls

Attachments: ☐ Inspection team roster attached ☐ Site map attached

II. INTERVIEWS (Check all that apply)

1. **O & M site manager** _____ _____ _____
   Name Title Date

   Interviewed ☐ at site ☐ at office ☐ by phone Phone No. _____

   Problems, suggestions; ☐ report attached _____

2. **O & M staff** _____ _____ _____
   Name Title Date

   Interviewed ☐ at site ☐ at office ☐ by phone Phone No. _____

   Problems, suggestions; ☐ report attached _____

3. **Local regulatory authorities and response agencies** (i.e., State and tribal offices, emergency response office, police department, office of public health or environmental health, zoning office, recorder of deeds, or other city and county offices, etc.) Fill in all that apply.

Agency _____

Contact _____ _____ _____ _____
Name Title Date Phone No.

Problems; suggestions; ☐ Report attached _____

_____

Agency _____

Contact _____ _____ _____ _____
Name Title Date Phone No.

Problems; suggestions; ☐ Report attached _____

_____

Agency _____

Contact _____ _____ _____ _____
Name Title Date Phone No.

Problems; suggestions; ☐ Report attached _____

_____

4. **Other interviews** (optional) ☐ Report attached _____

III. ONSITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)

1. **O & M Documents**

☒ O & M Manual ☒ Readily available ☐ Up to date ☐ N/A

☒ As-built drawings ☒ Readily available ☐ Up to date ☐ N/A

☒ Maintenance Logs ☒ Readily available ☐ Up to date ☐ N/A

Remarks (Inspection Records)

2. **Site-Specific Health and Safety Plan** ☐ Readily available ☐ Up to date ☒ N/A

☐ Contingency plan/emergency response plan ☐ Readily available ☐ Up to date ☒ N/A

Remarks

3. **O & M and OSHA Training Records** ☐ Readily available ☐ Up to date ☒ N/A

Remarks

4. **Permits and Service Agreements**

☐ Air discharge permit ☐ Readily available ☐ Up to date ☒ N/A

☐ Effluent discharge ☐ Readily available ☐ Up to date ☒ N/A

☐ Waste Disposal, POTW ☐ Readily available ☐ Up to date ☒ N/A

☐ Other permits ☐ Readily available ☐ Up to date ☒ N/A

Remarks

5. **Gas Generation Records** ☐ Readily available ☐ Up to date ☒ N/A

Remarks

6. **Settlement Monument Records** ☐ Readily available ☐ Up to date ☒ N/A

Remarks

7. **Groundwater Monitoring Records** ☒ Readily available ☐ Up to date ☐ N/A

Remarks Currently submitted annual Mixing Zone Report and data is on ERDMS

8. **Leachate Extraction Records**	☒ Readily available	☐ Up to date	☐ N/A	
Remarks				
9. **Discharge Compliance Records**				
☐ Air	☐ Readily available	☐ Up to date	☒ N/A	
☐ Water (effluent)	☐ Readily available	☐ Up to date	☒ N/A	
Remarks				
10. **Daily Access/Security Logs**	☐ Readily available	☐ Up to date	☒ N/A	
Remarks				

IV. O & M Costs

1. **O & M Organization**

☐ State in-house ☐ Contractor for State

☐ PRP in-house ☐ Contractor for PRP

☐ Other_____

_____

2. **O & M Cost Records**

☐ Readily available ☐ Up to date

☐ Funding mechanism/agreement in place

☐ Other_____

_____

Total annual cost by year for review period if available

From_____ To_____ _____ ☐ Breakdown attached
Date Date Total cost

From_____ To_____ _____ ☐ Breakdown attached
Date Date Total cost

From_____ To_____ _____ ☐ Breakdown attached
Date Date Total cost

From_____ To_____ _____ ☐ Breakdown attached
Date Date Total cost

From_____ To_____ _____ ☐ Breakdown attached
Date Date Total cost

1. **Unanticipated or Unusually High O & M Costs During Review Period**

Describe costs and reasons: _____

_____

_____

_____

_____

V. ACCESS AND INSTITUTIONAL CONTROLS ☒ Applicable ☐ N/A

A. Fencing

1. **Fencing Damaged** ☐ Location shown on site map ☒ Gates secured ☐ N/A

Remarks_____

_____

B. Other Access Restrictions

1. **Signs and other security measures** ☐ Location shown on site map ☐ N/A

Remarks_____

_____

C. Institutional Controls

1. **Implementation and enforcement**

Site conditions imply ICs not properly implemented ☐ Yes ☒ No ☐ N/A

Site conditions imply ICs not being fully enforced ☐ Yes ☒ No ☐ N/A

Type of monitoring (e.g., self-reporting, drive-by) field walk down

Frequency_____

Responsible party/agent ER Operations

Contact	Michael Redd	Manager ER Maintenance	_____	_____
	Name	Title	Date	Phone No.

Report is up-to-date ☒ Yes ☐ No ☐ N/A

Reports are verified by the lead agency ☒ Yes ☐ No ☐ N/A

Specific requirements in deed of decision documents have been met ☒ Yes ☐ No ☐ N/A

Violations have been reported ☐ Yes ☒ No ☐ N/A

Other problems or suggestions: ☒ Report attached

ERD Inspection Data Sheet for D Area Oil Seepage Basin, Document Number ER-SOP-014 dated 11/13/97

_____

_____

_____

2. **Adequacy** ☒ ICs are adequate ☐ ICs are inadequate ☐ N/A

Remarks_____

_____

D. General

1. **Vandalism/trespassing** ☐ Location shown on site map ☒ No vandalism evident

   Remarks_____

2. **Land use changes onsite** ☒ N/A

   Remarks_____

3. **Land use changes offsite** ☒ N/A

   Remarks_____

VI. GENERAL SITE CONDITIONS

A. Roads ☒ Applicable ☐ N/A

1. **Roads damaged** ☐ Location shown on site map ☒ Roads adequate ☐ N/A

   Remarks_____

B. Other site Conditions

Remarks_____

VII. LANDFILL COVERS ☐ Applicable ☒ N/A

A. Landfill Surface

1. **Settlement** (Low spots) ☐ Location shown on site map ☐ Settlement not evident

   Areal extent_____ Depth_____

   Remarks_____

2. **Cracks** ☐ Location shown on site map ☐ Cracking not evident

   Lengths_____ Widths_____ Depths_____

   Remarks_____

3. **Erosion** ☐ Location shown on site map ☐ Erosion not evident

Areal extent_____ Depth_____

Remarks_____

_____

4. **Holes** ☐ Location shown on site map ☐ Holes not evident

Areal extent_____ Depth_____

Remarks_____

_____

5. **Vegetative Cover** ☐ Grass ☐ Cover properly established ☐ No signs of stress

☐ Trees/shrubs (indicate size and location on a diagram)

Remarks_____

_____

6. **Alternative Cover (armored rock, concrete, etc.)** ☐ N/A

Remarks_____

_____

7. **Bulges** ☐ Location shown on site map ☐ Bulges not evident

Areal extent_____ Height_____

Remarks_____

_____

8. **Wet Areas/Water Damage** ☐ Wet areas/water damage not evident

☐ Wet Areas ☐ Location shown on site map Areal extent_____

☐ Ponding ☐ Location shown on site map Areal extent_____

☐ Seeps ☐ Location shown on site map Areal extent_____

☐ Soft subgrade ☐ Location shown on site map Areal extent_____

Remarks_____

_____

9. **Slope Instability** ☐ Slides ☐ Location shown on site map ☐ No evidence of slope instability

Areal extent_____

Remarks_____

_____

B. Benches ☐ Applicable ☒ N/A

(Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)

1. **Flows Bypass Bench** ☐ Location shown on site map ☐ N/A or okay

Remarks_____

_____

2. **Bench Breached** ☐ Location shown on site map ☐ N/A or okay

Remarks_____

_____

3. **Bench Overtopped** ☐ Location shown on site map ☐ N/A or okay

Remarks_____

_____

C. Letdown Channels ☐ Applicable ☒ N/A

(Channel lined with erosion control mates, riprap, grout bags, or gabions that descend down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)

1. **Settlement** ☐ Location shown on site map ☐ No evidence of settlement

Areal extent_____ Depth_____

Remarks_____

_____

2. **Material Degradation** ☐ Location shown on site map ☐ No evidence of degradation

Material type_____ Areal extent _____

Remarks_____

_____

3. **Erosion** ☐ Location shown on site map ☐ No evidence of erosion

Areal extent _____ Depth_____

Remarks_____

_____

4. **Undercutting** ☐ Location shown on site map ☐ No evidence of undercutting

Areal extent _____ Depth_____

Remarks_____

_____

5. **Obstructions** Type_____ ☐ No obstructions

☐ Location shown on site map Areal extent _____

Size _____

Remarks_____

_____

6. **Excessive Vegetative Growth** Type_____

☐ No evidence of excessive growth

☐ Vegetation in channels does not obstruct flow

☐ Location shown on site map Areal extent _____

Remarks_____

_____

D. Cover Penetrations ☐ Applicable ☒ N/A

1. **Gas Vents** ☐ Active ☐ Passive

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A

Remarks_____

_____

2. **Gas Monitoring Probes**

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A

Remarks_____

_____

3. **Monitoring Wells** (within surface area of landfill)

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A

Remarks_____

_____

4. **Leachate Extraction Wells**

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A

Remarks_____

_____

5. **Settlement Monuments** ☐ Located ☐ Routinely surveyed ☐ N/A

Remarks_____

_____

E. Gas Collection and Treatment ☐ Applicable ☒ N/A

1. **Gas Treatment Facilities**

☐ Flaring ☐ Thermal destruction ☐ Collection for reuse

☐ Good condition ☐ Needs Maintenance

Remarks_____

_____

2. **Gas Collection Wells, Manifolds and Piping**

☐ Good condition ☐ Needs Maintenance

Remarks_____

_____

3. **Gas Monitoring Facilities** (e.g., gas monitoring of adjacent homes or buildings)

☐ Good condition ☐ Needs Maintenance ☐ N/A

Remarks_____

_____

F. Cover Drainage Layer ☐ Applicable ☒ N/A

1.	**Outlet Pipes Inspected**	☐ Functioning	☐ N/A
	Remarks_____		
	_____		
2.	**Outlet Rock Inspected**	☐ Functioning	☐ N/A
	Remarks_____		
	_____		

G. Detention/sedimentation Ponds ☐ Applicable ☒ N/A

1. **Siltation** Areal extent_____ Depth_____ ☐ N/A

   ☐ Siltation not evident

   Remarks_____

2. **Erosion** Areal extent_____ Depth_____ ☐ N/A

   ☐ Erosion not evident

   Remarks_____

3. **Outlet Works** ☐ Functioning ☐ N/A

   Remarks_____

4. **Dam** ☐ Functioning ☐ N/A

   Remarks_____

H. Retaining Walls ☐ Applicable ☒ N/A

1. **Deformations** ☐ Location shown on site map ☐ Deformation not evident

   Horizontal displacement_____ Vertical displacement_____

   Rotational displacement_____

   Remarks_____

2. **Degradation** ☐ Location shown on site map ☐ Deformation not evident

   Remarks_____

I. Perimeter Ditches/Off-Site Discharge ☐ Applicable ☒ N/A

1. **Siltation** ☐ Location shown on site map ☐ Siltation not evident

   Areal extent_____ Depth_____

   Remarks_____

2. **Vegetative Growth** ☐ Location shown on site map ☐ Siltation not evident

☐ Vegetation does not impede flow

Areal extent_____ Type_____

Remarks_____

_____

3. **Erosion** ☐ Location shown on site map ☐ Erosion not evident

Areal extent_____ Depth_____

Remarks_____

_____

4. **Discharge Structure** ☐ Location shown on site map ☐ N/A

Remarks_____

_____

VIII. VERTICAL BARRIER WALLS ☐ Applicable ☒ N/A

1. **Settlement** ☐ Location shown on site map ☐ Settlement not evident

Areal extent_____ Depth_____

Remarks_____

_____

2. **Performance Monitoring** Type of Monitoring_____

☐ Performance not monitored

Frequency_____ ☐ Evidence of breaching

Head differential_____

Remarks_____

_____

IX. GROUNDWATER/SURFACE WATER REMEDIES ☒ Applicable ☐ N/A

A. Groundwater Extraction Wells, Pumps, and Pipelines ☐ Applicable ☒ N/A

1. **Pumps, Wellhead Plumbing, and Electrical**

☐ Good condition ☐ All required wells located ☐ Needs Maintenance ☐ N/A

Remarks_____

_____

2. **Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances**

☐ Good condition ☐ Needs Maintenance

Remarks_____

_____

3. **Spare Parts and Equipment**

☐ Readily available ☐ Good condition ☐ Requires upgrade ☐ Needs to be provided

Remarks_____

_____

B. Surface Water Collection Structures, Pumps, and Pipelines ☐ Applicable ☒ N/A

1. **Collection Structures, Pumps, and Electrical**

☐ Good condition ☐ Needs Maintenance

Remarks_____

_____

2. **Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances**

☐ Good condition ☐ Needs Maintenance

Remarks_____

_____

3. **Spare Parts and Equipment**

☐ Readily available ☐ Good condition ☐ Requires upgrade ☐ Needs to be provided

Remarks_____

_____

C. Treatment System ☐ Applicable ☒ N/A

1. **Treatment Train** (Check components that apply)

☐ Metals removal ☐ Oil/water separation ☐ Bioremediation

☐ Air stripping ☐ Carbon adsorbers

☐ Filters_____

☐ Additive (e.g., chelation agent, flocculent)_____

☐ Others_____

☐ Good condition ☐ Needs Maintenance

☐ Sampling ports properly marked and functional

☐ Sampling/maintenance log displayed and up to date

☐ Equipment properly identified

☐ Quantity of groundwater treated annually_____

☐ Quantity of surface water treated annually_____

Remarks_____

_____

2. **Electrical Enclosures and Panels** (properly rated and functional)

☐ N/A ☐ Good condition ☐ Needs Maintenance

Remarks_____

_____

3. **Tanks, Vaults, Storage Vessels**

☐ N/A ☐ Good condition ☐ Proper secondary containment ☐ Needs Maintenance

Remarks_____

_____

4. **Discharge Structure and Appurtenances**

☐ N/A ☐ Good condition ☐ Needs Maintenance

Remarks_____

_____

5. **Treatment Building(s)**

☐ N/A ☐ Good condition (esp. roof and doorways) ☐ Needs repair

☐ Chemicals and equipment properly stored

Remarks_____

_____

6. **Monitoring Wells** (pump and treatment remedy)

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ All required wells located ☐ Needs Maintenance ☐ N/A

Remarks_____

_____

D. Monitoring Data ☒ Applicable ☐ N/A

1. Monitoring Data

☒ Is routinely submitted on time ☐ Is of acceptable quality

2 .Monitoring data suggests:

☒ Groundwater plume is effectively contained ☐ Contaminant concentrations are declining

E. Monitored Natural Attenuation ☒ Applicable ☐ N/A

1. **Monitoring Wells** (Natural attenuation remedy)

☒ Properly secured/locked ☒ Functioning ☒ Routinely sampled ☒ Good condition

☒ All required wells located ☐ Needs Maintenance ☐ N/A

Remarks_____

_____

X. OTHER REMEDIES

If there are remedies applied at the site, which are not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.

XI. OVERALL OBSERVATIONS

A. Implementation of the Remedy

Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emissions, etc.).

B. Adequacy of O & M

Describe issues and observations related to the implementation and scope of O & M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy.

C. Early Indicators of Potential Remedy Failure

Describe issues and observations such as unexpected changes in the cost or scope of O & M or a high frequency of unscheduled repairs that suggest that the protectiveness of the remedy may be compromised in the future.

D. Opportunities for Optimization

Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy.

F-Area Burning/Rubble Pits (231-F, 231-1F, 231-2F) Operable Unit

I. Introduction

This is the second five-year review for the F-Area Burning/Rubble Pits (FBRP) (231-F, 231-1F, 231-2F) Operable Unit (OU). This review was conducted from August 2001 through September 2001. This report documents the results of the review.

II. OU Chronology

Table 1 lists the chronology of site events for the FBRP OU.

III. Background

The FBRP OU comprises a Resource Conservation and Recovery Act (RCRA)/Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) source unit located within the Savannah River Site (SRS), approximately 300 feet west of F Area and 1,100 feet north of SRS Road C (Figures 1 and 2). The FBRP consists of two burning rubble pits (231-F and 231-1F) and one rubble pit (231-2F). The FBRP is located in an industrial area that is proposed for continued future industrial use as supported by the proposed land use map for SRS (WSRC 1996a). Upper Three Runs (UTR) is located approximately 2,300 feet northwest of the FBRP. The local topography of the area is flat upland and the pits are at an elevation of 290 feet above mean sea level and 170 feet above the UTR aquifer. The water table is 70 to 100 feet below ground surface in the area of the FBRP. Surface drainage is to the northwest toward an ephemeral tributary of the UTR, about 7.5 miles upstream of its confluence with the Savannah River.

Groundwater contamination has been documented during the FBRP groundwater monitoring program, both upgradient and downgradient; however a technical

Table 1. Chronology of OU Events

Event	Date
Final ROD issuance	April 22, 1997
Remedial Action start	2Q-1998
Final Remediation Report approved	April 23, 1998
Previous Five-Year Reviews	June 30, 1997

Key:

Consent Decree – Date a consent decree (enforcement document from the court system) was issued for the operable unit.

Corrective Action start – Date the corrective (remedial) action was initiated (under RCRA).

ESD Issuance - Date all three parties (USDOE, USEPA, and SCDHEC) signed the Explanation of Significant Difference used to significantly modify the remedy selected in the Record of Decision.

Final or Interim ROD issuance – Date the three parties (USDOE, USEPA, and SCDHEC) signed the Record of Decision.

Federal Facility Agreement Declared Effective - Date the Federal Facility Agreement formalized the integration of CERCLA and RCRA in remediation activities at SRS.

NPL listing – Date the entire SRS was added to EPA's National Priorities List.

Previous Five-Year Reviews – Date of any previous five year reviews of remedy for the operable unit.

RCRA Closure Certified – Date the three parties (USDOE, USEPA, and SCDHEC) certified that the operable unit had been remediated and closed under the Resource Conservation and Recovery Act.

RCRA Closure Plan Approved – Date the three parties (USDOE, USEPA, and SCDHEC) approved the closure plan for the operable unit under Resource Conservation and Recovery Act.

Remedial Action start/complete – Date the remedial action (final or interim) was initiated/completed (under CERCLA).

Removal Action – Date contaminated media was removed from the operable unit (not associated with the ROD).

RFI/RI start/complete - Date the remedial investigation (sampling) was initiated/completed for the operable unit.

ROD Amendment Issuance - Date the three parties (USDOE, USEPA, and SCDHEC) signed the Record of Decision Amendment used to change the remedy selected in the original Record of Decision.

memorandum and summary for the groundwater has demonstrated that the FBRP is not the source of the groundwater contamination (WSRC 1998b). Revision 1 of this technical memorandum was approved by South Carolina Department of Health and Environmental Control (SCDHEC) on May 31, 2001. United States Environmental Protection Agency (USEPA) comment resolution and final approval of the Revision 1 technical memorandum and summary is pending. The final remedy selected in the FBRP Record of Decision (ROD) only applies to the FBRP source unit soils. This five-year review only addresses the final remedy selected for the FBRP source unit soils. If future groundwater monitoring activities determine FBRP unit soils to be a source contributing to groundwater contamination, a ROD for the FBRP groundwater will be pursued.

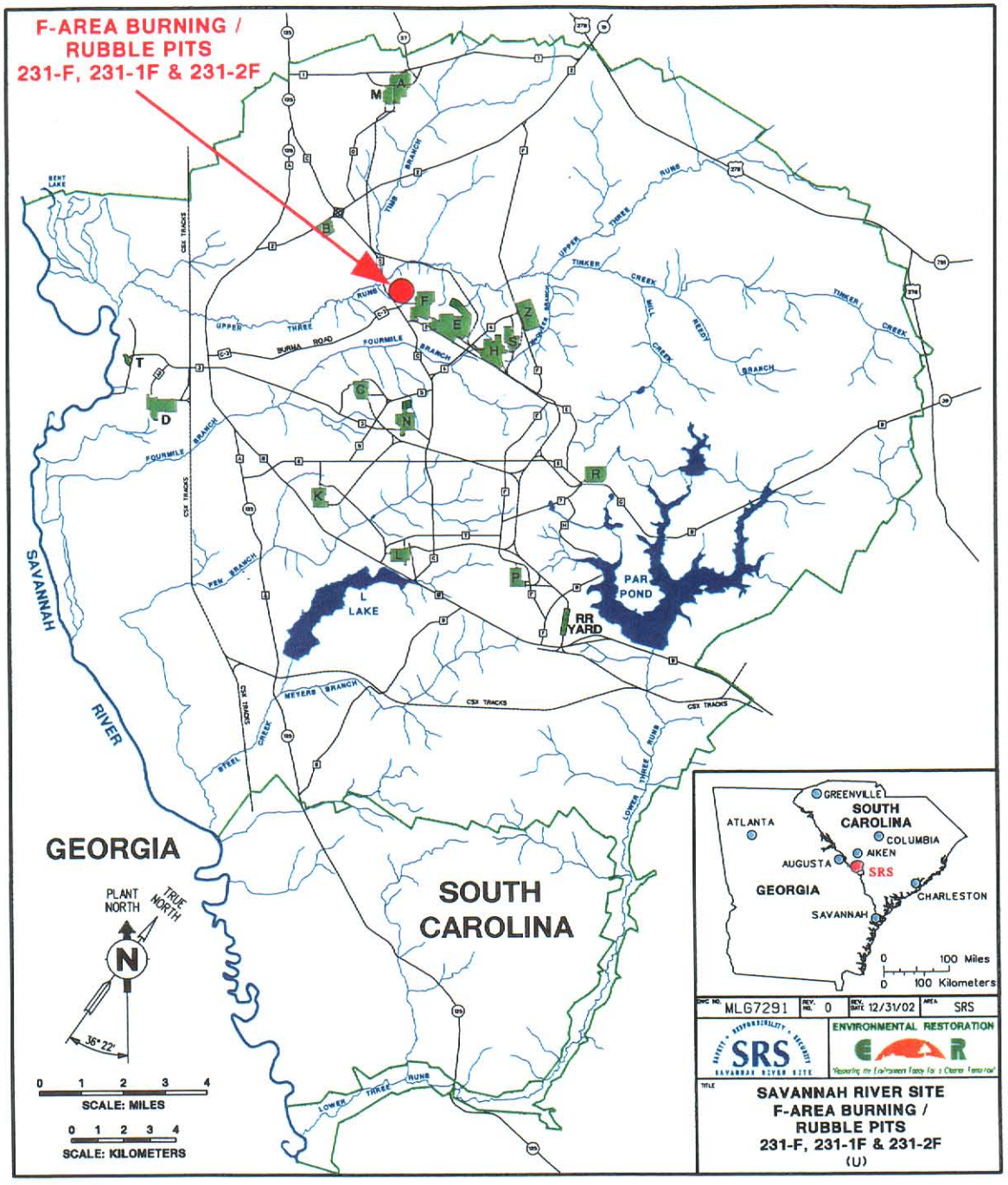


Figure 1. **Location of the F-Area Burning/Rubble Pits (231-F, 231-1F, 231-2F) Operable Unit at SRS**

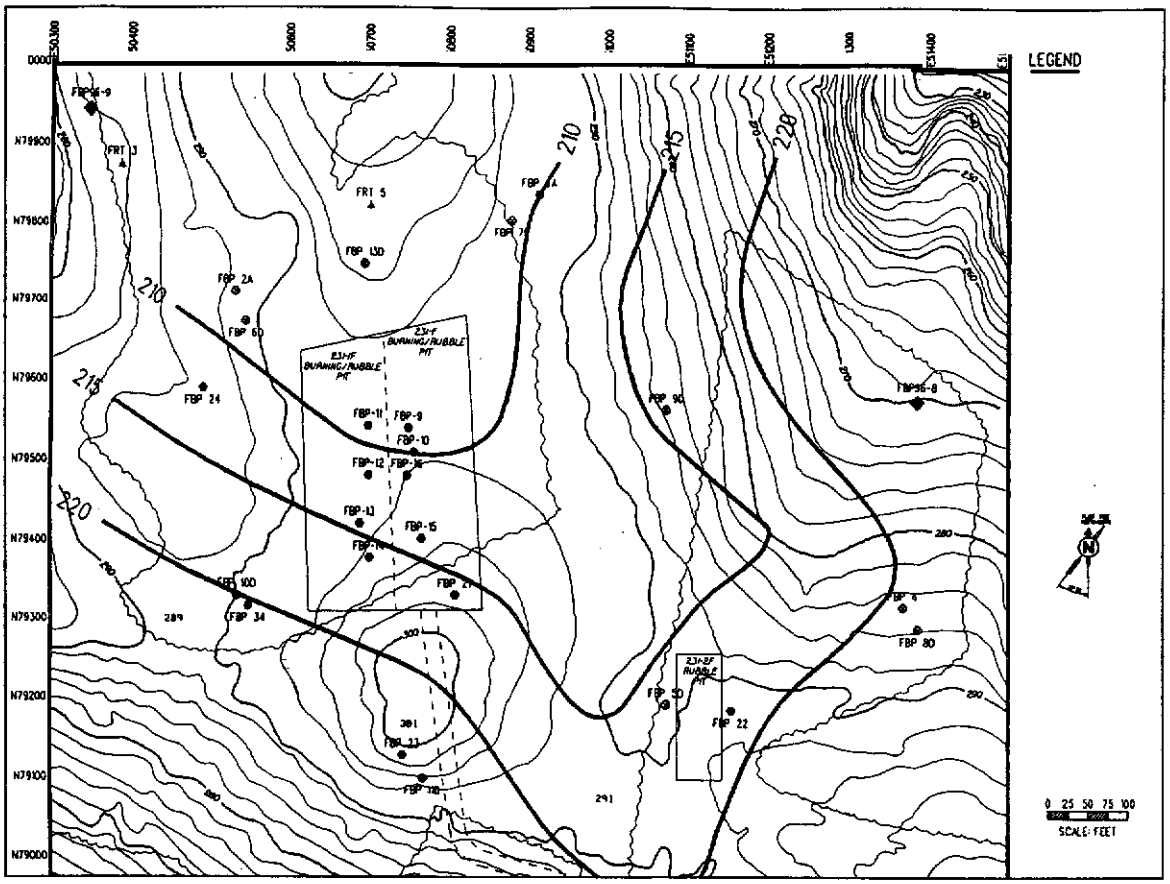


Figure 2. Topographic and Water Table Potentiometric Map of the F-Area Burning/Rubble Pits (231-F, 231-1F, 231-2F) Operable Unit

Pit 231-F is approximately 275 feet long by 50 feet wide by 10 feet deep, and Pit 231-1F is approximately 325 feet long by 50 feet wide by 10 feet deep. The burning/rubble pits operated from 1951 to 1973. During operation of the pits, spent organic solvents, waste oils, rags, paper, plastics, wood, telephone poles, and rubber were disposed of and periodically (monthly) burned. In 1973, the burning of wastes ceased at SRS. A layer of soil was placed over the pit debris and then was filled to capacity with rubble such as concrete, brick, tile, asphalt, plastics, wallboard, rubber, and nonreturnable empty drums. When the pits were filled to capacity in 1978, they were covered with compacted clay-rich native soil, and vegetation was established. All burning/rubble pits were closed by 1981.

Pit 231-2F is approximately 200 feet long by 40 feet wide by 10 feet deep. Pit 231-2F operated from approximately 1951 to 1970 and was used exclusively as a rubble pit for disposal of dry inert concrete, lumber, cement, fence and telephone poles, brick, tile, wallboard, paneling, metal scraps, drums, electrical conduits, and plastics. No burning took place at Pit 231-2F. The pit was filled with soil and closed by 1983.

As part of the RCRA Facility Investigation/Remedial Investigation (RFI/RI) unit assessment, a characterization of the unit was performed from May 4 to December 1, 1993. Twelve soil borings were taken within the pits (four in each pit) and four deep soil borings for geohydrologic data were completed. Seven temporary monitoring wells and six permanent monitoring wells were installed. Approximately 228 soil and water samples were taken for analyses.

The RFI/RI Report determined that the majority of contaminants in the FBRP are located in the interval from 4 feet below the surface to the bottom of Pits 231-F and 231-1F, which is about 10 feet below the surface. A Baseline Risk Assessment (BRA) was performed using data generated during the assessment phase. Detailed information regarding the development of constituents of potential concern, the fate and transport of contaminants, and the risk assessment can be found in the RFI/RI and BRA reports.

Soil

The final constituents of concern (COCs) for soil at the FBRP were arsenic, benzo(a)pyrene, heptachlorodibenzo-p-dioxin, cesium-137, and potassium-40 in Pits 231-F and 231-1F. The risks for future residential land use were 2×10^{-5} for soil ingestion and 3×10^{-5} for direct radiation. For future industrial land use the risks were 5×10^{-6} for soil ingestion and 3×10^{-6} for direct radiation.

The final COCs for Pit 231-2F were aroclor-1254, cesium-137, potassium-40, and strontium-90. The risks for future residential land use were 2×10^{-5} for soil

ingestion and 5 x 10^{-6} for direct radiation. For future industrial land use the risks were 4 x 10^{-6} for soil ingestion.

The maximum level of aroclor-1254 (2.87 mg/kg) contamination detected at the FBRP is below the applicable, relevant and appropriate requirements (ARARs) of 10 mg/kg established by the Toxic Substances Control Act and the USEPA industrial to-be-considered guidance of 10 mg/kg. However, it exceeds the USEPA residential to-be-considered guidance of 1 mg/kg.

There were no final ecological COCs.

Groundwater Assessment

Contaminant transport modeling in the BRA demonstrated that the soil contaminants constitute little or no risk to groundwater. However, groundwater contamination was present downgradient of the FBRP at a total risk (future resident) of 1 x 10^{-4} and a hazard index of 3.0 for all pathways and contaminants. The primary groundwater contaminants [i.e., volatile organic compounds (VOCs)] were also found in wells upgradient of the FBRP, possibly indicating an upgradient source. The source of this groundwater contamination was not determined at that time.

To determine the source of groundwater contamination in the FBRP area, additional groundwater characterization was conducted as proposed in the Rev 2.3 Workplan Addendum. Characterization activities were performed between February 9 and April 23, 1998. The activities included acquisition of cone penetrometer technology (CPT) lithology logs at locations previously sampled by hydropunch for the F-Area Inactive Process Sewer Line (FIPSL) project, installation of 10 new wells (one upgradient three-well cluster, two downgradient wells, and five seepline wells), and sampling of local surface water (seepline) and sediments and groundwater from all wells.

Using groundwater data from the RFI/RI characterization (through 1993) from previous CPT sampling conducted from August 5 to October 15, 1996, and from the additional characterization conducted in 1988, an assessment was performed to determine the source of groundwater contamination in the FBRP area. The assessment, which was documented as a technical memorandum and summary (WSRC 1998b), demonstrated that the FBRP is not the source of the groundwater contamination. Revision 1 of this technical memorandum was approved by SCDHEC on May 31, 2001. The USEPA comment resolution and final approval of the Revision 1 technical memorandum and summary is pending. If future groundwater monitoring activities determine FBRP unit soils to be a source contributing to groundwater contamination, a ROD for the FBRP groundwater will be pursued. Otherwise, the groundwater will be designated a new OU independent of the FBRP source control unit and will undergo a separate Remedial Investigation/Feasibility Study assessment.

Conclusion

Results from the RFI/RI/BRA demonstrate that the FBRP source control unit poses no significant risk to the environment, risk between 1×10^{-6} and 1×10^{-4} to human health of future residents, and risk between 1×10^{-6} and 1×10^{-5} to human health of future industrial workers. Based on these risk levels, a risk management decision was made to implement Institutional Controls as the final remedy to maintain future industrial land use. This decision was supported by SCDHEC and USEPA.

IV. Remedial Actions

The remedial action objectives for this unit are as follows:

- Protect human health (future residents) from exposure to aroclor-1254, cesium-137, potassium-40, and strontium-90 in Pit 231-2F soil above the

1×10^{-6} risk level and from exposure to aroclor-1254 in Pit 231-2F soil above a hazard index of 1.0

- Protect human health (future residents) from exposure to arsenic, benzo(a)pyrene, heptachlorodibenzo-p-dioxin, cesium-137, and potassium-40 in Pits 231-F and 231-lF soil above the 1×10^{-6} risk level

The remedial action for the FBRP source control unit consists of institutional controls that will restrict the land to future industrial use. The FBRP is located in an industrial area that is proposed for continued future industrial use as supported by the proposed land use map for SRS (WSRC 1996a).

As part of institutional controls, signs were posted indicating that this area was used to manage hazardous materials. In addition, existing SRS access controls are being used to maintain this site for industrial use only. In the long term, the elements of the institutional controls will comprise deed notifications, access controls, semi-annual field walkdowns for general site conditions, and further groundwater assessment as necessary. Detailed discussion of these elements is provided in the Final Remediation Report (WSRC 1998a). If the property is ever transferred to non-federal ownership, the U.S. Government will, in compliance with Section 120(h) of CERCLA, create a deed for the new property owner, which will include notification disclosing former waste management and disposal activities as well as remedial actions taken on the site. The deed will also include restrictions precluding residential use of the property.

V. Progress Since Last Review

No additional remedial actions were performed at the OU. Institutional controls are still in place.

VI. Five-Year Review Process

The following tasks were performed as part of the review:

- Reviewed documents listed in Attachment 1
- Reviewed changes in standards and to-be-considered guidance
- Inspected unit to confirm protectiveness of remedial action

VII. Technical Assessment

- Institutional controls are in place and being implemented to provide access control and prevent exposure as intended by the decision documents.
- The exposure assumptions, toxicity data, cleanup levels, and remedial action objectives used at the time of remedy selection are still valid.
- No new information has come to light that could call into question the protectiveness of the remedy.

Institutional controls are identified in the ROD and final remediation report as the selected remedial action at the unit. As part of the remedy, semi-annual walkdowns have been conducted for accuracy and legibility of identification and warning signs, for visible subsidence or erosion of the waste unit, for proper vegetation growth, for mowing, etc. All other routine maintenance activities (i.e., mowing, etc.) and corrective actions have been implemented and documented. For this five-year review, the unit was inspected to confirm that these signs were posted. Inspection records were reviewed to confirm semi-annual inspections. The unit was also inspected to confirm that the remedial action was protective of human health and the environment.

VIII. Issues

No issues related to current site conditions prevent the remedy from being protective.

IX. Recommendations and Follow-up Actions

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

X. Protectiveness Statement(s)

The remedy of Institutional Controls through implementation of a LUCIP at the FBRP OU is protective of human health and the environment. Exposure pathways that could result in unacceptable risks are being controlled by the institutional controls in place while USDOE controls the OU which include: (1) physical access controls to prevent unauthorized entry to SRS and FBRP (fences, guards, security patrols, etc); (2) administrative controls that maintain FBRP for industrial use only (SRS is a secured government facility with land use restrictions); and (3) warning signs and land use controls (SRS Site Use/Site Clearance Program).

XI. Next Review

The next five-year review is scheduled for June 30, 2007.

Attachment 1

Documents Reviewed

WSRC, 1996a. *Savannah River Site Federal Facility Agreement Implementation Plan* (U), WSRC-RP-94-1200, Revision 0, December, Westinghouse Savannah River Company, Aiken, SC

WSRC, 1996b. *RCRA Facility Investigation/Remedial Investigation Report for the F-Area Burning/Rubble Pits (231-F, 231-1F, & 231-2F)* (U), WSRC-RP-94-938, Volume I and II, Revision 1.1, March, Westinghouse Savannah River Company, Aiken, SC

WSRC, 1996c. *Baseline Risk Assessment for the F-Area Burning/Rubble Pits and Rubble Pit* (U), WSRC-TR-94-108, Revision 1.2, March, Westinghouse Savannah River Company, Aiken, SC

WSRC, 1996d. *F-Area Burning/Rubble Pits (231-F, 231-1F, & 231-2F) Corrective Measures Study/Feasibility Study* (U), WSRC-RP-95-660, Revision 1.1, June, Westinghouse Savannah River Company, Aiken, SC

WSRC, 1996e. *Statement of Basis/Proposed Plan for the F-Area Burning/Rubble Pits (231-F, 231-1F, & 231-2F)* (U), WSRC-RP-95-831, Revision 1.2, August, Westinghouse Savannah River Company, Aiken, SC

WSRC, 1997a. *Record of Decision Remedial Alternative Selection for the F-Area Burning/Rubble Pits (231-F, 231-1F, 231-2F) (U)*, WSRC-RP-96-868, Rev. 1, February, Westinghouse Savannah River Company, Aiken, SC

WSRC, 1997b. *Phase II RCRA Facility Investigation/Remedial Investigation Plan for the F-Area Burning/Rubble Pits (231-F, 231-1F) and Rubble Pit (231-2F)* (U), WSRC-RP-90-486, Revision 2.3, December, Westinghouse Savannah River Company, Aiken, SC

WSRC, 1998a. *Final Remediation Report for the F-Area Burning/Rubble Pits (231-F, 231-1F, 231-2F) (U)*, WSRC-RP-97-193, Rev. 1.1, March, Westinghouse Savannah River Company, Aiken, SC

WSRC, 1998b. *Technical Memorandum and Summary Report for the F-Area Burning/Rubble Pits (231-F, 231-1F, 231-2F) (U)*, WSRC-RP-96-884, Rev. 1, August, Westinghouse Savannah River Company, Aiken, SC

WSRC, 1999. *Federal Facility Agreement Annual Progress Report For Fiscal Year 1999* (U), WSRC-RP-99-4300, November, Westinghouse Savannah River Company, Aiken, SC

WSRC, 2000. *Federal Facility Agreement Annual Progress Report For Fiscal Year 2000* (U), WSRC-RP-2000-4300, November, Westinghouse Savannah River Company, Aiken, SC

Attachment 2

Five-Year Review Site Inspection Checklist

Five-Year Review Site Inspection Checklist

I. SITE INFORMATION

Site Name: F-Area Burning/Rubble Pits	**Date of Inspection: 10/17/01**
Location and Region: SRS, USEPA Region IV	**EPA ID:**
Agency, office, or company leading the five-year review: USDOE	**Weather/temperature:**

Remedy Includes: (Check all that apply)

- ☐ Landfill cover/containment
- ☐ Access controls
- ☒ Institutional Controls
- ☐ Groundwater pump and treatment
- ☐ Surface water collection and treatment
- ☐ Other_____
- ☐ Monitored Natural Attenuation
- ☐ Groundwater Containment
- ☐ Vertical Barrier Walls

Attachments: ☐ Inspection team roster attached ☐ Site map attached

II. INTERVIEWS (Check all that apply)

1. **O & M site manager** M. O. Redd (Name) — Mgr. Post-Closure Maintenance (Title) — 10/5/01 (Date)

   Interviewed ☐ at site ☒ at office ☐ by phone Phone No. (803) 952-6882

   Problems, suggestions; ☐ report attached _____

2. **O & M staff** J. D. Hope (Name) — Post-Closure Maintenance (Title) — 10/16/01 (Date)

   Interviewed ☒ at site ☐ at office ☐ by phone Phone No. (803) 952-6706

   Problems, suggestions; ☐ report attached _____

3. **Local regulatory authorities and response agencies** (i.e., State and tribal offices, emergency response office, police department, office of public health or environmental health, zoning office, recorder of deeds, or other city and county offices, etc.) Fill in all that apply.

Agency _____

Contact _____ _____ _____ _____

Name Title Date Phone No.

Problems; suggestions; ☐ Report attached _____

_____

Agency _____

Contact _____ _____ _____ _____

Name Title Date Phone No.

Problems; suggestions; ☐ Report attached _____

_____

Agency _____

Contact _____ _____ _____ _____

Name Title Date Phone No.

Problems; suggestions; ☐ Report attached _____

_____

4. **Other interviews** (optional) ☐ Report attached _____

III. ONSITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)

1. **O & M Documents**

☐ O & M Manual	☐ Readily available	☐ Up to date	☒ N/A
☒ As-built drawings	☒ Readily available	☒ Up to date	☐ N/A
☒ Maintenance Logs	☒ Readily available	☒ Up to date	☐ N/A

Remarks_____

2. **Site-Specific Health and Safety Plan** ☐ Readily available ☐ Up to date ☒ N/A

☐ Contingency plan/emergency response plan ☐ Readily available ☐ Up to date ☒ N/A

Remarks_____

3. **O & M and OSHA Training Records** ☒ Readily available ☒ Up to date ☐ N/A

Remarks_____

4. **Permits and Service Agreements**

☐ Air discharge permit	☐ Readily available	☐ Up to date	☒ N/A
☐ Effluent discharge	☐ Readily available	☐ Up to date	☒ N/A
☐ Waste Disposal, POTW	☐ Readily available	☐ Up to date	☒ N/A
☐ Other permits	☐ Readily available	☐ Up to date	☒ N/A

Remarks_____

5. **Gas Generation Records** ☐ Readily available ☐ Up to date ☒ N/A

Remarks_____

6. **Settlement Monument Records** ☐ Readily available ☐ Up to date ☒ N/A

Remarks_____

7. **Groundwater Monitoring Records** ☐ Readily available ☐ Up to date ☒ N/A

Remarks_____

8. **Leachate Extraction Records** ☐ Readily available ☐ Up to date ☒ N/A

Remarks_____

_____

9. **Discharge Compliance Records**

☐ Air ☐ Readily available ☐ Up to date ☒ N/A

☐ Water (effluent) ☐ Readily available ☐ Up to date ☒ N/A

Remarks_____

_____

10. **Daily Access/Security Logs** ☐ Readily available ☐ Up to date ☒ N/A

Remarks_____

_____

IV. O & M Costs

1. **O & M Organization**

☐ State in-house ☐ Contractor for State

☐ PRP in-house ☐ Contractor for PRP

☒ Other SRS

2. **O & M Cost Records**

☐ Readily available ☐ Up to date

☐ Funding mechanism/agreement in place

☐ Other_____

Total annual cost by year for review period if available

From_____ To_____ _____ ☐ Breakdown attached
Date Date Total cost

From_____ To_____ _____ ☐ Breakdown attached
Date Date Total cost

From_____ To_____ _____ ☐ Breakdown attached
Date Date Total cost

From_____ To_____ _____ ☐ Breakdown attached
Date Date Total cost

From_____ To_____ _____ ☐ Breakdown attached
Date Date Total cost

1. **Unanticipated or Unusually High O & M Costs During Review Period**

Describe costs and reasons: _____

V. ACCESS AND INSTITUTIONAL CONTROLS ☒ Applicable ☐ N/A

A. Fencing

1. **Fencing Damaged** ☐ Location shown on site map ☐ Gates secured ☒ N/A

Remarks_____

_____

B. Other Access Restrictions

1. **Signs and other security measures** ☐ Location shown on site map ☐ N/A

Remarks Signs posted at entrance.

_____

C. Institutional Controls

1. Implementation and enforcement

Site conditions imply ICs not properly implemented ☐ Yes ☒ No ☐ N/A

Site conditions imply ICs not being fully enforced ☐ Yes ☒ No ☐ N/A

Type of monitoring (e.g., self-reporting, drive-by) Visual Inspection

Frequency semi-annual

Responsible party/agent USDOE – Savannah River Field Office

Contact	D. Hannah	USDOE – Waste Area Group Manager	(803) 725-0420
	Name	Title	Phone No.

Report is up-to-date ☐ Yes ☐ No ☐ N/A

Reports are verified by the lead agency ☐ Yes ☐ No ☐ N/A

Specific requirements in deed of decision documents have been met ☐ Yes ☐ No ☐ N/A

Violations have been reported ☐ Yes ☐ No ☐ N/A

Other problems or suggestions: ☐ Report attached

Inspection data sheet attached

_____

_____

_____

2. Adequacy ☐ ICs are adequate ☐ ICs are inadequate ☐ N/A

Remarks_____

_____

D. General

1. **Vandalism/trespassing** ☐ Location shown on site map ☒ No vandalism evident

Remarks_____

2. **Land use changes onsite** ☒ N/A

Remarks_____

3. **Land use changes offsite** ☒ N/A

Remarks_____

VI. GENERAL SITE CONDITIONS

A. Roads ☐ Applicable ☐ N/A

1. **Roads damaged** ☐ Location shown on site map ☐ Roads adequate ☒ N/A

Remarks_____

B. Other site Conditions

Remarks_____

VII. LANDFILL COVERS ☐ Applicable ☒ N/A

A. Landfill Surface

1. **Settlement** (Low spots) ☐ Location shown on site map ☐ Settlement not evident

Areal extent_____ Depth_____

Remarks_____

2. **Cracks** ☐ Location shown on site map ☐ Cracking not evident

Lengths_____ Widths_____ Depths_____

Remarks_____

3. **Erosion** ☐ Location shown on site map ☐ Erosion not evident

Areal extent_____ Depth_____

Remarks_____

_____

4. **Holes** ☐ Location shown on site map ☐ Holes not evident

Areal extent_____ Depth_____

Remarks_____

_____

5. **Vegetative Cover** ☐ Grass ☐ Cover properly established ☐ No signs of stress

☐ Trees/shrubs (indicate size and location on a diagram)

Remarks_____

_____

6. **Alternative Cover (armored rock, concrete, etc.)** ☐ N/A

Remarks_____

_____

7. **Bulges** ☐ Location shown on site map ☐ Bulges not evident

Areal extent_____ Height_____

Remarks_____

_____

8. **Wet Areas/Water Damage** ☐ Wet areas/water damage not evident

☐ Wet Areas ☐ Location shown on site map Areal extent_____

☐ Ponding ☐ Location shown on site map Areal extent_____

☐ Seeps ☐ Location shown on site map Areal extent_____

☐ Soft subgrade ☐ Location shown on site map Areal extent_____

Remarks_____

_____

9. **Slope Instability** ☐ Slides ☐ Location shown on site map ☐ No evidence of slope instability

Areal extent_____

Remarks_____

_____

B. Benches ☐ Applicable ☐ N/A

(Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)

1. **Flows Bypass Bench** ☐ Location shown on site map ☐ N/A or okay

Remarks_____

_____

2. **Bench Breached** ☐ Location shown on site map ☐ N/A or okay

Remarks_____

_____

3. **Bench Overtopped** ☐ Location shown on site map ☐ N/A or okay

Remarks_____

_____

C. Letdown Channels ☐ Applicable ☐ N/A

(Channel lined with erosion control mates, riprap, grout bags, or gabions that descend down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)

1. **Settlement** ☐ Location shown on site map ☐ No evidence of settlement

Areal extent_____ Depth_____

Remarks_____

_____

2. **Material Degradation** ☐ Location shown on site map ☐ No evidence of degradation

Material type_____ Areal extent _____

Remarks_____

_____

3. **Erosion** ☐ Location shown on site map ☐ No evidence of erosion

Areal extent _____ Depth_____

Remarks_____

_____

4. **Undercutting** ☐ Location shown on site map ☐ No evidence of undercutting

Areal extent _____ Depth_____

Remarks_____

_____

5. **Obstructions** Type_____ ☐ No obstructions

☐ Location shown on site map Areal extent _____

Size _____

Remarks_____

_____

6. **Excessive Vegetative Growth** Type_____

☐ No evidence of excessive growth

☐ Vegetation in channels does not obstruct flow

☐ Location shown on site map Areal extent _____

Remarks_____

_____

D. Cover Penetrations ☐ Applicable ☐ N/A

1. **Gas Vents** ☐ Active ☐ Passive

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A

Remarks_____

_____

2. **Gas Monitoring Probes**

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A

Remarks_____

_____

3. **Monitoring Wells** (within surface area of landfill)

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A

Remarks_____

_____

4. **Leachate Extraction Wells**

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A

Remarks_____

_____

5. **Settlement Monuments** ☐ Located ☐ Routinely surveyed ☐ N/A

Remarks_____

_____

E. Gas Collection and Treatment ☐ Applicable ☐ N/A

1. **Gas Treatment Facilities**

☐ Flaring ☐ Thermal destruction ☐ Collection for reuse

☐ Good condition ☐ Needs Maintenance

Remarks_____

_____

2. **Gas Collection Wells, Manifolds and Piping**

☐ Good condition ☐ Needs Maintenance

Remarks_____

_____

3. **Gas Monitoring Facilities** (e.g., gas monitoring of adjacent homes or buildings)

☐ Good condition ☐ Needs Maintenance ☐ N/A

Remarks_____

_____

F. Cover Drainage Layer ☐ Applicable ☐ N/A

1. **Outlet Pipes Inspected** ☐ Functioning ☐ N/A Remarks_____	
2. **Outlet Rock Inspected** ☐ Functioning ☐ N/A Remarks_____	

G. Detention/sedimentation Ponds ☐ Applicable ☐ N/A

1. **Siltation** Areal extent_____ Depth_____ ☐ N/A

   ☐ Siltation not evident

   Remarks_____

2. **Erosion** Areal extent_____ Depth_____ ☐ N/A

   ☐ Erosion not evident

   Remarks_____

3. **Outlet Works** ☐ Functioning ☐ N/A

   Remarks_____

4. **Dam** ☐ Functioning ☐ N/A

   Remarks_____

H. Retaining Walls ☐ Applicable ☐ N/A

1. **Deformations** ☐ Location shown on site map ☐ Deformation not evident

   Horizontal displacement_____ Vertical displacement_____

   Rotational displacement_____

   Remarks_____

2. **Degradation** ☐ Location shown on site map ☐ Deformation not evident

   Remarks_____

I. Perimeter Ditches/Off-Site Discharge ☐ Applicable ☐ N/A

1. **Siltation** ☐ Location shown on site map ☐ Siltation not evident

   Areal extent_____ Depth_____

   Remarks_____

2. **Vegetative Growth** ☐ Location shown on site map ☐ Siltation not evident

☐ Vegetation does not impede flow

Areal extent_____ Type_____

Remarks_____

_____

3. **Erosion** ☐ Location shown on site map ☐ Erosion not evident

Areal extent_____ Depth_____

Remarks_____

_____

4. **Discharge Structure** ☐ Location shown on site map ☐ N/A

Remarks_____

_____

VIII. VERTICAL BARRIER WALLS ☐ Applicable ☒ N/A

1. **Settlement** ☐ Location shown on site map ☐ Settlement not evident

Areal extent_____ Depth_____

Remarks_____

_____

2. **Performance Monitoring** Type of Monitoring_____

☐ Performance not monitored

Frequency_____ ☐ Evidence of breaching

Head differential_____

Remarks_____

_____

IX. GROUNDWATER/SURFACE WATER REMEDIES ☐ Applicable ☒ N/A

A. Groundwater Extraction Wells, Pumps, and Pipelines ☐ Applicable ☐ N/A

1. **Pumps, Wellhead Plumbing, and Electrical**

☐ Good condition ☐ All required wells located ☐ Needs Maintenance ☐ N/A

Remarks_____

_____

2. **Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances**

☐ Good condition ☐ Needs Maintenance

Remarks_____

_____

3. **Spare Parts and Equipment**

☐ Readily available ☐ Good condition ☐ Requires upgrade ☐ Needs to be provided

Remarks_____

_____

B. Surface Water Collection Structures, Pumps, and Pipelines ☐ Applicable ☐ N/A

1. **Collection Structures, Pumps, and Electrical**

☐ Good condition ☐ Needs Maintenance

Remarks_____

_____

2. **Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances**

☐ Good condition ☐ Needs Maintenance

Remarks_____

_____

3. **Spare Parts and Equipment**

☐ Readily available ☐ Good condition ☐ Requires upgrade ☐ Needs to be provided

Remarks_____

_____

C. Treatment System ☐ Applicable ☐ N/A

1. **Treatment Train** (Check components that apply)

☐ Metals removal ☐ Oil/water separation ☐ Bioremediation

☐ Air stripping ☐ Carbon adsorbers

☐ Filters_____

☐ Additive (e.g., chelation agent, flocculent)_____

☐ Others_____

☐ Good condition ☐ Needs Maintenance

☐ Sampling ports properly marked and functional

☐ Sampling/maintenance log displayed and up to date

☐ Equipment properly identified

☐ Quantity of groundwater treated annually_____

☐ Quantity of surface water treated annually_____

Remarks_____

_____

2. **Electrical Enclosures and Panels** (properly rated and functional)

☐ N/A ☐ Good condition ☐ Needs Maintenance

Remarks_____

_____

3. **Tanks, Vaults, Storage Vessels**

☐ N/A ☐ Good condition ☐ Proper secondary containment ☐ Needs Maintenance

Remarks_____

_____

4. **Discharge Structure and Appurtenances**

☐ N/A ☐ Good condition ☐ Needs Maintenance

Remarks_____

_____

5. **Treatment Building(s)**

☐ N/A ☐ Good condition (esp. roof and doorways) ☐ Needs repair

☐ Chemicals and equipment properly stored

Remarks_____

_____

6. **Monitoring Wells** (pump and treatment remedy)

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ All required wells located ☐ Needs Maintenance ☐ N/A

Remarks_____

_____

D. Monitoring Data ☐ Applicable ☐ N/A

1. Monitoring Data

☐ Is routinely submitted on time ☐ Is of acceptable quality

2 Monitoring data suggests:

☐ Groundwater plume is effectively contained ☐ Contaminant concentrations are declining

E. Monitored Natural Attenuation ☐ Applicable ☐ N/A

1. **Monitoring Wells** (Natural attenuation remedy)

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ All required wells located ☐ Needs Maintenance ☐ N/A

Remarks_____

_____

X. OTHER REMEDIES

If there are remedies applied at the site, which are not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.

XI. OVERALL OBSERVATIONS

A. Implementation of the Remedy

Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emissions, etc.).

SRS site use/site clearance controls limit activities at the OU. Signs are in place.

B. Adequacy of O & M

Describe issues and observations related to the implementation and scope of O & M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy.

None at this time.

C. Early Indicators of Potential Remedy Failure

Describe issues and observations such as unexpected changes in the cost or scope of O & M or a high frequency of unscheduled repairs that suggest that the protectiveness of the remedy may be compromised in the future.

None at this time.

D. Opportunities for Optimization

Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy.

None at this time.

F-Area Groundwater Operable Unit

I. Introduction

The review for this unit is conducted under the SRS RCRA program. The CERCLA review requirements are met by the RCRA program, therefore a separate review of the RCRA Corrective Action is not duplicated in this document. This is the second such five-year review for the F-Area Groundwater Operable Unit (OU). This review was conducted from August 2001 through September 2001. This report documents the results of the review.

II. Site Chronology

Table 1 lists the chronology of site events for the F-Area Groundwater Operable Unit.

III. Background

The F-Area Groundwater OU is a media-specific OU within the Upper Three Runs Watershed. The basins comprising the F-Area HWMF were stabilized and closed in 1991. The F-Area Groundwater OU is the groundwater associated with the F-Area HWMF.

The F-Area HWMF was operated from 1955 until 1988. During that time, the facility received waste effluents from F-Area chemical separations facilities such as the nitric acid recovery unit, waste storage system evaporator overheads, and general purpose evaporator overheads. Significant amounts of nitrate and caustic were received. Tritium was the primary radionuclide released to the basins.

The maximum detected levels of several contaminants (e.g., tritium, cadmium, and lead) in the F-Area groundwater currently exceed the National Primary Drinking Water Standards, and applicable state standards. However, potential exposures to the general public are minimized by the distance from the OU to the

Table 1. Chronology of Site Events

Event	Date
RCRA Closure Plan Approved	1989
Corrective Action start	1989
RCRA Closure Certified	1991
Interim ROD issuance	April 13, 1995
Previous Five-Year Reviews	June 30, 1997

Key:

Consent Decree – Date a consent decree (enforcement document from the court system) was issued for the operable unit.

Corrective Action start – Date the corrective (remedial) action was initiated (under RCRA).

ESD Issuance - Date all three parties (USDOE, USEPA, and SCDHEC) signed the Explanation of Significant Difference used to significantly modify the remedy selected in the Record of Decision.

Final or Interim ROD issuance – Date the three parties (USDOE, USEPA, and SCDHEC) signed the Record of Decision.

Federal Facility Agreement Declared Effective - Date the Federal Facility Agreement formalized the integration of CERCLA and RCRA in remediation activities at SRS.

NPL listing – Date the entire SRS was added to EPA's National Priorities List.

Previous Five-Year Reviews – Date of any previous five year reviews of remedy for the operable unit.

RCRA Closure Certified – Date the three parties (USDOE, USEPA, and SCDHEC) certified that the operable unit had been remediated and closed under the Resource Conservation and Recovery Act.

RCRA Closure Plan Approved – Date the three parties (USDOE, USEPA, and SCDHEC) approved the closure plan for the operable unit under Resource Conservation and Recovery Act.

Remedial Action start/complete – Date the remedial action (final or interim) was initiated/completed (under CERCLA).

Removal Action – Date contaminated media was removed from the operable unit (not associated with the ROD).

RFI/RI start/complete - Date the remedial investigation (sampling) was initiated/completed for the operable unit.

ROD Amendment Issuance - Date the three parties (USDOE, USEPA, and SCDHEC) signed the Record of Decision Amendment used to change the remedy selected in the original Record of Decision.

site boundary, by natural attenuation and radionuclide decay, by institutional controls, and by dilution in receiving streams. In addition, all offsite contaminant concentrations are well below drinking water and other applicable standards. The remediation of the F-Area Groundwater OU will be designed to meet, as far as practicable, the Phase I groundwater protection standards outlined in the RCRA permit.

IV. Interim Remedial Actions

The selected remedy for this unit as identified in the Record of Decision is no further action under CERCLA.

V. Progress Since Last Review

This is the second 5-year review for this OU. Since the previous review in June of 1997, the following actions were completed:

- Continued operation of the groundwater removal and treatment system

VI. Five-Year Review Process

The following tasks were performed as part of the review:

- Reviewed the documents listed in Attachment 1
- Confirmed the implementation of the remedial action
- Assured that all actions required under the RCRA Permit were implemented

VII. Technical Assessment

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

VIII. Issues

There are no issues for this OU.

IX. Recommendations and Follow-up Actions

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

X. Protectiveness Statement(s)

The remedy of no further action under CERCLA is protective of human health and the environment.

XI. Next Review

The next five-year review is scheduled for June 30, 2007.

Attachment 1

List of Documents Reviewed

WSRC, 1994. *Interim Action Record of Decision Remedial Alternative Selection for F-Area Groundwater Operable Unit (U),* WSRC-RP-94-1162, Revision 1, April 1995, Westinghouse Savannah River Company, Aiken, SC.

F-Area Hazardous Waste Management Facility (904-41G, -42G, -43G) Operable Unit

I. Introduction

The review for this unit is conducted under the SRS RCRA program. The CERCLA review requirements are met by the RCRA program, therefore a separate review of the RCRA Corrective Action is not duplicated in this document. This is the second such five-year review for the F-Area Hazardous Waste Management Facility (904-41G, -42G, -43G) (HWMF) Operable Unit (OU). This review was conducted from August 2001 through September 2001. This report documents the results of the review.

II. Site Chronology

Table 1 lists the chronology of site events for the F-Area HWMF.

III. Background

The F-Area HWMF (904-41G, -42G, -43G) operated from 1955 until November 7, 1988. During that time, the facility received waste effluents from F-Area chemical separation facilities processes such as the nitric acid recovery unit, waste storage system evaporator overheads, and general-purpose evaporator overheads. The facility consists of three basins with a combined maximum operating capacity of 20.5 million gallons of wastewater.

Significant amounts of nitrate and caustic were received in the basins. Radioactive releases were greater than 99 percent tritium. A 1984 soil coring study showed that approximately 90 percent of the radionuclides, cations, and anions were concentrated within the top 1 ft of basin soil.

These basins were closed by dewatering, physically and chemically stabilizing the remaining sludges, and placing a protective multi-layer cover system over them to

Table 1. Chronology of Site Events

Event	Date
RCRA Closure Plan Approved	1989
Corrective Action start	1989
RCRA Closure Certified	1991
Final ROD issuance	September 23, 1993
Previous Five-Year Reviews	June 30, 1997

Key:

Consent Decree – Date a consent decree (enforcement document from the court system) was issued for the operable unit.

Corrective Action start – Date the corrective (remedial) action was initiated (under RCRA).

ESD Issuance - Date all three parties (USDOE, USEPA, and SCDHEC) signed the Explanation of Significant Difference used to significantly modify the remedy selected in the Record of Decision.

Final or Interim ROD issuance – Date the three parties (USDOE, USEPA, and SCDHEC) signed the Record of Decision.

Federal Facility Agreement Declared Effective - Date the Federal Facility Agreement formalized the integration of CERCLA and RCRA in remediation activities at SRS.

NPL listing – Date the entire SRS was added to EPA's National Priorities List.

Previous Five-Year Reviews – Date of any previous five year reviews of remedy for the operable unit.

RCRA Closure Certified – Date the three parties (USDOE, USEPA, and SCDHEC) certified that the operable unit had been remediated and closed under the Resource Conservation and Recovery Act.

RCRA Closure Plan Approved – Date the three parties (USDOE, USEPA, and SCDHEC) approved the closure plan for the operable unit under Resource Conservation and Recovery Act.

Remedial Action start/complete – Date the remedial action (final or interim) was initiated/completed (under CERCLA).

Removal Action – Date contaminated media was removed from the operable unit (not associated with the ROD).

RFI/RI start/complete - Date the remedial investigation (sampling) was initiated/completed for the operable unit.

ROD Amendment Issuance - Date the three parties (USDOE, USEPA, and SCDHEC) signed the Record of Decision Amendment used to change the remedy selected in the original Record of Decision.

reduce rainwater contact with basin bottoms. A RCRA Part B permit application for post-closure care was submitted in December 1990, and a hazardous waste permit was issued effective November 1992.

As a condition of the RCRA hazardous waste permit, post-closure groundwater monitoring is required to verify that no unacceptable exposures to potential hazards are posed by conditions at the OU in the future. Routine inspections are required for a minimum of 30 years to verify the integrity of the cover system, fences, signs, etc. Any necessary repairs to the cap will be made as part of the maintenance program. In addition, access to the F-Area HWMF is restricted to authorized personnel with appropriate training on applicable requirements. The

survey plat and records associated with deed restricted use of the F-Area HWMF have been filed in the Aiken County Courthouse, South Carolina.

IV. Final Remedial Actions

The selected remedy for this unit as identified in the Record of Decision is no further action under CERCLA.

V. Progress Since Last Review

This is the second 5-year review for this OU. Since the previous review in June of 1997, the following actions were completed:

- Annual inspections and maintenance to the soil cover as required by the RCRA Closure Plan

VI. Five-Year Review Process

The following tasks were performed as part of the review:

- Reviewed the documents listed in Attachment 1
- Confirmed the implementation of the remedial action
- Assured that all actions required under the RCRA Permit were implemented

VII. Technical Assessment

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

VIII. Issues

There are no issues for this OU.

IX. Recommendations and Follow-up Actions

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

X. Protectiveness Statement(s)

The remedy of no further action under CERCLA is protective of human health and the environment.

XI. Next Review

The next five-year review is scheduled for June 30, 2007.

Attachment 1

List of Documents Reviewed

WSRC, 1993. *Final Record of Decision Remedial Alternative Selection for F-Area Hazardous Waste Management Facility (U),* WSRC-RP-92-1042, Revision 1, September 2, 1993, Westinghouse Savannah River Company, Aiken, SC.

F-Area Retention Basin (281-3F) Operable Unit

I. Introduction

This is the first five-year review for the F-Area Retention Basin (FRB) (281-3F) Operable Unit (OU). This review was conducted from August 2001 through September 2001. This report documents the results of the review.

II. OU Chronology

Table 1 lists the chronology of site events for the FRB OU.

III. Background

The FRB OU is located outside and south of the F-Area perimeter fence, approximately 1,035 meters (m) (3,397 feet (ft)) north of Fourmile Branch (Figure 1). The FRB OU has an area of approximately 0.24 hectares (0.6 acres) with approximate dimensions of 61 m (200 ft) long, 39.3 m (129 ft) wide, and 2.1 m (6.9 ft) deep. The basin was designed and operated as an unlined temporary storage pond (capacity of approximately 4.5 million liters [1.2 million gallons]) for potentially contaminated cooling water from the F-Area Canyon Facility and stormwater drainage from the F-Area Tank Farm. Water was conveyed to the basin by a process sewer line (approximately 550 ft of 24-inch and 700 ft of 36-inch) that discharged into the north side of the basin.

The FRB OU became operational in 1955 and remained active until 1972. It was closed in December of 1978. At the time of closure, soil sampling was performed at the basin and approximately 2 ft of soil was excavated from the bottom of the basin. The basin was backfilled with clean soil and the area was seeded with grass. A total of 970 m^3 (1,268 yd^3) of contaminated soil was removed from the basin and transported to the Old Radioactive Waste Burial Ground (643-E) for permanent disposal.

Table 1. Chronology of OU Events

Event	Date
Removal action (Soil Excavation)	1979 removed 2 feet of soil
RI complete	1997
Final ROD issuance	October 19, 1998
Remedial Action start	March 17, 1999
ESD issuance	June 13, 2001

Key:

Consent Decree – Date a consent decree (enforcement document from the court system) was issued for the operable unit.

Corrective Action start – Date the corrective (remedial) action was initiated (under RCRA).

ESD Issuance - Date all three parties (USDOE, USEPA, and SCDHEC) signed the Explanation of Significant Difference used to significantly modify the remedy selected in the Record of Decision.

Final or Interim ROD issuance – Date the three parties (USDOE, USEPA, and SCDHEC) signed the Record of Decision.

Federal Facility Agreement Declared Effective - Date the Federal Facility Agreement formalized the integration of CERCLA and RCRA in remediation activities at SRS.

NPL listing – Date the entire SRS was added to EPA's National Priorities List.

Previous Five-Year Reviews – Date of any previous five year reviews of remedy for the operable unit.

RCRA Closure Certified – Date the three parties (USDOE, USEPA, and SCDHEC) certified that the operable unit had been remediated and closed under the Resource Conservation and Recovery Act.

RCRA Closure Plan Approved – Date the three parties (USDOE, USEPA, and SCDHEC) approved the closure plan for the operable unit under Resource Conservation and Recovery Act.

Remedial Action start/complete – Date the remedial action (final or interim) was initiated/completed (under CERCLA).

Removal Action – Date contaminated media was removed from the operable unit (not associated with the ROD).

RFI/RI start/complete - Date the remedial investigation (sampling) was initiated/completed for the operable unit.

ROD Amendment Issuance - Date the three parties (USDOE, USEPA, and SCDHEC) signed the Record of Decision Amendment used to change the remedy selected in the original Record of Decision.

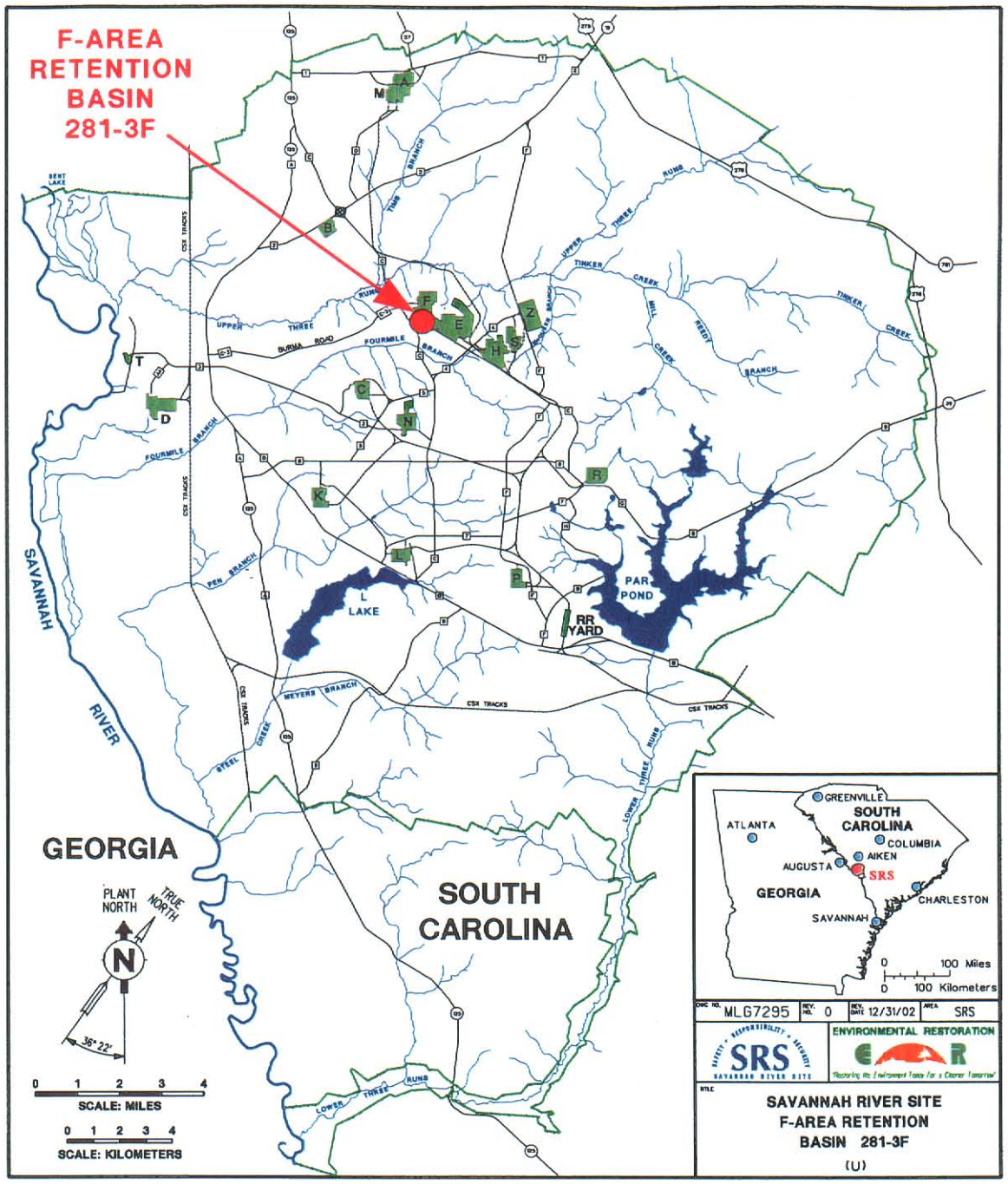


Figure 1. Location of the F-Area Retention Basin (281-3F) OU at SRS

When the basin was closed, two sections of the process sewer line that served the basin were abandoned. These included both branches of the pipeline that ran from the Tank Farm and from the Canyon Facility. The 24-inch diameter pipeline that extended from the Tank Farm was sealed off at manhole 805-2F. The 36-inch diameter pipeline that extended from the Canyon Facility was sealed off at manhole P-40. The approximate length of the abandoned portion of the process sewer line located to the north and south of the basin is 1,150 ft and forms a part of this OU.

The basin, surrounding soils, and groundwater were characterized in detail in 1997. These results were reported in the Groundwater Sampling Report (WSRC 1997a) and the Baseline Risk Assessment (BRA) (WSRC 1997b). The results showed that the groundwater was not contaminated and, therefore, would not require remediation. The soil in the basin area and the process sewer line area was contaminated primarily with cesium-137, radium-226, and potassium-40 in the surface soil. The subsurface soil contained strontium-90, which was identified as a contaminant migration constituent of concern (CM COC). The basin deep soil, 6 to 14 ft deep, is contaminated with high levels of radionuclides and is considered to be principal threat source material (PTSM). The final contaminants of concern (COCs) for the FRB OU are shown in Table 2. Table 3 shows the PTSM at depth in the FRB OU with their respective maximum detected concentrations.

Groundwater beneath the FRB is included in this OU. The current and future anticipated land use is industrial.

Table 2. COCs for Soil at the FRB OU with Maximum Detected Concentrations and Remedial Goals

Basin Area			
Medium	**Analyte**	**Maximum Detect**	**RG for Soil**
Surface Soil (0-1 foot)	Cesium-137 Potassium-40 Radium-226 Thallium*	0.29 pCi/g 2.49pCi/g 0.931 pCi/g 6.12 mg/kg	0.74 pCi/g 2.53 pCi/g 0.226 pCi/g 25.9 mg/kg
Subsurface Soil (0-4 feet)	Arsenic Cesium-137 Potassium-40 Radium-226 Thallium*	7.13 mg/kg 10.9 pCi/g 3.04 pCi/g 0.931 pCi/g 6.93 mg/kg	11.1 mg/kg 0.74 pCi/g 2.53 pCi/g 0.226 pCi/g 25.9 mg/kg
Groundwater	None	N/A	N/A
Leachability to Groundwater from FRB OU Soil	Strontium-90 (CM COC)	79 pCi/L @ 76 years (modeled level)	109 pCi/g** (will result in 8.0 pCi/L in groundwater)
Process Sewer Line Area			
Medium	**Analyte**	**Maximum Detect**	**RG for Soil**
Surface Soil (0-1 foot)	Arsenic* Actinium-228 Cesium-137 Lead-212* Potassium-40 Radium-226	20.8 mg/kg 1.57 pCi/g 2.69 pCi/g 1.65 pCi/g 2.42 pCi/g 1.21 pCi/g	11.1 mg/kg 0.202 pCi/g 0.74 pCi/g 2.19 pCi/g 2.53 pCi/g 0.226 pCi/g
Subsurface Soil (0-4 feet)	Arsenic* Actinium-228 Cesium-137 Lead-212* Potassium-40 Radium-226 Strontium-90	17.7 mg/kg 2.51 pCi/g 21.3 pCi/g 2.44 pCi/g 1.49 pCi/g 2.60 pCi/g 21.8 pCi/g	11.1 mg/kg 0.202 pCi/g 0.74 pCi/g 2.19 pCi/g 2.53 pCi/g 0.226 pCi/g 233 pCi/g
Groundwater	None	N/A	N/A
Sediment within the Pipeline & Manholes	Arsenic* Cesium-137* Plutonium-239/240*	16.3 mg/kg 2040 pCi/g 32.2 pCi/g	63.9 mg/kg 1.1 pCi/g 26.3 pCi/g

* Secondary COCs

** Remedial Goal (RG) is the level of leachable contaminants from FRB OU soil that will not exceed the maximum contaminant level (MCL) in the future. The RG is derived from the modeling performed for leachability. The MCL for strontium-90 is 8.0 pCi/L.

Table 3. PTSM Contamination at Depth for the FRB OU with Maximum Detected Concentrations

Basin Area		
Medium	**Analyte**	**Maximum Concentration**
Subsurface Soil at Depth	Cesium-137 Strontium-90 Radium-226	2,200 pCi/g 1,080 pCi/g 1.37 pCi/g

IV. Remedial Actions

The remedial objectives for this OU are listed below:

- Reduce risks to human health associated with the COCs through
  - ω external exposure to radiological constituents by direct contact with the basin area soil, surface water, and sewer line area soil and
  - ω ingestion of former basin area and sewer pipeline area soils and pipeline sediment or produce grown in soils with radiological constituents.
- Prevent or mitigate exposure to highly toxic or highly mobile contaminants that represent PTSM
- Prevent or mitigate leaching and migration of strontium-90 to groundwater at levels that will cause the groundwater to exceed its MCL of 8.0 pCi/L.

The remedial actions selected in the ROD for the basin soil at this OU are listed below:

- In Situ Stabilization – for the PTSM located approximately 2 ft above the basin bottom to approximately 6 ft below the basin bottom

- Low Permeability Soil Cover – a soil cover designed to minimize infiltration of precipitation and serve as a barrier to shield human and ecological receptors from potential contamination from the soil

- Institutional Controls - includes site access/site use controls while the property is owned and operated by United States Department of Energy (USDOE), installation of warning signs, and use of deed notifications if the property is ever passed to nonfederal ownership

- Groundwater Monitoring – to ensure in situ stabilization and the soil cover have prevented strontium-90 from migrating to the groundwater

The remedial actions selected in the ROD for the process sewer line soil at this OU are described below:

- Pipeline Grouting – pumping grout into the pipelines and manholes to prevent access to the contaminants within the pipeline

- Soil Excavation and Disposal in the Basin – the contaminated soil surrounding the pipeline will be excavated and disposed of in the basin before the soil cover is installed

- Institutional Controls – the same as for the basin soil

The groundwater at the OU did not have any COCs and, therefore, did not require any remedial action.

The ESD modified the remedy because during excavation it was discovered that some areas that were to be excavated did not contain PTSM and, therefore, would not be excavated.

V. Progress Since Last Review

This is the first review for the FRB OU.

VI. Five-Year Review Process

The following tasks were performed as part of the review:

- Reviewed documents listed in Attachment 1
- Confirmed implementation of the remedial action
- Inspected the unit to confirm protectiveness of the remedial action
- Reviewed changes in standards and to-be-considered guidance

VII. Technical Assessment

The following items address the three questions that deal with the technical assessment of the OU:

- The remedy is functioning as intended by the ROD and ESD.
- The exposure assumptions, toxicity data, cleanup levels, and remedial action objectives used at the time of remedy selection are still valid.
- No new information has come to light that could call into question the protectiveness of the remedy.

Results of the semi-annual monitoring will continue to determine if contaminant migration to groundwater has been prevented.

VIII. Issues

There are no issues for this OU.

IX. Recommendations and Follow-up Actions

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

X. Protectiveness Statement(s)

The remedy is protective of human health and the environment. All threats posed by contamination at the OU have been addressed through in situ stabilization of the PTSM, a low permeability soil cover, pipeline grouting, and institutional controls to maintain industrial land use. Current monitoring indicates that the remedy is functioning to prevent migration of Sr-90 to the groundwater. Long-term effectiveness of the remedy will be verified by obtaining additional groundwater samples to ensure that Sr-90 does not migrate to groundwater. Exposure pathways that could lead to unacceptable risk are being controlled through institutional controls. Institutional controls will maintain future industrial land use through implementation of a LUCIP and include: (1) physical access controls to prevent unauthorized entry to SRS (fences, guards, security patrols, etc.); (2) administrative controls that maintain this site for industrial use only (SRS is a secured government facility with land use restrictions); and (3) warning signs and land use controls (SRS Site Use/Site Clearance Program).

XI. Next Review

The next five-year review is scheduled for June 30, 2007.

Attachment 1

List of Documents Reviewed

WSRC, 1998. *Record of Decision for the F-Area Retention Basin (281-3F) (U)*, WSRC-RP-97-145, Revision 1.1, August, Westinghouse Savannah River Company, Aiken SC

WSRC, 2000. *Explanation of Significant Difference (ESD) to the Revision 1.1 Record of Decision (ROD) for the F-Area Retention Basin (281-3F) (U)*, WSRC-RP-2000-4079, Revision 1, July, Westinghouse Savannah River Company, Aiken SC

WSRC, 2001. *Post-Construction Report (PCR) for F-Area Retention Basin (FRB) (Building 281-3F) (U)*, WSRC-RP-2001-4049, Revision 0, March, Westinghouse Savannah River Company, Aiken SC

Attachment 2

Five-Year Review Site Inspection Checklist

Five-Year Review Site Inspection Checklist

I. SITE INFORMATION	
Site Name: F-Area Retention Basin (281-3F)	**Date of Inspection: 10/10/01**
Location and Region: SRS, USEPA Region IV	**EPA ID:**
Agency, office, or company leading the five-year review: USDOE	**Weather/temperature:**

Remedy Includes: (Check all that apply)

- ☐ Landfill cover/containment
- ☐ Access controls
- ☒ Institutional Controls
- ☐ Groundwater pump and treatment
- ☐ Surface water collection and treatment
- ☒ Other In situ S/S, low permeability soil cover
- ☐ Monitored Natural Attenuation
- ☐ Groundwater Containment
- ☐ Vertical Barrier Walls

Attachments: ☐ Inspection team roster attached ☐ Site map attached

II. INTERVIEWS (Check all that apply)

1. **O & M site manager** _____ (Name) _____ (Title) _____ (Date)
   Interviewed ☐ at site ☐ at office ☐ by phone Phone No. _____
   Problems, suggestions; ☐ report attached _____

2. **O & M staff** _____ (Name) _____ (Title) _____ (Date)
   Interviewed ☐ at site ☐ at office ☐ by phone Phone No. _____
   Problems, suggestions; ☐ report attached _____

3. **Local regulatory authorities and response agencies** (i.e., State and tribal offices, emergency response office, police department, office of public health or environmental health, zoning office, recorder of deeds, or other city and county offices, etc.) Fill in all that apply.

Agency _____

Contact _____ _____ _____ _____
Name Title Date Phone No.

Problems; suggestions; ☐ Report attached _____

_____

Agency _____

Contact _____ _____ _____ _____
Name Title Date Phone No.

Problems; suggestions; ☐ Report attached _____

_____

Agency _____

Contact _____ _____ _____ _____
Name Title Date Phone No.

Problems; suggestions; ☐ Report attached _____

_____

4. **Other interviews** (optional) ☐ Report attached _____

III. ONSITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)

1. **O & M Documents**

☐ O & M Manual ☐ Readily available ☐ Up to date ☒ N/A

☐ As-built drawings ☐ Readily available ☐ Up to date ☒ N/A

☐ Maintenance Logs ☐ Readily available ☐ Up to date ☒ N/A

Remarks Project not turned over to O&M until approval of the Post-Construction Report (WSRC-RP-2001-4049)

2. **Site-Specific Health and Safety Plan** ☐ Readily available ☐ Up to date ☒ N/A

☐ Contingency plan/emergency response plan ☐ Readily available ☐ Up to date ☒ N/A

Remarks_____

3. **O & M and OSHA Training Records** ☒ Readily available ☒ Up to date ☐ N/A

Remarks_____

4. **Permits and Service Agreements**

☐ Air discharge permit ☐ Readily available ☐ Up to date ☒ N/A

☐ Effluent discharge ☐ Readily available ☐ Up to date ☒ N/A

☐ Waste Disposal, POTW ☐ Readily available ☐ Up to date ☒ N/A

☐ Other permits ☐ Readily available ☐ Up to date ☒ N/A

Remarks_____

5. **Gas Generation Records** ☐ Readily available ☐ Up to date ☒ N/A

Remarks_____

6. **Settlement Monument Records** ☐ Readily available ☐ Up to date ☒ N/A

Remarks_____

7. **Groundwater Monitoring Records** ☐ Readily available ☐ Up to date ☒ N/A

Remarks_____

8. **Leachate Extraction Records** ☐ Readily available ☐ Up to date ☒ N/A

Remarks_____

_____

9. **Discharge Compliance Records**

☐ Air ☐ Readily available ☐ Up to date ☒ N/A

☐ Water (effluent) ☐ Readily available ☐ Up to date ☒ N/A

Remarks_____

_____

10. **Daily Access/Security Logs** ☐ Readily available ☐ Up to date ☒ N/A

Remarks Project not turned over to O&M until approval of the Post-Construction Report

_____

IV. O & M Costs

1. **O & M Organization**

☐ State in-house ☐ Contractor for State

☐ PRP in-house ☐ Contractor for PRP

☒ Other SRS

2. **O & M Cost Records**

☐ Readily available ☐ Up to date

☐ Funding mechanism/agreement in place

☒ Other O&M has not started yet.

Total annual cost by year for review period if available

From_____ To_____ _____ ☐ Breakdown attached
Date Date Total cost

From_____ To_____ _____ ☐ Breakdown attached
Date Date Total cost

From_____ To_____ _____ ☐ Breakdown attached
Date Date Total cost

From_____ To_____ _____ ☐ Breakdown attached
Date Date Total cost

From_____ To_____ _____ ☐ Breakdown attached
Date Date Total cost

1. **Unanticipated or Unusually High O & M Costs During Review Period**

Describe costs and reasons: _____

V. ACCESS AND INSTITUTIONAL CONTROLS ☒ Applicable ☐ N/A

A. Fencing

1. **Fencing Damaged** ☐ Location shown on site map ☐ Gates secured ☒ N/A

Remarks_____

_____

B. Other Access Restrictions

1. **Signs and other security measures** ☐ Location shown on site map ☐ N/A

Remarks Signs installed in accordance with Post-ROD Documents.

_____

C. Institutional Controls

1. Implementation and enforcement

Site conditions imply ICs not properly implemented ☐ Yes ☒ No ☐ N/A

Site conditions imply ICs not being fully enforced ☐ Yes ☒ No ☐ N/A

Type of monitoring (e.g., self-reporting, drive-by) Visual Inspection, groundwater monitoring

Frequency Monthly for first two years after Post-Construction Report approval.

Responsible party/agent USDOE -- Savannah River Field Office

Contact D. Hannah (Name) USDOE – Waste Area Field Office Manager (Title) 725-0420 (Phone No.)

