
United States Department of Energy

Savannah River Site



**Third Five-Year Remedy Review Report
for the
Savannah River Site
Aiken, South Carolina**

WSRC-RP-2007-4063

Revision 1.1

December 2008

Prepared by:
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Aiken, SC 29808

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

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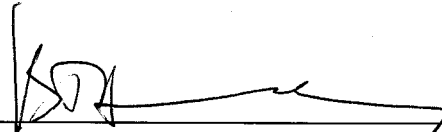
Third Five-Year Remedy Review Report (U)
Savannah River Site
December 2008

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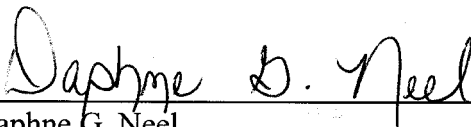
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Brian T. Hennessey
Federal Facility Agreement Project Manager
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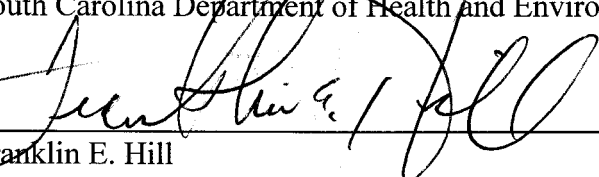
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Daphne G. Neel
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EXECUTIVE SUMMARY

The Third Five-Year Remedy Review Report evaluates the remedies at all Savannah River Site (SRS) Operable Units (OUs) with issued Records of Decision (RODs) or Interim Records of Decision (IRODs) to determine whether the remedy is protective of human health and the environment. The methods, findings, and conclusions of these reviews are documented in the report. The trigger for this report was the signing and issuance of the Second Five-Year Remedy Review Report on February 12, 2004.

After inclusion of Savannah River Site (SRS) on the National Priorities List, the Resource Conservation and Recovery Act (RCRA) and the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) were integrated to provide a focused environmental program. This report includes 45 OU-specific reviews of RODs and IRODs for OUs remediated in accordance with RCRA and/or CERCLA requirements. These OUs are in varying stages of remediation (e.g., under construction, in active remediation, or remediation completed). This assessment found that all the remedies were constructed in accordance with the requirements of the RODs, IRODs or Explanation of Significant Differences (ESDs). The remedies are functioning as designed. The immediate threats have been addressed, and the remedies are expected to be protective until concentration levels are low enough to allow unrestricted use and unlimited exposure. The exposure assumptions, toxicity data, cleanup levels, and Remedial Action Objectives (RAOs) used at the time of the remedy selection are still valid for all of the OUs included in this report.

Five-Year Review Summary Form

| SITE IDENTIFICATION | | |
|---|---|--------------------------|
| Site Name (from Waste LAN): Savannah River Site | | |
| EPA ID (from Waste LAN): SC1890008989 | | |
| Region: IV | State: South Carolina | City/County: Aiken/Aiken |
| SITE STATUS | | |
| NPL Status: <input checked="" type="checkbox"/> Final <input type="checkbox"/> Deleted <input type="checkbox"/> Other (specify) _____ | | |
| Remediation Status (choose all that apply): <input checked="" type="checkbox"/> Under Construction <input checked="" type="checkbox"/> Operating <input checked="" type="checkbox"/> Complete | | |
| Multiple OUs? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No | Construction Completion Date: Varies | |
| Has site been put into reuse? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO | | |
| REVIEW STATUS | | |
| Lead Agency: <input type="checkbox"/> EPA <input type="checkbox"/> State <input type="checkbox"/> Tribe <input checked="" type="checkbox"/> Other Federal Agency <u>US Department of Energy</u> | | |
| Author Name: Area Completion Projects | | |
| Author Title: Maintenance & Operation Contractor | Author Affiliation: Savannah River Nuclear Solutions, LLC | |
| Review Period: February 12, 2007 to February 12, 2009 | | |
| Date(s) of Site Inspection: July to September 2007 | | |
| Type of Review: <input checked="" type="checkbox"/> Post-SARA <input type="checkbox"/> Pre-SARA <input type="checkbox"/> NPL-Removal Only <input type="checkbox"/> Non-NPL Remedial Action Site <input type="checkbox"/> NPL State/Tribe-Lead <input type="checkbox"/> Regional Discretion | | |
| Review Number: <input type="checkbox"/> 1 (first) <input type="checkbox"/> 2 (second) <input checked="" type="checkbox"/> 3 (third) <input type="checkbox"/> Other (specify) _____ | | |
| Triggering Action: <input type="checkbox"/> Action RA Onsite Construction at OU # <input type="checkbox"/> Actual RA Start at OU# _____ <input type="checkbox"/> Construction Completion <input checked="" type="checkbox"/> Previous Five-year Review Report <input type="checkbox"/> Other (specify) _____ | | |
| Triggering Action Date (from Waste LAN): February 12, 2004 | | |
| Due Date (five years after triggering action): February 12, 2009 | | |

Five-Year Review Summary Form (Cont'd.)

Issues:

No issues were identified as a result of this review. However, issues are identified and solutions proposed in more frequently submitted monitoring reports for the individual Operable Units. These reports are Performance Evaluation Reports, Effectiveness Monitoring Reports, and Groundwater Monitoring Reports for the individual OUs. The frequency of monitoring and reporting, and the content of the various reports are identified in the CMI/RAIP post-ROD documents. These monitoring reports contain thorough evaluations of monitoring data and operational parameters, include interpretation of the information, identify issues, and propose recommendations. None of these reports have identified significant issues associated with the remedy selection. Issues identified have been associated with the location of monitoring wells, frequency of sampling and analysis, and proposals to change from active to passive SVE as the bulk of VOCs are removed from the subsurface. These detailed reports are submitted to EPA and SCDHEC for their review and approval and are referenced in the 5 Year remedy review document. These individual reports are submitted to EPA and SCDHEC on a more frequent basis than is statutorily required by the Five-Year Remedy Review process. They represent a comprehensive, intensive, and proactive review process that is part of and augments a thorough Five-Year Remedy Review process.

Recommendations and Follow-up Actions:

No recommendations, as a result of this review, were identified. As stated in issues above, recommendations are identified in the project-specific reports and discussed in the specific OU sections of the report.

Protectiveness Statement(s):

The C-Area Reactor Groundwater Electrical Resistance Heating (ERH), C-Area Burning/Rubble Pit Soil Vapor Extraction (SVE), Old Radioactive Waste Burial Ground soil cover and the PAR Pond dam repair are providing protection, but are only interim actions.

The following OUs are currently being constructed 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).

- Chemicals, Metals, and Pesticides Pit – ERH and SVE
- L-Area Southern Groundwater – Monitored Natural Attenuation
- M-Area Inactive Process Sewer Line – SVE

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

Other Comments:

None

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K-AREA BURNING/RUBBLE PIT (131-K AND 631-20G)
K-AREA REACTOR SEEPAGE BASIN (904-65G)
L & P BINGHAM PUMP OUTAGE PITS (643-2G, 643-3G, 643-4G)
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TNX AREA GROUNDWATER OPERABLE UNIT

APPENDIX A Records of Decision Issued for SRS

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 |
| ARP | A-Area Miscellaneous Rubble Pile (731-6A) |
| 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 (131-C) |
| 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/s | centimeter per second |
| cm/sec | 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 |
| RDR/CMI/R | Remedial Design Report/Corrective Measures Implementation/Remedial |
| D/RAWP | Design/ Remedial Action Work Plan |
| CMP | Chemicals, Metals, and Pesticides Pit (080-170G, -171G, -180G, -181G, - 182G, -183G, -190G) |
| 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 |
| CRGW | C-Reactor Groundwater |
| CRSB | C-Area Reactor Seepage Basins (904-66G, -67G, -68G) |
| CSBRP | Central Shops Burning/Rubble Pile (631-1G, 631-3G) |
| DBRP | D-Area Burning/Rubble Pits (431-D/1D) |
| DCE | Dichloroethylene |
| DCM | Dichloromethane |
| DEXOU | D-Area Expanded Operable Unit (488-D, 431-2D) |
| 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 |

LIST OF ACRONYMS AND ABBREVIATIONS *(Continued)*

| | |
|-----------------|--|
| ESD | Explanation of Significant Difference |
| FBRP | F-Area Burning/Rubble Pits (231-F, 231-1F, 231-2F) |
| FBSB | Ford Building Seepage Basin (904-91G) |
| 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 |
| GCPF | Gas Cylinder Disposal Facility (131-2L) |
| Gpm | gallons per minute |
| GSACU | General Separations Area Consolidation Unit |
| GWMZ | groundwater mixing zone |
| HEWB | Heavy Equipment Wash Basin (NBN) |
| HGCA | hybrid groundwater corrective action |
| HHWMF | H-Area Hazardous Waste Management Facility (904-44G, -45G, -46G, -56G) |
| 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) |
| KRSB | K-Reactor Seepage Basin (904-65G) |
| 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) |
| LBRP | L-Area Burning/Rubble Pit (131-L) |
| LLWDF | Low-Level Waste Disposal Facility |
| LRP | L-Area Rubble Pile (131-3L) |
| LUCAP | Land Use Controls Assurance Plan |
| LUCIP | Land Use Controls Implementation Plan |

LIST OF ACRONYMS AND ABBREVIATIONS *(Continued)*

| | |
|----------------|--|
| M | meter |
| m ³ | cubic meter |
| MCB/MBP | Miscellaneous Chemical Basin/Metals Burning Pit (731-4A/5A) |
| MCL | maximum contaminant level |
| Metlab | Metallurgical Laboratory |
| µg/kg | microgram per kilogram |
| µg/L | micrograms per liter |
| mg/L | milligrams per liter |
| mg/kg | milligram per kilogram |
| MHWMF | M-Area Hazardous Waste Management Facility (904-51G, -112G) |
| MIPSL | M-Area Inactive Sewer Line (081-M) |
| 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 (904-102G) |
| O&M | operation & maintenance |
| OCDD | octachlorodibenzo-p-dioxin |
| OFASB | Old F-Area Seepage Basin (904-49G) |
| ORWBG | Old Radioactive Waste Burial Ground (643-E) |
| OST | Old Solvent Tank (650-1E through 650-22E) |
| OTSB | Old TNX Seepage Basin (904-76G) |
| OU | operable unit |
| PAH | polycyclic aromatic hydrocarbon |
| PBRP | P-Area Burning Rubble Pit (131-P) |
| PCB | polychlorinated biphenyl |
| PCE | tetrachloroethylene (also, perchloroethylene, tetrachloroethene) |
| pCi/g | picocuries per gram |
| pCi/L | picocuries per liter |
| PCR | Post-Construction Report |
| ppb | parts per billion |
| ppm | parts per million |
| ppmv | parts per million vapor |
| PRSB | P-Area Reactor Seepage Basin (904-61G, -62G, -63G) |
| PSVE | passive soil vapor extraction |
| PTSM | principal threat source material |
| RAO | remedial action objective |
| RBPOP | R-Area Bingham Pump Outage Pits (643-8G, -9G, -10G) |
| RBC | risk-based concentration |
| RBRP&RP | R-Area Burning/Rubble Pits (131-R, 131-1R) and Rubble Pile (631-25G) |
| RCRA | Resource Conservation and Recovery Act |

LIST OF ACRONYMS AND ABBREVIATIONS *(Continued)*

| | |
|-----------------|--|
| 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 |
| RRSB | R-Area Reactor Seepage Basins (904-57G, -58G, -59G, -60G, -103G, -104G)) |
| 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 (904-53G, -54G, and -55G) |
| SRS | Savannah River Site |
| SRWU | Silverton Road Waste Unit (731-3A) |
| S/S | stabilization/solidification |
| SVE | soil vapor extraction |
| TAOU | T-Area Operable Unit |
| TBC | to-be-considered |
| TBG | TNX Burying Ground (643-5G) |
| TCE | trichloroethylene, trichloroethene |
| TNXGW | TNX Groundwater (082-G) |
| 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 | Washington Savannah River Company, Limited Liability Company |
| yd ³ | cubic yards |

SAVANNAH RIVER SITE SUMMARY

I. INTRODUCTION

The purpose of five-year remedy 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 these reviews are documented in a Five-Year Remedy Review Report. In addition, the report identifies issues found during the review and recommendations to address them.

On November 21, 1989, the United States Environmental Protection Agency (USEPA) finalized the Savannah River Site (SRS) on the National Priorities List (NPL) at 40 CFR Part 300, which became effective on December 21, 1989. The inclusion created a need to integrate the established Resource Conservation and Recovery Act (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 the USEPA and the South Carolina Department of Health and Environmental Control (SCDHEC) to coordinate remedial activities at SRS as one comprehensive strategy that fulfills these dual regulatory requirements. USDOE functions as the lead agency for remedial activities at SRS, with concurrence by USEPA - Region 4 and SCDHEC.

The first Five-Year Remedy Review Report was issued in June 1997 and the second Five-Year Remedy Review Report was issued in February 2004. All subsequent reviews are issued every five years thereafter. USEPA, SCDHEC, and USDOE recognized that multiple Records of Decision (RODs) would be issued for SRS and determined that it would be more cost effective to review all applicable remedies listed in the RODs on the same five-year cycle. They initiated the cycle with the issuance of the first report in 1997.

USDOE is preparing this five-year remedy 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 judgment 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 remedy reviews for this report were conducted from August 2007 through October 2007. This report documents the results of the reviews and is the third Five-Year Remedy Review for SRS.

This report is considered a “statutory” review because the SRS contains a number of OUs that may contain hazardous substances, pollutants, or contaminants at concentrations above levels that would allow unrestricted use and unlimited exposure. By agreement

with USEPA and SCDHEC, SRS shall prepare a Five-Year Remedy Review Report for all OUs at SRS that have issued RODs and/or Interim Records of Decision (IRODs) requiring remedial action at the time this review report is issued. The first 24 pages of this document, under the heading of Savannah River Site Summary, summarize common elements for the entire Site. The tabbed sections that follow include 45 OU specific reviews. Table A1 in Appendix A lists the chronology of all RODs and IRODs issued for SRS, including document numbers and ROD issuance dates. Table A2 in Appendix A provides a summary of the remedial actions or no further actions included in those RODs.

II. OU CHRONOLOGY

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

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

| Event | CERCLIS No. | Issuance Date |
|--|--------------------|----------------------|
| NPL Listing Effective Date | | December 21, 1989 |
| Federal Facility Agreement Declared Effective | | August 16, 1993 |
| TNX Groundwater Operable Unit, Interim Action ROD | 21, 29, 30, 31, 32 | November 16, 1994 |
| PAR Pond (685-G), Interim Action ROD | 35 | February 16, 1995 |
| D-Area Oil Seepage Basin (631-G), IROD | 27 | March 6, 1995 |
| Old Radioactive Waste Burial Ground (643-E), Interim Action ROD | 32 | June 18, 1996 |
| D-Area Burning/Rubble Pits (431-D, 431-1D), ROD | 15 | April 22, 1997 |
| F-Area Burning/Rubble Pits (231-F, 231-1F, and 231-2F), ROD | 14 | April 22, 1997 |
| Silverton Road Waste Unit (713-3A), ROD | 13 | April 22, 1997 |
| Old F-Area Seepage Basin (904-49G), ROD | 16 | June 19, 1997 |
| First Five-Year Remedy Review | | June 30, 1997 |
| TNX Groundwater Operable Unit, ESD | 21, 29 | September 22, 1997 |
| L-Area Oil and Chemical Basin and L-Area Acid/Caustic Basin (904-83G, -79G), ROD | 17 | January 5, 1998 |
| K-Area Bingham Pump Outage Pit (643-1G), ROD | 20 | April 14, 1998 |
| Old F-Area Seepage Basin (904-49G), ESD | 16 | September 15, 1998 |
| F-Area Retention Basin (281-3F), ROD | 23 | October 19, 1998 |
| C-, F-, K-, and P-Area Coal Pile Runoff Basins (189-C, 289-F, 189-K, 189-P), ROD | 41, 42, 52, 54 | November 10, 1998 |
| C Area Burning/Rubble Pit (131-C), Interim Action ROD | 31 | March 4, 1999 |
| D-Area Oil Seepage Basin (631-G), ROD | 27 | March 4, 1999 |

| Event | CERCLIS No. | Issuance Date |
|---|--------------------|--------------------------|
| OSB, ROD | | March 4, 1999 |
| Chemicals, Metals, and Pesticides Pit (080-17G, -17.1G, -18G, -18.1G, -18.2G, -18.3G, -19G), First Interim Action ROD | 24 | November 29, 1999 |
| Plug-In, ROD | N/A | November 29, 1999 |
| SRL Seepage Basins (904-51G1, -52G2, -52G, -55G), ROD | 47 | March 15, 2000 |
| C Reactor Seepage Basins (904-66G, -67G, -68G), Plug-In ROD, ESD | 60 | August 3, 2000 |
| L & P Bingham Pump Outage Pits (643-2G, -3G, -4G), ROD | 26, 39 | August 31, 2000 |
| A-Area Burning/Rubble Pits (731-A/1A) and Rubble Pit (731-2A), Interim Action ROD | 19 | November 17, 2000 |
| Miscellaneous Chemical Basin/Metals Burning Pit (731-4A/5A), Interim Action ROD | 28 | December 7, 2000 |
| F-Area Retention Basin (281-3F), ESD | 23 | June 7, 2001 |
| K-Area Burning/Rubble Pit (131-K & 631-20G), ROD | 40 | August 20, 2001 |
| ORWBG Old Solvent Tanks, Interim Action ROD | 32 | September 14, 2001 |
| Ford Building Seepage Basin ROD (643-11G) | 58 | February 14, 2002 |
| CMP Pits (080-170G, -171G, -180G, -181G, -182G, -183G, -190G) First Interim Action ROD Amendment | 24 | March 8, 2002 |
| K-Area Reactor Seepage Basin (9094-65G), ESD | 55 | September 16, 2002 |
| General Separations Area Consolidation Unit ROD | 22, 32, 48, 49 | September 26, 2002 |
| L-Area & C-Area Reactor Seepage Basin ROD Amendment | 60, 65 | October 23, 2002 |
| L-Area Burning/Rubble Pit (131-L) & Rubble Pile (131-3I) & Gas Cylinder Disposal Facility (131-2I) ROD | 56 | January 10, 2003 |
| A-Area Burning/Rubble Pits (731-A/1A) and Rubble Pit (731-2A) ESD | 19 | January 27, 2003 |
| R-Area Bingham Pump Outage Pits (643-8G, 643-9G and 643-10G) and R-Area Unknown Pits #1, #2, and #3 ROD | 38 | April 23, 2003 |
| Central Shops BRP (631-1G and 631-3G), ROD | 50 | May 19, 2003 |
| TNX Area Groundwater Operable Unit ESD | 21, 29 | May 19, 2003 |
| P-Area Burning/Rubble Pit (131-P) ROD | 59 | July 1, 2003 |
| A-Area Miscellaneous Rubble Pile (731-6A) ROD | 30 | July 21, 2003 |
| P-Area Reactor Seepage Basin (904-61G, 904-62G, 904-63G) ESD | 66 | September 24, 2003 |
| CMP Pits (080-170G, -171G, -180G, -181G, -182G, -183G, -190G) Second Interim Action ROD Amendment | 24 | October 7, 2003 |
| L-Area Hot Shop (707-G, 712-G, 717-G) ROD | 76 | October 21, 2003 |
| Second Five-Year Remedy Review | | February 12, 2004 |
| R-Area Reactor Seepage Basins (904-57G, 904-58G, 904-59G, 904-60G, 904-103G, 904-104G And 108-4R Overflow Basin) ROD | 25 | March 10, 2004 |
| TNX Burying Ground (643-G), New TNX Seepage Basin, Old TNX Seepage Basin and TNX Groundwater (082-G) ROD | 21, 29 | March 25, 2004 |
| Old F-Area Seepage Basin (904-49G) ROD Amendment | 16 | April 1, 2004 |
| C-Area Reactor Groundwater IROD | 82 | September 13, 2004 |
| R-Area Burning/Rubble Pits (131-R, 131-1R) and Rubble Pile (631-25G) ROD | 43 | September 13, 2004 |
| D-Area Expanded Operable Unit (Consisting of D-Area Ash Basin, 488-D and D-Area Rubble Pit, 431-2D) ROD | 67 | November 15, 2004 |

| Event | CERCLIS No. | Issuance Date |
|---|-------------|-------------------|
| Heavy Equipment Wash Basin and Central Shops Burning/Rubble Pit (631-5G) ROD | 53 | January 7, 2005 |
| Silverton Road Waste Site (713-3A), ESD | 13 | March 27, 2005 |
| Chemical, Metals, Pesticides Pits (080-170G, -171G, -180G, -181G, -182G, -183G, -190G) ROD | 24 | May 2, 2005 |
| TNX Area OU ESD | 21, 29 | September 2, 2005 |
| T-Area OU ROD | 96 | December 21, 2005 |
| M-Area Inactive Process Sewer Line (081-M) ROD | 92 | May 2, 2007 |
| L-Area Southern Groundwater ROD | 77 | May 3, 2007 |
| A-Burning/Rubble Pits and Rubble Pit (731-A, 731-1A, 731-2A) and Miscellaneous Chemical Basin/Metals Burning Pit (731-4A, -5A), ROD | 19, 28 | July 24, 2007 |
| C-Burning/Rubble Pit (131-C) OU ROD | 31 | June 25, 2008 |

The dates for the following events will be included in the individual OU reports.

| Event | Details | Date |
|--|--|------|
| 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 Remedy 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. | |

CROSSWALK WITH RE-ORGANIZED RODS

Since the last Five-Year Remedy Review Report, the scope of some of the RODs has been modified. These modifications are described in the following paragraphs.

The A-Area Burning/Rubble Pits (ABRP) (731-A, -1A) and Rubble Pit (731-2A) Operable Unit has been expanded to include the Miscellaneous Chemical Basin (MCB)/Metals Burning Pit (MBP) (731-4A and -5A). These units are listed as separate RCRA/CERCLA units in Appendix C of the FFA for SRS. However, to achieve final closure, these individual units have been consolidated to form the ABRP/MCB/MBP OU by issuing a combined ROD on July 24, 2007.

The TNX Area Groundwater Operable Unit in T Area – The T-Area OU includes all the OUs in T Area currently listed in Appendix C of the FFA, all T-Area Site Evaluation Areas (SEAs) in Appendix G.2 and T-Area building slabs. However, the following units in T Area are addressed under a separate ROD issued March 25, 2004, or ESD issued September 2, 2005: TNX Area OU includes TNX Burying Ground, New TNX Seepage Basin, Old TNX Seepage Basin, and TNX Groundwater.

GSACU – The General Separations Area Consolidation Unit consists of four primary waste units: H-Area Retention Basin, Warner's Pond, HP-52 Ponds, and the Old Radioactive Waste Burial Ground, which includes 22 underground storage tanks known as the Old Solvent Tanks (OSTs). The Warner's Pond unit also includes a portion of the H-Area Inactive Process Sewer Line. Because of their proximity and the similarity in their health and environmental threats, and the interrelationship of their remedial actions, these units were combined into a single OU ROD which was issued on October 2, 2002.

LRSB - A "plug-in" approach, developed by the USEPA, was used to design a common remedy for the high-risk radioactively contaminated C-, K-, L-, and P-Reactor Seepage Basins. This "plug-in" ROD specifies the conditions that OUs shall meet in order to plug-in to this ROD and, thus, use the common remedy of soil stabilization (i.e., grouting) and a soil cover. A unit-specific plug-in decision document was used to

demonstrate that an individual OU meets the criteria of the plug-in ROD. A ROD Amendment was issued to delete grouting in the remedial actions at L-Reactor Seepage Basin and C-Reactor Seepage Basin #2, because the risk from PTSM would be reduced due to radioactive decay to below 1×10^{-3} by the year 2006. Since L-Reactor Seepage Basin was remediated as a separate project and reported separately in regulatory documents (e.g., Remedial Action Implementation Plan and Post-Construction Report), L-Reactor Seepage Basin has a separate section in this report.

Old F-Area Seepage Basin – Based on the review of groundwater monitoring data, a ROD Amendment was issued to separate the groundwater associated with the OFASB OU from its surface unit and incorporate the OFASB OU groundwater into the larger F-Area groundwater OU, which later became the Western General Separations Area Groundwater OU.

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. USDOE owns SRS, which historically produced tritium, plutonium, and other special nuclear materials for national defense. In addition, SRS has provided nuclear materials for the space program, as well as for medical, industrial, and research efforts up to the present. Production of nuclear materials for the defense program was discontinued in 1988.

Chemical and radioactive wastes are byproducts of nuclear material production processes. These wastes have been treated, stored, and in some cases disposed of at SRS. Hazardous substances, as defined by the CERCLA, are currently present in the environment at SRS, with past disposal practices resulting 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's inclusion on the NPL became effective. 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 an FFA (1993) with USEPA and SCDHEC to coordinate remedial activities at SRS as one comprehensive strategy to fulfill these dual regulatory requirements. USDOE functions as the lead agency for remedial activities at SRS, with concurrence by USEPA - Region 4 and SCDHEC.

SRS derives its own drinking and process water supply from groundwater. SRS domestic and process water systems are supplied from a network of approximately 40 wells in widely scattered locations across the site, of which eight supply the primary drinking water system. Virtually all site process and drinking water is pumped from the Crouch Branch and McQueen's Branch aquifers. SRS ensures a high level of drinking water supply protection by 1) monitoring above and beyond SCDHEC requirements and 2) periodically evaluating production wells. No offsite wells have been contaminated by the migration of SRS groundwater.

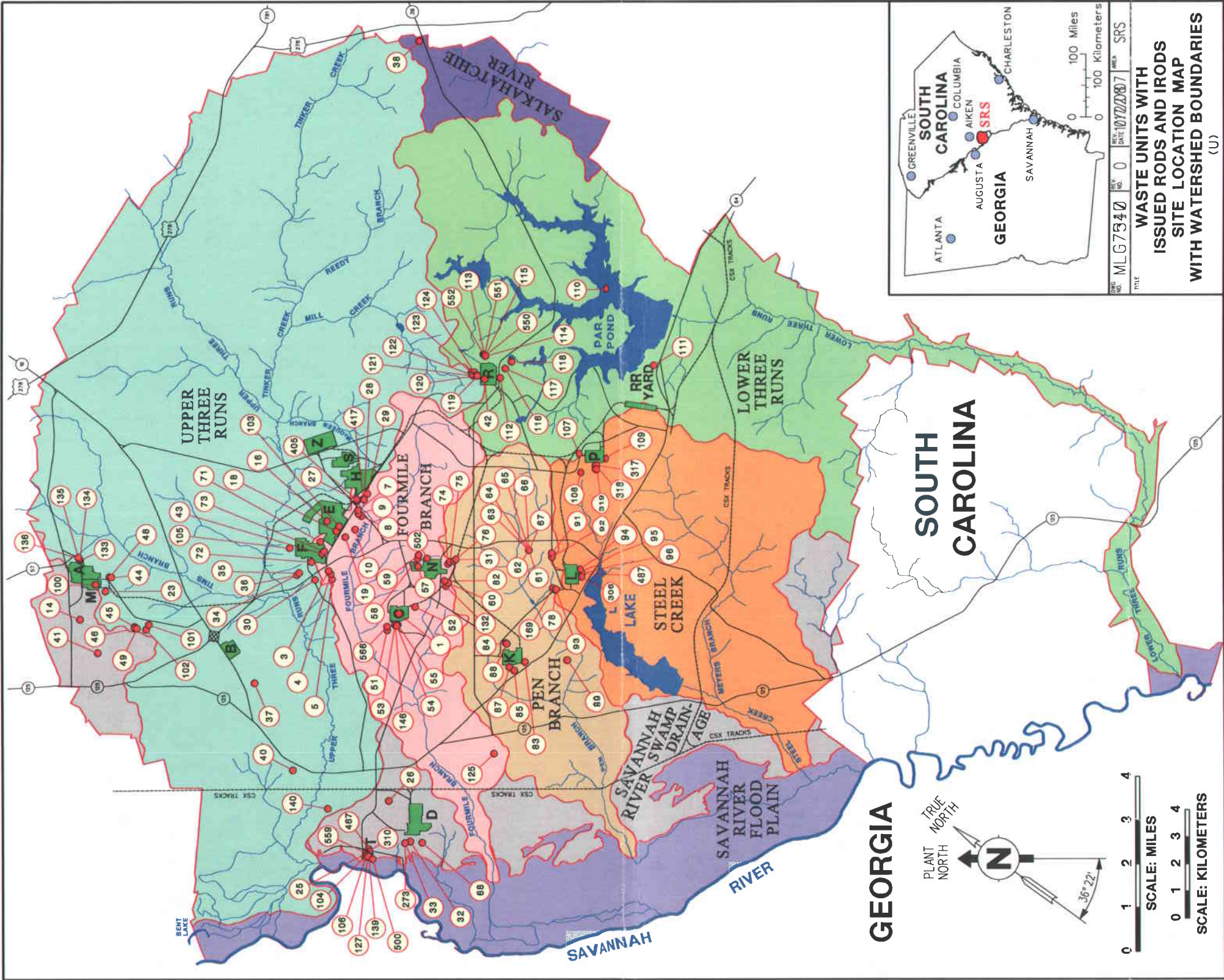


Figure 1. Map of SRS Showing the Location of OUs with Issued RODs and IRODs

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Figure 1. List of Units with Their Map Location Identification

| Unit ID | Unit Name |
|----------------|--|
| 1 | Tank 105-C Hazardous Waste Management Facility |
| 3 | F-Area Hazardous Waste Management Facility (F-Area Seepage Basin, 904-41G) |
| 4 | F-Area Hazardous Waste Management Facility (F-Area Seepage Basin, 904-42G) |
| 5 | F-Area Hazardous Waste Management Facility (F-Area Seepage Basin, 904-43G) |
| 7 | H-Area Hazardous Waste Management Facility (H-Area Seepage Basin, 904-44G) |
| 8 | H-Area Hazardous Waste Management Facility (H-Area Seepage Basin, 904-46G) |
| 9 | H-Area Hazardous Waste Management Facility (H-Area Seepage Basin, 904-45G) |
| 10 | H-Area Hazardous Waste Management Facility (H-Area Seepage Basin, 904-56G) |
| 14 | M-Area West, 631-21G |
| 16 | Mixed Waste Management Facility, 643-28E |
| 18 | Old Radioactive Waste Burial Ground, 643-E (Including Solvent Tanks 650-01-E-22E) |
| 19 | F & H-Area Hazardous Waste Management Facilities (Groundwater) |
| 23 | M-Area Hazardous Waste Management Facility, A/M Area Groundwater Portion, 904-110G |
| 25 | TNX Groundwater, 082-G |
| 26 | D-Area Oil Seepage Basin, 631G |
| 27 | Warner's Pond, 685-23G |
| 28 | H-Area Retention Basin, 281-3H |
| 29 | HP-52 Ponds, NBN |
| 30 | Burma Road Rubble Pit, 231-4F |
| 31 | Central Shops Burning/Rubble Pit, 631-6G |
| 32 | D-Area Burning/Rubble Pits, 431-1D |
| 33 | D- Area Burning/Rubble Pits, 431-D |
| 34 | F-Area Burning/Rubble Pits, 231-1F |
| 35 | F-Area Burning/Rubble Pits, 231-2F |
| 36 | F-Area Burning/Rubble Pits, 231-F |
| 37 | Grace Road Site, 631-22G |
| 38 | Gunsite 113 Access Road, 631-24G |
| 40 | Gunsite 720 Rubble Pit, 631-16G |
| 41 | Silverton Road Waste Site, 731-3A |
| 42 | Overflow Basin, 108-4R |
| 43 | 211-FB Line PU-239 Release, 081-F |
| 44 | 716-A Motor Shop Seepage Basin, 904-101G |
| 45 | A-Area Burning/Rubble Pits, 731-1A |
| 46 | A-Area Burning/Rubble Pits, 731-A |
| 48 | A-Area Miscellaneous Rubble Pile, 731-6A |
| 49 | A-Area Rubble Pit, 731-2A |
| 51 | C-Area Burning/Rubble Pit, 131-C |
| 52 | C-Area Coal Pile Runoff Basin, 189-C |
| 53 | C-Area Reactor Seepage Basins, 904-066G |
| 54 | C-Area Reactor Seepage Basins, 904-067G |
| 55 | C-Area Reactor Seepage Basins, 904-068G |
| 57 | Central Shops Burning/Rubble Pit, 631-5G |
| 58 | Central Shops Burning/Rubble Pit, 631-1G |

| Unit ID | Unit Name |
|---------|---|
| 59 | Central Shops Burning/Rubble Pit, 631-3G |
| 60 | Central Shops Sludge Lagoon, 080-24G |
| 61 | CMP Pits, 080-170G |
| 62 | CMP Pits, 080-171G |
| 63 | CMP Pits, 080-180-G |
| 64 | CMP Pits, 080-181G |
| 65 | CMP Pits, 080-182G |
| 66 | CMP Pits, 080-183G |
| 67 | CMP Pits, 080-190G |
| 68 | D-Area Ash Basin, 488-D |
| 71 | F-Area Coal Pile Runoff Basin, 289-F |
| 72 | F-Area Hazardous Waste Management Facility (F-Area Inactive Process Sewer Line, 081-1F) |
| 73 | F-Area Retention Basin, 281-3F |
| 74 | Fire Department Hose Training Facility, 904-113G |
| 75 | Ford Building Seepage Basin, 904-91G |
| 76 | Ford Building Seepage Basin, 643-11G |
| 78 | Gas Cylinder Disposal Facility, 131-2L |
| 82 | Hydrofluoric Acid Spill, 631-4G |
| 83 | K-Area Bingham Pump Outage Pit, 430-1G |
| 84 | K-Area Burning/Rubble Pit, 131-K |
| 85 | K-Area Coal Pile Runoff Basin, 189-K |
| 87 | K-Area Reactor Seepage Basin, 904-65G |
| 88 | K-Area Rubble Pile, 631-20G |
| 89 | K-Area Sludge Land Application Site, 761-4G |
| 91 | L-Area Bingham Pump Outage Pits, 643-2G |
| 92 | L-Area Bingham Pump Outage Pits, 643-3G |
| 93 | L-Area Burning/Rubble Pit, 131-L |
| 94 | L-Area Hot Shop, 717-G (including Sandblast Area CML-003, NBN) |
| 95 | L-Area Acid/Caustic Basin, 904-79G |
| 96 | L-Area Oil Chemical Basin, 904-83G |
| 100 | M-Area Inactive Process Sewer Line (MIPSL), 081-M |
| 101 | Miscellaneous Chemical Basin, 731-4B |
| 102 | Metal Burning Pits, 731-5A |
| 103 | Mixed Waste Management Facility (Groundwater) |
| 104 | New TNX Seepage Basin, 901-102G |
| 105 | Old F-Area Seepage Basin, 904-49G |
| 106 | Old TNX Seepage Basin, 904-076G |
| 107 | P-Area Bingham Pump Outage Pit, 643-4G |
| 108 | P-Area Burning/Rubble Pit, 131-P |
| 109 | P-Area Coal Pile Runoff Basin, 189-P |
| 110 | Par Pond (Including the Pre-Cooler Ponds and Canals), 685-G |
| 111 | Par Pond Sludge Land Application Site, 761-5G |
| 112 | R-Area Acid/Caustic Basin, 904-77G |
| 113 | R-Area Bingham Pump Outage Pits, 643-10G |

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| Unit ID | Unit Name |
|---------|--|
| 114 | R-Area Bingham Pump Outage Pits, 643-8G |
| 115 | R-Area Bingham Pump Outage Pits, 643-9G |
| 116 | R-Area Burning/Rubble Pits, 131-1R |
| 117 | R-Area Burning/Rubble Pits, 131-R |
| 118 | R-Area Rubble Pile, 631-25G |
| 119 | R-Area Reactor Seepage Basins, 904-103G |
| 120 | R-Area Reactor Seepage Basins, 904-104G |
| 121 | R-Area Reactor Seepage Basins, 904-57G |
| 122 | R-Area Reactor Seepage Basins, 904-58G |
| 123 | R-Area Reactor Seepage Basins, 904-59G |
| 124 | R-Area Reactor Seepage Basins, 904-60G |
| 125 | Road A Chemical Basin, 904-111G |
| 127 | Spill on 1/12/53 of 1/2 Ton of Uranyl Nitrate, NBN |
| 132 | SRL Oil Test Site, 080-16G |
| 133 | SRL Seepage Basins, 904-53G1 |
| 134 | SRL Seepage Basins, 904-53G2 |
| 135 | SRL Seepage Basins, 904-54G |
| 136 | SRL Seepage Basins, 904-55G |
| 139 | TNX Burying Ground, 643-5G |
| 140 | West of SREL "Georgia Fields" Site, 631-19G |
| 146 | C-Area Reactor Groundwater |
| 169 | L-Area Rubble Pile, 131-3L |
| 273 | D-Area Rubble Pit, 431-2D |
| 306 | K-Area Reactor Seepage Basin, 904-064G |
| 310 | Neutralization Sump, 678-T |
| 317 | P-Area Reactor Seepage Basin, 904-061G |
| 318 | P-Area Reactor Seepage Basin, 904-062G |
| 319 | P-Area Reactor Seepage Basin, 904-063G |
| 405 | Spill on 3/08/78 of Unknown , Seepage Basin Pipe Leak , H-Area Seepage Basin |
| 417 | Spill on 5/01/56 of Unknown , Retention Basin Pipe Leak , NBN |
| 467 | X-001 Outfall Drainage Ditch, NBN |
| 487 | L-Area Southern Groundwater, NBN |
| 500 | TNX Outfall Delta, Lower Discharge Gully and Swamp, NBN |
| 502 | Heavy Equipment Wash Basin, NBN |
| 550 | R-Area Unknown Pit #1 (Runk-1), NBN |
| 551 | R-Area Unknown Pit #2 (Runk-2), NBN |
| 552 | R-Area Unknown Pit #2 (Runk-3), NBN |
| 559 | TNX Process Sewer Lines and Tile Fields as Abandoned, NBN |
| 566 | Old C-Area Burning/Rubble Pit, NBN |

IV. REMEDIAL ACTIONS

The remedial actions for the OUs are described within Section IV of each specific report. A summary of the remedial actions employed at the OUs is given in Table 2. Section X of each report provides the total O&M costs for these remedial actions as of the end of FY06 and compares them to the estimated costs presented in the RODs.

In addition to the remedial actions taken, the following actions were also taken to perform the Five-Year Remedy Review:

- USDOE provided the Revision 0 Report to USEPA and SCDHEC for review and comment
- USEPA performed site inspections of all waste units with issued RODS/IRODs.
- USDOE addressed the comments received and provided a Revision 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

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

| Operable Unit | Remedial Action |
|--|---|
| Final RODs and ESDs | |
| A-Area Burning/Rubble Pits (731-A/1A) and Rubble Pit (731-2A), Miscellaneous Chemical Basin (731-4A) and Metals Burning Pit (731-5A) | Soil Cover, Institutional Controls, PSVE (Baroball™), Air Sparging |
| A-Area Miscellaneous Rubble Pile (731-6A) | Institutional Controls, excavation, soil vapor extraction, cover |
| C-Area Reactor Seepage Basins (904-66G, -67G, -68G) | In Situ S/S (Plug-In), Soil Cover, Institutional Controls |
| Central Shops Burning Rubble Pits (631-1G, -3G) | Institutional Controls and Stormwater Management |
| 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 |
| Chemicals, Metals, and Pesticides Pit (080-170G, -171G, -180G, -181G, -182G, -183G, -190G) | Institutional Controls, enhanced bioremediation, Electrical Resistance Heating, Soil Vapor Extraction, soil cover, passive soil vapor extraction, monitored natural attenuation |
| D-Area Burning/Rubble Pits (431-D, 431-1D) | Institutional Controls |
| D-Area Expanded Operable Unit (488-D, 431-2D) | Institutional Controls, excavation/disposal, geotextile cover, groundwater monitoring |
| 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 |
| Ford Building Seepage Basin (643-11G) | Institutional Controls, excavation, backfill |
| General Separations Area Consolidated Unit | Institutional Controls, excavation, consolidation, low permeability cover |
| Heavy Equipment Wash Basin and Central Shops Burning/Rubble Pit (631-5G) | 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, Institutional Controls |
| K-Area Reactor Seepage Basin (904-65G) | Institutional Controls, consolidation, in situ stabilization with soil cover |
| L-Area Burning/Rubble Pit (131-L), Rubble Pile (131-3L) and Gas Cylinder Disposal Facility (131-2L) | Institutional Controls, removal, groundwater mixing zone |
| L & P Bingham Pump Outage Pits (643-2G, -3G, -4G) | Institutional Controls |
| L-Area Hot Shop (707-G, 712-G, 717-G) | Institutional Controls, removal/disposal of pipelines and pad |
| L-Area Oil and Chemical Basin and L-Area Acid/Caustic Basin (904-83G, -79G) | In Situ S/S, Soil Cover, Institutional Controls |
| L-Area Reactor Seepage Basin (904-64G) | Institutional Controls, Removal, Low Permeability Soil Cover |

| Operable Unit | Remedial Action |
|---|---|
| L-Area Southern Groundwater | Institutional Controls, Monitored Natural Attenuation |
| M-Area Inactive Process Sewer Line (081-M) | Soil Vapor Extraction, Soil Fracturing, Institutional Controls |
| Old F-Area Seepage Basin (904-49G) | In Situ S/S, Institutional Controls, Mixing Zone |
| P-Area Burning/Rubble Pit (131-P) | Institutional Controls, Cover with Baroballs™, Natural Biodegradation, Groundwater Monitoring |
| P-Area Reactor Seepage Basin (904-61G, 62G, -63G) | Institutional Controls, Consolidation, In Situ Stabilization with Soil Cover, Inactive Process Sewer Line Excavated and Grouted in Basins, Asphalt Bioturbation Barrier |
| R-Area Bingham Pump Outage Pits (643-8G, -9G, -10G) and R-Area Unknown Pits #1, #2, and #3 | Institutional Controls |
| R-Area Burning/Rubble Pits (131-R, -1R) and Rubble Pile (631-25G) | Institutional Controls, Excavation, Soil Cover |
| R-Area Reactor Seepage Basins (904-57G, -58G, -59G, -60G, -103G, -104G) and 108-4R Overflow Basin | Concrete Intruder Barrier, Excavation, On-Site Disposal, Mixing Zone and Institutional Controls, and asphalt bioturbation barrier |
| Silverton Road Waste Unit (713-3A) | Institutional Controls |
| SRL Seepage Basins (904-53G, -54G, -55G) | Soil Excavation, Offsite Disposal, Institutional Controls |
| T-Area Operable Unit | Low Permeability Cap, Excavation, Backfill, Soil Amendments |
| TNX Groundwater Operable Unit | SVE (had recirculation wells but this was dropped), Institutional Controls |
| Interim Action RODs and ESDs | |
| C-Area Burning/Rubble Pit (131-C) | Soil Cover, SVE, Air Sparging, Institutional Controls |
| C-Area Reactor Groundwater | Electrical Resistance Heating with Soil Vapor Extraction |
| PAR Pond (685-G) | Repair Dam and refill pond to full and maintain the level at 195 ft minimum |

V. PROGRESS SINCE LAST REVIEW

The Protectiveness Statement from the Second Five-Year Remedy Review Report is as follows:

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.

There were six recommendations and agreements made in the Second SRS Five-Year Remedy Review Report. These are summarized and statused in Table 3.

Table 3. Second Five-Year Report Recommendations and Follow-up Actions

| Issues | Follow-up Actions | Current Status |
|--|--|--|
| 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. | Meeting to discuss the future of the Ash Pile. | Final ROD issued for ABRP on May 9, 2007. |
| 2) Chemicals, Metals, and Pesticides Pit (080-170G, -171G, -180G, -181G, -182G, -183G, -190G) 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. | IAROD Amendment will resolve the Silvex issue, final ROD will deal with the vadose zone and groundwater. | Final ROD issued on February 7, 2005 and is being implemented. |
| 3) D-Area Oil Seepage Basin (631-G) OU. The Annual Mixing Zone Monitoring Report stated that the 1Q 00 sampling for total-1, 2-dichloroethene in DOB-15A at this OU 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. | Meeting to discuss the changes needed in the Mixing Zone application. | Submitted revised Mixing Zone Application on June 7, 2005. |
| 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 | Issue a ROD amendment to remove the groundwater from the OFASB | Issued ROD amendment on April 1, 2004 to remove groundwater from OFSAB and to now include with Western Sector GSA groundwater. |

| Issues | Follow-up Actions | Current Status |
|--|--|--|
| 5) Pre-1998 RODs not containing provisions for a Land Use Control Implementation Plans and other RODs not containing ERP Headquarters approved land use control language should be modified through the appropriate mechanism. This is probably best done when final EPA Headquarters' guidance concerning minimum requirements for land use controls in RODs is issued. EPA suggests this item be added to the Bin List for future consideration. | Resolution of the land use control language will be added to the Bin List for future consideration. | This item is complete. SRS reached agreement with the USEPA in 2007 on the land use control language to be included in ROD and LUCIP documents to satisfy the USEPA Federal Facility Land Use Control ROD Checklist. |
| 6) Provide annual O&M costs associated with each ROD in the checklist and discuss appropriately in the text portion of each ROD review. | For future 5-Year Reports, evaluate SRS accounting systems to develop a mechanism to depict O&M costs. | In progress, will be included in 3 rd Report. |

VI. FIVE-YEAR REMEDY REVIEW PROCESS

USDOE performed the Five-Year Remedy Review. The following tasks were performed as part of the review:

- Reviewed appropriate documents such as RODs, RAIPs, annual groundwater monitoring reports, etc.
- Confirmed implementation of the remedial actions
- Inspected the units (other than the No Action OUs, groundwater units without operating equipment, 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 Remedy Review for a specific OU.

The review of changes in standards and to-be-considered guidance revealed new EPA guidance with respect to evaluating the vapor intrusion to indoor air pathway for occupiable structures overlying volatile organic compound (VOC) plumes. Under the Government Performance and Results Act (GPRA), SRS conducted an extensive evaluation of all existing structures potentially impacted by vapor intrusion and concluded that there is no vapor intrusion migration at SRS for existing structures. The results of this evaluation were documented in a September 30, 2005 memorandum from SCDHEC to DOE (Cystal Rippey and Cydne Devlin, SCDHEC to US DOE/Savannah River Site Project File EPA ID#SC1 890 008 989.) In this memo three structures were identified for further evaluation. The three referenced structures have been evaluated further as recommended, and it has been demonstrated that vapor intrusion migration does not present a problem.

The USDOE does not anticipate the need to construct new facilities over existing VOC plumes in the future. To address this concern for future projects: 1) conceptual site models will identify VOC vapor intrusion as a viable, potential pathway; and 2) a land use control objective will be included in the RODs for operable units with VOC plumes that prevent the construction of inhabitable buildings without an evaluation of indoor air quality.

In accordance with the SRS Community Involvement Plan, after the Third Five-Year Remedy Review Report has been signed and issued, a notice of the availability of this report will be made in newspapers in Aiken, Columbia, Barnwell, and Allendale, South Carolina, and in Augusta, Georgia. Additionally, the availability will be announced in the *SRS Environmental Bulletin*, which will be sent to the SRS mailing list. The report will be made available to the public at four information repositories.

VII. TECHNICAL ASSESSMENT

The technical assessment was made by answering the following three questions (according to EPA 540-R-01-007):

- 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, of each OU-Specific Remedy Review in this report. The exposure assumptions, toxicity data, cleanup levels, and RAOs used at the time of remedy selection are still valid for all of the OUs included in this report. Additional information has come to light that could call into question the protectiveness of the selected remedies has been identified and evaluated in the individual monitoring reports for each operable unit that have been submitted to EPA and SCDHEC and referenced in this report. No outstanding issues have been identified in this Five-Year Remedy Review Document.

VIII. ISSUES

The Issues section addresses OU operations, conditions, or activities, if any, that currently prevent the remedy from being protective. No issues have been identified.

IX. RECOMMENDATIONS AND FOLLOW-UP ACTIONS

There are no identified recommendations.

X. PROJECT COSTS

A project cost summary of the operation and maintenance (O&M) costs associated with each remedial action is included within Section X for each OU reviewed. A summary of the ROD O&M estimated present worth costs and project actual costs as of Fiscal Year (FY) 2006 associated with each OU is given in Table 4. It should be noted that the reported estimated O&M costs have been prepared using a present worth analysis, per EPA/540/G-89/004, *Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA*. The guidance explains present worth analysis as follows:

A present worth analysis is used to evaluate expenditures that occur over different time periods by discounting all future cost to a common base year, usually the current year. This allows the cost of the remedial action alternatives to be compared on the basis of a single figure representing the amount of money that, if invested in the base year and disbursed as needed, would be sufficient to cover all costs associated with the remedial action over its planned life.

Present worth estimated costs are shown in comparison to actual O&M costs incurred for each of the various operable units. Actual O&M costs for individual projects have been accrued over different lengths of time, (i.e., time from construction complete) and have not been discounted to a single base year worth, so a comparison between the numbers can be difficult to interpret. A present worth analysis is an appropriate tool for comparing costs of technologies when selecting a remedy for a specific site, but is not an accurate tool for predicting actual future costs at an individual site. In addition, project specific conditions and histories introduce uncertainties and cost variations that may not have been taken account in the estimation process.

The primary conclusions that can be drawn from the comparison of estimated and actual O&M costs are that:

- 1) In many cases the actual O&M costs are greater than the estimated costs, which is not unexpected since estimated costs have been discounted, and
- 2) No individual remedial technology seems to be especially prone to being more or less expensive than was originally estimated than any other technology.

Table 4. Operation and Maintenance Project Costs

| Waste Unit | ROD O&M Cost ESTIMATED | O&M Cost ACTUAL as of FY06 | O&M Start Date |
|---|---------------------------|----------------------------------|-------------------|
| A-Area BRPs/MCB/MBP OU | \$2,182,257 | \$2,641,782 | 2002 |
| A-Area Miscellaneous Rubble Pile OU | \$580,000 | \$75,835 | 2004 |
| C-Area Burning Rubble Pit OU | \$1,220,000 | \$642,827 | 2005 |
| C-Area Reactor Groundwater OU | \$1,229,940 | In construction | |
| C-Area Reactor Seepage Basin OU | \$1,135,945 | \$235,190 | 2003 |
| Central Shops BRP OU | \$94,420 | \$56,092 | 2005 |
| C-F-K-and P- CPRB OU | \$60,200 | \$260,533 | 1997 |
| CMP Pits OU | \$2,102,976 | In construction | 2006 |
| D-Area BRP OU | \$370,000 | \$209,939 | 1998 |
| D-Area Expanded Operable Unit | \$399,946 | In construction | |
| D-Area Oil Seepage Basin OU | \$509,364 | \$794,755 | 2003 |
| F-Area BRP OU | \$10,000 | \$12,912 | 1998 |
| F-Area Retention Basin OU | \$29,000 | \$66,520 | 2002 |
| Ford Building Seepage Basin OU | \$116,000 | \$72,924 | 2004 |
| GSA Consolidation Unit | \$2,213,505 | In construction | |
| Heavy Equipment WB OU | \$82,480 | \$370,538 | 2003 |
| K-Area BPOP OU | \$320,000 | \$123,092 | 1997 |
| K-Area BRP & RP OU | \$345,390 | \$349,619 | 2004 |
| K-Area Reactor Seepage Basin OU | \$458,813 | \$129,610 | 2003 |
| L-Area and P-Area BPOP OU | \$141,500 | \$246,184 | 2000 |
| L-Area BRP, RP, & GCDF OU | \$70,000 | \$100,004 | 2004 |
| L-Area Hot Shop OU | \$42,970 | 41,950 | 2004 |
| L-Area Oil and Chem Acid/Caustic Basin OU | \$430,000 | \$698 | 2005 |
| L-Area Reactor Seepage Basin OU | \$703,500 | \$189,957 | 2004 |
| L-Area Southern Groundwater OU | \$3,327,850 | In construction | |
| M-Area Inactive Sewer Lines OU | \$3,606,071 | In construction | |
| Old F-Area Seepage Basin OU | \$500,000 | \$107,393 | 2001 |
| P-Area BRP OU | \$188,000 | \$105,662 | 2005 |
| P-Area Reactor Seepage Basin OU | \$596,000 | In construction | |
| PAR Pond OU | \$5,500,000 | SRS site costs | |
| R-Area BPOP OU | \$75,799 | \$123,092 | 2002 |
| R-Area BRP and Rubble Pile OU | \$101,084 | In construction | 2006 |
| R-Area RSB and Overflow Basin OU | \$13,789,000 | In construction | |
| Silverton Road Waste Site OU | \$18,060 | \$263,806 | 1998 |
| SRL Seepage Basin OU | \$80,000 | \$13,032 | 2002 |
| T Area OU | \$3,122,000 | In construction | |
| TNX Groundwater OU | \$8,053,000 | \$1,232,798 | 2001 |

XI. PROTECTIVENESS STATEMENT(S)

For the Third Five-year Remedy Review, a protectiveness statement is included for each OU reviewed where the remedial action has begun. The following OUs are currently being constructed 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).

- Chemicals, Metals, and Pesticides Pit – ERH and SVE
- L-Area Southern Groundwater – Monitored Natural Attenuation
- M-Area Inactive Process Sewer Line – Soil Vapor Extraction

The C-Area Reactor Groundwater ERH, C-Area Burning Rubble Pit SVE, ORWBG soil cover and the PAR Pond dam repair provide protection, but are only interim actions. For all other OUs, the remedy was found to be protective.

In the last Five-Year Remedy Review, all remedies, with the exception of those four operable units indicated in Table 3, were found to be protective.

XII. NEXT REVIEW

As established in Section 121 of CERCLA, as amended by the Superfund Amendments and Reauthorization Act (SARA) and the NCP, periodic reviews are required at least every five years for sites where hazardous substances, pollutants, or contaminants remain at the site above levels that allow for unlimited use and unrestricted exposure following the completion of all remedial actions. Barring a change in the governing laws, another review should be completed within five years from the signature date of this document.

unrestricted use and unlimited exposure, the next FYR is anticipated to be due no later than February 12, 2014.

XIII. OU-SPECIFIC FIVE-YEAR REMEDY REVIEW REPORTS

The OU-specific Five-Year Remedy Review Reports for the 45 OUs that have RODs and/or IRODs are included under the following tabs. OU-specific field inspection checklists are provided as Attachment 2 except for groundwater OUs that do not have surface operating equipment.

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A-AREA BURNING/RUBBLE PITS (731-A/1A) AND RUBBLE PIT (731-2A)/MISCELLANEOUS CHEMICAL BASIN/METALS BURNING PIT (731-4A/5A) OPERABLE UNIT

I. Introduction

The A-Area Burning/Rubble Pits (731-A, -1A) and Rubble Pit (731-2A) (ABRP) and Miscellaneous Chemical Basin/Metals Burning Pit (731-4A, -5A) (MCB/MBP) Operable Units (OUs) are listed as separate Resource Conservation and Recovery Act (RCRA) 3004(u) Solid Waste Management Unit / Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) units in Appendix C of the Federal Facility Agreement (FFA) for the Savannah River Site (SRS). The two units have been consolidated to form the ABRP/MCB/MBP OU. The consolidation offers the potential for achieving final closure of the individual units in a shorter time frame because both have similar contaminants, impact the same aquifers, and have overlapping plumes. Both characterization and interim remedial efforts were completed separately at each unit prior to consolidation.

The ABRP OU includes eight subunits (Burning/Rubble Pit 731-A, Burning/Rubble Pit 731-1A, Rubble Pit 731-2A, Potential Pit, Depressional Area, Ash Scatter Area/Ditch, A-Area Ash Pile 788-2A, and Trench). Interim actions at these sites were identified in an Interim Record of Decision (IROD). Interim actions at the MCB/MBP OU were also identified in an IROD.

The ABRP/MCB/MCP OU includes the A-Area Ash Pile (788-2A). The media associated with this OU are surface and vadose zone soils; groundwater is not considered part of the scope for this OU. Any groundwater contamination resulting from the ABRP/MCB/MBP OU is regulated by the SRS RCRA Part B Permit and addressed by the requirements of the M-Area and Metallurgical Laboratory Hazardous Waste Management Facilities Groundwater Monitoring and Corrective Action agreements.

This is the second five-year review for the ABRP OU. The first five-year review addressed one final action to place a soil cover on the A-Area Rubble Pit (731-2A) and

one interim action to treat volatile organic compound- (VOC-) contaminated groundwater in the M-Area aquifer with air sparge wells and passive soil vapor extraction (PSVE) wells as detailed in the IROD. Since the first review, a final Record of Decision (ROD) has been signed.

This is the second five-year review for the MCB/MBP OU. The first five-year review addressed final actions at the MCB to excavate and properly dispose of soils contaminated with polychlorinated biphenyls (PCBs) (i.e., aroclor-1254 and aroclor-1260) and at the MBP to excavate and properly dispose of soils with elevated levels of aluminum. These actions were completed in August 2000. This five-year review addresses the final actions completed earlier with a summary of additional remedial actions to date. This review was conducted from August 2007 through September 2007.

II. OU Chronology

Table 1 lists the chronology of events for the ABRP/MCB/MBP OU.

Table 1. Chronology of OU Events

| Event | Date |
|--|--------------------|
| Interim Remedial Action Start – MCB/MBP | February 17, 2000 |
| Interim Remedial Action Start – ABRP | September 28, 2000 |
| IROD for ABRP | November 17, 2000 |
| IROD for MCB/MBP | December 7, 2000 |
| RFI/RI Field Start | March 22, 2001 |
| Explanation of Significant Difference - ABRP | January 27, 2003 |
| Previous Five-Year ROD Review | February 12, 2004 |
| FS Rev. 1 Submittal | March 8, 2005 |
| ABRP/MCB/MBP ROD issuance | July 24, 2007 |
| Remedial Action Start | May 6, 2008 |

III. Background

A-Area Burning/Rubble Pits and Rubble Pit

Physical Characteristics

The ABRP OU is located approximately 3 miles east of the SRS boundary and 1.5 miles south of M Area (see Figure 1). The OU is situated on the eastern edge of a north-south trending topographic ridge within the Upper Three Runs Creek watershed. This ridge

drains east to Tims Branch and west to the Savannah River floodplain. Its relief is characterized by flat areas and a few low rolling hills. Pine/hardwood forests are dominant, with some grassy areas.

Due to the receipt of waste from the A/M Area, the ABRP is being addressed in the SRS RCRA/CERCLA program. The ABRP is divided into eight subunits (Burning/Rubble Pit 731-A, Burning/Rubble Pit 731-1A, Rubble Pit 731-2A, Potential Pit, Depressional Area, Ash Scatter Area/Ditch, A-Area Ash Pile 788-2A, and Trench) (Figure 2). These potential waste sites were identified based on field investigations of existing sites and surface features and on reviews of historical aerial photographs from the 1950s through 1980s.

Land and Resource Use

The future land use for ABRP/MCB/MBP OU is anticipated to be industrial. Due to groundwater contamination, ICs are used to prevent access to or use of groundwater until cleanup levels are met under the RCRA program.

History of Contamination

The two Burning/Rubble Pits (731-A and 731-1A) were constructed in 1951. The pits are approximately 22 ft wide, 9 to 10 ft deep, and 250 ft long. They were used on a monthly basis to burn paper, plastics, wood, rubber, rags, cardboard, oil degreasers, and solvents. After burning was discontinued in October 1973, the burned remains were covered with a layer of soil. The pits were subsequently filled with rubble consisting of paper, wood, concrete, empty galvanized steel barrels, and cans. The pits reached capacity in 1978 and were taken out of service in 1983. They were then covered with native soils to grade level, and vegetation was allowed to re-establish.

Rubble Pit 731-2A was used from about 1951 until 1983 and is approximately 40 ft wide and 650 ft long, with an unknown depth that could extend to 20 ft. No specific disposal records are known to exist for this pit. However, SRS rubble pits were generally used to dispose of construction debris, waste wood products, and non-returnable empty drums. After the last use of Rubble Pit 731-2A in 1983, the area was backfilled and seeded.

The Potential Pit has estimated dimensions of 200 x 260 ft. This subunit was designated based on the existence of an area of depression/subsidence located approximately 50 ft east of the A-Area Ash Pile and discussions with SRS personnel. Ground-penetrating radar results suggested the presence of a trench boundary; however, further investigation produced no evidence of a trench.

The Depressional Area has estimated dimensions of 160 x 370 ft. It was identified by field observations as a potential receptor of surface runoff from the overflow of the pits/trenches or from spills in the immediate area. Although this area is a topographical "low spot," it does not contain permanent standing water or boggy areas, nor does it exhibit characteristic wetland soils and vegetation.

As shown in Figure 2, the Ash Scatter Area/Ditch is located between the A-Area Ash Pile and the Depressional Area. It is approximately 1.0 acre. An historic east-northeast trending ditch (currently filled) is located within this subunit and measures approximately 300 x 20 ft.

The A-Area Ash Pile 788-2A subunit is located in the central portion of the ABRP. It covers approximately 2.5 acres and rises approximately 14 to 24 ft above the surrounding topography. The A-Area Ash Pile was used to dispose of ash from the A-Area Powerhouse prior to 1994. The A-Area Ash Pile is permitted under Industrial Wastewater Permit No. 7289, which was issued on June 29, 1981.

The Trench subunit extends north-south and is mostly buried beneath 20 ft of compacted ash along the eastern portion of the A-Area Ash Pile. The Trench was filled with debris and covered with soil prior to construction of the A-Area Ash Pile. The Trench measures approximately 15 x 300 ft. The Trench is between 8 and 15 ft deep with approximately 5 to 10 percent of its length exposed to the south of the A-Area Ash Pile.

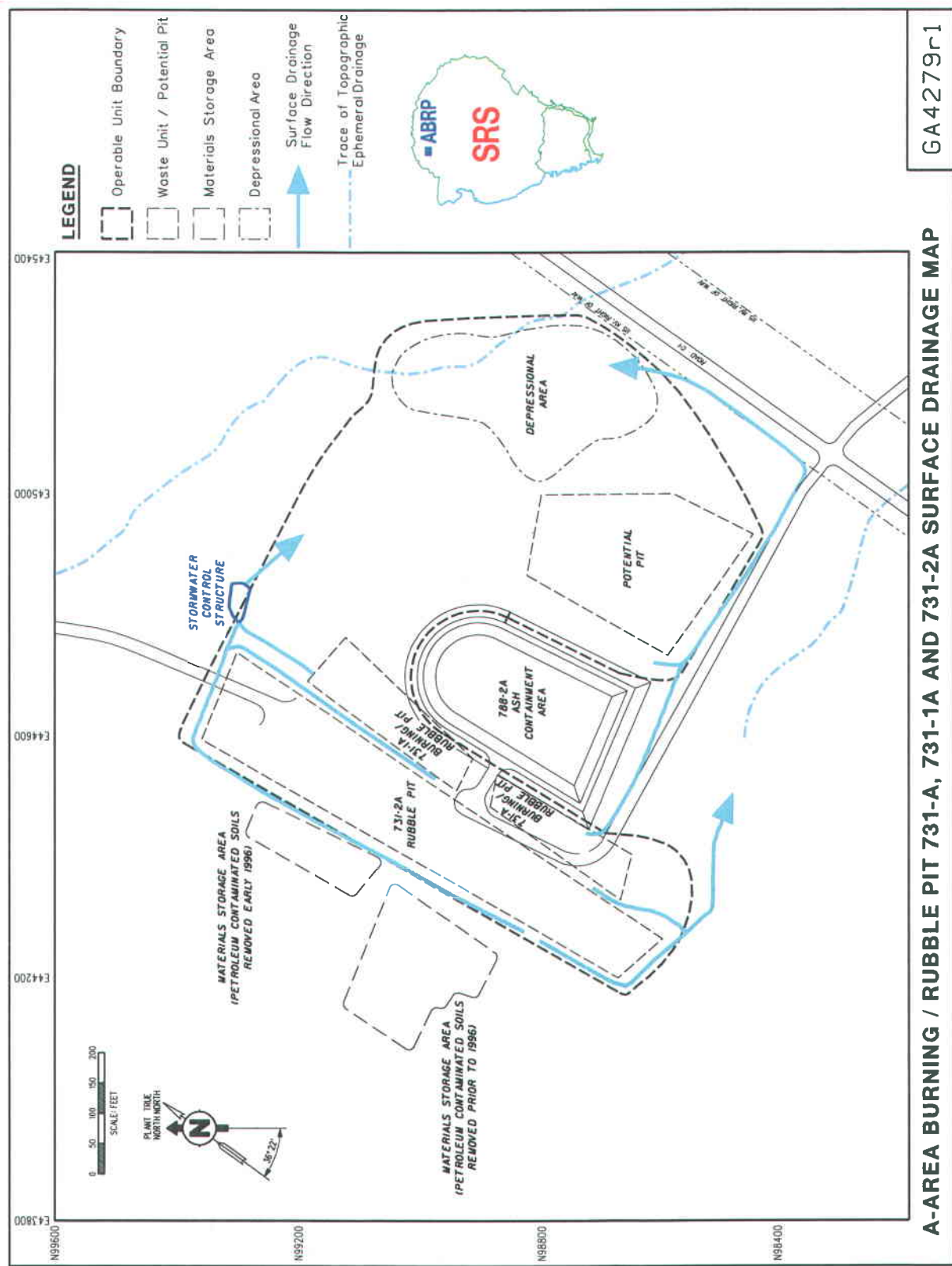


Figure 2. Surface Drainage Map of the ABRP

Miscellaneous Chemical Basin/Metals Burning Pit

Physical Characteristics

The MCB and the MBP are located in the northwest portion of the SRS in the Upper Three Runs Watershed (Figure 1). The OU is not located near or in an environmentally sensitive area and is unpopulated. MCB and MBP are addressed together due to their proximity. The MCB was approximately 20 by 20 ft and approximately 1 ft deep although exact basin boundaries have not been determined. The MCB was filled with soil and re-graded in 1974. At this time, the MCB has been cleared and much of the remediation equipment (i.e., 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.

History of Contamination

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 disposal of specific materials 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.

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 re-graded, and the area was allowed to re-vegetate.

Initial Response

At the time of this five-year ROD review, contaminated surface and subsurface soil have been removed and replaced with clean fill. The area has been re-vegetated.

IV. Remedial Actions

Remedy Selection

The IROD for ABRP OU was issued in April 2000, and addressed one final action for the surface soils as well as an interim action for the groundwater.

Remedy Implementation

A-Area Rubble Pit (731-2A) Surface Soils (Final Action)

The final remedial action objective (RAO) for surface soil is to prevent direct contact with and ingestion of benzo(a)pyrene- (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 remedial action chosen for this subunit was a minimum 1-ft thick soil cover and institutional controls, which include controlling access to the waste unit, posting signs in the area, conducting field walkdowns for general site conditions, and issuing deed notifications as required under CERCLA Section 120(h).

Groundwater (Interim Action)

The interim remedial action objectives (IRAOs) for groundwater were to mitigate any further plume growth; reduce the concentration of the contaminant plume within the 100 µg/L VOC-contaminated [i.e., trichloroethylene (TCE), tetrachloroethylene (PCE)], and methylene chloride) 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. A staged approach of active air sparging to

strip VOCs from the groundwater and a PSVE system to recover the VOC vapors from the unsaturated soils above the groundwater were planned.

The first stage consisted of 10 active air sparging wells, each with three BaroBall™ PSVE wells strategically positioned to address the “hot spot” area of the plume ($>500 \mu\text{g/L}$). Following twelve months of operation, the effectiveness of the process would be evaluated and, if warranted, a second phase would be added to expand the system to address the larger portion of the groundwater plume with TCE concentrations greater than 100 ppb. Stage 1 installation was completed and placed in service in 2001.

The MCB/MBP IROD was issued on December 7, 2000. The IROD addressed one final action for the surface soils, an interim action for the MCB vadose zone, and an interim action for the groundwater. A final ROD has been submitted and is under review by regulatory agencies.

MCB/MBP Surface Soils (Final Action)

The final RAO for surface soils was to prevent direct contact with aluminum-contaminated soils at the MBP and with PCB-contaminated surface/subsurface soils at the MCB so that the COCs are not a continued significant risk to human health or the ecological receptors. MBP surface and subsurface soils with contamination exceeding the ecological RGs of 11,000 mg/kg aluminum and MCB surface soils exceeding the ecological RGs of 215 $\mu\text{g/kg}$ PCBs (Aroclor-1254 and Aroclor-1260) were removed and disposed of in August 2000 in an appropriate Offsite Rule compliant facility, Three Rivers Landfill in South Carolina.

MCB vadose zone (Interim Action)

The IRAO for the vadose zone soil was to treat VOC-contaminated vadose zone soils with a combination of active and passive SVE, with an overall objective to reduce the potential migration of solvents to the water table that may result in contaminant concentrations exceeding maximum contaminant levels (MCLs). For the vadose zone, the final remedial goals (RGs) of 0.344 mg/kg were established for both PCE and TCE.

During initial characterization of the subunit with cone penetrometer technology, a network of SVE wells was installed.

These wells were equipped with BaroBalls™ and were monitored regularly as part of a treatability study while utility services and a soil vapor extraction unit (SVEU) were installed. In October 2001, the active SVEU was connected to the five SVE wells that produced the greatest VOC concentration, then placed in service. The SVEU operated for approximately one year and was removed from service once it met the shutdown criteria of 50 ppm exhaust gas. The five wells were returned to passive service. The contaminant soil-gas plume under the MCB has contracted substantially during SVE operation and is expected to reach RGs with SVE as the final action.

Groundwater (Interim Action)

Contaminants migrating downward from the MCB/MBP and ABRP subunits have contaminated the underlying groundwater with TCE and PCE. Airlift recirculation wells were installed as an interim action to treat the Lost Lake aquifer to prevent further plume growth, to demonstrate the effectiveness of in situ air stripping wells, and to obtain necessary site-specific run data to determine a final RG or strategy. The interim action allowed early start of remedial activities while generating additional data on the nature and extent of the groundwater interactions between the MCB/MBP, the ABRP, and the A&M Area. The interim and final RGs for groundwater are shown in Table 2. Lead was not treated because elevated levels were sporadic and were judged to be caused by natural geologic conditions.

Table 2. Final Groundwater COCs* and Interim RGs* for the MCB

| Final COC | Final RG, µg/L | Interim RG, High VOC Concentration Wells (>500 µg/L)* | Interim RG, Medium VOC Concentration Wells (ca. 200 µg/L)* | Interim RG, Low VOC Concentration Wells (<50 µg/L)* |
|----------------------|----------------|---|--|---|
| TCE | 5 | 20 | 41 | 20 |
| PCE | 5 | 20 | 41 | 20 |
| Carbon tetrachloride | 5 | 20 | 41 | 20 |
| Lead | 15 | 15 | 15 | 15 |

* Interim RGs based on modeling results

COC – constituent of concern; RG – remedial goal

V. Progress Since Last Review

For the ABRP, the soil cover at A-Area Rubble Pit 731-2A was completed, and the OU is being maintained according to the Land Use Control Implementation Plan (LUCIP) developed in the Interim Corrective Measures Implementation (ICMI)/Remedial Action Implementation Plan (RAIP).

Subsequent investigations established that no remedial action would be required at the following subunits: Burning/Rubble Pits (731-A/1A), the Potential Pit, the Depressional Area, and the Ash Scatter Area/Ditch.

Air sparging operations associated with interim action for groundwater at ABRP were found to be ineffective due to the presence of impermeable soils just above the water table and, with the concurrence of the Core Team, were discontinued in March of 2003.

The wells associated with the interim action for groundwater at MCB have operated as designed; however, actual mass removal rates have been low (less than 10 lb/year). Operating data from the wells and additional groundwater sampling have established that the groundwater plume is more dilute than originally believed. The lower contaminant concentrations result in lower mass removal rates.

Additional soil borings identified VOC contamination in the Trench under the ash pile. The VOCs have migrated downward and laterally along a perched water table to impact the underlying groundwater. An Explanation of Significant Difference (ESD) was issued to document the source area discovered in the Trench and to expand the interim SVE action to include four new SVE wells to address the contaminants.

A final ROD was prepared to add the A-Area Ash Pile (788-2A) to the OU and to address residual vadose zone contamination. The ROD addresses the consolidated ABRP/Miscellaneous Chemical Basin/Metals Burning Pit (MCB/MBP) OU. RAOs for the ABRP subunits are described below.

The RAO for the Trench subunit was defined as follows:

- Prevent migration of TCE contamination in soil to groundwater at a concentration above its MCL (5 µg/L).

The preferred remedial action to achieve the RAOs was identified as an expansion of the existing SVE system and the implementation of institutional controls until the vadose zone RAOs are achieved.

RAOs for the A-Area Ash Pile subunit were defined as follows:

- Prevent human exposure to constituents of concern (COCs) that present a risk to future industrial workers
- Prevent ecological exposure to COCs that present a hazard to ecological receptors.

The preferred remedial action to achieve the RAOs was identified as the installation of a soil cover over the A-Area Ash Pile 788-2A and the implementation of institutional controls to prevent exposure.

The passive SVE system at MCB as part of the interim action was determined to be appropriate as the final action and continues to remove contaminant mass as designed. A study conducted in 2004 by the Savannah River National Laboratory demonstrated that residual contaminants in the fine-grained soils near the surface were diffusing downward into the more permeable sands at a rate approximately equal to the rate at which contaminant mass was being removed by the passive SVE wells. This indicates that the SVE system can effectively prevent the residual mass from impacting the groundwater.

Institutional controls are being maintained at the subunits.

The final ROD was issued in February, 2007.

Because of the dilute nature of the groundwater plume and the potential impact of the larger M-Area groundwater plume that is migrating towards the ABRP/MCB/MBP OU,

the Core Team agreed to transfer responsibility for the groundwater portion of the OU to the RCRA program in early 2006. Groundwater contamination in the vicinity of the ABRP/MCB/MBP OU will now be addressed by RCRA under the 2000 RCRA Part B Permit Renewal Application for M Area and Metallurgical Laboratory Hazardous Waste Management Facilities Post-closure. An application revision selecting monitored natural attenuation as the final corrective action was submitted in March, 2007.

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 actions

VII. Technical Assessment

Interim SVE has proven effective in removing residual VOCs. Annual Performance Evaluation Reports have been prepared, and these detail the contaminant mass removed as well as the condition of the underlying groundwater plume. Characterization activities have adequately identified the type and extent of contamination requiring action. The actions identified in the final ROD are expected to be effective in addressing the RAOs.

The removal of contaminated soils at the MBP and the MCB has been completed and meets the RGs.

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. Project Costs

Costs associated with the selected remedy for ABRP/MCB/MBP include operation and maintenance costs of maintaining the existing cover, air sparging, passive soil vapor extraction (BaroBalls™) and institutional controls. The estimated operation and maintenance cost associated with the selected remedy is \$2,182,257. This is a present worth cost, including 30 years of maintenance activities based on a 3.9% discount rate. After characterization and effectiveness of the remedy was evaluated, the actual operation and maintenance cost for the ABRP/MCB/MBP was assessed. The total actual operation and maintenance cost from project support and other post construction expense to fiscal year 2006 is \$2,641,782.

XI. Protectiveness Statement(s)

When complete, the A-Area Ash Pile soil cover and the expanded SVE system are expected to be protective of human health and the environment.

Subsequent 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).

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 ROD.

The vadose zone elements of the overall remedy are operating and, as evidenced by the diffusion rate study, are expected to be protective of human health and the environment.

The vadose zone remedial action is considered a final action as stated in the ROD and is expected to be protective of human health and the environment when completed.

The groundwater remedy is considered an interim remedial action. The protectiveness of remedial actions addressing groundwater will be addressed by the M-Area program.

Subsequent 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). The Land Use Control Implementation Plan (LUCIP) is included in the MCB/MBP OU Interim Post-Construction Report.

XII. Next Review

The next five-year review is scheduled for February 12, 2014.

ATTACHMENT 1

List of Documents Reviewed

SRTC-EST-2003-00145, *ABRP Performance Evaluation Letter Report – FY03*, 2003, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

SRNL-EST-2005-00037, *ABRP Performance Evaluation Letter Report – Calendar Year 2004*, 2005, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

WSRC-RP-96-853, *RCRA Facility Investigation / Remedial Investigation Report with Baseline Risk Assessment for the Miscellaneous Chemical Basin/Metals Burning Pit*, Revision 1.2, 1998, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

WSRC-RP-98-4031, *Interim Record of Decision Remedial Selection for the Miscellaneous Chemical Basin/Metals Burning Pit (731-4A/5A) Operable Unit (U)*, Revision 1.1, 1999, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

WSRC-RP-98-4153, *Interim Action Proposed Plan for the Miscellaneous Chemical Basin/Metals Burning Rubble Pit (731-4A/5A) Operable Unit (OU)*, Revision 1, 1999, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

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

WSRC-RP-99-4037, *Interim Corrective Measures Implementation/Remedial Action Implementation Plan for the Miscellaneous Chemical Basin/Metal Burning Pit (731-4A/5A) (U)*, Revision 1.1, March 2000, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

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

ATTACHMENT 1 (Continued)

List of Documents Reviewed

WSRC-RP-2000-4024, *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)*, Revision 1, 2000, Westinghouse Savannah River Company, Savannah River Site, Aiken SC

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

WSRC-ERP-2001-4091, *Field Characterization report for the ABRP "Suspect Trench/Pit" and "Suspect Ditch*, Westinghouse Savannah River Company, 2001, Savannah River Site, Aiken, SC

WSRC-RP-2001-4281, *Explanation of Significant Difference (ESD) for the A-Area Burning/Rubble Pits (731-A/1A) and Rubble Pits (731-2A) (ABRP)*, Revision 1, 2002, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

WSRC-RP-2002-00534, *Performance Evaluation Report for the A-Area Burning/Rubble Pits (731-A/1A) and Rubble Pit (731-2A) Interim Remedial Action: September 2001 – September 2002 (U)*, Revision 0, 2002, Washington Savannah River Company, Savannah River Site, Aiken, SC

WSRC-RP-2002-4009, *Addendum to the Rev. 1.2 RCRA Facility Investigation Report with Baseline Risk Assessment for the A-Area Burning/Rubble Pits and Rubble Pit Operable Unit (U)*., Rev. 1, 2003, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

WSRC-RP-2003-00987, *Performance Evaluation Report for the A-Area Burning/Rubble Pits (731-A/1A) and Rubble Pit (731-2A) Interim Remedial Action: October 2002 – September 2003 (U)*, Revision 0, 2003, Washington Savannah River Company, Savannah River Site, Aiken, SC

ATTACHMENT 1 (Continued)

List of Documents Reviewed

WSRC-RP-2003-4084, *Performance Evaluation Report for the Miscellaneous Chemical Basin (731-5A) Interim Remedial Action through May 2003*, Revision 0, 2003, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

WSRC-RP-2003-4116, *Corrective Measures Study / Feasibility Study Report for A-Area Burning/Rubble Pits (731-A,-1A) and Rubble Pit (731-2A) and Miscellaneous Chemical Basin / Metals Burning Pit (731-4A/5A) Operable Unit (U)*, Rev. 1, 2005, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

WSRC-RP-2005-4016, *Performance Evaluation Report for the Combined A-Area Burning/Rubble Pits, Miscellaneous Chemical Basin, and Metals Burning Pit Operable Unit; October 2003 through December 2004 (U)*, Revision 0, 2005, Washington Savannah River Company, Savannah River Site, Aiken, SC

WSRC-RP-2005-4054, *Statement of Basis/Proposed Plan for the A-Area Burning/Rubble Pits (731-A, -1A) and Rubble Pit (731-2A) and the Miscellaneous Chemical Basin/Metals Burning Pit (731-4A, -5A) Operable Unit (U)*, Rev. 1.1, 2006, Washington Savannah River Company, Savannah River Site, Aiken, SC

WSRC-RP-2005-4095, *Record of Decision Remedial Alternative Selection for the A-Area Burning/Rubble Pits (731-A, -1A) and Rubble Pit (731-2A) and the Miscellaneous Chemical Basin / Metals Burning Pit (731-4A, -5A) Operable Unit (U)*, 2005, Revision 1.1, February 2007, Washington Savannah River Company, Savannah River Site, Aiken, SC

WSRC-TR-2005-00266, *Vadose Zone VOC Mass Transfer Testing at the SRS Miscellaneous Chemical Basin*, October 2005, Washington Savannah River Company, Savannah River Site, Aiken, SC

ATTACHMENT 1 (Continued)

List of Documents Reviewed

WSRC-RP-2006-4009, *Performance Evaluation Report for the Combined A-Area Burning/Rubble Pits, Miscellaneous Chemical Basin, and Metals Burning Pit Operable Unit; January 2005 through December 2005 (U)*, Revision 0, 2006, Washington Savannah River Company, Savannah River Site, Aiken, SC

WSRC-RP-2006-4073, *Land Use Control Implementation Plan (LUCIP) for the A-Area Burning/Rubble Pits (731-A, -1A) and Rubble Pit (731-2A) and the Miscellaneous Chemical Basin/Metals Burning Pit (731-4A, -5A) Operable Unit (U)*, Revision 0, 2006, Washington Savannah River Company, Savannah River Site, Aiken, SC

WSRC-RP-2007-4023, *Performance Evaluation Report for the Combined A-Area Burning/Rubble Pits, Miscellaneous Chemical Basin, and Metals Burning Pit Operable Unit; January through December 2006 (U)*, Revision 0, 2007, Washington Savannah River Company, Savannah River Site, Aiken, SC

ATTACHMENT 2

Five-Year Review Site Inspection Checklist

| I. SITE INFORMATION | | | |
|--|--|--|---|
| Site Name: | A Area Burning/Rubble Pits/Miscellaneous Chemical Basin/Metals Burning Pit | Date of Inspection: | 10/24/2007 |
| Location and Region: | SRS, USEPA Region IV | EPA ID: | SC1890008989 |
| Agency, office, or company leading the five- year review: | USDOE | CERCLIS No.: | 19,28,92 |
| | | Weather/Temperature: | |
| Remedy Includes: (Check all that apply) <div style="display: flex; flex-wrap: wrap;"><div style="width: 50%;"><input checked="" type="checkbox"/> Cover system <input checked="" type="checkbox"/> Access controls <input checked="" type="checkbox"/> Institutional Controls <input type="checkbox"/> Groundwater pump and treatment <input type="checkbox"/> Surface water collection and treatment <input checked="" type="checkbox"/> Other: <u>Soil Vapor Extraction (active and passive)</u></div><div style="width: 50%;"><input type="checkbox"/> Monitored Natural Attenuation <input type="checkbox"/> Groundwater Containment <input type="checkbox"/> Vertical Barrier Walls</div></div> | | | |
| Attachments: <input type="checkbox"/> Inspection team roster attached <input type="checkbox"/> Site map attached | | | |
| II. INTERVIEWS (Check all that apply) | | | |
| 1. O & M Site Manager | <u>Wayne Gleaton</u> (Name) | <u>Post Closure Manager</u> (Title) | <u>10-23-2007</u> (Date) |
| Interviewed: | <input type="checkbox"/> at site | <input type="checkbox"/> at office | <input checked="" type="checkbox"/> by phone Phone No. <u>803-557-8838</u> |
| Problems, suggestions: | <input type="checkbox"/> report attached _____ | | |
| 2. O & M Staff | <u>Richard Feagin</u> (Name) | <u>Post-Closure Waste Site Inspector/Maintenance Coord.</u> (Title) | <u>8-23-2007</u> (Date) |
| Interviewed: | <input type="checkbox"/> at site | <input type="checkbox"/> at office | <input checked="" type="checkbox"/> by phone Phone No. <u>803-952-4416</u> |
| Problems, suggestions: | <input type="checkbox"/> report attached _____ | | |

Five-Year Review Site Inspection Checklist (Continued)

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

| | | | |
|---|--|-------------------------------------|------------------------------|
| <input type="checkbox"/> O & M Manual | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |
| x As-built drawings | x Readily available | x Up to date | <input type="checkbox"/> N/A |
| <input type="checkbox"/> Maintenance Logs | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |

Remarks: See Waste Unit Inspection and Maintenance, ER-SOP-019

Third Five-Year Remedy Review Report (U)
ABRP/MCB/MBP OU
Savannah River Site, December 2008

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Five-Year Review Site Inspection Checklist (Continued)

| | | | |
|--|--|--|--|
| 2. Site-Specific Health and Safety Plan <input type="checkbox"/> Readily available <input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A | | | |
| <input type="checkbox"/> Contingency plan/emergency response plan <input type="checkbox"/> Readily available <input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A | | | |
| Remarks: <u>Routine O&M activities do not require an SSHASP under 29 CFR 1910.120, HAZWOPER. An SSHASP is prepared in needed.</u> | | | |
| 3. O & M and OSHA Training Records <input checked="" type="checkbox"/> Readily available <input checked="" type="checkbox"/> Up to date <input type="checkbox"/> N/A | | | |
| Remarks: _____ | | | |
| 4. Permits and Service Agreements | | | |
| <input checked="" type="checkbox"/> Air discharge permit <input type="checkbox"/> Readily available <input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A | | | |
| <input type="checkbox"/> Effluent discharge <input type="checkbox"/> Readily available <input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A | | | |
| <input type="checkbox"/> Waste Disposal, POTW <input type="checkbox"/> Readily available <input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A | | | |
| <input type="checkbox"/> Other permits <input type="checkbox"/> Readily available <input type="checkbox"/> Up to date <input type="checkbox"/> N/A | | | |
| Remarks: _____ | | | |
| 5. Gas Generation Records <input type="checkbox"/> Readily available <input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A | | | |
| Remarks: _____ | | | |
| 6. Settlement Monument Records <input type="checkbox"/> Readily available <input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A | | | |
| Remarks: _____ | | | |
| 7. Groundwater Monitoring Records <input checked="" type="checkbox"/> Readily available <input checked="" type="checkbox"/> Up to date <input type="checkbox"/> N/A | | | |
| Remarks: _____ | | | |
| 8. Leachate Extraction Records <input type="checkbox"/> Readily available <input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A | | | |
| Remarks: _____ | | | |
| 9. Discharge Compliance Records | | | |
| <input checked="" type="checkbox"/> Air <input checked="" type="checkbox"/> Readily available <input checked="" type="checkbox"/> Up to date <input type="checkbox"/> N/A | | | |
| <input type="checkbox"/> Water (effluent) <input type="checkbox"/> Readily available <input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A | | | |
| Remarks: _____ | | | |
| 10. Daily Access/Security Logs <input checked="" type="checkbox"/> Readily available <input checked="" type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A | | | |
| Remarks: _____ | | | |

Five-Year Review Site Inspection Checklist (Continued)

IV. O & M Costs

1. O & M Organization

- ☐ State in-house ☐ Contractor for State
☐ PRP in-house ☐ Contractor for PRP
x Other: SRS

2. O & M Cost Records

- ☐ Readily available ☐ Up to date ☐ Funding mechanism/agreement in place
x Other: Project cost data is summarized in Section X of attached review: WSRC-RP-2007-4063

Total annual cost by year for review period if available

| | | | |
|------------|----------|------------|---|
| From _____ | To _____ | _____ | <input type="checkbox"/> Breakdown attached |
| (Date) | (Date) | Total cost | |
| From _____ | To _____ | _____ | <input type="checkbox"/> Breakdown attached |
| (Date) | (Date) | Total cost | |
| From _____ | To _____ | _____ | <input type="checkbox"/> Breakdown attached |
| (Date) | (Date) | Total cost | |
| From _____ | To _____ | _____ | <input type="checkbox"/> Breakdown attached |
| (Date) | (Date) | Total cost | |
| From _____ | To _____ | _____ | <input type="checkbox"/> Breakdown attached |
| (Date) | (Date) | Total cost | |

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

Describe costs and reasons: _____

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

A. Fencing

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

Remarks _____

Five-Year Review Site Inspection Checklist (Continued)

| | | | | |
|--|---------------------------------|--|--|---|
| B. Other Access Restrictions | | | | |
| 1. Signs and Other Security Measures <input type="checkbox"/> Location shown on site map <input type="checkbox"/> N/A | | | | |
| Remarks: <u>Signs at this site are in good condition.</u> | | | | |
| C. Institutional Controls | | | | |
| 1. Implementation and enforcement | | | | |
| Site conditions imply ICs not properly implemented: | | <input type="checkbox"/> Yes | <input checked="" type="checkbox"/> No | <input type="checkbox"/> N/A |
| Site conditions imply ICs not being fully enforced: | | <input type="checkbox"/> Yes | <input checked="" type="checkbox"/> No | <input type="checkbox"/> N/A |
| Type of monitoring (e.g., self-reporting, drive-by): | | Walk Down | | |
| Frequency: | Semi-Annually | | | |
| Responsible party/agent: | DOE Savannah River Field Office | | | |
| Contact: | Karen Adams, (Name) | Waste Area Group Manager (Title) | 9/3/07 (Date) | 803-952-7871 (Phone No.) |
| Report is up-to-date: | | <input checked="" type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="checkbox"/> N/A |
| Reports are verified by the lead agency: | | <input checked="" type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="checkbox"/> N/A |
| Specific requirements in deed of decision documents have been met: | | <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input checked="" type="checkbox"/> N/A |
| Violations have been reported: | | <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input checked="" type="checkbox"/> N/A |
| Other problems or suggestions: | | <input type="checkbox"/> Report attached | | |
| <u>Construction of the ash pile soil cover and additional SVE wells has not been completed yet.</u> | | | | |
| 2. Adequacy <input checked="" type="checkbox"/> ICs are adequate <input type="checkbox"/> ICs are inadequate <input type="checkbox"/> N/A | | | | |
| Remarks: <u>ICs will be finalized after construction is complete.</u> | | | | |
| D. General | | | | |
| 1. Vandalism/trespassing <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> No vandalism evident | | | | |
| Remarks: _____ | | | | |
| 2. Land use changes onsite <input checked="" type="checkbox"/> N/A | | | | |
| Remarks: _____ | | | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | | |
|--|--|--|--|
| 3. Land use Changes Offsite <input checked="" type="checkbox"/> N/A | | | |
| Remarks _____ | | | |
| VI. GENERAL SITE CONDITIONS | | | |
| A. Roads <input checked="" type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A | | | |
| 1. Roads Damaged <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Roads adequate <input type="checkbox"/> N/A | | | |
| Remarks _____ | | | |
| B. Other Site Conditions | | | |
| Remarks _____ | | | |
| VII. COVER SYSTEMS <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A | | | |
| A. Soil Surface | | | |
| 1. Settlement (Low spots) <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Settlement not evident | | | |
| Areal extent _____ Depth _____ | | | |
| Remarks: <u>Soil cover at 731-2A is complete and in good condition. The ash pile soil cover has not been installed yet.</u> | | | |
| 2. Cracks <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Cracking not evident | | | |
| Lengths _____ Widths _____ Depths _____ | | | |
| Remarks _____ | | | |
| 3. Erosion <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Erosion not evident | | | |
| Areal extent _____ Depth _____ | | | |
| Remarks _____ | | | |
| 4. Holes <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Holes not evident | | | |
| Areal extent _____ Depth _____ | | | |
| Remarks _____ | | | |
| 5. Vegetative Cover <input type="checkbox"/> Grass <input type="checkbox"/> Cover properly established <input type="checkbox"/> No signs of stress | | | |
| <input type="checkbox"/> Trees/shrubs (indicate size and location on a diagram) | | | |
| Remarks: <u>Grass is established but dry due to lack of rain.</u> | | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | |
|--|---|--------------------|
| 6. Alternative Cover (armored rock, concrete, etc.) x N/A | | |
| Remarks: _____ _____ | | |
| 7. Bulges <input type="checkbox"/> Location shown on site map x Bulges not evident | | |
| Areal extent _____ Height _____ | | |
| Remarks _____ _____ | | |
| 8. Wet Areas/Water Damage x Wet areas/water damage not evident | | |
| <input type="checkbox"/> Wet Areas | <input type="checkbox"/> Location shown on site map | Areal extent _____ |
| <input type="checkbox"/> Ponding | <input type="checkbox"/> Location shown on site map | Areal extent _____ |
| <input type="checkbox"/> Seeps | <input type="checkbox"/> Location shown on site map | Areal extent _____ |
| <input type="checkbox"/> Soft subgrade | <input type="checkbox"/> Location shown on site map | Areal extent _____ |
| Remarks _____ _____ | | |
| 9. Slope Instability <input type="checkbox"/> Slides <input type="checkbox"/> Location shown on site map x No evidence of slope instability | | |
| Areal extent _____ | | |
| Remarks _____ _____ | | |
| B. Benches <input type="checkbox"/> Applicable x 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 <input type="checkbox"/> Location shown on site map <input type="checkbox"/> N/A or okay | | |
| Remarks _____ _____ | | |
| 2. Bench Breached <input type="checkbox"/> Location shown on site map <input type="checkbox"/> N/A or okay | | |
| Remarks _____ _____ | | |
| 3. Bench Overtopped <input type="checkbox"/> Location shown on site map <input type="checkbox"/> N/A or okay | | |
| Remarks _____ _____ | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | |
|---|--|--|
| C. Letdown Channels <input type="checkbox"/> Applicable x 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 | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> No evidence of settlement |
| Areal extent _____ Depth _____ | | |
| Remarks _____ | | |
| 2. Material Degradation | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> No evidence of degradation |
| Material type _____ Areal extent _____ | | |
| Remarks _____ | | |
| 3. Erosion | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> No evidence of erosion |
| Areal extent _____ Depth _____ | | |
| Remarks _____ | | |
| 4. Undercutting | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> No evidence of undercutting |
| Areal extent _____ Depth _____ | | |
| Remarks _____ | | |
| 5. Obstructions | Type _____ | <input type="checkbox"/> No obstructions |
| <input type="checkbox"/> Location shown on site map | Areal extent _____ | Size _____ |
| Remarks _____ | | |
| 6. Excessive Vegetative Growth | Type _____ | |
| <input type="checkbox"/> No evidence of excessive growth | <input type="checkbox"/> Vegetation in channels does not obstruct flow | |
| <input type="checkbox"/> Location shown on site map | Areal extent _____ | |
| Remarks _____ | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | | |
|--|--|--|--|
| D. Cover Penetrations <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A | | | |
| 1. Gas Vents <input type="checkbox"/> Active <input checked="" type="checkbox"/> Passive | | | |
| <input checked="" type="checkbox"/> Properly secured/locked <input checked="" type="checkbox"/> Functioning <input checked="" type="checkbox"/> Routinely sampled <input checked="" type="checkbox"/> Good condition | | | |
| <input type="checkbox"/> Evidence of leakage at penetration <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A | | | |
| Remarks _____ | | | |
| 2. Gas Monitoring Probes | | | |
| <input type="checkbox"/> Properly secured/locked <input type="checkbox"/> Functioning <input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition | | | |
| <input type="checkbox"/> Evidence of leakage at penetration <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A | | | |
| Remarks _____ | | | |
| 3. Monitoring Wells | | | |
| <input checked="" type="checkbox"/> Properly secured/locked <input checked="" type="checkbox"/> Functioning <input checked="" type="checkbox"/> Routinely sampled <input checked="" type="checkbox"/> Good condition | | | |
| <input type="checkbox"/> Evidence of leakage at penetration <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A | | | |
| Remarks _____ | | | |
| 4. Leachate Extraction Wells | | | |
| <input type="checkbox"/> Properly secured/locked <input type="checkbox"/> Functioning <input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition | | | |
| <input type="checkbox"/> Evidence of leakage at penetration <input type="checkbox"/> Needs Maintenance <input checked="" type="checkbox"/> N/A | | | |
| Remarks _____ | | | |
| 5. Settlement Monuments <input type="checkbox"/> Located <input type="checkbox"/> Routinely surveyed <input type="checkbox"/> N/A | | | |
| Remarks _____ | | | |
| E. Gas Collection and Treatment <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A | | | |
| 1. Gas Treatment Facilities | | | |
| <input type="checkbox"/> Flaring <input type="checkbox"/> Thermal destruction <input type="checkbox"/> Collection for reuse | | | |
| <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance | | | |
| Remarks _____ | | | |
| 2. Gas Collection Wells, Manifolds and Piping | | | |
| <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance | | | |
| Remarks _____ | | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | |
|--|--|--|
| 3. Gas Monitoring Facilities (e.g., gas monitoring of adjacent homes or buildings) <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A Remarks _____ _____ | | |
| F. Cover Drainage Layer <input type="checkbox"/> Applicable x N/A | | |
| 1. Outlet Pipes Inspected <input type="checkbox"/> Functioning <input type="checkbox"/> N/A Remarks _____ _____ | | |
| 2. Outlet Rock Inspected <input type="checkbox"/> Functioning <input type="checkbox"/> N/A Remarks _____ _____ | | |
| G. Detention/sedimentation Ponds <input type="checkbox"/> Applicable x N/A | | |
| 1. Siltation Areal extent _____ Depth _____ <input type="checkbox"/> N/A <input type="checkbox"/> Siltation not evident Remarks _____ _____ | | |
| 2. Erosion Areal extent _____ Depth _____ <input type="checkbox"/> N/A <input type="checkbox"/> Erosion not evident Remarks _____ _____ | | |
| 3. Outlet Works <input type="checkbox"/> Functioning <input type="checkbox"/> N/A Remarks _____ _____ | | |
| 4. Dam <input type="checkbox"/> Functioning <input type="checkbox"/> N/A Remarks _____ _____ | | |
| H. Retaining Walls <input type="checkbox"/> Applicable x N/A | | |
| 1. Deformations <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Deformation not evident Horizontal displacement _____ Vertical displacement _____ Rotational displacement _____ Remarks _____ _____ | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | |
|---|--|--|
| 2. Degradation <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Deformation not evident | | |
| Remarks _____ | | |
| I. Perimeter Ditches/Off-Site Discharge <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A | | |
| 1. Siltation <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Siltation not evident | | |
| Areal extent _____ Depth _____ | | |
| Remarks _____ | | |
| 2. Vegetative Growth <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Siltation not evident | | |
| <input checked="" type="checkbox"/> Vegetation does not impede flow | | |
| Areal extent _____ Type _____ | | |
| Remarks _____ | | |
| 3. Erosion <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Erosion not evident | | |
| Areal extent _____ Depth _____ | | |
| Remarks _____ | | |
| 4. Discharge Structure <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> N/A | | |
| Remarks _____ | | |
| VIII. VERTICAL BARRIER WALLS <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A | | |
| 1. Settlement <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Settlement not evident | | |
| Areal extent _____ Depth _____ | | |
| Remarks _____ | | |
| 2. Performance Monitoring Type of Monitoring _____ <input type="checkbox"/> Performance not monitored | | |
| Frequency _____ <input type="checkbox"/> Evidence of breaching Head differential _____ | | |
| Remarks _____ | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | | |
|--|--|-------------------------------------|---|
| IX. GROUNDWATER/SURFACE WATER REMEDIES | | <input type="checkbox"/> Applicable | <input checked="" type="checkbox"/> N/A |
| A. Groundwater Extraction Wells, Pumps, and Pipelines | | <input type="checkbox"/> Applicable | <input type="checkbox"/> N/A |
| 1. Pumps, Wellhead Plumbing, and Electrical | | | |
| <input type="checkbox"/> Good condition <input type="checkbox"/> All required wells located <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A | | | |
| Remarks _____ _____ | | | |
| 2. Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances | | | |
| <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance | | | |
| Remarks _____ _____ | | | |
| 3. Spare Parts and Equipment | | | |
| <input type="checkbox"/> Readily available <input type="checkbox"/> Good condition <input type="checkbox"/> Requires upgrade <input type="checkbox"/> Needs to be provided | | | |
| Remarks _____ _____ | | | |
| B. Surface Water Collection Structures, Pumps, and Pipelines | | <input type="checkbox"/> Applicable | <input type="checkbox"/> N/A |
| 1. Collection Structures, Pumps, and Electrical | | | |
| <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance | | | |
| Remarks _____ _____ | | | |
| 2. Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances | | | |
| <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance | | | |
| Remarks _____ _____ | | | |
| 3. Spare Parts and Equipment | | | |
| <input type="checkbox"/> Readily available <input type="checkbox"/> Good condition <input type="checkbox"/> Requires upgrade <input type="checkbox"/> Needs to be provided | | | |
| Remarks _____ _____ | | | |

Five-Year Review Site Inspection Checklist (Continued)

| C. Treatment System | € Applicable | x N/A |
|--|--|--|
| 1. Treatment Train (Check components that apply) | | |
| <input type="checkbox"/> Metals removal | <input type="checkbox"/> Oil/water separation | <input type="checkbox"/> Bioremediation |
| <input type="checkbox"/> Air stripping | <input type="checkbox"/> Carbon adsorbers | |
| <input type="checkbox"/> Filters | | |
| <input type="checkbox"/> Additive (e.g., chelation agent, flocculent) | | |
| <input type="checkbox"/> Others | | |
| <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance | |
| <input type="checkbox"/> Sampling ports properly marked and functional | | |
| <input type="checkbox"/> Sampling/maintenance log displayed and up to date | | |
| <input type="checkbox"/> Equipment properly identified | | |
| <input type="checkbox"/> Quantity of groundwater treated annually | | |
| <input type="checkbox"/> Quantity of surface water treated annually | | |
| Remarks | | |
| 2. Electrical Enclosures and Panels (properly rated and functional) | | |
| <input type="checkbox"/> N/A | <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance |
| Remarks | | |
| 3. Tanks, Vaults, Storage Vessels | | |
| <input type="checkbox"/> N/A | <input type="checkbox"/> Good condition | <input type="checkbox"/> Proper secondary containment <input type="checkbox"/> Needs Maintenance |
| Remarks | | |
| 4. Discharge Structure and Appurtenances | | |
| <input type="checkbox"/> N/A | <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance |
| Remarks | | |
| 5. Treatment Building(s) | | |
| <input type="checkbox"/> N/A | <input type="checkbox"/> Good condition (esp. roof and doorways) | <input type="checkbox"/> Needs repair |
| <input type="checkbox"/> Chemicals and equipment properly stored | | |
| Remarks | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | | |
|--|--|--|---|
| 6. Monitoring Wells (pump and treatment remedy) | | | |
| <input type="checkbox"/> Properly secured/locked | <input type="checkbox"/> Functioning | <input type="checkbox"/> Routinely sampled | <input type="checkbox"/> Good condition |
| <input type="checkbox"/> All required wells located | <input type="checkbox"/> Needs Maintenance | <input type="checkbox"/> N/A | |
| Remarks _____ | | | |
| _____ | | | |
| D. Monitoring Data | | | |
| 1. Monitoring Data | | | |
| x Is routinely submitted on time | | x Is of acceptable quality | |
| 2 Monitoring Data Suggests: | | | |
| <input type="checkbox"/> Groundwater plume is effectively contained | | x Contaminant concentrations are declining | |
| E. Monitored Natural Attenuation <input type="checkbox"/> Applicable <input type="checkbox"/> N/A | | | |
| 1. Monitoring Wells (Natural attenuation remedy) | | | |
| <input type="checkbox"/> Properly secured/locked | <input type="checkbox"/> Functioning | <input type="checkbox"/> Routinely sampled | <input type="checkbox"/> Good condition |
| <input type="checkbox"/> All required wells located | <input type="checkbox"/> Needs Maintenance | x 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. | | | |
| A. Soil Vapor Extraction Systems x Applicable <input type="checkbox"/> N/A | | | |
| 1. Blowers, Wellhead Plumbing, and Electrical | | | |
| x Good condition | x All required wells located | <input type="checkbox"/> Needs Maintenance | <input type="checkbox"/> NA |
| Remarks: <u>Passive SVE systems are in service</u> | | | |
| _____ | | | |
| 2. Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances | | | |
| <input type="checkbox"/> Good condition | | <input type="checkbox"/> Needs Maintenance | |
| Remarks _____ | | | |
| _____ | | | |
| 3. Spare Parts and Equipment | | | |
| x Readily available | x Good condition | <input type="checkbox"/> Requires upgrade | <input type="checkbox"/> Needs to be provided |
| Remarks _____ | | | |
| _____ | | | |

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.).

Interim SVE has proven effective in removing residual VOCs. Annual Performance Evaluation Reports have been prepared, and these detail the contaminant mass removed as well as the condition of the underlying groundwater plume. Characterization activities have adequately identified the type and extent of contamination requiring action. The actions identified in the ROD are expected to be effective in addressing the RAOs.

The removal of contaminated soils at the MBP and the MCB has been completed and meets the RGs. When complete, the A-Area Ash Pile soil cover and the expanded SVE system are expected to be protective of human health and the environment.

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.

Operating and Maintenance programs are well established and functioning to ensure that remedial systems remain in effective service.

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.

N/A

A-AREA MISCELLANEOUS RUBBLE PILE (731-6A) OPERABLE UNIT

I. Introduction

The remedy was chosen in accordance with Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended by the Superfund Amendments Reauthorization Act (SARA); and, to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). This is the first five-year review for the A-Area Miscellaneous Rubble Pile (ARP) (731-6A) Operable Unit (OU). This review was conducted from August 2007 through September 2007. This report documents the results of the review.

II. OU Chronology

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

Table 1. Chronology of OU Events

| Event | Date |
|-----------------------------------|-------------------|
| RFI/RI Field Start | November 10, 1997 |
| CMS/FS Rev.0 Submittal | March 26, 2001 |
| Record of Decision (ROD) issuance | July 21, 2003 |
| Remedial Action Start | September 8, 2003 |
| Previous Five-Year Reviews | None |

III. Background

Physical Characteristics

As shown on Figure 1, the ARP OU is located in the northwest part of the SRS within A Area and immediately east of M Area. The unit covers approximately 5.8 acres and is bounded on the southwest and southeast by outfall drainages that coalesce on the south side of the unit (Figure 2).



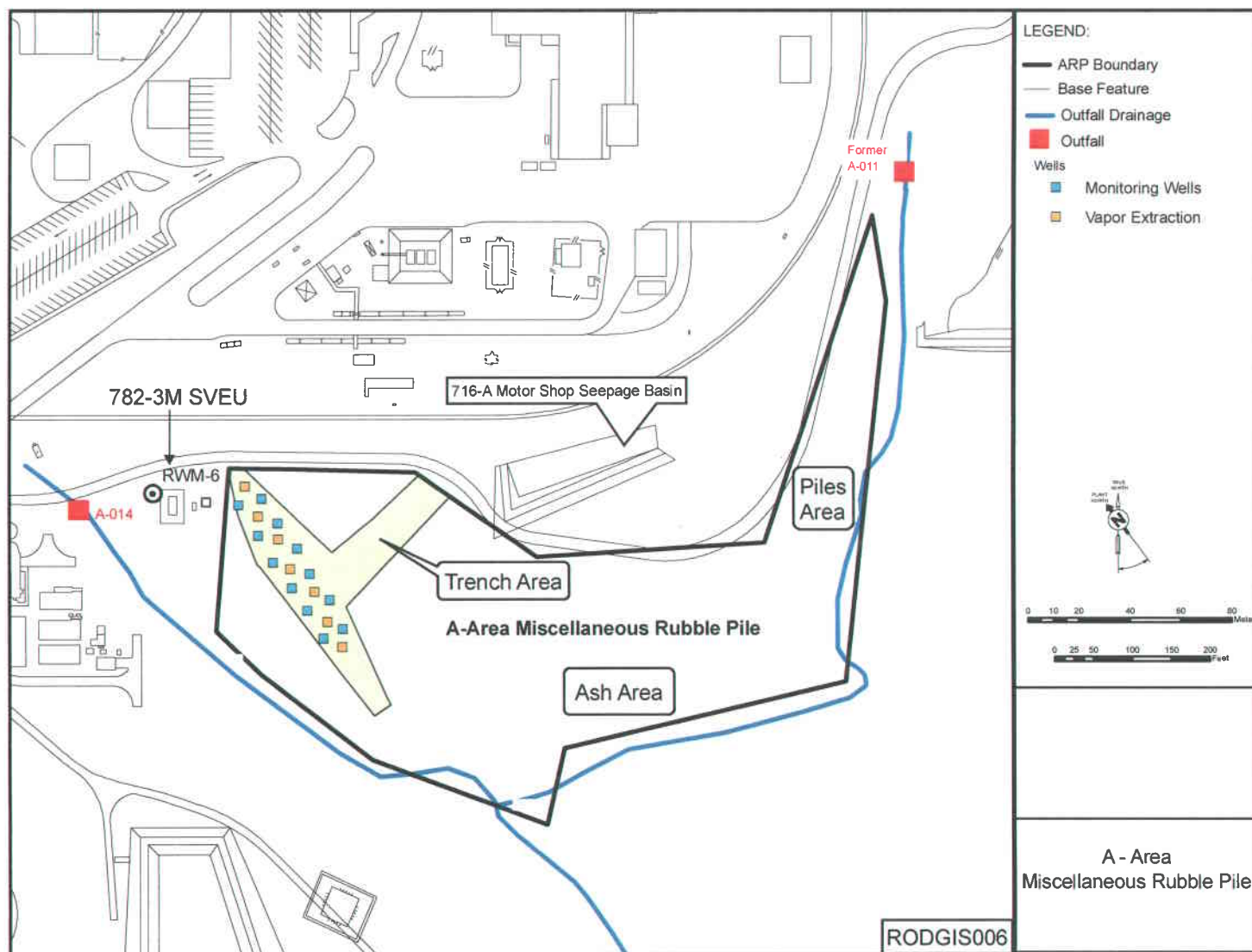


Figure 2. ARP Operable Unit (731-6A)

Land Use Resource Use

The future land use for ARP is anticipated to be industrial.

History of Contamination

The ARP OU has been divided into three subunits: the Piles Area, the Ash Area, and the Trenches Area. The Piles Area (approximately 2.3 acres) contained many small mounds (2 to 5 ft high) of construction debris that were disposed of directly on the ground surface. The Ash Area (approximately 1.8 acres) contained buried construction debris and an ash layer of approximately 4 ft. The Trenches Area (approximately 1.6 acres) contained construction debris and an 8 to 12 ft deep T-shaped trench. Figure 2 shows the locations of these subunits. Additional details on the history of the waste unit can be found in the Record of Decision (ROD) (WSRC 2003a).

Initial Response

The results of the soil and groundwater investigation indicate that the contaminated soil has not contributed to groundwater contamination adjacent to or beneath the ARP OU. Groundwater beneath this unit has been impacted by SRS operations not associated with this unit. The groundwater contamination is being addressed under the RCRA corrective action program for A/M Area.

IV. Remedial Actions

Remedy Selection and Remedy Implementation

The ROD for this OU was issued on August 7, 2003. The ROD addressed remedial actions at each of the three subunits.

Piles Area

Based on the human-health risks posed by contaminants in the soil in the Piles Area, the remedial action objectives (RAOs) for the Piles Area are as follows:

- Protect the future industrial worker from exposure to arsenic and lead in the lead hot spot above their respective remedial goals (RGs) of 4.4 mg/kg and 400 mg/kg.
- Protect the future industrial worker from exposure to aroclor-1254 (a polychlorinated biphenyl [PCB]) and benzo(a)pyrene (a polyaromatic hydrocarbon [PAH]) in the PCB/PAH waste pile above their respective RGs of 1 mg/kg and 0.256 mg/kg.

The remedial action chosen for this subunit is removal and disposal because it removes all unacceptable risk (principal threat source material [PTSM]) from the two very small-localized hot spots. The lead hot spot and PCB/PAH waste pile and underlying soil were excavated and transported from SRS to a permitted offsite disposal facility. This action was completed by February 17, 2004.

Ash Area

Based on the human-health risks posed by contaminants in the soil in the Ash Area, the RAO for the Ash Area is the following:

- Protect the future industrial worker from exposure to elevated levels of arsenic in the surface soil above the RG of 4.4 mg/kg.

The remedial action chosen for the Ash Area is Institutional Controls, which achieves the RAO to protect future industrial workers from exposure to elevated levels of arsenic above the RG of 4.4 mg/kg by restricting their access and activities. The alternative also prohibits future residential land use and is effective for as long as the controls are enforced. Institutional Controls for the ARP OU have been established as detailed in the *Land Use Control Implementation Plan for the A-Area Miscellaneous Rubble Pile (731-6A) Operable Unit*, Appendix A of the CMI/RAIP (WSRC 2002).

Trenches Area

Based on the human health risks posed by contaminants in the soil in the Trenches Area, the RAOs for the Trenches Area are as follows:

- Protect the future industrial worker from exposure to arsenic and PAHs in the soil above their respective RGs.
- Prevent leaching of trichloroethylene (TCE) and tetrachloroethylene (PCE) to groundwater above their respective maximum contaminant levels (MCLs) (5 µg/L).

The remedial action chosen for the Trenches Area is active soil vapor extraction (ASVE), Institutional Controls, and 1-ft soil cover. ASVE will permanently remove TCE and PCE from the soil, thus achieving the RAO to protect the groundwater from leaching of these contaminants above their respective MCLs (5 µg/L). The 1-ft soil cover and Institutional Controls achieve the RAO to protect remedial workers and future industrial workers from unacceptable exposure to arsenic and PAHs (benzo(a)pyrene) in the surface soil.

A minimum of 0.30 m (1 ft) of clean common fill material was placed over the Trenches Area in November 2003.

Operations and Maintenance

Seven soil vapor extraction (SVE) wells were installed and connected to the existing 782-3M SVEU located between the subunit and the A-014 Outfall. ASVE began on April 19, 2004.

V. Progress Since Last Review

This is the first five-year review for this OU. The following actions have been completed:

- The SVE wells remain in service
- Annual Performance Evaluation Reports have been submitted to document remedial performance.
- Institutional controls have been maintained.

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
- Ensured that all actions required under the CERCLA ROD were implemented

VII. Technical Assessment

The removal and disposal actions at the Piles Area are complete and the institutional controls for the Ash Area have been implemented. These actions are protective of human health and the environment. In the Trenches Area, the ASVE system is functioning as designed. The extraction well network continues to remove contaminant mass from the subsurface although mass removal rates have dropped significantly. It is likely that the system will be evaluated for pulsed operation or passive operation of the SVE wells using rebound testing sometime within the next five years. The subunits are being maintained according to the approved Land Use Control Implementation Plan (LUCIP) to ensure the effectiveness of the remedial actions.

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. Project Costs

Costs associated with the selected remedy for AMRP include operation and maintenance costs of the soil cover, soil vapor extraction, and institutional controls. The estimated operation and maintenance cost associated with the selected remedy is \$580,000. This is

a present worth cost, including 30 years of maintenance activities based on a 7% discount rate. After characterization and effectiveness of the remedy were evaluated, the actual operation and maintenance cost for the AMRP was assessed. The total actual operation and maintenance cost from project support and other post construction expense to fiscal year 2006 is \$75,835.

XI. Protectiveness Statement(s)

The removal actions at the Piles Area have met the RGs and are protective of human health and the environment. The SVE system is functioning as designed and is expected to be protective of human health and the environment when RGs are met. Annual Performance Evaluation Reports provide performance and process monitoring data that demonstrates system performance and indicate the contaminant mass removed. Soil exposure pathways that could result in unacceptable risks are being controlled through maintenance of a cover in the Trenches Area and through institutional controls established in the LUCIP for the Ash Area. 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).

XII. Next Review

The next five-year review is scheduled for February 12, 2014.