Report is up-to-date ☐ Yes ☐ No ☒ N/A

Reports are verified by the lead agency ☒ Yes ☐ No ☐ N/A

Specific requirements in deed of decision documents have been met ☐ Yes ☐ No ☒ N/A

Violations have been reported ☐ Yes ☐ No ☒ /A

Other problems or suggestions: ☐ Report attached

Inspection data sheet attached

_____

_____

_____

2. Adequacy ☒ ICs are adequate ☐ ICs are inadequate ☐ N/A

Remarks_____

_____

D. General

1. **Vandalism/trespassing** ☐ Location shown on site map ☒ No vandalism evident

Remarks_____

2. **Land use changes onsite** ☒ N/A

Remarks_____

3. **Land use changes offsite** ☒ N/A

Remarks_____

VI. GENERAL SITE CONDITIONS

A. Roads ☐ Applicable ☒ N/A

1. **Roads damaged** ☐ Location shown on site map ☐ Roads adequate ☐ N/A

Remarks_____

B. Other site Conditions

Remarks_____

VII. LANDFILL COVERS ☒ Applicable ☐ N/A

A. Landfill Surface

1. **Settlement** (Low spots) ☐ Location shown on site map ☒ Settlement not evident

Areal extent_____ Depth_____

Remarks_____

2. **Cracks** ☐ Location shown on site map ☒ Cracking not evident

Lengths_____ Widths_____ Depths_____

Remarks_____

3. **Erosion** ☐ Location shown on site map ☒ Erosion not evident

Areal extent_____ Depth_____

Remarks_____

_____

4. **Holes** ☐ Location shown on site map ☒ Holes not evident

Areal extent_____ Depth_____

Remarks_____

_____

5. **Vegetative Cover** ☒ Grass ☒ Cover properly established ☒ No signs of stress

☐ Trees/shrubs (indicate size and location on a diagram)

Remarks_____

_____

6. **Alternative Cover (armored rock, concrete, etc.)** ☒ N/A

Remarks_____

_____

7. **Bulges** ☐ Location shown on site map ☒ Bulges not evident

Areal extent_____ Height_____

Remarks_____

_____

8. **Wet Areas/Water Damage** ☒ Wet areas/water damage not evident

☐ Wet Areas ☐ Location shown on site map Areal extent_____

☐ Ponding ☐ Location shown on site map Areal extent_____

☐ Seeps ☐ Location shown on site map Areal extent_____

☐ Soft subgrade ☐ Location shown on site map Areal extent_____

Remarks_____

_____

9. **Slope Instability** ☐ Slides ☐ Location shown on site map ☒ No evidence of slope instability

Areal extent_____

Remarks_____

_____

B. Benches ☐ Applicable ☒ N/A

(Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)

1. **Flows Bypass Bench** ☐ Location shown on site map ☐ N/A or okay

Remarks_____

2. **Bench Breached** ☐ Location shown on site map ☐ N/A or okay

Remarks_____

3. **Bench Overtopped** ☐ Location shown on site map ☐ N/A or okay

Remarks_____

C. Letdown Channels ☐ Applicable ☒ N/A

(Channel lined with erosion control mates, riprap, grout bags, or gabions that descend down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)

1. **Settlement** ☐ Location shown on site map ☐ No evidence of settlement

Areal extent_____ Depth_____

Remarks_____

2. **Material Degradation** ☐ Location shown on site map ☐ No evidence of degradation

Material type_____ Areal extent _____

Remarks_____

3. **Erosion** ☐ Location shown on site map ☐ No evidence of erosion

Areal extent _____ Depth_____

Remarks_____

4. **Undercutting** ☐ Location shown on site map ☐ No evidence of undercutting

Areal extent _____ Depth_____

Remarks_____

_____

5. **Obstructions** Type_____ ☐ No obstructions

☐ Location shown on site map Areal extent _____

Size _____

Remarks_____

_____

6. **Excessive Vegetative Growth** Type_____

☐ No evidence of excessive growth

☐ Vegetation in channels does not obstruct flow

☐ Location shown on site map Areal extent _____

Remarks_____

_____

D. Cover Penetrations ☐ Applicable ☒ N/A

1. **Gas Vents** ☐ Active ☐ Passive

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A

Remarks_____

_____

2. **Gas Monitoring Probes**

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A

Remarks_____

_____

3. **Monitoring Wells** (within surface area of landfill)

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A

Remarks_____

_____

4. **Leachate Extraction Wells**

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A

Remarks_____

_____

5. **Settlement Monuments** ☐ Located ☐ Routinely surveyed ☐ N/A

Remarks_____

_____

E. Gas Collection and Treatment ☐ Applicable ☒ N/A

1. **Gas Treatment Facilities**

☐ Flaring ☐ Thermal destruction ☐ Collection for reuse

☐ Good condition ☐ Needs Maintenance

Remarks_____

_____

2. **Gas Collection Wells, Manifolds and Piping**

☐ Good condition ☐ Needs Maintenance

Remarks_____

_____

3. **Gas Monitoring Facilities** (e.g., gas monitoring of adjacent homes or buildings)

☐ Good condition ☐ Needs Maintenance ☐ N/A

Remarks_____

_____

F. **Cover Drainage Layer**	☐ Applicable	☒ N/A
1. **Outlet Pipes Inspected**	☐ Functioning	☐ N/A
Remarks_____		
2. **Outlet Rock Inspected**	☐ Functioning	☐ N/A
Remarks_____		

G. Detention/sedimentation Ponds ☐ Applicable ☒ N/A

1. **Siltation** Areal extent_____ Depth_____ ☐ N/A

☐ Siltation not evident

Remarks_____

_____

2. **Erosion** Areal extent_____ Depth_____ ☐ N/A

☐ Erosion not evident

Remarks_____

_____

3. **Outlet Works** ☐ Functioning ☐ N/A

Remarks_____

_____

4. **Dam** ☐ Functioning ☐ N/A

Remarks_____

_____

H. Retaining Walls ☐ Applicable ☒ N/A

1. **Deformations** ☐ Location shown on site map ☐ Deformation not evident

Horizontal displacement_____ Vertical displacement_____

Rotational displacement_____

Remarks_____

_____

2. **Degradation** ☐ Location shown on site map ☐ Deformation not evident

Remarks_____

_____

I. Perimeter Ditches/Off-Site Discharge ☐ Applicable ☒ N/A

1. **Siltation** ☐ Location shown on site map ☐ Siltation not evident

Areal extent_____ Depth_____

Remarks_____

_____

2. **Vegetative Growth** ☐ Location shown on site map ☐ Siltation not evident

☐ Vegetation does not impede flow

Areal extent_____ Type_____

Remarks_____

_____

3. **Erosion** ☐ Location shown on site map ☐ Erosion not evident

Areal extent_____ Depth_____

Remarks_____

_____

4. **Discharge Structure** ☐ Location shown on site map ☐ N/A

Remarks_____

_____

VIII. VERTICAL BARRIER WALLS ☐ Applicable ☒ N/A

1. **Settlement** ☐ Location shown on site map ☐ Settlement not evident

Areal extent_____ Depth_____

Remarks_____

_____

2. **Performance Monitoring** Type of Monitoring_____

☐ Performance not monitored

Frequency_____ ☐ Evidence of breaching

Head differential_____

Remarks_____

_____

IX. GROUNDWATER/SURFACE WATER REMEDIES ☒ Applicable ☐ N/A

A. Groundwater Extraction Wells, Pumps, and Pipelines ☐ Applicable ☒ N/A

1. Pumps, Wellhead Plumbing, and Electrical

☐ Good condition ☐ All required wells located ☐ Needs Maintenance ☐ N/A

Remarks_____

_____

2. Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances

☐ Good condition ☐ Needs Maintenance

Remarks_____

_____

3. Spare Parts and Equipment

☐ Readily available ☐ Good condition ☐ Requires upgrade ☐ Needs to be provided

Remarks_____

_____

B. Surface Water Collection Structures, Pumps, and Pipelines ☐ Applicable ☒ N/A

1. Collection Structures, Pumps, and Electrical

☐ Good condition ☐ Needs Maintenance

Remarks_____

_____

2. Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances

☐ Good condition ☐ Needs Maintenance

Remarks_____

_____

3. Spare Parts and Equipment

☐ Readily available ☐ Good condition ☐ Requires upgrade ☐ Needs to be provided

Remarks_____

_____

C. Treatment System ☐ Applicable ☒ N/A

1. **Treatment Train** (Check components that apply)

☐ Metals removal ☐ Oil/water separation ☐ Bioremediation

☐ Air stripping ☐ Carbon adsorbers

☐ Filters_____

☐ Additive (e.g., chelation agent, flocculent)_____

☐ Others_____

☐ Good condition ☐ Needs Maintenance

☐ Sampling ports properly marked and functional

☐ Sampling/maintenance log displayed and up to date

☐ Equipment properly identified

☐ Quantity of groundwater treated annually_____

☐ Quantity of surface water treated annually_____

Remarks_____

_____

2. **Electrical Enclosures and Panels** (properly rated and functional)

☐ N/A ☐ Good condition ☐ Needs Maintenance

Remarks_____

_____

3. **Tanks, Vaults, Storage Vessels**

☐ N/A ☐ Good condition ☐ Proper secondary containment ☐ Needs Maintenance

Remarks_____

_____

4. **Discharge Structure and Appurtenances**

☐ N/A ☐ Good condition ☐ Needs Maintenance

Remarks_____

_____

5. **Treatment Building(s)**

☐ N/A ☐ Good condition (esp. roof and doorways) ☐ Needs repair

☐ Chemicals and equipment properly stored

Remarks_____

_____

6. **Monitoring Wells** (pump and treatment remedy)

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ All required wells located ☐ Needs Maintenance ☐ N/A

Remarks_____

_____

D. Monitoring Data ☒ Applicable ☐ N/A

1. Monitoring Data (to verify effectiveness of the in situ stabilization)

☒ Is routinely submitted on time ☒ Is of acceptable quality

2 Monitoring data suggests: Sr-90 has not migrated to the groundwater. (no plume, no concentrations to decline)

☐ Groundwater plume is effectively contained ☐ Contaminant concentrations are declining

E. Monitored Natural Attenuation ☐ Applicable ☒ N/A

1. **Monitoring Wells** (Natural attenuation remedy)

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ All required wells located ☐ Needs Maintenance ☐ N/A

Remarks_____

_____

X. OTHER REMEDIES

If there are remedies applied at the site, which are not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.

XI. OVERALL OBSERVATIONS

A. Implementation of the Remedy

Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emissions, etc.).

The remedy for this OU is in situ stabilization of contaminated soil, low permeability soil cover system, and Institutional Controls. The cover system is intact; however, long-term grasses need to be fully established.

The remedy appears to be fully established and functioning as designed.

Groundwater monitoring wells are provided to verify the effectiveness of the in situ stabilization.

B. Adequacy of O & M

Describe issues and observations related to the implementation and scope of O & M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy.

N/A at this time, pending approval of the Post-Construction Report.

C. Early Indicators of Potential Remedy Failure

Describe issues and observations such as unexpected changes in the cost or scope of O & M or a high frequency of unscheduled repairs that suggest that the protectiveness of the remedy may be compromised in the future.

None.

D. Opportunities for Optimization

Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy.

None at this time.

H-Area Groundwater Operable Unit

I. Introduction

The review for this unit is conducted under the SRS RCRA program. The CERCLA review requirements are met by the RCRA program, therefore a separate review of the RCRA Corrective Action is not duplicated in this document. This is the second such five-year review for the H-Area Groundwater Operable Unit (OU). This review was conducted from August 2001 through September 2001. This report documents the results of the review.

II. Site Chronology

Table 1 lists the chronology of site events for the H-Area Groundwater Operable Unit.

III. Background

The H-Area Groundwater OU is a media-specific OU within the Upper Three Runs Watershed. The basins comprising the H-Area HWMF were stabilized and closed in 1991. The H-Area Groundwater OU is the groundwater associated with the H-Area HWMF.

The H-Area HWMF was operated from 1955 until 1988. During that time, the facility received waste effluents from F-Area chemical separations facilities such as the nitric acid recovery unit, waste storage system evaporator overheads, and general purpose evaporator overheads. Significant amounts of nitrate and caustic were received. Tritium was the primary radionuclide released to the basins.

The maximum detected levels of several contaminants (e.g., tritium, cadmium, and lead) in the H-Area groundwater currently exceed the National Primary Drinking Water Standards, and applicable state standards. However, potential exposures to the general public are minimized by the distance from the OU to the

Table 1. Chronology of Site Events

Event	Date
RCRA Closure Plan Approved	1989
Corrective Action start	1989
RCRA Closure Certified	1991
Interim ROD issuance	April 13, 1995
Previous Five-Year Reviews	June 30, 1997

Key:

Consent Decree – Date a consent decree (enforcement document from the court system) was issued for the operable unit.

Corrective Action start – Date the corrective (remedial) action was initiated (under RCRA).

ESD Issuance - Date all three parties (USDOE, USEPA, and SCDHEC) signed the Explanation of Significant Difference used to significantly modify the remedy selected in the Record of Decision.

Final or Interim ROD issuance – Date the three parties (USDOE, USEPA, and SCDHEC) signed the Record of Decision.

Federal Facility Agreement Declared Effective - Date the Federal Facility Agreement formalized the integration of CERCLA and RCRA in remediation activities at SRS.

NPL listing – Date the entire SRS was added to EPA's National Priorities List.

Previous Five-Year Reviews – Date of any previous five year reviews of remedy for the operable unit.

RCRA Closure Certified – Date the three parties (USDOE, USEPA, and SCDHEC) certified that the operable unit had been remediated and closed under the Resource Conservation and Recovery Act.

RCRA Closure Plan Approved – Date the three parties (USDOE, USEPA, and SCDHEC) approved the closure plan for the operable unit under Resource Conservation and Recovery Act.

Remedial Action start/complete – Date the remedial action (final or interim) was initiated/completed (under CERCLA).

Removal Action – Date contaminated media was removed from the operable unit (not associated with the ROD).

RFI/RI start/complete - Date the remedial investigation (sampling) was initiated/completed for the operable unit.

ROD Amendment Issuance - Date the three parties (USDOE, USEPA, and SCDHEC) signed the Record of Decision Amendment used to change the remedy selected in the original Record of Decision.

site boundary, by natural attenuation and radionuclide decay, by institutional controls, and by dilution in receiving streams. In addition, all offsite contaminant concentrations are well below drinking water and other applicable standards. This corrective action will address the potential ecological impacts at the seeplines along Fourmile Branch, and will also serve to address the ambient water quality standards in Fourmile Branch by remediating this OU. The remediation of the H-Area Groundwater OU will be designed to meet, as far as practicable, the Phase I groundwater protection standards outlined in the RCRA permit.

IV. Interim Remedial Actions

The selected remedy for this unit as identified in the Record of Decision is no further action under CERCLA.

V. Progress Since Last Review

This is the second 5-year review for this OU. Since the previous review in June of 1997, the following actions were completed:

- Continued operation of the groundwater removal and treatment system

VI. Five-Year Review Process

The following tasks were performed as part of the review:

- Reviewed the documents listed in Attachment 1
- Confirmed the implementation of the remedial action
- Assured that all actions required under the RCRA Permit were implemented

VII. Technical Assessment

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

VIII. Issues

There are no issues for this OU.

IX. Recommendations and Follow-up Actions

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

X. Protectiveness Statement(s)

The remedy of no further action under CERCLA is protective of human health and the environment.

XI. Next Review

The next five-year review is scheduled for June 30, 2007.

Attachment 1

List of Documents Reviewed

WSRC, 1994. *Interim Action Record of Decision Remedial Alternative Selection for H-Area Groundwater Operable Unit (U),* WSRC-RP-94-1163, Revision 1, April 1995, Westinghouse Savannah River Company, Aiken, SC.

H-Area Hazardous Waste Management Facility (904-44G, -45G, -46G, and –56G) Operable Unit

I. Introduction

The review for this unit is conducted under the SRS RCRA program. The CERCLA review requirements are met by the RCRA program, therefore a separate review of the RCRA Corrective Action is not duplicated in this document. This is the second such five-year review for the H-Area Hazardous Waste Management Facility (904-44G, -45G, -46G, and –56G) (HWMF) Operable Unit (OU). This review was conducted from August 2001 through September 2001. This report documents the results of the review.

II. Site Chronology

Table 1 lists the chronology of site events for the H-Area HWMF.

III. Background

The H-Area HWMF is a source-specific OU within the Upper Three Runs Watershed. The H-Area HWMF operated from 1955 until November 7, 1988. The original H-Area HWMF consisted of basins 904-44G, 904-45G and 904-46G and operated from 1955 to 1962. In 1962, 904-46G was replaced by 904-56G. At the time of closure, the H-Area HWMF (904-44G, 904-45G, and 904-56G) had a combined maximum operating capacity of 26.5 million gallons of wastewater.

The H-Area HWMF received waste effluents from H-Area chemical separation facilities such as the nitric acid recovery unit, waste storage system evaporator overheads, and general purpose evaporator overheads.

Significant amounts of nitrate and caustic were received in the basins. Radioactive releases were greater than 99 percent tritium. A 1984 soil coring

study showed that approximately 90 percent of the radionuclides, cations, and anions were concentrated within the top 1 ft of basin soil.

Table 1. Chronology of Site Events

Event	Date
RCRA Closure Plan Approved	1989
Corrective Action start	1989
RCRA Closure Certified	October 1991
Final ROD issuance	September 19, 1993
Previous Five-Year Reviews	June 30, 1997

Key:

Consent Decree – Date a consent decree (enforcement document from the court system) was issued for the operable unit.

Corrective Action start – Date the corrective (remedial) action was initiated (under RCRA).

ESD Issuance - Date all three parties (USDOE, USEPA, and SCDHEC) signed the Explanation of Significant Difference used to significantly modify the remedy selected in the Record of Decision.

Final or Interim ROD issuance – Date the three parties (USDOE, USEPA, and SCDHEC) signed the Record of Decision.

Federal Facility Agreement Declared Effective - Date the Federal Facility Agreement formalized the integration of CERCLA and RCRA in remediation activities at SRS.

NPL listing – Date the entire SRS was added to EPA's National Priorities List.

Previous Five-Year Reviews – Date of any previous five year reviews of remedy for the operable unit.

RCRA Closure Certified – Date the three parties (USDOE, USEPA, and SCDHEC) certified that the operable unit had been remediated and closed under the Resource Conservation and Recovery Act.

RCRA Closure Plan Approved – Date the three parties (USDOE, USEPA, and SCDHEC) approved the closure plan for the operable unit under Resource Conservation and Recovery Act.

Remedial Action start/complete – Date the remedial action (final or interim) was initiated/completed (under CERCLA).

Removal Action – Date contaminated media was removed from the operable unit (not associated with the ROD).

RFI/RI start/complete - Date the remedial investigation (sampling) was initiated/completed for the operable unit.

ROD Amendment Issuance - Date the three parties (USDOE, USEPA, and SCDHEC) signed the Record of Decision Amendment used to change the remedy selected in the original Record of Decision.

The four basins were closed by dewatering; physically and chemically stabilizing the remaining sludges with a layer of granite, limestone, and blast furnace slag; and placing a protective multi-layer cover system over them to reduce rainwater contact with basin bottoms. The remedy prevents physical exposure to contaminants and mitigates further migration of contaminants from the H-Area HWMF to groundwater by minimizing a liquid medium pathway (rainwater percolation) for transport.

Closure of the unit was begun in 1989 and completed in May 1991. The H-Area HWMF was certified closed in July 1991. In October 1991, the closure certification was accepted by SCDHEC as being in compliance with RCRA requirements. A RCRA Part B permit application for post-closure care was submitted in December 1990, and a hazardous waste permit was issued effective November 1992.

As a condition of the RCRA hazardous waste permit, post-closure groundwater monitoring is required to verify that no unacceptable exposures to potential hazards are posed by conditions at the OU in the future. Routine inspections are required for a minimum of 30 years to verify the integrity of the cover system, fences, signs, etc. Any necessary repairs to the cap will be made as part of the maintenance program. In addition, access to the H-Area HWMF is restricted to authorized personnel with appropriate training on applicable requirements. The survey plat and records associated with deed restricted use of the H-Area HWMF have been filed with Aiken County Courthouse, South Carolina.

IV. Final Remedial Actions

The selected remedy for this unit as identified in the Record of Decision under CERCLA is no further action.

V. Progress Since Last Review

This is the second 5-year review for this OU. Since the previous review in June of 1997, the following actions were completed:

- Annual inspections and maintenance to the soil cover as required by the RCRA Closure Plan

VI. Five-Year Review Process

The following tasks were performed as part of the review:

- Reviewed the documents listed in Attachment 1

- Confirmed the implementation of the remedial action
- Assured that all actions required under the RCRA Permit were implemented

VII. Technical Assessment

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

VIII. Issues

There are no issues for this OU.

IX. Recommendations and Follow-up Actions

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

X. Protectiveness Statement(s)

The remedy of no further action under CERCLA is protective of human health and the environment.

XI. Next Review

The next five-year review is scheduled for June 30, 2007.

Attachment 1

List of Documents Reviewed

WSRC, 1993. *Final Record of Decision Remedial Alternative Selection for H-Area Hazardous Waste Management Facility (U),* WSRC-RP-93-1043, Revision 1, September 2, 1993, Westinghouse Savannah River Company, Aiken, SC.

K-Area Bingham Pump Outage Pit (KBPOP) (643-1G) Operable Unit

I. Introduction

This is the first five-year review for the K-Area Bingham Pump Outage Pit (643-1G) (KBPOP) Operable Unit (OU). This review was conducted from August 2001 through September 2001. This report documents the results of the review.

II. OU Chronology

Table 1 lists the chronology of site events for the KBPOP OU.

Table 1. Chronology of OU Events

Event	Date
Removal Action (Disposal Operation)	1957-1958
RI complete	June 19, 1997
ROD issuance	April 14, 1998

Key:

Consent Decree – Date a consent decree (enforcement document from the court system) was issued for the operable unit.

Corrective Action start – Date the corrective (remedial) action was initiated (under RCRA).

ESD Issuance - Date all three parties (USDOE, USEPA, and SCDHEC) signed the Explanation of Significant Difference used to significantly modify the remedy selected in the Record of Decision.

Final or Interim ROD issuance – Date the three parties (USDOE, USEPA, and SCDHEC) signed the Record of Decision.

Federal Facility Agreement Declared Effective - Date the Federal Facility Agreement formalized the integration of CERCLA and RCRA in remediation activities at SRS.

NPL listing – Date the entire SRS was added to EPA's National Priorities List.

Previous Five-Year Reviews – Date of any previous five year reviews of remedy for the operable unit.

RCRA Closure Certified – Date the three parties (USDOE, USEPA, and SCDHEC) certified that the operable unit had been remediated and closed under the Resource Conservation and Recovery Act.

RCRA Closure Plan Approved – Date the three parties (USDOE, USEPA, and SCDHEC) approved the closure plan for the operable unit under Resource Conservation and Recovery Act.

Remedial Action start/complete – Date the remedial action (final or interim) was initiated/completed (under CERCLA).

Removal Action – Date contaminated media was removed from the operable unit (not associated with the ROD).

RFI/RI start/complete - Date the remedial investigation (sampling) was initiated/completed for the operable unit.

ROD Amendment Issuance - Date the three parties (USDOE, USEPA, and SCDHEC) signed the Record of Decision Amendment used to change the remedy selected in the original Record of Decision.

III. Background

Physical Characteristics

The KBPOP (643-1G) OU is located in the west-central portion of Savannah River Site (SRS) (Figure 1). It is approximately 4 miles east of the SRS boundary. The unit is approximately 400 feet in length and 60 feet in width (Figure 2).

Land and Resource Use

The current and anticipated future land use is an inactive industrial site.

History of Contamination

Between 1957 and 1958, miscellaneous construction debris (pipes, cables, ladders, etc.) generated by major modifications and repairs to the primary and secondary reactor cooling water systems was buried in the pit. There were no pumps buried and no liquid waste was disposed of in the pit. Low-level radioactive debris generated by the repairs (less than 25 mR/hr with no detected alpha activity) was buried in the pit. Table 2 illustrates the estimated inventory of activity at the time of burial and as of December 31, 1995.

Table 2. Estimated Radionuclide Inventory at the K-Area Bingham Pump Outage Pit

Radionuclide	Inventory at Burial (Curies)	Inventory Corrected for Decay Through December 31, 1995 (Curies)
Cobalt-60	0.172	1.34×10^{-3}
Strontium-90	0.112	4.70×10^{-2}
Ruthenium-103/106	0.130	1.12×10^{-12}
Cesium-137	0.414	1.75×10^{-1}
Promethium-147	0.172	7.50×10^{-6}
Total	1.00	2.23×10^{-1}

The pit was backfilled with approximately four feet of fill material in 1958 and is now an open grassy area marked by orange ball markers and concrete monuments. Annual inspections are conducted for signs of soil subsidence; and sunken areas are filled to grade as needed.

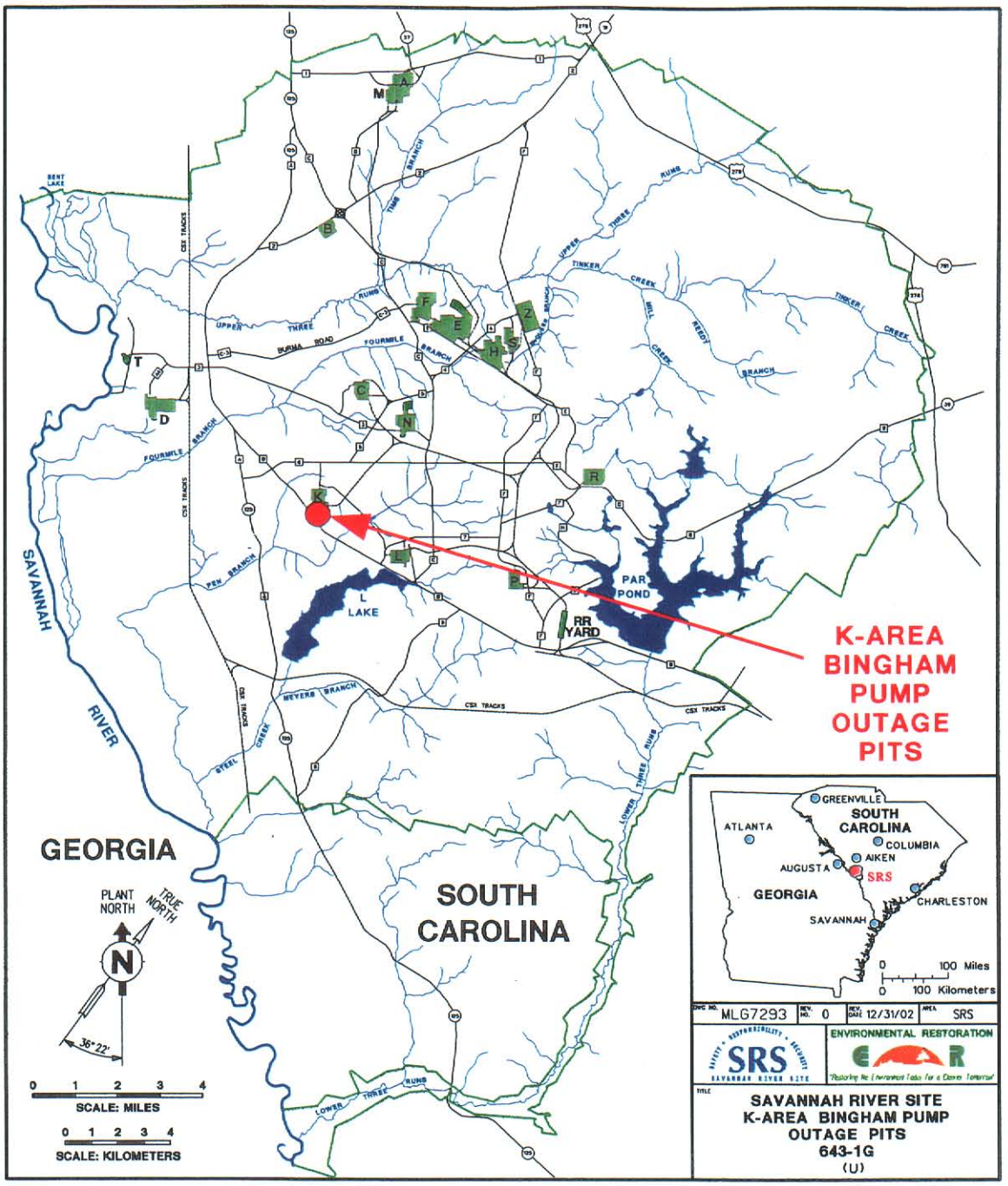


Figure 1. Location of the K-Area Bingham Pump Outage Pit (643-1G) Operable Unit at SRS

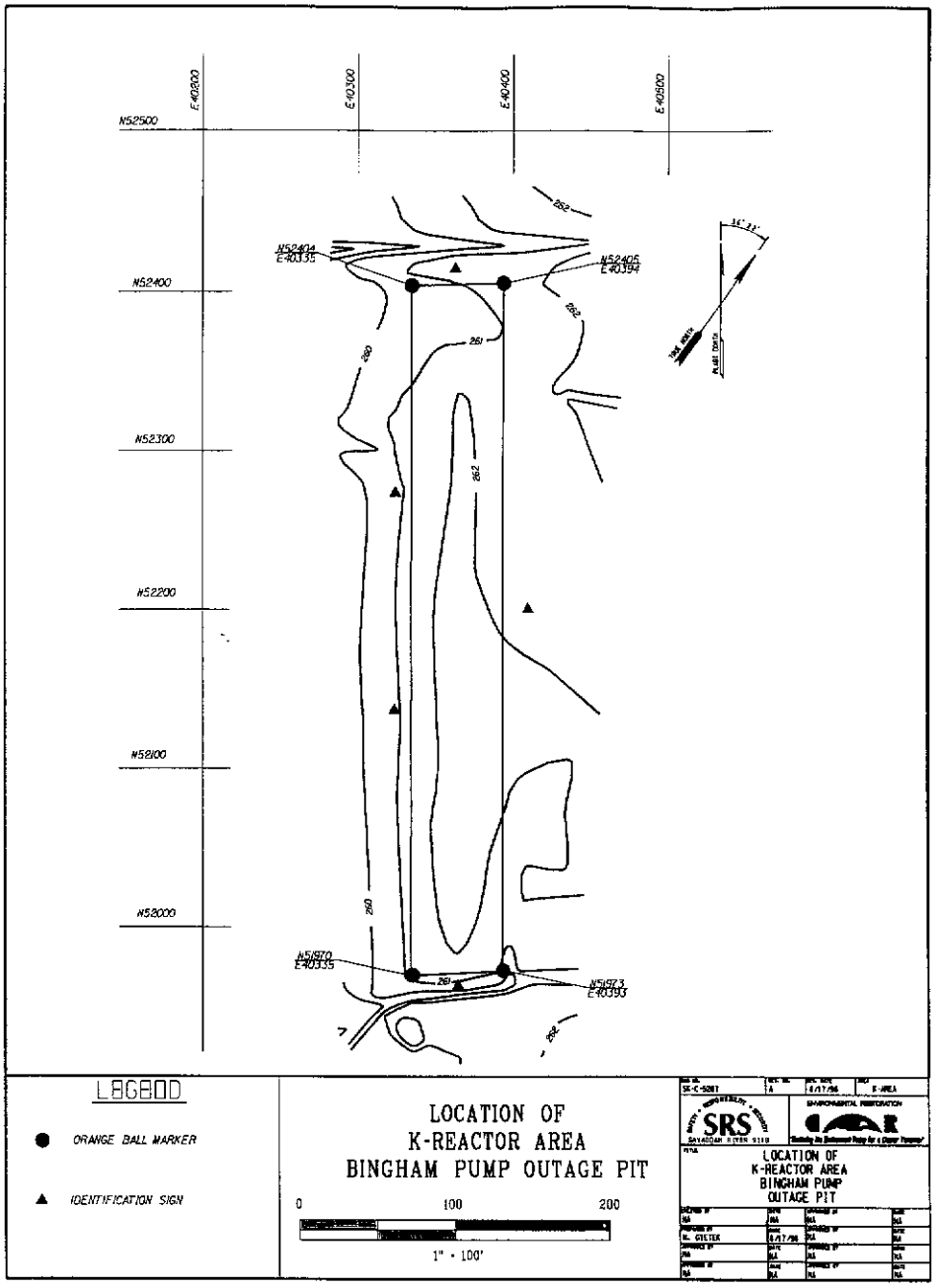


Figure 2. **Layout of the K-Area Bingham Pump Outage Pit (643-1G) Operable Unit**

Contaminants

Based on characterization and risk assessment information, the KBPOP OU source control unit does not impact the watershed.

For soil, the results from the KBPOP OU sample analyses indicate that minor concentrations/activities of constituents have migrated from the pit into the surrounding soil horizons; however, horizontal migration is limited to the boundaries of the pit, and vertical migration is limited to the upper clayey zones.

The geotechnical and geologic data indicate that a less permeable zone is present underneath the pit that will inhibit less mobile constituents from migrating vertically and potentially impacting the groundwater.

Results from the sampling of these wells support the interpretation that the KBPOP OU has not impacted the groundwater and that the metal constituents detected are naturally occurring.

A total of six groundwater samples were collected from the water table aquifer in the vicinity of the KBPOP. These include two background samples (KH1 and KH4), an additional upgradient sample (KH3), and three down- or sidegradient samples (KH2, KH5, and KH6) (Figure 3).

The metal concentrations were unusually high and were detected in both upgradient and downgradient sampling locations for the KBPOP and were interpreted to be directly related to the sampling protocol used. These unusually high metal concentrations were the indirect result of the high turbidity associated with each sample. To demonstrate the validity of this interpretation, Confirmatory Characterization was conducted in July 1996, during which two RCRA-standard groundwater-monitoring wells (one upgradient (KBP1D) and one downgradient (KBP2D)) were installed at the KBPOP. Results from the sampling

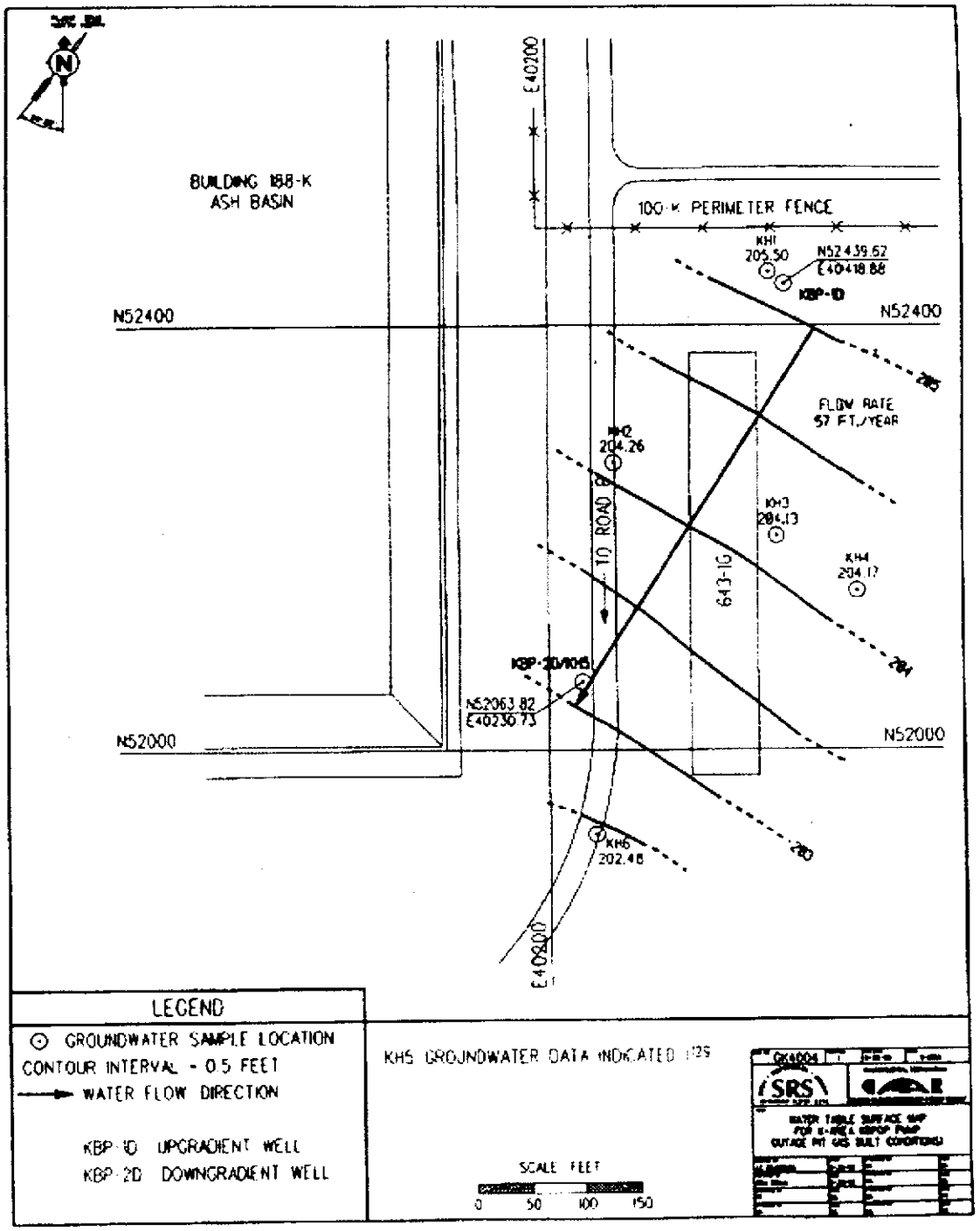


Figure 3. Groundwater Sample Locations at the KBPOP

of these wells support the interpretation that the KBPOP has not impacted the groundwater and that the metal constituents detected are naturally occurring.

IV. Remedial Actions

Remedy Selection

Institutional controls were selected as the remedial action at this unit.

Remedy Implementation

As part of the institutional controls, signs were posted at the unit.

System Operations/O&M

There are no system operation requirements. There are no annual system operations.

Annual inspections have been conducted for accuracy and legibility of identification signs, visible subsidence or erosion of the waste unit, proper vegetation growth, mowing, etc. No subsidence or erosion has been identified. All other routine maintenance activities (i.e., mowing, etc.) have been documented.

V. Progress Since Last Review

No recommendations or follow-up actions have been identified.

VI. Five-Year Review Process

The following tasks were performed as part of the review:

- Reviewed documents listed in Attachment 1
- Confirmed implementation of the remedial action

- Inspected the unit to confirm protectiveness of remedial action
- Reviewed changes in standards and to-be-considered guidance

VII. Technical Assessment

- The remedy is functioning as intended by the decision documents. Institutional controls are in place and being implemented to provide access control and prevent exposure as designed
- The exposure assumptions, toxicity data, cleanup levels, and remedial action objectives (RAOs) used at the time of remedy selection are still valid.
- No other information come to light that could call into question the protectiveness of the remedy.

VIII. Issues

There are no issues for this OU.

IX. Recommendations and Follow-up Actions

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

X. Protectiveness Statement(s)

Institutional controls to maintain future industrial land use through implementation of a LUCIP continue to provide protection to human health and the environment at the OU. Annual field inspections have been performed to verify that the institutional controls are maintained (site accessibility and maintenance, personnel warning signs). The existing institutional controls (site use/site clearance program and security measures) prevent human health and environmental exposure to the buried waste.

XI. Next Review

The next five-year review is scheduled for June 30, 2007.

Attachment 1

Documents Reviewed

WSRC, 1997. *Record of Decision Remedial Alternative Selection for the K-Area Bingham Pump Outage Pit (643-1G) (U)*, WSRC-RP-97-178, Rev. 1, October, Westinghouse Savannah River Company, Aiken, SC

WSRC, 1998. *Final Remediation Report for the K-Area Bingham Pump Outage Pit (643-1G) (U)*, WSRC-RP-98-4003, Rev. 1, August, Westinghouse Savannah River Company, Aiken, SC

WSRC, 1999. *Federal Facility Agreement Annual Progress Report for Fiscal Year 2000 (U)*, WSRC-RP-99-4300, November, Westinghouse Savannah River Company, Aiken, SC

WSRC, 2000. *Federal Facility Agreement Annual Progress Report for Fiscal Year 2000 (U)*, WSRC-RP-2000-4300, November, Westinghouse Savannah River Company, Aiken, SC

Attachment 2

Five-Year Review Site Inspection Checklist

Attachment 3

Site Inspection Sheet

and

Maintenance Request Forms

WORKING COPY - VERIFIED TO BE THE LATEST REVISION PRIOR TO USE.

BY: _____ DATE: 7-10-01 BY: _____ DATE: _____

INSPECTION DATA SHEET FOR THE K-AREA BINGHAM PUMP OUTAGE PIT

A= Satisfactory X= Unsatisfactory (Comments required)	A or X	Comments or Corrective Action Taken (See Maintenance Register for corrected items)
1. Check for potential encroachments. (Ensure there is no building on the site).	A	
2. Does site have brush or woody vegetation that needs cutting and disposal?	A	
3. Does site need mowing?	X	SITE NEEDS MOWING. (NEW OBSERVATION/SEE MAP NOTE ①).
4. Is there proper vegetation growth at the unit?	X	SOME SMALL BARE AREAS. SITE NEEDS TO BE OVERSEEDED. (NEW OBSERVATION/SEE MAP NOTE ②).
5. Verify wells and roads are accessible.	A	

INSPECTION DATA SHEET FOR THE K-AREA BINGHAM PUMP OUTAGE PIT

A= Satisfactory X= Unsatisfactory (Comments required)	A or X	**Comments or Corrective Action Taken** (See Maintenance Register for corrected items)
6. Are the wells properly locked per R.61-71.11.C.6?	A	
7. Is the concrete pad cracked or broken? Is the pad undercut or silted over?	A	
8. Is the well properly identified per R.61-71.6H?	A	
9. Verify the wells posts and protective covers (within the waste unit, i.e. orange balls) are in place.	A	

INSPECTION DATA SHEET FOR THE K-AREA BINGHAM PUMP OUTAGE PIT

A= Satisfactory X= Unsatisfactory (Comments required)	A or X	**Comments or Corrective Action Taken** (See Maintenance Register for corrected items)
10. Signs shall be legible from a distance of at least 25 feet and from any direction. The signs will read: K-Area Bingham Pump Outage Pit, 643-1G "Danger – Unauthorized Personnel Keep Out. This waste unit was used to manage hazardous substances. Do not dig or excavate. Do not enter without contacting the waste site custodian." Custodian: Manager, Post Closure Maintenance Phone: (803) 952-6882	A	
11. Does site show signs of erosion or subsidence? Are there any signs of burrowing animals (holes)? Excavation below three (3) feet is prohibited.	A	
12. Verify orange ball markers are in place.	A	

INSPECTION DATA SHEET FOR THE K-AREA BINGHAM PUMP OUTAGE PIT

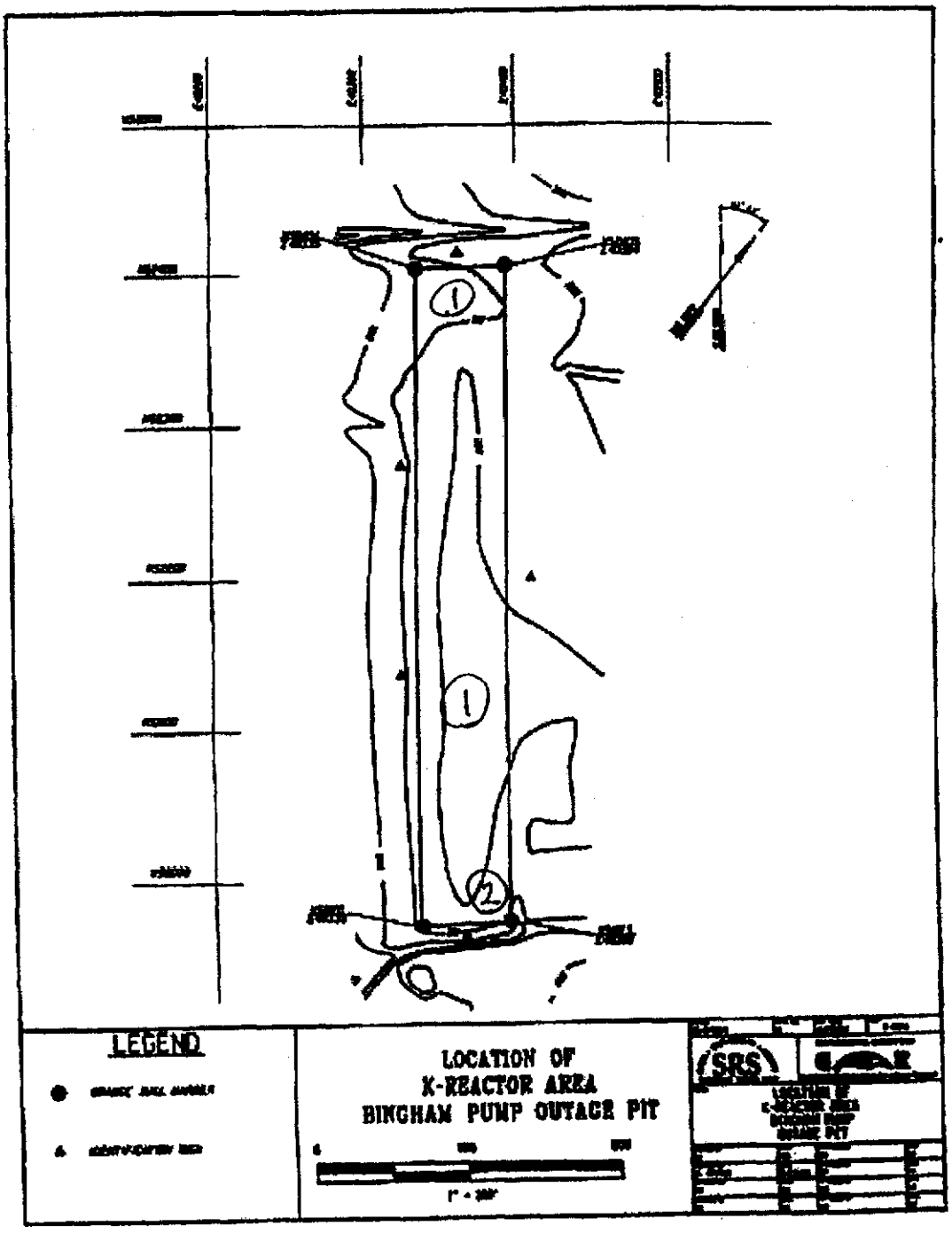
A= Satisfactory X= Unsatisfactory (Comments required)	A or X	Comments or Corrective Action Taken (See Maintenance Register for corrected items)
13. Verify the fence is locked and in good condition (If applicable).	A	
14. Check integrity of drainage ditches (if any) for presence of excessive erosion, sediment buildup, and any debris restricting water flow.	A	
15. Inspect general condition of site (housekeeping)	A	
16. Other	A	

Inspected By: J.D. Hope (Print name) J.D. Hope (Signature) Date: 7-11-01 Time: 1012 Hr

Accompanied By: Michael Redd (Print name) M L Oldd (Signature) Date: 7-11-01 Time: 1012 HR.

Reviewed By: Michael Oldd (ER-PCM or Designee (Print name)) M L Oldd (Signature) Date: 7-12-01 Time: 0747 HR

INSPECTION DATA SHEET FOR THE K-AREA BINGHAM PUMP OUTAGE PIT

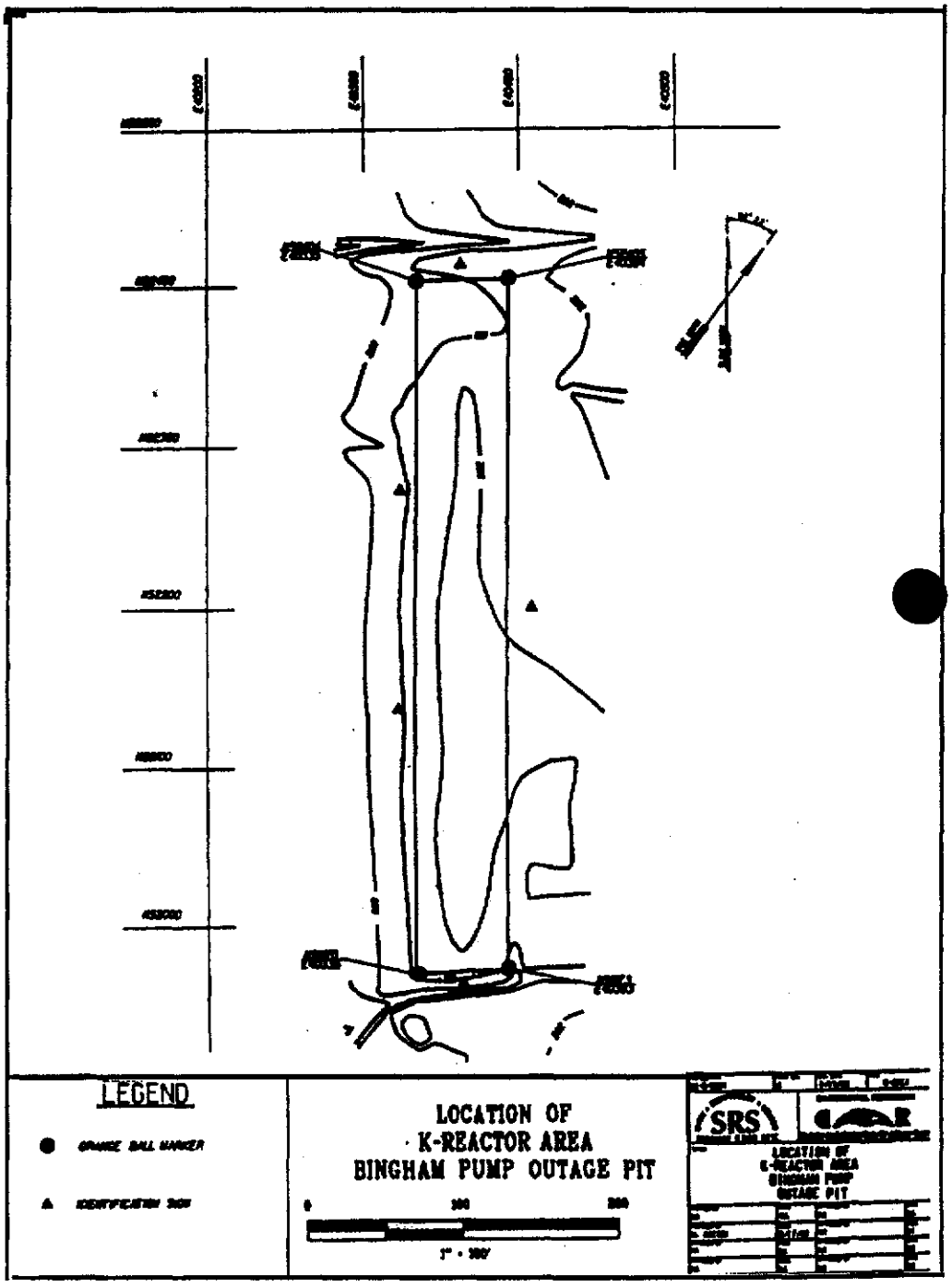


NOTES:

(1) SITE NEEDS MOWING.

(2) BARE AREAS REQUIRING OVERSEEDING.

Figure 4. Locations of the K-Area Bingham Pump Outage Pit Identification Signs



ER OPERATIONS MONITORING & MAINTENANCE

REQUEST FOR SITE MAINTENANCE

Correspondence Number
ERD-2001-00580

TO: Mary E. Beard, USFS, Bldg. 760-1G

FROM: J.D Hope, ERD, Bldg. 730-2B

Date of Inspection
7-11-2001

Waste Site: K-Area Bingham Pump Outage Pit (KBPOP)

Work Description	Date Complete
1. Mow grass throughout waste site area (new observation / see map note #1) 2. Overseed bare spot on cap area (new observation / see map note #2)	1. 2.

Comments

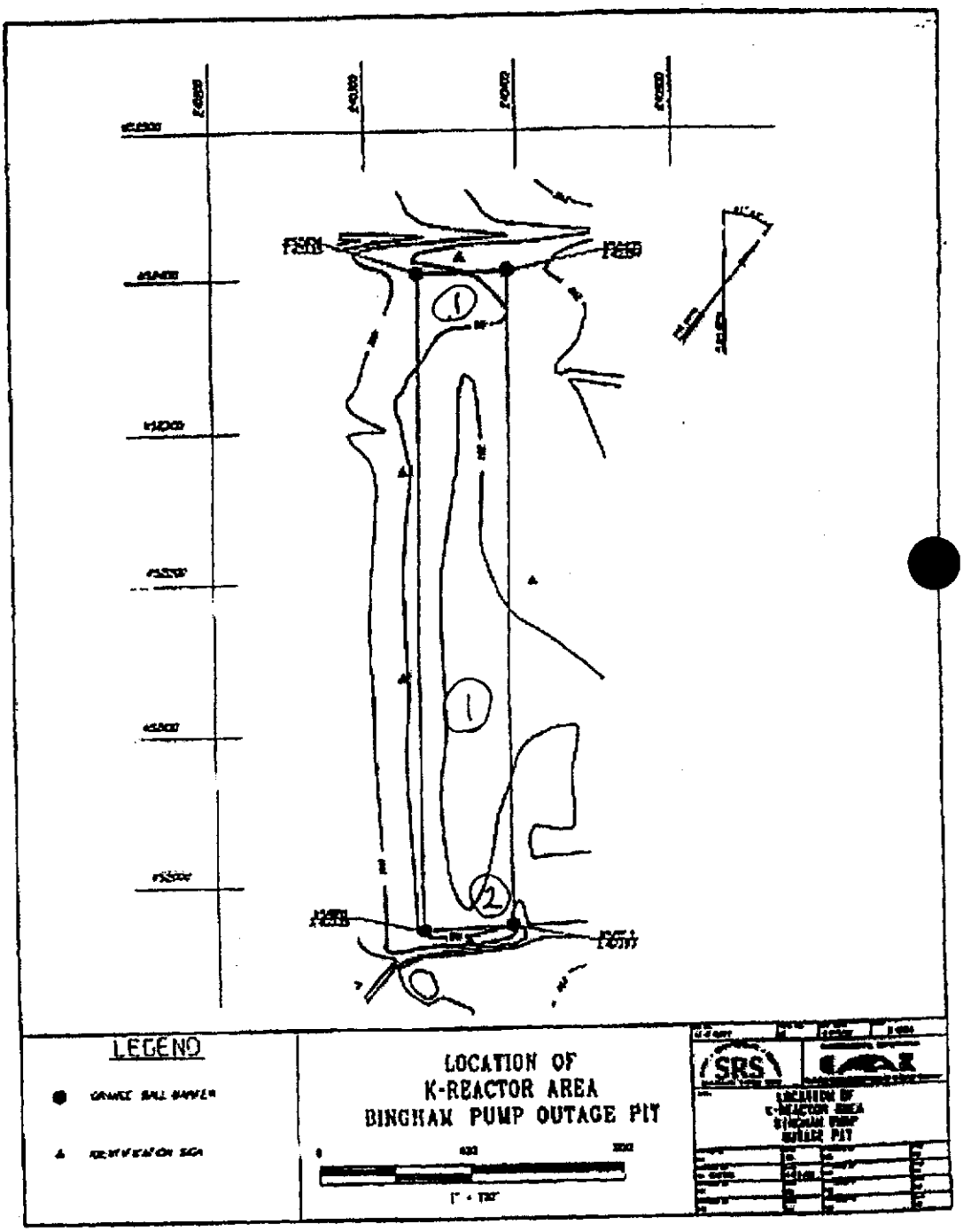
Attachments No

Priority N/A

ERPC/FC: [signature]

DATE: 7-23-01

INSPECTION DATA SHEET FOR THE K-AREA BINGHAM PUMP OUTAGE PIT



NOTES:

(1) SITE NEEDS MOWING.

(2) BARE AREAS REQUIRING OVERSEEDING.

MAINTENANCE REGISTER

Date 7-11-2001

Work Group
- ☐ CSWE
- ☒ USFS
- ☐ Const
- ☐ Subcon
- ☐ SWMO

Facility **K-Area Bingham Pump Outage Pit**

Correspondence Number **ERD-2001-00580**

Deficiency Status **incomplete**

Repeat Item *NO*

Description of Deficiency

1. Mow entire cap area (new observation / see map note #1)
2. Overseed bare area on cap (new observation / see map note #2

How Deficiency was Corrected?

1.
2.

Priority
- ○ High
- ◉ Medium
- ○ Low

RCRA ○ Yes ◉ No

ERPC/FC: LL O'Neal **DATE:** 7-23-01

Post Closure
Maintenance Register

Index Number: 83 **Watershed:** PEN BRANCH

Unit Name K-AREA BINGHAM PUMP OUTAGE PIT- 643-1G

Work Group ○ CSWE ● USFS ○ Const ○ Subcon ○ SWMO

Priority ○ High ● Medium ○ Low

RCRA ○ Yes ● No

Maintenance Number PC-2001-00040
Correspondence Number ERD-2001-00676
Deficiency Status ● Complete ○ Incomplete

Entry Date 07/16/2001
Sched Date
Completion Date 08/21/2001

Description of Deficiency
Waste site requires mowing.

How Deficiency was Corrected
Cap area mowed using large farm tractor and mower deck. Wells, signs and orange balls mowed using string trimmers.

Notes

View Source Document

Michael O Redd (ERPC/FC)	Approve		Comments
(Name)	(organization)	(Approver Date) 9-12-01	

Post Closure
Maintenance Register

Index Number: 83 **Watershed:** PEN BRANCH

Unit Name K-AREA BINGHAM PUMP OUTAGE PIT- 643-1G

Work Group: ○ CSWE ● USFS ○ Const ○ Subcon ○ SWMO

Priority: ○ High ● Medium ○ Low

RCRA: ○ Yes ● No

Maintenance Number PC-2001-00041
Correspondence Number ERD-2001-00677
Deficiency Status ● Complete ○ Incomplete

Entry Date 07/16/2001
Sched Date
Completion Date 07/31/2001

Description of Deficiency
Bare areas on cap require over seeding.

How Deficiency was Corrected
Areas overseeded with Hulled Bermuda and Brown Top Millet grass seed using large farm tractor and no-till-drill implement.

Notes

View Source Document

Michael O Redd (ERPC/FC)	Approve	[signature]	Comments
(Name)	(organization)	(Approver Date) 9-12-01	

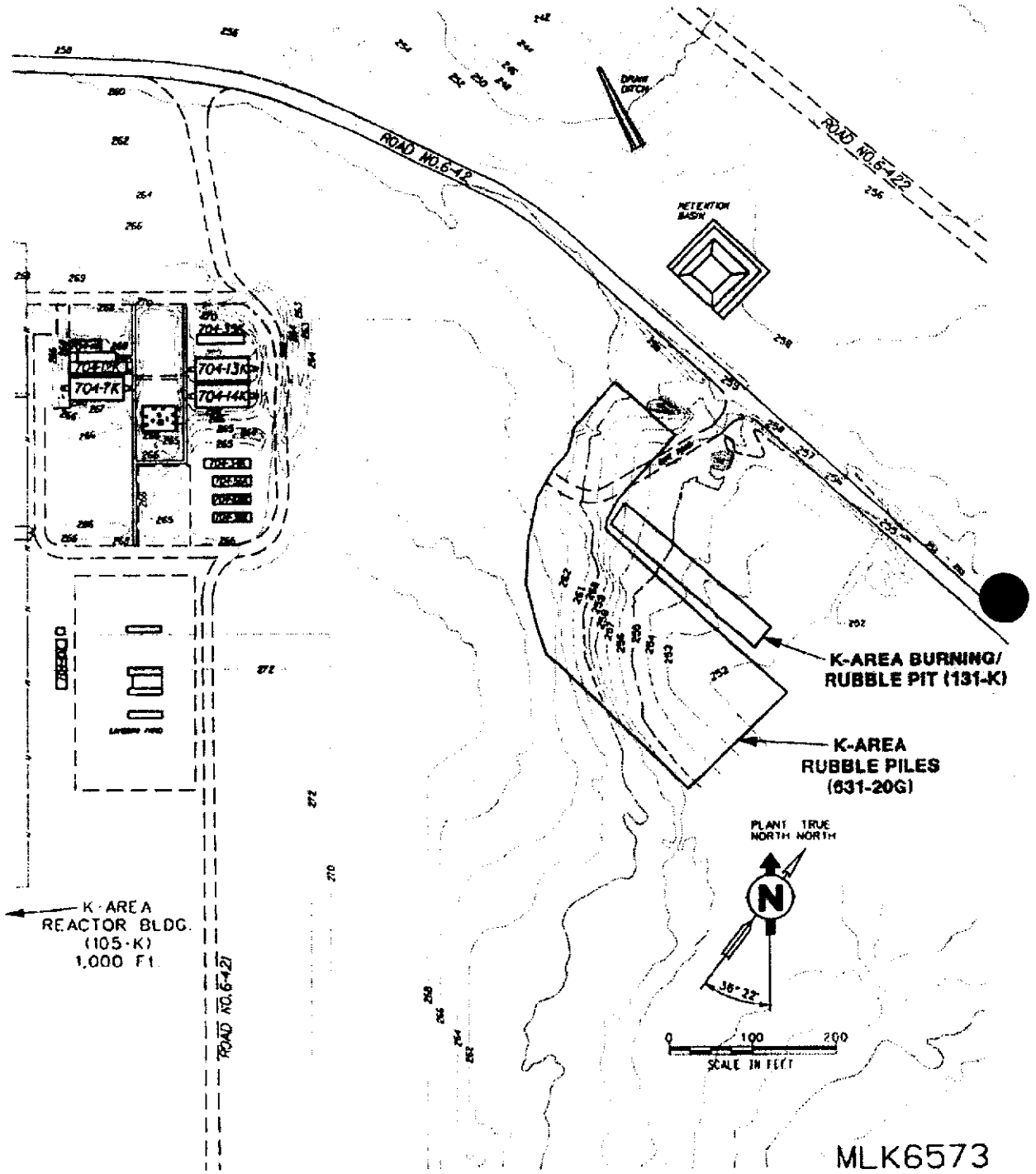
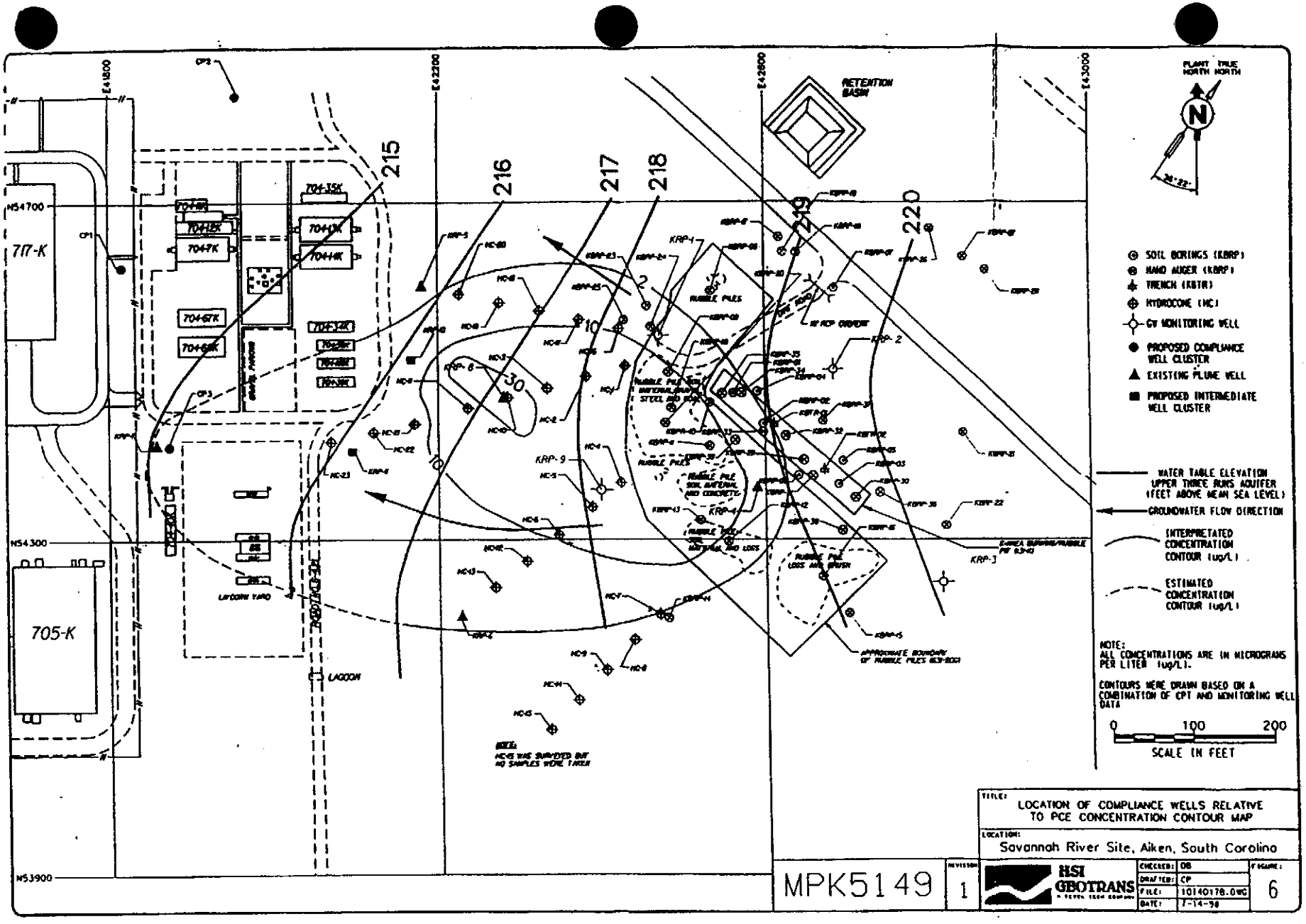


Figure 2. KBRP and KRP Operable Unit Layout



TITLE: LOCATION OF COMPLIANCE WELLS RELATIVE TO PCE CONCENTRATION CONTOUR MAP

LOCATION: Savannah River Site, Aiken, South Carolina

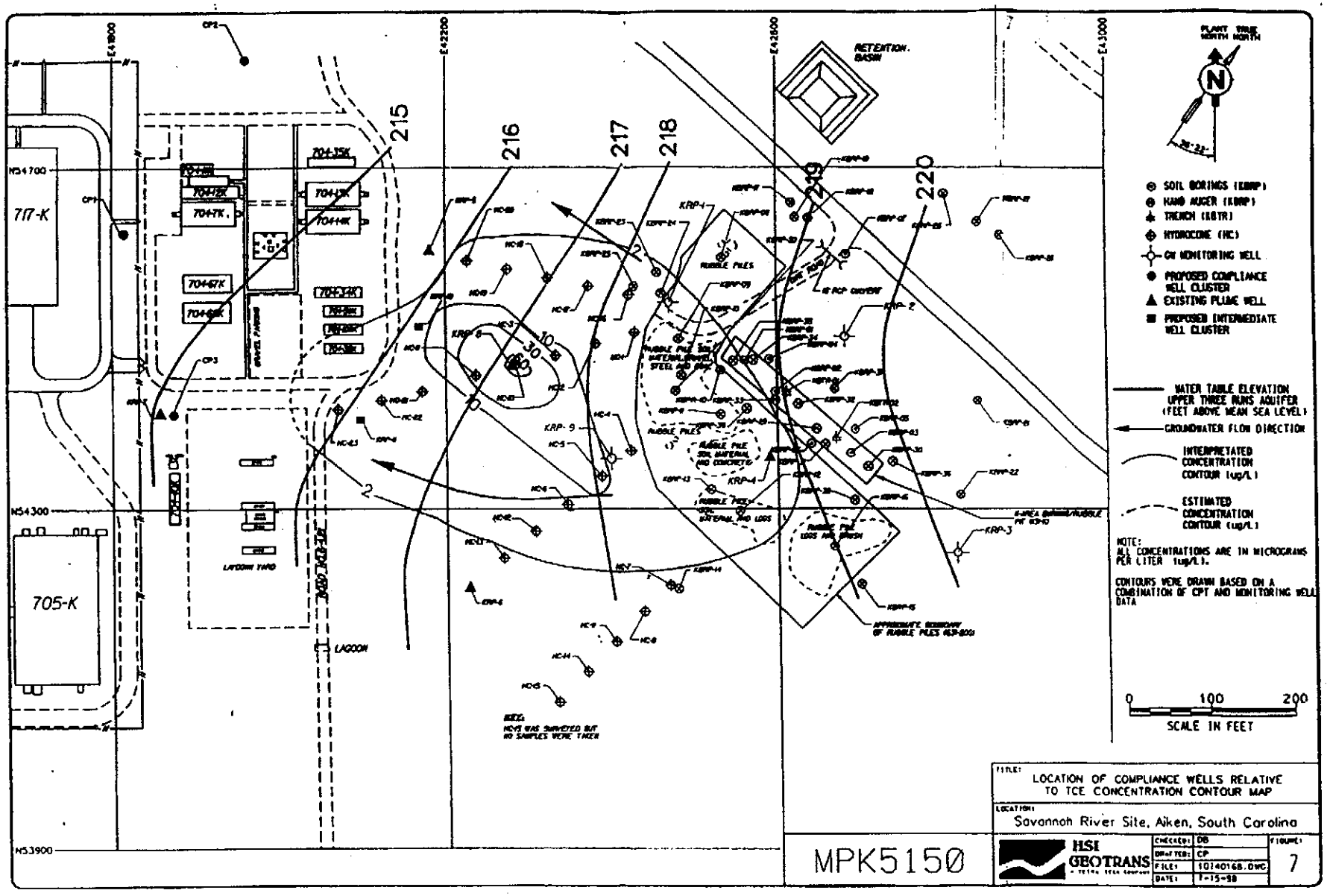
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REVISION: 1

HSI GEOTRANS

CHECKED:	DB
DRAFTED:	CP
FILE:	10140178.DWG
DATE:	7-14-98

FIGURE: 6


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E42600
E43000
N54700
N54300
N53900
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705-K
704-35K
704-47K
704-48K
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704-51K
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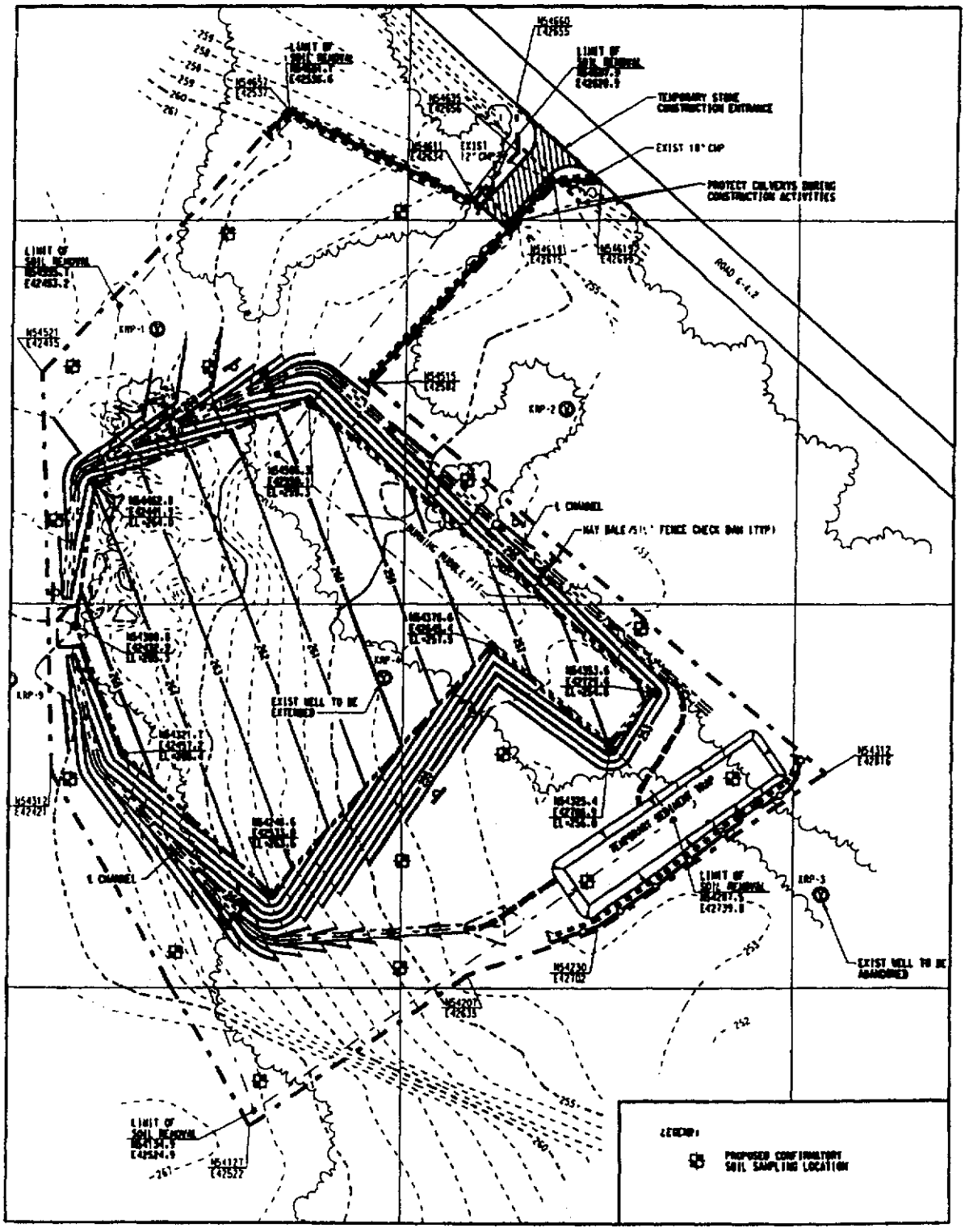


Figure 3. Proposed Soil Sampling Locations at the KBRP/KRP OU

Five-Year Review Site Inspection Checklist

I. SITE INFORMATION	
Site Name: K-Area Bingham Pump Outage Pit	**Date of Inspection: 7/10/01**
Location and Region: SRS, USEPA Region IV	**EPA ID:**
Agency, office, or company leading the five-year review: USDOE	**Weather/temperature:**

Remedy Includes: (Check all that apply)

- ☐ Landfill cover/containment
- ☐ Access controls
- ☒ Institutional Controls
- ☐ Groundwater pump and treatment
- ☐ Surface water collection and treatment
- ☐ Other_____
- ☐ Monitored Natural Attenuation
- ☐ Groundwater Containment
- ☐ Vertical Barrier Walls

Attachments: ☐ Inspection team roster attached ☒ Site map attached

II. INTERVIEWS (Check all that apply)

1. **O & M site manager** _____ _____ _____
   Name Title Date
   Interviewed ☐ at site ☐ at office ☐ by phone Phone No. _____
   Problems, suggestions; ☐ report attached _____

2. **O & M staff** _____ _____ _____
   Name Title Date
   Interviewed ☐ at site ☐ at office ☐ by phone Phone No. _____
   Problems, suggestions; ☐ report attached _____

3. **Local regulatory authorities and response agencies** (i.e., State and tribal offices, emergency response office, police department, office of public health or environmental health, zoning office, recorder of deeds, or other city and county offices, etc.) Fill in all that apply.

Agency _____

Contact _____ _____ _____ _____

Name Title Date Phone No.

Problems; suggestions; ☐ Report attached _____

_____

Agency _____

Contact _____ _____ _____ _____

Name Title Date Phone No.

Problems; suggestions; ☐ Report attached _____

_____

Agency _____

Contact _____ _____ _____ _____

Name Title Date Phone No.

Problems; suggestions; ☐ Report attached _____

_____

4. **Other interviews** (optional) ☐ Report attached _____

III. ONSITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)

1. **O & M Documents**

☐ O & M Manual ☐ Readily available ☐ Up to date ☒ N/A

☐ As-built drawings ☐ Readily available ☐ Up to date ☒ N/A

☐ Maintenance Logs ☐ Readily available ☐ Up to date ☒ N/A

Remarks_____

_____

2. **Site-Specific Health and Safety Plan** ☐ Readily available ☐ Up to date ☒ N/A

☐ Contingency plan/emergency response plan ☐ Readily available ☐ Up to date ☒ N/A

Remarks_____

_____

3. **O & M and OSHA Training Records** ☐ Readily available ☐ Up to date ☒ N/A

Remarks_____

_____

4. **Permits and Service Agreements**

☐ Air discharge permit ☐ Readily available ☐ Up to date ☒ N/A

☐ Effluent discharge ☐ Readily available ☐ Up to date ☒ N/A

☐ Waste Disposal, POTW ☐ Readily available ☐ Up to date ☒ N/A

☐ Other permits ☐ Readily available ☐ Up to date ☒ N/A

Remarks_____

_____

5. **Gas Generation Records** ☐ Readily available ☐ Up to date ☒ N/A

Remarks_____

_____

6. **Settlement Monument Records** ☐ Readily available ☐ Up to date ☒ N/A

Remarks_____

_____

7. **Groundwater Monitoring Records** ☐ Readily available ☐ Up to date ☒ N/A

Remarks_____

_____

8. **Leachate Extraction Records** ☐ Readily available ☐ Up to date ☒ N/A

Remarks_____

_____

9. **Discharge Compliance Records**

☐ Air ☐ Readily available ☐ Up to date ☒ N/A

☐ Water (effluent) ☐ Readily available ☐ Up to date ☒ N/A

Remarks_____

_____

10. **Daily Access/Security Logs** ☐ Readily available ☐ Up to date ☒ N/A

Remarks_____

_____

IV. O & M Costs

1. **O & M Organization**

☐ State in-house ☐ Contractor for State

☐ PRP in-house ☐ Contractor for PRP

☐ Other_____

_____

2. **O & M Cost Records**

☐ Readily available ☐ Up to date

☐ Funding mechanism/agreement in place

☐ Other_____

_____

Total annual cost by year for review period if available

From_____ To_____ _____ ☐ Breakdown attached
Date Date Total cost

From_____ To_____ _____ ☐ Breakdown attached
Date Date Total cost

From_____ To_____ _____ ☐ Breakdown attached
Date Date Total cost

From_____ To_____ _____ ☐ Breakdown attached
Date Date Total cost

From_____ To_____ _____ ☐ Breakdown attached
Date Date Total cost

1. **Unanticipated or Unusually High O & M Costs During Review Period**

Describe costs and reasons: _____

_____

_____

_____

_____

V. ACCESS AND INSTITUTIONAL CONTROLS ☒ Applicable ☐ N/A

A. Fencing

1. **Fencing Damaged** ☐ Location shown on site map ☐ Gates secured ☒ N/A

Remarks_____

_____

B. Other Access Restrictions

1. **Signs and other security measures** ☒ Location shown on site map ☐ N/A

Remarks_____

_____

C. Institutional Controls

1. Implementation and enforcement

Site conditions imply ICs not properly implemented ☐ Yes ☒ No ☐ N/A

Site conditions imply ICs not being fully enforced ☐ Yes ☒ No ☐ N/A

Type of monitoring (e.g., self-reporting, drive-by) Inspection

Frequency semi-annual

Responsible party/agent WSRC

Contact	Michael Redd	Manager ER Maintenance	9/17/01	952-6882
	Name	Title	Date	Phone No.

Report is up-to-date ☒ Yes ☐ No ☐ N/A

Reports are verified by the lead agency ☐ Yes ☐ No ☒ N/A

Specific requirements in deed of decision documents have been met ☒ Yes ☐ No ☐ N/A

Violations have been reported ☐ Yes ☐ No ☒ N/A

Other problems or suggestions: ☒ Report attached

Inspection data sheet attached

_____

_____

_____

2. Adequacy ☒ ICs are adequate ☐ ICs are inadequate ☐ N/A

Remarks_____

_____

D. General

1. **Vandalism/trespassing** ☐ Location shown on site map ☒ No vandalism evident

   Remarks_____

2. **Land use changes onsite** ☒ N/A

   Remarks_____

3. **Land use changes offsite** ☒ N/A

   Remarks_____

VI. GENERAL SITE CONDITIONS

A. Roads ☐ Applicable ☒ N/A

1. **Roads damaged** ☐ Location shown on site map ☐ Roads adequate ☐ N/A

   Remarks_____

B. Other site Conditions

Remarks_____

VII. LANDFILL COVERS ☒ Applicable ☐ N/A

A. Landfill Surface

1. **Settlement** (Low spots) ☐ Location shown on site map ☒ Settlement not evident

   Areal extent_____ Depth_____

   Remarks_____

2. **Cracks** ☐ Location shown on site map ☒ Cracking not evident

   Lengths_____ Widths_____ Depths_____

   Remarks_____

3. **Erosion** ☐ Location shown on site map ☒ Erosion not evident

Areal extent_____ Depth_____

Remarks_____

_____

4. **Holes** ☐ Location shown on site map ☒ Holes not evident

Areal extent_____ Depth_____

Remarks_____

_____

5. **Vegetative Cover** ☒ Grass ☐ Cover properly established ☒ No signs of stress

☐ Trees/shrubs (indicate size and location on a diagram)

Remarks Site was mowed and overseeded as needed per inspection report (see attached).

_____

6. **Alternative Cover (armored rock, concrete, etc.)** ☒ N/A

Remarks_____

_____

7. **Bulges** ☐ Location shown on site map ☒ Bulges not evident

Areal extent_____ Height_____

Remarks_____

_____

8. **Wet Areas/Water Damage** ☒ Wet areas/water damage not evident

☐ Wet Areas ☐ Location shown on site map Areal extent_____

☐ Ponding ☐ Location shown on site map Areal extent_____

☐ Seeps ☐ Location shown on site map Areal extent_____

☐ Soft subgrade ☐ Location shown on site map Areal extent_____

Remarks_____

_____

9. **Slope Instability** ☐ Slides ☐ Location shown on site map ☒ No evidence of slope instability

Areal extent_____

Remarks_____

_____

B. Benches ☐ Applicable ☒ N/A

(Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)

1. **Flows Bypass Bench** ☐ Location shown on site map ☐ N/A or okay

Remarks_____

_____

2. **Bench Breached** ☐ Location shown on site map ☐ N/A or okay

Remarks_____

_____

3. **Bench Overtopped** ☐ Location shown on site map ☐ N/A or okay

Remarks_____

_____

C. Letdown Channels ☐ Applicable ☒ N/A

(Channel lined with erosion control mates, riprap, grout bags, or gabions that descend down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)

1. **Settlement** ☐ Location shown on site map ☐ No evidence of settlement

Areal extent_____ Depth_____

Remarks_____

_____

2. **Material Degradation** ☐ Location shown on site map ☐ No evidence of degradation

Material type_____ Areal extent _____

Remarks_____

_____

3. **Erosion** ☐ Location shown on site map ☐ No evidence of erosion

Areal extent _____ Depth_____

Remarks_____

_____

4. **Undercutting** ☐ Location shown on site map ☐ No evidence of undercutting

Areal extent _____ Depth_____

Remarks_____

_____

5. **Obstructions** Type_____ ☐ No obstructions

☐ Location shown on site map Areal extent _____

Size _____

Remarks_____

_____

6. **Excessive Vegetative Growth** Type_____

☐ No evidence of excessive growth

☐ Vegetation in channels does not obstruct flow

☐ Location shown on site map Areal extent _____

Remarks_____

_____

D. Cover Penetrations ☐ Applicable ☒ N/A

1. **Gas Vents** ☐ Active ☐ Passive

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A

Remarks_____

_____

2. **Gas Monitoring Probes**

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A

Remarks_____

_____

3. **Monitoring Wells** (within surface area of landfill)

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A

Remarks_____

_____

4. **Leachate Extraction Wells**

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A

Remarks_____

_____

5. **Settlement Monuments** ☐ Located ☐ Routinely surveyed ☐ N/A

Remarks_____

_____

E. Gas Collection and Treatment ☐ Applicable ☒ N/A

1. **Gas Treatment Facilities**

☐ Flaring ☐ Thermal destruction ☐ Collection for reuse

☐ Good condition ☐ Needs Maintenance

Remarks_____

_____

2. **Gas Collection Wells, Manifolds and Piping**

☐ Good condition ☐ Needs Maintenance

Remarks_____

_____

3. **Gas Monitoring Facilities** (e.g., gas monitoring of adjacent homes or buildings)

☐ Good condition ☐ Needs Maintenance ☐ N/A

Remarks_____

_____

F. Cover Drainage Layer ☐ Applicable ☒ N/A

1. **Outlet Pipes Inspected** ☐ Functioning ☐ N/A Remarks_____	
2. **Outlet Rock Inspected** ☐ Functioning ☐ N/A Remarks_____	

G. Detention/sedimentation Ponds ☐ Applicable ☒ N/A

1. **Siltation** Areal extent_____ Depth_____ ☐ N/A

   ☐ Siltation not evident

   Remarks_____

2. **Erosion** Areal extent_____ Depth_____ ☐ N/A

   ☐ Erosion not evident

   Remarks_____

3. **Outlet Works** ☐ Functioning ☐ N/A

   Remarks_____

4. **Dam** ☐ Functioning ☐ N/A

   Remarks_____

H. Retaining Walls ☐ Applicable ☒ N/A

1. **Deformations** ☐ Location shown on site map ☐ Deformation not evident

   Horizontal displacement_____ Vertical displacement_____

   Rotational displacement_____

   Remarks_____

2. **Degradation** ☐ Location shown on site map ☐ Deformation not evident

   Remarks_____

I. Perimeter Ditches/Off-Site Discharge ☐ Applicable ☒ N/A

1. **Siltation** ☐ Location shown on site map ☐ Siltation not evident

   Areal extent_____ Depth_____

   Remarks_____

2. **Vegetative Growth** ☐ Location shown on site map ☐ Siltation not evident

☐ Vegetation does not impede flow

Areal extent_____ Type_____

Remarks_____

_____

3. **Erosion** ☐ Location shown on site map ☐ Erosion not evident

Areal extent_____ Depth_____

Remarks_____

_____

4. **Discharge Structure** ☐ Location shown on site map ☐ N/A

Remarks_____

_____

VIII. VERTICAL BARRIER WALLS ☐ Applicable ☒ N/A

1. **Settlement** ☐ Location shown on site map ☐ Settlement not evident

Areal extent_____ Depth_____

Remarks_____

_____

2. **Performance Monitoring** Type of Monitoring_____

☐ Performance not monitored

Frequency_____ ☐ Evidence of breaching

Head differential_____

Remarks_____

_____

IX. GROUNDWATER/SURFACE WATER REMEDIES ☐ Applicable ☒ N/A

A. Groundwater Extraction Wells, Pumps, and Pipelines ☐ Applicable ☐ N/A

1. **Pumps, Wellhead Plumbing, and Electrical**

☐ Good condition ☐ All required wells located ☐ Needs Maintenance ☐ N/A

Remarks_____

_____

2. **Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances**

☐ Good condition ☐ Needs Maintenance

Remarks_____

_____

3. **Spare Parts and Equipment**

☐ Readily available ☐ Good condition ☐ Requires upgrade ☐ Needs to be provided

Remarks_____

_____

B. Surface Water Collection Structures, Pumps, and Pipelines ☐ Applicable ☐ N/A

1. **Collection Structures, Pumps, and Electrical**

☐ Good condition ☐ Needs Maintenance

Remarks_____

_____

2. **Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances**

☐ Good condition ☐ Needs Maintenance

Remarks_____

_____

3. **Spare Parts and Equipment**

☐ Readily available ☐ Good condition ☐ Requires upgrade ☐ Needs to be provided

Remarks_____

_____

C. Treatment System ☐ Applicable ☐ N/A

1. **Treatment Train** (Check components that apply)

☐ Metals removal ☐ Oil/water separation ☐ Bioremediation

☐ Air stripping ☐ Carbon adsorbers

☐ Filters_____

☐ Additive (e.g., chelation agent, flocculent)_____

☐ Others_____

☐ Good condition ☐ Needs Maintenance

☐ Sampling ports properly marked and functional

☐ Sampling/maintenance log displayed and up to date

☐ Equipment properly identified

☐ Quantity of groundwater treated annually_____

☐ Quantity of surface water treated annually_____

Remarks_____

_____

2. **Electrical Enclosures and Panels** (properly rated and functional)

☐ N/A ☐ Good condition ☐ Needs Maintenance

Remarks_____

_____

3. **Tanks, Vaults, Storage Vessels**

☐ N/A ☐ Good condition ☐ Proper secondary containment ☐ Needs Maintenance

Remarks_____

_____

4. **Discharge Structure and Appurtenances**

☐ N/A ☐ Good condition ☐ Needs Maintenance

Remarks_____

_____

5. **Treatment Building(s)**

☐ N/A ☐ Good condition (esp. roof and doorways) ☐ Needs repair

☐ Chemicals and equipment properly stored

Remarks_____

_____

6. **Monitoring Wells** (pump and treatment remedy)

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ All required wells located ☐ Needs Maintenance ☐ N/A

Remarks_____

_____

D. Monitoring Data

1. Monitoring Data

☐ Is routinely submitted on time ☐ Is of acceptable quality

2 Monitoring data suggests:

☐ Groundwater plume is effectively contained ☐ Contaminant concentrations are declining

E. Monitored Natural Attenuation

1. **Monitoring Wells** (Natural attenuation remedy)

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ All required wells located ☐ Needs Maintenance ☐ N/A

Remarks_____

_____

X. OTHER REMEDIES

If there are remedies applied at the site, which are not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.