ATTACHMENT 1

List of Documents Reviewed

SGCP-SRD-2004-00011, *Sampling and Analysis Plan for Operations Vapor Monitoring at the A-Area Miscellaneous Rubble Pile (ARP) Operable Unit (OU) (731-6A)*, 2004, Revision 0, February 2004, Westinghouse Savannah River Company LLC, Savannah River Site, Aiken, SC

WSRC-RP-96-835, *Resource Conservation and Recovery Act (RCRA) Facility Investigation/Remedial Investigation Report Workplan Addendum for the A-Area Miscellaneous Rubble Pile (731-6A) (U)*, Revision 1.2, 1998, Westinghouse Savannah River Company, Savannah River Site, Aiken SC

WSRC-RP-99-4191, *Corrective Measures Study/Feasibility Study for the A-Area Miscellaneous Rubble Pile (731-6A)*, Revision 0, September 2000, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

WSRC-RP-2001-4197, *Record of Decision for the A-Area Miscellaneous Rubble Pile (731-6A) Operable Unit (U)*, Revision 1.3, April 2003, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

WSRC-RP-2002-4067, *Corrective Measures Implementation/Remedial Action Implementation Plan (CMI/RAIP) for the A-Area Miscellaneous Rubble Pile (731-6A) Operable Unit (U)*, Revision 1, 2003, Westinghouse Savannah River Company LLC, Savannah River Site, Aiken, SC

WSRC-RP-2004-4088, *Post-Construction Report (PCR) for the A-Area Miscellaneous Rubble Pile (731-6A) Operable Unit (U)*, Revision 1, November 2004, Westinghouse Savannah River Company LLC, Savannah River Site, Aiken, SC

WSRC-RP-2005-4049, *Performance Evaluation Report for the A-Area Miscellaneous Rubble Pile (731-6A) Operable Unit: April 2004 to April 2005 (U)*, Revision 0, July 2005, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

ATTACHMENT 1 (Continued)

List of Documents Reviewed

WSRC-RP-2006-4040, *Performance Evaluation Report for the A-Area Miscellaneous Rubble Pile (731-6A) Operable Unit: April 2005 to April 2006 (U)*, Revision 0, July 2006, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

WSRC-RP-2007-4046, *Performance Evaluation Report for the A-Area Miscellaneous Rubble Pile (731-6A) Operable Unit: April 2006 through April 2007 (U)*, Revision 0, July 2007, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

WSRC-TR-2002-00180, *Pre-Design Study for VOC Remediation at the A-Area Miscellaneous Rubble Pile Trenches Area*, Revision 0, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

WSRC-TR-2004-00195, *Initial SVE Well Testing for the A-Area Miscellaneous Rubble Pile (ARP) Trenches Area*, Revision 0, 2004, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

A-Area Miscellaneous Rubble Pile 731-6A Subsidence Monitor Survey Logs

WSRC-C1, ER-IDS-019-029, Soil and Groundwater Closure Projects, Standard Operating Procedures, Field Inspection Checklist A-Area Miscellaneous Rubble Pile Operable Unit (731-6A) (U), Rev. 0 – 1, Washington Savannah River Company, Savannah River Site, Aiken, SC

ATTACHMENT 2

Five-Year Review Site Inspection Checklist

| I. SITE INFORMATION | | | |
|--|--|--|--|
| Site Name: | A Area Miscellaneous Rubble Pile | Date of Inspection: | 10/24/2007 |
| Location and Region: | SRS, USEPA Region IV | EPA ID: | SC1890008989 |
| Agency, office, or company leading the five-year review: | USDOE | CERCLIS No.: | 48 |
| | | Weather/Temperature: | |
| Remedy Includes: (Check all that apply) <div style="display: flex; flex-wrap: wrap;"><div style="width: 50%;"><input checked="" type="checkbox"/> Cover system <input checked="" type="checkbox"/> Access controls <input checked="" type="checkbox"/> Institutional Controls <input type="checkbox"/> Groundwater pump and treatment <input type="checkbox"/> Surface water collection and treatment <input type="checkbox"/> Other: <u>Excavation, disposal, soil vapor extraction</u></div><div style="width: 50%;"><input type="checkbox"/> Monitored Natural Attenuation <input type="checkbox"/> Groundwater Containment <input type="checkbox"/> Vertical Barrier Walls</div></div> | | | |
| Attachments: <input type="checkbox"/> Inspection team roster attached <input type="checkbox"/> Site map attached | | | |
| II. INTERVIEWS (Check all that apply) | | | |
| 1. O & M Site Manager | <u>Wayne Gleaton</u> (Name) | <u>Post Closure Manager</u> (Title) | <u>10-23-2007</u> (Date) |
| Interviewed: | <input type="checkbox"/> at site | <input type="checkbox"/> at office | <input checked="" type="checkbox"/> by phone Phone No. <u>803-557-8838</u> |
| Problems, suggestions: | <input type="checkbox"/> report attached _____ | | |
| 2. O & M Staff | <u>Richard Feagin</u> (Name) | <u>Post-Closure Waste Site Inspector/Maintenance Coord.</u> (Title) | <u>8-23-2007</u> (Date) |
| Interviewed: | <input type="checkbox"/> at site | <input type="checkbox"/> at office | <input checked="" type="checkbox"/> by phone Phone No. <u>803-952-4416</u> |
| Problems, suggestions: | <input type="checkbox"/> report attached _____ | | |

Five-Year Review Site Inspection Checklist (Continued)

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**

| | | | |
|---|--|-------------------------------------|------------------------------|
| <input type="checkbox"/> O & M Manual | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |
| x As-built drawings | x Readily available | x Up to date | <input type="checkbox"/> N/A |
| <input type="checkbox"/> Maintenance Logs | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |

Remarks: See Waste Unit Inspection and Maintenance, ER-SOP-019

Five-Year Review Site Inspection Checklist (Continued)

| | | | |
|--|---|--|---|
| 2. Site-Specific Health and Safety Plan | | | |
| <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A | |
| <input type="checkbox"/> Contingency plan/emergency response plan <input type="checkbox"/> Readily available <input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A | | | |
| Remarks: <u>Routine O&M activities do not require an SSHASP under 29 CFR 1910.120, HAZWOPER. An SSHASP is prepared if needed.</u> | | | |
| 3. O & M and OSHA Training Records | | | |
| <input checked="" type="checkbox"/> Readily available | <input checked="" type="checkbox"/> Up to date | <input type="checkbox"/> N/A | |
| Remarks: _____ | | | |
| 4. Permits and Service Agreements | | | |
| <input checked="" type="checkbox"/> Air discharge permit | <input checked="" type="checkbox"/> Readily available | <input checked="" type="checkbox"/> Up to date | <input type="checkbox"/> N/A |
| <input type="checkbox"/> Effluent discharge | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A |
| <input type="checkbox"/> Waste Disposal, POTW | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A |
| <input type="checkbox"/> Other permits | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A |
| Remarks: _____ | | | |
| 5. Gas Generation Records | | | |
| <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A | |
| Remarks: _____ | | | |
| 6. Settlement Monument Records | | | |
| <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A | |
| Remarks: _____ | | | |
| 7. Groundwater Monitoring Records | | | |
| <input checked="" type="checkbox"/> Readily available | <input checked="" type="checkbox"/> Up to date | <input type="checkbox"/> N/A | |
| Remarks: _____ | | | |
| 8. Leachate Extraction Records | | | |
| <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A | |
| Remarks: _____ | | | |
| 9. Discharge Compliance Records | | | |
| <input checked="" type="checkbox"/> Air | <input checked="" type="checkbox"/> Readily available | <input checked="" type="checkbox"/> Up to date | <input type="checkbox"/> N/A |
| <input type="checkbox"/> Water (effluent) | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A |
| Remarks: _____ | | | |
| 10. Daily Access/Security Logs | | | |
| <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A | |
| Remarks: _____ | | | |

Five-Year Review Site Inspection Checklist (Continued)

| IV. O & M Costs | | | |
|--|--------------------|------------------|---|
| 1. O & M Organization <div style="display: flex; justify-content: space-between;"><div><input type="checkbox"/> State in-house</div><div><input type="checkbox"/> Contractor for State</div></div> <div style="display: flex; justify-content: space-between;"><div><input type="checkbox"/> PRP in-house</div><div><input type="checkbox"/> Contractor for PRP</div></div> <div><input checked="" type="checkbox"/> Other: <u>SRS</u></div> | | | |
| 2. O & M Cost Records <div style="display: flex; justify-content: space-between;"><div><input type="checkbox"/> Readily available</div><div><input type="checkbox"/> Up to date</div><div><input type="checkbox"/> Funding mechanism/agreement in place</div></div> <div><input checked="" type="checkbox"/> Other: <u>Project cost data is summarized in Section X of attached review: WSRC-RP-2007-4063</u></div> | | | |
| Total annual cost by year for review period if available | | | |
| From _____ (Date) | To _____ (Date) | Total cost _____ | <input type="checkbox"/> Breakdown attached |
| From _____ (Date) | To _____ (Date) | Total cost _____ | <input type="checkbox"/> Breakdown attached |
| From _____ (Date) | To _____ (Date) | Total cost _____ | <input type="checkbox"/> Breakdown attached |
| From _____ (Date) | To _____ (Date) | Total cost _____ | <input type="checkbox"/> Breakdown attached |
| From _____ (Date) | To _____ (Date) | Total cost _____ | <input type="checkbox"/> Breakdown attached |
| 3. Unanticipated or Unusually High O & M Costs During Review Period Describe costs and reasons: _____ _____ _____ _____ | | | |
| V. ACCESS AND INSTITUTIONAL CONTROLS <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A | | | |
| A. Fencing | | | |
| 1. Fencing Damaged <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Gates secured <input checked="" type="checkbox"/> N/A Remarks _____ _____ | | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | | | |
|--|---------------------------------|---|--|---|
| B. Other Access Restrictions | | | | |
| 1. Signs and Other Security Measures | | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> N/A | |
| Remarks: <u>Signs are in good condition.</u> | | | | |
| C. Institutional Controls | | | | |
| 1. Implementation and enforcement | | | | |
| Site conditions imply ICs not properly implemented: | | <input type="checkbox"/> Yes | <input checked="" type="checkbox"/> No | <input type="checkbox"/> N/A |
| Site conditions imply ICs not being fully enforced: | | <input type="checkbox"/> Yes | <input checked="" type="checkbox"/> No | <input type="checkbox"/> N/A |
| Type of monitoring (e.g., self-reporting, drive-by): | | Walk Down | | |
| Frequency: | Semi-Annual | | | |
| Responsible party/agent: | DOE Savannah River Field Office | | | |
| Contact: | Karen Adams | Waste Area Group Manager | 9/3/07 | 803-952-7871 |
| | (Name) | (Title) | (Date) | (Phone No.) |
| Reporting is up-to-date: | | <input checked="" type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="checkbox"/> N/A |
| Reports are verified by the lead agency: | | <input checked="" type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="checkbox"/> N/A |
| Specific requirements in deed of decision documents have been met: | | <input checked="" type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="checkbox"/> N/A |
| Violations have been reported: | | <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input checked="" type="checkbox"/> N/A |
| Other problems or suggestions: | | <input type="checkbox"/> Report attached | | |
| _____ | | | | |
| 2. Adequacy | | | | |
| <input checked="" type="checkbox"/> ICs are adequate | | <input type="checkbox"/> ICs are inadequate | | <input type="checkbox"/> N/A |
| Remarks: _____ | | | | |
| _____ | | | | |
| D. General | | | | |
| 1. Vandalism/trespassing | | <input type="checkbox"/> Location shown on site map | <input checked="" type="checkbox"/> No vandalism evident | |
| Remarks: _____ | | | | |
| _____ | | | | |
| 2. Land use changes onsite | | <input checked="" type="checkbox"/> N/A | | |
| Remarks: _____ | | | | |
| _____ | | | | |

Five-Year Review Site Inspection Checklist (Continued)

| | |
|--|--------------|
| 3. Land use Changes Offsite <input checked="" type="checkbox"/> N/A | |
| Remarks _____ | |
| _____ | |
| VI. GENERAL SITE CONDITIONS | |
| A. Roads <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A | |
| 1. Roads Damaged <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Roads adequate <input type="checkbox"/> N/A | |
| Remarks _____ | |
| _____ | |
| B. Other Site Conditions | |
| Remarks _____ | |
| _____ | |
| _____ | |
| VII. COVER SYSTEMS <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A | |
| A. Landfill Surface | |
| 1. Settlement (Low spots) <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Settlement not evident | |
| Areal extent _____ | Depth _____ |
| Remarks: _____ | |
| _____ | |
| 2. Cracks <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Cracking not evident | |
| Lengths _____ | Widths _____ |
| Depths _____ | |
| Remarks _____ | |
| _____ | |
| 3. Erosion <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Erosion not evident | |
| Areal extent _____ | Depth _____ |
| Remarks _____ | |
| _____ | |
| 4. Holes <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Holes not evident | |
| Areal extent _____ | Depth _____ |
| Remarks _____ | |
| _____ | |
| 5. Vegetative Cover <input type="checkbox"/> Grass <input type="checkbox"/> Cover properly established <input type="checkbox"/> No signs of stress | |
| <input type="checkbox"/> Trees/shrubs (indicate size and location on a diagram) | |
| Remarks <u>Grass is established but dry due to lack of rain.</u> | |
| _____ | |

Five-Year Review Site Inspection Checklist (Continued)

| | | |
|--|---|--------------------|
| 6. Alternative Cover (armored rock, concrete, etc.) x N/A | | |
| Remarks: _____ _____ | | |
| 7. Bulges <input type="checkbox"/> Location shown on site map x Bulges not evident | | |
| Areal extent _____ Height _____ | | |
| Remarks _____ _____ | | |
| 8. Wet Areas/Water Damage x Wet areas/water damage not evident | | |
| <input type="checkbox"/> Wet Areas | <input type="checkbox"/> Location shown on site map | Areal extent _____ |
| <input type="checkbox"/> Ponding | <input type="checkbox"/> Location shown on site map | Areal extent _____ |
| <input type="checkbox"/> Seeps | <input type="checkbox"/> Location shown on site map | Areal extent _____ |
| <input type="checkbox"/> Soft subgrade | <input type="checkbox"/> Location shown on site map | Areal extent _____ |
| Remarks _____ _____ | | |
| 9. Slope Instability <input type="checkbox"/> Slides <input type="checkbox"/> Location shown on site map x No evidence of slope instability | | |
| Areal extent _____ | | |
| Remarks _____ _____ | | |
| B. Benches <input type="checkbox"/> Applicable x 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 <input type="checkbox"/> Location shown on site map <input type="checkbox"/> N/A or okay | | |
| Remarks _____ _____ | | |
| 2. Bench Breached <input type="checkbox"/> Location shown on site map <input type="checkbox"/> N/A or okay | | |
| Remarks _____ _____ | | |
| 3. Bench Overtopped <input type="checkbox"/> Location shown on site map <input type="checkbox"/> N/A or okay | | |
| Remarks _____ _____ | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | |
|--|---|--|
| C. Letdown Channels <input type="checkbox"/> Applicable x 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 | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> No evidence of settlement |
| Areal extent _____ Depth _____ Remarks _____ _____ | | |
| 2. Material Degradation | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> No evidence of degradation |
| Material type _____ Areal extent _____ Remarks _____ _____ | | |
| 3. Erosion | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> No evidence of erosion |
| Areal extent _____ Depth _____ Remarks _____ _____ | | |
| 4. Undercutting | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> No evidence of undercutting |
| Areal extent _____ Depth _____ Remarks _____ _____ | | |
| 5. Obstructions | Type _____ | <input type="checkbox"/> No obstructions |
| <input type="checkbox"/> Location shown on site map Areal extent _____ Size _____ Remarks _____ _____ | | |
| 6. Excessive Vegetative Growth | Type _____ | |
| <input type="checkbox"/> No evidence of excessive growth <input type="checkbox"/> Vegetation in channels does not obstruct flow <input type="checkbox"/> Location shown on site map Areal extent _____ Remarks _____ _____ | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | | |
|---|---|---|--|
| D. Cover Penetrations <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A | | | |
| 1. Gas Vents <input checked="" type="checkbox"/> Active <input type="checkbox"/> Passive | | | |
| <input checked="" type="checkbox"/> Properly secured/locked | <input checked="" type="checkbox"/> Functioning | <input checked="" type="checkbox"/> Routinely sampled | <input checked="" type="checkbox"/> Good condition |
| <input type="checkbox"/> Evidence of leakage at penetration | <input type="checkbox"/> Needs Maintenance | <input type="checkbox"/> N/A | |
| Remarks: <u>Soil Vapor Extraction Wells</u> | | | |
| 2. Gas Monitoring Probes | | | |
| <input checked="" type="checkbox"/> Properly secured/locked | <input checked="" type="checkbox"/> Functioning | <input checked="" type="checkbox"/> Routinely sampled | <input checked="" type="checkbox"/> Good condition |
| <input type="checkbox"/> Evidence of leakage at penetration | <input type="checkbox"/> Needs Maintenance | <input checked="" type="checkbox"/> N/A | |
| Remarks: <u>Pressure monitoring wells.</u> | | | |
| 3. Monitoring Wells | | | |
| <input type="checkbox"/> Properly secured/locked | <input type="checkbox"/> Functioning | <input type="checkbox"/> Routinely sampled | <input type="checkbox"/> Good condition |
| <input type="checkbox"/> Evidence of leakage at penetration | <input type="checkbox"/> Needs Maintenance | <input checked="" type="checkbox"/> N/A | |
| Remarks: _____ | | | |
| 4. Leachate Extraction Wells | | | |
| <input type="checkbox"/> Properly secured/locked | <input type="checkbox"/> Functioning | <input type="checkbox"/> Routinely sampled | <input type="checkbox"/> Good condition |
| <input type="checkbox"/> Evidence of leakage at penetration | <input type="checkbox"/> Needs Maintenance | <input checked="" type="checkbox"/> N/A | |
| Remarks: _____ | | | |
| 5. Settlement Monuments <input type="checkbox"/> Located <input type="checkbox"/> Routinely surveyed <input checked="" type="checkbox"/> N/A | | | |
| Remarks: _____ | | | |
| E. Gas Collection and Treatment <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A | | | |
| 1. Gas Treatment Facilities | | | |
| <input type="checkbox"/> Flaring | <input type="checkbox"/> Thermal destruction | <input type="checkbox"/> Collection for reuse | |
| <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance | | |
| Remarks: _____ | | | |
| 2. Gas Collection Wells, Manifolds and Piping | | | |
| <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance | | |
| Remarks: _____ | | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | | |
|---|--|------------------------------|--|
| 3. Gas Monitoring Facilities (e.g., gas monitoring of adjacent homes or buildings) | | | |
| <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance | <input type="checkbox"/> N/A | |
| Remarks _____ | | | |
| F. Cover Drainage Layer <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A | | | |
| 1. Outlet Pipes Inspected <input type="checkbox"/> Functioning <input type="checkbox"/> N/A | | | |
| Remarks _____ | | | |
| 2. Outlet Rock Inspected <input type="checkbox"/> Functioning <input type="checkbox"/> N/A | | | |
| Remarks _____ | | | |
| G. Detention/Sedimentation Ponds <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A | | | |
| 1. Siltation Areal extent _____ Depth _____ <input type="checkbox"/> N/A | | | |
| <input type="checkbox"/> Siltation not evident | | | |
| Remarks _____ | | | |
| 2. Erosion Areal extent _____ Depth _____ <input type="checkbox"/> N/A | | | |
| <input type="checkbox"/> Erosion not evident | | | |
| Remarks _____ | | | |
| 3. Outlet Works <input type="checkbox"/> Functioning <input type="checkbox"/> N/A | | | |
| Remarks _____ | | | |
| 4. Dam <input type="checkbox"/> Functioning <input type="checkbox"/> N/A | | | |
| Remarks _____ | | | |
| H. Retaining Walls <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A | | | |
| 1. Deformations <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Deformation not evident | | | |
| Horizontal displacement _____ | | Vertical displacement _____ | |
| Rotational displacement _____ | | | |
| Remarks _____ | | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | |
|--|--|--|
| 2. Degradation <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Deformation not evident | | |
| Remarks _____ | | |
| I. Perimeter Ditches/Off-Site Discharge <input type="checkbox"/> Applicable x N/A | | |
| 1. Siltation <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Siltation not evident | | |
| Areal extent _____ Depth _____ | | |
| Remarks _____ | | |
| 2. Vegetative Growth <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Siltation not evident | | |
| <input type="checkbox"/> Vegetation does not impede flow | | |
| Areal extent _____ Type _____ | | |
| Remarks _____ | | |
| 3. Erosion <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Erosion not evident | | |
| Areal extent _____ Depth _____ | | |
| Remarks _____ | | |
| 4. Discharge Structure <input type="checkbox"/> Location shown on site map <input type="checkbox"/> N/A | | |
| Remarks _____ | | |
| VIII. VERTICAL BARRIER WALLS <input type="checkbox"/> Applicable x N/A | | |
| 1. Settlement <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Settlement not evident | | |
| Areal extent _____ Depth _____ | | |
| Remarks _____ | | |
| 2. Performance Monitoring Type of Monitoring _____ <input type="checkbox"/> Performance not monitored | | |
| Frequency _____ <input type="checkbox"/> Evidence of breaching Head differential _____ | | |
| Remarks _____ | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | | |
|---|---|--|---|
| IX. GROUNDWATER/SURFACE WATER REMEDIES | | <input type="checkbox"/> Applicable | <input checked="" type="checkbox"/> N/A |
| A. Groundwater Extraction Wells, Pumps, and Pipelines | | <input type="checkbox"/> Applicable | <input type="checkbox"/> N/A |
| 1. Pumps, Wellhead Plumbing, and Electrical | | | |
| <input type="checkbox"/> Good condition | <input type="checkbox"/> All required wells located | <input type="checkbox"/> Needs Maintenance | <input type="checkbox"/> N/A |
| Remarks _____ _____ | | | |
| 2. Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances | | | |
| <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance | | |
| Remarks _____ _____ | | | |
| 3. Spare Parts and Equipment | | | |
| <input type="checkbox"/> Readily available | <input type="checkbox"/> Good condition | <input type="checkbox"/> Requires upgrade | <input type="checkbox"/> Needs to be provided |
| Remarks _____ _____ | | | |
| B. Surface Water Collection Structures, Pumps, and Pipelines | | <input type="checkbox"/> Applicable | <input type="checkbox"/> N/A |
| 1. Collection Structures, Pumps, and Electrical | | | |
| <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance | | |
| Remarks _____ _____ | | | |
| 2. Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances | | | |
| <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance | | |
| Remarks _____ _____ | | | |
| 3. Spare Parts and Equipment | | | |
| <input type="checkbox"/> Readily available | <input type="checkbox"/> Good condition | <input type="checkbox"/> Requires upgrade | <input type="checkbox"/> Needs to be provided |
| Remarks _____ _____ | | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | |
|--|--|--|
| C. Treatment System | <input type="checkbox"/> Applicable | <input type="checkbox"/> N/A |
| 1. Treatment Train (Check components that apply) | | |
| <input type="checkbox"/> Metals removal | <input type="checkbox"/> Oil/water separation | <input type="checkbox"/> Bioremediation |
| <input type="checkbox"/> Air stripping | <input type="checkbox"/> Carbon adsorbers | |
| <input type="checkbox"/> Filters | | |
| <input type="checkbox"/> Additive (e.g., chelation agent, flocculent) | | |
| <input type="checkbox"/> Others | | |
| <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance | |
| <input type="checkbox"/> Sampling ports properly marked and functional | | |
| <input type="checkbox"/> Sampling/maintenance log displayed and up to date | | |
| <input type="checkbox"/> Equipment properly identified | | |
| <input type="checkbox"/> Quantity of groundwater treated annually | | |
| <input type="checkbox"/> Quantity of surface water treated annually | | |
| Remarks | | |
| | | |
| 2. Electrical Enclosures and Panels (properly rated and functional) | | |
| <input type="checkbox"/> N/A | <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance |
| Remarks | | |
| | | |
| 3. Tanks, Vaults, Storage Vessels | | |
| <input type="checkbox"/> N/A | <input type="checkbox"/> Good condition | <input type="checkbox"/> Proper secondary containment <input type="checkbox"/> Needs Maintenance |
| Remarks | | |
| | | |
| 4. Discharge Structure and Appurtenances | | |
| <input type="checkbox"/> N/A | <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance |
| Remarks | | |
| | | |
| 5. Treatment Building(s) | | |
| <input type="checkbox"/> N/A | <input type="checkbox"/> Good condition (esp. roof and doorways) | <input type="checkbox"/> Needs repair |
| <input type="checkbox"/> Chemicals and equipment properly stored | | |
| Remarks | | |
| | | |

Five-Year Review Site Inspection Checklist (Continued)**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.

A. Soil Vapor Extraction Systems ☒ Applicable ☐ N/A**1. Blowers, Wellhead Plumbing, and Electrical**

- ☒ Good condition ☒ All required wells located ☐ Needs Maintenance ☐ NA

Remarks: Active SVE systems are in 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 _____

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 remedial action for the Piles Area is removal and disposal to remove all unacceptable risk (PTSM) from small-localized hot spots of lead and PCB/PAH. The remedial action chosen for the Ash Area is Institutional Controls to protect future industrial workers and potential residents from exposure to elevated levels of arsenic. Institutional controls have been established for this subunit. The remedial action chosen for the Trenches Area is active soil vapor extraction to permanently remove TCE and PCE from the soil and institutional controls and a 1-foot soil cover to protect remedial workers and future industrial workers from unacceptable exposure to arsenic and PAHs (benzo(a)pyrene) in the surface soil. Annual Performance Evaluation Reports demonstrate that these actions are effective and that the remedies are 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.

The OU is being maintained as required to insure the effectiveness of the remedial action. .

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.

N/A

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A/M GROUNDWATER OPERABLE UNIT

I. Introduction

The review for this unit is conducted under the Savannah River Site (SRS) Resource Conservation and Recovery Act (RCRA) program. The Comprehensive Environmental Response, Compensation and Liability Act (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 third five-year review for the A/M Area Groundwater Operable Unit (OU). This review was conducted from August 2007 through September 2007. This report documents the results of the review.

II. OU Chronology

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

Table 1. Chronology of OU Events

| Event | Date |
|--|----------------------------------|
| RCRA Corrective Action Plan (CAP) Approved | 1983 |
| Corrective Action start | 1983 |
| Consent Decree, Civil Action No. 1:85-2583-6 | 1988 |
| SRS added to National Priorities List (NPL) | December 1989 |
| Interim Record of Decision (IROD) issuance | June 29, 1992 |
| Previous Five-Year Reviews | June 30, 1997, February 12, 2004 |

III. Background

Physical Characteristics

The A/M Areas of SRS are located near the northwest edge of SRS (Figure 1). The A/M Areas contained manufacturing facilities for nuclear fuel components, offices and research facilities (the Savannah River National Laboratory [SRNL]). 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). The A/M Area Groundwater OU was established to address this contamination. The A/M Area Groundwater OU is located within the Upper Three Runs Watershed.

Land and Resource Use

The future land use for A/M Area is anticipated to be industrial.

History of Contamination

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 process sewer systems that led to the A-014 Outfall and to the M-Area Settling Basin. Additionally, significant quantities of chlorinated solvents were inadvertently spilled during handling and storage.

The A/M Area Groundwater OU addresses multiple commingled plumes that have resulted from solvent releases or spills from degreasing operations at a variety of locations. The principal source locations have been identified as the A-014 Outfall, the M-Area Settling Basin, the M-Area Process Sewer Line to the M-Area Settling Basin, and the 321-M Solvent Storage Area. Additional contamination originated at a solvent transfer station in Building 313-M and at the Met Lab Basin, which received process wastewaters from the Metallurgical Laboratory (723-A). These sources contributed to the M-Area Hazardous Management Facility (HWMF) groundwater plume and to the more dilute Southern Sector plume extending to Tims Branch. A northeastern plume was believed to have originated within the SRNL facility. 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).

Initial Response

The dilute portion of the M-Area HWMF plume extending from the M-Area Settling Basin to the A-Area Burning/Rubble Pits (ABRP) is commingling with the plume originating at the ABRP and the Miscellaneous Chemicals Basin/Metals Burning Pit (ABRP/MCB/MBP) OU. By mutual agreement between the United States Department of Energy (USDOE), United States Environmental Protection Agency (USEPA), and South Carolina Department of Health and Environmental Control (SCDHEC), the responsibility for addressing the ABRP/MCB/MBP groundwater plume has been transferred to the A/M Area Groundwater OU.

IV. Remedial Actions

Remedy Selection

The selected interim remedy for groundwater within the A/M Area OU as identified in the Interim Record of Decision (IROD) 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. Corrective action plans (CAPs) incorporated in the RCRA Post-Closure Permit for the M-Area and Met Lab HWMFs include the interim remedy as well as a suite of innovative remedial technologies that target specific source areas that have contributed to groundwater contamination.

M-Area HWMF Plume

The M-Area HWMF Groundwater interim action was implemented in two phases. In the general M Area, Phase 1 groundwater recovery with treatment by air stripping was implemented in 1985 as a Corrective Action Program. The treatment system consisted 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. Two additional recovery wells were added in 2000 to address groundwater contamination at the Metallurgical Laboratory Basin. A zero-leakage drain line constructed to transfer treated groundwater from the air stripper to the A-014 Outfall has also been included. The A-014 Outfall is permitted by SCDHEC to receive this treated water.

Phase 2 included the evaluation of several offgas treatment technologies for future application at the M-1 Air Stripper. A final report was issued in January 1995 (WSRC-RP-94-927). Although all of the options studied showed strong potential for success, each had potential limitations and no specific technology was recommended. The M-1 Air Stripper currently complies with its air emissions permit without treatment.

Northern Sector Groundwater Plume

The northern sector plume was initially addressed by the installation of the A-1 Air Stripper and one recovery well in 1992. Phase 2 was to include additional recovery wells, a second air stripper, and offgas treatment. The A-2 Air Stripper began operation in 1996 with five recovery wells. Subsequently, in 1996 the A-1 Air Stripper was removed from service and its recovery well was redirected to the A-2 Air Stripper. The A-2 Air Stripper currently complies with its air emissions permit without additional treatment. A zero-leakage drain line carries treated liquid from the air stripper to a nearby permitted outfall.

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.

Southern Sector Plume

The Southern Sector groundwater plume includes distal portions of the M-Area plume that are not under the influence of the recovery well network. Additional characterization, aquifer testing, and the evaluation of various treatment technologies began in 1996; the results led to a revised CAP. The corrective action included the installation of a row of twelve airlift recirculation wells (ARWs) to capture and treat the plume as it migrates southward toward Tims Branch. The twelve wells were placed in service by 2000.

Vadose Zone

Phase 1 included characterization activities to identify potential opportunities to remediate soils above the groundwater at the four principal source areas. Phase 2 included the preparation of a revised CAP to address residual source contamination in the vadose zone. The CAP included plans for in situ air stripping with vacuum extraction at the M-Area Settling Basin. Methane injection was also identified as a treatment option to support bioremediation. These technologies were successfully applied with horizontal wells at the M-Area Settling Basin, achieved their objectives, and were subsequently removed from service. Contaminated soils under the process sewer line leading to the M-Area Settling Basin have been addressed by active and passive soil vapor extraction (SVE). After achieving remedial goals, the active soil vapor extraction units (SVEUs) were removed from service. Passive SVE continues.

Dense Non-Aqueous Liquids

It was recognized that at discrete locations, sufficient solvents were released to the vadose zone to create deposits of concentrated, undissolved DNAPLs within both the saturated and vadose zones. Plans were initiated to establish these locations through additional characterization and to develop recovery and treatment technologies for the DNAPLs. Treatment technologies demonstrated include Fenton's Chemistry

(GeoCleanse), six-phase thermal treatment, ozone injection and oxidation, and Dynamic Underground Stripping (DUS) with steam.

A-Area Burning/Rubble Pits/Miscellaneous Chemicals Basin/Metals Burning Pit Plume

An air sparge/passive SVE system at the ABRP subunit was installed to treat contamination in the M-Area aquifer zone under the OU. This system was removed from service after proving to be ineffective due to local lithology, which prevented recovery of the injected air.

Contaminants migrating downward from the MCB/MBP and ABRP subunits have contaminated the underlying groundwater with TCE and PCE. ARWs were installed as an interim action to 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 allowed an early start of remedial activities while generating additional data on the nature and extent of the groundwater interactions between the MCB/MBP, the ABRP, and the A&M Area. These data will allow determination of the final groundwater remedial goal. The recirculation wells were placed in service in February 2002. The wells have operated as designed; however, actual mass removal rates have been low (less than 10 lb/year). Operating data from the wells and additional groundwater sampling have established that the groundwater plume is more dilute than originally believed. The lower contaminant concentrations have resulted in lower mass removal rates.

The interim and final remedial goals (RGs) for groundwater are shown in Table 2. Lead will not be treated because elevated levels are sporadic and are judged to be caused by natural geologic conditions. As of June 2007 the interim goals for TCE have not been met.

Table 2. Final Groundwater COCs and Interim RGs for the MCB

| Final COC | Final RG, $\mu\text{g/L}$ | Interim RG, High VOC Concentration Wells ($>500 \mu\text{g/L}$)* | Interim RG, Medium VOC Concentration Wells (ca. $200 \mu\text{g/L}$)* | Interim RG, Low VOC Concentration Wells ($<50 \mu\text{g/L}$)* |
|----------------------|---------------------------|--|--|--|
| TCE | 5 | 20 | 41 | 20 |
| PCE | 5 | 20 | 41 | 20 |
| Carbon tetrachloride | 5 | 20 | 41 | 20 |
| Lead | 15 | 15 | 15 | 15 |

*Interim RGs based on modeling results

SCDHEC has approved the existing A/M Area Groundwater CAP 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 third five-year review for this OU. The following actions have been completed:

- Continued operation of the groundwater removal and treatment systems
- Two additional recovery wells at the Met Lab HWMF OU have been added to the M-1 Air Stripper, one of which is out of service due to low groundwater level. Continuous operation began July 2000.
- Numerous innovative technologies have been demonstrated at M Area including completion of a six-phase soil heating demonstration along the M-Area Sewer Line (PNL-SA-24002 Nov 1994) (11/3/93 to 11/29/93), a phytoremediation demonstration utilizing seepline soils and a variety of native and non-native plants, and hydraulic soil fracturing to enhance SVE in the M Area near the A-014 outfall.
- Two ARWs were placed in service in the Southern Sector to intercept the Southern Sector plume in April 1997. Nine additional wells were placed in service in 1999 and a 12th was placed in service in 2000. Four wells were converted to multi-stage in-well aerator technology in 2001 to address the higher concentration core of plume.

- A small area of residual DNAPL north of the M-Area Settling basin was treated with Fenton's Chemistry (GeoCleanse) (WSRC-TR-97-00283 9/19/97), achieving a 94% treatment efficiency after the 6-day test (Jan 8, 1997 – 7/23/97).
- The vadose zone in the vicinity of the Met Lab facility was characterized in three phases completed in 1997, principally by cone penetrometer technology (CPT) to determine the extent of vadose zone contamination contributing to the groundwater plume. Nineteen vadose zone wells were installed to operate passively with BaroBallsTM. These wells were placed in service in May 1998. One additional well was added in 2000. This system remains in service having removed 276 lb of TCE and PCE through June 2007.

A demonstration of in situ oxidation using ozone was conducted near the 321-M Solvent Storage Tank Pad in February 2000. A 30-ft diameter area of the shallow vadose zone where samples indicated residual DNAPL was present was treated with ozone gas. Post-treatment sampling indicated a DNAPL reduction of approximately 92%.

- A DUS I steam system was placed in service at the 321-M Solvent Storage Area in September 2000 to remove source contamination from the saturated and vadose zones. The system was removed from service in September 2001 after removing 68,200 lb of volatile organic compounds (VOCs.)
- A pilot-scale phytoirrigation study was initiated in the Southern Sector in October 2001 to recover contaminated groundwater from the Lost Lake aquifer and spray it on a test plot of poplar trees. Results were documented in a final report submitted to SCDHEC in January 2003
- A DUS II steam system was placed in service at the M-Area Settling basin in August 2005 to remove source contamination from the saturated and vadose zones. The system remains in service having removed 358,997 lb of VOCs through June 2007.

- Eleven ARWs were installed to address the groundwater plume emanating from the ABRP/MCB/MBP OU. The wells were placed in service on February 28, 2002, and remain in service. An application revision proposing monitored natural attenuation (MNA) as the final corrected action was submitted in March 2007.
- Six SVEUs were installed to address residual vadose zone contamination in the M-Area HWMF. The 782-3M SVEU was installed at the A-014 Outfall, began operation in May 1995, and remains in service. The 782-4M SVEU was installed at the M-Area Settling Basin and started up in April 1995. It was reconfigured to provide SVE for the Western Sector DUS II process in 2005. The 782-5M SVEU was installed to address solvent contamination along the M-Area Process Sewer Line and began operation in May 1995. It was shut down in the fall of 1999 after meeting shutdown criteria. The 782-6M SVEU was installed at the 321-M Solvent Storage Tank Area and began operation in May 1995. It was reconfigured to provide SVE for the DUS I process in 2000 and relocated to provide SVE for the Western Sector DUS II process in 2005. The 782-7M and 782-8M SVEUs were installed along the process sewer line from the M-Area security fence to the M-Area Settling Basin and began operation in 1998. They were removed from service after meeting shutdown criteria in May 2004 (782-7M) and in the fall of 1999 (782-8M).
- A smaller portable SVEU was located at the DUS I site in July 2006 to capture residual contaminants that continue to be volatilized as the site slowly returns to ambient temperatures.
- A waste unit (the A-Area Miscellaneous Rubble Pile) adjacent to the A-014 Outfall was characterized as a potential future risk to groundwater contamination and a series of SVE wells were installed and connected to the existing 782-3M SVEU in April 2004. These wells are still operating.
- The groundwater plume originating from the ABRP/MCB/MBP OU has been added to the M-Area HWMF CAP by agreement between USDOE, USEPA, and SCDHEC.

The inclusion of this dilute plume with the M-Area plume including the southern, northern, and western sector plumes brings the total plume area to 2,400 acres.

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 actions
- Assured that all actions required under the RCRA Permit were implemented

VII. Technical Assessment

The numerous active and passive remedial systems currently in operation, the active SVE systems that operated until meeting shutdown criteria, and the treatability studies and innovative technology demonstrations throughout the A/M areas are protective of human health and the environment. Subsequent 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).

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. Project Costs

Costs associated with the selected remedy for A/M Groundwater include operation and maintenance costs of air strippers, soil vapor extraction units and institutional controls. RCRA documentation does not require estimated project costs to be prepared. Therefore, none are included in this remedy review.

XI. Protectiveness Statement(s)

The remedies of groundwater removal and treatment, in situ treatment, and contaminant source treatment are 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).

XII. Next Review

The next five-year review is scheduled for February 12, 2014.

ATTACHMENT 1

List of Documents Reviewed

PNL-SA-24002, *Field Test of Six-Phase Soil Heating at the Savannah River Site*, Nov 1994, 1994, Pacific Northwest National Lab, Richland, WA

WSRC-RP-92-423, *Metallurgical Laboratory Hazardous Waste Management Facility Volume II Carolina Bay Closure*, Rev. 11, 1992, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

WSRC-RP-92-743, *Interim Action Record of Decision Remedial Alternative Selection M-Area Hazardous Waste Management Facility Operable Unit*, Rev. 0, 1992, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

WSRC-RP-92-744, *Interim Action Record of Decision Remedial Alternative Selection A/M Area Groundwater Operable Unit*, 1992, Rev. 0, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

WSRC-RP-92-745, *Interim Action Record of Decision Remedial Alternative Selection Metallurgical Laboratory Hazardous Waste Management Facility Operable Unit*, Rev. 0, 1992, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

WSRC-TR-93-369, *Post-Test Evaluation of the Geology, Geochemistry, Microbiology, and Hydrology of the In Situ Air Stripping Demonstration Site at the Savannah River Site*, 1993, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

WSRC-RP-94-927, *Final Report on Testing of Off-Gas Treatment Technologies for Abatement of Atmospheric Emissions of Chlorinated Volatile Organic Compounds*, 1997, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

WSRC-TR-97-00283, *Final Report for Demonstration of in situ oxidation of DNAPL Using Geo-Cleanse Technology*, 1997, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

WSRC-RP-98-4031, *Interim Record of Decision Remedial Alternative Selection for the Miscellaneous Chemical Basin/Metals Burning Pit (731-4A/5A)*, Rev. 1.1, 1999, Westinghouse Savannah River Company, Savannah River Site, Aiken SC

ATTACHMENT 1 (Continued)

List of Documents Reviewed

WSRC-RP-2000-4001, *Interim Record of Decision Remedial Alternative Selection for the A-Area Burning/Rubble Pits (731-A/1A) and Rubble Pit (731-2A) (U)*, Rev 1, 2000, Westinghouse Savannah River Company, Savannah River Site, Aiken SC

WSRC-TR-2001-00077, *Vadose Zone Remediation Assessment: M-Area Process Sewer Soil Vapor Extraction Units 782-5M, 782-7M, and 782-8M, February 2001*, Westinghouse Savannah River Company, Savannah River Site, Aiken SC

WSRC-IM-91-53, *1992 RCRA Part B Permit Application, Volume III, M-Area Hazardous Waste Management*, Rev. 17, 2002, Washington Savannah River Company, Savannah River Site, Aiken, SC

WSRC-MS-93-285, *Characterization and Closure of the Met Lab Carolina Bay at the Savannah River Site*, Rev. 0, 2003, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

WSRC-IM-98-30, *2000 RCRA Part B Permit Renewal Application: M-Area and Metallurgical Laboratory Hazardous Waste Management Facilities (M-Area and Met Lab HWMFs) Post-closure*, Volume III, Rev. 1, 2006, Washington Savannah River Company, Savannah River Site, Aiken, SC

WSRC-RP-2007-4023, *Performance Evaluation Report for the Combined A-Area Burning/Rubble Pits, Miscellaneous Chemical Basin, and Metals Burning Pit Operable Unit, January through December 2006 (U)*, Rev. 0, 2007, Washington Savannah River Company, Aiken, SC

WSRC-RP-2007-4001, *M-Area and Metallurgical Lab HWMF's Groundwater Monitoring and Corrective Action Report (U)*, Rev. 0, 2007, Washington Savannah River Company, Savannah River Site, Aiken, SC

WSRC-RP-2007-4046, *Performance Evaluation Report for the A-Area Miscellaneous Rubble Pile (731-6A) Operable Unit: April 2006 through April 2007 (U)*, 2007, Washington Savannah River Company, Aiken, SC

ATTACHMENT 2

Five-Year Review Site Inspection Checklist

| I. SITE INFORMATION | | | |
|--|--|--|--|
| Site Name: | A/M Area Groundwater | Date of Inspection: | 10/24/2007 |
| Location and Region: | SRS, USEPA Region IV | EPA ID: | SC1890008989 |
| Agency, office, or company leading the five-year review: | USDOE | CERCLIS No. | CNA |
| | | Weather/Temperature: | |
| Remedy Includes: (Check all that apply) | | | |
| <input type="checkbox"/> Cover system | | | |
| <input type="checkbox"/> Monitored Natural Attenuation | | | |
| <input checked="" type="checkbox"/> Access controls | | | |
| <input type="checkbox"/> Groundwater Containment | | | |
| <input checked="" type="checkbox"/> Institutional Controls | | | |
| <input type="checkbox"/> Vertical Barrier Walls | | | |
| <input checked="" type="checkbox"/> Groundwater pump and treatment | | | |
| <input type="checkbox"/> Surface water collection and treatment | | | |
| <input checked="" type="checkbox"/> Other: <u>Active and passive Soil Vapor Extraction, Dynamic Underground Stripping, Airlift Recirculation Wells</u> | | | |
| Attachments: <input type="checkbox"/> Inspection team roster attached <input type="checkbox"/> Site map attached | | | |
| II. INTERVIEWS (Check all that apply) | | | |
| 1. O & M Site Manager | <u>Wayne Gleaton</u> (Name) | <u>Post Closure Manager</u> (Title) | <u>10-23-2007</u> (Date) |
| Interviewed: | <input type="checkbox"/> at site | <input type="checkbox"/> at office | <input checked="" type="checkbox"/> by phone Phone No. <u>803-557-8838</u> |
| Problems, suggestions: | <input type="checkbox"/> report attached _____ | | |
| 2. O & M Staff | <u>Richard Feagin</u> (Name) | <u>Post-Closure Waste Site Inspector/Maintenance Coord.</u> (Title) | <u>9-27-2007</u> (Date) |
| Interviewed: | <input type="checkbox"/> at site | <input type="checkbox"/> at office | <input type="checkbox"/> by phone Phone No. <u>803-952-4416</u> |
| Problems, suggestions: | <input type="checkbox"/> report attached _____ | | |

Five-Year Review Site Inspection Checklist (Continued)

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

- | | | | |
|---|---|--|------------------------------|
| <input checked="" type="checkbox"/> O & M Manual | <input checked="" type="checkbox"/> Readily available | <input checked="" type="checkbox"/> Up to date | <input type="checkbox"/> N/A |
| <input checked="" type="checkbox"/> As-built drawings | <input checked="" type="checkbox"/> Readily available | <input checked="" type="checkbox"/> Up to date | <input type="checkbox"/> N/A |
| <input checked="" type="checkbox"/> Maintenance Logs | <input checked="" type="checkbox"/> Readily available | <input checked="" type="checkbox"/> Up to date | <input type="checkbox"/> N/A |

Remarks: _____

Five-Year Review Site Inspection Checklist (Continued)

| | | | |
|---|---|--|---|
| 2. Site-Specific Health and Safety Plan | | | |
| <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A | |
| <input type="checkbox"/> Contingency plan/emergency response plan | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A |
| Remarks: <u>Routine O&M activities do not require an SSHASP under 29 CFR 1910.120, HAZWOPER. An SSHASP is prepared as needed.</u> | | | |
| 3. O & M and OSHA Training Records | | | |
| <input checked="" type="checkbox"/> Readily available | <input checked="" type="checkbox"/> Up to date | <input type="checkbox"/> N/A | |
| Remarks: _____ | | | |
| 4. Permits and Service Agreements | | | |
| <input checked="" type="checkbox"/> Air discharge permit | <input checked="" type="checkbox"/> Readily available | <input checked="" type="checkbox"/> Up to date | <input type="checkbox"/> N/A |
| <input checked="" type="checkbox"/> Effluent discharge | <input checked="" type="checkbox"/> Readily available | <input checked="" type="checkbox"/> Up to date | <input type="checkbox"/> N/A |
| <input type="checkbox"/> Waste Disposal, POTW | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A |
| <input checked="" type="checkbox"/> Other permits | <input checked="" type="checkbox"/> Readily available | <input checked="" type="checkbox"/> Up to date | <input type="checkbox"/> N/A |
| Remarks: <u>Airlift Recirculation Wells underground injection control permit.</u> | | | |
| 5. Gas Generation Records | | | |
| <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A | |
| Remarks: _____ | | | |
| 6. Settlement Monument Records | | | |
| <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A | |
| Remarks: _____ | | | |
| 7. Groundwater Monitoring Records | | | |
| <input type="checkbox"/> Readily available | <input checked="" type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A | |
| Remarks: <u>Air Stripping Wells</u> | | | |
| 8. Leachate Extraction Records | | | |
| <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A | |
| Remarks: _____ | | | |
| 9. Discharge Compliance Records | | | |
| <input checked="" type="checkbox"/> Air | <input checked="" type="checkbox"/> Readily available | <input checked="" type="checkbox"/> Up to date | <input type="checkbox"/> N/A |
| <input checked="" type="checkbox"/> Water (effluent) | <input checked="" type="checkbox"/> Readily available | <input checked="" type="checkbox"/> Up to date | <input type="checkbox"/> N/A |
| Remarks: _____ | | | |
| 10. Daily Access/Security Logs | | | |
| <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A | |
| Remarks: _____ | | | |

Five-Year Review Site Inspection Checklist (Continued)

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: Project cost data is summarized in Section X of attached review: WSRC-RP-2007-4063

Total annual cost by year for review period if available

| | | |
|---------------------|------------|---|
| From _____ To _____ | _____ | <input type="checkbox"/> Breakdown attached |
| (Date) (Date) | Total cost | |
| From _____ To _____ | _____ | <input type="checkbox"/> Breakdown attached |
| (Date) (Date) | Total cost | |
| From _____ To _____ | _____ | <input type="checkbox"/> Breakdown attached |
| (Date) (Date) | Total cost | |
| From _____ To _____ | _____ | <input type="checkbox"/> Breakdown attached |
| (Date) (Date) | Total cost | |
| From _____ To _____ | _____ | <input type="checkbox"/> Breakdown attached |
| (Date) (Date) | Total cost | |

3. 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 _____

Five-Year Review Site Inspection Checklist (Continued)

B. Other Access Restrictions

1. **Signs and Other Security Measures** ☐ Location shown on site map ☐ N/A

Remarks: Signs at this site are in good condition

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: Remote operating facilities are inspected daily.

Responsible Party/Agent: DOE

Contact: Karen Adams, Waste Area Group Manager 9/3/07 803-952-7871
(Name) (Title) (Date) (Phone No.)

Reporting 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: _____

Five-Year Review Site Inspection Checklist (Continued)

| | |
|--|--|
| 3. Land use Changes Offsite <input checked="" type="checkbox"/> N/A | |
| Remarks _____ | |
| | |
| VI. GENERAL SITE CONDITIONS | |
| A. Roads <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A | |
| 1. Roads Damaged <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Roads adequate <input type="checkbox"/> N/A | |
| Remarks _____ | |
| | |
| B. Other Site Conditions | |
| Remarks _____ | |
| | |
| | |
| VII. COVER SYSTEMS <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A | |
| A. Landfill Surface | |
| 1. Settlement (Low spots) <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Settlement not evident | |
| Areal extent _____ Depth _____ | |
| Remarks: _____ | |
| | |
| 2. Cracks <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Cracking not evident | |
| Lengths _____ Widths _____ Depths _____ | |
| Remarks _____ | |
| | |
| 3. Erosion <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Erosion not evident | |
| Areal extent _____ Depth _____ | |
| Remarks _____ | |
| | |
| 4. Holes <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Holes not evident | |
| Areal extent _____ Depth _____ | |
| Remarks _____ | |
| | |
| 5. Vegetative Cover <input type="checkbox"/> Grass <input type="checkbox"/> Cover properly established <input type="checkbox"/> No signs of stress | |
| <input type="checkbox"/> Trees/shrubs (indicate size and location on a diagram) | |
| Remarks _____ | |
| | |

Five-Year Review Site Inspection Checklist (Continued)

| | | |
|--|---|--------------------|
| 6. Alternative Cover (armored rock, concrete, etc.) <input type="checkbox"/> N/A | | |
| Remarks: _____ _____ | | |
| 7. Bulges <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Bulges not evident | | |
| Areal extent _____ Height _____ | | |
| Remarks _____ _____ | | |
| 8. Wet Areas/Water Damage <input type="checkbox"/> Wet areas/water damage not evident | | |
| <input type="checkbox"/> Wet Areas | <input type="checkbox"/> Location shown on site map | Areal extent _____ |
| <input type="checkbox"/> Ponding | <input type="checkbox"/> Location shown on site map | Areal extent _____ |
| <input type="checkbox"/> Seeps | <input type="checkbox"/> Location shown on site map | Areal extent _____ |
| <input type="checkbox"/> Soft subgrade | <input type="checkbox"/> Location shown on site map | Areal extent _____ |
| Remarks _____ _____ | | |
| 9. Slope Instability <input type="checkbox"/> Slides <input type="checkbox"/> Location shown on site map <input type="checkbox"/> No evidence of slope instability | | |
| Areal extent _____ | | |
| Remarks _____ _____ | | |
| B. Benches <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> 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 <input type="checkbox"/> Location shown on site map <input type="checkbox"/> N/A or okay | | |
| Remarks _____ _____ | | |
| 2. Bench Breached <input type="checkbox"/> Location shown on site map <input type="checkbox"/> N/A or okay | | |
| Remarks _____ _____ | | |
| 3. Bench Overtopped <input type="checkbox"/> Location shown on site map <input type="checkbox"/> N/A or okay | | |
| Remarks _____ _____ | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | |
|---|--|--|
| C. Letdown Channels <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> 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 | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> No evidence of settlement |
| Areal extent _____ Depth _____ | | |
| Remarks _____ | | |
| 2. Material Degradation | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> No evidence of degradation |
| Material type _____ Areal extent _____ | | |
| Remarks _____ | | |
| 3. Erosion | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> No evidence of erosion |
| Areal extent _____ Depth _____ | | |
| Remarks _____ | | |
| 4. Undercutting | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> No evidence of undercutting |
| Areal extent _____ Depth _____ | | |
| Remarks _____ | | |
| 5. Obstructions | Type _____ | <input type="checkbox"/> No obstructions |
| <input type="checkbox"/> Location shown on site map | Areal extent _____ | Size _____ |
| Remarks _____ | | |
| 6. Excessive Vegetative Growth | Type _____ | |
| <input type="checkbox"/> No evidence of excessive growth | <input type="checkbox"/> Vegetation in channels does not obstruct flow | |
| <input type="checkbox"/> Location shown on site map | Areal extent _____ | |
| Remarks _____ | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | | |
|--|--|---|---|
| D. Cover Penetrations <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A | | | |
| 1. Gas Vents <input type="checkbox"/> Active <input type="checkbox"/> Passive | | | |
| <input type="checkbox"/> Properly secured/locked | <input type="checkbox"/> Functioning | <input type="checkbox"/> Routinely sampled | <input type="checkbox"/> Good condition |
| <input type="checkbox"/> Evidence of leakage at penetration | <input type="checkbox"/> Needs Maintenance | <input type="checkbox"/> N/A | |
| Remarks _____ | | | |
| 2. Gas Monitoring Probes | | | |
| <input type="checkbox"/> Properly secured/locked | <input type="checkbox"/> Functioning | <input type="checkbox"/> Routinely sampled | <input type="checkbox"/> Good condition |
| <input type="checkbox"/> Evidence of leakage at penetration | <input type="checkbox"/> Needs Maintenance | <input type="checkbox"/> N/A | |
| Remarks _____ | | | |
| 3. Monitoring Wells (within surface area of landfill) | | | |
| <input type="checkbox"/> Properly secured/locked | <input type="checkbox"/> Functioning | <input type="checkbox"/> Routinely sampled | <input type="checkbox"/> Good condition |
| <input type="checkbox"/> Evidence of leakage at penetration | <input type="checkbox"/> Needs Maintenance | <input type="checkbox"/> N/A | |
| Remarks _____ | | | |
| 4. Leachate Extraction Wells | | | |
| <input type="checkbox"/> Properly secured/locked | <input type="checkbox"/> Functioning | <input type="checkbox"/> Routinely sampled | <input type="checkbox"/> Good condition |
| <input type="checkbox"/> Evidence of leakage at penetration | <input type="checkbox"/> Needs Maintenance | <input type="checkbox"/> N/A | |
| Remarks _____ | | | |
| 5. Settlement Monuments <input type="checkbox"/> Located <input type="checkbox"/> Routinely surveyed <input type="checkbox"/> N/A | | | |
| Remarks _____ | | | |
| E. Gas Collection and Treatment <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A | | | |
| 1. Gas Treatment Facilities | | | |
| <input type="checkbox"/> Flaring | <input type="checkbox"/> Thermal destruction | <input type="checkbox"/> Collection for reuse | |
| <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance | | |
| Remarks _____ | | | |
| 2. Gas Collection Wells, Manifolds and Piping | | | |
| <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance | | |
| Remarks _____ | | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | | |
|--|--|--|--|
| 3. Gas Monitoring Facilities (e.g., gas monitoring of adjacent homes or buildings) <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A Remarks _____ _____ | | | |
| F. Cover Drainage Layer <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A | | | |
| 1. Outlet Pipes Inspected <input type="checkbox"/> Functioning <input type="checkbox"/> N/A Remarks _____ _____ | | | |
| 2. Outlet Rock Inspected <input type="checkbox"/> Functioning <input type="checkbox"/> N/A Remarks _____ _____ | | | |
| G. Detention/Sedimentation Ponds <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A | | | |
| 1. Siltation Areal extent _____ Depth _____ <input type="checkbox"/> N/A <input type="checkbox"/> Siltation not evident Remarks _____ _____ | | | |
| 2. Erosion Areal extent _____ Depth _____ <input type="checkbox"/> N/A <input type="checkbox"/> Erosion not evident Remarks _____ _____ | | | |
| 3. Outlet Works <input type="checkbox"/> Functioning <input type="checkbox"/> N/A Remarks _____ _____ | | | |
| 4. Dam <input type="checkbox"/> Functioning <input type="checkbox"/> N/A Remarks _____ _____ | | | |
| H. Retaining Walls <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A | | | |
| 1. Deformations <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Deformation not evident Horizontal displacement _____ Vertical displacement _____ Rotational displacement _____ Remarks _____ _____ | | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | |
|--|--|--|
| 2. Degradation <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Deformation not evident | | |
| Remarks _____ | | |
| 1. Perimeter Ditches/Off-Site Discharge <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A | | |
| 1. Siltation <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Siltation not evident | | |
| Areal extent _____ Depth _____ | | |
| Remarks _____ | | |
| 2. Vegetative Growth <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Siltation not evident | | |
| <input type="checkbox"/> Vegetation does not impede flow | | |
| Areal extent _____ Type _____ | | |
| Remarks _____ | | |
| 3. Erosion <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Erosion not evident | | |
| Areal extent _____ Depth _____ | | |
| Remarks _____ | | |
| 4. Discharge Structure <input type="checkbox"/> Location shown on site map <input type="checkbox"/> N/A | | |
| Remarks _____ | | |
| VIII. VERTICAL BARRIER WALLS <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A | | |
| 1. Settlement <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Settlement not evident | | |
| Areal extent _____ Depth _____ | | |
| Remarks _____ | | |
| 2. Performance Monitoring Type of Monitoring _____ <input type="checkbox"/> Performance not monitored | | |
| Frequency _____ <input type="checkbox"/> Evidence of breaching Head differential _____ | | |
| Remarks _____ | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | | |
|---|--|--|---|
| IX. GROUNDWATER/SURFACE WATER REMEDIES | | <input checked="" type="checkbox"/> Applicable | <input type="checkbox"/> N/A |
| A. Groundwater Extraction Wells, Pumps, and Pipelines | | <input checked="" type="checkbox"/> Applicable | <input type="checkbox"/> N/A |
| 1. Pumps, Wellhead Plumbing, and Electrical | | | |
| <input checked="" type="checkbox"/> Good condition <input type="checkbox"/> All required wells located <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A | | | |
| Remarks _____ | | | |
| _____ | | | |
| 2. Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances | | | |
| <input checked="" type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance | | | |
| Remarks _____ | | | |
| _____ | | | |
| 3. Spare Parts and Equipment | | | |
| <input checked="" type="checkbox"/> Readily available <input type="checkbox"/> Good condition <input type="checkbox"/> Requires upgrade <input type="checkbox"/> Needs to be provided | | | |
| Remarks _____ | | | |
| _____ | | | |
| B. Surface Water Collection Structures, Pumps, and Pipelines | | <input type="checkbox"/> Applicable | <input checked="" type="checkbox"/> N/A |
| 1. Collection Structures, Pumps, and Electrical | | | |
| <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance | | | |
| Remarks _____ | | | |
| _____ | | | |
| 2. Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances | | | |
| <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance | | | |
| Remarks _____ | | | |
| _____ | | | |
| 3. Spare Parts and Equipment | | | |
| <input type="checkbox"/> Readily available <input type="checkbox"/> Good condition <input type="checkbox"/> Requires upgrade <input type="checkbox"/> Needs to be provided | | | |
| Remarks _____ | | | |
| _____ | | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | |
|---|---|--|
| C. Treatment System | <input checked="" type="checkbox"/> Applicable | <input type="checkbox"/> N/A |
| 1. Treatment Train (Check components that apply) | | |
| <input type="checkbox"/> Metals removal | <input type="checkbox"/> Oil/water separation | <input type="checkbox"/> Bioremediation |
| <input checked="" type="checkbox"/> Air stripping | <input type="checkbox"/> Carbon adsorbers | |
| <input type="checkbox"/> Filters _____ | | |
| <input type="checkbox"/> Additive (e.g., chelation agent, flocculent) _____ | | |
| <input type="checkbox"/> Others _____ | | |
| <input checked="" type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance | |
| <input checked="" type="checkbox"/> Sampling ports properly marked and functional | | |
| <input type="checkbox"/> Sampling/maintenance log displayed and up to date | | |
| <input checked="" type="checkbox"/> Equipment properly identified | | |
| <input checked="" type="checkbox"/> Quantity of groundwater treated annually: <u>Approximately 375,000,000 gallons at the M-1 and A-2 Air Strippers</u> | | |
| <input type="checkbox"/> Quantity of surface water treated annually _____ | | |
| Remarks _____ | | |
| 2. Electrical Enclosures and Panels (properly rated and functional) | | |
| <input type="checkbox"/> N/A | <input checked="" type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance |
| Remarks _____ | | |
| 3. Tanks, Vaults, Storage Vessels | | |
| <input type="checkbox"/> N/A | <input checked="" type="checkbox"/> Good condition | <input type="checkbox"/> Proper secondary containment <input type="checkbox"/> Needs Maintenance |
| Remarks _____ | | |
| 4. Discharge Structure and Appurtenances | | |
| <input type="checkbox"/> N/A | <input checked="" type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance |
| Remarks _____ | | |
| 5. Treatment Building(s) | | |
| <input type="checkbox"/> N/A | <input checked="" type="checkbox"/> Good condition (esp. roof and doorways) | <input type="checkbox"/> Needs repair |
| <input checked="" type="checkbox"/> Chemicals and equipment properly stored | | |
| Remarks _____ | | |

Five-Year Review Site Inspection Checklist (Continued)

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

A. Soil Vapor Extraction Systems ☒ Applicable ☐ N/A

1. Blowers, Wellhead Plumbing, and Electrical

- ☒ Good condition ☐ All required wells located ☐ Needs Maintenance ☐ NA

Remarks: Active and passive SVE systems are in 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 _____

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 numerous active and passive remedial systems currently in operation, the active SVE systems that operated until meeting shutdown criteria, and the treatability studies and innovative technology demonstrations throughout the A/M areas are protective of human health and the environment. The remedies of groundwater removal and treatment, in situ treatment, and contaminant source treatment are 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.

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.

Operating and Maintenance programs are well established and functioning to ensure that remedial systems remain in effective service.

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.

N/A

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C-AREA BURNING/RUBBLE PIT (CBRP) OPERABLE UNIT (131-C)

I. Introduction

This report documents the second five-year review for the C-Area Burning/Rubble Pit (CBRP) Operable Unit (OU). The final Record of Decision (ROD) for the CBRP OU has been issued. However, the following is a review of the interim action performed at the OU since this review was conducted from August 2007 through September 2007 before the ROD was issued.

II. OU Chronology

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

Table 1. Chronology of OU Events

| Event | Date |
|---|--------------------|
| RFI/RI Field Start | August 22, 1995 |
| Interim Record of Decision (ROD) issuance | September 30, 1998 |
| Interim Remedial Action start | January 12, 1999 |
| Previous Five-Year Review | February 12, 2004 |
| FS Rev 1.2 Submittal | June 9, 2004 |
| Remedial Investigation (RI) complete | September 30, 2004 |
| ROD Issuance | June 25, 2008 |

III. Background

Physical Characteristics

Figure 1 shows the location of the CBRP OU at Savannah River Site (SRS). Figure 2 shows the site layout.

Land and Resource Use

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

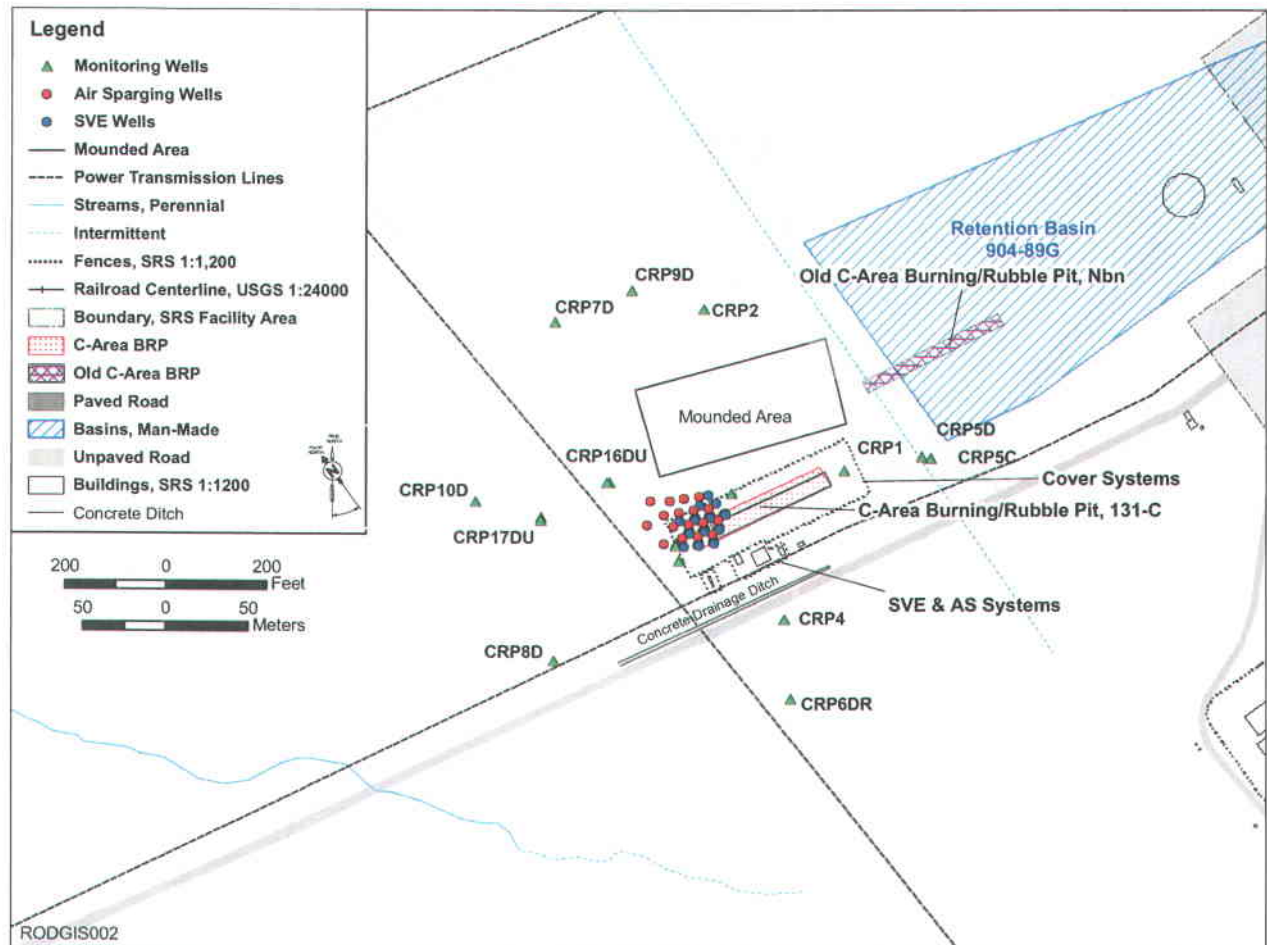


Figure 2. Site Layout for the C-Area Burning/Rubble Pit (CBRP) Operable Unit (OU)

History of Contamination

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 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 mounded area, approximately 30 ft high, is located directly north of the CBRP OU. It is covered with soil from the excavation of the C Reactor retention basin, located to the east of the CBRP OU. 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 Resource Conservation and Recovery Act (RCRA) Facility Investigation/Remedial Investigation/Baseline Risk Assessment (RFI/RI/BRA) assessment. Groundwater beneath CBRP is included as a subunit of this OU.

Initial Response

Effectiveness Monitoring Reports (EMRs) have presented the evidence that the Interim Remedial Action (IRA) has broken the pathway from vadose zone soils to groundwater. The core team determined that the IRA had achieved its goals during a comment resolution meeting on the 2003 EMR and successful completion was documented on

September 30, 2004. Upon achieving the IRA objectives, the soil vapor extraction (SVE) and air sparge (AS) system were shut down, and an active solar-powered Microblower system was installed for continued residual vapor extraction.

Over 2,100 lb of volatile organic compounds (VOCs) were removed from vadose zone soils by the active SVE system between 1999 and 2004 and subsequently, groundwater concentrations beneath the source zone were reduced from greater than 130,000 µg/L to approximately 100 µg/L measured at monitoring well CRP-27DU adjacent to the source zone. The groundwater plume extends from CBRP to the surface waters. The sporadic detection of the VOCs in the surface water is indicative of the periodic disposal pattern for the VOCs in the CBRP during operation of the facility for disposal, which resulted in a heterogeneous distribution of VOCs in the plume.

Surface water in the wetland areas of Twin Lakes and Fourmile Branch has sporadically contained levels of trichloroethylene (TCE), dichloroethylen (DCE), and vinyl chloride (VC) (DCE and VC are degradation products of TCE). Only TCE and VC have exceeded their respective maximum contaminant level (MCL) in surface water. However, the most recent surface water monitoring results from 2006 did not contain levels of any contaminant that exceeded their respective MCL.

IV. Remedial Actions

Remedy Selection

An interim action principally designed to control the migration of high concentrations of solvents from the vadose zone in to 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 within the 25,000 µg/L volatile organic compound (VOC) isocontour of the groundwater with an objective to reduce concentrations and control the migration of VOCs using in situ SVE. In 2004, the SVE system was replaced with microblowers, which continued to provide active SVE at a slower rate.

Upon achieving the interim remedial action objectives in 2004, the SVE system and AS system were shut down, and an active solar-powered Microblower system was installed for continued residual vapor extraction. The MNA remedy will be evaluated based on groundwater monitoring data as defined in the approved CMI/RAIP for the CBRP OU.

Remedy Implementation

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

Operations and Maintenance

The approved Final Action ROD (2008), which includes groundwater as a subunit, requires the existing soil cover system to be maintained in order to reduce infiltration and the existing active Microblowers will continue to operate. Institutional controls will remain, and monitored natural attenuation (MNA) remedy will be implemented. Through the implementation of the MNA remedy, groundwater concentrations will be reduced within a reasonable time frame (70 years), thereby reducing surface water concentrations, institutional controls, and surface water monitoring. The MNA remedy will be evaluated based on groundwater monitoring data as defined in the approved CMI/RAIP for the CBRP OU.

V. Progress Since Last Review

In the vicinity of the pit, treat the groundwater with volatile organic compound (VOC) contamination exceeding 25,000 µg/L. The treatment objective is to reduce concentrations and control migration of VOCs through in-situ SVE. In 2004, the SVE system was replaced with microblowers, which continued to provide active SVE at a slower rate of removal.

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 conclusions are as follows:

- Inspections of the soil cover are being performed and indicate no problems have occurred.
- The soil cover will continued to be maintained and will continue to reduce infiltration to minimize further migration of CMCOs to the groundwater from soils within and beneath the CBRP OU. The soil cover will also serve as a barrier to prevent exposure of ecological receptors to surface soil contaminants.
- The SVE system was operated as designed and has removed over 2,100 lb of VOCs. The active SVE system began full-scale operation in 1999, and successfully removed

VOCs until 2004 when it was replaced by microblowers, which continue to provide active SVE at a slower rate of removal.

- The microblower system, which was installed in 2004, has continued to break the solvent migration pathway from the source zone to the groundwater underneath the pit.
- Both groundwater and surface water monitoring data indicate a decreasing trend of TCE concentration over time.
- Institutional controls are in place and have been implemented to provide access control and prevent exposure as designed.
- 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.

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. The MNA remedy will be evaluated based on groundwater monitoring data as defined in the approved CMI/RAIP for the CBRP OU.

X. Project Costs

Costs associated with the selected remedy for CBRP include operation and maintenance costs of maintaining the existing cover, air sparging, soil extraction, and institutional controls. The estimated operation and maintenance cost associated with the selected remedy is \$1,220,000. This is a present worth cost, including 30 years of maintenance activities. After characterization and effectiveness of the remedy were evaluated, the

actual operation and maintenance cost for the CBRP was assessed. The total actual operation and maintenance cost from project support and other post-construction expense to fiscal year 2006 is \$642,827.

XI. Protectiveness Statement(s)

The interim action of SVE for the vadose zone and AS with SVE for the groundwater is expected to remain protective of human health and the environment. Land use, exposure pathways, COCs, and risk assessment methodologies have not changed in a way that affects the protectiveness of the remedy. Upon issuance of the final ROD, this interim measure will become part of a total remedial action, which is also expected to be protective of human health and the environment.

XII. Next Review

The next five-year review is scheduled for February 12, 2014.

ATTACHMENT 1
List of Documents Reviewed

WSRC-RP-96-170, *RCRA Facility Investigation (RFI)/Remedial Investigation (RI) Report with Baseline Risk Assessment (BRA) for the C-Area Burning/Rubble Pit (OU)*, Revision 1.4, 2002, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

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

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

WSRC-RP-2007-4004, *Statement of Basis/Proposed Plan for the C-Area Burning/Rubble Pit Operable Unit (CBRP) (U)*, Revision 0, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

WSRC-RP-2007-4082, *Record of Decision for Remedial Alternative Selection for the C-Area Burning/Rubble Pit Operable Unit (131-C) and Old C-Area Burning/Rubble Pit (NBN) (U)*, Revision 1, Washington Savannah River Company, Savannah River Site, Aiken, SC

ATTACHMENT 2

Five-Year Review Site Inspection Checklist

| I. SITE INFORMATION | | | | | | | | | | | | | | | |
|---|---|------------------------------------|---|--|---|---|--|--|---|---|--|---|--|---|--|
| Site Name: | C-Area Burning/Rubble Pit (131-C) | Date of Inspection: | 9/05/2007 | | | | | | | | | | | | |
| Location and Region: | Savannah River Site, USEPA IV | EPA ID: | SC1890008989 | | | | | | | | | | | | |
| Agency, office, or company leading the five-year review: | United States Department of Energy | CERCLIS OU No.: | 31 | | | | | | | | | | | | |
| | | Weather/Temperature: | clear and sunny, 90°F | | | | | | | | | | | | |
| Remedy Includes: (Check all that apply) <table border="0"><tr><td><input checked="" type="checkbox"/> Cover System</td><td><input checked="" type="checkbox"/> Monitored Natural Attenuation</td></tr><tr><td><input checked="" type="checkbox"/> Access controls</td><td><input type="checkbox"/> Groundwater Containment</td></tr><tr><td><input checked="" type="checkbox"/> Institutional Controls</td><td><input type="checkbox"/> Vertical Barrier Walls</td></tr><tr><td><input type="checkbox"/> Groundwater pump and treatment</td><td></td></tr><tr><td><input type="checkbox"/> Surface water collection and treatment</td><td></td></tr><tr><td colspan="2"><input checked="" type="checkbox"/> Other: <u>Operation of existing active Microblowers</u></td></tr></table> | | | | <input checked="" type="checkbox"/> Cover System | <input checked="" type="checkbox"/> Monitored Natural Attenuation | <input checked="" type="checkbox"/> Access controls | <input type="checkbox"/> Groundwater Containment | <input checked="" type="checkbox"/> Institutional Controls | <input type="checkbox"/> Vertical Barrier Walls | <input type="checkbox"/> Groundwater pump and treatment | | <input type="checkbox"/> Surface water collection and treatment | | <input checked="" type="checkbox"/> Other: <u>Operation of existing active Microblowers</u> | |
| <input checked="" type="checkbox"/> Cover System | <input checked="" type="checkbox"/> Monitored Natural Attenuation | | | | | | | | | | | | | | |
| <input checked="" type="checkbox"/> Access controls | <input type="checkbox"/> Groundwater Containment | | | | | | | | | | | | | | |
| <input checked="" type="checkbox"/> Institutional Controls | <input type="checkbox"/> Vertical Barrier Walls | | | | | | | | | | | | | | |
| <input type="checkbox"/> Groundwater pump and treatment | | | | | | | | | | | | | | | |
| <input type="checkbox"/> Surface water collection and treatment | | | | | | | | | | | | | | | |
| <input checked="" type="checkbox"/> Other: <u>Operation of existing active Microblowers</u> | | | | | | | | | | | | | | | |
| Attachments: <input type="checkbox"/> Inspection team roster attached <input type="checkbox"/> Site map attached | | | | | | | | | | | | | | | |
| II. INTERVIEWS (Check all that apply) | | | | | | | | | | | | | | | |
| 1. O & M Site Manager | | | | | | | | | | | | | | | |
| | (Name) _____ | (Title) _____ | (Date) _____ | | | | | | | | | | | | |
| Interviewed: | <input type="checkbox"/> at site | <input type="checkbox"/> at office | <input type="checkbox"/> by phone Phone No. _____ | | | | | | | | | | | | |
| Problems, suggestions: | <input type="checkbox"/> report attached _____ | | | | | | | | | | | | | | |
| 2. O & M Staff | | | | | | | | | | | | | | | |
| | (Name) _____ | (Title) _____ | (Date) _____ | | | | | | | | | | | | |
| Interviewed: | <input type="checkbox"/> at site | <input type="checkbox"/> at office | <input type="checkbox"/> by phone Phone No. _____ | | | | | | | | | | | | |
| Problems, suggestions: | <input type="checkbox"/> report attached _____ | | | | | | | | | | | | | | |

Five-Year Review Site Inspection Checklist (Continued)

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

| | | | |
|---|--|-------------------------------------|------------------------------|
| <input type="checkbox"/> O & M Manual | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |
| x As-built drawings | x Readily available | x Up to date | <input type="checkbox"/> N/A |
| <input type="checkbox"/> Maintenance Logs | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |

Remarks: See Waste Unit Inspection and Maintenance, ER-SOP-019

Five-Year Review Site Inspection Checklist (Continued)

| | | | |
|---|--|-------------------------------------|-------|
| 2. Site-Specific Health and Safety Plan | | | |
| <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A | |
| <input type="checkbox"/> Contingency plan/emergency response plan | | | |
| <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A | |
| Remarks: <u>Routine O&M activities do not require an SSHASP Under 29 CFR 1910.1201,HAZWOPER</u> | | | |
| 3. O & M and OSHA Training Records | | | |
| x Readily available | x Up to date | <input type="checkbox"/> N/A | |
| Remarks: _____ | | | |
| 4. Permits and Service Agreements | | | |
| <input type="checkbox"/> Air discharge permit | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |
| <input type="checkbox"/> Effluent discharge | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |
| <input type="checkbox"/> Waste Disposal, POTW | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |
| <input type="checkbox"/> Other permits | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |
| Remarks: _____ | | | |
| 5. Gas Generation Records | | | |
| <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A | |
| Remarks: _____ | | | |
| 6. Settlement Monument Records | | | |
| <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A | |
| Remarks: _____ | | | |
| 7. Groundwater Monitoring Records | | | |
| <input type="checkbox"/> Readily available | x Up to date | x N/A | |
| Remarks: _____ | | | |
| 8. Leachate Extraction Records | | | |
| <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A | |
| Remarks: _____ | | | |
| 9. Discharge Compliance Records | | | |
| <input type="checkbox"/> Air | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |
| <input type="checkbox"/> Water (effluent) | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |
| Remarks: _____ | | | |
| 10. Daily Access/Security Logs | | | |
| <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A | |
| Remarks: _____ | | | |

Five-Year Review Site Inspection Checklist (Continued)

IV. O & M Costs

1. O & M Organization

- ☐ State in-house ☐ Contractor for State
☐ PRP in-house ☐ Contractor for PRP
x Other: SRS

2. O & M Cost Records

- ☐ Readily available ☐ Up to date ☐ Funding mechanism/agreement in place
x Other: Project cost data is summarized in Section X of attached review: WSRC-RP-2007-4063

Total annual cost by year for review period if available

| | | |
|---------------------|------------|---|
| From _____ To _____ | _____ | <input type="checkbox"/> Breakdown attached |
| (Date) (Date) | Total cost | |
| From _____ To _____ | _____ | <input type="checkbox"/> Breakdown attached |
| (Date) (Date) | Total cost | |
| From _____ To _____ | _____ | <input type="checkbox"/> Breakdown attached |
| (Date) (Date) | Total cost | |
| From _____ To _____ | _____ | <input type="checkbox"/> Breakdown attached |
| (Date) (Date) | Total cost | |
| From _____ To _____ | _____ | <input type="checkbox"/> Breakdown attached |
| (Date) (Date) | Total cost | |

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

Describe costs and reasons: _____

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

A. Fencing

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

Remarks _____

Five-Year Review Site Inspection Checklist (Continued)

B. Other Access Restrictions

1. **Signs and Other Security Measures** ☐ Location shown on site map ☐ N/A

Remarks: Signs at this site are in good condition

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: Annually

Responsible party/agent: DOE Savannah River Field Office

Contact: K. M. Adams, Waste Area Group Manager 9/3/07 (803) 952-7871
(Name) (Title) (Date) (Phone No.)

Reporting 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: _____

Five-Year Review Site Inspection Checklist (Continued)

| | |
|--|---------------------------|
| 3. Land use Changes Offsite <input checked="" type="checkbox"/> N/A | |
| Remarks _____ | |
| | |
| VI. GENERAL SITE CONDITIONS | |
| A. Roads <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A | |
| 1. Roads Damaged <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Roads adequate <input type="checkbox"/> N/A | |
| Remarks _____ | |
| | |
| B. Other Site Conditions | |
| Remarks _____ | |
| | |
| VII. COVERS SYSTEMS <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A | |
| A. Soil Surface | |
| 1. Settlement (Low spots) <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Settlement not evident | |
| Areal extent _____ | Depth _____ |
| Remarks: _____ | |
| | |
| 2. Cracks <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Cracking not evident | |
| Lengths _____ | Widths _____ Depths _____ |
| Remarks _____ | |
| | |
| 3. Erosion <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Erosion not evident | |
| Areal extent _____ | Depth _____ |
| Remarks _____ | |
| | |
| 4. Holes <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Holes not evident | |
| Areal extent _____ | Depth _____ |
| Remarks _____ | |
| | |
| 5. Vegetative Cover <input checked="" type="checkbox"/> Grass <input type="checkbox"/> Cover properly established <input checked="" type="checkbox"/> No signs of stress | |
| <input type="checkbox"/> Trees/shrubs (indicate size and location on a diagram) | |
| _____ | |
| | |

Five-Year Review Site Inspection Checklist (Continued)

| | | |
|--|---|--------------------|
| 6. Alternative Cover (armored rock, concrete, etc.) x N/A | | |
| Remarks: _____ | | |
| 7. Bulges <input type="checkbox"/> Location shown on site map x Bulges not evident | | |
| Areal extent _____ Height _____ | | |
| Remarks _____ | | |
| 8. Wet Areas/Water Damage x Wet areas/water damage not evident | | |
| <input type="checkbox"/> Wet Areas | <input type="checkbox"/> Location shown on site map | Areal extent _____ |
| <input type="checkbox"/> Ponding | <input type="checkbox"/> Location shown on site map | Areal extent _____ |
| <input type="checkbox"/> Seeps | <input type="checkbox"/> Location shown on site map | Areal extent _____ |
| <input type="checkbox"/> Soft subgrade | <input type="checkbox"/> Location shown on site map | Areal extent _____ |
| Remarks _____ | | |
| 9. Slope Instability <input type="checkbox"/> Slides <input type="checkbox"/> Location shown on site map x No evidence of slope instability | | |
| Areal extent _____ | | |
| Remarks _____ | | |
| B. Benches <input type="checkbox"/> Applicable x 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 <input type="checkbox"/> Location shown on site map <input type="checkbox"/> N/A or okay | | |
| Remarks _____ | | |
| 2. Bench Breached <input type="checkbox"/> Location shown on site map <input type="checkbox"/> N/A or okay | | |
| Remarks _____ | | |
| 3. Bench Overtopped <input type="checkbox"/> Location shown on site map <input type="checkbox"/> N/A or okay | | |
| Remarks _____ | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | |
|---|--|--|
| C. Letdown Channels <input type="checkbox"/> Applicable x 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 | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> No evidence of settlement |
| Areal extent _____ Depth _____ | | |
| Remarks _____ | | |
| 2. Material Degradation | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> No evidence of degradation |
| Material type _____ Areal extent _____ | | |
| Remarks _____ | | |
| 3. Erosion | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> No evidence of erosion |
| Areal extent _____ Depth _____ | | |
| Remarks _____ | | |
| 4. Undercutting | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> No evidence of undercutting |
| Areal extent _____ Depth _____ | | |
| Remarks _____ | | |
| 5. Obstructions | Type _____ | <input type="checkbox"/> No obstructions |
| <input type="checkbox"/> Location shown on site map | Areal extent _____ | Size _____ |
| Remarks _____ | | |
| 6. Excessive Vegetative Growth | Type _____ | |
| <input type="checkbox"/> No evidence of excessive growth | <input type="checkbox"/> Vegetation in channels does not obstruct flow | |
| <input type="checkbox"/> Location shown on site map | Areal extent _____ | |
| Remarks _____ | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | | |
|--|--|---|---|
| D. Cover Penetrations <input type="checkbox"/> Applicable x N/A | | | |
| 1. Gas Vents <input type="checkbox"/> Active <input type="checkbox"/> Passive | | | |
| <input type="checkbox"/> Properly secured/locked | <input type="checkbox"/> Functioning | <input type="checkbox"/> Routinely sampled | <input type="checkbox"/> Good condition |
| <input type="checkbox"/> Evidence of leakage at penetration | <input type="checkbox"/> Needs Maintenance | <input type="checkbox"/> N/A | |
| Remarks _____ | | | |
| _____ | | | |
| 2. Gas Monitoring Probes | | | |
| <input type="checkbox"/> Properly secured/locked | <input type="checkbox"/> Functioning | <input type="checkbox"/> Routinely sampled | <input type="checkbox"/> Good condition |
| <input type="checkbox"/> Evidence of leakage at penetration | <input type="checkbox"/> Needs Maintenance | <input type="checkbox"/> N/A | |
| Remarks _____ | | | |
| _____ | | | |
| 3. Monitoring Wells | | | |
| <input type="checkbox"/> Properly secured/locked | <input type="checkbox"/> Functioning | <input type="checkbox"/> Routinely sampled | <input type="checkbox"/> Good condition |
| <input type="checkbox"/> Evidence of leakage at penetration | <input type="checkbox"/> Needs Maintenance | <input type="checkbox"/> N/A | |
| Remarks _____ | | | |
| _____ | | | |
| 4. Leachate Extraction Wells | | | |
| <input type="checkbox"/> Properly secured/locked | <input type="checkbox"/> Functioning | <input type="checkbox"/> Routinely sampled | <input type="checkbox"/> Good condition |
| <input type="checkbox"/> Evidence of leakage at penetration | <input type="checkbox"/> Needs Maintenance | <input type="checkbox"/> N/A | |
| Remarks _____ | | | |
| _____ | | | |
| 5. Settlement Monuments <input type="checkbox"/> Located <input type="checkbox"/> Routinely surveyed <input type="checkbox"/> N/A | | | |
| Remarks _____ | | | |
| _____ | | | |
| E. Gas Collection and Treatment <input type="checkbox"/> Applicable x N/A | | | |
| 1. Gas Treatment Facilities | | | |
| <input type="checkbox"/> Flaring | <input type="checkbox"/> Thermal destruction | <input type="checkbox"/> Collection for reuse | |
| <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance | | |
| Remarks _____ | | | |
| _____ | | | |
| 2. Gas Collection Wells, Manifolds and Piping | | | |
| <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance | | |
| Remarks _____ | | | |
| _____ | | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | | |
|---|--|--|------------------------------|
| 3. Gas Monitoring Facilities (e.g., gas monitoring of adjacent homes or buildings) | | | |
| <input type="checkbox"/> Good condition | | <input type="checkbox"/> Needs Maintenance | <input type="checkbox"/> N/A |
| Remarks _____ | | | |
| F. Cover Drainage Layer <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A | | | |
| 1. Outlet Pipes Inspected <input type="checkbox"/> Functioning <input type="checkbox"/> N/A | | | |
| Remarks _____ | | | |
| 2. Outlet Rock Inspected <input type="checkbox"/> Functioning <input type="checkbox"/> N/A | | | |
| Remarks _____ | | | |
| G. Detention/sedimentation Ponds <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A | | | |
| 1. Siltation Areal extent _____ Depth _____ <input type="checkbox"/> N/A | | | |
| <input type="checkbox"/> Siltation not evident | | | |
| Remarks _____ | | | |
| 2. Erosion Areal extent _____ Depth _____ <input type="checkbox"/> N/A | | | |
| <input type="checkbox"/> Erosion not evident | | | |
| Remarks _____ | | | |
| 3. Outlet Works <input type="checkbox"/> Functioning <input type="checkbox"/> N/A | | | |
| Remarks _____ | | | |
| 4. Dam <input type="checkbox"/> Functioning <input type="checkbox"/> N/A | | | |
| Remarks _____ | | | |
| H. Retaining Walls <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A | | | |
| 1. Deformations <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Deformation not evident | | | |
| Horizontal displacement _____ | | Vertical displacement _____ | |
| Rotational displacement _____ | | | |
| Remarks _____ | | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | |
|--|--|--|
| 2. Degradation <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Deformation not evident | | |
| Remarks _____ | | |
| I. Perimeter Ditches/Off-Site Discharge <input type="checkbox"/> Applicable x N/A | | |
| 1. Siltation <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Siltation not evident | | |
| Areal extent _____ Depth _____ | | |
| Remarks _____ | | |
| 2. Vegetative Growth <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Siltation not evident | | |
| <input type="checkbox"/> Vegetation does not impede flow | | |
| Areal extent _____ Type _____ | | |
| Remarks _____ | | |
| 3. Erosion <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Erosion not evident | | |
| Areal extent _____ Depth _____ | | |
| Remarks _____ | | |
| 4. Discharge Structure <input type="checkbox"/> Location shown on site map <input type="checkbox"/> N/A | | |
| Remarks _____ | | |
| VIII. VERTICAL BARRIER WALLS <input type="checkbox"/> Applicable x N/A | | |
| 1. Settlement <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Settlement not evident | | |
| Areal extent _____ Depth _____ | | |
| Remarks _____ | | |
| 2. Performance Monitoring Type of Monitoring _____ <input type="checkbox"/> Performance not monitored | | |
| Frequency _____ <input type="checkbox"/> Evidence of breaching Head differential _____ | | |
| Remarks _____ | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | | |
|---|--|--|---|
| IX. GROUNDWATER/SURFACE WATER REMEDIES | | <input checked="" type="checkbox"/> Applicable | <input type="checkbox"/> N/A |
| A. Groundwater Extraction Wells, Pumps, and Pipelines | | <input type="checkbox"/> Applicable | <input checked="" type="checkbox"/> N/A |
| 1. Pumps, Wellhead Plumbing, and Electrical <input type="checkbox"/> Good condition <input type="checkbox"/> All required wells located <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A Remarks _____ _____ | | | |
| 2. Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____ _____ | | | |
| 3. Spare Parts and Equipment <input type="checkbox"/> Readily available <input type="checkbox"/> Good condition <input type="checkbox"/> Requires upgrade <input type="checkbox"/> Needs to be provided Remarks _____ _____ | | | |
| B. Surface Water Collection Structures, Pumps, and Pipelines | | <input type="checkbox"/> Applicable | <input checked="" type="checkbox"/> N/A |
| 1. Collection Structures, Pumps, and Electrical <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____ _____ | | | |
| 2. Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____ _____ | | | |
| 3. Spare Parts and Equipment <input type="checkbox"/> Readily available <input type="checkbox"/> Good condition <input type="checkbox"/> Requires upgrade <input type="checkbox"/> Needs to be provided Remarks _____ _____ | | | |

Five-Year Review Site Inspection Checklist (Continued)

| C. Treatment System | <input type="checkbox"/> Applicable | <input checked="" type="checkbox"/> N/A |
|--|--|---|
| 1. Treatment Train (Check components that apply) | | |
| <input type="checkbox"/> Metals removal | <input type="checkbox"/> Oil/water separation | <input type="checkbox"/> Bioremediation |
| <input type="checkbox"/> Air stripping | <input type="checkbox"/> Carbon adsorbers | |
| <input type="checkbox"/> Filters | | |
| <input type="checkbox"/> Additive (e.g., chelation agent, flocculent) | | |
| <input type="checkbox"/> Others | | |
| <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance | |
| <input type="checkbox"/> Sampling ports properly marked and functional | | |
| <input type="checkbox"/> Sampling/maintenance log displayed and up to date | | |
| <input type="checkbox"/> Equipment properly identified | | |
| <input type="checkbox"/> Quantity of groundwater treated annually | | |
| <input type="checkbox"/> Quantity of surface water treated annually | | |
| Remarks | | |
| | | |
| 2. Electrical Enclosures and Panels (properly rated and functional) | | |
| <input type="checkbox"/> N/A | <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance |
| Remarks | | |
| | | |
| 3. Tanks, Vaults, Storage Vessels | | |
| <input type="checkbox"/> N/A | <input type="checkbox"/> Good condition | <input type="checkbox"/> Proper secondary containment |
| Maintenance | | <input type="checkbox"/> Needs |
| Remarks | | |
| | | |
| 4. Discharge Structure and Appurtenances | | |
| <input type="checkbox"/> N/A | <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance |
| Remarks | | |
| | | |
| 5. Treatment Building(s) | | |
| <input type="checkbox"/> N/A | <input type="checkbox"/> Good condition (esp. roof and doorways) | <input type="checkbox"/> Needs repair |
| <input type="checkbox"/> Chemicals and equipment properly stored | | |
| Remarks | | |
| | | |

Five-Year Review Site Inspection Checklist (Continued)

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 maintaining soil cover system, operation of the existing active Microblowers, institutional controls, and Monitored Natural Attenuation for the groundwater.

The remedy seems to be fully established 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.

Through the implementation of the MNA remedy, groundwater concentrations are reducing thereby reducing surface water concentrations, institutional controls, and surface monitoring.

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)

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.

N/A

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C-AREA REACTOR GROUNDWATER OPERABLE UNIT

I. Introduction

This is the first five-year review for the C-Area Reactor Groundwater (CRGW) operable unit (OU). The final Record of Decision (ROD) has not been issued. This review was conducted from August 2007 through September 2007. 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 CRGW OU.

Table 1. Chronology of OU Events

| Event | Date |
|---|---------------------------------|
| RFI/RI Field Start | February 20, 2002 |
| Interim Record of Decision (ROD) issuance | September 13, 2004 |
| FS Rev 1.1 Submittal | July 18, 2005 |
| Interim Remedial Action start | September 30, 2005/June 5, 2006 |
| Interim Operations and Management ended (transferred to Decontamination and Decommissioning Facility) | September 28, 2006 |
| Previous Five-Year Reviews | None |

III. Background

Physical Characteristics

Figure 1 shows the location of the CRGW OU at Savannah River Site (SRS). CRGW is located in the west-central portion of SRS, entirely within the Fourmile Branch watershed (see Figure 1). CRGW encompasses all of the groundwater below C Area, north to unnamed tributaries of Fourmile Branch, west to Fourmile Branch, and south to Castor Creek.

Land and Resource Use

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

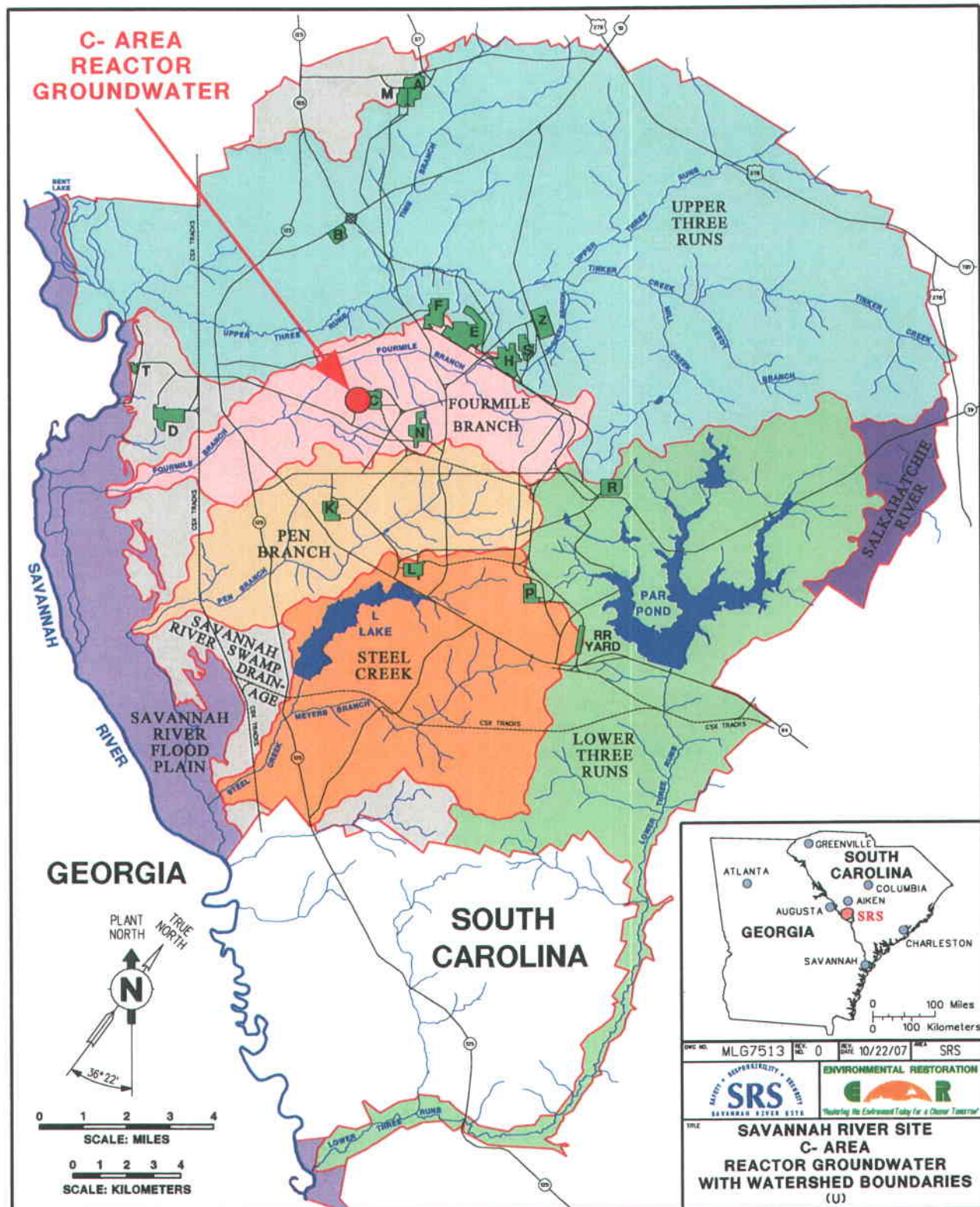


Figure 1. Location of the CRGW OU within the Savannah River Site

History of Contamination

C-Reactor operated from March 1955 until June 1985; C-Reactor was placed on cold standby in 1987. Trichloroethylene (TCE) was released to the soil at a manhole along a storm sewer line south of the C-Reactor building. The TCE plume extends from the manhole and forms a groundwater plume that ultimately discharges to a surface water body. Figure 2 shows the location of the TCE vadose zone (the unsaturated zone above the water table) source relative to the reactor building and the location of soil borings, cone penetrometer tests (CPTs), and monitoring wells.

Initial Response

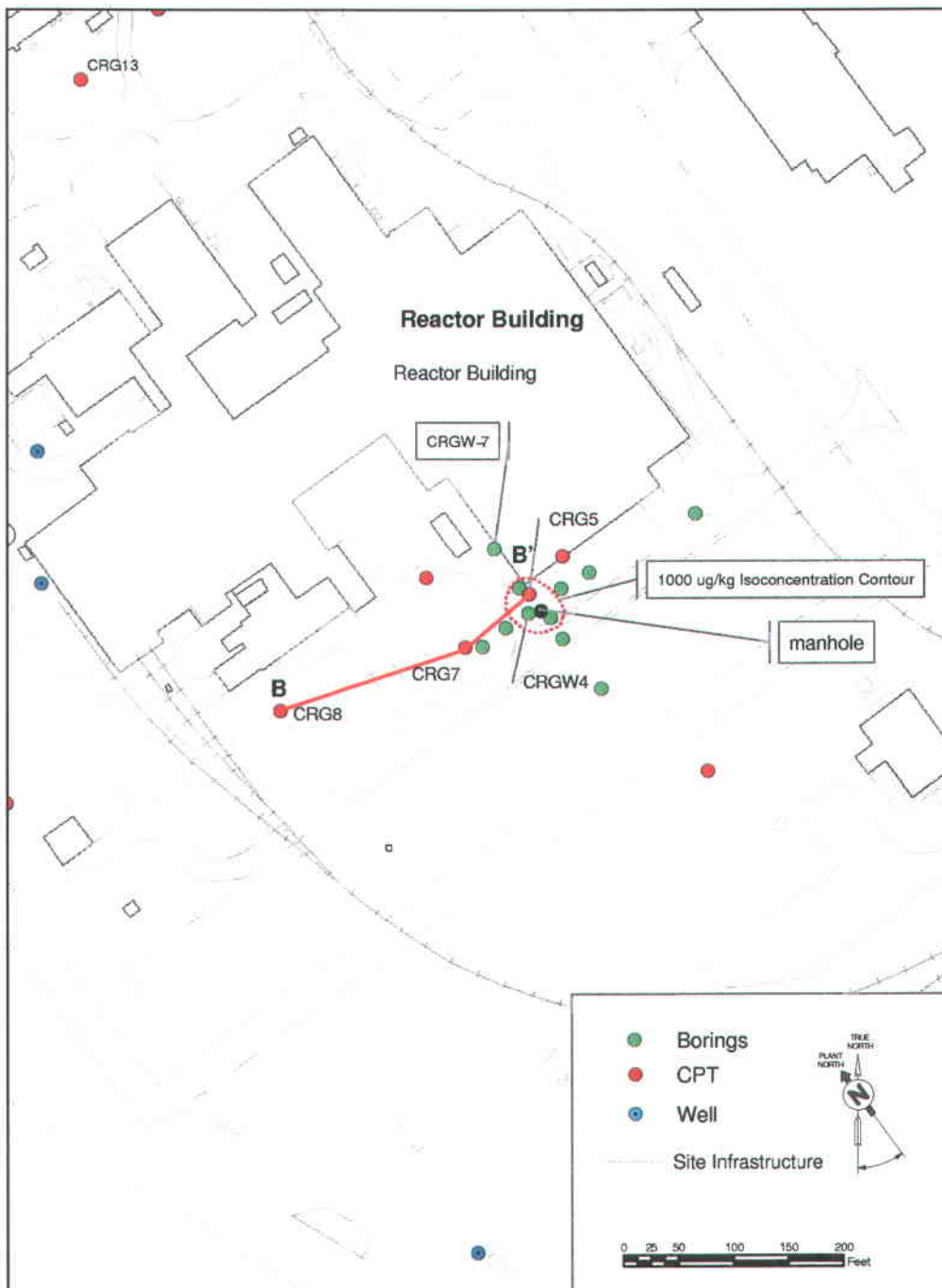
The geometry of the TCE vadose zone source addressed by the Interim Remedy was assumed to be a cylinder approximately 60 ft in diameter extending 70 ft below ground surface (bgs). The area is labeled as the 1,000 µg/kg isoconcentration contour on Figure 2.

IV. Remedial Actions

Remedy Selection

The interim action for CRGW minimized the impact of CRGW on the watershed by removing the principal threat waste from the source unit. Specifically, the objective of the interim action was to treat the vadose zone source area, where it exceeded the MCL for TCE by 2,600 times (13,100 µg/L divided by 5 µg/L) to reduce concentrations and control the migration of TCE.

The selected interim action remedy for the TCE vadose zone source unit at CRGW is electrical resistance heating (ERH) with soil vapor extraction (SVE). A single six-phase heating array consisting of six input electrode/SVE wells equally spaced around the circumference of a 30-ft diameter circle and a central neutral electrode/SVE well was centered on the highest contaminant levels in the TCE source.



CGW005GIS

Figure 2. Layout of the TCE Vadose Zone Source Unit at CRGW

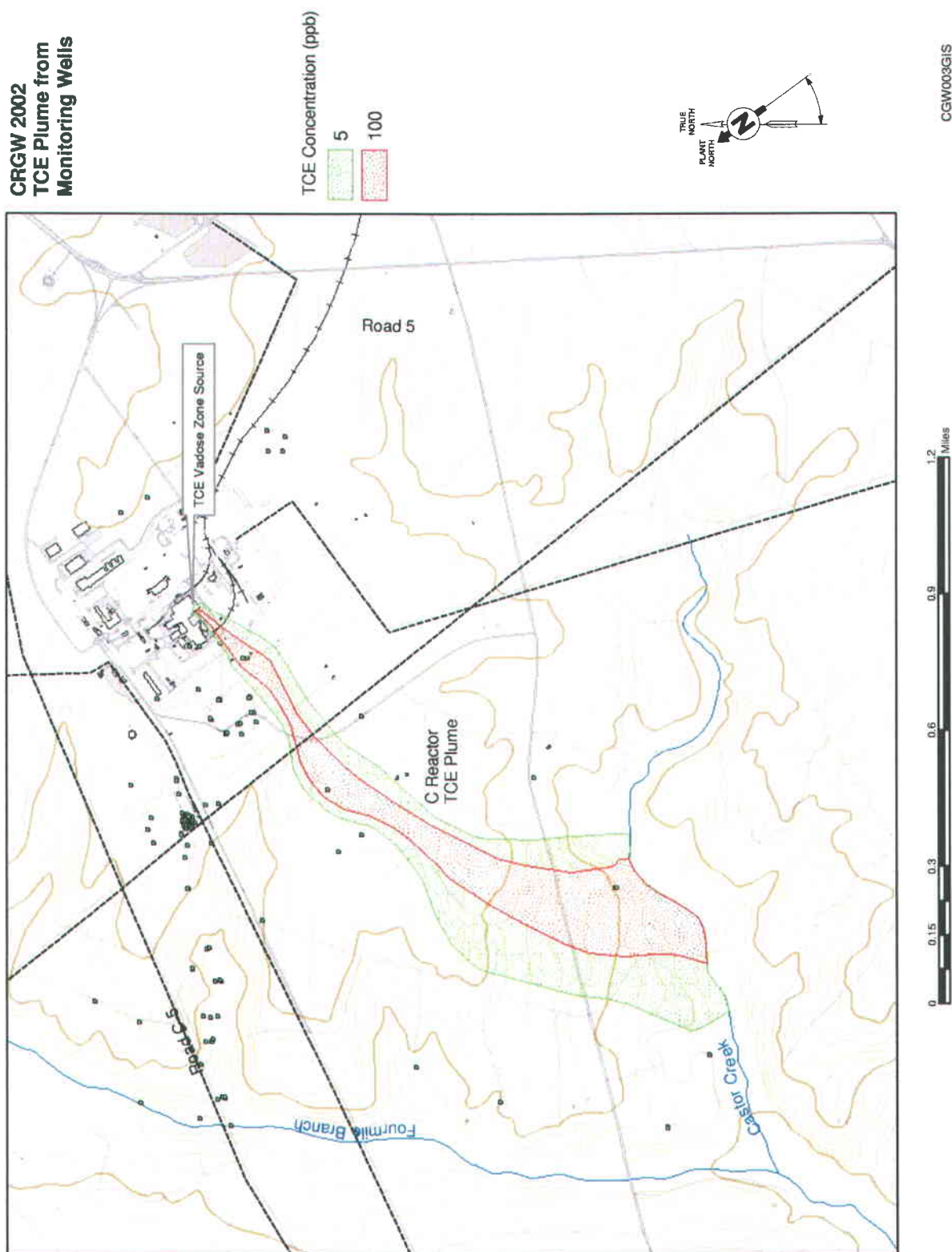


Figure 3. CRGW TCE Plume Map for Upper Three Runs Aquifer

ERH-SVE was demonstrated near M Area at SRS in November 1993. During the 25-day demonstration, initial concentrations of 4,529 µg/kg tetrachloroethylene (PCE) and 181 µg/kg TCE were reduced by 99.7%. The calculated mass half-life (the period in which contaminant mass is reduced by one half) for PCE and TCE in the M-Area demonstration is about 3 days. PCE boils at 121°C and TCE boils at 86.7°C, so a TCE-dominated system would probably have a shorter mass half-life.

According to the Interim Record of Decision (IROD), the shutdown criterion for the interim remedial action (IRA) was that the temperature in the treatment zone had to exceed 189°F (boiling point of TCE) for at least 30 days cumulatively. The temperature in two depth intervals, 26 ft and 49 ft, was measured using thermocouples. Heating began on June 15 and by July 5, the average temperature of the deepest soil exceeded the target temperature of 189°F. The shallower soil exceeded the target temperature by July 13. SRS decided to continue heating beyond the 30-day criterion to increase the potential removal of VOCs. The heating was discontinued on August 15 for the deeper soil and September 7 for the shallower soil.

As the soil is heated, the VOCs become more mobile to allow for removal by the SVE system. This also allows the VOCs to migrate more readily to the groundwater until the vapors have been removed from the subsurface. Accordingly, temporary increases in groundwater concentrations are a known impact from ERH deployments. ERH operated from June 15 to September 7, 2006, which corresponds with the lowest and highest groundwater concentrations shown in Figure 4. The temporary increase during ERH operations quickly declines to previous concentrations. Since the ERH has facilitated the removal of VOCs from the vadose zone, the groundwater VOC concentrations are anticipated to continue this declining trend. Initially the 12,000 ppb peak doubled from what was a 5,000 ppb average. The temporary increase during ERH operations was no quicker than the post-operations decrease back down to 6,850 ppb in the latest February 2007 sampling round. Now that the TCE source has been removed, the groundwater concentrations will continue this declining trend. Soil sampling was conducted in 2006 to determine the efficiency of the ERH system. On the average, the

removal was greater than 99% of the original TCE. Average concentrations were reduced from 6.31 mg/kg to 0.039 mg/kg. The data is presented in the Report on the Effectiveness of the Vadose Source Unit at C Reactor Groundwater (VCRGW) OU, WSRC-RP-2007-4006

Remedy Implementation

Implementation of the interim remedial action objective for the TCE vadose zone source unit at CRGW reduced TCE concentrations in the source unit so that any leaching of the contaminant will not cause groundwater to exceed the MCL (5.0 µg/L). The ERH-SVE system, which includes seven electrode/SVE wells, was installed and operated in the vadose zone source unit at the CRGW OU unit. Two SVE wells and two electrodes were installed in a single large well boring at each of the seven locations. ERH uses the electrical resistance of soil to heat the soil in situ by passing an electrical current through the soil. The electrolyte drip tube was used to provide the means to inject an electrolyte solution into the electrode to increase conductivity between the electrode and the soil interface. The heat vaporizes VOCs in the soil. These vapors are withdrawn by the SVE system, via manifold to a vacuum pumping system, treated and discharged per an air quality control permit. Figure 5 is a generalized graphic of an ERH-SVE system.

Operations and Maintenance

The following actions will be maintained until the 2021 start of a final remedial action at CRGW:

- Install groundwater monitoring well CRW-21DR.
- Continue semi-annual groundwater monitoring at VCRGW to verify system performance at CRGW-1D, -20D, and -21DR for TCE. The monitoring will be reported in the next five-year remedy review report. This interim action monitoring data will be compiled and documented as part of the normal Comprehensive

Environmental Response, Compensation, and Liability Act (CERCLA) remedy selection process for the final action for CRGW.

- The IRAO has been achieved and active remediation has been discontinued; therefore, annual monitoring reports will not be submitted.

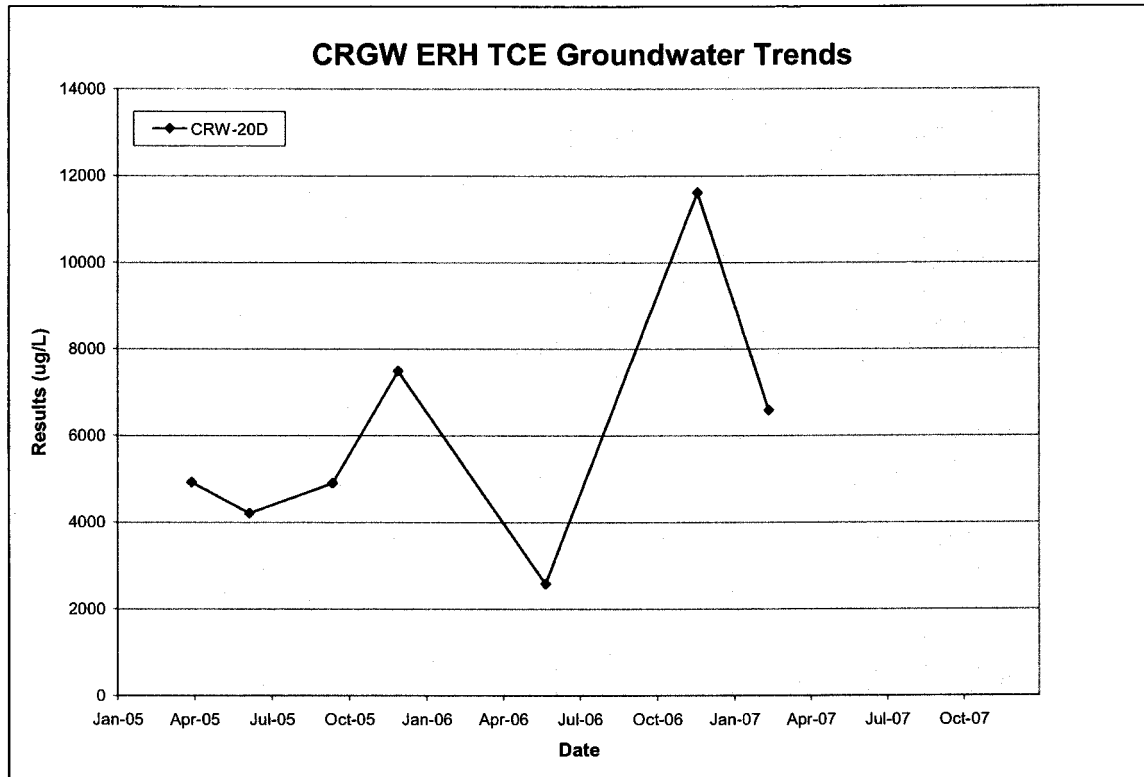


Figure 4. VCRGW ERH TCE Groundwater Trends at CRW-20D

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 are as follows:

- The SVE system removed a total of 730 lb of TCE, thereby reducing the concentrations and controlling the migration of the contaminant.
- Once the soil attained 189°F, the system operated longer than the required 30 days, which was followed by SVE only continuing through September 28, 2006.
- In addition to extending heating beyond the 30-day shutdown criteria, SVE only continued through September 28, 2006, to further decrease the potential for removing all traces of TCE, thereby achieving the IRAO.

VIII. Issues

There are no issues for this OU.

IX. Recommendations and Follow-up Actions

There are no recommendations or follow-up actions for the TCE vadose zone source unit.

X. Project Costs

Costs associated with the selected remedy for the CRGW include operation and maintenance costs. The estimated operation and maintenance cost associated with the ERH-SVE remedy is \$1,230,000. This estimate is an order-of-magnitude engineering

cost estimate that is expected to be within +50 to -30 percent of the actual project cost. The remedy was under construction in FY06; therefore, the actual operation and maintenance cost for the CRGW cannot be assessed at this time.

XI. Protectiveness Statement(s)

The interim action of ERH with SVE for the TCE vadose zone source unit at CRGW is protective of human health and the environment. In the interim, exposure pathways that could lead to unacceptable risk are being controlled through SRS 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 CRGW (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). These institutional controls will protect existing facilities and the health and safety of on-site workers and will monitor impact to local groundwater. Upon issuance of the final ROD, interim measures will become part of a total remedial action, which is also expected to be protective of human health and the environment.

XII. Next Review

The next five-year review is scheduled for February 12, 2014.

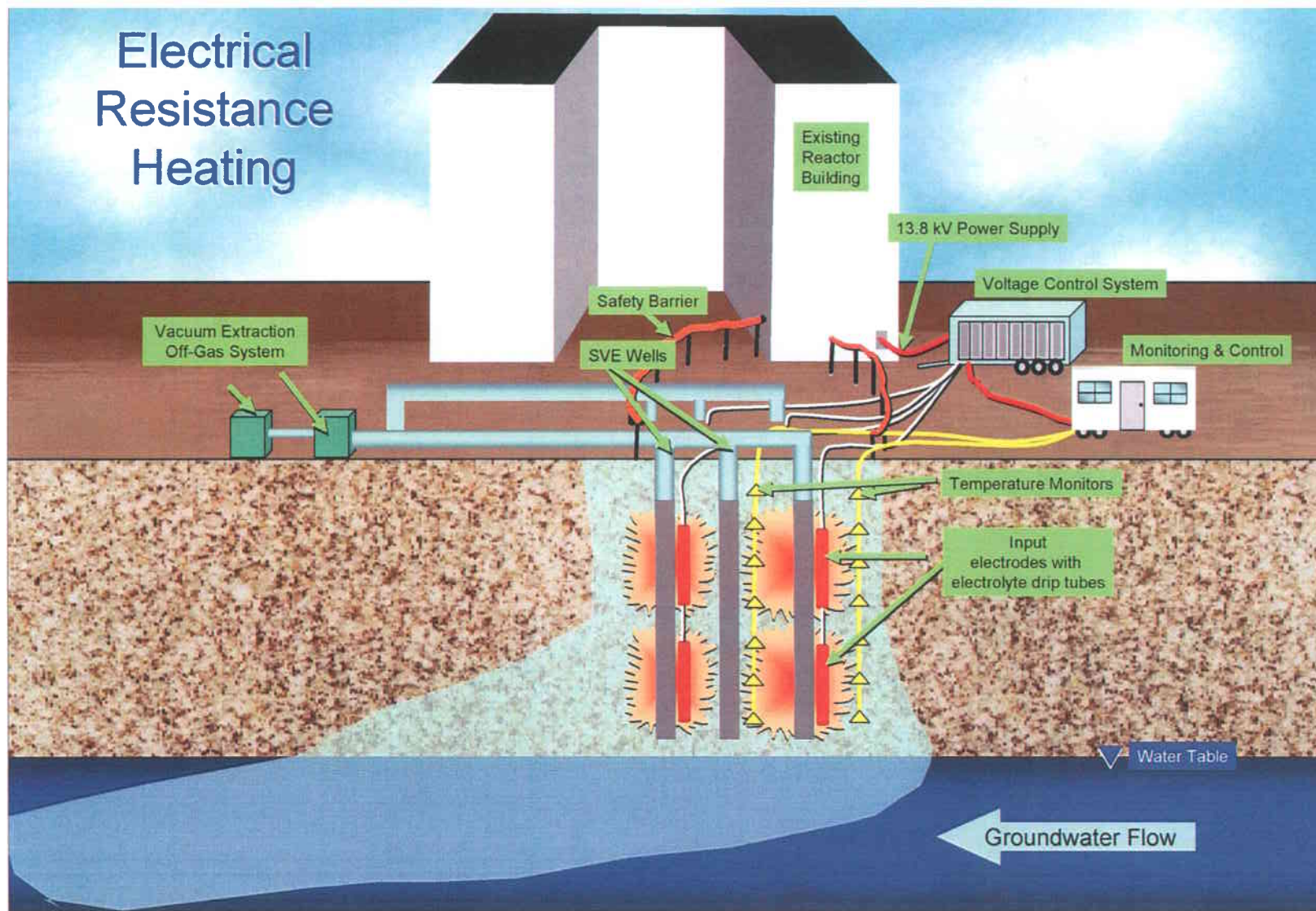


Figure 5. Generalized Graphic of an ERH/SVE System

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ATTACHMENT 1

List of Documents Reviewed

Tech ID 5 SCFA, United States Department of Energy, *Innovative Technology Summary Report: Six Phase Soil Heating; Demonstrated at U.S. Department of Energy; M Area Savannah River Site and 300-Area Hanford Site*, April 1995, USDOE Office of Environmental Management and Office of Technology Development, Aiken, SC and Richland, WA

WSRC-RP-2003-4073, *RCRA Facility Investigation/Remedial Investigation Report for the C-Area Reactor Groundwater (CRGW) Operable Unit (U)*, Revision 0, 2003, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

WSRC-RP-2003-4141, *Interim Action Proposed Plan for Remediation of the Trichloroethylene Vadose Zone Source Unit at the C-Reactor Groundwater Operable Unit (U)*, Revision 1.1, 2004, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

WSRC-RP-2004-4022, *Interim Record of Decision for the TCE Vadose Zone Source Unit at the CRGW OU (U)*, Revision 1, 2004, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

WSRC-RP-2004-4113, *Corrective Measures Study/Feasibility Study Report of the C-Reactor Groundwater Operable Unit (U)*, Rev. 1.1, October 2005, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

WSRC-RP-2004-4114, *Interim Remedial Action Implementation Plan for the TCE Vadose Zone Source Unit at the CRGW OU (U)*, Revision 1, 2005, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

WSRC-RP-2006-4032, *Interim Post-Construction Report for the TCE Vadose Zone Source Unit at the CRGW OU (U)*, Revision 1.1, 2007, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

WSRC-RP-2007-4006, Report on the Effectiveness of the TCE Vadose Source Unit at C Reactor Groundwater (VCRGW) OU Interim Remedial Action, Revision 1, April 2007, Washington Savannah River Company, Aiken, SC

C-AREA REACTOR SEEPAGE BASINS (904-66G, -68G) OPERABLE UNIT

I. Introduction

This is the second five-year review for the C-Area Reactor Seepage Basins (904-66G, -68G) (CRSB) Operable Unit (OU). This review was conducted from August 2007 through September 2007. 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 |
| RI Field Start | June 25, 1998 |
| Plug-In ROD | November 29, 1999 |
| ESD Issuance | August 31, 2000 |
| Remedial Action Start | February 5, 2001 |
| ROD Amendment | October 23, 2002 |
| Previous Five-Year Review | February 12, 2004 |

III. Background

Physical Characteristic

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. Prior to remediation, these basins were open and had not been backfilled to grade.

Groundwater beneath CRSB is not included as a subunit of this OU. Groundwater will be evaluated within the C-Area Reactor Groundwater (CRGW) OU. CRSB is one of multiple potential sources of groundwater contamination in C Area. In an effort to address large areas of groundwater contamination holistically, a CRGW OU was created. Monitoring at CRSB is being addressed through characterization of the CRGW OU. This

characterization identified only volatile organic compounds (VOCs) and tritium as constituents of concern (COCs).

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

Low-level radioactive purge water entered the basin via a 3-inch diameter polyethylene underground process sewer line that is approximately 800 ft 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 3). However, documentation for the metal chute is not available and its exact use is unknown.

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. Due to the plant uptake of radiological constituents, vegetation became radiologically contaminated. As the vegetation died, the potential for contamination spreading due to wind and bioturbation warranted action.



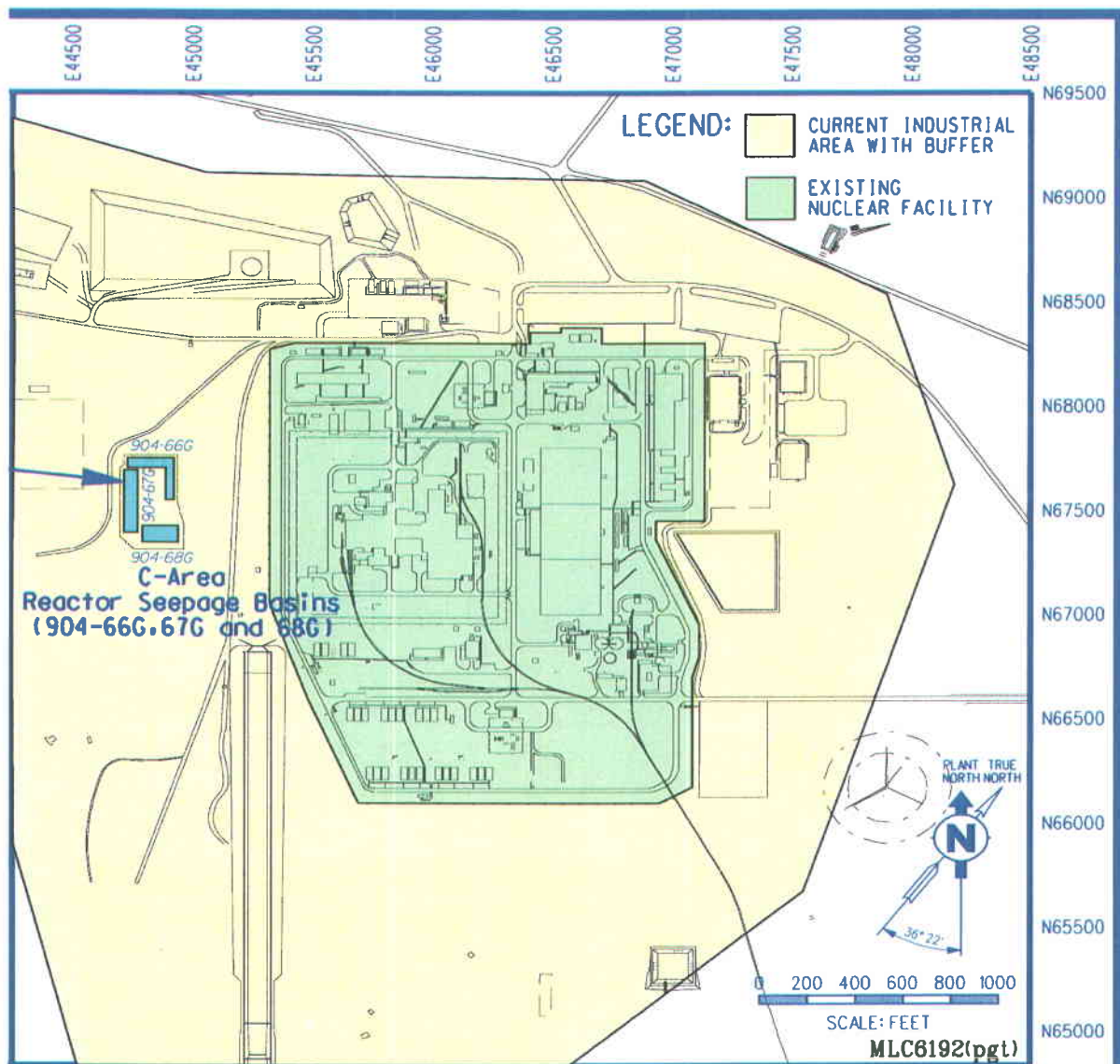


Figure 2. Location of the C-Area Reactor Seepage Basins (904-66G, -67G, -68G) Operable Unit at SRS within the Industrial Buffer Zone

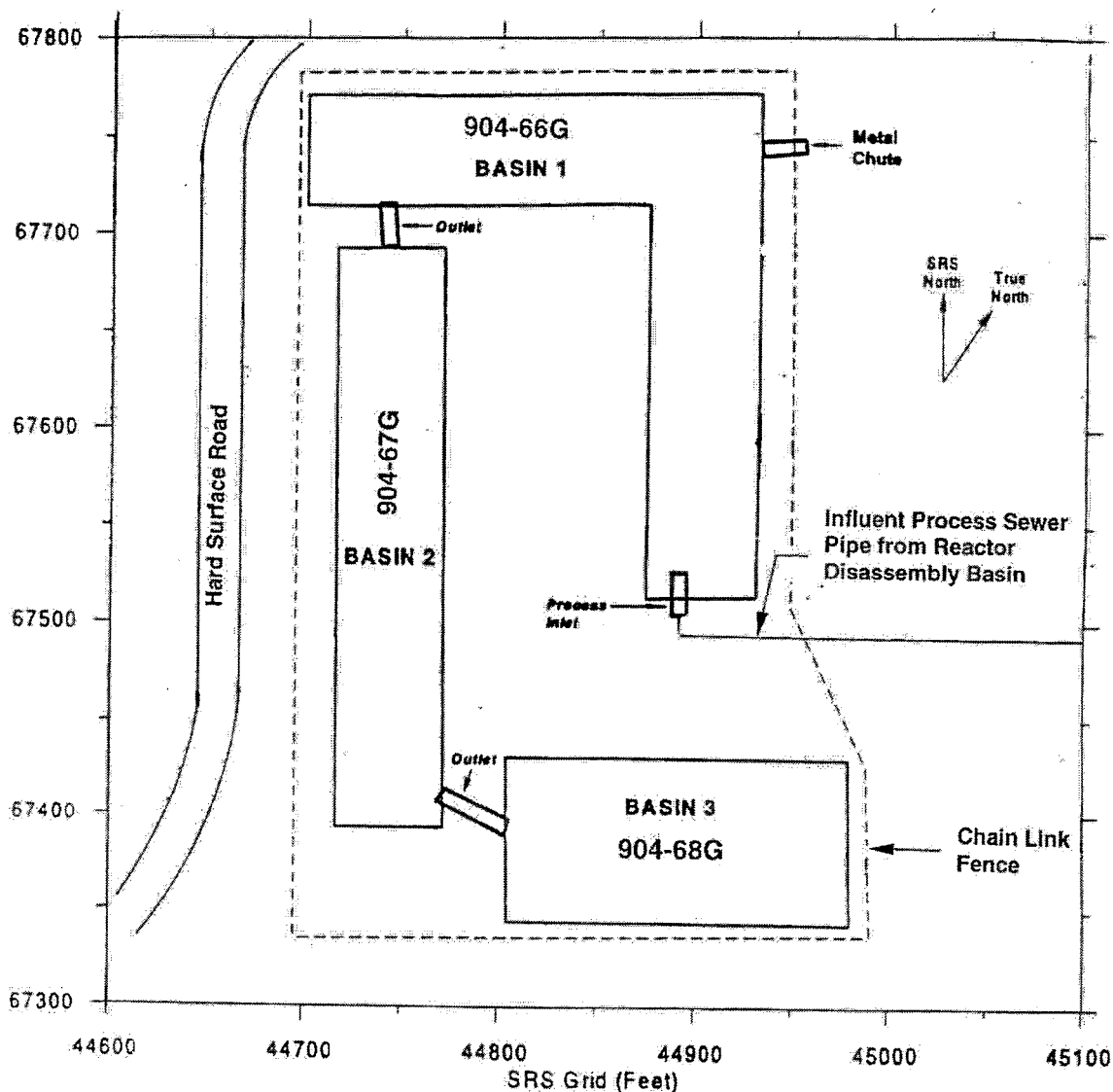


Figure 3. Layout of the C-Area Reactor Seepage Basins (904-66G, -67G, -68G) Operable Unit

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 via either 3-inch diameter polyethylene pipe or drums. While both options were available to convey wastewater, the primary source was via piping system from the Reactor Disassembly Basin. 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.

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. An Explanation of Significant Difference (ESD) to apply the Plug-In ROD remedy at the CRSB OU was approved in June 2000.

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 United States Department of Energy (USDOE), United States Environmental Protection Agency (USEPA), and South Carolina Department of Health and Environmental Control (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 Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)

Section 117. An amended ROD was approved for the CRSB to not grout basin 2 in November 2002. The amended ROD did not affect the Plug-In remedy for basins 1 and 3 at the CRSB. Review of CRSB basin 2 was performed as part of the remedy review of LRSB.

IV. Remedial Actions

Remedy Selection

The remedial action objectives for the unit are as follows:

- Prevent human exposure to contaminated basin soils (PTSM) by installing a low permeability soil cover. For soils present at PTSM levels, the remedy will also include implementing stabilization treatment to the extent practicable. Reduce risks to the future worker from surface soils (0 to 1 ft) outside the basin by establishing remedial goals (RGs) for 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.
- 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.

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 (e.g., replacing eroded or disturbed soil, sign repair, etc.) and vegetation management (e.g., mowing, removal of larger vegetation, etc.) will be performed when required.
- Institutional controls will be enforced.

V. Progress Since Last Review

This is the second five-year ROD review that the CRSB has undergone. Since the previous review in February 2004, the Post-Construction Report/Final Remediation Report was issued to document the field implementation of the RA for the closure of the CRSB OU.

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 is functioning as intended by the decision documents because stabilization is treating the PTSM, and a soil cover with institutional controls is providing access controls. Radioactive decay in Basin 2 has decreased the risk to future industrial works to lower than 1×10^{-3} as of 2002.
- 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 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. Project Costs

Costs associated with the selected remedy for CRSB include operation and maintenance costs of the cover and institutional controls. The estimated operation and maintenance cost associated with the selected remedy is \$1,135,945, which was discounted at 3.9%

per year. This is a present worth cost, including 30 years of maintenance activities. After characterization and effectiveness of the remedy were evaluated, the actual operation and maintenance cost for the CRSB was assessed. The total actual operation and maintenance cost from project support and other post-construction expense to fiscal year 2006 is \$235,190.

XI. Protectiveness Statement(s)

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

XII. Next Review

The next five-year review is scheduled for February 12, 2014.

ATTACHMENT 1

List of Documents Reviewed

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

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

WSRC-RP-2000-4032, *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)*, Revision 0, 2000, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

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

WSRC-RP-2002-4063, *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)*, Revision 1, 2002, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

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ATTACHMENT 2

Five-Year Review Site Inspection Checklist

| I. SITE INFORMATION | | | |
|---|--|------------------------------------|---|
| Site Name: | C-Area Reactor Seepage Basins (904-66G, -68G) Operable Unit (OU) | Date of Inspection: | 9/05/2007 |
| Location and Region: | Savannah River Site, USEPA IV | EPA ID: | SC1890008989 |
| Agency, office, or company leading the five-year review: | United States Department of Energy | CERCLIS No.: | 60 |
| | | Weather/Temperature: | clear and sunny, 90°F |
| Remedy Includes: (Check all that apply) <input checked="" type="checkbox"/> Cover System <input type="checkbox"/> Monitored Natural Attenuation <input checked="" type="checkbox"/> Access controls <input type="checkbox"/> Groundwater Containment <input checked="" type="checkbox"/> Institutional Controls <input type="checkbox"/> Vertical Barrier Walls <input type="checkbox"/> Groundwater pump and treatment <input type="checkbox"/> Surface water collection and treatment <input type="checkbox"/> Other _____ | | | |
| Attachments: <input type="checkbox"/> Inspection team roster attached <input type="checkbox"/> Site map attached | | | |
| II. INTERVIEWS (Check all that apply) | | | |
| 1. O & M site manager | | | |
| | _____ (Name) | _____ (Title) | _____ (Date) |
| Interviewed: | <input type="checkbox"/> at site | <input type="checkbox"/> at office | <input type="checkbox"/> by phone Phone No. _____ |
| Problems, suggestions: | <input type="checkbox"/> report attached _____ | | |
| 1. O & M staff | | | |
| | _____ (Name) | _____ (Title) | _____ (Date) |
| Interviewed: | <input type="checkbox"/> at site | <input type="checkbox"/> at office | <input type="checkbox"/> by phone Phone No. _____ |
| Problems, suggestions: | <input type="checkbox"/> report attached _____ | | |

Five-Year Review Site Inspection Checklist for CRSB (Continued)

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 _____

Five-Year Review Site Inspection Checklist for CRSB (Continued)

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

1. O & M Documents

- | | | | |
|---|---|--|---|
| <input type="checkbox"/> O & M Manual | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A |
| <input checked="" type="checkbox"/> As-built drawings | <input checked="" type="checkbox"/> Readily available | <input checked="" type="checkbox"/> Up to date | <input type="checkbox"/> N/A |
| <input type="checkbox"/> Maintenance Logs | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A |

Remarks: See Waste Unit Inspection And Maintenance, ER-SOP-19.

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

- | | | | |
|---|--|-------------------------------------|---|
| <input type="checkbox"/> Air discharge permit | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A |
| <input type="checkbox"/> Effluent discharge | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A |
| <input type="checkbox"/> Waste Disposal, POTW | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A |
| <input type="checkbox"/> Other permits | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A |

Remarks

5. Gas Generation Records

☐ 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

Five-Year Review Site Inspection Checklist for CRSB (Continued)

| | | | |
|---|---|-------------------------------------|---|
| 8. Leachate Extraction Records | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A |
| Remarks _____ | | | |
| | | | |
| 9. Discharge Compliance Records | | | |
| <input type="checkbox"/> Air | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A |
| <input type="checkbox"/> Water (effluent) | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A |
| Remarks _____ | | | |
| | | | |
| 10. Daily Access/Security Logs | <input checked="" type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input type="checkbox"/> N/A |
| Remarks _____ | | | |
| | | | |
| IV. O & M Costs | | | |
| | | | |
| 1. O & M Organization | | | |
| <input type="checkbox"/> State in-house | <input type="checkbox"/> Contractor for State | | |
| <input type="checkbox"/> PRP in-house | <input type="checkbox"/> Contractor for PRP | | |
| <input checked="" type="checkbox"/> Other: <u>SRS</u> | | | |
| | | | |
| 2. O & M Cost Records | | | |
| <input type="checkbox"/> Readily available <input type="checkbox"/> Up to date | | | |
| <input type="checkbox"/> Funding mechanism/agreement in place | | | |
| <input checked="" type="checkbox"/> Other: <u>Project cost data is summarized in Section X of attached review - WSRC RP-2007-4063</u> | | | |
| | | | |
| Total annual cost by year for review period if available | | | |
| From _____ | To _____ | _____ | <input type="checkbox"/> Breakdown attached |
| (Date) | (Date) | Total cost | |
| From _____ | To _____ | _____ | <input type="checkbox"/> Breakdown attached |
| (Date) | (Date) | Total cost | |
| From _____ | To _____ | _____ | <input type="checkbox"/> Breakdown attached |
| (Date) | (Date) | Total cost | |
| From _____ | To _____ | _____ | <input type="checkbox"/> Breakdown attached |
| (Date) | (Date) | Total cost | |
| From _____ | To _____ | _____ | <input type="checkbox"/> Breakdown attached |
| (Date) | (Date) | Total cost | |

Five-Year Review Site Inspection Checklist for CRSB (Continued)

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 at this site are in good condition.

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:

Annually

Responsible party/agent: DOE

Contact: K.M. Adams, Waste Area Group Manager 09/03/07 (803) 952-7871
(Name) (Title) (Date) (Phone No.)

Reporting 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

Five-Year Review Site Inspection Checklist for CRSB (Continued)

| | | | |
|---|--|--|------------------------------|
| 2. Adequacy | <input checked="" type="checkbox"/> ICs are adequate | <input type="checkbox"/> ICs are inadequate | <input type="checkbox"/> N/A |
| Remarks _____ | | | |
| D. General | | | |
| 1. Vandalism/trespassing | <input type="checkbox"/> Location shown on site map | <input checked="" type="checkbox"/> No vandalism evident | |
| Remarks _____ | | | |
| 2. Land use changes onsite | <input checked="" type="checkbox"/> N/A | | |
| Remarks _____ | | | |
| 3. Land use changes offsite | <input checked="" type="checkbox"/> N/A | | |
| Remarks _____ | | | |
| VI. GENERAL SITE CONDITIONS | | | |
| A. Roads | <input checked="" type="checkbox"/> Applicable | <input type="checkbox"/> N/A | |
| 1. Roads damaged | <input type="checkbox"/> Location shown on site map | <input checked="" type="checkbox"/> Roads adequate | <input type="checkbox"/> N/A |
| Remarks _____ | | | |
| B. Other site Conditions | | | |
| Remarks _____ | | | |
| VII. COVER SYSTEMS <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A | | | |
| A. Soil Surface | | | |
| 1. Settlement (Low spots) | <input type="checkbox"/> Location shown on site map | <input checked="" type="checkbox"/> Settlement not evident | |
| Areal extent _____ | Depth _____ | | |
| Remarks _____ | | | |
| 2. Cracks | <input type="checkbox"/> Location shown on site map | <input checked="" type="checkbox"/> Cracking not evident | |
| Lengths _____ | Widths _____ | Depths _____ | |
| Remarks _____ | | | |

Five-Year Review Site Inspection Checklist for CRSB (Continued)

| | | | | |
|--|---|--------------------|---|---|
| 3. Erosion | | | <input type="checkbox"/> Location shown on site map | <input checked="" type="checkbox"/> Erosion not evident |
| Areal extent _____ | | Depth _____ | | |
| Remarks _____ | | | | |
| | | | | |
| 4. Holes | | | <input type="checkbox"/> Location shown on site map | <input checked="" type="checkbox"/> Holes not evident |
| Areal extent _____ | | Depth _____ | | |
| Remarks _____ | | | | |
| | | | | |
| 5. Vegetative Cover | | | <input checked="" type="checkbox"/> Grass | <input type="checkbox"/> Cover properly established |
| | | | <input checked="" type="checkbox"/> No signs of stress | |
| | | | <input type="checkbox"/> Trees/shrubs (indicate size and location on a diagram) | |
| Remarks _____ | | | | |
| | | | | |
| 6. Alternative Cover (armored rock, concrete, etc.) | | | <input checked="" type="checkbox"/> N/A | |
| Remarks _____ | | | | |
| | | | | |
| 7. Bulges | | | <input type="checkbox"/> Location shown on site map | <input checked="" type="checkbox"/> Bulges not evident |
| Areal extent _____ | | Height _____ | | |
| Remarks _____ | | | | |
| | | | | |
| 8. Wet Areas/Water Damage | | | <input checked="" type="checkbox"/> Wet areas/water damage not evident | |
| <input type="checkbox"/> Wet Areas | <input type="checkbox"/> Location shown on site map | Areal extent _____ | | |
| <input type="checkbox"/> Ponding | <input type="checkbox"/> Location shown on site map | Areal extent _____ | | |
| <input type="checkbox"/> Seeps | <input type="checkbox"/> Location shown on site map | Areal extent _____ | | |
| <input type="checkbox"/> Soft subgrade | <input type="checkbox"/> Location shown on site map | Areal extent _____ | | |
| Remarks _____ | | | | |
| | | | | |
| 9. Slope Instability | | | <input type="checkbox"/> Slides | <input type="checkbox"/> Location shown on site map |
| | | | <input checked="" type="checkbox"/> No evidence of slope instability | |
| Areal extent _____ | | | | |
| Remarks _____ | | | | |
| | | | | |

Five-Year Review Site Inspection Checklist for CRSB (Continued)

| | | |
|---|---|--|
| B. Benches <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> 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 <input type="checkbox"/> Location shown on site map <input type="checkbox"/> N/A or okay | Remarks _____ | |
| 2. Bench Breached <input type="checkbox"/> Location shown on site map <input type="checkbox"/> N/A or okay | Remarks _____ | |
| 3. Bench Overtopped <input type="checkbox"/> Location shown on site map <input type="checkbox"/> N/A or okay | Remarks _____ | |
| C. Letdown Channels <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> 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 <input type="checkbox"/> Location shown on site map <input type="checkbox"/> No evidence of settlement | Areal extent _____ Depth _____ Remarks _____ | |
| 2. Material Degradation <input type="checkbox"/> Location shown on site map <input type="checkbox"/> No evidence of degradation | Material type _____ Areal extent _____ Remarks _____ | |
| 3. Erosion <input type="checkbox"/> Location shown on site map <input type="checkbox"/> No evidence of erosion | Areal extent _____ Depth _____ Remarks _____ | |
| 4. Undercutting <input type="checkbox"/> Location shown on site map <input type="checkbox"/> No evidence of undercutting | Areal extent _____ Depth _____ Remarks _____ | |

Five-Year Review Site Inspection Checklist for CRSB (Continued)

| | | | |
|--|--|--|--|
| 5. Obstructions | | Type _____ | <input type="checkbox"/> No obstructions |
| <input type="checkbox"/> Location shown on site map | Areal extent _____ | Size _____ | |
| Remarks _____ | | | |
| | | | |
| 6. Excessive Vegetative Growth | | Type _____ | |
| <input type="checkbox"/> No evidence of excessive growth | | | |
| <input type="checkbox"/> Vegetation in channels does not obstruct flow | | | |
| <input type="checkbox"/> Location shown on site map | Areal extent _____ | | |
| Remarks _____ | | | |
| | | | |
| D. Cover Penetrations | | <input type="checkbox"/> Applicable | <input checked="" type="checkbox"/> N/A |
| | | | |
| 1. Gas Vents | | <input type="checkbox"/> Active | <input type="checkbox"/> Passive |
| <input type="checkbox"/> Properly secured/locked | <input type="checkbox"/> Functioning | <input type="checkbox"/> Routinely sampled | <input type="checkbox"/> Good condition |
| <input type="checkbox"/> Evidence of leakage at penetration | <input type="checkbox"/> Needs Maintenance | <input type="checkbox"/> N/A | |
| Remarks _____ | | | |
| | | | |
| 2. Gas Monitoring Probes | | | |
| <input type="checkbox"/> Properly secured/locked | <input type="checkbox"/> Functioning | <input type="checkbox"/> Routinely sampled | <input type="checkbox"/> Good condition |
| <input type="checkbox"/> Evidence of leakage at penetration | <input type="checkbox"/> Needs Maintenance | <input type="checkbox"/> N/A | |
| Remarks _____ | | | |
| | | | |
| 3. Monitoring Wells | | | |
| <input type="checkbox"/> Properly secured/locked | <input type="checkbox"/> Functioning | <input type="checkbox"/> Routinely sampled | <input type="checkbox"/> Good condition |
| <input type="checkbox"/> Evidence of leakage at penetration | <input type="checkbox"/> Needs Maintenance | <input type="checkbox"/> N/A | |
| Remarks _____ | | | |
| | | | |
| 4. Leachate Extraction Wells | | | |
| <input type="checkbox"/> Properly secured/locked | <input type="checkbox"/> Functioning | <input type="checkbox"/> Routinely sampled | <input type="checkbox"/> Good condition |
| <input type="checkbox"/> Evidence of leakage at penetration | <input type="checkbox"/> Needs Maintenance | <input type="checkbox"/> N/A | |
| Remarks _____ | | | |
| | | | |

Five-Year Review Site Inspection Checklist for CRSB (Continued)

| | | | |
|---|----------------------------------|---|------------------------------|
| 5. Settlement Monuments | <input type="checkbox"/> Located | <input type="checkbox"/> Routinely surveyed | <input type="checkbox"/> N/A |
| Remarks _____ | | | |
| E. Gas Collection and Treatment <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A | | | |
| 1. Gas Treatment Facilities | | | |
| <input type="checkbox"/> Flaring <input type="checkbox"/> Thermal destruction <input type="checkbox"/> Collection for reuse | | | |
| <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance | | | |
| Remarks _____ | | | |
| 2. Gas Collection Wells, Manifolds and Piping | | | |
| <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance | | | |
| Remarks _____ | | | |
| 3. Gas Monitoring Facilities (e.g., gas monitoring of adjacent homes or buildings) | | | |
| <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A | | | |
| Remarks _____ | | | |
| F. Cover Drainage Layer <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A | | | |
| 1. Outlet Pipes Inspected <input type="checkbox"/> Functioning <input type="checkbox"/> N/A | | | |
| Remarks _____ | | | |
| 2. Outlet Rock Inspected <input type="checkbox"/> Functioning <input type="checkbox"/> N/A | | | |
| Remarks _____ | | | |
| G. Detention/sedimentation Ponds <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A | | | |
| 1. Siltation Areal extent _____ Depth _____ <input type="checkbox"/> N/A | | | |
| <input type="checkbox"/> Siltation not evident | | | |
| Remarks _____ | | | |

Five-Year Review Site Inspection Checklist for CRSB (Continued)

| | | | |
|--|---|--|------------------------------|
| 2. Erosion | Areal extent _____ | Depth _____ | <input type="checkbox"/> N/A |
| <input type="checkbox"/> Erosion not evident | | | |
| Remarks _____ | | | |
| 3. Outlet Works | <input type="checkbox"/> Functioning | <input type="checkbox"/> N/A | |
| Remarks _____ | | | |
| 4. Dam | <input type="checkbox"/> Functioning | <input type="checkbox"/> N/A | |
| Remarks _____ | | | |
| H. Retaining Walls | <input type="checkbox"/> Applicable | <input checked="" type="checkbox"/> N/A | |
| 1. Deformations | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> Deformation not evident | |
| Horizontal displacement _____ | | Vertical displacement _____ | |
| Rotational displacement _____ | | | |
| Remarks _____ | | | |
| 2. Degradation | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> Deformation not evident | |
| Remarks _____ | | | |
| I. Perimeter Ditches/Off-Site Discharge | <input type="checkbox"/> Applicable | <input checked="" type="checkbox"/> N/A | |
| 1. Siltation | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> Siltation not evident | |
| Areal extent _____ | | Depth _____ | |
| Remarks _____ | | | |
| 2. Vegetative Growth | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> Siltation not evident | |
| <input type="checkbox"/> Vegetation does not impede flow | | | |
| Areal extent _____ | | Type _____ | |
| Remarks _____ | | | |

Five-Year Review Site Inspection Checklist for CRSB (Continued)

| | | |
|---|---|---|
| 3. Erosion | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> Erosion not evident |
| Areal extent _____ Depth _____ | | |
| Remarks _____ | | |
| 4. Discharge Structure | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> N/A |
| Remarks _____ | | |
| VIII. VERTICAL BARRIER WALLS <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A | | |
| 1. Settlement | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> Settlement not evident |
| Areal extent _____ Depth _____ | | |
| Remarks _____ | | |
| 2. Performance Monitoring | Type of Monitoring _____ | |
| <input type="checkbox"/> Performance not monitored | Frequency _____ | <input type="checkbox"/> Evidence of breaching |
| Head differential _____ | | |
| Remarks _____ | | |
| IX. GROUNDWATER/SURFACE WATER REMEDIES <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A | | |
| A. Groundwater Extraction Wells, Pumps, and Pipelines <input type="checkbox"/> Applicable <input type="checkbox"/> N/A | | |
| 1. Pumps, Wellhead Plumbing, and Electrical | | |
| <input type="checkbox"/> Good condition | <input type="checkbox"/> All required wells located | <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A |
| Remarks _____ | | |
| 2. Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances | | |
| <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance | |
| Remarks _____ | | |
| 3. Spare Parts and Equipment | | |
| <input type="checkbox"/> Readily available | <input type="checkbox"/> Good condition | <input type="checkbox"/> Requires upgrade <input type="checkbox"/> Needs to be provided |
| Remarks _____ | | |

Five-Year Review Site Inspection Checklist for CRSB (Continued)

| | | | |
|--|--|-------------------------------------|------------------------------|
| B. Surface Water Collection Structures, Pumps, and Pipelines | | <input type="checkbox"/> Applicable | <input type="checkbox"/> N/A |
| 1. Collection Structures, Pumps, and Electrical | | | |
| <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance | | | |
| Remarks _____ | | | |
| _____ | | | |
| 2. Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances | | | |
| <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance | | | |
| Remarks _____ | | | |
| _____ | | | |
| 3. Spare Parts and Equipment | | | |
| <input type="checkbox"/> Readily available <input type="checkbox"/> Good condition <input type="checkbox"/> Requires upgrade <input type="checkbox"/> Needs to be provided | | | |
| Remarks _____ | | | |
| _____ | | | |
| C. Treatment System | | <input type="checkbox"/> Applicable | <input type="checkbox"/> N/A |
| 1. Treatment Train (Check components that apply) | | | |
| <input type="checkbox"/> Metals removal <input type="checkbox"/> Oil/water separation <input type="checkbox"/> Bioremediation | | | |
| <input type="checkbox"/> Air stripping <input type="checkbox"/> Carbon adsorbers | | | |
| <input type="checkbox"/> Filters _____ | | | |
| <input type="checkbox"/> Additive (e.g., chelation agent, flocculent) _____ | | | |
| <input type="checkbox"/> Others _____ | | | |
| <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance | | | |
| <input type="checkbox"/> Sampling ports properly marked and functional | | | |
| <input type="checkbox"/> Sampling/maintenance log displayed and up to date | | | |
| <input type="checkbox"/> Equipment properly identified | | | |
| <input type="checkbox"/> Quantity of groundwater treated annually _____ | | | |
| <input type="checkbox"/> Quantity of surface water treated annually _____ | | | |
| Remarks _____ | | | |
| _____ | | | |
| 2. Electrical Enclosures and Panels (properly rated and functional) | | | |
| <input type="checkbox"/> N/A <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance | | | |
| Remarks _____ | | | |
| _____ | | | |

Five-Year Review Site Inspection Checklist for CRSB (Continued)

| | |
|--|--|
| 3. Tanks, Vaults, Storage Vessels <input type="checkbox"/> N/A <input type="checkbox"/> Good condition <input type="checkbox"/> Proper secondary containment <input type="checkbox"/> Needs Maintenance Remarks _____ _____ | |
| 4. Discharge Structure and Appurtenances <input type="checkbox"/> N/A <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____ _____ | |
| 5. Treatment Building(s) <input type="checkbox"/> N/A <input type="checkbox"/> Good condition (esp. roof and doorways) <input type="checkbox"/> Needs repair <input type="checkbox"/> Chemicals and equipment properly stored Remarks _____ _____ | |
| 6. Monitoring Wells <input type="checkbox"/> Properly secured/locked <input type="checkbox"/> Functioning <input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition <input type="checkbox"/> All required wells located <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A Remarks _____ _____ | |
| D. Monitoring Data <input type="checkbox"/> Applicable <input type="checkbox"/> N/A | |
| 1. Monitoring Data <input type="checkbox"/> Is routinely submitted on time <input type="checkbox"/> Is of acceptable quality | |
| 2. Monitoring data suggests: <input type="checkbox"/> Groundwater plume is effectively contained <input type="checkbox"/> Contaminant concentrations are declining | |
| E. Monitored Natural Attenuation <input type="checkbox"/> Applicable <input type="checkbox"/> N/A | |
| 1. Monitoring Wells (Natural attenuation remedy) <input type="checkbox"/> Properly secured/locked <input type="checkbox"/> Functioning <input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition <input type="checkbox"/> All required wells located <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> 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. | |

Five-Year Review Site Inspection Checklist for CRSB (Continued)

XI. OVERALL OBSERVATIONS

A. Implementation of the Remedy

The remedy for this OU is institutional controls, contaminated soil consolidation and pipeline grouting, and a soil cover system.

The remedy seems to be fully established 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.

PTSM in CRSB basin 2 has radioactively decayed to levels that no longer pose a 1×10^{-3} risk to future industrial workers as of 2002. USDOE, USEPA, and SCDHEC also agreed that the current access controls and site use controls at SRS would effectively protect human health and the environment until 2002; therefore, a low permeability soil cover is an appropriate remedy for the CRSB basin 2.

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.

N/A

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C-, F-, K-, AND P-AREA COAL PILE RUNOFF BASINS (189-C, 289-F, 189-K, AND 189-P) OPERABLE UNIT

I. Introduction

This is the second 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 2007 through September 2007.

II. OU Chronology

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

Table 1. Chronology of OU Events

| Event | Date |
|--------------------------------------|---|
| RFI/RI Field Start for K-CPRB | December 12, 1994 |
| RFI/RI Field Start for C-CPRB | June 30, 1995 |
| Removal Action Start | April 25, 1997 |
| Remedial Investigation (RI) Complete | K-CPRB August 7, 1997 |
| Remedial Action Start/Finish | C-CPRB May 20-August 1, 1997/February 2005 F-CPRB May 13-July 18, 1997/February 2005 K-CPRB May 20-September 3, 1997/February 2005 P-CPRB May 26-August 19, 1997/February 2005 |
| Record of Decision (ROD) Issuance | November 10, 1998 |
| Previous Five-Year Review | February 12, 2004 |

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 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 7) 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 8) 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.

Land and Resource Use

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

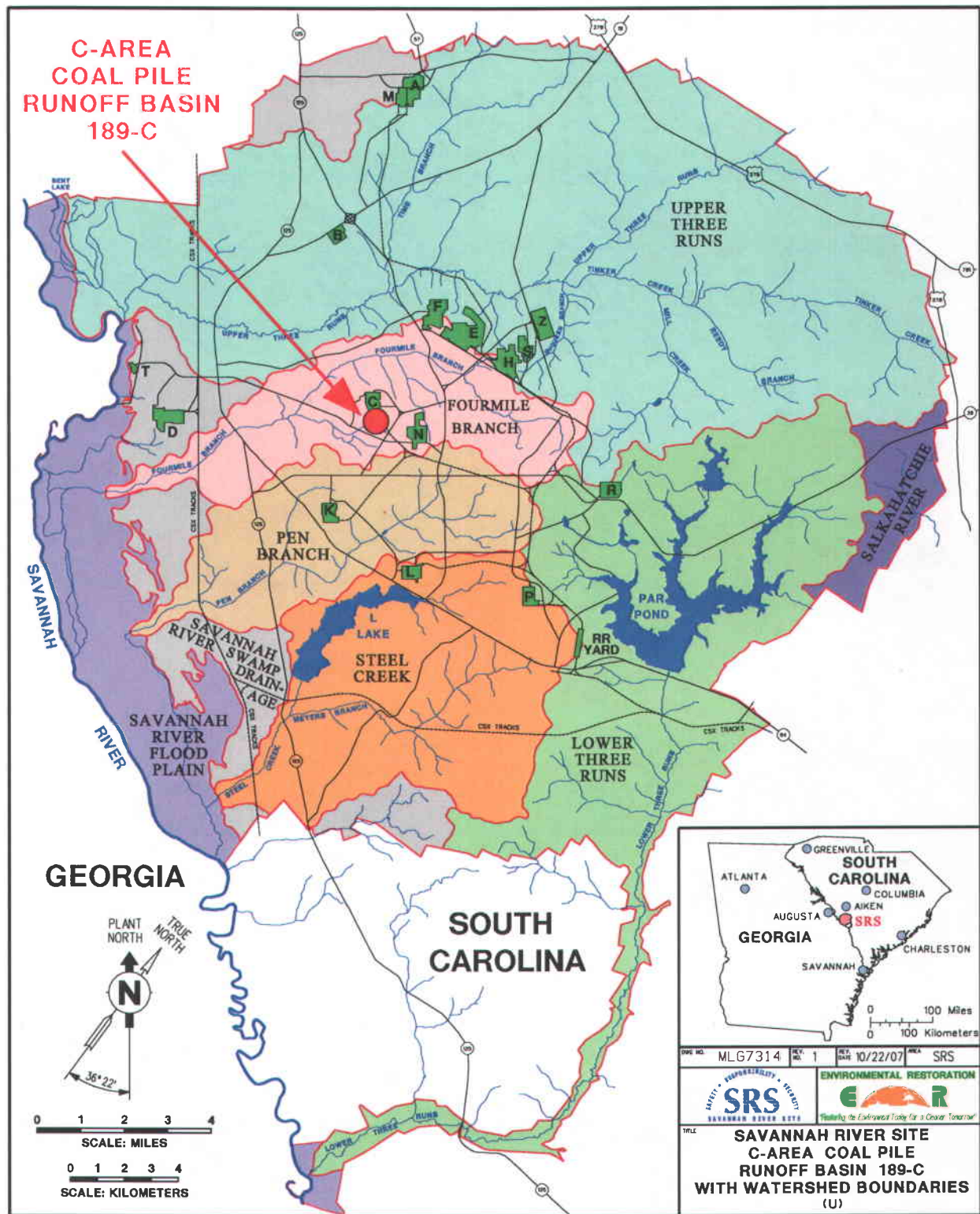


Figure 1. Location of the C-Area Coal Pile Runoff Basin (189-C) at SRS

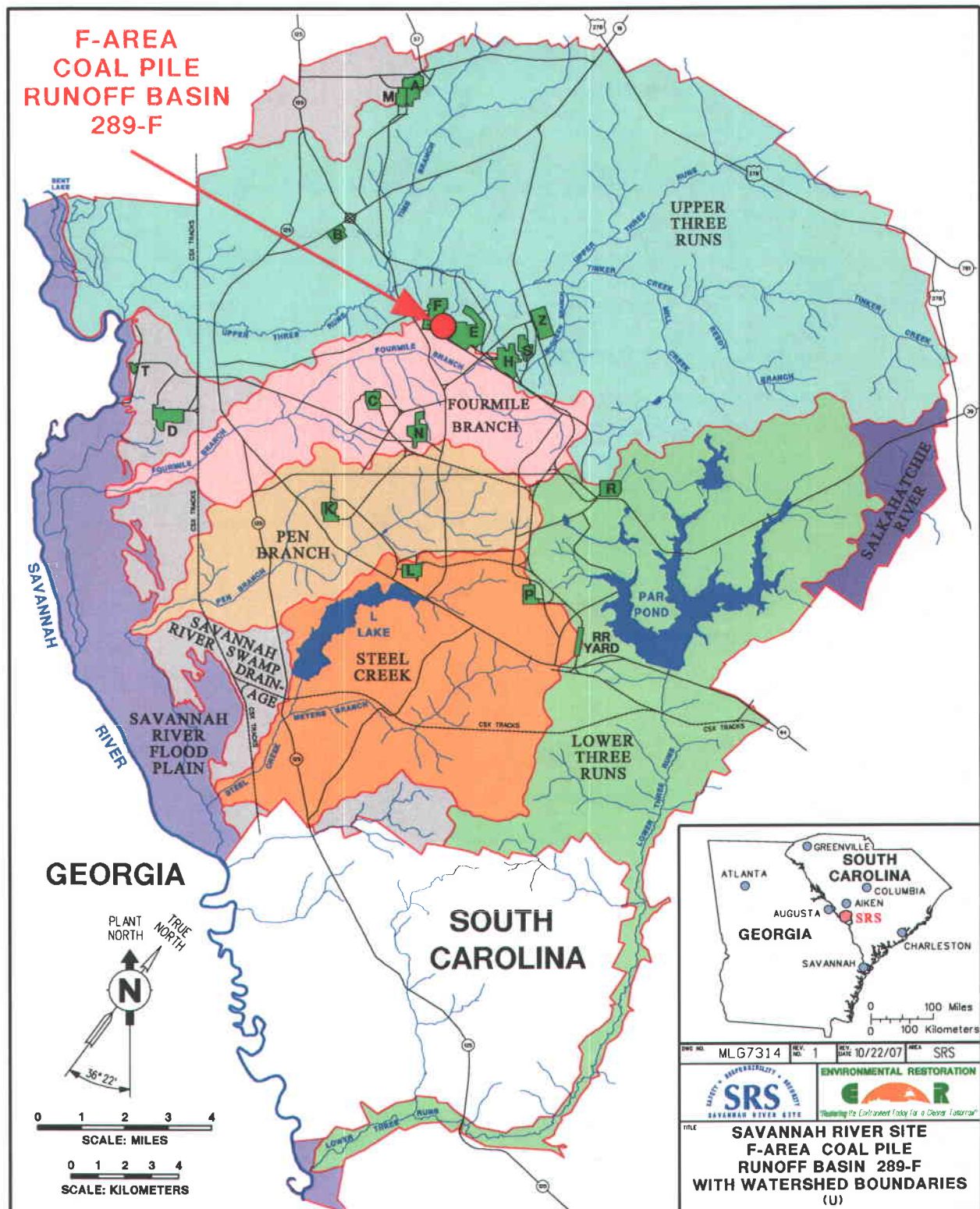


Figure 2. Location of the F-Area Coal Pile Runoff Basin (289-F) at SRS

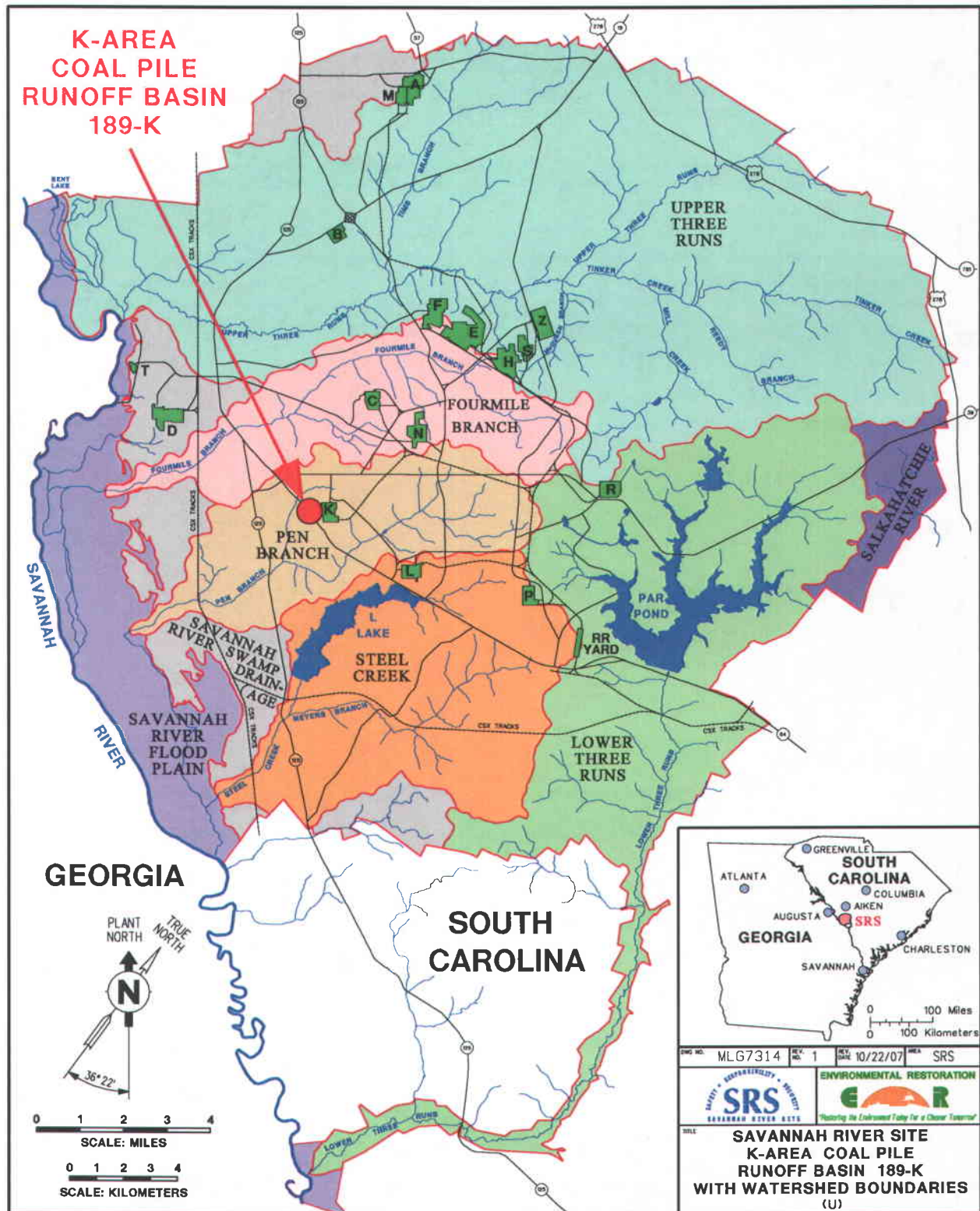


Figure 3. Location of the K-Area Coal Pile Runoff Basin (189-K) at SRS

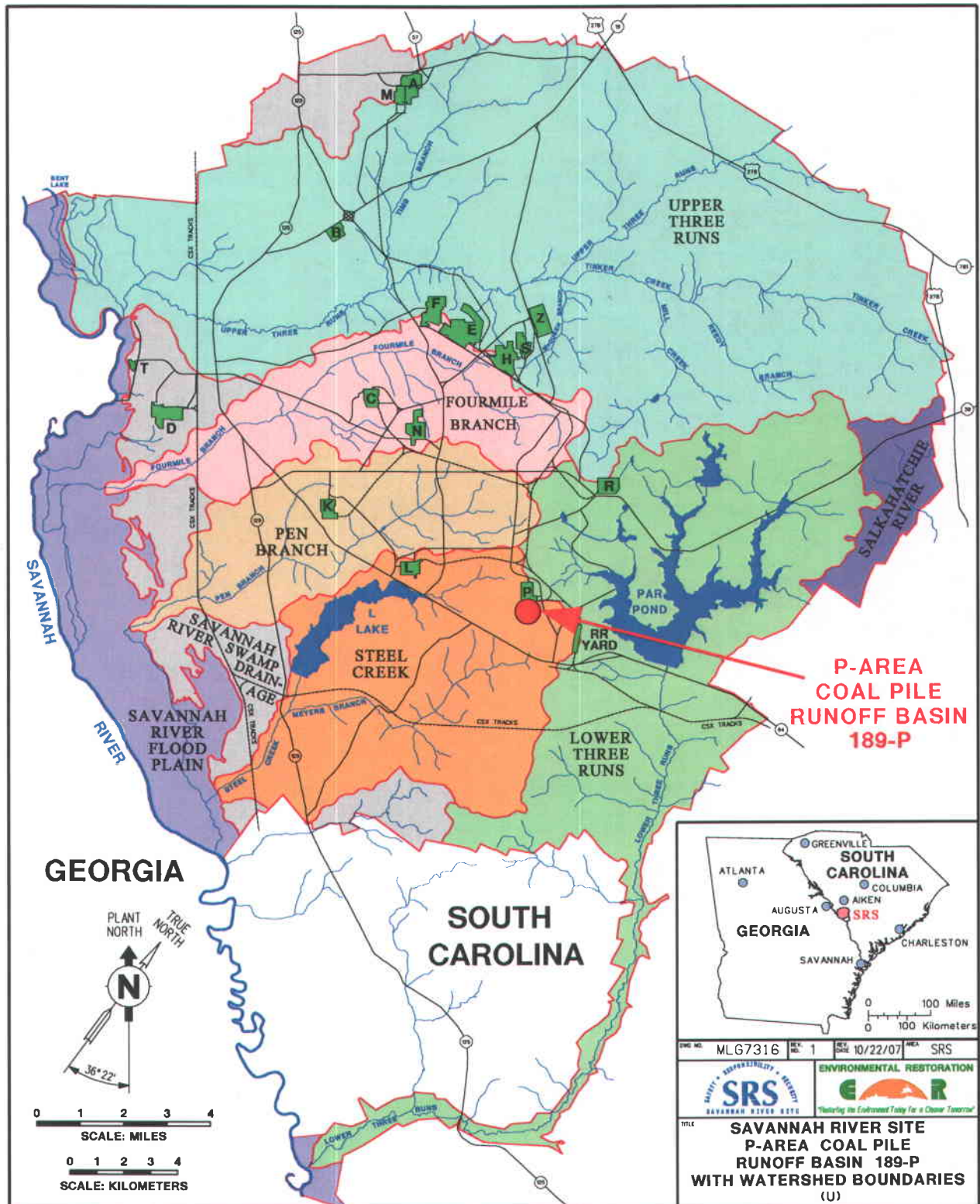


Figure 4. Location of the P-Area Coal Pile Runoff Basin (189-P) at SRS

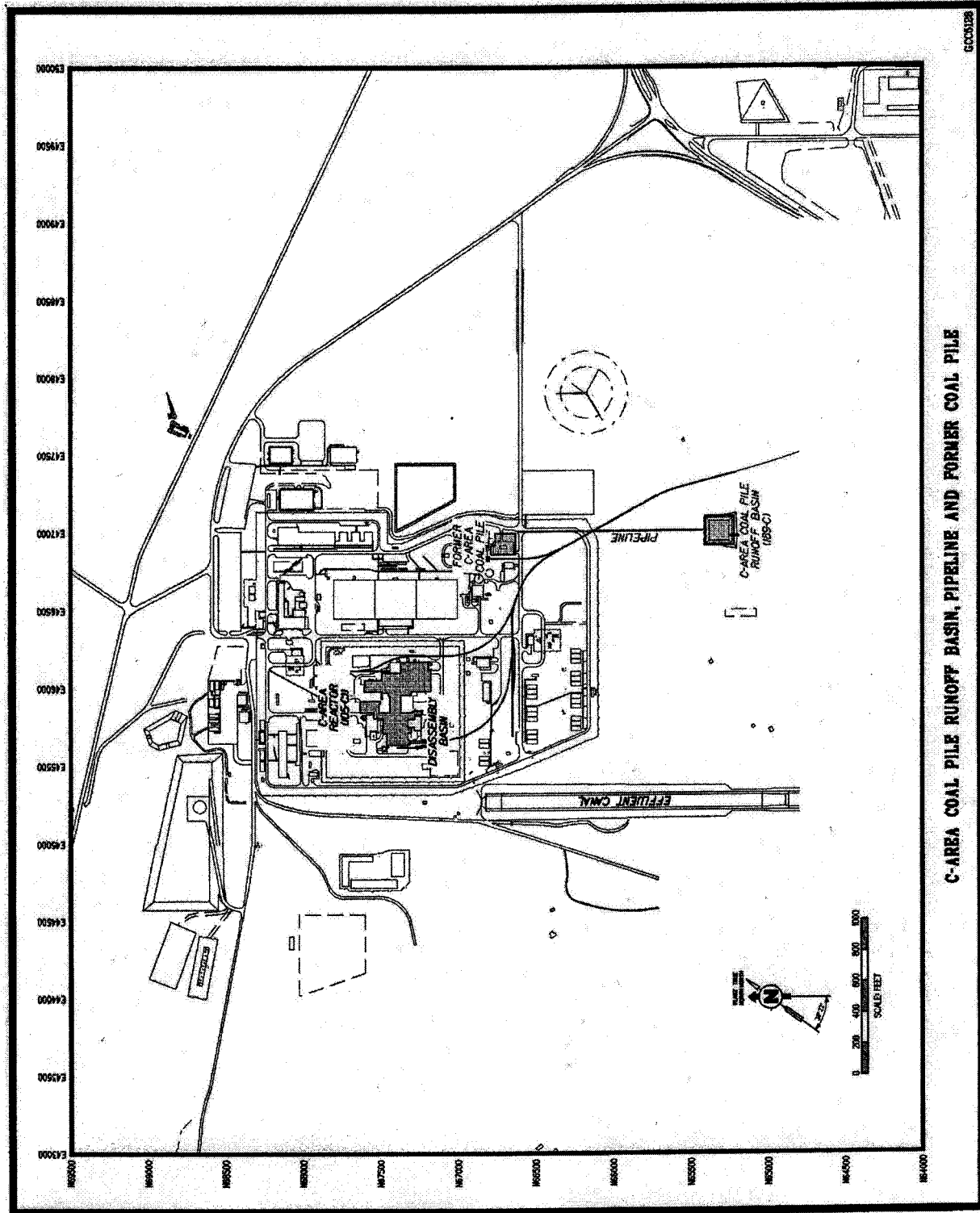


Figure 5. Location of the C -Area Coal Pile Runoff Basin in Relation to the Host Area, Pipeline, and Coal Pile

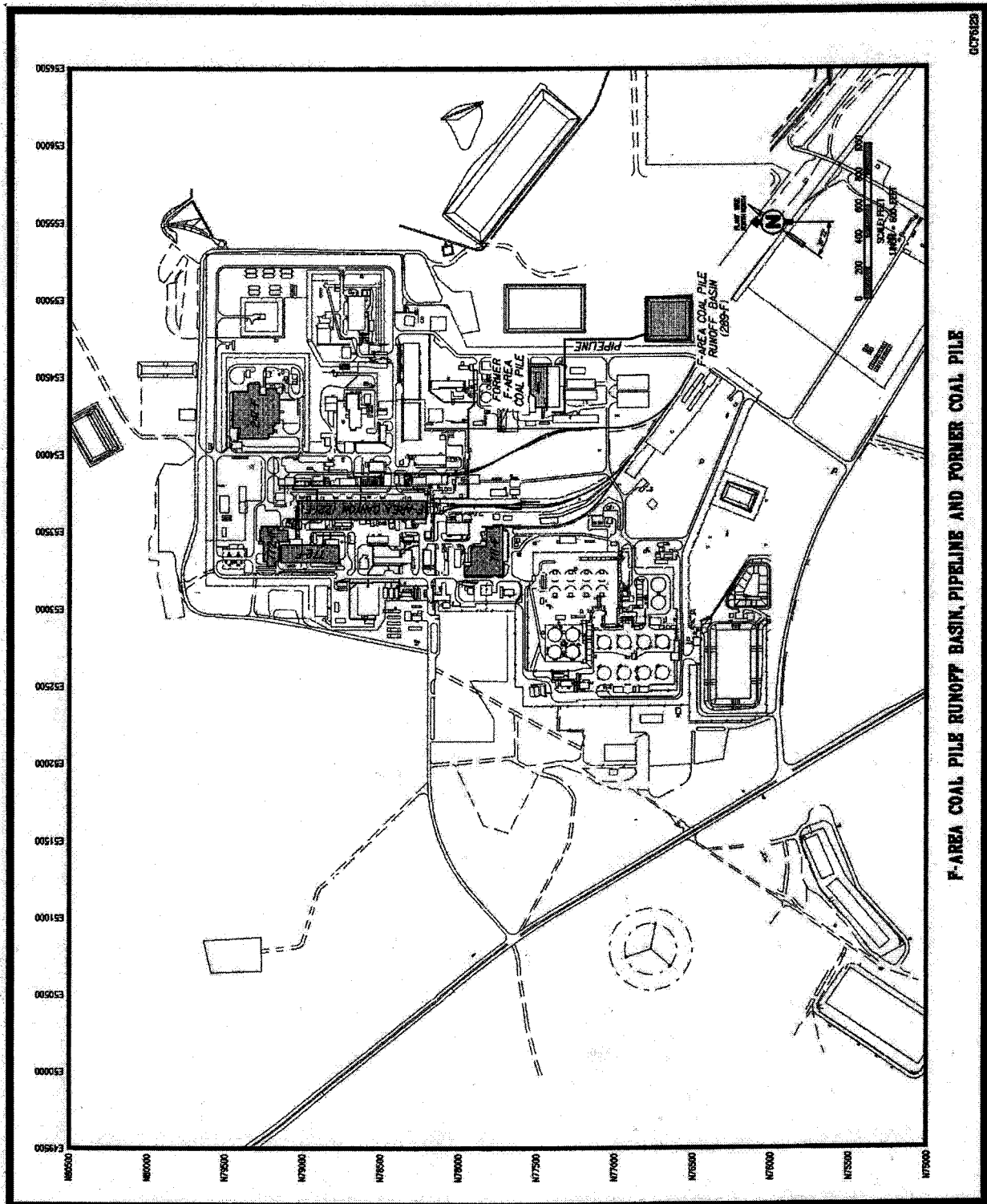


Figure 6. Location of the F-Area Coal Pile Runoff Basin in Relation to the Host Area, Pipeline, and Coal Pile

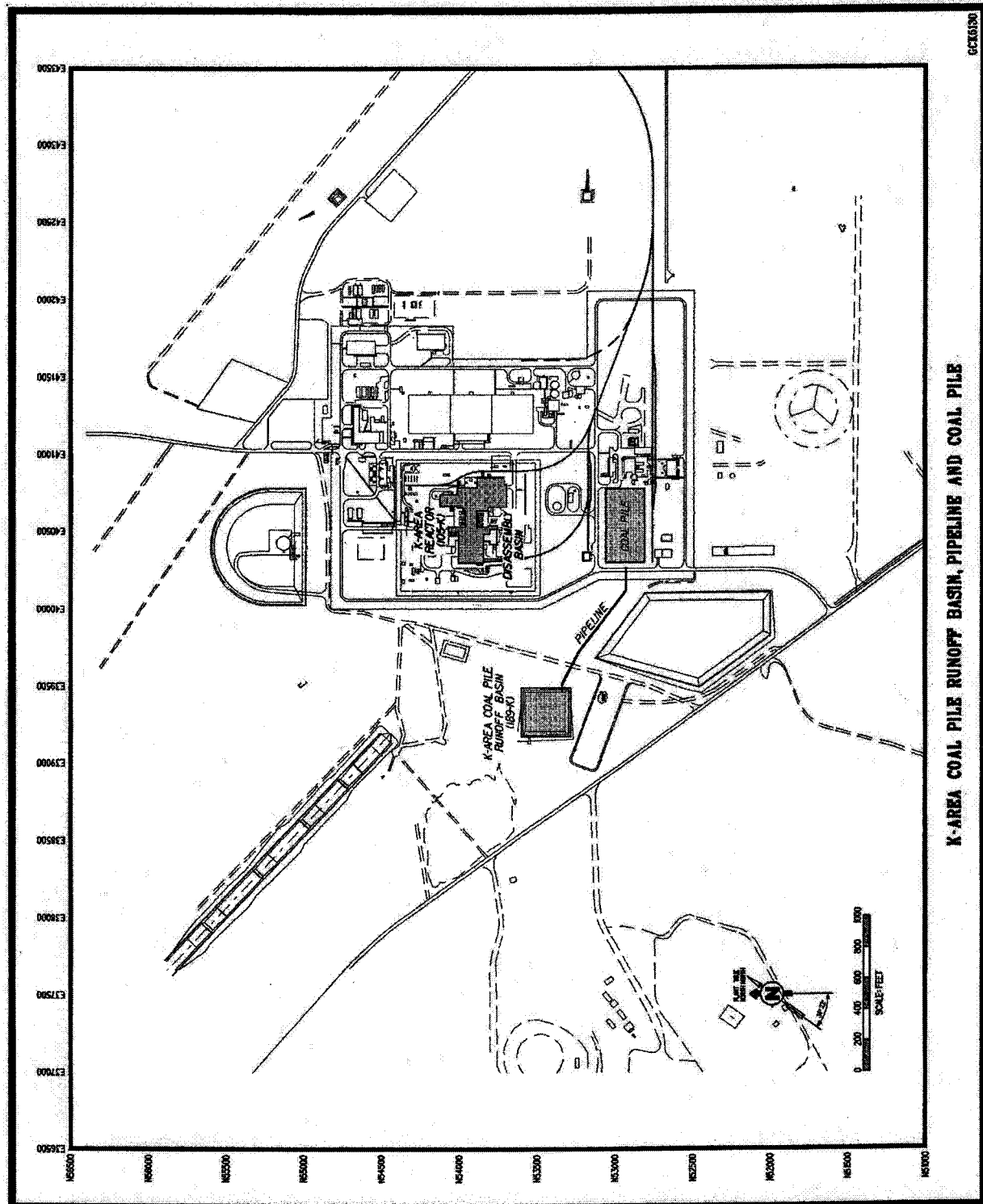


Figure 7. Location of the K-Area Coal Pile Runoff Basin in Relation to the Host Area, Pipeline, and Coal Pile

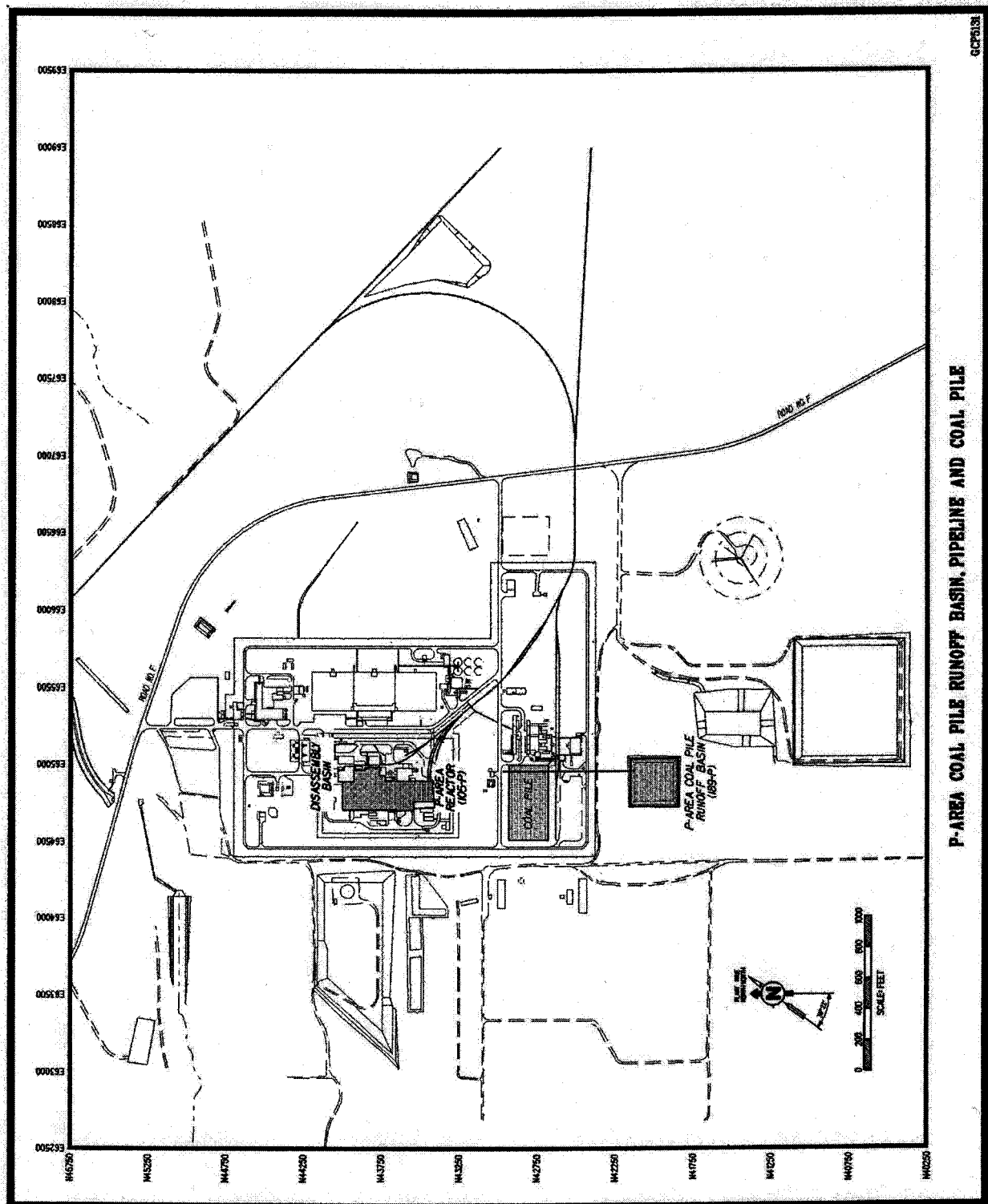


Figure 8. Location of the P-Area Coal Pile Runoff Basin in Relation to the Host Area, Pipeline, and Coal Pile

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 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, radionuclide, 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 to 1.0 ft interval of coal-laden sediments and soils within the basin. The Corrective Measures Study/Feasibility Study (CMS/FS), 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)* (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. After the coal-laden sediments were removed the pH rose from 2.5 to 5 through natural buffering of the carbonates in the solution, thus lowering the alpha concentration to no longer exceed its MCL. 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. Through natural buffering of the carbonates, the groundwater at the

K-CPRB no longer exhibits elevated gross alpha due to the removal of coal from the OU. The action completely removed at least the 0- to 1-ft interval, which contained the highest concentrations of the constituents of concern (COCs) in the CPRBs. The basins were backfilled with a minimum of 4 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 investigations of the C-, F-, K-, and P-CPRB OU found no retained COCs. 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)*). 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 4 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. The No Further Action remedy requires no land use restrictions since the carcinogenic risk is less than 1×10^{-6} .



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

Remedy Implementation

A summary report, including the data and interpretation, was submitted to South Carolina Department of Health and Environmental Control (SCDHEC) and United States Environmental Protection Agency (USEPA) following each monitoring event. During five consecutive monitoring and reporting cycles over the last five years, none of these COCs exceeded its MCL; therefore, in 2005, SCDHEC and USEPA concurred with suspending the monitoring program and decommissioning wells KCB3 and KCB 5 while keeping wells KCB 1 and KCB 6 open to support future construction at the K Groundwater System.

V. Progress Since Last Review

Prior to the removal of the coal-laden sediments at the K-CPRB, gross alpha was the only analyte that consistently exceeded its MCL. Gross alpha concentration is related to acidity. After the coal-laden sediments were removed the pH rose to 5 through natural buffering, thus lowering the alpha concentration to no longer exceed its MCL.

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. Project Costs

Costs associated with the selected remedy for CFK&P CPRB include operation and maintenance costs of groundwater monitoring. The estimated operation and maintenance cost associated with the selected remedy is \$60,200. This is a present worth cost, including 30 years of maintenance activities, which was discounted at 4% per year. After characterization and effectiveness of the remedy were evaluated, the actual operation and maintenance cost for the CFK&P CPRB was assessed. The total actual operation and maintenance cost from project support and other post-construction expense to fiscal year 2006 is \$260,533.

XI. Protectiveness Statement(s)

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

XII. Next Review

The next five-year review is scheduled for February 12, 2014.

ATTACHMENT 1

Documents Reviewed

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

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

WSRC-RP-96-897, *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)*, Revision 1, 1997, Westinghouse Savannah River Company; Savannah River Site, Aiken, SC

WSRC-RP-97-850, *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)*, Revision 1, 1998, Westinghouse Savannah River Company; Aiken, SC

WSRC-RP-97-931, *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)*, Revision 0, 1997, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

WSRC-TR-2004-00579, *Second Quarter 2004 Post-ROD Groundwater Monitoring Report for the K-Area Coal Pile Runoff Basin (189-K) (U)*, 2004, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

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ATTACHMENT 2

Third Five Year Review Site Inspection Checklist

| I. SITE INFORMATION | | | | | | | | | | | | | | | |
|--|--|------------------------------------|---|---------------------------------------|--|--|--|--|---|---|--|---|--|---|--|
| Site Name: | K-Area Coal Pile Runoff Basin (189-K) | Date of Inspection: | 9/05/2007 | | | | | | | | | | | | |
| Location and Region: | Savannah River Site, USEPA IV | EPA ID | SC1890008989 | | | | | | | | | | | | |
| Agency, office, or company leading the five-year review: | United States Department of Energy | CERCLIS OU No.: | # 52 | | | | | | | | | | | | |
| | | Weather/Temperature: | clear and sunny, 90°F | | | | | | | | | | | | |
| Remedy Includes: (Check all that apply) <table border="0"><tr><td><input type="checkbox"/> Cover System</td><td><input type="checkbox"/> Monitored Natural Attenuation</td></tr><tr><td><input type="checkbox"/> Access controls</td><td><input type="checkbox"/> Groundwater Containment</td></tr><tr><td><input checked="" type="checkbox"/> Institutional Controls</td><td><input type="checkbox"/> Vertical Barrier Walls</td></tr><tr><td><input type="checkbox"/> Groundwater pump and treatment</td><td></td></tr><tr><td><input type="checkbox"/> Surface water collection and treatment</td><td></td></tr><tr><td colspan="2"><input checked="" type="checkbox"/> Other: <u>Confirmatory Groundwater Monitoring</u></td></tr></table> | | | | <input type="checkbox"/> Cover System | <input type="checkbox"/> Monitored Natural Attenuation | <input type="checkbox"/> Access controls | <input type="checkbox"/> Groundwater Containment | <input checked="" type="checkbox"/> Institutional Controls | <input type="checkbox"/> Vertical Barrier Walls | <input type="checkbox"/> Groundwater pump and treatment | | <input type="checkbox"/> Surface water collection and treatment | | <input checked="" type="checkbox"/> Other: <u>Confirmatory Groundwater Monitoring</u> | |
| <input type="checkbox"/> Cover System | <input type="checkbox"/> Monitored Natural Attenuation | | | | | | | | | | | | | | |
| <input type="checkbox"/> Access controls | <input type="checkbox"/> Groundwater Containment | | | | | | | | | | | | | | |
| <input checked="" type="checkbox"/> Institutional Controls | <input type="checkbox"/> Vertical Barrier Walls | | | | | | | | | | | | | | |
| <input type="checkbox"/> Groundwater pump and treatment | | | | | | | | | | | | | | | |
| <input type="checkbox"/> Surface water collection and treatment | | | | | | | | | | | | | | | |
| <input checked="" type="checkbox"/> Other: <u>Confirmatory Groundwater Monitoring</u> | | | | | | | | | | | | | | | |
| Attachments: <input type="checkbox"/> Inspection team roster attached <input type="checkbox"/> Site map attached | | | | | | | | | | | | | | | |
| II. INTERVIEWS (Check all that apply) | | | | | | | | | | | | | | | |
| 1. O & M Site Manager | | | | | | | | | | | | | | | |
| | _____ (Name) | _____ (Title) | _____ (Date) | | | | | | | | | | | | |
| Interviewed: | <input type="checkbox"/> at site | <input type="checkbox"/> at office | <input type="checkbox"/> by phone Phone No. _____ | | | | | | | | | | | | |
| Problems, suggestions: | <input type="checkbox"/> report attached _____ | | | | | | | | | | | | | | |
| 2. O & M Staff | | | | | | | | | | | | | | | |
| | _____ (Name) | _____ (Title) | _____ (Date) | | | | | | | | | | | | |
| Interviewed: | <input type="checkbox"/> at site | <input type="checkbox"/> at office | <input type="checkbox"/> by phone Phone No. _____ | | | | | | | | | | | | |
| Problems, suggestions: | <input type="checkbox"/> report attached _____ | | | | | | | | | | | | | | |

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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

| | | | |
|---|--|-------------------------------------|------------------------------|
| <input type="checkbox"/> O & M Manual | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |
| x As-built drawings | x Readily available | x Up to date | <input type="checkbox"/> N/A |
| <input type="checkbox"/> Maintenance Logs | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |

Remarks: See Waste Unit Inspection and Maintenance, ER-SOP-019

Five-Year Review Site Inspection Checklist (Continued)

| | | | | | | |
|--|--|--|--|---|--|---|
| 2. Site-Specific Health and Safety Plan | | | | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A |
| <input type="checkbox"/> Contingency plan/emergency response plan | | | | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A |
| Remarks: <u>Routine O&M activities do not require an SSHASP Under 29 CFR 1910.1201, HAZWOPER</u> | | | | | | |
| 3. O & M and OSHA Training Records | | | | <input checked="" type="checkbox"/> Readily available | <input checked="" type="checkbox"/> Up to date | <input type="checkbox"/> N/A |
| Remarks _____ | | | | | | |
| 4. Permits and Service Agreements | | | | | | |
| <input type="checkbox"/> Air discharge permit | | <input type="checkbox"/> Readily available | | <input type="checkbox"/> Up to date | | <input checked="" type="checkbox"/> N/A |
| <input type="checkbox"/> Effluent discharge | | <input type="checkbox"/> Readily available | | <input type="checkbox"/> Up to date | | <input checked="" type="checkbox"/> N/A |
| <input type="checkbox"/> Waste Disposal, POTW | | <input type="checkbox"/> Readily available | | <input type="checkbox"/> Up to date | | <input checked="" type="checkbox"/> N/A |
| <input type="checkbox"/> Other permits | | <input type="checkbox"/> Readily available | | <input type="checkbox"/> Up to date | | <input checked="" type="checkbox"/> N/A |
| Remarks _____ | | | | | | |
| 5. Gas Generation Records | | | | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A |
| Remarks _____ | | | | | | |
| 6. Settlement Monument Records | | | | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A |
| Remarks _____ | | | | | | |
| 7. Groundwater Monitoring Records | | | | <input checked="" type="checkbox"/> Readily available | <input checked="" type="checkbox"/> Up to date | <input type="checkbox"/> N/A |
| Remarks _____ | | | | | | |
| 8. Leachate Extraction Records | | | | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A |
| Remarks _____ | | | | | | |
| 9. Discharge Compliance Records | | | | | | |
| <input type="checkbox"/> Air | | <input type="checkbox"/> Readily available | | <input type="checkbox"/> Up to date | | <input checked="" type="checkbox"/> N/A |
| <input type="checkbox"/> Water (effluent) | | <input type="checkbox"/> Readily available | | <input type="checkbox"/> Up to date | | <input checked="" type="checkbox"/> N/A |
| Remarks _____ | | | | | | |
| 10. Daily Access/Security Logs | | | | <input checked="" type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input type="checkbox"/> N/A |
| Remarks _____ | | | | | | |

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Five-Year Review Site Inspection Checklist (Continued)

| IV. O & M Costs | | | |
|--|--------------------|------------------|---|
| 1. O & M Organization <div style="display: flex; justify-content: space-between;"> <div> <input type="checkbox"/> State in-house <input type="checkbox"/> PRP in-house <input checked="" type="checkbox"/> Other: <u>SRS</u> </div> <div> <input type="checkbox"/> Contractor for State <input type="checkbox"/> Contractor for PRP </div> </div> | | | |
| 2. O & M Cost Records <input type="checkbox"/> Readily available <input type="checkbox"/> Up to date <input type="checkbox"/> Funding mechanism/agreement in place <input checked="" type="checkbox"/> Other: <u>Project cost data is summarized in Section X of attached review: WSRC-RP-2007-4063</u> | | | |
| Total annual cost by year for review period if available | | | |
| From _____ (Date) | To _____ (Date) | _____ Total cost | <input type="checkbox"/> Breakdown attached |
| From _____ (Date) | To _____ (Date) | _____ Total cost | <input type="checkbox"/> Breakdown attached |
| From _____ (Date) | To _____ (Date) | _____ Total cost | <input type="checkbox"/> Breakdown attached |
| From _____ (Date) | To _____ (Date) | _____ Total cost | <input type="checkbox"/> Breakdown attached |
| From _____ (Date) | To _____ (Date) | _____ Total cost | <input type="checkbox"/> Breakdown attached |
| 3. Unanticipated or Unusually High O & M Costs During Review Period Describe costs and reasons: _____ _____ _____ _____ | | | |
| V. ACCESS AND INSTITUTIONAL CONTROLS | | | |
| | | | <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A |
| A. Fencing | | | |
| 1. Fencing Damaged <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Gates secured <input checked="" type="checkbox"/> N/A Remarks _____ _____ | | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | | | |
|---|---------------------------------|--|--|---|
| B. Other Access Restrictions | | | | |
| 1. Signs and other security measures <input type="checkbox"/> Location shown on site map <input type="checkbox"/> N/A | | | | |
| Remarks: <u>Signs at this site are in good condition</u> | | | | |
| C. Institutional Controls | | | | |
| 1. Implementation and enforcement | | | | |
| Site conditions imply ICs not properly implemented: | | <input type="checkbox"/> Yes | <input checked="" type="checkbox"/> No | <input type="checkbox"/> N/A |
| Site conditions imply ICs not being fully enforced: | | <input type="checkbox"/> Yes | <input checked="" type="checkbox"/> No | <input type="checkbox"/> N/A |
| Type of monitoring (e.g., self-reporting, drive-by): | | Field Walk Down | | |
| Frequency: | Annually | | | |
| Responsible party/agent: | DOE Savannah River Field Office | | | |
| Contact: | W. G. Erickson, | Waste Area Group Manager | 09/3/07 | (803) 952-8408 |
| | (Name) | (Title) | (Date) | (Phone No.) |
| Reporting is up-to-date: | | <input checked="" type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="checkbox"/> N/A |
| Reports are verified by the lead agency: | | <input checked="" type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="checkbox"/> N/A |
| Specific requirements in deed of decision documents have been met: | | <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input checked="" type="checkbox"/> N/A |
| Violations have been reported: | | <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input checked="" type="checkbox"/> N/A |
| Other problems or suggestions: | | <input type="checkbox"/> Report attached | | |
| <hr/> <hr/> <hr/> | | | | |
| 2. Adequacy <input checked="" type="checkbox"/> ICs are adequate <input type="checkbox"/> ICs are inadequate <input type="checkbox"/> N/A | | | | |
| Remarks <hr/> <hr/> | | | | |
| D. General | | | | |
| 1. Vandalism/trespassing <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> No vandalism evident | | | | |
| Remarks <hr/> <hr/> | | | | |
| 2. Land use changes onsite <input checked="" type="checkbox"/> N/A | | | | |
| Remarks <hr/> <hr/> | | | | |

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| |
|--|
| 3. Land use changes offsite <input checked="" type="checkbox"/> N/A Remarks _____ _____ |
| VI. GENERAL SITE CONDITIONS |
| A. Roads <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A |
| 1. Roads damaged <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Roads adequate <input type="checkbox"/> N/A Remarks _____ _____ |
| B. Other site Conditions |
| Remarks _____ _____ _____ |
| VII. COVERS SYSTEMS <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A |
| A. Soil Surface |
| 1. Settlement (Low spots) <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Settlement not evident Areal extent _____ Depth _____ Remarks _____ _____ |
| 2. Cracks <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Cracking not evident Lengths _____ Widths _____ Depths _____ Remarks _____ _____ |
| 3. Erosion <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Erosion not evident Areal extent _____ Depth _____ Remarks _____ _____ |
| 4. Holes <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Holes not evident Areal extent _____ Depth _____ Remarks _____ _____ |
| 5. Vegetative Cover <input type="checkbox"/> Grass <input type="checkbox"/> Cover properly established <input type="checkbox"/> No signs of stress <input type="checkbox"/> Trees/shrubs (indicate size and location on a diagram) Remarks _____ _____ |

Five-Year Review Site Inspection Checklist (Continued)

| | | |
|--|---|--------------------|
| 6. Alternative Cover (armored rock, concrete, etc.) <input type="checkbox"/> N/A | | |
| Remarks: _____ | | |
| 7. Bulges <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Bulges not evident | | |
| Areal extent _____ Height _____ | | |
| Remarks _____ | | |
| 8. Wet Areas/Water Damage <input type="checkbox"/> Wet areas/water damage not evident | | |
| <input type="checkbox"/> Wet Areas | <input type="checkbox"/> Location shown on site map | Areal extent _____ |
| <input type="checkbox"/> Ponding | <input type="checkbox"/> Location shown on site map | Areal extent _____ |
| <input type="checkbox"/> Seeps | <input type="checkbox"/> Location shown on site map | Areal extent _____ |
| <input type="checkbox"/> Soft subgrade | <input type="checkbox"/> Location shown on site map | Areal extent _____ |
| Remarks _____ | | |
| 9. Slope Instability <input type="checkbox"/> Slides <input type="checkbox"/> Location shown on site map <input type="checkbox"/> No evidence of slope instability | | |
| Areal extent _____ | | |
| Remarks _____ | | |
| B. Benches <input type="checkbox"/> Applicable <input type="checkbox"/> 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 <input type="checkbox"/> Location shown on site map <input type="checkbox"/> N/A or okay | | |
| Remarks _____ | | |
| 2. Bench Breached <input type="checkbox"/> Location shown on site map <input type="checkbox"/> N/A or okay | | |
| Remarks _____ | | |
| 3. Bench Overtopped <input type="checkbox"/> Location shown on site map <input type="checkbox"/> N/A or okay | | |
| Remarks _____ | | |

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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 _____

Five-Year Review Site Inspection Checklist (Continued)

| | | | |
|--|--|---|---|
| D. Cover Penetrations | | <input type="checkbox"/> Applicable | <input type="checkbox"/> N/A |
| 1. Gas Vents | | | |
| <input type="checkbox"/> Active <input type="checkbox"/> Passive | | | |
| <input type="checkbox"/> Properly secured/locked | <input type="checkbox"/> Functioning | <input type="checkbox"/> Routinely sampled | <input type="checkbox"/> Good condition |
| <input type="checkbox"/> Evidence of leakage at penetration | <input type="checkbox"/> Needs Maintenance | <input type="checkbox"/> N/A | |
| Remarks _____ | | | |
| _____ | | | |
| 2. Gas Monitoring Probes | | | |
| <input type="checkbox"/> Properly secured/locked | <input type="checkbox"/> Functioning | <input type="checkbox"/> Routinely sampled | <input type="checkbox"/> Good condition |
| <input type="checkbox"/> Evidence of leakage at penetration | <input type="checkbox"/> Needs Maintenance | <input type="checkbox"/> N/A | |
| Remarks _____ | | | |
| _____ | | | |
| 3. Monitoring Wells | | | |
| <input type="checkbox"/> Properly secured/locked | <input type="checkbox"/> Functioning | <input type="checkbox"/> Routinely sampled | <input type="checkbox"/> Good condition |
| <input type="checkbox"/> Evidence of leakage at penetration | <input type="checkbox"/> Needs Maintenance | <input type="checkbox"/> N/A | |
| Remarks _____ | | | |
| _____ | | | |
| 4. Leachate Extraction Wells | | | |
| <input type="checkbox"/> Properly secured/locked | <input type="checkbox"/> Functioning | <input type="checkbox"/> Routinely sampled | <input type="checkbox"/> Good condition |
| <input type="checkbox"/> Evidence of leakage at penetration | <input type="checkbox"/> Needs Maintenance | <input type="checkbox"/> N/A | |
| Remarks _____ | | | |
| _____ | | | |
| 5. Settlement Monuments | | | |
| <input type="checkbox"/> Located | <input type="checkbox"/> Routinely surveyed | <input type="checkbox"/> N/A | |
| Remarks _____ | | | |
| _____ | | | |
| E. Gas Collection and Treatment | | <input type="checkbox"/> Applicable | <input type="checkbox"/> N/A |
| 1. Gas Treatment Facilities | | | |
| <input type="checkbox"/> Flaring | <input type="checkbox"/> Thermal destruction | <input type="checkbox"/> Collection for reuse | |
| <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance | | |
| Remarks _____ | | | |
| _____ | | | |
| 2. Gas Collection Wells, Manifolds and Piping | | | |
| <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance | | |
| Remarks _____ | | | |
| _____ | | | |

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| | | | |
|---|--|-----------------------------|--|
| 3. Gas Monitoring Facilities (e.g., gas monitoring of adjacent homes or buildings) | | | |
| <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A | | | |
| Remarks _____ _____ | | | |
| F. Cover Drainage Layer <input type="checkbox"/> Applicable <input type="checkbox"/> N/A | | | |
| 1. Outlet Pipes Inspected <input type="checkbox"/> Functioning <input type="checkbox"/> N/A | | | |
| Remarks _____ _____ | | | |
| 2. Outlet Rock Inspected <input type="checkbox"/> Functioning <input type="checkbox"/> N/A | | | |
| Remarks _____ _____ | | | |
| G. Detention/sedimentation Ponds <input type="checkbox"/> Applicable <input type="checkbox"/> N/A | | | |
| 1. Siltation Areal extent _____ Depth _____ <input type="checkbox"/> N/A | | | |
| <input type="checkbox"/> Siltation not evident | | | |
| Remarks _____ _____ | | | |
| 2. Erosion Areal extent _____ Depth _____ <input type="checkbox"/> N/A | | | |
| <input type="checkbox"/> Erosion not evident | | | |
| Remarks _____ _____ | | | |
| 3. Outlet Works <input type="checkbox"/> Functioning <input type="checkbox"/> N/A | | | |
| Remarks _____ _____ | | | |
| 4. Dam <input type="checkbox"/> Functioning <input type="checkbox"/> N/A | | | |
| Remarks _____ _____ | | | |
| H. Retaining Walls <input type="checkbox"/> Applicable <input type="checkbox"/> N/A | | | |
| 1. Deformations <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Deformation not evident | | | |
| Horizontal displacement _____ | | Vertical displacement _____ | |
| Rotational displacement _____ | | | |
| Remarks _____ _____ | | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | |
|---|---|--|
| 2. Degradation | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> Deformation not evident |
| Remarks _____ | | |
| I. Perimeter Ditches/Off-Site Discharge <input type="checkbox"/> Applicable <input type="checkbox"/> N/A | | |
| 1. Siltation | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> Siltation not evident |
| Areal extent _____ Depth _____ | | |
| Remarks _____ | | |
| 2. Vegetative Growth | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> Siltation not evident |
| <input type="checkbox"/> Vegetation does not impede flow | | |
| Areal extent _____ Type _____ | | |
| Remarks _____ | | |
| 3. Erosion | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> Erosion not evident |
| Areal extent _____ Depth _____ | | |
| Remarks _____ | | |
| 4. Discharge Structure | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> N/A |
| Remarks _____ | | |
| VIII. VERTICAL BARRIER WALLS <input type="checkbox"/> Applicable x N/A | | |
| 1. Settlement | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> Settlement not evident |
| Areal extent _____ Depth _____ | | |
| Remarks _____ | | |
| 2. Performance Monitoring | Type of Monitoring _____ | <input type="checkbox"/> Performance not monitored |
| Frequency _____ <input type="checkbox"/> Evidence of breaching Head differential _____ | | |
| Remarks _____ | | |

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Five-Year Review Site Inspection Checklist (Continued)

| | | | |
|---|---|--|---|
| IX. GROUNDWATER/SURFACE WATER REMEDIES | | <input checked="" type="checkbox"/> Applicable | <input type="checkbox"/> N/A |
| A. Groundwater Extraction Wells, Pumps, and Pipelines | | <input type="checkbox"/> Applicable | <input checked="" type="checkbox"/> N/A |
| 1. Pumps, Wellhead Plumbing, and Electrical | | | |
| <input type="checkbox"/> Good condition | <input type="checkbox"/> All required wells located | <input type="checkbox"/> Needs Maintenance | <input type="checkbox"/> N/A |
| Remarks _____ | | | |
| 2. Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances | | | |
| <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance | | |
| Remarks _____ | | | |
| 3. Spare Parts and Equipment | | | |
| <input type="checkbox"/> Readily available | <input type="checkbox"/> Good condition | <input type="checkbox"/> Requires upgrade | <input type="checkbox"/> Needs to be provided |
| Remarks _____ | | | |
| B. Surface Water Collection Structures, Pumps, and Pipelines | | <input type="checkbox"/> Applicable | <input checked="" type="checkbox"/> N/A |
| 1. Collection Structures, Pumps, and Electrical | | | |
| <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance | | |
| Remarks _____ | | | |
| 2. Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances | | | |
| <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance | | |
| Remarks _____ | | | |
| 3. Spare Parts and Equipment | | | |
| <input type="checkbox"/> Readily available | <input type="checkbox"/> Good condition | <input type="checkbox"/> Requires upgrade | <input type="checkbox"/> Needs to be provided |
| Remarks _____ | | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | |
|--|--|---|
| C. Treatment System | <input type="checkbox"/> Applicable | <input checked="" type="checkbox"/> N/A |
| 1. Treatment Train (Check components that apply) | | |
| <input type="checkbox"/> Metals removal | <input type="checkbox"/> Oil/water separation | <input type="checkbox"/> Bioremediation |
| <input type="checkbox"/> Air stripping | <input type="checkbox"/> Carbon adsorbers | |
| <input type="checkbox"/> Filters | | |
| <input type="checkbox"/> Additive (e.g., chelation agent, flocculent) | | |
| <input type="checkbox"/> Others | | |
| <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance | |
| <input type="checkbox"/> Sampling ports properly marked and functional | | |
| <input type="checkbox"/> Sampling/maintenance log displayed and up to date | | |
| <input type="checkbox"/> Equipment properly identified | | |
| <input type="checkbox"/> Quantity of groundwater treated annually | | |
| <input type="checkbox"/> Quantity of surface water treated annually | | |
| Remarks | | |
| | | |
| 2. Electrical Enclosures and Panels (properly rated and functional) | | |
| <input type="checkbox"/> N/A | <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance |
| Remarks | | |
| | | |
| 3. Tanks, Vaults, Storage Vessels | | |
| <input type="checkbox"/> N/A | <input type="checkbox"/> Good condition | <input type="checkbox"/> Proper secondary containment |
| Maintenance | <input type="checkbox"/> Needs | |
| Remarks | | |
| | | |
| 4. Discharge Structure and Appurtenances | | |
| <input type="checkbox"/> N/A | <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance |
| Remarks | | |
| | | |
| 5. Treatment Building(s) | | |
| <input type="checkbox"/> N/A | <input type="checkbox"/> Good condition (esp. roof and doorways) | <input type="checkbox"/> Needs repair |
| <input type="checkbox"/> Chemicals and equipment properly stored | | |
| Remarks | | |
| | | |

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Five-Year Review Site Inspection Checklist (Continued)

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 remedy for this OU is confirmatory groundwater monitoring with institutional controls.

A summary report, including the data and interpretation, was submitted to SCDHEC, DOE, and USEPA following each monitoring event. During five consecutive monitoring and reporting cycles over the last five years, none of the constituents of concern exceeded its MCL; therefore, in 2005, SCDHEC, DOE, and USEPA concurred with suspending the monitoring program and decommissioning wells KCB 3 and KCB 5.

Five-Year Review Site Inspection Checklist (Continued)

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.

The monitoring program was suspended and wells KCB 3 and KCB 5 were decommissioned due to five consecutive monitoring and reporting cycles over the last five years showing no MCL exceedances.

Wells KCB 1 and KCB 6 were kept open to support future construction at the K-Groundwater System.

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.

N/A

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CENTRAL SHOPS BURNING/RUBBLE PITS (631-1G AND 631-3G) OPERABLE UNIT

I. Introduction

This is the first five-year review for Central Shops Burning/Rubble Pit (631-1G and 631-3G) (CSBRP) Operable Unit (OU). This review was conducted from September 2007 through October 2007. This report documents the results of the review.

II. OU Chronology

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

Table 1. Chronology of OU Events

| Event | Date |
|-----------------------------------|--------------------------------------|
| RFI/RI Field Start | September 30, 1997 |
| Record of Decision (ROD) Issuance | May 19, 2003 |
| Remedial Action Start/Complete | November 17, 2003 / November 3, 2004 |
| Previous Five-Year Reviews | None |

III. Background

Physical Characteristics

The CSBRP OU is listed as a Resource Conservation and Recovery Act (RCRA) 3004(u) Solid Waste Management Unit/Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) unit in Appendix C of the Federal Facility Agreement (FFA) for Savannah River Site (SRS). The media associated with CSBRP OU include soil and groundwater beneath the OU. The results of the groundwater investigation contained in the RCRA Facility Investigation (RFI)/Remedial Investigation (RI) with Baseline Risk Assessment (BRA) for CSBRP (631-1G and 631-3G) OU included an evaluation of the groundwater. The conclusion of the evaluation was that the CSBRP OU has not contributed to groundwater contamination adjacent to or beneath the CSBRP OU. No refined constituents of concern have been identified for any of the subunits of CSBRP, including soil, surface water, and groundwater.

The CSBRP OU is located in the central part of the SRS, approximately 6.5 mi from the nearest site boundary. It is in the northern part of N Area (also known as Central Shops), Figure 1 shows the location of the Central Shops within SRS and Figure 2 depicts the layout of the CSBRP OU and the Active Burning Area (631-2G).

Initially, the CSBRP OU was composed of two inactive burning/rubble pits, Pit 631-1G and 631-3G, located along the northern and western sides of the Active Burning Area (631-2G). However, trenching performed during characterization activities identified that Pit 631-3G was composed of two adjacent pits, subsequently named 631-3G and 631-3GA. In this report, Pits 631-3G and 631-3GA are jointly addressed as Pits 631-3G.

Land and Resource Use

According to the *Savannah River Site Future Use Project Report*, residential use of SRS land should be prohibited. Therefore, an action is required to maintain restricted (industrial) land use at the CSBRP OU to ensure protection of human health and the environment. Hence, the remedial action (institutional controls in conjunction with improved stormwater management) has been selected for the CSBRP OU to protect public health or welfare and the environment from actual or threatened releases of hazardous substances.

History of Contamination

Prior to 1951, the CSBRP OU area was farmland, an area of moderate relief. The pits are located in cleared areas adjacent to wooded lands. Drainage ditches and the flow paths of stormwater runoff have changed over time. During disposal activities, water that collected in the pits was discharged to drainage ditches. The surface water drainage system and surface water flow pattern associated with CSBRP OU prior to remedial action construction are presented in Figure 2.

Pits 631-3G received asbestos and empty paint cans along with ash, paper, and glass at various times from the 1950s to the mid-1980s. Pits 631-3G are located along the northern and western sides of the Active Burning Area as shown in Figure 2. No refined

constituents of concern (COCs) have been identified as a result of the RFI/RI/BRA investigation into any subunit of the CSBRP OU, including groundwater, and there are no applicable or relevant and appropriate requirement (ARARs) associated with CSBRP OU. Hence, no problems warranting action are associated with the CSBRP OU. However, it has been determined that perched/trapped water associated with existing drainage conditions requires mitigation to prevent the waste from being in contact with this water. During the evaluation of the unit, no refined COCs were identified; therefore, no problem warranting action was identified. However, since material remained at depth, a decision was made to maximize stormwater runoff by providing soil backfill with necessary grading, which should in turn minimize infiltration as an added measure of protection.

IV. Remedial Actions

Remedy Implementation

The key elements of the remedial action address the remedial action objective and are discussed below:

- *Institutional controls* consist of near- and long-term actions. These actions will be consistent with industrial land use and the SRS LUCAP. As a pre-remedial action, after disposal activities had been completed, the pits and ditches were covered with soil backfill and then graded to enhance stormwater management. For the near term, signs and existing SRS access controls will be used to prevent disturbance of the soil backfill cover. Warning signs have been placed around the waste site. In the long term, if the property is ever transferred to non-federal ownership, the United States Government will take those actions necessary pursuant to Section 120(h) of CERCLA, which will likely include deed restrictions precluding residential use or excavation within the boundaries of the unit.

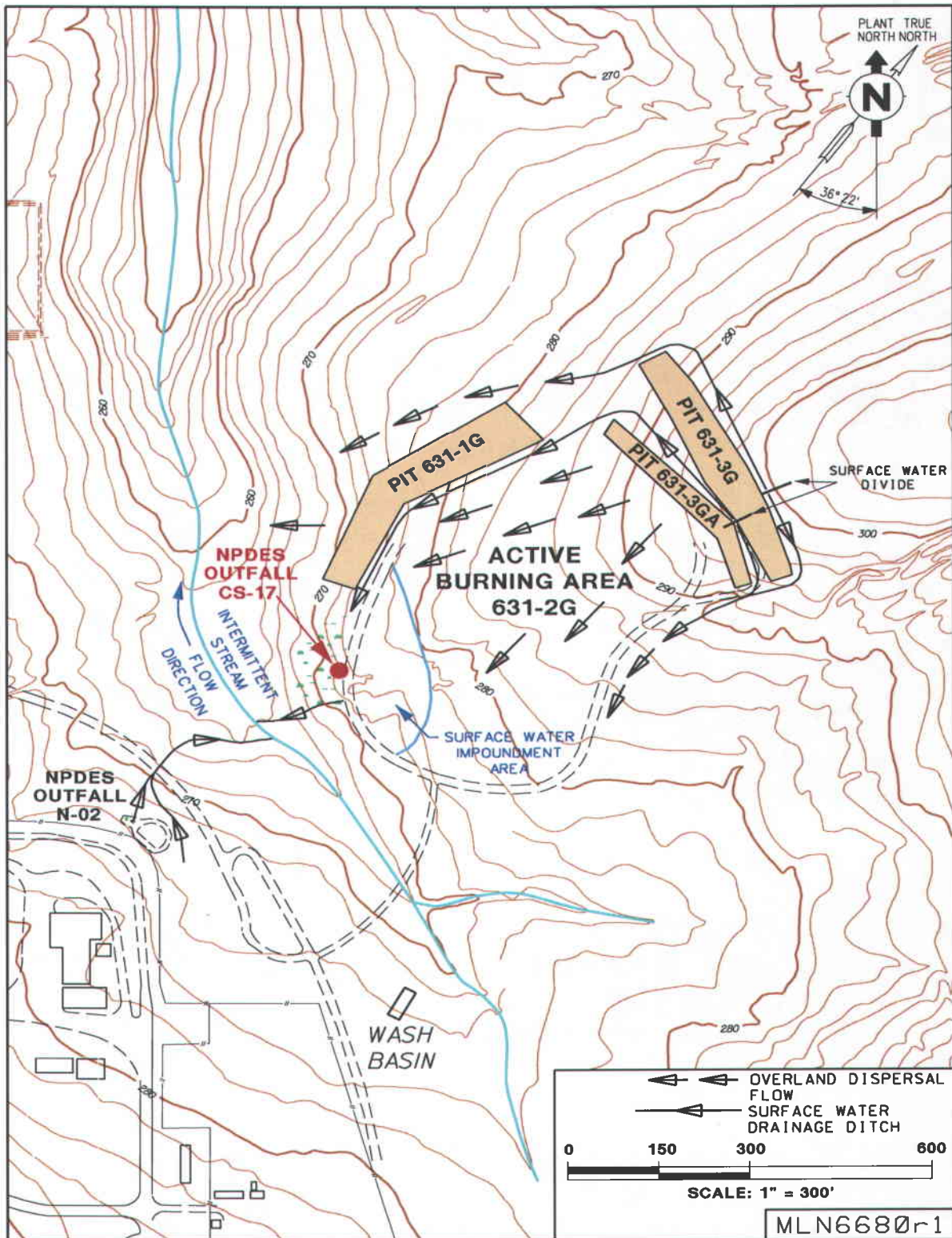


Figure 2. Layout of the Central Shops Burning/Rubble Pits Operable Unit

- Stormwater management will route the surface water away from the pits and thereby prevent buried waste from contacting the groundwater. Rerouting the surface water is anticipated to reduce infiltration through the waste material.
- The water level in pit 631-3G will be measured with piezometers to determine the effects of the drainage enhancement.
- Water level measurements will be collected quarterly.

Five-year remedy reviews will evaluate whether the remedy continues to provide adequate future protection of human health and the environment. The five-year remedy reviews will include the results of perched water measuring.

V. Progress since Last Review

This is the first five -year review for this OU.

VI. Five-Year Review Process

The following tasks were performed as part of the review:

- Reviewed the documents listed in Attachment 1.
- Reviewed the water level measurement data in two piezometers (CSR-14PZ and CSR-17PZ) at 631-3G. The data is provided in Attachment 2.
- Confirmed the implementation of the remedial action.
- Inspected the OU.
- Reviewed changes in standards and to-be-considered guidance.

VII. Technical Assessment

The operating procedures 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. Maintenance and institutional controls, including access controls and field walkdowns, are in place to prevent exposure, monitor, and maintain the cap area. Improved stormwater management routes the surface water away from the pits as designed. The following summary of data for water levels at two piezometers (CSR-14PZ and CSR-17PZ) is presented from the data in Attachment 2:

- Piezometer No. CSR-14PZ - Water level ranged from 13.15 ft below surface in 12/14/2004 to 14.8 ft below surface level in 10/16/2007 with minimum seasonal variability.
- Piezometer No. CSR-17PZ - Water level ranged from 13.4 ft below surface in 12/14/2004 to 17.4 ft below surface level at 10/16/2007 with minimum seasonal variability.

Reduction of water elevation in 631-3G pit indicated that the stormwater management improvement has been working as designed. However seasonal variability is much higher in Piezometer No. CSR-14Z. Remedy selected for this waste unit is working. The exposure assumptions, toxicity data, and cleanup levels used at the time of remedy selection are still valid. There have been no changes in standards or to-be-considered guidance 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

Continue measuring water level at the two piezometers (CSR-14PZ and CSR-17PZ).

X. Project Costs

Costs associated with the selected remedy for Central Shops BRP include operation and maintenance costs of stormwater management and institutional controls. The estimated operation and maintenance cost associated with the selected remedy is \$94,420. This is a present worth cost, including 30 years of maintenance activities. After characterization and effectiveness of the remedy were evaluated, the actual operation and maintenance cost for the Central Shops BRP was assessed. The total actual operation and maintenance cost from project support and other post-construction expense to fiscal year 2006 is \$56,092.

XI. Protectiveness Statement(s)

The implementation of institutional controls is expected to remain protective of human health and the environment. Institutional controls prevent contact, removal, and excavation of the buried waste in the pits by controlling access to CSBRP OU. If the property is ever transferred to non-federal ownership, deed notification/restrictions will preclude residential use of the area. The regrading/recontouring of the pit surface areas and the surrounding areas and construction of stormwater drainage system to collect and convey stormwater will limit water from contacting the waste contained in the pits.

XII. Next Review

The next five-year review is scheduled for February 12, 2014.