XI. OVERALL OBSERVATIONS

A. Implementation of the Remedy

Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emissions, etc.).

Remedy is effective and functioning as designed to prevent excavation of buried waste.

B. Adequacy of O & M

Describe issues and observations related to the implementation and scope of O & M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy.

C. Early Indicators of Potential Remedy Failure

Describe issues and observations such as unexpected changes in the cost or scope of O & M or a high frequency of unscheduled repairs that suggest that the protectiveness of the remedy may be compromised in the future.

N/A

D. Opportunities for Optimization

Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy.

None

K-Area Burning/Rubble Pit (131-K) and Rubble Pile (631-20G) Operable Unit

I. Introduction

This is the first five-year review for the K-Area Burning/Rubble Pit (131-K) and Rubble Pile (KBRP and KRP) (631-20G) Operable Unit (OU). This review was conducted from August 2001 through September 2001. This report documents the results of the review.

II. OU Chronology

Table 1 lists the chronology of site events for the KBRP and KRP OU.

Table 1. Chronology of OU Events

Event	Date
Remedial Investigation complete	October 18, 1999
ROD issuance	June 27, 2001
Remedial Action start	October 8, 2001

Key:

Consent Decree – Date a consent decree (enforcement document from the court system) was issued for the operable unit.

Corrective Action start – Date the corrective (remedial) action was initiated (under RCRA).

ESD Issuance - Date all three parties (USDOE, USEPA, and SCDHEC) signed the Explanation of Significant Difference used to significantly modify the remedy selected in the Record of Decision.

Final or Interim ROD issuance – Date the three parties (USDOE, USEPA, and SCDHEC) signed the Record of Decision.

Federal Facility Agreement Declared Effective - Date the Federal Facility Agreement formalized the integration of CERCLA and RCRA in remediation activities at SRS.

NPL listing – Date the entire SRS was added to EPA's National Priorities List.

Previous Five-Year Reviews – Date of any previous five year reviews of remedy for the operable unit.

RCRA Closure Certified – Date the three parties (USDOE, USEPA, and SCDHEC) certified that the operable unit had been remediated and closed under the Resource Conservation and Recovery Act.

RCRA Closure Plan Approved – Date the three parties (USDOE, USEPA, and SCDHEC) approved the closure plan for the operable unit under Resource Conservation and Recovery Act.

Remedial Action start/complete – Date the remedial action (final or interim) was initiated/completed (under CERCLA).

Removal Action – Date contaminated media was removed from the operable unit (not associated with the ROD).

RFI/RI start/complete - Date the remedial investigation (sampling) was initiated/completed for the operable unit.

ROD Amendment Issuance - Date the three parties (USDOE, USEPA, and SCDHEC) signed the Record of Decision Amendment used to change the remedy selected in the original Record of Decision.

III. Background

The KBRP and KRP OU is located approximately 5.9 miles east of the nearest site boundary and 0.4 miles east of the K-Reactor Area (see Figure 1).

The pit was constructed in 1955-1956 as a shallow, unlined excavation measuring approximately 30 feet (ft) wide, 240 ft long, and approximately 8 ft deep, for waste burning and burial. During operation, organic liquids of unknown use and origin, waste oils, paper, plastics, and rubber were disposed of in the pit and burned periodically (WSRC 1998b). Disposal records, including composition, origin, and use of materials disposed, were not kept for this unit during its period of operation. The use of the KBRP for disposal of combustible wastes was discontinued in 1973. When the pit became full with disposed wastes, it was backfilled with soil to grade level.

The pile was constructed sometime between 1956 and 1961. The pile consists of a general disposal area, semicircular in shape, measuring approximately 300 ft long and 50 to 135 ft wide. Individual rubble piles within the area are 4 to 6 ft high. Total estimated waste volume is 2,800 yd^3. The pile is composed primarily of soil matter, with some broken asphalt, broken concrete pieces, and gravel-sized coal. The coal and asphalt exist in a wide range of particle sizes and are dispersed in a highly heterogeneous manner throughout the piles. Disposal records were not kept for this unit during its period of operation. The Resource Conservation and Recovery Act (RCRA) Facility Investigation/Remedial Investigation (RFI/RI) included collecting soil samples from individual rubble piles as part of the pit and pile area evaluation.

The OU is located in an area that has been recommended for future industrial (nuclear) use and includes groundwater as a subunit.

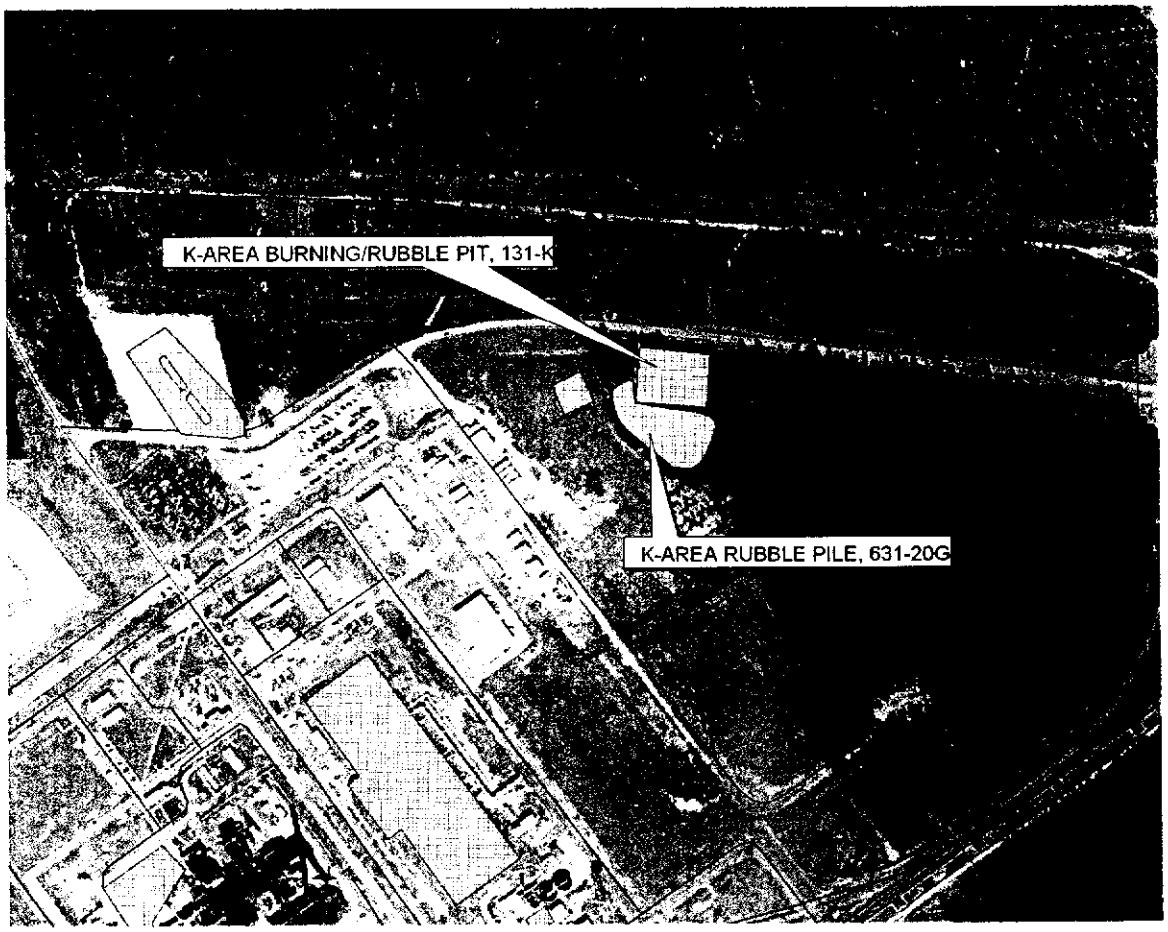


Figure 1. Location of the K-Area Burning/Rubble Pit (131-K) OU at Savannah River Site

Final human-health constituents of concern (COCs) are listed in Table 1. The risk/hazard results are based on the larger risk estimates of the KBRP and KRP OU.

Remedial Actions

The remedial action objectives (RAOs) for the unit are as follows:

Table 1. Constituents of Concern, Risks to Future Industrial Workers, and Remedial Goals for KBRP and KRP OU

Medium	COCs	Basis/Receptor	Baseline Risk	Remedial Goals (for 10^{-6} or HQ=0.1)
KBRP Soil	benzo(a)anthracene	Future Industrial Worker	$3.70 \times 10^{-5*}$	6.24 mg/kg[a]
	benzo(a)pyrene		$3.70 \times 10^{-4*}$	0.624 mg/kg[a]
	benzo(b)fluoranthene		$5.00 \times 10^{-5*}$	6.24 mg/kg[a]
	benzo(k)fluoranthene		$2.50 \times 10^{-6*}$	62.4 mg/kg[a]
	dibenzo(a,h)anthracene		$5.40 \times 10^{-5*}$	0.624 mg/kg[a]
	indeno(1,2,3-c,d)pyrene		$2.14 \times 10^{-5*}$	6.24 mg/kg[a]
KRP Soil	benzo(a)anthracene	Future Industrial Worker	$1.81 \times 10^{-5*}$	6.24 mg/kg[a]
	benzo(a)pyrene		$1.45 \times 10^{-4*}$	0.624 mg/kg[a]
	benzo(b)fluoranthene		$2.30 \times 10^{-5*}$	6.24 mg/kg[a]
	indeno(1,2,3-c,d)pyrene		$8.70 \times 10^{-6*}$	6.24 mg/kg[a]
	arsenic		$3.35 \times 10^{-5*}$	7.96 mg/kg[c]
KBRP and KRP OU Water Table Aquifer	tetrachloroethylene	Future Industrial Worker and Exceedence of MCL	$1.6 \times 10^{-6**}$	5.0 µg/L[b]
	trichloroethylene		$1.10 \times 10^{-7**}$	5.0 µg/L[b]

* Combines ingestion, inhalation, and dermal contact based on potential exposure to soil in the 0- to 1-foot interval.
** Risk based on potential exposure (ingestion) of groundwater.
a The remedial goal is based on the 1×10^{-6} target cancer risk to the hypothetical, future, industrial worker.
b The remedial goal is based on the Water Quality Protection of Human Health as established by South Carolina Regulation 61-68 of the Pollution Control Act.
c The remedial goal is based on two times the mean concentration of arsenic in background soil at the KBRP and KRP.
HQ = hazard quotient
mg/kg = milligrams per kilogram
µg/L = micrograms per liter
mg/L = milligrams per liter

Well sampling for monitored natural attenuation will be performed quarterly for the first year, then semiannually. Monitoring and sampling will be reported as part of the Groundwater Mixing Zone Application annual sampling and the CMIR/FRR. Table 2 shows the wells to be sampled, the mixing zone compliance limit, the sampling frequency and the reporting frequency for the groundwater sampling for KBRP.

Table 2. KBRP Groundwater Sampling Information

Well Identification (screen zone)	Mixing Zone Compliance Limit	Sampling Frequency	Reporting Frequency
Plume Wells			
KRP-4, -5, -6, 7-8 (Existing water table wells)	PCE – 43 μg/L TCE - 61 μg/L	Quarterly (first year) then Semiannually	Annually
Intermediate Wells			
KRP-10D & -11D (Upper Aquifer Zone of the Upper Three Runs Aquifer)	PCE – 43 μg/L TCE - 61 μg/L	Quarterly (first year) then Semiannually	Annually
KRP-10C & -11C (Lower Aquifer Zone of Upper Three Runs Aquifer)	PCE – 5 μg/L TCE – 5 μg/L	Quarterly (first year) then Semiannually	Annually
KRP-10A & -11A (Gordon Aquifer)[1]	PCE – 5 μg/L TCE – 5 μg/L	Quarterly (first year) then Semiannually	Annually
Compliance Well Clusters - CP3, CP1, & CP2			
KRP-7[1], -12D, -13D, -14D[2] (Upper Aquifer Zone of the Upper Three Runs Aquifer)	PCE – 5 μg/L TCE – 5 μg/L	Annually	Annually
KRP-12C, &-14C[2] (Lower Aquifer Zone of Upper Three Runs Aquifer)	PCE – 5 μg/L TCE – 5 μg/L	Annually	Annually
KRP-7A[1], –12A[1], & -13[1] (Gordon Aquifer)	PCE – 5 μg/L TCE – 5 μg/L	Annually	Annually

Footnotes:
1. To be installed if MZCL exceeded in corresponding –C or –D series well
2. Not considered a compliance well. Slight MCL exceedances were found in the CPT where KRP-7 was to be installed; therefore, KRP-14C & -14D were added.

The functionality of the remedy has recently been reported in the *Comparison of Groundwater Monitoring Data with Modeling Predictions for the K-Area Burning/Rubble Pit and Rubble Pile Groundwater Contamination and Plan for Corrective Action* (WSRC-RP-2002-4185, Revision 0, October 2002). In addition, annual groundwater monitoring reports will be submitted starting in October 2003.

K-Area Burning/Rubble Pit Soil

- Protect future industrial workers from unacceptable exposures to polycyclic aromatic hydrocarbons (PAHs) in soil at the KBRP.

K-Area Rubble Pile Soil

- Protect future industrial workers from unacceptable exposures to PAHs and arsenic in soil at the KRP.

Water Table Aquifer Groundwater

- Protect future industrial workers from unacceptable exposures to tetrachloroethylene (PCE) and trichloroethylene (TCE) in groundwater.

- Prevent further degradation of groundwater and return it to below MCLs to allow beneficial uses.

The remedial action at the unit is as follows:

K-Area Burning/Rubble Pit and K-Area Rubble Pile Soil

- Soil Cover over the KBRP and KRP with Institutional Controls

Water Table Aquifer Groundwater

- Monitored Natural Attenuation (MNA)

IV. Progress Since Last Review

This is the first five-year review for this OU. No recommendations or follow-up actions have been identified.

V. Five-Year Review Process

The following tasks were performed as part of the review:

- Reviewed documents listed in Attachment 1
- Inspected the OU
- Reviewed changes in standards and to-be-considered guidance

VI. Technical Assessment

The conclusions for this review are as follows:

- The groundwater remedy (MNA) cannot be assessed until data is collected over time. Institutional controls are in place and are protecting current/future industrial workers.
- The RAOs and assumptions used at the time of the remedy selection are still valid.
- No other information has come to light that could call into question the protectiveness of the remedy

VII. Issues

No issues related to current site conditions prevents the remedy from being protective.

VIII. Recommendations and Follow-up Actions

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

IX. Protectiveness Statement(s)

The interim action of a soil cover over KBRP and KRP and Monitored Natural Attenuation (MNA) is not fully protective of human health and the environment because the groundwater will not meet MCLs until MNA has demonstrated that natural remediation of the groundwater has been achieved. Exposure pathways that could lead to unacceptable risk are being controlled through institutional controls. Institutional controls will maintain future industrial land use through implementation of a LUCIP and include: (1) physical access controls to prevent unauthorized entry to SRS (fences, guards, security patrols, etc.); (2) administrative controls that maintain this site for industrial use only (SRS is a secured government facility with land use restrictions); and (3) warning signs and land use controls (SRS Site Use/Site Clearance Program).

X. Next Review

The next five-year review is scheduled for June 30, 2007.

Attachment 1

List of Documents Reviewed

WSRC, 2000. *Record of Decision Remedial Alternative Selection for the K-Area Burning/Rubble Pit (131-K) and Rubble Pile (631-20G) Operable Unit (U)*, WSRC-RP-97-862, Revision 1, July, Westinghouse Savannah River Company, Aiken SC

WSRC, 2001. *Corrective Measures Implementation/Remedial Action Implementation Plan (CMI/RAIP) for the K-Area Burning/Rubble Pit (131-K) and Rubble Pile (631-20G) Operable Unit (OU) (U)*, WSRC-RP-2000-4115, Revision 1.1, June, Westinghouse Savannah River Company, Aiken, SC

Attachment 2

Five-Year Review Site Inspection Checklist

Five-Year Review Site Inspection Checklist

I. SITE INFORMATION

Site Name: K-Area Burning/Rubble Pit (131-K)	**Date of Inspection: 10/25/01**
Location and Region: SRS, USEPA Region IV	**EPA ID: 40**
Agency, office, or company leading the five-year review: USDOE	**Weather/temperature:**

Remedy Includes: (Check all that apply)

- ☒ Landfill cover/containment
- ☐ Access controls
- ☒ Institutional Controls
- ☐ Groundwater pump and treatment
- ☐ Surface water collection and treatment
- ☐ Other_____

- ☒ Monitored Natural Attenuation
- ☐ Groundwater Containment
- ☐ Vertical Barrier Walls

Attachments: ☐ Inspection team roster attached ☒ Site map attached

II. INTERVIEWS (Check all that apply)

1. **O & M site manager** _____ _____ _____
   Name Title Date

   Interviewed ☐ at site ☐ at office ☐ by phone Phone No. _____

   Problems, suggestions; ☐ report attached _____

2. **O & M staff** _____ _____ _____
   Name Title Date

   Interviewed ☐ at site ☐ at office ☐ by phone Phone No. _____

   Problems, suggestions; ☐ report attached _____

3. **Local regulatory authorities and response agencies** (i.e., State and tribal offices, emergency response office, police department, office of public health or environmental health, zoning office, recorder of deeds, or other city and county offices, etc.) Fill in all that apply.

Agency _____

Contact _____ _____ _____ _____

Name Title Date Phone No.

Problems; suggestions; ☐ Report attached _____

_____

Agency _____

Contact _____ _____ _____ _____

Name Title Date Phone No.

Problems; suggestions; ☐ Report attached _____

_____

Agency _____

Contact _____ _____ _____ _____

Name Title Date Phone No.

Problems; suggestions; ☐ Report attached _____

_____

4. **Other interviews** (optional) ☐ Report attached _____

Remedial Action not implemented yet

III. ONSITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)

1. **O & M Documents**

☐ O & M Manual ☐ Readily available ☐ Up to date ☒ N/A

☒ As-built drawings ☒ Readily available ☐ Up to date ☐ N/A

☐ Maintenance Logs ☐ Readily available ☐ Up to date ☒ N/A

Remarks_____

_____

2. **Site-Specific Health and Safety Plan** ☒ Readily available ☒ Up to date ☐ N/A

☐ Contingency plan/emergency response plan ☐ Readily available ☐ Up to date ☒ N/A

Remarks_____

_____

3. **O & M and OSHA Training Records** ☒ Readily available ☒ Up to date ☐ N/A

Remarks_____

_____

4. **Permits and Service Agreements**

☐ Air discharge permit ☐ Readily available ☐ Up to date ☒ N/A

☐ Effluent discharge ☐ Readily available ☐ Up to date ☒ N/A

☐ Waste Disposal, POTW ☐ Readily available ☐ Up to date ☒ N/A

☐ Other permits ☐ Readily available ☐ Up to date ☒ N/A

Remarks_____

_____

5. **Gas Generation Records** ☐ Readily available ☐ Up to date ☒ N/A

Remarks_____

_____

6. **Settlement Monument Records** ☐ Readily available ☐ Up to date ☒ N/A

Remarks_____

_____

7. **Groundwater Monitoring Records** ☒ Readily available ☒ Up to date ☐ N/A

Remarks_____

_____

8. **Leachate Extraction Records**	☐ Readily available	☐ Up to date	☒ N/A	
Remarks_____				
9. **Discharge Compliance Records**				
☐ Air	☐ Readily available	☐ Up to date	☒ N/A	
☐ Water (effluent)	☐ Readily available	☐ Up to date	☒ N/A	
Remarks_____				
10. **Daily Access/Security Logs**	☒ Readily available	☒ Up to date	☐ N/A	
Remarks_____				

IV. O & M Costs

1. **O & M Organization**

☐ State in-house ☐ Contractor for State

☐ PRP in-house ☐ Contractor for PRP

☐ Other_____

_____

2. **O & M Cost Records**

☐ Readily available ☐ Up to date

☐ Funding mechanism/agreement in place

☐ Other_____

_____

Total annual cost by year for review period if available

From_____ To_____ _____ ☐ Breakdown attached
Date Date Total cost

From_____ To_____ _____ ☐ Breakdown attached
Date Date Total cost

From_____ To_____ _____ ☐ Breakdown attached
Date Date Total cost

From_____ To_____ _____ ☐ Breakdown attached
Date Date Total cost

From_____ To_____ _____ ☐ Breakdown attached
Date Date Total cost

1. **Unanticipated or Unusually High O & M Costs During Review Period**

Describe costs and reasons: _____

_____

_____

_____

_____

V. ACCESS AND INSTITUTIONAL CONTROLS ☒ Applicable ☐ N/A

A. Fencing

1. **Fencing Damaged** ☐ Location shown on site map ☐ Gates secured ☒ N/A

Remarks_____

_____

B. Other Access Restrictions

1. **Signs and other security measures** ☐ Location shown on site map ☒ N/A

Remarks Signs not installed yet.

_____

C. Institutional Controls

1. **Implementation and enforcement**

Site conditions imply ICs not properly implemented ☐ Yes ☒ No ☐ N/A

Site conditions imply ICs not being fully enforced ☐ Yes ☒ No ☐ N/A

Type of monitoring (e.g., self-reporting, drive-by) Inspection to be performed upon implementation.

Frequency_____

Responsible party/agent_____

Contact	Michael Redd	Manager ER Maintenance	_____	_____
	Name	Title	Date	Phone No.

Report is up-to-date ☒ Yes ☐ No ☐ N/A

Reports are verified by the lead agency ☒ Yes ☐ No ☐ N/A

Specific requirements in deed of decision documents have been met ☒ Yes ☐ No ☐ N/A

Violations have been reported ☐ Yes ☐ No ☒ N/A

Other problems or suggestions: ☐ Report attached

_____

_____

_____

_____

2. **Adequacy** ☒ ICs are adequate ☐ ICs are inadequate ☐ N/A

Remarks_____

_____

D. General

1. **Vandalism/trespassing** ☐ Location shown on site map ☒ No vandalism evident

   Remarks_____

2. **Land use changes onsite** ☒ N/A

   Remarks_____

3. **Land use changes offsite** ☒ N/A

   Remarks_____

VI. GENERAL SITE CONDITIONS

A. Roads ☐ Applicable ☒ N/A

1. **Roads damaged** ☐ Location shown on site map ☐ Roads adequate ☐ N/A

   Remarks_____

B. Other site Conditions

Remarks_____

VII. LANDFILL COVERS ☒ Applicable ☐ N/A

A. Landfill Surface

1. **Settlement** (Low spots) ☐ Location shown on site map ☒ Settlement not evident

   Areal extent_____ Depth_____

   Remarks_____

2. **Cracks** ☐ Location shown on site map ☒ Cracking not evident

   Lengths_____ Widths_____ Depths_____

   Remarks_____

3. **Erosion** ☐ Location shown on site map ☒ Erosion not evident

Areal extent_____ Depth_____

Remarks_____

4. **Holes** ☐ Location shown on site map ☒ Holes not evident

Areal extent_____ Depth_____

Remarks_____

5. **Vegetative Cover** ☐ Grass ☐ Cover properly established ☒ No signs of stress

☐ Trees/shrubs (indicate size and location on a diagram)

Remarks_____

6. **Alternative Cover (armored rock, concrete, etc.)** ☒ N/A

Remarks_____

7. **Bulges** ☐ Location shown on site map ☒ Bulges not evident

Areal extent_____ Height_____

Remarks_____

8. **Wet Areas/Water Damage** ☒ Wet areas/water damage not evident

☐ Wet Areas ☐ Location shown on site map Areal extent_____

☐ Ponding ☐ Location shown on site map Areal extent_____

☐ Seeps ☐ Location shown on site map Areal extent_____

☐ Soft subgrade ☐ Location shown on site map Areal extent_____

Remarks_____

9. **Slope Instability** ☐ Slides ☐ Location shown on site map ☒ No evidence of slope instability

Areal extent_____

Remarks_____

B. Benches ☐ Applicable ☒ N/A

(Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)

1. **Flows Bypass Bench** ☐ Location shown on site map ☐ N/A or okay

Remarks_____

_____

2. **Bench Breached** ☐ Location shown on site map ☐ N/A or okay

Remarks_____

_____

3. **Bench Overtopped** ☐ Location shown on site map ☐ N/A or okay

Remarks_____

_____

C. Letdown Channels ☐ Applicable ☒ N/A

(Channel lined with erosion control mates, riprap, grout bags, or gabions that descend down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)

1. **Settlement** ☐ Location shown on site map ☐ No evidence of settlement

Areal extent_____ Depth_____

Remarks_____

_____

2. **Material Degradation** ☐ Location shown on site map ☐ No evidence of degradation

Material type_____ Areal extent _____

Remarks_____

_____

3. **Erosion** ☐ Location shown on site map ☐ No evidence of erosion

Areal extent _____ Depth_____

Remarks_____

_____

4. **Undercutting** ☐ Location shown on site map ☐ No evidence of undercutting

Areal extent _____ Depth_____

Remarks_____

_____

5. **Obstructions** Type_____ ☐ No obstructions

☐ Location shown on site map Areal extent _____

Size _____

Remarks_____

_____

6. **Excessive Vegetative Growth** Type_____

☐ No evidence of excessive growth

☐ Vegetation in channels does not obstruct flow

☐ Location shown on site map Areal extent _____

Remarks_____

_____

D. Cover Penetrations ☐ Applicable ☒ N/A

1. **Gas Vents** ☐ Active ☐ Passive

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A

Remarks_____

_____

2. **Gas Monitoring Probes**

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A

Remarks_____

_____

3. **Monitoring Wells** (within surface area of landfill)

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A

Remarks_____

_____

4. **Leachate Extraction Wells**

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A

Remarks_____

_____

5. **Settlement Monuments** ☐ Located ☐ Routinely surveyed ☐ N/A

Remarks_____

_____

E. Gas Collection and Treatment ☐ Applicable ☒ N/A

1. **Gas Treatment Facilities**

☐ Flaring ☐ Thermal destruction ☐ Collection for reuse

☐ Good condition ☐ Needs Maintenance

Remarks_____

_____

2. **Gas Collection Wells, Manifolds and Piping**

☐ Good condition ☐ Needs Maintenance

Remarks_____

_____

3. **Gas Monitoring Facilities** (e.g., gas monitoring of adjacent homes or buildings)

☐ Good condition ☐ Needs Maintenance ☐ N/A

Remarks_____

_____

F. Cover Drainage Layer ☐ Applicable ☒ N/A

1. **Outlet Pipes Inspected** ☐ Functioning ☐ N/A Remarks_____	
2. **Outlet Rock Inspected** ☐ Functioning ☐ N/A Remarks_____	

G. Detention/sedimentation Ponds ☐ Applicable ☒ N/A

1. **Siltation** Areal extent_____ Depth_____ ☐ N/A

   ☐ Siltation not evident

   Remarks_____

2. **Erosion** Areal extent_____ Depth_____ ☐ N/A

   ☐ Erosion not evident

   Remarks_____

3. **Outlet Works** ☐ Functioning ☐ N/A

   Remarks_____

4. **Dam** ☐ Functioning ☐ N/A

   Remarks_____

H. Retaining Walls ☐ Applicable ☒ N/A

1. **Deformations** ☐ Location shown on site map ☐ Deformation not evident

   Horizontal displacement_____ Vertical displacement_____

   Rotational displacement_____

   Remarks_____

2. **Degradation** ☐ Location shown on site map ☐ Deformation not evident

   Remarks_____

I. Perimeter Ditches/Off-Site Discharge ☐ Applicable ☒ N/A

1. **Siltation** ☐ Location shown on site map ☐ Siltation not evident

   Areal extent_____ Depth_____

   Remarks_____

2. **Vegetative Growth** ☐ Location shown on site map ☐ Siltation not evident

☐ Vegetation does not impede flow

Areal extent_____ Type_____

Remarks_____

_____

3. **Erosion** ☐ Location shown on site map ☐ Erosion not evident

Areal extent_____ Depth_____

Remarks_____

_____

4. **Discharge Structure** ☐ Location shown on site map ☐ N/A

Remarks_____

_____

VIII. VERTICAL BARRIER WALLS ☐ Applicable ☒ N/A

1. **Settlement** ☐ Location shown on site map ☐ Settlement not evident

Areal extent_____ Depth_____

Remarks_____

_____

2. **Performance Monitoring** Type of Monitoring_____

☐ Performance not monitored

Frequency_____ ☐ Evidence of breaching

Head differential_____

Remarks_____

_____

IX. GROUNDWATER/SURFACE WATER REMEDIES ☒ Applicable ☐ N/A

A. Groundwater Extraction Wells, Pumps, and Pipelines ☒ Applicable ☐ N/A

1. **Pumps, Wellhead Plumbing, and Electrical**

☐ Good condition ☐ All required wells located ☐ Needs Maintenance ☐ N/A

Remarks Wells not installed yet.

2. **Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances**

☐ Good condition ☐ Needs Maintenance

Remarks Wells not installed yet.

3. **Spare Parts and Equipment**

☐ Readily available ☐ Good condition ☐ Requires upgrade ☐ Needs to be provided

Remarks Wells not installed yet.

B. Surface Water Collection Structures, Pumps, and Pipelines ☐ Applicable ☒ N/A

1. **Collection Structures, Pumps, and Electrical**

☐ Good condition ☐ Needs Maintenance

Remarks

2. **Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances**

☐ Good condition ☐ Needs Maintenance

Remarks

3. **Spare Parts and Equipment**

☐ Readily available ☐ Good condition ☐ Requires upgrade ☐ Needs to be provided

Remarks

C. Treatment System ☐ Applicable ☒ N/A

1. **Treatment Train** (Check components that apply)

☐ Metals removal ☐ Oil/water separation ☐ Bioremediation

☐ Air stripping ☐ Carbon adsorbers

☐ Filters_____

☐ Additive (e.g., chelation agent, flocculent)_____

☐ Others_____

☐ Good condition ☐ Needs Maintenance

☐ Sampling ports properly marked and functional

☐ Sampling/maintenance log displayed and up to date

☐ Equipment properly identified

☐ Quantity of groundwater treated annually_____

☐ Quantity of surface water treated annually_____

Remarks_____

_____

2. **Electrical Enclosures and Panels** (properly rated and functional)

☐ N/A ☐ Good condition ☐ Needs Maintenance

Remarks_____

_____

3. **Tanks, Vaults, Storage Vessels**

☐ N/A ☐ Good condition ☐ Proper secondary containment ☐ Needs Maintenance

Remarks_____

_____

4. **Discharge Structure and Appurtenances**

☐ N/A ☐ Good condition ☐ Needs Maintenance

Remarks_____

_____

5. **Treatment Building(s)**

☐ N/A ☐ Good condition (esp. roof and doorways) ☐ Needs repair

☐ Chemicals and equipment properly stored

Remarks_____

_____

6. **Monitoring Wells** (pump and treatment remedy)

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ All required wells located ☐ Needs Maintenance ☐ N/A

Remarks_____

_____

D. Monitoring Data ☐ Applicable ☒ N/A

1. Monitoring Data

☐ Is routinely submitted on time ☐ Is of acceptable quality

2 Monitoring data suggests:

☐ Groundwater plume is effectively contained ☐ Contaminant concentrations are declining

E. Monitored Natural Attenuation ☒ Applicable ☐ N/A

1. **Monitoring Wells** (Natural attenuation remedy)

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ All required wells located ☐ Needs Maintenance ☐ N/A

Remarks Wells not installed yet.

_____

X. OTHER REMEDIES

If there are remedies applied at the site, which are not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.

XI. OVERALL OBSERVATIONS

A. Implementation of the Remedy

Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emissions, etc.).

The efficiency and function of the design cannot be determined because the remedy (soil cover, institutional

Controls, and monitored natural attenuation) has not been implemented yet.

B. Adequacy of O & M

Describe issues and observations related to the implementation and scope of O & M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy.

C. Early Indicators of Potential Remedy Failure

Describe issues and observations such as unexpected changes in the cost or scope of O & M or a high frequency of unscheduled repairs that suggest that the protectiveness of the remedy may be compromised in the future.

D. Opportunities for Optimization

Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy.

L- and P-Area Bingham Pump Outage Pits (L & P BPOP) (643-2G, 643-3G, and 643-4G) Operable Unit

I. Introduction

This is the first five-year review for the L- and P-Area Bingham Pump Outage Pits (643-2G, 643-3G, and 643-4G) (L & P BPOP) Operable Unit (OU). This review was conducted from August 2001 through September 2001. This report documents the results of the review.

II. OU Chronology

Table 1 lists the chronology of site events for the L & P BPOP OU.

Table 1. Chronology of OU Events

Event	Date
RIcomplete	May 27, 1999
ROD issuance	October 22, 2000
Remedial Action start	September 11, 2000

Key:

Consent Decree – Date a consent decree (enforcement document from the court system) was issued for the operable unit.

Corrective Action start – Date the corrective (remedial) action was initiated (under RCRA).

ESD Issuance - Date all three parties (USDOE, USEPA, and SCDHEC) signed the Explanation of Significant Difference used to significantly modify the remedy selected in the Record of Decision.

Final or Interim ROD issuance – Date the three parties (USDOE, USEPA, and SCDHEC) signed the Record of Decision.

Federal Facility Agreement Declared Effective - Date the Federal Facility Agreement formalized the integration of CERCLA and RCRA in remediation activities at SRS.

NPL listing – Date the entire SRS was added to EPA's National Priorities List.

Previous Five-Year Reviews – Date of any previous five year reviews of remedy for the operable unit.

RCRA Closure Certified – Date the three parties (USDOE, USEPA, and SCDHEC) certified that the operable unit had been remediated and closed under the Resource Conservation and Recovery Act.

RCRA Closure Plan Approved – Date the three parties (USDOE, USEPA, and SCDHEC) approved the closure plan for the operable unit under Resource Conservation and Recovery Act.

Remedial Action start/complete – Date the remedial action (final or interim) was initiated/completed (under CERCLA).

Removal Action – Date contaminated media was removed from the operable unit (not associated with the ROD).

RFI/RI start/complete - Date the remedial investigation (sampling) was initiated/completed for the operable unit.

ROD Amendment Issuance - Date the three parties (USDOE, USEPA, and SCDHEC) signed the Record of Decision Amendment used to change the remedy selected in the original Record of Decision.

III. Background

The L and P BPOPs are located near the L and P Reactor Areas, respectively, at Savannah River Site (SRS) (Figures 1 through 4). The L BPOPs consist of two pits (643-2G and 643-3G) aligned end-to-end with approximately 125 ft between them; one pit is 275 x 22 ft and the other is 377 x 20 ft. The P BPOP consists of one pit (643-4G) having dimensions of 472 x 26 ft. The mean depth of each pit is approximately 13 ft. They are in areas designated for residential use, but their proximity to the L and P reactor areas and the presence of buried debris make the units unsuitable for residential use. Therefore the current and anticipated future land use is industrial.

The L and P BPOPs are burial pits containing waste debris that was generated by major modifications to primary and secondary reactor cooling systems in 1957 and 1958, including the primary system Bingham Pumps. The units were formed by excavating trenches to an average depth of 13 ft, disposing of 9 ft of debris, and then returning the unit to grade by covering the debris with 4 ft of backfill. The waste consists of miscellaneous construction materials such as pipes, cables, ladders, and concrete. No known pumps or liquid wastes were buried in the L and P BPOPs. The radioactive contamination was less than 25 milliRoentgen per hour (mR/hr) with no detected alpha activity. The buried waste is categorized as low level threat waste (USEPA 1991) because of the absence of free liquids or mobile or highly toxic material.

Groundwater is included as a subunit for the OU.

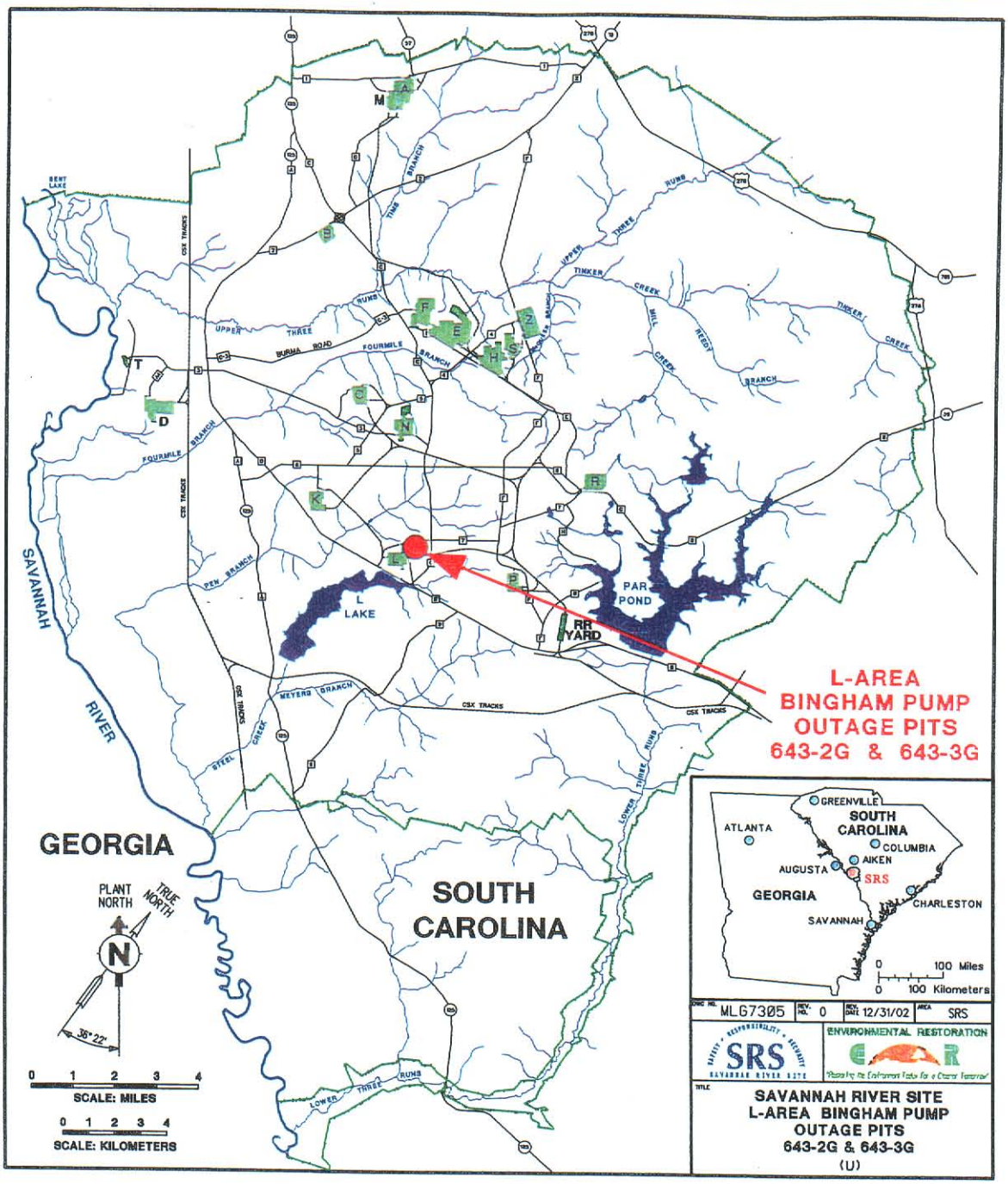


Figure 1. Location of the L-Area Bingham Pump Outage Pits at SRS

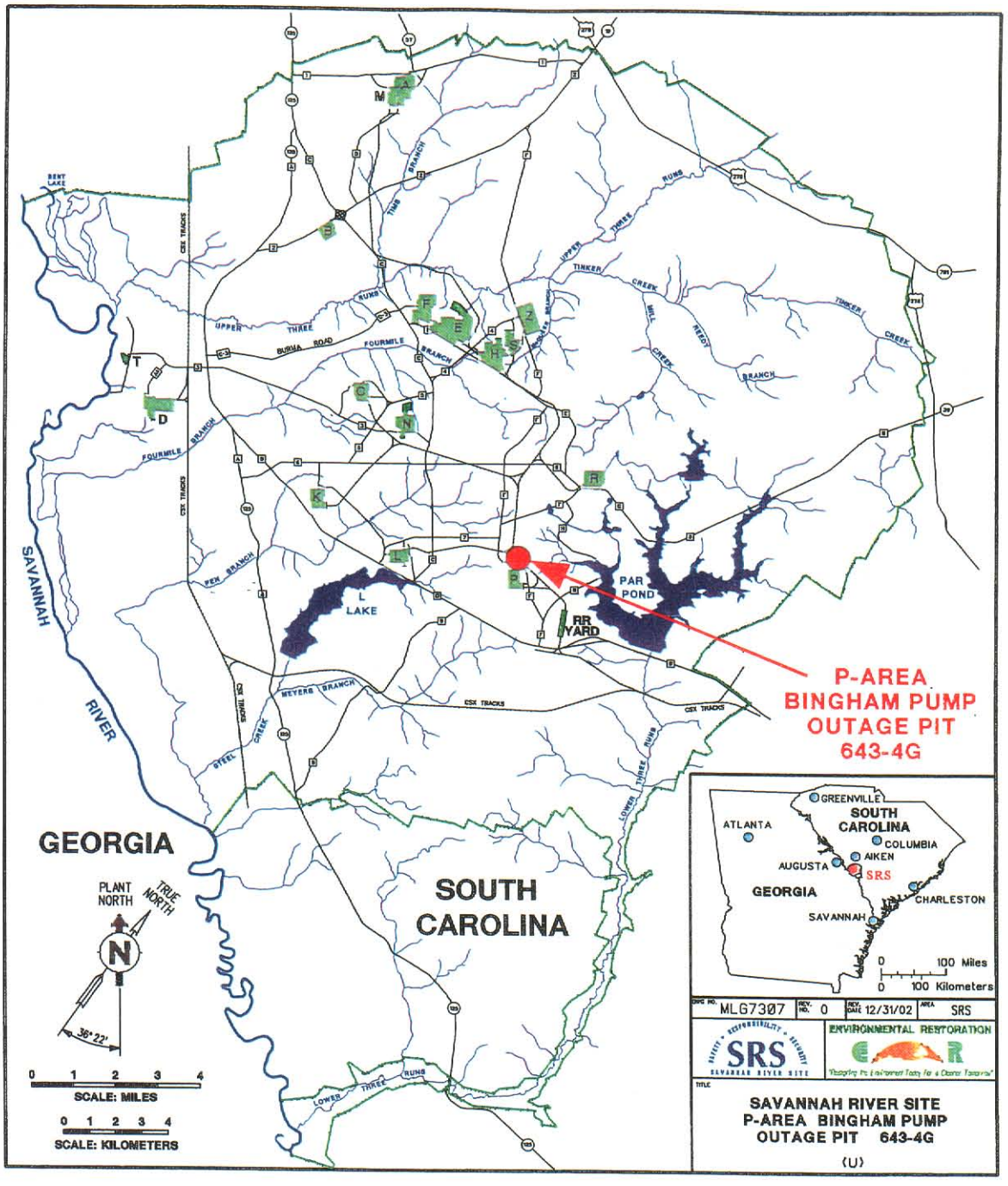


Figure 2. Location of the P-Area Bingham Pump Outage Pit at SRS

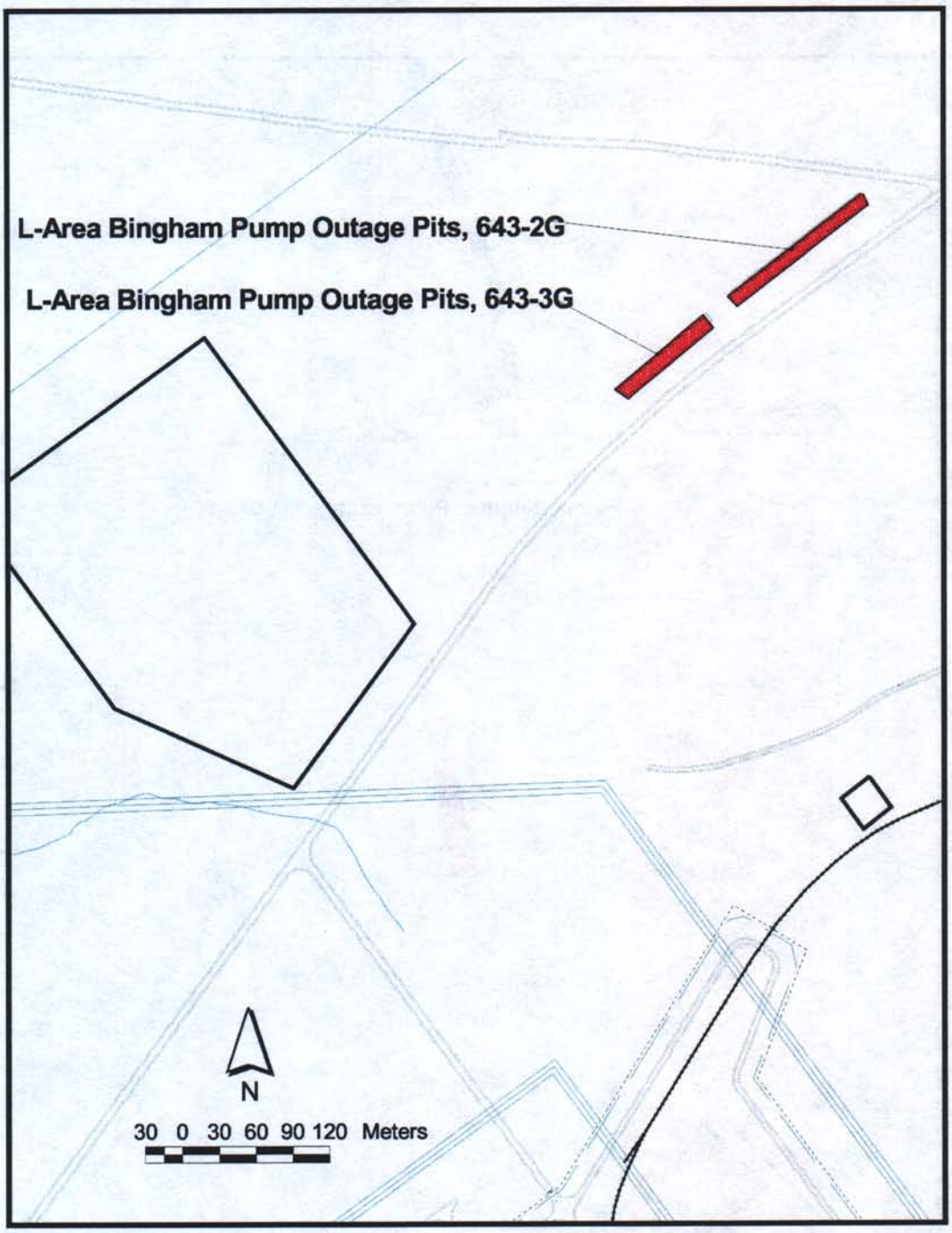


Figure 3. Layout of L-Area Bingham Pump Outage Pit

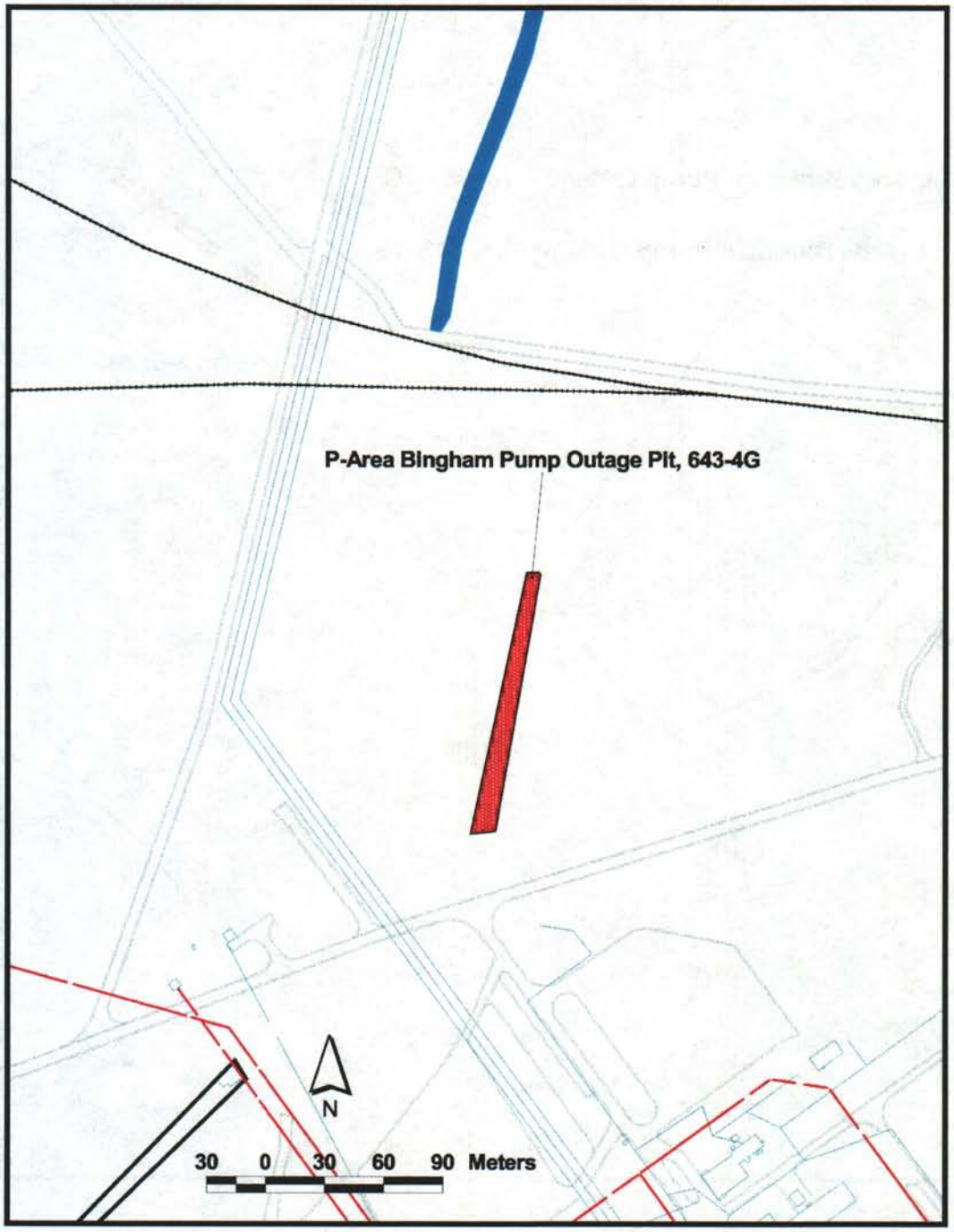


Figure 4. Layout of the P-Area Bingham Pump Outage Pit

Remedial Actions

The remedial action objectives (RAOs) for the L and P BPOPs soils are as follows:

- Prevent human exposure, via any exposure route (ingestion, inhalation, or dermal contact) to soil containing contaminants in concentrations that exceed appropriate risk levels

- Prevent environmental exposure to soil containing contaminants in concentrations that are likely to negatively stress environmental receptors

- Prevent migration of contaminants from the soil into other media (groundwater or surface water) at concentrations that would fail to meet the RAOs for that media

The remedial action at the L and P BPOPs is as follows:

- Land Use Controls (access and deed restrictions/notifications) for soil

- No action for groundwater

As part of land use controls, signs were posted at the units. There are no system operation requirements. There are no annual system operations.

Semi-annual monitoring has been conducted for accuracy and legibility of identification signs, visible subsidence or erosion of the waste unit, proper vegetation growth, mowing, etc. All other routine maintenance activities (i.e., mowing, etc.) and corrective actions have been implemented and documented.

IV. Progress Since Last Review

No recommendations or follow-up actions have been identified.

V. Five-Year Review Process

The following tasks were performed as part of the review:

- Reviewed documents listed in Attachment 1
- Confirmed implementation of the remedial action
- Inspected unit to confirm protectiveness of remedial action
- Reviewed changes in standards and to-be-considered guidance

VI. Technical Assessment

- The remedy is functioning as intended by the decision documents. Land use controls are in place and being implemented to provide access control and prevent exposure as intended by the decision documents.
- The exposure assumptions, toxicity data, cleanup levels, and remedial action objectives used at the time of remedy selection are still valid.
- No new information has come to light which could call into question the protectiveness of the remedy.

Land use controls are identified in the Record of Decision (ROD) and final remediation report as the selected remedial action at the unit. Warning signs are included as a component of the remedial action. The unit was inspected to confirm that warning signs were posted. Inspection records were reviewed to confirm semi-annual inspections. The unit was inspected to confirm that the remedial action was protective of human health and the environment.

VII. Issues

No issues related to current site conditions prevent the remedy from being protective.

VIII. Recommendations and Follow-up Actions

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

IX. Protectiveness Statement(s)

The remedy of Institutional Controls through implementation of a LUCIP is protective of human health and the environment. Exposure pathways that could result in unacceptable risks are controlled by the institutional controls in place while USDOE controls the OU which include: (1) physical access controls to prevent unauthorized entry to SRS and the OU (fences, guards, security patrols, etc); (2) administrative controls that maintain the OU for industrial use only (SRS is a secured government facility with land use restrictions); and (3) warning signs and land use controls (SRS Site Use/Site Clearance Program).

X. Next Review

The next five-year review is scheduled for June 30, 2007.

Attachment 1

List of Documents Reviewed

WSRC, 1999. *Record of Decision Remedial Alternative Selection for the L- and P- Area Bingham Pump Outage Pits (643-2G, 643-3G, and 643-4G)*, WSRC-RP-98-4015, Revision 1, September, Westinghouse Savannah River Company, Aiken, SC

WSRC, 2000. *Final Remediation Report for the L- and P-Area Bingham Pump Outage Pits (643-2G, 643-3G, and 643-4G)*, WSRC-RP-2000-4030, Revision 0, March, Westinghouse Savannah River Company, Aiken, SC

Attachment 2

Five-Year Review Site Inspection Checklists, L BPOP and P BPOP

Attachment 3

Site Inspection Sheets, L BPOP and P BPOP

WORKING COPY - VERIFIED TO BE THE LATEST REVISION PRIOR TO USE.

BY: J D Hayes DATE: 9-10-01 BY: DATE:

INSPECTION DATA SHEET FOR THE P-AREA BINGHAM PUMP OUTAGE PIT

A= Satisfactory X= Unsatisfactory (Comments required)	A or X	Comments or Corrective Action Taken (See Maintenance Register for corrected items)
1. Check for potential encroachments. (Ensure there is no building on the site).	A	
2. Does site have brush or woody vegetation that needs cutting and disposal?	A	
3. Does site need mowing?	A	
4. Is there proper vegetation growth at the unit?	A	
5. Verify wells and roads are accessible.	A	

INSPECTION DATA SHEET FOR THE P-AREA BINGHAM PUMP OUTAGE PIT

A= Satisfactory X= Unsatisfactory (Comments required)	A or X	Comments or Corrective Action Taken (See Maintenance Register for corrected items)
6. Are the wells properly locked per R.61-71.11.C.6?	A	
7. Is the concrete pad cracked or broken? Is the pad undercut or silted over?	A	
8. Is the well properly identified per R.61-71.6H?	A	
9. Verify the wells posts and protective covers (within the waste unit, i.e. orange balls) are in place.	A	

INSPECTION DATA SHEET FOR THE P-AREA BINGHAM PUMP OUTAGE PIT

A= Satisfactory X= Unsatisfactory (Comments required)	A or X	**Comments or Corrective Action Taken** (See Maintenance Register for corrected items)
10. Signs shall be legible from a distance of at least 25 feet and from any direction. The signs will read: P-Area Bingham Pump Outage Pit 643-4G "Danger – Unauthorized Personnel Keep Out. This waste unit was used to manage waste materials/hazardous substances (radioactively contaminated construction material). Do not dig or excavate. Do not enter without contacting the waste site custodian." Custodian: Manager, Post Closure Maintenance Phone: (803) 952-6882	A	
11. Does site show signs of erosion or subsidence? Are there any signs of burrowing animals (holes)? Excavation below three (3) feet is prohibited.	A	
12. Verify orange ball markers are in place.	A	

INSPECTION DATA SHEET FOR THE P-AREA BINGHAM PUMP OUTAGE PIT

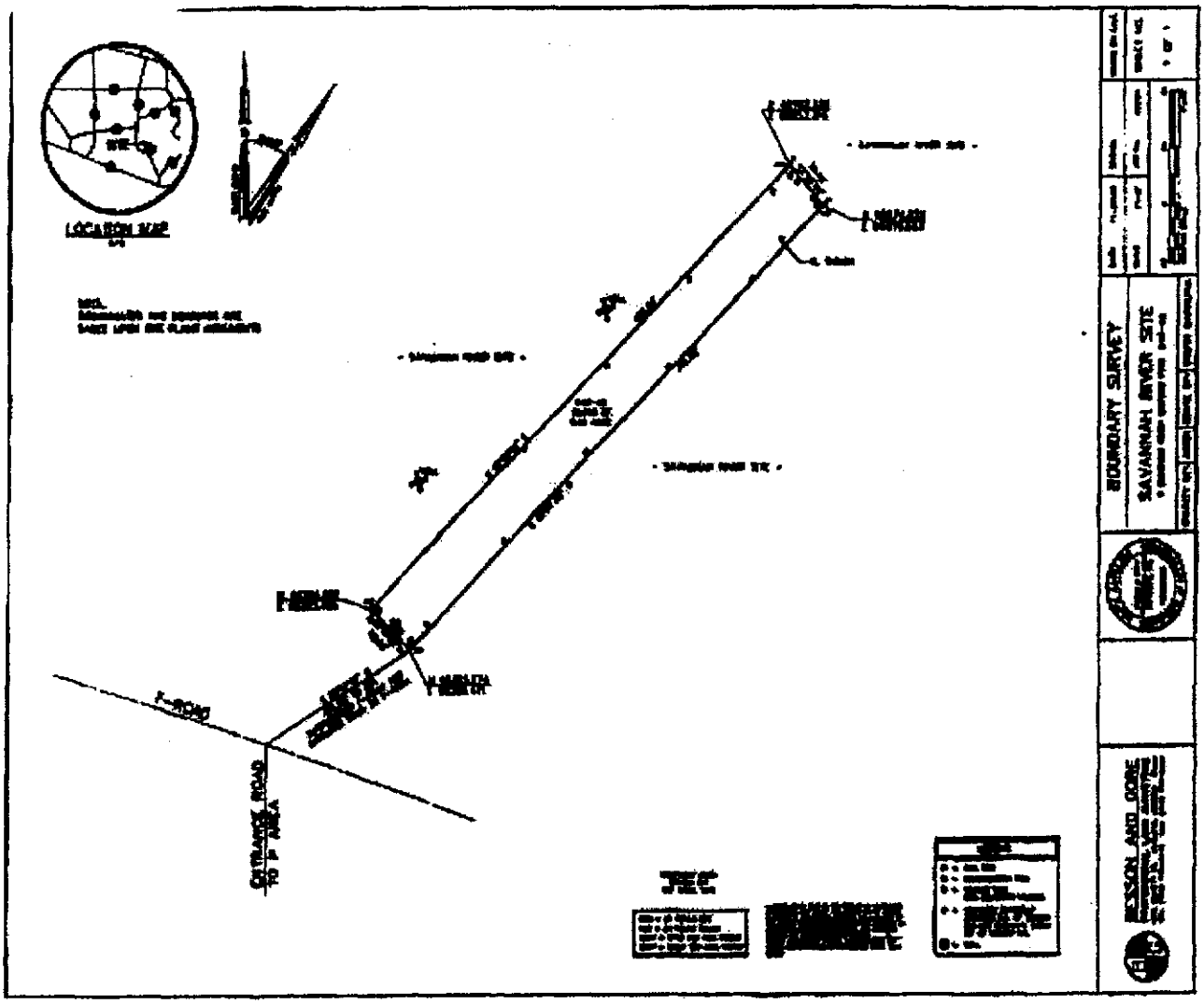
A= Satisfactory X= Unsatisfactory (Comments required)	A or X	Comments or Corrective Action Taken (See Maintenance Register for corrected items)
13. Verify the fence is locked and in good condition (If applicable).	A	NOTE: AREA IS NOT FENCED
14. Check integrity of drainage ditches (If any) for presence of excessive erosion, sediment buildup, and any debris restricting water flow.	A	
15. Inspect general condition of site (housekeeping)	A	
16. Other NONE	A	

Inspected By: J. D. HOPE, [signature] Date: 9-12-01 Time: 1430 Hr
(Print name) (Signature)

Accompanied By: MICHAEL O'REAR, [signature] Date: 9-12-01 Time: 1430 HR
(Print name) (Signature)

Reviewed By: MICHAEL O'REAR, [signature] Date: 9-12-01 Time: 1555 HR
ER-PCM or Designee (Print name) (Signature)

INSPECTION DATA SHEET FOR THE P-AREA BINGHAM PUMP OUTAGE PIT



006957

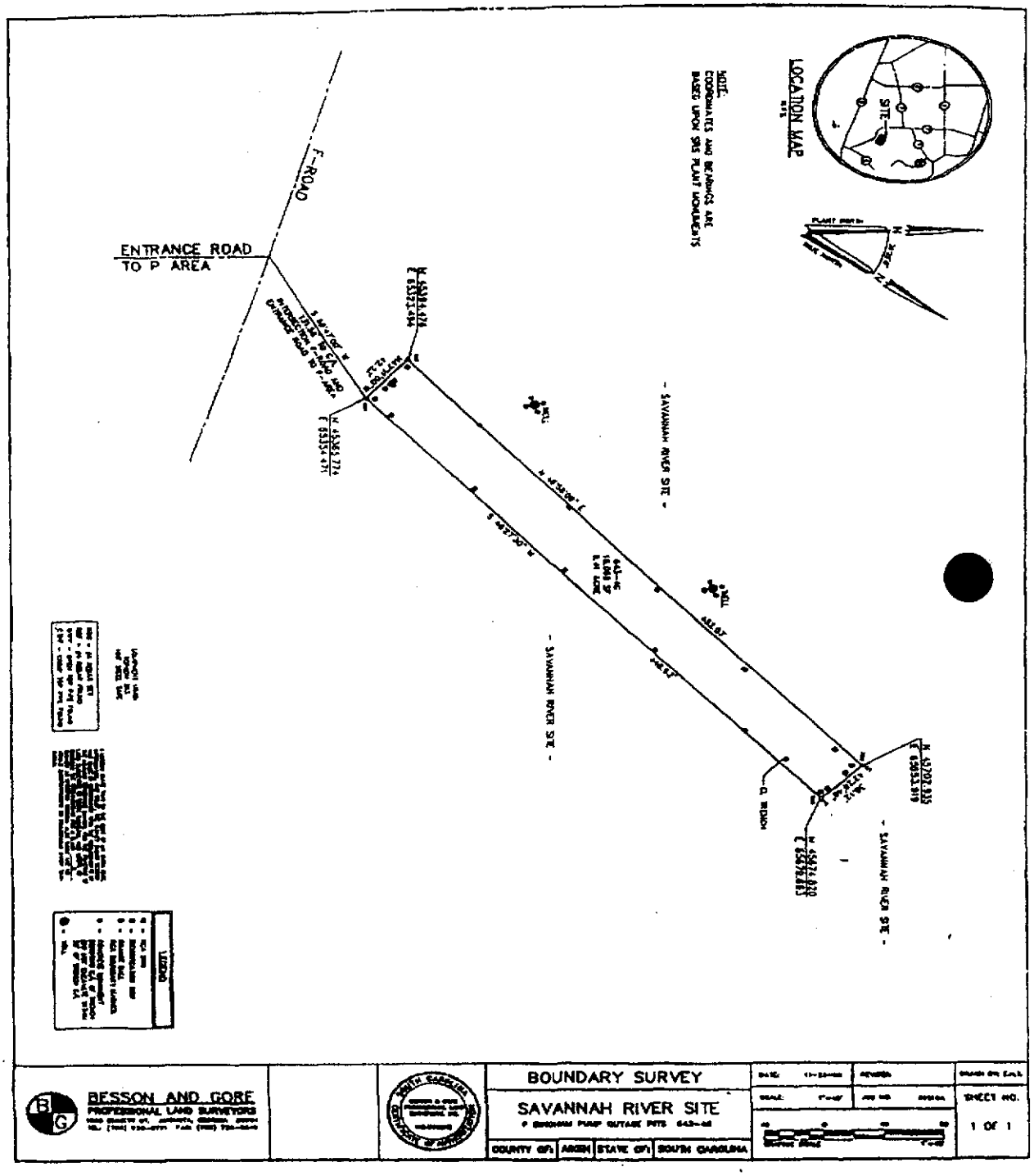


Figure 6. P Bingham Pump Outage Pit Survey Plat

Five-Year Review Site Inspection Checklist

I. SITE INFORMATION	
Site Name: L-Area Bingham Pump Outage Pit	**Date of Inspection: 9/12/01**
Location and Region: SRS, USEPA Region IV	**EPA ID: 26**
Agency, office, or company leading the five-year review: USDOE	**Weather/temperature:**

Remedy Includes: (Check all that apply)

- ☐ Landfill cover/containment
- ☐ Access controls
- ☒ Institutional Controls
- ☐ Groundwater pump and treatment
- ☐ Surface water collection and treatment
- ☐ Other_____
- ☐ Monitored Natural Attenuation
- ☐ Groundwater Containment
- ☐ Vertical Barrier Walls

Attachments: ☐ Inspection team roster attached ☐ Site map attached

II. INTERVIEWS (Check all that apply)

1. **O & M site manager** _____ _____ _____
   Name Title Date
   Interviewed ☐ at site ☐ at office ☐ by phone Phone No. _____
   Problems, suggestions; ☐ report attached _____

2. **O & M staff** _____ _____ _____
   Name Title Date
   Interviewed ☐ at site ☐ at office ☐ by phone Phone No. _____
   Problems, suggestions; ☐ report attached _____

3. **Local regulatory authorities and response agencies** (i.e., State and tribal offices, emergency response office, police department, office of public health or environmental health, zoning office, recorder of deeds, or other city and county offices, etc.) Fill in all that apply.

Agency _____

Contact _____ _____ _____ _____

Name Title Date Phone No.

Problems; suggestions; ☐ Report attached _____

_____

Agency _____

Contact _____ _____ _____ _____

Name Title Date Phone No.

Problems; suggestions; ☐ Report attached _____

_____

Agency _____

Contact _____ _____ _____ _____

Name Title Date Phone No.

Problems; suggestions; ☐ Report attached _____

_____

4. **Other interviews** (optional) ☐ Report attached _____

III. ONSITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)

1. **O & M Documents**

☐ O & M Manual ☐ Readily available ☐ Up to date ☒ N/A

☐ As-built drawings ☐ Readily available ☐ Up to date ☒ N/A

☐ Maintenance Logs ☐ Readily available ☐ Up to date ☒ N/A

Remarks_____

_____

2. **Site-Specific Health and Safety Plan** ☐ Readily available ☐ Up to date ☒ N/A

☐ Contingency plan/emergency response plan ☐ Readily available ☐ Up to date ☒ N/A

Remarks_____

_____

3. **O & M and OSHA Training Records** ☐ Readily available ☐ Up to date ☒ N/A

Remarks_____

_____

4. **Permits and Service Agreements**

☐ Air discharge permit ☐ Readily available ☐ Up to date ☒ N/A

☐ Effluent discharge ☐ Readily available ☐ Up to date ☒ N/A

☐ Waste Disposal, POTW ☐ Readily available ☐ Up to date ☒ N/A

☐ Other permits ☐ Readily available ☐ Up to date ☒ N/A

Remarks_____

_____

5. **Gas Generation Records** ☐ Readily available ☐ Up to date ☒ N/A

Remarks_____

_____

6. **Settlement Monument Records** ☐ Readily available ☐ Up to date ☒ N/A

Remarks_____

_____

7. **Groundwater Monitoring Records** ☐ Readily available ☐ Up to date ☒ N/A

Remarks_____

_____

8. **Leachate Extraction Records** ☐ Readily available ☐ Up to date ☒ N/A

Remarks_____

_____

9. **Discharge Compliance Records**

☐ Air ☐ Readily available ☐ Up to date ☒ N/A

☐ Water (effluent) ☐ Readily available ☐ Up to date ☒ N/A

Remarks_____

_____

10. **Daily Access/Security Logs** ☐ Readily available ☐ Up to date ☒ N/A

Remarks_____

_____

IV. O & M Costs

1. **O & M Organization**

☐ State in-house ☐ Contractor for State

☐ PRP in-house ☐ Contractor for PRP

☐ Other_____

_____

2. **O & M Cost Records**

☐ Readily available ☐ Up to date

☐ Funding mechanism/agreement in place

☐ Other_____

_____

Total annual cost by year for review period if available

From_____ To_____ _____ ☐ Breakdown attached
Date Date Total cost

From_____ To_____ _____ ☐ Breakdown attached
Date Date Total cost

From_____ To_____ _____ ☐ Breakdown attached
Date Date Total cost

From_____ To_____ _____ ☐ Breakdown attached
Date Date Total cost

From_____ To_____ _____ ☐ Breakdown attached
Date Date Total cost

1. **Unanticipated or Unusually High O & M Costs During Review Period**

Describe costs and reasons: _____

_____

_____

_____

_____

V. ACCESS AND INSTITUTIONAL CONTROLS ☒ Applicable ☐ N/A

A. Fencing

1. **Fencing Damaged** ☐ Location shown on site map ☐ Gates secured ☒ N/A

Remarks_____

_____

B. Other Access Restrictions

1. **Signs and other security measures** ☒ Location shown on site map ☐ N/A

Remarks_____

_____

C. Institutional Controls

1. Implementation and enforcement

Site conditions imply ICs not properly implemented ☐ Yes ☒ No ☐ N/A

Site conditions imply ICs not being fully enforced ☐ Yes ☒ No ☐ N/A

Type of monitoring (e.g., self-reporting, drive-by) Inspection

Frequency semi-annual

Responsible party/agent WSRC

Contact	Michael Redd	Manager ER Maintenance	9/17/01	952-6882
	Name	Title	Date	Phone No.

Report is up-to-date ☒ Yes ☐ No ☐ N/A

Reports are verified by the lead agency ☐ Yes ☐ No ☒ N/A

Specific requirements in deed of decision documents have been met ☒ Yes ☐ No ☐ N/A

Violations have been reported ☐ Yes ☐ No ☒ N/A

Other problems or suggestions: ☒ Report attached

Inspection data sheet attached

_____

_____

_____

2. Adequacy ☒ ICs are adequate ☐ ICs are inadequate ☐ N/A

Remarks_____

_____

D. General

1. **Vandalism/trespassing** ☐ Location shown on site map ☒ No vandalism evident

Remarks_____

_____

2. **Land use changes onsite** ☒ N/A

Remarks_____

_____

3. **Land use changes offsite** ☒ N/A

Remarks_____

_____

VI. GENERAL SITE CONDITIONS

A. Roads ☐ Applicable ☒ N/A

1. **Roads damaged** ☐ Location shown on site map ☐ Roads adequate ☐ N/A

Remarks_____

_____

B. Other site Conditions

Remarks_____

_____

_____

_____

_____

VII. LANDFILL COVERS ☒ Applicable ☐ N/A

A. Landfill Surface

1. **Settlement** (Low spots) ☐ Location shown on site map ☒ Settlement not evident

Areal extent_____ Depth_____

Remarks_____

_____

2. **Cracks** ☐ Location shown on site map ☒ Cracking not evident

Lengths_____ Widths_____ Depths_____

Remarks_____

_____

3. **Erosion** ☐ Location shown on site map ☒ Erosion not evident

Areal extent_____ Depth_____

Remarks_____

_____

4. **Holes** ☐ Location shown on site map ☒ Holes not evident

Areal extent_____ Depth_____

Remarks_____

_____

5. **Vegetative Cover** ☐ Grass ☐ Cover properly established ☒ No signs of stress

☐ Trees/shrubs (indicate size and location on a diagram)

Remarks_____

_____

6. **Alternative Cover (armored rock, concrete, etc.)** ☒ N/A

Remarks_____

_____

7. **Bulges** ☐ Location shown on site map ☒ Bulges not evident

Areal extent_____ Height_____

Remarks_____

_____

8. **Wet Areas/Water Damage** ☒ Wet areas/water damage not evident

☐ Wet Areas ☐ Location shown on site map Areal extent_____

☐ Ponding ☐ Location shown on site map Areal extent_____

☐ Seeps ☐ Location shown on site map Areal extent_____

☐ Soft subgrade ☐ Location shown on site map Areal extent_____

Remarks_____

_____

9. **Slope Instability** ☐ Slides ☐ Location shown on site map ☒ No evidence of slope instability

Areal extent_____

Remarks_____

_____

B. Benches ☐ Applicable ☒ N/A

(Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)

1. **Flows Bypass Bench** ☐ Location shown on site map ☐ N/A or okay

Remarks_____

_____

2. **Bench Breached** ☐ Location shown on site map ☐ N/A or okay

Remarks_____

_____

3. **Bench Overtopped** ☐ Location shown on site map ☐ N/A or okay

Remarks_____

_____

C. Letdown Channels ☐ Applicable ☒ N/A

(Channel lined with erosion control mates, riprap, grout bags, or gabions that descend down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)

1. **Settlement** ☐ Location shown on site map ☐ No evidence of settlement

Areal extent_____ Depth_____

Remarks_____

_____

2. **Material Degradation** ☐ Location shown on site map ☐ No evidence of degradation

Material type_____ Areal extent _____

Remarks_____

_____

3. **Erosion** ☐ Location shown on site map ☐ No evidence of erosion

Areal extent _____ Depth_____

Remarks_____

_____

4. **Undercutting** ☐ Location shown on site map ☐ No evidence of undercutting

Areal extent _____ Depth_____

Remarks_____

_____

5. **Obstructions** Type_____ ☐ No obstructions

☐ Location shown on site map Areal extent _____

Size _____

Remarks_____

_____

6. **Excessive Vegetative Growth** Type_____

☐ No evidence of excessive growth

☐ Vegetation in channels does not obstruct flow

☐ Location shown on site map Areal extent _____

Remarks_____

_____

D. Cover Penetrations ☐ Applicable ☒ N/A

1. **Gas Vents** ☐ Active ☐ Passive

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A

Remarks_____

_____

2. **Gas Monitoring Probes**

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A

Remarks_____

_____

3. **Monitoring Wells** (within surface area of landfill)

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A

Remarks_____

_____

4. **Leachate Extraction Wells**

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A

Remarks_____

_____

5. **Settlement Monuments** ☐ Located ☐ Routinely surveyed ☐ N/A

Remarks_____

_____

E. Gas Collection and Treatment ☐ Applicable ☒ N/A

1. **Gas Treatment Facilities**

☐ Flaring ☐ Thermal destruction ☐ Collection for reuse

☐ Good condition ☐ Needs Maintenance

Remarks_____

_____

2. **Gas Collection Wells, Manifolds and Piping**

☐ Good condition ☐ Needs Maintenance

Remarks_____

_____

3. **Gas Monitoring Facilities** (e.g., gas monitoring of adjacent homes or buildings)

☐ Good condition ☐ Needs Maintenance ☐ N/A

Remarks_____

_____

F. Cover Drainage Layer ☐ Applicable ☐ N/A

1. **Outlet Pipes Inspected** ☐ Functioning ☐ N/A Remarks_____	
2. **Outlet Rock Inspected** ☐ Functioning ☐ N/A Remarks_____	

G. Detention/sedimentation Ponds ☐ Applicable ☒ N/A

1. **Siltation** Areal extent_____ Depth_____ ☐ N/A

   ☐ Siltation not evident

   Remarks_____

2. **Erosion** Areal extent_____ Depth_____ ☐ N/A

   ☐ Erosion not evident

   Remarks_____

3. **Outlet Works** ☐ Functioning ☐ N/A

   Remarks_____

4. **Dam** ☐ Functioning ☐ N/A

   Remarks_____

H. Retaining Walls ☐ Applicable ☒ N/A

1. **Deformations** ☐ Location shown on site map ☐ Deformation not evident

   Horizontal displacement_____ Vertical displacement_____

   Rotational displacement_____

   Remarks_____

2. **Degradation** ☐ Location shown on site map ☐ Deformation not evident

   Remarks_____

I. Perimeter Ditches/Off-Site Discharge ☐ Applicable ☒ N/A

1. **Siltation** ☐ Location shown on site map ☐ Siltation not evident

   Areal extent_____ Depth_____

   Remarks_____

2. **Vegetative Growth** ☐ Location shown on site map ☐ Siltation not evident

☐ Vegetation does not impede flow

Areal extent_____ Type_____

Remarks_____

_____

3. **Erosion** ☐ Location shown on site map ☐ Erosion not evident

Areal extent_____ Depth_____

Remarks_____

_____

4. **Discharge Structure** ☐ Location shown on site map ☐ N/A

Remarks_____

_____

VIII. VERTICAL BARRIER WALLS ☐ Applicable ☒ N/A

1. **Settlement** ☐ Location shown on site map ☐ Settlement not evident

Areal extent_____ Depth_____

Remarks_____

_____

2. **Performance Monitoring** Type of Monitoring_____

☐ Performance not monitored

Frequency_____ ☐ Evidence of breaching

Head differential_____

Remarks_____

_____

IX. GROUNDWATER/SURFACE WATER REMEDIES ☐ Applicable ☒ N/A

A. Groundwater Extraction Wells, Pumps, and Pipelines ☐ Applicable ☐ N/A

1. **Pumps, Wellhead Plumbing, and Electrical**

☐ Good condition ☐ All required wells located ☐ Needs Maintenance ☐ N/A

Remarks_____

_____

2. **Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances**

☐ Good condition ☐ Needs Maintenance

Remarks_____

_____

3. **Spare Parts and Equipment**

☐ Readily available ☐ Good condition ☐ Requires upgrade ☐ Needs to be provided

Remarks_____

_____

B. Surface Water Collection Structures, Pumps, and Pipelines ☐ Applicable ☐ N/A

1. **Collection Structures, Pumps, and Electrical**

☐ Good condition ☐ Needs Maintenance

Remarks_____

_____

2. **Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances**

☐ Good condition ☐ Needs Maintenance

Remarks_____

_____

3. **Spare Parts and Equipment**

☐ Readily available ☐ Good condition ☐ Requires upgrade ☐ Needs to be provided

Remarks_____

_____

C. Treatment System ☐ Applicable ☐ N/A

1. **Treatment Train** (Check components that apply)

☐ Metals removal ☐ Oil/water separation ☐ Bioremediation

☐ Air stripping ☐ Carbon adsorbers

☐ Filters_____

☐ Additive (e.g., chelation agent, flocculent)_____

☐ Others_____

☐ Good condition ☐ Needs Maintenance

☐ Sampling ports properly marked and functional

☐ Sampling/maintenance log displayed and up to date

☐ Equipment properly identified

☐ Quantity of groundwater treated annually_____

☐ Quantity of surface water treated annually_____

Remarks_____

_____

2. **Electrical Enclosures and Panels** (properly rated and functional)

☐ N/A ☐ Good condition ☐ Needs Maintenance

Remarks_____

_____

3. **Tanks, Vaults, Storage Vessels**

☐ N/A ☐ Good condition ☐ Proper secondary containment ☐ Needs Maintenance

Remarks_____

_____

4. **Discharge Structure and Appurtenances**

☐ N/A ☐ Good condition ☐ Needs Maintenance

Remarks_____

_____

5. **Treatment Building(s)**

☐ N/A ☐ Good condition (esp. roof and doorways) ☐ Needs repair

☐ Chemicals and equipment properly stored

Remarks_____

_____

6. **Monitoring Wells** (pump and treatment remedy)

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ All required wells located ☐ Needs Maintenance ☐ N/A

Remarks_____

_____

D. Monitoring Data

1. Monitoring Data

☐ Is routinely submitted on time ☐ Is of acceptable quality

2 Monitoring data suggests:

☐ Groundwater plume is effectively contained ☐ Contaminant concentrations are declining

E. Monitored Natural Attenuation

1. **Monitoring Wells** (Natural attenuation remedy)

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ All required wells located ☐ Needs Maintenance ☐ N/A

Remarks_____

_____

X. OTHER REMEDIES

If there are remedies applied at the site, which are not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.

XI. OVERALL OBSERVATIONS

A. Implementation of the Remedy

Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emissions, etc.).

Remedy is effective and functioning as designed to prevent excavation of buried waste.

B. Adequacy of O & M

Describe issues and observations related to the implementation and scope of O & M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy.

C. Early Indicators of Potential Remedy Failure

Describe issues and observations such as unexpected changes in the cost or scope of O & M or a high frequency of unscheduled repairs that suggest that the protectiveness of the remedy may be compromised in the future.

D. Opportunities for Optimization

Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy.

L-Area Oil and Chemical Basin (904-83G) and L-Area Acid/Caustic Basin (904-79G) Operable Unit

I. Introduction

This is the first five-year review for the L-Area Oil and Chemical Basin (904-83G) and L-Area Acid/Caustic Basin (LAOCB and LAACB). This review was conducted from August 2001 through September 2001. This report documents the results of the review.

II. OU Chronology

Table 1 lists the chronology of site events for the LAOCB and LAACB.

III. Background

Unit Characteristics

The LAOCB and LAACB (see Figure 1) are located within the Savannah River Site (SRS), approximately 300 feet (ft) south of the L-Area Reactor perimeter fence and 1,250 ft north of L Lake. The water table is approximately 25 ft below ground surface in the area of the LAOCB. The LAOCB measured approximately 182 ft long by 108 ft wide at the berm, with an average depth of 12 ft.

The LAOCB was constructed in 1961 as an unlined seepage basin. Prior to its construction, approximately 750 ft of 6-inch diameter steel pipeline was installed from the maintenance Hot Shop (Building 717-G) to the L-Area Reactor Seepage Basin. After the LAOCB was constructed, wastewater was diverted to the LAOCB through a portion of the 6-inch pipeline between the Hot Shop and the LAOCB. The remainder of the pipeline was plugged off and taken out of use. A 2-inch diameter steel pipeline, approximately 450 ft long, located just south of the 6-inch pipeline, ran between the Hot Shop and the LAOCB. Wastewater from other areas of SRS was transported in drums and tanker trucks and was disposed

Table 1. Chronology of OU Events

Event	Date
RODissuance	September 15, 1997
Remedial Action start/complete	August 31, 1998/ May 7, 2001

Key:

Consent Decree – Date a consent decree (enforcement document from the court system) was issued for the operable unit.

Corrective Action start – Date the corrective (remedial) action was initiated (under RCRA).

ESD Issuance - Date all three parties (USDOE, USEPA, and SCDHEC) signed the Explanation of Significant Difference used to significantly modify the remedy selected in the Record of Decision.

Final or Interim ROD issuance – Date the three parties (USDOE, USEPA, and SCDHEC) signed the Record of Decision.

Federal Facility Agreement Declared Effective - Date the Federal Facility Agreement formalized the integration of CERCLA and RCRA in remediation activities at SRS.

NPL listing – Date the entire SRS was added to EPA's National Priorities List.

Previous Five-Year Reviews – Date of any previous five year reviews of remedy for the operable unit.

RCRA Closure Certified – Date the three parties (USDOE, USEPA, and SCDHEC) certified that the operable unit had been remediated and closed under the Resource Conservation and Recovery Act.

RCRA Closure Plan Approved – Date the three parties (USDOE, USEPA, and SCDHEC) approved the closure plan for the operable unit under Resource Conservation and Recovery Act.

Remedial Action start/complete – Date the remedial action (final or interim) was initiated/completed (under CERCLA).

Removal Action – Date contaminated media was removed from the operable unit (not associated with the ROD).

RFI/RI start/complete - Date the remedial investigation (sampling) was initiated/completed for the operable unit.

ROD Amendment Issuance - Date the three parties (USDOE, USEPA, and SCDHEC) signed the Record of Decision Amendment used to change the remedy selected in the original Record of Decision.

of in the basin via a bermed concrete drainage pad located outside and upgradient at the north side of the basin. The basin was put in operation in 1961 and remained active until 1979. Liquid wastes consisting of small volumes of slightly radioactive oil and chemical wastewater were sent to the LAOCB from throughout SRS, but came primarily from the reactor areas. The Hot Shop (Building 717-G) discharged decontamination wastewater containing radionuclides, detergents, and spent degreasing solvents through the pipeline to the basin.

Acid/caustic basins were constructed in F, H, K, L, P, and R Areas between 1952 and 1954 as unlined basins. These basins received dilute sulfuric acid and sodium hydroxide solutions used to regenerate ion exchange units in the water purification processes at the reactor and separations areas in the center of the SRS. The LAACB was constructed in 1954 and received wastewater from the L-Area water treatment plant facility via a pipeline (vitrified clay) that extends

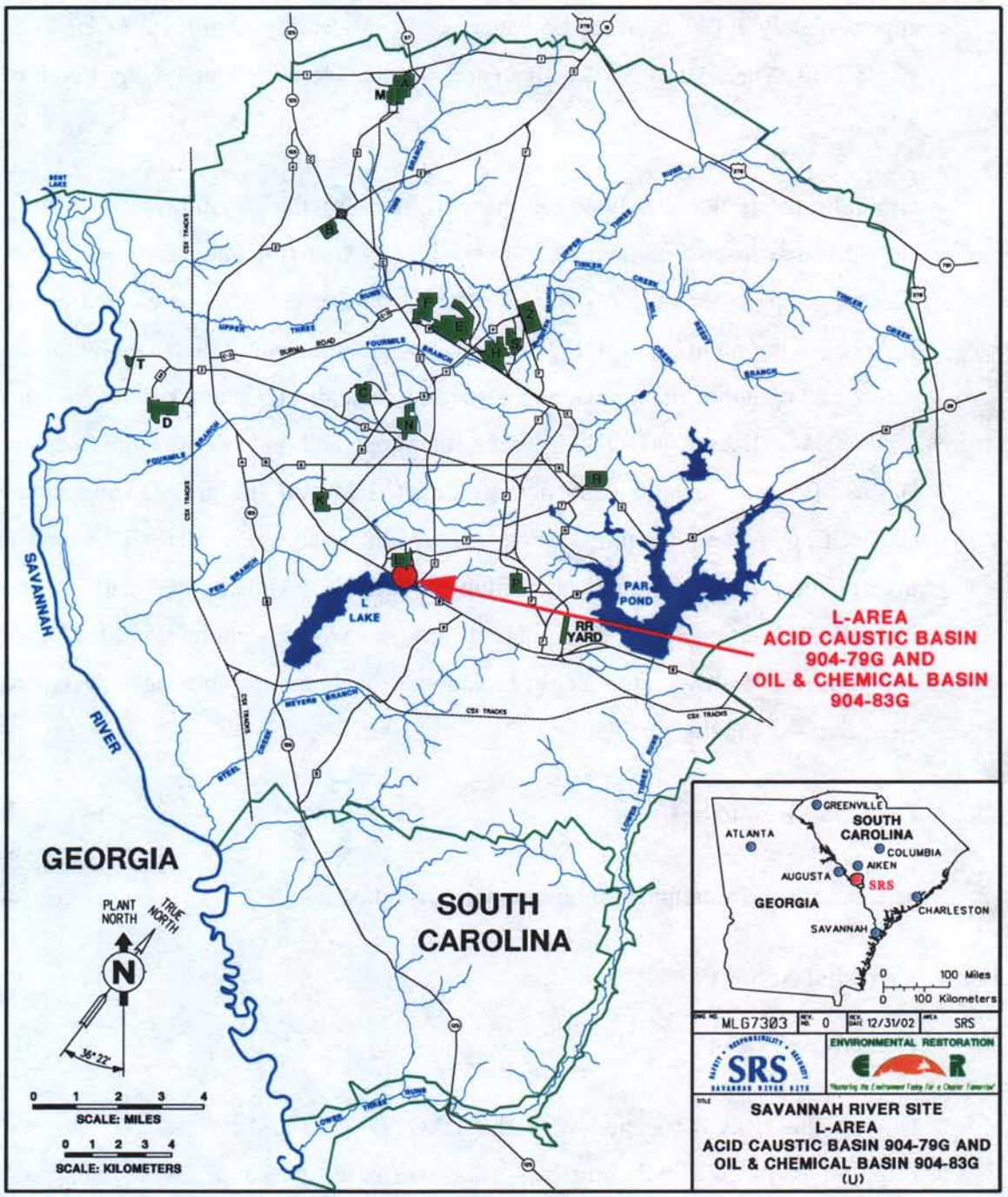


Figure 1. Location of the L-Area Oil and Chemical Basin OU at SRS

approximately 1,100 ft from the water treatment facility to the LAACB. The LAACB measures 50 by 50 ft with an area of 0.057 acres and an average depth of 7 ft.

Groundwater is not a subunit of this OU because the groundwater has been contaminated from a number of sources (i.e., L-Area Hot Shop and the L-Area Reactor Seepage Basin). A comprehensive groundwater OU was created as the L-Area Southern Groundwater OU because of the uncertainty associated with the nature and extent of the known and suspected groundwater plumes in the vicinity of the LAOCB/LAACB OU, L-Area Hot Shop, and L-Area Reactor Seepage Basin. Because any remedial actions directed toward the groundwater could cause further commingling of contaminant plumes, a phased remedial investigation of the groundwater plumes will be conducted as part of the integrator OU strategy. The phased process would continue until all the components of the source control, vadose zone, and groundwater OUs are characterized and documented.

Land and Resource Use

The current and anticipated future land use is industrial.

IV. Remedial Actions

Remedy Selection

Due to the risks associated with the LAOCB soil, In Situ Stabilization and Capping is the selected remedy. This alternative will meet remedial action objectives (RAOs) by permanently eliminating the potential for ingestion of soils and produce grown in soils, eliminating direct radiation exposure, and providing a permanent reduction in contaminant mobility and potential future impacts to groundwater. The selected alternative for remediating the LAOCB pipeline is In Situ Stabilization and Disposal in the LAOCB. This alternative will meet RAOs

by permanently eliminating the potential for ingestion of soils and produce grown in soils, eliminating direct radiation exposure, and providing a permanent reduction in contaminant mobility and potential future impacts to groundwater. Groundwater monitoring will be conducted under the L-Area Southern Groundwater OU. No Action is the selected remedy for the LAACB, for the soil along the LAACB pipeline, and for the soil along the effluent drainage ditch south of the LAACB.

Remedy Implementation

Implementation of the preferred alternatives required both short- and long-term actions that would be protective of human health and the environment. For the short-term, signs were posted at the LAOCB to indicate that this area was used for the disposal of radioactive and hazardous substances. In addition, existing SRS access controls will be used to maintain the use of this site for industrial activities only. The final implementation (construction) of the remedial action at the LAOCB (904-83G) was completed in accordance with the approved Corrective Measures Implementation/Remedial Design Report/ Remedial Action Work Plan (CMI/RDR/RAWP)(WSRC 1999). The remedial actions identified in the Record of Decision (ROD) were completed successfully. Figure 2 shows the current condition of the LAOCB. The LAOCB Post-Construction Report/Final Remedial Report (WSRC 2001) reported on the closure of the LAOCB unit. Table 1 below summarizes the design changes. These deviations did not adversely impact the final closure of the LAOCB operable unit (OU).

Table 1. Design Changes for the LAOCB

Item	Change
1	Instead of handling waste as mixed waste, LAOCB waste was handled as low-level radioactive waste.
2	Discharge of rainwater from the basin to the ground.
3	Removal of a new 8" pipe section at northeast section, located outside L-Area Hot Shop fence, and its placement in the basin.
4	Removal of additional 6" pipe sections at northwest end, between LAOCB and L-Area Reactor Seepage Basin.

5	Dispositioning of the remaining secondary waste at unit in a trench adjacent to the basin closure instead of off-unit.
6	Perimeter fencing was not needed, therefore deleted.



Figure 2. Photo of the Remediated LAOCB

V. Progress Since Last Review

This was the first review for this OU; therefore, this section does not apply.

VI. Five-Year Review Process

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

- Reviewed the documents listed in Attachment 1
- Confirmed implementation of the remedial action

- Inspected unit to confirm protectiveness of the selected remedial action
- Reviewed changes in standards and to-be-considered guidance

VII. Technical Assessment

The conclusions for this review are as follows:

- Institutional controls are in place and being implemented to provide access control and prevent exposure as designed.
- In Situ Stabilization and Capping of the LAOCB soil and In Situ Stabilization and Disposal of the LAOCB pipeline are functioning as intended.
- The exposure assumptions, toxicity data, cleanup levels, and RAOs used at the time of remedy selection are still valid.
- No new standards or to-be-considereds have been identified that could call into question the protectiveness of the remedy.
- Land use, exposure pathways, contaminants of concern, and risk assessment methodologies have not changed in a way that affects the protectiveness of the remedy.
- No new information has come to light that could affect the protectiveness of the remedy.

VIII. Issues

There are no issues for this OU.

IX. Recommendations and Follow-up Actions

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

X. Protectiveness Statement(s)

The remedy of in situ stabilization and capping at the LAOCB is protective of human health and the environment. This remedy, upon implementation of land use controls pursuant to a LUCIP, will become fully protective and will maintain future industrial land use. Exposure pathways that could result in unacceptable risks are controlled by the institutional controls in place while USDOE controls the OU which include: (1) physical access controls to prevent unauthorized entry to SRS and the OU (fences, guards, security patrols, etc); (2) administrative controls that maintain the OU for industrial use only (SRS is a secured government facility with land use restrictions); and (3) warning signs and land use controls (SRS Site Use/Site Clearance Program).

XI. Next Review

The next five-year review is scheduled for June 30, 2007.

Attachment 1

Documents Reviewed

WSRC, 1997. *Record of Decision Remedial Alternative Selection for the L-Area Oil and Chemical Basin (904-83G) and L-Area Acid/Caustic Basin (904-79G) (U)*, WSRC-RP-97-178, Revision 1, July, Westinghouse Savannah River Company, Aiken, SC

WSRC, 1997. *Corrective Measures Implementation/Remedial Design Report/Remedial Action Work Plan (CMI/RDR/RAWP) for L-Area Oil and Chemical Basin (904-83G) (U)*, WSRC-RP-97-844, Revision 1.4, October, Westinghouse Savannah River Company, Aiken, SC

WSRC, 2001. *Post-Construction Report (PCR)/Final Remediation Report (FRR) for the L-Area Oil and Chemical Basin Operable Unit (Bldg. 904-83G) (U)*, WSRC-RP-2001-4078, Revision. 0, July, Westinghouse Savannah River Company, Aiken, SC ().

WSRC, 1999. *Federal Facility Agreement Annual Progress Report for Fiscal Year 2000 (U)*, WSRC-RP-99-4300, November, Westinghouse Savannah River Company, Aiken, SC

WSRC, 2000. *Federal Facility Agreement Annual Progress Report for Fiscal Year 2000 (U)*, WSRC-RP-2000-4300, November, Westinghouse Savannah River Company, Aiken, SC

Attachment 2

Five-Year Review Site Inspection Checklist

Five-Year Review Site Inspection Checklist

I. SITE INFORMATION	
Site Name: L-Area Oil and Chemical Basin (904-83G)	**Date of Inspection: 10/3/01**
Location and Region: Savannah River Site, EPA Region IV	**EPA ID: CERCLIS OU# 17**
Agency, office, or company leading the five-year review: Department of Energy	**Weather/temperature: clear and sunny, 75 °F**

Remedy Includes: (Check all that apply)

- ☐ Landfill cover/containment
- ☐ Access controls
- ☒ Institutional Controls
- ☐ Groundwater pump and treatment
- ☐ Surface water collection and treatment
- ☒ Other Stabilization/Solidification and soil cover
- ☐ Monitored Natural Attenuation
- ☐ Groundwater Containment
- ☐ Vertical Barrier Walls

Attachments: ☐ Inspection team roster attached ☐ Site map attached

II. INTERVIEWS (Check all that apply)

1. **O & M site manager** M. O. Redd (Name) | Manager, ER Maintenance (Title) | 10/2/01 (Date)
   Interviewed ☐ at site ☒ at office ☐ by phone Phone No. 952-6882
   Problems, suggestions; ☐ report attached _____

2. **O & M staff** J. D. Hope (Name) | Post Closure Inspector (Title) | 10/2/01 (Date)
   Interviewed ☐ at site ☒ at office ☐ by phone Phone No. 952-6441
   Problems, suggestions; ☐ report attached _____

3. **Local regulatory authorities and response agencies** (i.e., State and tribal offices, emergency response office, police department, office of public health or environmental health, zoning office, recorder of deeds, or other city and county offices, etc.) Fill in all that apply.

Agency _____

Contact _____ _____ _____ _____
Name Title Date Phone No.

Problems; suggestions; ☐ Report attached _____

_____

Agency _____

Contact _____ _____ _____ _____
Name Title Date Phone No.

Problems; suggestions; ☐ Report attached _____

_____

Agency _____

Contact _____ _____ _____ _____
Name Title Date Phone No.

Problems; suggestions; ☐ Report attached _____

_____

4. **Other interviews** (optional) ☐ Report attached _____

III. ONSITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)

1. **O & M Documents**

☐ O & M Manual	☐ Readily available	☐ Up to date	☒ N/A
☒ As-built drawings	☒ Readily available	☒ Up to date	☐ N/A
☒ Maintenance Logs	☒ Readily available	☒ Up to date	☐ N/A

Remarks_____

2. **Site-Specific Health and Safety Plan** ☐ Readily available ☐ Up to date ☒ N/A

☐ Contingency plan/emergency response plan ☐ Readily available ☐ Up to date ☒ N/A

Remarks_____

3. **O & M and OSHA Training Records** ☒ Readily available ☒ Up to date ☐ N/A

Remarks_____

4. **Permits and Service Agreements**

☐ Air discharge permit	☐ Readily available	☐ Up to date	☒ N/A
☐ Effluent discharge	☐ Readily available	☐ Up to date	☒ N/A
☐ Waste Disposal, POTW	☐ Readily available	☐ Up to date	☒ N/A
☐ Other permits	☐ Readily available	☐ Up to date	☒ N/A

Remarks_____

5. **Gas Generation Records** ☐ Readily available ☐ Up to date ☒ N/A

Remarks_____

6. **Settlement Monument Records** ☐ Readily available ☐ Up to date ☒ N/A

Remarks_____

7. **Groundwater Monitoring Records** ☒ Readily available ☒ Up to date ☐ N/A

Remarks Groundwater monitoring data is available, however, it is not required as part of the remedy.

8. **Leachate Extraction Records** ☐ Readily available ☐ Up to date ☒ N/A

Remarks_____

_____

9. **Discharge Compliance Records**

☐ Air ☐ Readily available ☐ Up to date ☒ N/A

☐ Water (effluent) ☐ Readily available ☐ Up to date ☒ N/A

Remarks_____

_____

10. **Daily Access/Security Logs** ☐ Readily available ☐ Up to date ☒ N/A

Remarks_____

_____

IV. O & M Costs

1. **O & M Organization**

☐ State in-house ☐ Contractor for State

☐ PRP in-house ☐ Contractor for PRP

☐ Other_____

_____

2. **O & M Cost Records**

☐ Readily available ☐ Up to date

☐ Funding mechanism/agreement in place

☐ Other_____

_____

Total annual cost by year for review period if available

From_____ To_____ _____ ☐ Breakdown attached
Date Date Total cost

From_____ To_____ _____ ☐ Breakdown attached
Date Date Total cost

From_____ To_____ _____ ☐ Breakdown attached
Date Date Total cost

From_____ To_____ _____ ☐ Breakdown attached
Date Date Total cost

From_____ To_____ _____ ☐ Breakdown attached
Date Date Total cost

1. **Unanticipated or Unusually High O & M Costs During Review Period**

Describe costs and reasons: _____

_____

_____

_____

_____

V. ACCESS AND INSTITUTIONAL CONTROLS ☒ Applicable ☐ N/A

A. Fencing

1. **Fencing Damaged** ☐ Location shown on site map ☐ Gates secured ☒ N/A

Remarks_____

_____

B. Other Access Restrictions

1. **Signs and other security measures** ☒ Location shown on site map ☐ N/A

Remarks_____

_____

C. Institutional Controls

1. **Implementation and enforcement**

Site conditions imply ICs not properly implemented ☐ Yes ☒ No ☐ N/A

Site conditions imply ICs not being fully enforced ☐ Yes ☒ No ☐ N/A

Type of monitoring (e.g., self-reporting, drive-by) Groundwater Monitoring

Frequency Annually

Responsible party/agent DOE-Savannah River Field Office

Contact	J. J. Nelson	Waste Area Group Manager	10/2/01	(803) 725-2687
	Name	Title	Date	Phone No.

Report is up-to-date ☒ Yes ☐ No ☐ N/A

Reports are verified by the lead agency ☒ Yes ☐ No ☐ N/A

Specific requirements in deed of decision documents have been met ☐ Yes ☐ No ☒ N/A

Violations have been reported ☐ Yes ☐ No ☒ N/A

Other problems or suggestions: ☐ Report attached

_____

_____

_____

_____

2. **Adequacy** ☒ ICs are adequate ☐ ICs are inadequate ☐ N/A

Remarks_____

_____

D. General

1. **Vandalism/trespassing** ☐ Location shown on site map ☒ No vandalism evident

Remarks_____

_____

2. **Land use changes onsite** ☒ N/A

Remarks_____

_____

3. **Land use changes offsite** ☒ N/A

Remarks_____

_____

VI. GENERAL SITE CONDITIONS

A. Roads ☒ Applicable ☐ N/A

1. **Roads damaged** ☐ Location shown on site map ☒ Roads adequate ☐ N/A

Remarks_____

_____

B. Other site Conditions

Remarks_____

_____

_____

_____

_____

VII. SOIL COVER ☒ Applicable ☐ N/A

A. Surface

1. **Settlement** (Low spots) ☐ Location shown on site map ☒ Settlement not evident

Areal extent_____ Depth_____

Remarks_____

_____

2. **Cracks** ☐ Location shown on site map ☒ Cracking not evident

Lengths_____ Widths_____ Depths_____

Remarks_____

_____

3. **Erosion** ☐ Location shown on site map ☒ Erosion not evident

Areal extent_____ Depth_____

Remarks_____

_____

4. **Holes** ☐ Location shown on site map ☒ Holes not evident

Areal extent_____ Depth_____

Remarks_____

_____

5. **Vegetative Cover** ☐ Grass ☐ Cover properly established ☒ No signs of stress

☐ Trees/shrubs (indicate size and location on a diagram)

Remarks_____

_____

6. **Alternative Cover (armored rock, concrete, etc.)** ☒ N/A

Remarks_____

_____

7. **Bulges** ☐ Location shown on site map ☒ Bulges not evident

Areal extent_____ Height_____

Remarks_____

_____

8. **Wet Areas/Water Damage** ☒ Wet areas/water damage not evident

☐ Wet Areas ☐ Location shown on site map Areal extent_____

☐ Ponding ☐ Location shown on site map Areal extent_____

☐ Seeps ☐ Location shown on site map Areal extent_____

☐ Soft subgrade ☐ Location shown on site map Areal extent_____

Remarks_____

_____

9. **Slope Instability** ☐ Slides ☐ Location shown on site map ☒ No evidence of slope instability

Areal extent_____

Remarks_____

_____

B. Benches ☐ Applicable ☒ N/A

(Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)

1. **Flows Bypass Bench** ☐ Location shown on site map ☐ N/A or okay

Remarks_____

_____

2. **Bench Breached** ☐ Location shown on site map ☐ N/A or okay

Remarks_____

_____

3. **Bench Overtopped** ☐ Location shown on site map ☐ N/A or okay

Remarks_____

_____

C. Letdown Channels ☐ Applicable ☒ N/A

(Channel lined with erosion control mates, riprap, grout bags, or gabions that descend down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)

1. **Settlement** ☐ Location shown on site map ☐ No evidence of settlement

Areal extent_____ Depth_____

Remarks_____

_____

2. **Material Degradation** ☐ Location shown on site map ☐ No evidence of degradation

Material type_____ Areal extent _____

Remarks_____

_____

3. **Erosion** ☐ Location shown on site map ☐ No evidence of erosion

Areal extent _____ Depth_____

Remarks_____

_____

4. **Undercutting** ☐ Location shown on site map ☐ No evidence of undercutting

Areal extent _____ Depth_____

Remarks_____

_____

5. **Obstructions** Type_____ ☐ No obstructions

☐ Location shown on site map Areal extent _____

Size _____

Remarks_____

_____

6. **Excessive Vegetative Growth** Type_____

☐ No evidence of excessive growth

☐ Vegetation in channels does not obstruct flow

☐ Location shown on site map Areal extent _____

Remarks_____

_____

D. Cover Penetrations ☐ Applicable ☒ N/A

1. **Gas Vents** ☐ Active ☐ Passive

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A

Remarks_____

_____

2. **Gas Monitoring Probes**

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A

Remarks_____

_____

3. **Monitoring Wells** (within surface area of landfill)

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A

Remarks_____

4. **Leachate Extraction Wells**

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A

Remarks_____

5. **Settlement Monuments** ☐ Located ☐ Routinely surveyed ☐ N/A

Remarks_____

E. Gas Collection and Treatment ☐ Applicable ☒ N/A

1. **Gas Treatment Facilities**

☐ Flaring ☐ Thermal destruction ☐ Collection for reuse

☐ Good condition ☐ Needs Maintenance

Remarks_____

2. **Gas Collection Wells, Manifolds and Piping**

☐ Good condition ☐ Needs Maintenance

Remarks_____

3. **Gas Monitoring Facilities** (e.g., gas monitoring of adjacent homes or buildings)

☐ Good condition ☐ Needs Maintenance ☐ N/A

Remarks_____

F. Cover Drainage Layer ☐ Applicable ☒ N/A

1. **Outlet Pipes Inspected** ☐ Functioning ☐ N/A Remarks_____	
2. **Outlet Rock Inspected** ☐ Functioning ☐ N/A Remarks_____	

G. Detention/sedimentation Ponds ☐ Applicable ☒ N/A

1. **Siltation** Areal extent_____ Depth_____ ☐ N/A

☐ Siltation not evident

Remarks_____

2. **Erosion** Areal extent_____ Depth_____ ☐ N/A

☐ Erosion not evident

Remarks_____

3. **Outlet Works** ☐ Functioning ☐ N/A

Remarks_____

4. **Dam** ☐ Functioning ☐ N/A

Remarks_____

H. Retaining Walls ☐ Applicable ☒ N/A

1. **Deformations** ☐ Location shown on site map ☐ Deformation not evident

Horizontal displacement_____ Vertical displacement_____

Rotational displacement_____

Remarks_____

2. **Degradation** ☐ Location shown on site map ☐ Deformation not evident

Remarks_____

I. Perimeter Ditches/Off-Site Discharge ☐ Applicable ☒ N/A

1. **Siltation** ☐ Location shown on site map ☐ Siltation not evident

Areal extent_____ Depth_____

Remarks_____

2. **Vegetative Growth** ☐ Location shown on site map ☐ Siltation not evident

☐ Vegetation does not impede flow

Areal extent_____ Type_____

Remarks_____

_____

3. **Erosion** ☐ Location shown on site map ☐ Erosion not evident

Areal extent_____ Depth_____

Remarks_____

_____

4. **Discharge Structure** ☐ Location shown on site map ☐ N/A

Remarks_____

_____

VIII. VERTICAL BARRIER WALLS ☐ Applicable ☒ N/A

1. **Settlement** ☐ Location shown on site map ☐ Settlement not evident

Areal extent_____ Depth_____

Remarks_____

_____

2. **Performance Monitoring** Type of Monitoring_____

☐ Performance not monitored

Frequency_____ ☐ Evidence of breaching

Head differential_____

Remarks_____

_____

IX. GROUNDWATER/SURFACE WATER REMEDIES ☐ Applicable ☒ N/A

A. Groundwater Extraction Wells, Pumps, and Pipelines ☐ Applicable ☐ N/A

1. **Pumps, Wellhead Plumbing, and Electrical**

☐ Good condition ☐ All required wells located ☐ Needs Maintenance ☐ N/A

Remarks_____

2. **Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances**

☐ Good condition ☐ Needs Maintenance

Remarks_____

3. **Spare Parts and Equipment**

☐ Readily available ☐ Good condition ☐ Requires upgrade ☐ Needs to be provided

Remarks_____

B. Surface Water Collection Structures, Pumps, and Pipelines ☐ Applicable ☐ N/A

1. **Collection Structures, Pumps, and Electrical**

☐ Good condition ☐ Needs Maintenance

Remarks_____

2. **Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances**

☐ Good condition ☐ Needs Maintenance

Remarks_____

3. **Spare Parts and Equipment**

☐ Readily available ☐ Good condition ☐ Requires upgrade ☐ Needs to be provided

Remarks_____

C. Treatment System ☐ Applicable ☐ N/A

1. **Treatment Train** (Check components that apply)

☐ Metals removal ☐ Oil/water separation ☐ Bioremediation

☐ Air stripping ☐ Carbon adsorbers

☐ Filters_____

☐ Additive (e.g., chelation agent, flocculent)_____

☐ Others_____

☐ Good condition ☐ Needs Maintenance

☐ Sampling ports properly marked and functional

☐ Sampling/maintenance log displayed and up to date

☐ Equipment properly identified

☐ Quantity of groundwater treated annually_____

☐ Quantity of surface water treated annually_____

Remarks_____

_____

2. **Electrical Enclosures and Panels** (properly rated and functional)

☐ N/A ☐ Good condition ☐ Needs Maintenance

Remarks_____

_____

3. **Tanks, Vaults, Storage Vessels**

☐ N/A ☐ Good condition ☐ Proper secondary containment ☐ Needs Maintenance

Remarks_____

_____

4. **Discharge Structure and Appurtenances**

☐ N/A ☐ Good condition ☐ Needs Maintenance

Remarks_____

_____

5. **Treatment Building(s)**

☐ N/A ☐ Good condition (esp. roof and doorways) ☐ Needs repair

☐ Chemicals and equipment properly stored

Remarks_____

_____

6. **Monitoring Wells** (pump and treatment remedy)

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ All required wells located ☐ Needs Maintenance ☐ N/A

Remarks_____

_____

D. Monitoring Data

1. Monitoring Data

☐ Is routinely submitted on time ☐ Is of acceptable quality

2 .Monitoring data suggests:

☐ Groundwater plume is effectively contained ☐ Contaminant concentrations are declining

E. Monitored Natural Attenuation

1. **Monitoring Wells** (Natural attenuation remedy)

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ All required wells located ☐ Needs Maintenance ☒ N/A

Remarks_____

_____

X. OTHER REMEDIES

If there are remedies applied at the site, which are not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.

XI. OVERALL OBSERVATIONS

A. Implementation of the Remedy

Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emissions, etc.).

In-situ stabilization and capping of the LAOCB soil as well as in-situ stabilization and disposal of the LAOCB pipeline will permanently eliminate ingestion of soils and produce grown in soils, eliminating direct radiation exposure, and providing a permanent reduction in contaminant mobility and potential future impacts to groundwater. All inspections, reports, and observations indicate that the remedy is effective and functioning as designed.

B. Adequacy of O & M

Describe issues and observations related to the implementation and scope of O & M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy.

C. Early Indicators of Potential Remedy Failure

Describe issues and observations such as unexpected changes in the cost or scope of O & M or a high frequency of unscheduled repairs that suggest that the protectiveness of the remedy may be compromised in the future.

D. Opportunities for Optimization

Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy.

Metallurgical Laboratory Hazardous Waste Management Facility Operable Unit

I. Introduction

The review for this unit is conducted under the SRS RCRA program. The CERCLA review requirements are met by the RCRA program, therefore a separate review of the RCRA Corrective Action is not duplicated in this document. This is the second such five-year review for the Metallurgical Laboratory Hazardous Waste Management Facility (HWMF) Operable Unit (OU). This review was conducted from August 2001 through September 2001. This report documents the results of the review.

II. Site Chronology

Table 1 lists the chronology of site events for the Metallurgical Laboratory HWMF OU.

III. Background

The Metallurgical Laboratory HWMF OU includes an abandoned portion of a process sewer line, a seepage basin, a drainage outfall, and a Carolina bay. The nearest plant boundary is located approximately three-fourths of a mile to the northwest of this OU.

The Metallurgical Laboratory HWMF has been designated as a source-specific OU within the Upper Three Runs Watershed.

The Metallurgical Laboratory HWMF began receiving effluent from the Savannah River Laboratory Equipment Engineering Division Metallurgical Laboratory (Building 723-A) in 1956. The effluent consisted primarily of noncontact cooling water (water that did not contact process operations) and small quantities of laboratory rinse water containing hazardous substances. Discharges to the basin during the period from 1983 to November 8, 1985, consisted of

Table 1. Chronology of Site Events

Event	Date
Consent Decree (mandated OU is subject to RCRA)	1988
RCRA Closure Plan Approved	1991
Corrective Action start	1991
RCRA Closure Certified	1991
Interim ROD issuance	June 29, 1992
Previous Five-Year Reviews	June 30, 1997

Key:

Consent Decree – Date a consent decree (enforcement document from the court system) was issued for the operable unit.

Corrective Action start – Date the corrective (remedial) action was initiated (under RCRA).

ESD Issuance - Date all three parties (USDOE, USEPA, and SCDHEC) signed the Explanation of Significant Difference used to significantly modify the remedy selected in the Record of Decision.

Final or Interim ROD issuance – Date the three parties (USDOE, USEPA, and SCDHEC) signed the Record of Decision.

Federal Facility Agreement Declared Effective - Date the Federal Facility Agreement formalized the integration of CERCLA and RCRA in remediation activities at SRS.

NPL listing – Date the entire SRS was added to EPA's National Priorities List.

Previous Five-Year Reviews – Date of any previous five year reviews of remedy for the operable unit.

RCRA Closure Certified – Date the three parties (USDOE, USEPA, and SCDHEC) certified that the operable unit had been remediated and closed under the Resource Conservation and Recovery Act.

RCRA Closure Plan Approved – Date the three parties (USDOE, USEPA, and SCDHEC) approved the closure plan for the operable unit under Resource Conservation and Recovery Act.

Remedial Action start/complete – Date the remedial action (final or interim) was initiated/completed (under CERCLA).

Removal Action – Date contaminated media was removed from the operable unit (not associated with the ROD).

RFI/RI start/complete - Date the remedial investigation (sampling) was initiated/completed for the operable unit.

ROD Amendment Issuance - Date the three parties (USDOE, USEPA, and SCDHEC) signed the Record of Decision Amendment used to change the remedy selected in the original Record of Decision.

non-hazardous effluent. All flow to the Metallurgical Laboratory Basin was terminated on November 8, 1985, when the process sewer line was plugged.

IV. Interim Remedial Actions

The selected remedy for this unit as identified in the Record of Decision under CERCLA is excavation of the process sewer line, closure of the basin using a low permeability soil cover, and evaluation of the Carolina Bay.

V. Progress Since Last Review

This is the second 5-year review for this OU. Since the previous review in June of 1997, the following actions were completed:

- Annual inspections and maintenance to the soil cover as required by the RCRA Closure Plan

VI. Five-Year Review Process

The following tasks were performed as part of the review:

- Reviewed the documents listed in Attachment 1
- Confirmed the implementation of the remedial action
- Assured that all actions required under the RCRA Permit were implemented

VII. Technical Assessment

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

VIII. Issues

There are no issues for this OU.

IX. Recommendations and Follow-up Actions

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

X. Protectiveness Statement(s)

The remedy of no further action under CERCLA is protective of human health and the environment.

XI. Next Review

The next five-year review is scheduled for June 30, 2007.

Attachment 1

List of Documents Reviewed

WSRC, 1992. *Interim Action Record of Decision Remedial Alternative Selection, Metallurgical Laboratory Hazardous Waste Management Facility Operable Unit (U),* WSRC-RP-92-745, Revision 0, June 25, 1992, Westinghouse Savannah River Company, Aiken, SC.

Miscellaneous Chemical Basin/Metal Burning Pit (731-4A/5A) Operable Unit (INTERIM ACTION)

I. Introduction

The final Record of Decision (ROD) for the Miscellaneous Chemical Basin/Metals Burning Pit (731-4A/5A) (MCB/MBP) Operable Unit (OU) has not been issued. The following is for information purposes only. A review of the Interim Action Record of Decision (IAROD) MCB/MBP OU has not been conducted.

II. OU Chronology

Table 1 lists the chronology of site events for the MCB/MBP OU.

Table 1. Chronology of OU Events

Event	Date
RI complete	August 24, 1998
Interim ROD issuance	December 7, 2000
Remedial Action start	February 17, 2000

Key:

Consent Decree – Date a consent decree (enforcement document from the court system) was issued for the operable unit.

Corrective Action start – Date the corrective (remedial) action was initiated (under RCRA).

ESD Issuance - Date all three parties (USDOE, USEPA, and SCDHEC) signed the Explanation of Significant Difference used to significantly modify the remedy selected in the Record of Decision.

Final or Interim ROD issuance – Date the three parties (USDOE, USEPA, and SCDHEC) signed the Record of Decision.

Federal Facility Agreement Declared Effective - Date the Federal Facility Agreement formalized the integration of CERCLA and RCRA in remediation activities at SRS.

NPL listing – Date the entire SRS was added to EPA's National Priorities List.

Previous Five-Year Reviews – Date of any previous five year reviews of remedy for the operable unit.

RCRA Closure Certified – Date the three parties (USDOE, USEPA, and SCDHEC) certified that the operable unit had been remediated and closed under the Resource Conservation and Recovery Act.

RCRA Closure Plan Approved – Date the three parties (USDOE, USEPA, and SCDHEC) approved the closure plan for the operable unit under Resource Conservation and Recovery Act.

Remedial Action start/complete – Date the remedial action (final or interim) was initiated/completed (under CERCLA).

Removal Action – Date contaminated media was removed from the operable unit (not associated with the ROD).

RFI/RI start/complete - Date the remedial investigation (sampling) was initiated/completed for the operable unit.

ROD Amendment Issuance - Date the three parties (USDOE, USEPA, and SCDHEC) signed the Record of Decision Amendment used to change the remedy selected in the original Record of Decision.

III. Background

The MCB and the MBP are located in the northwest portion of the SRS, approximately 1.5 miles south of the A/M Area operations and 3 miles east of the Savannah River Site (SRS) boundary (Figure 1). The MCB and MBP are located in the Upper Three Runs Watershed and are situated on the west and east side, respectively, of Road C-1, a dirt road (Figure 2). The OU is not located near or in an environmentally sensitive area and is unpopulated. Due to their proximity to each other, MCB and MBP are being addressed together.

The MCB was approximately 20 by 20 feet (ft) and approximately 1 ft deep, although exact basin boundaries have not been determined. The MCB was filled with soil and regraded in 1974. At this time, the MCB has been cleared and much of the remediation equipment (i.e., soil vapor extraction (SVE) and in situ recirculation wells) has been installed, and the work is nearing completion.

The MBP is irregular in shape with approximate dimensions of 400 by 400 ft. Waste materials were piled 3 to 6 ft high within the boundaries of MBP. The western half of the unit has a slope of approximately 6 percent, and the eastern half of the unit has a slope of approximately 2.5 percent.

The MCB received liquid chemical wastes and was located in an old borrow pit. No construction records exist for the borrow pit. No records of specific materials disposed were kept, although its assumed use was for the disposal of waste solvent and used oil. It is believed that partially full drums were emptied at this site, and the empty drums were then discarded at the MBP. Records indicate that the basin was in use from about 1956 to 1974.

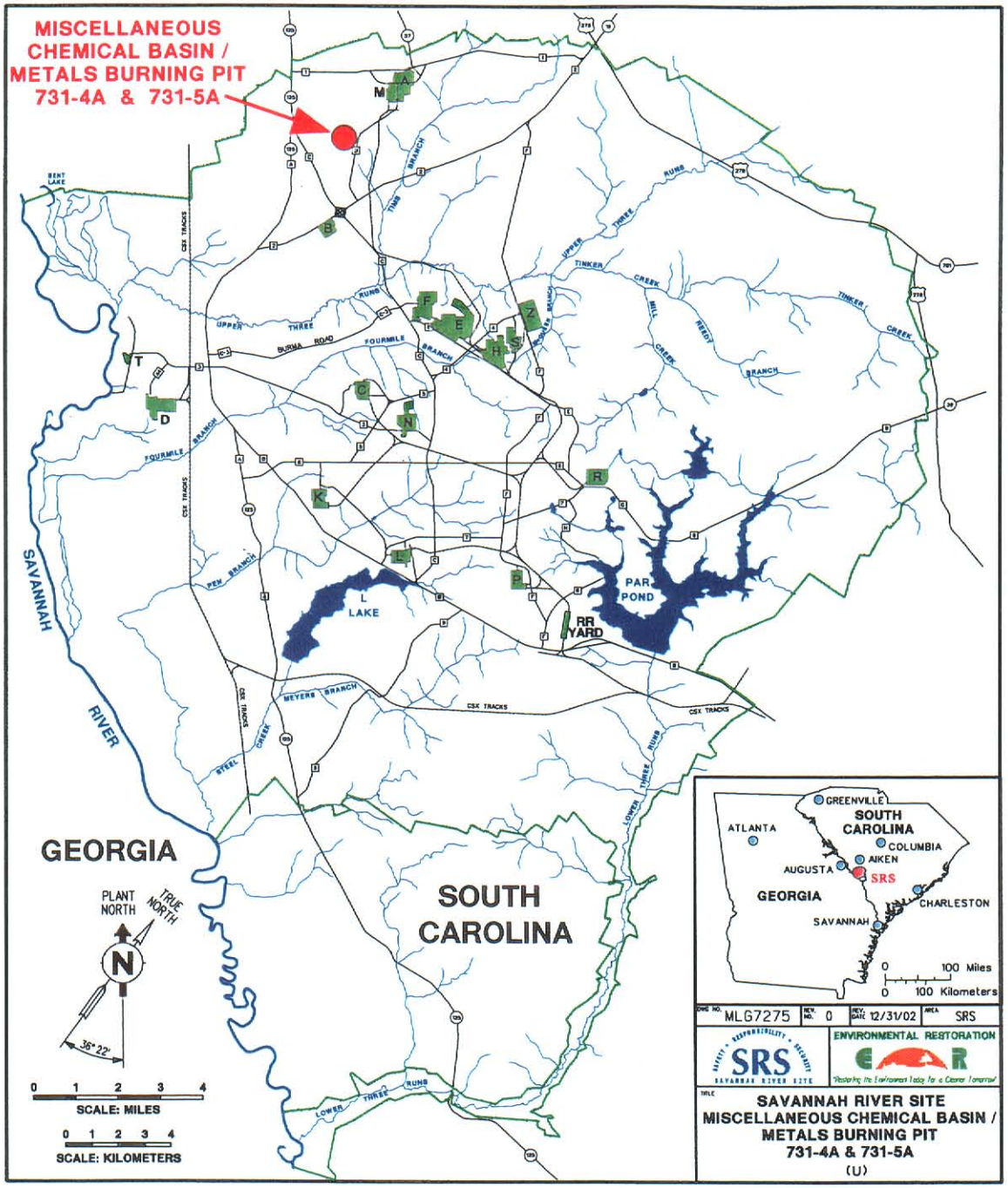


Figure 1. Location of Miscellaneous Chemical Basin/Metals Burning Pit at SRS

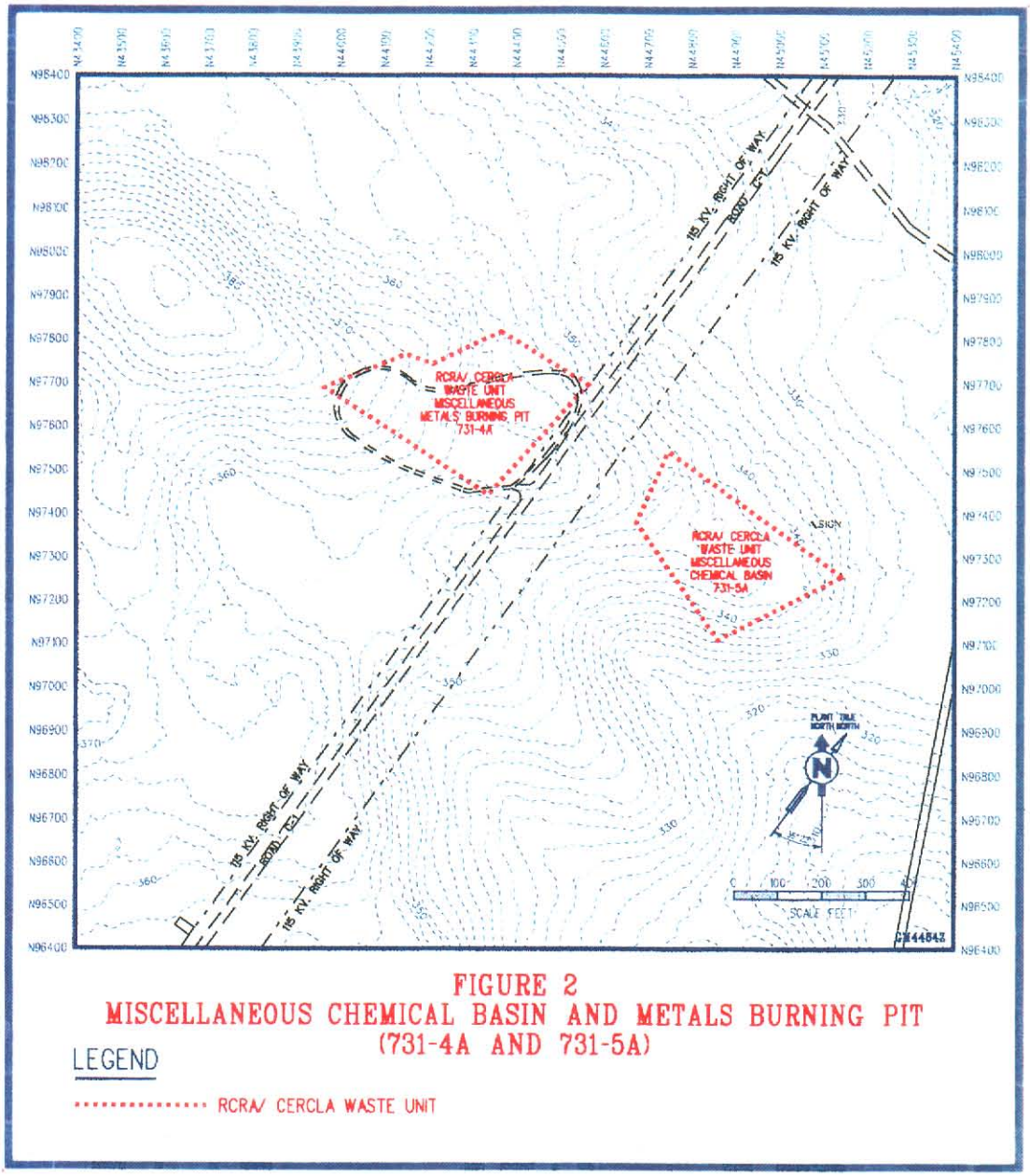


Figure 2. Miscellaneous Chemical Basin/Metals Burning Pit Layout Drawing

The MBP was actually a cleared area used for burning lithium-aluminum alloys, scrap, and cuttings from the A/M Area machining operations. A review of file material does not indicate the existence of any excavation as the word "pit" implies. Unit photographs show what is thought to be typical disposal of metal shavings, pieces of aluminum, plastic pipe, metal drums, and other miscellaneous scrap. Wastes were primarily contained in two discrete areas, one large pile and a series of small piles oriented in a semi-circular arc. The pit was reportedly placed in service in 1960 and taken out of service in 1974. At that time, the waste piles were regraded, and the area was allowed to revegetate. At the time of this 5-year IAROD review, contaminated surface soil and subsurface soil have been removed and replaced with clean fill. The area has been revegetated.

Soil

Previous screening activities conducted at the MCB and MBP units include soil-gas surveys performed in 1986 and soil confirmation sampling. Only dichloroethene was detected in the MBP. Constituents detected in the MCB include trichloroethylene (TCE), tetrachloroethylene (PCE), 1,1-dichloroethene, dichloromethane, trichloromethane, and dichloroethene.

The Phase I investigation was conducted in 1989. For MCB, the investigation included 11 soil borings. For MBP, it included nine soil borings and ten test pits. Chloroform, chlorobenzene, polychlorinated biphenyl (PCB) (i.e., arochlor-1260 and -1254), gross alpha, gross beta, and total radium were detected in soils at the MCB and MBP during the Phase I analysis. With the exception of lithium and aluminum, metals concentrations in the soils are comparable to background and therefore do not appear to be unit-related.

The current and future anticipated land use is industrial.

Groundwater

Groundwater monitoring of the MCB/MBP began in 1985 and continued on a quarterly basis until 1994. Depth to groundwater is approximately 120 to 140 ft, with variations due in part to topographic differences between well locations. A total of 14 monitoring wells and two piezometers were installed in the MCB/MBP area as part of the Phase II Resource Conservation and Recovery Act (RCRA) Facility Investigation/Remedial Investigation (RFI/RI) investigation. Of the 14 monitoring wells, five are screened in the water table aquifer, five are screened in the upper portion of the Lost Lake aquifer, and the remaining four wells are screened in the lower portion of the Lost Lake aquifer. One piezometer was screened in the upper portion of the Lost Lake aquifer and one was screened in the lower portion of the Lost Lake aquifer. Results of the unit characterization show the presence of carbon tetrachloride, TCE, and PCE in the M-Area aquifer (water table) and the Steed Pond aquifer; TCE and PCE are also present in the Lost Lake aquifer.

IV. Remedial Actions

An IAROD was issued on December 7, 2000, and selected the following alternatives:

- MBP surface and subsurface soils contaminated with aluminum and the MCB surface soils contaminated with PCBs will be removed and disposed in an appropriated Offsite Rule compliant facility.
- SVE will be performed in the MCB vadose zone, and
- The contaminated groundwater associated with the MCB/MBP will be treated by in situ air stripping.

The final constituents of concern (COC) are shown in Tables 1 and 2.

Table 1. Final Contaminant Migration, Human Health, and Ecological COC Summary: MCB/MBP Soils

	Metals Burning Pit (MBP)			Misc. Chem Basin (MCB)		
Analyte	HH	Eco.	CM	HH	Eco.	CM
Inorganics						
Aluminum		x				
Organics						
Aroclor-1254				x		
Aroclor-1260				x	x	
Octachlorodibenzo-p-dioxin (OCDD)				x		
TCE						x
PCE						x
Radionuclides						
None						

Table 2. Final Human Health COC Summary: MCB/MBP Groundwater

Analyte	Water Table Aquifer	Lost Lake Aquifer	Steed Pond Aquifer
	HH	HH	HH
Inorganics			
Lead	x	x	
Organics			
Carbon tetrachloride	x		x
Chloroform	x	x	
Tetrachloroethylene	x	x	x
1,1-Dichloroethylene		x	
1,2-Dichloroethylene		x	
Toluene	x		
Trichloroethylene	x	x	x
Radionuclides			
None			

The interim remedial action objectives (IRAOs) are specific early action goals developed to reduce risk to human health and the environment are identified in the Interim Action Proposed Plan (IAPP) and IAROD. Based on the RFI/RI and

the Baseline Risk Assessment (BRA), the IRAOs are the final remedial action objectives (RAOs) for the soils and the vadose zone.

The IRAOs established for this OU are as follows:

- Surface/Subsurface Soil - prevent direct contact with aluminum and PCB-contaminated surface/subsurface soils so that the COCs are not a continued significant risk to human health or the ecological receptors.

- Vadose Zone Soil - treat volatile organic compound (VOC)-contaminated vadose zone soils with a combination of active and passive treatment, with an overall objective to reduce the potential migration of solvents to the water table that result in contaminant concentrations exceeding maximum contaminant levels (MCLs).

- Groundwater - treat the Lost Lake aquifer to prevent further plume growth, demonstrate the effectiveness of in situ air stripping wells, and obtain necessary site-specific run data to determine a final remedial goal or strategy. The interim action will allow early start of remedial activities while generating additional data on the nature and extent of the groundwater interactions between the MCB/MBP, the A-Area Burning/Rubble Pit (ABRP), and the A&M Area. These data will allow determination of the final groundwater remedial goal.

For PCB soil contamination, the final remedial goals (RGs) are 1) 156 µg/kg (future residents), 2) 215 µg/kg (ecological), and 3) 479 µg/kg (future industrial workers). For octachlorodibenzo-p-dioxin (OCDD), a level of 3 µg/kg was used for future residents. OCDD is not a COC for future industrial workers. The final RG for aluminum for ecological risk was established at 11,000 mg/kg, which is the site-specific maximum background value.

For the vadose zone, the final RGs of 0.344 mg/kg were established for both PCE and TCE.

For groundwater, the interim RGs were set at the MCLs (5 µg/L) for VOC constituents. Lead will not be treated because elevated levels are sporadic and are judged to be caused by natural geologic conditions.

An interim Corrective Measures Implementation/Remedial Action Implementation Plan (ICMI/RAIP) for the MCB/MBP was issued on February 11, 2000. The purpose of this document is to provide information about the design implementation of the selected remedy for the MCB/MBP. The ICMI/RAIP documents design inputs and ensures that the remedial design requirements of the IAROD are incorporated into the remedial design.

Remedial design was started and completed in July of 1997 and July 1999, respectively. No difficulties were noted during the design phase of the MCB/MBP. Remedial action (i.e., construction start date) started February 18, 2000, and is still ongoing. The SVE unit was turned over to operations in September 2001. The recirculation wells system is on schedule to be completed and turned over to operations December 2001. Table 3 provides the status of the key elements of the selected final remedial action for the MCB/MBP OU.

Table 3. Status of Construction Activities for MCB/MBP OU

MBP Surface and Subsurface Soil	
Remedial Action	**Status**
Excavate soil containing aluminum in excess of the site-specific maximum background of 11,000 mg/kg to a maximum depth of 4 feet in selected areas	Complete
Confirm the lateral extent of contamination by sampling.	Complete
Dispose of excavated soil in Subtitle D sanitary landfill	Complete
Place clean fill into the excavated area until the surface is brought back to grade.	Complete
Vegetate the surface soil	Complete
Implement and maintain institution controls, which include access to the waste unit, posting signs in the area, field walkdowns for general site conditions, and deed notifications as required under Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) Section 120(H).	Ongoing

Table 3. Status of Construction Activities for MCB/MBP OU (continued)

MCB Surface Soil	
Excavate soil containing levels of aroclor-1260 above the ecological remedial goal (RG) of (215 µg/kg) in selected areas.	Complete
Excavate soil contaminated with aroclor-1254 above the applicable or relevant and appropriate requirement (ARAR) limit of 1,000 µg/kg to a maximum depth of 1 foot or 4 feet as appropriate.	Complete
Determine the lateral extent of contamination by sampling	Complete
Dispose of excavated soil in a Subtitle D sanitary landfill	Complete
Fill excavated areas with clean fill until the surface is brought back to grade	Complete
Vegetate surface soil	Complete
Implement institutional controls, which include controlling access to the waste unit, posting signs in the area, field walkdowns for general site conditions, and deed modifications as required under CERCLA Section 120(H).	Ongoing
Install active SVE wells in the vicinity of high VOC concentrations (>50 parts per million volume (ppmv), define for this OU as a hot spot area)	Complete[1]
Install passive SVE wells in the vicinity of the lower concentrations areas (<50 ppmv)	Complete[2]
Offgas will be exhausted to the atmosphere at levels not to exceed air permit limits (8.67 lb/hr total VOCs)	System Operation has not begun operations
MCB Vadose Zone	
Active SVE wells can be converted to passive SVE wells after concentrations reach 50 ppmv	System operations have not begun
Groundwater	
Install and operate three series of in situ air stripping wells	Construction ongoing
Offgas will be exhausted to the atmosphere at levels not to exceed air permit levels	System operations have not begun
Install monitoring wells to monitor in situ air stripper performance	Complete
Sample monitoring wells to monitor in situ air stripper performance	Sampling planned
Continue monitoring for lead to test the hypothesis that elevated concentrations are the result of natural process	Ongoing

Notes:

1. The active SVE system has been installed but has not undergone startup and turnover to operations, which is scheduled to occur in calendar year 2001

2. The passive SVE system has been installed but has not undergone startup and turnover to operation, which is scheduled to occur in calendar year 2001.

System Operation and Maintenance

The MCB/MBP OU remedy has not been fully constructed and has not been turned over to operations. Therefore, no operations and maintenance costs have posted against this project to date.

V. Progress In the Last Five Years

Not applicable for this OU.

VI. Technical Assessment

Since the overall remedy construction is not complete, definitive data are not available to evaluate if the remedy is effective. Because the remedial actions (excavation/disposal and institutional controls) selected for the subsurface and surface soils are complete, these elements of the overall remedy have achieved their final remedial goals. The remedy for the vadose zone and the groundwater are expected to be effective but until the SVE systems, in situ recirculation wells and monitoring wells are operated and sampled, direct evidence will not be available to determine the effectiveness of these elements of the overall remedy.

The RAOs are still valid for this remedial action because the exposure assumptions, cleanup levels, and toxicity data have not changed since the remedy was selected. No other information has been identified that would negatively impact the effectiveness of the selected remedy.

The exposure assumptions, toxicity data, cleanup levels, and RAOs used at the time of remedy selection are still valid. No other information has come to light that could call into question the protectiveness of the remedy.

VII. Issues

Since remedy construction and turnover to operations is not complete, no conditions or activities issue can be identified related to current site operations versus the protectiveness of the remedy. However, the selected remedy is expected to be completely protective of human health and the environment.

VIII. Recommendations and Follow-up Actions

No specific required or suggested recommendations/improvements have been identified as a result of this review because the selected remedy is not operational. However, the remedy is expected to be effective.

IX. Protectiveness Statement(s)

The surface and subsurface soil elements of the overall remedy are complete and protective of human health and the environment (i.e., the RAOs and RGs established in the IROD have been met). The surface and subsurface soil remedial actions are final actions as stated in the IROD.

The vadose zone and interim groundwater elements of the overall remedy are operating and thus are not fully protective of human health and the environment because the groundwater may remain above MCLs upon completion of this interim action. In the interim, exposure pathways that could lead to unacceptable risk are being controlled through the installation of a soil cover over the area to protect remedial workers from soil contaminants and institutional controls. Institutional controls include: (1) physical access controls to prevent unauthorized entry to SRS (fences, guards, security patrols, etc.); (2) administrative controls that maintain this site for industrial use only (SRS is a secured government facility with land use restrictions); and (3) warning signs and land use controls (SRS Site Use/Site Clearance Program). The vadose zone remedial action is considered a final action as stated in the IROD. Upon completion of operation, the RAOs and RGs established for the vadose zone in the IROD will be met. The groundwater remedy is considered an interim remedial action. The interim groundwater action may be sufficient to reduce VOC levels to less than MCLs if there is no interaction between the MCB/MBP and upgradient groundwater sources. However, due to uncertainties in the interaction between the contaminated groundwater plumes associated with the upgradient units, the

MCB/MBP groundwater action is being taken on an interim basis to allow for further determination of the regional VOC groundwater contamination. A final remedial action decision for the groundwater will be made in the final ROD for this OU.

In addition, institutional controls are also in place at the MCB/MBP OU. The LUCIP is included in the MCB/MBP OU Interim Post-Construction Report.

Attachment 1

List of Associated Documents

WSRC, 1999a *Interim Action Proposed Plan for the Miscellaneous Chemical Basin/Metals Burning Rubble Pit (731-4A/5A) Operable Unit (OU),* WSRC-RP-98-4153, Revision 1, January, Westinghouse Savannah River Company, Aiken, SC

WSRC, 1999b. *Interim Record of Decision Remedial Selection for the Miscellaneous Chemical Basin/Metals Burning Pit (731-4A/5A) Operable Unit (U),* WSRC-RP-98-4031, Revision 1.1, December, Westinghouse Savannah River Co., Aiken, SC

WSRC, 2000. *Interim Corrective Measures Implementation/Remedial Action Implementation Plan for the Miscellaneous Chemical Basin/Metal Burning Pit (731-4A/5A) (U),* WSRC-RP-99-4037, Revision 1.1, March, Westinghouse Savannah River Co., Aiken SC

Five-Year Review Site Inspection Checklist

I. SITE INFORMATION	
Site Name: Miscellaneous Chemical Basin/Metals Burning Pit (731-4A/5A)	**Date of Inspection: October 1, 2001**
Location and Region: SRS, USEPA Region IV	**EPA ID:**
Agency, office, or company leading the five-year review: USDOE	**Weather/temperature: mid 70's**

Remedy Includes: (Check all that apply)

- ☐ Landfill cover/containment
- ☐ Access controls
- ☒ Institutional Controls
- ☐ Groundwater pump and treatment
- ☐ Surface water collection and treatment
- ☐ Monitored Natural Attenuation
- ☐ Groundwater Containment
- ☐ Vertical Barrier Walls
- ☒ Other Excavation, Offsite disposal, SVE (active and passive), Air sparging, Monitoring

Attachments: ☐ Inspection team roster attached ☐ Site map attached

II. INTERVIEWS (Check all that apply)

1. **O & M site manager Chris Bergren** _____ _____
   Name Title Date
   Interviewed ☒ at site ☐ at office ☐ by phone Phone No. _____
   Problems, suggestions; ☐ report attached _____

2. **O & M staff** Tom Kmetz _____ _____
   Name Title Date
   Interviewed ☒ at site ☐ at office ☐ by phone Phone No. _____
   Problems, suggestions; ☐ report attached _____

3. **Local regulatory authorities and response agencies** (i.e., State and tribal offices, emergency response office, police department, office of public health or environmental health, zoning office, recorder of deeds, or other city and county offices, etc.) Fill in all that apply.

Agency _____

Contact _____ _____ _____ _____
Name Title Date Phone No.

Problems; suggestions; ☐ Report attached _____

_____

Agency _____

Contact _____ _____ _____ _____
Name Title Date Phone No.

Problems; suggestions; ☐ Report attached _____

_____

Agency _____

Contact _____ _____ _____ _____
Name Title Date Phone No.

Problems; suggestions; ☐ Report attached _____

_____

4. **Other interviews** (optional) ☐ Report attached _____

III. ONSITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)

1. **O & M Documents**

☐ O & M Manual	☐ Readily available	☐ Up to date	☒ N/A
☒ As-built drawings	☒ Readily available	☐ Up to date	☐ N/A
☒ Maintenance Logs	☒ Readily available	☐ Up to date	☐ N/A

Remarks_____

2. **Site-Specific Health and Safety Plan** ☒ Readily available ☒ Up to date ☐ N/A

☐ Contingency plan/emergency response plan ☒ Readily available ☒ Up to date ☐ N/A

Remarks_____

3. **O & M and OSHA Training Records** ☐ Readily available ☐ Up to date ☒ N/A

Remarks_____

4. **Permits and Service Agreements**

☐ Air discharge permit	☐ Readily available	☐ Up to date	☒ N/A
☐ Effluent discharge	☐ Readily available	☐ Up to date	☒ N/A
☐ Waste Disposal, POTW	☐ Readily available	☐ Up to date	☒ N/A
☒ Other permits	☒ Readily available	☐ Up to date	☐ N/A

Remarks In Situ Air Stripping Wells underground injection control permit

5. **Gas Generation Records** ☐ Readily available ☐ Up to date ☒ N/A

Remarks_____

6. **Settlement Monument Records** ☐ Readily available ☐ Up to date ☒ N/A

Remarks_____

7. **Groundwater Monitoring Records** ☐ Readily available ☐ Up to date ☒ N/A

Remarks Air Stripping Wells

8. **Leachate Extraction Records**	☐ Readily available	☐ Up to date	☒ N/A	
Remarks_____				
9. **Discharge Compliance Records**				
☐ Air	☐ Readily available	☐ Up to date	☒ N/A	
☐ Water (effluent)	☐ Readily available	☐ Up to date	☒ N/A	
Remarks_____				
10. **Daily Access/Security Logs**	☒ Readily available	☐ Up to date	☐ N/A	
Remarks_____				

Note: An important report to review is the *Field Work Report for the Installation of Effectiveness Monitoring Wells at the MCB/MBP (U)*, WSRC-RP-2001-4021, January 2001.

IV. O & M Costs

1. **O & M Organization**

☐ State in-house ☐ Contractor for State

☐ PRP in-house ☐ Contractor for PRP

☐ Other_____

_____

2. **O & M Cost Records**

☐ Readily available ☐ Up to date

☐ Funding mechanism/agreement in place

☐ Other_____

_____

Total annual cost by year for review period if available

From_____ To_____ _____ ☐ Breakdown attached
Date Date Total cost

From_____ To_____ _____ ☐ Breakdown attached
Date Date Total cost

From_____ To_____ _____ ☐ Breakdown attached
Date Date Total cost

From_____ To_____ _____ ☐ Breakdown attached
Date Date Total cost

From_____ To_____ _____ ☐ Breakdown attached
Date Date Total cost

1. **Unanticipated or Unusually High O & M Costs During Review Period**

Describe costs and reasons: _____

_____

_____

_____

_____

V. ACCESS AND INSTITUTIONAL CONTROLS ☒ Applicable ☐ N/A

A. Fencing

1. **Fencing Damaged** ☐ Location shown on site map ☐ Gates secured ☒ N/A

Remarks_____

_____

B. Other Access Restrictions

1. **Signs and other security measures** ☐ Location shown on site map ☐ N/A

Remarks One orange ball marker needs to be put back up. At the moment it is on the ground.

This has been reported to the maintenance group.

C. Institutional Controls

1. **Implementation and enforcement**

Site conditions imply ICs not properly implemented ☐ Yes ☒ No ☐ N/A

Site conditions imply ICs not being fully enforced ☐ Yes ☒ No ☐ N/A

Type of monitoring (e.g., self-reporting, drive-by)_____

Frequency_____

Responsible party/agent_____

Contact	Michael Redd	Manager ER Maintenance	_____	_____
	Name	Title	Date	Phone No.

Report is up-to-date ☒ Yes ☐ No ☐ N/A

Reports are verified by the lead agency ☐ Yes ☐ No ☐ N/A

Specific requirements in deed of decision documents have been met ☐ Yes ☐ No ☒ N/A

Violations have been reported ☐ Yes ☐ No ☒ N/A

Other problems or suggestions: ☐ Report attached

_____

_____

_____

_____

2. **Adequacy** ☒ ICs are adequate ☐ ICs are inadequate ☐ N/A

Remarks_____

_____

D. General

1. **Vandalism/trespassing** ☐ Location shown on site map ☒ No vandalism evident

Remarks_____

_____

2. **Land use changes onsite** ☒ N/A

Remarks_____

_____

3. **Land use changes offsite** ☒ N/A

Remarks_____

_____

VI. GENERAL SITE CONDITIONS

A. Roads ☒ Applicable ☐ N/A

1. **Roads damaged** ☐ Location shown on site map ☒ Roads adequate ☐ N/A

Remarks Dirt/gravel roads

_____

B. Other site Conditions

Remarks Needs to be mowed around the well MCSV-4.

_____

_____

_____

_____

VII. LANDFILL COVERS ☐ Applicable ☒ N/A

A. Landfill Surface

1. **Settlement** (Low spots) ☐ Location shown on site map ☐ Settlement not evident

Areal extent_____ Depth_____

Remarks_____

_____

2. **Cracks** ☐ Location shown on site map ☐ Cracking not evident

Lengths_____ Widths_____ Depths_____

Remarks_____

_____

3. **Erosion** ☐ Location shown on site map ☐ Erosion not evident

Areal extent_____ Depth_____

Remarks_____

_____

4. **Holes** ☐ Location shown on site map ☐ Holes not evident

Areal extent_____ Depth_____

Remarks_____

_____

5. **Vegetative Cover** ☐ Grass ☐ Cover properly established ☐ No signs of stress

☐ Trees/shrubs (indicate size and location on a diagram)

Remarks_____

_____

6. **Alternative Cover (armored rock, concrete, etc.)** ☐ N/A

Remarks_____

_____

7. **Bulges** ☐ Location shown on site map ☐ Bulges not evident

Areal extent_____ Height_____

Remarks_____

_____

8. **Wet Areas/Water Damage** ☐ Wet areas/water damage not evident

☐ Wet Areas ☐ Location shown on site map Areal extent_____

☐ Ponding ☐ Location shown on site map Areal extent_____

☐ Seeps ☐ Location shown on site map Areal extent_____

☐ Soft subgrade ☐ Location shown on site map Areal extent_____

Remarks_____

_____

9. **Slope Instability** ☐ Slides ☐ Location shown on site map ☐ No evidence of slope instability

Areal extent_____

Remarks_____

_____

B. Benches ☐ Applicable ☒ N/A

(Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)

1. **Flows Bypass Bench** ☐ Location shown on site map ☐ N/A or okay

Remarks_____

2. **Bench Breached** ☐ Location shown on site map ☐ N/A or okay

Remarks_____

3. **Bench Overtopped** ☐ Location shown on site map ☐ N/A or okay

Remarks_____

C. Letdown Channels ☐ Applicable ☒ N/A

(Channel lined with erosion control mates, riprap, grout bags, or gabions that descend down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)

1. **Settlement** ☐ Location shown on site map ☐ No evidence of settlement

Areal extent_____ Depth_____

Remarks_____

2. **Material Degradation** ☐ Location shown on site map ☐ No evidence of degradation

Material type_____ Areal extent _____

Remarks_____

3. **Erosion** ☐ Location shown on site map ☐ No evidence of erosion

Areal extent _____ Depth_____

Remarks_____

4. **Undercutting** ☐ Location shown on site map ☐ No evidence of undercutting

Areal extent _____ Depth_____

Remarks_____

_____

5. **Obstructions** Type_____ ☐ No obstructions

☐ Location shown on site map Areal extent _____

Size _____

Remarks_____

_____

6. **Excessive Vegetative Growth** Type_____

☐ No evidence of excessive growth

☐ Vegetation in channels does not obstruct flow

☐ Location shown on site map Areal extent _____

Remarks_____

_____

D. Cover Penetrations ☐ Applicable ☒ N/A

1. **Gas Vents** ☐ Active ☐ Passive

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A

Remarks_____

_____

2. **Gas Monitoring Probes**

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A

Remarks_____

_____

3. **Monitoring Wells** (within surface area of landfill)

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A

Remarks_____

_____

4. **Leachate Extraction Wells**

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A

Remarks_____

_____

5. **Settlement Monuments** ☐ Located ☐ Routinely surveyed ☐ N/A

Remarks_____

_____

E. Gas Collection and Treatment ☐ Applicable ☒ N/A

1. **Gas Treatment Facilities**

☐ Flaring ☐ Thermal destruction ☐ Collection for reuse

☐ Good condition ☐ Needs Maintenance

Remarks_____

_____

2. **Gas Collection Wells, Manifolds and Piping**

☐ Good condition ☐ Needs Maintenance

Remarks_____

_____

3. **Gas Monitoring Facilities** (e.g., gas monitoring of adjacent homes or buildings)

☐ Good condition ☐ Needs Maintenance ☐ N/A

Remarks_____

_____

F. Cover Drainage Layer ☐ Applicable ☒ N/A

1. **Outlet Pipes Inspected** ☐ Functioning ☐ N/A Remarks_____	
2. **Outlet Rock Inspected** ☐ Functioning ☐ N/A Remarks_____	

G. Detention/sedimentation Ponds ☐ Applicable ☒ N/A

1. **Siltation** Areal extent_____ Depth_____ ☐ N/A

   ☐ Siltation not evident

   Remarks_____

2. **Erosion** Areal extent_____ Depth_____ ☐ N/A

   ☐ Erosion not evident

   Remarks_____

3. **Outlet Works** ☐ Functioning ☐ N/A

   Remarks_____

4. **Dam** ☐ Functioning ☐ N/A

   Remarks_____

H. Retaining Walls ☐ Applicable ☒ N/A

1. **Deformations** ☐ Location shown on site map ☐ Deformation not evident

   Horizontal displacement_____ Vertical displacement_____

   Rotational displacement_____

   Remarks_____

2. **Degradation** ☐ Location shown on site map ☐ Deformation not evident

   Remarks_____

I. Perimeter Ditches/Off-Site Discharge ☐ Applicable ☒ N/A

1. **Siltation** ☐ Location shown on site map ☐ Siltation not evident

   Areal extent_____ Depth_____

   Remarks_____

2. **Vegetative Growth** ☐ Location shown on site map ☐ Siltation not evident

☐ Vegetation does not impede flow

Areal extent_____ Type_____

Remarks_____

_____

3. **Erosion** ☐ Location shown on site map ☐ Erosion not evident

Areal extent_____ Depth_____

Remarks_____

_____

4. **Discharge Structure** ☐ Location shown on site map ☐ N/A

Remarks_____

_____

VIII. VERTICAL BARRIER WALLS ☐ Applicable ☒ N/A

1. **Settlement** ☐ Location shown on site map ☐ Settlement not evident

Areal extent_____ Depth_____

Remarks_____

_____

2. **Performance Monitoring** Type of Monitoring_____

☐ Performance not monitored

Frequency_____ ☐ Evidence of breaching

Head differential_____

Remarks_____

_____

IX. GROUNDWATER/SURFACE WATER REMEDIES ☒ Applicable ☐ N/A

A. Groundwater Extraction Wells, Pumps, and Pipelines ☐ Applicable ☒ N/A

1. **Pumps, Wellhead Plumbing, and Electrical**

☐ Good condition ☐ All required wells located ☐ Needs Maintenance ☐ N/A

Remarks_____

_____

2. **Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances**

☐ Good condition ☐ Needs Maintenance

Remarks_____

_____

3. **Spare Parts and Equipment**

☐ Readily available ☐ Good condition ☐ Requires upgrade ☐ Needs to be provided

Remarks_____

_____

B. Surface Water Collection Structures, Pumps, and Pipelines ☐ Applicable ☒ N/A

1. **Collection Structures, Pumps, and Electrical**

☐ Good condition ☐ Needs Maintenance

Remarks_____

_____

2. **Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances**

☐ Good condition ☐ Needs Maintenance

Remarks_____

_____

3. **Spare Parts and Equipment**

☐ Readily available ☐ Good condition ☐ Requires upgrade ☐ Needs to be provided

Remarks_____

_____

C. **Treatment System** ☒ Applicable ☐ N/A

1. **Treatment Train** (Check components that apply)

☐ Metals removal ☐ Oil/water separation ☐ Bioremediation

☒ Air sparging ☐ Carbon adsorbers

☐ Filters_____

☐ Additive (e.g., chelation agent, flocculent)_____

☒ Others Soil Vapor Extraction (active and passive)

☐ Good condition ☐ Needs Maintenance

☐ Sampling ports properly marked and functional

☐ Sampling/maintenance log displayed and up to date

☐ Equipment properly identified

☐ Quantity of groundwater treated annually_____

☐ Quantity of surface water treated annually_____

Remarks New wells currently being installed.

_____

2. **Electrical Enclosures and Panels** (properly rated and functional)

☐ N/A ☒ Good condition ☒ Needs Maintenance

Remarks_____

_____

3. **Tanks, Vaults, Storage Vessels**

☒ N/A ☐ Good condition ☐ Proper secondary containment ☐ Needs Maintenance

Remarks_____

_____

4. **Discharge Structure and Appurtenances**

☒ N/A ☐ Good condition ☐ Needs Maintenance

Remarks_____

_____

5. **Treatment Building(s)**

☒ N/A ☐ Good condition (esp. roof and doorways) ☐ Needs repair

☐ Chemicals and equipment properly stored

Remarks_____

_____

6. **Monitoring Wells** (pump and treatment remedy)

☒ Properly secured/locked ☒ Functioning ☒ Routinely sampled ☒ Good condition

☒ All required wells located ☐ Needs Maintenance ☐ N/A

Remarks_____

_____

D. Monitoring Data

1. Monitoring Data

☒ Is routinely submitted on time ☒ Is of acceptable quality

2 .Monitoring data suggests:

☐ Groundwater plume is effectively contained ☐ Contaminant concentrations are declining

E. Monitored Natural Attenuation

1. **Monitoring Wells** (Natural attenuation remedy)

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ All required wells located ☐ Needs Maintenance ☒ N/A

Remarks_____

_____

X. OTHER REMEDIES

If there are remedies applied at the site, which are not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.

XI. OVERALL OBSERVATIONS

A. Implementation of the Remedy

Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emissions, etc.).

B. Adequacy of O & M

Describe issues and observations related to the implementation and scope of O & M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy.

C. Early Indicators of Potential Remedy Failure

Describe issues and observations such as unexpected changes in the cost or scope of O & M or a high frequency of unscheduled repairs that suggest that the protectiveness of the remedy may be compromised in the future.

D. Opportunities for Optimization

Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy.

Mixed Waste Management Facility Operable Unit

I. Introduction

The review for this unit is conducted under the SRS RCRA program. The CERCLA review requirements are met by the RCRA program, therefore a separate review of the RCRA Corrective Action is not duplicated in this document. This is the second such five-year review for the Mixed Waste Management Facility (MWMF) Operable Unit (OU). This review was conducted from August 2001 through September 2001. This report documents the results of the review.

II. Site Chronology

Table 1 lists the chronology of site events for the MWMF OU.

III. Background

The MWMF is a source-specific OU in the Upper Three Runs Watershed. The MWMF consists of 118 slit trenches, 1 engineered low level trench, and a naval core barrel mound. It is located in the center of SRS, between F and H Areas.

The MWMF operated from 1969 until March 11, 1986. During that time this facility, which comprises approximately 58 acres, received low-level radioactive waste materials produced at the SRS. Some of these materials are classified under RCRA as mixed waste containing both hazardous and radioactive components.

Waste from SRS disposed in the form of job control waste such as rags, gloves and coveralls, soil, construction debris, failed equipment, spent air filters, spent lithium-aluminum targets, irradiated scrap metal, naval reactor hardware, lead shielding, waste oil, scintillation fluids, cadmium, and silver-coated beryl saddles, were sent to the MWMF. The primary constituents of concern are tritium, lead, TCE and uranium.

Table 1. Chronology of Site Events

Event	Date
RCRA Closure Plan Approved	1987
Corrective Action start	1988
RCRA Closure Certified	1991
Final ROD issuance	September 23, 1994
Previous Five-Year Reviews	June 30, 1997

Key:

Consent Decree – Date a consent decree (enforcement document from the court system) was issued for the operable unit.

Corrective Action start – Date the corrective (remedial) action was initiated (under RCRA).

ESD Issuance - Date all three parties (USDOE, USEPA, and SCDHEC) signed the Explanation of Significant Difference used to significantly modify the remedy selected in the Record of Decision.

Final or Interim ROD issuance – Date the three parties (USDOE, USEPA, and SCDHEC) signed the Record of Decision.

Federal Facility Agreement Declared Effective - Date the Federal Facility Agreement formalized the integration of CERCLA and RCRA in remediation activities at SRS.

NPL listing – Date the entire SRS was added to EPA's National Priorities List.

Previous Five-Year Reviews – Date of any previous five year reviews of remedy for the operable unit.

RCRA Closure Certified – Date the three parties (USDOE, USEPA, and SCDHEC) certified that the operable unit had been remediated and closed under the Resource Conservation and Recovery Act.

RCRA Closure Plan Approved – Date the three parties (USDOE, USEPA, and SCDHEC) approved the closure plan for the operable unit under Resource Conservation and Recovery Act.

Remedial Action start/complete – Date the remedial action (final or interim) was initiated/completed (under CERCLA).

Removal Action – Date contaminated media was removed from the operable unit (not associated with the ROD).

RFI/RI start/complete - Date the remedial investigation (sampling) was initiated/completed for the operable unit.

ROD Amendment Issuance - Date the three parties (USDOE, USEPA, and SCDHEC) signed the Record of Decision Amendment used to change the remedy selected in the original Record of Decision.

IV. Final Remedial Actions

The selected remedy for this unit as identified in the Record of Decision is no further action under CERCLA.

V. Progress Since Last Review

This is the second 5-year review for this OU. Since the previous review in June of 1997, the following actions were completed:

- Annual inspections and maintenance to the soil cover as required by the RCRA Closure Plan
- Groundwater monitoring as required by the RCRA Closure Plan

VI. Five-Year Review Process

The following tasks were performed as part of the review:

- Reviewed the documents listed in Attachment 1
- Confirmed the implementation of the remedial action
- Assured that all actions required under the RCRA Permit were implemented

VII. Technical Assessment

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

VIII. Issues

There are no issues for this OU.

IX. Recommendations and Follow-up Actions

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

X. Protectiveness Statement(s)

The remedy of no further action under CERCLA is protective of human health and the environment.

XI. Next Review

The next five-year review is scheduled for June 30, 2007.

Attachment 1

List of Documents Reviewed

WSRC, 1993. *Final Record of Decision Remedial Alternative Selection for Mixed Waste Management Facility (U),* WSRC-RP-93-1511, Revision 1, September 12, 1994, Westinghouse Savannah River Company, Aiken, SC.

Old F-Area Seepage Basin (OFASB) (904-49G) Operable Unit

I. Introduction

This is the second five-year review for the Old F-Area Seepage Basin (OFASB) Operable Unit (OU). This review was conducted from August 2001 through September 2001. This report documents the results of the review.

II. OU Chronology

Table 1 lists the chronology of site events for the OFASB OU.

III. Background

The OFASB is located approximately 600 feet north of F Area and 1 mile east of Road C, approximately six miles from the nearest Savannah River Site (SRS) boundary (see Figures 1 and 2). The OFASB was an unlined seepage basin (approximately 300 feet long by 200 feet wide and 13 feet deep) that received 9 to 14 million gallons of low radioactive activity wastewater between November 1954 and mid-May 1995. Wastewater included overhead condensates from evaporates, laundry wastewater, non-reactor cooling water from F and H Areas, and possibly other chemicals. Groundwater is included as a subunit of this OU.

After 1955, the OFASB received occasional discharges of cooling water and rainfall runoff. During a three-month period in 1969, spent nitric acid solutions used to etch depleted uranium were discharged (via tanker truck) to the basin.

Wastewater disposal was discontinued after the 1969 discharge. An estimated 1.8 curies of radioactivity was released to the basin during its use. Due to natural radioactive decay an estimated inventory of less than 0.8 curies remained in 1998, at the time of the Explanation of Significant Differences (ESD) to the Record of Decision (ROD).

Table 1. Chronology of OU Events

Event	Date
Final ROD issuance	June 19, 1997
ESD approved	September 15, 1998
Remedial Action start/complete	September 10, 1998/ November 17, 2000
Previous Five-Year Reviews	June 30, 1997

Key:

Consent Decree – Date a consent decree (enforcement document from the court system) was issued for the operable unit.

Corrective Action start – Date the corrective (remedial) action was initiated (under RCRA).

ESD Issuance - Date all three parties (USDOE, USEPA, and SCDHEC) signed the Explanation of Significant Difference used to significantly modify the remedy selected in the Record of Decision.

Final or Interim ROD issuance – Date the three parties (USDOE, USEPA, and SCDHEC) signed the Record of Decision.

Federal Facility Agreement Declared Effective - Date the Federal Facility Agreement formalized the integration of CERCLA and RCRA in remediation activities at SRS.

NPL listing – Date the entire SRS was added to EPA's National Priorities List.

Previous Five-Year Reviews – Date of any previous five year reviews of remedy for the operable unit.

RCRA Closure Certified – Date the three parties (USDOE, USEPA, and SCDHEC) certified that the operable unit had been remediated and closed under the Resource Conservation and Recovery Act.

RCRA Closure Plan Approved – Date the three parties (USDOE, USEPA, and SCDHEC) approved the closure plan for the operable unit under Resource Conservation and Recovery Act.

Remedial Action start/complete – Date the remedial action (final or interim) was initiated/completed (under CERCLA).

Removal Action – Date contaminated media was removed from the operable unit (not associated with the ROD).

RFI/RI start/complete - Date the remedial investigation (sampling) was initiated/completed for the operable unit.

ROD Amendment Issuance - Date the three parties (USDOE, USEPA, and SCDHEC) signed the Record of Decision Amendment used to change the remedy selected in the original Record of Decision.

Analytical data pertaining to the OFASB indicated that radionuclide-contaminated soils associated with the OFASB are principal threat wastes that pose risk to both the future resident and industrial worker. These radionuclide risks are primarily associated with external radiation from the top two feet of the former basin bottom soils. Major contaminants include cesium-137 and mercury. The top two feet of the former basin bottom soils contain 53% of the cesium-137 and 97% of the mercury.