ATTACHMENT 1

List of Documents Reviewed

WSRC-RP-98-4043, *RCRA Facility Investigation/Remedial Investigation (RFI/RI) with BRA for the Central Shops Burning/Rubble Pits Operable Unit (U)*, Rev. 1.2, 2001, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

WSRC-RP-2001-4265, *Record of Decision Remedial Alternative Selection for the Central Shops Burning/Rubble Pits, 631-1G, and 631-3G/3GA (U), Operable Unit (OU)*, Rev. 1.1, 2002, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

WSRC-RP-2003-4018, *Corrective Measures Implementation/Remedial Action Implementation Plan (CMI/RAIP) for the Central Shops Burning/Rubble Pits (CSBRP) (631-1G and 631-3G Operable Unit (U))*, Rev. 1, 2003, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

ATTACHMENT 2

Water Level Measurement Data in Piezometers CSR-14PZ and CSR-17PZ)

| CSR 14PZ | | CSR 17PZ | |
|-----------------|------------------------------------|------------------|------------------------------------|
| <u>Date</u> | <u>Ft Below Ground Surface</u> | <u>Date</u> | <u>Ft Below Ground Surface</u> |
| 12/14/2004..... | 13.55 | 12/14/2004 | 13.40 |
| 01/06/2005..... | 13.65 | 01/06/2005 | 13.50 |
| 02/24/2005..... | 13.95 | 02/24/2005 | 13.80 |
| 03/23/2005..... | 13.87 | 03/23/2005 | 13.98 |
| 04/04/2005..... | 13.75 | 04/04/2005 | 14.00 |
| 05/17/2005..... | 13.60 | 05/17/2005 | 14.30 |
| 06/21/2005..... | 13.45 | 06/21/2005 | 14.45 |
| 07/06/2005..... | 13.43 | 07/06/2005 | 14.50 |
| 08/23/2005..... | 13.35 | 08/23/2005 | 14.70 |
| 09/20/2005..... | 13.85 | 09/20/2005 | 14.75 |
| 10/25/2005..... | 13.86 | 10/25/2005 | 14.95 |
| 11/16/2005..... | 14.10 | 11/16/2005 | 15.20 |
| 12/19/2005..... | 14.32 | 12/19/2005 | 15.28 |
| 01/25/2006..... | 13.57 | 01/25/2006 | 15.45 |
| 02/22/2006..... | 13.30 | 02/22/2006 | 15.54 |
| 03/21/2006..... | 13.15 | 03/21/2006 | 15.62 |
| 04/18/2006..... | 13.28 | 04/18/2006 | 15.85 |
| 05/16/2006..... | 13.60 | 05/16/2006 | 15.90 |
| 06/20/2006..... | 13.92 | 06/20/2006 | 16.10 |
| 07/26/2006..... | 13.90 | 07/26/2006 | 16.15 |
| 08/23/2006..... | 13.94 | 08/23/2006 | 16.22 |
| 09/20/2006..... | 14.10 | 09/20/2006 | 16.30 |
| 10/18/2006..... | 14.40 | 10/18/2006 | 16.50 |
| 11/29/2006..... | 14.70 | 11/29/2006 | 16.60 |
| 01/23/2007..... | 14.33 | 01/23/2007 | 16.88 |
| 02/13/2007..... | 13.75 | 02/13/2007 | 16.80 |
| 03/21/2007..... | 13.35 | 03/21/2007 | 17.00 |
| 04/18/2007..... | 13.40 | 04/18/2007 | 17.00 |
| 05/24/2007..... | 13.45 | 05/24/2007 | 17.30 |
| 06/14/2007..... | 13.80 | 06/14/2007 | 17.10 |
| 07/24/2007..... | 13.95 | 07/24/2007 | 17.24 |
| 08/20/2007..... | 14.20 | 08/20/2007 | 17.30 |
| 09/11/2007..... | 14.35 | 09/11/2007 | 17.35 |
| 10/16/2007..... | 14.80 | 10/16/2007 | 17.40 |

ATTACHMENT 3

Five-Year Review Site Inspection Checklist

| I. SITE INFORMATION | | | | | | | | | | | | | | | |
|--|---|----------------------|-----------------------|--|--|--|--|--|---|---|--|---|--|---------------------------------------|--|
| Site Name: | Central Shops Burning/Rubble Pits (CSBRP) (631-1G and 631-3G) Operable Unit (U) | Date of Inspection: | 10/22/2007 | | | | | | | | | | | | |
| Location and Region: | Savannah River Site, USEPA IV | EPA ID: | SC1890008989 | | | | | | | | | | | | |
| Agency, office, or company leading the five-year review: | United States Department of Energy | CERCLIS OU No.: | # 50 | | | | | | | | | | | | |
| | | Weather/Temperature: | clear and sunny, 79°F | | | | | | | | | | | | |
| Remedy Includes: (Check all that apply) <table border="0"><tr><td><input checked="" type="checkbox"/> Cover system</td><td><input type="checkbox"/> Monitored Natural Attenuation</td></tr><tr><td><input type="checkbox"/> Access controls</td><td><input type="checkbox"/> Groundwater Containment</td></tr><tr><td><input checked="" type="checkbox"/> Institutional Controls</td><td><input type="checkbox"/> Vertical Barrier Walls</td></tr><tr><td><input type="checkbox"/> Groundwater pump and treatment</td><td></td></tr><tr><td><input type="checkbox"/> Surface water collection and treatment</td><td></td></tr><tr><td><input type="checkbox"/> Other: _____</td><td></td></tr></table> | | | | <input checked="" type="checkbox"/> Cover system | <input type="checkbox"/> Monitored Natural Attenuation | <input type="checkbox"/> Access controls | <input type="checkbox"/> Groundwater Containment | <input checked="" type="checkbox"/> Institutional Controls | <input type="checkbox"/> Vertical Barrier Walls | <input type="checkbox"/> Groundwater pump and treatment | | <input type="checkbox"/> Surface water collection and treatment | | <input type="checkbox"/> Other: _____ | |
| <input checked="" type="checkbox"/> Cover system | <input type="checkbox"/> Monitored Natural Attenuation | | | | | | | | | | | | | | |
| <input type="checkbox"/> Access controls | <input type="checkbox"/> Groundwater Containment | | | | | | | | | | | | | | |
| <input checked="" type="checkbox"/> Institutional Controls | <input type="checkbox"/> Vertical Barrier Walls | | | | | | | | | | | | | | |
| <input type="checkbox"/> Groundwater pump and treatment | | | | | | | | | | | | | | | |
| <input type="checkbox"/> Surface water collection and treatment | | | | | | | | | | | | | | | |
| <input type="checkbox"/> Other: _____ | | | | | | | | | | | | | | | |
| Attachments: <input type="checkbox"/> Inspection team roster attached <input checked="" type="checkbox"/> Site map attached | | | | | | | | | | | | | | | |
| II. INTERVIEWS (Check all that apply) | | | | | | | | | | | | | | | |
| 1. O & M Site Manager : _____ (Name) (Title) (Date) Interviewed: <input type="checkbox"/> at site <input type="checkbox"/> at office <input type="checkbox"/> by phone Phone No. _____ Problems, suggestions: <input type="checkbox"/> report attached _____ | | | | | | | | | | | | | | | |
| 2. O & M Site Staff : <u>R. Feagin</u> <u>Post-Closure Maintenance</u> <u>10/22/07</u> (Name) (Title) (Date) Interviewed: <input checked="" type="checkbox"/> at site <input type="checkbox"/> at office <input type="checkbox"/> by phone Phone No. <u>(803) 952-6706</u> Problems, suggestions: <input type="checkbox"/> report attached _____ | | | | | | | | | | | | | | | |

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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

| | | | |
|---|--|-------------------------------------|------------------------------|
| <input type="checkbox"/> O & M Manual | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |
| x As-built drawings | x Readily available | x Up to date | <input type="checkbox"/> N/A |
| <input type="checkbox"/> Maintenance Logs | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |

Remarks: See Waste Unit Inspection and Maintenance, ER-SOP-019

Five-Year Review Site Inspection Checklist (Continued)

| | | | |
|---|--|-------------------------------------|---|
| 2. Site-Specific Health and Safety Plan <input type="checkbox"/> Readily available <input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A | | | |
| <input type="checkbox"/> Contingency plan/emergency response plan <input type="checkbox"/> Readily available <input type="checkbox"/> Up to date | | | |
| X N/A Remarks: <u>Routine O&M activities do not require an SSHASP under 29 CFR 1910.1201, HAZWOPER</u> | | | |
| 3. O & M and OSHA Training Records <input checked="" type="checkbox"/> Readily available <input checked="" type="checkbox"/> Up to date <input type="checkbox"/> N/A | | | |
| Remarks _____ | | | |
| 4. Permits and Service Agreements | | | |
| <input type="checkbox"/> Air discharge permit | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A |
| <input type="checkbox"/> Effluent discharge | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A |
| <input type="checkbox"/> Waste Disposal, POTW | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A |
| <input type="checkbox"/> Other permits | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A |
| Remarks _____ | | | |
| 5. Gas Generation Records <input type="checkbox"/> Readily available <input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A | | | |
| Remarks _____ | | | |
| 6. Settlement Monument Records <input type="checkbox"/> Readily available <input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A | | | |
| Remarks _____ | | | |
| 7. Groundwater Monitoring Records <input checked="" type="checkbox"/> Readily available <input checked="" type="checkbox"/> Up to date <input type="checkbox"/> N/A | | | |
| Remarks: <u>Water elevation records only.</u> | | | |
| 8. Leachate Extraction Records <input type="checkbox"/> Readily available <input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A | | | |
| Remarks _____ | | | |
| 9. Discharge Compliance Records | | | |
| <input type="checkbox"/> Air | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A |
| <input type="checkbox"/> Water (effluent) | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A |
| Remarks _____ | | | |
| 10. Daily Access/Security Logs <input type="checkbox"/> Readily available <input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A | | | |
| Remarks _____ | | | |

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| IV. O & M Costs | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--|----------|------------|---|------------|----------|--|---|--------|--------|------------|--|------------|----------|--|---|--------|--------|------------|--|------------|----------|--|---|--------|--------|------------|--|------------|----------|--|---|--------|--------|------------|--|------------|----------|--|---|--------|--------|------------|--|
| 1. O & M Organization <input type="checkbox"/> State in-house <input type="checkbox"/> Contractor for State <input type="checkbox"/> PRP in-house <input type="checkbox"/> Contractor for PRP x Other: <u>SRS</u> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2. O & M Cost Records x Readily available <input type="checkbox"/> Up to date <input type="checkbox"/> Funding mechanism/agreement in place x Other: <u>Project cost data is summarized in Section X of attached review: WSRC-RP-2007-4063</u> <p align="center">Total annual cost by year for review period if available</p> <table style="width: 100%; border: none;"> <tr> <td style="width: 20%;">From _____</td> <td style="width: 20%;">To _____</td> <td style="width: 40%;"></td> <td style="width: 20%; text-align: right;"><input type="checkbox"/> Breakdown attached</td> </tr> <tr> <td align="center">(Date)</td> <td align="center">(Date)</td> <td align="center">Total cost</td> <td></td> </tr> <tr> <td>From _____</td> <td>To _____</td> <td></td> <td align="right"><input type="checkbox"/> Breakdown attached</td> </tr> <tr> <td align="center">(Date)</td> <td align="center">(Date)</td> <td align="center">Total cost</td> <td></td> </tr> <tr> <td>From _____</td> <td>To _____</td> <td></td> <td align="right"><input type="checkbox"/> Breakdown attached</td> </tr> <tr> <td align="center">(Date)</td> <td align="center">(Date)</td> <td align="center">Total cost</td> <td></td> </tr> <tr> <td>From _____</td> <td>To _____</td> <td></td> <td align="right"><input type="checkbox"/> Breakdown attached</td> </tr> <tr> <td align="center">(Date)</td> <td align="center">(Date)</td> <td align="center">Total cost</td> <td></td> </tr> <tr> <td>From _____</td> <td>To _____</td> <td></td> <td align="right"><input type="checkbox"/> Breakdown attached</td> </tr> <tr> <td align="center">(Date)</td> <td align="center">(Date)</td> <td align="center">Total cost</td> <td></td> </tr> </table> | | | | From _____ | To _____ | | <input type="checkbox"/> Breakdown attached | (Date) | (Date) | Total cost | | From _____ | To _____ | | <input type="checkbox"/> Breakdown attached | (Date) | (Date) | Total cost | | From _____ | To _____ | | <input type="checkbox"/> Breakdown attached | (Date) | (Date) | Total cost | | From _____ | To _____ | | <input type="checkbox"/> Breakdown attached | (Date) | (Date) | Total cost | | From _____ | To _____ | | <input type="checkbox"/> Breakdown attached | (Date) | (Date) | Total cost | |
| From _____ | To _____ | | <input type="checkbox"/> Breakdown attached | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| (Date) | (Date) | Total cost | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| From _____ | To _____ | | <input type="checkbox"/> Breakdown attached | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| (Date) | (Date) | Total cost | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| From _____ | To _____ | | <input type="checkbox"/> Breakdown attached | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| (Date) | (Date) | Total cost | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| From _____ | To _____ | | <input type="checkbox"/> Breakdown attached | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| (Date) | (Date) | Total cost | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| From _____ | To _____ | | <input type="checkbox"/> Breakdown attached | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| (Date) | (Date) | Total cost | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3. Unanticipated or Unusually High O & M Costs During Review Period Describe costs and reasons: _____ _____ _____ _____ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| V. ACCESS AND INSTITUTIONAL CONTROLS x Applicable <input type="checkbox"/> N/A | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| A. Fencing | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1. Fencing Damaged <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Gates secured x N/A Remarks _____ _____ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | | | |
|---|--|--|--|--|
| B. Other Access Restrictions | | | | |
| 1. Signs and other security measures <input type="checkbox"/> Location shown on site map <input type="checkbox"/> N/A | | | | |
| Remarks: Signs at this site are in good condition. | | | | |
| C. Institutional Controls | | | | |
| 1. Implementation and enforcement | | | | |
| Site conditions imply ICs not properly implemented: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A | | | | |
| Site conditions imply ICs not being fully enforced: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A | | | | |
| Type of monitoring (e.g., self-reporting, drive-by): Field Walk Down | | | | |
| Frequency: Semi-Annually | | | | |
| Responsible party/agent: DOE Savannah River Field Office | | | | |
| Contact: Karen Adams Waste Area Group Manager 10/25/07 803-952-7871 | | | | |
| (Name) (Title) (Date) (Phone No.) | | | | |
| Reporting is up-to-date: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A | | | | |
| Reports are verified by the lead agency: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A | | | | |
| Specific requirements in deed of decision documents have been met: <input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A | | | | |
| Violations have been reported: <input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A | | | | |
| Other problems or suggestions: <input type="checkbox"/> Report attached | | | | |
| | | | | |
| | | | | |
| | | | | |
| 2. Adequacy <input checked="" type="checkbox"/> ICs are adequate <input type="checkbox"/> ICs are inadequate <input type="checkbox"/> N/A | | | | |
| Remarks | | | | |
| | | | | |
| D. General | | | | |
| 1. Vandalism/trespassing <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> No vandalism evident | | | | |
| Remarks | | | | |
| | | | | |
| | | | | |
| 2. Land use changes onsite <input checked="" type="checkbox"/> N/A | | | | |
| Remarks | | | | |
| | | | | |
| | | | | |

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| | |
|---|--|
| 3. Land use changes offsite | <input checked="" type="checkbox"/> N/A |
| Remarks _____ | |
| VI. GENERAL SITE CONDITIONS | |
| A. Roads | <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A |
| 1. Roads damaged | <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Roads adequate <input type="checkbox"/> N/A |
| Remarks _____ | |
| B. Other site Conditions | |
| Remarks: _____ Good _____ | |
| VII. COVER SYSTEMS <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A | |
| A. Soil Surface | |
| 1. Settlement (Low spots) | <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Settlement not evident |
| Areal extent _____ | Depth _____ |
| Remarks _____ | |
| 2. Cracks | <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Cracking not evident |
| Lengths _____ | Widths _____ Depths _____ |
| Remarks _____ | |
| 3. Erosion | <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Erosion not evident |
| Areal extent _____ | Depth _____ |
| Remarks _____ | |
| 4. Holes | <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Holes not evident |
| Areal extent _____ | Depth _____ |
| Remarks _____ | |
| 5. Vegetative Cover | <input type="checkbox"/> Grass <input checked="" type="checkbox"/> Cover properly established <input checked="" type="checkbox"/> No signs of stress |
| <input type="checkbox"/> Trees/shrubs (indicate size and location on a diagram) | |
| Remarks _____ | |

Five-Year Review Site Inspection Checklist (Continued)

| | | |
|--|---|--------------------|
| 6. Alternative Cover (armored rock, concrete, etc.) x N/A | | |
| Remarks: _____ _____ | | |
| 7. Bulges <input type="checkbox"/> Location shown on site map x Bulges not evident | | |
| Areal extent _____ Height _____ | | |
| Remarks _____ _____ | | |
| 8. Wet Areas/Water Damage x Wet areas/water damage not evident | | |
| <input type="checkbox"/> Wet Areas | <input type="checkbox"/> Location shown on site map | Areal extent _____ |
| <input type="checkbox"/> Ponding | <input type="checkbox"/> Location shown on site map | Areal extent _____ |
| <input type="checkbox"/> Seeps | <input type="checkbox"/> Location shown on site map | Areal extent _____ |
| <input type="checkbox"/> Soft subgrade | <input type="checkbox"/> Location shown on site map | Areal extent _____ |
| Remarks _____ _____ | | |
| 9. Slope Instability <input type="checkbox"/> Slides <input type="checkbox"/> Location shown on site map x No evidence of slope instability | | |
| Areal extent _____ | | |
| Remarks _____ _____ | | |
| B. Benches <input type="checkbox"/> Applicable x 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 <input type="checkbox"/> Location shown on site map x N/A or okay | | |
| Remarks _____ _____ | | |
| 2. Bench Breached <input type="checkbox"/> Location shown on site map x N/A or okay | | |
| Remarks _____ _____ | | |
| 3. Bench Overtopped <input type="checkbox"/> Location shown on site map x N/A or okay | | |
| Remarks _____ _____ | | |

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C. Letdown Channels☐ Applicable x N/A

(Channel lined with erosion control matts, 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 _____

Five-Year Review Site Inspection Checklist (Continued)

| | | |
|--|--------------|------------------------------|
| D. Cover Penetrations | x Applicable | <input type="checkbox"/> N/A |
| 1. Gas Vents <input type="checkbox"/> Active <input type="checkbox"/> Passive <input type="checkbox"/> Properly secured/locked <input type="checkbox"/> Functioning <input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition <input type="checkbox"/> Evidence of leakage at penetration <input type="checkbox"/> Needs Maintenance x N/A Remarks _____ _____ | | |
| 2. Gas Monitoring Probes <input type="checkbox"/> Properly secured/locked <input type="checkbox"/> Functioning <input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition <input type="checkbox"/> Evidence of leakage at penetration <input type="checkbox"/> Needs Maintenance x N/A Remarks _____ _____ | | |
| 3. Monitoring Wells x Properly secured/locked <input type="checkbox"/> Functioning x Routinely sampled x Good condition <input type="checkbox"/> Evidence of leakage at penetration <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A Remarks <u>CSR-14 PZ and CSR-17PZ are properly secured/locked and routinely monitored. Monitoring data is kept in the Environmental Restoration Data Management System, which is a computer data base of analytical data.</u> _____ | | |
| 4. Leachate Extraction Wells <input type="checkbox"/> Properly secured/locked <input type="checkbox"/> Functioning <input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition <input type="checkbox"/> Evidence of leakage at penetration <input type="checkbox"/> Needs Maintenance x N/A Remarks _____ _____ | | |
| 5. Settlement Monuments <input type="checkbox"/> Located <input type="checkbox"/> Routinely surveyed x N/A Remarks _____ _____ | | |
| E. Gas Collection and Treatment <input type="checkbox"/> Applicable x N/A | | |
| 1. Gas Treatment Facilities <input type="checkbox"/> Flaring <input type="checkbox"/> Thermal destruction <input type="checkbox"/> Collection for reuse <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____ _____ | | |
| 2. Gas Collection Wells, Manifolds and Piping <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____ _____ | | |

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| | | | |
|---|--|---|--|
| 3. Gas Monitoring Facilities (e.g., gas monitoring of adjacent homes or buildings) | | | |
| <input type="checkbox"/> Good condition | | <input type="checkbox"/> Needs Maintenance | <input type="checkbox"/> N/A |
| Remarks _____ _____ | | | |
| F. Cover Drainage Layer | | | |
| | | <input type="checkbox"/> Applicable | <input checked="" type="checkbox"/> N/A |
| 1. Outlet Pipes Inspected | | | |
| | | <input type="checkbox"/> Functioning | <input type="checkbox"/> N/A |
| Remarks _____ _____ | | | |
| 2. Outlet Rock Inspected | | | |
| | | <input type="checkbox"/> Functioning | <input type="checkbox"/> N/A |
| Remarks _____ _____ | | | |
| G. Detention/sedimentation Ponds | | | |
| | | <input type="checkbox"/> Applicable | <input checked="" type="checkbox"/> N/A |
| 1. Siltation | | | |
| Areal extent _____ | | Depth _____ | <input type="checkbox"/> N/A |
| <input type="checkbox"/> Siltation not evident | | | |
| Remarks _____ _____ | | | |
| 2. Erosion | | | |
| Areal extent _____ | | Depth _____ | <input type="checkbox"/> N/A |
| <input type="checkbox"/> Erosion not evident | | | |
| Remarks _____ _____ | | | |
| 3. Outlet Works | | | |
| | | <input type="checkbox"/> Functioning | <input type="checkbox"/> N/A |
| Remarks _____ _____ | | | |
| 4. Dam | | | |
| | | <input type="checkbox"/> Functioning | <input type="checkbox"/> N/A |
| Remarks _____ _____ | | | |
| H. Retaining Walls | | | |
| | | <input type="checkbox"/> Applicable | <input checked="" type="checkbox"/> N/A |
| 1. Deformations | | | |
| | | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> Deformation not evident |
| Horizontal displacement _____ | | Vertical displacement _____ | |
| Rotational displacement _____ | | | |
| Remarks _____ _____ | | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | |
|---|--|--|
| 2. Degradation <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Deformation not evident | | |
| Remarks _____ | | |
| I. Perimeter Ditches/Off-Site Discharge <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A | | |
| 1. Siltation <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Siltation not evident | | |
| Areal extent _____ Depth _____ | | |
| Remarks _____ | | |
| 2. Vegetative Growth <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Siltation not evident | | |
| x Vegetation does not impede flow | | |
| Areal extent _____ Type _____ | | |
| Remarks _____ | | |
| 3. Erosion <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Erosion not evident | | |
| Areal extent _____ Depth _____ | | |
| Remarks _____ | | |
| 4. Discharge Structure <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> N/A | | |
| Remarks _____ | | |
| VIII. VERTICAL BARRIER WALLS <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A | | |
| 1. Settlement <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Settlement not evident | | |
| Areal extent _____ Depth _____ | | |
| Remarks _____ | | |
| 2. Performance Monitoring Type of Monitoring _____ <input type="checkbox"/> Performance not monitored | | |
| Frequency _____ <input type="checkbox"/> Evidence of breaching Head differential _____ | | |
| Remarks _____ | | |

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| | | | |
|---|--|-------------------------------------|---|
| IX. GROUNDWATER/SURFACE WATER REMEDIES | | <input type="checkbox"/> Applicable | <input checked="" type="checkbox"/> N/A |
| A. Groundwater Extraction Wells, Pumps, and Pipelines | | <input type="checkbox"/> Applicable | <input type="checkbox"/> N/A |
| 1. Pumps, Wellhead Plumbing, and Electrical <input type="checkbox"/> Good condition <input type="checkbox"/> All required wells located <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A Remarks _____ _____ | | | |
| 2. Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____ _____ | | | |
| 3. Spare Parts and Equipment <input type="checkbox"/> Readily available <input type="checkbox"/> Good condition <input type="checkbox"/> Requires upgrade <input type="checkbox"/> Needs to be provided Remarks _____ _____ | | | |
| B. Surface Water Collection Structures, Pumps, and Pipelines | | <input type="checkbox"/> Applicable | <input checked="" type="checkbox"/> N/A |
| 1. Collection Structures, Pumps, and Electrical <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____ _____ | | | |
| 2. Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____ _____ | | | |
| 3. Spare Parts and Equipment <input type="checkbox"/> Readily available <input type="checkbox"/> Good condition <input type="checkbox"/> Requires upgrade <input type="checkbox"/> Needs to be provided Remarks _____ _____ | | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | |
|---|--|--|
| C. Treatment System | <input type="checkbox"/> Applicable | <input checked="" type="checkbox"/> N/A |
| 1. Treatment Train (Check components that apply) | | |
| <input type="checkbox"/> Metals removal | <input type="checkbox"/> Oil/water separation | <input type="checkbox"/> Bioremediation |
| <input type="checkbox"/> Air stripping | <input type="checkbox"/> Carbon adsorbers | |
| <input type="checkbox"/> Filters _____ | | |
| <input type="checkbox"/> Additive (e.g., chelation agent, flocculent) _____ | | |
| <input type="checkbox"/> Others _____ | | |
| <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance | |
| <input type="checkbox"/> Sampling ports properly marked and functional | | |
| <input type="checkbox"/> Sampling/maintenance log displayed and up to date | | |
| <input type="checkbox"/> Equipment properly identified | | |
| <input type="checkbox"/> Quantity of groundwater treated annually _____ | | |
| <input type="checkbox"/> Quantity of surface water treated annually _____ | | |
| Remarks _____ | | |
| _____ | | |
| 2. Electrical Enclosures and Panels (properly rated and functional) | | |
| <input type="checkbox"/> N/A | <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance |
| Remarks _____ | | |
| _____ | | |
| 3. Tanks, Vaults, Storage Vessels | | |
| <input type="checkbox"/> N/A | <input type="checkbox"/> Good condition | <input type="checkbox"/> Proper secondary containment <input type="checkbox"/> Needs Maintenance |
| Remarks _____ | | |
| _____ | | |
| 4. Discharge Structure and Appurtenances | | |
| <input type="checkbox"/> N/A | <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance |
| Remarks _____ | | |
| _____ | | |
| 5. Treatment Building(s) | | |
| <input type="checkbox"/> N/A | <input type="checkbox"/> Good condition (esp. roof and doorways) | <input type="checkbox"/> Needs repair |
| <input type="checkbox"/> Chemicals and equipment properly stored | | |
| Remarks _____ | | |
| _____ | | |

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6. Monitoring Wells

- ☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ All required wells located ☐ Needs Maintenance ☐ N/A

Remarks _____

D. Monitoring Data x Applicable ☐ N/A

1. Monitoring Data (see Section X)

x Is routinely submitted on time x Is of acceptable quality

2 Monitoring Data Suggests:

- ☐ Groundwater plume is effectively contained ☐ Contaminant concentrations are declining

E. Monitored Natural Attenuation ☐ Applicable x N/A

1. Monitoring Wells (Natural attenuation remedy)

- x Properly secured/locked ☐ Functioning ☐ Routinely sampled x Good condition
☐ All required wells located ☐ Needs Maintenance ☐ N/A

Remarks: See below other remedies _____

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.

The water level in Pit 631-3G is being measured quarterly. A hydrogeologist has determined that the pit surface area improvements are reducing water level in the pit as designed. The water level measurement will be discontinued only when the trapped water shows a declining trend for three consecutive years.

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 institutional controls in conjunction with improved stormwater management. The remedy is effective and functioning as designed.

Five-Year Review Site Inspection Checklist (Continued)

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.

Implementation of the Institutional Controls alternative required both short- and long-term actions, which are protective of human health and the environment. For the short-term signs were posted at the Waste Unit, which indicate that this area was used for the disposal of waste material. In addition, existing SRS access controls are used to maintain this site for industrial use only.

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.

N/A

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CHEMICALS, METALS, AND PESTICIDES PITS (CMP PITS) (080-170G, -171G, -180G, -181G, -182G, -183G, AND -190G) OPERABLE UNIT

I. Introduction

This is the second five-year review for the Chemicals, Metals, and Pesticides Pits (CMP Pits) Operable Unit (OU). This five-year review addresses the final portion of this Record of Decision (ROD) with a summary of the interim actions to date. This review was conducted from August 2007 through September 2007.

II. OU Chronology

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

Table 1. Chronology of OU Events

| Event | Date |
|---------------------------------------|-------------------|
| Removal Action (Soil Excavation) | 1984 |
| Remedial Investigation Complete | October 1, 1997 |
| First Interim ROD Issuance | November 29, 1999 |
| Interim Remedial Action Start | December 10, 1999 |
| First Interim ROD Amendment Issuance | March 8, 2002 |
| Second Interim ROD Amendment Issuance | October 7, 2003 |
| Second Interim ROD Issuance | October 7, 2003 |
| FS Rev 1.1 Submittal | May 4, 2004 |
| ROD Issuance | May 2, 2005 |
| Remedial Action Start | April 24, 2006 |
| Previous Five-Year Review | February 12, 2004 |

III. Background

Physical Characteristics

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 ft north of the L-Area perimeter fence (Figure 1). The CMP Pits are located within the Pen Branch watershed approximately 1,250 ft southeast of Pen Branch.

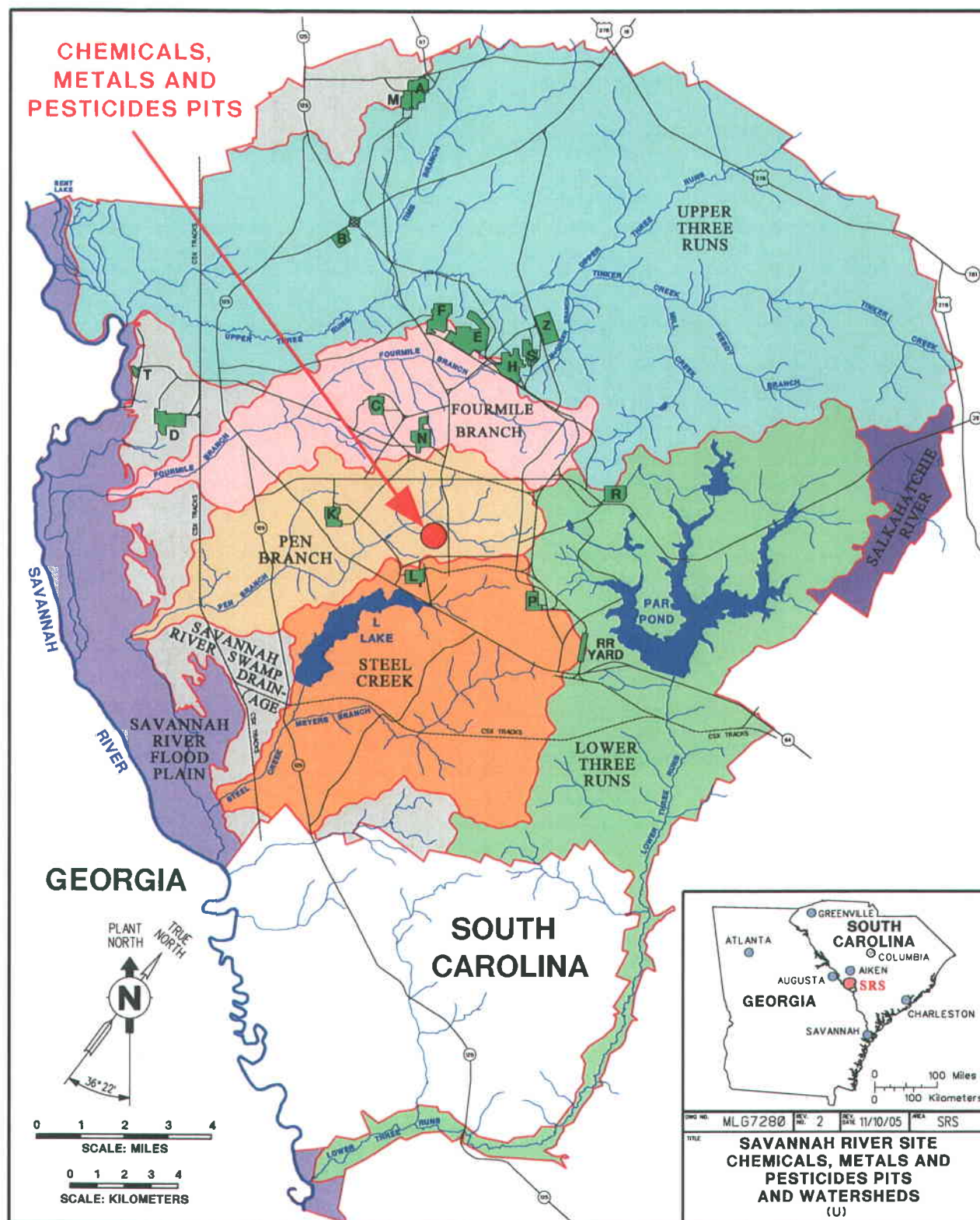


Figure 1. Location of the CMP Pits OU at SRS

The OU consists of the ballast area soils, CMP pits and associated vadose zone (field A), vadose zone (field B), groundwater, and Pen Branch surface water and sediment (Figure 2).

Land and Resource Use

The future land use for CMP Pits is anticipated to be industrial.

History of Contamination

The unit consists of seven former unlined pits, placed in two rows and occupies an area 10 to 15 ft wide, 45 to 70 ft long, and 10 to 15 ft deep. The CMP pits were designed to receive nonradioactive wastes (chemicals, metals, and pesticides) and operated from August 1971 until February 1979. During that time, chemicals, metals, pesticides, and fluorescent lighting ballasts containing polychlorinated biphenyls (PCBs) were disposed of in the pits. In 1984, drums and other contaminated media were excavated from the pits. In a portion of the northwest pit, contaminated soils were excavated beneath the pit floor in two areas to depths of 25 ft and 5 ft below the bottom of the pit. These “over-excavation” areas were backfilled with coarse aggregate. The entire length of the pits was filled with approximately 2 ft of coarse aggregate. A corrugated high density polyethylene (HDPE) pipe was placed in the gravel to connect four manholes. The pits were then backfilled with soil and an 80-mil HDPE liner was placed over the pits to minimize the migration of residual contaminants in the vadose zone. An additional 4 ft of soil was placed over the liner. The gravel, piping, and manholes were installed to allow passive venting from residual soil contamination.

Fluorescent light ballasts containing PCBs were found and pesticides were detected in soil at or near the ground surface to the west of the CMP Pits in an area that is now referred to as the “Ballast Area.” The presence of the PCB- and pesticide-contaminated soil is attributed to stockpiling material recovered from the pits during the 1984 excavation activities.

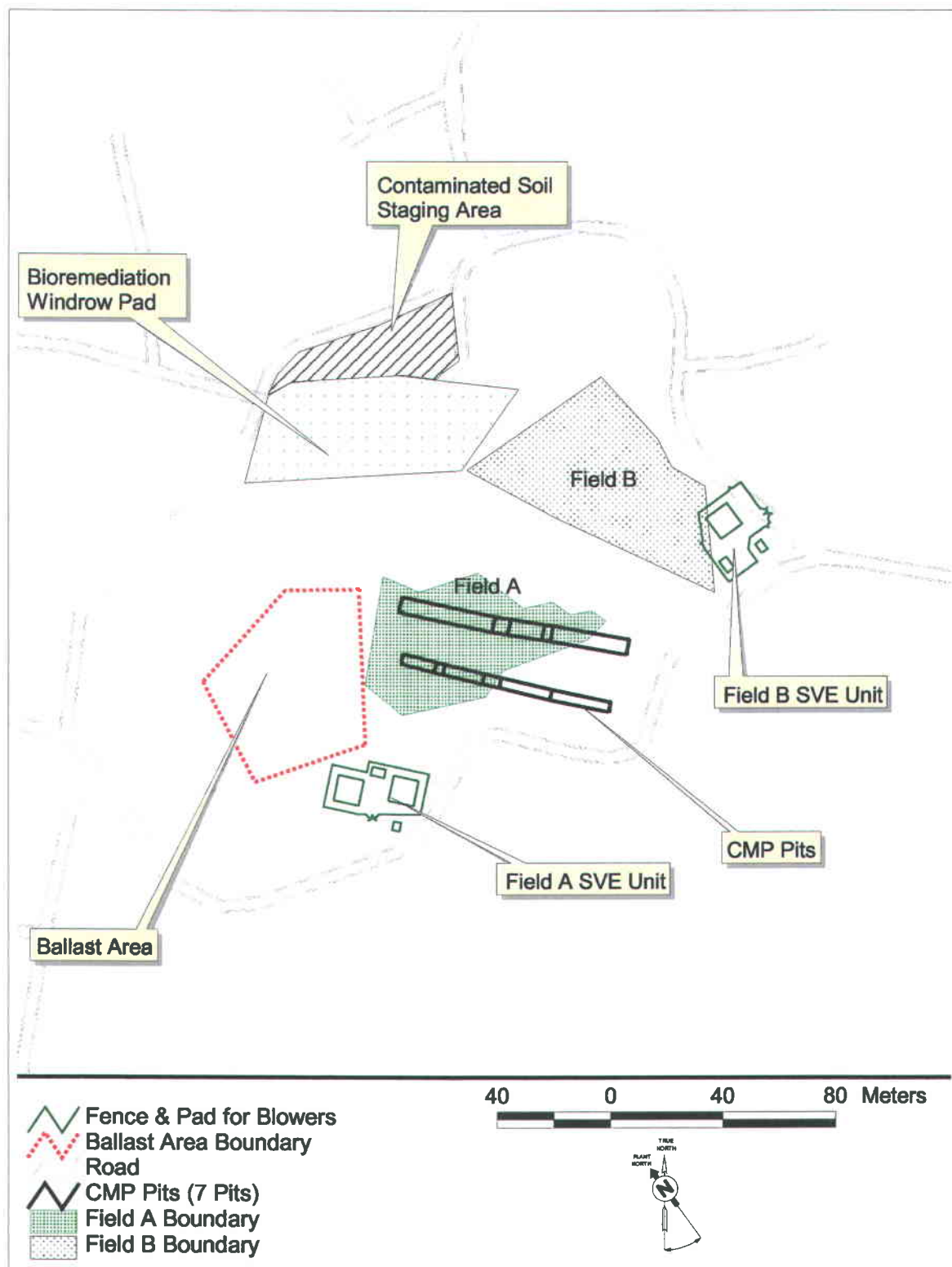


Figure 2. Layout of the CMP Pits OU

The OU consists of the ballast area soils, CMP pits and associated vadose zone (field A), vadose zone (field B), groundwater, and Pen Branch surface water and sediment (Figure 2).

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Groundwater contamination has occurred as a result of the contamination leaching from soil. Two groundwater plumes exist at the CMP Pits, designated as the main plume and the northeast plume. These plumes are moving northward towards Pen Branch sediment and surface water. Groundwater modeling indicates that the CMP Pits are the source for the main plume. Particle tracking towards and from the northeast plume suggests that this plume is from a different source than that of the main plume. The source of the northeast plume is depleted.

Based on the sampling results from the Resource Conservation Recovery Act/Comprehensive Environmental Response, Compensation, and Liability Act (RCRA/CERCLA) investigation, an Interim Record of Decision (IROD) was approved that addressed PCB- and pesticide-contaminated soil in the Ballast Area, chlorinated volatile organic compounds (VOCs) in the vadose zone, and groundwater under the pits.

Initial Response

In 2000, approximately 216 yd³ of PCB- and pesticide-contaminated soil was excavated from the Ballast Area and transported for incineration. During the interim remedial action, excavated soil was found to contain Silvex, an herbicide that cannot be disposed of at any treatment or disposal facility in the United States. Additionally, data collected to support the excavation work indicated that the total volume of contaminated soil was 6,000 yd³ versus 1,300 yd³, much larger than originally estimated. Additional characterization activities were completed in 2001 to determine the extent of Silvex as well as the true extent of pesticide and PCB contamination.

In April 2001 a soil vapor extraction (SVE) unit was placed in operation in Field B. The SVE system was intended as an interim action in conjunction with air sparging to remediate contaminated groundwater from the CMP Pits. However, subsequent to the initial planning of the Field B interim action, a tight clay that would impede sparging was discovered and the water table dropped due to drought conditions. The lowering of the water table stranded chlorinated VOCs that were in the groundwater in the vadose zone

of Field B. Therefore, the air sparging aspect of the remediation was not implemented and SVE was implemented to remove the stranded chlorinated VOCs.

Based on the conditions found in 2000 and 2001, an IROD Amendment was issued in 2001, which eliminated the air sparging portion of the remedy in Fields A and B and called for more characterization of the OU.

The results of the SVE operation were reported annually in the Effectiveness Monitoring Reports. Approximately 220 lb of chlorinated VOCs were removed from Field B. The active SVE system in Field B was shut down in May 2002 and converted to a passive system with the installation of Baroballs™ at each SVE well. These wells will remain in passive operation and will be abandoned after completion of the final OU remedy. The Field A SVE system was effective at removing 9,300 lb of VOCs from the more porous horizons in the vadose zone in the pits area. The system operated from 2002 until 2005. However, additional characterization indicated the presence tetrachloroethylene (PCE) contamination in the less permeable soil horizons at concentrations indicative of dense non-aqueous phase liquid (DNAPL) in a relatively small area beneath the northwest pit.

In June 2003, a second amendment to the IROD was approved. The IROD Amendment specified enhanced bioremediation for the Ballast Area. In 2004 and 2005, approximately 4,000 yd³ of soil were excavated over approximately 0.7 acres in the Ballast Area. This soil was staged in windrows and remediated via enhanced biological treatment with the addition and mixing of nutrient amendments to the contaminated soil. Once the amended soil samples were shown to be below remedial goals (RGs), the soil was placed back on the Ballast Area and seeded. In 2004 a final ROD was issued to address the source of the groundwater contamination in the vadose zone and the groundwater plume. Electrical resistance heating (ERH) with SVE was selected to remove the DNAPL from the vadose zone. Monitored natural attenuation was the selected remedy for the groundwater once the source of groundwater contamination was removed.

IV. Remedial Actions

Remedy Selection and Implementation

Ballast Area

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

- Prevent ecological receptors from direct contact with PCB-contaminated surface soil at concentrations > 1 mg/kg.
- Prevent direct contact with pesticide-contaminated surface soils so that constituents of concern (COCs) do not present an unacceptable risk to human and ecological receptors.

The interim remedial action of enhanced bioremediation was effective in meeting the RAOs with respect to pesticide- and PCB-contaminated surface soils. The remedial action will include institutional controls that are compliant with the approved Land Use Control Implementation Plan (LUCIP).

CMP Pits Field A

The CMP Pits Field A and Field B RAOs are as follows:

- Prevent COC migration to groundwater
- Prevent residential exposure to surface soil above RGs.

SVE was operating in the Field A Vadose Zone in accordance with the interim action. The SVE system removed approximately 9,300 lb of VOC contamination from Field A. While soil-gas concentrations have been reduced, soil samples indicate that VOC contamination is sorbed onto the clay layers in the vadose zone.

The Source Area (Field A) remedial action is Combination of ERH to remove DNAPL and continued operation of the SVE system. Electrical resistance heating was identified as the preferred remedy for the Source Area (Field A) because soil heating effectively mobilizes DNAPL and is compatible with the existing SVE system. Continued operation of the SVE system is included as the preferred alternative to support removal of volatilized contaminants and steam generated during ERH operation.

Groundwater

The groundwater RAOs are as follows:

- Prevent human exposure to contaminated groundwater above MCLs or RGs
- Reduce the COC concentrations in the groundwater plume to MCLs
- Prevent discharge of contaminated groundwater to surface water at concentrations above MCLs

RGs are the final acceptable exposure levels that are determined on the basis of the results of the BRA and evaluation of the expected exposures and associated risks. The CMP Pits OU RG in soil (Table 2) have been developed to be protective based upon future industrial land use and in groundwater have been developed to achieve MCLs or residential RGs.

The remedial action for Groundwater is Monitored Natural Attenuation (MNA) and Institutional Controls. This remedy effectively remediates the low-concentration residual groundwater contamination that will remain following implementation of a source control remedial action.

The Effectiveness Monitoring Plan provides the sampling and reporting requirements associated with this remedy.

Table 2. Summary of Remedial Goals for the CMP Pits OU

| Area/Media of Concern | Refined COCs | Type of RCOC | | | | Final Remedial Goals (mg/kg or mg/L) | Final Remedial Goal Basis |
|--|------------------------------------|--------------|---------|----|-----|--------------------------------------|---------------------------|
| | | ARAR | CM/PTSM | HH | ECO | | |
| Ballast Area | PCB | ✓ | | | ✓ | 1.00E+00 | ARAR |
| | Dieldrin | | | ✓ | ✓ | 6.84E-02 | Ecological |
| | Endrin | | | | ✓ | 3.97E-02 | Ecological |
| | Heptachlor Epoxide | | | | ✓ | 2.10E-02 | Ecological |
| | p,p'-DDD | | | | ✓ | 2.87E-01 | Ecological |
| | p,p'-DDE | | | | ✓ | 5.54E-01 | Ecological |
| | p,p'-DDT | | | ✓ | ✓ | 1.62E+00 | Ecological |
| CMP Pits and Associated Field A Vadose Zone ² | Dichloromethane | | ✓ | | | 2.48E-02 | Contaminant migration |
| | Tetrachloroethylene | | ✓ | | | 3.07E+01 | Contaminant migration |
| Groundwater | Alpha-benzene hexachloride | | | ✓ | | 5.33E-06 | Future Resident |
| | Beta-benzene hexachloride | | | ✓ | | 1.84E-05 | Future Resident |
| | Delta-benzene hexachloride | | | ✓ | | 1.84E-05 | Future Resident |
| | Dieldrin | | | ✓ | | 2.09E-06 | Future Resident |
| | Lindane | ✓ | | ✓ | | 2.00E-04 | ARAR |
| | Bis(2-ethylhexyl)phthalate | ✓ | | ✓ | | 6.00E-03 | ARAR |
| | Total Trihalomethanes ¹ | ✓ | | ✓ | | 1.00E-01 | ARAR |
| | Carbon Tetrachloride | ✓ | | ✓ | | 5.00E-03 | ARAR |
| | Dichloromethane | ✓ | | ✓ | | 5.00E-03 | ARAR |
| | Tetrachloroethylene (PCE) | ✓ | | ✓ | | 5.00E-03 | ARAR |
| | Trichloroethylene (TCE) | ✓ | | ✓ | | 5.00E-03 | ARAR |

1. Total Trihalomethanes includes chloroform and bromodichloromethane. These constituents do not have an individual MCL; however, Total Trihalomethanes is assigned an MCL. Although these constituents are not ARAR COCs (Site concentrations pose a risk but do not exceed the MCL), they do have an MCL that is an ARAR and; as such, is the appropriate final RG.
2. Vadose zone RGs apply anywhere in the vadose zone. The RGs are target values based on available data. During remedial action implementation, vadose zone and groundwater monitoring may indicate that different values may be protective and meet the remedial action objective of preventing migration to groundwater.

Vadose Zone (Field B)

The remedial action for Field B includes the continuation of the passive SVE system via Baroballs™. This action will continue to remove minor amounts of residual VOCs from the soil until the wells are abandoned after completion of the final action associated with Field A.

Surface Water and Sediment

There is no remedial action required for the Pen Branch surface water.

V. Progress Since Last Review

This is the second five-year ROD review that the CMP Pits OU has undergone. Since the previous review in June of 2003, it was reported that the selected remedy of contaminated soil excavation for the ballast area was not functioning as intended. The remedy was not functioning due to the presence of Silvex (an herbicide that cannot be disposed of at any treatment or disposal facility in the United States) found in the ballast area soil. Therefore the ballast area remedial action changed from an off-site disposal to on-site bioremediation remedy. In 2004 and 2005, the pesticide-contaminated soils located in the Ballast Area were excavated, staged in windrows, and remediated via the addition and mixing of biological amendments. The remedial action for the Ballast Area is complete. Institutional controls as specified by the approved LUCIP will be implemented for the entire CMP Pits OU.

The SVE systems were effective at removing VOC contamination from the vadose zone created when the water table level dropped in elevation in Field B and from the porous horizons in the source area in Field A. Additional characterization indicated that a DNAPL source remains in the impermeable/clay horizons in a portion of Field A. ERH combined with SVE was constructed to eliminate the DNAPL as the source of groundwater in September of 2007. The additional six-phase electrode array was a change from the design estimated in the ROD versus the design documented in the

CMI/RAIP. The CMP arrays were installed as described in the CMI/RAIP. Moreover, in early 2007 94 required MNA wells were installed. The system is currently operational.

VI. Five-Year Review Process

The United States Department of Energy (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 conclusions are as follows:

- The remedies selected for the CMP pits OU 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 information has come to light which 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. Project Costs

Since the Vadose Zone Field A is located adjacent to the Ballast Area and the Field A remedy will also include institutional controls, costs associated with the CMP Pits Ballast Area are included with the CMP Pits Vadose Zone Field A cost estimates. In addition, there is duplication between the Operation and Maintenance (O&M) at Field B (groundwater monitoring, soil-gas sampling, effectiveness reporting, and land use controls) and Field A. Due to this duplication, O&M costs reported for Field A are inclusive of O&M costs for Field B. The total estimated operations and management cost estimate for the Ballast Area, CMP Pits Vadose Zone Field A and Field B is \$995,914. This estimated present worth cost is based on two years of soil heating and active SVE at a 2.1% discount rate and three years of passive SVE at a 2.1% discount rate. The CMP Pits groundwater remedy includes O&M costs for MNA, Institutional Controls, and Periodic Groundwater Monitoring. The estimated O&M cost associated with the groundwater remedy is \$1,200,000. This estimated present worth cost is based on 40 years of groundwater monitoring at a 3.9% discount rate.

The total estimated O&M cost of all the remedies for the CMP Pits is \$2,102,976. The remedy was under construction in fiscal year 2006; therefore the actual O&M cost for the CMP Pits OU cannot be assessed at this time.

XI. Protectiveness Statement(s)

The selected remedy for the CMP Pits OU leaves hazardous substances in place that pose a potential future risk and will require land use restrictions for an indefinite period of time. (See Figure 3) As agreed on March 30, 2000, among the USDOE, United States Environmental Protection Agency (USEPA), and South Carolina Department of Health and Environmental Control (SCDHEC), SRS is implementing a Land Use Control

Assurance Plan (LUCAP) to ensure that the land use controls required by numerous remedial decisions at SRS are properly maintained and periodically verified. The land use controls shall be maintained until the concentration of hazardous substances associated with the unit have been reduced to levels that allow for unlimited exposure and unrestricted use. Approval by USEPA and SCDHEC is required for any modification or termination of the institutional controls. Land use controls, including institutional controls, will restrict the CMP Pits OU to future industrial use and will prohibit residential use of the area. Unauthorized excavation will also be prohibited and the waste unit will remain undisturbed.

XII. Next Review

The next five-year review is scheduled for February 12, 2014.

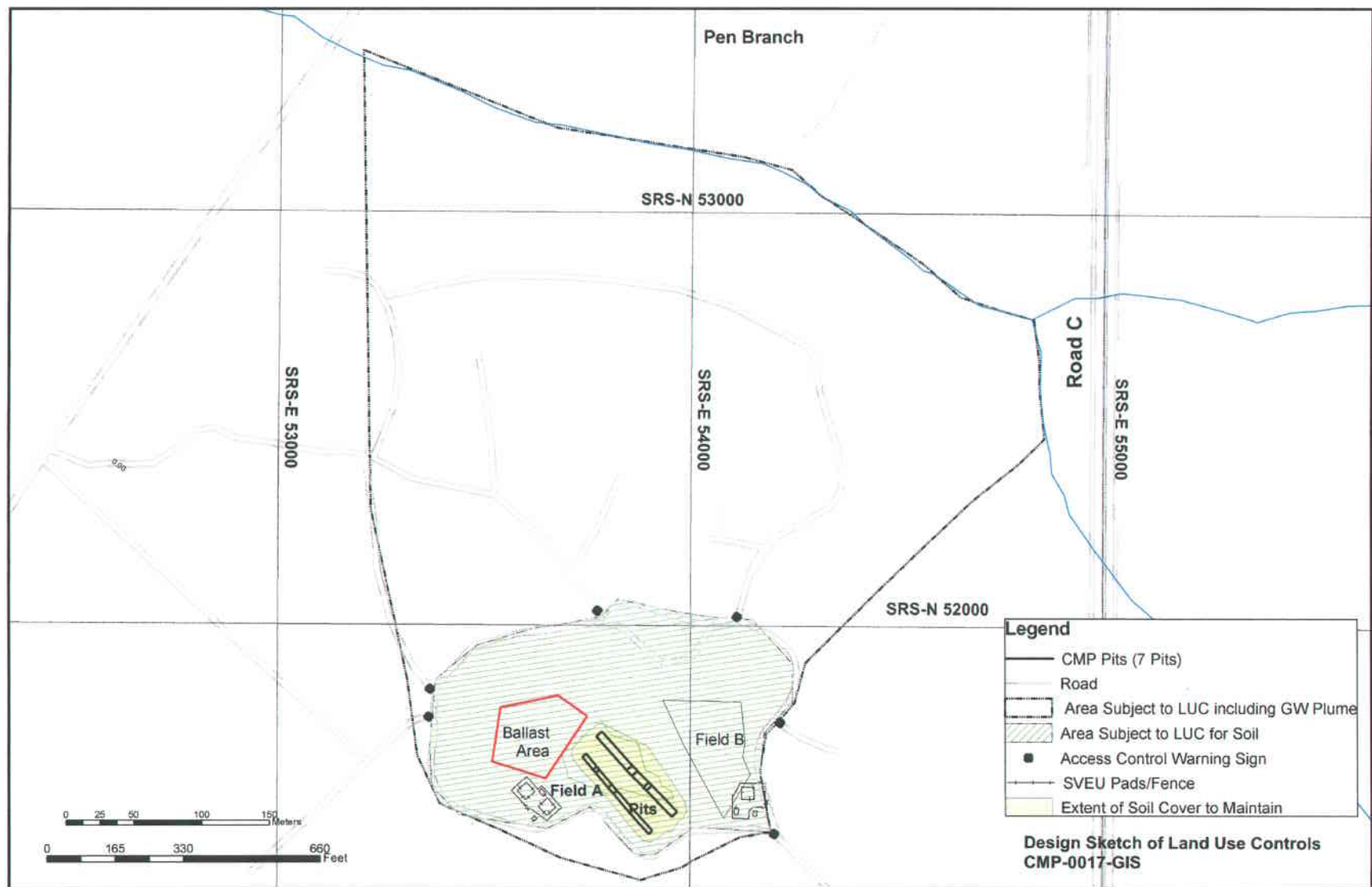


Figure 3. Area Subject to Land Use Controls

ATTACHMENT 1

List of Documents Reviewed

WSRC-RP-98-4192, *Interim Record of Decision RA Selection for CMP Pits*, Revision 1.1, Augusta 1999, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

WSRC-RP-2000-4158, *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)*, Redline Revision 1.2, 2001, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

WSRC-RP-2002-4049, *RCRA Facility Investigation/Remedial Investigation Addendum with Baseline Risk Assessment for the CMP Pits (U)*, Revision 1.1, 2002, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

WSRC-RP-2001-4232, *Interim Record of Decision Amendment for the Chemicals, Metals, and Pesticides Pits-Ballast Area (U)*, Revision 0, 2003, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

WSRC-RP-2004-4090, *Record of Decision Remedial Alternative Selection for the Chemicals, Metals, and Pesticides Pits Operable Unit (080-170G, 080-171G, 080-180G, 080-181G, 080-182G, 080-183G, and 080-190G) (U)*, Revision 0, 2005, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

WSRC-RP-2005-4077, *Effectiveness Monitoring Plan for the Electrical Resistance Heating (ERH)/Soil Vapor Extraction (SVE) System and Monitored Natural Attenuation at the Chemicals, Metals, and Pesticides Pits Operable Unit (U)*, Revision 1, 2006, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

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ATTACHMENT 2

Five-Year Review Site Inspection Checklist

| I. SITE INFORMATION | | | | | | | | | | | | | | | |
|---|---|-----------------------------------|-----------------------|---------------------------------------|---|--|--|--|---|---|--|---|--|--|--|
| Site Name: | Chemicals, Metals, and Pesticides Pits Operable Unit | Date of Inspection: | 9/25/2007 | | | | | | | | | | | | |
| Location and Region: | Savannah River Site, USEPA IV | EPA ID: | SC1890008989 | | | | | | | | | | | | |
| Agency, office, or company leading the five-year review: | United States Department of Energy | CERCLIS No.: | 24 | | | | | | | | | | | | |
| | | Weather/Temperature: | clear and sunny, 91°F | | | | | | | | | | | | |
| Remedy Includes: (Check all that apply) <table><tr><td><input type="checkbox"/> Cover System</td><td><input checked="" type="checkbox"/> Monitored Natural Attenuation</td></tr><tr><td><input type="checkbox"/> Access controls</td><td><input type="checkbox"/> Groundwater Containment</td></tr><tr><td><input checked="" type="checkbox"/> Institutional Controls</td><td><input type="checkbox"/> Vertical Barrier Walls</td></tr><tr><td><input type="checkbox"/> Groundwater pump and treatment</td><td></td></tr><tr><td><input type="checkbox"/> Surface water collection and treatment</td><td></td></tr><tr><td colspan="2"><input checked="" type="checkbox"/> Other: <u>Combination of ERH and continued operation of the SVE system (Field A); passive soil vapor extraction system via Baroballs™ for (Field B).</u></td></tr></table> | | | | <input type="checkbox"/> Cover System | <input checked="" type="checkbox"/> Monitored Natural Attenuation | <input type="checkbox"/> Access controls | <input type="checkbox"/> Groundwater Containment | <input checked="" type="checkbox"/> Institutional Controls | <input type="checkbox"/> Vertical Barrier Walls | <input type="checkbox"/> Groundwater pump and treatment | | <input type="checkbox"/> Surface water collection and treatment | | <input checked="" type="checkbox"/> Other: <u>Combination of ERH and continued operation of the SVE system (Field A); passive soil vapor extraction system via Baroballs™ for (Field B).</u> | |
| <input type="checkbox"/> Cover System | <input checked="" type="checkbox"/> Monitored Natural Attenuation | | | | | | | | | | | | | | |
| <input type="checkbox"/> Access controls | <input type="checkbox"/> Groundwater Containment | | | | | | | | | | | | | | |
| <input checked="" type="checkbox"/> Institutional Controls | <input type="checkbox"/> Vertical Barrier Walls | | | | | | | | | | | | | | |
| <input type="checkbox"/> Groundwater pump and treatment | | | | | | | | | | | | | | | |
| <input type="checkbox"/> Surface water collection and treatment | | | | | | | | | | | | | | | |
| <input checked="" type="checkbox"/> Other: <u>Combination of ERH and continued operation of the SVE system (Field A); passive soil vapor extraction system via Baroballs™ for (Field B).</u> | | | | | | | | | | | | | | | |
| Attachments: <input type="checkbox"/> Inspection team roster attached <input type="checkbox"/> Site map attached | | | | | | | | | | | | | | | |
| II. INTERVIEWS (Check all that apply) | | | | | | | | | | | | | | | |
| 1. O & M site manager | | | | | | | | | | | | | | | |
| | Name | Title | Date | | | | | | | | | | | | |
| Interviewed: | <input type="checkbox"/> at site <input type="checkbox"/> at office | <input type="checkbox"/> by phone | Phone No. _____ | | | | | | | | | | | | |
| Problems, suggestions; | <input type="checkbox"/> report attached _____ | | | | | | | | | | | | | | |
| 2. O & M staff | | | | | | | | | | | | | | | |
| | Name | Title | Date | | | | | | | | | | | | |
| Interviewed: | <input type="checkbox"/> at site <input type="checkbox"/> at office | <input type="checkbox"/> by phone | Phone No. _____ | | | | | | | | | | | | |
| Problems, suggestions; | <input type="checkbox"/> report attached _____ | | | | | | | | | | | | | | |

Five-Year Review Site Inspection Checklist for CMP Pits (Continued)

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 _____

Problems; suggestions; ☐ Report attached _____

Agency _____

Contact _____

Name _____

Title _____

Date _____

Phone No. _____

Problems; suggestions; ☐ Report attached _____

- 4 **Other interviews (optional)** ☐ Report attached

Five-Year Review Site Inspection Checklist for CMP Pits (Continued)

| III. ONSITE DOCUMENTS & RECORDS VERIFIED (Check all that apply) | | | |
|---|--|-------------------------------------|------------------------------|
| 1. O & M Documents | | | |
| <input type="checkbox"/> O & M Manual | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | × N/A |
| × As-built drawings | × Readily available | × Up to date | <input type="checkbox"/> N/A |
| <input type="checkbox"/> Maintenance Logs | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | × N/A |
| Remarks: <u>See Waste Unit Inspection and Maintenance, ER-SOP-019</u> | | | |
| 2. Site-Specific Health and Safety Plan | | | |
| <input type="checkbox"/> Contingency plan/emergency response plan | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | × N/A |
| Remarks: <u>Routine O&M activities do not require a SSHASP Under 29 CFR 1910.1201, HAZWOPER</u> | | | |
| 3. O & M and OSHA Training Records | | | |
| | × Readily available | × Up to date | <input type="checkbox"/> N/A |
| Remarks: _____ | | | |
| 4. Permits and Service Agreements | | | |
| × Air discharge permit | × Readily available | <input type="checkbox"/> Up to date | × N/A |
| <input type="checkbox"/> Effluent discharge | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | × N/A |
| <input type="checkbox"/> Waste Disposal, POTW | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | × N/A |
| <input type="checkbox"/> Other permits | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | × N/A |
| Remarks: _____ | | | |
| 5. Gas Generation Records | | | |
| | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | × N/A |
| Remarks: _____ | | | |
| 6. Settlement Monument Records | | | |
| | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | × N/A |
| Remarks: _____ | | | |
| 7. Groundwater Monitoring Records | | | |
| | × Readily available | <input type="checkbox"/> Up to date | <input type="checkbox"/> N/A |
| Remarks: _____ | | | |

Five-Year Review Site Inspection Checklist for CMP Pits (Continued)

| | | | |
|--|---|---|---|
| 8. Leachate Extraction Records | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |
| Remarks _____ | | | |
| | | | |
| 9. Discharge Compliance Records | | | |
| <input type="checkbox"/> Air | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |
| <input type="checkbox"/> Water (effluent) | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |
| Remarks _____ | | | |
| | | | |
| 10. Daily Access/Security Logs | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |
| Remarks _____ | | | |
| | | | |
| IV. O & M Costs | | | |
| 1. O & M Organization | | | |
| <input type="checkbox"/> State in-house | <input type="checkbox"/> Contractor for State | | |
| <input type="checkbox"/> PRP in-house | <input type="checkbox"/> Contractor for PRP | | |
| x Other: <u>SRS</u> | | | |
| | | | |
| 2. O & M Cost Records | | | |
| <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input type="checkbox"/> Funding mechanism/agreement in place | |
| x Other: <u>Project cost data is summarized in Section X of attached review: WSRC-RP-2007-4063</u> | | | |
| | | | |
| Total annual cost by year for review period if available | | | |
| From _____ | To _____ | _____ | <input type="checkbox"/> Breakdown attached |
| Date | Date | Total cost | |
| From _____ | To _____ | _____ | <input type="checkbox"/> Breakdown attached |
| Date | Date | Total cost | |
| From _____ | To _____ | _____ | <input type="checkbox"/> Breakdown attached |
| Date | Date | Total cost | |
| From _____ | To _____ | _____ | <input type="checkbox"/> Breakdown attached |
| Date | Date | Total cost | |
| From _____ | To _____ | _____ | <input type="checkbox"/> Breakdown attached |
| Date | Date | Total cost | |

Five-Year Review Site Inspection Checklist for CMP Pits (Continued)

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

Describe costs and reasons:

V. ACCESS AND INSTITUTIONAL CONTROLS

x Applicable

☐ N/A

A. Fencing

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

Remarks _____

B. Other Access Restrictions

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

Remarks: Signs at this site are in good condition

C. Institutional Controls

1. Implementation and enforcement

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

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

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

Field Walkdown

Frequency: Annually

Responsible party/agent: DOE Savannah River Field Office

Contact: K. M. Adams Waste Area Group Manager 09/3/07 (803) 952-7871
(Name) (Title) (Date) (Phone No.)

Reporting is up-to-date: x Yes ☐ No ☐ N/A

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

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

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

Other problems or suggestions: ☐ Report attached

Five-Year Review Site Inspection Checklist for CMP Pits (Continued)

| | | | |
|--|--|--|------------------------------|
| 2. Adequacy | <input checked="" type="checkbox"/> ICs are adequate | <input type="checkbox"/> ICs are inadequate | <input type="checkbox"/> N/A |
| Remarks _____ | | | |
| D. General | | | |
| 1. Vandalism/trespassing | <input type="checkbox"/> Location shown on site map | <input checked="" type="checkbox"/> No vandalism evident | |
| Remarks _____ | | | |
| 2. Land use changes onsite | <input checked="" type="checkbox"/> N/A | | |
| Remarks _____ | | | |
| 3. Land use changes offsite | <input checked="" type="checkbox"/> N/A | | |
| Remarks _____ | | | |
| VI. GENERAL SITE CONDITIONS | | | |
| A. Roads | <input checked="" type="checkbox"/> Applicable | <input type="checkbox"/> N/A | |
| 1. Roads damaged | <input type="checkbox"/> Location shown on site map | <input checked="" type="checkbox"/> Roads adequate | <input type="checkbox"/> N/A |
| Remarks _____ | | | |
| B. Other site Conditions | | | |
| Remarks _____ | | | |
| VII. COVERS SYSTEMS <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A | | | |
| A. Soil Surface | | | |
| 1. Settlement (Low spots) | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> Settlement not evident | |
| Areal extent _____ | | Depth _____ | |
| Remarks _____ | | | |
| 2. Cracks | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> Cracking not evident | |
| Lengths _____ | | Widths _____ | Depths _____ |
| Remarks _____ | | | |

Five-Year Review Site Inspection Checklist for CMP Pits (Continued)

| | | |
|---|---|---|
| 3. Erosion | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> Erosion not evident |
| Areal extent _____ Depth _____ | | |
| Remarks _____ | | |
| 4. Holes | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> Holes not evident |
| Areal extent _____ Depth _____ | | |
| Remarks _____ | | |
| 5. Vegetative Cover | <input type="checkbox"/> Grass | <input type="checkbox"/> Cover properly established |
| <input type="checkbox"/> No signs of stress | | |
| <input type="checkbox"/> Trees/shrubs (indicate size and location on a diagram) | | |
| Remarks _____ | | |
| 6. Alternative Cover (armored rock, concrete, etc.) | <input type="checkbox"/> N/A | |
| Remarks _____ | | |
| 7. Bulges | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> Bulges not evident |
| Areal extent _____ Height _____ | | |
| Remarks _____ | | |
| 8. Wet Areas/Water Damage | <input type="checkbox"/> Wet areas/water damage not evident | |
| <input type="checkbox"/> Wet Areas | <input type="checkbox"/> Location shown on site map | Areal extent _____ |
| <input type="checkbox"/> Ponding | <input type="checkbox"/> Location shown on site map | Areal extent _____ |
| <input type="checkbox"/> Seeps | <input type="checkbox"/> Location shown on site map | Areal extent _____ |
| <input type="checkbox"/> Soft subgrade | <input type="checkbox"/> Location shown on site map | Areal extent _____ |
| Remarks _____ | | |
| 9. Slope Instability | <input type="checkbox"/> Slides | <input type="checkbox"/> Location shown on site map |
| <input type="checkbox"/> No evidence of slope instability | | |
| Areal extent _____ | | |
| Remarks _____ | | |

Five-Year Review Site Inspection Checklist for CMP Pits (Continued)

| | | |
|--|---|--|
| B. Benches <input type="checkbox"/> Applicable <input type="checkbox"/> 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 | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> N/A or okay |
| Remarks _____ | | |
| 2. Bench Breached | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> N/A or okay |
| Remarks _____ | | |
| 3. Bench Overtopped | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> N/A or okay |
| Remarks _____ | | |
| C. Letdown Channels <input type="checkbox"/> Applicable <input type="checkbox"/> 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 | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> No evidence of settlement |
| Areal extent _____ | Depth _____ | |
| Remarks _____ | | |
| 2. Material Degradation | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> No evidence of degradation |
| Material type _____ | Areal extent _____ | |
| Remarks _____ | | |
| 3. Erosion | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> No evidence of erosion |
| Areal extent _____ | Depth _____ | |
| Remarks _____ | | |
| 4. Undercutting | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> No evidence of undercutting |
| Areal extent _____ | Depth _____ | |
| Remarks _____ | | |

Five-Year Review Site Inspection Checklist for CMP Pits (Continued)

| | | | | |
|--|--|--|--|--|
| 5. Obstructions | | Type _____ | <input type="checkbox"/> No obstructions | |
| <input type="checkbox"/> Location shown on site map | | Areal extent _____ | | |
| Size _____ | | | | |
| Remarks _____ | | | | |
| 6. Excessive Vegetative Growth | | Type _____ | | |
| <input type="checkbox"/> No evidence of excessive growth | | | | |
| <input type="checkbox"/> Vegetation in channels does not obstruct flow | | | | |
| <input type="checkbox"/> Location shown on site map | | Areal extent _____ | | |
| Remarks _____ | | | | |
| D. Cover Penetrations | | <input type="checkbox"/> Applicable | <input type="checkbox"/> N/A | |
| 1. Gas Vents | | <input type="checkbox"/> Active | <input type="checkbox"/> Passive | |
| <input type="checkbox"/> Properly secured/locked | <input type="checkbox"/> Functioning | <input type="checkbox"/> Routinely sampled | <input type="checkbox"/> Good condition | |
| <input type="checkbox"/> Evidence of leakage at penetration | <input type="checkbox"/> Needs Maintenance | <input type="checkbox"/> N/A | | |
| Remarks _____ | | | | |
| 2. Gas Monitoring Probes | | | | |
| <input type="checkbox"/> Properly secured/locked | <input type="checkbox"/> Functioning | <input type="checkbox"/> Routinely sampled | <input type="checkbox"/> Good condition | |
| <input type="checkbox"/> Evidence of leakage at penetration | <input type="checkbox"/> Needs Maintenance | <input type="checkbox"/> N/A | | |
| Remarks _____ | | | | |
| 3. Monitoring Wells | | | | |
| <input type="checkbox"/> Properly secured/locked | <input type="checkbox"/> Functioning | <input type="checkbox"/> Routinely sampled | <input type="checkbox"/> Good condition | |
| <input type="checkbox"/> Evidence of leakage at penetration | <input type="checkbox"/> Needs Maintenance | <input type="checkbox"/> N/A | | |
| Remarks _____ | | | | |
| 4. Leachate Extraction Wells | | | | |
| <input type="checkbox"/> Properly secured/locked | <input type="checkbox"/> Functioning | <input type="checkbox"/> Routinely sampled | <input type="checkbox"/> Good condition | |
| <input type="checkbox"/> Evidence of leakage at penetration | <input type="checkbox"/> Needs Maintenance | <input type="checkbox"/> N/A | | |
| Remarks _____ | | | | |

Five-Year Review Site Inspection Checklist for CMP Pits (Continued)

| | | | |
|---|--|--|--|
| 5. Settlement Monuments <input type="checkbox"/> Located <input type="checkbox"/> Routinely surveyed <input type="checkbox"/> N/A | | | |
| Remarks _____ | | | |
| E. Gas Collection and Treatment <input type="checkbox"/> Applicable <input type="checkbox"/> N/A | | | |
| 1. Gas Treatment Facilities | | | |
| <input type="checkbox"/> Flaring <input type="checkbox"/> Thermal destruction <input type="checkbox"/> Collection for reuse | | | |
| <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance | | | |
| Remarks _____ | | | |
| 2. Gas Collection Wells, Manifolds and Piping | | | |
| <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance | | | |
| Remarks _____ | | | |
| 3. Gas Monitoring Facilities (e.g., gas monitoring of adjacent homes or buildings) | | | |
| <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A | | | |
| Remarks _____ | | | |
| F. Cover Drainage Layer <input type="checkbox"/> Applicable <input type="checkbox"/> N/A | | | |
| 1. Outlet Pipes Inspected <input type="checkbox"/> Functioning <input type="checkbox"/> N/A | | | |
| Remarks _____ | | | |
| 2. Outlet Rock Inspected <input type="checkbox"/> Functioning <input type="checkbox"/> N/A | | | |
| Remarks _____ | | | |
| G. Detention/sedimentation Ponds <input type="checkbox"/> Applicable <input type="checkbox"/> N/A | | | |
| 1. Siltation Areal extent _____ Depth _____ <input type="checkbox"/> N/A | | | |
| <input type="checkbox"/> Siltation not evident | | | |
| Remarks _____ | | | |

Five-Year Review Site Inspection Checklist for CMP Pits (Continued)

| | | | |
|---|---|--|------------------------------|
| 2. Erosion | Areal extent _____ | Depth _____ | <input type="checkbox"/> N/A |
| <input type="checkbox"/> Erosion not evident | | | |
| Remarks _____ | | | |
| 3. Outlet Works | <input type="checkbox"/> Functioning | <input type="checkbox"/> N/A | |
| Remarks _____ | | | |
| 4. Dam | <input type="checkbox"/> Functioning | <input type="checkbox"/> N/A | |
| Remarks _____ | | | |
| H. Retaining Walls <input type="checkbox"/> Applicable <input type="checkbox"/> N/A | | | |
| 1. Deformations | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> Deformation not evident | |
| Horizontal displacement _____ | | Vertical displacement _____ | |
| Rotational displacement _____ | | | |
| Remarks _____ | | | |
| 2. Degradation | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> Deformation not evident | |
| Remarks _____ | | | |
| I. Perimeter Ditches/Off-Site Discharge <input type="checkbox"/> Applicable <input type="checkbox"/> N/A | | | |
| 1. Siltation | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> Siltation not evident | |
| Areal extent _____ | | Depth _____ | |
| Remarks _____ | | | |
| 2. Vegetative Growth | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> Siltation not evident | |
| <input type="checkbox"/> Vegetation does not impede flow | | | |
| Areal extent _____ | | Type _____ | |
| Remarks _____ | | | |
| 3. Erosion | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> Erosion not evident | |
| Areal extent _____ | | Depth _____ | |
| Remarks _____ | | | |

Five-Year Review Site Inspection Checklist for CMP Pits (Continued)

| | | | |
|---|--|---|---|
| 4. Discharge Structure | | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> N/A |
| Remarks _____ | | | |
| VIII. VERTICAL BARRIER WALLS | | | |
| | | <input type="checkbox"/> Applicable | <input checked="" type="checkbox"/> N/A |
| 1. Settlement | | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> Settlement not evident |
| Areal extent _____ | | Depth _____ | |
| Remarks _____ | | | |
| 2. Performance Monitoring | | Type of Monitoring _____ | |
| <input type="checkbox"/> Performance not monitored | | | |
| Frequency _____ | | <input type="checkbox"/> Evidence of breaching | |
| Head differential _____ | | | |
| Remarks _____ | | | |
| IX. GROUNDWATER/SURFACE WATER REMEDIES | | | |
| | | <input checked="" type="checkbox"/> Applicable | <input type="checkbox"/> N/A |
| A. Groundwater Extraction Wells, Pumps, and Pipelines | | <input checked="" type="checkbox"/> Applicable | <input type="checkbox"/> N/A |
| 1. Pumps, Wellhead Plumbing, and Electrical | | | |
| <input checked="" type="checkbox"/> Good condition | | | |
| <input type="checkbox"/> All required wells located | | <input type="checkbox"/> Needs Maintenance | <input type="checkbox"/> N/A |
| Remarks _____ | | | |
| 2. Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances | | | |
| <input checked="" type="checkbox"/> Good condition | | | |
| <input type="checkbox"/> Needs Maintenance | | | |
| Remarks _____ | | | |
| 3. Spare Parts and Equipment | | | |
| <input checked="" type="checkbox"/> Readily available | | <input type="checkbox"/> Good condition | <input type="checkbox"/> Requires upgrade |
| | | <input type="checkbox"/> Needs to be provided | |
| Remarks _____ | | | |
| B. Surface Water Collection Structures, Pumps, and Pipelines | | <input type="checkbox"/> Applicable | <input checked="" type="checkbox"/> N/A |
| 1. Collection Structures, Pumps, and Electrical | | | |
| <input type="checkbox"/> Good condition | | <input type="checkbox"/> Needs Maintenance | |
| Remarks _____ | | | |

Five-Year Review Site Inspection Checklist for CMP Pits (Continued)

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 _____

Five-Year Review Site Inspection Checklist for CMP Pits (Continued)

| | | |
|--|--|--|
| 4. | Discharge Structure and Appurtenances | |
| | <input type="checkbox"/> N/A <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance | |
| | Remarks _____ | |
| 5. | Treatment Building(s) | |
| | <input type="checkbox"/> N/A <input type="checkbox"/> Good condition (esp. roof and doorways) <input type="checkbox"/> Needs repair | |
| | <input type="checkbox"/> Chemicals and equipment properly stored | |
| | Remarks _____ | |
| 6. | Monitoring Wells | |
| | <input type="checkbox"/> Properly secured/locked <input type="checkbox"/> Functioning <input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition | |
| | <input type="checkbox"/> All required wells located <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A | |
| | Remarks _____ | |
| D. Monitoring Data <input type="checkbox"/> Applicable x N/A | | |
| 1. | Monitoring Data | |
| | <input type="checkbox"/> Is routinely submitted on time <input type="checkbox"/> Is of acceptable quality | |
| 2 | Monitoring data suggests: | |
| | <input type="checkbox"/> Groundwater plume is effectively contained <input type="checkbox"/> Contaminant concentrations are declining | |
| E. Monitored Natural Attenuation x Applicable <input type="checkbox"/> N/A | | |
| 1. | Monitoring Wells (Natural attenuation remedy) | |
| | x Properly secured/locked x Functioning x Routinely sampled x Good condition | |
| | x All required wells located <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> 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. | | |
| SOIL VAPOR EXTRACTION REMEDIES x Applicable <input type="checkbox"/> N/A | | |
| A. SVE Extraction Wells, Pumps, and Pipelines x Applicable <input type="checkbox"/> N/A | | |
| 1. | Pumps, Wellhead Plumbing, and Electrical | |
| | x Good condition <input type="checkbox"/> All required wells located <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A | |
| | Remarks _____ | |

Five-Year Review Site Inspection Checklist for CMP Pits (Continued)

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 _____

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 selected remedy for the Ballast Area includes institutional controls. A combination of ERH to remove DNAPL and continued operation of the SVE system is the selected remedy for Source Area (Field A). The remedial action for Groundwater is Monitored Natural Attenuation (MNA) and Institutional Controls; and the remedial action for Field B includes the continuation of the passive soil vapor extraction system via Baroballs™.

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

MNA effectively remediates the low-concentration residual groundwater contamination that will remain following implementation of a source control remedial action.

In conclusion, the selected remedies for the CMP Pits are functioning as intended.

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.

The CMP Pits are located within an industrially developed area, and future industrial land use is anticipated. Remedial action objectives (RAOs) and response actions were developed with the expectation that future land use will be industrial. Land use controls are part of the remedial action to ensure protection against unrestricted use (e.g., residential or agricultural).

Five-Year Review Site Inspection Checklist for CMP Pits (Continued)

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.

N/A

D-AREA BURNING/RUBBLE PITS (431-D AND 431-1D) OPERABLE UNIT

I. Introduction

This is the third 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 2007 through September 2007. 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 |
|---|----------------------------------|
| RCRA Facility Investigation (RFI)/Remedial Investigation (RI) start | 1993 |
| Record of Decision (ROD) issuance | April 22, 1997 |
| Remedial Action start | May 12, 1998 |
| Previous Five-Year Reviews | June 30, 1997, February 12, 2004 |

III. Background

Physical Characteristics

The DBRP OU is located in the western part of the Savannah River Site (SRS) in Barnwell County, approximately 3,000 ft east of the Savannah River in D Area (Figure 1). The topography of the unit is flat with a surface elevation of 130 ft above mean sea level (msl) and 45 ft above the Savannah River. The water table is approximately 10 ft 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.

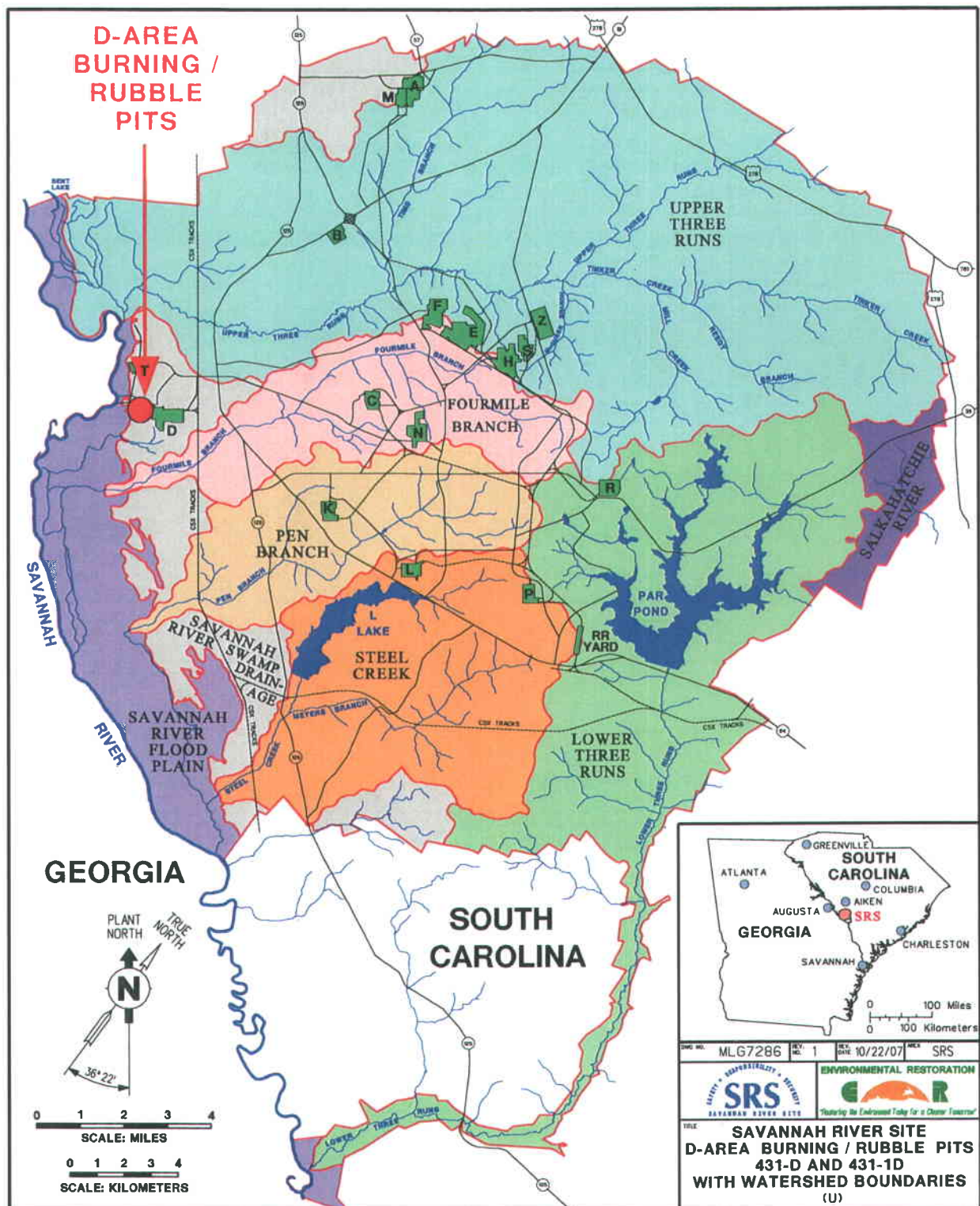


Figure 1. Location of the D-Area Burning/Rubble Pits (431-D and 431-1D) OU

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 ft, and the dimensions of 431-1D are 229 x 36 x 10 ft. The two pits are separated by a 150-ft 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.

Land and Resource Use

The future land use of the DBRP OU is anticipated to be industrial.

History of Contamination

Between 1951 and 1973, burning pits were used at SRS to burn various hazardous and non-hazardous wastes. 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.

Initial Response

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-ft layer of clayey soil was placed over the contents, and the surface was compacted and mounded above the surrounding terrain. The cover material was placed at a time preceding the preparation of the formal CERCLA documentation. The cover system was placed prior to the CERCLA investigation. 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 soil has occurred outside of the OU.

In the BRA, the 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.

IV. Remedial Actions

Remedy Selection

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 a period of continued 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.

Remedy Implementation

Implementation of the Institutional Controls alternative required both short- and long-term actions, which are protective of human health and the environment. For the short-term signs were posted at the Waste Unit, which indicate that this area was used for the disposal of waste material and contains buried waste. In addition, existing SRS access controls are used to maintain this site 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.

Operations and Maintenance

A confirmatory groundwater-monitoring program was established in the FRR (WSRC 1998) to ensure that institutional controls were the appropriate remedial action for the DBRP groundwater. Under the confirmatory groundwater program, five monitoring wells were selected to monitor groundwater over time. In accordance with the FRR, groundwater samples were collected from the wells annually (starting in CY 1998) during the second quarter of each calendar year (ending in CY 2003). Figure 2 shows the monitoring wells and water level contours.

The FRR states "If there are no exceedances of MCLs by any of the risk and hazard drivers during the preceding five year period, indicating no appreciable leaching to groundwater of these chemicals, SRS will request USEPA and SCDHEC concurrence for the termination of groundwater monitoring." Based on these criteria the data from samples collected from May 1998 through June 2003 show that none of the COCs in the groundwater have been detected above MCLs. Thus, the requirements of the FRR have been met. The three parties (DOE, USEPA, and SCDHEC) agreed in 2004 to terminate groundwater monitoring at the DBRP OU.

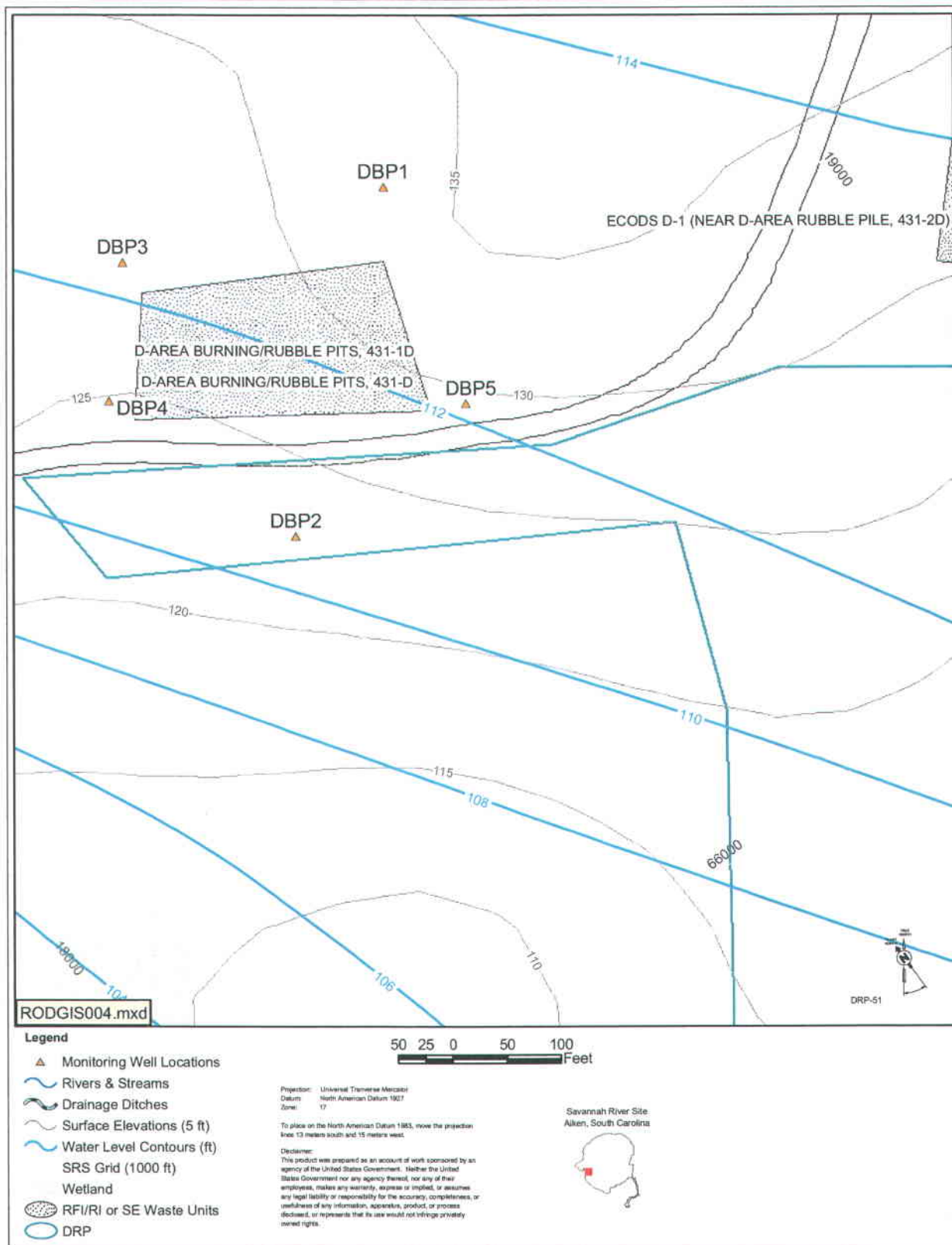


Figure 2. Monitoring Well Locations and Water Level Contours

V. Progress Since Last Review

This is the third five-year ROD review that the DBRP has undergone. Since the previous review in June of 2003, SRS requested and obtained USEPA, SCDHEC, and USDOE concurrence for the termination of groundwater monitoring.

VI. 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

VII. 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 over the five-year period indicated that there were no exceedances of MCLs by any of the risk and hazard drivers, indicating no appreciable leaching to groundwater of these chemicals.
- 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 was changed in 2002 to 10 µg/L. However, arsenic was not detected in the groundwater during the monitoring period.
- No other 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 issues for this OU.

X. Project Costs

Costs associated with the selected remedy for DBRP include operation and maintenance costs of groundwater monitoring and institutional controls. The estimated operation and maintenance cost associated with the selected remedy is \$370,000. This is a present worth cost, including 30 years of maintenance activities. After characterization and effectiveness of the remedy were evaluated, the actual operation and maintenance cost for the DBRP was assessed. The total actual operation and maintenance cost from project support and other post-construction expense to fiscal year 2006 is \$209,939.

XI. 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 and prohibit the excavation of soil which might expose future workers to low concentrations of hazardous constituents.

XII. Next Review

The next five-year review is scheduled for February 12, 2014.

ATTACHMENT 1

List of Documents Reviewed

WSRC-RP-96-867, *Record of Decision Remedial Alternative Selection for the D-Area Burning/Rubble Pits (431-d and 431-1D) (U)*, Revision 1, 1997, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

WSRC-RP-97-406, *Final Remediation Report for the D-Area Burning/Rubble Pits (431-D and 431-1D) (U)*, Revision 1.1, 1998, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

WSRC-RP-2004-4056, *Technical Evaluation for Groundwater Monitoring at the D-Area Burning/Rubble Pits (431-D and 431-1D) OU (U)*, Revision 1, 2005, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

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ATTACHMENT 2

Five-Year Review Site Inspection Checklist

| I. SITE INFORMATION | | | | | | | | | | | | | | | |
|--|--|------------------------------------|---|---------------------------------------|--|--|--|--|---|---|--|---|--|--------------------------------------|--|
| Site Name: | D-Area Burning Rubble Pits (431-D and 431-1D) | Date of Inspection: | 9/24/2007 | | | | | | | | | | | | |
| Location and Region: | Savannah River Site, USEPA IV | EPA ID: | SC1890008989 | | | | | | | | | | | | |
| Agency, office, or company leading the five-year review: | United States Department of Energy | CERCLIS OU No.: | 31 | | | | | | | | | | | | |
| | | Weather/Temperature: | clear and sunny, 88°F | | | | | | | | | | | | |
| Remedy Includes: (Check all that apply) <table><tbody><tr><td><input type="checkbox"/> Cover System</td><td><input type="checkbox"/> Monitored Natural Attenuation</td></tr><tr><td><input type="checkbox"/> Access controls</td><td><input type="checkbox"/> Groundwater Containment</td></tr><tr><td><input checked="" type="checkbox"/> Institutional Controls</td><td><input type="checkbox"/> Vertical Barrier Walls</td></tr><tr><td><input type="checkbox"/> Groundwater pump and treatment</td><td></td></tr><tr><td><input type="checkbox"/> Surface water collection and treatment</td><td></td></tr><tr><td><input type="checkbox"/> Other _____</td><td></td></tr></tbody></table> | | | | <input type="checkbox"/> Cover System | <input type="checkbox"/> Monitored Natural Attenuation | <input type="checkbox"/> Access controls | <input type="checkbox"/> Groundwater Containment | <input checked="" type="checkbox"/> Institutional Controls | <input type="checkbox"/> Vertical Barrier Walls | <input type="checkbox"/> Groundwater pump and treatment | | <input type="checkbox"/> Surface water collection and treatment | | <input type="checkbox"/> Other _____ | |
| <input type="checkbox"/> Cover System | <input type="checkbox"/> Monitored Natural Attenuation | | | | | | | | | | | | | | |
| <input type="checkbox"/> Access controls | <input type="checkbox"/> Groundwater Containment | | | | | | | | | | | | | | |
| <input checked="" type="checkbox"/> Institutional Controls | <input type="checkbox"/> Vertical Barrier Walls | | | | | | | | | | | | | | |
| <input type="checkbox"/> Groundwater pump and treatment | | | | | | | | | | | | | | | |
| <input type="checkbox"/> Surface water collection and treatment | | | | | | | | | | | | | | | |
| <input type="checkbox"/> Other _____ | | | | | | | | | | | | | | | |
| Attachments: <input type="checkbox"/> Inspection team roster attached <input type="checkbox"/> Site map attached | | | | | | | | | | | | | | | |
| II. INTERVIEWS (Check all that apply) | | | | | | | | | | | | | | | |
| 1. O & M site manager | | | | | | | | | | | | | | | |
| | _____ (Name) | _____ (Title) | _____ (Date) | | | | | | | | | | | | |
| Interviewed: | <input type="checkbox"/> at site | <input type="checkbox"/> at office | <input type="checkbox"/> by phone Phone No. _____ | | | | | | | | | | | | |
| Problems, suggestions: | <input type="checkbox"/> report attached _____ | | | | | | | | | | | | | | |
| 2. O & M staff | | | | | | | | | | | | | | | |
| | _____ (Name) | _____ (Title) | _____ (Date) | | | | | | | | | | | | |
| Interviewed: | <input type="checkbox"/> at site | <input type="checkbox"/> at office | <input type="checkbox"/> by phone Phone No. _____ | | | | | | | | | | | | |
| Problems, suggestions: | <input type="checkbox"/> report attached _____ | | | | | | | | | | | | | | |

Five-Year Review Site Inspection Checklist (Continued)

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 _____

Five-Year Review Site Inspection Checklist (Continued)

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

1. O & M Documents

- | | | | |
|---|--|-------------------------------------|------------------------------|
| <input type="checkbox"/> O & M Manual | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |
| x As-built drawings | x Readily available | x Up to date | <input type="checkbox"/> N/A |
| <input type="checkbox"/> Maintenance Logs | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |

Remarks: See Waste Unit Inspection and Maintenance, ER-SOP-019

2. Site-Specific Health and Safety Plan

☐ Readily available ☐ Up to date x N/A

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

Remarks: Routine O&M activities do not require an SSHASP Under 29 CFR 1910.1201, HAZWOPER

3. O & M and OSHA Training Records

x Readily available x Up to date ☐ N/A

Remarks

4. Permits and Service Agreements

- | | | | |
|---|--|-------------------------------------|-------|
| <input type="checkbox"/> Air discharge permit | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |
| <input type="checkbox"/> Effluent discharge | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |
| <input type="checkbox"/> Waste Disposal, POTW | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |
| <input type="checkbox"/> Other permits | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |

Remarks

5. Gas Generation Records

☐ Readily available ☐ Up to date x N/A

Remarks

6. Settlement Monument Records

☐ Readily available ☐ Up to date x N/A

Remarks

7. Groundwater Monitoring Records

☐ Readily available ☐ Up to date x N/A

Remarks

Five-Year Review Site Inspection Checklist (Continued)

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
x Other: SRS

2. **O & M Cost Records**
☐ Readily available ☐ Up to date ☐ Funding mechanism/agreement in place
x Other: Project cost data is summarized in Section X of attached review: WSRC-RP-2007-4063

Total annual cost by year for review period if available

| | | | |
|----------------------|--------------------|------------|---|
| From _____ (Date) | To _____ (Date) | _____ | <input type="checkbox"/> Breakdown attached |
| | | Total cost | |
| From _____ (Date) | To _____ (Date) | _____ | <input type="checkbox"/> Breakdown attached |
| | | Total cost | |
| From _____ (Date) | To _____ (Date) | _____ | <input type="checkbox"/> Breakdown attached |
| | | Total cost | |
| From _____ (Date) | To _____ (Date) | _____ | <input type="checkbox"/> Breakdown attached |
| | | Total cost | |
| From _____ (Date) | To _____ (Date) | _____ | <input type="checkbox"/> Breakdown attached |
| | | Total cost | |

Five-Year Review Site Inspection Checklist (Continued)

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 at this site are in good condition

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: Annually

Responsible party/agent: DOE Savannah River Field Office

Contact:

D. C. Hannah
(Name)

Waste Area Group Manager
(Title)

09/3/07
(Date)

(803) 952-7813
(Phone No.)

Reporting 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

Five-Year Review Site Inspection Checklist (Continued)

| | | | | |
|---|---|--|--|------------------------------|
| 2. | Adequacy | <input checked="" type="checkbox"/> ICs are adequate | <input type="checkbox"/> ICs are inadequate | <input type="checkbox"/> N/A |
| Remarks _____ | | | | |
| D. General | | | | |
| 1. | Vandalism/trespassing | <input type="checkbox"/> Location shown on site map | <input checked="" type="checkbox"/> No vandalism evident | |
| Remarks _____ | | | | |
| 2. | Land use changes onsite | <input checked="" type="checkbox"/> N/A | | |
| Remarks _____ | | | | |
| 3. | Land use changes offsite | <input checked="" type="checkbox"/> N/A | | |
| Remarks _____ | | | | |
| VI. GENERAL SITE CONDITIONS | | | | |
| A. Roads | <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A | | | |
| 1. | Roads damaged | <input type="checkbox"/> Location shown on site map | <input checked="" type="checkbox"/> Roads adequate | <input type="checkbox"/> N/A |
| Remarks _____ | | | | |
| B. Other site Conditions | | | | |
| Remarks _____ | | | | |
| VII. COVERS SYSTEMS | | | | |
| <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A | | | | |
| A. Soil Surface | | | | |
| 1. | Settlement (Low spots) | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> Settlement not evident | |
| Areal extent _____ Depth _____ | | | | |
| Remarks _____ | | | | |
| 2. | Cracks | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> Cracking not evident | |
| Lengths _____ Widths _____ Depths _____ | | | | |
| Remarks _____ | | | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | |
|---|---|---|
| 3. Erosion | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> Erosion not evident |
| Areal extent _____ Depth _____ | | |
| Remarks _____ | | |
| | | |
| 4. Holes | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> Holes not evident |
| Areal extent _____ Depth _____ | | |
| Remarks _____ | | |
| | | |
| 5. Vegetative Cover | <input type="checkbox"/> Grass | <input type="checkbox"/> Cover properly established |
| <input type="checkbox"/> No signs of stress | | |
| <input type="checkbox"/> Trees/shrubs (indicate size and location on a diagram) | | |
| Remarks _____ | | |
| | | |
| 6. Alternative Cover (armored rock, concrete, etc.) | <input type="checkbox"/> N/A | |
| Remarks _____ | | |
| | | |
| 7. Bulges | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> Bulges not evident |
| Areal extent _____ Height _____ | | |
| Remarks _____ | | |
| | | |
| 8. Wet Areas/Water Damage | <input type="checkbox"/> Wet areas/water damage not evident | |
| <input type="checkbox"/> Wet Areas | <input type="checkbox"/> Location shown on site map | Areal extent _____ |
| <input type="checkbox"/> Ponding | <input type="checkbox"/> Location shown on site map | Areal extent _____ |
| <input type="checkbox"/> Seeps | <input type="checkbox"/> Location shown on site map | Areal extent _____ |
| <input type="checkbox"/> Soft subgrade | <input type="checkbox"/> Location shown on site map | Areal extent _____ |
| Remarks _____ | | |
| | | |
| 9. Slope Instability | <input type="checkbox"/> Slides | <input type="checkbox"/> Location shown on site map |
| <input type="checkbox"/> No evidence of slope instability | | |
| Areal extent _____ | | |
| Remarks _____ | | |
| | | |

Five-Year Review Site Inspection Checklist (Continued)

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 _____

Five-Year Review Site Inspection Checklist (Continued)

| | | | |
|---|--|--|--|
| 5. Obstructions | | Type _____ | <input type="checkbox"/> No obstructions |
| <input type="checkbox"/> Location shown on site map | Areal extent _____ | Size _____ | |
| Remarks _____ | | | |
| | | | |
| 6. Excessive Vegetative Growth | | Type _____ | |
| <input type="checkbox"/> No evidence of excessive growth | <input type="checkbox"/> Vegetation in channels does not obstruct flow | | |
| <input type="checkbox"/> Location shown on site map | Areal extent _____ | | |
| Remarks _____ | | | |
| | | | |
| D. Cover Penetrations | | <input type="checkbox"/> Applicable | <input type="checkbox"/> N/A |
| | | | |
| 1. Gas Vents | | <input type="checkbox"/> Active | <input type="checkbox"/> Passive |
| <input type="checkbox"/> Properly secured/locked | <input type="checkbox"/> Functioning | <input type="checkbox"/> Routinely sampled | <input type="checkbox"/> Good condition |
| <input type="checkbox"/> Evidence of leakage at penetration | <input type="checkbox"/> Needs Maintenance | <input type="checkbox"/> N/A | |
| Remarks _____ | | | |
| | | | |
| 2. Gas Monitoring Probes | | | |
| <input type="checkbox"/> Properly secured/locked | <input type="checkbox"/> Functioning | <input type="checkbox"/> Routinely sampled | <input type="checkbox"/> Good condition |
| <input type="checkbox"/> Evidence of leakage at penetration | <input type="checkbox"/> Needs Maintenance | <input type="checkbox"/> N/A | |
| Remarks _____ | | | |
| | | | |
| 3. Monitoring Wells | | | |
| <input type="checkbox"/> Properly secured/locked | <input type="checkbox"/> Functioning | <input type="checkbox"/> Routinely sampled | <input type="checkbox"/> Good condition |
| <input type="checkbox"/> Evidence of leakage at penetration | <input type="checkbox"/> Needs Maintenance | <input type="checkbox"/> N/A | |
| Remarks _____ | | | |
| | | | |
| 4. Leachate Extraction Wells | | | |
| <input type="checkbox"/> Properly secured/locked | <input type="checkbox"/> Functioning | <input type="checkbox"/> Routinely sampled | <input type="checkbox"/> Good condition |
| <input type="checkbox"/> Evidence of leakage at penetration | <input type="checkbox"/> Needs Maintenance | <input type="checkbox"/> N/A | |
| Remarks _____ | | | |
| | | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | | |
|--|--|--|--|
| 5. Settlement Monuments <input type="checkbox"/> Located <input type="checkbox"/> Routinely surveyed <input type="checkbox"/> N/A | | | |
| Remarks _____ _____ | | | |
| E. Gas Collection and Treatment <input type="checkbox"/> Applicable <input type="checkbox"/> N/A | | | |
| 1. Gas Treatment Facilities | | | |
| <input type="checkbox"/> Flaring <input type="checkbox"/> Thermal destruction <input type="checkbox"/> Collection for reuse | | | |
| <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance | | | |
| Remarks _____ _____ | | | |
| 2. Gas Collection Wells, Manifolds and Piping | | | |
| <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance | | | |
| Remarks _____ _____ | | | |
| 3. Gas Monitoring Facilities (e.g., gas monitoring of adjacent homes or buildings) | | | |
| <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A | | | |
| Remarks _____ _____ | | | |
| F. Cover Drainage Layer <input type="checkbox"/> Applicable <input type="checkbox"/> N/A | | | |
| 1. Outlet Pipes Inspected <input type="checkbox"/> Functioning <input type="checkbox"/> N/A | | | |
| Remarks _____ _____ | | | |
| 2. Outlet Rock Inspected <input type="checkbox"/> Functioning <input type="checkbox"/> N/A | | | |
| Remarks _____ _____ | | | |
| G. Detention/sedimentation Ponds <input type="checkbox"/> Applicable <input type="checkbox"/> N/A | | | |
| 1. Siltation Areal extent _____ Depth _____ <input type="checkbox"/> N/A | | | |
| <input type="checkbox"/> Siltation not evident | | | |
| Remarks _____ _____ | | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | | |
|---|---|--|------------------------------|
| 2. Erosion | Areal extent _____ | Depth _____ | <input type="checkbox"/> N/A |
| <input type="checkbox"/> Erosion not evident | | | |
| Remarks _____ | | | |
| _____ | | | |
| 3. Outlet Works | <input type="checkbox"/> Functioning | <input type="checkbox"/> N/A | |
| Remarks _____ | | | |
| _____ | | | |
| 4. Dam | <input type="checkbox"/> Functioning | <input type="checkbox"/> N/A | |
| Remarks _____ | | | |
| _____ | | | |
| H. Retaining Walls <input type="checkbox"/> Applicable <input type="checkbox"/> N/A | | | |
| 1. Deformations | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> Deformation not evident | |
| Horizontal displacement _____ | | Vertical displacement _____ | |
| Rotational displacement _____ | | | |
| Remarks _____ | | | |
| _____ | | | |
| 2. Degradation | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> Deformation not evident | |
| Remarks _____ | | | |
| _____ | | | |
| I. Perimeter Ditches/Off-Site Discharge <input type="checkbox"/> Applicable <input type="checkbox"/> N/A | | | |
| 1. Siltation | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> Siltation not evident | |
| Areal extent _____ | | Depth _____ | |
| Remarks _____ | | | |
| _____ | | | |
| 2. Vegetative Growth | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> Siltation not evident | |
| <input type="checkbox"/> Vegetation does not impede flow | | | |
| Areal extent _____ | | Type _____ | |
| Remarks _____ | | | |
| _____ | | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | |
|---|---|---|
| 3. Erosion | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> Erosion not evident |
| Areal extent _____ Depth _____ | | |
| Remarks _____ | | |
| | | |
| 4. Discharge Structure | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> N/A |
| Remarks _____ | | |
| | | |
| VIII. VERTICAL BARRIER WALLS | | |
| <input type="checkbox"/> Applicable x N/A | | |
| 1. Settlement | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> Settlement not evident |
| Areal extent _____ Depth _____ | | |
| Remarks _____ | | |
| | | |
| 2. Performance Monitoring | Type of Monitoring _____ | |
| <input type="checkbox"/> Performance not monitored | Frequency _____ | <input type="checkbox"/> Evidence of breaching |
| Head differential _____ | | |
| Remarks _____ | | |
| | | |
| IX. GROUNDWATER/SURFACE WATER REMEDIES | | |
| <input type="checkbox"/> Applicable x N/A | | |
| A. Groundwater Extraction Wells, Pumps, and Pipelines | | |
| <input type="checkbox"/> Applicable <input type="checkbox"/> N/A | | |
| 1. Pumps, Wellhead Plumbing, and Electrical | | |
| <input type="checkbox"/> Good condition | <input type="checkbox"/> All required wells located | <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A |
| Remarks _____ | | |
| | | |
| 2. Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances | | |
| <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance | |
| Remarks _____ | | |
| | | |
| 3. Spare Parts and Equipment | | |
| <input type="checkbox"/> Readily available | <input type="checkbox"/> Good condition | <input type="checkbox"/> Requires upgrade <input type="checkbox"/> Needs to be provided |
| Remarks _____ | | |
| | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | | |
|--|--|-------------------------------------|------------------------------|
| B. Surface Water Collection Structures, Pumps, and Pipelines | | <input type="checkbox"/> Applicable | <input type="checkbox"/> N/A |
| 1. Collection Structures, Pumps, and Electrical | | | |
| <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance | | | |
| Remarks _____ | | | |
| _____ | | | |
| 2. Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances | | | |
| <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance | | | |
| Remarks _____ | | | |
| _____ | | | |
| 3. Spare Parts and Equipment | | | |
| <input type="checkbox"/> Readily available <input type="checkbox"/> Good condition <input type="checkbox"/> Requires upgrade <input type="checkbox"/> Needs to be provided | | | |
| Remarks _____ | | | |
| _____ | | | |
| C. Treatment System | | <input type="checkbox"/> Applicable | <input type="checkbox"/> N/A |
| 1. Treatment Train (Check components that apply) | | | |
| <input type="checkbox"/> Metals removal <input type="checkbox"/> Oil/water separation <input type="checkbox"/> Bioremediation | | | |
| <input type="checkbox"/> Air stripping <input type="checkbox"/> Carbon adsorbers | | | |
| <input type="checkbox"/> Filters _____ | | | |
| <input type="checkbox"/> Additive (e.g., chelation agent, flocculent) _____ | | | |
| <input type="checkbox"/> Others _____ | | | |
| <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance | | | |
| <input type="checkbox"/> Sampling ports properly marked and functional | | | |
| <input type="checkbox"/> Sampling/maintenance log displayed and up to date | | | |
| <input type="checkbox"/> Equipment properly identified | | | |
| <input type="checkbox"/> Quantity of groundwater treated annually _____ | | | |
| <input type="checkbox"/> Quantity of surface water treated annually _____ | | | |
| Remarks _____ | | | |
| _____ | | | |
| 2. Electrical Enclosures and Panels (properly rated and functional) | | | |
| <input type="checkbox"/> N/A <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance | | | |
| Remarks _____ | | | |
| _____ | | | |

Five-Year Review Site Inspection Checklist (Continued)

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.

Five-Year Review Site Inspection Checklist (Continued)

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 institutional controls with a period of groundwater monitoring.

A summary report, including the data and interpretation, was submitted to SCDHEC, DOE, and USEPA following each monitoring event. During five consecutive monitoring and reporting cycles over the last five years, none of the constituents of concern exceeded its MCL; therefore, in 2004, SCDHEC, DOE, and USEPA concurred with terminating the groundwater monitoring at DBRP.

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.

Implementation of the Institutional Controls alternative required both short- and long-term actions, which are protective of human health and the environment. For the short-term signs were posted at the Waste Unit, which indicate that this area was used for the disposal of waste material and contains buried waste. In addition, existing SRS access controls are used to maintain this site for industrial use only.

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.

N/A

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D-AREA EXPANDED OPERABLE UNIT (488-D, 431-2D) (U)

I. Introduction

This is the first five-year review for the D-Area Expanded Operable Unit (DEXOU). This review was conducted from August 2007 through September 2007. This report documents the results of the review.

II. OU Chronology

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

Table 1. Chronology of OU Events

| Event | Date |
|-----------------------------------|------------------------------|
| RFI/RI Field Start for DAB/DCPRD | September 29, 1998 |
| RFI/RI Field Start | February 23, 2001 |
| FS Rev 1 Submittal | December 18, 2003 |
| Record of Decision (ROD) issuance | November 15, 2004 |
| Remedial Action start complete | August 5, 2005/July 10, 2007 |
| Previous Five-Year Review | None |

III. Background

Physical Characteristics

D-Area Expanded Operable Unit

The DEXOU is located within D Area at Savannah River Site (SRS) in Barnwell County, South Carolina (Figure 1). The unit lies approximately 3,000 ft east of the nearest site boundary, the Savannah River, and includes two surface units: the D-Area Rubble Pit (DRP) and the 488-D Ash Basin (488-DAB) (Figure 2).

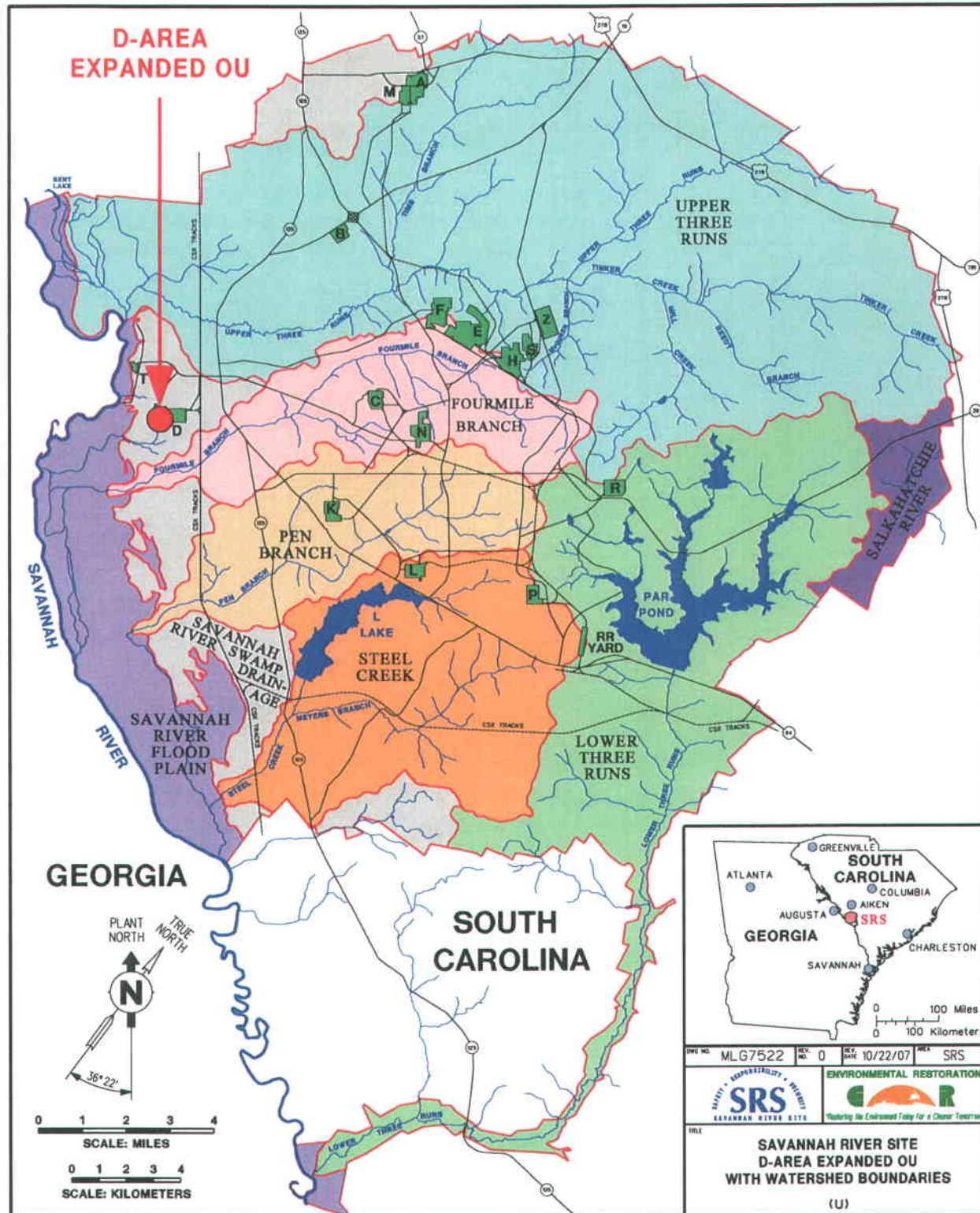


Figure 1. Location of the DEXOU within the Savannah River Site

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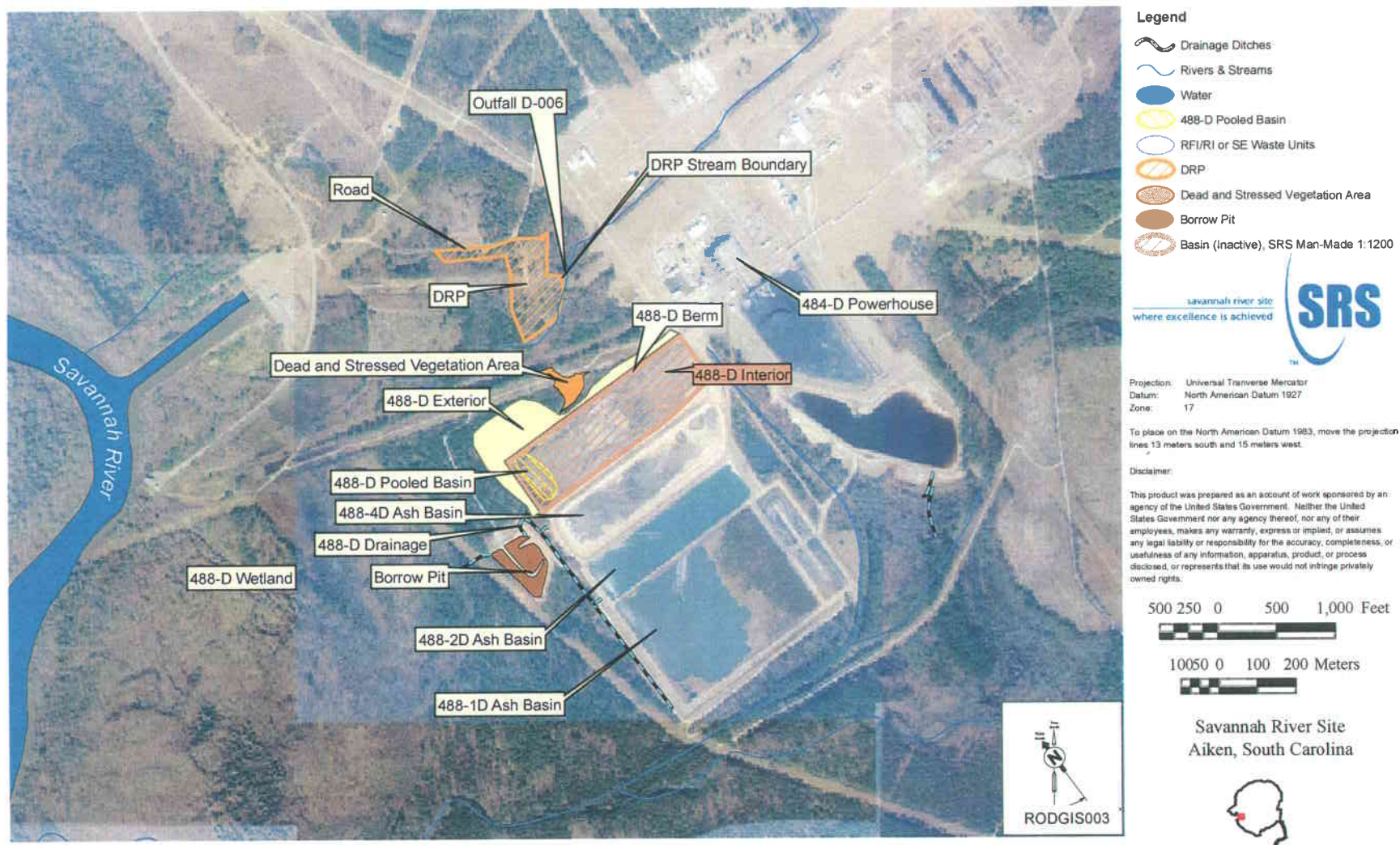


Figure 2. Layout of D Area and the DEXOU

D-Area Rubble Pit

The DRP is located approximately 1,000 ft northwest of the 488-DAB and covers about 8 acres. The topography is relatively flat with an elevation range of approximately 125 to 131 ft above mean sea level (msl). The area is heavily vegetated and bounded by a natural drainage (DRP Stream Boundary) both to the east and south of the unit. The DRP Stream Boundary is fed by the D-006 outfall, which receives stormwater runoff from the northwestern portion of D Area, including storage facilities, parking lots, the northwest side of the 484-D powerhouse, and other active and inactive facilities. Surface water runoff from the DRP occurs only during heavy rainfall events. The DRP Stream Boundary flows west into the flood plain of the Savannah River.

Land and Resource Use

The future land use for 488-DAB is anticipated to be industrial.

History of Contamination

Historical records and aerial photographs indicate that disposal occurred at the DRP from 1951 through 1989. Detailed review of historical photographs and the absence of any observed pits during intrusive sampling indicate that waste was disposed of on the surface in piles and then graded rather than buried below grade in pits. There are no records of placement of any hazardous or radioactive materials at the unit.

Initial Response

The characterization of the DRP indicated that the waste consisted of soil mixed with asphalt, coal, paper, metal, plastic, glass fragments, foam insulation, fiberboard, asbestos, roofing materials, wire, road gravel, and other miscellaneous debris. Beryllium was identified as a contaminant migration constituent of concern (COC). See Table 2 for a complete list of DRP COCs. Manganese was identified as a preliminary remediation goal (PRG). In some places, the waste piles are several feet high. In other places, the piles are

less tall and more spread out, which indicates that the area has been reworked by heavy machinery.

Table 2. Constituents of Concern for DRP

| Refined COC | Refined COC Type |
|--------------------|-------------------------|
| Antimony | ECO |
| Arsenic | HH, ECO |
| Beryllium | CM |
| Selenium | ECO |
| Zinc | ECO |
| Benzo(a)pyrene | HH-res |
| Aroclor-1254 | ARAR, HH-res, ECO |
| Aroclor-1260 | ARAR, ECO |

The largest area of waste disposal is approximately 4.5 acres. The estimated volume, assuming an average thickness of 6 ft, is about 50,000 yd³. The soils area impacted adjacent to the road in the northwest portion of DRP is about 2 acres, which is typically contaminated to a depth of about 1 ft.

488-D Ash Basin

Physical Characteristics

Steam and electricity for several SRS facilities are produced by a coal-fired power plant that has been operating in D Area since 1952. It is assumed that the 488-DAB and the adjacent 488-4D ash basin were placed in operation in 1952 when the 484-D powerhouse began operating. Ash generated by powerhouse operation was mixed with water and transported via an elevated sluice to the 488-D Ash Basin for disposal. The ash basins were used to intercept, stabilize, and provide passive treatment of ash-sluice water before it was discharged to local surface streams. In 1978, ash-sluice water was diverted to the newly constructed 488-1D and 488-2D ash basins. After 1978, the 488-DAB received only dry ash and coal-reject material until the early to mid-1990s.

The 488-DAB is an unlined, earthen containment basin located approximately 900 ft south of the 484-D powerhouse. The 488-DAB is situated adjacent to the floodplain of the Savannah River on a terrace deposit with low relief. The 488-DAB is approximately 1,800 ft long and 600 ft wide. The basin was constructed above grade and the berms that form the walls of the basin are 18 ft high. The berms are constructed of man-made fill consisting primarily of sand, silt, and clay. Elevations across the basin range from approximately 120 ft msl in the western end to 130 ft msl in the eastern end while the bottom is near original grade, approximately 110 to 115 ft msl, which is about 20 ft above the elevation of the Savannah River (92 ft msl).

The bottom of the 488-DAB sits atop a dense, locally continuous, low permeability clay layer, which runs beneath both the 488-DAB and the Dead and Stressed Vegetation Area (DSVA). The vertical hydraulic conductivity of the clay layer averages about 1.0×10^{-7} cm/s, which has restricted vertical percolation across the clay layer. As a result, the perched water above the clay layer is elevated with respect to the “regional” water table. The regional water table potentiometric surface is within the clay layer under the basins; consequently, there is little to no unsaturated zone under the water that is mounded above the clay layer.

The perched zone in the 488-DAB extends from the floor of the basin locally up to 10 ft above the floor of the basin (or approximately 10 ft below the surface). Data indicates that there is greater leakage through the clay layer at the western end of the basin where pooled low pH surface water accumulates.

Land and Resource Use

The future land use for 488-DAB is anticipated to be industrial.

History of Contamination

The 488-DAB unit is an inactive facility. The unit includes several subunits that are known or suspected to have been contaminated by processes related to the 488-DAB (Figure 2). These subunits are the 488-DAB (Interior), the 488-DAB (Exterior), the

488-D Pooled Basin (within the western end of the basin), the 488-D Drainage and the DSVA.

Initial Response

An RFI/RI/Baseline Risk Assessment (BRA) was performed to assess the risks posed by the DEXOU to human health and the environment. The assessment included quantitative calculations of human health risks, ecological risks, and the threat posed by future leaching to groundwater.

The following lists principal sources of contamination for the DEXOU:

- Elevated metals and polychlorinated biphenyls (PCBs) at the DRP
- Coal-related metals and radionuclides associated with coal rejects and ash in and near the 488-DAB; Coal rejects containing arsenic and beryllium were identified as principal threat source material (PTSM) based on contaminant mobility
- Low pH pooled surface water in the 488-D Pooled Basin
- Low pH surface water and sediments at the DSVA to the north of the 488-DAB

See Table 3 for a complete listing of COCs in 488-DAB.

IV. Remedial Actions

Remedy Selection

The selected remedy for the DEXOU was excavation of waste material from DRP and consolidation with the 488-DAB in conjunction with consolidation of the 488-DAB exposure areas (DSVA, basin exterior, DAB drainage), and installation of a low permeability geosynthetic cover system, institutional controls, and monitoring. Institutional controls and monitoring will be performed per the Land Use Control Assurance Plan (LUCAP) and site-specific Land Use Control Implementation Plan (LUCIP).

Table 3. Constituents of Concern for 488-DAB

| Refined COC | 488-DAB Refined COC Type | | |
|---------------|--------------------------|----------------|-----------------------------------|
| | (Interior) | | (Exterior) |
| Soil | | | |
| Arsenic | PTSM, CM, HH, ECO | | HH |
| Barium | CM | | |
| Beryllium | PTSM, CM | | |
| Iron | CM, HH-res | | |
| Mercury | CM | | |
| Selenium | CM, ECO | | |
| Thallium | CM, HH-res | | |
| Vanadium | ECO | | |
| Actinium-228 | HH | | |
| Lead-212 | HH | | |
| Potassium-40 | HH | | |
| Radium-226 | CM, HH | | |
| Radium-228 | CM, HH | | |
| Thorium-228 | HH | | |
| Thorium-234 | HH-res | | |
| Uranium-234 | CM | | |
| Uranium-235 | CM, HH-res | | |
| Uranium-238 | CM, HH | | |
| Refined COC | Refined COC Type | | |
| | 488-D Pooled Basin | 488-D Drainage | Dead and Stressed Vegetation Area |
| Surface Water | | | |
| Aluminum | ARAR, ECO | ARAR, ECO | ARAR, ECO |
| Arsenic | ARAR, HH-res | ARAR, HH-res | |
| Beryllium | ARAR, ECO | ARAR, ECO | ECO |
| Cobalt | | ECO | |
| Copper | ARAR, ECO | ARAR | |
| Iron | ARAR, ECO | ARAR, ECO | |
| Thallium | ARAR | ARAR | |
| pH | ECO | ECO | ECO |
| Sediment | | | |
| Arsenic | | HH-res, ECO | HH-res |
| Actinium-228 | | HH-res | |
| Potassium-40 | | HH-res | HH-res |
| Radium-226 | | HH-res | |
| Radium-228 | | | HH-res |
| pH | | | ECO |

The DEXOU is located within an industrially developed area, and future industrial land use is anticipated. Remedial action objectives (RAOs) and response actions were developed with the expectation that future land use will be industrial. Land use controls are part of the remedial action to ensure protection against unrestricted use (e.g., residential or agricultural).