Groundwater monitoring data have also revealed that iodine-129, nitrate, strontium-90, and tritium are present in the groundwater above maximum

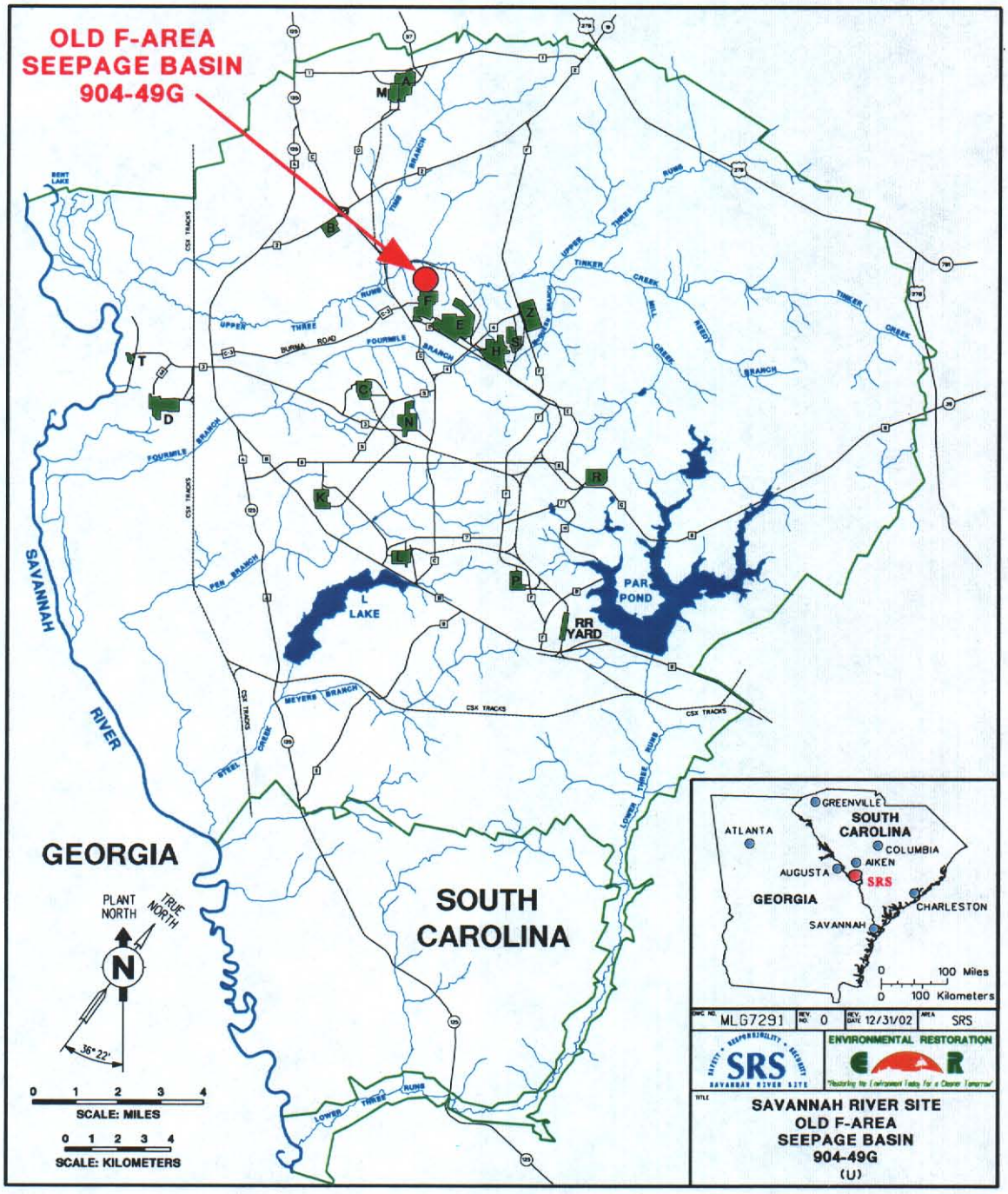


Figure 1. Location of the Old F-Area Seepage Basin at SRS

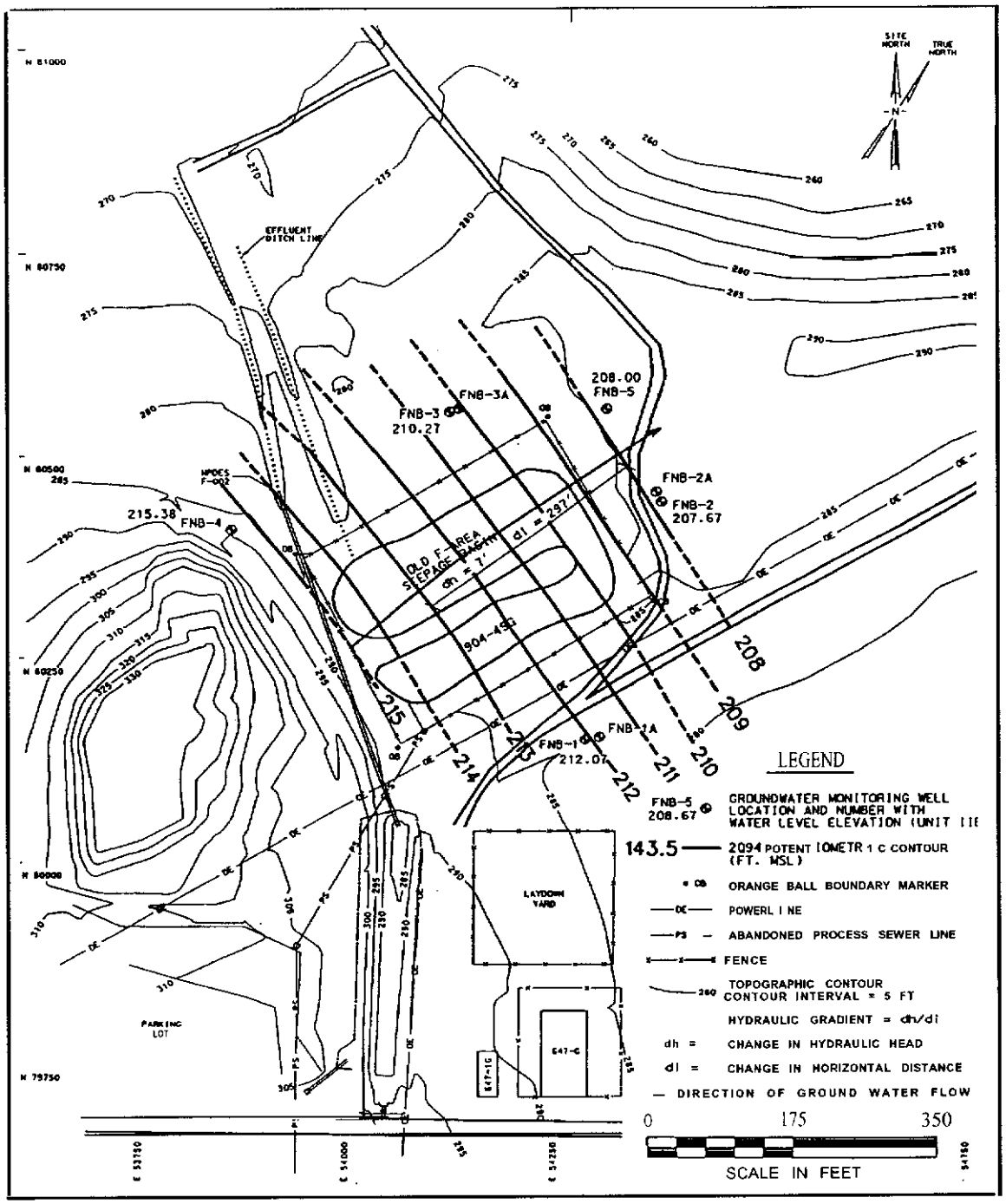


Figure 2. Topographic and Water Table Potentiometric Map of the OFASB

contaminant levels (MCLs). Uranium has also been detected above proposed MCLs. Although radium

has been decreasing over time, it has also exceeded MCLs. The groundwater plume has been detected in eight local wells associated with the OFASB. The groundwater plume in the water table aquifer has migrated beyond the surface boundaries of the OFASB by more than 200 feet toward the Upper Three Runs Creek, which is more than 2,500 feet to the north.

Based on the risk analysis, the OFASB soils pose a significant risk to human health. The significant carcinogenic risk to the potential future resident and worker is driven by exposure from direct radiation in the basin soils. These soils are contaminated with cesium-137 to a depth of 0 to 2 feet and overflow ditchline soils to a depth of 0 to 2 feet. Significant carcinogenic risks to the potential future resident are also driven by exposure from ingestion of groundwater contaminated with iodine-129, tritium, strontium-90, and radium-228 in the water table aquifer.

The current and future anticipated land use for the OFASB is industrial.

IV. Remedial Actions

The remedial action objectives (RAOs) developed for the OFASB are as follows:

- Prevent external exposure to radiological constituents
- Prevent inhalation of radiological constituents
- Prevent ingestion of soil or produce grown in soil with radiological constituents
- Prevent or mitigate the release of constituents of concern to the groundwater

- Prevent or mitigate the impact to the nearest surface water receptor located at the Upper Three Runs Creek

- Restore the aquifer through natural groundwater mixing processes and other processes (radioactive decay) to achieve MCLs throughout the groundwater plume (groundwater mixing zone application modeling estimates that MCLs will be achieved throughout the entire groundwater aquifer in approximately 200 years)

- Achieve State of South Carolina groundwater mixing zone objectives, which are listed below:

  - control source to minimize addition of contaminants to the groundwater,

  - establish plume monitoring and compliance wells to ensure compliance with mixing zone concentration limits and/or MCLs established in the groundwater mixing zone application, and

  - monitor to ensure contaminated groundwater remains on SRS until MCLs are achieved throughout the plume and to ensure the plume is decreasing in concentrations.

The remedial actions selected in the OFASB ROD for vegetation, pipeline and associated soils, ditchline soils, basin bottom soils, and groundwater was (1) removal of vegetation (approximately 285 cubic yards) with disposal at an off unit facility; (2) implementation of institutional controls for the pipeline and pipeline soils; (3) removal of the top two feet of ditchline soils with placement in the OFASB; (4) in situ grouting of the top two feet of basin bottom soils and ditchline soils placed in the basin (approximately 4,600 cubic yards); (5) backfill of the basin with clean soil with compaction to grade; (6) placement of a low-permeability soil cover (minimum 10^{-5} cm/sec hydraulic conductivity) over the OFASB area to minimize surface infiltration (see Figure 2); and (7) installation of

a monitoring well network, monitoring of groundwater through a groundwater alternate concentration limit/mixing zone demonstration, and institutional controls

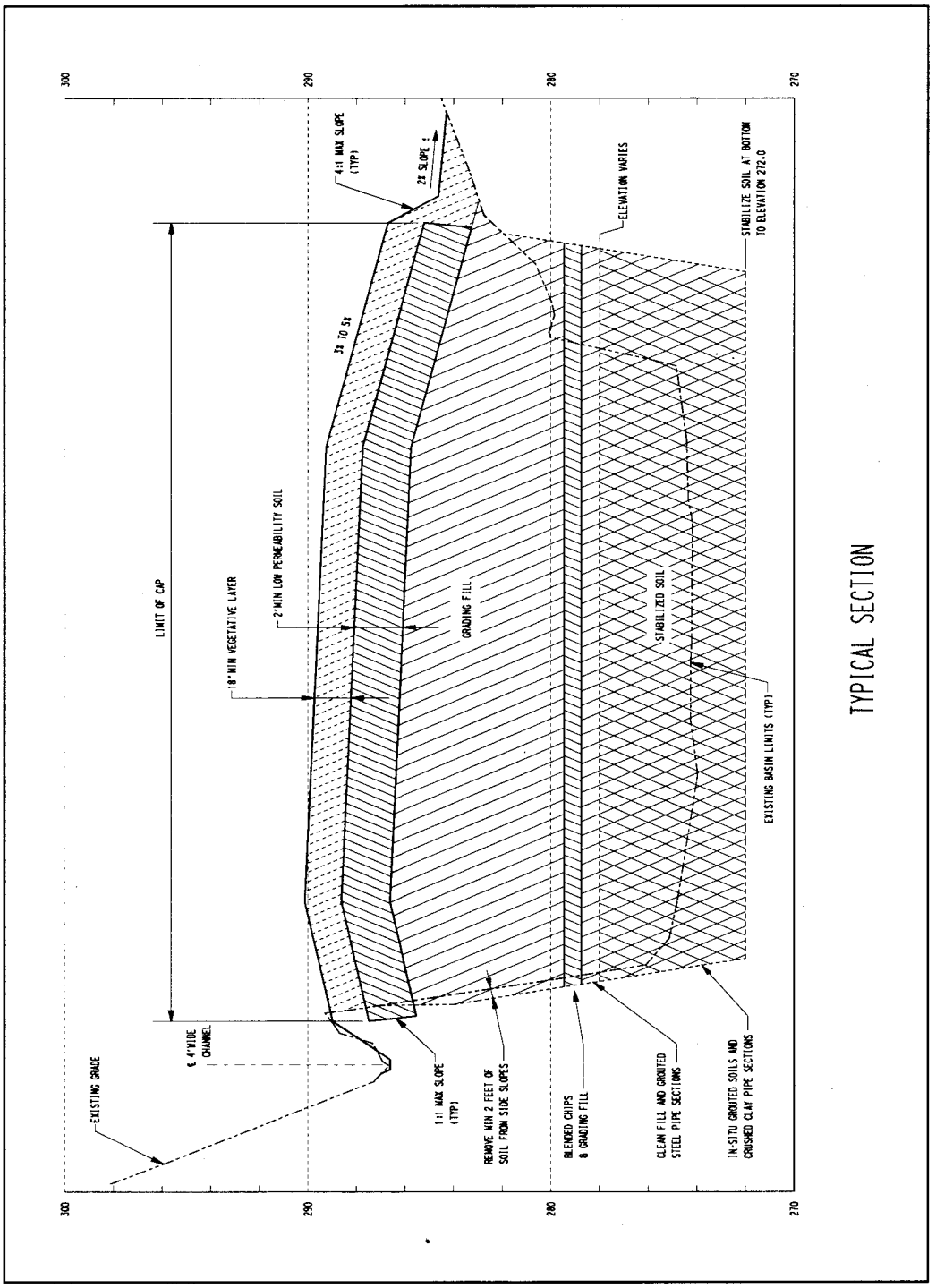


Figure 2. Cross-Section of the Soil Cover System over the OFASB

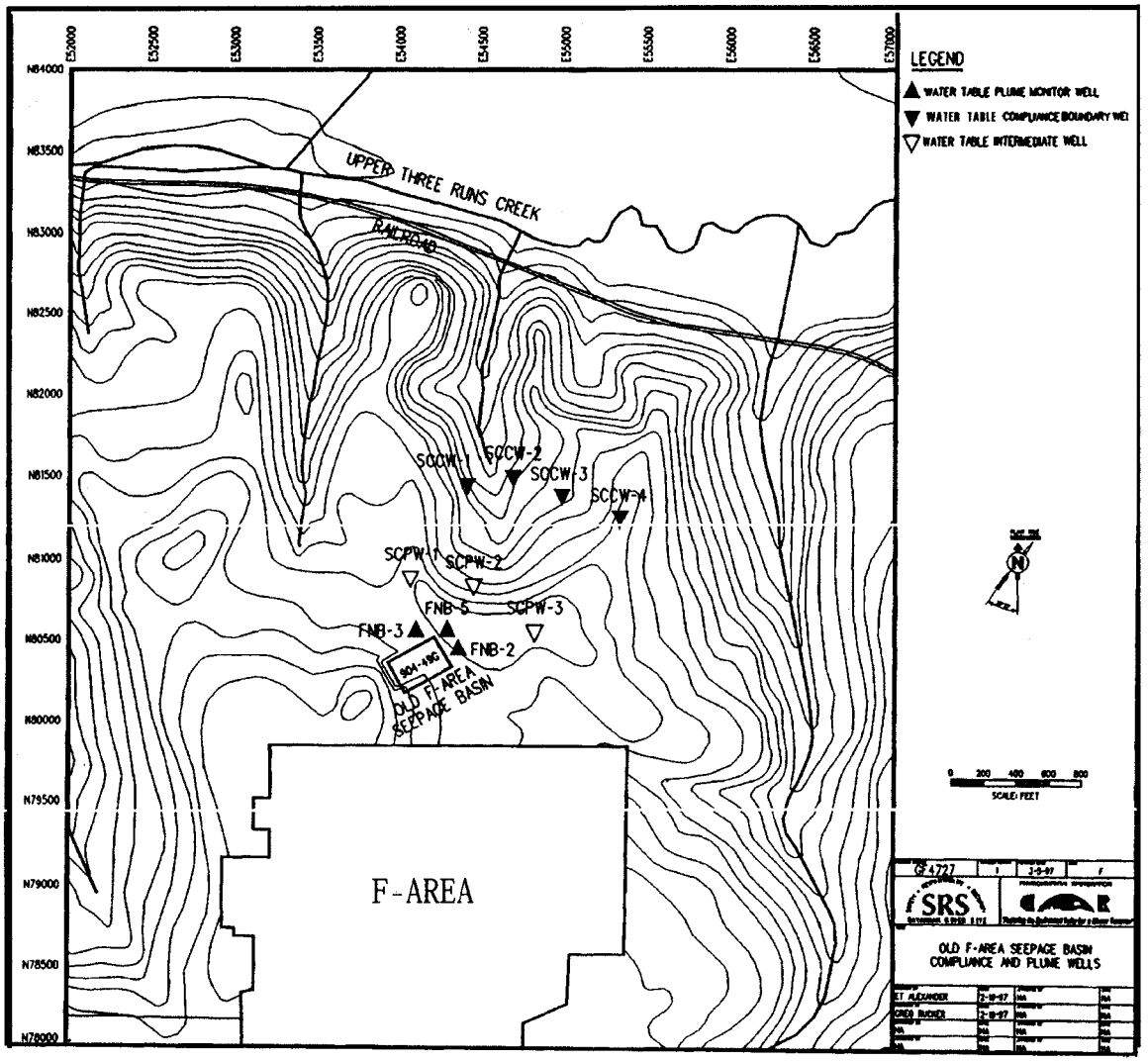


Figure 3. Location of OFASB Groundwater Mixing Zone Plume Wells, Intermediate Wells, and Compliance Boundary Wells

In September 1998, an ESD to the ROD was approved to change the disposal of vegetation from off-unit disposal to on-unit disposal. Following completion of grouting and backfilling with clean soil, chipped vegetation would be disposed on-unit by (1) placing vegetation on top of the first clean, compacted, soil fill layer placed over the grouted mass; (2) blending and compacting vegetation into the second clean soil layer, with subsequent surface grading; and (3) placement of a low-permeability soil cover (minimum 10^{-5} cm/sec hydraulic conductivity) over the graded layer.

The remedial action was started on September 10, 1998, and completed on June 9, 2000. Subsequent to remedial action completion, it was agreed upon at the July 19, 2000 Federal Facility Agreement (FFA) Process Improvement Team (FPIT) meeting that the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) radioactive low-level secondary wastes generated during remediation activities would be dispose of in an excavation adjacent to the OFASB grouted mass. It was further agreed that the appropriate place to document this decision was in the OFASB Post-Construction Report (PCR). The waste disposition was completed November 17, 2000.

The grout and engineered cap have been successful at preventing external exposure to radiological contaminants.

In accordance with the groundwater mixing zone (GWMZ) application, three plume wells, four compliance wells, and three intermediate wells are to be sampled semi-annually (subject to review) and results reported United States Environmental Protection Agency (USEPA) and South Carolina Department of Health and Environmental Control (SCDHEC) annually. The first round of groundwater samples was collected in September 2000 and validated results were received on January 8, 2001. Up to four constituents exceeded MCLs in three of the four compliance boundary wells. All three intermediate wells were below

MCLs, and the three plume wells were under the mixing zone concentration limits. As required by the GWMZ, all wells were resampled within 30 days of receipt of the data. The validated data from the resampling was received on July 27, 2001. The data confirm exceedances in three compliance boundary wells. A plan for corrective action is required within 90 days of receipt of the confirmed sampling results, and therefore will be submitted to the regulators by October 25, 2001.

V. Progress Since Last Review

Sampling of the mixing zone compliance wells has continued.

VI. Five-Year Review Process

The following tasks were performed as part of the review:

- Reviewed the documents listed in Attachment 1
- Confirmed implementation of the remedial action
- Inspected unit to confirm protectiveness of remedial action
- Reviewed changes in standards and to-be-considered (TBC) guidance

VII. Technical Assessment

- The soil cover and grouting selected in the ROD is functioning as intended to prevent external exposure.
- The exposure assumptions, toxicity data, cleanup levels, and remedial action objectives used at the time of remedy selection are still valid.

- Due to confirmed exceedances in the GWMZ compliance wells, a plan for corrective action is required and was submitted to the regulators on October 25, 2001.

VIII. Issues

The effectiveness of the groundwater remedial action is an issue due to confirmed exceedances in the GWMZ compliance wells. A plan for corrective action is required and was submitted to USEPA and SCDHEC on October 25, 2001.

IX. Recommendations and Follow-up Actions

The effectiveness of the groundwater remedial action is an issue due to confirmed exceedances in the GWMZ compliance wells. A plan for corrective action is required and was submitted to USEPA and SCDHEC on October 25, 2001. This plan will propose groundwater monitoring upgradient of the OFASB to address the uncertainty of an upgradient source.

X. Protectiveness Statement(s)

The grouting and soil cover remedy at OFASB is protective of human health and the environment for soil contamination and prevents external exposure to radiological contaminants. Due to MCL exceedances in GWMZ compliance wells, a corrective action was performed to develop a sample plan and obtain additional field characterization data to better quantify the upgradient releases from the F-Area Separation Facility. Results from that characterization indicated the groundwater was being impacted from upgradient sources rather than from the Old F-Area Seepage Basin. This led to the Core Team decision that a Mixing Zone Application would not be appropriate for this OU. The Core Team further decided that the groundwater portion of the Old F-Area Seepage Basin would be remediated under an F-Area Groundwater Operable Unit. Therefore, groundwater is no longer part of this OU. Land use controls (site use/site clearance and

security measures) are in place and ensure the protectiveness of the remedy despite the MCL exceedances.

XI. Next Review

The next five-year review is scheduled for June 30, 2007.

Attachment 1

Documents Reviewed

WSRC, 1997a. *Record of Decision Remedial Alternative Selection for the Old F-Area Seepage Basin (904-49G)* (U), WRSC-RP-96-872, Revision 1.1, March, Westinghouse Savannah River Company, Aiken, SC

WSRC, 1997b. *Groundwater Mixing Zone Application for the Old F-Area Seepage Basin*, WRSC-RP-97-39, Revision 1, March, Westinghouse Savannah River Company, Aiken, SC

WSRC, 1998. *Explanation of Significant Differences to the Revision 1.1 Record of Decision for the Old F-Area Seepage Basin* (U), WRSC-RP-98-4123, Revision 1, 1998, Westinghouse Savannah River Company, Aiken, SC

WSRC, 1999. *Federal Facility Agreement Annual Progress Report for Fiscal Year 1999 (U)*, WSRC-RP-99-4300, November, Westinghouse Savannah River Company, Aiken, SC

WSRC, 2000. *Federal Facility Agreement Annual Progress Report for Fiscal Year 2000 (U)*, WSRC-RP-2000-4300, November, Westinghouse Savannah River Company, Aiken, SC

WSRC, 2001. *Post-Construction Report for the Old F-Area Seepage Basin (904-49G)* (U), WSRC-RP-2000-4100, Revision 1, August, Westinghouse Savannah River Company, Aiken, SC

February 1, 2001 letter, Brian Hennessey (USDOE) to Mr. C. M. Gorman (SCDHEC) and Mr. K. B. Feely (USEPA), Subject: Groundwater Mixing Zone Initial Sampling Results for the Old F-Area Seepage Basin (904-49G).

August 24, 2001 letter, Thomas Johnson, Jr. (USDOE) to Mr. C. M. Gorman (SCDHEC) and Mr. K. B. Feely (USEPA), Subject: Groundwater Mixing Zone Confirmation Sampling Results for the Old F-Area Seepage Basin (904-49G).

Attachment 2

Five-Year Review Site Inspection Checklist

Five-Year Review Site Inspection Checklist

I. SITE INFORMATION	
Site Name: Old F-Area Seepage Basin	**Date of Inspection: 10/17/01**
Location and Region: SRS, USEPA Region IV	**EPA ID:**
Agency, office, or company leading the five-year review: USDOE	**Weather/temperature:**

Remedy Includes: (Check all that apply)

- ☐ Landfill cover/containment
- ☐ Access controls
- ☒ Institutional Controls
- ☐ Groundwater pump and treatment
- ☐ Surface water collection and treatment
- ☒ Monitored Natural Attenuation (groundwater)
- ☐ Groundwater Containment
- ☐ Vertical Barrier Walls
- ☒ Other (1) In-situ grouting of basin bottom soils and ditchline soils placed in basin; (2) backfill of the basin with clean soil with compaction to grade; (3) low-permeability soil cover system; (4) monitoring of groundwater through Mixing Zone demonstration; and (5) institutional controls.

Attachments: ☐ Inspection team roster attached ☐ Site map attached

II. INTERVIEWS (Check all that apply)

1. **O & M site manager** M. O. Redd (Name) | Mgr. Post-Closure Maintenance (Title) | 10/5/01 (Date)

   Interviewed ☐ at site ☒ at office ☐ by phone Phone No. (803) 952-6882

   Problems, suggestions; ☐ report attached _____

2. **O & M staff** J. D. Hope (Name) | Post-Closure Maintenance (Title) | 10/16/01 (Date)

   Interviewed ☒ at site ☐ at office ☐ by phone Phone No. (803) 952-6706

   Problems, suggestions; ☐ report attached _____

3. **Local regulatory authorities and response agencies** (i.e., State and tribal offices, emergency response office, police department, office of public health or environmental health, zoning office, recorder of deeds, or other city and county offices, etc.) Fill in all that apply.

Agency _____

Contact _____ _____ _____ _____
Name Title Date Phone No.

Problems; suggestions; ☐ Report attached _____

_____

Agency _____

Contact _____ _____ _____ _____
Name Title Date Phone No.

Problems; suggestions; ☐ Report attached _____

_____

Agency _____

Contact _____ _____ _____ _____
Name Title Date Phone No.

Problems; suggestions; ☐ Report attached _____

_____

4. **Other interviews** (optional) ☐ Report attached _____

III. ONSITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)

1. **O & M Documents**

☐ O & M Manual	☐ Readily available	☐ Up to date	☒ N/A
☒ As-built drawings	☒ Readily available	☒ Up to date	☐ N/A
☒ Maintenance Logs	☒ Readily available	☒ Up to date	☐ N/A

Remarks_____

_____

2. **Site-Specific Health and Safety Plan** ☐ Readily available ☐ Up to date ☒ N/A

☐ Contingency plan/emergency response plan ☐ Readily available ☐ Up to date ☒ N/A

Remarks_____

_____

3. **O & M and OSHA Training Records** ☒ Readily available ☒ Up to date ☐ N/A

Remarks_____

_____

4. **Permits and Service Agreements**

☐ Air discharge permit	☐ Readily available	☐ Up to date	☒ N/A
☐ Effluent discharge	☐ Readily available	☐ Up to date	☒ N/A
☐ Waste Disposal, POTW	☐ Readily available	☐ Up to date	☒ N/A
☐ Other permits	☐ Readily available	☐ Up to date	☒ N/A

Remarks_____

_____

5. **Gas Generation Records** ☐ Readily available ☐ Up to date ☒ N/A

Remarks_____

_____

6. **Settlement Monument Records** ☐ Readily available ☐ Up to date ☒ N/A

Remarks_____

_____

7. **Groundwater Monitoring Records** ☐ Readily available ☐ Up to date ☒ N/A

Remarks_____

_____

8. **Leachate Extraction Records** ☐ Readily available ☐ Up to date ☒ N/A

Remarks_____

_____

9. **Discharge Compliance Records**

☐ Air ☐ Readily available ☐ Up to date ☒ N/A

☐ Water (effluent) ☐ Readily available ☐ Up to date ☒ N/A

Remarks_____

_____

10. **Daily Access/Security Logs** ☐ Readily available ☐ Up to date ☒ N/A

Remarks_____

_____

IV. O & M Costs

1. **O & M Organization**

☐ State in-house ☐ Contractor for State

☐ PRP in-house ☐ Contractor for PRP

☐ Other SRS

2. **O & M Cost Records**

☐ Readily available ☐ Up to date

☐ Funding mechanism/agreement in place

☐ Other_____

Total annual cost by year for review period if available

From_____ To_____ _____ ☐ Breakdown attached
Date Date Total cost

From_____ To_____ _____ ☐ Breakdown attached
Date Date Total cost

From_____ To_____ _____ ☐ Breakdown attached
Date Date Total cost

From_____ To_____ _____ ☐ Breakdown attached
Date Date Total cost

From_____ To_____ _____ ☐ Breakdown attached
Date Date Total cost

1. **Unanticipated or Unusually High O & M Costs During Review Period**

Describe costs and reasons: _____

V. ACCESS AND INSTITUTIONAL CONTROLS ☒ Applicable ☐ N/A

A. Fencing

1. **Fencing Damaged** ☐ Location shown on site map ☐ Gates secured ☒ N/A

Remarks

B. Other Access Restrictions

1. **Signs and other security measures** ☒ Location shown on site map ☐ N/A

Remarks Signs installed in accordance with Post ROD documents.

C. Institutional Controls

1. **Implementation and enforcement**

Site conditions imply ICs not properly implemented ☐ Yes ☒ No ☐ N/A

Site conditions imply ICs not being fully enforced ☐ Yes ☒ No ☐ N/A

Type of monitoring (e.g., self-reporting, drive-by) Visual Inspection, Groundwater Monitoring

Frequency As specified in the Post Construction Report (PCR), visual inspection monthly for first 2 years and semi-annually after 2 years. As specified in the Groundwater Mixing Zone Application, groundwater monitoring will be performed semi-annually at three plume wells, four compliance wells, and three intermediate wells with results reported EPA and SCDHEC annually.

Responsible party/agent USDOE – Savannah River Field Office

Contact	D. Hannah	USDOE – Waste Area Group Manager	(803) 725-0420
	Name	Title	Phone No.

Report is up-to-date ☒ Yes ☐ No ☐ N/A

Reports are verified by the lead agency ☒ Yes ☐ No ☐ N/A

Specific requirements in deed of decision documents have been met ☐ Yes ☐ No ☒ N/A

Violations have been reported ☐ Yes ☐ No ☒ N/A

Other problems or suggestions: ☐ Report attached

Inspection data sheet attached

2. **Adequacy** ☒ ICs are adequate ☐ ICs are inadequate ☐ N/A

Remarks

D. General

1. **Vandalism/trespassing** ☐ Location shown on site map ☒ No vandalism evident

Remarks_____

2. **Land use changes onsite** ☒ N/A

Remarks_____

3. **Land use changes offsite** ☒ N/A

Remarks_____

VI. GENERAL SITE CONDITIONS

A. Roads ☐ Applicable ☒ N/A

1. **Roads damaged** ☐ Location shown on site map ☐ Roads adequate ☒ N/A

Remarks_____

B. Other site Conditions

Remarks N/A

VII. LANDFILL COVERS ☒ Applicable ☐ N/A

(Applicable for low permeability soil cover system covering grouted soil in basin)

A. Landfill Surface ☒ Applicable ☐ N/A

1. **Settlement** (Low spots) ☐ Location shown on site map ☒ Settlement not evident

Areal extent_____ Depth_____

Remarks_____

2. **Cracks** ☐ Location shown on site map ☒ Cracking not evident

Lengths_____ Widths_____ Depths_____

Remarks_____

3. **Erosion** ☐ Location shown on site map ☒ Erosion not evident

Areal extent_____ Depth_____

Remarks_____

_____

4. **Holes** ☐ Location shown on site map ☒ Holes not evident

Areal extent_____ Depth_____

Remarks_____

_____

5. **Vegetative Cover** ☒ Grass ☒ Cover properly established ☒ No signs of stress

☐ Trees/shrubs (indicate size and location on a diagram)

Remarks The soil cover system is intact, however, long term grasses need to be fully established.

_____

6. **Alternative Cover (armored rock, concrete, etc.)** ☒ N/A

Remarks_____

_____

7. **Bulges** ☐ Location shown on site map ☒ Bulges not evident

Areal extent_____ Height_____

Remarks_____

_____

8. **Wet Areas/Water Damage** ☒ Wet areas/water damage not evident

☐ Wet Areas ☐ Location shown on site map Areal extent_____

☐ Ponding ☐ Location shown on site map Areal extent_____

☐ Seeps ☐ Location shown on site map Areal extent_____

☐ Soft subgrade ☐ Location shown on site map Areal extent_____

Remarks_____

_____

9. **Slope Instability** ☐ Slides ☐ Location shown on site map ☒ No evidence of slope instability

Areal extent_____

Remarks_____

_____

B. Benches ☐ Applicable ☒ N/A

(Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)

1. **Flows Bypass Bench** ☐ Location shown on site map ☒ N/A or okay

Remarks_____

2. **Bench Breached** ☐ Location shown on site map ☒ N/A or okay

Remarks_____

3. **Bench Overtopped** ☐ Location shown on site map ☒ N/A or okay

Remarks_____

C. Letdown Channels ☐ Applicable ☒ N/A

(Channel lined with erosion control mates, riprap, grout bags, or gabions that descend down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)

1. **Settlement** ☐ Location shown on site map ☐ No evidence of settlement

Areal extent_____ Depth_____

Remarks_____

2. **Material Degradation** ☐ Location shown on site map ☐ No evidence of degradation

Material type_____ Areal extent _____

Remarks_____

3. **Erosion** ☐ Location shown on site map ☐ No evidence of erosion

Areal extent _____ Depth_____

Remarks_____

4. **Undercutting** ☐ Location shown on site map ☐ No evidence of undercutting

Areal extent _____ Depth_____

Remarks_____

_____

5. **Obstructions** Type_____ ☐ No obstructions

☐ Location shown on site map Areal extent _____

Size _____

Remarks_____

_____

6. **Excessive Vegetative Growth** Type_____

☐ No evidence of excessive growth

☐ Vegetation in channels does not obstruct flow

☐ Location shown on site map Areal extent _____

Remarks_____

_____

D. Cover Penetrations ☐ Applicable ☒ N/A

1. **Gas Vents** ☐ Active ☐ Passive

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A

Remarks_____

_____

2. **Gas Monitoring Probes**

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A

Remarks_____

_____

3. **Monitoring Wells** (within surface area of landfill)

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A

Remarks_____

_____

4. **Leachate Extraction Wells**

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A

Remarks_____

_____

5. **Settlement Monuments** ☐ Located ☐ Routinely surveyed ☐ N/A

Remarks_____

_____

E. Gas Collection and Treatment ☐ Applicable ☒ N/A

1. **Gas Treatment Facilities**

☐ Flaring ☐ Thermal destruction ☐ Collection for reuse

☐ Good condition ☐ Needs Maintenance

Remarks_____

_____

2. **Gas Collection Wells, Manifolds and Piping**

☐ Good condition ☐ Needs Maintenance

Remarks_____

_____

3. **Gas Monitoring Facilities** (e.g., gas monitoring of adjacent homes or buildings)

☐ Good condition ☐ Needs Maintenance ☐ N/A

Remarks_____

_____

F. Cover Drainage Layer ☐ Applicable ☒ N/A

1. **Outlet Pipes Inspected** ☐ Functioning ☐ N/A Remarks_____	
2. **Outlet Rock Inspected** ☐ Functioning ☐ N/A Remarks_____	

G. Detention/sedimentation Ponds ☐ Applicable ☒ N/A

1. **Siltation** Areal extent_____ Depth_____ ☐ N/A

   ☐ Siltation not evident

   Remarks_____

2. **Erosion** Areal extent_____ Depth_____ ☐ N/A

   ☐ Erosion not evident

   Remarks_____

3. **Outlet Works** ☐ Functioning ☐ N/A

   Remarks_____

4. **Dam** ☐ Functioning ☐ N/A

   Remarks_____

H. Retaining Walls ☐ Applicable ☒ N/A

1. **Deformations** ☐ Location shown on site map ☐ Deformation not evident

   Horizontal displacement_____ Vertical displacement_____

   Rotational displacement_____

   Remarks_____

2. **Degradation** ☐ Location shown on site map ☐ Deformation not evident

   Remarks_____

I. Perimeter Ditches/Off-Site Discharge ☐ Applicable ☒ N/A

1. **Siltation** ☐ Location shown on site map ☐ Siltation not evident

   Areal extent_____ Depth_____

   Remarks_____

2. **Vegetative Growth** ☐ Location shown on site map ☐ Siltation not evident

☐ Vegetation does not impede flow

Areal extent_____ Type_____

Remarks_____

_____

3. **Erosion** ☐ Location shown on site map ☐ Erosion not evident

Areal extent_____ Depth_____

Remarks_____

_____

4. **Discharge Structure** ☐ Location shown on site map ☐ N/A

Remarks_____

_____

VIII. VERTICAL BARRIER WALLS ☐ Applicable ☒ N/A

1. **Settlement** ☐ Location shown on site map ☐ Settlement not evident

Areal extent_____ Depth_____

Remarks_____

_____

2. **Performance Monitoring** Type of Monitoring_____

☐ Performance not monitored

Frequency_____ ☐ Evidence of breaching

Head differential_____

Remarks_____

_____

IX. GROUNDWATER/SURFACE WATER REMEDIES ☒ Applicable ☐ N/A

A. Groundwater Extraction Wells, Pumps, and Pipelines ☐ Applicable ☒ N/A

1. **Pumps, Wellhead Plumbing, and Electrical**

☐ Good condition ☐ All required wells located ☐ Needs Maintenance ☐ N/A

Remarks_____

2. **Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances**

☐ Good condition ☐ Needs Maintenance

Remarks_____

3. **Spare Parts and Equipment**

☐ Readily available ☐ Good condition ☐ Requires upgrade ☐ Needs to be provided

Remarks_____

B. Surface Water Collection Structures, Pumps, and Pipelines ☐ Applicable ☒ N/A

1. **Collection Structures, Pumps, and Electrical**

☐ Good condition ☐ Needs Maintenance

Remarks_____

2. **Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances**

☐ Good condition ☐ Needs Maintenance

Remarks_____

3. **Spare Parts and Equipment**

☐ Readily available ☐ Good condition ☐ Requires upgrade ☐ Needs to be provided

Remarks_____

C. Treatment System ☐ Applicable ☒ N/A

1. **Treatment Train** (Check components that apply)

☐ Metals removal ☐ Oil/water separation ☐ Bioremediation

☐ Air stripping ☐ Carbon adsorbers

☐ Filters_____

☐ Additive (e.g., chelation agent, flocculent)_____

☐ Others_____

☐ Good condition ☐ Needs Maintenance

☐ Sampling ports properly marked and functional

☐ Sampling/maintenance log displayed and up to date

☐ Equipment properly identified

☐ Quantity of groundwater treated annually_____

☐ Quantity of surface water treated annually_____

Remarks_____

_____

2. **Electrical Enclosures and Panels** (properly rated and functional)

☐ N/A ☐ Good condition ☐ Needs Maintenance

Remarks_____

_____

3. **Tanks, Vaults, Storage Vessels**

☐ N/A ☐ Good condition ☐ Proper secondary containment ☐ Needs Maintenance

Remarks_____

_____

4. **Discharge Structure and Appurtenances**

☐ N/A ☐ Good condition ☐ Needs Maintenance

Remarks_____

_____

5. **Treatment Building(s)**

☐ N/A ☐ Good condition (esp. roof and doorways) ☐ Needs repair

☐ Chemicals and equipment properly stored

Remarks_____

_____

6. **Monitoring Wells** (pump and treatment remedy)

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ All required wells located ☐ Needs Maintenance ☐ N/A

Remarks_____

_____

D. Monitoring Data ☒ Applicable ☐ N/A

1. Monitoring Data

☒ Is routinely submitted on time ☒ Is of acceptable quality

2 Monitoring data suggests:

☐ Groundwater plume is effectively contained ☒ Contaminant concentrations are declining (plume concentrations are not increasing with time)

E. Monitored Natural Attenuation ☒ Applicable (Groundwater Mixing Zone) ☐ N/A

1. **Monitoring Wells** (Natural attenuation remedy)

☒ Properly secured/locked ☒ Functioning ☒ Routinely sampled ☒ Good condition

☒ All required wells located ☐ Needs Maintenance ☐ N/A

Remarks Remedy for groundwater is monitoring with Mixing Zone demonstration.

_____

X. OTHER REMEDIES

If there are remedies applied at the site which are not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.

XI. OVERALL OBSERVATIONS

A. Implementation of the Remedy

Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emissions, etc.).

Remedy for this site is: (1) In-situ grouting of basin bottom soils and ditchline soils placed in basin; (2) backfill of the basin with clean soil with compaction to grade; (3) low-permeability soil cover system; (4) monitoring of groundwater through Mixing Zone demonstration; and (5) institutional controls. The cover system is intact, however, long term grasses need to be fully established. The in-situ grouting and soil cover system remedy appears to be functioning as designed. Groundwater monitoring has indicated wells around the basin are within expected limits, wells at boundary have some exceedances. The first round of groundwater samples was collected in September 2000 and validated results were received on January 8, 2001. Up to four constituents exceeded MCLs in three of the four compliance boundary wells. All three intermediate wells were below MCLs and the three plume wells were under the mixing zone concentration limits. As required by the GWMZ, all wells were resampled within 30 days of receipt of the data. The validated data from the resampling was received on July 27, 2001. The data confirm exceedances in three compliance boundary wells. A plan for corrective action is required within 90 days of receipt of the confirmed sampling results, and therefore will be submitted to the regulators by October 25, 2001

B. Adequacy of O & M

Describe issues and observations related to the implementation and scope of O & M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy.

No issues at this time.

C. Early Indicators of Potential Remedy Failure

Describe issues and observations such as unexpected changes in the cost or scope of O & M or a high frequency of unscheduled repairs that suggest that the protectiveness of the remedy may be compromised in the future.

No issues at this time for the in-situ grouted mass, soil cover system, or institutional controls. The groundwater in the area will require additional review.

D. Opportunities for Optimization

Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy.

No issues at this time.

Old Radioactive Waste Burial Ground (634-E) Operable Unit (INTERIM ACTION)

I. Introduction

The final Record of Decision (ROD) for the Old Radioactive Waste Burial Ground (634-E) (ORWBG) Operable Unit (OU) has not been issued. The following is for information purposes only. A review of the Interim Action Record of Decision (IAROD) for the ORWBG OU has not been conducted.

II. OU Chronology

Table 1 lists the chronology of site events for the ORWBG.

Table 1. Chronology of OU Events

Event	Date
Interim ROD issuance	May 9, 1996
Interim Remedial Action start/complete	July 31, 1996/ February 1, 1998

Key:

Consent Decree – Date a consent decree (enforcement document from the court system) was issued for the operable unit.

Corrective Action start – Date the corrective (remedial) action was initiated (under RCRA).

ESD Issuance - Date all three parties (USDOE, USEPA, and SCDHEC) signed the Explanation of Significant Difference used to significantly modify the remedy selected in the Record of Decision.

Final or Interim ROD issuance – Date the three parties (USDOE, USEPA, and SCDHEC) signed the Record of Decision.

Federal Facility Agreement Declared Effective - Date the Federal Facility Agreement formalized the integration of CERCLA and RCRA in remediation activities at SRS.

NPL listing – Date the entire SRS was added to EPA's National Priorities List.

Previous Five-Year Reviews – Date of any previous five year reviews of remedy for the operable unit.

RCRA Closure Certified – Date the three parties (USDOE, USEPA, and SCDHEC) certified that the operable unit had been remediated and closed under the Resource Conservation and Recovery Act.

RCRA Closure Plan Approved – Date the three parties (USDOE, USEPA, and SCDHEC) approved the closure plan for the operable unit under Resource Conservation and Recovery Act.

Remedial Action start/complete – Date the remedial action (final or interim) was initiated/completed (under CERCLA).

Removal Action – Date contaminated media was removed from the operable unit (not associated with the ROD).

RFI/RI start/complete - Date the remedial investigation (sampling) was initiated/completed for the operable unit.

ROD Amendment Issuance - Date the three parties (USDOE, USEPA, and SCDHEC) signed the Record of Decision Amendment used to change the remedy selected in the original Record of Decision.

III. Background

The ORWBG OU is located in the central portion of the Savannah River Site (SRS), approximately six miles from the nearest SRS boundary, and occupies approximately 76 acres (Figure 1).

The ORWBG consists of four distinct subunits:

- The ORWBG - a former disposal area for solid radioactive waste produced at the SRS and other United States Department of Energy (USDOE) sites. Most waste was placed in the ORWBG from 1952 until 1972. Radioactive, hazardous and mixed waste remain buried at depth in the ORWBG.

- Twenty-two Old Solvent Tanks (OST) - emptied in 1977 (by transferring the liquid solvent from the ORWBG to another facility), the OSTs were originally used to store spent plutonium-uranium extraction solvent from 1953 to 1977. Very little residual liquid and sludge remains in the OSTs.

- Mercury Hot Spot – a distinct area containing approximately 20% of the total mercury in the ORWBG. Each burial consists of two or three 1-liter polyethylene bottles filled with elemental mercury, double-bagged, and containerized in 5-gallon cans.

- Radioactive Hot Spots – multiple and distinct areas containing relatively high concentrations of radionuclides (>60 curies per 20 feet (ft) x 20 ft grid cell). Generally these consist of tritium, transuranic isotopes, carbon-14, and fission products such as cesium-137 and strontium-90.

This interim action addresses three of the four subunits. The OST area is not included in this interim action; the soil cover will not be placed over the OSTs until they are stabilized to prevent collapse.

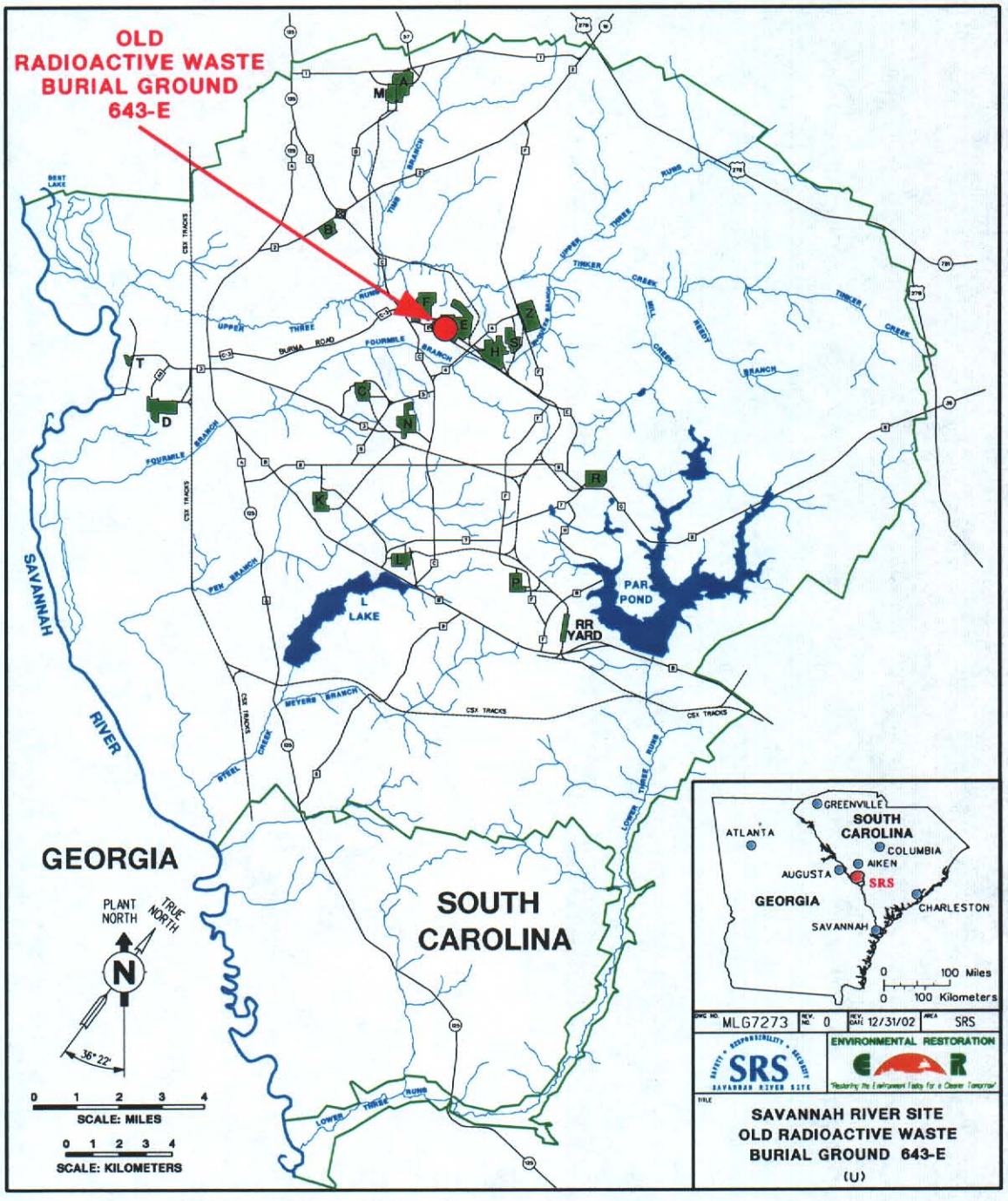


Figure 1. Location of the Old Radioactive Waste Burial Ground (634-E) OU

Groundwater is not included as a subunit of this OU. Groundwater has been contaminated by releases from the Burial Ground Complex. Groundwater is being evaluated separately under the Resource Conservation and Recovery Act (RCRA) Part B permit for the Mixed Waste Management Facility (MWMF). Under that permit, institutional controls are required for as long as groundwater remediation is required (anticipated to be 170 years).

The ORWBG is located within a Heavy Industrial (Nuclear) zone in the Federal Facility Agreement Implementation Plan (FIP). Current and anticipated future land use is industrial.

The United States Environmental Protection Agency (USEPA), South Carolina Department of Health and Environmental Control (SCDHEC), and USDOE agreed that existing information about the ORWBG was sufficient to proceed without the need for a conventional quantitative Baseline Risk Assessment. The decision was based primarily on the following: (1) the nature and extent of waste was known from extensive review of historical information; (2) the unit clearly requires a response action; and (3) intrusive sampling activities would have posed a threat to the health and safety of the workers involved.

The risks, in general, are the contaminants in the buried waste. These contaminants have been released to the soil and groundwater due to infiltration and percolation. Future releases of contaminants to the soil and groundwater can be reduced by infiltration and percolation from stormwater/rain events, thereby minimizing future risks.

The estimated stormwater infiltration for the ORWBG prior to the interim action was 45% for a given rainfall event over a twenty-year period. After installation of the soil cover, it is estimated that the stormwater infiltration would decrease to 13% for a given rainfall event over a twenty-year period. Therefore, the interim action soil cover yields a 70% reduction in the amount of water infiltration

through the waste layer and reduces the potential for introducing contaminants into the groundwater.

The reduction in stormwater infiltration is consistent with the goals of the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) because it provides risk reduction early in the investigation/assessment process without precluding any final action. The soil cover reduces the source hazards by reducing contaminant migration and minimizing future groundwater remediation efforts.

IV. Remedial Actions

The remedial action objective is to reduce stormwater infiltration through the waste layer.

The remedial action is placement of a low-permeability soil cover on top of the existing grade. Each soil cover section has a minimum thickness of 2 feet of compact, low-hydraulic conductivity soil (nominal in-place saturated hydraulic conductivity of 1×10^{-5} cm/sec or less). The soil covers have an upper surface with a slope to promote surface runoff and minimize surface erosion. A vegetative layer was added and the area seeded and compacted to prevent erosion.

V. Progress In the Last Five Years

No recommendations or follow-up actions have been identified.

VI. Technical Assessment

- The soil cover selected in the IAROD is functioning as intended.

- The exposure assumptions, toxicity data, cleanup levels, and remedial action objectives used at the time of remedy selection are still valid.

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

VII. Issues

There are no issues for this OU.

VIII. Recommendations and Follow-up Actions

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

IX. Protectiveness Statement(s)

The interim soil cover remedy at ORWBG is an interim measure that will become part of a total remedial action. Although the interim soil cover continues to provide radiation shielding (at the surface) from buried waste and mitigates contaminant migration to the groundwater, the interim measure is not fully protective of human health since land use controls have not been formally imposed via a final ROD. In the interim, exposure pathways that could lead to unacceptable risk are being controlled through institutional controls, environmental monitoring, and site inspection and maintenance. Institutional controls include: (1) physical access controls to prevent unauthorized entry to SRS (fences, guards, security patrols, etc.) and the ORWBG (perimeter fence); (2) administrative controls that maintain this site for industrial use only (SRS is a secured government facility with land use restrictions); and (3) warning signs and land use controls (SRS Site Use/Site Clearance Program). Upon issuance of the final ROD, this interim measure will become part of a total remedial action, which is expected to be protective of human health and the environment.

Attachment 1

List of Documents Reviewed

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

WSRC, 1999. *Interim Measures/Interim Action Post-Construction Report for the Old Radioactive Waste Burial Ground (643-E) (U)*, WSRC-RP-98-721, Revision 0, April, Westinghouse Savannah River Company, Aiken, SC

Five-Year Review Site Inspection Checklist

I. SITE INFORMATION

Site Name: Old Radioactive Waste Burial Ground (643-E)	**Date of Inspection: 10/10/01**
Location and Region: SRS, USEPA Region IV	**EPA ID:**
Agency, office, or company leading the five-year review: USDOE	**Weather/temperature:**

Remedy Includes: (Check all that apply)

- ☐ Landfill cover/containment
- ☐ Access controls
- ☒ Institutional Controls
- ☐ Groundwater pump and treatment
- ☐ Surface water collection and treatment
- ☐ Monitored Natural Attenuation
- ☐ Groundwater Containment
- ☐ Vertical Barrier Walls
- ☒ Other Interim cover system on portions of the Old Radioactive Waste Burial Ground

Attachments: ☐ Inspection team roster attached ☐ Site map attached

II. INTERVIEWS (Check all that apply)

1. **O & M site manager** Michael Redd — Mgr. Post-Closure Maint. — 10/10/01
   Name — Title — Date

   Interviewed ☐ at site ☒ at office ☐ by phone Phone No. (803) 952-6882

   Problems, suggestions; ☐ report attached _____

2. **O & M staff** J. D. Hope — Post-Closure Maintenance — 10/16/01
   Name — Title — Date

   Interviewed ☒ at site ☐ at office ☐ by phone Phone No. (803) 952-6706

   Problems, suggestions; ☐ report attached _____

3. **Local regulatory authorities and response agencies** (i.e., State and tribal offices, emergency response office, police department, office of public health or environmental health, zoning office, recorder of deeds, or other city and county offices, etc.) Fill in all that apply.

Agency _____

Contact _____ _____ _____ _____
Name Title Date Phone No.

Problems; suggestions; ☐ Report attached _____

_____

Agency _____

Contact _____ _____ _____ _____
Name Title Date Phone No.

Problems; suggestions; ☐ Report attached _____

_____

Agency _____

Contact _____ _____ _____ _____
Name Title Date Phone No.

Problems; suggestions; ☐ Report attached _____

_____

4. **Other interviews** (optional) ☐ Report attached _____

III. ONSITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)

1. **O & M Documents**

☐ O & M Manual	☐ Readily available	☐ Up to date	☒ N/A
☐ As-built drawings	☐ Readily available	☐ Up to date	☒ N/A
☒ Maintenance Logs	☒ Readily available	☒ Up to date	☐ N/A

Remarks_____

_____

2. **Site-Specific Health and Safety Plan** ☐ Readily available ☐ Up to date ☒ N/A

☐ Contingency plan/emergency response plan ☐ Readily available ☐ Up to date ☒ N/A

Remarks_____

_____

3. **O & M and OSHA Training Records** ☒ Readily available ☒ Up to date ☐ N/A

Remarks_____

_____

4. **Permits and Service Agreements**

☐ Air discharge permit	☐ Readily available	☐ Up to date	☒ N/A
☐ Effluent discharge	☐ Readily available	☐ Up to date	☒ N/A
☐ Waste Disposal, POTW	☐ Readily available	☐ Up to date	☒ N/A
☐ Other permits	☐ Readily available	☐ Up to date	☒ N/A

Remarks_____

_____

5. **Gas Generation Records** ☐ Readily available ☐ Up to date ☒ N/A

Remarks_____

_____

6. **Settlement Monument Records** ☐ Readily available ☐ Up to date ☒ N/A

Remarks_____

_____

7. **Groundwater Monitoring Records** ☐ Readily available ☐ Up to date ☒ N/A

Remarks_____

_____

8. **Leachate Extraction Records** ☐ Readily available ☐ Up to date ☒ N/A

Remarks_____

_____

9. **Discharge Compliance Records**

☐ Air ☐ Readily available ☐ Up to date ☒ N/A

☐ Water (effluent) ☐ Readily available ☐ Up to date ☒ N/A

Remarks_____

_____

10. **Daily Access/Security Logs** ☐ Readily available ☐ Up to date ☒ N/A

Remarks_____

_____

IV. O & M Costs

1. **O & M Organization**

☐ State in-house ☐ Contractor for State

☐ PRP in-house ☐ Contractor for PRP

☒ Other SRS

2. **O & M Cost Records**

☐ Readily available ☐ Up to date

☐ Funding mechanism/agreement in place

☐ Other_____

Total annual cost by year for review period if available

From_____ To_____ _____ ☐ Breakdown attached
Date Date Total cost

From_____ To_____ _____ ☐ Breakdown attached
Date Date Total cost

From_____ To_____ _____ ☐ Breakdown attached
Date Date Total cost

From_____ To_____ _____ ☐ Breakdown attached
Date Date Total cost

From_____ To_____ _____ ☐ Breakdown attached
Date Date Total cost

1. **Unanticipated or Unusually High O & M Costs During Review Period**

Describe costs and reasons: _____

V. ACCESS AND INSTITUTIONAL CONTROLS ☒ Applicable ☐ N/A

A. Fencing

1. **Fencing Damaged** ☐ Location shown on site map ☒ Gates secured ☐ N/A

Remarks Access is controlled by Solid Waste Division. No fence damage.

B. Other Access Restrictions

1. **Signs and other security measures** ☐ Location shown on site map ☐ N/A

Remarks Signs posted at entrance and visible from any approach.

C. Institutional Controls

1. **Implementation and enforcement**

Site conditions imply ICs not properly implemented ☐ Yes ☒ No ☐ N/A

Site conditions imply ICs not being fully enforced ☐ Yes ☒ No ☐ N/A

Type of monitoring (e.g., self-reporting, drive-by) Visual Inspection

Frequency monthly

Responsible party/agent USDOE Savannah River Field Office

Contact	R. Rimando	USDOE Waste Area Group Manager	(803) 725-0420
	Name	Title	Phone No.

Report is up-to-date ☒ Yes ☐ No ☐ N/A

Reports are verified by the lead agency ☒ Yes ☐ No ☐ N/A

Specific requirements in deed of decision documents have been met ☒ Yes ☐ No ☐ N/A

Violations have been reported ☐ Yes ☐ No ☒ N/A

Other problems or suggestions: ☐ Report attached

Inspection data sheet attached

2. **Adequacy** ☒ ICs are adequate ☐ ICs are inadequate ☐ N/A

Remarks

D. General

1. **Vandalism/trespassing** ☐ Location shown on site map ☒ No vandalism evident

Remarks_____

_____

2. **Land use changes onsite** ☒ N/A

Remarks_____

_____

3. **Land use changes offsite** ☒ N/A

Remarks_____

_____

VI. GENERAL SITE CONDITIONS

A. Roads ☐ Applicable ☒ N/A

1. **Roads damaged** ☐ Location shown on site map ☐ Roads adequate ☐ N/A

Remarks_____

_____

B. Other site Conditions

Remarks_____

_____

_____

_____

_____

VII. LANDFILL COVERS ☒ Applicable ☐ N/A

A. Landfill Surface

1. **Settlement** (Low spots) ☐ Location shown on site map ☒ Settlement not evident

Areal extent_____ Depth_____

Remarks Minor low spot off cap from tires. Noted on SRS inspection form.

_____

2. **Cracks** ☐ Location shown on site map ☒ Cracking not evident

Lengths_____ Widths_____ Depths_____

Remarks_____

_____

3. **Erosion** ☐ Location shown on site map ☒ Erosion not evident

Areal extent_____ Depth_____

Remarks_____

4. **Holes** ☐ Location shown on site map ☒ Holes not evident

Areal extent_____ Depth_____

Remarks_____

5. **Vegetative Cover** ☒ Grass ☒ Cover properly established ☐ No signs of stress

☐ Trees/shrubs (indicate size and location on a diagram)

Remarks_____

6. **Alternative Cover (armored rock, concrete, etc.)** ☒ N/A

Remarks_____

7. **Bulges** ☐ Location shown on site map ☒ Bulges not evident

Areal extent_____ Height_____

Remarks_____

8. **Wet Areas/Water Damage** ☒ Wet areas/water damage not evident

☐ Wet Areas ☐ Location shown on site map Areal extent_____

☐ Ponding ☐ Location shown on site map Areal extent_____

☐ Seeps ☐ Location shown on site map Areal extent_____

☐ Soft subgrade ☐ Location shown on site map Areal extent_____

Remarks_____

9. **Slope Instability** ☐ Slides ☐ Location shown on site map ☒ No evidence of slope instability

Areal extent_____

Remarks_____

B. Benches ☐ Applicable ☒ N/A

(Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)

1. **Flows Bypass Bench** ☐ Location shown on site map ☐ N/A or okay

Remarks_____

2. **Bench Breached** ☐ Location shown on site map ☐ N/A or okay

Remarks_____

3. **Bench Overtopped** ☐ Location shown on site map ☐ N/A or okay

Remarks_____

C. Letdown Channels ☒ Applicable ☐ N/A

(Channel lined with erosion control mates, riprap, grout bags, or gabions that descend down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)

1. **Settlement** ☐ Location shown on site map ☒ No evidence of settlement

Areal extent_____ Depth_____

Remarks_____

2. **Material Degradation** ☐ Location shown on site map ☒ No evidence of degradation

Material type_____ Areal extent _____

Remarks_____

3. **Erosion** ☒ Location shown on site map ☐ No evidence of erosion

Areal extent _____ Depth_____

Remarks Minor erosion area repaired when found. Closure CAP B Area per ERSOP 007.

4. **Undercutting** ☐ Location shown on site map ☒ No evidence of undercutting

Areal extent _____ Depth_____

Remarks_____

_____

5. **Obstructions** Type_____ ☒ No obstructions

☐ Location shown on site map Areal extent _____

Size _____

Remarks_____

_____

6. **Excessive Vegetative Growth** Type_____

☐ No evidence of excessive growth

☒ Vegetation in channels does not obstruct flow

☐ Location shown on site map Areal extent _____

Remarks_____

_____

D. Cover Penetrations ☐ Applicable ☒ N/A

1. **Gas Vents** ☐ Active ☐ Passive

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A

Remarks_____

_____

2. **Gas Monitoring Probes**

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A

Remarks_____

_____

3. **Monitoring Wells** (within surface area of landfill)

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A

Remarks_____

_____

4. **Leachate Extraction Wells**

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A

Remarks_____

_____

5. **Settlement Monuments** ☐ Located ☐ Routinely surveyed ☐ N/A

Remarks_____

_____

E. Gas Collection and Treatment ☐ Applicable ☒ N/A

1. **Gas Treatment Facilities**

☐ Flaring ☐ Thermal destruction ☐ Collection for reuse

☐ Good condition ☐ Needs Maintenance

Remarks_____

_____

2. **Gas Collection Wells, Manifolds and Piping**

☐ Good condition ☐ Needs Maintenance

Remarks_____

_____

3. **Gas Monitoring Facilities** (e.g., gas monitoring of adjacent homes or buildings)

☐ Good condition ☐ Needs Maintenance ☐ N/A

Remarks_____

_____

F. Cover Drainage Layer ☐ Applicable ☒ N/A

1. **Outlet Pipes Inspected** ☐ Functioning ☐ N/A Remarks_____	
2. **Outlet Rock Inspected** ☐ Functioning ☐ N/A Remarks_____	

G. Detention/sedimentation Ponds ☒ Applicable ☐ N/A

1. **Siltation** Areal extent_____ Depth_____ ☒ N/A

☐ Siltation not evident

Remarks_____

2. **Erosion** Areal extent_____ Depth_____ ☒ N/A

☐ Erosion not evident

Remarks_____

3. **Outlet Works** ☒ Functioning ☐ N/A

Remarks_____

4. **Dam** ☒ Functioning ☐ N/A

Remarks Stable banks on retention basin walls.

H. Retaining Walls ☐ Applicable ☒ N/A

1. **Deformations** ☐ Location shown on site map ☐ Deformation not evident

Horizontal displacement_____ Vertical displacement_____

Rotational displacement_____

Remarks_____

2. **Degradation** ☐ Location shown on site map ☐ Deformation not evident

Remarks_____

I. Perimeter Ditches/Off-Site Discharge ☒ Applicable ☐ N/A

1. **Siltation** ☐ Location shown on site map ☒ Siltation not evident

Areal extent_____ Depth_____

Remarks_____

2. **Vegetative Growth** ☐ Location shown on site map ☐ Siltation not evident

☒ Vegetation does not impede flow

Areal extent_____ Type_____

Remarks_____

_____

3. **Erosion** ☐ Location shown on site map ☒ Erosion not evident

Areal extent_____ Depth_____

Remarks_____

_____

4. **Discharge Structure** ☒ Location shown on site map ☐ N/A

Remarks_____

_____

VIII. VERTICAL BARRIER WALLS ☐ Applicable ☒ N/A

1. **Settlement** ☐ Location shown on site map ☐ Settlement not evident

Areal extent_____ Depth_____

Remarks_____

_____

2. **Performance Monitoring** Type of Monitoring_____

☐ Performance not monitored

Frequency_____ ☐ Evidence of breaching

Head differential_____

Remarks_____

_____

IX. GROUNDWATER/SURFACE WATER REMEDIES ☐ Applicable ☒ N/A

A. Groundwater Extraction Wells, Pumps, and Pipelines ☐ Applicable ☒ N/A

1. **Pumps, Wellhead Plumbing, and Electrical**

☐ Good condition ☐ All required wells located ☐ Needs Maintenance ☐ N/A

Remarks_____

_____

2. **Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances**

☐ Good condition ☐ Needs Maintenance

Remarks_____

_____

3. **Spare Parts and Equipment**

☐ Readily available ☐ Good condition ☐ Requires upgrade ☐ Needs to be provided

Remarks_____

_____

B. Surface Water Collection Structures, Pumps, and Pipelines ☐ Applicable ☒ N/A

1. **Collection Structures, Pumps, and Electrical**

☐ Good condition ☐ Needs Maintenance

Remarks_____

_____

2. **Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances**

☐ Good condition ☐ Needs Maintenance

Remarks_____

_____

3. **Spare Parts and Equipment**

☐ Readily available ☐ Good condition ☐ Requires upgrade ☐ Needs to be provided

Remarks_____

_____

C. Treatment System ☐ Applicable ☒ N/A

1. **Treatment Train** (Check components that apply)

☐ Metals removal ☐ Oil/water separation ☐ Bioremediation

☐ Air stripping ☐ Carbon adsorbers

☐ Filters_____

☐ Additive (e.g., chelation agent, flocculent)_____

☐ Others_____

☐ Good condition ☐ Needs Maintenance

☐ Sampling ports properly marked and functional

☐ Sampling/maintenance log displayed and up to date

☐ Equipment properly identified

☐ Quantity of groundwater treated annually_____

☐ Quantity of surface water treated annually_____

Remarks_____

_____

2. **Electrical Enclosures and Panels** (properly rated and functional)

☐ N/A ☐ Good condition ☐ Needs Maintenance

Remarks_____

_____

3. **Tanks, Vaults, Storage Vessels**

☐ N/A ☐ Good condition ☐ Proper secondary containment ☐ Needs Maintenance

Remarks_____

_____

4. **Discharge Structure and Appurtenances**

☐ N/A ☐ Good condition ☐ Needs Maintenance

Remarks_____

_____

5. **Treatment Building(s)**

☐ N/A ☐ Good condition (esp. roof and doorways) ☐ Needs repair

☐ Chemicals and equipment properly stored

Remarks_____

_____

6. **Monitoring Wells** (pump and treatment remedy)

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ All required wells located ☐ Needs Maintenance ☐ N/A

Remarks_____

_____

D. Monitoring Data ☐ Applicable ☒ N/A

1. Monitoring Data

☐ Is routinely submitted on time ☐ Is of acceptable quality

2 Monitoring data suggests:

☐ Groundwater plume is effectively contained ☐ Contaminant concentrations are declining

E. Monitored Natural Attenuation ☐ Applicable ☒ N/A

1. **Monitoring Wells** (Natural attenuation remedy)

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ All required wells located ☐ Needs Maintenance ☐ N/A

Remarks_____

_____

X. OTHER REMEDIES

If there are remedies applied at the site which are not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.

XI. OVERALL OBSERVATIONS

A. Implementation of the Remedy

Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emissions, etc.).

Low permeability soil cover installed over sections of the Old Radioactive Waste Burial Ground (643-E)

In accordance with an Interim ROD action.

B. Adequacy of O & M

Describe issues and observations related to the implementation and scope of O & M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy.

None at this time.

C. Early Indicators of Potential Remedy Failure

Describe issues and observations such as unexpected changes in the cost or scope of O & M or a high frequency of unscheduled repairs, that suggest that the protectiveness of the remedy may be compromised in the future.

None at this time.

D. Opportunities for Optimization

Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy.

None at this time.

Old Solvent Tanks at the Old Radioactive Waste Burial Ground Operable Unit (INTERIM ACTION)

I. Introduction

The final Record of Decision (ROD) for the Old Radioactive Waste Burial Ground (ORWBG) Operable Unit (OU) has not been issued. The following is for information purposes only. A review of the Interim Action Record of Decision (IAROD) for the Old Solvent Tanks (OSTs) (650-01E through 22E), a subunit of the ORWBG OU, has not been conducted.

II. OU Chronology

Table 1 lists the chronology of site events for the OSTs OU.

III. Background

The OSTs are a subunit of the ORWBG (643-E) OU. The ORWBG is part of the central disposal area for solid radioactive waste at Savannah River Site (SRS) known as the Burial Ground Complex. The Burial Ground Complex is located in the interior of SRS, approximately 6 miles from the nearest SRS boundary (Figure 1). Current and future anticipated land use of the OU is industrial.

The OSTs is comprised of 22 underground storage tanks designated 650-01E through 650-22E. The tanks were installed at various dates from 1955 to 1968.

Some of the tanks were used as fuel storage tanks at SRS and other federal facilities prior to their underground emplacement in the ORWBG.

All 22 tanks were constructed of thin-walled (approximately 0.75-inch) milled steel. Each tank is equipped with one or two riser/vent pipes. The tanks have different sizes and capacities. The diameters range from 7.5 to 11.0 feet while

Table 1. Chronology of OU Events

Event	Date
Removal Action (Material Transfer)	11/80 through 1/81, the contents of 650-19E through – 22E were transferred into new tanks S23 through S30 in the Low-Level Radioactive Waste Disposal Facility.
Interim ROD issuance	9/14/01
Remedial Action start	11/01

Key:

Consent Decree – Date a consent decree (enforcement document from the court system) was issued for the operable unit.

Corrective Action start – Date the corrective (remedial) action was initiated (under RCRA).

ESD Issuance - Date all three parties (USDOE, USEPA, and SCDHEC) signed the Explanation of Significant Difference used to significantly modify the remedy selected in the Record of Decision.

Final or Interim ROD issuance – Date the three parties (USDOE, USEPA, and SCDHEC) signed the Record of Decision.

Federal Facility Agreement Declared Effective - Date the Federal Facility Agreement formalized the integration of CERCLA and RCRA in remediation activities at SRS.

NPL listing – Date the entire SRS was added to EPA's National Priorities List.

Previous Five-Year Reviews – Date of any previous five year reviews of remedy for the operable unit.

RCRA Closure Certified – Date the three parties (USDOE, USEPA, and SCDHEC) certified that the operable unit had been remediated and closed under the Resource Conservation and Recovery Act.

RCRA Closure Plan Approved – Date the three parties (USDOE, USEPA, and SCDHEC) approved the closure plan for the operable unit under Resource Conservation and Recovery Act.

Remedial Action start/complete – Date the remedial action (final or interim) was initiated/completed (under CERCLA).

Removal Action – Date contaminated media was removed from the operable unit (not associated with the ROD).

RFI/RI start/complete - Date the remedial investigation (sampling) was initiated/completed for the operable unit.

ROD Amendment Issuance - Date the three parties (USDOE, USEPA, and SCDHEC) signed the Record of Decision Amendment used to change the remedy selected in the original Record of Decision.

lengths range from 18.0 to 38.5 feet. The capacities range from 6,769 to 27,016 gallons. The total capacity of all of the tanks is 294,308 gallons.

The tanks were placed underground in a horizontal position. The depths to the top of the tanks range from 6 to 7 feet, 4 inches. Most of the tanks are slightly inclined although several are inclined more than 6 inches.

Hundreds of thousands of gallons of solvent were used in the chemical separations facilities at SRS in a process that removes plutonium and uranium from spent fuel rods. The spent solvent generated from this plutonium-uranium extraction process consisted of a mixture of tri-n-butyl phosphate and dodecane. When the solvent became degraded and was no longer useful, it was managed as low-level radioactive waste.

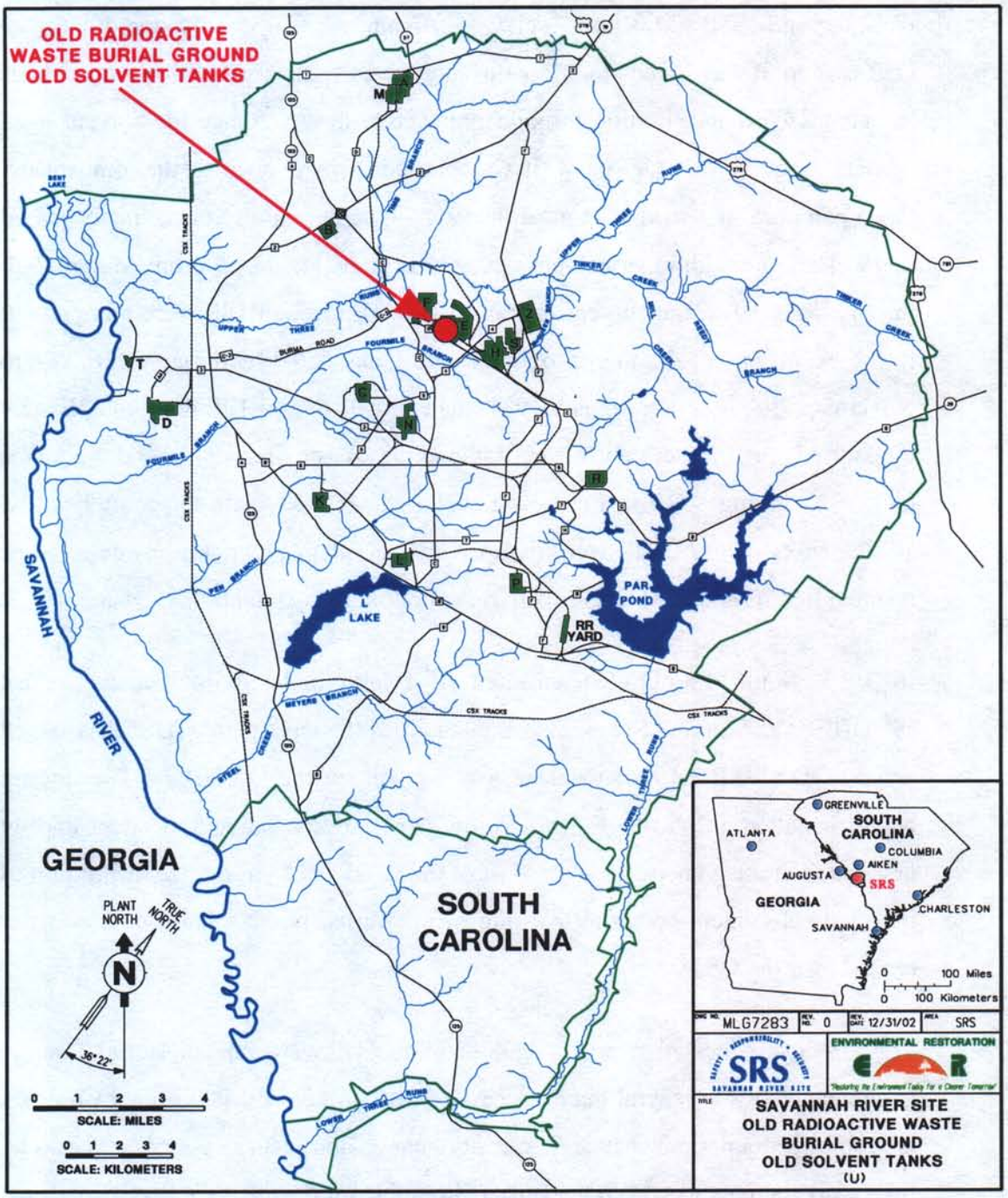


Figure 1. **Location of the Old Radioactive Waste Burial Ground (634-E) OU Including the Old Solvent Tanks**

Until the mid-1970's, this low-level waste stream was temporarily stored in the 22 OSTs where it was "aged" to allow the short-lived fission and activation products to decrease in concentration through radioactive decay. Once the solvent aged (about 6 months to 12.4 years), it was burned in pans open to the atmosphere. Open pan burning was discontinued in 1972. Operational use of the tanks ceased in 1974 and no additional solvent was added after this date. From March 1977 through May 1978, the contents of tanks 650-01E through 18E were pumped out to the extent practical and consolidated into tanks 650-19E through 22E. From November 1980 through January 1981, the contents of 650-19E through 22E were transferred out of the Low-Level Radioactive Waste Burial Ground into new tanks S23 through S30 in the Low-Level Radioactive Waste Disposal Facility. All 22 tanks of the OSTs were pumped to the extent practical; however, some residual liquids and/or solids remain in the bottom of each tank.

In 1996, South Carolina Department of Health and Environmental Control (SCDHEC) and United States Environmental Protection Agency (USEPA) issued an IAROD (WSRC 1996) to place a soil cover on the ORWBG. The interim action installed a 2- to 8- foot thick low permeability native soil cover and an associated drainage network over most of the ORWBG to minimize infiltration of rain and subsequent potential leaching of the buried waste. This cover was not placed over the OSTs.

The OSTs are located near the middle of the ORWBG in the Burial Ground Complex at SRS. General public access to SRS and the Burial Ground Complex is prohibited by perimeter fences, security guards, and security patrols. Access by SRS workers to areas within the Burial Ground Complex is controlled by physical and administrative controls. The physical barrier to the Burial Ground Complex is an 8-foot high chain-link and barbed-wire fence. Administrative controls include orange marker balls and signs identifying the ORWBG as a Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) waste area and as an Underground Radioactive Materials Area. At

the OSTs, a chain barrier and signs provide additional administrative controls to prevent prolonged exposure to fixed contamination on the riser pipes.

Video surveys and sampling of the OSTs were performed in 1998 to better understand the current condition of the tanks and their contents (WSRC 1998 a, b, c). Video surveys with a remote camera were performed for each tank. This survey revealed no visible evidence of tank breaching. The surveys were also used to verify and refine the estimated volume of residual materials (solid and liquid) that remain in the OSTs. Currently, four of the tanks contain no liquid. The other tanks have liquid volumes ranging from 5 to 1,995 gallons for a total of 5,635 gallons. On average, approximately 2 percent of the volume of the tanks is filled with liquid, with the largest percentage being 8 per cent in Tank 20. Except for Tank 6, all tanks contain solids. Volumes of solids in the tanks range from 0.267 to 36.38 cubic feet. On average, 0.3 percent of the tank volume is filled with solids.

The tanks were also sampled in 1998. Sampling was performed to the extent practical given the small amount of residual material in the tanks and the limited access to the tanks. Aqueous samples were obtained from 14 tanks, organic liquid samples were obtained from 2 tanks, and sludge samples were obtained from 12 tanks. Analytical results showed that the tanks contain high levels of radioactive materials that are potentially harmful to human health and the environment. The levels were not high enough to cause a criticality event during remedial actions.

Groundwater is not part of this OU. Groundwater has been contaminated by releases from the various facilities in the Burial ground Complex. The contaminated groundwater is currently managed by the corrective action plan in the SRS Part B permit for the Mixed Waste Management Facility in accordance with Settlement Agreement 87-52-SW.

IV. Remedial Actions

The remedial action objectives for the interim action are as follows:

- Stabilize the tanks to prevent collapse,
- Minimize the exposure risk to workers (current and future),
- Prevent or mitigate inadvertent intrusion via intruder access controls, and
- Prevent or mitigate leaching of contaminants present in the tanks and surrounding soils to groundwater above maximum contaminant levels (MCLs) and discharge to surface water above standards.

The selected interim remedy for the OSTs is in situ grouting of the tanks. Grouting will prevent the tanks from collapsing. It also places the radioactive material in a form that minimizes exposure to workers or intruders and reduces the likelihood of the material migrating to groundwater. The soil cover, currently placed over the rest of the ORWBG, will eventually extend over the OSTs. This will greatly reduce any potential for migration of the radionuclides to the groundwater.

The remedial action is expected to be started in November 2001 and is expected to be completed by February 2003.

V. Progress In the Last Five Years

This section is not applicable for this OU.

VI. Technical Assessment

The remedy has not been completed; therefore, a technical assessment cannot be made at this time.

VII. Issues

There are no issues for this OU.

VIII. Recommendations and Follow-up Actions

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

IX. Protectiveness Statement(s)

The interim remedy at OSTs is being pursued as an interim effort until the final remedy at the ORWBG is completed. The interim measure is not fully protective of human health since land use controls have not been formally imposed via a final ROD. Upon completion of the interim measure and issuance of the final ROD for the ORWBG, this interim measure will become part of a total remedial action, which is expected to be protective of human health and the environment. In the interim, exposure pathways that could lead to unacceptable risk are being controlled through institutional controls, environmental monitoring, and site maintenance. Institutional controls include: (1) physical access controls to prevent unauthorized entry to SRS (fences, guards, security patrols, etc.) and the ORWBG (perimeter fence and chain barrier); (2) administrative controls that maintain this site for industrial use only (SRS is a secured government facility with land use restrictions); and (3) warning signs and land use controls (SRS Site Use/Site Clearance Program). Upon issuance of the final ROD for the ORWBG, this interim measure will become part of a total remedial action which is expected to be protective of human health and the environment.

Attachment 1

List of Documents Reviewed

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

WSRC, 1998a. *Technical Report on the Old Solvent Tanks Video Survey Summary*, WSRC-RP-98-04225, Westinghouse Savannah River Company, Aiken, SC

WSRC, 1998b. *Characterization of Samples from Old Solvent Tanks S1 through S22*, WSRC-RP-98-01486, Westinghouse Savannah River Company, Aiken, SC

WSRC, 1998c. *Summary Report Expert Panel on the S1-S22 Old Solvent Tanks, Savannah River Site*, WSRC-RP-98-4131, Westinghouse Savannah River Company, Aiken, SC

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

PAR Pond (685-G) Operable Unit (INTERIM ACTION)

I. Introduction

The final Record of Decision (ROD) for the PAR Pond Operable Unit (OU) (685-G) has not been issued. The following is for information purposes only. A review of the Interim Action Record of Decision (IAROD) for the PAR Pond OU has not been conducted.

II. OU Chronology

Table 1 lists the chronology of site events for the PAR Pond OU.

Table 1. Chronology of OU Events

Event	Date
Interim ROD issuance	February 16, 1995
Interim Remedial Action start/complete	March 15, 2001/May 7, 2001

Key:

Consent Decree – Date a consent decree (enforcement document from the court system) was issued for the operable unit.

Corrective Action start – Date the corrective (remedial) action was initiated (under RCRA).

ESD Issuance - Date all three parties (USDOE, USEPA, and SCDHEC) signed the Explanation of Significant Difference used to significantly modify the remedy selected in the Record of Decision.

Final or Interim ROD issuance – Date the three parties (USDOE, USEPA, and SCDHEC) signed the Record of Decision.

Federal Facility Agreement Declared Effective - Date the Federal Facility Agreement formalized the integration of CERCLA and RCRA in remediation activities at SRS.

NPL listing – Date the entire SRS was added to EPA's National Priorities List.

Previous Five-Year Reviews – Date of any previous five year reviews of remedy for the operable unit.

RCRA Closure Certified – Date the three parties (USDOE, USEPA, and SCDHEC) certified that the operable unit had been remediated and closed under the Resource Conservation and Recovery Act.

RCRA Closure Plan Approved – Date the three parties (USDOE, USEPA, and SCDHEC) approved the closure plan for the operable unit under Resource Conservation and Recovery Act.

Remedial Action start/complete – Date the remedial action (final or interim) was initiated/completed (under CERCLA).

Removal Action – Date contaminated media was removed from the operable unit (not associated with the ROD).

RFI/RI start/complete - Date the remedial investigation (sampling) was initiated/completed for the operable unit.

ROD Amendment Issuance - Date the three parties (USDOE, USEPA, and SCDHEC) signed the Record of Decision Amendment used to change the remedy selected in the original Record of Decision.

III. Background

PAR Pond was built to augment the cooling water requirements of both P and R Reactors, which began operations in 1953 and 1954, respectively. Releases in the form of process leaks, purges and makeup cooling water have contaminated PAR Pond with cesium-137 and other radioactive and nonradioactive contaminants. Between 1954 and 1964, approximately 222 curies of cesium-137 were released from R Reactor into PAR Pond or Lower Three Runs Creek (before the creation of the reservoir in 1958). All radioactive isotope releases ceased following the shutdown of R Reactor in 1964. No measurable cesium-137 was released into PAR Pond from P Reactor. Since most of the radionuclide releases to PAR Pond (direct or indirect) occurred during the 1950 to 1960 era, and the half-life of cesium-137 is approximately 30 years, more than half of this radionuclide has decayed. The current estimated inventory of cesium-137 associated with all sediments within the PAR Pond reservoir is approximately 43 curies, of which 9 curies are present in the 1,340 acres of exposed sediments. The remaining 68 curies of cesium-137 inventory in the PAR Pond system is located in the sediments of the pre-cooler canal/pond system and Lower Three Runs Creek.

Mercury has been detected in fish from the Savannah River and Savannah River Site (SRS) water bodies since analyses began in 1971, with comparable concentrations measured in onsite and offsite fish. Much of the mercury has been assumed to be present in Savannah River water, which originated from industrial releases upriver from SRS. Since 1989, concentrations of mercury in fish collected at all locations onsite have been higher than in fish collected from the Savannah River. Therefore, concentrations of mercury may not be totally attributable to offsite sources. SRS is currently investigating possible causes for these increased concentrations.