Remedy Implementation

The selected remedy for the DRP includes the following activities:

- Excavate approximately 2,000 ft³ of soil contaminated with PCBs at a concentration greater than 1 mg/kg. Material was packaged in appropriate containers and disposed of off-SRS at an approved disposal facility. The area was sampled for confirmation that PCBs were removed to the remedial goal (RG).
- Excavate soil and coal reject materials containing unacceptable levels of arsenic, approximately 60,000 yd³, to visual extent of coal within the DRP and along the adjacent road. The 60,000 yd³ was approximated in the ROD using a combination of characterization and visual inspection and is a combination of the 50,000 yd³ from the 4.5 acre area plus the additional yardage from the 2 acres. The yardage is as excavated and a fluffing factor of 30% is typically applied. The lateral extent of surface soil removal was confirmed based on the zinc and arsenic RGs. Excavated material was transported to the 488-DAB for consolidation under a geosynthetic cover. Both the DRP and 488-DAB contained coal rejects. During investigation of these two units, it became clear that some ash and coal rejects were present in areas not within the strict subunit boundary. Therefore, to facilitate waste consolidation based on visual inspection, both the DRP and 488-DAB were designated as an area of contamination (AOC). The excavated materials were placed within this AOC, under the same cover system, to achieve cleanup of this OU.
- Excavated areas within the DRP were backfilled a minimum of 0.3 1 ft, graded and vegetated to minimize erosion.

- The surface water drainage adjacent to DRP was protected during construction activities by placement of erosion control measures.
- Institutional controls will be implemented at DRP in perpetuity, and will be described in detail after the 488-DAB remedy components are described. Groundwater monitoring will be performed per the requirements of the Monitoring Work Plan for the D-Area Groundwater Operable Unit (WSRC-RP-2003-4150, Rev. 1) to evaluate long-term effectiveness of the remedy until contaminants present in the groundwater downgradient of DRP are below maximum contaminant levels (MCLs) (beryllium) and preliminary remediation goals (PRGs) (manganese). Documentation and analysis of collected data will be presented in a bi-annual report in odd-numbered years and an Annual letter report presenting the data and information on exceedances in even-numbered years.

The selected remedy for the 488-DAB includes the following activities:

- Approximately 50,000 yd³ of material containing coal rejects was excavated from outside the 488-DAB (488-D Drainage, DSVA, and Basin Exterior) and covered. A minimum depth of 1 ft was removed, with the extent of removal being the visual extent of coal. Excavated material was placed under the 488-DAB cover. All excavated areas were backfilled and regraded as required, then seeded. The portion of the DSVA delineated as a wetland (approximately 1 acre) was replaced either through the site wetland bank or reconstruction of a wetland at another location. After excavation and removal of waste from 488-D exterior, a permanent berm was installed for the new sedimentation basin, and the overflow detention basin was constructed to the north of the sedimentation basin with a 36-inch corrugated drainage pipe leading to the detection basin to drain the stormwater collected in the sedimentation basin from the engineered cover system.
- Approximately 1 ft of soil from the bottom and sides of the drainage ditch was excavated at the west end of the 488-DAB. The section of the overflow drain pipe, which ran between the 488-D Ash Basin and the drainage ditch, was removed. The

remaining section of the pipe, which was within the basin, was sealed with low strength concrete. Excavated material was placed in the main basin. The excavated areas were backfilled and regraded as required followed by seeding.

- Pooled water on the west side of the basin was managed through evaporation or discharge to the land surface as needed following pH measurement. Based on the pH of the water discharged, no treatment was required. As construction was in progress, erosion/ sediment control measures and temporary berms were used to minimize soil erosion and direct water away from the pooled water area.
- An engineered cover system was placed on the entire 488-DAB and consolidated areas (approximately 25 acres). The cover systems expected life is a minimum 100 years and was designed for a 25-year, 24-hour storm event. The maximum hydraulic conductivity of the cover system was 1×10^{-8} cm/s. At a minimum, the cover system includes an erosion layer, a protection layer, a drainage layer, and an infiltration layer (geosynthetics). The cover was designed to 1) require minimal maintenance for the life of the system, 2) promote drainage and minimize erosion or abrasion of the cover, and 3) accommodate settling and subsidence so that the integrity of the cover is maintained.
- Institutional controls consisting of access controls (warning signs and land use restrictions) would be implemented to maintain the cover system. Groundwater monitoring would be performed to evaluate the long-term effectiveness of the action. Institutional controls are needed in perpetuity to prevent exposure to potential future residents to elevated levels of arsenic at DRP and 488-DAB. Land use controls will also be used to prevent disturbance of the cover system or waste at 488-DAB.

The selected remedy for the 488-DAB addressed the PTSM present in the ash and coal within the basin. Coal rejects containing arsenic and beryllium are identified as PTSM based on their mobility. Both constituents are present in groundwater above their respective MCLs, and both are known to be present in coal-reject material. At DRP, the selected remedy addressed the low-level threat source material with elevated metals and

aroclor-1254. The selected remedy prevents groundwater impact by limiting infiltration through the waste.

These actions presented for the DRP and 488-DAB source units were conducted as final actions. Contamination present in groundwater and the wetland will be addressed as part of the D-Area groundwater and D-Area Wetland OU investigations. The RCRA permit will be revised to reflect selection of the final remedy in accordance with the procedures under 40 CFR Part 270 and South Carolina Hazardous Waste Management Regulations (SCHWMR) R.61-79.264.101, 270.

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 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.
- Selected remedies for the D- Area Rubble Pile and the 488-D Ash Basin 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, constituents of concern, and risk assessment methodologies have not changed in a way that 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. Project Costs

Costs associated with the selected remedy for the DEXOU include operation and maintenance costs of the cover, groundwater monitoring, and institutional controls. The estimated operation and maintenance cost associated with the selected remedy is \$399,946. This estimate is an order-of-magnitude engineering cost estimate that is expected to be within +50 to -30 percent of the actual project cost. The remedy is currently under construction; therefore, the actual operation and maintenance cost for the DEXOU cannot be assessed at this time.

XI. Protectiveness Statements

The selected remedy of excavation, removal, and the backfilling of excavated areas along with institutional controls at the DEXOU is protective of human health and the environment. This remedy, upon implementation of land use controls pursuant to the

LUCAP, 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 United States Department of Energy (USDOE) controls the OU. These controls 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).

XII. Next Review

The next five-year review is scheduled for February 12, 2014.

ATTACHMENT 1

List of Documents Reviewed

WSRC-RP-97-440, *RCRA Facility Investigation/Remedial Investigation Work Plan for the 488-D Ash Basin and D-Area Coal Pile Runoff Basin Operable Unit*, Revision 1, 1998, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

WSRC-RP-99-4067, *RCRA Facility Investigation/Remedial Investigation Work Plan Addendum for the D-Area Expanded Operable Unit*, Revision 1, 2001, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

WSRC-RP-2001-4162, *RCRA Facility Investigation/Remedial Investigation with Baseline Risk Assessment for the D-Area Expanded Operable Unit (DEXOU) (U)*, Revision 1, 2003, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

WSRC-RP-2003-4143, *Corrective Measures Study/Feasibility Study Report for the D-Area Expanded Operable Unit (U)*, Revision 1, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

WSRC-RP-2003-4165, *Statement of Basis/Proposed Plan for the D-Area Expanded Operable Unit (U)*, Revision 1, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

WSRC-RP-2004-4007, *Record of Decision Remedial Alternative Selection for the D-Area Expanded Operable Unit (U)*, Revision 1, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

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ATTACHMENT 2

Five-Year Review Site Inspection Checklist

| I. SITE INFORMATION | | | |
|--|---|-----------------------------------|-----------------------|
| Site Name: | D-Area Expanded Operable Unit | Date of Inspection: | 9/24/2007 |
| Location and Region: | Savannah River Site, USEPA IV | EPA ID | SC1890008989 |
| Agency, office, or company leading the five-year review: | United States Department of Energy | CERCLIS OU: | 63 |
| | | Weather/Temperature: | clear and sunny, 90°F |
| Remedy Includes: (Check all that apply) <div><input type="checkbox"/> Cover System <input type="checkbox"/> Monitored Natural Attenuation</div> <div><input type="checkbox"/> Access controls <input type="checkbox"/> Groundwater Containment</div> <div><input checked="" type="checkbox"/> Institutional Controls <input type="checkbox"/> Vertical Barrier Walls</div> <div><input type="checkbox"/> Groundwater pump and treatment</div> <div><input type="checkbox"/> Surface water collection and treatment</div> <div><input checked="" type="checkbox"/> Other: <u>Groundwater Monitoring; Extraction and Consolidation</u></div> | | | |
| Attachments: <input type="checkbox"/> Inspection team roster attached <input type="checkbox"/> Site map attached | | | |
| II. INTERVIEWS (Check all that apply) | | | |
| 1. O & M site manager | | | |
| | (Name) | (Title) | (Date) |
| Interviewed: | <input type="checkbox"/> at site <input type="checkbox"/> at office | <input type="checkbox"/> by phone | Phone No. _____ |
| Problems, suggestions: | <input type="checkbox"/> report attached _____ | | |
| 2. O & M staff | | | |
| | (Name) | (Title) | (Date) |
| Interviewed: | <input type="checkbox"/> at site <input type="checkbox"/> at office | <input type="checkbox"/> by phone | Phone No. _____ |
| Problems, suggestions: | <input type="checkbox"/> report attached _____ | | |

Five-Year Review Site Inspection Checklist (Continued)

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 _____

Five-Year Review Site Inspection Checklist (Continued)

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

1. O & M Documents

| | | | |
|---|--|-------------------------------------|------------------------------|
| <input type="checkbox"/> O & M Manual | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |
| x As-built drawings | x Readily available | x Up to date | <input type="checkbox"/> N/A |
| <input type="checkbox"/> Maintenance Logs | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |

Remarks: See Waste Unit Inspection and Maintenance, ER-SOP-019

2. Site-Specific Health and Safety Plan

☐ Readily available ☐ Up to date x N/A

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

Remarks: Routine O&M activities do not require an SSHASP under 29 CFR 1910.1201, HAZWOPER.

3. O & M and OSHA Training Records

x Readily available x Up to date ☐ N/A

Remarks

4. Permits and Service Agreements

| | | | |
|---|--|-------------------------------------|-------|
| <input type="checkbox"/> Air discharge permit | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |
| <input type="checkbox"/> Effluent discharge | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |
| <input type="checkbox"/> Waste Disposal, POTW | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |
| <input type="checkbox"/> Other permits | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |

Remarks

5. Gas Generation Records

☐ Readily available ☐ Up to date x N/A

Remarks

6. Settlement Monument Records

☐ Readily available ☐ Up to date x N/A

Remarks

7. Groundwater Monitoring Records

x Readily available ☐ Up to date ☐ N/A

Remarks

Five-Year Review Site Inspection Checklist (Continued)

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
x Other : SRS

2. **O & M Cost Records**
☐ Readily available ☐ Up to date ☐ Funding mechanism/agreement in place
x Other: Project cost data is summarized in Section X of attached review: WSRC-RP-2007-4063.

Total annual cost by year for review period if available

| | | |
|--------------------------------------|------------------|---|
| From _____ To _____ (Date) (Date) | _____ Total cost | <input type="checkbox"/> Breakdown attached |
| From _____ To _____ (Date) (Date) | _____ Total cost | <input type="checkbox"/> Breakdown attached |
| From _____ To _____ (Date) (Date) | _____ Total cost | <input type="checkbox"/> Breakdown attached |
| From _____ To _____ (Date) (Date) | _____ Total cost | <input type="checkbox"/> Breakdown attached |
| From _____ To _____ (Date) (Date) | _____ Total cost | <input type="checkbox"/> Breakdown attached |

Five-Year Review Site Inspection Checklist (Continued)

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 at this site are in good condition.

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 Walkdown

Frequency: Annually

Responsible party/agent: DOE Savannah River Field Office

Contact: D. C. Hannah Waste Area Group Manager 09/3/07 (803) 952-7813
(Name) (Title) (Date) (Phone No.)

Reporting 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

Five-Year Review Site Inspection Checklist (Continued)

| | | | |
|------------------------------------|--|--|---|
| 2. Adequacy | <input checked="" type="checkbox"/> ICs are adequate | <input type="checkbox"/> ICs are inadequate | <input checked="" type="checkbox"/> N/A |
| Remarks _____ | | | |
| D. General | | | |
| 1. Vandalism/trespassing | <input type="checkbox"/> Location shown on site map | <input checked="" type="checkbox"/> No vandalism evident | |
| Remarks _____ | | | |
| 2. Land use changes onsite | <input checked="" type="checkbox"/> N/A | | |
| Remarks _____ | | | |
| 3. Land use changes offsite | <input checked="" type="checkbox"/> N/A | | |
| Remarks _____ | | | |
| VI. GENERAL SITE CONDITIONS | | | |
| A. Roads | <input checked="" type="checkbox"/> Applicable | <input type="checkbox"/> N/A | |
| 1. Roads damaged | <input type="checkbox"/> Location shown on site map | <input checked="" type="checkbox"/> Roads adequate | <input type="checkbox"/> N/A |
| Remarks _____ | | | |
| B. Other site Conditions | | | |
| Remarks _____ | | | |
| VII. COVERS SYSTEMS | | | |
| | | <input checked="" type="checkbox"/> Applicable | <input type="checkbox"/> N/A |
| A. Soil Surface | | | |
| 1. Settlement (Low spots) | <input type="checkbox"/> Location shown on site map | <input checked="" type="checkbox"/> Settlement not evident | |
| Areal extent _____ | Depth _____ | | |
| Remarks _____ | | | |
| 2. Cracks | <input type="checkbox"/> Location shown on site map | <input checked="" type="checkbox"/> Cracking not evident | |
| Lengths _____ | Widths _____ | Depths _____ | |
| Remarks _____ | | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | |
|---|--|---|
| 3. Erosion | <input type="checkbox"/> Location shown on site map | <input checked="" type="checkbox"/> Erosion not evident |
| Areal extent _____ Depth _____ | | |
| Remarks _____ | | |
| 4. Holes | <input type="checkbox"/> Location shown on site map | <input checked="" type="checkbox"/> Holes not evident |
| Areal extent _____ Depth _____ | | |
| Remarks _____ | | |
| 5. Vegetative Cover | <input type="checkbox"/> Grass | <input type="checkbox"/> Cover properly established |
| <input checked="" type="checkbox"/> No signs of stress | | |
| <input type="checkbox"/> Trees/shrubs (indicate size and location on a diagram) | | |
| Remarks _____ | | |
| 6. Alternative Cover (armored rock, concrete, etc.) | <input checked="" type="checkbox"/> N/A | |
| Remarks _____ | | |
| 7. Bulges | <input type="checkbox"/> Location shown on site map | <input checked="" type="checkbox"/> Bulges not evident |
| Areal extent _____ Height _____ | | |
| Remarks _____ | | |
| 8. Wet Areas/Water Damage | <input checked="" type="checkbox"/> Wet areas/water damage not evident | |
| <input type="checkbox"/> Wet Areas | <input type="checkbox"/> Location shown on site map | Areal extent _____ |
| <input type="checkbox"/> Ponding | <input type="checkbox"/> Location shown on site map | Areal extent _____ |
| <input type="checkbox"/> Seeps | <input type="checkbox"/> Location shown on site map | Areal extent _____ |
| <input type="checkbox"/> Soft subgrade | <input type="checkbox"/> Location shown on site map | Areal extent _____ |
| Remarks _____ | | |
| 9. Slope Instability | <input type="checkbox"/> Slides | <input type="checkbox"/> Location shown on site map |
| <input checked="" type="checkbox"/> No evidence of slope instability | | |
| Areal extent _____ | | |
| Remarks _____ | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | |
|---|---|--|
| B. Benches <input type="checkbox"/> Applicable x 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 | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> N/A or okay |
| Remarks _____ | | |
| _____ | | |
| 2. Bench Breached | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> N/A or okay |
| Remarks _____ | | |
| _____ | | |
| 3. Bench Overtopped | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> N/A or okay |
| Remarks _____ | | |
| _____ | | |
| C. Letdown Channels <input type="checkbox"/> Applicable x 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 | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> No evidence of settlement |
| Areal extent _____ | Depth _____ | |
| Remarks _____ | | |
| _____ | | |
| 2. Material Degradation | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> No evidence of degradation |
| Material type _____ | Areal extent _____ | |
| Remarks _____ | | |
| _____ | | |
| 3. Erosion | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> No evidence of erosion |
| Areal extent _____ | Depth _____ | |
| Remarks _____ | | |
| _____ | | |
| 4. Undercutting | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> No evidence of undercutting |
| Areal extent _____ | Depth _____ | |
| Remarks _____ | | |
| _____ | | |

Five-Year Review Site Inspection Checklist (Continued)

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 x 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 _____

Five-Year Review Site Inspection Checklist (Continued)

| | | | |
|--|--|--|--|
| 5. Settlement Monuments <input type="checkbox"/> Located <input type="checkbox"/> Routinely surveyed <input type="checkbox"/> N/A | | | |
| Remarks _____ | | | |
| E. Gas Collection and Treatment <input type="checkbox"/> Applicable x N/A | | | |
| 1. Gas Treatment Facilities | | | |
| <input type="checkbox"/> Flaring <input type="checkbox"/> Thermal destruction <input type="checkbox"/> Collection for reuse | | | |
| <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance | | | |
| Remarks _____ | | | |
| 2. Gas Collection Wells, Manifolds and Piping | | | |
| <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance | | | |
| Remarks _____ | | | |
| 3. Gas Monitoring Facilities (e.g., gas monitoring of adjacent homes or buildings) | | | |
| <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A | | | |
| Remarks _____ | | | |
| F. Cover Drainage Layer x Applicable <input type="checkbox"/> N/A | | | |
| 1. Outlet Pipes Inspected x Functioning <input type="checkbox"/> N/A | | | |
| Remarks _____ | | | |
| 2. Outlet Rock Inspected x Functioning <input type="checkbox"/> N/A | | | |
| Remarks _____ | | | |
| G. Detention/sedimentation Ponds x Applicable x N/A | | | |
| 1. Siltation Areal extent _____ Depth _____ <input type="checkbox"/> N/A | | | |
| x Siltation not evident | | | |
| Remarks _____ | | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | | |
|--|---|--|------------------------------|
| 2. Erosion | Areal extent _____ | Depth _____ | <input type="checkbox"/> N/A |
| x Erosion not evident | | | |
| Remarks _____ | | | |
| | | | |
| 3. Outlet Works | x Functioning | <input type="checkbox"/> N/A | |
| Remarks _____ | | | |
| | | | |
| 4. Dam | x Functioning | <input type="checkbox"/> N/A | |
| Remarks _____ | | | |
| | | | |
| H. Retaining Walls <input type="checkbox"/> Applicable x N/A | | | |
| 1. Deformations | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> Deformation not evident | |
| Horizontal displacement _____ | | Vertical displacement _____ | |
| Rotational displacement _____ | | | |
| Remarks _____ | | | |
| | | | |
| 2. Degradation | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> Deformation not evident | |
| Remarks _____ | | | |
| | | | |
| I. Perimeter Ditches/Off-Site Discharge x Applicable <input type="checkbox"/> N/A | | | |
| 1. Siltation | <input type="checkbox"/> Location shown on site map | x Siltation not evident | |
| Areal extent _____ | | Depth _____ | |
| Remarks _____ | | | |
| | | | |
| 2. Vegetative Growth | <input type="checkbox"/> Location shown on site map | x Siltation not evident | |
| x Vegetation does not impede flow | | | |
| Areal extent _____ | | Type _____ | |
| Remarks _____ | | | |
| | | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | |
|--|---|---|
| 3. Erosion | <input type="checkbox"/> Location shown on site map | <input checked="" type="checkbox"/> Erosion not evident |
| Areal extent _____ Depth _____ | | |
| Remarks _____ | | |
| | | |
| 4. Discharge Structure | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> N/A |
| Remarks: <u>In good condition</u> | | |
| | | |
| VIII. VERTICAL BARRIER WALLS <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A | | |
| 1. Settlement | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> Settlement not evident |
| Areal extent _____ Depth _____ | | |
| Remarks _____ | | |
| | | |
| 2. Performance Monitoring | Type of Monitoring _____ | |
| <input type="checkbox"/> Performance not monitored | Frequency _____ | <input type="checkbox"/> Evidence of breaching |
| Head differential _____ | | |
| Remarks _____ | | |
| | | |
| IX. GROUNDWATER/SURFACE WATER REMEDIES <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A | | |
| A. Groundwater Extraction Wells, Pumps, and Pipelines <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A | | |
| 1. Pumps, Wellhead Plumbing, and Electrical | | |
| <input type="checkbox"/> Good condition | <input type="checkbox"/> All required wells located | <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A |
| Remarks _____ | | |
| | | |
| 2. Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances | | |
| <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance | |
| Remarks _____ | | |
| | | |
| 3. Spare Parts and Equipment | | |
| <input type="checkbox"/> Readily available | <input type="checkbox"/> Good condition | <input type="checkbox"/> Requires upgrade <input type="checkbox"/> Needs to be provided |
| Remarks _____ | | |
| | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | | |
|--|--|-------------------------------------|---|
| B. Surface Water Collection Structures, Pumps, and Pipelines | | <input type="checkbox"/> Applicable | <input checked="" type="checkbox"/> N/A |
| 1. Collection Structures, Pumps, and Electrical | | | |
| <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance | | | |
| Remarks _____ | | | |
| _____ | | | |
| 2. Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances | | | |
| <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance | | | |
| Remarks _____ | | | |
| _____ | | | |
| 3. Spare Parts and Equipment | | | |
| <input type="checkbox"/> Readily available <input type="checkbox"/> Good condition <input type="checkbox"/> Requires upgrade <input type="checkbox"/> Needs to be provided | | | |
| Remarks _____ | | | |
| _____ | | | |
| C. Treatment System | | <input type="checkbox"/> Applicable | <input checked="" type="checkbox"/> N/A |
| 1. Treatment Train (Check components that apply) | | | |
| <input type="checkbox"/> Metals removal <input type="checkbox"/> Oil/water separation <input type="checkbox"/> Bioremediation | | | |
| <input type="checkbox"/> Air stripping <input type="checkbox"/> Carbon adsorbers | | | |
| <input type="checkbox"/> Filters _____ | | | |
| <input type="checkbox"/> Additive (e.g., chelation agent, flocculent) _____ | | | |
| <input type="checkbox"/> Others _____ | | | |
| <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance | | | |
| <input type="checkbox"/> Sampling ports properly marked and functional | | | |
| <input type="checkbox"/> Sampling/maintenance log displayed and up to date | | | |
| <input type="checkbox"/> Equipment properly identified | | | |
| <input type="checkbox"/> Quantity of groundwater treated annually _____ | | | |
| <input type="checkbox"/> Quantity of surface water treated annually _____ | | | |
| Remarks _____ | | | |
| _____ | | | |
| 2. Electrical Enclosures and Panels (properly rated and functional) | | | |
| <input type="checkbox"/> N/A <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance | | | |
| Remarks _____ | | | |
| _____ | | | |

Five-Year Review Site Inspection Checklist (Continued)

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 x 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 x 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.

Five-Year Review Site Inspection Checklist (Continued)

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 selected remedy for the DEXOU is excavation of waste material from DRP and consolidation with the 488-DAB in conjunction with consolidation of the 488-DAB exposure areas (DSVA, basin exterior, DAB drainage), and application of a low permeability geosynthetic cover system, institutional controls, and monitoring.

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

Selected remedies for the D-Area Rubble Pile and the 488-D Ash Basin are functioning as intended.

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.

The DEXOU is located within an industrially developed area, and future industrial land use is anticipated. Remedial action objectives (RAOs) and response actions were developed with the expectation that future land use will be industrial. Land use controls will be part of the remedial action to ensure protection against unrestricted use (e.g., residential or agricultural).

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.

N/A

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D-AREA OIL SEEPAGE BASIN (631-G) OPERABLE UNIT

I. Introduction

This is the third five-year review for the D-Area Oil Seepage Basin (DOSB) Operable Unit (OU). This review was conducted from October 2007 through September 2007. This report documents the results of the review.

II. OU Chronology

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

Table 1. Chronology of OU Events

| Event | Date |
|---|---------------------------------------|
| RFI/RI Field Start | 1995 |
| Interim Record of Decision (ROD) Issuance | March 6, 1995 |
| Remedial Investigation Complete | April 24, 1998 |
| CMS/FS Rev 1.1 Submittal | April 29, 1998 |
| Interim Remedial Action Start/Complete | August 13, 1996 and December 31, 1999 |
| Final ROD issuance | March 4, 1999 |
| Remedial Action Start/Complete | September 3, 1999/ January 13, 2000 |
| Previous Five-Year Reviews | June 30, 1997; February 12, 2004 |

III. Background

Physical Characteristics

The DOSB OU is located within Savannah River Site (SRS) in a clearing, 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 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 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 it 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 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 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))]. This plan 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 maximum contaminant levels (MCLs), the OU will meet the requirements for unrestricted land use.

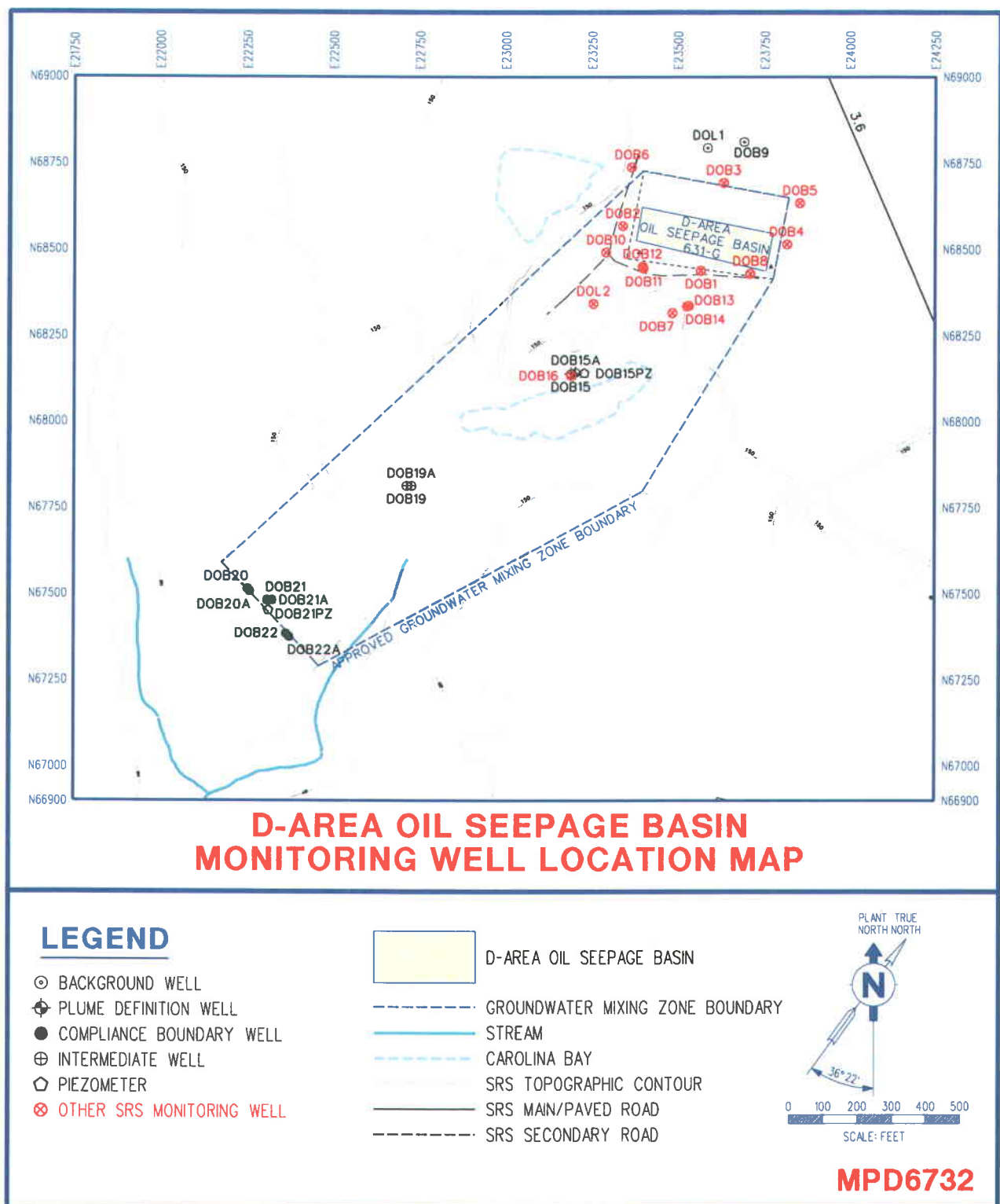


Figure 2. D-Area Oil Seepage Basin Monitoring Well Location Map

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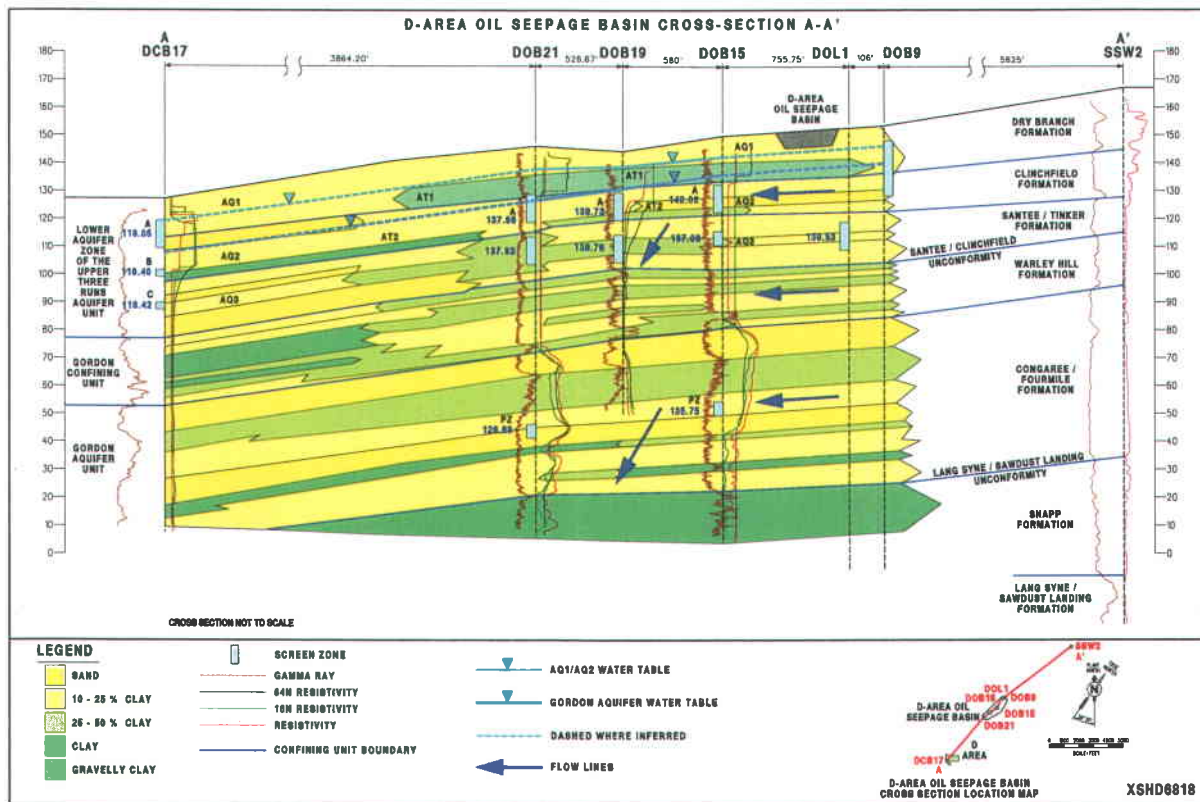
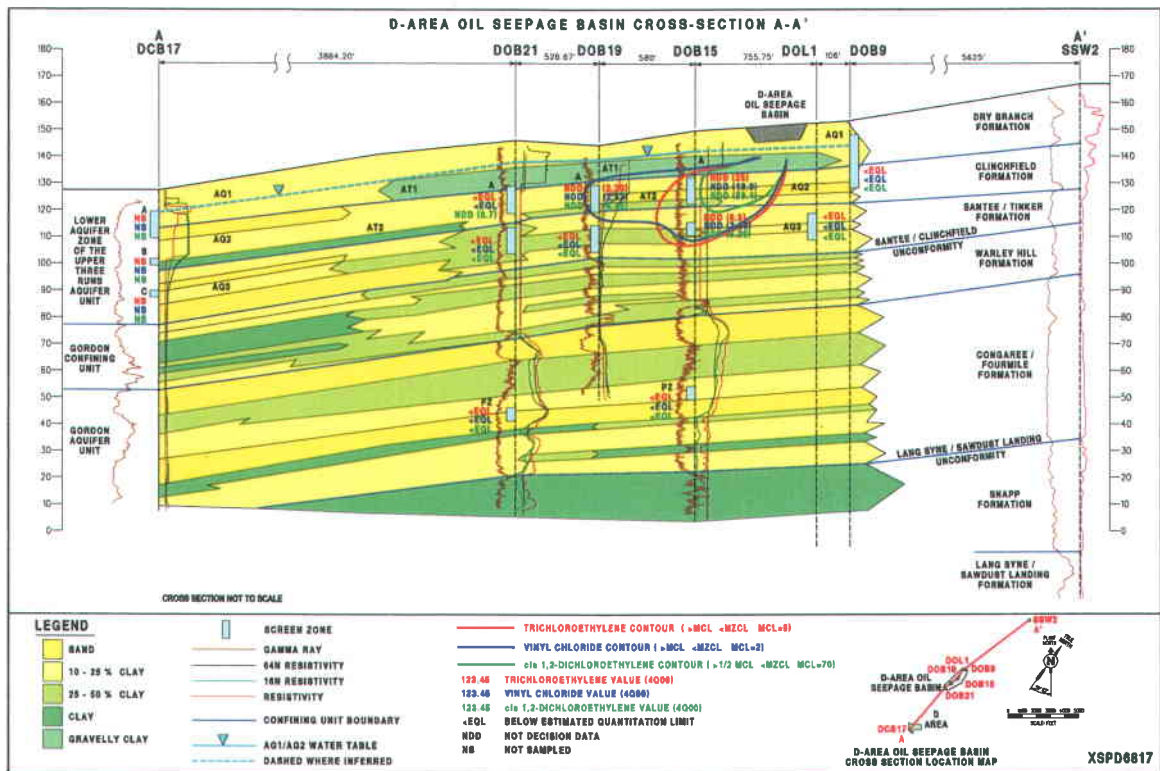


Figure 3. D-Area Oil Seepage Basin Cross Section

History of Contamination

The DOSB OU was constructed in 1952 as a series of unlined trenches to dispose 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 interim remedial action (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.

Initial Response

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 Resource Conservation and Recovery Act (RCRA) Facility Investigation/Remedial Investigation (RFI/RI) Workplan. The investigation revealed soils contamination in the trenches and a plume of volatile organic compounds (VOCs) in the groundwater. The RFI/RI and Baseline Risk Assessment (BRA) for the D-Area Oil Seepage Basin (631-G) (U) identified eight VOCs as final constituents of concern (COCs): benzene, 1,1-dichloroethylene, 2-dichloroethylene, cis-1,2-dichloroethylene, methylene chloride, tetrachloroethylene (PCE), trichloroethylene (TCE), and vinyl chloride (VC) (WSRC 1999a).

IV. Remedial Actions

Remedy Selection

An IRA was implemented in 1996 to remove drums, debris and principal threat source material (PTSM). 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 IRA 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).

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 BRA.

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. 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, relevant and appropriate requirements (ARARs) and remedial goals (RGs).

RGs for groundwater COCs will be equivalent to their respective 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 | Average Concentration in Groundwater | Selected RG |
|---|-----------------------------------|---|----------------|
| | (µg/L) | | |
| Tetrachloroethene | 85.00 | 2.100 | 5.0 |
| Trichloroethene | 1151.00 | 8.000 | 5.0 |
| cis-1,2-Dichloroethene | 457.00 | 4.880 | 70.0 |
| total-1,2-Dichloroethene | 68.60 | 21.240 | 70.0 |
| 1,1-Dichloroethene | 0.84 | 0.399 | 7.0 |
| Vinyl Chloride | 52.00 | 1.100 | 2.0 |
| Benzene | 6.20 | 0.220 | 5.0 |
| Dichloromethane (Methylene Chloride) | 9.50 | 0.160 | 5.0 |

Remedy Implementation

There was 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 started September 3, 1999, and well installation and development was completed by January 13, 2000. The project successfully installed nine new monitoring wells in accordance with the Corrective Measures Implementation/Remedial Design/Remedial Action Work Plan (CMI/RD/RDR/RAWP). No major configuration changes were implemented (WSRC 2000).

Operations and Maintenance

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 contaminant levels (MZCLs) at the plume wells as required by the Groundwater Mixing Zone Application (GWMZ) application and the ROD. Groundwater modeling was used to predict the MZCLs and the location of the compliance boundary. The compliance

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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.

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 | 85.0 | <EQL | <5.0 | | | 5.0 |
| Trichloroethylene | 1,150.0 | <EQL | 194.00 | 23.20 | 4.12 | 5.0 |
| Cis-1,2-Dichloroethylene | 457.0 | <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 | 32.0 | <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 and ROD (WSRC 1998) 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 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 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 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 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 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 re-sampled 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 MCLs will be exceeded at the compliance boundary, SRS will notify USEPA and SCDHEC and begin implementing the strategy outlined in Section 4.2 of the CCAPS (WSRC 1999a).

The year 2000 was the first year of monitoring under the approved mixing zone application. 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 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.

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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, alkalinity, temperature, turbidity, dissolved oxygen, oxidation/reduction potential, and water levels.

Laboratory: total organic carbon, nitrate, ethane/ethane, methane, sulfide, iron (2+),

V. Progress Since Last Review

This is the third five-year ROD review that DOSB OU has undergone. Since the previous review in June of 2003, no additional action has been required at this OU. However, a Revision 1.3 Groundwater Mixing Zone Application has been submitted to SCDHEC.

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
- 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:

- Monitoring data appears to be consistent with the modeling predictions from the GWMZ application. The concentrations should continue to decrease within the heart of the plume 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

There are no significant issues for this OU.

IX. Recommendations and Follow-up Actions

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

Project Costs
Costs associated with the selected remedy for DOSB include operation and maintenance costs of institutional controls. The estimated operation and maintenance cost associated with the selected remedy is \$509,364, which was discounted at 5% per year. This is a present worth cost, including 30 years of maintenance activities. After characterization and effectiveness of the remedy was evaluated, the actual operation and maintenance cost for the DOSB was assessed. The total actual operation and maintenance cost from project support and other post-construction expense to fiscal year 2006 is \$794,755.

XI. 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 GWMZ 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 ingestion of contaminated groundwater.

XII. Next Review

The next five-year review is scheduled for February 12, 2014.

ATTACHMENT 1

Documents Reviewed

WSRC-RP-93-1550, *Interim Action Record of Decision Remedial Alternative Selection (U) D-Area Oil Seepage Basin*, Revision 1, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

WSRC-RP-96-00154, *RCRA Facility Investigation/Remedial Investigation Report and the Baseline Risk Assessment for the D-Area Oil Seepage Basin (631-G) (U)*, Revision 1.1, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

WSRC-RP-97-402, *Record of Decision Remedial Alternative Selection for the D-Area Oil Seepage Basin (631-G) (U)*, Revision 1, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

WSRC-RP-99-4007, *Conceptual Corrective Action Plan Strategy for the D-Area Oil Seepage Basin (631-G) (U)*, Revision 1, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

WSRC-RP-99-4006, *Corrective Measures Implementation/Remedial Design/Remedial Design Report/Remedial Action Work Plan for the D-Area Oil Seepage Basin (631-G) (U)*, Revision 1, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

WSRC-RP-2000-4071, *Post Construction Report (PCR) for the D-Area Oil Seepage Basin (631-G) (U)*, Revision 0, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

ATTACHMENT 2

Five-Year Review Site Inspection Checklist

| I. SITE INFORMATION | | | |
|--|---|----------------------|-----------------------|
| Site Name: | D-Area Oil Seepage Basin (631-G) | Date of Inspection: | 9/24/2007 |
| Location and Region: | Savannah River Site, USEPA IV | EPA ID | SC1890008989 |
| Agency, office, or company leading the five-year review: | United States Department of Energy | CERCLIS OU: | 27 |
| | | Weather/Temperature: | clear and sunny, 88°F |
| Remedy Includes: (Check all that apply) | | | |
| <input type="checkbox"/> Cover System <input checked="" type="checkbox"/> Monitored Natural Attenuation | | | |
| <input type="checkbox"/> Access controls <input type="checkbox"/> Groundwater Containment | | | |
| <input checked="" type="checkbox"/> Institutional Controls <input type="checkbox"/> Vertical Barrier Walls | | | |
| <input type="checkbox"/> Groundwater pump and treatment | | | |
| <input type="checkbox"/> Surface water collection and treatment | | | |
| <input checked="" type="checkbox"/> Other: <u>Groundwater Mixing Zone Monitoring</u> | | | |
| Attachments: <input type="checkbox"/> Inspection team roster attached <input type="checkbox"/> Site map attached | | | |
| II. INTERVIEWS (Check all that apply) | | | |
| 1. O & M site manager | | | |
| | (Name) | (Title) | (Date) |
| Interviewed: | <input type="checkbox"/> at site <input type="checkbox"/> at office <input type="checkbox"/> by phone | Phone No. _____ | |
| Problems, suggestions: | <input type="checkbox"/> report attached _____ | | |
| 2. O & M staff | | | |
| | (Name) | (Title) | (Date) |
| Interviewed: | <input type="checkbox"/> at site <input type="checkbox"/> at office <input type="checkbox"/> by phone | Phone No. _____ | |
| Problems, suggestions: | <input type="checkbox"/> report attached _____ | | |

Five-Year Review Site Inspection Checklist (Continued)

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

| | | | |
|---|--|-------------------------------------|------------------------------|
| <input type="checkbox"/> O & M Manual | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |
| x As-built drawings | x Readily available | x Up to date | <input type="checkbox"/> N/A |
| <input type="checkbox"/> Maintenance Logs | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |

Remarks: See Waste Unit Inspection and Maintenance, ER-SOP-019

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| | | | |
|--|--|---|---|
| 2. Site-Specific Health and Safety Plan | | | |
| <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A | |
| <input type="checkbox"/> Contingency plan/emergency response plan | | | |
| <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A | |
| Remarks: <u>Routine O&M activities do not require a SSHASP under 29 CFR 1910.1201, HAZWOPER.</u> | | | |
| 3. O & M and OSHA Training Records | | | |
| <input checked="" type="checkbox"/> Readily available | <input checked="" type="checkbox"/> Up to date | <input type="checkbox"/> N/A | |
| Remarks: _____ | | | |
| 4. Permits and Service Agreements | | | |
| <input type="checkbox"/> Air discharge permit | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A |
| <input type="checkbox"/> Effluent discharge | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A |
| <input type="checkbox"/> Waste Disposal, POTW | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A |
| <input type="checkbox"/> Other permits | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A |
| Remarks: _____ | | | |
| 5. Gas Generation Records | | | |
| <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A | |
| Remarks: _____ | | | |
| 6. Settlement Monument Records | | | |
| <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A | |
| Remarks: _____ | | | |
| 7. Groundwater Monitoring Records | | | |
| <input checked="" type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input type="checkbox"/> N/A | |
| Remarks: <u>Annual Mixing Zone Report and data is posted on ERDMS</u> | | | |
| 8. Leachate Extraction Records | | | |
| <input checked="" type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input type="checkbox"/> N/A | |
| Remarks: _____ | | | |
| 9. Discharge Compliance Records | | | |
| <input type="checkbox"/> Air | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A |
| <input type="checkbox"/> Water (effluent) | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A |
| Remarks: _____ | | | |
| 10. Daily Access/Security Logs | | | |
| <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A | |
| Remarks: _____ | | | |

Five-Year Review Site Inspection Checklist (Continued)

IV. O & M Costs

1. O & M Organization

- ☐ State in-house ☐ Contractor for State
☐ PRP in-house ☐ Contractor for PRP
x Other: SRS

2. O & M Cost Records

- ☐ Readily available ☐ Up to date ☐ Funding mechanism/agreement in place
x Other: Project cost data is summarized in Section X of attached review: WSRC-RP-2007-4063.

Total annual cost by year for review period if available

| | | |
|---------------------|------------|---|
| From _____ To _____ | _____ | <input type="checkbox"/> Breakdown attached |
| (Date) (Date) | Total cost | |
| From _____ To _____ | _____ | <input type="checkbox"/> Breakdown attached |
| (Date) (Date) | Total cost | |
| From _____ To _____ | _____ | <input type="checkbox"/> Breakdown attached |
| (Date) (Date) | Total cost | |
| From _____ To _____ | _____ | <input type="checkbox"/> Breakdown attached |
| (Date) (Date) | Total cost | |
| From _____ To _____ | _____ | <input type="checkbox"/> Breakdown attached |
| (Date) (Date) | Total cost | |

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

Describe costs and reasons: _____

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

A. Fencing

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

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Five-Year Review Site Inspection Checklist (Continued)

| | | | | | |
|--|---------------------------------|-------------------------------------|--|--|---|
| B. Other Access Restrictions | | | | | |
| 1. Signs and other security measures <input type="checkbox"/> Location shown on site map <input type="checkbox"/> N/A | | | | | |
| Remarks: <u>Signs at this site are in good condition.</u> | | | | | |
| C. Institutional Controls | | | | | |
| 1. Implementation and enforcement | | | | | |
| Site conditions imply ICs not properly implemented: | | | <input type="checkbox"/> Yes | <input checked="" type="checkbox"/> No | <input type="checkbox"/> N/A |
| Site conditions imply ICs not being fully enforced: | | | <input type="checkbox"/> Yes | <input checked="" type="checkbox"/> No | <input type="checkbox"/> N/A |
| Type of monitoring (e.g., self-reporting, drive-by): | | | Field Walk Down | | |
| Frequency: | Annually | | | | |
| Responsible party/agent: | DOE Savannah River Field Office | | | | |
| Contact: | D. C. Hannah (Name) | Waste Area Group Manager (Title) | 09/3/07 (Date) | (803) 952-7813 (Phone No.) | |
| Reporting is up-to-date: | | | <input checked="" type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="checkbox"/> N/A |
| Reports are verified by the lead agency: | | | <input checked="" type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="checkbox"/> N/A |
| Specific requirements in deed of decision documents have been met: | | | <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input checked="" type="checkbox"/> N/A |
| Violations have been reported: | | | <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input checked="" type="checkbox"/> N/A |
| Other problems or suggestions: | | | <input type="checkbox"/> Report attached | | |
| | | | | | |
| | | | | | |
| | | | | | |
| 2. Adequacy <input checked="" type="checkbox"/> ICs are adequate <input type="checkbox"/> ICs are inadequate <input type="checkbox"/> N/A | | | | | |
| Remarks: _____ | | | | | |
| | | | | | |
| D. General | | | | | |
| 1. Vandalism/trespassing <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> No vandalism evident | | | | | |
| Remarks: _____ | | | | | |
| | | | | | |
| 2. Land use changes onsite <input checked="" type="checkbox"/> N/A | | | | | |
| Remarks: _____ | | | | | |
| | | | | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | | |
|---|--|--|--|
| 3. Land use changes offsite <input checked="" type="checkbox"/> N/A Remarks _____ _____ | | | |
| VI. GENERAL SITE CONDITIONS | | | |
| A. Roads <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A | | | |
| 1. Roads damaged <input checked="" type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Roads adequate <input type="checkbox"/> N/A Remarks _____ _____ | | | |
| B. Other site Conditions Remarks _____ _____ _____ | | | |
| VII. COVERS SYSTEMS <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A | | | |
| A. Soil Surface | | | |
| 1. Settlement (Low spots) <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Settlement not evident Areal extent _____ Depth _____ Remarks _____ _____ | | | |
| 2. Cracks <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Cracking not evident Lengths _____ Widths _____ Depths _____ Remarks _____ _____ | | | |
| 3. Erosion <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Erosion not evident Areal extent _____ Depth _____ Remarks _____ _____ | | | |
| 4. Holes <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Holes not evident Areal extent _____ Depth _____ Remarks _____ _____ | | | |
| 5. Vegetative Cover <input checked="" type="checkbox"/> Grass <input type="checkbox"/> Cover properly established <input type="checkbox"/> No signs of stress <input type="checkbox"/> Trees/shrubs (indicate size and location on a diagram) Remarks _____ _____ | | | |

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| | | | | | | | | | | | | | | | |
|---|---|---|--|------------------------------------|---|--------------------|----------------------------------|---|--------------------|--------------------------------|---|--------------------|--|---|--------------------|
| 6. | Alternative Cover (armored rock, concrete, etc.) | <input type="checkbox"/> N/A | Remarks _____ _____ | | | | | | | | | | | | |
| 7. | Bulges | <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Bulges not evident | Areal extent _____ Height _____ Remarks _____ _____ | | | | | | | | | | | | |
| 8. | Wet Areas/Water Damage | <input type="checkbox"/> Wet areas/water damage not evident | <table style="width: 100%; border: none;"> <tr> <td style="width: 33%;"><input type="checkbox"/> Wet Areas</td> <td style="width: 33%;"><input type="checkbox"/> Location shown on site map</td> <td style="width: 34%;">Areal extent _____</td> </tr> <tr> <td><input type="checkbox"/> Ponding</td> <td><input type="checkbox"/> Location shown on site map</td> <td>Areal extent _____</td> </tr> <tr> <td><input type="checkbox"/> Seeps</td> <td><input type="checkbox"/> Location shown on site map</td> <td>Areal extent _____</td> </tr> <tr> <td><input type="checkbox"/> Soft subgrade</td> <td><input type="checkbox"/> Location shown on site map</td> <td>Areal extent _____</td> </tr> </table> Remarks _____ _____ | <input type="checkbox"/> Wet Areas | <input type="checkbox"/> Location shown on site map | Areal extent _____ | <input type="checkbox"/> Ponding | <input type="checkbox"/> Location shown on site map | Areal extent _____ | <input type="checkbox"/> Seeps | <input type="checkbox"/> Location shown on site map | Areal extent _____ | <input type="checkbox"/> Soft subgrade | <input type="checkbox"/> Location shown on site map | Areal extent _____ |
| <input type="checkbox"/> Wet Areas | <input type="checkbox"/> Location shown on site map | Areal extent _____ | | | | | | | | | | | | | |
| <input type="checkbox"/> Ponding | <input type="checkbox"/> Location shown on site map | Areal extent _____ | | | | | | | | | | | | | |
| <input type="checkbox"/> Seeps | <input type="checkbox"/> Location shown on site map | Areal extent _____ | | | | | | | | | | | | | |
| <input type="checkbox"/> Soft subgrade | <input type="checkbox"/> Location shown on site map | Areal extent _____ | | | | | | | | | | | | | |
| 9. | Slope Instability | <input type="checkbox"/> Slides <input type="checkbox"/> Location shown on site map <input type="checkbox"/> No evidence of slope instability | Areal extent _____ Remarks _____ _____ | | | | | | | | | | | | |
| B. Benches <input type="checkbox"/> Applicable <input type="checkbox"/> 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 | <input type="checkbox"/> Location shown on site map <input type="checkbox"/> N/A or okay | Remarks _____ _____ | | | | | | | | | | | | |
| 2. | Bench Breached | <input type="checkbox"/> Location shown on site map <input type="checkbox"/> N/A or okay | Remarks _____ _____ | | | | | | | | | | | | |
| 3. | Bench Overtopped | <input type="checkbox"/> Location shown on site map <input type="checkbox"/> N/A or okay | Remarks _____ _____ | | | | | | | | | | | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | |
|--|---|--|
| C. Letdown Channels <input type="checkbox"/> Applicable <input type="checkbox"/> 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 | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> No evidence of settlement |
| Areal extent _____ Depth _____ Remarks _____ _____ | | |
| 2. Material Degradation | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> No evidence of degradation |
| Material type _____ Areal extent _____ Remarks _____ _____ | | |
| 3. Erosion | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> No evidence of erosion |
| Areal extent _____ Depth _____ Remarks _____ _____ | | |
| 4. Undercutting | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> No evidence of undercutting |
| Areal extent _____ Depth _____ Remarks _____ _____ | | |
| 5. Obstructions | Type _____ | <input type="checkbox"/> No obstructions |
| <input type="checkbox"/> Location shown on site map Areal extent _____ Size _____ Remarks _____ _____ | | |
| 6. Excessive Vegetative Growth | Type _____ | |
| <input type="checkbox"/> No evidence of excessive growth <input type="checkbox"/> Vegetation in channels does not obstruct flow <input type="checkbox"/> Location shown on site map Areal extent _____ Remarks _____ _____ | | |

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| | | | | | |
|--|--|---|---|-------------------------------------|------------------------------|
| D. Cover Penetrations | | | | <input type="checkbox"/> Applicable | <input type="checkbox"/> N/A |
| 1. Gas Vents <input type="checkbox"/> Active <input type="checkbox"/> Passive | | | | | |
| <input type="checkbox"/> Properly secured/locked | <input type="checkbox"/> Functioning | <input type="checkbox"/> Routinely sampled | <input type="checkbox"/> Good condition | | |
| <input type="checkbox"/> Evidence of leakage at penetration | <input type="checkbox"/> Needs Maintenance | | <input type="checkbox"/> N/A | | |
| Remarks _____ | | | | | |
| <hr/> | | | | | |
| 2. Gas Monitoring Probes | | | | | |
| <input type="checkbox"/> Properly secured/locked | <input type="checkbox"/> Functioning | <input type="checkbox"/> Routinely sampled | <input type="checkbox"/> Good condition | | |
| <input type="checkbox"/> Evidence of leakage at penetration | <input type="checkbox"/> Needs Maintenance | | <input type="checkbox"/> N/A | | |
| Remarks _____ | | | | | |
| <hr/> | | | | | |
| 3. Monitoring Wells | | | | | |
| <input type="checkbox"/> Properly secured/locked | <input type="checkbox"/> Functioning | <input type="checkbox"/> Routinely sampled | <input type="checkbox"/> Good condition | | |
| <input type="checkbox"/> Evidence of leakage at penetration | <input type="checkbox"/> Needs Maintenance | | <input type="checkbox"/> N/A | | |
| Remarks _____ | | | | | |
| <hr/> | | | | | |
| 4. Leachate Extraction Wells | | | | | |
| <input type="checkbox"/> Properly secured/locked | <input type="checkbox"/> Functioning | <input type="checkbox"/> Routinely sampled | <input type="checkbox"/> Good condition | | |
| <input type="checkbox"/> Evidence of leakage at penetration | <input type="checkbox"/> Needs Maintenance | | <input type="checkbox"/> N/A | | |
| Remarks _____ | | | | | |
| <hr/> | | | | | |
| 5. Settlement Monuments | | | | | |
| <input type="checkbox"/> Located | | <input type="checkbox"/> Routinely surveyed | | <input type="checkbox"/> N/A | |
| Remarks _____ | | | | | |
| <hr/> | | | | | |
| E. Gas Collection and Treatment | | | | | |
| | | <input type="checkbox"/> Applicable | <input type="checkbox"/> N/A | | |
| 1. Gas Treatment Facilities | | | | | |
| <input type="checkbox"/> Flaring | <input type="checkbox"/> Thermal destruction | <input type="checkbox"/> Collection for reuse | | | |
| <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance | | | | |
| Remarks _____ | | | | | |
| <hr/> | | | | | |
| 2. Gas Collection Wells, Manifolds and Piping | | | | | |
| <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance | | | | |
| Remarks _____ | | | | | |
| <hr/> | | | | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | | |
|---|--|--|--|
| 3. Gas Monitoring Facilities (e.g., gas monitoring of adjacent homes or buildings) | | | |
| <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A | | | |
| Remarks _____ _____ | | | |
| F. Cover Drainage Layer <input type="checkbox"/> Applicable <input type="checkbox"/> N/A | | | |
| 1. Outlet Pipes Inspected <input type="checkbox"/> Functioning <input type="checkbox"/> N/A | | | |
| Remarks _____ _____ | | | |
| 2. Outlet Rock Inspected <input type="checkbox"/> Functioning <input type="checkbox"/> N/A | | | |
| Remarks _____ _____ | | | |
| G. Detention/sedimentation Ponds <input type="checkbox"/> Applicable <input type="checkbox"/> N/A | | | |
| 1. Siltation Areal extent _____ | | Depth _____ <input type="checkbox"/> N/A | |
| <input type="checkbox"/> Siltation not evident | | | |
| Remarks _____ _____ | | | |
| 2. Erosion Areal extent _____ | | Depth _____ <input type="checkbox"/> N/A | |
| <input type="checkbox"/> Erosion not evident | | | |
| Remarks _____ _____ | | | |
| 3. Outlet Works <input type="checkbox"/> Functioning <input type="checkbox"/> N/A | | | |
| Remarks _____ _____ | | | |
| 4. Dam <input type="checkbox"/> Functioning <input type="checkbox"/> N/A | | | |
| Remarks _____ _____ | | | |
| H. Retaining Walls <input type="checkbox"/> Applicable <input type="checkbox"/> N/A | | | |
| 1. Deformations <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Deformation not evident | | | |
| Horizontal displacement _____ | | Vertical displacement _____ | |
| Rotational displacement _____ | | | |
| Remarks _____ _____ | | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | |
|---|---|--|
| 2. Degradation | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> Deformation not evident |
| Remarks _____ | | |
| I. Perimeter Ditches/Off-Site Discharge <input type="checkbox"/> Applicable <input type="checkbox"/> N/A | | |
| 1. Siltation | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> Siltation not evident |
| Areal extent _____ Depth _____ | | |
| Remarks _____ | | |
| 2. Vegetative Growth | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> Siltation not evident |
| <input type="checkbox"/> Vegetation does not impede flow | | |
| Areal extent _____ Type _____ | | |
| Remarks _____ | | |
| 3. Erosion | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> Erosion not evident |
| Areal extent _____ Depth _____ | | |
| Remarks _____ | | |
| 4. Discharge Structure | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> N/A |
| Remarks _____ | | |
| VIII. VERTICAL BARRIER WALLS <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A | | |
| 1. Settlement | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> Settlement not evident |
| Areal extent _____ Depth _____ | | |
| Remarks _____ | | |
| 2. Performance Monitoring | Type of Monitoring _____ | <input type="checkbox"/> Performance not monitored |
| Frequency _____ <input type="checkbox"/> Evidence of breaching Head differential | | |
| Remarks _____ | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | | |
|---|--|-------------------------------------|-------|
| IX. GROUNDWATER/SURFACE WATER REMEDIES | | x Applicable | € N/A |
| A. Groundwater Extraction Wells, Pumps, and Pipelines | | <input type="checkbox"/> Applicable | x N/A |
| 1. Pumps, Wellhead Plumbing, and Electrical <input type="checkbox"/> Good condition <input type="checkbox"/> All required wells located <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A Remarks _____ _____ | | | |
| 2. Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____ _____ | | | |
| 3. Spare Parts and Equipment <input type="checkbox"/> Readily available <input type="checkbox"/> Good condition <input type="checkbox"/> Requires upgrade <input type="checkbox"/> Needs to be provided Remarks _____ _____ | | | |
| B. Surface Water Collection Structures, Pumps, and Pipelines | | <input type="checkbox"/> Applicable | x N/A |
| 1. Collection Structures, Pumps, and Electrical <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____ _____ | | | |
| 2. Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____ _____ | | | |
| 3. Spare Parts and Equipment <input type="checkbox"/> Readily available <input type="checkbox"/> Good condition <input type="checkbox"/> Requires upgrade <input type="checkbox"/> Needs to be provided Remarks _____ _____ | | | |

Third Five-Year Remedy Review Report (U)
D-Area Oil Seepage Basin (631-G) Operable Unit
Savannah River Site, December 2008

WSRC-RP-2007-4063

Rev. 1.1

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Five-Year Review Site Inspection Checklist (Continued)

| C. Treatment System | € Applicable | x N/A |
|--|--------------|-------|
| 1. Treatment Train (Check components that apply) <div style="display: flex; justify-content: space-between; margin-top: 5px;"> <div> <input type="checkbox"/> Metals removal <input type="checkbox"/> Air stripping <input type="checkbox"/> Filters _____ <input type="checkbox"/> Additive (e.g., chelation agent, flocculent) _____ <input type="checkbox"/> Others _____ </div> <div> <input type="checkbox"/> Oil/water separation <input type="checkbox"/> Carbon adsorbers <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> Sampling ports properly marked and functional <input type="checkbox"/> Sampling/maintenance log displayed and up to date <input type="checkbox"/> Equipment properly identified <input type="checkbox"/> Quantity of groundwater treated annually _____ <input type="checkbox"/> Quantity of surface water treated annually _____ </div> <div> <input type="checkbox"/> Bioremediation </div> </div> <div style="margin-top: 5px;"> Remarks _____ _____ </div> | | |
| 2. Electrical Enclosures and Panels (properly rated and functional) <div style="display: flex; justify-content: space-between; margin-top: 5px;"> <input type="checkbox"/> N/A € Good condition <input type="checkbox"/> Needs Maintenance </div> <div style="margin-top: 5px;"> Remarks _____ _____ </div> | | |
| 3. Tanks, Vaults, Storage Vessels <div style="display: flex; justify-content: space-between; margin-top: 5px;"> <input type="checkbox"/> N/A € Good condition <input type="checkbox"/> Proper secondary containment <input type="checkbox"/> Needs Maintenance </div> <div style="margin-top: 5px;"> Remarks _____ _____ </div> | | |
| 4. Discharge Structure and Appurtenances <div style="display: flex; justify-content: space-between; margin-top: 5px;"> <input type="checkbox"/> N/A <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance </div> <div style="margin-top: 5px;"> Remarks _____ _____ </div> | | |
| 5. Treatment Building(s) <div style="display: flex; justify-content: space-between; margin-top: 5px;"> <input type="checkbox"/> N/A <input type="checkbox"/> Good condition (esp. roof and doorways) <input type="checkbox"/> Needs repair </div> <div style="margin-top: 5px;"> <input type="checkbox"/> Chemicals and equipment properly stored Remarks _____ _____ </div> | | |

Five-Year Review Site Inspection Checklist (Continued)

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 DOSB OU deep soils is no further action since RAOs have been achieved by the IRA and bioventing testing.

The 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 remedy for DOSB OU groundwater is monitored natural attenuation/groundwater mixing zone with institutional controls. 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.

Five-Year Review Site Inspection Checklist (Continued)

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.

Monitoring data appears to be consistent with the modeling predictions from the GWMZ application. The concentrations should continue to decrease within the heart of the plume 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.

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.

N/A

F-AREA BURNING/RUBBLE PITS (231-F, 231-1F, 231-2F) OPERABLE UNIT

I. Introduction

This is the third five-year review for the F-Area Burning/Rubble Pits (FBRP) (231-F, 231-1F, and 231-2F) Operable Unit (OU). This review was conducted from August 2007 through September 2007. This report documents the results of the review.

II. OU Chronology

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

Table 1. Chronology of OU Events

| Event | Date |
|--|-------------------------------------|
| Groundwater Characterization Field Start | February 6, 1998 |
| Final Record of Decision (ROD) Issuance | April 22, 1997 |
| Remedial Action Start | 2Q-1998 |
| Final Remediation Report Approved | April 23, 1998 |
| Previous Five-Year Reviews | June 30, 1997 and February 12, 2004 |

III. Background

Physical Characteristics

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 ft west of F Area (Figures 1). The FBRP consists of two burning rubble pits (231-F and 231-1F) and a 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. Upper Three Runs (UTR) is located approximately 2,300 ft northwest of the FBRP. The local topography of the area is flat upland and the pits are at an elevation of 290 ft above mean sea level and 170 ft above the UTR aquifer. The water table is 70 to

100 ft 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. Figure 2 shows a topographical water table of the F-Area Burning/Rubble Pits (231-F, 231-1F, 231-2F) Operable Unit.

Groundwater contamination has been documented during the FBRP groundwater monitoring program, both upgradient and downgradient; however, a technical memorandum and summary for the groundwater has demonstrated that the FBRP is not the source of the groundwater contamination. 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 was approved on July 7, 2003. The final remedy selected in the FBRP 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.

Land and Resource 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.

History of Contamination

Pit 231-F is approximately 275 ft long by 50 ft wide by 10 ft deep, and Pit 231-1F is approximately 325 ft long by 50 ft wide by 10 ft 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 non-returnable 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 ft long by 40 ft wide by 10 ft 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.

Initial Response

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 ft below the surface to the bottom of Pits 231-F and 231-1F, which is about 10 ft 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.

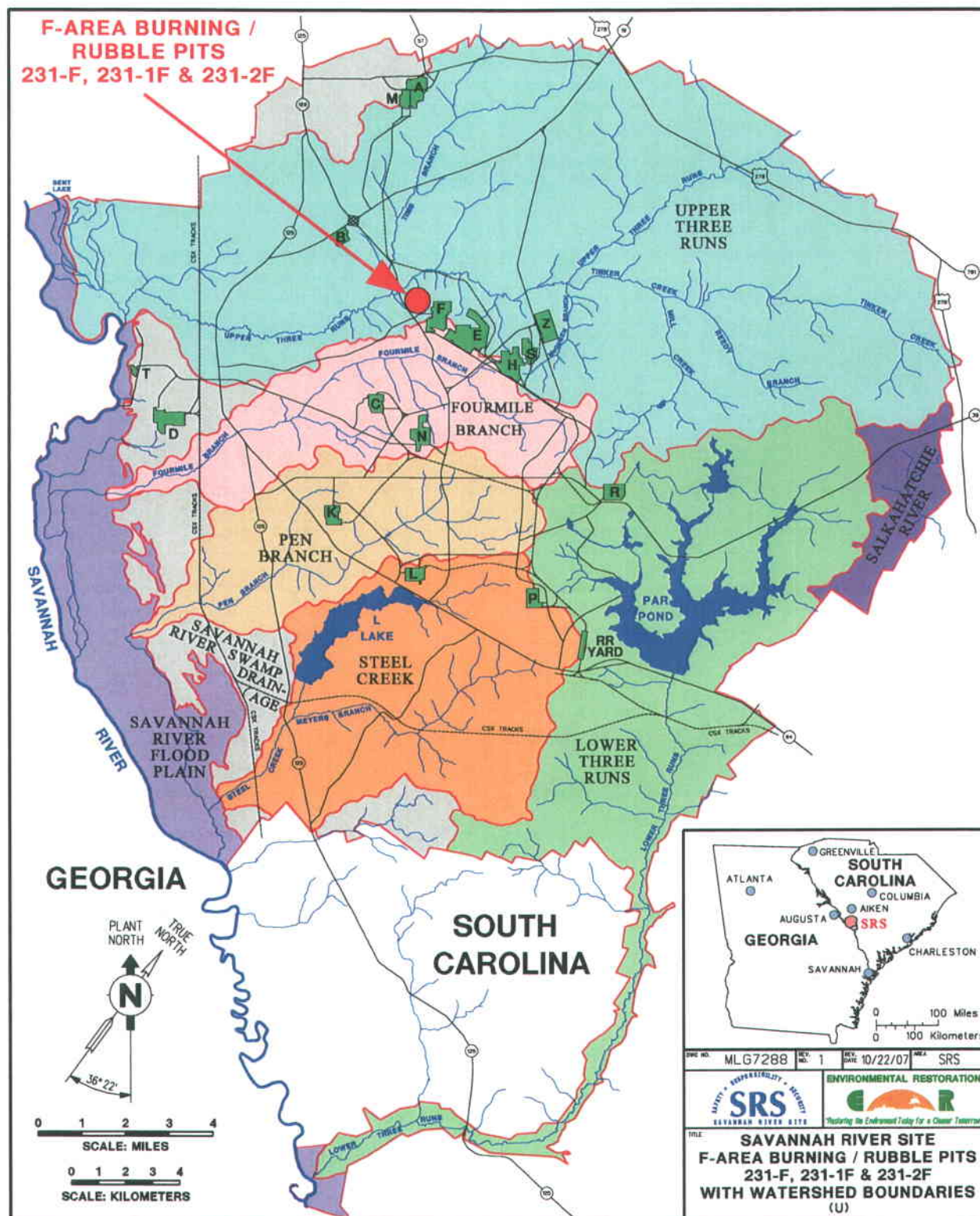


Figure 1. Location of the F-Area Burning/Rubble Pits (231-F, 231-1F, 231-2F) Operable Unit at SRS

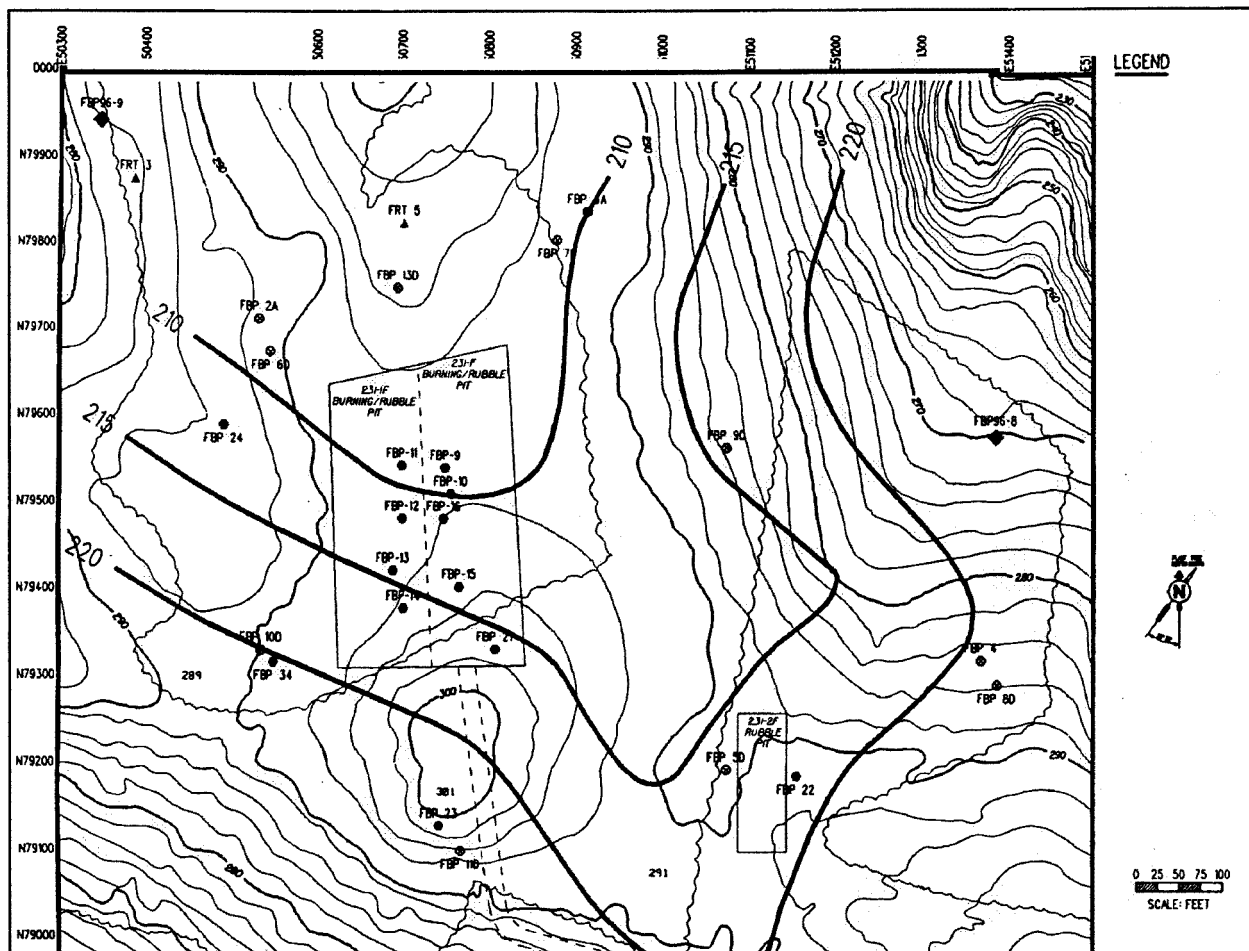


Figure 2. Topographic and Water Table Potentiometric Map of the F-Area Burning/Rubble Pits (231-F, 231-1F, 231-2F) Operable Unit

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 5×10^{-6} for direct radiation. For future industrial land use the risks were 4×10^{-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 1×10^{-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, 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 RI/Feasibility Study assessment.

Basis for Taking Action

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

Remedy Selection

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-IF soil above the 1×10^{-6} risk level

Remedy Implementation

The remedial action for the FBRP source control unit consists of institutional controls that will restrict the land to future industrial use. As part of institutional controls, signs were posted to indicate 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. If the property is ever transferred to non-federal ownership, the United States 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

There are no issues for this OU.

IX. Recommendations and Follow-up Actions

There are no recommendations or follow-up actions for this OU. However, the groundwater associated with this unit will be addressed as part of the Western General Separations Area (GSA) Groundwater OU. Annual monitoring data are submitted to USEPA and SCDHEC in a scoping summary format.

X. Project Costs

Costs associated with the selected remedy for FBRP include operation and maintenance costs of institutional controls. The estimated operation and maintenance cost associated with the selected remedy is \$10,000. This is a present worth cost, including 30 years of maintenance activities and is based 5% interest rate. After characterization and effectiveness of the remedy was evaluated, the actual operation and maintenance cost for the FBRP was assessed. The total actual operation and maintenance cost from project support and other post-construction expense to fiscal year 2006 is \$12,912.

XI. Protectiveness Statement(s)

The remedy of institutional controls at the FBRP OU is protective of human health and the environment. This remedy, upon implementation of land use controls pursuant to the Land Use Control Assurance Plan (LUCAP), 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 United States Department of Energy (USDOE) controls the OU. These controls 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).

XII. Next Review

The next five-year review is scheduled for February 12, 2014.

ATTACHMENT 1

List of Documents Reviewed

WSRC, 1996a. *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, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

WSRC, 1996b. *Baseline Risk Assessment for the F-Area Burning/Rubble Pits and Rubble Pit (U)*, WSRC-TR-94-108, Revision 1.2, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

WSRC, 1996c. *F-Area Burning/Rubble Pits (231-F, 231-1F, & 231-2F) Corrective Measures Study/Feasibility Study (U)*, WSRC-RP-95-660, Revision 1.1, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

WSRC, 1996d. *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, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

WSRC, 1997. *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, Westinghouse Savannah River Company, Savannah River Site, 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, Westinghouse Savannah River Company, Savannah River Site, 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, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

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ATTACHMENT 2

Five-Year Review Site Inspection Checklist

| I. SITE INFORMATION | | | |
|--|--|------------------------------------|---|
| Site Name: | F-Area Burning/Rubble Pits | Date of Inspection: | 9/24/2007 |
| Location and Region: | Savannah River Site, USEPA IV | EPA ID: | SC1890008989 |
| Agency, office, or company leading the five- year review: | United States Department of Energy | CERCLIS OU: | 14 |
| | | Weather/Temperature: | clear and sunny, 88°F |
| Remedy Includes: (Check all that apply) | | | |
| <input type="checkbox"/> Cover System <input type="checkbox"/> Monitored Natural Attenuation | | | |
| <input type="checkbox"/> Access controls <input type="checkbox"/> Groundwater Containment | | | |
| <input checked="" type="checkbox"/> Institutional Controls <input type="checkbox"/> Vertical Barrier Walls | | | |
| <input type="checkbox"/> Groundwater pump and treatment | | | |
| <input type="checkbox"/> Surface water collection and treatment | | | |
| <input type="checkbox"/> Other: _____ | | | |
| Attachments: <input type="checkbox"/> Inspection team roster attached <input type="checkbox"/> Site map attached | | | |
| II. INTERVIEWS (Check all that apply) | | | |
| 1. O & M site manager | | | |
| | _____ (Name) | _____ (Title) | _____ (Date) |
| Interviewed: | <input type="checkbox"/> at site | <input type="checkbox"/> at office | <input type="checkbox"/> by phone Phone No. _____ |
| Problems, suggestions: | <input type="checkbox"/> report attached _____ | | |
| 2. O & M staff | | | |
| | _____ (Name) | _____ (Title) | _____ (Date) |
| Interviewed: | <input type="checkbox"/> at site | <input type="checkbox"/> at office | <input type="checkbox"/> by phone Phone No. _____ |
| Problems, suggestions: | <input type="checkbox"/> report attached _____ | | |

Five-Year Review Site Inspection Checklist (Continued)

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

| | | | |
|---|--|-------------------------------------|------------------------------|
| <input type="checkbox"/> O & M Manual | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |
| x As-built drawings | x Readily available | x Up to date | <input type="checkbox"/> N/A |
| <input type="checkbox"/> Maintenance Logs | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |

Remarks: See Waste Unit Inspection and Maintenance, ER-SOP-019

Five-Year Review Site Inspection Checklist (Continued)

| | | | |
|---|--|-------------------------------------|-------|
| 2. Site-Specific Health and Safety Plan | | | |
| <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A | |
| <input type="checkbox"/> Contingency plan/emergency response plan | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |
| Remarks: <u>Routine O&M activities do not require an SSHASP under 29 CFR 1910.1201, HAZWOPER.</u> | | | |
| 3. O & M and OSHA Training Records | | | |
| x Readily available | x Up to date | <input type="checkbox"/> N/A | |
| Remarks _____ | | | |
| 4. Permits and Service Agreements | | | |
| <input type="checkbox"/> Air discharge permit | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |
| <input type="checkbox"/> Effluent discharge | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |
| <input type="checkbox"/> Waste Disposal, POTW | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |
| <input type="checkbox"/> Other permits | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |
| Remarks _____ | | | |
| 5. Gas Generation Records | | | |
| <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A | |
| Remarks _____ | | | |
| 6. Settlement Monument Records | | | |
| <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A | |
| Remarks _____ | | | |
| 7. Groundwater Monitoring Records | | | |
| <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A | |
| Remarks _____ | | | |
| 8. Leachate Extraction Records | | | |
| <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A | |
| Remarks _____ | | | |
| 9. Discharge Compliance Records | | | |
| <input type="checkbox"/> Air | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |
| <input type="checkbox"/> Water (effluent) | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |
| Remarks _____ | | | |
| 10. Daily Access/Security Logs | | | |
| <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A | |
| Remarks _____ | | | |

Five-Year Review Site Inspection Checklist (Continued)

IV. O & M Costs

1. O & M Organization

- ☐ State in-house ☐ Contractor for State
☐ PRP in-house ☐ Contractor for PRP

x Other: SRS

2. O & M Cost Records

- ☐ Readily available ☐ Up to date ☐ Funding mechanism/agreement in place

x Other: Project cost data is summarized in Section X of attached review: WSRC-RP-2007-4063.

Total annual cost by year for review period if available

| | | |
|---------------------|------------|---|
| From _____ To _____ | _____ | <input type="checkbox"/> Breakdown attached |
| (Date) (Date) | Total cost | |
| From _____ To _____ | _____ | <input type="checkbox"/> Breakdown attached |
| (Date) (Date) | Total cost | |
| From _____ To _____ | _____ | <input type="checkbox"/> Breakdown attached |
| (Date) (Date) | Total cost | |
| From _____ To _____ | _____ | <input type="checkbox"/> Breakdown attached |
| (Date) (Date) | Total cost | |
| From _____ To _____ | _____ | <input type="checkbox"/> Breakdown attached |
| (Date) (Date) | Total cost | |

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

Describe costs and reasons: _____

V. ACCESS AND INSTITUTIONAL CONTROLS

x Applicable ☐ N/A

A. Fencing

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

Remarks _____

Five-Year Review Site Inspection Checklist (Continued)

B. Other Access Restrictions

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

Remarks: Signs at this site are in good condition.

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: Semi-annual

Responsible party/agent: DOE Savannah River Field Office

Contact: M. P. Prater Waste Area Group Manager 09/3/07 (803) 952-9333
(Name) (Title) (Date) (Phone No.)

Reporting 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

Five-Year Review Site Inspection Checklist (Continued)

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. COVERS SYSTEMS ☐ Applicable ☒ N/A

A. Soil 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 _____

Five-Year Review Site Inspection Checklist (Continued)

| | | |
|--|---|--------------------|
| 6. Alternative Cover (armored rock, concrete, etc.) <input type="checkbox"/> N/A | | |
| Remarks _____ | | |
| 7. Bulges <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Bulges not evident | | |
| Areal extent _____ Height _____ | | |
| Remarks _____ | | |
| 8. Wet Areas/Water Damage <input type="checkbox"/> Wet areas/water damage not evident | | |
| <input type="checkbox"/> Wet Areas | <input type="checkbox"/> Location shown on site map | Areal extent _____ |
| <input type="checkbox"/> Ponding | <input type="checkbox"/> Location shown on site map | Areal extent _____ |
| <input type="checkbox"/> Seeps | <input type="checkbox"/> Location shown on site map | Areal extent _____ |
| <input type="checkbox"/> Soft subgrade | <input type="checkbox"/> Location shown on site map | Areal extent _____ |
| Remarks _____ | | |
| 9. Slope Instability <input type="checkbox"/> Slides <input type="checkbox"/> Location shown on site map <input type="checkbox"/> No evidence of slope instability | | |
| Areal extent _____ | | |
| Remarks _____ | | |
| B. Benches <input type="checkbox"/> Applicable <input type="checkbox"/> 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 <input type="checkbox"/> Location shown on site map <input type="checkbox"/> N/A or okay | | |
| Remarks _____ | | |
| 2. Bench Breached <input type="checkbox"/> Location shown on site map <input type="checkbox"/> N/A or okay | | |
| Remarks _____ | | |
| 3. Bench Overtopped <input type="checkbox"/> Location shown on site map <input type="checkbox"/> N/A or okay | | |
| Remarks _____ | | |

Five-Year Review Site Inspection Checklist (Continued)

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 _____

Five-Year Review Site Inspection Checklist (Continued)

| | | | |
|--|--|---|---|
| D. Cover Penetrations <input type="checkbox"/> Applicable <input type="checkbox"/> N/A | | | |
| 1. Gas Vents <input type="checkbox"/> Active <input type="checkbox"/> Passive | | | |
| <input type="checkbox"/> Properly secured/locked | <input type="checkbox"/> Functioning | <input type="checkbox"/> Routinely sampled | <input type="checkbox"/> Good condition |
| <input type="checkbox"/> Evidence of leakage at penetration | <input type="checkbox"/> Needs Maintenance | <input type="checkbox"/> N/A | |
| Remarks _____ | | | |
| | | | |
| 2. Gas Monitoring Probes | | | |
| <input type="checkbox"/> Properly secured/locked | <input type="checkbox"/> Functioning | <input type="checkbox"/> Routinely sampled | <input type="checkbox"/> Good condition |
| <input type="checkbox"/> Evidence of leakage at penetration | <input type="checkbox"/> Needs Maintenance | <input type="checkbox"/> N/A | |
| Remarks _____ | | | |
| | | | |
| 3. Monitoring Wells | | | |
| <input type="checkbox"/> Properly secured/locked | <input type="checkbox"/> Functioning | <input type="checkbox"/> Routinely sampled | <input type="checkbox"/> Good condition |
| <input type="checkbox"/> Evidence of leakage at penetration | <input type="checkbox"/> Needs Maintenance | <input type="checkbox"/> N/A | |
| Remarks _____ | | | |
| | | | |
| 4. Leachate Extraction Wells | | | |
| <input type="checkbox"/> Properly secured/locked | <input type="checkbox"/> Functioning | <input type="checkbox"/> Routinely sampled | <input type="checkbox"/> Good condition |
| <input type="checkbox"/> Evidence of leakage at penetration | <input type="checkbox"/> Needs Maintenance | <input type="checkbox"/> N/A | |
| Remarks _____ | | | |
| | | | |
| 5. Settlement Monuments <input type="checkbox"/> Located <input type="checkbox"/> Routinely surveyed <input type="checkbox"/> N/A | | | |
| Remarks _____ | | | |
| | | | |
| E. Gas Collection and Treatment <input type="checkbox"/> Applicable <input type="checkbox"/> N/A | | | |
| 1. Gas Treatment Facilities | | | |
| <input type="checkbox"/> Flaring | <input type="checkbox"/> Thermal destruction | <input type="checkbox"/> Collection for reuse | |
| <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance | | |
| Remarks _____ | | | |
| | | | |
| 2. Gas Collection Wells, Manifolds and Piping | | | |
| <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance | | |
| Remarks _____ | | | |
| | | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | | |
|--|--|--|--|
| 3. Gas Monitoring Facilities (e.g., gas monitoring of adjacent homes or buildings) <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A Remarks _____ _____ | | | |
| F. Cover Drainage Layer <input type="checkbox"/> Applicable <input type="checkbox"/> N/A | | | |
| 1. Outlet Pipes Inspected <input type="checkbox"/> Functioning <input type="checkbox"/> N/A Remarks _____ _____ | | | |
| 2. Outlet Rock Inspected <input type="checkbox"/> Functioning <input type="checkbox"/> N/A Remarks _____ _____ | | | |
| G. Detention/sedimentation Ponds <input type="checkbox"/> Applicable <input type="checkbox"/> N/A | | | |
| 1. Siltation Areal extent _____ Depth _____ <input type="checkbox"/> N/A <input type="checkbox"/> Siltation not evident Remarks _____ _____ | | | |
| 2. Erosion Areal extent _____ Depth _____ <input type="checkbox"/> N/A <input type="checkbox"/> Erosion not evident Remarks _____ _____ | | | |
| 3. Outlet Works <input type="checkbox"/> Functioning <input type="checkbox"/> N/A Remarks _____ _____ | | | |
| 4. Dam <input type="checkbox"/> Functioning <input type="checkbox"/> N/A Remarks _____ _____ | | | |
| H. Retaining Walls <input type="checkbox"/> Applicable <input type="checkbox"/> N/A | | | |
| 1. Deformations <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Deformation not evident Horizontal displacement _____ Vertical displacement _____ Rotational displacement _____ Remarks _____ _____ | | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | |
|--|---|--|
| 2. Degradation | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> Deformation not evident |
| Remarks _____ | | |
| I. Perimeter Ditches/Off-Site Discharge | | |
| | <input type="checkbox"/> Applicable | <input type="checkbox"/> N/A |
| 1. Siltation | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> Siltation not evident |
| Areal extent _____ Depth _____ | | |
| Remarks _____ | | |
| 2. Vegetative Growth | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> Siltation not evident |
| <input type="checkbox"/> Vegetation does not impede flow | | |
| Areal extent _____ Type _____ | | |
| Remarks _____ | | |
| 3. Erosion | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> Erosion not evident |
| Areal extent _____ Depth _____ | | |
| Remarks _____ | | |
| 4. Discharge Structure | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> N/A |
| Remarks _____ | | |
| VIII. VERTICAL BARRIER WALLS | | |
| | <input type="checkbox"/> Applicable | <input checked="" type="checkbox"/> N/A |
| 1. Settlement | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> Settlement not evident |
| Areal extent _____ Depth _____ | | |
| Remarks _____ | | |
| 2. Performance Monitoring | Type of Monitoring _____ | <input type="checkbox"/> Performance not monitored |
| Frequency _____ <input type="checkbox"/> Evidence of breaching | | |
| Head differential _____ | | |
| Remarks _____ | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | | |
|--|--|-------------------------------------|---|
| IX. GROUNDWATER/SURFACE WATER REMEDIES | | <input type="checkbox"/> Applicable | <input checked="" type="checkbox"/> N/A |
| A. Groundwater Extraction Wells, Pumps, and Pipelines | | <input type="checkbox"/> Applicable | <input type="checkbox"/> N/A |
| 1. Pumps, Wellhead Plumbing, and Electrical | | | |
| <input type="checkbox"/> Good condition <input type="checkbox"/> All required wells located <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A | | | |
| Remarks _____ | | | |
| 2. Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances | | | |
| <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance | | | |
| Remarks _____ | | | |
| 3. Spare Parts and Equipment | | | |
| <input type="checkbox"/> Readily available <input type="checkbox"/> Good condition <input type="checkbox"/> Requires upgrade <input type="checkbox"/> Needs to be provided | | | |
| Remarks _____ | | | |
| B. Surface Water Collection Structures, Pumps, and Pipelines | | <input type="checkbox"/> Applicable | <input checked="" type="checkbox"/> N/A |
| 1. Collection Structures, Pumps, and Electrical | | | |
| <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance | | | |
| Remarks _____ | | | |
| 2. Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances | | | |
| <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance | | | |
| Remarks _____ | | | |
| 3. Spare Parts and Equipment | | | |
| <input type="checkbox"/> Readily available <input type="checkbox"/> Good condition <input type="checkbox"/> Requires upgrade <input type="checkbox"/> Needs to be provided | | | |
| Remarks _____ | | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | |
|---|--|---|
| C. Treatment System | <input type="checkbox"/> Applicable | <input type="checkbox"/> N/A |
| 1. Treatment Train (Check components that apply) | | |
| <input type="checkbox"/> Metals removal | <input type="checkbox"/> Oil/water separation | <input type="checkbox"/> Bioremediation |
| <input type="checkbox"/> Air stripping | <input type="checkbox"/> Carbon adsorbers | |
| <input type="checkbox"/> Filters _____ | | |
| <input type="checkbox"/> Additive (e.g., chelation agent, flocculent) _____ | | |
| <input type="checkbox"/> Others _____ | | |
| <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance | |
| <input type="checkbox"/> Sampling ports properly marked and functional | | |
| <input type="checkbox"/> Sampling/maintenance log displayed and up to date | | |
| <input type="checkbox"/> Equipment properly identified | | |
| <input type="checkbox"/> Quantity of groundwater treated annually _____ | | |
| <input type="checkbox"/> Quantity of surface water treated annually _____ | | |
| Remarks _____ | | |
| _____ | | |
| 2. Electrical Enclosures and Panels (properly rated and functional) | | |
| <input type="checkbox"/> N/A | <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance |
| Remarks _____ | | |
| _____ | | |
| 3. Tanks, Vaults, Storage Vessels | | |
| <input type="checkbox"/> N/A | <input type="checkbox"/> Good condition | <input type="checkbox"/> Proper secondary containment |
| <input type="checkbox"/> Needs Maintenance | | |
| Remarks _____ | | |
| _____ | | |
| 4. Discharge Structure and Appurtenances | | |
| <input type="checkbox"/> N/A | <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance |
| Remarks _____ | | |
| _____ | | |
| 5. Treatment Building(s) | | |
| <input type="checkbox"/> N/A | <input type="checkbox"/> Good condition (esp. roof and doorways) | <input type="checkbox"/> Needs repair |
| <input type="checkbox"/> Chemicals and equipment properly stored | | |
| Remarks _____ | | |
| _____ | | |

Five-Year Review Site Inspection Checklist (Continued)

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 remedial action for the FBRP source control unit consists of institutional controls that will restrict the land to future industrial use.

The institutional controls are in place and being implemented to provide access control and prevent exposures as intended by the decision documents.

Five-Year Review Site Inspection Checklist (Continued)

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.

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, and further groundwater assessment as necessary.

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.

N/A



F-AREA GROUNDWATER OPERABLE UNIT

I. Introduction

The review for this unit is conducted under the Savannah River Site (SRS) Resource Conservation and Recovery Act (RCRA) program. The Comprehensive Environmental Response, Compensation, and Liability Act (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 third such five-year review for the F-Area Groundwater Operable Unit (OU). This review was conducted from August 2007 through September 2007 and documents the results of the review.

II. OU Chronology

Table 1 lists the chronology of site events for the F-Area Groundwater OU.

Table 1. Chronology of OU Events

| Event | Date |
|--|-------------------------------------|
| RCRA Closure Plan Approved | 1989 |
| Corrective Action Start | 1989 |
| RCRA Closure Certified | 1991 |
| Interim Record of Decision (ROD) Issuance | April 13, 1995 |
| Revised Corrective Action Plan (CAP) Submitted for Alternative Treatment | March 2003 |
| Previous Five-Year Reviews | June 30, 1997 and February 12, 2004 |

III. Background

Physical Characteristics

The F-Area Groundwater OU, a media-specific OU within the Fourmile Branch Watershed, comprises the groundwater associated with F-Area HWMF. The basins associated with the F-Area Hazardous Waste Management Facility (HWMF) were

stabilized and closed in 1991. The F-Area HWMF lies in the central portion of SRS, approximately 5 miles from the nearest site boundary (see Figure 1).

Land and Resource Use

F-Area Groundwater OU is located in an industrial area that is proposed for continued industrial use as supported by the proposed land use map for SRS.

History of Contamination

The F-Area HWMF 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.

Initial Response

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 site boundary, by natural attenuation and radionuclide decay, by institutional controls, and by dilution in receiving streams. The remediation of the F-Area Groundwater OU will be designed to meet, as far as practicable, the groundwater protection standards outlined in the RCRA permit.

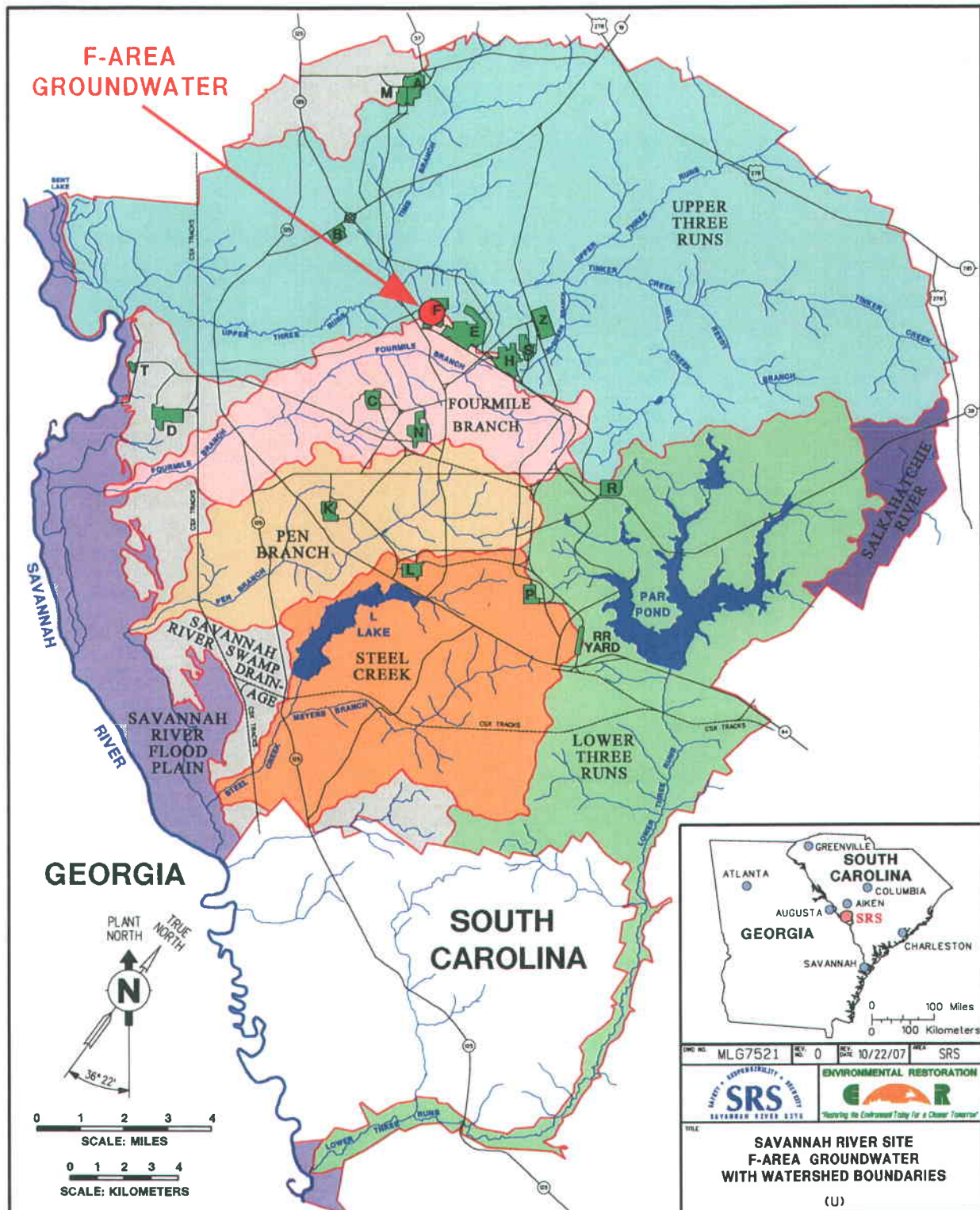


Figure 1. F-Area Groundwater on Savannah River Site

IV. Remedial Actions

Remedy Selection

The selected remedy for this unit as identified in the Interim Record of Decision (IROD) is No Further Action under CERCLA beyond that required by the SRS RCRA Permit. The initial remedy described in the 1992 RCRA permit provides for recovery of contaminated groundwater via extraction wells and treatment of hazardous constituents and radionuclides (except tritium and nitrates).

Remedy Implementation

The water treatment system operated for six years. The treated water was injected into the shallow aquifer at the upgradient extent of the groundwater plume. During treatment, additional investigation and pilot studies established that the groundwater impacted by the seepage basins was following relatively narrow preferential pathways to the wetlands adjacent to Fourmile Branch. The acidic nature of the contaminated groundwater plume led to increased metals mobility in the groundwater.

Although the extraction/treatment/reinjection systems functioned as designed, the reinjection of treated water contributed to lower plume capture efficiency than expected. A Phase 2 Corrective Action Plan (CAP) was approved that included the replacement of the extraction/injection process with new technologies that are designed to reduce the flux of contaminants to Fourmile Branch. An underground barrier wall was constructed in 2004 across the preferential groundwater flowpath leading to the wetlands adjacent to Fourmile Branch. The barrier wall has two openings (gates) in which base injection wells have been installed to inject alkaline solution into the groundwater to treat the groundwater (by raising the groundwater pH) and reduce the mobility of metals.

V. Progress Since Last Review

This is the third five-year review for this OU. The following actions have been completed:

- In February 2003 a pilot study demonstrated that the pH of the groundwater could be artificially raised by injections of alkaline solution. This provided a scientific basis supporting a revision to the CAP to include new remediation technologies.
- In March 2003 SRS submitted a revised CAP to SCDHEC.
- In October 2003, SCDHEC provided conditional approval to suspend the F-Area water treatment unit (WTU) and to begin preparations to install replacement remediation technologies consisting of engineered subsurface barriers and base solution injections to address both creek/seepage and groundwater contamination. On October 8, 2003, the F-Area WTU was placed in safe standby condition.
- In September 2004, the F-Area barrier wall was completed. Three walls totaling 1,300 ft in length were constructed using a deep soil mixer to inject low permeability amendments into the soil to a depth of 120 ft and a thickness of 2 ft. The walls created two funnels directing groundwater through two gates.
- In 2004, a base (alkaline) injection system was installed and successfully operated under a temporary authorization to demonstrate the feasibility of artificially raising the pH of the groundwater in order to reduce the mobility of metals in the groundwater.
- In June 2005, a base injection system was placed in service to inject an alkaline solution (approximate pH of 10) into the aquifer to immobilize metals. Injection wells are located in the two gates of the F-Area barrier wall.

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
- Ensured that all actions required under the RCRA Permit were implemented

VII. Technical Assessment

The groundwater extraction/treat/reinjection remedial system functioned as designed and met Phase 1 objectives. The installation of the barrier wall with base injection in the gates is installed and operating as designed. The concept is supported by pilot studies and hydrogeological studies and is expected to meet Phase 2a objectives. Groundwater monitoring is continuing in accordance with the CAP.

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. Project Costs

Cost associated with the selected remedy for F-Area Groundwater includes operation and maintenance costs of the RCRA Pump-Treat-Inject remedy and institutional controls. RCRA documentation does not require estimated project costs to be prepared. Therefore, none are included in this remedy review. It should be noted that the Pump-Treat-Inject system has stopped operating in 2003 and was replaced with in-situ barrier and base injection remedy.

XI. Protectiveness Statement(s)

The F-Area barrier walls, in conjunction with the base injection process supported by ongoing monitoring of groundwater quality, are expected to be protective of human health and the environment.

XII. Next Review

The next five-year review is scheduled for February 12, 2014.

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ATTACHMENT 1

List of Documents Reviewed

GeoTrans, 1990. Preliminary Evaluation of Remedial Alternatives for the F-Area Seepage Basins, LB-037, November 8, 1990

Closure Plan for the F-Area Hazardous Waste management Facility, Revision 8, Volume IV, Book 1, LB-130, November 18, 1991

WSRC-RP-94-1162, *Interim Action Record of Decision Remedial Alternative Selection for F-Area Groundwater Operable Unit (U)*, Revision 1, Westinghouse Savannah River Company, Aiken, SC

WSRC-RP-2001-4014, *F-Area HWMF Corrective Action Phase 1 Evaluation*, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

WSRC-RP-2003-4111 & -4112, *F and H-Area Hazardous Waste Management Facilities Annual Corrective Action Reports (U)*, (1st and 2nd Quarters 2003), Volume II, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

WSRC-RP-2002-4213 & -4214, *F and H-Area Hazardous Waste Management Facilities Annual Corrective Action Reports (U)*, (3rd and 4th Quarters 2003), Volumes I & II, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

WSRC-RP-2002-4012, *F-Area Hazardous Waste Management Facilities Annual Corrective Action Reports (U)*, (3rd and 4th Quarters 2001), Volume I, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

WSRC-RP-2003-4177, *F and H Area Seepage Basins Groundwater Barrier Wall Construction Details (U)*, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

WSRC-RP-2004-4099, *Semi-Annual Corrective Action Report for the F-Area Hazardous Waste Management Facility, the H-Area Hazardous Waste Management Facility, and the Mixed Waste Management Facility (U)*, Volumes I & II, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

ATTACHMENT 1 *(Continued)*

List of Documents Reviewed *(Continued)*

WSRC-RP-2005-4069, *Semi-Annual Corrective Action Report for the F-Area Hazardous Waste Management Facility, the H-Area Hazardous Waste Management Facility, and the Mixed Waste Management Facility (U)*, Volume I, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

WSRC-RP-2005-4011, Annual Corrective Action Report for the F-Area Hazardous Waste Management Facility, the H-Area Hazardous Waste Management Facility, and the Mixed Waste Management Facility (U), Volume I, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

WSRC-RP-2006-4011, *Annual Corrective Action Report for the F-Area Hazardous Waste Management Facility, the H-Area Hazardous Waste Management Facility, and the Mixed Waste Management Facility (U)*, Volume I, Washington Savannah River Company, Savannah River Site, Aiken, SC

WSRC-RP-2007-4002, Annual Corrective Action Report for the F-Area Hazardous Waste Management Facility, the H-Area Hazardous Waste Management Facility, and the Mixed Waste Management Facility (U) Volume I, Washington Savannah River Company, Savannah River Site, Aiken, SC

ATTACHMENT 2

Five-Year Review Site Inspection Checklist

| I. SITE INFORMATION | | | | | | | | | | | | | | | |
|---|--|--|--|---------------------------------------|--|---|--|--|--|--|--|---|--|--|--|
| Site Name: | F-Area Groundwater | Date of Inspection: | 10/25/2007 | | | | | | | | | | | | |
| Location and Region: | SRS, USEPA Region IV | EPA ID: | SC1890008989 | | | | | | | | | | | | |
| Agency, office, or company leading the five-year review: | United States Department of Energy | CERCLIS No.: | CNA | | | | | | | | | | | | |
| | | Weather/Temperature: | | | | | | | | | | | | | |
| Remedy Includes: (Check all that apply) <table border="0"><tr><td><input type="checkbox"/> Cover System</td><td><input type="checkbox"/> Monitored Natural Attenuation</td></tr><tr><td><input checked="" type="checkbox"/> Access controls</td><td><input type="checkbox"/> Groundwater Containment</td></tr><tr><td><input checked="" type="checkbox"/> Institutional Controls</td><td><input checked="" type="checkbox"/> Vertical Barrier Walls</td></tr><tr><td><input checked="" type="checkbox"/> Groundwater pump and treatment</td><td></td></tr><tr><td><input type="checkbox"/> Surface water collection and treatment</td><td></td></tr><tr><td><input checked="" type="checkbox"/> Other: <u>Base injection</u></td><td></td></tr></table> | | | | <input type="checkbox"/> Cover System | <input type="checkbox"/> Monitored Natural Attenuation | <input checked="" type="checkbox"/> Access controls | <input type="checkbox"/> Groundwater Containment | <input checked="" type="checkbox"/> Institutional Controls | <input checked="" type="checkbox"/> Vertical Barrier Walls | <input checked="" type="checkbox"/> Groundwater pump and treatment | | <input type="checkbox"/> Surface water collection and treatment | | <input checked="" type="checkbox"/> Other: <u>Base injection</u> | |
| <input type="checkbox"/> Cover System | <input type="checkbox"/> Monitored Natural Attenuation | | | | | | | | | | | | | | |
| <input checked="" type="checkbox"/> Access controls | <input type="checkbox"/> Groundwater Containment | | | | | | | | | | | | | | |
| <input checked="" type="checkbox"/> Institutional Controls | <input checked="" type="checkbox"/> Vertical Barrier Walls | | | | | | | | | | | | | | |
| <input checked="" type="checkbox"/> Groundwater pump and treatment | | | | | | | | | | | | | | | |
| <input type="checkbox"/> Surface water collection and treatment | | | | | | | | | | | | | | | |
| <input checked="" type="checkbox"/> Other: <u>Base injection</u> | | | | | | | | | | | | | | | |
| Attachments: <input type="checkbox"/> Inspection team roster attached <input type="checkbox"/> Site map attached | | | | | | | | | | | | | | | |
| II. INTERVIEWS (Check all that apply) | | | | | | | | | | | | | | | |
| 1. O & M Site Manager | <u>Wayne Gleaton</u> (Name) | <u>Post Closure Manager</u> (Title) | <u>10-23-2007</u> (Date) | | | | | | | | | | | | |
| Interviewed: | <input type="checkbox"/> at site | <input type="checkbox"/> at office | <input checked="" type="checkbox"/> by phone Phone No. <u>557-8838</u> | | | | | | | | | | | | |
| Problems, suggestions: | <input type="checkbox"/> report attached _____ | | | | | | | | | | | | | | |
| 2. O & M Staff | <u>Richard Feagin</u> (Name) | <u>Post-Closure Waste Site Inspector/Maintenance Coord.</u> (Title) | <u>8-23-2007</u> (Date) | | | | | | | | | | | | |
| Interviewed: | <input type="checkbox"/> at site | <input type="checkbox"/> at office | <input checked="" type="checkbox"/> by phone Phone No. <u>952-4416</u> | | | | | | | | | | | | |
| Problems, suggestions: | <input type="checkbox"/> report attached _____ | | | | | | | | | | | | | | |

Five-Year Review Site Inspection Checklist (Continued)

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

- | | | | |
|---|---|--|---|
| <input type="checkbox"/> O & M Manual | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A |
| <input checked="" type="checkbox"/> As-built drawings | <input checked="" type="checkbox"/> Readily available | <input checked="" type="checkbox"/> Up to date | <input type="checkbox"/> N/A |
| <input type="checkbox"/> Maintenance Logs | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A |

Remarks: _____

Five-Year Review Site Inspection Checklist (Continued)

| | | | | | | |
|--|--|---|--|---|--|---|
| 2. Site-Specific Health and Safety Plan | | | | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A |
| <input type="checkbox"/> Contingency plan/emergency response plan | | | | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A |
| Remarks: <u>Routine O&M activities do not require a SSHASP under 29 CFR 1910.120, HAZWOPER. A</u> <u>SSHASP is prepared if needed</u> | | | | | | |
| 3. O & M and OSHA Training Records | | | | <input checked="" type="checkbox"/> Readily available | <input checked="" type="checkbox"/> Up to date | <input type="checkbox"/> N/A |
| Remarks: _____ | | | | | | |
| 4. Permits and Service Agreements | | | | | | |
| <input type="checkbox"/> Air discharge permit | | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A | | |
| <input type="checkbox"/> Effluent discharge | | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A | | |
| <input type="checkbox"/> Waste Disposal, POTW | | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A | | |
| <input checked="" type="checkbox"/> Other permits | | <input checked="" type="checkbox"/> Readily available | <input checked="" type="checkbox"/> Up to date | <input type="checkbox"/> N/A | | |
| Remarks: <u>RCRA Part B Permit, Underground Injection Control Permits</u> | | | | | | |
| 5. Gas Generation Records | | | | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A |
| Remarks: _____ | | | | | | |
| 6. Settlement Monument Records | | | | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A |
| Remarks: _____ | | | | | | |
| 7. Groundwater Monitoring Records | | | | <input checked="" type="checkbox"/> Readily available | <input checked="" type="checkbox"/> Up to date | <input type="checkbox"/> N/A |
| Remarks: _____ | | | | | | |
| 8. Leachate Extraction Records | | | | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A |
| Remarks: _____ | | | | | | |
| 9. Discharge Compliance Records | | | | | | |
| <input type="checkbox"/> Air | | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A | | |
| <input type="checkbox"/> Water (effluent) | | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input type="checkbox"/> N/A | | |
| Remarks: _____ | | | | | | |
| 10. Daily Access/Security Logs | | | | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A |
| Remarks: _____ | | | | | | |

Five-Year Review Site Inspection Checklist (Continued)

| IV. O & M Costs | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--|----------|------------|---|------------|----------|--|---|--------|--------|------------|--|------------|----------|--|---|--------|--------|------------|--|------------|----------|--|---|--------|--------|------------|--|------------|----------|--|---|--------|--------|------------|--|------------|----------|--|---|--------|--------|------------|--|
| 1. O & M Organization <div style="display: flex; justify-content: space-between; margin-top: 10px;"><div><input type="checkbox"/> State in-house</div><div><input type="checkbox"/> Contractor for State</div></div> <div style="display: flex; justify-content: space-between; margin-top: 10px;"><div><input type="checkbox"/> PRP in-house</div><div><input type="checkbox"/> Contractor for PRP</div></div> <div style="margin-top: 10px;"><input checked="" type="checkbox"/> Other <u>SRS</u></div> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2. O & M Cost Records <div style="margin-top: 10px;"><input type="checkbox"/> Readily available <input type="checkbox"/> Up to date <input type="checkbox"/> Funding mechanism/agreement in place</div> <div style="margin-top: 10px;"><input checked="" type="checkbox"/> Other: <u>Project cost data is summarized in Section X of attached review: WSRC-RP-2007-4063.</u></div> <div style="margin-top: 20px; text-align: center;">Total annual cost by year for review period if available</div> <table style="width: 100%; border-collapse: collapse;"><tr><td style="width: 20%;">From _____</td><td style="width: 20%;">To _____</td><td style="width: 40%;"></td><td style="width: 20%; text-align: right;"><input type="checkbox"/> Breakdown attached</td></tr><tr><td style="text-align: center;">(Date)</td><td style="text-align: center;">(Date)</td><td style="text-align: center;">Total cost</td><td></td></tr><tr><td>From _____</td><td>To _____</td><td></td><td style="text-align: right;"><input type="checkbox"/> Breakdown attached</td></tr><tr><td style="text-align: center;">(Date)</td><td style="text-align: center;">(Date)</td><td style="text-align: center;">Total cost</td><td></td></tr><tr><td>From _____</td><td>To _____</td><td></td><td style="text-align: right;"><input type="checkbox"/> Breakdown attached</td></tr><tr><td style="text-align: center;">(Date)</td><td style="text-align: center;">(Date)</td><td style="text-align: center;">Total cost</td><td></td></tr><tr><td>From _____</td><td>To _____</td><td></td><td style="text-align: right;"><input type="checkbox"/> Breakdown attached</td></tr><tr><td style="text-align: center;">(Date)</td><td style="text-align: center;">(Date)</td><td style="text-align: center;">Total cost</td><td></td></tr><tr><td>From _____</td><td>To _____</td><td></td><td style="text-align: right;"><input type="checkbox"/> Breakdown attached</td></tr><tr><td style="text-align: center;">(Date)</td><td style="text-align: center;">(Date)</td><td style="text-align: center;">Total cost</td><td></td></tr></table> | | | | From _____ | To _____ | | <input type="checkbox"/> Breakdown attached | (Date) | (Date) | Total cost | | From _____ | To _____ | | <input type="checkbox"/> Breakdown attached | (Date) | (Date) | Total cost | | From _____ | To _____ | | <input type="checkbox"/> Breakdown attached | (Date) | (Date) | Total cost | | From _____ | To _____ | | <input type="checkbox"/> Breakdown attached | (Date) | (Date) | Total cost | | From _____ | To _____ | | <input type="checkbox"/> Breakdown attached | (Date) | (Date) | Total cost | |
| From _____ | To _____ | | <input type="checkbox"/> Breakdown attached | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| (Date) | (Date) | Total cost | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| From _____ | To _____ | | <input type="checkbox"/> Breakdown attached | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| (Date) | (Date) | Total cost | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| From _____ | To _____ | | <input type="checkbox"/> Breakdown attached | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| (Date) | (Date) | Total cost | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| From _____ | To _____ | | <input type="checkbox"/> Breakdown attached | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| (Date) | (Date) | Total cost | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| From _____ | To _____ | | <input type="checkbox"/> Breakdown attached | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| (Date) | (Date) | Total cost | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3. Unanticipated or Unusually High O & M Costs During Review Period Describe costs and reasons: _____ _____ _____ _____ _____ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| V. ACCESS AND INSTITUTIONAL CONTROLS <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| A. Fencing | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1. Fencing Damaged <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Gates secured <input checked="" type="checkbox"/> N/A Remarks _____ _____ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

Five-Year Review Site Inspection Checklist (Continued)

B. Other Access Restrictions

1. **Signs and Other Security Measures** ☐ Location shown on site map ☐ N/A

Remarks: Signs are in good condition.

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: Monthly

Responsible party/agent: DOE

| | | | |
|----------|--|---------|-------------|
| Contact: | M. Philip Prater, Waste Area Group Manager | 09/3/07 | 952-9333 |
| | (Name) (Title) | (Date) | (Phone No.) |

Reporting 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 _____

Five-Year Review Site Inspection Checklist (Continued)

| | |
|--|--|
| 3. Land Use Changes Offsite <input checked="" type="checkbox"/> N/A | |
| Remarks _____ | |
| _____ | |
| VI. GENERAL SITE CONDITIONS | |
| A. Roads <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A | |
| 1. Roads Damaged <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Roads adequate <input type="checkbox"/> N/A | |
| Remarks _____ | |
| _____ | |
| B. Other Site Conditions | |
| Remarks _____ | |
| _____ | |
| _____ | |
| VII. COVERS SYSTEMS <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A | |
| A. Landfill Surface | |
| 1. Settlement (Low spots) <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Settlement not evident | |
| Areal extent _____ Depth _____ | |
| Remarks: _____ | |
| _____ | |
| 2. Cracks <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Cracking not evident | |
| Lengths _____ Widths _____ Depths _____ | |
| Remarks _____ | |
| _____ | |
| 3. Erosion <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Erosion not evident | |
| Areal extent _____ Depth _____ | |
| Remarks _____ | |
| _____ | |
| 4. Holes <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Holes not evident | |
| Areal extent _____ Depth _____ | |
| Remarks _____ | |
| _____ | |
| 5. Vegetative Cover <input type="checkbox"/> Grass <input type="checkbox"/> Cover properly established <input type="checkbox"/> No signs of stress | |
| <input type="checkbox"/> Trees/shrubs (indicate size and location on a diagram) | |
| Remarks _____ | |
| _____ | |

Five-Year Review Site Inspection Checklist (Continued)

| | | |
|--|---|--|
| 6. Alternative Cover (armored rock, concrete, etc.) | | <input type="checkbox"/> N/A |
| Remarks: _____ _____ | | |
| 7. Bulges | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> Bulges not evident |
| Areal extent _____ | Height _____ | |
| Remarks _____ _____ | | |
| 8. Wet Areas/Water Damage | | <input type="checkbox"/> Wet areas/water damage not evident |
| <input type="checkbox"/> Wet Areas | <input type="checkbox"/> Location shown on site map | Areal extent _____ |
| <input type="checkbox"/> Ponding | <input type="checkbox"/> Location shown on site map | Areal extent _____ |
| <input type="checkbox"/> Seeps | <input type="checkbox"/> Location shown on site map | Areal extent _____ |
| <input type="checkbox"/> Soft subgrade | <input type="checkbox"/> Location shown on site map | Areal extent _____ |
| Remarks _____ _____ | | |
| 9. Slope Instability | <input type="checkbox"/> Slides | <input type="checkbox"/> Location shown on site map |
| | | <input type="checkbox"/> No evidence of slope instability |
| Areal extent _____ | | |
| Remarks _____ _____ | | |
| B. Benches | | <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> 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 | | <input type="checkbox"/> Location shown on site map <input type="checkbox"/> N/A or okay |
| Remarks _____ _____ | | |
| 2. Bench Breached | | <input type="checkbox"/> Location shown on site map <input type="checkbox"/> N/A or okay |
| Remarks _____ _____ | | |
| 3. Bench Overtopped | | <input type="checkbox"/> Location shown on site map <input type="checkbox"/> N/A or okay |
| Remarks _____ _____ | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | |
|---|--|--|
| C. Letdown Channels <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> 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 | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> No evidence of settlement |
| Areal extent _____ Depth _____ | | |
| Remarks _____ | | |
| 2. Material Degradation | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> No evidence of degradation |
| Material type _____ Areal extent _____ | | |
| Remarks _____ | | |
| 3. Erosion | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> No evidence of erosion |
| Areal extent _____ Depth _____ | | |
| Remarks _____ | | |
| 4. Undercutting | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> No evidence of undercutting |
| Areal extent _____ Depth _____ | | |
| Remarks _____ | | |
| 5. Obstructions | Type _____ | <input type="checkbox"/> No obstructions |
| <input type="checkbox"/> Location shown on site map | Areal extent _____ | Size _____ |
| Remarks _____ | | |
| 6. Excessive Vegetative Growth | Type _____ | |
| <input type="checkbox"/> No evidence of excessive growth | <input type="checkbox"/> Vegetation in channels does not obstruct flow | |
| <input type="checkbox"/> Location shown on site map | Areal extent _____ | |
| Remarks _____ | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | | |
|--|--|---|---|
| D. Cover Penetrations <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A | | | |
| 1. Gas Vents <input type="checkbox"/> Active <input type="checkbox"/> Passive | | | |
| <input type="checkbox"/> Properly secured/locked | <input type="checkbox"/> Functioning | <input type="checkbox"/> Routinely sampled | <input type="checkbox"/> Good condition |
| <input type="checkbox"/> Evidence of leakage at penetration | <input type="checkbox"/> Needs Maintenance | <input type="checkbox"/> N/A | |
| Remarks _____ | | | |
| _____ | | | |
| 2. Gas Monitoring Probes | | | |
| <input type="checkbox"/> Properly secured/locked | <input type="checkbox"/> Functioning | <input type="checkbox"/> Routinely sampled | <input type="checkbox"/> Good condition |
| <input type="checkbox"/> Evidence of leakage at penetration | <input type="checkbox"/> Needs Maintenance | <input type="checkbox"/> N/A | |
| Remarks _____ | | | |
| _____ | | | |
| 3. Monitoring Wells | | | |
| <input type="checkbox"/> Properly secured/locked | <input type="checkbox"/> Functioning | <input type="checkbox"/> Routinely sampled | <input type="checkbox"/> Good condition |
| <input type="checkbox"/> Evidence of leakage at penetration | <input type="checkbox"/> Needs Maintenance | <input type="checkbox"/> N/A | |
| Remarks _____ | | | |
| _____ | | | |
| 4. Leachate Extraction Wells | | | |
| <input type="checkbox"/> Properly secured/locked | <input type="checkbox"/> Functioning | <input type="checkbox"/> Routinely sampled | <input type="checkbox"/> Good condition |
| <input type="checkbox"/> Evidence of leakage at penetration | <input type="checkbox"/> Needs Maintenance | <input type="checkbox"/> N/A | |
| Remarks _____ | | | |
| _____ | | | |
| 5. Settlement Monuments <input type="checkbox"/> Located <input type="checkbox"/> Routinely surveyed <input type="checkbox"/> N/A | | | |
| Remarks _____ | | | |
| _____ | | | |
| E. Gas Collection and Treatment <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A | | | |
| 1. Gas Treatment Facilities | | | |
| <input type="checkbox"/> Flaring | <input type="checkbox"/> Thermal destruction | <input type="checkbox"/> Collection for reuse | |
| <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance | | |
| Remarks _____ | | | |
| _____ | | | |
| 2. Gas Collection Wells, Manifolds and Piping | | | |
| <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance | | |
| Remarks _____ | | | |
| _____ | | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | | |
|---|--|--|------------------------------|
| 3. Gas Monitoring Facilities (e.g., gas monitoring of adjacent homes or buildings) | | | |
| <input type="checkbox"/> Good condition | | <input type="checkbox"/> Needs Maintenance | <input type="checkbox"/> N/A |
| Remarks _____ | | | |
| F. Cover Drainage Layer <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A | | | |
| 1. Outlet Pipes Inspected <input type="checkbox"/> Functioning <input type="checkbox"/> N/A | | | |
| Remarks _____ | | | |
| 2. Outlet Rock Inspected <input type="checkbox"/> Functioning <input type="checkbox"/> N/A | | | |
| Remarks _____ | | | |
| G. Detention/sedimentation Ponds <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A | | | |
| 1. Siltation Areal extent _____ Depth _____ <input type="checkbox"/> N/A | | | |
| <input type="checkbox"/> Siltation not evident | | | |
| Remarks _____ | | | |
| 2. Erosion Areal extent _____ Depth _____ <input type="checkbox"/> N/A | | | |
| <input type="checkbox"/> Erosion not evident | | | |
| Remarks _____ | | | |
| 3. Outlet Works <input type="checkbox"/> Functioning <input type="checkbox"/> N/A | | | |
| Remarks _____ | | | |
| 4. Dam <input type="checkbox"/> Functioning <input type="checkbox"/> N/A | | | |
| Remarks _____ | | | |
| H. Retaining Walls <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A | | | |
| 1. Deformations <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Deformation not evident | | | |
| Horizontal displacement _____ | | Vertical displacement _____ | |
| Rotational displacement _____ | | | |
| Remarks _____ | | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | |
|--|---|--|
| 2. Degradation | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> Deformation not evident |
| Remarks _____ | | |
| I. Perimeter Ditches/Off-Site Discharge | | |
| | <input type="checkbox"/> Applicable | <input checked="" type="checkbox"/> N/A |
| 1. Siltation | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> Siltation not evident |
| Areal extent _____ Depth _____ | | |
| Remarks _____ | | |
| 2. Vegetative Growth | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> Siltation not evident |
| <input type="checkbox"/> Vegetation does not impede flow | | |
| Areal extent _____ Type _____ | | |
| Remarks _____ | | |
| 3. Erosion | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> Erosion not evident |
| Areal extent _____ Depth _____ | | |
| Remarks _____ | | |
| 4. Discharge Structure | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> N/A |
| Remarks _____ | | |
| VIII. VERTICAL BARRIER WALLS | | |
| | <input checked="" type="checkbox"/> Applicable | <input type="checkbox"/> N/A |
| 1. Settlement | <input type="checkbox"/> Location shown on site map | <input checked="" type="checkbox"/> Settlement not evident |
| Areal extent _____ Depth _____ | | |
| Remarks _____ | | |
| 2. Performance Monitoring | Type of Monitoring _____ | <input type="checkbox"/> Performance not monitored |
| Frequency _____ <input type="checkbox"/> Evidence of breaching Head differential _____ | | |
| Remarks: <u>Since installation of the walls, potentiometric heads have been rising on the upstream side and declining on the downstream side and have not reached equilibrium yet.</u> | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | | |
|--|--|--|---|
| IX. GROUNDWATER/SURFACE WATER REMEDIES | | <input checked="" type="checkbox"/> Applicable | <input type="checkbox"/> N/A |
| A. Groundwater Extraction Wells, Pumps, and Pipelines | | <input checked="" type="checkbox"/> Applicable | <input type="checkbox"/> N/A |
| 1. Pumps, Wellhead Plumbing, and Electrical | | | |
| <input checked="" type="checkbox"/> Good condition <input type="checkbox"/> All required wells located <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A | | | |
| Remarks: <u>The groundwater extraction system has been removed from service.</u> | | | |
| <hr/> | | | |
| 2. Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances | | | |
| <input checked="" type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance | | | |
| Remarks _____ | | | |
| <hr/> | | | |
| 3. Spare Parts and Equipment | | | |
| <input checked="" type="checkbox"/> Readily available <input checked="" type="checkbox"/> Good condition <input type="checkbox"/> Requires upgrade <input type="checkbox"/> Needs to be provided | | | |
| Remarks _____ | | | |
| <hr/> | | | |
| B. Surface Water Collection Structures, Pumps, and Pipelines | | <input type="checkbox"/> Applicable | <input checked="" type="checkbox"/> N/A |
| 1. Collection Structures, Pumps, and Electrical | | | |
| <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance | | | |
| Remarks _____ | | | |
| <hr/> | | | |
| 2. Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances | | | |
| <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance | | | |
| Remarks _____ | | | |
| <hr/> | | | |
| 3. Spare Parts and Equipment | | | |
| <input type="checkbox"/> Readily available <input type="checkbox"/> Good condition <input type="checkbox"/> Requires upgrade <input type="checkbox"/> Needs to be provided | | | |
| Remarks _____ | | | |
| <hr/> | | | |

Five-Year Review Site Inspection Checklist *(Continued)*

| | | |
|--|---|--|
| C. Treatment System | <input checked="" type="checkbox"/> Applicable | <input type="checkbox"/> N/A |
| 1. Treatment Train (Check components that apply) | | |
| <input type="checkbox"/> Metals removal | <input type="checkbox"/> Oil/water separation | <input type="checkbox"/> Bioremediation |
| <input type="checkbox"/> Air stripping | <input type="checkbox"/> Carbon adsorbers | |
| <input checked="" type="checkbox"/> Filters _____ | | |
| <input type="checkbox"/> Additive (e.g., chelation agent, flocculent) _____ | | |
| <input type="checkbox"/> Others _____ | | |
| <input checked="" type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance | |
| <input type="checkbox"/> Sampling ports properly marked and functional | | |
| <input type="checkbox"/> Sampling/maintenance log displayed and up to date | | |
| <input checked="" type="checkbox"/> Equipment properly identified | | |
| <input type="checkbox"/> Quantity of groundwater treated annually _____ | | |
| <input type="checkbox"/> Quantity of surface water treated annually _____ | | |
| Remarks: <u>The groundwater extraction system has been removed from service.</u> | | |
| | | |
| 2. Electrical Enclosures and Panels (properly rated and functional) | | |
| <input type="checkbox"/> N/A | <input checked="" type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance |
| Remarks _____ | | |
| | | |
| 3. Tanks, Vaults, Storage Vessels | | |
| <input type="checkbox"/> N/A | <input checked="" type="checkbox"/> Good condition | <input type="checkbox"/> Proper secondary containment <input type="checkbox"/> Needs Maintenance |
| Remarks _____ | | |
| | | |
| 4. Discharge Structure and Appurtenances | | |
| <input checked="" type="checkbox"/> N/A | <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance |
| Remarks _____ | | |
| | | |
| 5. Treatment Building(s) | | |
| <input type="checkbox"/> N/A | <input checked="" type="checkbox"/> Good condition (esp. roof and doorways) | <input type="checkbox"/> Needs repair |
| <input type="checkbox"/> Chemicals and equipment properly stored | | |
| Remarks _____ | | |
| | | |

Five-Year Review Site Inspection Checklist (Continued)

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.

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

1. Pumps, Wellhead Plumbing, and Electrical

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

Remarks: The baseline injection system is operated as needed to maintain desired groundwater parameters.

3. Injection 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 _____

Five-Year Review Site Inspection Checklist (Continued)

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 groundwater extraction/treat/reinjection remedial system functioned as designed and met Phase 1 objectives. The installation of the barrier wall with base injection in the gates is installed and operating as designed. The concept is supported by pilot studies and hydrogeological studies and is expected to meet Phase 2 objectives.

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.

Operating and Maintenance programs are well established and functioning to ensure that remedial systems remain in effective service.

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.

N/A

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F-AREA HAZARDOUS WASTE MANAGEMENT FACILITY (904-41G, -42G, -43G) OPERABLE UNIT

I. Introduction

The review for this unit is conducted under the Savannah River Site (SRS) Resource Conservation and Recovery Act (RCRA) program. The Comprehensive Environmental Resource, Compensation, Liability Act (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 third 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 2007 through September 2007, and this report documents the results of that review.

II. OU Chronology

Table 1 lists the chronology of site events for the F-Area HWMF.

Table 1. Chronology of OU Events

| Event | Date |
|---|-----------------------------------|
| RCRA Closure Plan Approved | 1989 |
| Corrective Action Start | 1989 |
| RCRA Closure Certified | 1991 |
| Final Record of Decision (ROD) Issuance | September 23, 1993 |
| Previous Five-Year Reviews | June 30, 1997 & February 12, 2004 |

III. Background

Physical Characteristics

The F-Area HWMF is located in the central portion of SRS, approximately 5 miles from the nearest site boundary. Figure 1 shows the location of the OU at SRS. Figure 2 shows the site layout for F-Area HWMF. The original F-Area HWMF consisted of Basins 906-41G, 906-42G and 904-43G and associated F-Area Inactive Process Sewer Lines (FIPSLs).

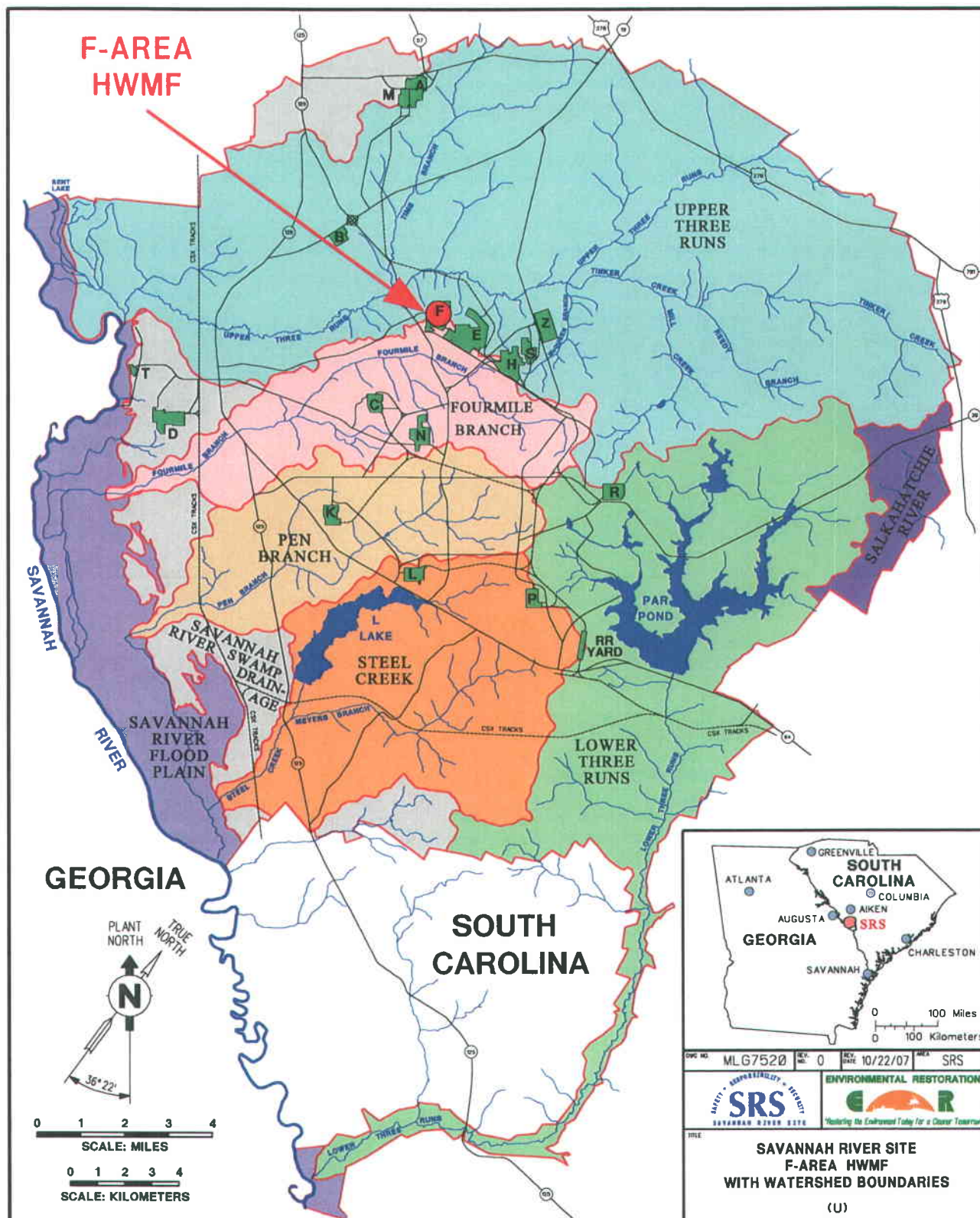


Figure 1. Location of the F-Area Hazardous Waste Management Facility at SRS

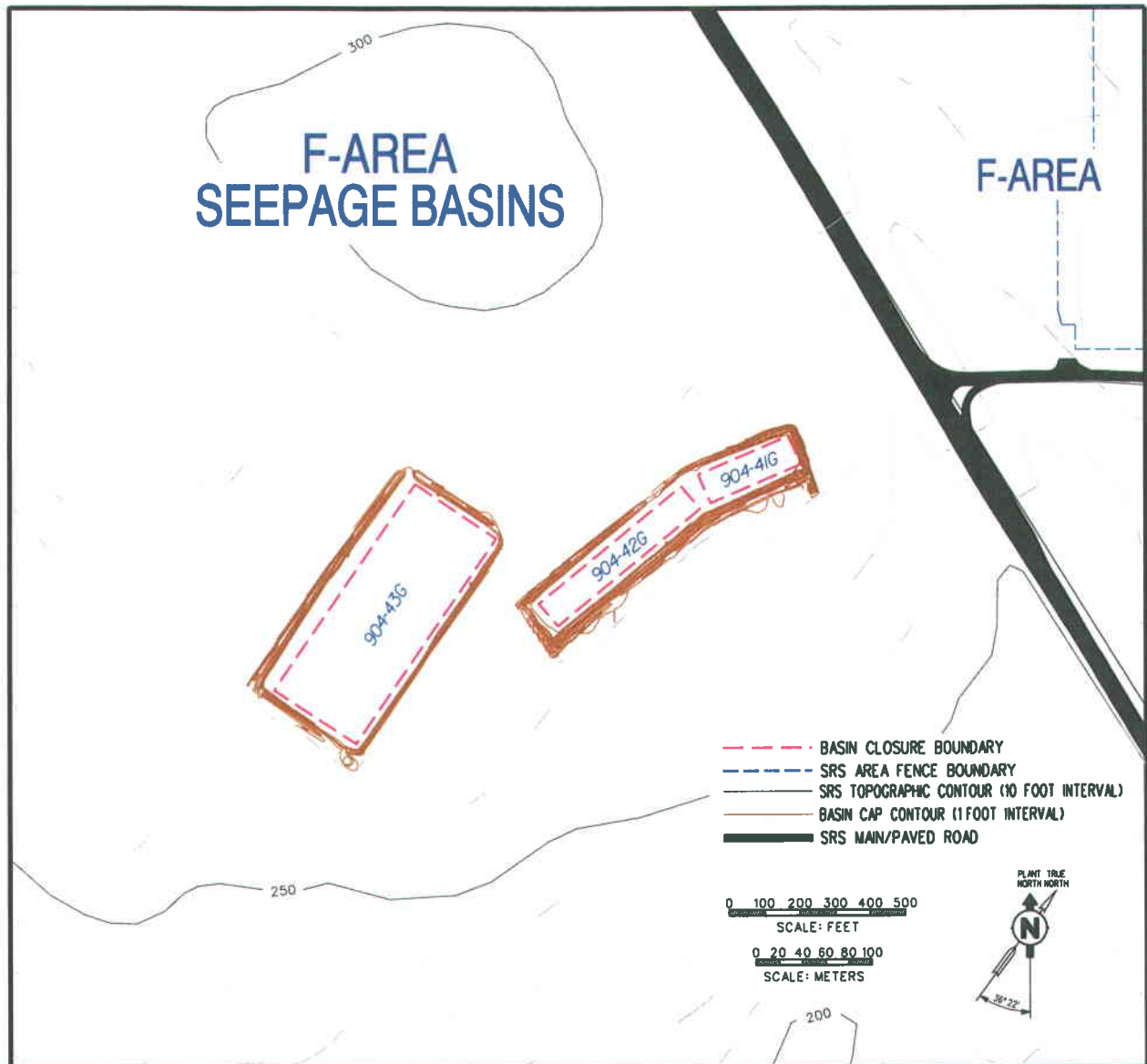


Figure 2. Site Layout for F-Area Hazardous Waste Management Facility

Land and Resource Use

F-Area HWMF OU is located in an industrial area that is proposed for continued industrial use as supported by the proposed land use map for SRS.

History of Contamination

The facility 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.

Initial Response

These basins were closed by dewatering, physically and chemically stabilizing the remaining sludges, and placing a protective multi-layer cover system over them to reduce rainwater contact with basin bottoms.

Basis for Taking Action

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. Remedial Actions

Remedy Selection

The selected remedy identified in the Record of Decision (ROD) is closure of the three basins (904-41G, -42G, -43G) by dewatering, physically and chemically stabilizing the remaining sludge, and placing a protective multi-layer cover system over them. A RCRA Part B permit application for post-closure care was submitted in December 1990. A modification to the RCRA permit application was submitted in July 2005 to add closure requirements for the F-Area Inactive Process Sewer Line (FIPSL).

Remedy Implementation

The selected remedy for FIPSL is to grout manholes and treblers in place and to install a geosynthetic cover over the length of the vitrified clay pipe (except for those areas covered by asphalt or paving) and around the perimeters of the manholes and treblers associated with the high density polyethylene line. This action will be completed as a part of the closure of the F-Area Tank Farm and Separations facility to avoid impacting underground and overhead interferences necessary to ensure safe operation of the F-Area facilities.

V. Progress Since Last Review

This is the third five-year review for this OU. The following actions have been completed since the review in June of 1997:

- A modification to the RCRA permit application was submitted in July 2005 to add closure requirements for the FIPSL.
- Annual inspections and maintenance to the soil covers were performed as required by the RCRA Closure Plan
- Groundwater was monitored 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
- Ensured that all actions required under the RCRA Permit were implemented

VII. Technical Assessment

The closure of the three basins (904-41G, -42G, -43G) by dewatering, physically and chemically stabilizing the remaining sludge, and placing a protective multi-layer cover system over them has met the remedial objectives of preventing physical exposure to contaminants and mitigating further migration of contaminants to the groundwater. The selected remedy for FIPSL of grouting manholes and treblers in place and installing a geosynthetic cover over the length of the vitrified clay pipe and around the perimeters of the manholes and treblers associated with the high density polyethylene line is expected to meet the remedial objectives when completed. Due to the declining concentrations of groundwater contaminants, the delay in completing the FIPSL remedial action is not expected to significantly impact the overall remedial process.

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. Project Costs

Costs associated with the selected remedy for FHWMF include operation and maintenance costs of the soil cover and institutional controls. RCRA documentation does not require estimated project costs to be prepared. Therefore, none are included in this remedy review

XI. Protectiveness Statement(s)

The remedies at the F-Area HWMF are protective of human health and the environment, and exposure pathways that could result in unacceptable risks are being controlled. All threats are being addressed by corrective action programs in the RCRA Part B Permit.

XII. Next Review

The next five-year review is scheduled for February 12, 2014.

ATTACHMENT 1

List of Documents Reviewed

WSRC-RP-92-1042, *Final Record of Decision Remedial Alternative Selection for F-Area Hazardous Waste Management Facility (U)*, Revision 1, 1993, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

WSRC-IM-91-53, Volume IV, Revision 21, 1992 RCRA Part B Permit Application for F-Area Hazardous Waste Management Facility

WSRC C-3, *Soil and Groundwater Closure Projects, Standard Operating Procedures*, "Post-Closure Inspection F-Area Hazardous Waste Management Facilities 904-41G, 904-42G, 904-43G," ER-SOP-008, Washington Savannah River Company, Savannah River Site, Aiken, SC

F-Area Seepage Basins 904-41G, 904-42G, 904-43G Subsidence Monitor Survey Logs

ATTACHMENT 2
Five-Year Review Site Inspection Checklist

| I. SITE INFORMATION | | | |
|--|--|--|---|
| Site Name: | F-Area HWMF (904-41G, -42G, -43G) | Date of Inspection: | 10/28/2007 |
| Location and Region: | SRS, USEPA Region IV | EPA ID: | SC1890008989 |
| Agency, office, or company leading the five- year review: | USDOE | CERCLIS OU No.: | 6 |
| | | Weather/Temperature: | |
| Remedy Includes: (Check all that apply) <div style="display: flex; flex-wrap: wrap;"><div style="width: 50%;"><input checked="" type="checkbox"/> Cover System <input checked="" type="checkbox"/> Access controls <input checked="" type="checkbox"/> Institutional Controls <input type="checkbox"/> Groundwater pump and treatment <input type="checkbox"/> Surface water collection and treatment <input checked="" type="checkbox"/> Other: <u>Excavation, disposal</u></div><div style="width: 50%;"><input type="checkbox"/> Monitored Natural Attenuation <input type="checkbox"/> Groundwater Containment <input type="checkbox"/> Vertical Barrier Walls</div></div> | | | |
| Attachments: <input type="checkbox"/> Inspection team roster attached <input type="checkbox"/> Site map attached | | | |
| II. INTERVIEWS (Check all that apply) | | | |
| 1. O & M Site Manager | <u>Wayne Gleaton</u> (Name) | <u>Post Closure Manager</u> (Title) | <u>10-23-2007</u> (Date) |
| Interviewed: | <input type="checkbox"/> at site | <input type="checkbox"/> at office | <input checked="" type="checkbox"/> by phone Phone No. <u>557-8838</u> |
| Problems, suggestions: | <input type="checkbox"/> report attached _____ | | |
| 2. O & M Staff | <u>Richard Feagin</u> (Name) | <u>Post-Closure Waste Site Inspector/Maintenance Coord.</u> (Title) | <u>8-23-2007</u> (Date) |
| Interviewed: | <input type="checkbox"/> at site | <input type="checkbox"/> at office | <input checked="" type="checkbox"/> by phone Phone No. <u>952-4416</u> |
| Problems, suggestions: | <input type="checkbox"/> report attached _____ | | |

Five-Year Review Site Inspection Checklist (Continued)

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

| | | | |
|---|--|-------------------------------------|------------------------------|
| <input type="checkbox"/> O & M Manual | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |
| x As-built drawings | x Readily available | x Up to date | <input type="checkbox"/> N/A |
| <input type="checkbox"/> Maintenance Logs | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |

Remarks: See Waste Unit Inspection and Maintenance, ER-SOP-019

Five-Year Review Site Inspection Checklist (Continued)

| | | | |
|---|--|-------------------------------------|-------|
| 2. Site-Specific Health and Safety Plan | | | |
| <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A | |
| <input type="checkbox"/> Contingency plan/emergency response plan <input type="checkbox"/> Readily available <input type="checkbox"/> Up to date x N/A | | | |
| Remarks: <u>Routine O&M activities do not require a SSHASP under 29 CFR 1910.120, HAZWOPER. A</u> <u>SSHASP is prepared in needed.</u> | | | |
| 3. O & M and OSHA Training Records | | | |
| x Readily available | x Up to date | <input type="checkbox"/> N/A | |
| Remarks: _____ | | | |
| 4. Permits and Service Agreements | | | |
| <input type="checkbox"/> Air discharge permit | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |
| <input type="checkbox"/> Effluent discharge | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |
| <input type="checkbox"/> Waste Disposal, POTW | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |
| <input type="checkbox"/> Other permits <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A | |
| Remarks: _____ | | | |
| 5. Gas Generation Records | | | |
| <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A | |
| Remarks: _____ | | | |
| 6. Settlement Monument Records | | | |
| x Readily available | x Up to date | <input type="checkbox"/> N/A | |
| Remarks: _____ | | | |
| 7. Groundwater Monitoring Records | | | |
| <input type="checkbox"/> Readily available | x Up to date | <input type="checkbox"/> N/A | |
| Remarks: _____ | | | |
| 8. Leachate Extraction Records | | | |
| <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A | |
| Remarks: _____ | | | |
| 9. Discharge Compliance Records | | | |
| <input type="checkbox"/> Air | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |
| <input type="checkbox"/> Water (effluent) | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |
| Remarks: _____ | | | |
| 10. Daily Access/Security Logs | | | |
| <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A | |
| Remarks: _____ | | | |

Five-Year Review Site Inspection Checklist (Continued)

IV. O & M Costs

1. O & M Organization

- ☐ State in-house ☐ Contractor for State
☐ PRP in-house ☐ Contractor for PRP
x Other SRS

2. O & M Cost Records

- ☐ Readily available ☐ Up to date ☐ Funding mechanism/agreement in place
x Other: Project cost data is summarized in Section X of attached review: WSRC-RP-2007-4063.

Total annual cost by year for review period if available

| | | |
|---------------------|------------|---|
| From _____ To _____ | _____ | <input type="checkbox"/> Breakdown attached |
| (Date) (Date) | Total cost | |
| From _____ To _____ | _____ | <input type="checkbox"/> Breakdown attached |
| (Date) (Date) | Total cost | |
| From _____ To _____ | _____ | <input type="checkbox"/> Breakdown attached |
| (Date) (Date) | Total cost | |
| From _____ To _____ | _____ | <input type="checkbox"/> Breakdown attached |
| (Date) (Date) | Total cost | |
| From _____ To _____ | _____ | <input type="checkbox"/> Breakdown attached |
| (Date) (Date) | Total cost | |

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

Describe costs and reasons:

V. ACCESS AND INSTITUTIONAL CONTROLS

x Applicable ☐ N/A

A. Fencing

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

Remarks: Fences are in good condition

Five-Year Review Site Inspection Checklist (Continued)

B. Other Access Restrictions

1. **Signs and Other Security Measures** ☐ Location shown on site map ☐ N/A

Remarks: Signs at this site are in good condition.

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: Semi-Annually

Responsible party/agent: WSRC

Contact: W.G. Erickson, Waste Area Group Manager 09/3/07 952-8408
(Name) (Title) (Date) (Phone No.)

Reporting 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: _____

Five-Year Review Site Inspection Checklist (Continued)

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. COVERS SYSTEMS ☒ 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: Grass is established but dry due to lack of rain. _____

Five-Year Review Site Inspection Checklist (Continued)

| | | |
|--|---|--------------------|
| 6. Alternative Cover (armored rock, concrete, etc.) x N/A | | |
| Remarks: _____ | | |
| 7. Bulges <input type="checkbox"/> Location shown on site map x Bulges not evident | | |
| Areal extent _____ Height _____ | | |
| Remarks _____ | | |
| 8. Wet Areas/Water Damage x Wet areas/water damage not evident | | |
| <input type="checkbox"/> Wet Areas | <input type="checkbox"/> Location shown on site map | Areal extent _____ |
| <input type="checkbox"/> Ponding | <input type="checkbox"/> Location shown on site map | Areal extent _____ |
| <input type="checkbox"/> Seeps | <input type="checkbox"/> Location shown on site map | Areal extent _____ |
| <input type="checkbox"/> Soft subgrade | <input type="checkbox"/> Location shown on site map | Areal extent _____ |
| Remarks _____ | | |
| 9. Slope Instability <input type="checkbox"/> Slides <input type="checkbox"/> Location shown on site map x No evidence of slope instability | | |
| Areal extent _____ | | |
| Remarks _____ | | |
| B. Benches <input type="checkbox"/> Applicable x 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 <input type="checkbox"/> Location shown on site map <input type="checkbox"/> N/A or okay | | |
| Remarks _____ | | |
| 2. Bench Breached <input type="checkbox"/> Location shown on site map <input type="checkbox"/> N/A or okay | | |
| Remarks _____ | | |
| 3. Bench Overtopped <input type="checkbox"/> Location shown on site map <input type="checkbox"/> N/A or okay | | |
| Remarks _____ | | |

Five-Year Review Site Inspection Checklist (Continued)

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 _____

Five-Year Review Site Inspection Checklist (Continued)

| | | | |
|--|--|---|---|
| D. Cover Penetrations <input type="checkbox"/> Applicable x N/A | | | |
| 1. Gas Vents <input type="checkbox"/> Active <input type="checkbox"/> Passive | | | |
| <input type="checkbox"/> Properly secured/locked | <input type="checkbox"/> Functioning | <input type="checkbox"/> Routinely sampled | <input type="checkbox"/> Good condition |
| <input type="checkbox"/> Evidence of leakage at penetration | <input type="checkbox"/> Needs Maintenance | <input type="checkbox"/> N/A | |
| Remarks _____ | | | |
| | | | |
| 2. Gas Monitoring Probes | | | |
| <input type="checkbox"/> Properly secured/locked | <input type="checkbox"/> Functioning | <input type="checkbox"/> Routinely sampled | <input type="checkbox"/> Good condition |
| <input type="checkbox"/> Evidence of leakage at penetration | <input type="checkbox"/> Needs Maintenance | <input type="checkbox"/> N/A | |
| Remarks _____ | | | |
| | | | |
| 3. Monitoring Wells (within surface area of landfill) | | | |
| <input type="checkbox"/> Properly secured/locked | <input type="checkbox"/> Functioning | <input type="checkbox"/> Routinely sampled | <input type="checkbox"/> Good condition |
| <input type="checkbox"/> Evidence of leakage at penetration | <input type="checkbox"/> Needs Maintenance | <input type="checkbox"/> N/A | |
| Remarks _____ | | | |
| | | | |
| 4. Leachate Extraction Wells | | | |
| <input type="checkbox"/> Properly secured/locked | <input type="checkbox"/> Functioning | <input type="checkbox"/> Routinely sampled | <input type="checkbox"/> Good condition |
| <input type="checkbox"/> Evidence of leakage at penetration | <input type="checkbox"/> Needs Maintenance | <input type="checkbox"/> N/A | |
| Remarks _____ | | | |
| | | | |
| 5. Settlement Monuments <input type="checkbox"/> Located <input type="checkbox"/> Routinely surveyed <input type="checkbox"/> N/A | | | |
| Remarks _____ | | | |
| | | | |
| E. Gas Collection and Treatment <input type="checkbox"/> Applicable x N/A | | | |
| 1. Gas Treatment Facilities | | | |
| <input type="checkbox"/> Flaring | <input type="checkbox"/> Thermal destruction | <input type="checkbox"/> Collection for reuse | |
| <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance | | |
| Remarks _____ | | | |
| | | | |
| 2. Gas Collection Wells, Manifolds and Piping | | | |
| <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance | | |
| Remarks _____ | | | |
| | | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | | |
|--|--|--|--|
| 3. Gas Monitoring Facilities (e.g., gas monitoring of adjacent homes or buildings) <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A Remarks _____ _____ | | | |
| F. Cover Drainage Layer <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A | | | |
| 1. Outlet Pipes Inspected <input type="checkbox"/> Functioning <input type="checkbox"/> N/A Remarks _____ _____ | | | |
| 2. Outlet Rock Inspected <input type="checkbox"/> Functioning <input type="checkbox"/> N/A Remarks _____ _____ | | | |
| G. Detention/sedimentation Ponds <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A | | | |
| 1. Siltation Areal extent _____ Depth _____ <input type="checkbox"/> N/A <input type="checkbox"/> Siltation not evident Remarks _____ _____ | | | |
| 2. Erosion Areal extent _____ Depth _____ <input type="checkbox"/> N/A <input type="checkbox"/> Erosion not evident Remarks _____ _____ | | | |
| 3. Outlet Works <input type="checkbox"/> Functioning <input type="checkbox"/> N/A Remarks _____ _____ | | | |
| 4. Dam <input type="checkbox"/> Functioning <input type="checkbox"/> N/A Remarks _____ _____ | | | |
| H. Retaining Walls <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A | | | |
| 1. Deformations <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Deformation not evident Horizontal displacement _____ Vertical displacement _____ Rotational displacement _____ Remarks _____ _____ | | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | |
|--|--|--|
| 2. Degradation <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Deformation not evident | | |
| Remarks _____ | | |
| I. Perimeter Ditches/Off-Site Discharge x Applicable <input type="checkbox"/> N/A | | |
| 1. Siltation <input type="checkbox"/> Location shown on site map x Siltation not evident | | |
| Areal extent _____ Depth _____ | | |
| Remarks _____ | | |
| 2. Vegetative Growth <input type="checkbox"/> Location shown on site map x Siltation not evident | | |
| x Vegetation does not impede flow | | |
| Areal extent _____ Type _____ | | |
| Remarks _____ | | |
| 3. Erosion <input type="checkbox"/> Location shown on site map x Erosion not evident | | |
| Areal extent _____ Depth _____ | | |
| Remarks _____ | | |
| 4. Discharge Structure <input type="checkbox"/> Location shown on site map <input type="checkbox"/> N/A | | |
| Remarks _____ | | |
| VIII. VERTICAL BARRIER WALLS <input type="checkbox"/> Applicable x N/A | | |
| 1. Settlement <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Settlement not evident | | |
| Areal extent _____ Depth _____ | | |
| Remarks _____ | | |
| 2. Performance Monitoring Type of Monitoring _____ <input type="checkbox"/> Performance not monitored | | |
| Frequency _____ <input type="checkbox"/> Evidence of breaching Head differential _____ | | |
| Remarks _____ | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | | |
|--|--|-------------------------------------|---|
| IX. GROUNDWATER/SURFACE WATER REMEDIES | | <input type="checkbox"/> Applicable | <input checked="" type="checkbox"/> N/A |
| A. Groundwater Extraction Wells, Pumps, and Pipelines | | <input type="checkbox"/> Applicable | <input type="checkbox"/> N/A |
| 1. Pumps, Wellhead Plumbing, and Electrical | | | |
| <input type="checkbox"/> Good condition <input type="checkbox"/> All required wells located <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A | | | |
| Remarks _____ | | | |
| 2. Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances | | | |
| <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance | | | |
| Remarks _____ | | | |
| 3. Spare Parts and Equipment | | | |
| <input type="checkbox"/> Readily available <input type="checkbox"/> Good condition <input type="checkbox"/> Requires upgrade <input type="checkbox"/> Needs to be provided | | | |
| Remarks _____ | | | |
| B. Surface Water Collection Structures, Pumps, and Pipelines | | <input type="checkbox"/> Applicable | <input type="checkbox"/> N/A |
| 1. Collection Structures, Pumps, and Electrical | | | |
| <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance | | | |
| Remarks _____ | | | |
| 2. Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances | | | |
| <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance | | | |
| Remarks _____ | | | |
| 3. Spare Parts and Equipment | | | |
| <input type="checkbox"/> Readily available <input type="checkbox"/> Good condition <input type="checkbox"/> Requires upgrade <input type="checkbox"/> Needs to be provided | | | |
| Remarks _____ | | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | |
|--|--|---|
| C. Treatment System | <input type="checkbox"/> Applicable | <input type="checkbox"/> N/A |
| 1. Treatment Train (Check components that apply) | | |
| <input type="checkbox"/> Metals removal | <input type="checkbox"/> Oil/water separation | <input type="checkbox"/> Bioremediation |
| <input type="checkbox"/> Air stripping | <input type="checkbox"/> Carbon adsorbers | |
| <input type="checkbox"/> Filters | | |
| <input type="checkbox"/> Additive (e.g., chelation agent, flocculent) | | |
| <input type="checkbox"/> Others | | |
| <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance | |
| <input type="checkbox"/> Sampling ports properly marked and functional | | |
| <input type="checkbox"/> Sampling/maintenance log displayed and up to date | | |
| <input type="checkbox"/> Equipment properly identified | | |
| <input type="checkbox"/> Quantity of groundwater treated annually | | |
| <input type="checkbox"/> Quantity of surface water treated annually | | |
| Remarks | | |
| | | |
| 2. Electrical Enclosures and Panels (properly rated and functional) | | |
| <input type="checkbox"/> N/A | <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance |
| Remarks | | |
| | | |
| 3. Tanks, Vaults, Storage Vessels | | |
| <input type="checkbox"/> N/A | <input type="checkbox"/> Good condition | <input type="checkbox"/> Proper secondary containment |
| | | <input type="checkbox"/> Needs Maintenance |
| Remarks | | |
| | | |
| 4. Discharge Structure and Appurtenances | | |
| <input type="checkbox"/> N/A | <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance |
| Remarks | | |
| | | |
| 5. Treatment Building(s) | | |
| <input type="checkbox"/> N/A | <input type="checkbox"/> Good condition (esp. roof and doorways) | <input type="checkbox"/> Needs repair |
| <input type="checkbox"/> Chemicals and equipment properly stored | | |
| Remarks | | |
| | | |

Five-Year Review Site Inspection Checklist (Continued)

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

x Is routinely submitted on time x Is of acceptable quality

2 Monitoring Data Suggests:

☐ Groundwater plume is effectively contained x 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.).

The closure of the three basins (904-41G, -42G, -43G) by dewatering, physically and chemically stabilizing the remaining sludge, and placing a protective multi-layer cover system over them has met the remedial objectives of preventing physical exposure to contaminants and mitigating further migration of contaminants to the groundwater. The selected remedy for FIPSL of grouting manholes and treblers in place and installing a geosynthetic cover over the length of the vitrified clay pipe and around the perimeters of the manholes and treblers associated with the high density polyethylene line is expected to meet the remedial objectives when completed. Due to the declining concentrations of groundwater contaminants, the delay in completing the FIPSL remedial action is not expected to significantly impact the overall remedial process.

Five-Year Review Site Inspection Checklist (Continued)

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.

Operating and Maintenance programs are well established and functioning to ensure that remedial systems remain in effective service.

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.

N/A

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F-AREA RETENTION BASIN (281-3F) OPERABLE UNIT

I. Introduction

This is the second five-year review for the F-Area Retention Basin (FRB) (281-3F) Operable Unit (OU). This review was conducted from August 2007 through September 2007. This report documents the results of the review.

II. OU Chronology

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

Table 1. Chronology of OU Events

| Event | Date |
|--|-----------------------------|
| Removal Action (Soil Excavation) | 1979 removed 2 feet of soil |
| Remedial Investigation (RI) Start/Complete | 1994/1997 |
| CMS/FS Rev 1.1 Submittal | July 29, 1997 |
| Final Record of Decision (ROD) Issuance | October 19, 1998 |
| Remedial Action Start | March 17, 1999 |
| Explanation of Significant Difference (ESD) Issuance | June 7, 2001 |
| Previous Five-Year Review | February 12, 2004 |

III. Background

Physical Characteristics

The FRB OU is located outside and south of the F-Area perimeter fence, approximately 3,397 ft north of Fourmile Branch (Figure 1). The FRB OU has an area of approximately 0.6 acres with approximate dimensions of 200 ft long, 129 ft wide, and 6.9 ft deep. The basin was designed and operated as an unlined temporary storage pond (capacity of approximately 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

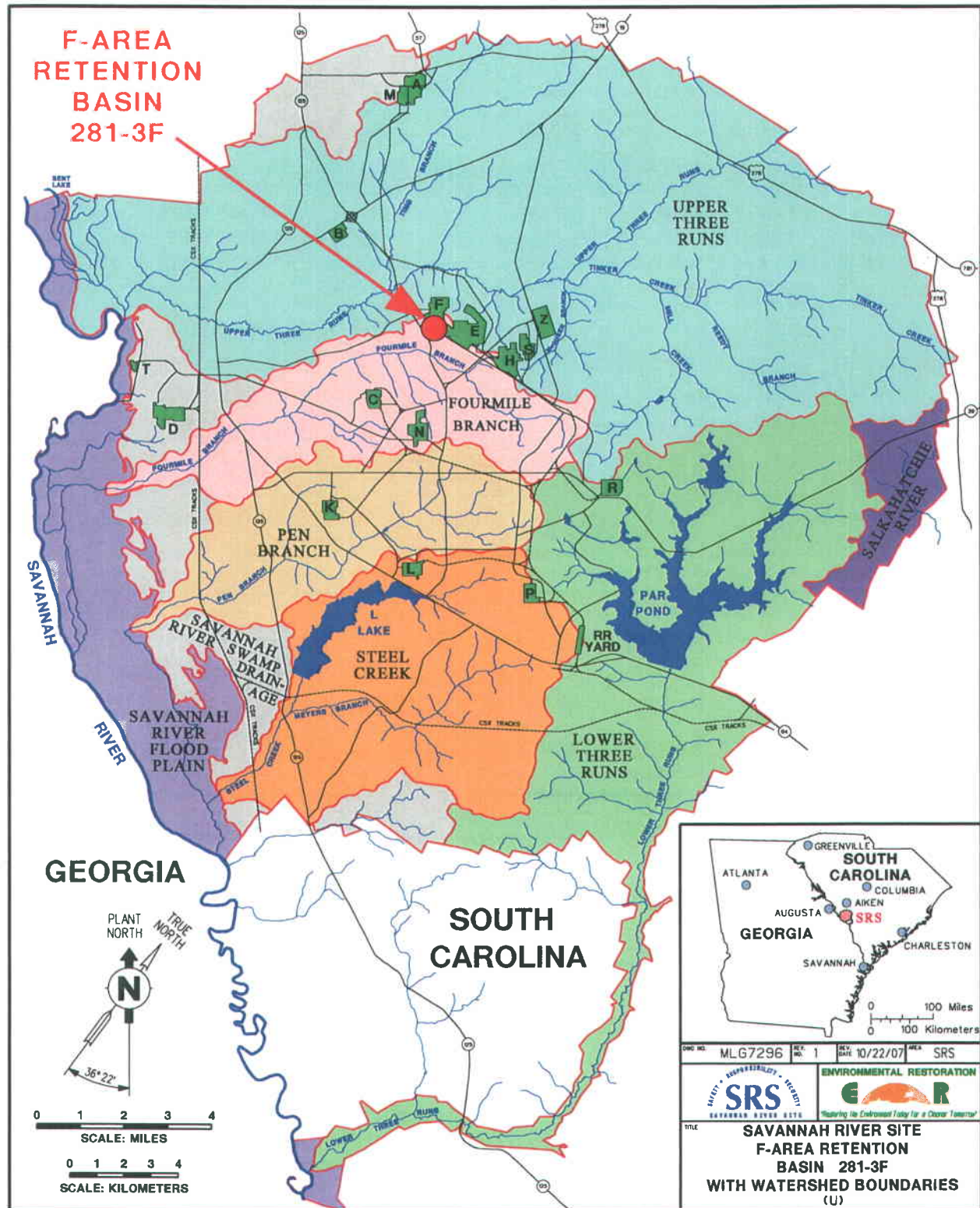


Figure 1. Location of the F-Area Retention Basin (281-3F) OU at SRS

700 ft of 36-inch) that discharged into the north side of the basin. See Figure 2 for site layout of F-Area Retention Basin.

Land and Resource Use

Groundwater beneath the FRB is included in this OU. The current and future anticipated land use is industrial.

History of Contamination

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 1,268 yd³ of contaminated soil was removed from the basin and transported to the Old Radioactive Waste Burial Ground (643-E) for permanent disposal.

Initial Response

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.

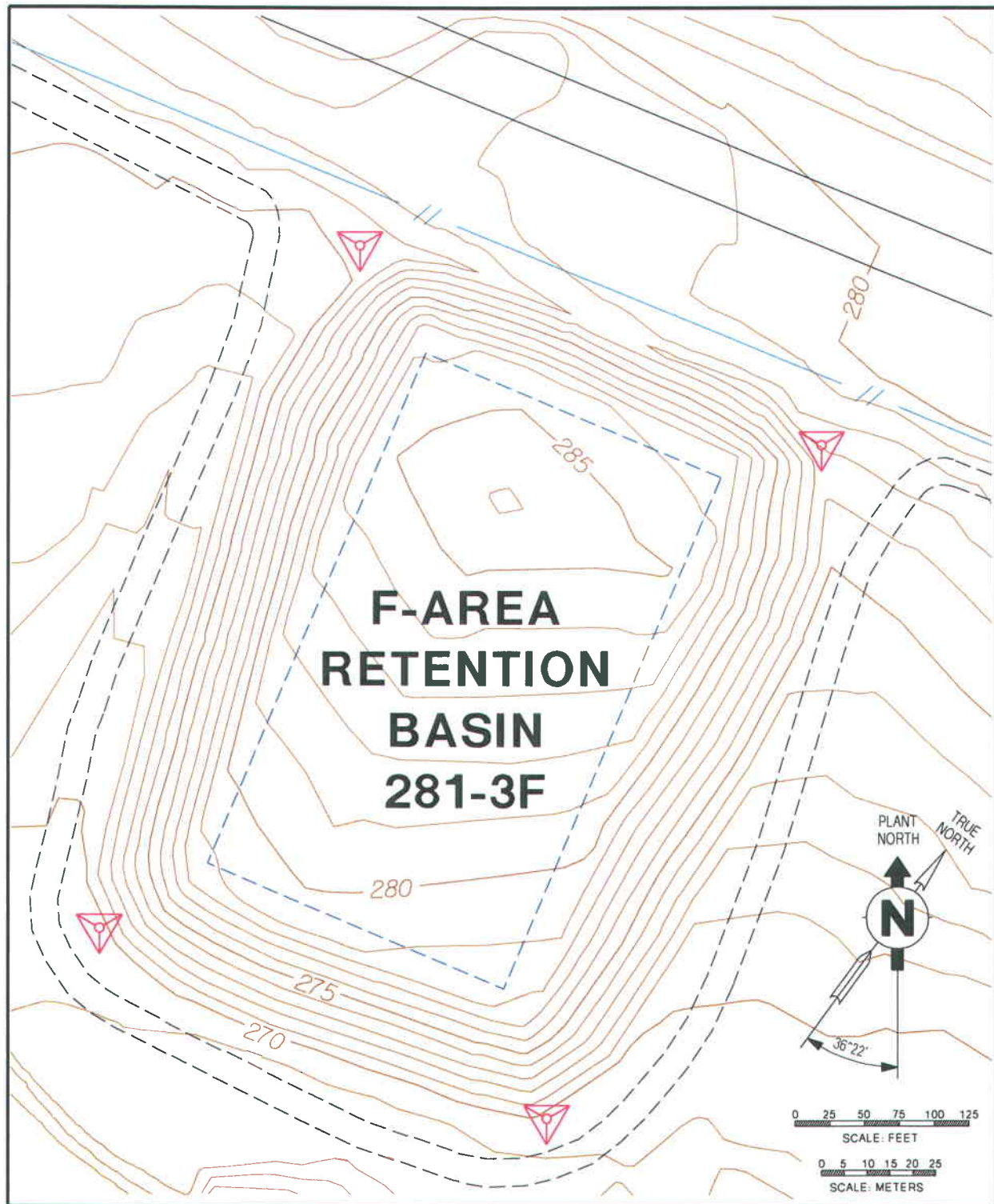


Figure 2. Site Layout of the F-Area Retention Basin (281-3F) OU at SRS

The basin, surrounding soils, and groundwater were characterized in detail in 1997. These results were reported in the Groundwater Sampling Report and the Baseline Risk Assessment (BRA). 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 (CMCOC). 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.

IV. Remedial Actions

Remedy Selection

The remedial objectives for this OU are listed below:

- Reduce risks to human health associated with the COCs through external exposure to radiological constituents by direct contact with the basin area soil, surface water, and sewer line area soil. Risks will also be reduced through the 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.

Third Five-Year Remedy Review Report (U)
F-Area Retention Basin (281-3F) Operable Unit
Savannah River Site, December 2008

WSRC-RP-2007-4063

Rev. 1.1

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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 | 0.290 pCi/g | 0.740 pCi/g |
| | Potassium-40 | 2.490 pCi/g | 2.530 pCi/g |
| | Radium-226 | 0.931 pCi/g | 0.226 pCi/g |
| | Thallium* | 6.120 mg/kg | 25.900 mg/kg |
| Subsurface Soil (0-4 feet) | Arsenic | 7.130 mg/kg | 11.100 mg/kg |
| | Cesium-137 | 10.900 pCi/g | 0.740 pCi/g |
| | Potassium-40 | 3.040 pCi/g | 2.530 pCi/g |
| | Radium-226 | 0.931 pCi/g | 0.226 pCi/g |
| Groundwater | Thallium* | 6.930 mg/kg | 25.900 mg/kg |
| | None | N/A | N/A |
| | Leachability to Groundwater from FRB OU Soil | 79 pCi/L @ 76 years (modeled level) | 109 pCi/g** (will result in 8.0 pCi/L in groundwater) |
| | Strontium-90 (CM COC) | | |
| Process Sewer Line Area | | | |
| Medium | Analyte | Maximum Detect | RG for Soil |
| Surface Soil (0-1 foot) | Arsenic* | 20.80 mg/kg | 11.100 mg/kg |
| | Actinium-228 | 1.570 pCi/g | 0.202 pCi/g |
| | Cesium-137 | 2.690 pCi/g | 0.740 pCi/g |
| | Lead-212* | 1.650 pCi/g | 2.190 pCi/g |
| | Potassium-40 | 2.420 pCi/g | 2.530 pCi/g |
| | Radium-226 | 1.210 pCi/g | 0.226 pCi/g |
| Subsurface Soil (0-4 feet) | Arsenic* | 17.700 mg/kg | 11.100 mg/kg |
| | Actinium-228 | 2.510 pCi/g | 0.202 pCi/g |
| | Cesium-137 | 21.300 pCi/g | 0.740 pCi/g |
| | Lead-212* | 2.440 pCi/g | 2.190 pCi/g |
| | Potassium-40 | 1.490 pCi/g | 2.530 pCi/g |
| | Radium-226 | 2.600 pCi/g | 0.226 pCi/g |
| Groundwater | Strontium-90 | 21.800 pCi/g | 233.000 pCi/g |
| | None | N/A | N/A |
| Sediment within the Pipeline & Manholes | Arsenic* | 16.300 mg/kg | 63.900 mg/kg |
| | Cesium-137* | 2040.000 pCi/g | 1.100 pCi/g |
| | Plutonium-239/240* | 32.200 pCi/g | 26.300 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 | 2,200.000 pCi/g |
| | Strontium-90 | 1,080.000 pCi/g |
| | Radium-226 | 1.370 pCi/g |

Remedy Implementation

As specified in the ROD, the remedial actions implemented 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

As specified in the ROD, the remedial actions implemented 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 second 5-year ROD review that the FRB OU has undergone. Since the previous review in June of 2003, no additional action has been required at this 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.

Available groundwater data collected from the F Retention Basin wells between 1997 and 2008 were examined. The results of sampling and analysis of groundwater at F Retention Basin indicates that there is no impact to groundwater from F Retention Basin. All constituents required for monitoring at F Retention Basin were either undetected or consistently detected at levels below regulatory limits.

Results of the semi-annual monitoring will continue to be used 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. Project Costs

Costs associated with the selected remedy for FRB include operation and maintenance costs of groundwater monitoring, soil cover, and institutional controls. The estimated operation and maintenance cost associated with the selected remedy is \$29,000. This is a present worth cost, including 30 years of maintenance activities. After characterization and effectiveness of the remedy were evaluated, the actual operation and maintenance

cost for the FRB was assessed. The total actual operation and maintenance cost from project support and other post construction expense to fiscal year 2006 is \$66,520.

XI. 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. 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).

XII. Next Review

The next five-year review is scheduled for February 12, 2014.

ATTACHMENT 1

List of Documents Reviewed

WSRC-RP-97-145, *Record of Decision for the F-Area Retention Basin (281-3F) (U)*, Revision 1.1, Westinghouse Savannah River Company, Savannah River Site, Aiken SC

WSRC-RP-2000-4079, *Explanation of Significant Difference (ESD) to the Revision 1.1 Record of Decision (ROD) for the F-Area Retention Basin (281-3F) (U)*, Revision 1, Westinghouse Savannah River Company, Savannah River Site, Aiken SC

WSRC-RP-2001-4049, *Post-Construction Report (PCR) for F-Area Retention Basin (FRB) (Building 281-3F) (U)*, Revision 1, Westinghouse Savannah River Company, Savannah River Site, Aiken SC

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ATTACHMENT 2

Five-Year Review Site Inspection Checklist

| I. SITE INFORMATION | | | |
|--|--|------------------------------------|---|
| Site Name: | F-Area Retention Basin | Date of Inspection: | 9/24/2007 |
| Location and Region: | SRS, USEPA Region IV | EPA ID: | SC1890008989 |
| Agency, office, or company leading the five-year review: | USDOE | CERCLIS OU No.: | 63 |
| | | Weather/Temperature: | |
| Remedy Includes: (Check all that apply) <div style="display: flex; flex-wrap: wrap;"><div style="width: 50%;"><input checked="" type="checkbox"/> Cover System <input type="checkbox"/> Access controls <input checked="" type="checkbox"/> Institutional Controls <input type="checkbox"/> Groundwater pump and treatment <input type="checkbox"/> Surface water collection and treatment <input checked="" type="checkbox"/> Other: <u>Groundwater Monitoring; In situ stabilization; soil excavation and disposal (process sewer line soil)</u></div><div style="width: 50%;"><input type="checkbox"/> Monitored Natural Attenuation <input type="checkbox"/> Groundwater Containment <input type="checkbox"/> Vertical Barrier Walls</div></div> | | | |
| Attachments: <input type="checkbox"/> Inspection team roster attached <input type="checkbox"/> Site map attached | | | |
| II. INTERVIEWS (Check all that apply) | | | |
| 1. O & M Site Manager | | | |
| | _____ (Name) | _____ (Title) | _____ (Date) |
| Interviewed: | <input type="checkbox"/> at site | <input type="checkbox"/> at office | <input type="checkbox"/> by phone Phone No. _____ |
| Problems, suggestions: | <input type="checkbox"/> report attached _____ | | |
| 2. O & M Staff | | | |
| | _____ (Name) | _____ (Title) | _____ (Date) |
| Interviewed: | <input type="checkbox"/> at site | <input type="checkbox"/> at office | <input type="checkbox"/> by phone Phone No. _____ |
| Problems, suggestions: | <input type="checkbox"/> report attached _____ | | |

Five-Year Review Site Inspection Checklist (Continued)

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

| | | | |
|---|--|-------------------------------------|------------------------------|
| <input type="checkbox"/> O & M Manual | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |
| x As-built drawings | x Readily available | x Up to date | <input type="checkbox"/> N/A |
| <input type="checkbox"/> Maintenance Logs | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |

Remarks: See Waste Unit Inspection and Maintenance, ER-SOP-019

Five-Year Review Site Inspection Checklist (Continued)

| | | | |
|--|--|-------------------------------------|-------|
| 2. Site-Specific Health and Safety Plan | | | |
| <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A | |
| <input type="checkbox"/> Contingency plan/emergency response plan | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |
| Remarks: <u>Routine O&M activities do not require an SSHASP under 29 CFR 1910.120, HAZWOPER.</u> | | | |
| 3. O & M and OSHA Training Records | | | |
| x Readily available | x Up to date | <input type="checkbox"/> N/A | |
| Remarks: _____ | | | |
| 4. Permits and Service Agreements | | | |
| <input type="checkbox"/> Air discharge permit | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |
| <input type="checkbox"/> Effluent discharge | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |
| <input type="checkbox"/> Waste Disposal, POTW | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |
| <input type="checkbox"/> Other permits | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |
| Remarks: _____ | | | |
| 5. Gas Generation Records | | | |
| <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A | |
| Remarks: _____ | | | |
| 6. Settlement Monument Records | | | |
| <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A | |
| Remarks: _____ | | | |
| 7. Groundwater Monitoring Records | | | |
| <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A | |
| Remarks: _____ | | | |
| 8. Leachate Extraction Records | | | |
| <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A | |
| Remarks: _____ | | | |
| 9. Discharge Compliance Records | | | |
| <input type="checkbox"/> Air | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |
| <input type="checkbox"/> Water (effluent) | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |
| Remarks: _____ | | | |
| 10. Daily Access/Security Logs | | | |
| <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A | |
| Remarks: _____ | | | |

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Five-Year Review Site Inspection Checklist (Continued)

IV. O & M Costs

1. O & M Organization

- ☐ State in-house ☐ Contractor for State
☐ PRP in-house ☐ Contractor for PRP
x Other: SRS

2. O & M Cost Records

- ☐ Readily available ☐ Up to date ☐ Funding mechanism/agreement in place
x Other: Project cost data is summarized in Section X of attached review: WSRC-RP-2007-4063.

Total annual cost by year for review period if available

| | | |
|------------------------------------|------------|---|
| From _____ To _____ | _____ | <input type="checkbox"/> Breakdown attached |
| (Date) (Date) | Total cost | |
| From _____ To _____ | _____ | <input type="checkbox"/> Breakdown attached |
| (Date) (Date) | Total cost | |
| From _____ To _____ | _____ | <input type="checkbox"/> Breakdown attached |
| (Date) (Date) | Total cost | |
| From _____ To _____ | _____ | <input type="checkbox"/> Breakdown attached |
| (Date) (Date) | Total cost | |
| From _____ To _____ | _____ | <input type="checkbox"/> Breakdown attached |
| (Date) (Date) | Total cost | |

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

Describe costs and reasons: _____

V. ACCESS AND INSTITUTIONAL CONTROLS

x Applicable ☐ N/A

A. Fencing

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

Remarks _____

Five-Year Review Site Inspection Checklist (Continued)

B. Other Access Restrictions

1. **Signs and Other Security Measures** ☐ Location shown on site map ☐ N/A

Remarks: Signs at this site are in good condition.

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: Semi-Annually

Responsible party/agent: DOE Savannah River Field Office

Contact: M. P. Prater, Waste Area Group Manager 09/3/07 952-9333
(Name) (Title) (Date) (Phone No.)

Reporting 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

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| | | | |
|---|--|--|--|
| 3. Land Use Changes Offsite <input checked="" type="checkbox"/> N/A Remarks _____ _____ | | | |
| VI. GENERAL SITE CONDITIONS | | | |
| A. Roads <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A | | | |
| 1. Roads Damaged <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Roads adequate <input type="checkbox"/> N/A Remarks _____ _____ | | | |
| B. Other Site Conditions Remarks _____ _____ _____ | | | |
| VII. COVERS SYSTEMS <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A | | | |
| A. Soil Surface | | | |
| 1. Settlement (Low spots) <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Settlement not evident Areal extent _____ Depth _____ Remarks: _____ _____ | | | |
| 2. Cracks <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Cracking not evident Lengths _____ Widths _____ Depths _____ Remarks _____ _____ | | | |
| 3. Erosion <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Erosion not evident Areal extent _____ Depth _____ Remarks _____ _____ | | | |
| 4. Holes <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Holes not evident Areal extent _____ Depth _____ Remarks _____ _____ | | | |
| 5. Vegetative Cover <input checked="" type="checkbox"/> Grass <input type="checkbox"/> Cover properly established <input checked="" type="checkbox"/> No signs of stress <input type="checkbox"/> Trees/shrubs (indicate size and location on a diagram) Remarks: _____ _____ | | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | |
|---|---|-------|
| 6. | Alternative Cover (armored rock, concrete, etc.) | x N/A |
| Remarks: _____ | | |
| 7. | Bulges <div style="display: flex; justify-content: space-between; align-items: center;"> <input type="checkbox"/> Location shown on site map x Bulges not evident </div> | |
| Areal extent _____ Height _____ Remarks _____ | | |
| 8. | Wet Areas/Water Damage <div style="display: flex; justify-content: space-between; align-items: center;"> <input checked="" type="checkbox"/> Wet areas/water damage not evident </div> | |
| <div style="display: flex; justify-content: space-between;"> <div style="width: 30%;"> <input type="checkbox"/> Wet Areas <input type="checkbox"/> Ponding <input type="checkbox"/> Seeps <input type="checkbox"/> Soft subgrade </div> <div style="width: 30%;"> <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Location shown on site map </div> <div style="width: 30%;"> Areal extent _____ Areal extent _____ Areal extent _____ Areal extent _____ </div> </div> Remarks _____ | | |
| 9. | Slope Instability <div style="display: flex; justify-content: space-between; align-items: center;"> <input type="checkbox"/> Slides <input type="checkbox"/> Location shown on site map x No evidence of slope instability </div> | |
| Areal extent _____ Remarks _____ | | |
| B. Benches <div style="display: flex; justify-content: space-between; align-items: center;"> <input type="checkbox"/> Applicable x N/A </div> <p>(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.)</p> | | |
| 1. | Flows Bypass Bench <div style="display: flex; justify-content: space-between; align-items: center;"> <input type="checkbox"/> Location shown on site map <input type="checkbox"/> N/A or okay </div> | |
| Remarks _____ | | |
| 2. | Bench Breached <div style="display: flex; justify-content: space-between; align-items: center;"> <input type="checkbox"/> Location shown on site map <input type="checkbox"/> N/A or okay </div> | |
| Remarks _____ | | |
| 3. | Bench Overtopped <div style="display: flex; justify-content: space-between; align-items: center;"> <input type="checkbox"/> Location shown on site map <input type="checkbox"/> N/A or okay </div> | |
| Remarks _____ | | |

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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 _____

Five-Year Review Site Inspection Checklist (Continued)

| | | | |
|--|--|---|---|
| D. Cover Penetrations | | <input type="checkbox"/> Applicable | <input checked="" type="checkbox"/> N/A |
| 1. Gas Vents <input type="checkbox"/> Active <input type="checkbox"/> Passive | | | |
| <input type="checkbox"/> Properly secured/locked | <input type="checkbox"/> Functioning | <input type="checkbox"/> Routinely sampled | <input type="checkbox"/> Good condition |
| <input type="checkbox"/> Evidence of leakage at penetration | <input type="checkbox"/> Needs Maintenance | <input type="checkbox"/> N/A | |
| Remarks _____ | | | |
| 2. Gas Monitoring Probes | | | |
| <input type="checkbox"/> Properly secured/locked | <input type="checkbox"/> Functioning | <input type="checkbox"/> Routinely sampled | <input type="checkbox"/> Good condition |
| <input type="checkbox"/> Evidence of leakage at penetration | <input type="checkbox"/> Needs Maintenance | <input type="checkbox"/> N/A | |
| Remarks _____ | | | |
| 3. Monitoring Wells | | | |
| <input type="checkbox"/> Properly secured/locked | <input type="checkbox"/> Functioning | <input type="checkbox"/> Routinely sampled | <input type="checkbox"/> Good condition |
| <input type="checkbox"/> Evidence of leakage at penetration | <input type="checkbox"/> Needs Maintenance | <input type="checkbox"/> N/A | |
| Remarks _____ | | | |
| 4. Leachate Extraction Wells | | | |
| <input type="checkbox"/> Properly secured/locked | <input type="checkbox"/> Functioning | <input type="checkbox"/> Routinely sampled | <input type="checkbox"/> Good condition |
| <input type="checkbox"/> Evidence of leakage at penetration | <input type="checkbox"/> Needs Maintenance | <input type="checkbox"/> N/A | |
| Remarks _____ | | | |
| 5. Settlement Monuments <input type="checkbox"/> Located <input type="checkbox"/> Routinely surveyed <input type="checkbox"/> N/A | | | |
| Remarks _____ | | | |
| E. Gas Collection and Treatment | | <input type="checkbox"/> Applicable | <input checked="" type="checkbox"/> N/A |
| 1. Gas Treatment Facilities | | | |
| <input type="checkbox"/> Flaring | <input type="checkbox"/> Thermal destruction | <input type="checkbox"/> Collection for reuse | |
| <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance | | |
| Remarks _____ | | | |
| 2. Gas Collection Wells, Manifolds and Piping | | | |
| <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance | | |
| Remarks _____ | | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | | |
|--|--|--|--|
| 3. Gas Monitoring Facilities (e.g., gas monitoring of adjacent homes or buildings) <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A Remarks _____ _____ | | | |
| F. Cover Drainage Layer <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A | | | |
| 1. Outlet Pipes Inspected <input type="checkbox"/> Functioning <input type="checkbox"/> N/A Remarks _____ _____ | | | |
| 2. Outlet Rock Inspected <input type="checkbox"/> Functioning <input type="checkbox"/> N/A Remarks _____ _____ | | | |
| G. Detention/sedimentation Ponds <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A | | | |
| 1. Siltation Areal extent _____ Depth _____ <input type="checkbox"/> N/A <input type="checkbox"/> Siltation not evident Remarks _____ _____ | | | |
| 2. Erosion Areal extent _____ Depth _____ <input type="checkbox"/> N/A <input type="checkbox"/> Erosion not evident Remarks _____ _____ | | | |
| 3. Outlet Works <input type="checkbox"/> Functioning <input type="checkbox"/> N/A Remarks _____ _____ | | | |
| 4. Dam <input type="checkbox"/> Functioning <input type="checkbox"/> N/A Remarks _____ _____ | | | |
| H. Retaining Walls <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A | | | |
| 1. Deformations <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Deformation not evident Horizontal displacement _____ Vertical displacement _____ Rotational displacement _____ Remarks _____ _____ | | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | |
|--|---|--|
| 2. Degradation | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> Deformation not evident |
| Remarks _____ _____ | | |
| I. Perimeter Ditches/Off-Site Discharge <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A | | |
| 1. Siltation | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> Siltation not evident |
| Areal extent _____ Depth _____ | | |
| Remarks _____ _____ | | |
| 2. Vegetative Growth | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> Siltation not evident |
| x Vegetation does not impede flow | | |
| Areal extent _____ Type _____ | | |
| Remarks _____ _____ | | |
| 3. Erosion | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> Erosion not evident |
| Areal extent _____ Depth _____ | | |
| Remarks _____ _____ | | |
| 4. Discharge Structure | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> N/A |
| Remarks _____ _____ | | |
| VIII. VERTICAL BARRIER WALLS <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A | | |
| 1. Settlement | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> Settlement not evident |
| Areal extent _____ Depth _____ | | |
| Remarks _____ _____ | | |
| 2. Performance Monitoring | Type of Monitoring _____ | <input type="checkbox"/> Performance not monitored |
| Frequency _____ <input type="checkbox"/> Evidence of breaching Head differential _____ | | |
| Remarks _____ _____ | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | | |
|--|--|--|---|
| IX. GROUNDWATER/SURFACE WATER REMEDIES | | <input checked="" type="checkbox"/> Applicable | <input type="checkbox"/> N/A |
| A. Groundwater Extraction Wells, Pumps, and Pipelines | | <input type="checkbox"/> Applicable | <input checked="" type="checkbox"/> N/A |
| 1. Pumps, Wellhead Plumbing, and Electrical <input type="checkbox"/> Good condition <input type="checkbox"/> All required wells located <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A Remarks _____ | | | |
| 2. Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____ | | | |
| 3. Spare Parts and Equipment <input type="checkbox"/> Readily available <input type="checkbox"/> Good condition <input type="checkbox"/> Requires upgrade <input type="checkbox"/> Needs to be provided Remarks _____ | | | |
| B. Surface Water Collection Structures, Pumps, and Pipelines | | <input type="checkbox"/> Applicable | <input checked="" type="checkbox"/> N/A |
| 1. Collection Structures, Pumps, and Electrical <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____ | | | |
| 2. Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____ | | | |
| 3. Spare Parts and Equipment <input type="checkbox"/> Readily available <input type="checkbox"/> Good condition <input type="checkbox"/> Requires upgrade <input type="checkbox"/> Needs to be provided Remarks _____ | | | |

Five-Year Review Site Inspection Checklist (Continued)

| C. Treatment System | <input type="checkbox"/> Applicable | <input checked="" type="checkbox"/> N/A |
|---|--|--|
| 1. Treatment Train (Check components that apply) | | |
| <input type="checkbox"/> Metals removal | <input type="checkbox"/> Oil/water separation | <input type="checkbox"/> Bioremediation |
| <input type="checkbox"/> Air stripping | <input type="checkbox"/> Carbon adsorbers | |
| <input type="checkbox"/> Filters _____ | | |
| <input type="checkbox"/> Additive (e.g., chelation agent, flocculent) _____ | | |
| <input type="checkbox"/> Others _____ | | |
| <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance | |
| <input type="checkbox"/> Sampling ports properly marked and functional | | |
| <input type="checkbox"/> Sampling/maintenance log displayed and up to date | | |
| <input type="checkbox"/> Equipment properly identified | | |
| <input type="checkbox"/> Quantity of groundwater treated annually _____ | | |
| <input type="checkbox"/> Quantity of surface water treated annually _____ | | |
| Remarks _____ | | |
| _____ | | |
| 2. Electrical Enclosures and Panels (properly rated and functional) | | |
| <input type="checkbox"/> N/A | <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance |
| Remarks _____ | | |
| _____ | | |
| 3. Tanks, Vaults, Storage Vessels | | |
| <input type="checkbox"/> N/A | <input type="checkbox"/> Good condition | <input type="checkbox"/> Proper secondary containment <input type="checkbox"/> Needs Maintenance |
| Remarks _____ | | |
| _____ | | |
| 4. Discharge Structure and Appurtenances | | |
| <input type="checkbox"/> N/A | <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance |
| Remarks _____ | | |
| _____ | | |
| 5. Treatment Building(s) | | |
| <input type="checkbox"/> N/A | <input type="checkbox"/> Good condition (esp. roof and doorways) | <input type="checkbox"/> Needs repair |
| <input type="checkbox"/> Chemicals and equipment properly stored | | |
| Remarks _____ | | |
| _____ | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | | |
|---|---|---|--|
| 6. Monitoring Wells | | | |
| <input checked="" type="checkbox"/> Properly secured/locked | <input checked="" type="checkbox"/> Functioning | <input checked="" type="checkbox"/> Routinely sampled | <input checked="" type="checkbox"/> Good condition |
| <input checked="" type="checkbox"/> All required wells located | <input type="checkbox"/> Needs Maintenance | <input type="checkbox"/> N/A | |
| Remarks _____ _____ | | | |
| D. Monitoring Data <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A | | | |
| 1. Monitoring Data | | | |
| <input checked="" type="checkbox"/> Is routinely submitted on time | | <input checked="" type="checkbox"/> Is of acceptable quality | |
| 2 Monitoring Data Suggests: | | | |
| <input type="checkbox"/> Groundwater plume is effectively contained | | <input type="checkbox"/> Contaminant concentrations are declining | |
| E. Monitored Natural Attenuation <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A | | | |
| 1. Monitoring Wells (Natural attenuation remedy) | | | |
| <input type="checkbox"/> Properly secured/locked | <input type="checkbox"/> Functioning | <input type="checkbox"/> Routinely sampled | <input type="checkbox"/> Good condition |
| <input type="checkbox"/> All required wells located | <input type="checkbox"/> Needs Maintenance | <input type="checkbox"/> 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; Institutional controls; groundwater monitoring; pipeline grouting; and excavation and disposal of contaminated soil | | | |
| 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. | | | |

Five-Year Review Site Inspection Checklist (Continued)

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.

N/A

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FORD BUILDING SEEPAGE BASIN (904-91G) OPERABLE UNIT

I. Introduction

This is the first five-year review for the Ford Building Seepage Basin (904-91G) (FBSB) Operable Unit (OU). This review was conducted from August 2007 through September 2007. This report documents the results of the review.

II. OU Chronology

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

Table 1. Chronology of OU Events

| Event | Date |
|-----------------------------------|-----------------------------------|
| RFI/RI Field Start | October 20, 1997 |
| Record of Decision (ROD) issuance | February 14, 2002 |
| Remedial Action start/complete | January 27, 2003 / April 22, 2003 |
| February 12, 2004 | None |

III. Background

Physical Characteristics

Figure 1 shows the location of the FBSB OU. Figure 2 shows the layout of the Ford Building.

Land and Resource Use

The future land use for FBSB is anticipated to be industrial.

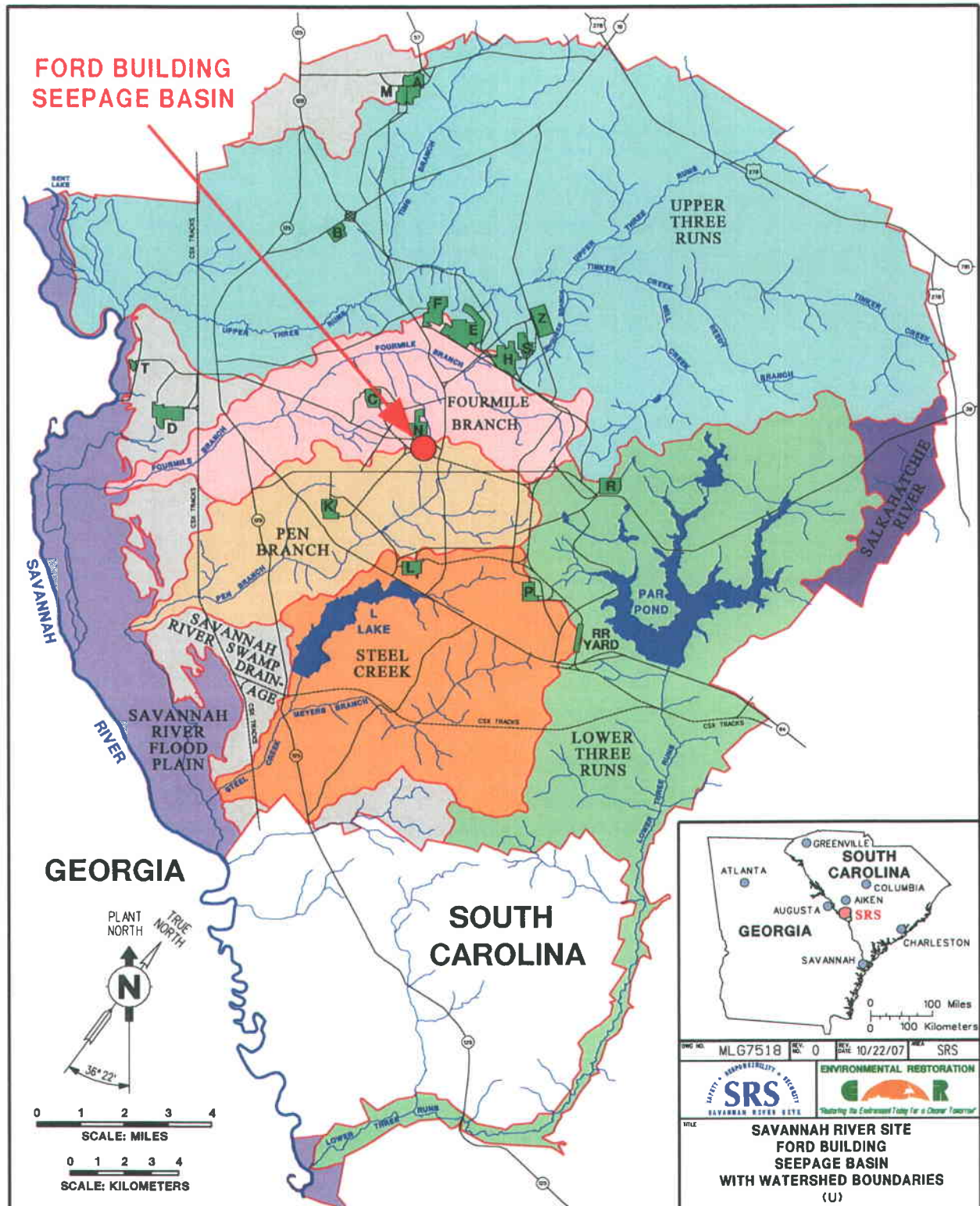


Figure 1. Location of the Ford Building Seepage Basin Unit

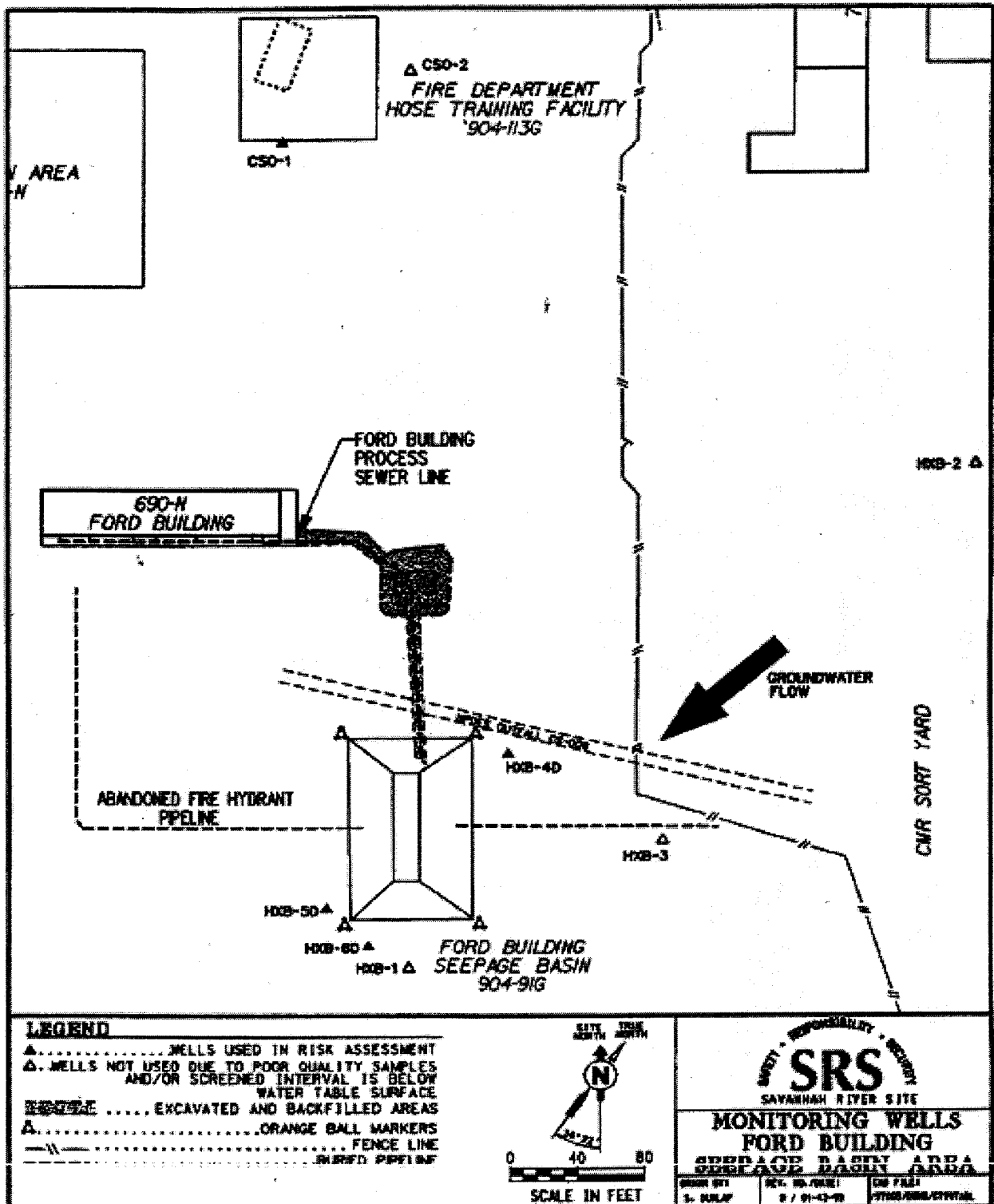


Figure 2. Layout of the Ford Building Seepage Basin Operable Unit (FBSB) with Limits

History of Contamination

The FBSB was constructed in 1964 to receive wastewater from the Ford Building. At the Ford building, wastewater was generated during the reconfiguration, repair, and scrapping of reactor heat exchangers and other process equipment. The seepage basin was in operation until 1984.

Initial Response

The FBSB OU is listed as a Resource Conservation and Recovery Act (RCRA) 304(u) Solid Waste Management Unit/Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) unit in Appendix C of the Federal Facility Agreement (FFA) for Savannah River Site (SRS). The media associated with the FBSB OU include soil and groundwater beneath the OU. However, the results of the groundwater investigation contained in the RCRA Facility Investigation/Remedial Investigation (RFI/RI) with Baseline Risk Assessment (BRA) for the FBSB, which included a collection of groundwater samples and analyses, have revealed that the groundwater associated with FBSB OU is not contaminated.

IV. Remedial Actions

Remedy Selection

As stipulated in the ROD (WSRC 2001), the following are the RAOs for the FBSB OU.

Seepage Basin Area Subunit

- (1) Protect future industrial workers at the Seepage Basin Area from exposure to three refined COCs (cesium-137, cobalt-60, and europium-154) that exceed RGs in surface soils 0 to 0.3 m (0 to 1 ft) deep and four refined COCs (arsenic, cesium-137, cobalt-60, and europium-154) that exceed RGs in subsurface soils 0.3 to 2.1 m (1 to 7 ft deep) (see Table 1 for RGs).

- (2) Protect current terrestrial ecological receptors (insectivorous mammals) at the Seepage Basin Area from exposure to the sole ecological refined COC, aroclor-1254, at levels above the RG of 0.0219 mg/kg in surface soil.

Tank/Process Sewer Line Area Subunit

- (3) Protect future industrial workers at the Tank/Process Line Area from exposure to cesium-137 and cobalt-60 that exceed RGs in soil limited to a 1.3-m (4-ft) depth (see Table 1 for RGs).

The selected remedy for the FBSB OU was excavation, dispositioning, backfilling, vegetative covers, and institutional controls.

Remedy Implementation

The key elements of the remedial action included excavating the contaminated soil at the Tank/Process Sewer Line Area and dispositioning the excavated soil into the basin along with vegetation existing in the basin; removing the containerized soil and dispositioning the soil into the seepage basin; backfilling the remaining volume of the seepage basin and the excavated areas of the Tank/Process Sewer Area with clean soil from an SRS borrow pit; covering the backfilled areas with a vegetative cover; and implementing institutional controls. Note: The cover is described as backfill with a vegetative cover to differentiate it from an engineered cover system. The vegetative cover is inspected on a semi-annual frequency.

V. Progress Since Last Review

This is the first five-year review for this OU.

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 guidance

VII. Technical Assessment

The operating procedures 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 walkdowns, are in place to prevent exposure and monitor contaminant levels. No other actions are necessary to ensure that immediate threats have been addressed.

The exposure assumptions, toxicity data, and cleanup levels used at the time of remedy selection are still valid. There have been no changes in standards or to-be-considered guidance identified in the Record of Decision (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

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

X. Project Costs

Costs associated with the selected remedy for the Ford Building Seepage Basin OU includes operation and maintenance costs of institutional controls and the soil cover. The estimated operation and maintenance cost associated with the selected remedy is \$116,000, which was discounted at 7% per year. This is a present worth cost, including 30 years of maintenance activities. After characterization and effectiveness of the remedy were evaluated, the actual operation and maintenance cost for the FBSB was assessed. The total actual operation and maintenance cost from project support and other post-construction expense to fiscal year 2006 is \$72,924.

XI. Protectiveness Statement(s)

The remedy at FBSB, institutional controls for the soils, is protective of human health and the environment; and exposure pathways that could result in unacceptable risks are being controlled. The institutional controls include warning signs that are posted at the waste unit, use of existing SRS access controls for trespassers, use of the SRS Site Use and Site Clearance Programs for on-site workers, and land use restrictions. The selected remedy will maintain future industrial land use and prevent unrestricted use of the area.

XII. Next Review

The next five-year review is scheduled for February 12, 2014.

ATTACHMENT 1

List of Documents Reviewed

WSRC, 2000. *RCRA Facility Investigation with Baseline Risk Assessment for the Ford Building Seepage Basin (904-91G) Operable Unit (U)*, WSRC-RP-98-4096, Rev. 1, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

WSRC, 2001. *Record of Decision Remedial Alternative Selection for the Ford Building Seepage Basin Operable Unit (904-91G) (U)*, WSRC-RP-2001-4156, Rev. 1, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

WSRC, 2002. *Corrective Measures Implementation/Remedial Action Implementation Plan for the Ford Building Seepage Basin Unit (904-91G) (U)*, WSRC-RP-2002-4062, Rev. 1, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

ATTACHMENT 2

Five-Year Review Site Inspection Checklist

| I. SITE INFORMATION | | | | | | | | | | | | | | | |
|---|--|------------------------------------|---|---------------------------------------|--|--|--|--|---|---|--|---|--|---------------------------------------|--|
| Site Name: | Ford Building Seepage Basin Operable Unit (904-91G) | Date of Inspection: | 10/17/2007 | | | | | | | | | | | | |
| Location and Region: | Savannah River Site, USEPA IV | EPA ID: | SC1890008989 | | | | | | | | | | | | |
| Agency, office, or company leading the five-year review: | United States Department of Energy | CERCLIS OU: | 13 | | | | | | | | | | | | |
| | | Weather/Temperature: | clear and sunny, 76°F | | | | | | | | | | | | |
| Remedy Includes: (Check all that apply) <table><tbody><tr><td><input type="checkbox"/> Cover System</td><td><input type="checkbox"/> Monitored Natural Attenuation</td></tr><tr><td><input type="checkbox"/> Access controls</td><td><input type="checkbox"/> Groundwater Containment</td></tr><tr><td><input checked="" type="checkbox"/> Institutional Controls</td><td><input type="checkbox"/> Vertical Barrier Walls</td></tr><tr><td><input type="checkbox"/> Groundwater pump and treatment</td><td></td></tr><tr><td><input type="checkbox"/> Surface water collection and treatment</td><td></td></tr><tr><td><input type="checkbox"/> Other: _____</td><td></td></tr></tbody></table> | | | | <input type="checkbox"/> Cover System | <input type="checkbox"/> Monitored Natural Attenuation | <input type="checkbox"/> Access controls | <input type="checkbox"/> Groundwater Containment | <input checked="" type="checkbox"/> Institutional Controls | <input type="checkbox"/> Vertical Barrier Walls | <input type="checkbox"/> Groundwater pump and treatment | | <input type="checkbox"/> Surface water collection and treatment | | <input type="checkbox"/> Other: _____ | |
| <input type="checkbox"/> Cover System | <input type="checkbox"/> Monitored Natural Attenuation | | | | | | | | | | | | | | |
| <input type="checkbox"/> Access controls | <input type="checkbox"/> Groundwater Containment | | | | | | | | | | | | | | |
| <input checked="" type="checkbox"/> Institutional Controls | <input type="checkbox"/> Vertical Barrier Walls | | | | | | | | | | | | | | |
| <input type="checkbox"/> Groundwater pump and treatment | | | | | | | | | | | | | | | |
| <input type="checkbox"/> Surface water collection and treatment | | | | | | | | | | | | | | | |
| <input type="checkbox"/> Other: _____ | | | | | | | | | | | | | | | |
| Attachments: <input type="checkbox"/> Inspection team roster attached <input type="checkbox"/> Site map attached | | | | | | | | | | | | | | | |
| II. INTERVIEWS (Check all that apply) | | | | | | | | | | | | | | | |
| 1. O & M Site Manager | | | | | | | | | | | | | | | |
| | _____ (Name) | _____ (Title) | _____ (Date) | | | | | | | | | | | | |
| Interviewed: | <input type="checkbox"/> at site | <input type="checkbox"/> at office | <input type="checkbox"/> by phone Phone No. _____ | | | | | | | | | | | | |
| Problems, suggestions: | <input type="checkbox"/> report attached _____ | | | | | | | | | | | | | | |
| 2. O & M Staff | | | | | | | | | | | | | | | |
| | _____ (Name) | _____ (Title) | _____ (Date) | | | | | | | | | | | | |
| Interviewed: | <input type="checkbox"/> at site | <input type="checkbox"/> at office | <input type="checkbox"/> by phone Phone No. _____ | | | | | | | | | | | | |
| Problems, suggestions: | <input type="checkbox"/> report attached _____ | | | | | | | | | | | | | | |

Five-Year Review Site Inspection Checklist (Continued)

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

| | | | |
|---------------------------------------|--|-------------------------------------|------------------------------|
| <input type="checkbox"/> O & M Manual | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |
| x As-built drawings | x Readily available | x Up to date | <input type="checkbox"/> N/A |
| x Maintenance Logs | x Readily available | x Up to date | x N/A |

Remarks: See Waste Unit Inspection and Maintenance, ER-SOP-019.

Five-Year Review Site Inspection Checklist (Continued)

| | | | |
|--|--|-------------------------------------|-------|
| 2. Site-Specific Health and Safety Plan | | | |
| <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A | |
| <input type="checkbox"/> Contingency plan/emergency response plan | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |
| Remarks: <u>Routing O&M activities do not require a SSHASP under 29 CFT 1910.1201, HAZWOPER.</u> | | | |
| 3. O & M and OSHA Training Records | | | |
| x Readily available | x Up to date | <input type="checkbox"/> N/A | |
| Remarks _____ | | | |
| 4. Permits and Service Agreements | | | |
| <input type="checkbox"/> Air discharge permit | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |
| <input type="checkbox"/> Effluent discharge | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |
| <input type="checkbox"/> Waste Disposal, POTW | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |
| <input type="checkbox"/> Other permits | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |
| Remarks _____ | | | |
| 5. Gas Generation Records | | | |
| <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A | |
| Remarks _____ | | | |
| 6. Settlement Monument Records | | | |
| <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A | |
| Remarks _____ | | | |
| 7. Groundwater Monitoring Records | | | |
| <input type="checkbox"/> Readily available | x Up to date | x N/A | |
| Remarks _____ | | | |
| 8. Leachate Extraction Records | | | |
| <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A | |
| Remarks _____ | | | |
| 9. Discharge Compliance Records | | | |
| <input type="checkbox"/> Air | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |
| <input type="checkbox"/> Water (effluent) | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |
| Remarks _____ | | | |
| 10. Daily Access/Security Logs | | | |
| x Readily available | <input type="checkbox"/> Up to date | <input type="checkbox"/> N/A | |
| Remarks _____ | | | |

Five-Year Review Site Inspection Checklist (Continued)

| IV. O & M Costs | | | |
|--|--------------------|------------------|---|
| 1. O & M Organization <div style="display: flex; justify-content: space-between;"><div><input type="checkbox"/> State in-house</div><div><input type="checkbox"/> Contractor for State</div></div> <div style="display: flex; justify-content: space-between;"><div><input type="checkbox"/> PRP in-house</div><div><input type="checkbox"/> Contractor for PRP</div></div> <div><input checked="" type="checkbox"/> Other: <u>SRS</u></div> | | | |
| 2. O & M Cost Records <div style="display: flex; justify-content: space-between;"><div><input type="checkbox"/> Readily available</div><div><input type="checkbox"/> Up to date</div><div><input type="checkbox"/> Funding mechanism/agreement in place</div></div> <div><input checked="" type="checkbox"/> Other: <u>Project cost data is summarized in SectionX of attached review: WSRC-RP-2007-4063.</u></div> | | | |
| Total annual cost by year for review period if available | | | |
| From _____ (Date) | To _____ (Date) | _____ Total cost | <input type="checkbox"/> Breakdown attached |
| From _____ (Date) | To _____ (Date) | _____ Total cost | <input type="checkbox"/> Breakdown attached |
| From _____ (Date) | To _____ (Date) | _____ Total cost | <input type="checkbox"/> Breakdown attached |
| From _____ (Date) | To _____ (Date) | _____ Total cost | <input type="checkbox"/> Breakdown attached |
| From _____ (Date) | To _____ (Date) | _____ Total cost | <input type="checkbox"/> Breakdown attached |
| 3. Unanticipated or Unusually High O & M Costs During Review Period Describe costs and reasons: _____ _____ _____ _____ | | | |
| V. ACCESS AND INSTITUTIONAL CONTROLS <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A | | | |
| A. Fencing | | | |
| 1. Fencing Damaged <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Gates secured <input checked="" type="checkbox"/> N/A Remarks _____ _____ | | | |

Five-Year Review Site Inspection Checklist (Continued)

B. Other Access Restrictions

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

Remarks: Signs at this site are in good condition.

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:

Semi-Annually

Responsible party/agent:

WSRC

Contact:

N/A

N/A

N/A

N/A

(Name)

(Title)

(Date)

(Phone No.)

Reporting 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

Five-Year Review Site Inspection Checklist (Continued)

| | | | |
|--|---|---|---|
| 3. | Land use changes offsite | <input checked="" type="checkbox"/> N/A | Remarks _____ _____ |
| VI. GENERAL SITE CONDITIONS | | | |
| A. | Roads | <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A | |
| 1. | Roads damaged | <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Roads adequate <input type="checkbox"/> N/A | Remarks _____ _____ |
| B. | Other site Conditions | | |
| | Remarks _____ _____ | | |
| VII. COVERS SYSTEMS <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A | | | |
| A. | Soil Surface | | |
| 1. | Settlement (Low spots) | <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Settlement not evident | Areal extent _____ Depth _____ Remarks _____ _____ |
| 2. | Cracks | <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Cracking not evident | Lengths _____ Widths _____ Depths _____ Remarks _____ _____ |
| 3. | Erosion | <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Erosion not evident | Areal extent _____ Depth _____ Remarks _____ _____ |
| 4. | Holes | <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Holes not evident | Areal extent _____ Depth _____ Remarks _____ _____ |
| 5. | Vegetative Cover <input type="checkbox"/> Grass <input checked="" type="checkbox"/> Cover properly established <input type="checkbox"/> No signs of stress <input type="checkbox"/> Trees/shrubs (indicate size and location on a diagram) Remarks _____ _____ | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | |
|--|---|--------------------|
| 6. Alternative Cover (armored rock, concrete, etc.) <input type="checkbox"/> N/A | | |
| Remarks: _____ | | |
| 7. Bulges <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Bulges not evident | | |
| Areal extent _____ Height _____ | | |
| Remarks _____ | | |
| 8. Wet Areas/Water Damage <input type="checkbox"/> Wet areas/water damage not evident | | |
| <input type="checkbox"/> Wet Areas | <input type="checkbox"/> Location shown on site map | Areal extent _____ |
| <input type="checkbox"/> Ponding | <input type="checkbox"/> Location shown on site map | Areal extent _____ |
| <input type="checkbox"/> Seeps | <input type="checkbox"/> Location shown on site map | Areal extent _____ |
| <input type="checkbox"/> Soft subgrade | <input type="checkbox"/> Location shown on site map | Areal extent _____ |
| Remarks _____ | | |
| 9. Slope Instability <input type="checkbox"/> Slides <input type="checkbox"/> Location shown on site map <input type="checkbox"/> No evidence of slope instability | | |
| Areal extent _____ | | |
| Remarks _____ | | |
| B. Benches <input type="checkbox"/> Applicable <input type="checkbox"/> 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 <input type="checkbox"/> Location shown on site map <input type="checkbox"/> N/A or okay | | |
| Remarks _____ | | |
| 2. Bench Breached <input type="checkbox"/> Location shown on site map <input type="checkbox"/> N/A or okay | | |
| Remarks _____ | | |
| 3. Bench Overtopped <input type="checkbox"/> Location shown on site map <input type="checkbox"/> N/A or okay | | |
| Remarks _____ | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | |
|---|--|--|
| C. Letdown Channels <input type="checkbox"/> Applicable <input type="checkbox"/> 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 | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> No evidence of settlement |
| Areal extent _____ Depth _____ | | |
| Remarks _____ | | |
| | | |
| 2. Material Degradation | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> No evidence of degradation |
| Material type _____ Areal extent _____ | | |
| Remarks _____ | | |
| | | |
| 3. Erosion | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> No evidence of erosion |
| Areal extent _____ Depth _____ | | |
| Remarks _____ | | |
| | | |
| 4. Undercutting | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> No evidence of undercutting |
| Areal extent _____ Depth _____ | | |
| Remarks _____ | | |
| | | |
| 5. Obstructions | Type _____ | <input type="checkbox"/> No obstructions |
| <input type="checkbox"/> Location shown on site map | Areal extent _____ | Size _____ |
| Remarks _____ | | |
| | | |
| 6. Excessive Vegetative Growth | Type _____ | |
| <input type="checkbox"/> No evidence of excessive growth | <input type="checkbox"/> Vegetation in channels does not obstruct flow | |
| <input type="checkbox"/> Location shown on site map | Areal extent _____ | |
| Remarks _____ | | |
| | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | | |
|--|--|---|---|
| D. Cover Penetrations <input type="checkbox"/> Applicable <input type="checkbox"/> N/A | | | |
| 1. Gas Vents <input type="checkbox"/> Active <input type="checkbox"/> Passive | | | |
| <input type="checkbox"/> Properly secured/locked | <input type="checkbox"/> Functioning | <input type="checkbox"/> Routinely sampled | <input type="checkbox"/> Good condition |
| <input type="checkbox"/> Evidence of leakage at penetration | <input type="checkbox"/> Needs Maintenance | <input type="checkbox"/> N/A | |
| Remarks _____ | | | |
| | | | |
| 2. Gas Monitoring Probes | | | |
| <input type="checkbox"/> Properly secured/locked | <input type="checkbox"/> Functioning | <input type="checkbox"/> Routinely sampled | <input type="checkbox"/> Good condition |
| <input type="checkbox"/> Evidence of leakage at penetration | <input type="checkbox"/> Needs Maintenance | <input type="checkbox"/> N/A | |
| Remarks _____ | | | |
| | | | |
| 3. Monitoring Wells | | | |
| <input type="checkbox"/> Properly secured/locked | <input type="checkbox"/> Functioning | <input type="checkbox"/> Routinely sampled | <input type="checkbox"/> Good condition |
| <input type="checkbox"/> Evidence of leakage at penetration | <input type="checkbox"/> Needs Maintenance | <input type="checkbox"/> N/A | |
| Remarks _____ | | | |
| | | | |
| 4. Leachate Extraction Wells | | | |
| <input type="checkbox"/> Properly secured/locked | <input type="checkbox"/> Functioning | <input type="checkbox"/> Routinely sampled | <input type="checkbox"/> Good condition |
| <input type="checkbox"/> Evidence of leakage at penetration | <input type="checkbox"/> Needs Maintenance | <input type="checkbox"/> N/A | |
| Remarks _____ | | | |
| | | | |
| 5. Settlement Monuments <input type="checkbox"/> Located <input type="checkbox"/> Routinely surveyed <input type="checkbox"/> N/A | | | |
| Remarks _____ | | | |
| | | | |
| E. Gas Collection and Treatment <input type="checkbox"/> Applicable <input type="checkbox"/> N/A | | | |
| 1. Gas Treatment Facilities | | | |
| <input type="checkbox"/> Flaring | <input type="checkbox"/> Thermal destruction | <input type="checkbox"/> Collection for reuse | |
| <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance | | |
| Remarks _____ | | | |
| | | | |
| 2. Gas Collection Wells, Manifolds and Piping | | | |
| <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance | | |
| Remarks _____ | | | |
| | | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | | |
|--|--|--|--|
| 3. Gas Monitoring Facilities (e.g., gas monitoring of adjacent homes or buildings) <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A Remarks _____ _____ | | | |
| F. Cover Drainage Layer <input type="checkbox"/> Applicable <input type="checkbox"/> N/A | | | |
| 1. Outlet Pipes Inspected <input type="checkbox"/> Functioning <input type="checkbox"/> N/A Remarks _____ _____ | | | |
| 2. Outlet Rock Inspected <input type="checkbox"/> Functioning <input type="checkbox"/> N/A Remarks _____ _____ | | | |
| G. Detention/sedimentation Ponds <input type="checkbox"/> Applicable <input type="checkbox"/> N/A | | | |
| 1. Siltation Areal extent _____ | | Depth _____ <input type="checkbox"/> N/A <input type="checkbox"/> Siltation not evident Remarks _____ _____ | |
| 2. Erosion Areal extent _____ | | Depth _____ <input type="checkbox"/> N/A <input type="checkbox"/> Erosion not evident Remarks _____ _____ | |
| 3. Outlet Works <input type="checkbox"/> Functioning <input type="checkbox"/> N/A Remarks _____ _____ | | | |
| 4. Dam <input type="checkbox"/> Functioning <input type="checkbox"/> N/A Remarks _____ _____ | | | |
| H. Retaining Walls <input type="checkbox"/> Applicable <input type="checkbox"/> N/A | | | |
| 1. Deformations <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Deformation not evident Horizontal displacement _____ Vertical displacement _____ Rotational displacement _____ Remarks _____ _____ | | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | |
|--|--|--|
| 2. Degradation <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Deformation not evident | | |
| Remarks _____ | | |
| I. Perimeter Ditches/Off-Site Discharge <input type="checkbox"/> Applicable <input type="checkbox"/> N/A | | |
| 1. Siltation <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Siltation not evident | | |
| Areal extent _____ Depth _____ | | |
| Remarks _____ | | |
| 2. Vegetative Growth <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Siltation not evident | | |
| <input type="checkbox"/> Vegetation does not impede flow | | |
| Areal extent _____ Type _____ | | |
| Remarks _____ | | |
| 3. Erosion <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Erosion not evident | | |
| Areal extent _____ Depth _____ | | |
| Remarks _____ | | |
| 4. Discharge Structure <input type="checkbox"/> Location shown on site map <input type="checkbox"/> N/A | | |
| Remarks _____ | | |
| VIII. VERTICAL BARRIER WALLS <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A | | |
| 1. Settlement <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Settlement not evident | | |
| Areal extent _____ Depth _____ | | |
| Remarks _____ | | |
| 2. Performance Monitoring Type of Monitoring _____ <input type="checkbox"/> Performance not monitored | | |
| Frequency _____ <input type="checkbox"/> Evidence of breaching Head differential _____ | | |
| Remarks _____ | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | | |
|---|--|-------------------------------------|---|
| IX. GROUNDWATER/SURFACE WATER REMEDIES | | <input type="checkbox"/> Applicable | <input checked="" type="checkbox"/> N/A |
| A. Groundwater Extraction Wells, Pumps, and Pipelines | | <input type="checkbox"/> Applicable | <input type="checkbox"/> N/A |
| 1. Pumps, Wellhead Plumbing, and Electrical <input type="checkbox"/> Good condition <input type="checkbox"/> All required wells located <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A Remarks _____ _____ | | | |
| 2. Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____ _____ | | | |
| 3. Spare Parts and Equipment <input type="checkbox"/> Readily available <input type="checkbox"/> Good condition <input type="checkbox"/> Requires upgrade <input type="checkbox"/> Needs to be provided Remarks _____ _____ | | | |
| B. Surface Water Collection Structures, Pumps, and Pipelines | | <input type="checkbox"/> Applicable | <input type="checkbox"/> N/A |
| 1. Collection Structures, Pumps, and Electrical <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____ _____ | | | |
| 2. Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____ _____ | | | |
| 3. Spare Parts and Equipment <input type="checkbox"/> Readily available <input type="checkbox"/> Good condition <input type="checkbox"/> Requires upgrade <input type="checkbox"/> Needs to be provided Remarks _____ _____ | | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | |
|--|--|--|
| C. Treatment System | <input type="checkbox"/> Applicable | <input type="checkbox"/> N/A |
| 1. Treatment Train (Check components that apply) | | |
| <input type="checkbox"/> Metals removal | <input type="checkbox"/> Oil/water separation | <input type="checkbox"/> Bioremediation |
| <input type="checkbox"/> Air stripping | <input type="checkbox"/> Carbon adsorbers | |
| <input type="checkbox"/> Filters | | |
| <input type="checkbox"/> Additive (e.g., chelation agent, flocculent) | | |
| <input type="checkbox"/> Others | | |
| <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance | |
| <input type="checkbox"/> Sampling ports properly marked and functional | | |
| <input type="checkbox"/> Sampling/maintenance log displayed and up to date | | |
| <input type="checkbox"/> Equipment properly identified | | |
| <input type="checkbox"/> Quantity of groundwater treated annually | | |
| <input type="checkbox"/> Quantity of surface water treated annually | | |
| Remarks | | |
| | | |
| 2. Electrical Enclosures and Panels (properly rated and functional) | | |
| <input type="checkbox"/> N/A | <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance |
| Remarks | | |
| | | |
| 3. Tanks, Vaults, Storage Vessels | | |
| <input type="checkbox"/> N/A | <input type="checkbox"/> Good condition | <input type="checkbox"/> Proper secondary containment <input type="checkbox"/> Needs Maintenance |
| Remarks | | |
| | | |
| 4. Discharge Structure and Appurtenances | | |
| <input type="checkbox"/> N/A | <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance |
| Remarks | | |
| | | |
| 5. Treatment Building(s) | | |
| <input type="checkbox"/> N/A | <input type="checkbox"/> Good condition (esp. roof and doorways) | <input type="checkbox"/> Needs repair |
| <input type="checkbox"/> Chemicals and equipment properly stored | | |
| Remarks | | |
| | | |

Five-Year Review Site Inspection Checklist (Continued)

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 remedy for this OU is institutional controls with a vegetative cover.

Five-Year Review Site Inspection Checklist (Continued)

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.

Implementation of the Institutional Controls alternative required both short- and long-term actions, which are protective of human health and the environment. For the short-term, signs were posted at the Waste Unit, which indicate that this area contains hazardous substances. In addition, existing SRS access controls are used to maintain this site for industrial use only.

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.

N/A

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GENERAL SEPARATIONS AREA CONSOLIDATED UNIT

I. Introduction

The General Separations Area Consolidated Unit (GSACU) consists of four primary waste units: H-Area Retention Basin (HRB) (281-3H), Warner's Pond (685-23G), HP-52 Ponds, and the Old Radioactive Waste Burial Ground (ORWBG) (643-E), including 22 underground storage tanks (Old Solvent Tanks (OSTs) 650-01E through 650-22E). Collectively, these waste units are identified as a single operable unit (OU) because of their proximity to each other and similar health and environmental threats. Final remedial requirements have been consolidated under one final Record of Decision (ROD).

The unit is listed as a Resource Conservation and Recovery Act (RCRA) 3004(u) Solid Waste Management Unit/Comprehensive Environmental Response, Compensation, Liability Act (CERCLA) unit in Appendix C of the Federal Facility Agreement (FFA) for the Savannah River Site (SRS). The media associated with the GSACU are soil, sediment, and debris.

II. OU Chronology

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

Table 1. Chronology of OU Events

| Event | Date |
|---|--------------------|
| Interim Record of Decision (ROD) issuance - ORWBG | May 9, 1996 |
| Interim Remedial Action start | July 31, 1996 |
| RFI/RI Field Start for HRB | October 1, 1997 |
| Interim ROD issuance - OST | September 19, 2001 |
| RFI/RI Field Start for Warner's Pond | July 31, 2002 |
| RFI/RI Field Start for HP-52 Ponds | August 2, 2002 |
| Final ROD issuance - GSACU | October 2, 2002 |
| Previous Five-Year Reviews | None |

III. Background

The GSACU is located in the central portion of SRS, approximately six miles from the nearest SRS boundary (Figure 1). The GSACU consists of four primary waste units (Figure 2).

- H-Area Retention Basin (HRB) (281-3H), including Spill on 05/01/1956 of Unknown Amount of Retention Basin Pipe Leak,
- Warner's Pond (685-23G), including Spill on 03/08/1978 of Unknown Seepage Basin Pipe Leak in H-Area Seepage Basin and Spill on 02/08/1978 of H-Area Process Sewer Line Cave-In (also includes a portion of the H-Area Inactive Process Sewer Line [HIPSL] that was remediated in accordance with the RCRA Closure Plan),
- HP-52 Ponds (no building number [NBN]), and
- Old Radioactive Waste Burial Ground (ORWBG) (643-E), including 22 underground storage tanks (OSTs 650-01E through 650-22E).

Collectively, these waste units are identified as a single OU (Figure 1) because of their proximity to each other and similar health and environmental threats. Initially, the four waste units were being evaluated separately. The RCRA/CERCLA documents for HRB and the ORWBG were completed through the Corrective Measures Study/Feasibility Study (CMS/FS) stage, and it was determined that there was a preference to remove principal threat source material (PTSM) from HRB and place it at the ORWBG. At this point, PTSM was also identified at Warner's Pond and HP-52 Ponds during pre-characterization work. Given the similar health and environmental threats, similar geologic setting, and proximity of the units; United States Department of Energy (USDOE), South Carolina Department of Health and Environmental Control (SCDHEC), and United States Environmental Protection Agency (USEPA) agreed to consolidate HRB, Warner's Pond, HP-52 Ponds, and the ORWBG into a single OU to expedite remedial action.

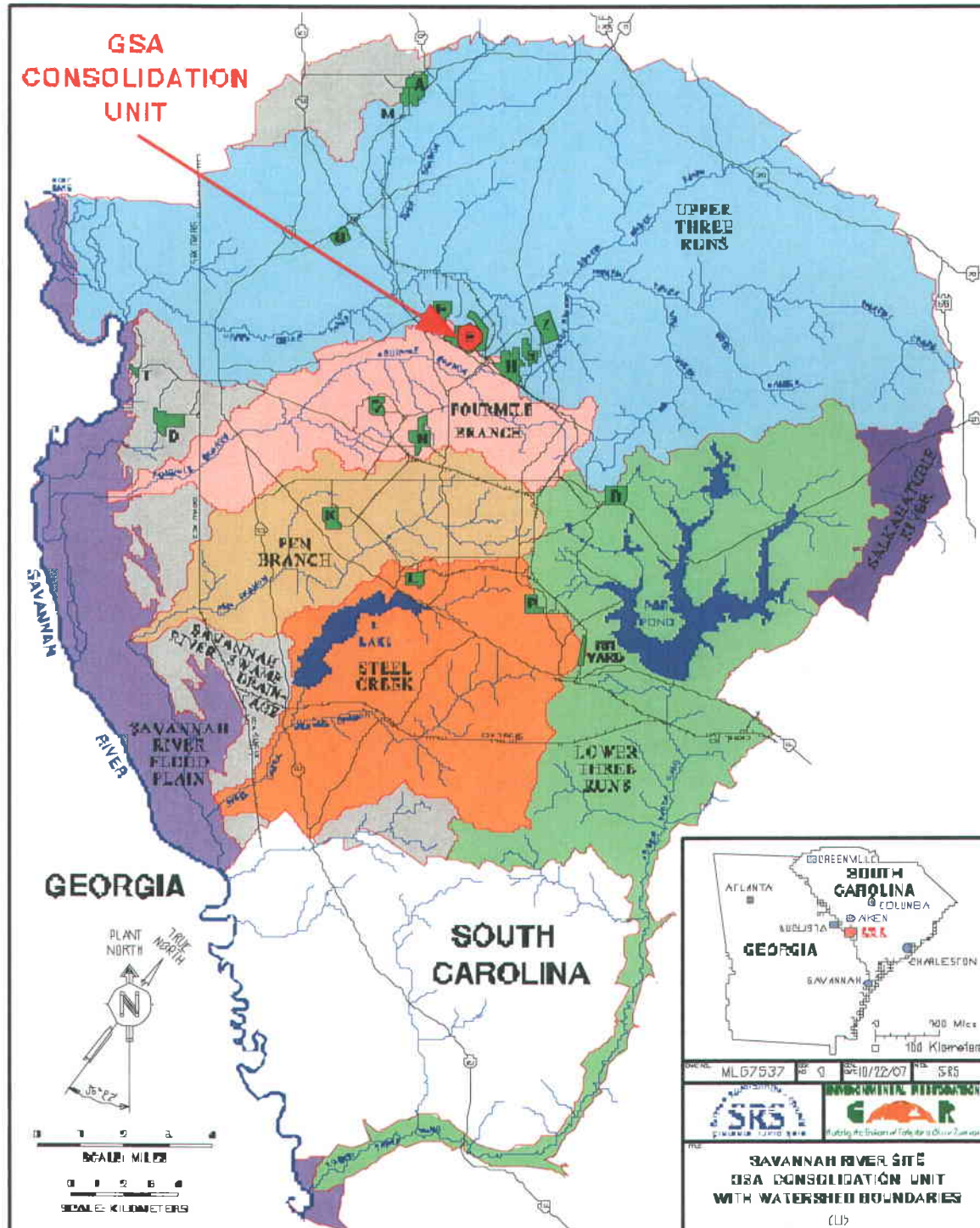


Figure 1. Location of the General Separations Area Consolidation Unit

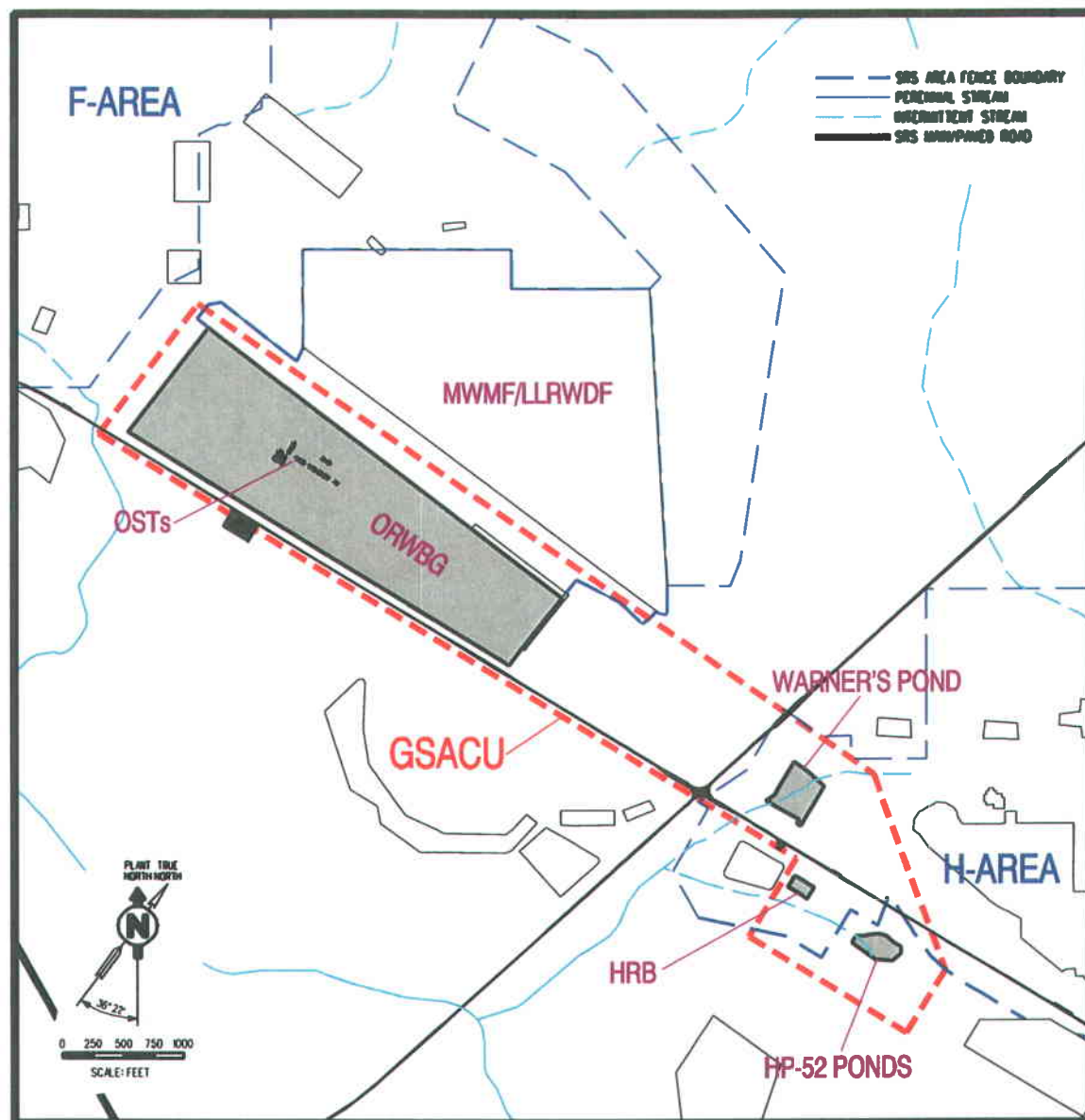


Figure 2. General Separations Area Consolidation Unit Four Primary Waste Units

HRB

Physical Characteristics

HRB (281-3H) is a single open inactive retention basin surrounded by a berm. HRB is 200 ft long by 120 ft wide by 7 ft deep.