During an inspection of the PAR Pond Dam in March 1991, a small surface depression was noted on the downstream face. Based on the inspection report,

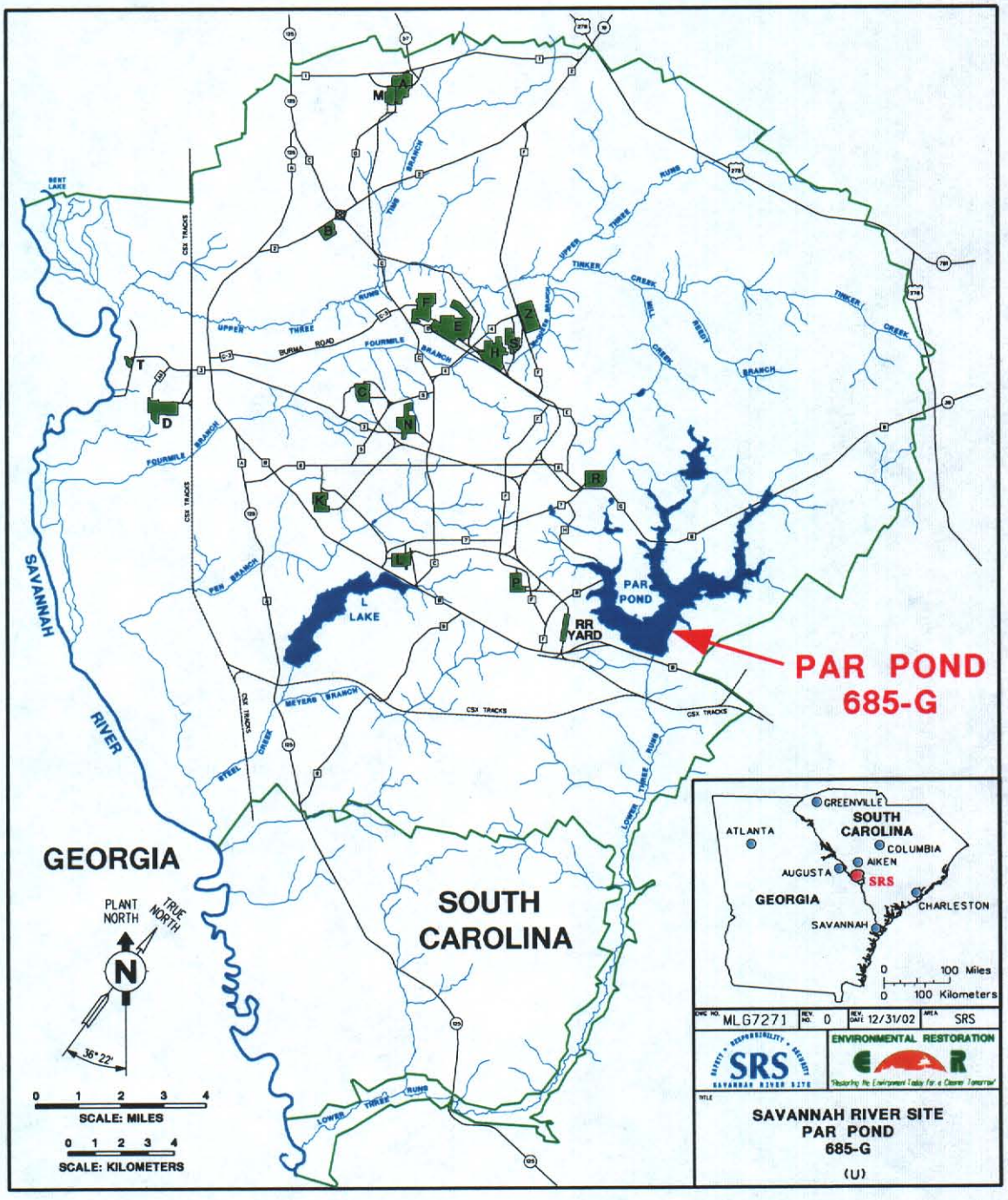


Figure 1. Location of the PAR Pond OU at SRS

United States Department of Energy (USDOE) ordered a detailed structural investigation into the cause of the depression and simultaneously initiated a precautionary drawdown of the reservoir. From June through September 1991, the level of PAR Pond was lowered from 200 (± 1 foot) to 181 feet (ft) mean sea level (msl). The 181-ft level was chosen to reduce the risk and consequences, in the unlikely even of a dam failure, of potential flooding in downstream communities. Lowering the surface water level elevation of PAR Pond resulted in a reduction of the reservoir's surface area and volume by approximately 50 and 65 percent, respectively. The drawdown had two major repercussions: (1) the elimination of the previous littoral (shore) zone and its interrelated communities, and (2) the exposure of sediments contaminated with mercury and radioactive cesium.

As of July 1, 1994, the PAR Pond Dam has been repaired and is considered safe to maintain the reservoir at pre-drawdown water levels.

This interim action did not include groundwater beneath the Par Pond.

Land and Resource Use

The current and anticipated future land use is industrial.

IV. Remedial Actions

The interim action addressed only the remediation of approximately 1,340 acres of sediments on the periphery of the PAR Pond reservoir that were exposed as a result of reservoir drawdown. The overall strategy of remediating the PAR Pond waste unit, consisting of the PAR Pond reservoir, the series of pre-cooling ponds and canals, and Lower Three Runs Creek, was as follows:

- Perform the proposed interim action.

- Further characterize the waste unit, delineating the nature and extent of contamination and identifying the media of concern.

- Perform a quantitative Baseline Risk Assessment (BRA) to evaluate media of concern, chemicals of concern, exposure pathways and to characterize potential risks.

- Evaluate and perform a final action to remediate the identified media of concern.

The IAROD was to refill the pond to full pool and maintain the level at 200 A1 ft msl, thus submerging the exposed sediments. The wetland and aquatic habitats of the PAR Pond ecosystem would eventually recover to essentially pre-drawdown conditions. Because access to SRS is controlled, the only temporary exposure pathway would be to workers at the PAR Pond Unit who were directly exposed to the sediment. External exposure to radionuclides, ingestion of and dermal contact with sediments, and inhalation of airborne sediments would cease with the refilling of the pond.

This action fulfills the interim remedial goals by providing timely reduction of risk to human health and the environment through the submergence of the sediments. Following completion of the interim action, further characterization, and the performance of a risk assessment, the final remedial action will be selected to address the entire PAR Pond OU.

Remedy Implementation

On February 1, 1995, SRS initiated the forced refill (pumping of water) of PAR Pond. Pumping rates during the refill ranged from 60,000 to 160,000 gallons per minute (gpm) as described in the Interim Action Record of Decision (IAROD). During the refill, 90 to 95% of the refilling occurred through the PAR Pond Pump house and only 5 to 10% of the total water added went through the P Canal. Flow

through the canal did not exceed 50,000 gpm. Resuspension of sediments was minimized. A minimum flow of 10 cubic feet per second (cfs) was maintained to Lower Three Runs during the refill. During the refill, the two feet per week level increase was maintained and not exceeded [for dam stability and testing purposes, not Comprehensive Environmental Response, Compensation and Liability Act (CERCLA)-driven]. PAR Pond overflowed the spillway on March 15, 1995, indicating the water level had reached full pool. SRS considered the refilling complete with the topping of the spillway. Following the refill of the pond to full pool, SRS reconfigured the PAR Pond Pump house to its normal operating configuration. Currently, one or two pumps are required to maintain the water level in PAR Pond and in L Lake.

V. Progress In the Last Five Years

No additional action has been required at PAR Pond. Pumps continue to operate, as needed, to maintain the level of the pond.

VI. Technical Assessment

The conclusions for this OU are as follows:

- The remedy is functioning as intended. The dam has been repaired and the water level is being maintained to prevent exposure to human receptors.

- The exposure assumptions, toxicity data, cleanup levels, and remedial action objectives used at the time of the remedy selection are still valid.

- No new standards or to be considered guidance have been identified that could call into question the protectiveness of the remedy. Land use, exposure pathways, contaminants of concern, and risk assessment methodologies have not changed in a way to affect the protectiveness of the remedy.

- No new information has come to light which could affect the protectiveness of the remedy.

VII. Issues

There are no issues for this OU.

VIII. Recommendations and Follow-up Actions

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

IX. Protectiveness Statement(s)

The interim action of refilling the PAR pond reservoir and maintaining the water level at the 200±1 ft msl is not fully protective of human health and the environment at PAR Pond (685-G). This remedy will become fully protective upon implementation of land use controls pursuant to a LUCIP. In the interim, exposure pathways that could lead to unacceptable risk are being controlled through institutional controls. Institutional controls include: (1) physical access controls to prevent unauthorized entry to SRS (fences, guards, security patrols, etc.); (2) administrative controls that maintain this site for industrial use only (SRS is a secured government facility with land use restrictions); and (3) warning signs and land use controls (SRS Site Use/Site Clearance Program).

Attachment 1

List of Associated Documents

WSRC, 1993. *Interim Action Record of Decision Remedial Alternative Selection for the PAR Pond Unit (685-G) (U)*, WSRC-RP-93-1549, Rev. 0, January, Westinghouse Savannah River Company, Aiken, SC

WSRC, 1996. *Remedial Design/Remedial Action Plan for the PAR Pond Source Control Operable Unit Interim Action*, Rev. 1, March, Westinghouse Savannah River Company, Aiken, SC

Five-Year Review Site Inspection Checklist

I. SITE INFORMATION	
Site Name: Par Pond (685-G)	**Date of Inspection: 10/3/01**
Location and Region: Savannah River Site, EPA IV	**EPA ID: CERCLIS OU# 35**
Agency, office, or company leading the five-year review: USDOE	**Weather/temperature: clear and sunny, 75 °F**

Remedy Includes: (Check all that apply)

- ☐ Landfill cover/containment
- ☐ Access controls
- ☒ Institutional Controls
- ☐ Groundwater pump and treatment
- ☐ Surface water collection and treatment
- ☒ Other Fill pond to full pool and maintain water level at 200 feet msl.
- ☐ Monitored Natural Attenuation
- ☐ Groundwater Containment
- ☐ Vertical Barrier Walls

Attachments: ☐ Inspection team roster attached ☐ Site map attached

II. INTERVIEWS (Check all that apply)

1. **O & M site manager** _____ _____ _____
   Name Title Date
   Interviewed ☐ at site ☐ at office ☐ by phone Phone No. _____
   Problems, suggestions; ☐ report attached _____

2. O & M staff _____ _____ _____
   Name Title Date
   Interviewed ☐ at site ☐ at office ☐ by phone Phone No. _____
   Problems, suggestions; ☐ report attached _____

3. **Local regulatory authorities and response agencies** (i.e., State and tribal offices, emergency response office, police department, office of public health or environmental health, zoning office, recorder of deeds, or other city and county offices, etc.) Fill in all that apply.

Agency _____

Contact _____ _____ _____ _____
Name Title Date Phone No.

Problems; suggestions; ☐ Report attached _____

_____

Agency _____

Contact _____ _____ _____ _____
Name Title Date Phone No.

Problems; suggestions; ☐ Report attached _____

_____

Agency _____

Contact _____ _____ _____ _____
Name Title Date Phone No.

Problems; suggestions; ☐ Report attached _____

_____

4. **Other interviews** (optional) ☐ Report attached _____

III. ONSITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)

1. **O & M Documents**

☐ O & M Manual ☐ Readily available ☐ Up to date ☒ N/A

☐ As-built drawings ☐ Readily available ☐ Up to date ☒ N/A

☐ Maintenance Logs ☐ Readily available ☐ Up to date ☒ N/A

Remarks_____

_____

2. **Site-Specific Health and Safety Plan** ☐ Readily available ☐ Up to date ☒ N/A

☐ Contingency plan/emergency response plan ☐ Readily available ☐ Up to date ☒ N/A

Remarks_____

_____

3. **O & M and OSHA Training Records** ☒ Readily available ☒ Up to date ☐ N/A

Remarks_____

_____

4. **Permits and Service Agreements**

☐ Air discharge permit ☐ Readily available ☐ Up to date ☒ N/A

☐ Effluent discharge ☐ Readily available ☐ Up to date ☒ N/A

☐ Waste Disposal, POTW ☐ Readily available ☐ Up to date ☒ N/A

☐ Other permits ☐ Readily available ☐ Up to date ☒ N/A

Remarks_____

_____

5. **Gas Generation Records** ☐ Readily available ☐ Up to date ☒ N/A

Remarks_____

_____

6. **Settlement Monument Records** ☐ Readily available ☐ Up to date ☒ N/A

Remarks_____

_____

7. **Groundwater Monitoring Records** ☐Readily available ☐Up to date ☒ N/A

Remarks_____

_____

8. **Leachate Extraction Records** ☐ Readily available ☐ Up to date ☒ N/A

Remarks_____

_____

9. **Discharge Compliance Records**

☐ Air ☐ Readily available ☐ Up to date ☒ N/A

☐ Water (effluent) ☐ Readily available ☐ Up to date ☒ N/A

Remarks_____

_____

10. **Daily Access/Security Logs** ☐ Readily available ☐ Up to date ☒ N/A

Remarks_____

_____

IV. O & M Costs

1. **O & M Organization**

☐ State in-house ☐ Contractor for State

☐ PRP in-house ☐ Contractor for PRP

☐ Other_____

_____

2. **O & M Cost Records**

☐ Readily available ☐ Up to date

☐ Funding mechanism/agreement in place

☐ Other_____

_____

Total annual cost by year for review period if available

From_____ To_____ _____ ☐ Breakdown attached
Date Date Total cost

From_____ To_____ _____ ☐ Breakdown attached
Date Date Total cost

From_____ To_____ _____ ☐ Breakdown attached
Date Date Total cost

From_____ To_____ _____ ☐ Breakdown attached
Date Date Total cost

From_____ To_____ _____ ☐ Breakdown attached
Date Date Total cost

1. **Unanticipated or Unusually High O & M Costs During Review Period**

Describe costs and reasons: _____

_____

_____

_____

_____

V. ACCESS AND INSTITUTIONAL CONTROLS ☒ Applicable ☐ N/A

A. Fencing

1. **Fencing Damaged** ☐ Location shown on site map ☐ Gates secured ☒ N/A

Remarks_____

_____

B. Other Access Restrictions

1. **Signs and other security measures** ☒ Location shown on site map ☐ N/A

Remarks_____

_____

C. Institutional Controls

1. Implementation and enforcement

Site conditions imply ICs not properly implemented ☐ Yes ☒ No ☐ N/A

Site conditions imply ICs not being fully enforced ☐ Yes ☒ No ☐ N/A

Type of monitoring (e.g., self-reporting, drive-by)_____

Frequency_____

Responsible party/agent_____

Contact_____ _____ _____ _____

Name Title Date Phone No.

Report is up-to-date ☐ Yes ☐ No ☒ N/A

Reports are verified by the lead agency ☐ Yes ☐ No ☒ N/A

Specific requirements in deed of decision documents have been met ☐ Yes ☐ No ☒ N/A

Violations have been reported ☐ Yes ☐ No ☒ N/A

Other problems or suggestions: ☐ Report attached

_____

_____

_____

_____

2. Adequacy ☐ ICs are adequate ☐ ICs are inadequate ☒ N/A

Remarks_____

_____

D. General

1. **Vandalism/trespassing** ☐ Location shown on site map ☒ No vandalism evident

Remarks_____

2. **Land use changes onsite** ☒ N/A

Remarks_____

3. **Land use changes offsite** ☒ N/A

Remarks_____

VI. GENERAL SITE CONDITIONS

A. Roads ☒ Applicable ☐ N/A

1. **Roads damaged** ☒ Location shown on site map ☒ Roads adequate ☐ N/A

Remarks_____

B. Other site Conditions

Remarks_____

VII. SOIL COVER ☐ Applicable ☒ N/A

A. Landfill Surface ☐ Applicable ☐ N/A

1. **Settlement** (Low spots) ☐ Location shown on site map ☐ Settlement not evident

Areal extent_____ Depth_____

Remarks_____

2. **Cracks** ☐ Location shown on site map ☐ Cracking not evident

Lengths_____ Widths_____ Depths_____

Remarks_____

3. **Erosion** ☐ Location shown on site map ☐ Erosion not evident

Areal extent_____ Depth_____

Remarks_____

_____

4. **Holes** ☐ Location shown on site map ☐ Holes not evident

Areal extent_____ Depth_____

Remarks_____

_____

5. **Vegetative Cover** ☐ Grass ☐ Cover properly established ☐ No signs of stress

☐ Trees/shrubs (indicate size and location on a diagram)

Remarks_____

_____

6. **Alternative Cover (armored rock, concrete, etc.)** ☐ N/A

Remarks_____

_____

7. **Bulges** ☐ Location shown on site map ☐ Bulges not evident

Areal extent_____ Height_____

Remarks_____

_____

8. **Wet Areas/Water Damage** ☐ Wet areas/water damage not evident

☐ Wet Areas ☐ Location shown on site map Areal extent_____

☐ Ponding ☐ Location shown on site map Areal extent_____

☐ Seeps ☐ Location shown on site map Areal extent_____

☐ Soft subgrade ☐ Location shown on site map Areal extent_____

Remarks_____

_____

9. **Slope Instability** ☐ Slides ☐ Location shown on site map ☐ No evidence of slope instability

Areal extent_____

Remarks_____

_____

B. Benches ☐ Applicable ☐ N/A

(Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)

1. **Flows Bypass Bench** ☐ Location shown on site map ☐ N/A or okay

Remarks_____

_____

2. **Bench Breached** ☐ Location shown on site map ☐ N/A or okay

Remarks_____

_____

3. **Bench Overtopped** ☐ Location shown on site map ☐ N/A or okay

Remarks_____

_____

C. Letdown Channels ☐ Applicable ☐ N/A

(Channel lined with erosion control mates, riprap, grout bags, or gabions that descend down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)

1. **Settlement** ☐ Location shown on site map ☐ No evidence of settlement

Areal extent_____ Depth_____

Remarks_____

_____

2. **Material Degradation** ☐ Location shown on site map ☐ No evidence of degradation

Material type_____ Areal extent _____

Remarks_____

_____

3. **Erosion** ☐ Location shown on site map ☐ No evidence of erosion

Areal extent _____ Depth_____

Remarks_____

_____

4. **Undercutting** ☐ Location shown on site map ☐ No evidence of undercutting

Areal extent _____ Depth_____

Remarks_____

_____

5. **Obstructions** Type_____ ☐ No obstructions

☐ Location shown on site map Areal extent _____

Size _____

Remarks_____

_____

6. **Excessive Vegetative Growth** Type_____

☐ No evidence of excessive growth

☐ Vegetation in channels does not obstruct flow

☐ Location shown on site map Areal extent _____

Remarks_____

_____

D. Cover Penetrations ☐ Applicable ☐ N/A

1. **Gas Vents** ☐ Active ☐ Passive

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A

Remarks_____

_____

2. **Gas Monitoring Probes**

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A

Remarks_____

_____

3. **Monitoring Wells** (within surface area of landfill)

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A

Remarks_____

_____

4. **Leachate Extraction Wells**

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A

Remarks_____

_____

5. **Settlement Monuments** ☐ Located ☐ Routinely surveyed ☐ N/A

Remarks_____

_____

E. Gas Collection and Treatment ☐ Applicable ☐ N/A

1. **Gas Treatment Facilities**

☐ Flaring ☐ Thermal destruction ☐ Collection for reuse

☐ Good condition ☐ Needs Maintenance

Remarks_____

_____

2. **Gas Collection Wells, Manifolds and Piping**

☐ Good condition ☐ Needs Maintenance

Remarks_____

_____

3. **Gas Monitoring Facilities** (e.g., gas monitoring of adjacent homes or buildings)

☐ Good condition ☐ Needs Maintenance ☐ N/A

Remarks_____

_____

F. Cover Drainage Layer ☐ Applicable ☐ N/A

1. **Outlet Pipes Inspected** ☐ Functioning ☐ N/A Remarks_____	
2. **Outlet Rock Inspected** ☐ Functioning ☐ N/A Remarks_____	

G. Detention/sedimentation Ponds ☐ Applicable ☐ N/A

1. **Siltation** Areal extent_____ Depth_____ ☐ N/A

   ☐ Siltation not evident

   Remarks_____

2. **Erosion** Areal extent_____ Depth_____ ☐ N/A

   ☐ Erosion not evident

   Remarks_____

3. **Outlet Works** ☐ Functioning ☐ N/A

   Remarks_____

4. **Dam** ☐ Functioning ☐ N/A

   Remarks_____

H. Retaining Walls ☐ Applicable ☐ N/A

1. **Deformations** ☐ Location shown on site map ☐ Deformation not evident

   Horizontal displacement_____ Vertical displacement_____

   Rotational displacement_____

   Remarks_____

2. **Degradation** ☐ Location shown on site map ☐ Deformation not evident

   Remarks_____

I. Perimeter Ditches/Off-Site Discharge ☐ Applicable ☒ N/A

1. **Siltation** ☐ Location shown on site map ☐ Siltation not evident

   Areal extent_____ Depth_____

   Remarks_____

2. **Vegetative Growth** ☐ Location shown on site map ☐ Siltation not evident

☐ Vegetation does not impede flow

Areal extent_____ Type_____

Remarks_____

_____

3. **Erosion** ☐ Location shown on site map ☐ Erosion not evident

Areal extent_____ Depth_____

Remarks_____

_____

4. **Discharge Structure** ☐ Location shown on site map ☐ N/A

Remarks_____

_____

VIII. VERTICAL BARRIER WALLS ☐ Applicable ☒ N/A

1. **Settlement** ☐ Location shown on site map ☐ Settlement not evident

Areal extent_____ Depth_____

Remarks_____

_____

2. **Performance Monitoring** Type of Monitoring_____

☐ Performance not monitored

Frequency_____ ☐ Evidence of breaching

Head differential_____

Remarks_____

_____

IX. GROUNDWATER/SURFACE WATER REMEDIES ☐ Applicable ☒ N/A

A. Groundwater Extraction Wells, Pumps, and Pipelines ☐ Applicable ☐ N/A

1. **Pumps, Wellhead Plumbing, and Electrical**

☐ Good condition ☐ All required wells located ☐ Needs Maintenance ☐ N/A

Remarks_____

_____

2. **Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances**

☐ Good condition ☐ Needs Maintenance

Remarks_____

_____

3. **Spare Parts and Equipment**

☐ Readily available ☐ Good condition ☐ Requires upgrade ☐ Needs to be provided

Remarks_____

_____

B. Surface Water Collection Structures, Pumps, and Pipelines ☐ Applicable ☐ N/A

1. **Collection Structures, Pumps, and Electrical**

☐ Good condition ☐ Needs Maintenance

Remarks_____

_____

2. **Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances**

☐ Good condition ☐ Needs Maintenance

Remarks_____

_____

3. **Spare Parts and Equipment**

☐ Readily available ☐ Good condition ☐ Requires upgrade ☐ Needs to be provided

Remarks_____

_____

C. **Treatment System** ☐ Applicable ☐ N/A

1. **Treatment Train** (Check components that apply)

☐ Metals removal ☐ Oil/water separation ☐ Bioremediation

☐ Air stripping ☐ Carbon adsorbers

☐ Filters_____

☐ Additive (e.g., chelation agent, flocculent)_____

☐ Others_____

☐ Good condition ☐ Needs Maintenance

☐ Sampling ports properly marked and functional

☐ Sampling/maintenance log displayed and up to date

☐ Equipment properly identified

☐ Quantity of groundwater treated annually_____

☐ Quantity of surface water treated annually_____

Remarks_____

_____

2. **Electrical Enclosures and Panels** (properly rated and functional)

☐ N/A ☐ Good condition ☐ Needs Maintenance

Remarks_____

_____

3. **Tanks, Vaults, Storage Vessels**

☐ N/A ☐ Good condition ☐ Proper secondary containment ☐ Needs Maintenance

Remarks_____

_____

4. **Discharge Structure and Appurtenances**

☐ N/A ☐ Good condition ☐ Needs Maintenance

Remarks_____

_____

5. **Treatment Building(s)**

☐ N/A ☐ Good condition (esp. roof and doorways) ☐ Needs repair

☐ Chemicals and equipment properly stored

Remarks_____

_____

6. **Monitoring Wells**

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ All required wells located ☐ Needs Maintenance ☐ N/A

Remarks_____

_____

D. Monitoring Data ☐ Applicable ☐ N/A

1. Monitoring Data

☐ Is routinely submitted on time ☐ Is of acceptable quality

2 .Monitoring data suggests:

☐ Groundwater plume is effectively contained ☐ Contaminant concentrations are declining

E. Monitored Natural Attenuation ☐ Applicable ☐ N/A

1. **Monitoring Wells** (Natural attenuation remedy)

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ All required wells located ☐ Needs Maintenance ☐ N/A

Remarks_____

_____

X. OTHER REMEDIES

If there are remedies applied at the site which are not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.

XI. OVERALL OBSERVATIONS

A. Implementation of the Remedy

Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emissions, etc.).

The ROD was to refill the pond to full pool and allow it to fluctuate naturally, thus submerging the exposed sediments. The wetland and aquatic habitats of the Par Pond ecosystem would eventually recover to essentially pre-drawdown conditions. Because access to SRS is controlled, the only temporary exposure pathway would be to workers at the Par Pond Unit who were directly exposed to the sediment. External exposure to radionuclides, ingestion of and dermal contact with sediments, and inhalation of airborne sediments would cease with the refilling of the pond. All observations indicate that the remedy is effective at eliminating exposure to the contaminated sediments.

B. Adequacy of O & M

Describe issues and observations related to the implementation and scope of O & M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy.

C. Early Indicators of Potential Remedy Failure

Describe issues and observations such as unexpected changes in the cost or scope of O & M or a high frequency of unscheduled repairs, that suggest that the protectiveness of the remedy may be compromised in the future.

D. Opportunities for Optimization

Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy.

Silverton Road Waste Unit (731-3A) (SRWU) Operable Unit

I. Introduction

This is the second five-year review for the Silverton Road Waste Unit (731-3A) (SRWU) Operable Unit (OU). This review was conducted from August 2001 through September 2001. This report documents the results of the review.

II. OU Chronology

Table 1 lists the chronology of site events for the SRWU.

III. Background

The SRWU, 731-3A, is located in the northwestern part of the Savannah River Site (SRS) in Aiken County, approximately 1.5 miles southwest of A/M Area (Figures 1 and 2). The OU is not located in or near an environmentally sensitive area and is unpopulated.

The SRWU was first used before construction of the SRS. Although there is no written record of when disposal began at the SRWU, or what materials were accepted, it is believed that the SRWU was originally a borrow pit used as an "open dump" by the local municipalities, including Old Ellenton before the land was acquired by the federal government. Municipal, agricultural, and commercial trash, rubbish, garbage, debris, and refuse probably constituted the waste stream until the early 1950s. The waste material at the dump was probably burned periodically, as was the practice at that time, for volume reduction. This practice would have eliminated many of the combustible organic materials while creating combustion by-products.

Table 1. Chronology of OU Events

Event	Date
ROD issuance	April 22, 1997
Remedial Action start/complete	July 7, 1998/ September 9, 1998
Previous Five-Year Reviews	June 30, 1997

Key:

Consent Decree – Date a consent decree (enforcement document from the court system) was issued for the operable unit.

Corrective Action start – Date the corrective (remedial) action was initiated (under RCRA).

ESD Issuance - Date all three parties (USDOE, USEPA, and SCDHEC) signed the Explanation of Significant Difference used to significantly modify the remedy selected in the Record of Decision.

Final or Interim ROD issuance – Date the three parties (USDOE, USEPA, and SCDHEC) signed the Record of Decision.

Federal Facility Agreement Declared Effective - Date the Federal Facility Agreement formalized the integration of CERCLA and RCRA in remediation activities at SRS.

NPL listing – Date the entire SRS was added to EPA's National Priorities List.

Previous Five-Year Reviews – Date of any previous five year reviews of remedy for the operable unit.

RCRA Closure Certified – Date the three parties (USDOE, USEPA, and SCDHEC) certified that the operable unit had been remediated and closed under the Resource Conservation and Recovery Act.

RCRA Closure Plan Approved – Date the three parties (USDOE, USEPA, and SCDHEC) approved the closure plan for the operable unit under Resource Conservation and Recovery Act.

Remedial Action start/complete – Date the remedial action (final or interim) was initiated/completed (under CERCLA).

Removal Action – Date contaminated media was removed from the operable unit (not associated with the ROD).

RFI/RI start/complete - Date the remedial investigation (sampling) was initiated/completed for the operable unit.

ROD Amendment Issuance - Date the three parties (USDOE, USEPA, and SCDHEC) signed the Record of Decision Amendment used to change the remedy selected in the original Record of Decision.

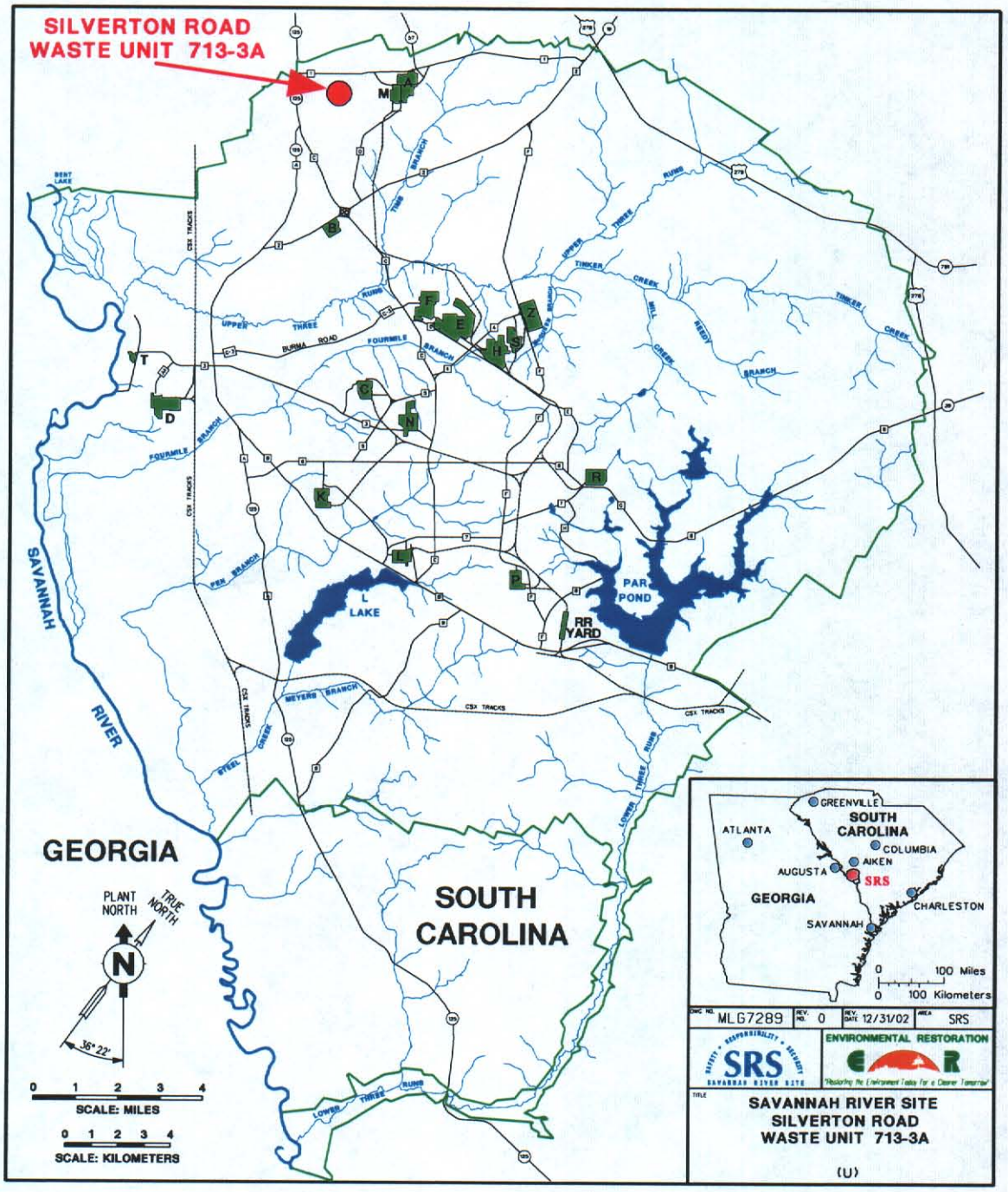


Figure 1. Location of the Silverton Road Waste Unit

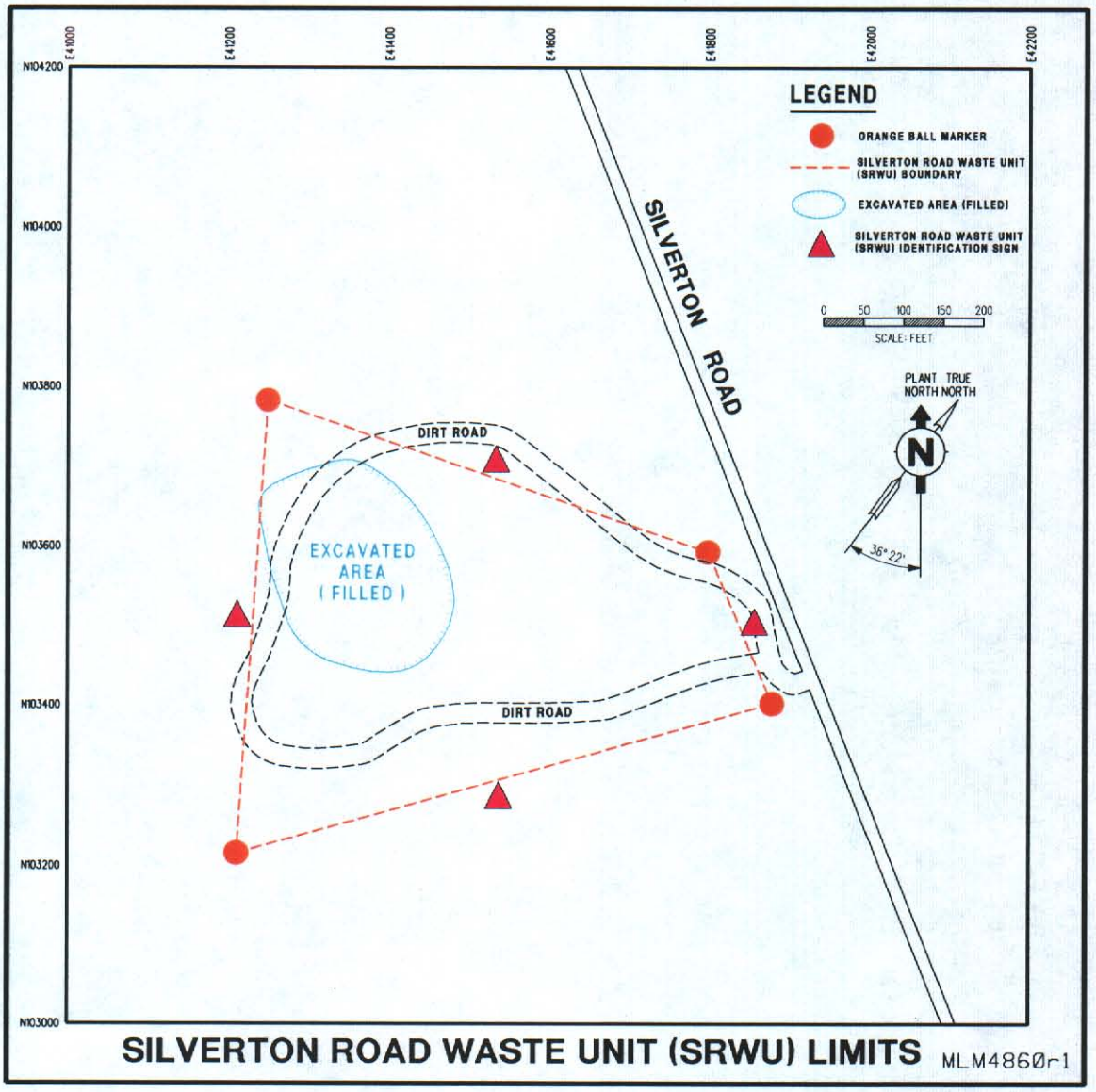


Figure 2. Layout of the Silverton Road Waste Unit (SRWU) with Limits

After procurement by the federal government, the SRWU land continued to be used as an open dump (a legal practice at the time) by SRS. Historical and aerial photographs show large piles of metal shavings (possibly aluminum), 55-gallon drums, cardboard drums, tires, lumber, wooden pallets, cardboard, construction debris, tanks, possibly asbestos, and other unidentified metal and wood objects. No records of waste disposal activities were kept. In 1974, the disposal of waste at the SRWU ceased, the area was bulldozed, graded, covered with soil, and planted with grasses.

The SRWU area is an irregular quadrilateral, which contains an unlined earthen depression dug into surficial soils and later filled with various waste materials. This area has been designated as "excavated area (filled)" on Figure 1. Soil borings conducted in 1993 identified the presence of waste buried beyond the excavated area. The additional area of waste disposal is within the orange ball markers and covers an area of approximately 600 by 400 feet (ft) with waste being buried to a maximum depth of approximately 16 ft below ground level. The excavated area is larger than the soil boring dimensions but is less than the orange ball dimensions. Since characterization data indicated contamination of the surface soils, the planar area calculation for the SRWU includes the entire area within the orange balls. Therefore, the SRWU planar area of the SRWU is assumed to be 750 by 600 ft (450,000 ft^2). Using an average estimated depth of 6 ft for the excavated area, the approximate waste volume of the SRWU is 2,700,000 ft^3.

The SRWU OU is located on the southwestern flank of an interstream divide between Upper Three Runs Creek (approximately 4.5 miles to the southeast) and the flood plain of the Savannah River (approximately 1.5 miles to the west). The ground surface elevation at the unit averages 350 ft above mean sea level. Surface drainage is southwestward, along a series of dry-wash tributaries, into the flood plain of the Savannah River. The water table at the SRWU ranges from

about 40 ft below ground level to the southwest to about 130 ft below ground level to the northeast.

In the "M Area" groundwater aquifer, low levels of contaminants have been detected which minimally and infrequently exceed maximum contaminant levels (MCLs). The probable condition for the "M Area" groundwater aquifer is no significant groundwater contamination is resulting from the SRWU. Based on the SRWU Resource Conservation and Recovery Act (RCRA) Facility Investigation/Remedial Investigation (RFI/RI) Report and the Baseline Risk Assessment (BRA), the SRWU poses no significant risk to the environment and minimal risk to human health.

The groundwater in the lower aquifers is in separate operable units and is not within the scope of this Record of Decision. The groundwater in the lower aquifers will be evaluated as part of the 1995 RCRA Permit for the A/M Area Western Sector Corrective Action Program.

IV. Remedial Actions

Prior to SRS ownership, the SRWU area was primarily used for agriculture. At the time of this 5-year Record of Decision (ROD) review and for the foreseeable future, the land use will be controlled by the United States Department of Energy (USDOE). Existing and future administrative controls will limit the use of the SRWU area to industrial uses only.

The preferred alternative for the SRWU is Institutional Controls with groundwater monitoring. Institutional Controls restrict this land to future industrial use and prohibit the excavation of soil, which might expose future workers to low concentrations of hazardous constituents. Implementation of the Institutional Controls alternative will require both short- and long-term actions, which will be protective of human health and the environment. For the short-term, signs were posted at the Waste Unit that indicate that this area was used for the disposal of

waste material and contains buried waste. In addition, existing SRS access controls will be used to maintain this site for industrial use only.

As a result of minimal and infrequent exceedences in MCLs, no Remedial Action with Groundwater Monitoring was deemed appropriate for the SRWU "M Area" groundwater aquifer. A confirmatory groundwater-monitoring program has been established to ensure that this is the appropriate remedial action for the "M Area" groundwater aquifer.

Under the groundwater monitoring program, additional background monitoring wells were installed (SRW-18 and SRW-19). One of two original background wells, SRW-17D, for the "M Area" (water table) groundwater unit went dry and was replaced with SRW-17DR. The background wells (SRW-16C, SRW-17DR, SRW-18, and SRW-19) will be used to further evaluate the up-gradient concentrations of the contaminants in the "M Area" water table groundwater unit. In addition to the four background wells, four existing down-gradient (SRW-7, SRW-8, SRW-9, and SRW-12C) and two side-gradient (SRW-2 and SRW-4) "M Area" water table wells are also being monitored (Figure 3). The wells are being monitored for 1,2-dichloroethane, carbon tetrachloride, dichloromethane, tetrachloroethylene (PCE), and trichloroethylene (TCE) due to their sporadic exceedences of Safe Drinking Water Act (SDWA) MCLs (see attachments 2 and 3).

Background well SRW18 was moved from (N103100/E43250) to a more strategic location (N103057.97/E42094.76) to monitor background groundwater conditions. It was moved because in the A/M Area there is a contaminated groundwater plume in the Western Sector moving westerly towards the vicinity of the SRWU. The new location (N103057.97/E42094.76) lies in a more direct path of groundwater flow from A/M Area Western Sector towards the SRWU, and would be more appropriate to detect changes in background groundwater quality conditions (e.g., potential co-mingling of groundwater plumes) at the SRWU.

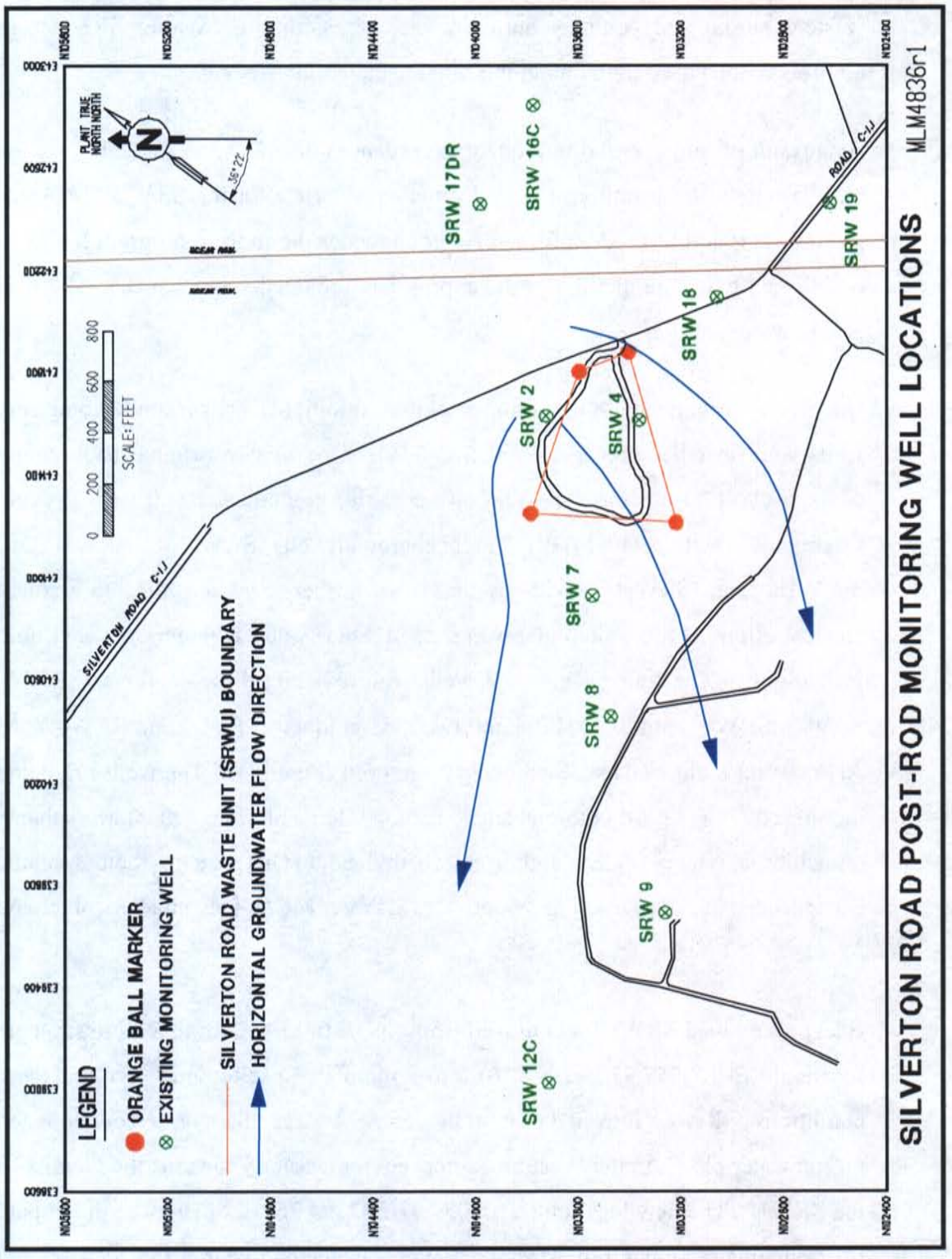


Figure 3. Silverton Road Post-ROD Monitoring Well Locations

The selected remedy required no specific design. The South Carolina Department of Health and Environmental Control (SCDHEC) approved the request for installation of three new wells (SRW-17DR, SRW-18, and SRW-19) on June 25, 1998. The monitoring well installation started on July 8, 1998, and was completed September 9, 1998.

The Final Remediation Report (FRR), which provides the elements of the institutional controls necessary to achieve the remedial goals, was approved by the United States Environmental Protection Agency (USEPA) and SCDHEC on April 20, 1998, and April 23, 1998, respectively.

A determination has been made that institutional controls are sufficient for protection of human health and the environment for the SRWU soils and that no remedial action with confirmatory groundwater monitoring is deemed appropriate for the SRWU "M Area" groundwater aquifer. A confirmatory groundwater-monitoring program has been established to ensure that this is the appropriate remedial action for the "M Area" groundwater aquifer. In the event that the probable condition is no longer appropriate, it will be reevaluated for the need for remedial action.

Under the confirmatory groundwater program, ten monitoring wells, including 3 new wells, were selected to monitor the extent of the contaminant plume and the severity of the contamination. The number and location of the new background wells, a list of the existing wells to be monitored, the frequency of monitoring, and the submittal frequency of the groundwater data for regulatory review was listed in the FRR post-ROD document. The FRR also identifies the groundwater strategy, which includes trend analysis, and recommendations based on the interpretation of the data in the post-ROD groundwater monitoring reports. The selected remedy is protective of human health and the environment, complies with federal and state requirements that are legally applicable or relevant and

appropriate to the remedial action, and is cost-effective. The size of the waste unit and the random distribution and low levels of contaminants preclude a remedy in which treatment is a practical alternative. Because treatment of the principal threats of the site was found to be impracticable, this remedy does not satisfy the statutory preference for treatment as a principal element.

V. Progress Since Last Review

This is the second 5-year ROD review that the SRWU has undergone. Since the previous review in June of 1997, the following actions were completed:

- Completion of the FRR
- Installation of 3 new monitoring wells
- Five rounds of groundwater sampling

VI. Five-Year Review Process

The following tasks were performed as part of the review:

- Reviewed the documents listed in Attachment 1
- Confirmed the implementation of the remedial action
- Inspected the OU
- Reviewed changes in standards and to-be-considered (TBC) guidance

VII. Five-Year Review Findings

The data for the SRWU have been reviewed (Attachments 2 and 3). Groundwater monitoring for the SRWU, as prescribed in the FRR, began in the fourth quarter of 1998 and is being conducted for the 10 wells identified in Table 2. The wells are being monitored for 1,2-dichloroethane, carbon tetrachloride,

dichloromethane, PCE, and TCE. Since the initiation of groundwater monitoring, with the exceptions noted in the table below, each well has been sampled according to the FRR.

Table 2. Well Identification, Site Orientation, and Collection Status

Station ID	Site Orientation	Collection Date						
		1Q95	4Q98	2Q99	4Q99	2Q00	4Q00	2Q01
SRW 2	side gradient	x	x	x	x	x	x	x
SRW 4	side gradient	x	x	x	x	x	3	3
SRW 7	down gradient	x	x	x	x	x	x	x
SRW 8	down gradient	x	x	x	x	x	x	x
SRW 9	down gradient	x	x	x	x	x	x	x
SRW 12C	down gradient	x	x	x	x	x	x	x
SRW 16C	up gradient	x	x	x	x	x	x	x
SRW 17DR	up gradient	1	x	x	x	x	x	x
SRW 18	up gradient	1	2	x	x	x	x	x
SRW 19	up gradient	1	2	x	x	3	3	3

x Sample Collected

1 Wells SRW 17DR, SRW 18, SRW 19 installed 3Q98.

2 Well did not stabilize, no sample was taken.

3 Well pumped dry, no sample was taken.

For the samples collected during the periods identified above, there have been no detectable levels of the listed contaminants in any of the upgradient wells or in the farthest downgradient well SRW-12C (Attachment 2). Since the initiation of the groundwater monitoring for the SRWU in the fourth quarter of 1998, there has been only one detection of any of the listed contaminants above MCLs. This occurred in well SRW-7 in the fourth quarter of 1999 when carbon tetrachloride was detected at 6.2 µg/L. For detected constituents, carbon tetrachloride in wells SRW 7, SRW 8, and SRW 9 and PCE in wells SRW 7 and SRW 8, where lab detection limits are low enough to observe changes in the 1 µg/L range, downward trends can be specifically noted.

The FRR states: "Analytes not exceeding background concentrations or SDWA MCLs, as applicable, for four (4) sequential monitoring events will be proposed for removal from the list for subsequent monitoring with concurrence by the USEPA and the SCDHEC." Based on the results to date, none of the constituents of concern (COCs) in the groundwater has been detected above MCLs in the last three monitoring events.

VII. Technical Assessment

The remedial action continues to operate and function as designed and is performing as expected.

The operating procedures, which are currently implemented, continue to maintain the effectiveness of response actions. Historical data do not indicate a history of remedy problems or potential remedy failure, which could place protectiveness at risk. There are no opportunities for optimization.

Maintenance and institutional controls, including access controls and field walk-downs, and semi-annual groundwater monitoring events, are in place to prevent exposure and monitor contaminant levels. No other actions are indicated that are necessary to ensure that immediate threats have been addressed are complete.

The exposure assumptions, toxicity data, cleanup levels, and remedial action objectives (RAOs) used at the time of remedy selection are still valid. There have been no changes in standards or TBCs, as identified in the ROD that call into question the protectiveness of the remedy

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

VIII. Issues

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

IX. Recommendations and Follow-up Actions

Upon submittal of the 2002 Federal Facility Agreement (FFA) Annual Progress Report, the need for continued monitoring should be assessed based on the data. If the results are in line with previous data (no exceeded MCLs), a proposal to remove the groundwater monitoring from the SRWU should be submitted to USEPA and SCDHEC.

X. Protectiveness Statement(s)

The remedy at SRWU is protective of human health and the environment, and exposure pathways that could result in unacceptable risks are being controlled. The remedy for the SRWU consisted of institutional controls and a confirmatory groundwater-monitoring program. The institutional controls that will maintain future industrial land use are being maintained. In addition, the groundwater monitoring results to date indicate that none of the COCs in the groundwater have been detected above MCLs in the last four monitoring events. Based on this data, SRS will seek to discontinue monitoring for the groundwater COCs per the FRR.

XI. Next Review

The next five-year review is scheduled for June 30, 2007.

Attachment 1

Documents Reviewed

WSRC, 1996a. *Corrective Measures Study/Feasibility Study for the Silverton Road Waste Unit (731-3A)* (U),WSRC-RP-96-100, Revision 1.1, August , Westinghouse Savannah River Company, Aiken, SC

WSRC, 1996b. *Final Baseline Risk Assessment for the Silverton Road Waste Unit (U)*, WSRC-RP-95-215, Rev. 1.1, January, Westinghouse Savannah River Company, Aiken, SC

WSRC, 1996c, *Final RFI/RI Report for the Silverton Road Waste Unit (U)*, WSRC-RP-95-214, Rev. 1.2, April, Westinghouse Savannah River Company, Aiken, SC

WSRC, 1997. *Record of Decision Remedial Alternative Selection for the Silverton Road Waste Unit (731-3A)* (U), WSRC-RP-96-171, Rev. 1, February , Westinghouse Savannah River Company, Aiken, SC

WSRC, 1998. *Final Remediation Report for the Silverton Road Waste Unit (73 1 -3A)* (U), WSRC-RP-97-153, Revision 1.1, March, Westinghouse Savannah River Company, Aiken, SC

Attachment 2

Silverton Road Waste Unit, Data Summary 1995-2001, 5-Year ROD Review Data

Post-ROD groundwater samples were collected from monitoring wells identified in the Final Remediation Report for the Silverton Road Waste Unit in November 2000 and March/May 2001. Table A2-1 provides a summary of these results. The evaluation of Pre- and Post- ROD groundwater sampling data from 1995 through 2001 sampling events concludes there is no significant evidence of increasing concentrations of 1,2–dichloroethane, carbon tetrachloride, dichloromethane, trichloroethylene, or tetrachloroethylene. Carbon tetrachloride, which was observed at a concentration of 6.2 micrograms per liter (above the MCL of 5 micrograms per liter) in well SRW-7 in November 1999, has decreased in concentration in each of the three subsequent sampling events.

The analytical data from the Post-ROD second semi-annual groundwater monitoring events indicate that the concentrations of the five volatile organic compounds sampled for in the groundwater monitoring wells are below their respective MCLs and therefore within the Safe Drinking Water Act (SDWA) limits.

If the observed VOC concentrations continue to be below MCLs, SRS will seek to discontinue monitoring for these VOCs as per the Final Remediation Report.

Table A2-1 Monitoring Well Data, Silverton Road, Second Quarter 2001

Well Name	Sample Date	Analyte Name	RQ*	Result	Units	MCL UGL
SRW 2	20-Nov-00	1,2-DICHLOROETHANE	U	5	UGL	5
SRW 2	20-Nov-00	CARBON TETRACHLORIDE	U	5	UGL	5
SRW 2	20-Nov-00	DICHLOROMETHANE (METHYLENE CHLORIDE)	U	10	UGL	5
SRW 2	20-Nov-00	TETRACHLOROETHYLENE	U	5	UGL	5
SRW 2	20-Nov-00	TRICHLOROETHYLENE	J	1.5	UGL	5
SRW 2	14-May-01	1,2-DICHLOROETHANE	U	1	UGL	5
SRW 2	14-May-01	CARBON TETRACHLORIDE	U	1	UGL	5
SRW 2	14-May-01	DICHLOROMETHANE (METHYLENE CHLORIDE)	U	10	UGL	5
SRW 2	14-May-01	TETRACHLOROETHYLENE	U	1	UGL	5
SRW 2	14-May-01	TRICHLOROETHYLENE		1.2	UGL	5
SRW 7	20-Nov-00	1,2-DICHLOROETHANE	U	5	UGL	5
SRW 7	20-Nov-00	CARBON TETRACHLORIDE	J	3.6	UGL	5
SRW 7	20-Nov-00	DICHLOROMETHANE (METHYLENE CHLORIDE)	U	10	UGL	5
SRW 7	20-Nov-00	TETRACHLOROETHYLENE	J	1.2	UGL	5
SRW 7	20-Nov-00	TRICHLOROETHYLENE	J	2.7	UGL	5
SRW 7	15-May-01	1,2-DICHLOROETHANE	J	0.67	UGL	5
SRW 7	15-May-01	CARBON TETRACHLORIDE		2.69	UGL	5
SRW 7	15-May-01	DICHLOROMETHANE (METHYLENE CHLORIDE)	J	0.85	UGL	5
SRW 7	15-May-01	TETRACHLOROETHYLENE	J	0.74	UGL	5
SRW 7	15-May-01	TRICHLOROETHYLENE		2.05	UGL	5
SRW 8	27-Nov-00	1,2-DICHLOROETHANE	U	5	UGL	5
SRW 8	27-Nov-00	CARBON TETRACHLORIDE	U	5	UGL	5
SRW 8	27-Nov-00	DICHLOROMETHANE (METHYLENE CHLORIDE)	U	10	UGL	5
SRW 8	27-Nov-00	TETRACHLOROETHYLENE	U	5	UGL	5
SRW 8	27-Nov-00	TRICHLOROETHYLENE	J	1.3	UGL	5
SRW 8	15-May-01	1,2-DICHLOROETHANE	U	1	UGL	5
SRW 8	15-May-01	CARBON TETRACHLORIDE		1.3	UGL	5
SRW 8	15-May-01	DICHLOROMETHANE (METHYLENE CHLORIDE)	U	10	UGL	5
SRW 8	15-May-01	TETRACHLOROETHYLENE	U	1	UGL	5
SRW 8	15-May-01	TRICHLOROETHYLENE		1.39	UGL	5
SRW 9	21-Nov-00	1,2-DICHLOROETHANE	U	5	UGL	5
SRW 9	21-Nov-00	CARBON TETRACHLORIDE	U	5	UGL	5
SRW 9	21-Nov-00	DICHLOROMETHANE (METHYLENE CHLORIDE)	U	10	UGL	5
SRW 9	21-Nov-00	TETRACHLOROETHYLENE	U	5	UGL	5
SRW 9	21-Nov-00	TRICHLOROETHYLENE	J	1.9	UGL	5
SRW 9	15-May-01	1,2-DICHLOROETHANE	U	1	UGL	5
SRW 9	15-May-01	CARBON TETRACHLORIDE		1.15	UGL	5
SRW 9	15-May-01	DICHLOROMETHANE (METHYLENE CHLORIDE)	J	0.98	UGL	5
SRW 9	15-May-01	TETRACHLOROETHYLENE	U	1	UGL	5
SRW 9	15-May-01	TRICHLOROETHYLENE		2.42	UGL	5
SRW 12C	21-Nov-00	1,2-DICHLOROETHANE	U	5	UGL	5
SRW 12C	21-Nov-00	1,2-DICHLOROETHANE	U	5	UGL	5
SRW 12C	21-Nov-00	1,2-DICHLOROETHANE	U	5	UGL	5

Well Name	Sample Date	Analyte Name	RQ*	Result	Units	MCL UGL
SRW 12C	21-Nov-00	CARBON TETRACHLORIDE	U	5	UGL	5
SRW 12C	21-Nov-00	CARBON TETRACHLORIDE	U	5	UGL	5
SRW 12C	21-Nov-00	CARBON TETRACHLORIDE	U	5	UGL	5
SRW 12C	21-Nov-00	DICHLOROMETHANE (METHYLENE CHLORIDE)	U	10	UGL	5
SRW 12C	21-Nov-00	DICHLOROMETHANE (METHYLENE CHLORIDE)	U	10	UGL	5
SRW 12C	21-Nov-00	DICHLOROMETHANE (METHYLENE CHLORIDE)	U	5	UGL	5
SRW 12C	21-Nov-00	TETRACHLOROETHYLENE	U	5	UGL	5
SRW 12C	21-Nov-00	TETRACHLOROETHYLENE	U	5	UGL	5
SRW 12C	21-Nov-00	TETRACHLOROETHYLENE	U	5	UGL	5
SRW 12C	21-Nov-00	TRICHLOROETHYLENE	U	5	UGL	5
SRW 12C	21-Nov-00	TRICHLOROETHYLENE	U	5	UGL	5
SRW 12C	21-Nov-00	TRICHLOROETHYLENE	U	5	UGL	5
SRW 12C	15-May-01	1,2-DICHLOROETHANE	U	1	UGL	5
SRW 12C	15-May-01	CARBON TETRACHLORIDE	U	1	UGL	5
SRW 12C	15-May-01	DICHLOROMETHANE (METHYLENE CHLORIDE)	U	10	UGL	5
SRW 12C	15-May-01	TETRACHLOROETHYLENE	U	1	UGL	5
SRW 12C	15-May-01	TRICHLOROETHYLENE	U	1	UGL	5
SRW 16C	20-Nov-00	1,2-DICHLOROETHANE	U	5	UGL	5
SRW 16C	20-Nov-00	CARBON TETRACHLORIDE	U	5	UGL	5
SRW 16C	20-Nov-00	DICHLOROMETHANE (METHYLENE CHLORIDE)	U	10	UGL	5
SRW 16C	20-Nov-00	TETRACHLOROETHYLENE	U	5	UGL	5
SRW 16C	20-Nov-00	TRICHLOROETHYLENE	U	5	UGL	5
SRW 16C	14-May-01	1,2-DICHLOROETHANE	U	1	UGL	5
SRW 16C	14-May-01	CARBON TETRACHLORIDE	U	1	UGL	5
SRW 16C	14-May-01	DICHLOROMETHANE (METHYLENE CHLORIDE)	U	10	UGL	5
SRW 16C	14-May-01	TETRACHLOROETHYLENE	U	1	UGL	5
SRW 16C	14-May-01	TRICHLOROETHYLENE	U	1	UGL	5
SRW 17DR	21-Nov-00	1,2-DICHLOROETHANE	U	5	UGL	5
SRW 17DR	21-Nov-00	CARBON TETRACHLORIDE	U	5	UGL	5
SRW 17DR	21-Nov-00	DICHLOROMETHANE (METHYLENE CHLORIDE)	U	10	UGL	5
SRW 17DR	21-Nov-00	TETRACHLOROETHYLENE	U	5	UGL	5
SRW 17DR	21-Nov-00	TRICHLOROETHYLENE	U	5	UGL	5
SRW 17DR	14-May-01	1,2-DICHLOROETHANE	U	1	UGL	5
SRW 17DR	14-May-01	1,2-DICHLOROETHANE	U	1	UGL	5
SRW 17DR	14-May-01	1,2-DICHLOROETHANE	U	5	UGL	5
SRW 17DR	14-May-01	CARBON TETRACHLORIDE	U	5	UGL	5
SRW 17DR	14-May-01	CARBON TETRACHLORIDE	U	1	UGL	5
SRW 17DR	14-May-01	CARBON TETRACHLORIDE	U	1	UGL	5
SRW 17DR	14-May-01	DICHLOROMETHANE (METHYLENE CHLORIDE)	U	10	UGL	5
SRW 17DR	14-May-01	DICHLOROMETHANE (METHYLENE CHLORIDE)	U	10	UGL	5
SRW 17DR	14-May-01	DICHLOROMETHANE (METHYLENE CHLORIDE)	U	5	UGL	5
SRW 17DR	14-May-01	TETRACHLOROETHYLENE	U	1	UGL	5
SRW 17DR	14-May-01	TETRACHLOROETHYLENE	U	1	UGL	5
SRW 17DR	14-May-01	TETRACHLOROETHYLENE	U	5	UGL	5
SRW 17DR	14-May-01	TRICHLOROETHYLENE	U	1	UGL	5

Well Name	Sample Date	Analyte Name	RQ*	Result	Units	MCL UGL
SRW 17DR	14-May-01	TRICHLOROETHYLENE	U	1	UGL	5
SRW 17DR	14-May-01	TRICHLOROETHYLENE	U	5	UGL	5
SRW 18	20-Nov-00	1,2-DICHLOROETHANE	U	5	UGL	5
SRW 18	20-Nov-00	CARBON TETRACHLORIDE	U	5	UGL	5
SRW 18	20-Nov-00	DICHLOROMETHANE (METHYLENE CHLORIDE)	U	10	UGL	5
SRW 18	20-Nov-00	TETRACHLOROETHYLENE	U	5	UGL	5
SRW 18	20-Nov-00	TRICHLOROETHYLENE	U	5	UGL	5
SRW 18	15-May-01	1,2-DICHLOROETHANE	U	1	UGL	5
SRW 18	15-May-01	CARBON TETRACHLORIDE	U	1	UGL	5
SRW 18	15-May-01	DICHLOROMETHANE (METHYLENE CHLORIDE)	U	10	UGL	5
SRW 18	15-May-01	TETRACHLOROETHYLENE	U	1	UGL	5
SRW 18	15-May-01	TRICHLOROETHYLENE	U	1	UGL	5

*Result Qualifier

Attachment 3

Silverton Road Waste Unit, Data Summary 1995-2001, 5-Year ROD Review Data

Table A3-1 Silverton Road Waste Unit, Data Summary 1995-2001

Station ID	Sample Collection Date	Analyte Name	Detection Limit	Sample Quantification Limit	Result Qualifier	Result	Result Units	MCL ppm
SRW 2	14-Feb-95	1,2-DICHLOROETHANE		1.67	U	1.67	UGL	5
SRW 2	23-Nov-98	1,2-DICHLOROETHANE	0.58	5	U	5	UGL	5
SRW 2	5-May-99	1,2-DICHLOROETHANE	0.58	5	U	5	UGL	5
SRW 2	18-Nov-99	1,2-DICHLOROETHANE	0.95	5	U	5	UGL	5
SRW 2	4-May-00	1,2-DICHLOROETHANE	0.95	5	U	5	UGL	5
SRW 2	20-Nov-00	1,2-DICHLOROETHANE	0.95	5	U	5	UGL	5
SRW 2	14-May-01	1,2-DICHLOROETHANE	0.39	1	U	1	UGL	5
SRW 4	15-Feb-95	1,2-DICHLOROETHANE		1.67	U	1.67	UGL	5
SRW 4	23-Nov-98	1,2-DICHLOROETHANE	0.58	5	U	5	UGL	5
SRW 4	5-May-99	1,2-DICHLOROETHANE	0.58	5	U	5	UGL	5
SRW 4	18-Nov-99	1,2-DICHLOROETHANE	0.95	5	U	5	UGL	5
SRW 4	25-May-00	1,2-DICHLOROETHANE	0.95	5	U	5	UGL	5
SRW 7	15-Feb-95	1,2-DICHLOROETHANE		1.67	U	1.67	UGL	5
SRW 7	23-Nov-98	1,2-DICHLOROETHANE	0.58	5	U	5	UGL	5
SRW 7	5-May-99	1,2-DICHLOROETHANE	0.58	5	U	5	UGL	5
SRW 7	18-Nov-99	1,2-DICHLOROETHANE	0.95	5	U	5	UGL	5
SRW 7	2-May-00	1,2-DICHLOROETHANE	0.95	5	U	5	UGL	5
SRW 7	20-Nov-00	1,2-DICHLOROETHANE	0.95	5	U	5	UGL	5
SRW 7	15-May-01	1,2-DICHLOROETHANE	0.39	1	J	0.67	UGL	5
SRW 8	9-Feb-95	1,2-DICHLOROETHANE		1.67	U	1.67	UGL	5
SRW 8	9-Feb-95	1,2-DICHLOROETHANE		5	U	5	UGL	5
SRW 8	23-Nov-98	1,2-DICHLOROETHANE	0.58	5	U	5	UGL	5
SRW 8	6-May-99	1,2-DICHLOROETHANE	0.58	5	U	5	UGL	5
SRW 8	18-Nov-99	1,2-DICHLOROETHANE	0.95	5	U	5	UGL	5
SRW 8	2-May-00	1,2-DICHLOROETHANE	0.95	5	U	5	UGL	5
SRW 8	27-Nov-00	1,2-DICHLOROETHANE	0.95	5	U	5	UGL	5
SRW 8	15-May-01	1,2-DICHLOROETHANE	0.39	1	U	1	UGL	5
SRW 9	9-Feb-95	1,2-DICHLOROETHANE		1.67	U	1.67	UGL	5
SRW 9	23-Nov-98	1,2-DICHLOROETHANE	0.58	5	U	5	UGL	5
SRW 9	10-May-99	1,2-DICHLOROETHANE	0.53	5	U	5	UGL	5
SRW 9	10-May-99	1,2-DICHLOROETHANE	0.58	5	U	5	UGL	5
SRW 9	10-May-99	1,2-DICHLOROETHANE	0.58	5	U	5	UGL	5
SRW 9	18-Nov-99	1,2-DICHLOROETHANE	0.95	5	U	5	UGL	5
SRW 9	2-May-00	1,2-DICHLOROETHANE	0.53	5	U	5	UGL	5
SRW 9	2-May-00	1,2-DICHLOROETHANE	0.95	5	U	5	UGL	5
SRW 9	2-May-00	1,2-DICHLOROETHANE	0.95	5	U	5	UGL	5
SRW 9	21-Nov-00	1,2-DICHLOROETHANE	0.95	5	U	5	UGL	5
SRW 9	15-May-01	1,2-DICHLOROETHANE	0.39	1	U	1	UGL	5
SRW 12C	9-Feb-95	1,2-DICHLOROETHANE		1.67	U	1.67	UGL	5
SRW 12C	23-Nov-98	1,2-DICHLOROETHANE	0.58	5	U	5	UGL	5
SRW 12C	5-May-99	1,2-DICHLOROETHANE	0.58	5	U	5	UGL	5

Station ID	Sample Collection Date	Analyte Name	Detection Limit	Sample Quantification Limit	Result Qualifier	Result	Result Units	MCL ppm
SRW 12C	18-Nov-99	1,2-DICHLOROETHANE	0.95	5	U	5	UGL	5
SRW 12C	2-May-00	1,2-DICHLOROETHANE	0.95	5	U	5	UGL	5
SRW 12C	21-Nov-00	1,2-DICHLOROETHANE	0.53	5	U	5	UGL	5
SRW 12C	21-Nov-00	1,2-DICHLOROETHANE	0.95	5	U	5	UGL	5
SRW 12C	21-Nov-00	1,2-DICHLOROETHANE	0.95	5	U	5	UGL	5
SRW 12C	15-May-01	1,2-DICHLOROETHANE	0.39	1	U	1	UGL	5
SRW 16C	15-Feb-95	1,2-DICHLOROETHANE		1.67	U	1.67	UGL	5
SRW 16C	23-Nov-98	1,2-DICHLOROETHANE	0.53	5	U	5	UGL	5
SRW 16C	23-Nov-98	1,2-DICHLOROETHANE	0.58	5	U	5	UGL	5
SRW 16C	10-May-99	1,2-DICHLOROETHANE	0.58	5	U	5	UGL	5
SRW 16C	18-Nov-99	1,2-DICHLOROETHANE	0.95	5	U	5	UGL	5
SRW 16C	18-Nov-99	1,2-DICHLOROETHANE	0.95	5	U	5	UGL	5
SRW 16C	2-May-00	1,2-DICHLOROETHANE	0.95	5	U	5	UGL	5
SRW 16C	20-Nov-00	1,2-DICHLOROETHANE	0.95	5	U	5	UGL	5
SRW 16C	14-May-01	1,2-DICHLOROETHANE	0.39	1	U	1	UGL	5
SRW 17DR	23-Nov-98	1,2-DICHLOROETHANE	0.58	5	U	5	UGL	5
SRW 17DR	5-May-99	1,2-DICHLOROETHANE	0.58	5	U	5	UGL	5
SRW 17DR	1-Dec-99	1,2-DICHLOROETHANE	0.95	5	U	5	UGL	5
SRW 17DR	3-May-00	1,2-DICHLOROETHANE	0.95	5	U	5	UGL	5
SRW 17DR	21-Nov-00	1,2-DICHLOROETHANE	0.95	5	U	5	UGL	5
SRW 17DR	14-May-01	1,2-DICHLOROETHANE	0.39	1	U	1	UGL	5
SRW 17DR	14-May-01	1,2-DICHLOROETHANE	0.39	1	U	1	UGL	5
SRW 17DR	14-May-01	1,2-DICHLOROETHANE	0.53	5	U	5	UGL	5
SRW 18	12-May-99	1,2-DICHLOROETHANE	0.58	5	U	5	UGL	5
SRW 18	2-Dec-99	1,2-DICHLOROETHANE	0.95	5	U	5	UGL	5
SRW 18	2-May-00	1,2-DICHLOROETHANE	0.95	5	U	5	UGL	5
SRW 18	20-Nov-00	1,2-DICHLOROETHANE	0.95	5	U	5	UGL	5
SRW 18	15-May-01	1,2-DICHLOROETHANE	0.39	1	U	1	UGL	5
SRW 19	10-May-99	1,2-DICHLOROETHANE	0.58	5	U	5	UGL	5
SRW 19	2-Dec-99	1,2-DICHLOROETHANE	0.95	5	U	5	UGL	5
SRW 2	14-Feb-95	CARBON TETRACHLORIDE		1.67	J	1.2	UGL	5
SRW 2	23-Nov-98	CARBON TETRACHLORIDE	1.28	5	U	5	UGL	5
SRW 2	5-May-99	CARBON TETRACHLORIDE	1.3	5	U	5	UGL	5
SRW 2	18-Nov-99	CARBON TETRACHLORIDE	0.83	5	U	5	UGL	5
SRW 2	4-May-00	CARBON TETRACHLORIDE	0.83	5	U	5	UGL	5
SRW 2	20-Nov-00	CARBON TETRACHLORIDE	0.83	5	U	5	UGL	5
SRW 2	14-May-01	CARBON TETRACHLORIDE	0.44	1	U	1	UGL	5
SRW 4	15-Feb-95	CARBON TETRACHLORIDE		1.67	U	1.67	UGL	5
SRW 4	23-Nov-98	CARBON TETRACHLORIDE	1.28	5	U	5	UGL	5
SRW 4	5-May-99	CARBON TETRACHLORIDE	1.3	5	U	5	UGL	5

Station ID	Sample Collection Date	Analyte Name	Detection Limit	Sample Quantification Limit	Result Qualifier	Result	Result Units	MCL ppm
SRW 4	18-Nov-99	CARBON TETRACHLORIDE	0.83	5	U	5	UGL	5
SRW 4	25-May-00	CARBON TETRACHLORIDE	0.83	5	U	5	UGL	5
SRW 7	15-Feb-95	CARBON TETRACHLORIDE		1.67		5.1	UGL	5
SRW 7	23-Nov-98	CARBON TETRACHLORIDE	1.28	5	J	3.78	UGL	5
SRW 7	5-May-99	CARBON TETRACHLORIDE	1.3	5	J	2.8	UGL	5
SRW 7	18-Nov-99	CARBON TETRACHLORIDE	0.83	5		6.2	UGL	5
SRW 7	2-May-00	CARBON TETRACHLORIDE	0.83	5	J	4.5	UGL	5
SRW 7	20-Nov-00	CARBON TETRACHLORIDE	0.83	5	J	3.6	UGL	5
SRW 7	15-May-01	CARBON TETRACHLORIDE	0.44	1		2.69	UGL	5
SRW 8	9-Feb-95	CARBON TETRACHLORIDE		1.67		3.64	UGL	5
SRW 8	9-Feb-95	CARBON TETRACHLORIDE		1.67		3.83	UGL	5
SRW 8	9-Feb-95	CARBON TETRACHLORIDE		5	J	3.34	UGL	5
SRW 8	9-Feb-95	CARBON TETRACHLORIDE		5	J	3.38	UGL	5
SRW 8	23-Nov-98	CARBON TETRACHLORIDE	1.28	5	U	5	UGL	5
SRW 8	6-May-99	CARBON TETRACHLORIDE	1.3	5	U	5	UGL	5
SRW 8	18-Nov-99	CARBON TETRACHLORIDE	0.83	5	J	2.8	UGL	5
SRW 8	2-May-00	CARBON TETRACHLORIDE	0.83	5	J	1.6	UGL	5
SRW 8	27-Nov-00	CARBON TETRACHLORIDE	0.83	5	U	5	UGL	5
SRW 8	15-May-01	CARBON TETRACHLORIDE	0.44	1		1.3	UGL	5
SRW 9	9-Feb-95	CARBON TETRACHLORIDE		1.67	U	1.67	UGL	5
SRW 9	23-Nov-98	CARBON TETRACHLORIDE	1.28	5	U	5	UGL	5
SRW 9	10-May-99	CARBON TETRACHLORIDE	1.3	5	U	5	UGL	5
SRW 9	10-May-99	CARBON TETRACHLORIDE	1.3	5	U	5	UGL	5
SRW 9	10-May-99	CARBON TETRACHLORIDE	2.07	5	U	5	UGL	5
SRW 9	18-Nov-99	CARBON TETRACHLORIDE	0.83	5	J	1.1	UGL	5
SRW 9	2-May-00	CARBON TETRACHLORIDE	0.188	5	J	1.1	UGL	5
SRW 9	2-May-00	CARBON TETRACHLORIDE	0.83	5	U	5	UGL	5
SRW 9	2-May-00	CARBON TETRACHLORIDE	0.83	5	U	5	UGL	5
SRW 9	21-Nov-00	CARBON TETRACHLORIDE	0.83	5	U	5	UGL	5
SRW 9	15-May-01	CARBON TETRACHLORIDE	0.44	1		1.15	UGL	5
SRW 12C	9-Feb-95	CARBON TETRACHLORIDE		1.67	U	1.67	UGL	5
SRW 12C	23-Nov-98	CARBON TETRACHLORIDE	1.28	5	U	5	UGL	5
SRW 12C	5-May-99	CARBON TETRACHLORIDE	1.3	5	U	5	UGL	5
SRW 12C	18-Nov-99	CARBON TETRACHLORIDE	0.83	5	U	5	UGL	5
SRW 12C	2-May-00	CARBON TETRACHLORIDE	0.83	5	U	5	UGL	5
SRW 12C	21-Nov-00	CARBON TETRACHLORIDE	0.83	5	U	5	UGL	5
SRW 12C	21-Nov-00	CARBON TETRACHLORIDE	0.83	5	U	5	UGL	5
SRW 12C	21-Nov-00	CARBON TETRACHLORIDE	2.07	5	U	5	UGL	5
SRW 12C	15-May-01	CARBON TETRACHLORIDE	0.44	1	U	1	UGL	5
SRW 16C	15-Feb-95	CARBON TETRACHLORIDE		1.67	U	1.67	UGL	5
SRW 16C	15-Feb-96	CARBON TETRACHLORIDE		2	U	2	UGL	5
SRW 16C	15-May-97	CARBON TETRACHLORIDE		1	U	1	UGL	5
SRW 16C	23-Nov-98	CARBON TETRACHLORIDE	1.28	5	U	5	UGL	5

Station ID	Sample Collection Date	Analyte Name	Detection Limit	Sample Quantification Limit	Result Qualifier	Result	Result Units	MCL ppm
SRW 16C	23-Nov-98	CARBON TETRACHLORIDE	2.07	5	U	5	UGL	5
SRW 16C	10-May-99	CARBON TETRACHLORIDE	1.3	5	U	5	UGL	5
SRW 16C	27-Aug-99	CARBON TETRACHLORIDE	0.154	1	U	1	UGL	5
SRW 16C	18-Nov-99	CARBON TETRACHLORIDE	0.83	5	U	5	UGL	5
SRW 16C	18-Nov-99	CARBON TETRACHLORIDE	0.83	5	U	5	UGL	5
SRW 16C	2-May-00	CARBON TETRACHLORIDE	0.83	5	U	5	UGL	5
SRW 16C	20-Nov-00	CARBON TETRACHLORIDE	0.83	5	U	5	UGL	5
SRW 16C	14-May-01	CARBON TETRACHLORIDE	0.44	1	U	1	UGL	5
SRW 17DR	23-Nov-98	CARBON TETRACHLORIDE	1.28	5	U	5	UGL	5
SRW 17DR	5-May-99	CARBON TETRACHLORIDE	1.3	5	U	5	UGL	5
SRW 17DR	1-Dec-99	CARBON TETRACHLORIDE	0.83	5	U	5	UGL	5
SRW 17DR	3-May-00	CARBON TETRACHLORIDE	0.83	5	U	5	UGL	5
SRW 17DR	21-Nov-00	CARBON TETRACHLORIDE	0.83	5	U	5	UGL	5
SRW 17DR	14-May-01	CARBON TETRACHLORIDE	0.188	5	U	5	UGL	5
SRW 17DR	14-May-01	CARBON TETRACHLORIDE	0.44	1	U	1	UGL	5
SRW 17DR	14-May-01	CARBON TETRACHLORIDE	0.44	1	U	1	UGL	5
SRW 18	12-May-99	CARBON TETRACHLORIDE	1.3	5	U	5	UGL	5
SRW 18	2-Dec-99	CARBON TETRACHLORIDE	0.83	5	U	5	UGL	5
SRW 18	2-May-00	CARBON TETRACHLORIDE	0.83	5	U	5	UGL	5
SRW 18	20-Nov-00	CARBON TETRACHLORIDE	0.83	5	U	5	UGL	5
SRW 18	15-May-01	CARBON TETRACHLORIDE	0.44	1	U	1	UGL	5
SRW 19	10-May-99	CARBON TETRACHLORIDE	1.3	5	U	5	UGL	5
SRW 19	2-Dec-99	CARBON TETRACHLORIDE	0.83	5	U	5	UGL	5
SRW 2	14-Feb-95	CHLOROMETHANE (METHYL CHLORIDE)		1.67	U	1.67	UGL	5
SRW 2	23-Nov-98	CHLOROMETHANE (METHYL CHLORIDE)	1.69	5	U	5	UGL	5
SRW 2	5-May-99	CHLOROMETHANE (METHYL CHLORIDE)	1.7	5	U	5	UGL	5
SRW 2	18-Nov-99	CHLOROMETHANE (METHYL CHLORIDE)	0.67	5	U	5	UGL	5
SRW 2	4-May-00	CHLOROMETHANE (METHYL CHLORIDE)	0.67	5	U	5	UGL	5
SRW 2	20-Nov-00	CHLOROMETHANE (METHYL CHLORIDE)	0.67	5	U	5	UGL	5
SRW 2	14-May-01	CHLOROMETHANE (METHYL CHLORIDE)	0.78	1	U	1	UGL	5
SRW 4	15-Feb-95	CHLOROMETHANE (METHYL CHLORIDE)		1.67	U	1.67	UGL	5
SRW 4	23-Nov-98	CHLOROMETHANE (METHYL CHLORIDE)	1.69	5	U	5	UGL	5
SRW 4	5-May-99	CHLOROMETHANE (METHYL CHLORIDE)	1.7	5	U	5	UGL	5
SRW 4	18-Nov-99	CHLOROMETHANE (METHYL CHLORIDE)	0.67	5	U	5	UGL	5
SRW 4	25-May-00	CHLOROMETHANE (METHYL CHLORIDE)	0.67	5	U	5	UGL	5

Station ID	Sample Collection Date	Analyte Name	Detection Limit	Sample Quantification Limit	Result Qualifier	Result	Result Units	MCL ppm
SRW 7	15-Feb-95	CHLOROMETHANE (METHYL CHLORIDE)		1.67	U	1.67	UGL	5
SRW 7	23-Nov-98	CHLOROMETHANE (METHYL CHLORIDE)	1.69	5	U	5	UGL	5
SRW 7	5-May-99	CHLOROMETHANE (METHYL CHLORIDE)	1.7	5	U	5	UGL	5
SRW 7	18-Nov-99	CHLOROMETHANE (METHYL CHLORIDE)	0.67	5	U	5	UGL	5
SRW 7	2-May-00	CHLOROMETHANE (METHYL CHLORIDE)	0.67	5	U	5	UGL	5
SRW 7	20-Nov-00	CHLOROMETHANE (METHYL CHLORIDE)	0.67	5	U	5	UGL	5
SRW 7	15-May-01	CHLOROMETHANE (METHYL CHLORIDE)	0.78	1	U	1	UGL	5
SRW 8	9-Feb-95	CHLOROMETHANE (METHYL CHLORIDE)		1.67	U	1.67	UGL	5
SRW 8	9-Feb-95	CHLOROMETHANE (METHYL CHLORIDE)		10	U	10	UGL	5
SRW 8	23-Nov-98	CHLOROMETHANE (METHYL CHLORIDE)	1.69	5	U	5	UGL	5
SRW 8	6-May-99	CHLOROMETHANE (METHYL CHLORIDE)	1.7	5	U	5	UGL	5
SRW 8	18-Nov-99	CHLOROMETHANE (METHYL CHLORIDE)	0.67	5	U	5	UGL	5
SRW 8	2-May-00	CHLOROMETHANE (METHYL CHLORIDE)	0.67	5	U	5	UGL	5
SRW 8	27-Nov-00	CHLOROMETHANE (METHYL CHLORIDE)	0.67	5	U	5	UGL	5
SRW 8	15-May-01	CHLOROMETHANE (METHYL CHLORIDE)	0.78	1	U	1	UGL	5
SRW 9	9-Feb-95	CHLOROMETHANE (METHYL CHLORIDE)		1.67	U	1.67	UGL	5
SRW 9	23-Nov-98	CHLOROMETHANE (METHYL CHLORIDE)	1.69	5	U	5	UGL	5
SRW 9	10-May-99	CHLOROMETHANE (METHYL CHLORIDE)	1.7	5	U	5	UGL	5
SRW 9	10-May-99	CHLOROMETHANE (METHYL CHLORIDE)	1.7	5	U	5	UGL	5
SRW 9	10-May-99	CHLOROMETHANE (METHYL CHLORIDE)	2.19	10	U	10	UGL	5
SRW 9	18-Nov-99	CHLOROMETHANE (METHYL CHLORIDE)	0.67	5	U	5	UGL	5
SRW 9	2-May-00	CHLOROMETHANE (METHYL CHLORIDE)	0.67	5	U	5	UGL	5
SRW 9	2-May-00	CHLOROMETHANE (METHYL CHLORIDE)	0.67	5	U	5	UGL	5
SRW 9	2-May-00	CHLOROMETHANE (METHYL CHLORIDE)	2.19	10	U	10	UGL	5
SRW 9	21-Nov-00	CHLOROMETHANE (METHYL CHLORIDE)	0.67	5	U	5	UGL	5
SRW 9	15-May-01	CHLOROMETHANE (METHYL CHLORIDE)	0.78	1	U	1	UGL	5
SRW 12C	9-Feb-95	CHLOROMETHANE (METHYL CHLORIDE)		1.67	U	1.67	UGL	5
SRW 12C	23-Nov-98	CHLOROMETHANE (METHYL CHLORIDE)	1.69	5	U	5	UGL	5
SRW 12C	5-May-99	CHLOROMETHANE (METHYL CHLORIDE)	1.7	5	U	5	UGL	5
SRW 12C	18-Nov-99	CHLOROMETHANE (METHYL CHLORIDE)	0.67	5	U	5	UGL	5
SRW 12C	2-May-00	CHLOROMETHANE	0.67	5	U	5	UGL	5

Station ID	Sample Collection Date	Analyte Name	Detection Limit	Sample Quantification Limit	Result Qualifier	Result	Result Units	MCL ppm
		(METHYL CHLORIDE)						
SRW 12C	21-Nov-00	CHLOROMETHANE (METHYL CHLORIDE)	0.67	5	U	5	UGL	5
SRW 12C	21-Nov-00	CHLOROMETHANE (METHYL CHLORIDE)	0.67	5	U	5	UGL	5
SRW 12C	21-Nov-00	CHLOROMETHANE (METHYL CHLORIDE)	2.19	10	U	10	UGL	5
SRW 12C	15-May-01	CHLOROMETHANE (METHYL CHLORIDE)	0.78	1	U	1	UGL	5
SRW 16C	15-Feb-95	CHLOROMETHANE (METHYL CHLORIDE)		1.67	U	1.67	UGL	5
SRW 16C	23-Nov-98	CHLOROMETHANE (METHYL CHLORIDE)	1.69	5	U	5	UGL	5
SRW 16C	23-Nov-98	CHLOROMETHANE (METHYL CHLORIDE)	2.19	10	U	10	UGL	5
SRW 16C	10-May-99	CHLOROMETHANE (METHYL CHLORIDE)	1.7	5	U	5	UGL	5
SRW 16C	18-Nov-99	CHLOROMETHANE (METHYL CHLORIDE)	0.67	5	U	5	UGL	5
SRW 16C	18-Nov-99	CHLOROMETHANE (METHYL CHLORIDE)	0.67	5	U	5	UGL	5
SRW 16C	2-May-00	CHLOROMETHANE (METHYL CHLORIDE)	0.67	5	U	5	UGL	5
SRW 16C	20-Nov-00	CHLOROMETHANE (METHYL CHLORIDE)	0.67	5	U	5	UGL	5
SRW 16C	14-May-01	CHLOROMETHANE (METHYL CHLORIDE)	0.78	1	U	1	UGL	5
SRW 17DR	23-Nov-98	CHLOROMETHANE (METHYL CHLORIDE)	1.69	5	U	5	UGL	5
SRW 17DR	5-May-99	CHLOROMETHANE (METHYL CHLORIDE)	1.7	5	U	5	UGL	5
SRW 17DR	1-Dec-99	CHLOROMETHANE (METHYL CHLORIDE)	0.67	5	U	5	UGL	5
SRW 17DR	3-May-00	CHLOROMETHANE (METHYL CHLORIDE)	0.67	5	U	5	UGL	5
SRW 17DR	21-Nov-00	CHLOROMETHANE (METHYL CHLORIDE)	0.67	5	U	5	UGL	5
SRW 17DR	14-May-01	CHLOROMETHANE (METHYL CHLORIDE)	0.78	1	U	1	UGL	5
SRW 17DR	14-May-01	CHLOROMETHANE (METHYL CHLORIDE)	0.78	1	U	1	UGL	5
SRW 17DR	14-May-01	CHLOROMETHANE (METHYL CHLORIDE)	2.19	10	U	10	UGL	5
SRW 18	12-May-99	CHLOROMETHANE (METHYL CHLORIDE)	1.7	5	U	5	UGL	5
SRW 18	2-Dec-99	CHLOROMETHANE (METHYL CHLORIDE)	0.67	5	U	5	UGL	5
SRW 18	2-May-00	CHLOROMETHANE (METHYL CHLORIDE)	0.67	5	U	5	UGL	5
SRW 18	20-Nov-00	CHLOROMETHANE (METHYL CHLORIDE)	0.67	5	U	5	UGL	5
SRW 18	15-May-01	CHLOROMETHANE (METHYL CHLORIDE)	0.78	1	U	1	UGL	5
SRW 19	10-May-99	CHLOROMETHANE (METHYL CHLORIDE)	1.7	5	U	5	UGL	5
SRW 19	2-Dec-99	CHLOROMETHANE (METHYL CHLORIDE)	0.67	5	U	5	UGL	5
SRW 2	14-Feb-95	TETRACHLOROETHYLENE		1.67	U	1.67	UGL	5
SRW 2	23-Nov-98	TETRACHLOROETHYLENE	1.22	5	U	5	UGL	5
SRW 2	5-May-99	TETRACHLOROETHYLENE	1.2	5	U	5	UGL	5

Station ID	Sample Collection Date	Analyte Name	Detection Limit	Sample Quantification Limit	Result Qualifier	Result	Result Units	MCL ppm
SRW 2	18-Nov-99	TETRACHLOROETHYLENE	1.1	5	U	5	UGL	5
SRW 2	4-May-00	TETRACHLOROETHYLENE	1.1	5	U	5	UGL	5
SRW 2	20-Nov-00	TETRACHLOROETHYLENE	1.1	5	U	5	UGL	5
SRW 2	14-May-01	TETRACHLOROETHYLENE	0.42	1	U	1	UGL	5
SRW 4	15-Feb-95	TETRACHLOROETHYLENE		1.67	U	1.67	UGL	5
SRW 4	23-Nov-98	TETRACHLOROETHYLENE	1.22	5	U	5	UGL	5
SRW 4	5-May-99	TETRACHLOROETHYLENE	1.2	5	U	5	UGL	5
SRW 4	18-Nov-99	TETRACHLOROETHYLENE	1.1	5	U	5	UGL	5
SRW 4	25-May-00	TETRACHLOROETHYLENE	1.1	5	U	5	UGL	5
SRW 7	15-Feb-95	TETRACHLOROETHYLENE		1.67	J	1.2	UGL	5
SRW 7	23-Nov-98	TETRACHLOROETHYLENE	1.22	5	U	5	UGL	5
SRW 7	5-May-99	TETRACHLOROETHYLENE	1.2	5	J	1.4	UGL	5
SRW 7	18-Nov-99	TETRACHLOROETHYLENE	1.1	5	J	1.8	UGL	5
SRW 7	2-May-00	TETRACHLOROETHYLENE	1.1	5	J	1.3	UGL	5
SRW 7	20-Nov-00	TETRACHLOROETHYLENE	1.1	5	J	1.2	UGL	5
SRW 7	15-May-01	TETRACHLOROETHYLENE	0.42	1	J	0.74	UGL	5
SRW 8	9-Feb-95	TETRACHLOROETHYLENE		1.67	J	1.01	UGL	5
SRW 8	9-Feb-95	TETRACHLOROETHYLENE		1.67	J	1.06	UGL	5
SRW 8	9-Feb-95	TETRACHLOROETHYLENE		5	J	1.12	UGL	5
SRW 8	9-Feb-95	TETRACHLOROETHYLENE		5	J	1.28	UGL	5
SRW 8	23-Nov-98	TETRACHLOROETHYLENE	1.22	5	U	5	UGL	5
SRW 8	6-May-99	TETRACHLOROETHYLENE	1.2	5	U	5	UGL	5
SRW 8	18-Nov-99	TETRACHLOROETHYLENE	1.1	5	U	5	UGL	5
SRW 8	2-May-00	TETRACHLOROETHYLENE	1.1	5	U	5	UGL	5
SRW 8	27-Nov-00	TETRACHLOROETHYLENE	1.1	5	U	5	UGL	5
SRW 8	15-May-01	TETRACHLOROETHYLENE	0.42	1	U	1	UGL	5
SRW 9	9-Feb-95	TETRACHLOROETHYLENE		1.67	U	1.67	UGL	5
SRW 9	23-Nov-98	TETRACHLOROETHYLENE	1.22	5	U	5	UGL	5
SRW 9	10-May-99	TETRACHLOROETHYLENE	0.38	5	U	5	UGL	5
SRW 9	10-May-99	TETRACHLOROETHYLENE	1.2	5	U	5	UGL	5
SRW 9	10-May-99	TETRACHLOROETHYLENE	1.2	5	U	5	UGL	5
SRW 9	18-Nov-99	TETRACHLOROETHYLENE	1.1	5	U	5	UGL	5
SRW 9	2-May-00	TETRACHLOROETHYLENE	0.38	5	U	5	UGL	5
SRW 9	2-May-00	TETRACHLOROETHYLENE	1.1	5	U	5	UGL	5
SRW 9	2-May-00	TETRACHLOROETHYLENE	1.1	5	U	5	UGL	5
SRW 9	21-Nov-00	TETRACHLOROETHYLENE	1.1	5	U	5	UGL	5
SRW 9	15-May-01	TETRACHLOROETHYLENE	0.42	1	U	1	UGL	5
SRW 12C	9-Feb-95	TETRACHLOROETHYLENE		1.67	U	1.67	UGL	5
SRW 12C	23-Nov-98	TETRACHLOROETHYLENE	1.22	5	U	5	UGL	5
SRW 12C	5-May-99	TETRACHLOROETHYLENE	1.2	5	U	5	UGL	5
SRW 12C	18-Nov-99	TETRACHLOROETHYLENE	1.1	5	U	5	UGL	5
SRW 12C	2-May-00	TETRACHLOROETHYLENE	1.1	5	U	5	UGL	5
SRW 12C	21-Nov-00	TETRACHLOROETHYLENE	0.38	5	U	5	UGL	5

Station ID	Sample Collection Date	Analyte Name	Detection Limit	Sample Quantification Limit	Result Qualifier	Result	Result Units	MCL ppm
SRW 12C	21-Nov-00	TETRACHLOROETHYLENE	1.1	5	U	5	UGL	5
SRW 12C	21-Nov-00	TETRACHLOROETHYLENE	1.1	5	U	5	UGL	5
SRW 12C	15-May-01	TETRACHLOROETHYLENE	0.42	1	U	1	UGL	5
SRW 16C	15-Feb-95	TETRACHLOROETHYLENE		1.67	U	1.67	UGL	5
SRW 16C	15-Feb-96	TETRACHLOROETHYLENE		2	U	2	UGL	5
SRW 16C	15-May-97	TETRACHLOROETHYLENE		1	U	1	UGL	5
SRW 16C	23-Nov-98	TETRACHLOROETHYLENE	1.22	5	U	5	UGL	5
SRW 16C	23-Nov-98	TETRACHLOROETHYLENE	1.45	5	U	5	UGL	5
SRW 16C	10-May-99	TETRACHLOROETHYLENE	1.2	5	U	5	UGL	5
SRW 16C	27-Aug-99	TETRACHLOROETHYLENE	0.229	1	U	1	UGL	5
SRW 16C	18-Nov-99	TETRACHLOROETHYLENE	1.1	5	U	5	UGL	5
SRW 16C	18-Nov-99	TETRACHLOROETHYLENE	1.1	5	U	5	UGL	5
SRW 16C	2-May-00	TETRACHLOROETHYLENE	1.1	5	U	5	UGL	5
SRW 16C	20-Nov-00	TETRACHLOROETHYLENE	1.1	5	U	5	UGL	5
SRW 16C	14-May-01	TETRACHLOROETHYLENE	0.42	1	U	1	UGL	5
SRW 17DR	23-Nov-98	TETRACHLOROETHYLENE	1.22	5	U	5	UGL	5
SRW 17DR	5-May-99	TETRACHLOROETHYLENE	1.2	5	U	5	UGL	5
SRW 17DR	1-Dec-99	TETRACHLOROETHYLENE	1.1	5	U	5	UGL	5
SRW 17DR	3-May-00	TETRACHLOROETHYLENE	1.1	5	U	5	UGL	5
SRW 17DR	21-Nov-00	TETRACHLOROETHYLENE	1.1	5	U	5	UGL	5
SRW 17DR	14-May-01	TETRACHLOROETHYLENE	0.42	1	U	1	UGL	5
SRW 17DR	14-May-01	TETRACHLOROETHYLENE	0.42	1	U	1	UGL	5
SRW 17DR	14-May-01	TETRACHLOROETHYLENE	0.77	5	U	5	UGL	5
SRW 18	12-May-99	TETRACHLOROETHYLENE	1.2	5	U	5	UGL	5
SRW 18	2-Dec-99	TETRACHLOROETHYLENE	1.1	5	U	5	UGL	5
SRW 18	2-May-00	TETRACHLOROETHYLENE	1.1	5	U	5	UGL	5
SRW 18	20-Nov-00	TETRACHLOROETHYLENE	1.1	5	U	5	UGL	5
SRW 18	15-May-01	TETRACHLOROETHYLENE	0.42	1	U	1	UGL	5
SRW 19	10-May-99	TETRACHLOROETHYLENE	1.2	5	U	5	UGL	5
SRW 19	2-Dec-99	TETRACHLOROETHYLENE	1.1	5	U	5	UGL	5
SRW 2	14-Feb-95	TRICHLOROETHYLENE		1.67		1.8	UGL	5
SRW 2	23-Nov-98	TRICHLOROETHYLENE	0.9	5	J	1.86	UGL	5
SRW 2	5-May-99	TRICHLOROETHYLENE	0.9	5	J	1.9	UGL	5
SRW 2	18-Nov-99	TRICHLOROETHYLENE	0.89	5	J	1.5	UGL	5
SRW 2	4-May-00	TRICHLOROETHYLENE	0.89	5	J	1.6	UGL	5
SRW 2	20-Nov-00	TRICHLOROETHYLENE	0.89	5	J	1.5	UGL	5
SRW 2	14-May-01	TRICHLOROETHYLENE	0.6	1		1.2	UGL	5
SRW 4	15-Feb-95	TRICHLOROETHYLENE		1.67	U	1.67	UGL	5
SRW 4	23-Nov-98	TRICHLOROETHYLENE	0.9	5	U	5	UGL	5
SRW 4	5-May-99	TRICHLOROETHYLENE	0.9	5	U	5	UGL	5

Station ID	Sample Collection Date	Analyte Name	Detection Limit	Sample Quantification Limit	Result Qualifier	Result	Result Units	MCL ppm
SRW 4	18-Nov-99	TRICHLOROETHYLENE	0.89	5	U	5	UGL	5
SRW 4	25-May-00	TRICHLOROETHYLENE	0.89	5	U	5	UGL	5
SRW 7	15-Feb-95	TRICHLOROETHYLENE		1.67	J	1.5	UGL	5
SRW 7	23-Nov-98	TRICHLOROETHYLENE	0.9	5	J	1.55	UGL	5
SRW 7	5-May-99	TRICHLOROETHYLENE	0.9	5	U	5	UGL	5
SRW 7	18-Nov-99	TRICHLOROETHYLENE	0.89	5	J	2.4	UGL	5
SRW 7	2-May-00	TRICHLOROETHYLENE	0.89	5	J	2.5	UGL	5
SRW 7	20-Nov-00	TRICHLOROETHYLENE	0.89	5	J	2.7	UGL	5
SRW 7	15-May-01	TRICHLOROETHYLENE	0.6	1		2.05	UGL	5
SRW 8	9-Feb-95	TRICHLOROETHYLENE		1.67		4.22	UGL	5
SRW 8	9-Feb-95	TRICHLOROETHYLENE		1.67		4.32	UGL	5
SRW 8	9-Feb-95	TRICHLOROETHYLENE		5		4.52	UGL	5
SRW 8	9-Feb-95	TRICHLOROETHYLENE		5		4.57	UGL	5
SRW 8	23-Nov-98	TRICHLOROETHYLENE	0.9	5	J	1.23	UGL	5
SRW 8	6-May-99	TRICHLOROETHYLENE	0.9	5	J	3.1	UGL	5
SRW 8	18-Nov-99	TRICHLOROETHYLENE	0.89	5	J	1.8	UGL	5
SRW 8	2-May-00	TRICHLOROETHYLENE	0.89	5	J	1.8	UGL	5
SRW 8	27-Nov-00	TRICHLOROETHYLENE	0.89	5	J	1.3	UGL	5
SRW 8	15-May-01	TRICHLOROETHYLENE	0.6	1		1.39	UGL	5
SRW 9	9-Feb-95	TRICHLOROETHYLENE		1.67		2.4	UGL	5
SRW 9	23-Nov-98	TRICHLOROETHYLENE	0.9	5	J	2.69	UGL	5
SRW 9	10-May-99	TRICHLOROETHYLENE	0.22	5	J	2.52	UGL	5
SRW 9	10-May-99	TRICHLOROETHYLENE	0.9	5	J	2.9	UGL	5
SRW 9	10-May-99	TRICHLOROETHYLENE	0.9	5	J	2.9	UGL	5
SRW 9	18-Nov-99	TRICHLOROETHYLENE	0.89	5	J	2.7	UGL	5
SRW 9	2-May-00	TRICHLOROETHYLENE	0.22	5	J	2.17	UGL	5
SRW 9	2-May-00	TRICHLOROETHYLENE	0.89	5	J	2.1	UGL	5
SRW 9	2-May-00	TRICHLOROETHYLENE	0.89	5	J	2.1	UGL	5
SRW 9	21-Nov-00	TRICHLOROETHYLENE	0.89	5	J	1.9	UGL	5
SRW 9	15-May-01	TRICHLOROETHYLENE	0.6	1		2.42	UGL	5
SRW 12C	9-Feb-95	TRICHLOROETHYLENE		1.67	U	1.67	UGL	5
SRW 12C	23-Nov-98	TRICHLOROETHYLENE	0.9	5	U	5	UGL	5
SRW 12C	5-May-99	TRICHLOROETHYLENE	0.9	5	U	5	UGL	5
SRW 12C	18-Nov-99	TRICHLOROETHYLENE	0.89	5	U	5	UGL	5
SRW 12C	2-May-00	TRICHLOROETHYLENE	0.89	5	U	5	UGL	5
SRW 12C	21-Nov-00	TRICHLOROETHYLENE	0.22	5	U	5	UGL	5
SRW 12C	21-Nov-00	TRICHLOROETHYLENE	0.89	5	U	5	UGL	5
SRW 12C	21-Nov-00	TRICHLOROETHYLENE	0.89	5	U	5	UGL	5
SRW 12C	15-May-01	TRICHLOROETHYLENE	0.6	1	U	1	UGL	5
SRW 16C	15-Feb-95	TRICHLOROETHYLENE		1.67	U	1.67	UGL	5
SRW 16C	15-Feb-96	TRICHLOROETHYLENE		2	U	2	UGL	5
SRW 16C	15-May-97	TRICHLOROETHYLENE		1	U	1	UGL	5
SRW 16C	23-Nov-98	TRICHLOROETHYLENE	0.22	5	U	5	UGL	5

Station ID	Sample Collection Date	Analyte Name	Detection Limit	Sample Quantification Limit	Result Qualifier	Result	Result Units	MCL ppm
SRW 16C	23-Nov-98	TRICHLOROETHYLENE	0.9	5	U	5	UGL	5
SRW 16C	10-May-99	TRICHLOROETHYLENE	0.9	5	U	5	UGL	5
SRW 16C	27-Aug-99	TRICHLOROETHYLENE	0.075	1	U	1	UGL	5
SRW 16C	18-Nov-99	TRICHLOROETHYLENE	0.89	5	U	5	UGL	5
SRW 16C	18-Nov-99	TRICHLOROETHYLENE	0.89	5	U	5	UGL	5
SRW 16C	2-May-00	TRICHLOROETHYLENE	0.89	5	U	5	UGL	5
SRW 16C	20-Nov-00	TRICHLOROETHYLENE	0.89	5	U	5	UGL	5
SRW 16C	14-May-01	TRICHLOROETHYLENE	0.6	1	U	1	UGL	5
SRW 17DR	23-Nov-98	TRICHLOROETHYLENE	0.9	5	U	5	UGL	5
SRW 17DR	5-May-99	TRICHLOROETHYLENE	0.9	5	U	5	UGL	5
SRW 17DR	1-Dec-99	TRICHLOROETHYLENE	0.89	5	U	5	UGL	5
SRW 17DR	3-May-00	TRICHLOROETHYLENE	0.89	5	U	5	UGL	5
SRW 17DR	21-Nov-00	TRICHLOROETHYLENE	0.89	5	U	5	UGL	5
SRW 17DR	14-May-01	TRICHLOROETHYLENE	0.6	1	U	1	UGL	5
SRW 17DR	14-May-01	TRICHLOROETHYLENE	0.6	1	U	1	UGL	5
SRW 17DR	14-May-01	TRICHLOROETHYLENE	0.839	5	U	5	UGL	5
SRW 18	12-May-99	TRICHLOROETHYLENE	0.9	5	U	5	UGL	5
SRW 18	2-Dec-99	TRICHLOROETHYLENE	0.89	5	U	5	UGL	5
SRW 18	2-May-00	TRICHLOROETHYLENE	0.89	5	U	5	UGL	5
SRW 18	20-Nov-00	TRICHLOROETHYLENE	0.89	5	U	5	UGL	5
SRW 18	15-May-01	TRICHLOROETHYLENE	0.6	1	U	1	UGL	5
SRW 19	10-May-99	TRICHLOROETHYLENE	0.9	5	U	5	UGL	5
SRW 19	2-Dec-99	TRICHLOROETHYLENE	0.89	5	U	5	UGL	5

Attachment 4

Five-Year Review Site Inspection Checklist

Attachment 5

Site Inspection Sheet

and

Maintenance Request Forms

WORKING COPY - VERIFIED TO BE THE LATEST REVISION PRIOR TO USE.

BY: [signature] DATE: 7-10-01 BY: _____ DATE: _____

INSPECTION DATA SHEET FOR THE SILVERTON ROAD WASTE SITE

A= Satisfactory X= Unsatisfactory (Comments required)	A or X	Comments or Corrective Action Taken (See Maintenance Register for corrected items)
1. Check for potential encroachments. (Ensure there is no building on the site).	A	
2. Does site have brush or woody vegetation that needs cutting and disposal?	A	
3. Does site need mowing?	X	SITE NEEDS MOWING (NEW OBSERVATION/SEE MAP NOTE ①)
4. Is there proper vegetation growth at the unit?	X	BARE SPOTS ON THE WASTE UNIT. (NEW OBSERVATION/SEE MAP NOTE ②)
5. Verify wells and roads are accessible.	A	

INSPECTION DATA SHEET FOR THE SILVERTON ROAD WASTE SITE

A= Satisfactory X= Unsatisfactory (Comments required)	A or X	**Comments or Corrective Action Taken** (See Maintenance Register for corrected items)
6. Are the wells properly locked per R.61-71.11.C.6?	A	
7. Is the concrete pad cracked or broken? Is the pad undercut or silted over?	A	
8. Is the well properly identified per R.61-71.6H?	A	
9.. Verify the wells posts and protective covers (within the waste unit, i.e. orange balls) are in place.	A	

INSPECTION DATA SHEET FOR THE SILVERTON ROAD WASTE SITE

10. Signs shall be legible from a distance of at least 25 feet and from any direction. The signs will read: Silverton Road Waste Unit Building 731-3A "Danger – Unauthorized Personnel Keep Out. This waste unit was used to manage hazardous substances. Do not dig or excavate. Do not enter without contacting the waste site custodian." Custodian: Manager, Post Closure Maintenance Phone: (803) 952-6882	A	
11. Does site show signs of erosion or subsidence? Are there any signs of burrowing animals (holes)? Excavation below three (3) feet is prohibited.	A	
12. Verify orange ball markers are in place.	A	NOTE: REMOVE VEGETATION/TREES OBSTRUCTING MARKER (ORANGE BALL) (NEW OBSERVATION/SEE MAP NOTE (3)).

INSPECTION DATA SHEET FOR THE SILVERTON ROAD WASTE SITE

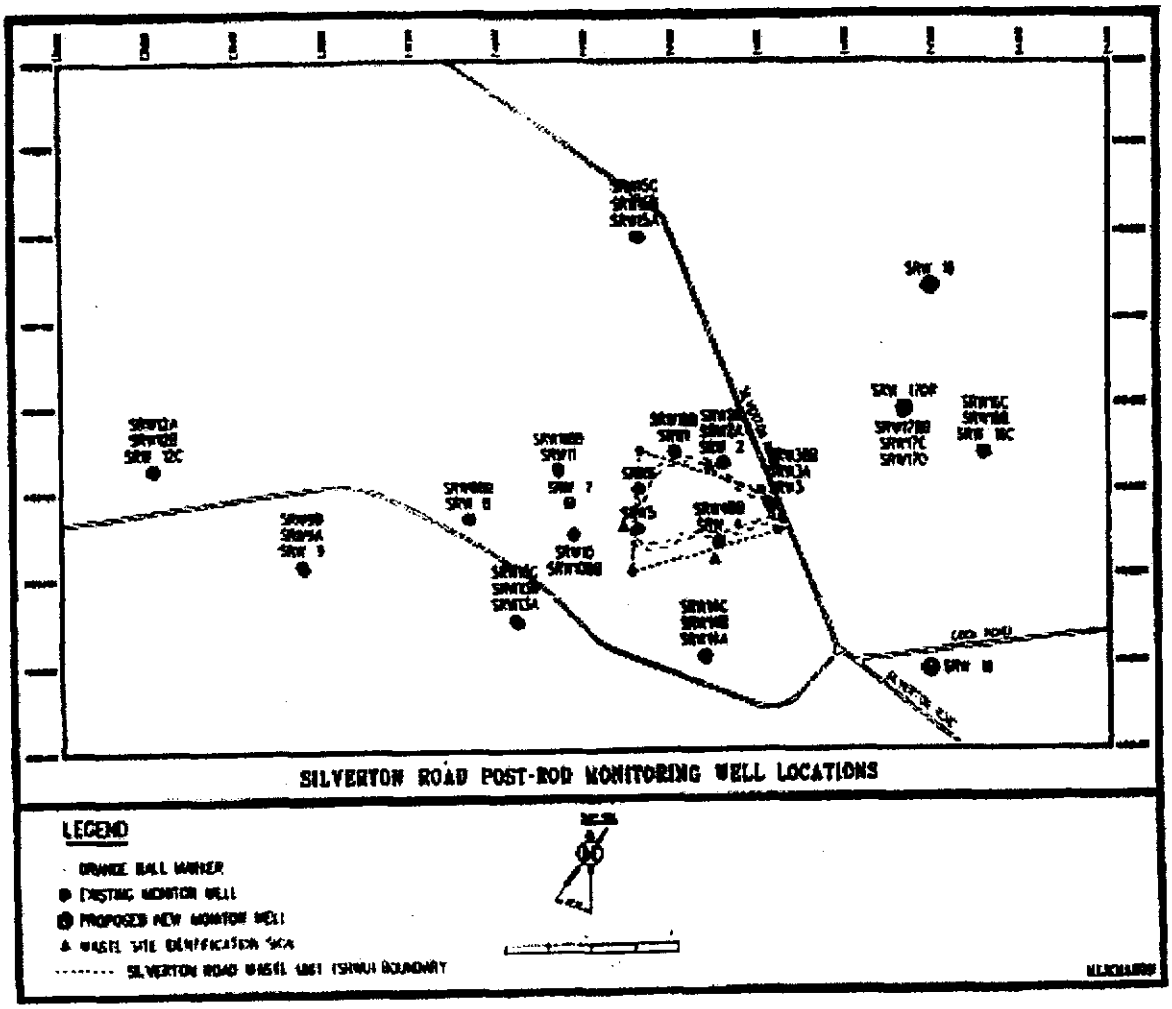
A= Satisfactory X= Unsatisfactory (Comments required)	A or X	**Comments or Corrective Action Taken** (See Maintenance Register for corrected items)
13. Verify the fence is locked and in good condition (if applicable).	A	
14. Check integrity of drainage ditches (if any) for presence of excessive erosion, sediment buildup, and any debris restricting water flow.	A	
15. Inspect general condition of site (housekeeping)	A	
16.Other	A	

Inspected By: J.D. Hope (Print name) , [signature] (Signature) Date: 7-10-01 Time: 1027 Hr

Accompanied By: Michael Reds (Print name) , [signature] (Signature) Date: 7-10-01 Time: 1027 Hr

Reviewed By: Michael O'Neil ER-PCM or Designee (Print name) , [signature] (Signature) Date: 7-12-01 Time: 0750 Hr

MAP OF SILVERTON ROAD WASTE SITE



ER OPERATIONS MONITORING & MAINTENANCE

REQUEST FOR SITE MAINTENANCE

Correspondence Number
ERD-2001-00577

TO: Mary E. Beard, USFS, Bldg. 760-1G

FROM: J.D Hope, ERD, Bldg. 730-2B

Date of Inspection
7-10-2001

Waste Site: Silverton Rd. Waste Site

Work Description	Date Complete
1. Mow grass throughout waste site area (new observation / see map note #1) 2. Overseed bare spots on cap area (new observation / see map note #2) 3. Remove trees/vegetation obstructing orange ball marker (new observation / see map note #3)	1. 2. 3.

Comments

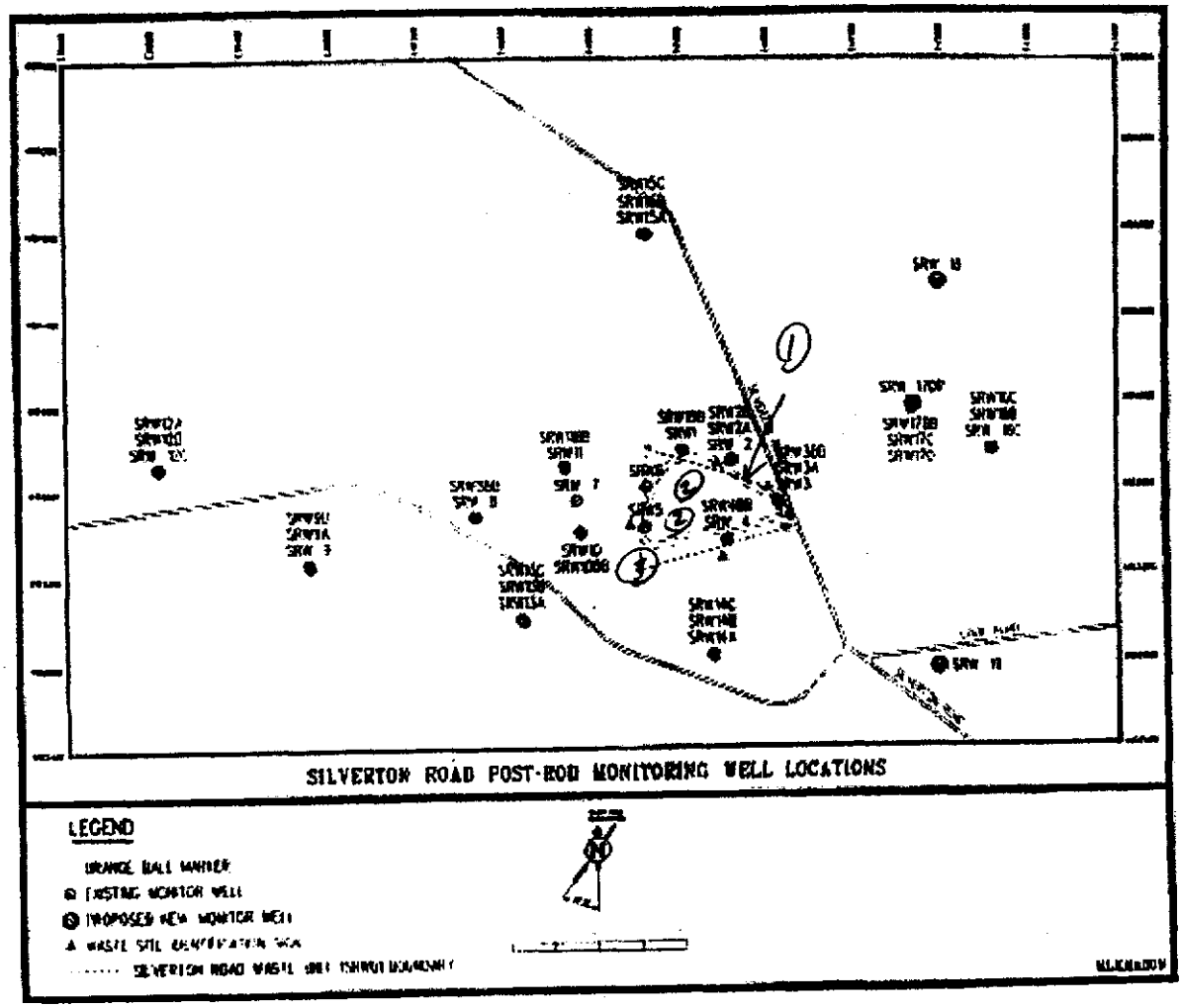
Attachments Yes

Priority medium

ERPC/FC: [signature]

DATE: 7-23-01

MAP OF SILVERTON ROAD WASTE SITE



NOTES: (1) MOW GRASS THROUGHOUT WASTE UNIT

(2) OVERSEED BARE SPOTS ON CAP

(3) REMOVE TREES/VEGETATION OBSTRUCTING ORANGE BALL MARKER

MAINTENANCE REGISTER

Date 7-10-2001

Work Group
- ☐ CSWE
- ☒ USFS
- ☐ Const
- ☐ Subcon
- ☐ SWMO

Facility **Silverton Rd. Waste Site**

Correspondence Number **ERD-2001-00577**

Deficiency Status **incomplete**

Repeat Item *NO*

Description of Deficiency

1. Mow entire cap area (new observation / see map note #1)
2. Overseed bare areas cap (new observation / see map note #2)
3. Remove trees/vegetation obstructing orange ball marker (new observation / see map note #3)

How Deficiency was Corrected?

1.
2.
3.

Priority
- ○ High
- ◉ Medium
- ○ Low

RCRA ○ Yes ◉ No

ERPC/FC: Mel Oldred **DATE:** 7-23-01

Post Closure
Maintenance Register

Index Number: 41 **Watershed:** SAVANNAH RIVER FLOODPLAIN SWAMP

Unit Name SILVERTON ROAD WASTE SITE- 731-3A

Work Group ○ CSWE ● USFS ○ Const ○ Subcon ○ SWMO

Priority ○ High ● Medium ○ Low

RCRA ○ Yes ● No

Maintenance Number PC-2001-00033
Correspondence Number ERD-2001-00577
Deficiency Status ● Complete ○ Incomplete

Entry Date 07/10/2001
Sched Date 08/23/2001
Completion Date 08/20/2001

Description of Deficiency
Vegetative cover needs mowing.

How Deficiency was Corrected
Cap area mowed using large farm tractor and mower deck. Wells, signs and orange balls mowed using string trimmers.

Notes

View Source Document

Michael O Redd (ERPC/FC)	Approve	M O Redd	Comments
(Name)	(organization)	(Approver Date) 9-12-01	

Post Closure
Maintenance Register

Index Number: 41 **Watershed:** SAVANNAH RIVER FLOODPLAIN SWAMP

Unit Name SILVERTON ROAD WASTE SITE- 731-3A

Work Group: ○ CSWE ● USFS ○ Const ○ Subcon ○ SWMO

Priority: ○ High ● Medium ○ Low

RCRA: ○ Yes ● No

Maintenance Number PC-2001-00034
Correspondence Number ERD-2001-00672
Deficiency Status ● Complete ○ Incomplete

Entry Date 07/10/2001
Sched Date 08/23/2001
Completion Date 07/31/2001

Description of Deficiency
Bare spots on cover.

How Deficiency was Corrected
Areas overseeded with Hulled Bermuda and Brown Top Millet grass seed using large farm tractor and no-till-drill implement.

Notes

View Source Document

Michael O Redd (ERPC/FC)	Approve		Comments
(Name)	(organization)	(Approver Date) 9-12-01	

Post Closure
Maintenance Register

Index Number: 41 **Watershed:** SAVANNAH RIVER FLOODPLAIN SWAMP

Unit Name SILVERTON ROAD WASTE SITE- 731-3A

Work Group ○ CSWE ● USFS ○ Const ○ Subcon ○ SWMO

Priority ○ High ○ Medium ● Low

RCRA ○ Yes ● No

Maintenance Number PC-2001-00035
Correspondence Number ERD-2001-00673
Deficiency Status ● Complete ○ Incomplete

Entry Date 07/10/2001
Sched Date 08/23/2001
Completion Date 08/20/2001

Description of Deficiency
Trees obstructing orange ball.

How Deficiency was Corrected
Trees and vegetation removed using chain saw and bush axe.

Notes

View Source Document

Michael O Redd (ERPC/FC)	Approve	MLORedd	Comments
(Name)	(organization)	(Approver Date) 9-12-01	

Five-Year Review Site Inspection Checklist

I. SITE INFORMATION	
Site Name: Silverton Road Waste Site	**Date of Inspection: 9/24/01**
Location and Region: SRS, USEPA Region IV	**EPA ID:**
Agency, office, or company leading the five-year review: USDOE	**Weather/temperature: 75°F**

Remedy Includes: (Check all that apply)

- ☐ Landfill cover/containment
- ☐ Access controls
- ☒ Institutional Controls
- ☐ Groundwater pump and treatment
- ☐ Surface water collection and treatment
- ☒ Other Monitoring Wells
- ☐ Monitored Natural Attenuation
- ☐ Groundwater Containment
- ☐ Vertical Barrier Walls

Attachments: ☐ Inspection team roster attached ☐ Site map attached

II. INTERVIEWS (Check all that apply)

1. **O & M site manager** _____ _____ _____
   Name Title Date
   Interviewed ☐ at site ☐ at office ☐ by phone Phone No. _____
   Problems, suggestions; ☐ report attached _____

2. **O & M staff** _____ _____ _____
   Name Title Date
   Interviewed ☐ at site ☐ at office ☐ by phone Phone No. _____
   Problems, suggestions; ☐ report attached _____

3. **Local regulatory authorities and response agencies** (i.e., State and tribal offices, emergency response office, police department, office of public health or environmental health, zoning office, recorder of deeds, or other city and county offices, etc.) Fill in all that apply.

Agency _____

Contact _____ _____ _____ _____

Name Title Date Phone No.

Problems; suggestions; ☐ Report attached _____

_____

Agency _____

Contact _____ _____ _____ _____

Name Title Date Phone No.

Problems; suggestions; ☐ Report attached _____

_____

Agency _____

Contact _____ _____ _____ _____

Name Title Date Phone No.

Problems; suggestions; ☐ Report attached _____

_____

4. **Other interviews** (optional) ☐ Report attached _____

III. ONSITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)

1. **O & M Documents**

☐ O & M Manual	☐ Readily available	☐ Up to date	☐ N/A
☒ As-built drawings	☒ Readily available	☐ Up to date	☐ N/A
☐ Maintenance Logs	☐ Readily available	☐ Up to date	☐ N/A

Remarks_____

_____

2. **Site-Specific Health and Safety Plan** ☐ Readily available ☐ Up to date ☒ N/A

☐ Contingency plan/emergency response plan ☐ Readily available ☐ Up to date ☒ N/A

Remarks_____

_____

3. **O & M and OSHA Training Records** ☐ Readily available ☐ Up to date ☒ N/A

Remarks_____

_____

4. **Permits and Service Agreements**

☐ Air discharge permit	☐ Readily available	☐ Up to date	☒ N/A
☐ Effluent discharge	☐ Readily available	☐ Up to date	☒ N/A
☐ Waste Disposal, POTW	☐ Readily available	☐ Up to date	☒ N/A
☐ Other permits	☐ Readily available	☐ Up to date	☒ N/A

Remarks_____

_____

5. **Gas Generation Records** ☐ Readily available ☐ Up to date ☒ N/A

Remarks_____

_____

6. **Settlement Monument Records** ☐ Readily available ☐ Up to date ☒ N/A

Remarks_____

_____

7. **Groundwater Monitoring Records** ☐ Readily available ☐ Up to date ☒ N/A

Remarks_____

_____

8. **Leachate Extraction Records** ☐ Readily available ☐ Up to date ☒ N/A

Remarks_____

_____

9. **Discharge Compliance Records**

☐ Air ☐ Readily available ☐ Up to date ☒ N/A

☐ Water (effluent) ☐ Readily available ☐ Up to date ☒ N/A

Remarks_____

_____

10. **Daily Access/Security Logs** ☐ Readily available ☐ Up to date ☒ N/A

Remarks_____

_____

IV. O & M Costs

1. **O & M Organization**

☐ State in-house ☐ Contractor for State

☐ PRP in-house ☐ Contractor for PRP

☐ Other_____

_____

2. **O & M Cost Records**

☐ Readily available ☐ Up to date

☐ Funding mechanism/agreement in place

☐ Other_____

_____

Total annual cost by year for review period if available

From_____ To_____ _____ ☐ Breakdown attached
Date Date Total cost

From_____ To_____ _____ ☐ Breakdown attached
Date Date Total cost

From_____ To_____ _____ ☐ Breakdown attached
Date Date Total cost

From_____ To_____ _____ ☐ Breakdown attached
Date Date Total cost

From_____ To_____ _____ ☐ Breakdown attached
Date Date Total cost

1. **Unanticipated or Unusually High O & M Costs During Review Period**

Describe costs and reasons: _____

_____

_____

_____

_____

V. ACCESS AND INSTITUTIONAL CONTROLS ☒ Applicable ☐ N/A

A. Fencing

1. **Fencing Damaged** ☐ Location shown on site map ☐ Gates secured ☒ N/A

Remarks_____

_____

B. Other Access Restrictions

1. **Signs and other security measures** ☐ Location shown on site map ☐ N/A

Remarks_____

_____

C. Institutional Controls ☒ Applicable ☐ N/A

1. Implementation and enforcement

Site conditions imply ICs not properly implemented ☐ Yes ☒ No ☐ N/A

Site conditions imply ICs not being fully enforced ☐ Yes ☒ No ☐ N/A

Type of monitoring (e.g., self-reporting, drive-by)_____

Frequency_____

Responsible party/agent_____

Contact	Michael Redd	Manager ER Maintenance	_____	_____
	Name	Title	Date	Phone No.

Report is up-to-date ☒ Yes ☐ No ☐ N/A

Reports are verified by the lead agency ☐ Yes ☐ No ☐ N/A

Specific requirements in deed of decision documents have been met ☒ Yes ☐ No ☐ N/A

Violations have been reported ☐ Yes ☐ No ☒ N/A

Other problems or suggestions: ☒ Report attached

ERD Inspection Data sheet for Silverton Road Waste Site (U), Document Number ER-IDS-019-001

_____

_____

_____

2. Adequacy ☒ ICs are adequate ☐ ICs are inadequate ☐ N/A

Remarks_____

_____

D. General

1. **Vandalism/trespassing** ☐ Location shown on site map ☒ No vandalism evident

Remarks_____

_____

2. **Land use changes onsite** ☒ N/A

Remarks_____

_____

3. **Land use changes offsite** ☒ N/A

Remarks_____

_____

VI. GENERAL SITE CONDITIONS

A. Roads ☐ Applicable ☒ N/A

1. **Roads damaged** ☐ Location shown on site map ☐ Roads adequate ☐ N/A

Remarks_____

_____

B. Other site Conditions

Remarks_____

_____

_____

_____

_____

VII. LANDFILL COVERS ☐ Applicable ☒ N/A

A. Landfill Surface ☐ Applicable ☒ N/A

1. **Settlement** (Low spots) ☐ Location shown on site map ☐ Settlement not evident

Areal extent_____ Depth_____

Remarks_____

_____

2. **Cracks** ☐ Location shown on site map ☐ Cracking not evident

Lengths_____ Widths_____ Depths_____

Remarks_____

_____

3. **Erosion** ☐ Location shown on site map ☐ Erosion not evident

Areal extent_____ Depth_____

Remarks_____

_____

4. **Holes** ☐ Location shown on site map ☐ Holes not evident

Areal extent_____ Depth_____

Remarks_____

_____

5. **Vegetative Cover** ☐ Grass ☐ Cover properly established ☐ No signs of stress

☐ Trees/shrubs (indicate size and location on a diagram)

Remarks_____

_____

6. **Alternative Cover (armored rock, concrete, etc.)** ☐ N/A

Remarks_____

_____

7. **Bulges** ☐ Location shown on site map ☐ Bulges not evident

Areal extent_____ Height_____

Remarks_____

_____

8. **Wet Areas/Water Damage** ☐ Wet areas/water damage not evident

☐ Wet Areas ☐ Location shown on site map Areal extent_____

☐ Ponding ☐ Location shown on site map Areal extent_____

☐ Seeps ☐ Location shown on site map Areal extent_____

☐ Soft subgrade ☐ Location shown on site map Areal extent_____

Remarks_____

_____

9. **Slope Instability** ☐ Slides ☐ Location shown on site map ☐ No evidence of slope instability

Areal extent_____

Remarks_____

_____

B. Benches ☐ Applicable ☒ N/A

(Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)

1. **Flows Bypass Bench** ☐ Location shown on site map ☐ N/A or okay

   Remarks_____

2. **Bench Breached** ☐ Location shown on site map ☐ N/A or okay

   Remarks_____

3. **Bench Overtopped** ☐ Location shown on site map ☐ N/A or okay

   Remarks_____

C. Letdown Channels ☐ Applicable ☒ N/A

(Channel lined with erosion control mates, riprap, grout bags, or gabions that descend down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)

1. **Settlement** ☐ Location shown on site map ☐ No evidence of settlement

   Areal extent_____ Depth_____

   Remarks_____

2. **Material Degradation** ☐ Location shown on site map ☐ No evidence of degradation

   Material type_____ Areal extent _____

   Remarks_____

3. **Erosion** ☐ Location shown on site map ☐ No evidence of erosion

   Areal extent _____ Depth_____

   Remarks_____

4. **Undercutting** ☐ Location shown on site map ☐ No evidence of undercutting

Areal extent _____ Depth_____

Remarks_____

_____

5. **Obstructions** Type_____ ☐ No obstructions

☐ Location shown on site map Areal extent _____

Size _____

Remarks_____

_____

6. **Excessive Vegetative Growth** Type_____

☐ No evidence of excessive growth

☐ Vegetation in channels does not obstruct flow

☐ Location shown on site map Areal extent _____

Remarks_____

_____

D. Cover Penetrations ☐ Applicable ☒ N/A

1. **Gas Vents** ☐ Active ☐ Passive

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A

Remarks_____

_____

2. **Gas Monitoring Probes**

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A

Remarks_____

_____

3. **Monitoring Wells** (within surface area of landfill)

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A

Remarks_____

_____

4. **Leachate Extraction Wells**

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A

Remarks_____

_____

5. **Settlement Monuments** ☐ Located ☐ Routinely surveyed ☐ N/A

Remarks_____

_____

E. Gas Collection and Treatment ☐ Applicable ☒ N/A

1. **Gas Treatment Facilities**

☐ Flaring ☐ Thermal destruction ☐ Collection for reuse

☐ Good condition ☐ Needs Maintenance

Remarks_____

_____

2. **Gas Collection Wells, Manifolds and Piping**

☐ Good condition ☐ Needs Maintenance

Remarks_____

_____

3. **Gas Monitoring Facilities** (e.g., gas monitoring of adjacent homes or buildings)

☐ Good condition ☐ Needs Maintenance ☐ N/A

Remarks_____

_____

F. Cover Drainage Layer ☐ Applicable ☒ N/A

1.	**Outlet Pipes Inspected**	☐ Functioning	☐ N/A
	Remarks_____		
	_____		
2.	**Outlet Rock Inspected**	☐ Functioning	☐ N/A
	Remarks_____		
	_____		

G. Detention/sedimentation Ponds ☐ Applicable ☒ N/A

1. **Siltation** Areal extent_____ Depth_____ ☐ N/A

   ☐ Siltation not evident

   Remarks_____

2. **Erosion** Areal extent_____ Depth_____ ☐ N/A

   ☐ Erosion not evident

   Remarks_____

3. **Outlet Works** ☐ Functioning ☐ N/A

   Remarks_____

4. **Dam** ☐ Functioning ☐ N/A

   Remarks_____

H. Retaining Walls ☐ Applicable ☒ N/A

1. **Deformations** ☐ Location shown on site map ☐ Deformation not evident

   Horizontal displacement_____ Vertical displacement_____

   Rotational displacement_____

   Remarks_____

2. **Degradation** ☐ Location shown on site map ☐ Deformation not evident

   Remarks_____

I. Perimeter Ditches/Off-Site Discharge ☐ Applicable ☒ N/A

1. **Siltation** ☐ Location shown on site map ☐ Siltation not evident

   Areal extent_____ Depth_____

   Remarks_____

2. **Vegetative Growth** ☐ Location shown on site map ☐ Siltation not evident

☐ Vegetation does not impede flow

Areal extent_____ Type_____

Remarks_____

_____

3. **Erosion** ☐ Location shown on site map ☐ Erosion not evident

Areal extent_____ Depth_____

Remarks_____

_____

4. **Discharge Structure** ☐ Location shown on site map ☐ N/A

Remarks_____

_____

VIII. VERTICAL BARRIER WALLS ☐ Applicable ☒ N/A

1. **Settlement** ☐ Location shown on site map ☐ Settlement not evident

Areal extent_____ Depth_____

Remarks_____

_____

2. **Performance Monitoring** Type of Monitoring_____

☐ Performance not monitored

Frequency_____ ☐ Evidence of breaching

Head differential_____

Remarks_____

_____

IX. GROUNDWATER/SURFACE WATER REMEDIES ☒ Applicable ☐ N/A

A. Groundwater Extraction Wells, Pumps, and Pipelines ☐ Applicable ☒ N/A

1. **Pumps, Wellhead Plumbing, and Electrical**

☐ Good condition ☐ All required wells located ☐ Needs Maintenance ☐ N/A

Remarks_____

_____

2. **Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances**

☐ Good condition ☐ Needs Maintenance

Remarks_____

_____

3. **Spare Parts and Equipment**

☐ Readily available ☐ Good condition ☐ Requires upgrade ☐ Needs to be provided

Remarks_____

_____

B. Surface Water Collection Structures, Pumps, and Pipelines ☐ Applicable ☒ N/A

1. **Collection Structures, Pumps, and Electrical**

☐ Good condition ☐ Needs Maintenance

Remarks_____

_____

2. **Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances**

☐ Good condition ☐ Needs Maintenance

Remarks_____

_____

3. **Spare Parts and Equipment**

☐ Readily available ☐ Good condition ☐ Requires upgrade ☐ Needs to be provided

Remarks_____

_____

C. Treatment System ☐ Applicable ☒ N/A

1. **Treatment Train** (Check components that apply)

☐ Metals removal ☐ Oil/water separation ☐ Bioremediation

☐ Air stripping ☐ Carbon adsorbers

☐ Filters_____

☐ Additive (e.g., chelation agent, flocculent)_____

☐ Others_____

☐ Good condition ☐ Needs Maintenance

☐ Sampling ports properly marked and functional

☐ Sampling/maintenance log displayed and up to date

☐ Equipment properly identified

☐ Quantity of groundwater treated annually_____

☐ Quantity of surface water treated annually_____

Remarks_____

_____

2. **Electrical Enclosures and Panels** (properly rated and functional)

☐ N/A ☐ Good condition ☐ Needs Maintenance

Remarks_____

_____

3. **Tanks, Vaults, Storage Vessels**

☐ N/A ☐ Good condition ☐ Proper secondary containment ☐ Needs Maintenance

Remarks_____

_____

4. **Discharge Structure and Appurtenances**

☐ N/A ☐ Good condition ☐ Needs Maintenance

Remarks_____

_____

5. **Treatment Building(s)**

☐ N/A ☐ Good condition (esp. roof and doorways) ☐ Needs repair

☐ Chemicals and equipment properly stored

Remarks_____

_____

6. **Monitoring Wells** (pump and treatment remedy)

☒ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☒ All required wells located ☐ Needs Maintenance ☐ N/A

Remarks_____

_____

D. Monitoring Data ☒ Applicable ☐ N/A

1. Monitoring Data

☒ Is routinely submitted on time ☒ Is of acceptable quality

2 .Monitoring data suggests:

☒ Groundwater plume is effectively contained ☐ Contaminant concentrations are declining

E. Monitored Natural Attenuation ☐ Applicable ☒ N/A

1. **Monitoring Wells** (Natural attenuation remedy)

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled Good condition

☐ All required wells located ☐ Needs Maintenance ☐ N/A

Remarks_____

_____

X. OTHER REMEDIES

If there are remedies applied at the site which are not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.

XI. OVERALL OBSERVATIONS

A. Implementation of the Remedy

Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emissions, etc.).

B. Adequacy of O & M

Describe issues and observations related to the implementation and scope of O & M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy.

C. Early Indicators of Potential Remedy Failure

Describe issues and observations such as unexpected changes in the cost or scope of O & M or a high frequency of unscheduled repairs, that suggest that the protectiveness of the remedy may be compromised in the future.

D. Opportunities for Optimization

Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy.

Savannah River Laboratory Seepage Basins (SRLSB) (904-53G, -53G, -54G, and -55G) Operable Unit

I. Introduction

This is the first five-year review for the Savannah River Lab Seepage Basins (SRLSB) Operable Unit (OU). This review was conducted from August 2001 through September 2001. This report documents the results of the review.

II. OU Chronology

Table 1 lists the chronology of site events for the SRLSB.

III. Background

The SRLSB OU is located within the northwestern section of Savannah River Site (SRS), approximately 4,000 feet (ft) from the nearest SRS boundary and 4,500 ft from the nearest residence (Figure 1). The four basins lie within the northern portions of the A/M Area, northeast of Savannah River Ecology Laboratory and southeast of the Savannah River Technology Center. The setting to the north, east, and south of the basins is wooded. Tims Branch is located north of the basins. An unnamed intermittent stream is also located immediately east of the basins. The area to the west is cleared and vegetated with low grasses. The four basins (Figure 1) cover a total area of approximately 92,000 ft^2. A berm of undisturbed soil separated each of the four basins.

Over the years, large trees had grown in and around the basins. The removal of the vegetation at the SRL Seepage Basins was initiated on August 22, 1997 and completed on October 15, 1997as a Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) removal action. The vegetation was stored and covered with geotextile material in Basins 2 and 4 until disposal issues were resolved. The disposal at the SRS Low-Level Waste Disposal Facility

Table 1. Chronology of OU Events

Event	Date
Removal Action start/ finish (vegetation)	August 22, 1997 – October 15, 1997
ROD issuance	November 1999
Consent Decree, Civil Action No. 1:85-2583-6	1988
Remedial Action start/complete	December 8, 1999/August 20, 2001

Key:

Consent Decree – Date a consent decree (enforcement document from the court system) was issued for the operable unit.

Corrective Action start – Date the corrective (remedial) action was initiated (under RCRA).

ESD Issuance - Date all three parties (USDOE, USEPA, and SCDHEC) signed the Explanation of Significant Difference used to significantly modify the remedy selected in the Record of Decision.

Final or Interim ROD issuance – Date the three parties (USDOE, USEPA, and SCDHEC) signed the Record of Decision.

Federal Facility Agreement Declared Effective - Date the Federal Facility Agreement formalized the integration of CERCLA and RCRA in remediation activities at SRS.

NPL listing – Date the entire SRS was added to EPA's National Priorities List.

Previous Five-Year Reviews – Date of any previous five year reviews of remedy for the operable unit.

RCRA Closure Certified – Date the three parties (USDOE, USEPA, and SCDHEC) certified that the operable unit had been remediated and closed under the Resource Conservation and Recovery Act.

RCRA Closure Plan Approved – Date the three parties (USDOE, USEPA, and SCDHEC) approved the closure plan for the operable unit under Resource Conservation and Recovery Act.

Remedial Action start/complete – Date the remedial action (final or interim) was initiated/completed (under CERCLA).

Removal Action – Date contaminated media was removed from the operable unit (not associated with the ROD).

RFI/RI start/complete - Date the remedial investigation (sampling) was initiated/completed for the operable unit.

ROD Amendment Issuance - Date the three parties (USDOE, USEPA, and SCDHEC) signed the Record of Decision Amendment used to change the remedy selected in the original Record of Decision.

(LLWDF) was completed on October 26, 1999. Disposal of this contaminated vegetation was not a component of the preferred remedial alternative for this OU and was being performed as a separate action under United States Department of Energy (USDOE) removal action authority.

The four basins were connected by a series of sequential overflow channels designed to receive wastewater by overflow from Basin 1 to Basin 4. Wastewater entered the west end of Basin 1 through a 10-in diameter vitrified clay process sewer pipe, approximately 900 ft in length. The depth of the line varies from 8 to 12 ft, moving from Building 776-A toward the basins. The line was constructed in conjunction with Basins 1 and 2 for start of operation in 1954.

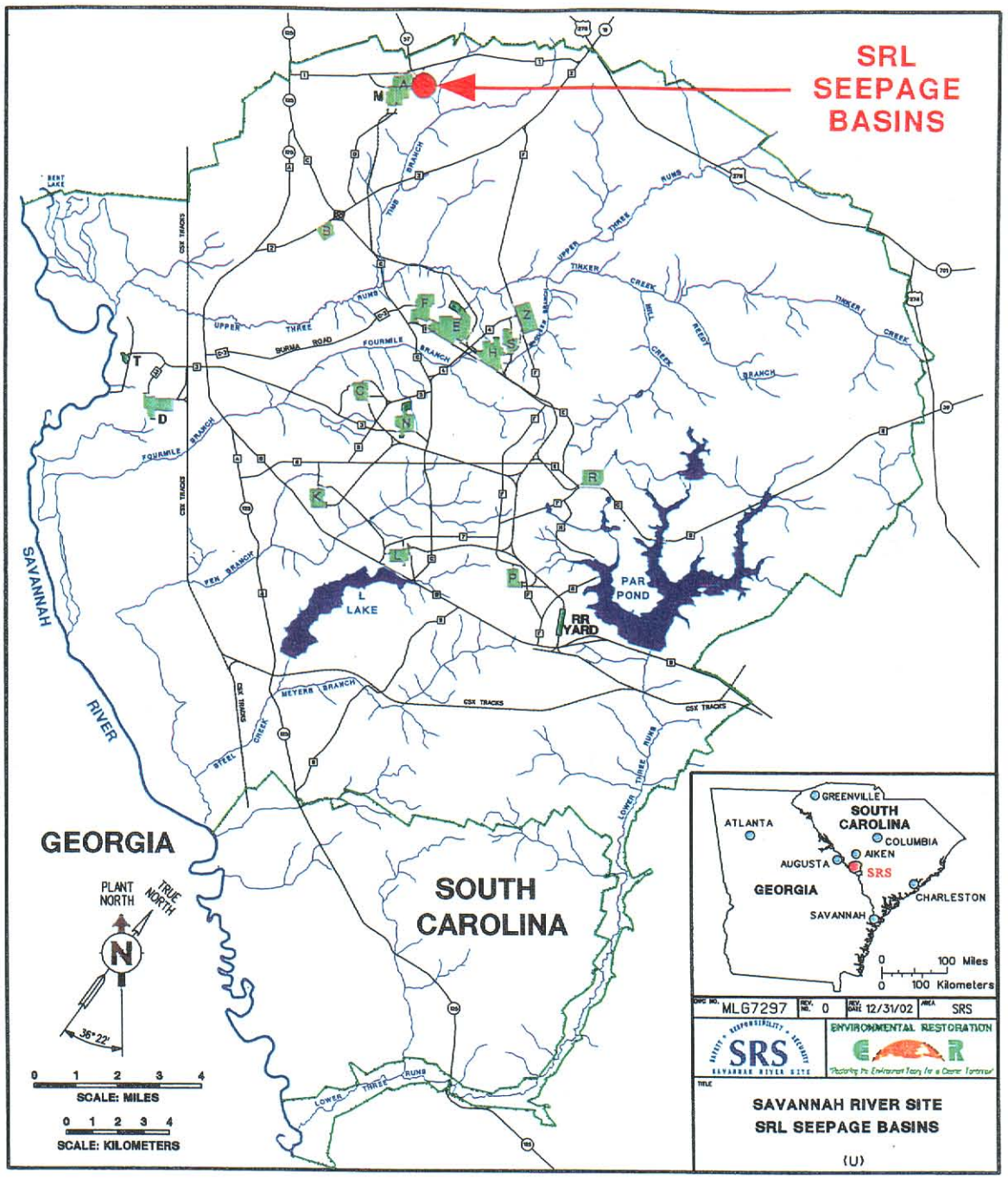


Figure 1. Location of the SRL Seepage Basins at SRS



Figure 2. Layout of the SRL Seepage Basins Operable Unit (904-53G, -53G, -54G, and -55G) after Construction Completion August 2001

Basins 1 and 2 (904-53G) were placed into operation in 1954. Basins 3 (904-54G) and 4 (904- 55G) were added in 1958 and 1960, respectively. The basins were used from 1954 to 1982 to dispose of low-level radioactive liquid waste generated in the laboratories located in Building 735-A and 773-A. The laboratory-derived low-level liquid waste was stored in Building 776-A waste tanks until the activity was confined to below 100 dpm/mL alpha and/or 50 dpm/ml beta-gamma. Waste meeting this transfer criterion was then sent to Basin 1 via a process sewer line. The basins and the process sewer line were taken out of operation in 1982.

During the 28 years of operation, the basins received 4,550,000 ft^3 of wastewater or about 162,000 ft^3/yr. The total capacity of the basins is 850,000 ft^3. There is no record of overflow out of the basins and no account of any local ground surface seeps.

At the time of this five-year Record of Decision (ROD) review, contaminated soil has been removed, the basins have been filled to grade with clean fill, and the area has been revegetated.

Prior to federal ownership, the SRLSB area was primarily used for agriculture. The current and foreseeable future land use at the SRLSB is industrial and will be controlled by the USDOE. Since the land is likely to remain under the control of the United States Government, it is not likely to ever be used for residential purposes. Existing administrative controls for the SRLSB OU consist of access controls that include posting of identification signs and semi-annual field walkdowns to check on general site conditions. A Land Use Control Implementation Plan (LUCIP), which provides details the specific institutional controls necessary to achieve the remedial goals has been prepared and approved by USDOE, South Carolina Department of Health and Environmental Control (SCDHEC), and United States Environmental Protection Agency (USEPA) and will be appended to the SRS Land Use Assurance Plan (LUCAP).

There is no surface water within the boundaries of the SRLSB. However, the headwaters of Tims Branch lie in the immediate vicinity of the unit. Tims Branch is not currently used as a source of drinking water or for industrial applications. It is not likely that Tims Branch will ever be used for these applications.

There are currently no drinking water wells in the area. Institutional controls will prevent the installation of drinking water wells in the area. These controls are necessary due to groundwater contamination below the SRLSB from other upgradient contaminant sources in the A/M Area.

Analytical data collected for the Remedial Facility Investigation/Remedial Investigation (RFI/RI) indicate that significant impacts to the soil media associated with the SRLSB had occurred from both radiological and nonradiological (metals) contaminants. Radiological contaminants and metals within the basins decrease substantially with depth. Major contaminants in the

soil at SRLSB OU are radionuclides (actinium-228, cesium-137, cobalt-60, curium-243/244, radium-228, thorium-228, and uranium-238). Metals (primarily mercury, silver, vanadium, and chromium) are also contaminants.

Basin operation has not significantly impacted groundwater. The fate and transport analysis does not predict future impacts to the groundwater from the contaminants within the SRLSB OU. Therefore, groundwater remediation was not required nor addressed in the proposed plan. However, groundwater remediation of volatile organic compounds (VOCs) as a result of other source release points in the A/M Area is proceeding and the effectiveness of the remediation is being monitored through a RCRA Part B Permit.

The predominant constituents of concern (COCs) at the SRLSB OU are radionuclides in the basin soils for human receptors and chromium in Basin 1 soils for ecological receptors. The final list of human health COCs for the future industrial worker scenario includes 18 radionuclides and 2 metals (Table 2). Remedial goals (RGs) were established for the industrial worker scenario based on a risk of 1×10^{-6} or a hazard quotient (HQ) of 1.0.

Chromium in Basin 1 was the only ecological COC identified. To be protective of environmental receptors, an RG of 200 mg/kg was established for chromium.

Table 2. Final Human Health-Industrial RGs for the SRLSB Soil

Final COC	Units	RG
Actinium-228	pCi/g	0.07
Americium-24 1	pCi/g	8.08
Cesium-137	pCi/g	0.11
Cobalt-60	pCi/g	0.02
Curium-243/244	pCi/g	1.6
Lead-212	pCi/g	0.7
Neptunium-239	pCi/g	0.9
Plutonium-238	pCi/g	10.857
Plutonium-239/240	pCi/g	10.130
Potassium-40	pCi/g	0.4
Radium-228	pCi/g	0.067
Strontium-90	pCi/g	57.13

Final COC	Units	RG
Thorium-228	pCi/g	0.035
Thorium-230	pCi/g	85.38
Thorium-232	pCi/g	98.0
Uranium-233/234	pCi/g	71.0
Uranium-235	pCi/g	0.83
Uranium-238	pCi/g	3.1
Hexavalent Chromium	mg/kg	1501
Mercury	mg/kg	47.0

IV. Remedial Actions

The ROD was issued on November 1999. The preferred remedial alternatives are:

- excavate soil above 1 x 10^{-3} industrial risk (principal threat source material [PTSM])
- dispose PTSM at an approved off-SRS facility
- place an earthen cover over all four basins and
- use institutional controls to maintain future industrial land use only.

The RFI/RI and Baseline Risk Assessment (BRA) indicate that the secondary sources (i.e., basin soil) associated with the SRLSB OU pose significant carcinogenic risk to human health. Only one final ecological COC, chromium, was found in the surface soils of Basin 1. Based on these conclusions, the Corrective Measures Study/Feasibility Study (CMS/FS) was conducted to consider possible actions for reducing the risks associated with the SRLSB OU.

Based on the risks posed, the remedial action objectives (RAOs) for the SRLSB is to ensure the protection of human health and the environment. The human health RAOs for the SRLSB are as follows:

- Eliminate exposure of the future industrial worker to radiochemical, mercury and chromium contamination in surface soils of Basins 1, 2, 3, and 4.

- Remove all PTSM from Basins 1,2, and 3.

The ecological RAO for the SRLSB is to reduce risk to soil invertebrates from ingestion of chromium in the surface soils of Basin 1.

A Corrective Measures Implementation/Remedial Action Implementation Plan (CMI/RAIP) for the SRLSB was issued on November 1, 1999. This document provides information about the design implementation of the selected remedy for the SRLSB OU. The CMI/RAIP documented design inputs and ensured that the remedial design requirements of the ROD were incorporated into the remedial design.

Remedial design was started, at risk, January 1999 and completed April 1999. No difficulties were noted during the design phase of the SRLSB. Remedial action (i.e., construction start date) started December 9, 1999, and completed August 20, 2000. The SRLSB is on schedule to be turned over to operations in September 2001.

This alternative involved the excavation of all PTSM.

Soil was removed from the bottom and berms of Basins 1, 2, and 3 (Table 3). The removal of PTSM in Basin 1 also addressed the ecological risks associated with chromium (achieving the remedial goal of 200 mg/kg). PTSM is not present in Basin 4; contaminant levels are not above 1 x 10^{-6} industrial risk. Therefore, soil was not removed from Basin 4. Removal of the section of process sewer pipeline that runs from the basin to the first manhole, including 1 foot of soil below the pipeline, was also included. All contaminated soil and the process sewer pipeline were removed from the SRLSB OU and were accepted and disposed of at Envirocare, Utah, an approved, licensed, out-of-state, low-level waste disposal facility. Residual contamination (at levels below 1 x 10^{-3} industrial risk) remains in place. The contaminated soil above the 1 x 10^{-6} residential risk level, which remains, will be managed in place at the OU. However, all four basins have been

backfilled with clean soil and an earthen cover, eliminating any risk to the future industrial worker.

Table 3. Depth of Soil Removal from the Basins

	Soil Removal (Depth in feet)		Comments
Basin	**Basin Bottom**	**Basin Berm**	
1	4	1	
2	5	1	
3	1	1	1 additional foot of soil was removed from three "hot spots" in the bottom of the basin and 2 additional feet of soil from a hot spot in the berm
4	NA	NA	

The SRLSB OU remedy construction has just been completed and has not been turned over to operations. Therefore, no maintenance costs have been posted against this project to date.

V. Progress Since Last Review

This 5-year ROD review is the first time the SRLSB has undergone the review; therefore addressing progress against the last review is not applicable. However, the construction phase of the remedial action is complete and turnover to operations is scheduled for September 2001.

VI. Five-Year Review Process

The following tasks were performed as part of the review:

- Reviewed the documents listed in Attachment 1,
- Reviewed changes in standards and to be considered guidance,
- Inspected the OU to ensure that warning signs and fences are in place and no activities have taken place that could compromise the final remedy.

VII. Technical Assessment

The source of the RAOs, Applicable or Relevant and Appropriate Requirements (ARARs), and clean-up levels came from the ROD and the Statement of Basis/Proposed Plan (SB/PP) and are based on risk levels as calculated using the current protocols.

Confirmatory sampling for the SRLSB was based on the selected remedy as described in the approved ROD (WSRC 1999b). Section XI of the ROD states: "During the excavation process, confirmation soil sampling will be conducted in the berms and bottoms of the basins and the process sewer line trench. If the sampling reveals soils constituting a risk greater than 1×10^{-3} industrial risk (PTSM) remaining at depths greater than anticipated, those soil areas, or "hot spots," will be excavated and disposed of off SRS." A confirmatory sampling plan was submitted to the regulators as part of the CMI/RAIP (WSRC 1999c).

A review of the confirmatory sampling performed during the construction phase as documented in the Corrective Measures Implementation Report/Post-Construction Report/Final Remediation Report (CMI/PCR/FRR) provides verification that all soils constituting a risk greater than 1×10^{-3} industrial risk (PTSM) were removed from the site. After the soil and pipeline removal and confirmation that all PTSM had been removed, the process sewer trench and basins were backfilled with clean soil and a vegetative layer. Quality control testing was performed and documented for the soils throughout the project in accordance with the project specifications.

Because the remedy construction has just been completed and not yet turned over to operations, no operating and maintenance (O&M) site inspections have been conducted. Interviews with operations personnel are not possible at this time. However, a joint walkdown was performed on July 10, 2001, as part of the CMI/PCR/FRR as the final inspection and acceptance of the SRLSB closure. The walkdown included representatives from the USDOE, USEPA, SCDHEC, and

SRLSB Project Team. Only one minor item was noted, which was to add identification (warning signs) around the unit. The item has been corrected.

The SRLSB OU remedy is functioning as intended by the decision documents.

Field implementation of the remedial action was performed in accordance with the CMI/RAIP, which was strategically developed to meet the RAOs. The results of the inspections and verification sampling, analysis, and testing of the components to this remedial action implementation process indicate that the established acceptance criteria was met or exceeded. The results of the analytical sampling and testing have been documented and the records are on file.

Based on the reviews and the rationale stated above, the SRLSB remedial action was conducted within the project specifications and has met the following performance goals and RAOs that were stated in the ROD:

- Eliminate exposure of the future industrial worker to radiochemical, mercury and chromium contamination in the surface soils of Basins 1, 2, 3, and 4.

- Remove all PTSM from Basins 1, 2, and 3.

- Reduce risk to soil invertebrates from ingestion of chromium in the surface soils of Basin 1.

The remedial action continues to operate and function as designed. The remedial action is performing as expected and cleanup levels have been achieved.

The exposure assumptions, toxicity data, cleanup levels, and RAOs used at the time of remedy selection are still valid. The operating procedures, which will be implemented with the project turnover to operations, are expected to maintain the effectiveness of response actions. No maintenance cost or historical data is available at this time to indicate a history of remedy problems or potential remedy

failure, which could place protectiveness at risk. There are no opportunities for optimization at this time.

Access controls are in place. Maintenance, institutional controls, and field walkdowns are in place and prevent exposure. No other actions are indicated that are necessary to ensure that the immediate threats, have been addressed.

There have been no changes in standards or to-be-considered (TBC) guidance, as identified in the ROD, that call into question the protectiveness of the remedy.

There have been no changes in chemical-specific, action-specific, or location-specific requirements that could call into question the protectiveness of the remedy. No changes in toxicity and other contaminant characteristics that could affect the protectiveness of the remedy are expected.

Based on the current project status and the successful completion of the performance goals and RAOs for the SRLSB, no specific required or suggested recommendations/improvements have been identified as a result of this review.

VIII. Issues

No issues related to current site operations, conditions, or activities currently prevent the remedy from being protective.

IX. Recommendations and Follow-up Actions

No specific required or suggested recommendations/improvements have been identified as a result of this review because the selected remedy is complete.

X. Protectiveness Statement(s)

The remedy at SRLSB is protective of human health and the environment, and exposure pathways that could result in unacceptable risks are being controlled. All threats at the SRLSB have been addressed through soil excavation and disposal at an off-SRS CERCLA approved facility, backfilling the area to grade

with clean soil, and revegetation of the area. In addition, warning signs are posted at the unit and institutional controls to maintain future industrial land use only have been implemented through the LUCIP.

XI. Next Review

The next five-year review is scheduled for June 30, 2007.

Attachment 1

Documents Reviewed

WSRC, 1998a. *Statement of Basis/Proposed Plan for the SRL Seepage Basins Operable Unit (904-53G1, -53G2, -54G, and -55G) (U)*, WSRC-RP-97-847, Revision 1.1, December , Westinghouse Savannah River Company, Aiken, South Carolina

WSRC, 1998b. *RCRA Facility Investigation/Remedial Investigation/Baseline Risk Assessment and Focused Corrective Measures Study/Feasibility Study for the SRL Seepage Basins Operable Unit (904-53G, -54G, and –55G) (U)*, WSRC-RP-97-846, Revision 1.1, September, Westinghouse Savannah River Company, Aiken, South Carolina

WSRC, 1999a. *Land Use Control Assurance Plan for the Savannah River Site*, WSRC-RP-98-4125, Revision 0, August, Westinghouse Savannah River Company, Aiken, South Carolina

WSRC, 1999b. *Record of Decision, Remedial Alternative Selection for the SRL Seepage Basins Operable Unit (904-53G1, -53G2, -54G and –55G) (U)*, WSRC-RP-97-848, Revision 1.1, October, Westinghouse Savannah River Company, Aiken, South Carolina

WSRC, 1999c. *Corrective Measures Implementation/Remedial Action Implementation Plan for Closure of SRL Seepage Basins Operable Unit (904-53G1, -53G2, -54G and –55G) (U)*, WSRC-RP-99-04026, Revision 1, October, Westinghouse Savannah River Company, Aiken, South Carolina

WSRC, 2001. *Corrective Measure Implementation Report/Post-Construction Report/Final Remediation Report (CMI/PCR/FRR) for Closure of SRL Seepage Basins Operable Unit (904-53G, -53G, -54G, and -55G) (U)*, WSRC-RP-2001-4123, Revision 0, July, Westinghouse Savannah River Company, Aiken, South Carolina

Attachment 2

Five-Year Review Site Inspection Checklist

Attachment 3

Site Inspection Sheet

Five-Year Review Site Inspection Checklist

I. SITE INFORMATION	
Site Name: SRL Seepage Basins (904-53G, 1 & 2, -54G, and -55G)	**Date of Inspection: 9/24/01**
Location and Region: SRS, USEPA Region IV	**EPA ID: CERCLIS # 47**
Agency, office, or company leading the five-year review: USDOE	**Weather/temperature:**

Remedy Includes: (Check all that apply)

- ☐ Landfill cover/containment
- ☒ Access controls
- ☒ Institutional Controls
- ☐ Groundwater pump and treatment
- ☐ Surface water collection and treatment
- ☒ Other Excavation, disposal
- ☐ Monitored Natural Attenuation
- ☐ Groundwater Containment
- ☐ Vertical Barrier Walls

Attachments: ☐ Inspection team roster attached ☐ Site map attached

II. INTERVIEWS (Check all that apply)

1. **O & M site manager** _____ (Name) _____ (Title) _____ (Date)
   Interviewed ☐ at site ☐ at office ☐ by phone Phone No. _____
   Problems, suggestions; ☐ report attached _____

2. O & M staff _____ (Name) _____ (Title) _____ (Date)
   Interviewed ☐ at site ☐ at office ☐ by phone Phone No. _____
   Problems, suggestions; ☐ report attached _____

3. **Local regulatory authorities and response agencies** (i.e., State and tribal offices, emergency response office, police department, office of public health or environmental health, zoning office, recorder of deeds, or other city and county offices, etc.) Fill in all that apply.

Agency _____

Contact _____ _____ _____ _____
Name Title Date Phone No.

Problems; suggestions; ☐ Report attached _____

_____

Agency _____

Contact _____ _____ _____ _____
Name Title Date Phone No.

Problems; suggestions; ☐ Report attached _____

_____

Agency _____

Contact _____ _____ _____ _____
Name Title Date Phone No.

Problems; suggestions; ☐ Report attached _____

_____

4. **Other interviews** (optional) ☐ Report attached _____

III. ONSITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)

1. **O & M Documents**

☒ O & M Manual	☐ Readily available	☐ Up to date	☒ N/A
☒ As-built drawings	☐ Readily available	☐ Up to date	☒ N/A
☒ Maintenance Logs	☐ Readily available	☐ Up to date	☒ N/A

Remarks_____

2. **Site-Specific Health and Safety Plan** ☒ Readily available ☐ Up to date ☐ N/A

☒ Contingency plan/emergency response plan ☒ Readily available ☐ Up to date ☐ N/A

Remarks_____

3. **O & M and OSHA Training Records** ☒ Readily available ☒ Up to date ☐ N/A

Remarks_____

4. **Permits and Service Agreements**

☐ Air discharge permit	☐ Readily available	☐ Up to date	☒ N/A
☐ Effluent discharge	☐ Readily available	☐ Up to date	☒ N/A
☐ Waste Disposal, POTW	☐ Readily available	☐ Up to date	☒ N/A
☒ Other permits	☒ Readily available	☒ Up to date	☐ N/A

Remarks Certificate of Disposal for Manifested Shipment, Work Clearance Permit

5. **Gas Generation Records** ☐ Readily available ☐ Up to date ☒ N/A

Remarks_____

6. **Settlement Monument Records** ☐ Readily available ☐ Up to date ☒ N/A

Remarks_____

7. **Groundwater Monitoring Records** ☐ Readily available ☐ Up to date ☒ N/A

Remarks_____

8. **Leachate Extraction Records** ☐ Readily available ☐ Up to date ☒ N/A

Remarks_____

_____

9. **Discharge Compliance Records**

☐ Air ☐ Readily available ☐ Up to date ☒ N/A

☐ Water (effluent) ☐ Readily available ☐ Up to date ☒ N/A

Remarks_____

_____

10. **Daily Access/Security Logs** ☐ Readily available ☐ Up to date ☒ N/A

Remarks_____

_____

IV. O & M Costs

1. **O & M Organization**

☐ State in-house ☐ Contractor for State

☐ PRP in-house ☐ Contractor for PRP

☐ Other_____

_____

2. **O & M Cost Records**

☐ Readily available ☐ Up to date

☐ Funding mechanism/agreement in place

☐ Other_____

_____

Total annual cost by year for review period if available

From_____ To_____ _____ ☐ Breakdown attached
Date Date Total cost

From_____ To_____ _____ ☐ Breakdown attached
Date Date Total cost

From_____ To_____ _____ ☐ Breakdown attached
Date Date Total cost

From_____ To_____ _____ ☐ Breakdown attached
Date Date Total cost

From_____ To_____ _____ ☐ Breakdown attached
Date Date Total cost

1. **Unanticipated or Unusually High O & M Costs During Review Period**

Describe costs and reasons: _____

_____

_____

_____

_____

V. ACCESS AND INSTITUTIONAL CONTROLS ☒ Applicable ☐ N/A

A. Fencing

1. **Fencing Damaged** ☐ Location shown on site map ☐ Gates secured ☒ N/A

Remarks_____

_____

B. Other Access Restrictions

1. **Signs and other security measures** ☐ Location shown on site map ☐ N/A

Remarks_____

_____

C. Institutional Controls

1. **Implementation and enforcement**

Site conditions imply ICs not properly implemented ☐ Yes ☒ No ☐ N/A

Site conditions imply ICs not being fully enforced ☐ Yes ☒ No ☐ N/A

Type of monitoring (e.g., self-reporting, drive-by) walk down

Frequency_____

Responsible party/agent ER Operations

Contact	Michael Redd	Manager ER Maintenance	_____	_____
	Name	Title	Date	Phone No.