History of Contamination

From 1955 to 1972, it received non-hazardous radioactively contaminated wastewater from chemical separations facilities and from the H-Area Tank Farm. Wastewater flowed from these facilities through an underground process sewer line to a diversion box that directed the waste stream to either HRB (281-3H) or a former retention basin (281-7H) located several hundred yards to the west at the location of the current operational retention basin (281-8H). The diversion box is still operational and is currently used to route wastewater to the operational retention basin 281-8H. The process sewer line from the diversion box to HRB is no longer in service and is part of the HRB unit. This segment is a 3-ft diameter concrete pipe 75 ft long. Drainage from HRB was via a 100-ft long, 3-ft diameter concrete pipe on the south side of the basin. The pipe discharged to a concrete spillway along an existing active effluent stream that flows from H Area to Fourmile Branch. The exact volumes of wastewater received at the basin and discharged from the basin are not known.

Initial Response

In May 1956, an undetermined volume of material leaked from the discharge gate on the south side of HRB. SRS constructed a temporary holding pond (approximately 45 x 45 ft) to contain the material. This area was identified as a site evaluation area (SEA) called "Spill on 05/01/1956 of Unknown Amount of Retention Basin Pipe Leak (NBN) (no building number)" and subsequently has been included in the HRB unit.

Warner's Pond

Physical Characteristics

Warner's Pond (685-23G) is approximately 4 acres in size and is centered on an area that was formerly occupied by a pond approximately 1 acre in size ("Former Pond").

History of Contamination

The pond was constructed in 1956 as an emergency holding pond to receive contaminated cooling water from the 221-H (H Canyon) building that flowed into an effluent stream. Contaminated cooling water was discharged to Warner's Pond on three occasions: 1956 (cooling coil leak), 1960 (source not determined), and 1965 (cooling coil leak that released approximately 300 curies [Ci] of activity). Contaminated water from all three events entered the pond via the effluent stream leading from H Area and was diverted or pumped to HRB or to the H-Area Seepage Basins. In 1966, Warner's Pond was drained, backfilled with clean soil, and paved with asphalt.

There are several inactive pipelines that run through the Warner's Pond area and are part of the unit. One is a RCRA-regulated pipeline known as the H-Area Inactive Process Sewer Line (HIPSL). The RCRA-HIPSL is a 18-inch diameter vitrified clay pipe through which liquid waste was transported from the H-Area Separations Facilities to the H-Area Seepage Basins. The RCRA-HIPSL is approximately 2 to 6 ft below land surface (bls) in the former pond area and approximately 4 to 10 ft bls on the north side of the railroad tracks. Facility records indicate the sewer line operated from 1955 to 1982. This effluent was characterized as hazardous due to mercury and chromium concentrations and low pH. No listed wastes were managed at the RCRA-HIPSL. There are approximately 1,250 ft of RCRA-HIPSL, several manholes, and a diversion box inside the Warner's Pond OU boundary.

The other two inactive process sewer lines (IPSLs) in the Warner's Pond waste unit ("CERCLA Inactive Pipe") are within the berms and are subject to CERCLA. One section of the CERCLA-IPSL is approximately 350 ft of reinforced concrete pipe, and the other section is approximately 230 ft of polyethylene pipe. The CERCLA-IPSLs were gravity-fed to the RCRA-HIPSL and are near grade within the berms. These pipelines adjoin the RCRA-HIPSL from a network of sewer lines (now inactive) that carried effluent to several non-RCRA regulated units (HRB [281-3H] and the former retention basin [281-7H]). This configuration provided the option to manage potentially radiologically contaminated effluent (non-RCRA contaminated cooling water from the chemical separations process and occasional contaminated storm sewer drainage from the H-Area Tank Farm) that was sent to two basins (281-3H and 281-7H) or diverted to the pipelines.

In 1978, two spills (overflows) from a diversion box along the then-active vitrified clay pipeline contaminated soils in the vicinity of the diversion box over an area at least 25 by 250 ft. This area was identified as a SEA called "Spill on 03/08/1978 of Unknown Seepage Basin Pipe Leak in H-Area Seepage Basin (NBN)" and subsequently has been included in the Warner's Pond unit.

Intital Response

There are also reports that 40 ft of a pipeline collapsed in 1978 just north of the railroad line at the northern part of Warner's Pond. A parallel bypass line was installed adjacent to the broken section, which was abandoned in place. The collapsed pipe was identified as a SEA called "Spill on 02/08/1978 of H-Area Process Sewer Line Cave-In (NBN)" and subsequently has been included in the Warner's Pond unit.

HP-52 Ponds

Physical Characteristics

The HP-52 Ponds waste unit (no building number) is a site approximately 1.1 acres in size and is centered on an area that was formerly occupied by two small holding ponds.

History of Contamination

In 1967, during a transfer of high level waste at the H-Area Tank Farm, some spilled material flowed into a nearby storm sewer and reached the HP-52 outfall. Two small holding ponds, referred to as the "HP-52 Cesium Ponds" or "HP-52 Ponds," were constructed to contain the contaminated water. Contaminated soil from the spill containing approximately 1,200 Ci of radioactivity was removed and shipped to the ORWBG. The stream banks below the HP-52 outfall were paved with asphalt to minimize contaminant migration from the soil to the stream.

A smaller spill occurred in 1969 when an H-Area Tank Farm waste transfer line ruptured and released high level waste to the storm sewer and outfall. After the 1969 spill, soil containing approximately 0.5 Ci of radioactivity was disposed of in the ORWBG. Following this event, the pond areas were filled with contaminated soil excavated from the stream banks and covered with clean backfill. Stream flow was diverted from the original effluent ditch ("Old Effluent Ditch") and re-directed around the former ponds area. The original effluent ditch was backfilled.

There is no historical evidence to document the exact locations of the former ponds at HP-52 Ponds. The former ponds area was inferred from the field locations of, and information associated with, two concrete waste site markers. Several soil piles are present at HP-52 Ponds, the result of soil movement at the unit to fill the pond areas, to backfill ditches, and to redirect the active regulated effluent ditch.

A pre-SRS historic drainage channel fed by stormwater runoff is present south of the former ponds area ("Historic Drainage Channel"). Beaver dams created a pond ("Former Beaver Pond") along the historic drainage channel.

Initial Response

During pre-characterization sampling, sediments beneath the former beaver pond were determined to be radiologically contaminated due to the HP-52 spills. The beaver dams were removed and the pond drained. As a result, the exposed materials are evaluated as soil.

ORWBG

Physical Characteristics

The ORWBG (643-G) is located in E Area directly south of the Low-Level Radioactive Waste Disposal Facility (LLRWDF) (643-7E) and the Mixed Waste Management Facility (MWMF) (643-28E). The ORWBG is bordered by SRS e Road on the south and F-Area on the west. The ORWBG is part of the central disposal area for solid radioactive waste at SRS known as the Burial Ground Complex (BGC).

Land and Resource Use

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.

History of Contamination

Waste was disposed of at the ORWBG from 1952 until 1974, when the site was essentially filled and the majority of waste disposal operations shifted to other facilities in the BGC.

The ORWBG is a 76-acre disposal area for solid radioactive waste produced at SRS, as well as for shipments from other USDOE and Department of Defense facilities. During its operational history, approximately 200,000 m³ (7,125,000 ft³) of radioactive wastes, including radioactively contaminated hazardous substances, were buried at depth within the ORWBG. Most wastes disposed of in the ORWBG were placed in drums, cans, cardboard boxes, plastic bags, and metal containers and then buried in earthen trenches approximately 6 m (20 ft) deep. Most waste was disposed of at the ORWBG from 1952 until 1972. In addition, small quantities of radioactive waste (contaminated primarily with transuranic isotopes) were disposed of in 1973 and 1974. At the time of burial, approximately 5.1 million Ci of radioactivity was placed in the ORWBG. Much of the short-lived radioactivity has decayed, but a large inventory of radioactive and hazardous substances remain buried at depth in the ORWBG.

The ORWBG consists of four distinct subunits:

- The ORWBG - a former disposal area for solid radioactive waste produced at the SRS and other 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 OSTs - 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 Ci per 20 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.

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 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).

Initial Response

USEPA, 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 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

Remedy Selection

The HRB was initially addressed in the ROD Remedial Alternative Selection for the H-Area Retention Basin (231-3H) (U) (WSRC-RP-97-189), which specified consolidation of contaminated media within the basin and installation of a low permeability cap. Upon the identification of PTSM at HRB and at Warner's Pond and the HP-52 Ponds, the remedial action was revised in the final ROD for the GSACU (WSRC-RP-2002-4002) to include removal of PTSM-contaminated media from HRB, Warner's Pond, and the HP-52 Ponds to the extent practicable and emplacement at the ORWBG where it would be placed under the low permeability cap. PTSM-contaminated media were excavated from the Warner's Pond, the HP-52, and the HRB (to the extent practicable) waste units and consolidated in the ORWBG waste placement areas. Low permeability geosynthetic covers were installed over the ORWBG, HRB, and Warner's Pond units and compacted soil backfill was placed over the excavated areas of HP-52 Ponds unit. The approved GSACU Post Construction Report/Corrective Measures Implementation Report/Remedial Action Completion Report (PCR/CMIR/RACR) (#WSRC-RP-2006-4067), Revision 1.0, discussed in detail how the contaminated media were removed, consolidated in the ORWBG, and the RAOs were met for the HRB, Warner's Pond, HP-52 Ponds, and the ORWBG waste units.

Remedy Implementation

The ORWBG was initially addressed in the Interim Record of Decision (IROD) for the ORWBG (WSRC-RP-96-102). The interim remedial action installed a temporary low-permeability soil cover to control contaminant migration by minimizing water infiltration.

The 22 OSTs were addressed in the IROD for the OSTs at the ORWBG (WSRC-RP-2000-4193). The tanks were emptied to the extent practical, residual fluids were

stabilized, and the tanks were filled with grout to stabilize them and allow for the placement and subsequent maintenance of a permanent cover.

The final remedial action for the ORWBG installed a low-permeability geosynthetic cover on top of the existing grade. The cover section has a nominal in-place saturated hydraulic conductivity of 1×10^{-7} cm/sec or less. The cover has 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. The mercury hot spot and the radioactive hot spots are addressed in the final ROD for the GSACU (WSRC-RP-2002-4002). The approved remedial action for the mercury hot spot and for the ORWBG as a whole is a low permeability cap and institutional controls. The approved remedial action for the long-lived persistent radioactive hot spots is the ORWBG low permeability cap and institutional controls with individual intruder barriers that are to be installed at a future time before the institutional controls at the ORWBG are terminated. The likely intruder barrier will be a heavy rip-rap placed over the low impermeability cap but beneath a soil cover.

V. Progress Since Last Review

The following actions have been completed:

- A final ROD has been approved to include remedial actions at HRB, Warner's Pond, HP-52 Ponds, and ORWBG.
- Remedial actions have been completed at HRB, Warner's Pond, and HP-52 Ponds.
- The OSTs have been stabilized in preparation for the final ORWBG cap.
- Installation of the ORWBG cover is in progress.

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
- Ensured that all actions required under the RCRA Permit were implemented

VII. Technical Assessment

The closure of HRB, Warner's Pond, and the HP-52 Ponds by removing media contaminated at PTSM levels, consolidating residual contaminated materials within the OU, and placing a protective soil cover over them has met the remedial objectives of preventing physical exposure to contaminants and mitigating further migration of contaminants to the groundwater.

The temporary soil cover on the ORWBG that was selected in the IROD has functioned as intended. The OSTs have been stabilized by with grout. The emplacement of PTSM-contaminated media from the above OUs into the ORWBG and the installation of a final geosynthetic cover system with institutional controls is expected to meet all remedial objectives when completed.

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. Project Costs

Costs associated with the selected remedy for the GSACU include operation and maintenance costs of the cover and institutional controls. The estimated operation and maintenance cost associated with the selected remedy is \$2,213,505. This estimate is an order-of-magnitude engineering cost estimate that is expected to be within +50 to -30 percent of the actual project cost. The remedy is currently under construction; therefore, the actual operation and maintenance cost for the GSACU cannot be assessed at this time.

XI. Protectiveness Statement(s)

The stabilization of the OSTs and the consolidation of contaminated materials from neighboring subunits into the ORWBG and the installation of a final geosynthetic cover are 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 SRS 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 completion of construction activities and turnover to Operations, the remedial actions are expected to be protective of human health and the environment.

XII. Next Review

The next five-year review is scheduled for February 12, 2014.

ATTACHMENT 1

List of Documents Reviewed

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

WSRC-RP-98-721, *Interim Measures/Interim Action Post-Construction Report for the Old Radioactive Waste Burial Ground (643-E) (U)*, Revision 0, 1999, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

WSRC-RP-2002-4002, *Record of Decision Remedial Alternative Selection for the General Separations Area Consolidation Unit (U)*, Redline Revision 0, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

WSRC-IM-91-53, *RCRA Part B Permit Renewal Application for the Mixed Waste Management Facility*, vol. 7, Mixed Waste Management Facility Post-closure, 1995, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

WSRC-RP-96-102, *Interim Record of Decision Remedial Alternative Selection Old Radioactive Waste Burial Ground (643-E) Savannah River Site*, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

WSRC-RP-97-146, *RFI/RI Work Plan Addendum for the H-Area Retention Basin Operable Unit (281-3H)*, Rev. 1.5, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

WSRC-RP-97-00127, *Workplan/RCRA Facility Investigation/Remedial Investigation Report for the Old Radioactive Waste Burial Ground 643-E, S01-S22*, Savannah River Site, Vol. I, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

WSRC-TR-97-00329, *Delineation of Potential "Hot Spots" for the Old Radioactive Waste Burial Ground (ORWBG)*, Rev. 0, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

ATTACHMENT 1 (Continued)

List of Documents Reviewed

WSRC-RP-98-4136, *RCRA Facility Investigation/ Remedial Investigation Report with Baseline Risk Assessment for the H-Area Retention Basin (281-3H)*, Rev. 1.1, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

WSRC-RP-98-4125, *Land Use Control Assurance Plan for the Savannah River Site*, Rev. 1.1, 1999, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

WSRC-RP-2000-4110, *Focused Corrective Measures Study/Feasibility Study for the H-Area Retention Basin (281-3H)*, Rev. 0, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

WSRC-RP-99-4023, *Addendum to the Workplan/RCRA Facility Investigation/ Remedial Investigation Report for the Old Radioactive Waste Burial Ground, 643-E, S01-S22*, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

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

WSRC-RP-2001-4048, *RCRA Facility Investigation/ Remedial Investigation Work Plan for Warner's Pond and HP-52 Ponds Operable Units*, Rev. 0, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

WSRC-RP-98-4012, *Corrective Measures Study/Feasibility Study for the Old Radioactive Waste Burial Ground, 643-E*, Rev. 1.1, 2002, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

WSRC-RP-2001-4267, *Statement of Basis/Proposed Plan for the General Separations Area Consolidation Unit*, Rev. 1, 2002, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

ATTACHMENT 1 (Continued)**List of Documents Reviewed**

WSRC-RP-97-189, *Record of Decision Remedial Alternative Selection for the H-Area Retention Basin (231-3H) (U)*, Revision 0, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

WSRC-RP-2000-4110, *Focused Corrective Measures Study/Feasibility Study for the H-Area Retention Basin (231-3H) (U)*, Revision 0, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

WSRC-RP-2003-4053, *Corrective Measures Implementation/Remedial Action Implementation Plan (CMI/RAIP) for the General Separations Area Consolidation Unit (U)*, Revision 1, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

WSRC-RP-98-00721, *Interim Measure/Interim Action Post-Construction Report (PCR) for the Old Radioactive Waste Burial Ground (643-E) (U)*, Revision 1, 2000, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

Environmental Restoration Standard Operating Procedures, "Waste Site Maintenance Inspections," ER-SOP-014, Washington Savannah River Company, Aiken, SC

Long Form Radiation Logsheet, OSR 4-17A

ATTACHMENT 2

Five-Year Review Site Inspection Checklist

| I. SITE INFORMATION | | | |
|--|--|--|--|
| Site Name: | General Separations Area Consolidated Unit | Date of Inspection: | 10/25/2007 |
| Location and Region: | SRS, USEPA Region IV | EPA ID: | SC1890008989 |
| Agency, office, or company leading the five-year review: | USDOE | CERCLIS No(s).: | 32,49.22,48 |
| | | Weather/Temperature: | |
| Remedy Includes: (Check all that apply) | | | |
| <input checked="" type="checkbox"/> Cover System <input type="checkbox"/> Monitored Natural Attenuation | | | |
| <input checked="" type="checkbox"/> Access controls <input type="checkbox"/> Groundwater Containment | | | |
| <input checked="" type="checkbox"/> Institutional Controls <input type="checkbox"/> Vertical Barrier Walls | | | |
| <input type="checkbox"/> Groundwater pump and treatment | | | |
| <input type="checkbox"/> Surface water collection and treatment | | | |
| <input checked="" type="checkbox"/> Other: <u>Excavation, disposal</u> | | | |
| Attachments: <input type="checkbox"/> Inspection team roster attached <input type="checkbox"/> Site map attached | | | |
| II. INTERVIEWS (Check all that apply) | | | |
| 1. O & M Site Manager | <u>Wayne Gleaton</u> (Name) | <u>Post Closure Manager</u> (Title) | <u>10-23-2007</u> (Date) |
| Interviewed: | <input type="checkbox"/> at site | <input type="checkbox"/> at office | <input checked="" type="checkbox"/> by phone Phone No. <u>803-557-8838</u> |
| Problems, suggestions: | <input type="checkbox"/> report attached _____ | | |
| 2. O & M Staff | <u>Richard Feagin</u> (Name) | <u>Post-Closure Waste Site Inspector/Maintenance Coord.</u> (Title) | <u>8-23-2007</u> (Date) |
| Interviewed: | <input type="checkbox"/> at site | <input type="checkbox"/> at office | <input checked="" type="checkbox"/> by phone Phone No. <u>803-952-4416</u> |
| Problems, suggestions: | <input type="checkbox"/> report attached _____ | | |

Third Five-Year Remedy Review Report (U)
General Separations Area Consolidated Unit
Savannah River Site, December 2008

WSRC-RP-2007-4063

Rev. 1.1

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Five-Year Review Site Inspection Checklist (Continued)

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

- | | | | |
|---|---|--|---|
| <input type="checkbox"/> O & M Manual | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A |
| <input checked="" type="checkbox"/> As-built drawings | <input checked="" type="checkbox"/> Readily available | <input checked="" type="checkbox"/> Up to date | <input type="checkbox"/> N/A |
| <input type="checkbox"/> Maintenance Logs | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A |

Remarks: See Waste Unit Inspection and Maintenance, ER-SOP-019

Five-Year Review Site Inspection Checklist (Continued)

| | | | | | | |
|---|--|--|--|---|--|---|
| 2. Site-Specific Health and Safety Plan | | | | <input checked="" type="checkbox"/> Readily available | <input checked="" type="checkbox"/> Up to date | <input type="checkbox"/> N/A |
| <input checked="" type="checkbox"/> Contingency plan/emergency response plan | | | | <input checked="" type="checkbox"/> Readily available | <input checked="" type="checkbox"/> Up to date | <input type="checkbox"/> N/A |
| Remarks: <u>Project activities – Subcontractor Project Safety & Health Description for GSACU-contract #QBOOY37K, T&FW Project 2919. Routine O&M activities do not require a SSHASP under 29 CFR 1910.120, HAZWOPER. A SSHASP is prepared in needed.</u> | | | | | | |
| 3. O & M and OSHA Training Records | | | | <input checked="" type="checkbox"/> Readily available | <input checked="" type="checkbox"/> Up to date | <input type="checkbox"/> N/A |
| Remarks _____ | | | | | | |
| 4. Permits and Service Agreements | | | | | | |
| <input type="checkbox"/> Air discharge permit | | | | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A |
| <input type="checkbox"/> Effluent discharge | | | | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A |
| <input type="checkbox"/> Waste Disposal, POTW | | | | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A |
| <input checked="" type="checkbox"/> Other permits (<i>SeeRemarks</i>) | | | | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input type="checkbox"/> N/A |
| Remarks: <u>RCRA Part B Permit.</u> | | | | | | |
| 5. Gas Generation Records | | | | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A |
| Remarks _____ | | | | | | |
| 6. Settlement Monument Records | | | | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A |
| Remarks _____ | | | | | | |
| 7. Groundwater Monitoring Records | | | | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A |
| Remarks: _____ | | | | | | |
| 8. Leachate Extraction Records | | | | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A |
| Remarks _____ | | | | | | |
| 9. Discharge Compliance Records | | | | | | |
| <input type="checkbox"/> Air | | | | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A |
| <input type="checkbox"/> Water (effluent) | | | | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A |
| Remarks _____ | | | | | | |
| 10. Daily Access/Security Logs | | | | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A |
| Remarks _____ | | | | | | |

Five-Year Review Site Inspection Checklist (Continued)

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: Project cost data is summarized in Section X of attached review: WSRC-RP-2007-4063.

Total annual cost by year for review period if available

| | | | |
|----------------------|--------------------|------------|---|
| From _____ (Date) | To _____ (Date) | _____ | <input type="checkbox"/> Breakdown attached |
| | | Total cost | |
| From _____ (Date) | To _____ (Date) | _____ | <input type="checkbox"/> Breakdown attached |
| | | Total cost | |
| From _____ (Date) | To _____ (Date) | _____ | <input type="checkbox"/> Breakdown attached |
| | | Total cost | |
| From _____ (Date) | To _____ (Date) | _____ | <input type="checkbox"/> Breakdown attached |
| | | Total cost | |
| From _____ (Date) | To _____ (Date) | _____ | <input type="checkbox"/> Breakdown attached |
| | | Total cost | |

3. 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: Fencing is in good condition.

Five-Year Review Site Inspection Checklist (Continued)

| | | | | |
|--|-------------------------|--|-------------------|-----------------------------|
| B. Other Access Restrictions | | | | |
| 1. Signs and Other Security Measures <input type="checkbox"/> Location shown on site map <input type="checkbox"/> N/A | | | | |
| Remarks: <u>Signs at this site are in good condition.</u> | | | | |
| C. Institutional Controls | | | | |
| 1. Implementation and enforcement | | | | |
| Site conditions imply ICs not properly implemented: | | <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A | | |
| Site conditions imply ICs not being fully enforced: | | <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A | | |
| Type of monitoring (e.g., self-reporting, drive-by): | | Under construction | | |
| Frequency: | TBD | | | |
| Responsible party/agent: | DOE | | | |
| Contact: | Diana Hannah, (Name) | Waste Area Group Manager (Title) | 09/3/07 (Date) | 803-952-7813 (Phone No.) |
| Reporting is up-to-date: | | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A | | |
| Reports are verified by the lead agency: | | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A | | |
| Specific requirements in deed of decision documents have been met: | | <input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A | | |
| Violations have been reported: | | <input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A | | |
| Other problems or suggestions: | | <input type="checkbox"/> Report attached | | |
| <hr/> | | | | |
| 2. Adequacy <input checked="" type="checkbox"/> ICs are adequate <input type="checkbox"/> ICs are inadequate <input type="checkbox"/> N/A | | | | |
| Remarks: <hr/> | | | | |
| D. General | | | | |
| 1. Vandalism/Trespassing <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> No vandalism evident | | | | |
| Remarks: <hr/> | | | | |
| 2. Land Use Changes Onsite <input checked="" type="checkbox"/> N/A | | | | |
| Remarks: <hr/> | | | | |

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| | | | |
|--|--|--|--|
| 3. Land Use Changes Offsite <input checked="" type="checkbox"/> N/A Remarks _____ _____ | | | |
| VI. GENERAL SITE CONDITIONS | | | |
| A. Roads <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A | | | |
| 1. Roads Damaged <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Roads adequate <input type="checkbox"/> N/A Remarks _____ _____ | | | |
| B. Other Site Conditions Remarks _____ _____ | | | |
| VII. COVERS SYSTEMS <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A | | | |
| A. Landfill Surface | | | |
| 1. Settlement (Low spots) <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Settlement not evident Areal extent _____ Depth _____ Remarks: _____ _____ | | | |
| 2. Cracks <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Cracking not evident Lengths _____ Widths _____ Depths _____ Remarks _____ _____ | | | |
| 3. Erosion <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Erosion not evident Areal extent _____ Depth _____ Remarks _____ _____ | | | |
| 4. Holes <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Holes not evident Areal extent _____ Depth _____ Remarks _____ _____ | | | |
| 5. Vegetative Cover <input type="checkbox"/> Grass <input type="checkbox"/> Cover properly established <input type="checkbox"/> No signs of stress <input type="checkbox"/> Trees/shrubs (indicate size and location on a diagram) Remarks: <u>Cover is recently completed and grass is not fully established yet.</u> _____ | | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | |
|--|---|--------------------|
| 6. Alternative Cover (armored rock, concrete, etc.) <input type="checkbox"/> N/A | | |
| Remarks: _____ | | |
| 7. Bulges <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Bulges not evident | | |
| Areal extent _____ Height _____ | | |
| Remarks _____ | | |
| 8. Wet Areas/Water Damage <input checked="" type="checkbox"/> Wet areas/water damage not evident | | |
| <input type="checkbox"/> Wet Areas | <input type="checkbox"/> Location shown on site map | Areal extent _____ |
| <input type="checkbox"/> Ponding | <input type="checkbox"/> Location shown on site map | Areal extent _____ |
| <input type="checkbox"/> Seeps | <input type="checkbox"/> Location shown on site map | Areal extent _____ |
| <input type="checkbox"/> Soft subgrade | <input type="checkbox"/> Location shown on site map | Areal extent _____ |
| Remarks _____ | | |
| 9. Slope Instability <input type="checkbox"/> Slides <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> No evidence of slope instability | | |
| Areal extent _____ | | |
| Remarks _____ | | |
| B. Benches <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> 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 <input type="checkbox"/> Location shown on site map <input type="checkbox"/> N/A or okay | | |
| Remarks _____ | | |
| 2. Bench Breached <input type="checkbox"/> Location shown on site map <input type="checkbox"/> N/A or okay | | |
| Remarks _____ | | |
| 3. Bench Overtopped <input type="checkbox"/> Location shown on site map <input type="checkbox"/> N/A or okay | | |
| Remarks _____ | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | |
|--|---|--|
| C. Letdown Channels <input type="checkbox"/> Applicable <input type="checkbox"/> 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 | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> No evidence of settlement |
| Areal extent _____ Depth _____ Remarks _____ | | |
| 2. Material Degradation | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> No evidence of degradation |
| Material type _____ Areal extent _____ Remarks _____ | | |
| 3. Erosion | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> No evidence of erosion |
| Areal extent _____ Depth _____ Remarks _____ | | |
| 4. Undercutting | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> No evidence of undercutting |
| Areal extent _____ Depth _____ Remarks _____ | | |
| 5. Obstructions | Type _____ <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> No obstructions Areal extent _____ Size _____ |
| Remarks _____ | | |
| 6. Excessive Vegetative Growth | Type _____ <input type="checkbox"/> No evidence of excessive growth <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> Vegetation in channels does not obstruct flow Areal extent _____ |
| Remarks _____ | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | | |
|--|--|---|---|
| D. Cover Penetrations <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A | | | |
| 1. Gas Vents <input type="checkbox"/> Active <input type="checkbox"/> Passive | | | |
| <input type="checkbox"/> Properly secured/locked | <input type="checkbox"/> Functioning | <input type="checkbox"/> Routinely sampled | <input type="checkbox"/> Good condition |
| <input type="checkbox"/> Evidence of leakage at penetration | <input type="checkbox"/> Needs Maintenance | <input type="checkbox"/> N/A | |
| Remarks _____ | | | |
| 2. Gas Monitoring Probes | | | |
| <input type="checkbox"/> Properly secured/locked | <input type="checkbox"/> Functioning | <input type="checkbox"/> Routinely sampled | <input type="checkbox"/> Good condition |
| <input type="checkbox"/> Evidence of leakage at penetration | <input type="checkbox"/> Needs Maintenance | <input type="checkbox"/> N/A | |
| Remarks _____ | | | |
| 3. Monitoring Wells (within surface area of landfill) | | | |
| <input type="checkbox"/> Properly secured/locked | <input type="checkbox"/> Functioning | <input type="checkbox"/> Routinely sampled | <input type="checkbox"/> Good condition |
| <input type="checkbox"/> Evidence of leakage at penetration | <input type="checkbox"/> Needs Maintenance | <input type="checkbox"/> N/A | |
| Remarks _____ | | | |
| 4. Leachate Extraction Wells | | | |
| <input type="checkbox"/> Properly secured/locked | <input type="checkbox"/> Functioning | <input type="checkbox"/> Routinely sampled | <input type="checkbox"/> Good condition |
| <input type="checkbox"/> Evidence of leakage at penetration | <input type="checkbox"/> Needs Maintenance | <input type="checkbox"/> N/A | |
| Remarks _____ | | | |
| 5. Settlement Monuments <input type="checkbox"/> Located <input type="checkbox"/> Routinely surveyed <input type="checkbox"/> N/A | | | |
| Remarks _____ | | | |
| E. Gas Collection and Treatment <input type="checkbox"/> Applicable <input type="checkbox"/> N/A | | | |
| 1. Gas Treatment Facilities | | | |
| <input type="checkbox"/> Flaring | <input type="checkbox"/> Thermal destruction | <input type="checkbox"/> Collection for reuse | |
| <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance | | |
| Remarks _____ | | | |
| 2. Gas Collection Wells, Manifolds and Piping | | | |
| <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance | | |
| Remarks _____ | | | |

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| | | | |
|---|--|--|--|
| 3. Gas Monitoring Facilities (e.g., gas monitoring of adjacent homes or buildings) | | | |
| <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A | | | |
| Remarks _____ | | | |
| F. Cover Drainage Layer <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A | | | |
| 1. Outlet Pipes Inspected <input checked="" type="checkbox"/> Functioning <input type="checkbox"/> N/A | | | |
| Remarks: <u>Drainage is along edges, no pipe</u> | | | |
| 2. Outlet Rock Inspected <input type="checkbox"/> Functioning <input type="checkbox"/> N/A | | | |
| Remarks _____ | | | |
| G. Detention/sedimentation Ponds <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A | | | |
| 1. Siltation Areal extent _____ | | Depth _____ <input type="checkbox"/> N/A | |
| <input type="checkbox"/> Siltation not evident | | | |
| Remarks _____ | | | |
| 2. Erosion Areal extent _____ | | Depth _____ <input type="checkbox"/> N/A | |
| <input type="checkbox"/> Erosion not evident | | | |
| Remarks _____ | | | |
| 3. Outlet Works <input type="checkbox"/> Functioning <input type="checkbox"/> N/A | | | |
| Remarks _____ | | | |
| 4. Dam <input type="checkbox"/> Functioning <input type="checkbox"/> N/A | | | |
| Remarks _____ | | | |
| H. Retaining Walls <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A | | | |
| 1. Deformations <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Deformation not evident | | | |
| Horizontal displacement _____ | | Vertical displacement _____ | |
| Rotational displacement _____ | | | |
| Remarks _____ | | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | |
|---|--|--|
| 2. Degradation <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Deformation not evident | | |
| Remarks _____ | | |
| I. Perimeter Ditches/Off-Site Discharge <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A | | |
| 1. Siltation <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Siltation not evident | | |
| Areal extent _____ Depth _____ | | |
| Remarks _____ | | |
| 2. Vegetative Growth <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Siltation not evident | | |
| <input type="checkbox"/> Vegetation does not impede flow | | |
| Areal extent _____ Type _____ | | |
| Remarks _____ | | |
| 3. Erosion <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Erosion not evident | | |
| Areal extent _____ Depth _____ | | |
| Remarks _____ | | |
| 4. Discharge Structure <input type="checkbox"/> Location shown on site map <input type="checkbox"/> N/A | | |
| Remarks _____ | | |
| VIII. VERTICAL BARRIER WALLS <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A | | |
| 1. Settlement <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Settlement not evident | | |
| Areal extent _____ Depth _____ | | |
| Remarks _____ | | |
| 2. Performance Monitoring Type of Monitoring _____ <input type="checkbox"/> Performance not monitored | | |
| Frequency _____ <input type="checkbox"/> Evidence of breaching Head differential _____ | | |
| Remarks _____ | | |

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| | | | |
|--|--|-------------------------------------|---|
| IX. GROUNDWATER/SURFACE WATER REMEDIES | | <input type="checkbox"/> Applicable | <input checked="" type="checkbox"/> N/A |
| A. Groundwater Extraction Wells, Pumps, and Pipelines | | <input type="checkbox"/> Applicable | <input type="checkbox"/> N/A |
| 1. Pumps, Wellhead Plumbing, and Electrical <input type="checkbox"/> Good condition <input type="checkbox"/> All required wells located <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A Remarks _____ | | | |
| 2. Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____ | | | |
| 3. Spare Parts and Equipment <input type="checkbox"/> Readily available <input type="checkbox"/> Good condition <input type="checkbox"/> Requires upgrade <input type="checkbox"/> Needs to be provided Remarks _____ | | | |
| B. Surface Water Collection Structures, Pumps, and Pipelines | | <input type="checkbox"/> Applicable | <input type="checkbox"/> N/A |
| 1. Collection Structures, Pumps, and Electrical <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____ | | | |
| 2. Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____ | | | |
| 3. Spare Parts and Equipment <input type="checkbox"/> Readily available <input type="checkbox"/> Good condition <input type="checkbox"/> Requires upgrade <input type="checkbox"/> Needs to be provided Remarks _____ | | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | |
|---|--|--|
| C. Treatment System <input type="checkbox"/> Applicable <input type="checkbox"/> N/A | | |
| 1. Treatment Train (Check components that apply) | | |
| <input type="checkbox"/> Metals removal | <input type="checkbox"/> Oil/water separation | <input type="checkbox"/> Bioremediation |
| <input type="checkbox"/> Air stripping | <input type="checkbox"/> Carbon adsorbers | |
| <input type="checkbox"/> Filters _____ | | |
| <input type="checkbox"/> Additive (e.g., chelation agent, flocculent) _____ | | |
| <input type="checkbox"/> Others _____ | | |
| <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance | |
| <input type="checkbox"/> Sampling ports properly marked and functional | | |
| <input type="checkbox"/> Sampling/maintenance log displayed and up to date | | |
| <input type="checkbox"/> Equipment properly identified | | |
| <input type="checkbox"/> Quantity of groundwater treated annually _____ | | |
| <input type="checkbox"/> Quantity of surface water treated annually _____ | | |
| Remarks _____ | | |
| 2. Electrical Enclosures and Panels (properly rated and functional) | | |
| <input type="checkbox"/> N/A | <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance |
| Remarks _____ | | |
| 3. Tanks, Vaults, Storage Vessels | | |
| <input type="checkbox"/> N/A | <input type="checkbox"/> Good condition | <input type="checkbox"/> Proper secondary containment <input type="checkbox"/> Needs Maintenance |
| Remarks _____ | | |
| 4. Discharge Structure and Appurtenances | | |
| <input type="checkbox"/> N/A | <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance |
| Remarks _____ | | |
| 5. Treatment Building(s) | | |
| <input type="checkbox"/> N/A | <input type="checkbox"/> Good condition (esp. roof and doorways) | <input type="checkbox"/> Needs repair |
| <input type="checkbox"/> Chemicals and equipment properly stored | | |
| Remarks _____ | | |

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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.).

The closure of HRB, Warner's Pond, and the HP-52 Ponds by removing media contaminated at PTSM levels, consolidating residual contaminated materials within the OU and placing a protective soil cover over them has met the remedial objectives of preventing physical exposure to contaminants and mitigating further migration of contaminants to the groundwater.

The temporary soil cover on the ORWBG that was selected in the IAROD has functioned as intended. The OSTs have been stabilized by filling them with grout. The emplacement of PTSM contaminated media from the above OUs into the ORWBG and the installation of a final geosynthetic cover system with institutional controls is expected to meet all remedial objectives when completed

Five-Year Review Site Inspection Checklist (Continued)

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.

The remedial systems are under construction. O&M requirements are outlined in the LUCIP.

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.

N/A

H-AREA GROUNDWATER OPERABLE UNIT

I. Introduction

The review for this unit is conducted under the Savannah River Site (SRS) Resource Conservation and Recovery Act (RCRA) program. The Comprehensive Environmental Response, Compensation, and Liability Act (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 third such five-year review for the H-Area Groundwater Operable Unit (OU). This review was conducted from August 2007 through September 2007 and documents the results of the review.

II. OU Chronology

Table 1 lists the chronology of site events for the H-Area Groundwater OU.

Table 1. Chronology of OU Events

| Event | Date |
|--|----------------------------------|
| RCRA Closure Plan Approved | 1989 |
| Corrective Action start | 1989 |
| RCRA Closure Certified | 1991 |
| Interim Record of Decision (IROD) issuance | April 13, 1995 |
| Field Start | August 16, 2001 |
| Previous Five-Year Reviews | June 30, 1997, February 12, 2004 |

III. Background

Physical Characteristics

The H-Area Groundwater OU is a media-specific OU within the Fourmile Branch Watershed (Figure 1). The H-Area Groundwater OU is the groundwater associated with the H-Area Hazardous Waste Management Facility (HWMF). The basins comprising the H-Area HWMF were stabilized and closed in 1991.

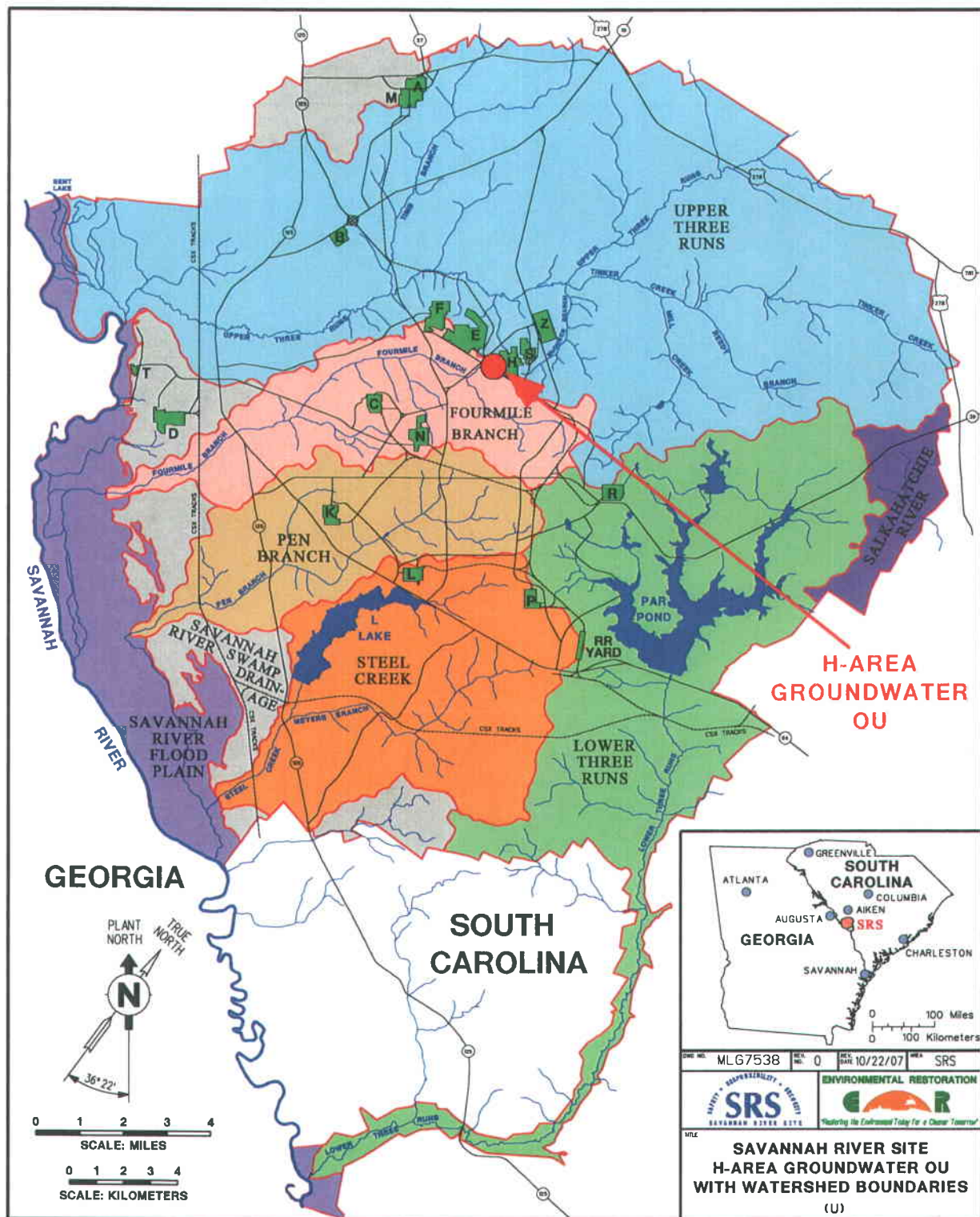


Figure 1. Location of the H-Area Groundwater OU

Land and Resource Use

The H-Area Groundwater OU is located in an industrial area that is proposed for continued industrial use as supported by the proposed land use map for SRS.

History of Contamination

The H-Area HWMF operated from 1955 until 1988. During that time, the facility 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. Tritium was the primary radionuclide released to the basins.

Initial Response

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 site boundary, by natural attenuation and radionuclide decay, by institutional controls, and by dilution in receiving streams. 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. Remedial Actions

Remedy Selection

The selected remedy for this unit as identified in the Interim Record of Decision (IROD) is no further action under CERCLA beyond that required by the SRS RCRA Permit.

Remedy Implementation

The initial remedy described in the 1992 RCRA permit provides for recovery of contaminated groundwater via extraction wells and treatment of hazardous constituents and radionuclides (except tritium and nitrates). The treated water was injected into the shallow aquifer at the upgradient extent of the groundwater plume. The water treatment system operated for six years. During that period, additional investigation and pilot studies established that the groundwater impacted by the H-Area Seepage Basins was following relatively narrow preferential pathways to the wetlands adjacent to Fourmile Branch. Although the extraction/treatment/reinjection systems functioned as designed, the reinjection of treated water has contributed to much lower plume capture efficiency than expected.

Operations and Maintenance

A Phase 2 Corrective Action Plan (CAP) was approved that included the replacement of the extraction/injection process with new technologies that are designed to reduce the flux of contaminants to Fourmile Branch. Engineered underground barrier walls totaling 3,200 ft in length have been constructed across the upgradient and downgradient sides of the H-4 basin. The barrier walls are intended to reduce the hydraulic gradient under the basin, slowing the transport of contaminants downgradient. The slowing of contaminant transport is expected to reduce the flux of contaminants to Fourmile Branch.

V. Progress Since Last Review

This is the third five-year review for this OU. The following actions have been completed:

- In January 2000, the Core Team agreed to modify the boundaries of the H-Area Groundwater OU to include groundwater impacted by the H-Area Retention Basins, Warner's Pond, and the HP-52 Ponds. A groundwater monitoring program was

subsequently established to define the nature and extent of contamination in the Upper Three Runs and Gordon aquifers of the H-Area Groundwater OU.

- In March 2003 SRS submitted a revised CAP to SCDHEC.
- In October 2003, SCDHEC provided conditional approval to suspend the H-Area water treatment unit (WTU) and to begin preparations to install replacement remediation technologies consisting of engineered tritium barriers to address both creek/seepline and groundwater contamination. On October 8, 2003, the H-Area WTU was placed in safe standby condition.
- In December 2004, the H-Area Barrier Walls were completed. Two walls totaling 3,200 ft long were constructed using a deep soil mixer to inject low permeability amendments into the soil to a depth of 120 ft and a thickness of 2 ft. One wall was installed on the upgradient side of basin H-4 and the second wall was installed on the downgradient side.

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
- Ensured that all actions required under the RCRA Permit were implemented

VII. Technical Assessment

The groundwater extraction/treat/reinjection remedial system functioned as designed and met Phase 1 objectives. The installation of the barrier walls is complete and they are functioning as designed. The concept is supported by hydrogeological studies and is expected to meet Phase 2 objectives.

Groundwater monitoring is continuing in accordance with the CAP.

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. Project Costs

Costs associated with the selected remedy for H-Area Groundwater include operation and maintenance costs of the RCRA Pump-Treat-Inject remedy and institutional controls. RCRA documentation does not require estimated project costs to be prepared. Therefore, none are included in this remedy review.

It should be noted that the Pump-Treat-Inject system stopped operating in 2003 and was replaced with an in-situ barrier and base injection remedy.

XI. Protectiveness Statement(s)

The remedy of subsurface barrier walls on the upgradient and downgradient sides of the H-4 seepage basin to control the flow of contaminated groundwater, supported by ongoing monitoring of groundwater quality in the vicinity of the H-Area Retention Basin, Warner's Pond, the HP-52 Ponds, and the seep line at Fourmile Branch are expected to be protective of human health and the environment.

XII. Next Review

The next five-year review is scheduled for February 12, 2014.

ATTACHMENT 1

List of Documents Reviewed

WSRC-RP-94-1163, *Interim Action Record of Decision Remedial Alternative Selection for H-Area Groundwater Operable Unit (U)*, Revision 1, 1994, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

WSRC-RP-2000-4144, *RFI/RI Work Plan for the H-Area Groundwater Operable Unit (U)*, Revision 1.1, 2001, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

WSRC-RP-2003-4111 & -4112, *F and H-Area Hazardous Waste Management Facilities Annual Corrective Action Reports (U)*, (1st and 2nd Quarters 2003), Volume II, 2003, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

WSRC-RP-2002-4213 & -4214, *F and H-Area Hazardous Waste Management Facilities Annual Corrective Action Reports (U)*, (3rd and 4th Quarters 2003), Volumes I & II, 2003, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

WSRC-RP-2002-4012, *F-Area Hazardous Waste Management Facilities Annual Corrective Action Reports (U)*, (3rd and 4th Quarters 2001), Volume I, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

WSRC-RP-2004-4099, *Semi-Annual Corrective Action Report for the F-Area Hazardous Waste Management Facility, the H-Area Hazardous Waste Management Facility, and the Mixed Waste Management Facility (U)*, Volumes I & II, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

WSRC-RP-2005-4011, *Annual Corrective Action Report for the F-Area Hazardous Waste Management Facility, the H-Area Hazardous Waste Management Facility, and the Mixed Waste Management Facility (U)*, Volume I, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

ATTACHMENT 1 (Continued)

List of Documents Reviewed

WSRC-RP-2005-4069, *Semi-Annual Corrective Action Report for the F-Area Hazardous Waste Management Facility, the H-Area Hazardous Waste Management Facility, and the Mixed Waste Management Facility (U)*, Volume I, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

WSRC-RP-2006-4011, *Annual Corrective Action Report for the F-Area Hazardous Waste Management Facility, the H-Area Hazardous Waste Management Facility, and the Mixed Waste Management Facility (U)*, Volume I, Washington Savannah River Company, Savannah River Site, Aiken, SC

WSRC-RP-2007-4002, *Annual Corrective Action Report for the F-Area Hazardous Waste Management Facility, the H-Area Hazardous Waste Management Facility, and the Mixed Waste Management Facility (U)* Volume I, Washington Savannah River Company, Savannah River Site, Aiken, SC

WSRC-RP-2003-4177, *F and H Area Seepage Basins Groundwater Barrier Wall Construction Detail (U)*, Rev. 0, November 2003, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

ATTACHMENT 2

Five-Year Review Site Inspection Checklist

| I. SITE INFORMATION | | | |
|---|--|--|---|
| Site Name: | H-Area Groundwater | Date of Inspection: | 10/25/2007 |
| Location and Region: | SRS, USEPA Region IV | EPA ID: | SC1890008989 |
| Agency, office, or company leading the five-year review: | USDOE | CERCLIS No.: | CNA |
| | | Weather/Temperature: | |
| Remedy Includes: (Check all that apply) <div style="display: flex; flex-wrap: wrap;"> <div style="width: 50%;"> <input type="checkbox"/> Cover System <input checked="" type="checkbox"/> Access controls <input checked="" type="checkbox"/> Institutional Controls <input checked="" type="checkbox"/> Groundwater pump and treatment <input type="checkbox"/> Surface water collection and treatment <input type="checkbox"/> Other: _____ </div> <div style="width: 50%;"> <input type="checkbox"/> Monitored Natural Attenuation <input type="checkbox"/> Groundwater Containment <input checked="" type="checkbox"/> Vertical Barrier Walls </div> </div> | | | |
| Attachments: <input type="checkbox"/> Inspection team roster attached <input type="checkbox"/> Site map attached | | | |
| II. INTERVIEWS (Check all that apply) | | | |
| 1. O & M Site Manager | <u>Wayne Gleaton</u> (Name) | <u>Post Closure Manager</u> (Title) | <u>10-23-2007</u> (Date) |
| Interviewed: | <input type="checkbox"/> at site | <input type="checkbox"/> at office | <input checked="" type="checkbox"/> by phone Phone No. <u>803-557-8838</u> |
| Problems, suggestions: | <input type="checkbox"/> report attached _____ | | |
| 2. O & M Staff | <u>Richard Feagin</u> (Name) | <u>Post-Closure Waste Site Inspector/Maintenance Coord.</u> (Title) | <u>8-23-2007</u> (Date) |
| Interviewed: | <input type="checkbox"/> at site | <input type="checkbox"/> at office | <input checked="" type="checkbox"/> by phone Phone No. <u>803-952-4416</u> |
| Problems, suggestions: | <input type="checkbox"/> report attached _____ | | |

Five-Year Review Site Inspection Checklist (Continued)

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

| | | | |
|---|--|-------------------------------------|------------------------------|
| <input type="checkbox"/> O & M Manual | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |
| x As-built drawings | x Readily available | x Up to date | <input type="checkbox"/> N/A |
| <input type="checkbox"/> Maintenance Logs | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |

Remarks: _____

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| | | | |
|---|---|--|---|
| 2. Site-Specific Health and Safety Plan | | | |
| <input checked="" type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input type="checkbox"/> N/A | |
| <input checked="" type="checkbox"/> Contingency plan/emergency response plan | <input checked="" type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input type="checkbox"/> N/A |
| Remarks: <u>Routine O&M activities do not require a SSHASP under 29 CFR 1910.120, HAZWOPER. A SSHASP is prepared in needed.</u> | | | |
| 3. O & M and OSHA Training Records | | | |
| <input checked="" type="checkbox"/> Readily available | <input checked="" type="checkbox"/> Up to date | <input type="checkbox"/> N/A | |
| Remarks: _____ | | | |
| 4. Permits and Service Agreements | | | |
| <input type="checkbox"/> Air discharge permit | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A |
| <input type="checkbox"/> Effluent discharge | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A |
| <input type="checkbox"/> Waste Disposal, POTW | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A |
| <input checked="" type="checkbox"/> Other permits (See Remarks) | <input checked="" type="checkbox"/> Readily available | <input checked="" type="checkbox"/> Up to date | <input type="checkbox"/> N/A |
| Remarks: <u>RCRA Part B Permit.</u> | | | |
| 5. Gas Generation Records | | | |
| <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A | |
| Remarks: _____ | | | |
| 6. Settlement Monument Records | | | |
| <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A | |
| Remarks: _____ | | | |
| 7. Groundwater Monitoring Records | | | |
| <input checked="" type="checkbox"/> Readily available | <input checked="" type="checkbox"/> Up to date | <input type="checkbox"/> N/A | |
| Remarks: _____ | | | |
| 8. Leachate Extraction Records | | | |
| <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A | |
| Remarks: _____ | | | |
| 9. Discharge Compliance Records | | | |
| <input type="checkbox"/> Air | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A |
| <input type="checkbox"/> Water (effluent) | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A |
| Remarks: _____ | | | |
| 10. Daily Access/Security Logs | | | |
| <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A | |
| Remarks: _____ | | | |

Five-Year Review Site Inspection Checklist (Continued)

IV. O & M Costs

1. O & M Organization

- ☐ State in-house ☐ Contractor for State
☐ PRP in-house ☐ Contractor for PRP
x Other: SRS

2. O & M Cost Records

- ☐ Readily available ☐ Up to date ☐ Funding mechanism/agreement in place
x Other: Project cost data is summarized in Section X of attached review: WSRC-RP-2007-4063.

Total annual cost by year for review period if available

| | | | |
|------------|----------|------------|---|
| From _____ | To _____ | _____ | <input type="checkbox"/> Breakdown attached |
| (Date) | (Date) | Total cost | |
| From _____ | To _____ | _____ | <input type="checkbox"/> Breakdown attached |
| (Date) | (Date) | Total cost | |
| From _____ | To _____ | _____ | <input type="checkbox"/> Breakdown attached |
| (Date) | (Date) | Total cost | |
| From _____ | To _____ | _____ | <input type="checkbox"/> Breakdown attached |
| (Date) | (Date) | Total cost | |
| From _____ | To _____ | _____ | <input type="checkbox"/> Breakdown attached |
| (Date) | (Date) | Total cost | |

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

Describe costs and reasons: _____

V. ACCESS AND INSTITUTIONAL CONTROLS

x Applicable ☐ N/A

A. Fencing

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

Remarks _____

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B. Other Access Restrictions

1. **Signs and Other Security Measures** ☐ Location shown on site map ☐ N/A

Remarks: Signs at this site are in good condition.

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:

Monthly

Responsible party/agent: DOE

Contact: Phillip Prater, Waste Area Group Manager 09/3/07 803-952-9333
 (Name) (Title) (Date) (Phone No.)

Reporting 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: _____

Five-Year Review Site Inspection Checklist (Continued)

| |
|---|
| 3. Land Use Changes Offsite <input checked="" type="checkbox"/> N/A Remarks _____ _____ |
| VI. GENERAL SITE CONDITIONS |
| A. Roads <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A |
| 1. Roads Damaged <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Roads adequate <input type="checkbox"/> N/A Remarks _____ _____ |
| B. Other Site Conditions Remarks _____ _____ _____ |
| VII. COVERS SYSTEMS <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A |
| A. Landfill Surface |
| 1. Settlement (Low spots) <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Settlement not evident Areal extent _____ Depth _____ Remarks: _____ _____ |
| 2. Cracks <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Cracking not evident Lengths _____ Widths _____ Depths _____ Remarks _____ _____ |
| 3. Erosion <input checked="" type="checkbox"/> Location shown on site map <input type="checkbox"/> Erosion not evident Areal extent _____ Depth _____ Remarks _____ _____ |
| 4. Holes <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Holes not evident Areal extent _____ Depth _____ Remarks _____ _____ |
| 5. Vegetative Cover <input type="checkbox"/> Grass <input type="checkbox"/> Cover properly established <input type="checkbox"/> No signs of stress <input type="checkbox"/> Trees/shrubs (indicate size and location on a diagram) Remarks: _____ _____ |

Five-Year Review Site Inspection Checklist (Continued)

| | | | |
|--|---|--------------------|--|
| 6. Alternative Cover (armored rock, concrete, etc.) <input type="checkbox"/> N/A | | | |
| Remarks: _____ | | | |
| 7. Bulges <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Bulges not evident | | | |
| Areal extent _____ | | Height _____ | |
| Remarks _____ | | | |
| 8. Wet Areas/Water Damage <input type="checkbox"/> Wet areas/water damage not evident | | | |
| <input type="checkbox"/> Wet Areas | <input type="checkbox"/> Location shown on site map | Areal extent _____ | |
| <input type="checkbox"/> Ponding | <input type="checkbox"/> Location shown on site map | Areal extent _____ | |
| <input type="checkbox"/> Seeps | <input type="checkbox"/> Location shown on site map | Areal extent _____ | |
| <input type="checkbox"/> Soft subgrade | <input type="checkbox"/> Location shown on site map | Areal extent _____ | |
| Remarks _____ | | | |
| 9. Slope Instability <input type="checkbox"/> Slides <input type="checkbox"/> Location shown on site map <input type="checkbox"/> No evidence of slope instability | | | |
| Areal extent _____ | | | |
| Remarks _____ | | | |
| B. Benches <input type="checkbox"/> Applicable x 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 <input type="checkbox"/> Location shown on site map <input type="checkbox"/> N/A or okay | | | |
| Remarks _____ | | | |
| 2. Bench Breached <input type="checkbox"/> Location shown on site map <input type="checkbox"/> N/A or okay | | | |
| Remarks _____ | | | |
| 3. Bench Overtopped <input type="checkbox"/> Location shown on site map <input type="checkbox"/> N/A or okay | | | |
| Remarks _____ | | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | |
|---|--|--|
| C. Letdown Channels <input type="checkbox"/> Applicable x 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 | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> No evidence of settlement |
| Areal extent _____ Depth _____ | | |
| Remarks _____ | | |
| 2. Material Degradation | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> No evidence of degradation |
| Material type _____ Areal extent _____ | | |
| Remarks _____ | | |
| 3. Erosion | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> No evidence of erosion |
| Areal extent _____ Depth _____ | | |
| Remarks _____ | | |
| 4. Undercutting | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> No evidence of undercutting |
| Areal extent _____ Depth _____ | | |
| Remarks _____ | | |
| 5. Obstructions | Type _____ | <input type="checkbox"/> No obstructions |
| <input type="checkbox"/> Location shown on site map | Areal extent _____ | Size _____ |
| Remarks _____ | | |
| 6. Excessive Vegetative Growth | Type _____ | |
| <input type="checkbox"/> No evidence of excessive growth | <input type="checkbox"/> Vegetation in channels does not obstruct flow | |
| <input type="checkbox"/> Location shown on site map | Areal extent _____ | |
| Remarks _____ | | |

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| | | | |
|---|--|--|--|
| D. Cover Penetrations <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A | | | |
| 1. Gas Vents <input type="checkbox"/> Active <input type="checkbox"/> Passive <input type="checkbox"/> Properly secured/locked <input type="checkbox"/> Functioning <input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition <input type="checkbox"/> Evidence of leakage at penetration <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A Remarks _____ _____ | | | |
| 2. Gas Monitoring Probes <input type="checkbox"/> Properly secured/locked <input type="checkbox"/> Functioning <input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition <input type="checkbox"/> Evidence of leakage at penetration <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A Remarks _____ _____ | | | |
| 3. Monitoring Wells (within surface area of landfill) <input type="checkbox"/> Properly secured/locked <input type="checkbox"/> Functioning <input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition <input type="checkbox"/> Evidence of leakage at penetration <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A Remarks _____ _____ | | | |
| 4. Leachate Extraction Wells <input type="checkbox"/> Properly secured/locked <input type="checkbox"/> Functioning <input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition <input type="checkbox"/> Evidence of leakage at penetration <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A Remarks _____ _____ | | | |
| 5. Settlement Monuments <input type="checkbox"/> Located <input type="checkbox"/> Routinely surveyed <input type="checkbox"/> N/A Remarks _____ _____ | | | |
| E. Gas Collection and Treatment <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A | | | |
| 1. Gas Treatment Facilities <input type="checkbox"/> Flaring <input type="checkbox"/> Thermal destruction <input type="checkbox"/> Collection for reuse <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____ _____ | | | |
| 2. Gas Collection Wells, Manifolds and Piping <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____ _____ | | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | |
|--|--|--|
| 3. Gas Monitoring Facilities (e.g., gas monitoring of adjacent homes or buildings) <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A Remarks _____ _____ | | |
| F. Cover Drainage Layer <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A | | |
| 1. Outlet Pipes Inspected <input type="checkbox"/> Functioning <input type="checkbox"/> N/A Remarks _____ _____ | | |
| 2. Outlet Rock Inspected <input type="checkbox"/> Functioning <input type="checkbox"/> N/A Remarks _____ _____ | | |
| G. Detention/sedimentation Ponds <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A | | |
| 1. Siltation Areal extent _____ Depth _____ <input type="checkbox"/> N/A <input type="checkbox"/> Siltation not evident Remarks _____ _____ | | |
| 2. Erosion Areal extent _____ Depth _____ <input type="checkbox"/> N/A <input type="checkbox"/> Erosion not evident Remarks _____ _____ | | |
| 3. Outlet Works <input type="checkbox"/> Functioning <input type="checkbox"/> N/A Remarks _____ _____ | | |
| 4. Dam <input type="checkbox"/> Functioning <input type="checkbox"/> N/A Remarks _____ _____ | | |
| H. Retaining Walls <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A | | |
| 1. Deformations <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Deformation not evident Horizontal displacement _____ Vertical displacement _____ Rotational displacement _____ Remarks _____ _____ | | |

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| | | |
|---|---|--|
| 2. Degradation Remarks _____ _____ | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> Deformation not evident |
| I. Perimeter Ditches/Off-Site Discharge | | |
| <input type="checkbox"/> Applicable x N/A | | |
| 1. Siltation Areal extent _____ Depth _____ Remarks _____ _____ | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> Siltation not evident |
| 2. Vegetative Growth x Vegetation does not impede flow Areal extent _____ Type _____ Remarks _____ _____ | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> Siltation not evident |
| 3. Erosion Areal extent _____ Depth _____ Remarks _____ _____ | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> Erosion not evident |
| 4. Discharge Structure Remarks _____ _____ | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> N/A |
| VIII. VERTICAL BARRIER WALLS | | |
| x Applicable <input type="checkbox"/> N/A | | |
| 1. Settlement Areal extent _____ Depth _____ Remarks _____ _____ | <input type="checkbox"/> Location shown on site map | x Settlement not evident |
| 2. Performance Monitoring Type of Monitoring: <u>Potentiometric Head</u> <input type="checkbox"/> Performance not monitored Frequency _____ <input type="checkbox"/> Evidence of breaching Head differential _____ Remarks: <u>Since installation of the walls, potentiometric heads have been rising on the upstream side and declining on the downstream side and have not reached equilibrium yet.</u> | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | | |
|--|--|--|---|
| IX. GROUNDWATER/SURFACE WATER REMEDIES | | <input checked="" type="checkbox"/> Applicable | <input type="checkbox"/> N/A |
| A. Groundwater Extraction Wells, Pumps, and Pipelines | | <input checked="" type="checkbox"/> Applicable | <input type="checkbox"/> N/A |
| 1. Pumps, Wellhead Plumbing, and Electrical <input checked="" type="checkbox"/> Good condition <input type="checkbox"/> All required wells located <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A Remarks: <u>The groundwater extraction system has been removed from service.</u> | | | |
| 2. Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances <input checked="" type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks: | | | |
| 3. Spare Parts and Equipment <input checked="" type="checkbox"/> Readily available <input checked="" type="checkbox"/> Good condition <input type="checkbox"/> Requires upgrade <input type="checkbox"/> Needs to be provided Remarks: | | | |
| B. Surface Water Collection Structures, Pumps, and Pipelines | | <input type="checkbox"/> Applicable | <input checked="" type="checkbox"/> N/A |
| 1. Collection Structures, Pumps, and Electrical <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks: | | | |
| 2. Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks: | | | |
| 3. Spare Parts and Equipment <input type="checkbox"/> Readily available <input type="checkbox"/> Good condition <input type="checkbox"/> Requires upgrade <input type="checkbox"/> Needs to be provided Remarks: | | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | |
|--|---|--|
| C. Treatment System | <input checked="" type="checkbox"/> Applicable | <input type="checkbox"/> N/A |
| 1. Treatment Train (Check components that apply) | | |
| <input type="checkbox"/> Metals removal | <input type="checkbox"/> Oil/water separation | <input type="checkbox"/> Bioremediation |
| <input type="checkbox"/> Air stripping | <input type="checkbox"/> Carbon adsorbers | |
| x Filters _____ | | |
| <input type="checkbox"/> Additive (e.g., chelation agent, flocculent) _____ | | |
| <input type="checkbox"/> Others _____ | | |
| x Good condition <input type="checkbox"/> Needs Maintenance | | |
| <input type="checkbox"/> Sampling ports properly marked and functional | | |
| <input type="checkbox"/> Sampling/maintenance log displayed and up to date | | |
| x Equipment properly identified | | |
| <input type="checkbox"/> Quantity of groundwater treated annually _____ | | |
| <input type="checkbox"/> Quantity of surface water treated annually _____ | | |
| Remarks: <u>The groundwater extraction system has been removed from service.</u> | | |
| <hr/> | | |
| 2. Electrical Enclosures and Panels (properly rated and functional) | | |
| <input type="checkbox"/> N/A | <input checked="" type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance |
| Remarks _____ | | |
| <hr/> | | |
| 3. Tanks, Vaults, Storage Vessels | | |
| <input type="checkbox"/> N/A | <input checked="" type="checkbox"/> Good condition | <input type="checkbox"/> Proper secondary containment <input type="checkbox"/> Needs Maintenance |
| Remarks _____ | | |
| <hr/> | | |
| 4. Discharge Structure and Appurtenances | | |
| <input checked="" type="checkbox"/> N/A | <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance |
| Remarks _____ | | |
| <hr/> | | |
| 5. Treatment Building(s) | | |
| <input type="checkbox"/> N/A | <input checked="" type="checkbox"/> Good condition (esp. roof and doorways) | <input type="checkbox"/> Needs repair |
| <input type="checkbox"/> Chemicals and equipment properly stored | | |
| Remarks _____ | | |
| <hr/> | | |

Five-Year Review Site Inspection Checklist (Continued)

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.).

The groundwater extraction/treat/reinjection remedial system functioned as designed and met Phase 1 objectives. The installation of the barrier walls is complete and they are functioning as designed. The concept is supported by hydrogeological studies and is expected to meet Phase 2 objectives.

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Five-Year Review Site Inspection Checklist (Continued)

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.

Operating and Maintenance programs are well established and functioning to ensure that remedial systems remain in effective service. .

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.

N/A

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 Savannah River Site (SRS) Resource Conservation and Recovery Act (RCRA) program. The Comprehensive Environmental Response, Compensation, and Liability Act (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 third 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 2007 through September 2007. This report documents the results of the review.

II. OU Chronology

Table 1 lists the chronology of site events for the H-Area HWMF.

Table 1. Chronology of OU Events

| Event | Date |
|---|----------------------------------|
| RCRA Closure Plan Approved | 1989 |
| Corrective Action Start | 1989 |
| RCRA Closure Certified | October 1991 |
| Final Record of Decision (ROD) Issuance | September 23, 1993 |
| Previous Five-Year Reviews | June 30, 1997; February 12, 2004 |

III. Background

Physical Characteristics

The H Area HWMF is located in the central portion of SRS, approximately 6 miles from the nearest site boundary (Figure 1). The original H-Area HWMF consisted of three unlined seepage basins, Basins 904-44G, 904-45G and 904-46G, and associated H-Area Inactive Process Sewer Lines (HIPSLs). In 1962, 904-46G was replaced by another

unlined seepage basin (904-56G). Figure 2 shows the Site layout for H-Area HWMF. The four seepage basins cover approximately 15.5 acres.

Land and Resource Use

The current and future anticipated land use for H-Area HWMF OU is industrial.

History of Contamination

The H-Area HWMF operated from 1955 to November 7, 1988. 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.

Initial Response

Closure of the unit was begun in 1989 and completed in May 1991. 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. 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.

Operations and Maintenance

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. Remedial Actions

The selected remedy for this unit as identified in the Record of Decision (ROD) is closure of the four basins (904-44G, -45G, -46G, and -56G) by dewatering, stabilizing the remaining waste, and placing a low permeability cap over them. Closure of the four basins began in 1989 and was completed in May 1991.

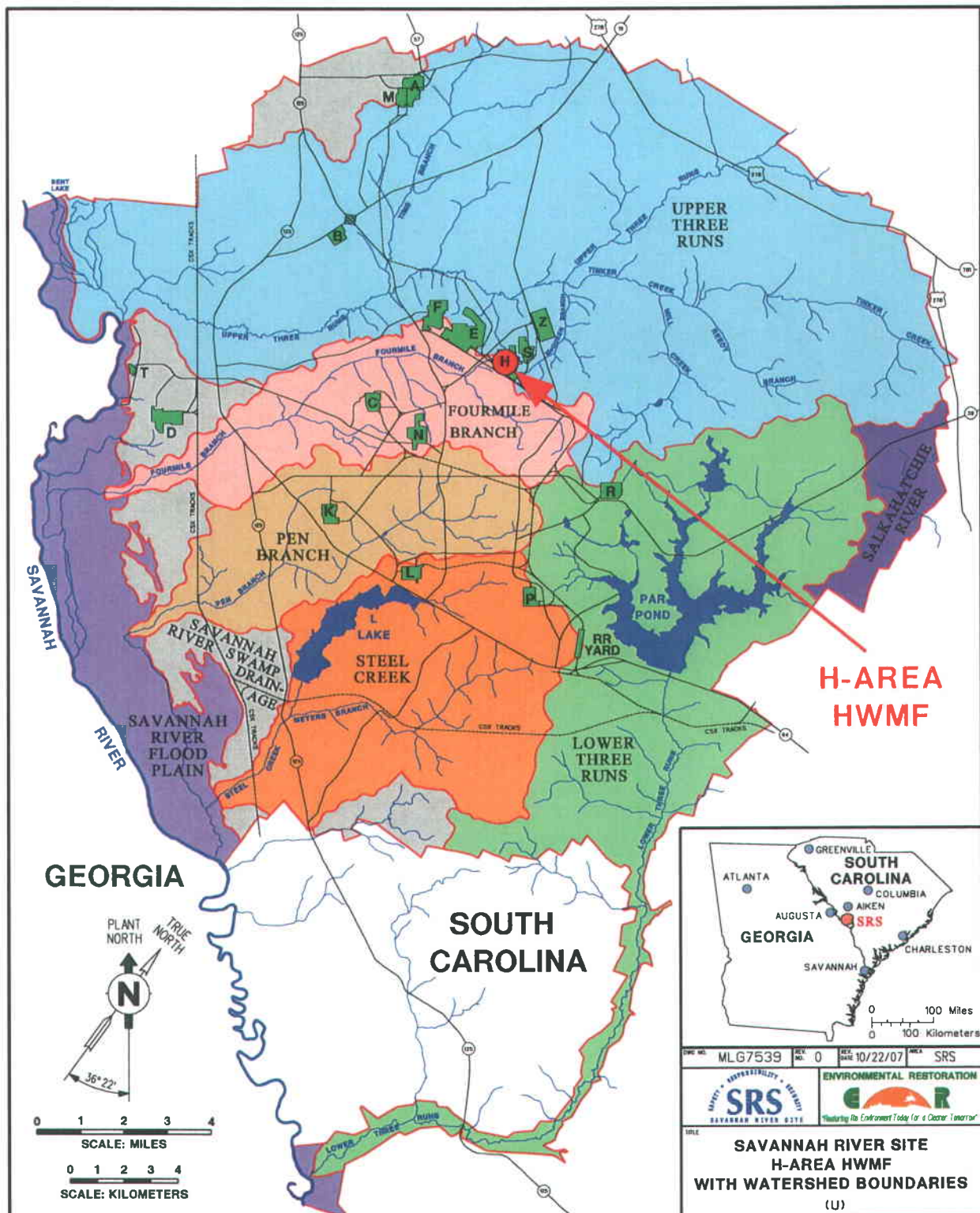


Figure 1. Location of the H-Area Hazardous Waste Management Facility

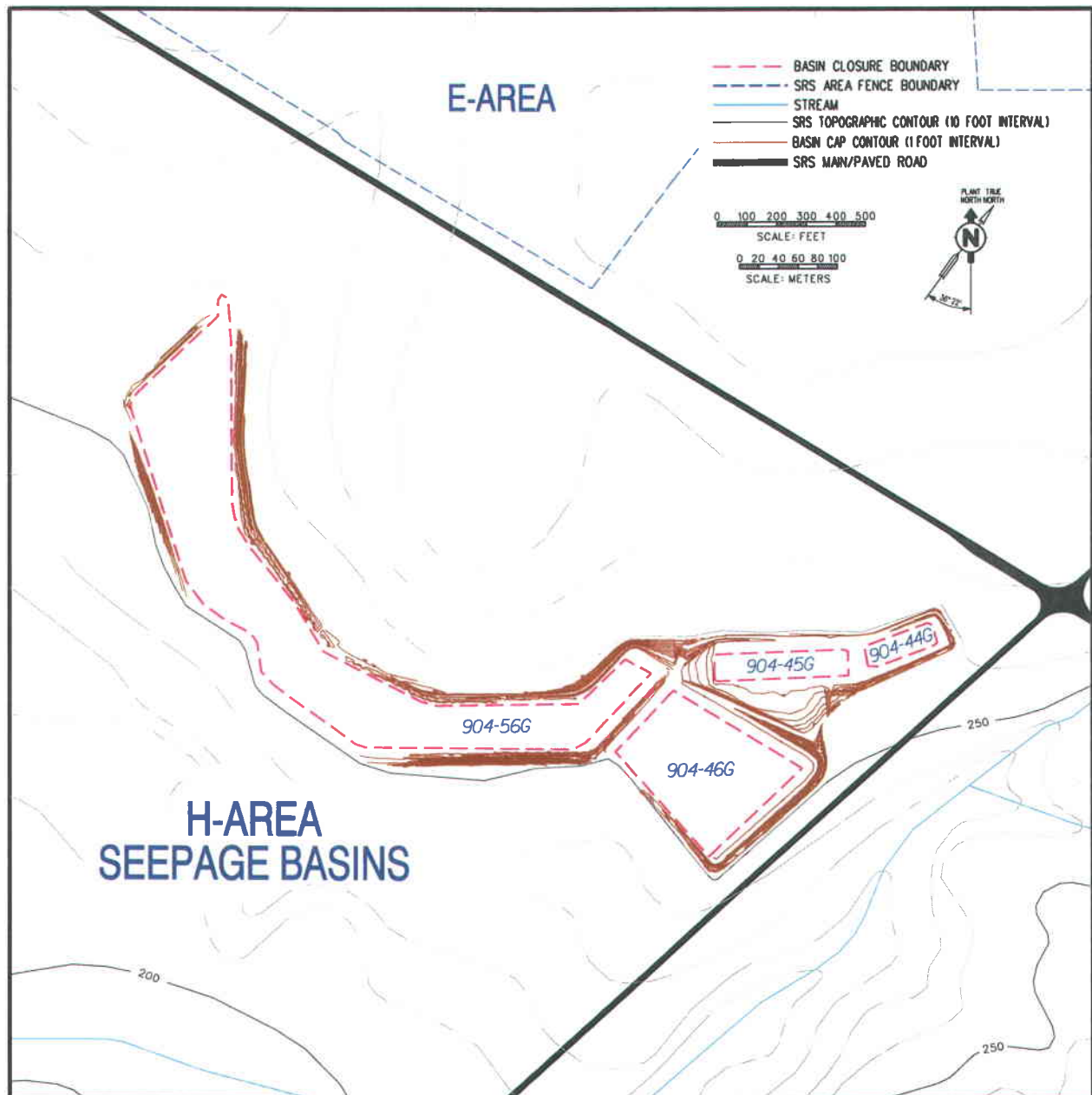


Figure 2. Site Layout for H-Area Hazardous Waste Management Facility

V. Progress Since Last Review

This is the third five-year review for this OU. Since the previous review in September of 2003, the following actions were completed:

- Soils associated with the H-Area Inactive Process Sewer Line were characterized for contaminants and a RCRA Closure Plan was developed to address the findings. The proposed RCRA Closure Plan includes excavation, in-place grouting of pipe sections and manholes, placement of an engineered cover system over selected sections of remaining vitrified clay pipe to control infiltration, and postclosure maintenance. Due to proximity, the remedial action took place in conjunction with the General Separations Area Consolidated Unit (GSACU) remedial action.
- Annual inspections and maintenance to the soil covers as required by the RCRA Closure Plan
- Groundwater was monitored 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
- Ensured that all actions required under the RCRA Permit were implemented

VII. Technical Assessment

The closure of the four basins (904-44G, -45G, -46G, and -56G) by dewatering, stabilizing the remaining waste, and placing a low permeability cap over them has met the remedial objectives of preventing physical exposure to contaminants and mitigating further migration of contaminants to the groundwater. The selected remedy for HIPSL of

excavating, grouting manholes and pipe sections in place, and installing an engineered cover over selected sections of the remaining vitrified clay pipe is expected to meet the remedial objectives when completed.

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. Project Costs

Costs associated with the selected remedy for HHWMF include operation and maintenance costs of the soil cover and institutional controls. RCRA documentation does not require estimated project costs to be prepared. Therefore, none are included in this remedy review.

XI. Protectiveness Statement(s)

The remedies at the H-Area HWMF are protective of human health and the environment, and exposure pathways that could result in unacceptable risks are being controlled. All threats are being addressed by corrective action programs in the RCRA Part B Permit.

XII. Next Review

The next five-year review is scheduled for February 12, 2014.

ATTACHMENT 1

List of Documents Reviewed

WSRC-RP-93-1043, *Final Record of Decision Remedial Alternative Selection for H-Area Hazardous Waste Management Facility (U)*, Revision 1, September 2, 1993, Westinghouse Savannah River Company, Aiken, SC

WSRC-RP-2001-4015, *H-Area Corrective Action Phase I Evaluation*, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

WSRC-IM-91-53, Volume V, Revision 22, 1992 RCRA Part B Permit Application - H-Area Hazardous Waste Management Facility, October 2004

WSRC C-3, Soil and Groundwater Closure Projects, Standard Operating Procedures, Post Closure Inspection H-Area Hazardous Waste Management Facility Bldg. 904-44G, 904-45G, 904-46G, 904-56G (U), ER-SOP-009, Washington Savannah River Company, Savannah River Site, Aiken, SC.

H-Area Seepage Basins 904-44G, 904-45G, 904-46G, 904-56G Subsidence Monitor Survey Logs

ATTACHMENT 2

Five-Year Review Site Inspection Checklist

| I. SITE INFORMATION | | | |
|--|--|--|---|
| Site Name: | H-Area HWMF (904-44G, -45G, -46G) | Date of Inspection: | 10/25/2007 |
| Location and Region: | SRS, USEPA Region IV | EPA ID: | SC1890008989 |
| Agency, office, or company leading the five- year review: | USDOE | CERCLIS OU No.: | 7 |
| | | Weather/Temperature: | |
| Remedy Includes: (Check all that apply) <div style="display: flex; flex-wrap: wrap;"><div style="width: 50%;"><input checked="" type="checkbox"/> Cover System <input checked="" type="checkbox"/> Access controls <input checked="" type="checkbox"/> Institutional Controls <input type="checkbox"/> Groundwater pump and treatment <input type="checkbox"/> Surface water collection and treatment <input checked="" type="checkbox"/> Other: <u>Excavation, disposal</u></div><div style="width: 50%;"><input type="checkbox"/> Monitored Natural Attenuation <input type="checkbox"/> Groundwater Containment <input type="checkbox"/> Vertical Barrier Walls</div></div> | | | |
| Attachments: <input type="checkbox"/> Inspection team roster attached <input type="checkbox"/> Site map attached | | | |
| II. INTERVIEWS (Check all that apply) | | | |
| 1. O & M Site Manager | <u>Wayne Gleaton</u> (Name) | <u>Post Closure Manager</u> (Title) | <u>10-23-2007</u> (Date) |
| Interviewed: | <input type="checkbox"/> at site | <input type="checkbox"/> at office | <input type="checkbox"/> by phone Phone No. <u>803-557-8838</u> |
| Problems, suggestions: | <input type="checkbox"/> report attached _____ | | |
| 2. O & M Staff | <u>Richard Feagin</u> (Name) | <u>Post-Closure Waste Site Inspector/Maintenance Coord.</u> (Title) | <u>8-23-2007</u> (Date) |
| Interviewed: | <input type="checkbox"/> at site | <input type="checkbox"/> at office | <input type="checkbox"/> by phone Phone No. <u>803-952-4416</u> |
| Problems, suggestions: | <input type="checkbox"/> report attached _____ | | |

Five-Year Review Site Inspection Checklist (Continued)

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

| | | | |
|---|--|-------------------------------------|------------------------------|
| <input type="checkbox"/> O & M Manual | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |
| x As-built drawings | x Readily available | x Up to date | <input type="checkbox"/> N/A |
| <input type="checkbox"/> Maintenance Logs | <input type="checkbox"/> Readily available | x Up to date | x N/A |

Remarks: See Waste Unit Inspection and Maintenance, ER-SOP-019

Five-Year Review Site Inspection Checklist (Continued)

| | | | |
|---|--|-------------------------------------|-------|
| 2. Site-Specific Health and Safety Plan | | | |
| <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A | |
| <input type="checkbox"/> Contingency plan/emergency response plan | | | |
| <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A | |
| Remarks: <u>Routine O&M activities do not require a SSHASP under 29 CFR 1910.120, HAZWOPER. A</u> | | | |
| <u>SSHASP is prepared in needed.</u> | | | |
| 3. O & M and OSHA Training Records | | | |
| x Readily available | x Up to date | <input type="checkbox"/> N/A | |
| Remarks _____ | | | |
| 4. Permits and Service Agreements | | | |
| <input type="checkbox"/> Air discharge permit | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |
| <input type="checkbox"/> Effluent discharge | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |
| <input type="checkbox"/> Waste Disposal, POTW | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |
| x Other permits (See Remarks) | x Readily available | x Up to date | x N/A |
| Remarks: <u>RCRA Part B Permit.</u> | | | |
| 5. Gas Generation Records | | | |
| <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A | |
| Remarks _____ | | | |
| 6. Settlement Monument Records | | | |
| x Readily available | <input type="checkbox"/> Up to date | <input type="checkbox"/> N/A | |
| Remarks _____ | | | |
| 7. Groundwater Monitoring Records | | | |
| x Readily available | x Up to date | <input type="checkbox"/> N/A | |
| Remarks: _____ | | | |
| 8. Leachate Extraction Records | | | |
| <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A | |
| Remarks _____ | | | |
| 9. Discharge Compliance Records | | | |
| <input type="checkbox"/> Air | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |
| <input type="checkbox"/> Water (effluent) | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |
| Remarks _____ | | | |
| 10. Daily Access/Security Logs | | | |
| <input type="checkbox"/> Readily available | <input checked="" type="checkbox"/> Up to date | x N/A | |
| Remarks _____ | | | |

Five-Year Review Site Inspection Checklist (Continued)

IV. O & M Costs

1. O & M Organization

- ☐ State in-house ☐ Contractor for State
☐ PRP in-house ☐ Contractor for PRP
x Other: SRS

2. O & M Cost Records

- ☐ Readily available ☐ Up to date ☐ Funding mechanism/agreement in place

x Other: Project cost data is summarized in Section X of attached review: WSRC-RP-2007-4063.

Total annual cost by year for review period if available

| | | | |
|------------|----------|------------|---|
| From _____ | To _____ | _____ | <input type="checkbox"/> Breakdown attached |
| (Date) | (Date) | Total cost | |
| From _____ | To _____ | _____ | <input type="checkbox"/> Breakdown attached |
| (Date) | (Date) | Total cost | |
| From _____ | To _____ | _____ | <input type="checkbox"/> Breakdown attached |
| (Date) | (Date) | Total cost | |
| From _____ | To _____ | _____ | <input type="checkbox"/> Breakdown attached |
| (Date) | (Date) | Total cost | |
| From _____ | To _____ | _____ | <input type="checkbox"/> Breakdown attached |
| (Date) | (Date) | Total cost | |

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

Describe costs and reasons:

V. ACCESS AND INSTITUTIONAL CONTROLS

x Applicable ☐ N/A

A. Fencing

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

Remarks: Fencing is in good condition.

Five-Year Review Site Inspection Checklist (Continued)

| | | | | |
|--|---------------------------------|--|--|---|
| B. Other Access Restrictions | | | | |
| 1. Signs and Other Security Measures <input type="checkbox"/> Location shown on site map <input type="checkbox"/> N/A | | | | |
| Remarks: <u>Signs at this site are in good condition.</u> | | | | |
| C. Institutional Controls | | | | |
| 1. Implementation and enforcement | | | | |
| Site conditions imply ICs not properly implemented: | | <input type="checkbox"/> Yes | <input checked="" type="checkbox"/> No | <input type="checkbox"/> N/A |
| Site conditions imply ICs not being fully enforced: | | <input type="checkbox"/> Yes | <input checked="" type="checkbox"/> No | <input type="checkbox"/> N/A |
| Type of monitoring (e.g., self-reporting, drive-by): | | Walk Down | | |
| Frequency: | Monthly | | | |
| Responsible party/agent: | DOE Savannah River Field Office | | | |
| Contact: | Phillip Prater, (Name) | Waste Area Group Manager (Title) | 09/3/07 (Date) | 803-952-9333 (Phone No.) |
| Reporting is up-to-date: | | <input checked="" type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="checkbox"/> N/A |
| Reports are verified by the lead agency: | | <input checked="" type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="checkbox"/> N/A |
| Specific requirements in deed of decision documents have been met: | | <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input checked="" type="checkbox"/> N/A |
| Violations have been reported: | | <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input checked="" type="checkbox"/> N/A |
| Other problems or suggestions: | | <input type="checkbox"/> Report attached | | |
| <hr/> | | | | |
| 2. Adequacy <input checked="" type="checkbox"/> ICs are adequate <input type="checkbox"/> ICs are inadequate <input type="checkbox"/> N/A | | | | |
| Remarks: <hr/> | | | | |
| D. General | | | | |
| 1. Vandalism/Trespassing <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> No vandalism evident | | | | |
| Remarks: <hr/> | | | | |
| 2. Land Use Changes Onsite <input checked="" type="checkbox"/> N/A | | | | |
| Remarks: <hr/> | | | | |

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Five-Year Review Site Inspection Checklist (Continued)

| | | | |
|---|--|--|--|
| 3. Land Use Changes Offsite <input checked="" type="checkbox"/> N/A Remarks _____ _____ | | | |
| VI. GENERAL SITE CONDITIONS | | | |
| A. Roads <input checked="" type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A | | | |
| 1. Roads Damaged <input checked="" type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Roads adequate <input type="checkbox"/> N/A Remarks _____ _____ | | | |
| B. Other Site Conditions Remarks _____ _____ _____ | | | |
| VII. COVERS SYSTEMS <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A | | | |
| A. Landfill Surface | | | |
| 1. Settlement (Low spots) <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Settlement not evident Areal extent _____ Depth _____ Remarks: _____ _____ | | | |
| 2. Cracks <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Cracking not evident Lengths _____ Widths _____ Depths _____ Remarks _____ _____ | | | |
| 3. Erosion <input checked="" type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Erosion not evident Areal extent _____ Depth _____ Remarks _____ _____ | | | |
| 4. Holes <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Holes not evident Areal extent _____ Depth _____ Remarks _____ _____ | | | |
| 5. Vegetative Cover <input type="checkbox"/> Grass <input type="checkbox"/> Cover properly established <input type="checkbox"/> No signs of stress <input type="checkbox"/> Trees/shrubs (indicate size and location on a diagram) Remarks: <u>Grass is established but dry due to lack of rain.</u> _____ _____ | | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | |
|--|---|--------------------|
| 6. Alternative Cover (armored rock, concrete, etc.) x N/A | | |
| Remarks: _____ | | |
| 7. Bulges <input type="checkbox"/> Location shown on site map x Bulges not evident | | |
| Areal extent _____ Height _____ | | |
| Remarks _____ | | |
| 8. Wet Areas/Water Damage x Wet areas/water damage not evident | | |
| <input type="checkbox"/> Wet Areas | <input type="checkbox"/> Location shown on site map | Areal extent _____ |
| <input type="checkbox"/> Ponding | <input type="checkbox"/> Location shown on site map | Areal extent _____ |
| <input type="checkbox"/> Seeps | <input type="checkbox"/> Location shown on site map | Areal extent _____ |
| <input type="checkbox"/> Soft subgrade | <input type="checkbox"/> Location shown on site map | Areal extent _____ |
| Remarks _____ | | |
| 9. Slope Instability <input type="checkbox"/> Slides <input type="checkbox"/> Location shown on site map x No evidence of slope instability | | |
| Areal extent _____ | | |
| Remarks _____ | | |
| B. Benches <input type="checkbox"/> Applicable x 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 <input type="checkbox"/> Location shown on site map <input type="checkbox"/> N/A or okay | | |
| Remarks _____ | | |
| 2. Bench Breached <input type="checkbox"/> Location shown on site map <input type="checkbox"/> N/A or okay | | |
| Remarks _____ | | |
| 3. Bench Overtopped <input type="checkbox"/> Location shown on site map <input type="checkbox"/> N/A or okay | | |
| Remarks _____ | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | |
|--|--|--|
| C. Letdown Channels <input type="checkbox"/> Applicable x 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 | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> No evidence of settlement |
| Areal extent _____ Depth _____ Remarks _____ _____ | | |
| 2. Material Degradation | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> No evidence of degradation |
| Material type _____ Areal extent _____ Remarks _____ _____ | | |
| 3. Erosion | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> No evidence of erosion |
| Areal extent _____ Depth _____ Remarks _____ _____ | | |
| 4. Undercutting | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> No evidence of undercutting |
| Areal extent _____ Depth _____ Remarks _____ _____ | | |
| 5. Obstructions | Type _____ | <input type="checkbox"/> No obstructions |
| <input type="checkbox"/> Location shown on site map | Areal extent _____ | Size _____ |
| Remarks _____ _____ | | |
| 6. Excessive Vegetative Growth | Type _____ | |
| <input type="checkbox"/> No evidence of excessive growth | <input type="checkbox"/> Vegetation in channels does not obstruct flow | |
| <input type="checkbox"/> Location shown on site map | Areal extent _____ | |
| Remarks _____ _____ | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | | |
|--|--|---|---|
| D. Cover Penetrations <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A | | | |
| 1. Gas Vents <input type="checkbox"/> Active <input type="checkbox"/> Passive | | | |
| <input type="checkbox"/> Properly secured/locked | <input type="checkbox"/> Functioning | <input type="checkbox"/> Routinely sampled | <input type="checkbox"/> Good condition |
| <input type="checkbox"/> Evidence of leakage at penetration | <input type="checkbox"/> Needs Maintenance | <input type="checkbox"/> N/A | |
| Remarks _____ | | | |
| 2. Gas Monitoring Probes | | | |
| <input type="checkbox"/> Properly secured/locked | <input type="checkbox"/> Functioning | <input type="checkbox"/> Routinely sampled | <input type="checkbox"/> Good condition |
| <input type="checkbox"/> Evidence of leakage at penetration | <input type="checkbox"/> Needs Maintenance | <input type="checkbox"/> N/A | |
| Remarks _____ | | | |
| 3. Monitoring Wells (within surface area of landfill) | | | |
| <input type="checkbox"/> Properly secured/locked | <input type="checkbox"/> Functioning | <input type="checkbox"/> Routinely sampled | <input type="checkbox"/> Good condition |
| <input type="checkbox"/> Evidence of leakage at penetration | <input type="checkbox"/> Needs Maintenance | <input type="checkbox"/> N/A | |
| Remarks _____ | | | |
| 4. Leachate Extraction Wells | | | |
| <input type="checkbox"/> Properly secured/locked | <input type="checkbox"/> Functioning | <input type="checkbox"/> Routinely sampled | <input type="checkbox"/> Good condition |
| <input type="checkbox"/> Evidence of leakage at penetration | <input type="checkbox"/> Needs Maintenance | <input type="checkbox"/> N/A | |
| Remarks _____ | | | |
| 5. Settlement Monuments <input type="checkbox"/> Located <input type="checkbox"/> Routinely surveyed <input type="checkbox"/> N/A | | | |
| Remarks _____ | | | |
| E. Gas Collection and Treatment <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A | | | |
| 1. Gas Treatment Facilities | | | |
| <input type="checkbox"/> Flaring | <input type="checkbox"/> Thermal destruction | <input type="checkbox"/> Collection for reuse | |
| <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance | | |
| Remarks _____ | | | |
| 2. Gas Collection Wells, Manifolds and Piping | | | |
| <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance | | |
| Remarks _____ | | | |

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| | | | |
|--|--|--|--|
| 3. Gas Monitoring Facilities (e.g., gas monitoring of adjacent homes or buildings) <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A Remarks _____ _____ | | | |
| F. Cover Drainage Layer <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A | | | |
| 1. Outlet Pipes Inspected <input type="checkbox"/> Functioning <input type="checkbox"/> N/A Remarks _____ _____ | | | |
| 2. Outlet Rock Inspected <input type="checkbox"/> Functioning <input type="checkbox"/> N/A Remarks _____ _____ | | | |
| G. Detention/sedimentation Ponds <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A | | | |
| 1. Siltation Areal extent _____ | | Depth _____ <input type="checkbox"/> N/A <input type="checkbox"/> Siltation not evident Remarks _____ _____ | |
| 2. Erosion Areal extent _____ | | Depth _____ <input type="checkbox"/> N/A <input type="checkbox"/> Erosion not evident Remarks _____ _____ | |
| 3. Outlet Works <input type="checkbox"/> Functioning <input type="checkbox"/> N/A Remarks _____ _____ | | | |
| 4. Dam <input type="checkbox"/> Functioning <input type="checkbox"/> N/A Remarks _____ _____ | | | |
| H. Retaining Walls <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A | | | |
| 1. Deformations <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Deformation not evident Horizontal displacement _____ Vertical displacement _____ Rotational displacement _____ Remarks _____ _____ | | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | |
|---|---|--|
| 2. Degradation | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> Deformation not evident |
| Remarks _____ | | |
| I. Perimeter Ditches/Off-Site Discharge x Applicable <input type="checkbox"/> N/A | | |
| 1. Siltation | <input type="checkbox"/> Location shown on site map | x Siltation not evident |
| Areal extent _____ Depth _____ | | |
| Remarks _____ | | |
| 2. Vegetative Growth | <input type="checkbox"/> Location shown on site map | x Siltation not evident |
| x Vegetation does not impede flow | | |
| Areal extent _____ Type _____ | | |
| Remarks _____ | | |
| 3. Erosion | <input type="checkbox"/> Location shown on site map | x Erosion not evident |
| Areal extent _____ Depth _____ | | |
| Remarks _____ | | |
| 4. Discharge Structure | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> N/A |
| Remarks _____ | | |
| VIII. VERTICAL BARRIER WALLS <input type="checkbox"/> Applicable x N/A | | |
| 1. Settlement | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> Settlement not evident |
| Areal extent _____ Depth _____ | | |
| Remarks: <u>See H-Area Groundwater OU</u> | | |
| 2. Performance Monitoring | Type of Monitoring _____ | <input type="checkbox"/> Performance not monitored |
| Frequency _____ <input type="checkbox"/> Evidence of breaching Head differential _____ | | |
| Remarks _____ | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | | |
|---|--|-------------------------------------|---|
| IX. GROUNDWATER/SURFACE WATER REMEDIES | | <input type="checkbox"/> Applicable | <input checked="" type="checkbox"/> N/A |
| A. Groundwater Extraction Wells, Pumps, and Pipelines | | <input type="checkbox"/> Applicable | <input type="checkbox"/> N/A |
| 1. Pumps, Wellhead Plumbing, and Electrical <input type="checkbox"/> Good condition <input type="checkbox"/> All required wells located <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A Remarks _____ _____ | | | |
| 2. Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____ _____ | | | |
| 3. Spare Parts and Equipment <input type="checkbox"/> Readily available <input type="checkbox"/> Good condition <input type="checkbox"/> Requires upgrade <input type="checkbox"/> Needs to be provided Remarks _____ _____ | | | |
| B. Surface Water Collection Structures, Pumps, and Pipelines | | <input type="checkbox"/> Applicable | <input type="checkbox"/> N/A |
| 1. Collection Structures, Pumps, and Electrical <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____ _____ | | | |
| 2. Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____ _____ | | | |
| 3. Spare Parts and Equipment <input type="checkbox"/> Readily available <input type="checkbox"/> Good condition <input type="checkbox"/> Requires upgrade <input type="checkbox"/> Needs to be provided Remarks _____ _____ | | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | |
|--|--|--|
| C. Treatment System | <input checked="" type="checkbox"/> Applicable | <input type="checkbox"/> N/A |
| 1. Treatment Train (Check components that apply) | | |
| <input type="checkbox"/> Metals removal | <input type="checkbox"/> Oil/water separation | <input type="checkbox"/> Bioremediation |
| <input type="checkbox"/> Air stripping | <input type="checkbox"/> Carbon adsorbers | |
| <input type="checkbox"/> Filters | | |
| <input type="checkbox"/> Additive (e.g., chelation agent, flocculent) | | |
| <input type="checkbox"/> Others | | |
| <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance | |
| <input type="checkbox"/> Sampling ports properly marked and functional | | |
| <input type="checkbox"/> Sampling/maintenance log displayed and up to date | | |
| <input type="checkbox"/> Equipment properly identified | | |
| <input type="checkbox"/> Quantity of groundwater treated annually | | |
| <input type="checkbox"/> Quantity of surface water treated annually | | |
| Remarks | | |
| | | |
| 2. Electrical Enclosures and Panels (properly rated and functional) | | |
| <input type="checkbox"/> N/A | <input checked="" type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance |
| Remarks | | |
| | | |
| 3. Tanks, Vaults, Storage Vessels | | |
| <input type="checkbox"/> N/A | <input checked="" type="checkbox"/> Good condition | <input type="checkbox"/> Proper secondary containment <input type="checkbox"/> Needs Maintenance |
| Remarks | | |
| | | |
| 4. Discharge Structure and Appurtenances | | |
| <input type="checkbox"/> N/A | <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance |
| Remarks | | |
| | | |
| 5. Treatment Building(s) | | |
| <input type="checkbox"/> N/A | <input type="checkbox"/> Good condition (esp. roof and doorways) | <input type="checkbox"/> Needs repair |
| <input type="checkbox"/> Chemicals and equipment properly stored | | |
| Remarks | | |
| | | |

Third Five-Year Remedy Review Report (U)
H-Area HWMF (904-44G, -45G, -46G, and -56G)
Savannah River Site, December 2008

WSRC-RP-2007-4063

Rev. 1.1

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Five-Year Review Site Inspection Checklist (Continued)

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.).

The closure of the three basins (904-44G, -45G, -46G) by dewatering, physically and chemically stabilizing the remaining waste, and placing a low permeability cap over them has met the remedial objectives of preventing physical exposure to contaminants and mitigating further migration of contaminants to the groundwater. The selected remedy for HIPSL of excavating, grouting manholes and pipe sections in place, and installing an engineered cover over selected sections of the remaining vitrified clay pipe is expected to meet the remedial objectives when completed.

Five-Year Review Site Inspection Checklist (Continued)

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.

Operating and Maintenance programs are well established and functioning to ensure that remedial systems remain in effective service.

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.

N/A

HEAVY EQUIPMENT WASH BASIN AND CENTRAL SHOPS BURNING/RUBBLE PIT (631-5G) OPERABLE UNIT

I. Introduction

This is the first five-year review for the Heavy Equipment Wash Basin (HEWB) and Central Shops Burning/Rubble Pit (631-5G) (CSBRP) Operable Unit (OU). This review was conducted from August 2007 through September 2007. This report documents the results of the review.

II. OU Chronology

Table 1 lists the chronology of site events for the HEWB/CSBRP OU.

Table 1. Chronology of OU Events

| Event | Date |
|-----------------------------------|------------------------------------|
| RFI/RI Field Start | August 3, 2001 |
| Record of Decision (ROD) issuance | January 7, 2005 |
| Remedial Action start/complete | February 22, 2005 / March 22, 2005 |
| Previous Five-Year Reviews | None |

III. Background

Physical Characteristics

The HEWB/CSBRP OU is listed as a Resource Conservation and Recovery Act (RCRA) 304(u) Solid Waste Management Unit/Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) unit in Appendix C of the Federal Facility Agreement (FFA) for the Savannah River Site (SRS). Figure 1 shows the location of the HEWB/CSBRP at SRS. Figure 2 shows the Site layout for HEWB/CSBRP OU.

Land and Resource Use

The HEWB/CSBRP OU is located in an industrial area.

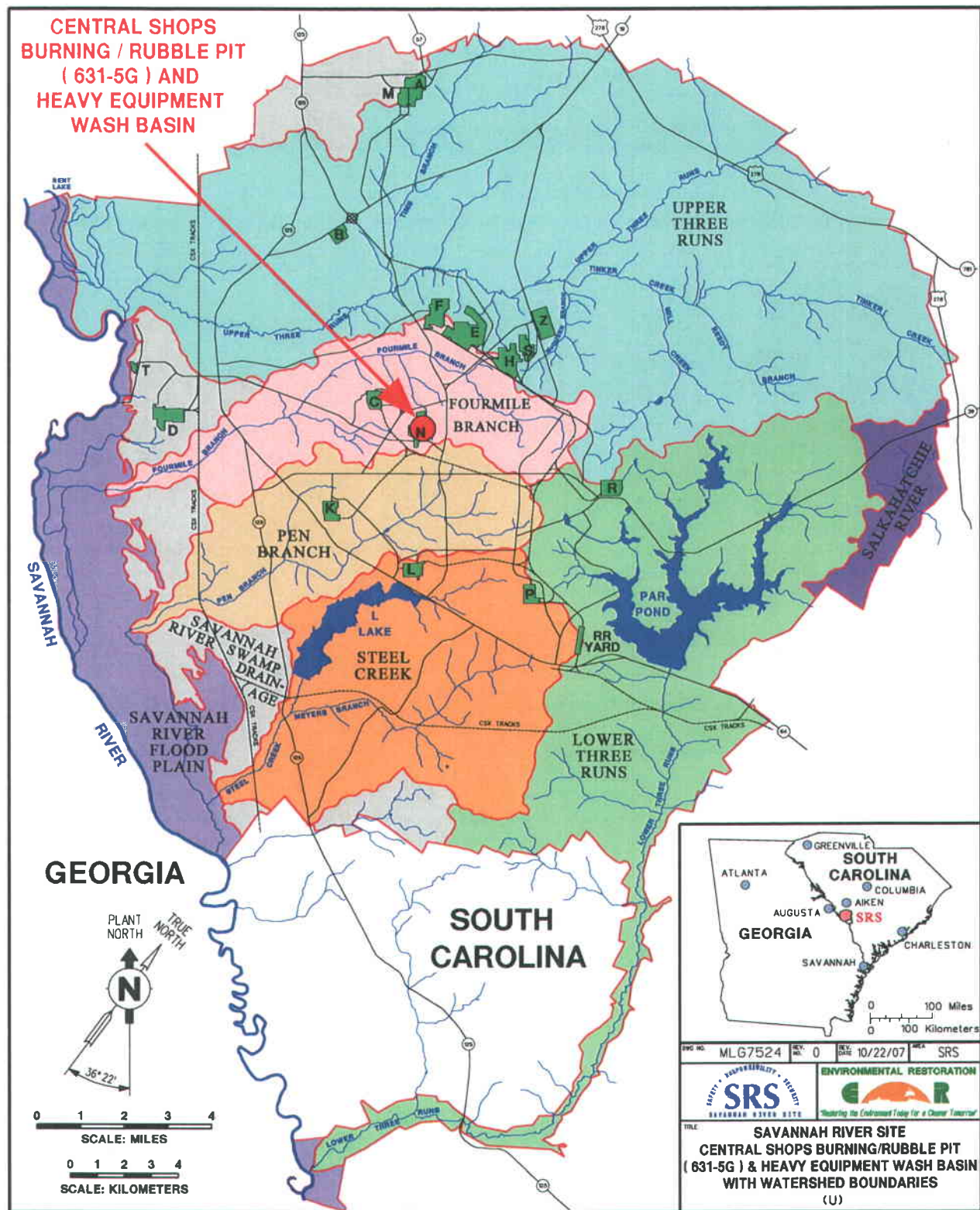


Figure 1. Location of the Heavy Equipment Wash Basin and Central Shops Burning Rubble Pit Operable Unit

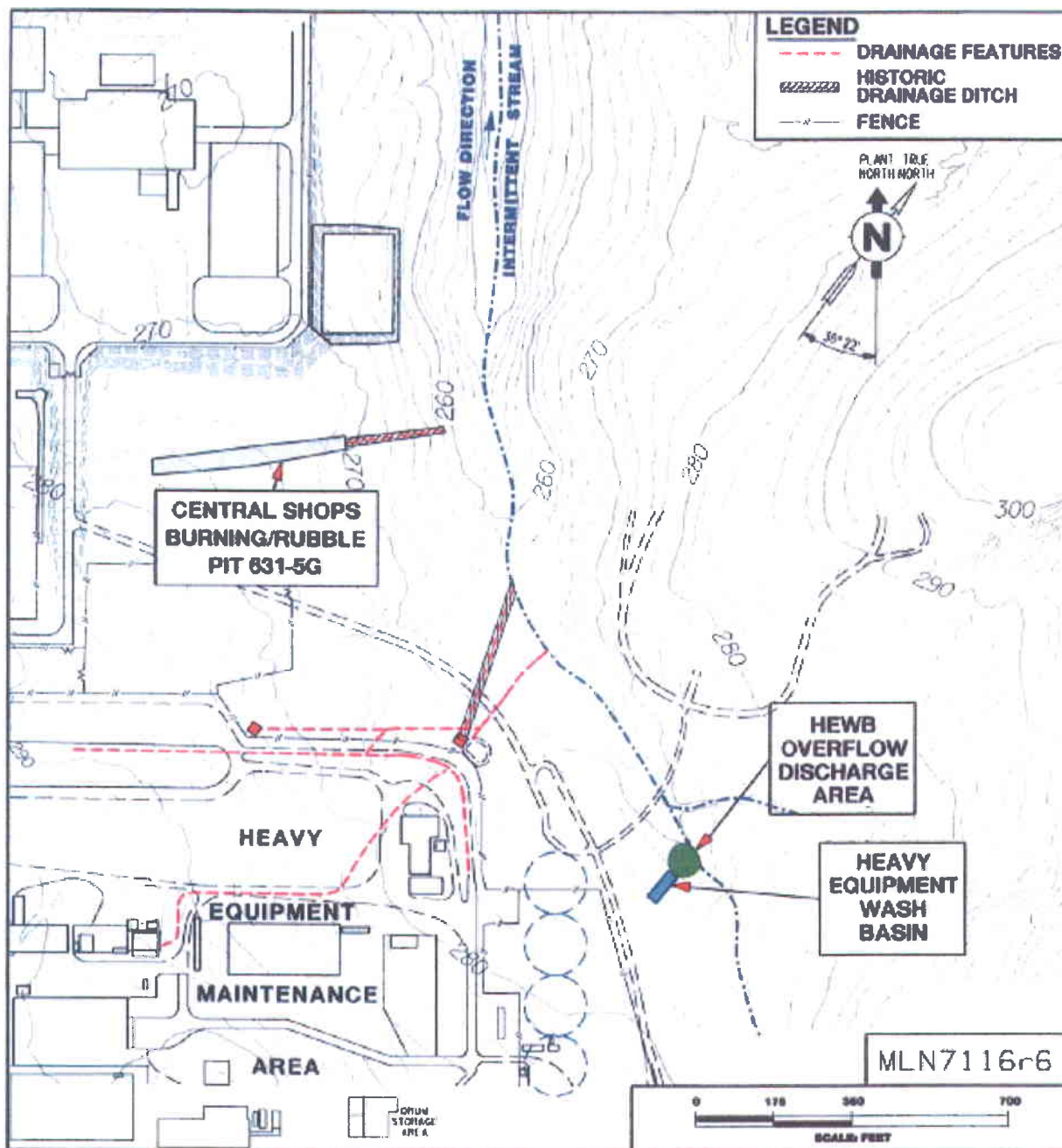


Figure 2. Layout of the Heavy Equipment Wash Basin and Central Shops Burning Rubble Pit Operable Unit with Limits

History of Contamination

From 1950 until the early 1970s, the HEWB received Heavy Equipment Wash Area (HEWA) effluent wash water together with sanitary wastewater from Central Shops. HEWA was a facility set up in the maintenance area to clean equipment prior to maintenance. Historically, during day shifts the HEWB received approximately 10 gal/min of wastewater five days a week. The wastewater contained traces of oil, grease, and detergents, plus significant levels of solids that were allowed to settle in the basin. According to the wastewater permit, about one-half of the resulting wash water was lost through infiltration /evaporation.

Initial Response

After construction of the Central Shops Sanitary Wastewater Treatment plant in the early 1970s, the wash water from the HEWA was no longer directed to the HEWB. Since 1981, the HEWB has not received water from Central Shops and the associated facilities. The HEWB only collects stormwater at the present time. The groundwater will be addressed as part of the Central Shops Groundwater OU.

IV. Remedial Actions

Remedy Selection

The selected remedy for the HEWB/CSBRP OU was institutional controls, which include access control (SRS barrier fence), access control signs posted around the HEWB, periodic inspections, and deed restrictions. The No Action alternative was selected for the CSBRP and HEWB Overflow Discharge Area subunits.

Remedy Implementation

There were no construction or operation activities.

V. Progress Since Last Review

This is the first five -year review for this OU.

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 guidance

VII. Technical Assessment

The operating procedures currently implemented continue to maintain the effectiveness of response actions. Historical data do not indicate a history of remedy problems or potential remedy failure that could place protectiveness at risk. There are no opportunities for optimization.

Maintenance and institutional controls, including access controls and field walkdowns, are in place to prevent exposure and monitor contaminant levels. No other actions are necessary to ensure that immediate threats have been addressed.

The exposure assumptions, toxicity data, and cleanup levels used at the time of remedy selection are still valid. There have been no changes in standards or to-be-considered guidance identified in the Record of Decision (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

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

X. Project Costs

Costs associated with the selected remedy for the HEWB OU includes operation and maintenance costs of institutional controls. The estimated operation and maintenance cost associated with the selected remedy is \$82,480, which was discounted at 4% per year. This is a present worth cost, including 30 years of maintenance activities. After characterization and effectiveness of the remedy were evaluated, the actual operation and maintenance cost for the HEWB was assessed. The total actual operation and maintenance cost from project support and other post construction expense to fiscal year 2006 is \$25,771.

XI. Protectiveness Statement(s)

The remedy at the HEWB/CSBRP OU, institutional controls for the soils, is protective of human health and the environment; and exposure pathways that could result in unacceptable risks are being controlled. The institutional controls include warning signs that are posted at the waste unit, use of existing SRS access controls for trespassers, use of the SRS Site Use and Site Clearance Programs for on-site workers, and land use restrictions. The selected remedy will maintain future industrial land use and prevent unrestricted use of the area.

XII. Next Review

The next five-year review is scheduled for February 12, 2014.

ATTACHMENT 1

List of Documents Reviewed

WSRC-RP-98-4187, *RCRA Facility Investigation/Remedial Investigation Work Plan for the Heavy Equipment Wash Basin and Central Shops Burning/Rubble Pit (631-5G) Operable Unit (U)*, Rev. 1, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

WSRC-RP-2003-4185, *Record of Decision Remedial Alternative Selection for the Heavy Equipment Wash Basin and Central Shops Burning/Rubble Pit Operable Unit (631-5G) (U)*, Rev. 1, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

WSRC-RP-2002-4088, *RCRA Facility Investigation/Remedial Investigation with Baseline Risk Assessment for the Heavy Equipment Wash Basin and Central Shops Burning/Rubble Pit (631-5G) Operable Unit (U)*, Rev. 1, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

WSRC-RP-2005-4006, *Corrective Measures Implementation Report/Final Remediation Report for the Heavy Equipment Wash Basin and Central Shops Burning/Rubble Pit Operable Unit (631-5G) (U)*, Rev. 1, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

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ATTACHMENT 2

Five-Year Review Site Inspection Checklist

| I. SITE INFORMATION | | | | | | | | | | | | | | | |
|---|---|------------------------------------|---|---------------------------------------|--|--|--|--|---|---|--|---|--|---------------------------------------|--|
| Site Name: | Heavy Equipment Wash Basin and Central Shops Burning/Rubble Pit Operable Unit | Date of Inspection: | 10/17/2007 | | | | | | | | | | | | |
| Location and Region: | Savannah River Site, USEPA IV | EPA ID: | SC1890008989 | | | | | | | | | | | | |
| Agency, office, or company leading the five-year review: | United States Department of Energy | CERCLIS OU: | 13 | | | | | | | | | | | | |
| | | Weather/Temperature: | clear and sunny, 76°F | | | | | | | | | | | | |
| Remedy Includes: (Check all that apply) <table><tbody><tr><td><input type="checkbox"/> Cover system</td><td><input type="checkbox"/> Monitored Natural Attenuation</td></tr><tr><td><input type="checkbox"/> Access controls</td><td><input type="checkbox"/> Groundwater Containment</td></tr><tr><td><input checked="" type="checkbox"/> Institutional Controls</td><td><input type="checkbox"/> Vertical Barrier Walls</td></tr><tr><td><input type="checkbox"/> Groundwater pump and treatment</td><td></td></tr><tr><td><input type="checkbox"/> Surface water collection and treatment</td><td></td></tr><tr><td><input type="checkbox"/> Other: _____</td><td></td></tr></tbody></table> | | | | <input type="checkbox"/> Cover system | <input type="checkbox"/> Monitored Natural Attenuation | <input type="checkbox"/> Access controls | <input type="checkbox"/> Groundwater Containment | <input checked="" type="checkbox"/> Institutional Controls | <input type="checkbox"/> Vertical Barrier Walls | <input type="checkbox"/> Groundwater pump and treatment | | <input type="checkbox"/> Surface water collection and treatment | | <input type="checkbox"/> Other: _____ | |
| <input type="checkbox"/> Cover system | <input type="checkbox"/> Monitored Natural Attenuation | | | | | | | | | | | | | | |
| <input type="checkbox"/> Access controls | <input type="checkbox"/> Groundwater Containment | | | | | | | | | | | | | | |
| <input checked="" type="checkbox"/> Institutional Controls | <input type="checkbox"/> Vertical Barrier Walls | | | | | | | | | | | | | | |
| <input type="checkbox"/> Groundwater pump and treatment | | | | | | | | | | | | | | | |
| <input type="checkbox"/> Surface water collection and treatment | | | | | | | | | | | | | | | |
| <input type="checkbox"/> Other: _____ | | | | | | | | | | | | | | | |
| Attachments: <input type="checkbox"/> Inspection team roster attached <input type="checkbox"/> Site map attached | | | | | | | | | | | | | | | |
| II. INTERVIEWS (Check all that apply) | | | | | | | | | | | | | | | |
| 1. O & M Site Manager | | | | | | | | | | | | | | | |
| | _____ (Name) | _____ (Title) | _____ (Date) | | | | | | | | | | | | |
| Interviewed: | <input type="checkbox"/> at site | <input type="checkbox"/> at office | <input type="checkbox"/> by phone Phone No. _____ | | | | | | | | | | | | |
| Problems, suggestions: | <input type="checkbox"/> report attached _____ | | | | | | | | | | | | | | |
| 2. O & M Staff | | | | | | | | | | | | | | | |
| | _____ (Name) | _____ (Title) | _____ (Date) | | | | | | | | | | | | |
| Interviewed: | <input type="checkbox"/> at site | <input type="checkbox"/> at office | <input type="checkbox"/> by phone Phone No. _____ | | | | | | | | | | | | |
| Problems, suggestions: | <input type="checkbox"/> report attached _____ | | | | | | | | | | | | | | |

Five-Year Review Site Inspection Checklist (Continued)

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

| | | | |
|---|--|-------------------------------------|------------------------------|
| <input type="checkbox"/> O & M Manual | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |
| x As-built drawings | x Readily available | x Up to date | <input type="checkbox"/> N/A |
| <input type="checkbox"/> Maintenance Logs | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |

Remarks: See Waste Unit Inspection and Maintenance, ER-SOP-019.