Report is up-to-date ☒ Yes ☐ No ☐ N/A

Reports are verified by the lead agency ☒ Yes ☐ No ☐ N/A

Specific requirements in deed of decision documents have been met ☒ Yes ☐ No ☐ N/A

Violations have been reported ☐ Yes ☐ No ☒ N/A

Other problems or suggestions: ☒ Report attached

ERD Inspection Data Sheet for SRL Seepage Basins Document Number WSRC-RP-2001-4123, Page A8 of A10

_____

_____

_____

2. **Adequacy** ☒ ICs are adequate ☐ ICs are inadequate ☐ N/A

Remarks_____

_____

D. General

1. **Vandalism/trespassing** ☐ Location shown on site map ☒ No vandalism evident

Remarks_____

2. **Land use changes onsite** ☒ N/A

Remarks_____

3. **Land use changes offsite** ☒ N/A

Remarks_____

VI. GENERAL SITE CONDITIONS

A. Roads ☒ Applicable ☐ N/A

1. **Roads damaged** ☐ Location shown on site map ☒ Roads adequate ☐ N/A

Remarks_____

B. Other site Conditions

Remarks_____

VII. LANDFILL COVERS ☐ Applicable ☒ N/A

A. Landfill Surface

1. **Settlement** (Low spots) ☐ Location shown on site map ☐ Settlement not evident

Areal extent_____ Depth_____

Remarks_____

2. **Cracks** ☐ Location shown on site map ☐ Cracking not evident

Lengths_____ Widths_____ Depths_____

Remarks_____

3. **Erosion** ☐ Location shown on site map ☐ Erosion not evident

Areal extent_____ Depth_____

Remarks_____

_____

4. **Holes** ☐ Location shown on site map ☐ Holes not evident

Areal extent_____ Depth_____

Remarks_____

_____

5. **Vegetative Cover** ☐ Grass ☐ Cover properly established ☐ No signs of stress

☐ Trees/shrubs (indicate size and location on a diagram)

Remarks_____

_____

6. **Alternative Cover (armored rock, concrete, etc.)** ☐ N/A

Remarks_____

_____

7. **Bulges** ☐ Location shown on site map ☐ Bulges not evident

Areal extent_____ Height_____

Remarks_____

_____

8. **Wet Areas/Water Damage** ☐ Wet areas/water damage not evident

☐ Wet Areas ☐ Location shown on site map Areal extent_____

☐ Ponding ☐ Location shown on site map Areal extent_____

☐ Seeps ☐ Location shown on site map Areal extent_____

☐ Soft subgrade ☐ Location shown on site map Areal extent_____

Remarks_____

_____

9. **Slope Instability** ☐ Slides ☐ Location shown on site map ☐ No evidence of slope instability

Areal extent_____

Remarks_____

_____

B. Benches ☐ Applicable ☒ N/A

(Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)

1. **Flows Bypass Bench** ☐ Location shown on site map ☐ N/A or okay

   Remarks_____

2. **Bench Breached** ☐ Location shown on site map ☐ N/A or okay

   Remarks_____

3. **Bench Overtopped** ☐ Location shown on site map ☐ N/A or okay

   Remarks_____

C. Letdown Channels ☐ Applicable ☒ N/A

(Channel lined with erosion control mates, riprap, grout bags, or gabions that descend down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)

1. **Settlement** ☐ Location shown on site map ☐ No evidence of settlement

   Areal extent_____ Depth_____

   Remarks_____

2. **Material Degradation** ☐ Location shown on site map ☐ No evidence of degradation

   Material type_____ Areal extent _____

   Remarks_____

3. **Erosion** ☐ Location shown on site map ☐ No evidence of erosion

   Areal extent _____ Depth_____

   Remarks_____

4. **Undercutting** ☐ Location shown on site map ☐ No evidence of undercutting

Areal extent _____ Depth_____

Remarks_____

_____

5. **Obstructions** Type_____ ☐ No obstructions

☐ Location shown on site map Areal extent _____

Size _____

Remarks_____

_____

6. **Excessive Vegetative Growth** Type_____

☐ No evidence of excessive growth

☐ Vegetation in channels does not obstruct flow

☐ Location shown on site map Areal extent _____

Remarks_____

_____

D. Cover Penetrations ☐ Applicable ☒ N/A

1. **Gas Vents** ☐ Active ☐ Passive

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A

Remarks_____

_____

2. **Gas Monitoring Probes**

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A

Remarks_____

_____

3. **Monitoring Wells** (within surface area of landfill)

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A

Remarks_____

_____

4. **Leachate Extraction Wells**

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A

Remarks_____

_____

5. **Settlement Monuments** ☐ Located ☐ Routinely surveyed ☐ N/A

Remarks_____

_____

E. Gas Collection and Treatment ☐ Applicable ☒ N/A

1. **Gas Treatment Facilities**

☐ Flaring ☐ Thermal destruction ☐ Collection for reuse

☐ Good condition ☐ Needs Maintenance

Remarks_____

_____

2. **Gas Collection Wells, Manifolds and Piping**

☐ Good condition ☐ Needs Maintenance

Remarks_____

_____

3. **Gas Monitoring Facilities** (e.g., gas monitoring of adjacent homes or buildings)

☐ Good condition ☐ Needs Maintenance ☐ N/A

Remarks_____

_____

F. Cover Drainage Layer ☐ Applicable ☒ N/A

1.	**Outlet Pipes Inspected**	☐ Functioning	☐ N/A
	Remarks_____		
	_____		
2.	**Outlet Rock Inspected**	☐ Functioning	☐ N/A
	Remarks_____		
	_____		

G. Detention/sedimentation Ponds ☐ Applicable ☒ N/A

1. **Siltation** Areal extent_____ Depth_____ ☐ N/A

   ☐ Siltation not evident

   Remarks_____

2. **Erosion** Areal extent_____ Depth_____ ☐ N/A

   ☐ Erosion not evident

   Remarks_____

3. **Outlet Works** ☐ Functioning ☐ N/A

   Remarks_____

4. **Dam** ☐ Functioning ☐ N/A

   Remarks_____

H. Retaining Walls ☐ Applicable ☒ N/A

1. **Deformations** ☐ Location shown on site map ☐ Deformation not evident

   Horizontal displacement_____ Vertical displacement_____

   Rotational displacement_____

   Remarks_____

2. **Degradation** ☐ Location shown on site map ☐ Deformation not evident

   Remarks_____

I. Perimeter Ditches/Off-Site Discharge ☐ Applicable ☒ N/A

1. **Siltation** ☐ Location shown on site map ☐ Siltation not evident

   Areal extent_____ Depth_____

   Remarks_____

2. **Vegetative Growth** ☐ Location shown on site map ☐ Siltation not evident

☐ Vegetation does not impede flow

Areal extent_____ Type_____

Remarks_____

_____

3. **Erosion** ☐ Location shown on site map ☐ Erosion not evident

Areal extent_____ Depth_____

Remarks_____

_____

4. **Discharge Structure** ☐ Location shown on site map ☐ N/A

Remarks_____

_____

VIII. VERTICAL BARRIER WALLS ☐ Applicable ☒ N/A

1. **Settlement** ☐ Location shown on site map ☐ Settlement not evident

Areal extent_____ Depth_____

Remarks_____

_____

2. **Performance Monitoring** Type of Monitoring_____

☐ Performance not monitored

Frequency_____ ☐ Evidence of breaching

Head differential_____

Remarks_____

_____

IX. GROUNDWATER/SURFACE WATER REMEDIES ☐ Applicable ☒ N/A

A. Groundwater Extraction Wells, Pumps, and Pipelines ☐ Applicable ☐ N/A

1. **Pumps, Wellhead Plumbing, and Electrical**

☐ Good condition ☐ All required wells located ☐ Needs Maintenance ☐ N/A

Remarks_____

_____

2. **Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances**

☐ Good condition ☐ Needs Maintenance

Remarks_____

_____

3. **Spare Parts and Equipment**

☐ Readily available ☐ Good condition ☐ Requires upgrade ☐ Needs to be provided

Remarks_____

_____

B. Surface Water Collection Structures, Pumps, and Pipelines ☐ Applicable ☐ N/A

1. **Collection Structures, Pumps, and Electrical**

☐ Good condition ☐ Needs Maintenance

Remarks_____

_____

2. **Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances**

☐ Good condition ☐ Needs Maintenance

Remarks_____

_____

3. **Spare Parts and Equipment**

☐ Readily available ☐ Good condition ☐ Requires upgrade ☐ Needs to be provided

Remarks_____

_____

C. Treatment System ☐ Applicable ☐ N/A

1. **Treatment Train** (Check components that apply)

☐ Metals removal ☐ Oil/water separation ☐ Bioremediation

☐ Air stripping ☐ Carbon adsorbers

☐ Filters_____

☐ Additive (e.g., chelation agent, flocculent)_____

☐ Others_____

☐ Good condition ☐ Needs Maintenance

☐ Sampling ports properly marked and functional

☐ Sampling/maintenance log displayed and up to date

☐ Equipment properly identified

☐ Quantity of groundwater treated annually_____

☐ Quantity of surface water treated annually_____

Remarks_____

_____

2. **Electrical Enclosures and Panels** (properly rated and functional)

☐ N/A ☐ Good condition ☐ Needs Maintenance

Remarks_____

_____

3. **Tanks, Vaults, Storage Vessels**

☐ N/A ☐ Good condition ☐ Proper secondary containment ☐ Needs Maintenance

Remarks_____

_____

4. **Discharge Structure and Appurtenances**

☐ N/A ☐ Good condition ☐ Needs Maintenance

Remarks_____

_____

5. **Treatment Building(s)**

☐ N/A ☐ Good condition (esp. roof and doorways) ☐ Needs repair

☐ Chemicals and equipment properly stored

Remarks_____

_____

6. **Monitoring Wells** (pump and treatment remedy)

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ All required wells located ☐ Needs Maintenance ☐ N/A

Remarks_____

_____

D. Monitoring Data

1. Monitoring Data

☐ Is routinely submitted on time ☐ Is of acceptable quality

2 .Monitoring data suggests:

☐ Groundwater plume is effectively contained ☐ Contaminant concentrations are declining

E. Monitored Natural Attenuation

1. **Monitoring Wells** (Natural attenuation remedy)

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ All required wells located ☐ Needs Maintenance ☐ N/A

Remarks_____

_____

X. OTHER REMEDIES

If there are remedies applied at the site which are not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.

XI. OVERALL OBSERVATIONS

A. Implementation of the Remedy

Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emissions, etc.).

B. Adequacy of O & M

Describe issues and observations related to the implementation and scope of O & M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy.

C. Early Indicators of Potential Remedy Failure

Describe issues and observations such as unexpected changes in the cost or scope of O & M or a high frequency of unscheduled repairs, that suggest that the protectiveness of the remedy may be compromised in the future.

D. Opportunities for Optimization

Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy.

ATTACHMENT 1
SRL SEEPAGE BASINS INSPECTION SHEET
SRL SEEPAGE BASINS (904-53G (1 & 2), -54G, and -55G) INSPECTION SHEET

A = Satisfactory X = Unsatisfactory (Comments required)	A or X	Comments of Corrective Action Taken (See Maintenance Register for Corrected Items)
Check for potential encroachments (Ensure that there is no building on the site).	A	
Does the site have brush or woody vegetation that needs cutting and disposal?	A	
Does the site need to have the grass cut?	A	
Verify that the roads are accessible.	A	
Verify that the waste unit's signs are correct and legible.	A	
Does the site show signs of erosion or subsidence? Are there any signs of burrowing animals (holes)?	A	
Does the site have adequate vegetative cover?	A	recently seeded while under construction - some small areas
Check the integrity of drainage ditches (around the area) for the presence of excessive erosion, sediment buildup, and any debris restricting water flow.	A	
Does the site need general cleanup (housekeeping)?	A	

Inspected By: R.P. Socha / [signature] Date/Time: 9/18/01 2pm
(Print Name) (Signature)

~~Post~~ Closure Manager: R.P. Socha / [signature] Date/Time: 9/18/01 2 pm
(Print Name) (Signature)

Note: USEPA and SCDHEC must be notified within 30 days of identification of any area where any breach or compromise of restrictions place on this institutional control operable unit has occurred

Tank 105-C Hazardous Waste Management Facility Operable Unit

I. Introduction

The review for this unit is conducted under the SRS RCRA program. The CERCLA review requirements are met by the RCRA program, therefore a separate review of the RCRA Corrective Action is not duplicated in this document. This is the second such five-year review for the Tank 105-C Hazardous Waste Management Facility (HWMF) Operable Unit (OU). This review was conducted from August 2001 through September 2001. This report documents the results of the review.

II. Site Chronology

Table 1 lists the chronology of site events for the Tank 105-C HWMF.

III. Background

The Tank 105-C HWMF is a source-specific OU within the Fourmile Branch Watershed. The Tank 105-C HWMF consisted of one 8,400-gallon capacity underground storage tank and ancillary piping located in C Area, east of C Reactor (Building 105-C) and approximately 6 miles from the nearest site boundary.

The Tank 105-C HWMF was installed in 1961 as part of an off-line heat exchanger repair program and was used as a temporary holding tank for liquid solutions. Sumps from the heat exchanger cleaning area drained into Tank 105-C. Oil in the tank is probably attributable to oil leaks into these sumps. The reacted or spent oxalic acid solution that resulted from the rinsing process was pumped into an above-ground neutralization tank in the stack area of the reactor building. Potassium hydroxide was then added and mixed to raise the solution pH to 8.0 or above. After neutralization, the waste was transferred to the underground storage tank for temporary storage. It was common for the neutralization process to

Table 1. Chronology of Site Events

Event	Date
RCRA Closure Plan Approved	1991
Corrective Action start	1991
RCRA Closure Certified	1991
Final ROD issuance	September 23, 1994
Previous Five-Year Reviews	June 30, 1997

Key:

Consent Decree – Date a consent decree (enforcement document from the court system) was issued for the operable unit.

Corrective Action start – Date the corrective (remedial) action was initiated (under RCRA).

ESD Issuance - Date all three parties (USDOE, USEPA, and SCDHEC) signed the Explanation of Significant Difference used to significantly modify the remedy selected in the Record of Decision.

Final or Interim ROD issuance – Date the three parties (USDOE, USEPA, and SCDHEC) signed the Record of Decision.

Federal Facility Agreement Declared Effective - Date the Federal Facility Agreement formalized the integration of CERCLA and RCRA in remediation activities at SRS.

NPL listing – Date the entire SRS was added to EPA's National Priorities List.

Previous Five-Year Reviews – Date of any previous five year reviews of remedy for the operable unit.

RCRA Closure Certified – Date the three parties (USDOE, USEPA, and SCDHEC) certified that the operable unit had been remediated and closed under the Resource Conservation and Recovery Act.

RCRA Closure Plan Approved – Date the three parties (USDOE, USEPA, and SCDHEC) approved the closure plan for the operable unit under Resource Conservation and Recovery Act.

Remedial Action start/complete – Date the remedial action (final or interim) was initiated/completed (under CERCLA).

Removal Action – Date contaminated media was removed from the operable unit (not associated with the ROD).

RFI/RI start/complete - Date the remedial investigation (sampling) was initiated/completed for the operable unit.

ROD Amendment Issuance - Date the three parties (USDOE, USEPA, and SCDHEC) signed the Record of Decision Amendment used to change the remedy selected in the original Record of Decision.

require additional pH adjustment inside Tank 105-C, accomplished by circulating the waste in the tank with a pump and adding more potassium hydroxide to fine-tune the pH. A permanent pump was set up to pump the waste into a waste trailer for transportation to a storage/disposal facility. The pump and circulation lines were disassembled in 1983.

Prior to the RCRA closure, chemicals of concern at the Tank 105-C HWMF included tritium and other radionuclides in a characteristic hazardous waste with a pH of 13.2. Post-closure chemicals of concern are residual minimal quantities of radionuclides solidified with concrete, with a pH of less than 12.5. Since the waste was neutralized, the solidified waste remaining in the tank is radioactive waste that has been immobilized.

IV. Final Remedial Actions

The selected remedy for this unit as identified in the Record of Decision is no further action under CERCLA.

V. Progress Since Last Review

This is the second 5-year review for this OU. Since the previous review in June of 1997, the following actions were completed:

- Annual inspections as required by the RCRA Closure Plan

VI. Five-Year Review Process

The following tasks were performed as part of the review:

- Reviewed the documents listed in Attachment 1
- Confirmed the implementation of the remedial action
- Assured that all actions required under the RCRA Permit were implemented

VII. Technical Assessment

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

VIII. Issues

There are no issues for this OU.

IX. Recommendations and Follow-up Actions

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

X. Protectiveness Statement(s)

The remedy of no further action under CERCLA is protective of human health and the environment.

XI. Next Review

The next five-year review is scheduled for June 30, 2007.

Attachment 1

List of Documents Reviewed

WSRC, 1994. *Final Record of Decision Remedial Alternative Selection for Tank 105-C Hazardous Waste Management Facility Operable Unit (U),* WSRC-RP-94-106, Revision 0, September 9, 1994, Westinghouse Savannah River Company, Aiken, SC.

TNX Area Operable Unit Groundwater (082-G) (INTERIM ACTION)

I. Introduction

The final Record of Decision (ROD) for the TNX Area Operable Unit (OU) has not been issued. The following is for information purposes only. A review of the Interim Action Record of Decision (IAROD) for the TNX Groundwater Subunit (082-G) of the TNX OU has not been conducted.

II. OU Chronology

Table 1 lists the chronology of site events for the Groundwater Subunit (082-G) of the TNX Area OU.

III. Background

The TNX area is located in the southwestern portion of Savannah River Site (SRS), approximately one-quarter mile east of the Savannah River (Figures 1 and 2) and contains three Resource Conservation and Recovery Act/Comprehensive Environmental Response/Compensation and Liability Act (RCRA/CERCLA) OUs: the TNX Area OU, the TNX Outfall Delta OU, and the X-001 Outfall Drainage Ditch OU. The TNX Area OU consists of four major subunits: the New TNX Seepage Basin (NTSB) (904-102G); the TNX Burying Ground (TBG) (643-5G); the Old TNX Seepage Basin (OTSB) (904-076G); and the TNX Groundwater (TNXGW) (082-G) (see Figures 2 and 3). The TNX Outfall Delta OU (TNXOD OU) is located between the TNX Area OU and the Savannah River. The TNX area is an industrial area that is proposed for continued future industrial (non-nuclear) use as supported by the proposed land use map for SRS (WSRC 1994b).

This summary is for the IAROD prepared for the TNX Groundwater Subunit (082-G) of the TNX Area OU. Discussion of OU history and contamination at

Table 1. Chronology of OU Events

Event	Date
Interim ROD issuance	November 16, 1994
Interim Remedial Action start	September 16, 1996
ESD issuance	September 22, 1997
ESD issuance	February 5, 2002

Key:

Consent Decree – Date a consent decree (enforcement document from the court system) was issued for the operable unit.

Corrective Action start – Date the corrective (remedial) action was initiated (under RCRA).

ESD Issuance - Date all three parties (USDOE, USEPA, and SCDHEC) signed the Explanation of Significant Difference used to significantly modify the remedy selected in the Record of Decision.

Final or Interim ROD issuance – Date the three parties (USDOE, USEPA, and SCDHEC) signed the Record of Decision.

Federal Facility Agreement Declared Effective - Date the Federal Facility Agreement formalized the integration of CERCLA and RCRA in remediation activities at SRS.

NPL listing – Date the entire SRS was added to EPA's National Priorities List.

Previous Five-Year Reviews – Date of any previous five year reviews of remedy for the operable unit.

RCRA Closure Certified – Date the three parties (USDOE, USEPA, and SCDHEC) certified that the operable unit had been remediated and closed under the Resource Conservation and Recovery Act.

RCRA Closure Plan Approved – Date the three parties (USDOE, USEPA, and SCDHEC) approved the closure plan for the operable unit under Resource Conservation and Recovery Act.

Remedial Action start/complete – Date the remedial action (final or interim) was initiated/completed (under CERCLA).

Removal Action – Date contaminated media was removed from the operable unit (not associated with the ROD).

RFI/RI start/complete - Date the remedial investigation (sampling) was initiated/completed for the operable unit.

ROD Amendment Issuance - Date the three parties (USDOE, USEPA, and SCDHEC) signed the Record of Decision Amendment used to change the remedy selected in the original Record of Decision.

TNX will focus primarily on the volatile organic compound (VOC) contamination within the vadose zone and groundwater. Additional information on site history and contamination for the TNX Area OU and its subunits or the TNXOD OU can be found in the RCRA Facility Investigation/Remedial Investigation Report (RFI/RI) with Baseline Risk Assessment (BRA) for the TNX Area OU (WSRC 1999b and WSRC 1999c) and for the TNXOD OU (WSRC 2001e).

OU Characteristics

The TNX Area OU is located 0.25 miles east of the Savannah River on a terrace between Upper Three Runs Creek to the north and Fourmile Branch to the south. The unit is at an elevation of 150 feet (ft) above mean sea level (msl). Local topography is relatively flat and slopes westward toward the Savannah River. A portion of the Savannah River floodplain swamp lies immediately west of the TNX Area OU at an elevation of 95 ft msl.

During high stages of the river, portions of the swamp may be flooded. The swamp has stands of cypress and tupelo in low-lying areas and bottomland hardwoods at higher elevations. The water table is approximately 35 ft below land surface (bls) at the NTSB, 45 ft bls at the TBG, 55 ft bls at the OTSB, and 4 ft bls in the Savannah River floodplain. There is an upward gradient between the shallow and deeper aquifer systems below the Crouch Branch confining unit. This upward gradient is such that groundwater beneath the TNX facility and floodplain areas moves progressively from the deeper aquifer system to the shallow aquifer and then to the Savannah River. In the TNX swamp, the X-8 outfall ditch intersects the water table and, therefore, has a channeling effect on groundwater flow.

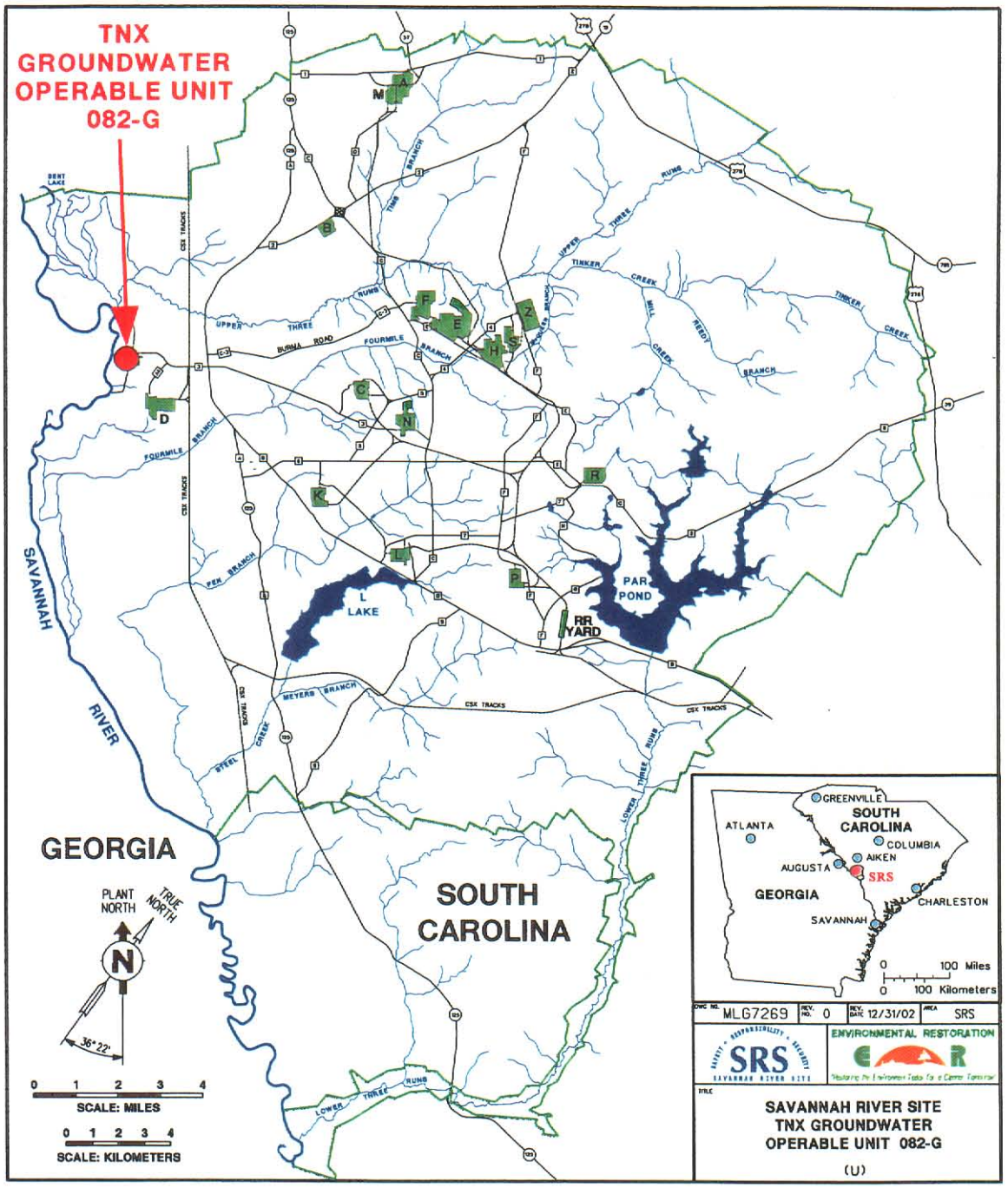


Figure 1. TNX-Area Location at SRS

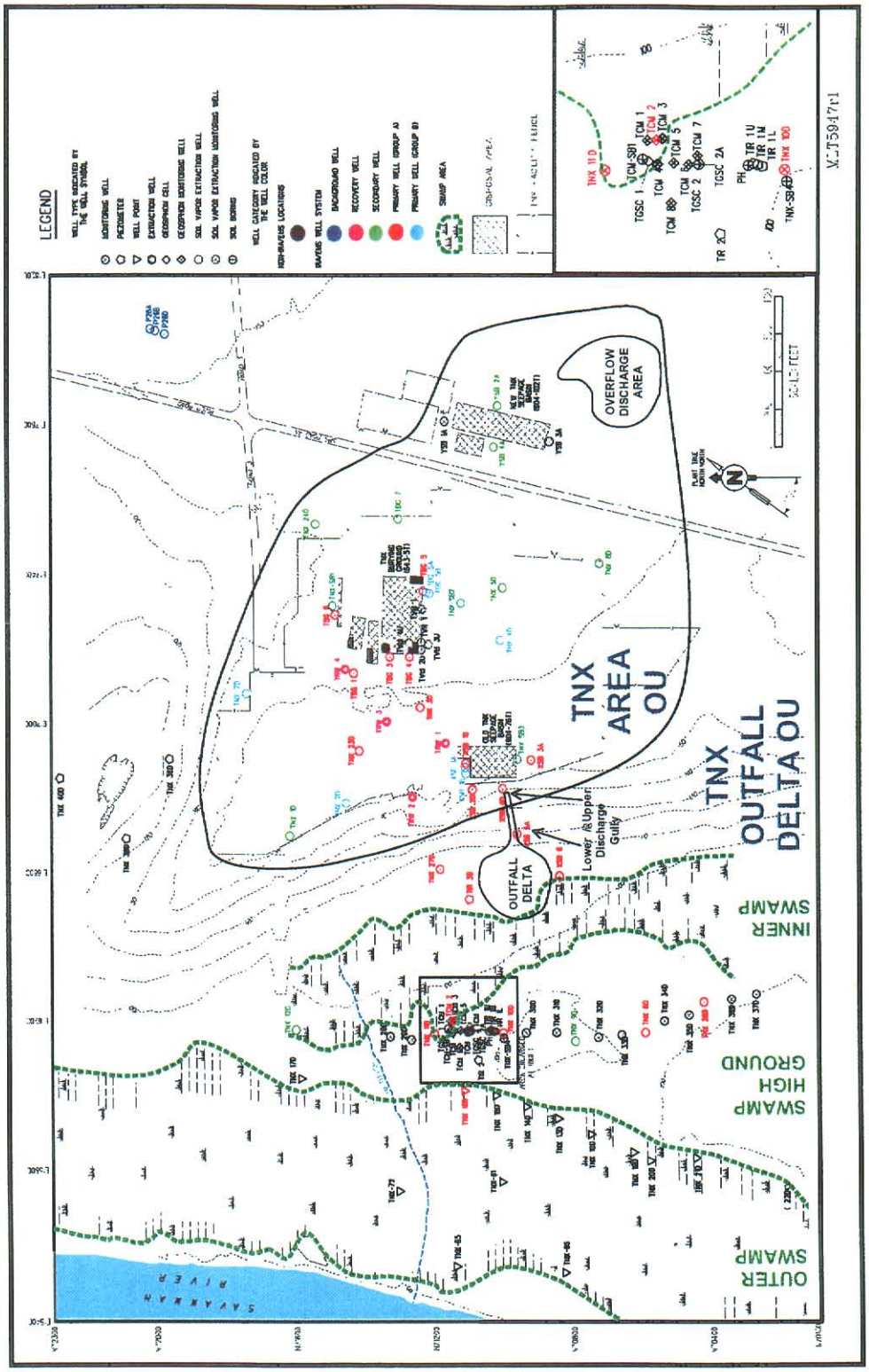


Figure 2. Location of Interim Action Effectiveness Monitoring Strategy Well System

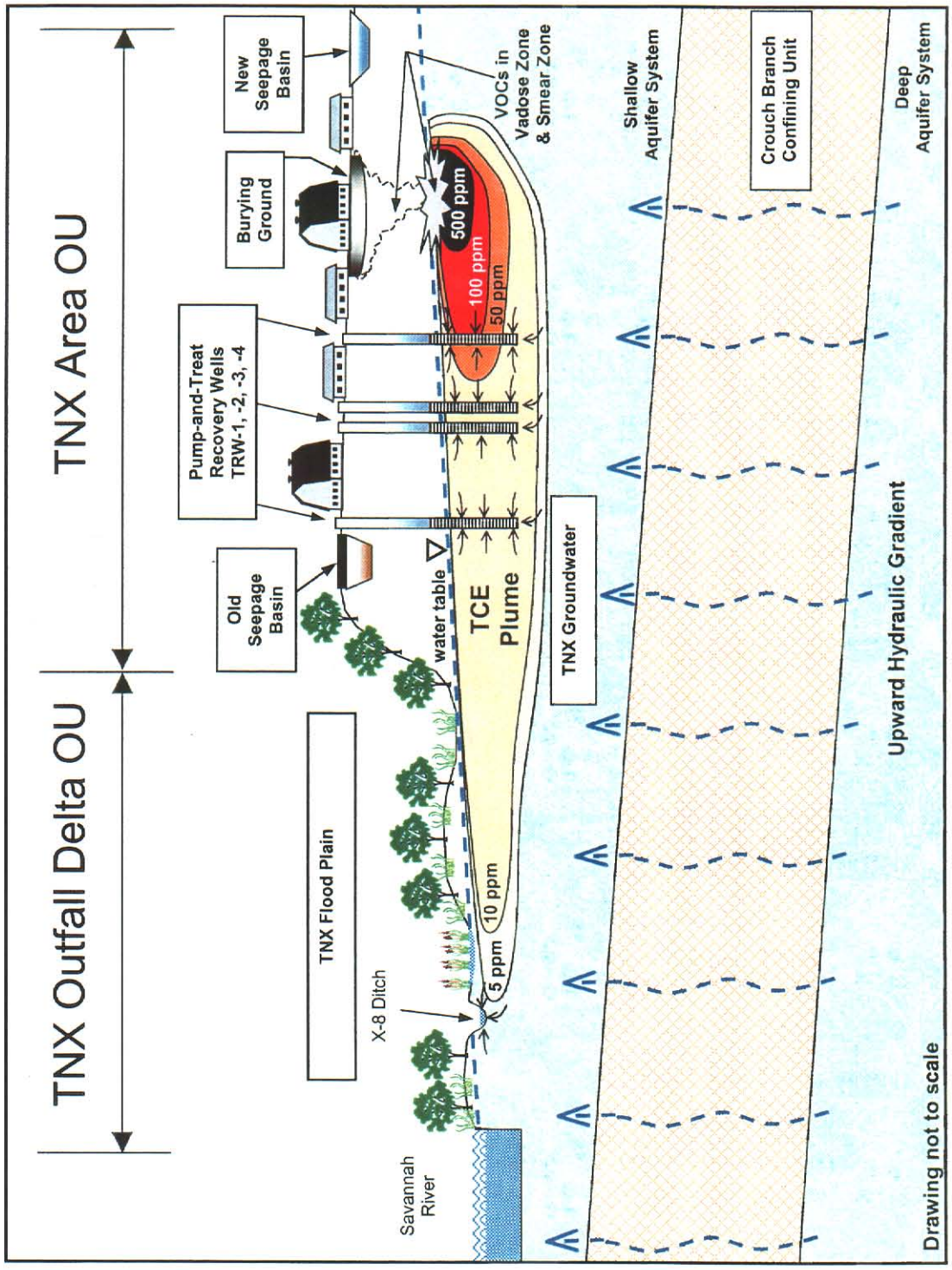


Figure 3. Schematic Cross Section of TNXGW Showing TCE for 4Q2000

OU History

The TNX Area was a pilot-scale testing and evaluation facility that supported nuclear fuel and target manufacturing chemical processes and the Defense Waste Processing Facility (DWPF). Past operations within the TNX Area resulted in contamination of the vadose zone and groundwater. Potential sources of groundwater contamination included seepage from unlined basins (OTSB, NTSB), leakage from the process sewers, leachate from contaminated media in the TBG, and leachate from other sources at TNX (e.g., a temporary storage facility for 55-gallon drums during the 1950s and an equipment staging area).

The OTSB was an unlined liquid-waste disposal area that operated from the mid-1950's until 1980 and received radioactive, organic, and inorganic contaminated process wastewaters generated from TNX facilities. From 1981 to 1988, non-hazardous and non-radioactive process wastewater was sent to an unlined earthen basin known as the NTSB. In August 1988, the NTSB was removed from operation, at which time wastewaters were routed to the TNX Effluent Treatment Facility.

The TBG, which consisted of four trenches at 6 to 8 ft bls, was created in 1953 to dispose of contaminated debris from an accidental explosion of an experimental evaporator that was being used to concentrate a solution of uranyl nitrate (0.4 Ci) and nitric acid. The debris included materials such as conduits, drums, and structural steel. Between 1982 and 1984, during an expansion of the TNX-Area facilities, most of the buried material was excavated and sent to the SRS Radioactive Waste Burial Ground. Five small areas were not excavated due to numerous underground obstructions (i.e., utilities, process sewer lines, and computer and telephone lines) as well as aboveground structures. An estimated 0.02 Ci of uranyl nitrate may remain buried in the five unexcavated areas. In 1996 an additional disposal area was identified. Excavation revealed a buried

drum; subsequent investigation revealed two additional drums. The three drums contained materials contaminated with radionuclides and metals. They were removed and the area was characterized thoroughly. No soil contamination was observed and there was no indication of any more drums in the area. Currently, almost all of the TBG area lies under the buildings and laboratories. The area is highly congested with structures, overhead obstructions, and underground obstructions; much of the available ground surface is covered with asphalt.

The TNXGW is the groundwater beneath the TNX Area OU surface units described above and beneath the TNXOD OU, extending all the way to the Savannah River. Groundwater at TNX can be divided into two main aquifer systems, a shallow and deep aquifer system. The shallow system can be further subdivided into an upper unconfined water table aquifer (35 to 40 ft thick) that outcrops in the TNX floodplain and a lower semi-confined aquifer. Groundwater flows progressively from deep to shallow aquifers (i.e., upward hydraulic gradient) and to the Savannah River.

TNXGW Contamination Problems

The nature and extent of contamination in soil, sediment, surface water, and groundwater at the TNX Area OU were characterized with the results summarized in the TNX Area OU RFI/RI/BRA (WSRC 1999b and WSRC 1999c). Results from the RFI/RI/BRA and recent monitoring have demonstrated that the TNXGW is contaminated with chlorinated VOCs (primarily trichloroethylene (TCE), and to a lesser extent, tetrachloroethylene (PCE), and carbon tetrachloride), nitrate, mercury, and gross alpha above maximum contaminant levels (MCLs). VOCs are the most widespread and fastest migrating groundwater constituents in the TNXGW. The dominant VOC contaminant, TCE, has been detected in groundwater at concentrations as high as 4,800 parts per billion (ppb) (September 1990), but currently the concentrations have decreased to below 1,500 ppb near the groundwater plume core (Figure 4).

Mercury, gross alpha (primarily radium-226), and nitrate have been consistently detected above MCL in a localized area of groundwater downgradient of the TBG (near TBG-4). SRS believes that the contamination is the result of acid leaching of naturally occurring mercury and radium-226 from soil (i.e., dissolution of clay minerals) by low pH groundwater beneath the TBG. Low pH conditions (and elevated nitrate) in the groundwater have historically existed immediately downgradient of the TBG and likely resulted from the leaching of the nitric acid-contaminated soil and debris that had been buried in the TBG from 1953 to 1984.

Groundwater beneath the TNXOD OU exceeds the MCL for gross alpha, uranium, and mercury. Mercury contamination in groundwater beneath the TNXOD OU has occurred as MCL exceedances in well TIR-3B (3 samples out of 8 above the MCL since 1997) with a maximum detected value of 2.72 μg/L (sample taken 5/24/99). Gross alpha (primarily uranium) contamination in groundwater beneath the TNXOD OU has occurred as MCL exceedances in the area near wells TCM-3, -5, and -7 (downgradient of the Inner Swamp). Based on these exceedances and fate and transport modeling, mercury and uranium have been identified as contaminant migration (CM) refined constituents of concern (COCs) for soil/sediments in RFI/RI/BRA for the TNXOD OU.

Manganese and boron were also retained as groundwater human health COCs for the future resident in the TNX Area OU RFI/RI/BRA because they contribute to the noncarcinogenic hazard index for the contaminated groundwater at the TNX Area OU. There are no MCLs for these constituents. The hazard index for this medium is dominated by the health hazard contribution of the VOCs found in the groundwater. By reducing the VOC concentrations to be within MCLs, the groundwater hazard index will be reduced such that it will not be necessary to remediate the manganese and boron in groundwater. Therefore, manganese and boron do not require remedial action.

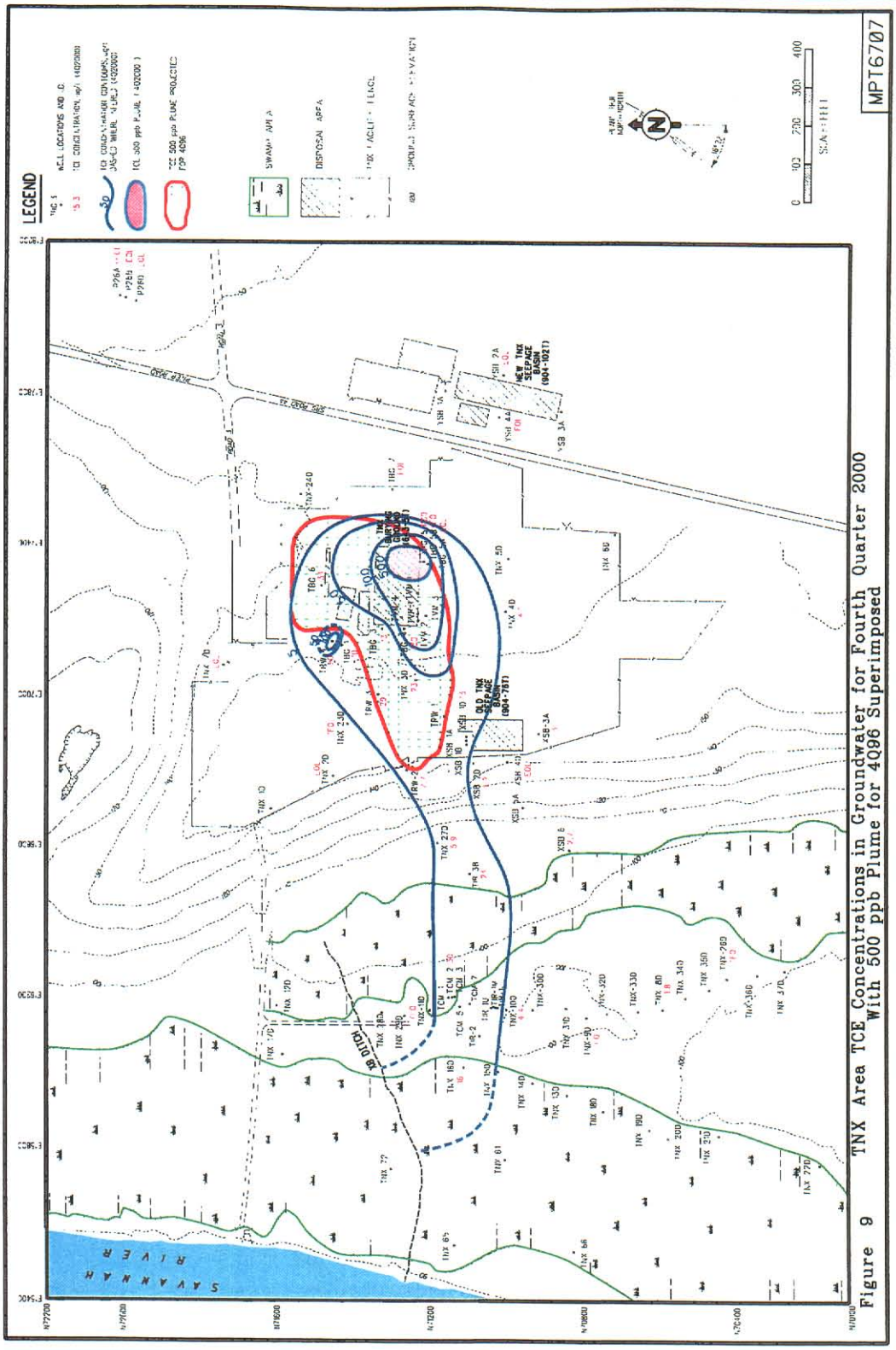


Figure 4. TNX Area TCE Concentrations in Groundwater for 4Q2000

The hydrogeological conditions at TNX have contained the VOCs to the water table aquifer, resulting in a plume extending from the TNX facility toward the adjacent floodplain and the Savannah River (Figures 3 and 4). VOCs have not been detected in the semi-confined or deep aquifers. TCE has been detected at the seep line in the TNX floodplain where the groundwater plume outcrops. However, no contaminants from the plume have been detected in the Savannah River or offsite groundwater.

The contaminant responsible for the largest portion of the risk to the onsite worker is TCE, through contact with contaminated soil and water at the groundwater outcrop in the swamp during sampling. Under current conditions, the onsite worker is not exposed to contaminants at concentrations that will produce an unacceptable risk to human health. While the contaminants in the groundwater system exceed Safe Drinking Water Standards, the contaminated groundwater is not being used, nor is it planned to be used, while the site is controlled by United States Department of Energy (USDOE). Use of this groundwater as a drinking water source would present unacceptable risk levels.

Even though the RFI/RI/BRA did not identify any COCs or Principal Threat Source Material (PTSM) in the TBG and vadose zone, ongoing treatability studies performed in the last five years indicate the presence of secondary source VOCs in the deep vadose zone that continue to impact groundwater at concentrations above MCLs. This secondary source material is considered PTSM and is a problem warranting action.

In 1994, an interim action was chosen to mitigate further migration of the groundwater plume hotspot and to remove contaminants from the groundwater. As part of the remedy selection process for the TNX Area OU, the TNXGW subunit will be reassessed and an appropriate final remedial action will be selected.

IV. Remedial Interim Actions

To control and remediate VOC source material and the groundwater plume, an IAROD for the TNXGW was issued on November 16, 1994 (WSRC 1994a). The purpose of the interim action was to serve as an incremental step in part of an overall remedy to address groundwater contamination, but was not intended as a final remedy.

The Interim Remedial Action Objectives (IRAOs) developed for the TNXGW subunit are:

- Prevent further aquifer degradation
- Maintain risk at acceptable levels to the onsite worker at the seep line
- Reduce potential risk to human health and the environment in general

To successfully achieve these IRAOs, the following Interim Remedial Goals (IRGs) were agreed upon for the interim action:

- Mitigate migration of VOCs to the floodplain by stabilizing the 500 ppb TCE plume core
- Remove VOC contamination in the groundwater near the 500 ppb TCE plume core

The interim action is required to be operated and maintained for the period of time necessary to achieve the IRAOs and IRGs or until a final response action is determined.

The remedy selected in the IAROD to achieve the IRGs was the Hybrid Groundwater Corrective Action (HGCA). The HGCA consisted of two components: (1) a pump and treat system (recovery well network and low-profile

air stripper) to treat and inhibit further migration of the 500 ppb TCE plume core, and (2) an airlift recirculation well, located at the heart of the plume to expedite remediation. Testing performed in 1996 demonstrated that the recirculation well system was ineffective in the TBG area because of geological factors and the nature of the contamination. Furthermore, it was determined that the pump and treat system could adequately achieve the IRGs. Consequently, the IAROD was modified in 1997 with an Explanation of Significant Difference (ESD) to discontinue operation of the recirculation well. Location of the current interim action system and associated monitoring wells are presented in Figure 2. As part of interim action, institutional controls consisting of existing SRS access controls were to be used to limit public access to the TNX Area.

As outlined in the TNXGW IAROD and Remedial Design Report/Remedial Action Work Plan (RDR/RAWP) (WSRC 1994a and WSRC 1999d), VOC air emissions from the air stripper were to be monitored to ensure compliance with South Carolina Department of Health and Environmental Control (SCDHEC) air pollution regulations and VOC effluent discharges to the X-08C Outfall must comply with effluent limitations of the National Pollution Discharge Elimination System (NPDES) permit SC0000175. In addition to VOCs (TCE and PCE), mercury, gross alpha, and nitrate in the effluent water from the treatment system were to be monitored to ensure that they do not exceed discharge limits. Performance standards specified that the interim action would operate 24 hours per day, 7 days per week under prevailing ambient air temperatures (generally ranging from 10-110 degrees Fahrenheit) and weather conditions throughout its service life. After the initial startup period, the unit would operate essentially unattended except for inspection, routine sampling, maintenance, and repair. A combined estimated downtime of no more than 10% for normal maintenance, troubleshooting and repairs should occur during the estimated service lifetime of 10 years.

The performance of the interim action system is evaluated through an effectiveness monitoring program as specified in the RDR/RAWP. The reporting requirements for this program specify that SRS is required to submit semi-annual monitoring reports to United States Environmental Protection Agency (USEPA) and SCDHEC for the duration of the interim action. The first report, known as the *TNX Area Groundwater and Effectiveness Monitoring Strategy Data Only Report* (Data Only Report), includes data collected during the first two quarters of each calendar year. The second report, known as the *Comprehensive TNX Area Annual Groundwater and Effectiveness Monitoring Strategy Report* (Annual Monitoring Report), is compiled six months later and includes data collected during all four quarters of the calendar year and a comprehensive evaluation of the interim action effectiveness (WSRC 2001b). During the first few years of interim action operation, semi-annual reporting provided frequent updates on interim action effectiveness.

V. Progress In the Last Five Years

Since startup in 1996, the interim action pump and treat system has continued to perform effectively at containing the 500 ppb TCE plume core, reducing transport of VOCs to the TNX floodplain and the overall contaminant mass in the groundwater. The recovery wells of the interim action system are designed to feed the air stripper at a rate of 80 gallons per minute (gpm). Water table elevations and the estimated zone of capture associated with the system are presented in Figure 5 (WSRC 2001b). The extent of the groundwater TCE plume for the fourth quarter of 2000 is presented in Figure 4 (WSRC 2001b). As of July 2001, 570 million liters (150 million gallons) of groundwater have been treated and 90 pounds (40.8 kilograms) of VOCs have been removed.

In addition to the interim action pump and treat system, two treatability studies using other technologies (i.e., GeoSiphon™ Cell and soil vapor extraction (SVE))

were evaluated in the field for their effectiveness in removing VOCs from the groundwater or vadose zone, respectively.

The GeoSiphon Cell treatability study was conducted in the TNX floodplain to evaluate in situ treatment of VOC-contaminated groundwater. The GeoSiphon Cell consisted of a large diameter well containing granular cast iron, which reduces chlorinated VOCs in groundwater to ethane, methane, and chloride ions. Results from the study demonstrated that the passive technology can successfully treat TCE-contaminated groundwater from the TNX floodplain to concentrations below 5 ppb. Based on these results, the GeoSiphon Cell technology will remain as a possible alternative option during final remedy selection for the TNXGW. However, as a result of the continued effectiveness of the interim action pump and treat system, floodplain VOC concentrations have decreased significantly. Consequently, deployment of several GeoSiphon Cells in the floodplain may not be the most effective or cost efficient alternative at reducing the mass of VOC contamination at TNX and minimizing future VOC groundwater concentrations in the TNX floodplain.

The SVE treatability study was performed in the vadose zone near the TBG in 1997 (Phase I) and in 1999 (Phase II). Data from the study demonstrate the existence of a "smear zone" of VOC contamination extending about 15 ft above and below the water table (centered at a depth of 50 ft bls). All other characterization activities, however, have been unable to specifically locate the source material (i.e., hot spot) contributing to this "smear zone." In addition, the lateral extent of the "smear zone" has not been delineated but is assumed to be similar to the extent of the 500-ppb groundwater isoconcentration line.

During a 180-day period of intermittent operation, a very small scale SVE unit was able to remove 18 pounds of TCE and 8 pounds of carbon tetrachloride (pumping rates between 5 and 20 cubic feet per minute with an estimated radius of influence between 40 and 110 feet). Based on these results, addition of SVE to

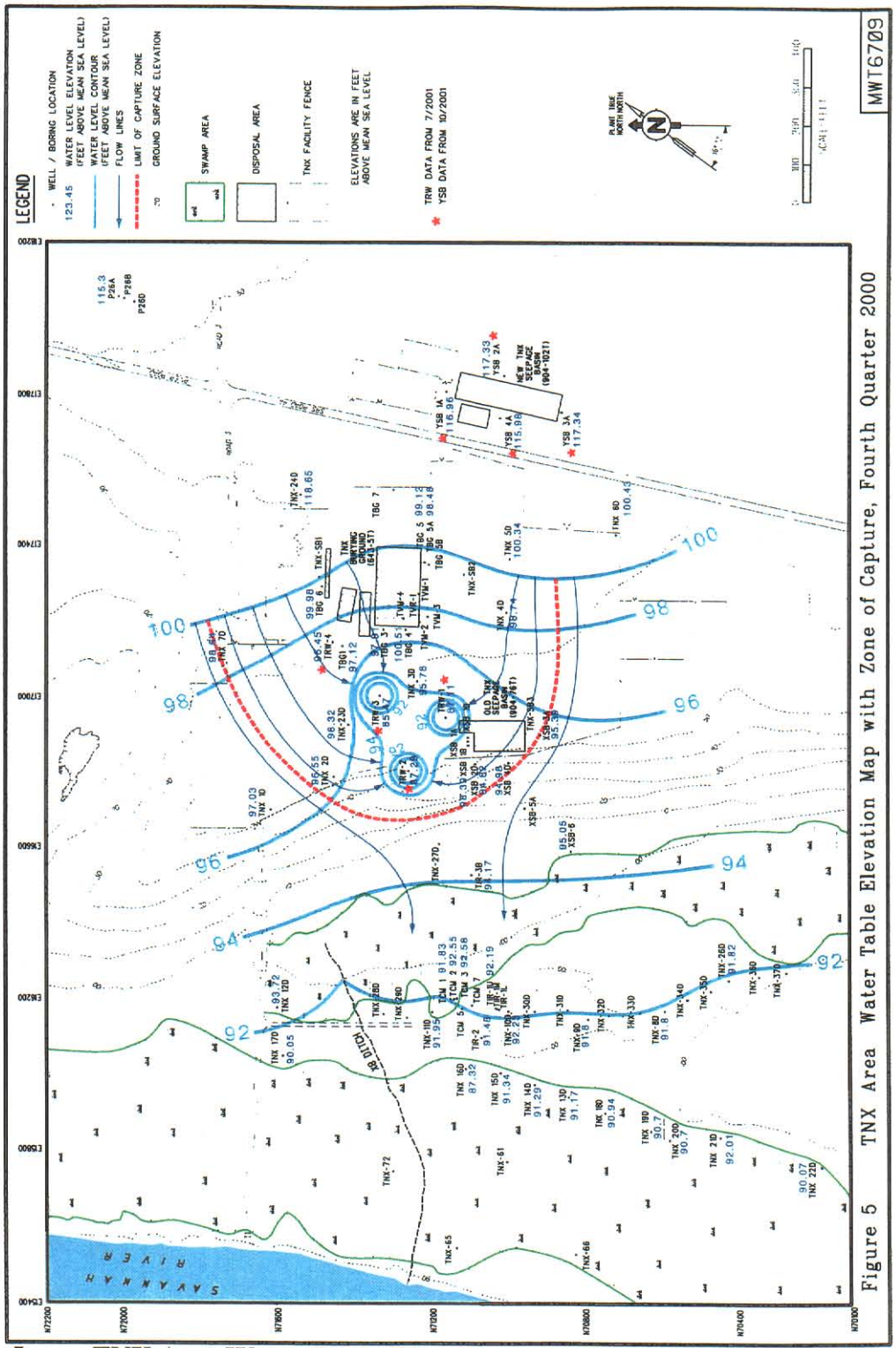


Figure 5. TNX Area Water Table Elevations with Zone of Capture for 4Q2000

the current interim action pump-and-treat system has been proposed to USEPA and SCDHEC. SVE would be an effective and cost efficient approach at reducing the mass of VOCs at TNX (i.e., removing vadose zone secondary source VOCs near the plume core) and minimizing future VOC groundwater concentrations in the TNX floodplain.

If approved by the regulators, accelerated deployment of SVE will be accomplished by revising the existing IAROD for the TNX Groundwater through issuance of an ESD (WSRC 2001d). The ESD will also document modification of the existing interim action effectiveness monitoring reporting requirements from two semi-annual reports to one annual report. The annual effectiveness monitoring report will include the performance of both the pump-and-treat and the SVE systems.

VI. Technical Assessment

- The interim action system is operating effectively and continues to achieve the IRAOs and IRGs, providing protection to human health and the environment.

- The exposure assumptions, toxicity data, cleanup levels, and remedial action objectives used at the time of remedy selection are still valid.

- SRS access controls are in place and being implemented.

- Operation and maintenance records, health and safety plans and training records, groundwater monitoring records, daily operation logs, and semi-annual effectiveness monitoring reports are being prepared as required.

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

VII. Issues

No issues related to current site conditions prevent the remedy from being protective.

Since startup, the performance of the interim action system has continued to be good with only one unplanned shutdown. The system shut down because of a low air flow alarm. Alarm malfunction was found to be the cause of the problem. Only minor modifications have been made to improve system performance and ensure compliance with effluent permit requirements.

With the exception of controls at wells TRW 3 and 4 to prevent these wells from running dry, flow to the interim action air stripper has not been restricted. TRW 4 has not been operated since 1999 since the well has had such a low flow rate.

Since startup of the interim action system, effluent water discharges from the system to the NPDES X-08C outfall have been monitored for TCE and PCE (NPDES monthly average limit for TCE is 5 ppb and PCE is 5 ppb). Only one exceedance (7.4 ppb TCE on November 24, 1998) of the monthly average TCE limit of 5 ppb has occurred at the X-08C outfall. In addition, groundwater from the interim action system recovery wells TRW-1, -2, -3, and -4 have never exceeded the MCLs for gross alpha (15 pCi/L), nitrate (10 ppm) and mercury (2 ppb) during monthly monitoring (1996-1999) and annual monitoring (1999-present) except for one exceedance of the mercury MCL (3.55 ppb mercury in well TRW-1 on January 16, 1998).

VIII. Recommendations and Follow-up Actions

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

IX. Protectiveness Statement(s)

The interim remedy is not fully protective of human heath and the environment because additional remedies will be necessary under a final ROD to reduce the level of contaminants in the groundwater to below MCLs. The interim remedy is removing TCE from the most concentrated portion of the contaminated plume (> 500 g/L TCE). In the interim, exposure pathways that could lead to unacceptable risk are being controlled through institutional controls. Institutional controls include: (1) physical access controls to prevent unauthorized entry to SRS (fences, guards, security patrols, etc.); (2) administrative controls that maintain this site for industrial use only (SRS is a secured government facility with land use restrictions); and (3) warning signs and land use controls (SRS Site Use/Site Clearance Program).

Attachment 1

List of Associated Documents

WSRC, 1994a. *Interim Action Record of Decision, Remedial Alternative Selection - TNX Groundwater Operable Unit* (U), WSRC-TR-94-0375, Revision 1, October, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

WSRC, 1994b. *Savannah River Site Federal Facility Agreement Implementation Plan* (U), WSRC-RP-94-1200, Revision 0, December 18, 1996, Westinghouse Savannah River Company, Aiken, SC.

WSRC,1997. *Explanation of Significant Differences for the TNX Groundwater Operable Unit* (U), WSRC-RP-97-169, Revision 1, September, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

WSRC, 1999a. *Federal Facility Agreement Annual Progress Report For Fiscal Year 1999* (U), WSRC-RP-99-4300, November, Westinghouse Savannah River Company, Aiken, SC

WSRC, 1999b. *RCRA Facility Investigation/ Remedial Investigation Report with Baseline Risk Assessment for the TNX Area Operable Unit* (U), Volume I, WSRC-TR-96-00808, Revision 1.2, January, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

WSRC, 1999c. *RCRA Facility Investigation/ Remedial Investigation Report with Baseline Risk Assessment for the TNX Area Operable Unit* (U), Volume II, WSRC-TR-96-00808, Revision 1.2, November, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

WSRC, 1999d. *TNX Groundwater Operable Unit Remedial Design Report/Remedial Action Work Plan* (U), WSRC-TR-95-284, Revision 1.5, May, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

WSRC, 2000a. *Federal Facility Agreement Annual Progress Report For Fiscal Year 2000* (U), WSRC-RP-2000-4300, November, Westinghouse Savannah River Company, Aiken, SC

WSRC, 2001b. *2000 Comprehensive TNX Area Annual Groundwater and Effectiveness Monitoring Strategy Report* (U), WSRC-RP-2001-04054, May, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

WSRC, 2001c. *Corrective Measures Study/Feasibility Study for the TNX Area Operable Unit* (U), WSRC-RP-97-428, Redline Revision 1.1, October, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

WSRC, 2001d. *Explanation of Significant Differences (ESD) to the Revision 1 Interim Record of Decision (IAROD) for the TNX Area Operable Unit Groundwater* (U), WSRC-RP-2001-00764, Revision 0, October, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

WSRC, 2001e. *RFI/FI with Baseline Risk Assessment for the TNX Outfall Delta. Lower Discharge Gully and Swamp Operable Unit* (U), Volumes I and II, WSRC-TR-98-4158, Revision 0, August, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

WSRC, 2001f. *Statement of Basis/Proposed Plan for the TNX Area Operable Unit* (U), WSRC-RP-2001-4198, Revision 0, October, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

Five-Year Review Site Inspection Checklist

I. SITE INFORMATION

Site Name: TNX OU – Air Stripper	**Date of Inspection: 9/26/01**
Location and Region: SRS, USEPA Region IV	**EPA ID:**
Agency, office, or company leading the five-year review: USDOE	**Weather/temperature: Clear, ~70°F**

Remedy Includes: (Check all that apply)

- ☐ Landfill cover/containment
- ☐ Access controls
- ☐ Institutional Controls
- ☐ Monitored Natural Attenuation
- ☐ Groundwater Containment
- ☐ Vertical Barrier Walls
- ☒ Groundwater pump and treatment (T1 Air Stripper, 906T)
- ☐ Surface water collection and treatment
- ☐ Other_____

Attachments: ☐ Inspection team roster attached ☐ Site map attached

II. INTERVIEWS (Check all that apply)

1. **O & M site manager** Jerry Faulk (Name) | Facility Manager (Title) | 9/27/01 (Date)

   Interviewed ☐ at site ☐ at office ☒ by phone Phone No. 952-4542

   Problems, suggestions; ☐ report attached _____

2. **O & M staff** Mike Lybrand (Name) | Operator in charge (Title) | 9/27/01 (Date)

   Interviewed ☐ at site ☐ at office ☒ by phone Phone No. 952-2586

   Problems, suggestions; ☐ report attached _____

3. **Local regulatory authorities and response agencies** (i.e., State and tribal offices, emergency response office, police department, office of public health or environmental health, zoning office, recorder of deeds, or other city and county offices, etc.) Fill in all that apply.

Agency _____

Contact _____ _____ _____ _____
Name Title Date Phone No.

Problems; suggestions; ☐ Report attached _____

_____

Agency _____

Contact _____ _____ _____ _____
Name Title Date Phone No.

Problems; suggestions; ☐ Report attached _____

_____

Agency _____

Contact _____ _____ _____ _____
Name Title Date Phone No.

Problems; suggestions; ☐ Report attached _____

_____

4. **Other interviews** (optional) ☐ Report attached _____

Dan Williams, CTF

Walkdown of air stripper, purge water tank, and associated wells

III. ONSITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)

1. **O & M Documents**

☒ O & M Manual	☒ Readily available	☒ Up to date	☐ N/A
☒ As-built drawings	☒ Readily available	☒ Up to date	☐ N/A
☒ Maintenance Logs	☒ Readily available	☐ Up to date	☐ N/A

Remarks Passport

2. **Site-Specific Health and Safety Plan** ☐ Readily available ☐ Up to date ☒ N/A

☐ Contingency plan/emergency response plan ☐ Readily available ☐ Up to date ☒ N/A

Remarks

3. **O & M and OSHA Training Records** ☐ Readily available ☐ Up to date ☒ N/A

Remarks

4. **Permits and Service Agreements**

☐ Air discharge permit	☐ Readily available	☐ Up to date	☒ N/A
☐ Effluent discharge	☒ Readily available	☒ Up to date	☐ N/A
☐ Waste Disposal, POTW	☐ Readily available	☐ Up to date	☒ N/A
☐ Other permits	☐ Readily available	☐ Up to date	☒ N/A

Remarks

5. **Gas Generation Records** ☐ Readily available ☐ Up to date ☒ N/A

Remarks

6. **Settlement Monument Records** ☐ Readily available ☐ Up to date ☒ N/A

Remarks

7. **Groundwater Monitoring Records** ☒ Readily available ☒ Up to date ☐ N/A

Remarks

8. **Leachate Extraction Records** ☐ Readily available ☐ Up to date ☒ N/A

Remarks_____

_____

9. **Discharge Compliance Records**

☐ Air	☐ Readily available	☐ Up to date	☒ N/A
☐ Water (effluent)	☒ Readily available	☒ Up to date	☐ N/A

Remarks_____

_____

10. **Daily Access/Security Logs** ☒ Readily available ☐ Up to date ☐ N/A

Remarks Daily Operational Logs

_____

IV. O & M Costs

1. **O & M Organization**

☐ State in-house ☐ Contractor for State

☐ PRP in-house ☐ Contractor for PRP

☐ Other_____

_____

2. **O & M Cost Records**

☐ Readily available ☐ Up to date

☐ Funding mechanism/agreement in place

☐ Other_____

_____

Total annual cost by year for review period if available

From_____ To_____ _____ ☐ Breakdown attached
Date Date Total cost

From_____ To_____ _____ ☐ Breakdown attached
Date Date Total cost

From_____ To_____ _____ ☐ Breakdown attached
Date Date Total cost

From_____ To_____ _____ ☐ Breakdown attached
Date Date Total cost

From_____ To_____ _____ ☐ Breakdown attached
Date Date Total cost

1. **Unanticipated or Unusually High O & M Costs During Review Period**

Describe costs and reasons: _____

_____

_____

_____

_____

V. ACCESS AND INSTITUTIONAL CONTROLS ☒ Applicable ☐ N/A

A. Fencing ☒ Applicable ☐ N/A

1. **Fencing Damaged** ☒ Location shown on site map ☒ Gates secured ☐ N/A

Remarks_____

_____

B. Other Access Restrictions ☒ Applicable ☐ N/A

1. **Signs and other security measures** ☒ Location shown on site map ☐ N/A

Remarks_____

_____

C. Institutional Controls ☒ Applicable ☐ N/A

1. Implementation and enforcement

Site conditions imply ICs not properly implemented ☐ Yes ☐ No ☒ N/A

Site conditions imply ICs not being fully enforced ☐ Yes ☐ No ☒ N/A

Type of monitoring (e.g., self-reporting, drive-by) _____

Frequency _____

Responsible party/agent _____

Contact _____ _____ _____ _____

Name Title Date Phone No.

Report is up-to-date ☐ Yes ☐ No ☐ N/A

Reports are verified by the lead agency ☐ Yes ☐ No ☐ N/A

Specific requirements in deed of decision documents have been met ☐ Yes ☐ No ☐ N/A

Violations have been reported ☐ Yes ☐ No ☐ N/A

Other problems or suggestions: ☐ Report attached

Inspection data sheet attached

_____

_____

_____

2. Adequacy ☐ ICs are adequate ☐ ICs are inadequate ☐ N/A

Remarks_____

_____

D. General

1. **Vandalism/trespassing** ☐ Location shown on site map ☒ No vandalism evident

Remarks_____

_____

2. **Land use changes onsite** ☒ N/A

Remarks_____

_____

3. **Land use changes offsite** ☒ N/A

Remarks_____

_____

VI. GENERAL SITE CONDITIONS

A. Roads ☒ Applicable ☐ N/A

1. **Roads damaged** ☐ Location shown on site map ☒ Roads adequate ☐ N/A

Remarks_____

_____

B. Other site Conditions

Remarks_____

_____

_____

_____

_____

VII. LANDFILL COVERS ☐ Applicable ☒ N/A

A. Landfill Surface ☐ Applicable ☐ N/A

1. **Settlement** (Low spots) ☐ Location shown on site map ☐ Settlement not evident

Areal extent_____ Depth_____

Remarks_____

_____

2. **Cracks** ☐ Location shown on site map ☐ Cracking not evident

Lengths_____ Widths_____ Depths_____

Remarks_____

_____

3. **Erosion** ☐ Location shown on site map ☐ Erosion not evident

Areal extent_____ Depth_____

Remarks_____

_____

4. **Holes** ☐ Location shown on site map ☐ Holes not evident

Areal extent_____ Depth_____

Remarks_____

_____

5. **Vegetative Cover** ☐ Grass ☐ Cover properly established ☐ No signs of stress

☐ Trees/shrubs (indicate size and location on a diagram)

Remarks_____

_____

6. **Alternative Cover (armored rock, concrete, etc.)** ☐ N/A

Remarks_____

_____

7. **Bulges** ☐ Location shown on site map ☐ Bulges not evident

Areal extent_____ Height_____

Remarks_____

_____

8. **Wet Areas/Water Damage** ☐ Wet areas/water damage not evident

☐ Wet Areas ☐ Location shown on site map Areal extent_____

☐ Ponding ☐ Location shown on site map Areal extent_____

☐ Seeps ☐ Location shown on site map Areal extent_____

☐ Soft subgrade ☐ Location shown on site map Areal extent_____

Remarks_____

_____

9. **Slope Instability** ☐ Slides ☐ Location shown on site map ☐ No evidence of slope instability

Areal extent_____

Remarks_____

_____

B. Benches ☐ Applicable ☐ N/A

(Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)

1. **Flows Bypass Bench** ☐ Location shown on site map ☐ N/A or okay

   Remarks_____

2. **Bench Breached** ☐ Location shown on site map ☐ N/A or okay

   Remarks_____

3. **Bench Overtopped** ☐ Location shown on site map ☐ N/A or okay

   Remarks_____

C. Letdown Channels ☐ Applicable ☐ N/A

(Channel lined with erosion control mates, riprap, grout bags, or gabions that descend down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)

1. **Settlement** ☐ Location shown on site map ☐ No evidence of settlement

   Areal extent_____ Depth_____

   Remarks_____

2. **Material Degradation** ☐ Location shown on site map ☐ No evidence of degradation

   Material type_____ Areal extent _____

   Remarks_____

3. **Erosion** ☐ Location shown on site map ☐ No evidence of erosion

   Areal extent _____ Depth_____

   Remarks_____

4. **Undercutting** ☐ Location shown on site map ☐ No evidence of undercutting

Areal extent _____ Depth_____

Remarks_____

_____

5. **Obstructions** Type_____ ☐ No obstructions

☐ Location shown on site map Areal extent _____

Size _____

Remarks_____

_____

6. **Excessive Vegetative Growth** Type_____

☐ No evidence of excessive growth

☐ Vegetation in channels does not obstruct flow

☐ Location shown on site map Areal extent _____

Remarks_____

_____

D. Cover Penetrations ☐ Applicable ☐ N/A

1. **Gas Vents** ☐ Active ☐ Passive

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A

Remarks_____

_____

2. **Gas Monitoring Probes**

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A

Remarks_____

_____

3. **Monitoring Wells** (within surface area of landfill)

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A

Remarks_____

_____

4. **Leachate Extraction Wells**

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A

Remarks_____

_____

5. **Settlement Monuments** ☐ Located ☐ Routinely surveyed ☐ N/A

Remarks_____

_____

E. Gas Collection and Treatment ☐ Applicable ☐ N/A

1. **Gas Treatment Facilities**

☐ Flaring ☐ Thermal destruction ☐ Collection for reuse

☐ Good condition ☐ Needs Maintenance

Remarks_____

_____

2. **Gas Collection Wells, Manifolds and Piping**

☐ Good condition ☐ Needs Maintenance

Remarks_____

_____

3. **Gas Monitoring Facilities** (e.g., gas monitoring of adjacent homes or buildings)

☐ Good condition ☐ Needs Maintenance ☐ N/A

Remarks_____

_____

F. Cover Drainage Layer ☐ Applicable ☐ N/A

1. **Outlet Pipes Inspected** ☐ Functioning ☐ N/A Remarks_____ _____
2. **Outlet Rock Inspected** ☐ Functioning ☐ N/A Remarks_____ _____

G. Detention/sedimentation Ponds ☐ Applicable ☐ N/A

1. **Siltation** Areal extent_____ Depth_____ ☐ N/A

   ☐ Siltation not evident

   Remarks_____

2. **Erosion** Areal extent_____ Depth_____ ☐ N/A

   ☐ Erosion not evident

   Remarks_____

3. **Outlet Works** ☐ Functioning ☐ N/A

   Remarks_____

4. **Dam** ☐ Functioning ☐ N/A

   Remarks_____

H. Retaining Walls ☐ Applicable ☐ N/A

1. **Deformations** ☐ Location shown on site map ☐ Deformation not evident

   Horizontal displacement_____ Vertical displacement_____

   Rotational displacement_____

   Remarks_____

2. **Degradation** ☐ Location shown on site map ☐ Deformation not evident

   Remarks_____

I. Perimeter Ditches/Off-Site Discharge ☐ Applicable ☐ N/A

1. **Siltation** ☐ Location shown on site map ☐ Siltation not evident

   Areal extent_____ Depth_____

   Remarks_____

2. **Vegetative Growth** ☐ Location shown on site map ☐ Siltation not evident

☐ Vegetation does not impede flow

Areal extent_____ Type_____

Remarks_____

_____

3. **Erosion** ☐ Location shown on site map ☐ Erosion not evident

Areal extent_____ Depth_____

Remarks_____

_____

4. **Discharge Structure** ☐ Location shown on site map ☐ N/A

Remarks_____

_____

VIII. VERTICAL BARRIER WALLS ☐ Applicable ☒ N/A

1. **Settlement** ☐ Location shown on site map ☐ Settlement not evident

Areal extent_____ Depth_____

Remarks_____

_____

2. **Performance Monitoring** Type of Monitoring_____

☐ Performance not monitored

Frequency_____ ☐ Evidence of breaching

Head differential_____

Remarks_____

_____

IX. GROUNDWATER/SURFACE WATER REMEDIES ☒ Applicable ☐ N/A

A. Groundwater Extraction Wells, Pumps, and Pipelines ☒ Applicable ☐ N/A

1. **Pumps, Wellhead Plumbing, and Electrical**

☒ Good condition ☒ All required wells located ☐ Needs Maintenance ☐ N/A

Remarks TRW 1, 2, 3, and 4: TRW 4 low flow, out of service

2. **Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances**

☒ Good condition ☐ Needs Maintenance

Remarks

3. **Spare Parts and Equipment**

☒ Readily available ☒ Good condition ☐ Requires upgrade ☐ Needs to be provided

Remarks

B. Surface Water Collection Structures, Pumps, and Pipelines ☐ Applicable ☒ N/A

1. **Collection Structures, Pumps, and Electrical**

☐ Good condition ☐ Needs Maintenance

Remarks

2. **Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances**

☐ Good condition ☐ Needs Maintenance

Remarks

3. **Spare Parts and Equipment**

☐ Readily available ☐ Good condition ☐ Requires upgrade ☐ Needs to be provided

Remarks

C. Treatment System ☒ Applicable ☐ N/A

1. **Treatment Train** (Check components that apply)

☐ Metals removal ☐ Oil/water separation ☐ Bioremediation

☒ Air stripping ☐ Carbon adsorbers

☐ Filters_____

☐ Additive (e.g., chelation agent, flocculent)_____

☐ Others_____

☒ Good condition ☐ Needs Maintenance

☒ Sampling ports properly marked and functional

☒ Sampling/maintenance log displayed and up to date

☒ Equipment properly identified

☒ Quantity of groundwater treated annually 100 gpm maximum, 65 gpm average

☐ Quantity of surface water treated annually_____

Remarks_____

_____

2. **Electrical Enclosures and Panels** (properly rated and functional)

☐ N/A ☒ Good condition ☐ Needs Maintenance

Remarks_____

_____

3. **Tanks, Vaults, Storage Vessels**

☐ N/A ☒ Good condition ☐ Proper secondary containment ☐ Needs Maintenance

Remarks_____

_____

4. **Discharge Structure and Appurtenances**

☐ N/A ☒ Good condition ☐ Needs Maintenance

Remarks_____

_____

5. **Treatment Building(s)**

☒ N/A ☐ Good condition (esp. roof and doorways) ☐ Needs repair

☐ Chemicals and equipment properly stored

Remarks_____

_____

6. **Monitoring Wells** (pump and treatment remedy)

☒ Properly secured/locked ☒ Functioning ☒ Routinely sampled ☒ Good condition

☒ All required wells located ☐ Needs Maintenance ☐ N/A

Remarks_____

_____

D. Monitoring Data ☒ Applicable ☐ N/A

1. Monitoring Data

☒ Is routinely submitted on time ☒ Is of acceptable quality

2 Monitoring data suggests:

☒ Groundwater plume is effectively contained ☒ Contaminant concentrations are declining

E. Monitored Natural Attenuation ☐ Applicable ☒ N/A

1. **Monitoring Wells** (Natural attenuation remedy)

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ All required wells located ☐ Needs Maintenance ☐ N/A

Remarks_____

_____

X. OTHER REMEDIES

If there are remedies applied at the site, which are not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.

XI. OVERALL OBSERVATIONS

A. Implementation of the Remedy

Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emissions, etc.).

B. Adequacy of O & M

Describe issues and observations related to the implementation and scope of O & M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy.

C. Early Indicators of Potential Remedy Failure

Describe issues and observations such as unexpected changes in the cost or scope of O & M or a high frequency of unscheduled repairs that suggest that the protectiveness of the remedy may be compromised in the future.

D. Opportunities for Optimization

Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy.

Appendix A

Records of Decision Issued for SRS

The following tables are included for information only. Table A1 lists the chronology of all RODs issued for SRS. It also lists the document numbers for the RODs for reference. Table A2 is a summary of the remedial actions included in those RODs. Figure A1 shows the location of these OUs.

Table A1. Chronology of RODs Issued at SRS

Event	Date
A/M Area Groundwater, Interim ROD (RCRA), WSRC-RP-92-743, Revision 0	June 29, 1992
M-Area Hazardous Waste Management Facility (904-51G, -112G), Interim ROD (RCRA), WSRC-RP-92-743, Revision 0	June 29, 1992
Metallurgical Laboratory Hazardous Waste Management Facility (904-110G), ROD (RCRA), WSRC-RP-92-745, Revision 0	June 29, 1992
F-Area Hazardous Waste Management Facility (904-41G, -42G, -43G), ROD (RCRA), WSRC-RP-93-1042, Revision 1	September 23, 1993
Mixed Waste Management Facility (643-28E), ROD (RCRA), WSRC-RP-93-1511, Revision 1	September 23, 1993
Tank 105-C Hazardous Waste Management Facility, ROD, WSRC-RP-94-106, Revision 1	September 23, 1994
TNX Groundwater Operable Unit, Interim ROD and ESD, WSRC-TR-94-0375, Revision 1, (ESD) WSRC-RP-2001-00764, Revision 0	November 16, 1994 (ESD 1997)
Par Pond (685-G), Interim ROD, WSRC-RP-93-1549, Revision 0	February 16, 1995
D-Area Oil Seepage Basin (631-G), ROD, WSRC-RP-97-402, Revision 1	March 6, 1995
F-Area Groundwater Operable Unit (904-41G, -42G, -43G), Interim ROD (RCRA), WSRC-RP-94-1162, Revision 1	April 13, 1995
H-Area Groundwater Operable Unit (904-44G, -45G, -45G, -56G), Interim ROD (RCRA), WSRC-RP-94-1163, Revision 1	April 13, 1995
H-Area Hazardous Waste Management Facility (904-44G, -45G, -46G, -56G), ROD (RCRA), WSRC-RP-93-1043, Revision 1	September 23, 1995
M-Area West Unit (631-21G), ROD, WSRC-RP-95-626, Revision 0	September 29, 1995
Old Radioactive Waste Burial Ground (643-E), Interim ROD, WRSC-RP-96-102, Revision 0	June 18, 1996
Burma Road Rubble Pit (231-4F), ROD, WSRC-RP-96-101, Revision 1	July 7, 1996 (ESD 1999)
D-Area Burning/Rubble Pits (431-D, 431-1D), ROD, WSRC-RP-96-867, Revision 1	April 22, 1997
F-Area Burning/Rubble Pits (231-F, 231-1F, and 231-2F), ROD, WSRC-RP-96-868, Revision 1	April 22, 1997
Grace Road Site (631-22G), ROD, WSRC-RP-96-0160, Revision 1	April 22, 1997

Event	Date
Gunsite 113 Access Road Unit (631-24G), ROD, WSRC-RP-96-O0833, Revision 1	April 22, 1997
Gunsite 720 Rubble Pit Unit (631-16G), ROD, WSRC-RP-96-O0832, Revision 1	April 22, 1997
Silverton Road Waste Unit (713-3A), ROD, WSRC-RP-96-171, Revision 1	April 22, 1997
Central Shops Burning/Rubble Pit (631-6G), ROD, WSRC-RP-96-873, Revision 1	June 19, 1997
Old F-Area Seepage Basin (904-49G), ROD, WRSC-RP-96-872, Revision 1.1	June 19, 1997
L-Area Oil and Chemical Basin and L-Area Acid/Caustic Basin (904-83G, -79G), ROD, WSRC-RP-97-178, Revision 1	January 5, 1998
K-Area Bingham Pump Outage Pit (643-1G), ROD, WSRC-RP-97-178, Revision 1	April 14, 1998
716-A Motor Shops Seepage Basin (904-101G), ROD, WSRC-RP-97-840, Revision 0	September 17, 1998
Fire Department Hose Training Facility (904-113G), ROD, WSRC-RP-97-171, Revision 1	September 17, 1998
F-Area Retention Basin (281-3F), ROD, WSRC-RP-97-145, Revision 1.1	October 19, 1998
C-, F-, K-, and P-Area Coal Pile Runoff Basins (189-C, 289-F, 189-K, 189-P), ROD, WSRC-RP-97-850, Revision 1	November 10, 1998
C Area Burning/Rubble Pit (131-C), Interim ROD, WSRC-RP-98-4039, Revision 0	March 4, 1999
Ford Building Waste Site (643-11G), ROD, WSRC-RP-98-4066, Revision 1	June 7, 1999
Chemicals, Metals, and Pesticides Pit (080-17G, -17.1G, -18G, -18.1G, -18.2G, -18.3G, -19G), Interim ROD, WSRC-RP-2000-4158, Revision 1.1	November 29, 1999
SRL Seepage Basins (904-51G1, -52G2, -52G, -55G), ROD, WSRC-RP-97-848, Revision 1.1	March 15, 2000
C Reactor Seepage Basins (904-66G, -67G, -68G), Plug-In ROD, ESD , WSRC-RP-2000-4032, Revision 0	August 3, 2000
L & P Bingham Pump Outage Pits (643-2G, -3G, -4G), ROD, WSRC-RP-98-4015, Revision 1	August 31, 2000
A-Area Burning/Rubble Pits (731-A/1A) and Rubble Pit (731-2A), Interim ROD, WSRC-RP-2000-4001, Revision 1	November 17, 2000
West of SRL "Georgia Fields" Site (631-19G), ROD, WSRC-RP-99-4164, Revision 0	November 17, 2000
Miscellaneous Chemical Basin/Metals Burning Pit (731-4A/5A), Interim ROD, WSRC-RP-98-4031, Revision 1.1	December 7, 2000
K-Area Burning/Rubble Pit (131-K & 631-20G), ROD, WSRC-RP-97-862, Revision 1	August 8, 2001
ORWBG Old Solvent Tanks (650-01E - 22E), Interim ROD, WSRC-RP-2000-4193, Revision 1	September 14, 2001
Previous Five-Year Reviews	June 30, 1997

Table A2. Summary of Remedial Actions Used at the OUs at SRS

Operable Unit	Remedial Action
No Action/No Further Action	
M-Area West Unit (631-21G)	No Action
Burma Road Rubble Pit (231-4F)	No Action
Grace Road Site (631-22G)	No Action
Gunsite 113 Access Road Unit (631-24G)	No Action
Gunsite 720 Rubble Pit Unit (631-16G)	No Action
Central Shops Burning/Rubble Pit (631-6G)	No Action
Fire Department Hose Training Facility (904-113G)	No Action
Ford Building Waste Site (643-11G)	No Further Action (Removal)
716-A Motor Shops Seepage Basin (904-101G)	No Action
West of SRL "Georgia Fields" Site (631-19G)	No Action
RCRA No Further Action	
H-Area Hazardous Waste Management Facility (904-44G, -45G, -46G, -56G)	No Further Action (Low Permeability Cap)
Tank 105-C Hazardous Waste Management Facility	No Further Action
F-Area Hazardous Waste Management Facility (904-41G, -42G, -43G)	No Further Action (Low Permeability Cap and In Situ S/S)
Mixed Waste Management Facility (643-28E)	No Further Action (Low Permeability Cap)
RCRA Interim Action	
A/M Area Groundwater	Air Stripping
Metallurgical Laboratory Hazardous Waste Management Facility (904-110G)	Low Permeability Cap, Institutional Controls
M-Area Hazardous Waste Management Facility (904-51G, -112G)	In Situ S/S, Low Permeability Cap, Institutional Controls
F-Area Groundwater Operable Unit (904-41G, -42G, -43G)	Groundwater Extraction
H-Area Groundwater Operable Unit (904-44G, -45G, -45G, -56G)	Groundwater Extraction
FFA Interim Action	
TNX Groundwater Operable Unit	SVE (Recirculation wells dropped)
Par Pond (685-G)	Repair Dam
Old Radioactive Waste Burial Ground (643-E)	Soil Cover
Miscellaneous Chemical Basin/Metals Burning Pit (731-4A/5A)	Soil Excavation, Offsite Disposal, SVE (active & passive), Air Sparging, Institutional Controls, Monitoring, Institutional Controls

Table A2. Summary of Remedial Actions Used at the OUs at SRS (continued)

Operable Unit	Remedial Action
FFA Interim Action (continued)	
A-Area Burning/Rubble Pits (731-A/1A) and Rubble Pit (731-2A)	Soil Cover, SVE (active & passive), Air Sparging, Institutional Controls
Chemicals, Metals, and Pesticides Pit (080-17G, -17.1G, -18G, -18.1G, -18.2G, -18.3G, -19G)	Soil Excavation, Offsite Disposal, SVE, Air Sparging
C Area Burning/Rubble Pit (131-C)	Soil Cover, SVE, Air Sparging
ORWBG Old Solvent Tanks	S/S Tanks In Situ
FFA Final	
D-Area Oil Seepage Basin (631-G)	No Further Action for Soil (Removal), Institutional Controls, Mixing Zone
D-Area Burning/Rubble Pits (431-D, 431-1D)	Institutional Controls, Groundwater Monitoring
F-Area Burning/Rubble Pits (231-F, 231-1F, and 231-2F)	Institutional Controls
Silverton Road Waste Unit (713-3A)	Institutional Controls
Old F-Area Seepage Basin (904-49G)	In Situ S/S, Institutional Controls, Mixing Zone
L-Area Oil and Chemical Basin and L-Area Acid/Caustic Basin (904-83G, -79G)	In Situ S/S, Soil Cover, Institutional Controls
K-Area Bingham Pump Outage Pit (643-1G)	Institutional Controls
F-Area Retention Basin (281-3F)	In Situ S/S, Soil Cover, Institutional Controls
C-, F-, K-, and P-Area Coal Pile Runoff Basins (189-C, 289-F, 189-K, 189-P)	No Further Action for Soils, Groundwater Monitoring
SRL Seepage Basins (904-51G1, -52G2, -52G, -55G)	Soil Excavation, Offsite Disposal, Institutional Controls
C Reactor Seepage Basins (904-66G, -67G, -68G)	In Situ S/S, Soil Cover, Institutional Controls
L & P Bingham Pump Outage Pits (643-2G, -3G, -4G)	Institutional Controls
K-Area Burning/Rubble Pit (131-K & 631-20G)	Soil Cover, MNA

MNA = monitored natural attenuation
SVE = soil vapor extraction
S/S = Solidification/Stabilization

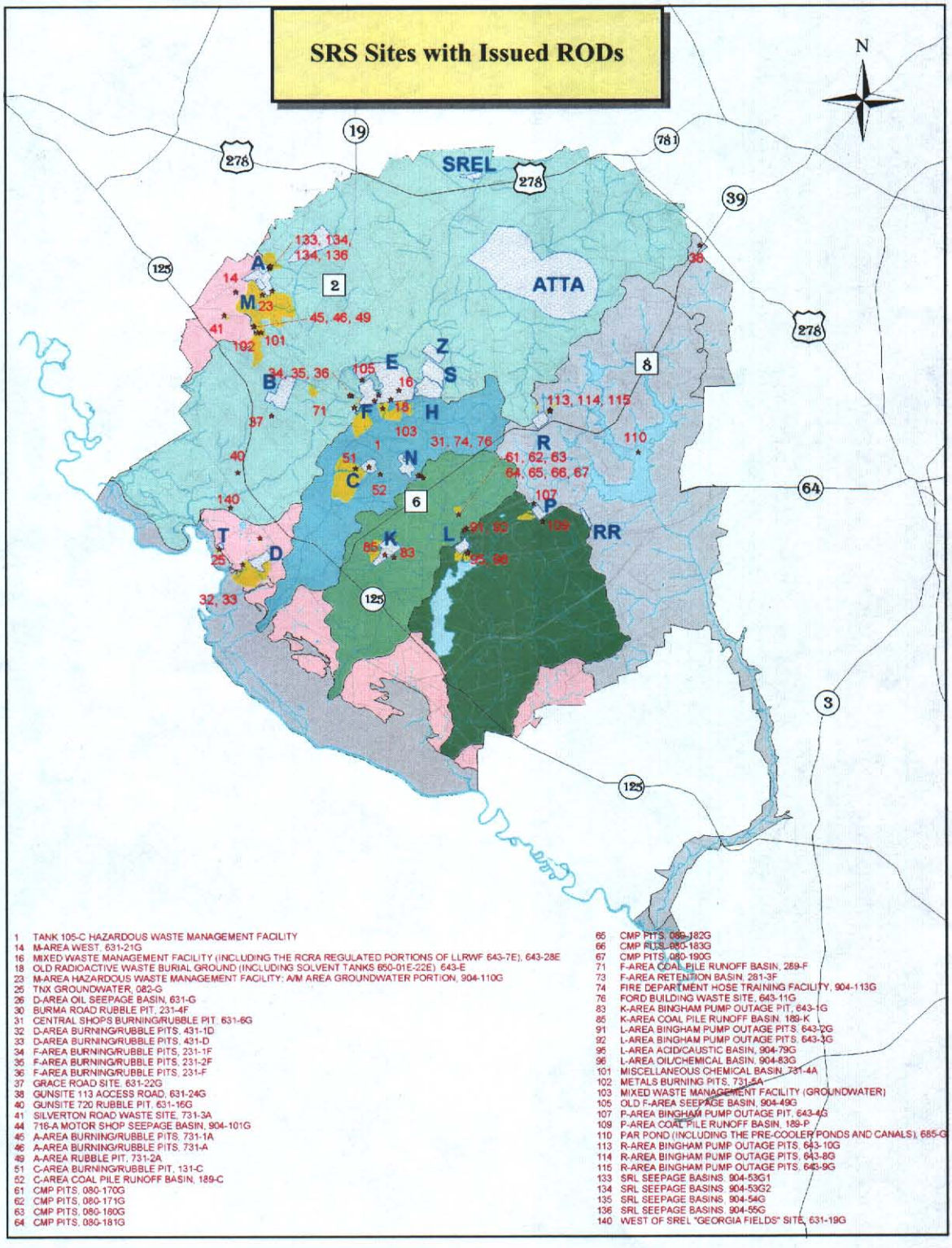


Figure A1. Map of SRS Showing the Location of OUs with Issued RODs