Five-Year Review Site Inspection Checklist (Continued)

| | | | | | | |
|---|--|--|-------------------------------------|--|-------------------------------------|------------------------------|
| 2. Site-Specific Health and Safety Plan | | | | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |
| <input type="checkbox"/> Contingency plan/emergency response plan | | | | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |
| Remarks: <u>Routine O&M activities do not require an SSHASP under 29 CFR 1910.1201.</u> <u>HAZWOPER</u> | | | | | | |
| 3. O & M and OSHA Training Records | | | | x Readily available | x Up to date | <input type="checkbox"/> N/A |
| Remarks _____ | | | | | | |
| 4. Permits and Service Agreements | | | | | | |
| <input type="checkbox"/> Air discharge permit | | | | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |
| <input type="checkbox"/> Effluent discharge | | | | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |
| <input type="checkbox"/> Waste Disposal, POTW | | | | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |
| <input type="checkbox"/> Other permits | | | | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |
| Remarks _____ | | | | | | |
| 5. Gas Generation Records | | | | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |
| Remarks _____ | | | | | | |
| 6. Settlement Monument Records | | | | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |
| Remarks _____ | | | | | | |
| 7. Groundwater Monitoring Records | | | | <input type="checkbox"/> Readily available | x Up to date | x N/A |
| Remarks _____ | | | | | | |
| 8. Leachate Extraction Records | | | | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |
| Remarks _____ | | | | | | |
| 9. Discharge Compliance Records | | | | | | |
| <input type="checkbox"/> Air | | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A | | |
| <input type="checkbox"/> Water (effluent) | | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A | | |
| Remarks _____ | | | | | | |
| 10. Daily Access/Security Logs | | | | x Readily available | <input type="checkbox"/> Up to date | <input type="checkbox"/> N/A |
| Remarks _____ | | | | | | |

Five-Year Review Site Inspection Checklist (Continued)

| IV. O & M Costs | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--|----------|--------------|---|------------|----------|--|---|--------|--------|------------|--|------------|----------|--|---|--------|--------|------------|--|------------|----------|--|---|--------|--------|------------|--|------------|----------|--|---|--------|--------|------------|--|------------|----------|--|---|--------|--------|------------|--|
| 1. O & M Organization <div style="display: flex; justify-content: space-between;"> <div> <input type="checkbox"/> State in-house <input type="checkbox"/> PRP in-house <input checked="" type="checkbox"/> Other: <u>SRS</u> </div> <div> <input type="checkbox"/> Contractor for State <input type="checkbox"/> Contractor for PRP </div> </div> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2. O & M Cost Records <input checked="" type="checkbox"/> Readily available <input checked="" type="checkbox"/> Up to date <input type="checkbox"/> Funding mechanism/agreement in place <input type="checkbox"/> Other: <u>Project cost data is summarized in Section X of attached review: WSRC-RP-2007-4063</u> <p style="text-align: center;">Total annual cost by year for review period if available.</p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%;">From _____</td> <td style="width: 20%;">To _____</td> <td style="width: 40%;"></td> <td style="width: 20%; text-align: right;"><input type="checkbox"/> Breakdown attached</td> </tr> <tr> <td style="text-align: center;">(Date)</td> <td style="text-align: center;">(Date)</td> <td style="text-align: center;">Total cost</td> <td></td> </tr> <tr> <td>From _____</td> <td>To _____</td> <td></td> <td style="text-align: right;"><input type="checkbox"/> Breakdown attached</td> </tr> <tr> <td style="text-align: center;">(Date)</td> <td style="text-align: center;">(Date)</td> <td style="text-align: center;">Total cost</td> <td></td> </tr> <tr> <td>From _____</td> <td>To _____</td> <td></td> <td style="text-align: right;"><input type="checkbox"/> Breakdown attached</td> </tr> <tr> <td style="text-align: center;">(Date)</td> <td style="text-align: center;">(Date)</td> <td style="text-align: center;">Total cost</td> <td></td> </tr> <tr> <td>From _____</td> <td>To _____</td> <td></td> <td style="text-align: right;"><input type="checkbox"/> Breakdown attached</td> </tr> <tr> <td style="text-align: center;">(Date)</td> <td style="text-align: center;">(Date)</td> <td style="text-align: center;">Total cost</td> <td></td> </tr> <tr> <td>From _____</td> <td>To _____</td> <td></td> <td style="text-align: right;"><input type="checkbox"/> Breakdown attached</td> </tr> <tr> <td style="text-align: center;">(Date)</td> <td style="text-align: center;">(Date)</td> <td style="text-align: center;">Total cost</td> <td></td> </tr> </table> | | | | From _____ | To _____ | | <input type="checkbox"/> Breakdown attached | (Date) | (Date) | Total cost | | From _____ | To _____ | | <input type="checkbox"/> Breakdown attached | (Date) | (Date) | Total cost | | From _____ | To _____ | | <input type="checkbox"/> Breakdown attached | (Date) | (Date) | Total cost | | From _____ | To _____ | | <input type="checkbox"/> Breakdown attached | (Date) | (Date) | Total cost | | From _____ | To _____ | | <input type="checkbox"/> Breakdown attached | (Date) | (Date) | Total cost | |
| From _____ | To _____ | | <input type="checkbox"/> Breakdown attached | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| (Date) | (Date) | Total cost | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| From _____ | To _____ | | <input type="checkbox"/> Breakdown attached | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| (Date) | (Date) | Total cost | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| From _____ | To _____ | | <input type="checkbox"/> Breakdown attached | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| (Date) | (Date) | Total cost | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| From _____ | To _____ | | <input type="checkbox"/> Breakdown attached | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| (Date) | (Date) | Total cost | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| From _____ | To _____ | | <input type="checkbox"/> Breakdown attached | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| (Date) | (Date) | Total cost | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3. Unanticipated or Unusually High O & M Costs During Review Period Describe costs and reasons: <u>N/A</u> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| V. ACCESS AND INSTITUTIONAL CONTROLS | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | x Applicable | <input type="checkbox"/> N/A | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| A. Fencing | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1. Fencing Damaged <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Gates secured <input checked="" type="checkbox"/> N/A Remarks _____ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

Five-Year Review Site Inspection Checklist (Continued)

B. Other Access Restrictions

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

Remarks: Signs at this site are in good condition.

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 Walkdown

Frequency: Annual

Responsible party/agent: DOE

Contact: K. M. Adams Waste Area Group Manager 09/3/07 (803) 952-7871
(Name) (Title) (Date) (Phone No.)

Reporting 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

Five-Year Review Site Inspection Checklist (Continued)

| | | | |
|---|--|--------------|--|
| 3. Land use changes offsite <input checked="" type="checkbox"/> N/A | | | |
| Remarks _____ | | | |
| VI. GENERAL SITE CONDITIONS | | | |
| A. Roads <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A | | | |
| 1. Roads damaged <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Roads adequate <input type="checkbox"/> N/A | | | |
| Remarks _____ | | | |
| B. Other site Conditions | | | |
| Remarks _____ | | | |
| VII. COVER SYSTEMS <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A | | | |
| A. Soil Surface | | | |
| 1. Settlement (Low spots) <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Settlement not evident | | | |
| Areal extent _____ | | Depth _____ | |
| Remarks _____ | | | |
| 2. Cracks <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Cracking not evident | | | |
| Lengths _____ | | Widths _____ | |
| | | Depths _____ | |
| Remarks _____ | | | |
| 3. Erosion <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Erosion not evident | | | |
| Areal extent _____ | | Depth _____ | |
| Remarks _____ | | | |
| 4. Holes <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Holes not evident | | | |
| Areal extent _____ | | Depth _____ | |
| Remarks _____ | | | |
| 5. Vegetative Cover <input type="checkbox"/> Grass <input checked="" type="checkbox"/> Cover properly established <input type="checkbox"/> No signs of stress | | | |
| <input type="checkbox"/> Trees/shrubs (indicate size and location on a diagram) | | | |
| Remarks _____ | | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | |
|--|---|--------------------|
| 6. Alternative Cover (armored rock, concrete, etc.) <input type="checkbox"/> N/A | | |
| Remarks: _____ _____ | | |
| 7. Bulges <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Bulges not evident | | |
| Areal extent _____ Height _____ | | |
| Remarks _____ _____ | | |
| 8. Wet Areas/Water Damage <input type="checkbox"/> Wet areas/water damage not evident | | |
| <input type="checkbox"/> Wet Areas | <input type="checkbox"/> Location shown on site map | Areal extent _____ |
| <input type="checkbox"/> Ponding | <input type="checkbox"/> Location shown on site map | Areal extent _____ |
| <input type="checkbox"/> Seeps | <input type="checkbox"/> Location shown on site map | Areal extent _____ |
| <input type="checkbox"/> Soft subgrade | <input type="checkbox"/> Location shown on site map | Areal extent _____ |
| Remarks _____ _____ | | |
| 9. Slope Instability <input type="checkbox"/> Slides <input type="checkbox"/> Location shown on site map <input type="checkbox"/> No evidence of slope instability | | |
| Areal extent _____ | | |
| Remarks _____ _____ | | |
| B. Benches <input type="checkbox"/> Applicable <input type="checkbox"/> 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 <input type="checkbox"/> Location shown on site map <input type="checkbox"/> N/A or okay | | |
| Remarks _____ _____ | | |
| 2. Bench Breached <input type="checkbox"/> Location shown on site map <input type="checkbox"/> N/A or okay | | |
| Remarks _____ _____ | | |
| 3. Bench Overtopped <input type="checkbox"/> Location shown on site map <input type="checkbox"/> N/A or okay | | |
| Remarks _____ _____ | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | |
|---|--|--|
| C. Letdown Channels <input type="checkbox"/> Applicable <input type="checkbox"/> 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 | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> No evidence of settlement |
| Areal extent _____ Depth _____ | | |
| Remarks _____ | | |
| 2. Material Degradation | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> No evidence of degradation |
| Material type _____ Areal extent _____ | | |
| Remarks _____ | | |
| 3. Erosion | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> No evidence of erosion |
| Areal extent _____ Depth _____ | | |
| Remarks _____ | | |
| 4. Undercutting | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> No evidence of undercutting |
| Areal extent _____ Depth _____ | | |
| Remarks _____ | | |
| 5. Obstructions | Type _____ | <input type="checkbox"/> No obstructions |
| <input type="checkbox"/> Location shown on site map | Areal extent _____ | Size _____ |
| Remarks _____ | | |
| 6. Excessive Vegetative Growth | Type _____ | |
| <input type="checkbox"/> No evidence of excessive growth | <input type="checkbox"/> Vegetation in channels does not obstruct flow | |
| <input type="checkbox"/> Location shown on site map | Areal extent _____ | |
| Remarks _____ | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | | |
|--|--|---|---|
| D. Cover Penetrations <input type="checkbox"/> Applicable <input type="checkbox"/> N/A | | | |
| 1. Gas Vents <input type="checkbox"/> Active <input type="checkbox"/> Passive | | | |
| <input type="checkbox"/> Properly secured/locked | <input type="checkbox"/> Functioning | <input type="checkbox"/> Routinely sampled | <input type="checkbox"/> Good condition |
| <input type="checkbox"/> Evidence of leakage at penetration | <input type="checkbox"/> Needs Maintenance | <input type="checkbox"/> N/A | |
| Remarks _____ | | | |
| _____ | | | |
| 2. Gas Monitoring Probes | | | |
| <input type="checkbox"/> Properly secured/locked | <input type="checkbox"/> Functioning | <input type="checkbox"/> Routinely sampled | <input type="checkbox"/> Good condition |
| <input type="checkbox"/> Evidence of leakage at penetration | <input type="checkbox"/> Needs Maintenance | <input type="checkbox"/> N/A | |
| Remarks _____ | | | |
| _____ | | | |
| 3. Monitoring Wells | | | |
| <input type="checkbox"/> Properly secured/locked | <input type="checkbox"/> Functioning | <input type="checkbox"/> Routinely sampled | <input type="checkbox"/> Good condition |
| <input type="checkbox"/> Evidence of leakage at penetration | <input type="checkbox"/> Needs Maintenance | <input type="checkbox"/> N/A | |
| Remarks _____ | | | |
| _____ | | | |
| 4. Leachate Extraction Wells | | | |
| <input type="checkbox"/> Properly secured/locked | <input type="checkbox"/> Functioning | <input type="checkbox"/> Routinely sampled | <input type="checkbox"/> Good condition |
| <input type="checkbox"/> Evidence of leakage at penetration | <input type="checkbox"/> Needs Maintenance | <input type="checkbox"/> N/A | |
| Remarks _____ | | | |
| _____ | | | |
| 5. Settlement Monuments <input type="checkbox"/> Located <input type="checkbox"/> Routinely surveyed <input type="checkbox"/> N/A | | | |
| Remarks _____ | | | |
| _____ | | | |
| E. Gas Collection and Treatment <input type="checkbox"/> Applicable <input type="checkbox"/> N/A | | | |
| 1. Gas Treatment Facilities | | | |
| <input type="checkbox"/> Flaring | <input type="checkbox"/> Thermal destruction | <input type="checkbox"/> Collection for reuse | |
| <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance | | |
| Remarks _____ | | | |
| _____ | | | |
| 2. Gas Collection Wells, Manifolds and Piping | | | |
| <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance | | |
| Remarks _____ | | | |
| _____ | | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | | |
|--|--|--|--|
| 3. Gas Monitoring Facilities (e.g., gas monitoring of adjacent homes or buildings) <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A Remarks _____ _____ | | | |
| F. Cover Drainage Layer <input type="checkbox"/> Applicable <input type="checkbox"/> N/A | | | |
| 1. Outlet Pipes Inspected <input type="checkbox"/> Functioning <input type="checkbox"/> N/A Remarks _____ _____ | | | |
| 2. Outlet Rock Inspected <input type="checkbox"/> Functioning <input type="checkbox"/> N/A Remarks _____ _____ | | | |
| G. Detention/sedimentation Ponds <input type="checkbox"/> Applicable <input type="checkbox"/> N/A | | | |
| 1. Siltation Areal extent _____ Depth _____ <input type="checkbox"/> N/A <input type="checkbox"/> Siltation not evident Remarks _____ _____ | | | |
| 2. Erosion Areal extent _____ Depth _____ <input type="checkbox"/> N/A <input type="checkbox"/> Erosion not evident Remarks _____ _____ | | | |
| 3. Outlet Works <input type="checkbox"/> Functioning <input type="checkbox"/> N/A Remarks _____ _____ | | | |
| 4. Dam <input type="checkbox"/> Functioning <input type="checkbox"/> N/A Remarks _____ _____ | | | |
| H. Retaining Walls <input type="checkbox"/> Applicable <input type="checkbox"/> N/A | | | |
| 1. Deformations <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Deformation not evident Horizontal displacement _____ Vertical displacement _____ Rotational displacement _____ Remarks _____ _____ | | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | |
|--|---|---|
| 2. Degradation | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> Deformation not evident |
| Remarks _____ | | |
| I. Perimeter Ditches/Off-Site Discharge | | |
| | <input type="checkbox"/> Applicable | <input type="checkbox"/> N/A |
| 1. Siltation | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> Siltation not evident |
| Areal extent _____ Depth _____ | | |
| Remarks _____ | | |
| 2. Vegetative Growth | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> Siltation not evident |
| <input type="checkbox"/> Vegetation does not impede flow | | |
| Areal extent _____ Type _____ | | |
| Remarks _____ | | |
| 3. Erosion | <input type="checkbox"/> Location shown on site map | <input checked="" type="checkbox"/> Erosion not evident |
| Areal extent _____ Depth _____ | | |
| Remarks _____ | | |
| 4. Discharge Structure | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> N/A |
| Remarks _____ | | |
| VIII. VERTICAL BARRIER WALLS | | |
| | <input type="checkbox"/> Applicable | <input checked="" type="checkbox"/> N/A |
| 1. Settlement | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> Settlement not evident |
| Areal extent _____ Depth _____ | | |
| Remarks _____ | | |
| 2. Performance Monitoring | Type of Monitoring _____ | <input type="checkbox"/> Performance not monitored |
| Frequency _____ <input type="checkbox"/> Evidence of breaching | | |
| Head differential _____ | | |
| Remarks _____ | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | | |
|---|---|--|---|
| IX. GROUNDWATER/SURFACE WATER REMEDIES | | <input type="checkbox"/> Applicable | <input checked="" type="checkbox"/> N/A |
| A. Groundwater Extraction Wells, Pumps, and Pipelines | | <input type="checkbox"/> Applicable | <input type="checkbox"/> N/A |
| 1. Pumps, Wellhead Plumbing, and Electrical | | | |
| <input type="checkbox"/> Good condition | <input type="checkbox"/> All required wells located | <input type="checkbox"/> Needs Maintenance | <input type="checkbox"/> N/A |
| Remarks _____ | | | |
| _____ | | | |
| 2. Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances | | | |
| <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance | | |
| Remarks _____ | | | |
| _____ | | | |
| 3. Spare Parts and Equipment | | | |
| <input type="checkbox"/> Readily available | <input type="checkbox"/> Good condition | <input type="checkbox"/> Requires upgrade | <input type="checkbox"/> Needs to be provided |
| Remarks _____ | | | |
| _____ | | | |
| B. Surface Water Collection Structures, Pumps, and Pipelines | | <input type="checkbox"/> Applicable | <input type="checkbox"/> N/A |
| 1. Collection Structures, Pumps, and Electrical | | | |
| <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance | | |
| Remarks _____ | | | |
| _____ | | | |
| 2. Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances | | | |
| <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance | | |
| Remarks _____ | | | |
| _____ | | | |
| 3. Spare Parts and Equipment | | | |
| <input type="checkbox"/> Readily available | <input type="checkbox"/> Good condition | <input type="checkbox"/> Requires upgrade | <input type="checkbox"/> Needs to be provided |
| Remarks _____ | | | |
| _____ | | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | |
|---|--|---|
| C. Treatment System | <input type="checkbox"/> Applicable | <input type="checkbox"/> N/A |
| 1. Treatment Train (Check components that apply) | | |
| <input type="checkbox"/> Metals removal | <input type="checkbox"/> Oil/water separation | <input type="checkbox"/> Bioremediation |
| <input type="checkbox"/> Air stripping | <input type="checkbox"/> Carbon adsorbers | |
| <input type="checkbox"/> Filters _____ | | |
| <input type="checkbox"/> Additive (e.g., chelation agent, flocculent) _____ | | |
| <input type="checkbox"/> Others _____ | | |
| <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance | |
| <input type="checkbox"/> Sampling ports properly marked and functional | | |
| <input type="checkbox"/> Sampling/maintenance log displayed and up to date | | |
| <input type="checkbox"/> Equipment properly identified | | |
| <input type="checkbox"/> Quantity of groundwater treated annually _____ | | |
| <input type="checkbox"/> Quantity of surface water treated annually _____ | | |
| Remarks _____ | | |
| _____ | | |
| 2. Electrical Enclosures and Panels (properly rated and functional) | | |
| <input type="checkbox"/> N/A | <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance |
| Remarks _____ | | |
| _____ | | |
| 3. Tanks, Vaults, Storage Vessels | | |
| <input type="checkbox"/> N/A | <input type="checkbox"/> Good condition | <input type="checkbox"/> Proper secondary containment |
| <input type="checkbox"/> Needs Maintenance | | |
| Remarks _____ | | |
| _____ | | |
| 4. Discharge Structure and Appurtenances | | |
| <input type="checkbox"/> N/A | <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance |
| Remarks _____ | | |
| _____ | | |
| 5. Treatment Building(s) | | |
| <input type="checkbox"/> N/A | <input type="checkbox"/> Good condition (esp. roof and doorways) | <input type="checkbox"/> Needs repair |
| <input type="checkbox"/> Chemicals and equipment properly stored | | |
| Remarks _____ | | |
| _____ | | |

Five-Year Review Site Inspection Checklist (Continued)

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 remedy for this OU is institutional controls.

Five-Year Review Site Inspection Checklist (Continued)

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.

Implementation of the Institutional Controls alternative required both short- and long-term actions, which are protective of human health and the environment. For the short-term, signs were posted at the HEWB Waste Unit, which indicate that this area was used to manage hazardous substances. In addition, existing SRS access controls are used to maintain this site for industrial use only.

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.

N/A

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K-AREA BINGHAM PUMP OUTAGE PIT (643-1G) OPERABLE UNIT

I. Introduction

This is the second five-year review for the K-Area Bingham Pump Outage Pit (643-1G) (KBPOP) Operable Unit (OU). This review was conducted from August 2007 through September 2007. 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 Start | 1994 |
| FS Rev 1.1 Submittal | May 22, 1997 |
| Remedial Investigation (RI) complete | June 19, 1997 |
| Record of Decision (ROD) issuance | April 14, 1998 |
| Previous Five-Year Review | February 12, 2004 |

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 ft in length and 60 ft 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 were 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. The pit was backfilled with approximately 4 ft 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.

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).

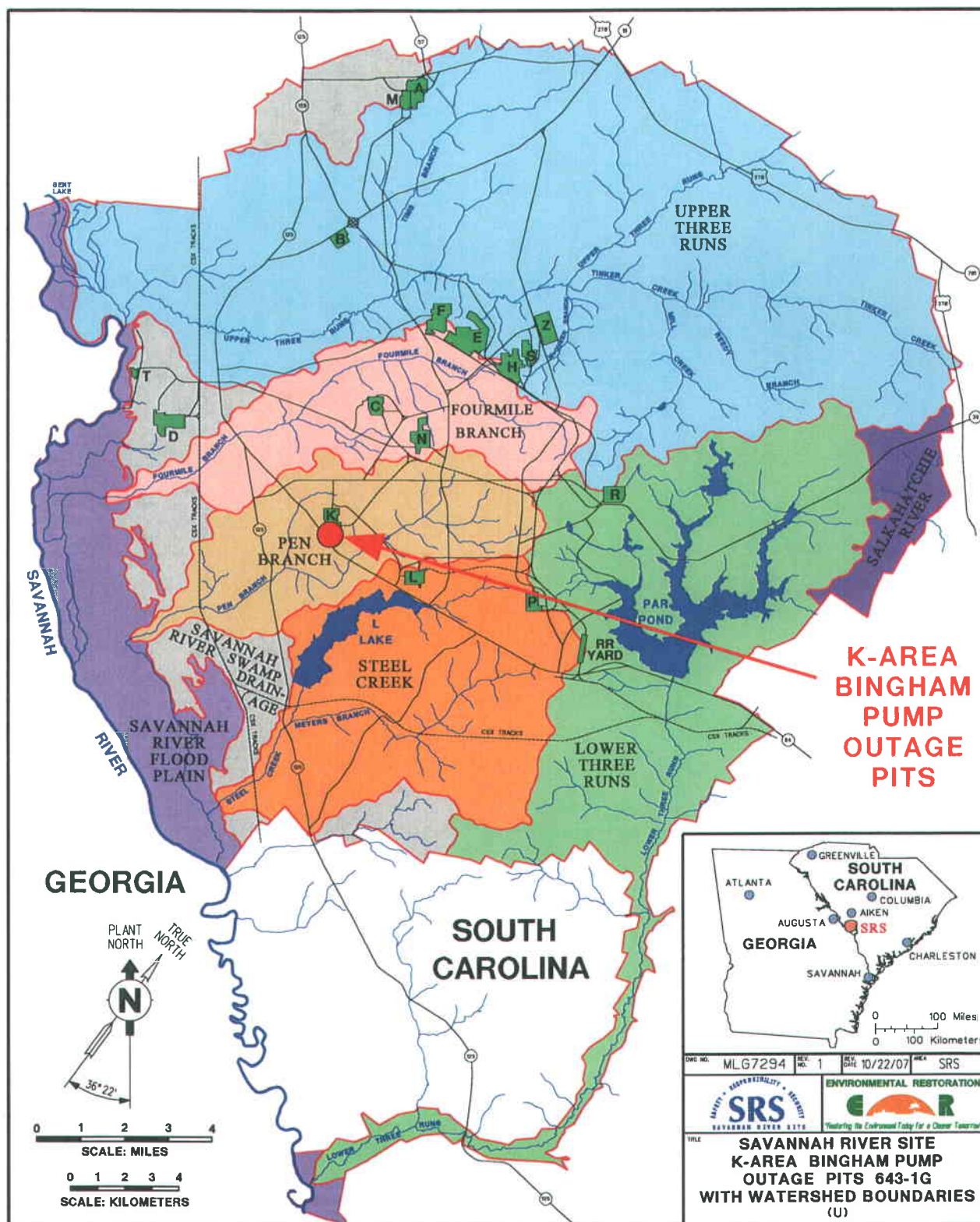


Figure 1. Location of the K-Area Bingham Pump Outage Pit (643-1G) Operable Unit at SRS

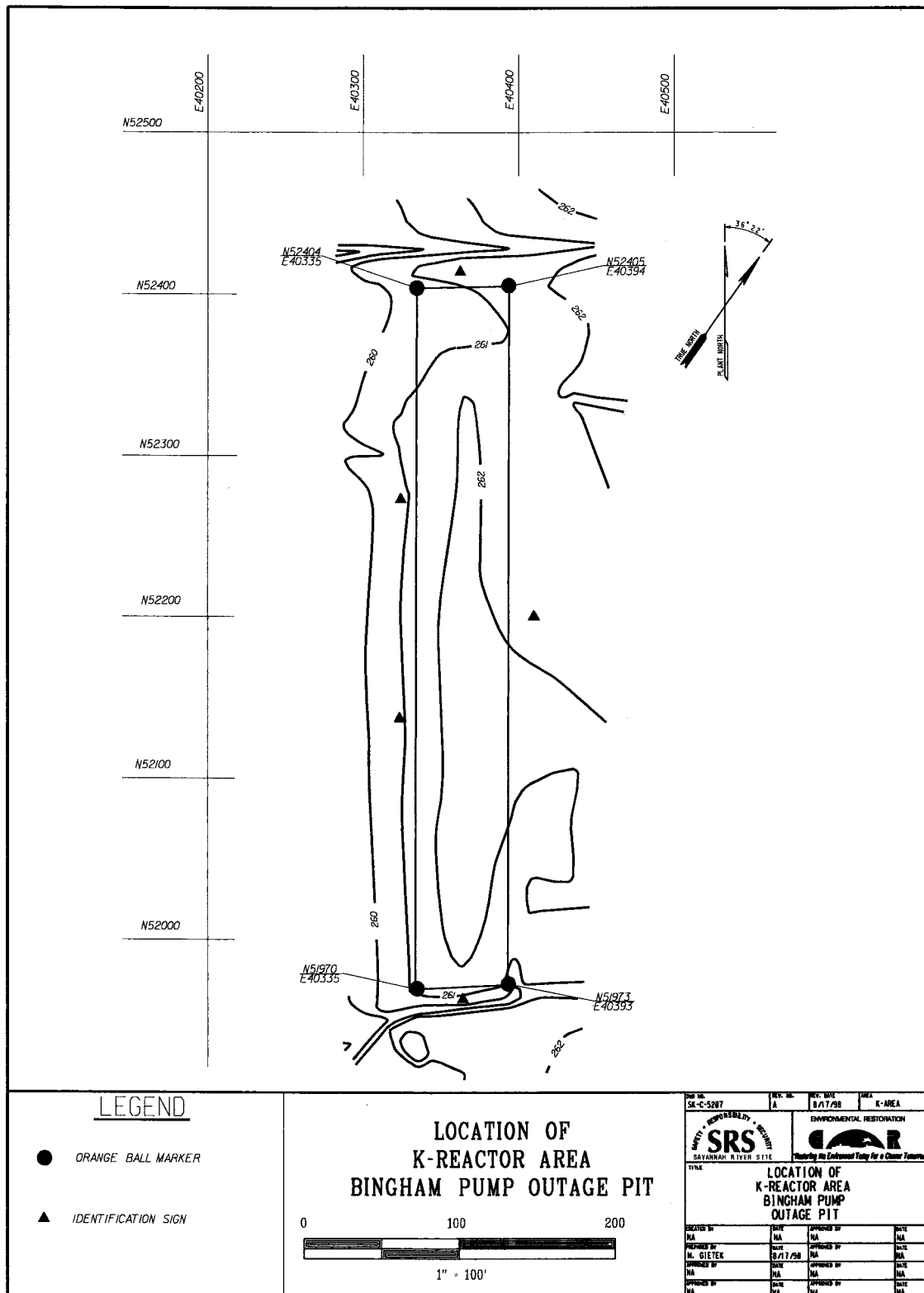


Figure 2. Layout of the K-Area Bingham Pump Outage Pit (643-1G) Operable Unit

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 time two Resource Conservation and Recovery Act- (RCRA-) standard groundwater-monitoring wells (one upgradient (KBP1D) and one downgradient (KBP2D)) were installed at the KBPOP. Results from the sampling 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. The cover material was placed at a time preceding the preparation of the formal CERCLA documentation. The cover system was placed prior to the CERCLA investigation.

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.

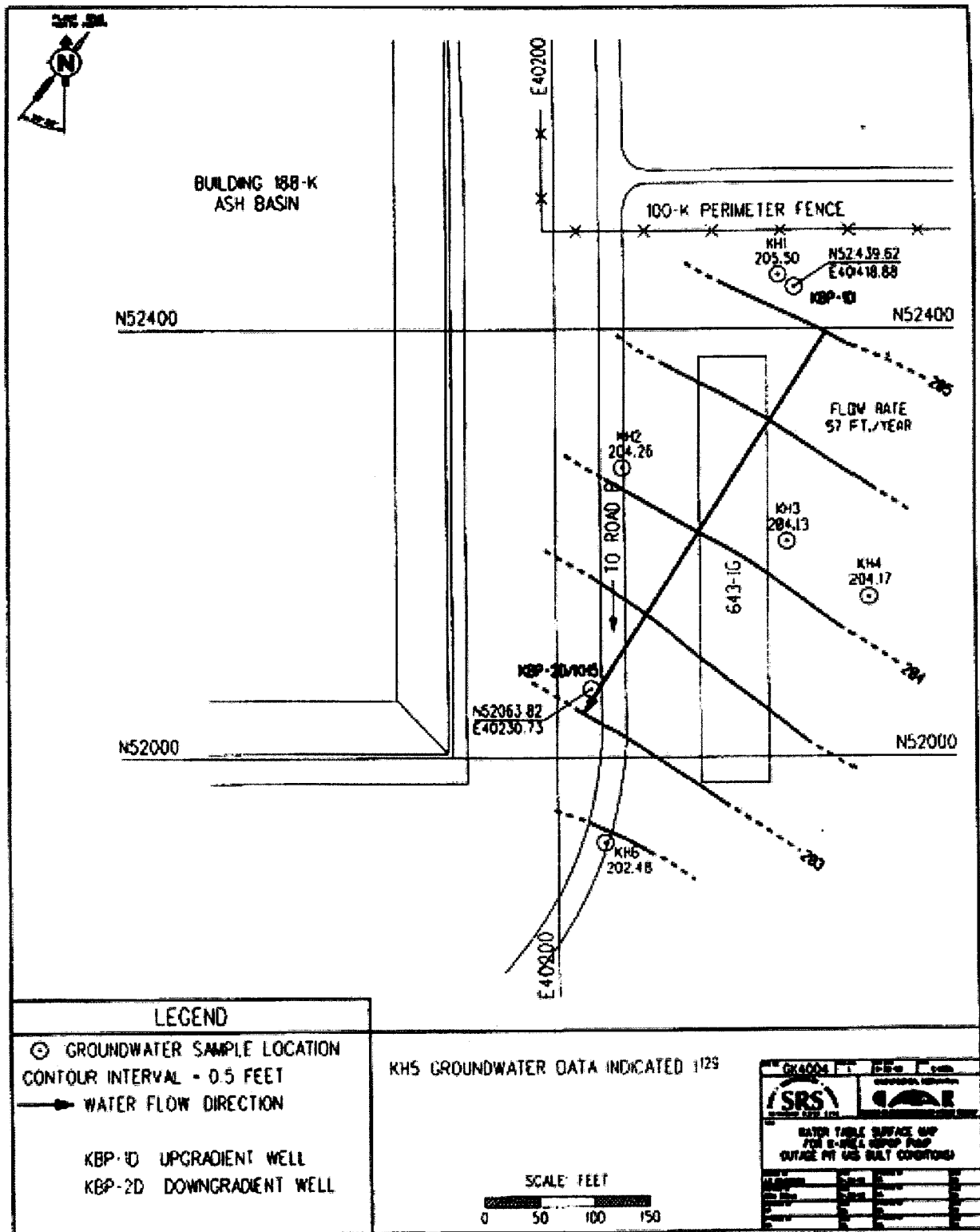


Figure 3. Groundwater Sample Locations at the KBPOP

V. Progress Since Last Review

This is the second five-year ROD review that the KBPOP has undergone. Since the previous review in June of 2003, no additional action has been required at this 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 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 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

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. Project Costs

Costs associated with the selected remedy for the KBPOP OU includes operation and maintenance costs of institutional controls. The estimated operation and maintenance cost associated with the selected remedy is \$320,000. This is a present worth cost, including 30 years of maintenance activities based on a 5% discount rate. After characterization and effectiveness of the remedy was evaluated, the actual operation and maintenance cost for the KBPOP was assessed. The total actual operation and maintenance cost from project support and other post-construction expense to fiscal year 2006 is \$123,092.

XI. Protectiveness Statement(s)

The remedy of institutional controls at the KBPOP is protective of human health and the environment. This remedy, upon implementation of land use controls pursuant to the Land Use Control Assurance Plan (LUCAP) 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 United States Department of Energy (USDOE) controls the OU. These controls 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).

XII. Next Review

The next five-year review is scheduled for February 12, 2014.

ATTACHMENT 1

List of Documents Reviewed

WSRC-RP-97-178, *Record of Decision Remedial Alternative Selection for the K-Area Bingham Pump Outage Pit (643-1G) (U)*, Rev. 1, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

WSRC-RP-95-1555, *Remedial Investigation Report with Baseline Risk Assessment for the K-Area Bingham Pump Outage Pit (643-1G) (U)*, Rev. 1.2, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

WSRC-RP-98-4003, *Final Remediation Report for the K-Area Bingham Pump Outage Pit (643-1G) (U)*, Rev. 1, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

WSRC-RP-2000-4300, *Federal Facility Agreement Annual Progress Report for Fiscal Year 2000 (U)*, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

WSRC-RP-96-831, *Feasibility Study for the K-Area Bingham Pump Outage Pit (643-1G) Operable Unit*, Rev. 1.1, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

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ATTACHMENT 2**Five-Year Review Site Inspection Checklist**

| I. SITE INFORMATION | | | |
|--|---|-----------------------------|------------------------------|
| Site Name: | K-Area Burning/Rubble Pits | Date of Inspection: | 9/05/2007 |
| Location and Region: | SRS, USEPA Region IV | EPA ID: | SC1890008989 |
| Agency, office, or company leading the five-year review: | United States Department of Energy | CERCLIS OU: | 20 |
| | | Weather/Temperature: | Clear and Sunny, 90°F |
| Remedy Includes: (Check all that apply) <div style="display: flex; flex-wrap: wrap;"> <div style="width: 50%;"> <input type="checkbox"/> Cover System <input type="checkbox"/> Access controls <input checked="" type="checkbox"/> Institutional Controls <input type="checkbox"/> Groundwater pump and treatment <input type="checkbox"/> Surface water collection and treatment <input type="checkbox"/> Other: _____ </div> <div style="width: 50%;"> <input type="checkbox"/> Monitored Natural Attenuation <input type="checkbox"/> Groundwater Containment <input type="checkbox"/> Vertical Barrier Walls </div> </div> | | | |
| Attachments: <input type="checkbox"/> Inspection team roster attached <input type="checkbox"/> Site map attached | | | |
| II. INTERVIEWS (Check all that apply) | | | |
| 1. O & M Site Manager <div style="display: flex; justify-content: space-between; margin-top: 5px;"> <div style="width: 45%;">(Name) _____</div> <div style="width: 20%;">(Title) _____</div> <div style="width: 35%;">(Date) _____</div> </div> <div style="margin-top: 5px;"> Interviewed: <input type="checkbox"/> at site <input type="checkbox"/> at office <input type="checkbox"/> by phone Phone No. _____ </div> <div style="margin-top: 5px;"> Problems, suggestions: <input type="checkbox"/> report attached _____ </div> | | | |
| Post-Closure Waste Site | | | |
| 2. O & M Staff <div style="display: flex; justify-content: space-between; margin-top: 5px;"> <div style="width: 45%;">(Name) _____</div> <div style="width: 20%;">(Title) _____</div> <div style="width: 35%;">(Date) _____</div> </div> <div style="margin-top: 5px;"> Interviewed: <input type="checkbox"/> at site <input type="checkbox"/> at office <input type="checkbox"/> by phone Phone No. _____ </div> <div style="margin-top: 5px;"> Problems, suggestions: <input type="checkbox"/> report attached _____ </div> | | | |

Five-Year Review Site Inspection Checklist (Continued)

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

| | | | |
|---|--|-------------------------------------|------------------------------|
| <input type="checkbox"/> O & M Manual | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |
| x As-built drawings | x Readily available | x Up to date | <input type="checkbox"/> N/A |
| <input type="checkbox"/> Maintenance Logs | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |

Remarks: See Waste Unit Inspection and Maintenance, ER-SOP-019

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| | | | | | | |
|---|--|--|--|---|--|---|
| 2. Site-Specific Health and Safety Plan | | | | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A |
| <input type="checkbox"/> Contingency plan/emergency response plan | | | | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A |
| Remarks: <u>Routine O&M activities do not require a SSHASP under 29 CFR 1910.120, HAZWOPER. A SSHASP is prepared in needed.</u> | | | | | | |
| 3. O & M and OSHA Training Records | | | | <input checked="" type="checkbox"/> Readily available | <input checked="" type="checkbox"/> Up to date | <input type="checkbox"/> N/A |
| Remarks: _____ | | | | | | |
| 4. Permits and Service Agreements | | | | | | |
| <input type="checkbox"/> Air discharge permit | | <input type="checkbox"/> Readily available | | <input type="checkbox"/> Up to date | | <input checked="" type="checkbox"/> N/A |
| <input type="checkbox"/> Effluent discharge | | <input type="checkbox"/> Readily available | | <input type="checkbox"/> Up to date | | <input checked="" type="checkbox"/> N/A |
| <input type="checkbox"/> Waste Disposal, POTW | | <input type="checkbox"/> Readily available | | <input type="checkbox"/> Up to date | | <input checked="" type="checkbox"/> N/A |
| <input type="checkbox"/> Other permits | | <input type="checkbox"/> Readily available | | <input type="checkbox"/> Up to date | | <input checked="" type="checkbox"/> N/A |
| Remarks: _____ | | | | | | |
| 5. Gas Generation Records | | | | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A |
| Remarks: _____ | | | | | | |
| 6. Settlement Monument Records | | | | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A |
| Remarks: _____ | | | | | | |
| 7. Groundwater Monitoring Records | | | | <input type="checkbox"/> Readily available | <input checked="" type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A |
| Remarks: _____ | | | | | | |
| 8. Leachate Extraction Records | | | | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A |
| Remarks: _____ | | | | | | |
| 9. Discharge Compliance Records | | | | | | |
| <input type="checkbox"/> Air | | <input type="checkbox"/> Readily available | | <input type="checkbox"/> Up to date | | <input checked="" type="checkbox"/> N/A |
| <input type="checkbox"/> Water (effluent) | | <input type="checkbox"/> Readily available | | <input type="checkbox"/> Up to date | | <input checked="" type="checkbox"/> N/A |
| Remarks: _____ | | | | | | |
| 10. Daily Access/Security Logs | | | | <input checked="" type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input type="checkbox"/> N/A |
| Remarks: _____ | | | | | | |

Five-Year Review Site Inspection Checklist (Continued)

| IV. O & M Costs | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--|----------|--------------|---|------------|----------|--|---|--------|--------|------------|--|--|--|--|--|------------|----------|--|---|--------|--------|------------|--|--|--|--|--|------------|----------|--|---|--------|--------|------------|--|--|--|--|--|------------|----------|--|---|--------|--------|------------|--|--|--|--|--|------------|----------|--|---|--------|--------|------------|--|
| 1. O & M Organization <div style="display: flex; justify-content: space-between; margin-top: 10px;"><div><input type="checkbox"/> State in-house</div><div><input type="checkbox"/> Contractor for State</div></div> <div style="display: flex; justify-content: space-between; margin-top: 10px;"><div><input type="checkbox"/> PRP in-house</div><div><input type="checkbox"/> Contractor for PRP</div></div> <div style="margin-top: 10px;"><input checked="" type="checkbox"/> Other <u>SRS</u></div> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2. O & M Cost Records <div style="display: flex; justify-content: space-between; margin-top: 10px;"><div><input type="checkbox"/> Readily available</div><div><input type="checkbox"/> Up to date</div><div><input type="checkbox"/> Funding mechanism/agreement in place</div></div> <div style="margin-top: 10px;"><input checked="" type="checkbox"/> Other: <u>Project cost data is summarized in Section X of attached review: WSRC-RP-2007-4063.</u></div> <div style="margin-top: 20px; text-align: center;"><p>Total annual cost by year for review period if available</p><table style="width: 100%; border-collapse: collapse;"><tr><td style="width: 20%;">From _____</td><td style="width: 20%;">To _____</td><td style="width: 40%;"></td><td style="width: 20%; text-align: right;"><input type="checkbox"/> Breakdown attached</td></tr><tr><td style="text-align: center;">(Date)</td><td style="text-align: center;">(Date)</td><td style="text-align: center;">Total cost</td><td></td></tr><tr><td colspan="4" style="height: 10px;"></td></tr><tr><td>From _____</td><td>To _____</td><td></td><td style="text-align: right;"><input type="checkbox"/> Breakdown attached</td></tr><tr><td style="text-align: center;">(Date)</td><td style="text-align: center;">(Date)</td><td style="text-align: center;">Total cost</td><td></td></tr><tr><td colspan="4" style="height: 10px;"></td></tr><tr><td>From _____</td><td>To _____</td><td></td><td style="text-align: right;"><input type="checkbox"/> Breakdown attached</td></tr><tr><td style="text-align: center;">(Date)</td><td style="text-align: center;">(Date)</td><td style="text-align: center;">Total cost</td><td></td></tr><tr><td colspan="4" style="height: 10px;"></td></tr><tr><td>From _____</td><td>To _____</td><td></td><td style="text-align: right;"><input type="checkbox"/> Breakdown attached</td></tr><tr><td style="text-align: center;">(Date)</td><td style="text-align: center;">(Date)</td><td style="text-align: center;">Total cost</td><td></td></tr><tr><td colspan="4" style="height: 10px;"></td></tr><tr><td>From _____</td><td>To _____</td><td></td><td style="text-align: right;"><input type="checkbox"/> Breakdown attached</td></tr><tr><td style="text-align: center;">(Date)</td><td style="text-align: center;">(Date)</td><td style="text-align: center;">Total cost</td><td></td></tr></table></div> | | | | From _____ | To _____ | | <input type="checkbox"/> Breakdown attached | (Date) | (Date) | Total cost | | | | | | From _____ | To _____ | | <input type="checkbox"/> Breakdown attached | (Date) | (Date) | Total cost | | | | | | From _____ | To _____ | | <input type="checkbox"/> Breakdown attached | (Date) | (Date) | Total cost | | | | | | From _____ | To _____ | | <input type="checkbox"/> Breakdown attached | (Date) | (Date) | Total cost | | | | | | From _____ | To _____ | | <input type="checkbox"/> Breakdown attached | (Date) | (Date) | Total cost | |
| From _____ | To _____ | | <input type="checkbox"/> Breakdown attached | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| (Date) | (Date) | Total cost | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| From _____ | To _____ | | <input type="checkbox"/> Breakdown attached | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| (Date) | (Date) | Total cost | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| From _____ | To _____ | | <input type="checkbox"/> Breakdown attached | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| (Date) | (Date) | Total cost | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| From _____ | To _____ | | <input type="checkbox"/> Breakdown attached | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| (Date) | (Date) | Total cost | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| From _____ | To _____ | | <input type="checkbox"/> Breakdown attached | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| (Date) | (Date) | Total cost | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3. Unanticipated or Unusually High O & M Costs During Review Period Describe costs and reasons: _____ _____ _____ _____ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| V. ACCESS AND INSTITUTIONAL CONTROLS | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | x Applicable | <input type="checkbox"/> N/A | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| A. Fencing | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1. Fencing Damaged <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Gates secured <input checked="" type="checkbox"/> N/A Remarks _____ _____ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

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| | | | | |
|---|---------------------------------|--------------------------|--|---|
| B. Other Access Restrictions | | | | |
| 1. Signs and Other Security Measures <input type="checkbox"/> Location shown on site map <input type="checkbox"/> N/A | | | | |
| Remarks: <u>Signs are in good condition.</u> | | | | |
| C. Institutional Controls | | | | |
| 1. Implementation and enforcement | | | | |
| Site conditions imply ICs not properly implemented: | | | <input type="checkbox"/> Yes | <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A |
| Site conditions imply ICs not being fully enforced: | | | <input type="checkbox"/> Yes | <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A |
| Type of monitoring (e.g., self-reporting, drive-by): | | | Field Walk Down | |
| Frequency: | Semi-Annually | | | |
| Responsible party/agent: | DOE Savannah River Field Office | | | |
| Contact: | W.G. Erickson, | Waste Area Group Manager | 09/3/07 | 952-8408 |
| | (Name) | (Title) | (Date) | (Phone No.) |
| Reporting is up-to-date: | | | <input checked="" type="checkbox"/> Yes | <input type="checkbox"/> No <input type="checkbox"/> N/A |
| Reports are verified by the lead agency: | | | <input checked="" type="checkbox"/> Yes | <input type="checkbox"/> No <input type="checkbox"/> N/A |
| Specific requirements in deed of decision documents have been met: | | | <input type="checkbox"/> Yes | <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A |
| Violations have been reported: | | | <input type="checkbox"/> Yes | <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A |
| Other problems or suggestions: | | | <input type="checkbox"/> Report attached | |
| | | | | |
| 2. Adequacy <input checked="" type="checkbox"/> ICs are adequate <input type="checkbox"/> ICs are inadequate <input type="checkbox"/> N/A | | | | |
| Remarks: _____ | | | | |
| | | | | |
| D. General | | | | |
| 1. Vandalism/Trespassing <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> No vandalism evident | | | | |
| Remarks: _____ | | | | |
| | | | | |
| 2. Land Use Changes Onsite <input checked="" type="checkbox"/> N/A | | | | |
| Remarks: _____ | | | | |
| | | | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | | |
|---|--|--------------|--|
| 3. Land use Changes Offsite <input checked="" type="checkbox"/> N/A | | | |
| Remarks _____ _____ | | | |
| VI. GENERAL SITE CONDITIONS | | | |
| A. Roads <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A | | | |
| 1. Roads Damaged <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Roads adequate <input type="checkbox"/> N/A | | | |
| Remarks _____ _____ | | | |
| B. Other Site Conditions | | | |
| Remarks _____ _____ _____ | | | |
| VII. COVERS SYSTEMS <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A | | | |
| A. Soil Surface | | | |
| 1. Settlement (Low spots) <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Settlement not evident | | | |
| Areal extent _____ | | Depth _____ | |
| Remarks: _____ _____ | | | |
| 2. Cracks <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Cracking not evident | | | |
| Lengths _____ | | Widths _____ | |
| | | Depths _____ | |
| Remarks _____ _____ | | | |
| 3. Erosion <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Erosion not evident | | | |
| Areal extent _____ | | Depth _____ | |
| Remarks _____ _____ | | | |
| 4. Holes <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Holes not evident | | | |
| Areal extent _____ | | Depth _____ | |
| Remarks _____ _____ | | | |
| 5. Vegetative Cover <input type="checkbox"/> Grass <input type="checkbox"/> Cover properly established <input type="checkbox"/> No signs of stress | | | |
| <input type="checkbox"/> Trees/shrubs (indicate size and location on a diagram) | | | |
| Remarks _____ _____ | | | |

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| | | |
|--|--|---|
| 6. | Alternative Cover (armored rock, concrete, etc.) | <input type="checkbox"/> N/A |
| Remarks: _____ | | |
| | | |
| 7. | Bulges | <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Bulges not evident |
| Areal extent _____ | | Height _____ |
| Remarks _____ | | |
| | | |
| 8. | Wet Areas/Water Damage <input type="checkbox"/> Wet areas/water damage not evident | |
| <input type="checkbox"/> Wet Areas | <input type="checkbox"/> Location shown on site map | Areal extent _____ |
| <input type="checkbox"/> Ponding | <input type="checkbox"/> Location shown on site map | Areal extent _____ |
| <input type="checkbox"/> Seeps | <input type="checkbox"/> Location shown on site map | Areal extent _____ |
| <input type="checkbox"/> Soft subgrade | <input type="checkbox"/> Location shown on site map | Areal extent _____ |
| Remarks _____ | | |
| | | |
| 9. | Slope Instability <input type="checkbox"/> Slides <input type="checkbox"/> Location shown on site map <input type="checkbox"/> No evidence of slope instability | |
| Areal extent _____ | | |
| Remarks _____ | | |
| | | |
| B. Benches <input type="checkbox"/> Applicable <input type="checkbox"/> 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 <input type="checkbox"/> Location shown on site map <input type="checkbox"/> N/A or okay | |
| Remarks _____ | | |
| | | |
| 2. | Bench Breached <input type="checkbox"/> Location shown on site map <input type="checkbox"/> N/A or okay | |
| Remarks _____ | | |
| | | |
| 3. | Bench Overtopped <input type="checkbox"/> Location shown on site map <input type="checkbox"/> N/A or okay | |
| Remarks _____ | | |
| | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | |
|---|--|--|
| C. Letdown Channels <input type="checkbox"/> Applicable <input type="checkbox"/> 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 | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> No evidence of settlement |
| Areal extent _____ | Depth _____ | |
| Remarks _____ | | |
| | | |
| 2. Material Degradation | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> No evidence of degradation |
| Material type _____ | Areal extent _____ | |
| Remarks _____ | | |
| | | |
| 3. Erosion | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> No evidence of erosion |
| Areal extent _____ | Depth _____ | |
| Remarks _____ | | |
| | | |
| 4. Undercutting | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> No evidence of undercutting |
| Areal extent _____ | Depth _____ | |
| Remarks _____ | | |
| | | |
| 5. Obstructions | Type _____ | <input type="checkbox"/> No obstructions |
| <input type="checkbox"/> Location shown on site map | Areal extent _____ | Size _____ |
| Remarks _____ | | |
| | | |
| 6. Excessive Vegetative Growth | Type _____ | |
| <input type="checkbox"/> No evidence of excessive growth | <input type="checkbox"/> Vegetation in channels does not obstruct flow | |
| <input type="checkbox"/> Location shown on site map | Areal extent _____ | |
| Remarks _____ | | |
| | | |

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| | | | |
|---|--|--|--|
| D. Cover Penetrations <input type="checkbox"/> Applicable <input type="checkbox"/> N/A | | | |
| 1. Gas Vents <input type="checkbox"/> Active <input type="checkbox"/> Passive <input type="checkbox"/> Properly secured/locked <input type="checkbox"/> Functioning <input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition <input type="checkbox"/> Evidence of leakage at penetration <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A Remarks _____ _____ | | | |
| 2. Gas Monitoring Probes <input type="checkbox"/> Properly secured/locked <input type="checkbox"/> Functioning <input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition <input type="checkbox"/> Evidence of leakage at penetration <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A Remarks _____ _____ | | | |
| 3. Monitoring Wells <input type="checkbox"/> Properly secured/locked <input type="checkbox"/> Functioning <input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition <input type="checkbox"/> Evidence of leakage at penetration <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A Remarks _____ _____ | | | |
| 4. Leachate Extraction Wells <input type="checkbox"/> Properly secured/locked <input type="checkbox"/> Functioning <input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition <input type="checkbox"/> Evidence of leakage at penetration <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A Remarks _____ _____ | | | |
| 5. Settlement Monuments <input type="checkbox"/> Located <input type="checkbox"/> Routinely surveyed <input type="checkbox"/> N/A Remarks _____ _____ | | | |
| E. Gas Collection and Treatment <input type="checkbox"/> Applicable <input type="checkbox"/> N/A | | | |
| 1. Gas Treatment Facilities <input type="checkbox"/> Flaring <input type="checkbox"/> Thermal destruction <input type="checkbox"/> Collection for reuse <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____ _____ | | | |
| 2. Gas Collection Wells, Manifolds and Piping <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____ _____ | | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | | |
|--|--|--|--|
| 3. Gas Monitoring Facilities (e.g., gas monitoring of adjacent homes or buildings) <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A Remarks _____ _____ | | | |
| F. Cover Drainage Layer <input type="checkbox"/> Applicable <input type="checkbox"/> N/A | | | |
| 1. Outlet Pipes Inspected <input type="checkbox"/> Functioning <input type="checkbox"/> N/A Remarks _____ _____ | | | |
| 2. Outlet Rock Inspected <input type="checkbox"/> Functioning <input type="checkbox"/> N/A Remarks _____ _____ | | | |
| G. Detention/sedimentation Ponds <input type="checkbox"/> Applicable <input type="checkbox"/> N/A | | | |
| 1. Siltation Areal extent _____ Depth _____ <input type="checkbox"/> N/A <input type="checkbox"/> Siltation not evident Remarks _____ _____ | | | |
| 2. Erosion Areal extent _____ Depth _____ <input type="checkbox"/> N/A <input type="checkbox"/> Erosion not evident Remarks _____ _____ | | | |
| 3. Outlet Works <input type="checkbox"/> Functioning <input type="checkbox"/> N/A Remarks _____ _____ | | | |
| 4. Dam <input type="checkbox"/> Functioning <input type="checkbox"/> N/A Remarks _____ _____ | | | |
| H. Retaining Walls <input type="checkbox"/> Applicable <input type="checkbox"/> N/A | | | |
| 1. Deformations <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Deformation not evident Horizontal displacement _____ Vertical displacement _____ Rotational displacement _____ Remarks _____ _____ | | | |

Third Five-Year Remedy Review Report (U)
K-Area Bingham Pump Outage Pit (643-1G) Operable Unit
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Five-Year Review Site Inspection Checklist (Continued)

| | | |
|--|--|---|
| 2. Degradation Remarks _____ _____ | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> Deformation not evident |
| I. Perimeter Ditches/Off-Site Discharge | | |
| 1. Siltation Areal extent _____ Depth _____ Remarks _____ _____ | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> Siltation not evident |
| 2. Vegetative Growth <input type="checkbox"/> Vegetation does not impede flow Areal extent _____ Type _____ Remarks _____ _____ | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> Siltation not evident |
| 3. Erosion Areal extent _____ Depth _____ Remarks _____ _____ | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> Erosion not evident |
| 4. Discharge Structure Remarks _____ _____ | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> N/A |
| VIII. VERTICAL BARRIER WALLS | | |
| <input type="checkbox"/> Applicable x N/A | | |
| 1. Settlement Areal extent _____ Depth _____ Remarks _____ _____ | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> Settlement not evident |
| 2. Performance Monitoring Frequency _____ Remarks _____ _____ | Type of Monitoring _____ <input type="checkbox"/> Evidence of breaching | <input type="checkbox"/> Performance not monitored Head differential _____ |

Five-Year Review Site Inspection Checklist (Continued)

| | | | |
|---|---|--|---|
| IX. GROUNDWATER/SURFACE WATER REMEDIES | | <input type="checkbox"/> Applicable | <input checked="" type="checkbox"/> N/A |
| A. Groundwater Extraction Wells, Pumps, and Pipelines | | <input type="checkbox"/> Applicable | <input type="checkbox"/> N/A |
| 1. Pumps, Wellhead Plumbing, and Electrical | | | |
| <input type="checkbox"/> Good condition | <input type="checkbox"/> All required wells located | <input type="checkbox"/> Needs Maintenance | <input type="checkbox"/> N/A |
| Remarks _____ | | | |
| _____ | | | |
| 2. Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances | | | |
| <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance | | |
| Remarks _____ | | | |
| _____ | | | |
| 3. Spare Parts and Equipment | | | |
| <input type="checkbox"/> Readily available | <input type="checkbox"/> Good condition | <input type="checkbox"/> Requires upgrade | <input type="checkbox"/> Needs to be provided |
| Remarks _____ | | | |
| _____ | | | |
| B. Surface Water Collection Structures, Pumps, and Pipelines | | <input type="checkbox"/> Applicable | <input type="checkbox"/> N/A |
| 1. Collection Structures, Pumps, and Electrical | | | |
| <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance | | |
| Remarks _____ | | | |
| _____ | | | |
| 2. Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances | | | |
| <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance | | |
| Remarks _____ | | | |
| _____ | | | |
| 3. Spare Parts and Equipment | | | |
| <input type="checkbox"/> Readily available | <input type="checkbox"/> Good condition | <input type="checkbox"/> Requires upgrade | <input type="checkbox"/> Needs to be provided |
| Remarks _____ | | | |
| _____ | | | |

Third Five-Year Remedy Review Report (U)
K-Area Bingham Pump Outage Pit (643-1G) Operable Unit
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Five-Year Review Site Inspection Checklist (Continued)

| | | |
|---|--|--|
| C. Treatment System | <input type="checkbox"/> Applicable | <input type="checkbox"/> N/A |
| 1. Treatment Train (Check components that apply) | | |
| <input type="checkbox"/> Metals removal | <input type="checkbox"/> Oil/water separation | <input type="checkbox"/> Bioremediation |
| <input type="checkbox"/> Air stripping | <input type="checkbox"/> Carbon adsorbers | |
| <input type="checkbox"/> Filters _____ | | |
| <input type="checkbox"/> Additive (e.g., chelation agent, flocculent) _____ | | |
| <input type="checkbox"/> Others _____ | | |
| <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance | |
| <input type="checkbox"/> Sampling ports properly marked and functional | | |
| <input type="checkbox"/> Sampling/maintenance log displayed and up to date | | |
| <input type="checkbox"/> Equipment properly identified | | |
| <input type="checkbox"/> Quantity of groundwater treated annually _____ | | |
| <input type="checkbox"/> Quantity of surface water treated annually _____ | | |
| Remarks _____ | | |
| 2. Electrical Enclosures and Panels (properly rated and functional) | | |
| <input type="checkbox"/> N/A | <input checked="" type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance |
| Remarks _____ | | |
| 3. Tanks, Vaults, Storage Vessels | | |
| <input type="checkbox"/> N/A | <input checked="" type="checkbox"/> Good condition | <input type="checkbox"/> Proper secondary containment <input type="checkbox"/> Needs Maintenance |
| Remarks _____ | | |
| 4. Discharge Structure and Appurtenances | | |
| <input type="checkbox"/> N/A | <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance |
| Remarks _____ | | |
| 5. Treatment Building(s) | | |
| <input type="checkbox"/> N/A | <input type="checkbox"/> Good condition (esp. roof and doorways) | <input type="checkbox"/> Needs repair |
| <input type="checkbox"/> Chemicals and equipment properly stored | | |
| Remarks _____ | | |

Five-Year Review Site Inspection Checklist (Continued)

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.

A. Soil Vapor Extraction Systems ☒ Applicable ☐ N/A

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 remedial action for this unit is institutional controls.

The institutional controls are in place and being implemented to provide access control and prevent exposures as intended by the decision documents.

Five-Year Review Site Inspection Checklist (Continued)

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.

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, and further groundwater assessment as necessary.

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.

N/A

K-AREA BURNING/RUBBLE PIT (131-K) AND RUBBLE PILE (631-20G) OPERABLE UNIT

I. Introduction

This is the second 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 2007 through September 2007. 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 |
|-------------------------------------|-------------------|
| RFI/RI Start | 1992 |
| RFI/RI Complete | October 18, 1999 |
| CMS/FS Rev 1.1 Submittal | August 2, 1999 |
| Record of Decision (ROD) issuance | August 20, 2001 |
| Remedial Action (RA) start | October 8, 2001 |
| RA Construction activities complete | March 27, 2002 |
| Previous Five-Year Review | February 12, 2004 |

III. Background

Physical Characteristics

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). See Figure 2 for site layout of KBRP and KRP. The pit was constructed in 1955-1956 as a shallow, unlined excavation measuring approximately 30 ft wide, 240 ft long, and approximately 8 ft deep, for waste burning and burial.

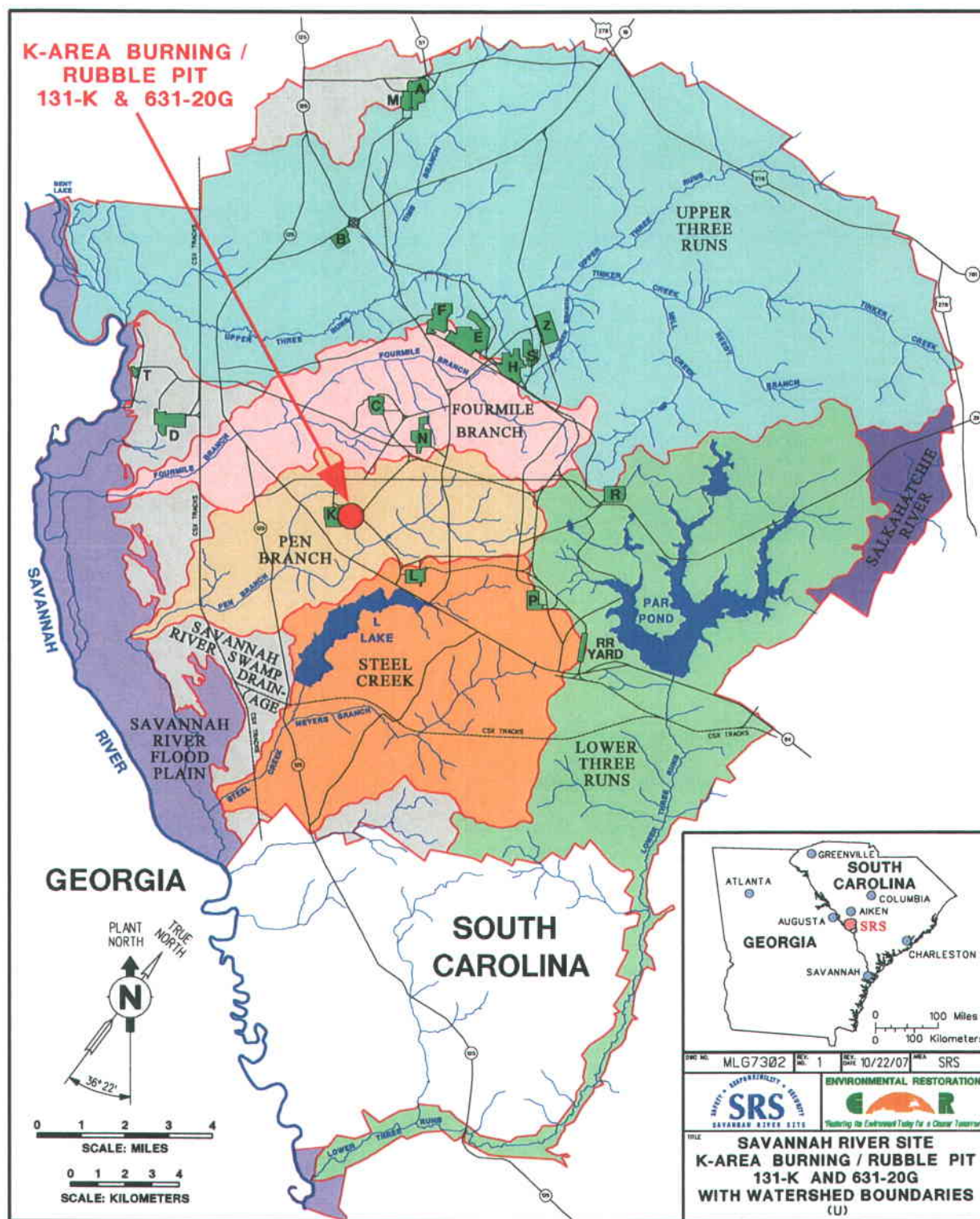
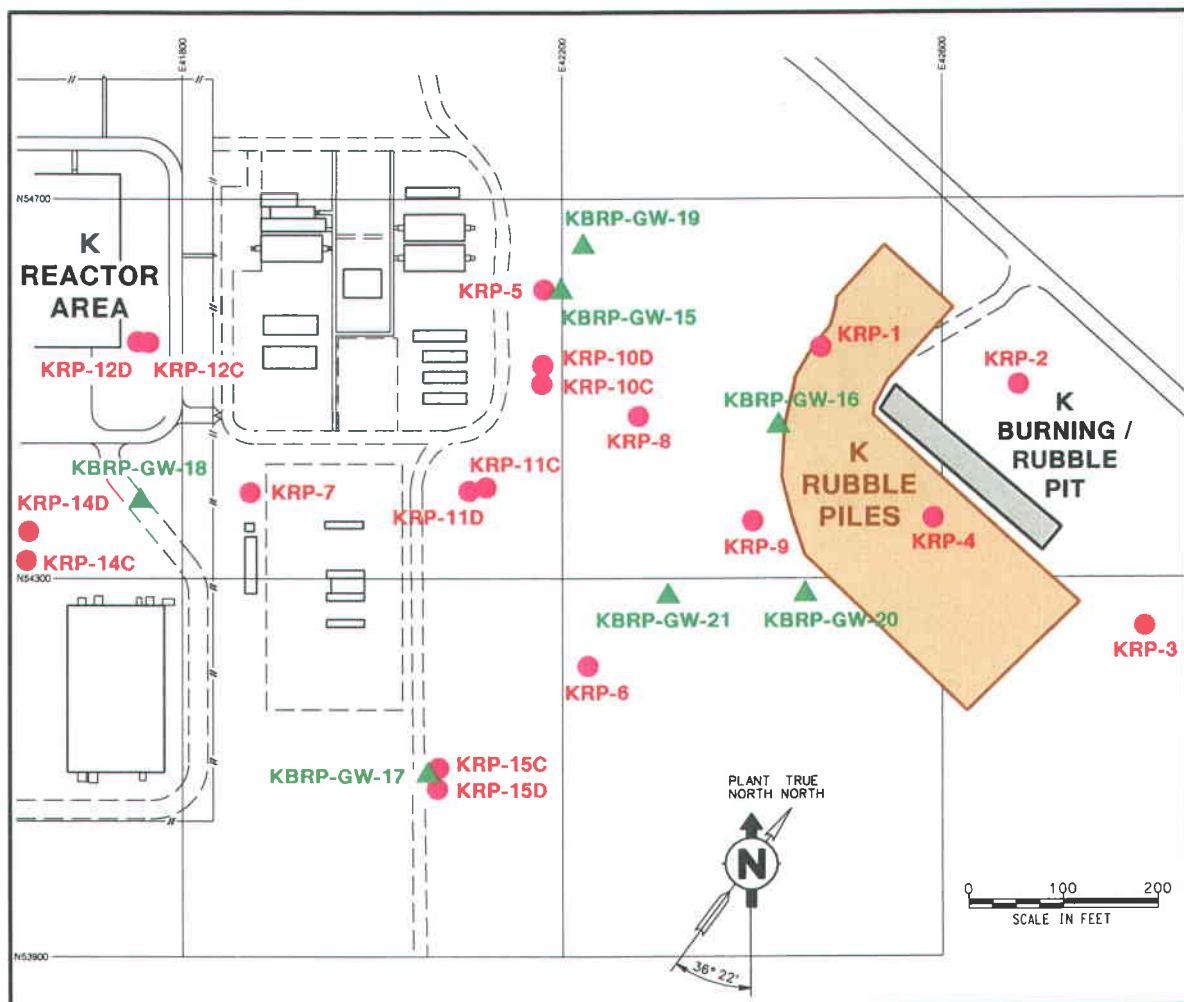


Figure 1. Location of the K-Area Burning/Rubble Pit (131-K) OU at Savannah River Site



Key:

- Monitoring Wells
- ▲ Point of Compliance Wells

Figure 2. Site Layout of KBRP and Well Locations

Land and Resource Use

The KBRP and KRP OU is located in an industrial area.

History of Contamination

During operation, organic liquids of unknown use and origin, waste oils, paper, plastics, and rubber were disposed of in the pit and burned periodically. 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, constructed sometime between 1956 and 1961, 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 yd³. 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.

Initial Response

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. During unit screening, GPR surveys were performed to define the boundaries of the pits and to locate any buried objects in order to avoid drilling into buried material. Nothing was discovered to restrict drilling. Final human-health constituents of concern (COCs) are listed in Table 2. The risk/hazard results are based on the larger risk estimates of the KBRP and KRP OU.

Groundwater immediately downgradient of KBRP was found to have tetrachloroethylene (PCE) and trichloroethylene (TCE) concentrations above the applicable maximum contaminant levels (MCLs). The sources of the final COCs were determined to be depleted. This is based on the historical trends of analytical data in the adjacent monitoring wells and the results of the soil investigation. No contaminant migration COCs were identified for the surface units. Polycyclic aromatic hydrocarbons (PAHs) and arsenic were identified as human health COCs based on potential exposure to the contaminated soil media.

In 2001, in accordance with the selected remedy identified in the Record of Decision (ROD), contaminated soil was consolidated and a soil cover was placed over the KBRP/KRP to protect future industrial workers from unacceptable exposure to the COCs. Because the source of groundwater contamination is depleted and no contaminant migration COCs was identified, no source control actions were required for the unit.

IV. Remedial Actions

Remedy Selection

The remedial action objectives (RAOs) for the unit are as follows:

- Protect future industrial workers from unacceptable exposures to PAHs in soil at the KBRP/KRP and arsenic in soil at the KRP.
- Protect future industrial workers from unacceptable exposures to PCE and TCE in groundwater.
- Prevent further degradation of groundwater and return it to levels below MCL to allow beneficial uses.

Table 2. 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

Remedy Implementation

The selected remedial action for the KBRP/KRP included the installation of a soil cover over the KBRP and KRP with institutional controls and monitored natural attenuation (MNA) for the water table aquifer groundwater.

The soil cover was designed to minimize the footprint (acreage) of the area subject to land use controls. To meet the RAO of protecting future industrial workers from unacceptable exposures to PCE and TCE in groundwater, the piles outside of the cover area were excavated and consolidated into the cover area. Confirmatory sampling was

removed then conducted to ensure no COCs remained in the soil removal area. During the clearing and grubbing of KRP, another rubble pile was identified approximately 30 feet from the unit boundary. A visual inspection of the “new pile” indicated that it was composed of gravel size coal, rocks and dirt, which is consistent with the description given in the KBRP/KRP ROD for other piles in the area. Additionally, after trees were cleared from the western side of the KRP, portions of the western boundary of the soil removal area had to be extended approximately 20 ft to the west to encompass “extended piles” containing additional gravel size coal, rock and dirt consistent with the description given in the KBRP/KRP ROD for other piles in the area. Therefore, in accordance with the ROD and CMI/RAIP, the project boundary including erosion controls, was extended to incorporate these piles, and the construction team proceeded with consolidating the “new pile” and the “extended piles” with other KRP piles under the soil cover to reduce the overall footprint of the unit. Confirmatory KRP sampling was performed in these areas, to verify that COCs were less than remedial goals (RGs).

Following excavation of all soil removal areas and confirmatory sampling, the soil cover was installed over the KBRP and KRP per the CMI/RAIP Site Grading Plan and Sections and Details using conventional and commercially available earth-moving equipment. The cover was inspected semi-annually and maintenance was performed as required to ensure protection of human health and the environment.

The remedial action for the groundwater is to allow for the natural decrease of contaminant concentrations in the groundwater to levels below MCLs for PCE and TCE. Groundwater mixing zone with institutional controls was the selected remedy for achieving this goal. Monitoring and sampling were reported as part of the Groundwater Mixing Zone Application (GMZA) annual sampling and the Corrective Measures Implementation Report (CMIR)/Final Remediation Report (FRR).

In 2002, the installation of the monitoring wells associated with the GMZA began. In August 2002 and in September 2002, PCE and TCE exceeded concentrations above the MCL in well KRP 14D. Since the number of exceedances was small; the core team

directed SRS to a moderate corrective action. The plan included continued quarterly sampling in the Mixing Zone network and the installation of the KRP 15 well cluster.

In 2004, it was again reported that well KRP 14D exceeded the TCE MCL for the third quarter sampling event. The core team agreed that it would not be feasible to pursue the contamination beyond KRP 14 because the plume was migrating toward the congested subsurface of the K-Reactor facility and could merge with additional uncharacterized plumes associated with K Area. Per a mixing zone core team agreement and during the time since the last remedy review, the KRP 14 series of wells were removed as compliance points. It was further agreed that the GMZA would not be modified, additional modeling would not be required, and there was no need to add new monitoring wells.

Initially the GMZA called for quarterly sampling for the first year followed by semi-annual after that first year. When analytical data indicate a level or declining concentration trend, the sampling frequency could be reasonably changed to semi-annually. At this time, all boundary wells are consistently below MCLs and characteristically non-detect. All plume and intermediate wells are consistently below the mixing zone contaminant levels (MZCLs) and are frequently non-detect. South Carolina Department of Health and Environmental Control (SCDHEC) approved a recommendation to reduce the monitoring frequency from quarterly to semi-annually on January 24, 2006, and United States Environmental Protection Agency (USEPA) approved this request on April 11, 2006. This new sample frequency was initiated in the second quarter of 2007. SCDHEC and USEPA also approved a request to reduce the analytical list from Method 8260 for volatile organic compounds (VOCs), Modified List to only PCE and TCE and their daughter products: PCE, TCE, vinyl chloride, 1,1-dichloroethene, cis- and trans-1,2-dichloroethene. As of the 4th quarter in 2006, these were the only analytes monitored.

V. Progress Since Last Review

This is the second five-year ROD review that the KBRP/KRP has undergone. Since the previous review in June of 2003, SDHEC approved a recommendation to reduce the groundwater monitoring frequency from quarterly to semi-annually on January 24, 2006. This new sample frequency was initiated in the second quarter of 2007. In addition, since the previous review the SRS recommended that the analytes monitored be reduced to PCE, TCE and their daughter products. SCDHEC and USEPA also approved this request in 2006.

In 2008, an agreement was reached to combine the reports for K, L, and P Burning/Rubble Pit (BRP) OU data reports into an annual letter with a detailed groundwater report every fifth year beginning June 30, 2012.

VI. 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

VII. Technical Assessment

The conclusions for this review are as follows:

- Institutional controls are in place and are protecting current/future industrial workers.
- Reviews of the groundwater monitoring data indicate that there are no significant changes in any of the network wells.

- Based on the annual monitoring reporting, the requirements of the Mixing Zone are being satisfied.
- A new pile was found and the western boundary of the KRP was extended 20 ft. Confirmatory sampling was then performed in these areas to verify COCs therein were less than RGs.
- Construction activities required for the remedial action have met the acceptance criteria established in the approved CMI/RAIP. The results of the Soil Sampling and Analysis Plan demonstrate all excavated KRP areas are below RGs.
- No other information has come to light that could call into question the protectiveness of the remedy

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. Project Costs

Costs associated with the selected remedy for KBRP and KRP include operation and maintenance costs of the soil cover, groundwater mixing zone monitoring, and institutional controls. The estimated operation and maintenance cost associated with the selected remedy is \$345,390, which was discounted at 5% per year. This is a present worth cost, including 30 years of maintenance activities. After characterization and effectiveness of the remedy was evaluated, the actual operation and maintenance cost for the KBRP and KRP was assessed. The total actual operation and maintenance cost from project support and other post-construction expense to fiscal year 2006 is \$349,619.

XI. Protectiveness Statement(s)

The remedy of a soil cover over the KBRP and KRP with institutional controls and MNA for the groundwater at the KBRP/KRP is protective of human health and the environment. This remedy, upon implementation of land use controls pursuant to the LUCAP, 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 United States Department of Energy (USDOE) controls the OU. These controls 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).

XII. Next Review

The next five-year review is scheduled for February 12, 2014.

ATTACHMENT 1

List of Documents Reviewed

USDOE, 2008. Memo from Brian T. Hennessey to Donald Siron and Robert H. Pope, Subject: Submittal of the Proposal to Standardize Sampling and Reporting Requirements of Groundwater Data for P, L, and K Area Burning/Rubble Pit Operable Units, CERCLIS Numbers 59, 56, 40; ARF # 15055

WSRC-RP-97-442, *RCRA Facility Investigation/Remedial Investigation Report with the Baseline Risk Assessment for the K-Area Burning/Rubble Pit (131-K) and Rubble Pile (631-20G) Operable Unit (U)*, Revision 1.2, Westinghouse Savannah River Company, Savannah River Site, Aiken SC

WSRC-RP-97-862, *Record of Decision Remedial Alternative Selection for the K-Area Burning/Rubble Pit (131-K) and Rubble Pile (631-20G) Operable Unit (U)*, Revision 1, Westinghouse Savannah River Company, Savannah River Site, Aiken SC

WSRC-RP-2000-4115, *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)*, Revision 1.1, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

WSRC-RP-2002-4095, *Post-Construction Report (PCR) for the K-Area Burning/Rubble Pit (131-K) (U) and K-Area Rubble Pile (631-20G) Operable Unit (U)*, Revision 1, October, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

WSRC-RP-2007-4030, *2006 Annual Mixing Zone Monitoring Report for the K-Area Burning/Rubble Pit and Rubble Pile (KBRP) (U)*, Revision 0, Washington Savannah River Company, Savannah River Site, Aiken, SC

ATTACHMENT 2

Five-Year Review Site Inspection Checklist

| I. SITE INFORMATION | | | | | | | | | | | | | | | |
|---|---|------------------------------------|---|--|---|--|--|--|---|---|--|---|--|---------------------------------------|--|
| Site Name: | K-Area Burning/Rubble Pit (131-K) and Rubble Pile (631-20G) Operable Unit | Date of Inspection: | 09/05/2007 | | | | | | | | | | | | |
| Location and Region: | Savannah River Site, USEPA Region IV | EPA ID: | SC1890008989 | | | | | | | | | | | | |
| Agency, office, or company leading the five-year review: | United States Department of Energy | CERCLIS OU No.: | 65 | | | | | | | | | | | | |
| | | Weather/Temperature: | Clear and Sunny, 90°F | | | | | | | | | | | | |
| Remedy Includes: (Check all that apply) <table><tbody><tr><td><input checked="" type="checkbox"/> Cover System</td><td><input checked="" type="checkbox"/> Monitored Natural Attenuation</td></tr><tr><td><input type="checkbox"/> Access controls</td><td><input type="checkbox"/> Groundwater Containment</td></tr><tr><td><input checked="" type="checkbox"/> Institutional Controls</td><td><input type="checkbox"/> Vertical Barrier Walls</td></tr><tr><td><input type="checkbox"/> Groundwater pump and treatment</td><td></td></tr><tr><td><input type="checkbox"/> Surface water collection and treatment</td><td></td></tr><tr><td><input type="checkbox"/> Other: _____</td><td></td></tr></tbody></table> | | | | <input checked="" type="checkbox"/> Cover System | <input checked="" type="checkbox"/> Monitored Natural Attenuation | <input type="checkbox"/> Access controls | <input type="checkbox"/> Groundwater Containment | <input checked="" type="checkbox"/> Institutional Controls | <input type="checkbox"/> Vertical Barrier Walls | <input type="checkbox"/> Groundwater pump and treatment | | <input type="checkbox"/> Surface water collection and treatment | | <input type="checkbox"/> Other: _____ | |
| <input checked="" type="checkbox"/> Cover System | <input checked="" type="checkbox"/> Monitored Natural Attenuation | | | | | | | | | | | | | | |
| <input type="checkbox"/> Access controls | <input type="checkbox"/> Groundwater Containment | | | | | | | | | | | | | | |
| <input checked="" type="checkbox"/> Institutional Controls | <input type="checkbox"/> Vertical Barrier Walls | | | | | | | | | | | | | | |
| <input type="checkbox"/> Groundwater pump and treatment | | | | | | | | | | | | | | | |
| <input type="checkbox"/> Surface water collection and treatment | | | | | | | | | | | | | | | |
| <input type="checkbox"/> Other: _____ | | | | | | | | | | | | | | | |
| Attachments: <input type="checkbox"/> Inspection team roster attached <input type="checkbox"/> Site map attached | | | | | | | | | | | | | | | |
| II. INTERVIEWS (Check all that apply) | | | | | | | | | | | | | | | |
| 1. O & M Site Manager | | | | | | | | | | | | | | | |
| | _____ (Name) | _____ (Title) | _____ (Date) | | | | | | | | | | | | |
| Interviewed: | <input type="checkbox"/> at site | <input type="checkbox"/> at office | <input type="checkbox"/> by phone Phone No. _____ | | | | | | | | | | | | |
| Problems, suggestions: | <input type="checkbox"/> report attached _____ | | | | | | | | | | | | | | |
| 2. O & M Staff | | | | | | | | | | | | | | | |
| | _____ (Name) | _____ (Title) | _____ (Date) | | | | | | | | | | | | |
| Interviewed: | <input type="checkbox"/> at site | <input type="checkbox"/> at office | <input type="checkbox"/> by phone Phone No. _____ | | | | | | | | | | | | |
| Problems, suggestions: | <input type="checkbox"/> report attached _____ | | | | | | | | | | | | | | |

Five-Year Review Site Inspection Checklist (Continued)

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

| | | | |
|---|--|-------------------------------------|------------------------------|
| <input type="checkbox"/> O & M Manual | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |
| x As-built drawings | x Readily available | x Up to date | <input type="checkbox"/> N/A |
| <input type="checkbox"/> Maintenance Logs | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |

Remarks: See Waste Unit Inspection and Maintenance, ER-SOP-019

Five-Year Review Site Inspection Checklist (Continued)

| | | | |
|---|--|-------------------------------------|-------|
| 2. Site-Specific Health and Safety Plan | | | |
| <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A | |
| <input type="checkbox"/> Contingency plan/emergency response plan <input type="checkbox"/> Readily available <input type="checkbox"/> Up to date x N/A | | | |
| Remarks: <u>Routine O&M activities do not require an SSHASP under 29 CFR 1910.120, HAZWOPER. A SSHASP is prepared in needed.</u> | | | |
| 3. O & M and OSHA Training Records | | | |
| x Readily available | x Up to date | <input type="checkbox"/> N/A | |
| Remarks: _____ | | | |
| 4. Permits and Service Agreements | | | |
| <input type="checkbox"/> Air discharge permit | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |
| <input type="checkbox"/> Effluent discharge | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |
| <input type="checkbox"/> Waste Disposal, POTW | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |
| <input type="checkbox"/> Other permits | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |
| Remarks: _____ | | | |
| 5. Gas Generation Records | | | |
| <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A | |
| Remarks: _____ | | | |
| 6. Settlement Monument Records | | | |
| <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A | |
| Remarks: _____ | | | |
| 7. Groundwater Monitoring Records | | | |
| <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A | |
| Remarks: _____ | | | |
| 8. Leachate Extraction Records | | | |
| <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A | |
| Remarks: _____ | | | |
| 9. Discharge Compliance Records | | | |
| <input type="checkbox"/> Air | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |
| <input type="checkbox"/> Water (effluent) | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |
| Remarks: _____ | | | |
| 10. Daily Access/Security Logs | | | |
| <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A | |
| Remarks: _____ | | | |

Five-Year Review Site Inspection Checklist (Continued)

IV. O & M Costs

1. O & M Organization

- ☐ State in-house ☐ Contractor for State
☐ PRP in-house ☐ Contractor for PRP
x Other SRS

2. O & M Cost Records

- ☐ Readily available ☐ Up to date ☐ Funding mechanism/agreement in place
x Other: Project cost data is summarized in Section X of attached review: WSRC-RP-2007-4063.

Total annual cost by year for review period if available

| | | | |
|------------|----------|------------|---|
| From _____ | To _____ | _____ | <input type="checkbox"/> Breakdown attached |
| (Date) | (Date) | Total cost | |
| From _____ | To _____ | _____ | <input type="checkbox"/> Breakdown attached |
| (Date) | (Date) | Total cost | |
| From _____ | To _____ | _____ | <input type="checkbox"/> Breakdown attached |
| (Date) | (Date) | Total cost | |
| From _____ | To _____ | _____ | <input type="checkbox"/> Breakdown attached |
| (Date) | (Date) | Total cost | |
| From _____ | To _____ | _____ | <input type="checkbox"/> Breakdown attached |
| (Date) | (Date) | Total cost | |

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

Describe costs and reasons: _____

V. ACCESS AND INSTITUTIONAL CONTROLS

x Applicable ☐ N/A

A. Fencing

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

Remarks _____

Five-Year Review Site Inspection Checklist (Continued)

B. Other Access Restrictions

1. **Signs and Other Security Measures** ☐ Location shown on site map ☐ N/A

Remarks: Signs at this site are in good condition.

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: Semi-Annually

Responsible party/agent: DOE Savannah River Field Office

Contact: W.G. Erickson, Waste Area Group Manager 09/3/07 952-8408
(Name) (Title) (Date) (Phone No.)

Reporting 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: _____

Five-Year Review Site Inspection Checklist (Continued)

| | | | |
|--|--|--------------|--|
| 3. Land Use Changes Offsite <input checked="" type="checkbox"/> N/A | | | |
| Remarks _____ | | | |
| | | | |
| VI. GENERAL SITE CONDITIONS | | | |
| A. Roads <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A | | | |
| 1. Roads Damaged <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Roads adequate <input type="checkbox"/> N/A | | | |
| Remarks _____ | | | |
| | | | |
| B. Other Site Conditions | | | |
| Remarks _____ | | | |
| | | | |
| | | | |
| VII. COVERS SYSTEMS <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A | | | |
| A. Soil Surface | | | |
| 1. Settlement (Low spots) <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Settlement not evident | | | |
| Areal extent _____ | | Depth _____ | |
| Remarks: _____ | | | |
| | | | |
| 2. Cracks <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Cracking not evident | | | |
| Lengths _____ | | Widths _____ | |
| | | Depths _____ | |
| Remarks _____ | | | |
| | | | |
| 3. Erosion <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Erosion not evident | | | |
| Areal extent _____ | | Depth _____ | |
| Remarks _____ | | | |
| | | | |
| 4. Holes <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Holes not evident | | | |
| Areal extent _____ | | Depth _____ | |
| Remarks _____ | | | |
| | | | |
| 5. Vegetative Cover <input checked="" type="checkbox"/> Grass <input type="checkbox"/> Cover properly established <input checked="" type="checkbox"/> No signs of stress | | | |
| <input type="checkbox"/> Trees/shrubs (indicate size and location on a diagram) | | | |
| Remarks: _____ | | | |
| | | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | | |
|--|---|--------------------|--|
| 6. Alternative Cover (armored rock, concrete, etc.) x N/A | | | |
| Remarks: _____ _____ | | | |
| 7. Bulges <input type="checkbox"/> Location shown on site map x Bulges not evident | | | |
| Areal extent _____ | | Height _____ | |
| Remarks _____ _____ | | | |
| 8. Wet Areas/Water Damage x Wet areas/water damage not evident | | | |
| <input type="checkbox"/> Wet Areas | <input type="checkbox"/> Location shown on site map | Areal extent _____ | |
| <input type="checkbox"/> Ponding | <input type="checkbox"/> Location shown on site map | Areal extent _____ | |
| <input type="checkbox"/> Seeps | <input type="checkbox"/> Location shown on site map | Areal extent _____ | |
| <input type="checkbox"/> Soft subgrade | <input type="checkbox"/> Location shown on site map | Areal extent _____ | |
| Remarks _____ _____ | | | |
| 9. Slope Instability <input type="checkbox"/> Slides <input type="checkbox"/> Location shown on site map x No evidence of slope instability | | | |
| Areal extent _____ | | | |
| Remarks _____ _____ | | | |
| B. Benches <input type="checkbox"/> Applicable x 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 <input type="checkbox"/> Location shown on site map <input type="checkbox"/> N/A or okay | | | |
| Remarks _____ _____ | | | |
| 2. Bench Breached <input type="checkbox"/> Location shown on site map <input type="checkbox"/> N/A or okay | | | |
| Remarks _____ _____ | | | |
| 3. Bench Overtopped <input type="checkbox"/> Location shown on site map <input type="checkbox"/> N/A or okay | | | |
| Remarks _____ _____ | | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | |
|---|--|--|
| C. Letdown Channels <input type="checkbox"/> Applicable x 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 | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> No evidence of settlement |
| Areal extent _____ Depth _____ | | |
| Remarks _____ | | |
| 2. Material Degradation | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> No evidence of degradation |
| Material type _____ Areal extent _____ | | |
| Remarks _____ | | |
| 3. Erosion | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> No evidence of erosion |
| Areal extent _____ Depth _____ | | |
| Remarks _____ | | |
| 4. Undercutting | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> No evidence of undercutting |
| Areal extent _____ Depth _____ | | |
| Remarks _____ | | |
| 5. Obstructions | Type _____ | <input type="checkbox"/> No obstructions |
| <input type="checkbox"/> Location shown on site map | Areal extent _____ | Size _____ |
| Remarks _____ | | |
| 6. Excessive Vegetative Growth | Type _____ | |
| <input type="checkbox"/> No evidence of excessive growth | <input type="checkbox"/> Vegetation in channels does not obstruct flow | |
| <input type="checkbox"/> Location shown on site map | Areal extent _____ | |
| Remarks _____ | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | | |
|--|--|---|---|
| D. Cover Penetrations <input type="checkbox"/> Applicable x N/A | | | |
| 1. Gas Vents <input type="checkbox"/> Active <input type="checkbox"/> Passive | | | |
| <input type="checkbox"/> Properly secured/locked | <input type="checkbox"/> Functioning | <input type="checkbox"/> Routinely sampled | <input type="checkbox"/> Good condition |
| <input type="checkbox"/> Evidence of leakage at penetration | <input type="checkbox"/> Needs Maintenance | <input type="checkbox"/> N/A | |
| Remarks _____ | | | |
| _____ | | | |
| 2. Gas Monitoring Probes | | | |
| <input type="checkbox"/> Properly secured/locked | <input type="checkbox"/> Functioning | <input type="checkbox"/> Routinely sampled | <input type="checkbox"/> Good condition |
| <input type="checkbox"/> Evidence of leakage at penetration | <input type="checkbox"/> Needs Maintenance | <input type="checkbox"/> N/A | |
| Remarks _____ | | | |
| _____ | | | |
| 3. Monitoring Wells | | | |
| <input type="checkbox"/> Properly secured/locked | <input type="checkbox"/> Functioning | <input type="checkbox"/> Routinely sampled | <input type="checkbox"/> Good condition |
| <input type="checkbox"/> Evidence of leakage at penetration | <input type="checkbox"/> Needs Maintenance | <input type="checkbox"/> N/A | |
| Remarks _____ | | | |
| _____ | | | |
| 4. Leachate Extraction Wells | | | |
| <input type="checkbox"/> Properly secured/locked | <input type="checkbox"/> Functioning | <input type="checkbox"/> Routinely sampled | <input type="checkbox"/> Good condition |
| <input type="checkbox"/> Evidence of leakage at penetration | <input type="checkbox"/> Needs Maintenance | <input type="checkbox"/> N/A | |
| Remarks _____ | | | |
| _____ | | | |
| 5. Settlement Monuments <input type="checkbox"/> Located <input type="checkbox"/> Routinely surveyed <input type="checkbox"/> N/A | | | |
| Remarks _____ | | | |
| _____ | | | |
| E. Gas Collection and Treatment <input type="checkbox"/> Applicable x N/A | | | |
| 1. Gas Treatment Facilities | | | |
| <input type="checkbox"/> Flaring | <input type="checkbox"/> Thermal destruction | <input type="checkbox"/> Collection for reuse | |
| <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance | | |
| Remarks _____ | | | |
| _____ | | | |
| 2. Gas Collection Wells, Manifolds and Piping | | | |
| <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance | | |
| Remarks _____ | | | |
| _____ | | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | | |
|---|--|------------------------------|--|
| 3. Gas Monitoring Facilities (e.g., gas monitoring of adjacent homes or buildings) | | | |
| <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance | <input type="checkbox"/> N/A | |
| Remarks _____ | | | |
| F. Cover Drainage Layer <input type="checkbox"/> Applicable x N/A | | | |
| 1. Outlet Pipes Inspected <input type="checkbox"/> Functioning <input type="checkbox"/> N/A | | | |
| Remarks _____ | | | |
| 2. Outlet Rock Inspected <input type="checkbox"/> Functioning <input type="checkbox"/> N/A | | | |
| Remarks _____ | | | |
| G. Detention/sedimentation Ponds <input type="checkbox"/> Applicable x N/A | | | |
| 1. Siltation Areal extent _____ Depth _____ <input type="checkbox"/> N/A | | | |
| <input type="checkbox"/> Siltation not evident | | | |
| Remarks _____ | | | |
| 2. Erosion Areal extent _____ Depth _____ <input type="checkbox"/> N/A | | | |
| <input type="checkbox"/> Erosion not evident | | | |
| Remarks _____ | | | |
| 3. Outlet Works <input type="checkbox"/> Functioning <input type="checkbox"/> N/A | | | |
| Remarks _____ | | | |
| 4. Dam <input type="checkbox"/> Functioning <input type="checkbox"/> N/A | | | |
| Remarks _____ | | | |
| H. Retaining Walls <input type="checkbox"/> Applicable x N/A | | | |
| 1. Deformations <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Deformation not evident | | | |
| Horizontal displacement _____ | | Vertical displacement _____ | |
| Rotational displacement _____ | | | |
| Remarks _____ | | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | |
|--|---|--|
| 2. Degradation | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> Deformation not evident |
| Remarks _____ | | |
| I. Perimeter Ditches/Off-Site Discharge <input type="checkbox"/> Applicable x N/A | | |
| 1. Siltation | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> Siltation not evident |
| Areal extent _____ Depth _____ | | |
| Remarks _____ | | |
| 2. Vegetative Growth | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> Siltation not evident |
| <input type="checkbox"/> Vegetation does not impede flow | | |
| Areal extent _____ Type _____ | | |
| Remarks _____ | | |
| 3. Erosion | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> Erosion not evident |
| Areal extent _____ Depth _____ | | |
| Remarks _____ | | |
| 4. Discharge Structure | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> N/A |
| Remarks _____ | | |
| VIII. VERTICAL BARRIER WALLS <input type="checkbox"/> Applicable x N/A | | |
| 1. Settlement | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> Settlement not evident |
| Areal extent _____ Depth _____ | | |
| Remarks _____ | | |
| 2. Performance Monitoring | Type of Monitoring _____ | <input type="checkbox"/> Performance not monitored |
| Frequency _____ <input type="checkbox"/> Evidence of breaching Head differential _____ | | |
| Remarks _____ | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | | |
|---|---|--|---|
| IX. GROUNDWATER/SURFACE WATER REMEDIES | | x Applicable | <input type="checkbox"/> N/A |
| A. Groundwater Extraction Wells, Pumps, and Pipelines | | <input type="checkbox"/> Applicable | x N/A |
| 1. Pumps, Wellhead Plumbing, and Electrical | | | |
| <input type="checkbox"/> Good condition | <input type="checkbox"/> All required wells located | <input type="checkbox"/> Needs Maintenance | <input type="checkbox"/> N/A |
| Remarks _____ | | | |
| 2. Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances | | | |
| <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance | | |
| Remarks _____ | | | |
| 3. Spare Parts and Equipment | | | |
| <input type="checkbox"/> Readily available | <input type="checkbox"/> Good condition | <input type="checkbox"/> Requires upgrade | <input type="checkbox"/> Needs to be provided |
| Remarks _____ | | | |
| B. Surface Water Collection Structures, Pumps, and Pipelines | | <input type="checkbox"/> Applicable | x N/A |
| 1. Collection Structures, Pumps, and Electrical | | | |
| <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance | | |
| Remarks _____ | | | |
| 2. Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances | | | |
| <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance | | |
| Remarks _____ | | | |
| 3. Spare Parts and Equipment | | | |
| <input type="checkbox"/> Readily available | <input type="checkbox"/> Good condition | <input type="checkbox"/> Requires upgrade | <input type="checkbox"/> Needs to be provided |
| Remarks _____ | | | |

Five-Year Review Site Inspection Checklist (Continued)

| C. Treatment System <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A | | |
|---|--|--|
| 1. Treatment Train (Check components that apply) | | |
| <input type="checkbox"/> Metals removal | <input type="checkbox"/> Oil/water separation | <input type="checkbox"/> Bioremediation |
| <input type="checkbox"/> Air stripping | <input type="checkbox"/> Carbon adsorbers | |
| <input type="checkbox"/> Filters _____ | | |
| <input type="checkbox"/> Additive (e.g., chelation agent, flocculent) _____ | | |
| <input type="checkbox"/> Others _____ | | |
| <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance | |
| <input type="checkbox"/> Sampling ports properly marked and functional | | |
| <input type="checkbox"/> Sampling/maintenance log displayed and up to date | | |
| <input type="checkbox"/> Equipment properly identified | | |
| <input type="checkbox"/> Quantity of groundwater treated annually _____ | | |
| <input type="checkbox"/> Quantity of surface water treated annually _____ | | |
| Remarks _____ | | |
| _____ | | |
| 2. Electrical Enclosures and Panels (properly rated and functional) | | |
| <input type="checkbox"/> N/A | <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance |
| Remarks _____ | | |
| _____ | | |
| 3. Tanks, Vaults, Storage Vessels | | |
| <input type="checkbox"/> N/A | <input type="checkbox"/> Good condition | <input type="checkbox"/> Proper secondary containment <input type="checkbox"/> Needs Maintenance |
| Remarks _____ | | |
| _____ | | |
| 4. Discharge Structure and Appurtenances | | |
| <input type="checkbox"/> N/A | <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance |
| Remarks _____ | | |
| _____ | | |
| 5. Treatment Building(s) | | |
| <input type="checkbox"/> N/A | <input type="checkbox"/> Good condition (esp. roof and doorways) | <input type="checkbox"/> Needs repair |
| <input type="checkbox"/> Chemicals and equipment properly stored | | |
| Remarks _____ | | |
| _____ | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | | |
|---|---|---|--|
| 6. Monitoring Wells | | | |
| <input type="checkbox"/> Properly secured/locked | <input type="checkbox"/> Functioning | <input type="checkbox"/> Routinely sampled | <input type="checkbox"/> Good condition |
| <input type="checkbox"/> All required wells located | <input type="checkbox"/> Needs Maintenance | <input type="checkbox"/> N/A | |
| Remarks _____ | | | |
| _____ | | | |
| D. Monitoring Data <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A | | | |
| 1. Monitoring Data | | | |
| <input type="checkbox"/> Is routinely submitted on time | | <input type="checkbox"/> Is of acceptable quality | |
| 2 Monitoring Data Suggests: | | | |
| <input type="checkbox"/> Groundwater plume is effectively contained | | <input type="checkbox"/> Contaminant concentrations are declining | |
| E. Monitored Natural Attenuation <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A | | | |
| 1. Monitoring Wells (Natural attenuation remedy) | | | |
| <input checked="" type="checkbox"/> Properly secured/locked | <input checked="" type="checkbox"/> Functioning | <input checked="" type="checkbox"/> Routinely sampled | <input checked="" type="checkbox"/> Good condition |
| <input checked="" type="checkbox"/> All required wells located | <input type="checkbox"/> Needs Maintenance | <input type="checkbox"/> 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 installation of a soil cover over the KBRP and KRP with institutional controls and Monitored Natural Attenuation for the water table aquifer groundwater. | | | |
| The remedy seems to be fully established and functioning as designed. | | | |

Five-Year Review Site Inspection Checklist (Continued)

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.

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)..

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.

N/A

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K-AREA REACTOR SEEPAGE BASINS (904-65G) OPERABLE UNIT

I. Introduction

This is the first five-year review for the K-Area Reactor Seepage Basins (KRSB) (904-65G) Operable Unit (OU). This review was conducted from August 2007 through September 2007. This report documents the results of the review.

II. OU Chronology

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

Table 1. Chronology of OU Events

| Event | Date |
|--|----------------------------|
| RI Start/Finish | July 1995 / September 1996 |
| Explanation of Significant Difference (ESD) Issuance | September 16, 2002 |
| Remedial Action (RA) Start | September 29, 2000 |
| Plug-In Record of Decision (ROD) | November 29, 1999 |
| RA Construction Activities Complete | September 3, 2002 |
| Previous Five-Year Review | None |

III. Background

Physical Characteristics

The KRSB OU is located in the south-central portion of the Savannah River Site (SRS) in K-Area Reactor (Figure 1). The OU is adjacent to a major electrical transmission line right-of-way and is approximately 400 ft west of the K-Reactor (Building 105-K). This area is located in an industrial zone identified in the proposed SRS future land use map of the SRS Federal Facility Agreement (FFA) Implementation Plan, is adjacent to a nuclear facility, and has been selected to remain as an industrial use area. Figure 2 shows the Site layout of the KRSB.

Land and Resource Use

The KRSB OU is located in an industrial area.

History of Contamination

The KRSB was constructed in 1957 to receive low-level radioactive wastewater from disassembly basin purges from K-Reactor (Building 105-K). The basin dimensions are approximately 135 ft x 70 ft with an average depth of 7 ft below land surface (bls). From 1957 until 1969, the KRSB received low-level radioactive purge water from the K-Area Disassembly Basin via a 600-ft long, 3-in-diameter polyethylene pipe buried approximately 2 to 4 ft bls. The basin is currently open and has not been backfilled to grade.

Initial Response

Various sampling has occurred at the KRSB to support environmental assessments and environmental impact statements. In 1995, characterization activities were conducted under the *Phase II Remedial Investigation Work Plan for the K-Area Reactor Seepage Basin*. An evaluation of the characterization efforts is provided in the *Remedial Investigation Report and Baseline Risk Assessment for the K-Reactor Seepage Basin (904-65G) (U)*. These studies indicate that the seepage basin, process sewer line, and soil adjacent to the process sewer line present a potential hazard to future industrial workers and residents, and that remediation of the KRSB OU was warranted. Tritium, gross alpha, and total radium were detected in groundwater near the KRSB OU at concentrations above maximum contaminant levels (MCLs) from 1992 to 1996. Based on the period of use (1957 to 1960) of the seepage basin and the calculated pore-water velocity in the vadose zone beneath the seepage basin (6.89 ft/year), any tritium discharged to the basin would have migrated through the vadose zone and into the aquifer by 1967. Because tritium has a half-life of 12.4 years, in the 39 years since the basin was last used, more than 87.5% of the original tritium released to the basin will have decayed.

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 principal threat source material (PTSM) was selected as the common remedy in the Plug-In ROD approved in September 1999. The Plug-In ROD process streamlines the normal CERCLA documentation process for units that are similar and meet criteria defined in the Plug-In ROD. In lieu of an RFI/RI/BRA, a Technical Evaluation Report (TER) is prepared that uses characterization data to verify that the plug-in unit meets the Plug-In ROD criteria. In lieu of Proposed Plan and ROD documents, an Explanation of Significant Difference (ESD) document is submitted. The approved ESD is the document that amends the approved Plug-In ROD to include the individual plug-in unit – in this case, the KRSB. An Explanation of Significant Difference (ESD) to apply the Plug-In ROD remedy at the KRSB OU was approved in March 2000.

IV. Remedial Actions

Remedy Selection

The remedy selected is designed to meet the following remedial action objectives (RAOs) for this source unit:

- Prevent human exposure to highly 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 ft 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 the soil to groundwater beneath the unit above MCLs or risk-based concentrations (RBCs) if there are no MCLs. The soil RGs are back-calculated based on MCLs or RBCs.
- Protect the ecological receptors indigenous to the area by preventing or limiting contact with contaminated basin soil/pipelines and preventing plants and animals from bringing contaminants up toward the surface.

Land use controls (institutional controls) are used to support the first RAO by restricting the KRSB OU to future industrial use and prohibiting residential or agricultural use of the area. The controls will be maintained until they are deemed necessary.

The land use control objectives necessary to ensure the protectiveness of the preferred alternative are listed below:

- Prevent contact, removal, or excavation of buried waste or pipelines in the OU areas designated in the technical evaluation report and ESD and
- Preclude residential or agricultural use of the area.

These objectives will be met by near-and long-term use controls. The following near-term land use controls are expected to prevent exposure to the contaminated media at the KRSB OU:

- SRS boundary security gates prevent exposure to intruders;
- Visible warning signs at the most probable access points requiring contact of the waste unit custodian prior to entry to the OU; and

Site use/clearance program prevents excavation in the area of the unit pipeline or cover system.

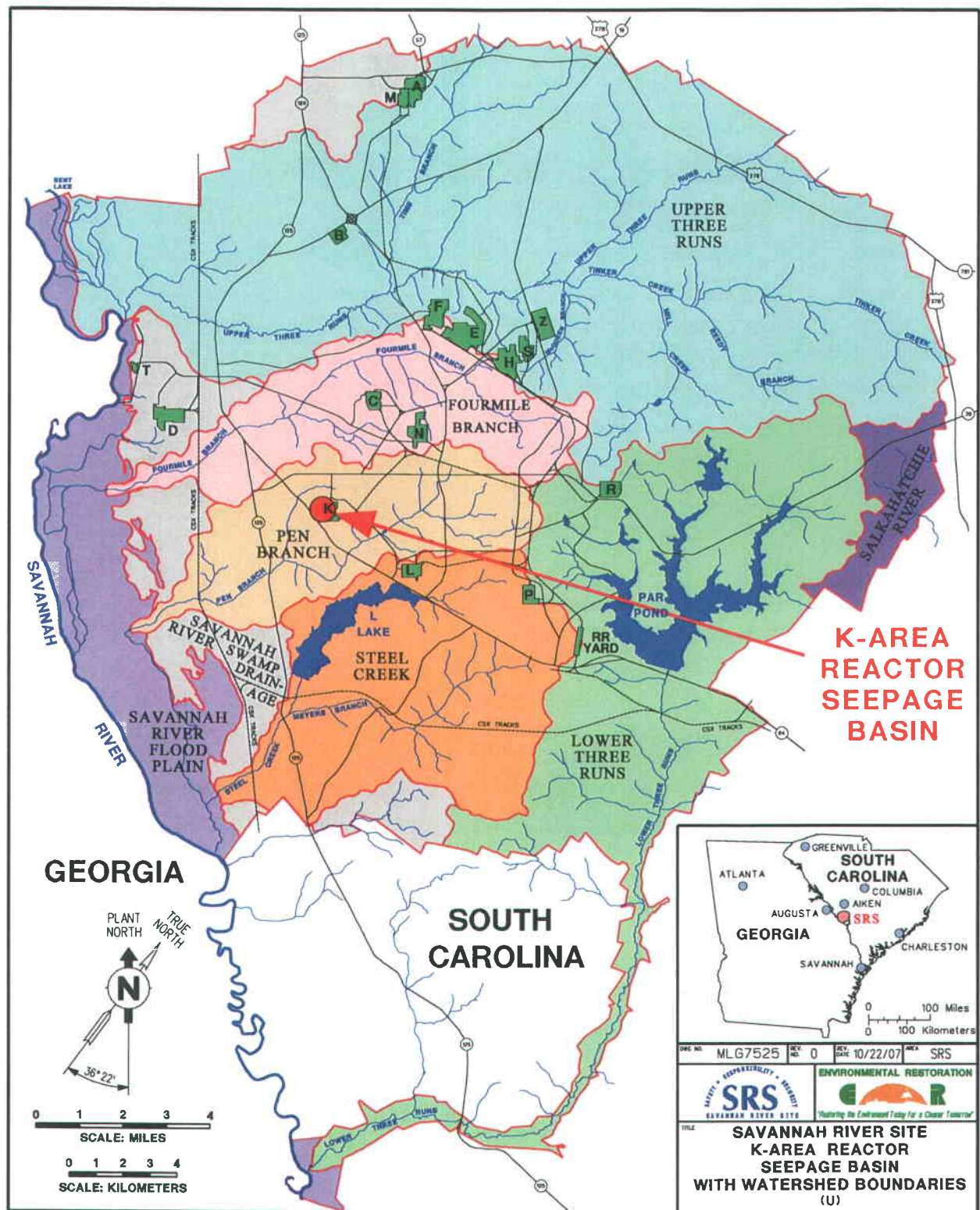


Figure 1. Map of SRS Showing the Location of K-Area Reactor Seepage Basin OU at SRS

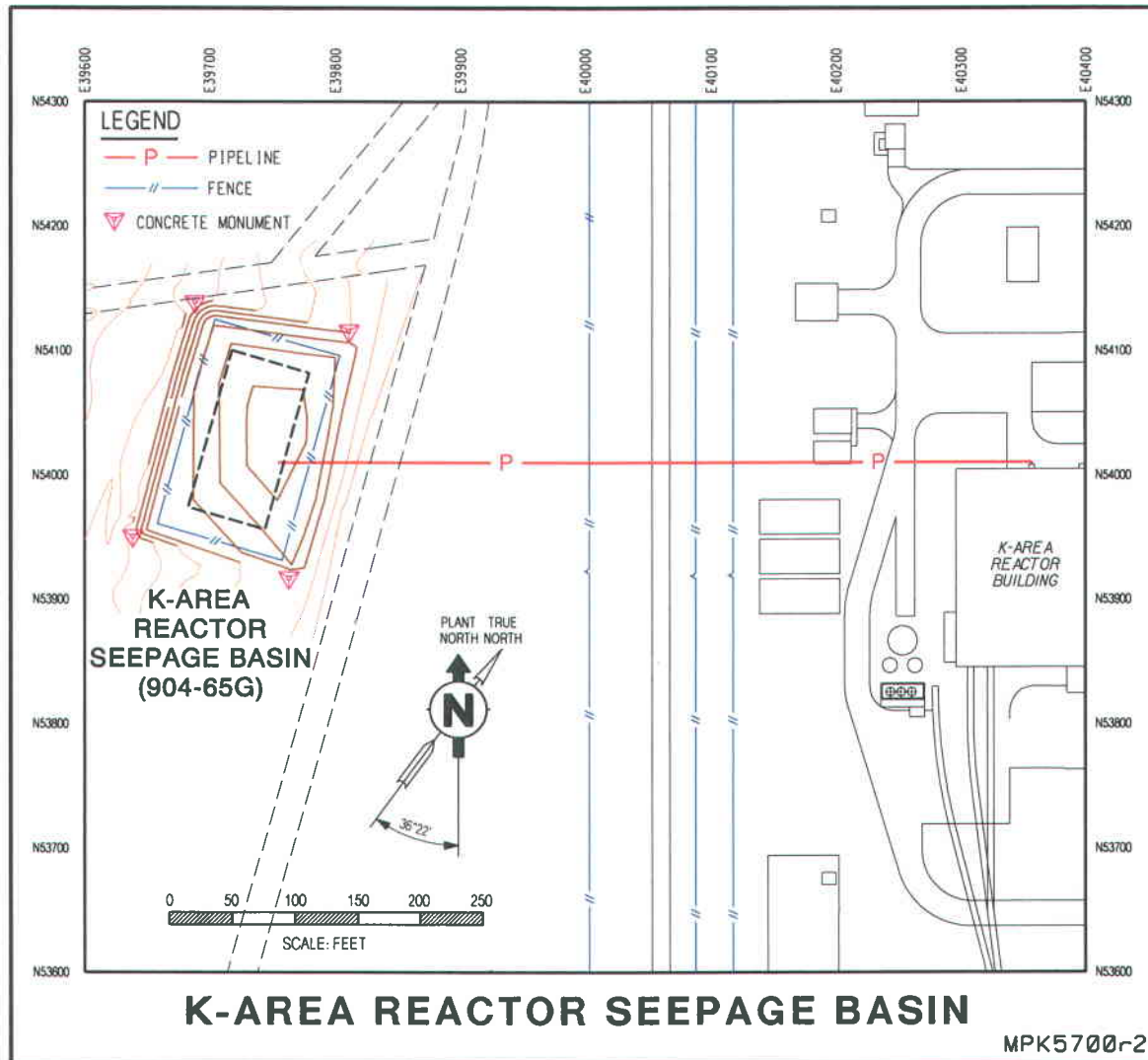


Figure 2. Site Layout for K-Area Reactor Seepage Basin

Remedy Implementation

The in situ stabilization treatment technology was used to stabilize the soil and contaminants, converting the material into a form less susceptible to uptake by potential human and ecological intruders and less susceptible to leaching, supporting the first and second RAOs. The area to be stabilized consists of the basin bottom, which has dimensions of approximately 70 by 135 ft. In situ soil grouting was performed by mixing stabilization agents directly into or with the contaminated soil on the basin bottom to a depth of 3 ft below basin bottom. Details of the grouting process were provided as part of the PCR/FRR issued 9/1/02 for the KRSB OU.

A low-permeability soil cover was placed over the open basin. The soil cover system was designed with permeability low enough to prevent migration of soil contaminants to groundwater for 1,000 years at a concentration that will exceed MCLs. The soil cover system consists of a layer of soil placed over the contaminated area. Low permeability soil material was obtained from the designated SRS borrow-source after necessary pre-qualification tests were performed to verify the adequacy of the material. The primary purpose of the cover is to reduce the infiltration rate through the contaminated zone and thus reduce contaminant migration, which supports RAO 2. The cover also acts as a barrier between potential receptors and the contaminants, which supports RAOs 1 and 3. The soil cover system, using native compacted soil, meets the hydraulic conductivity requirements and specified performance standards in the Plug-In ROD. The performance of a 10^{-5} cm/sec soil cover system meets RAO 2 and prevents the release of COCs in the soil to groundwater beneath the unit above MCLs.

Operation and Maintenance

There are no system operation requirements. There are no annual system operations. However, the following steps are 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
- Inspected unit to confirm protectiveness of the selected remedial action

VII. Technical Assessment

The conclusions for this review are as follows:

- The remedy functions as intended by the decision documents because stabilization treats the PTSM, the soil cover prevents migration of COCs, and institutional controls provides access controls.
- The assumptions regarding receptors and exposure pathways 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.

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. Project Costs

Costs associated with the selected remedy for KRSB include operation and maintenance costs of the cover and institutional controls. The estimated operation and maintenance cost associated with the selected remedy is \$458,813. This is a present worth cost, including 30 years of maintenance activities. After characterization and effectiveness of the remedy were evaluated, the actual operation and maintenance cost for the KRSB was assessed. The total actual operation and maintenance cost from project support and other post-construction expense to fiscal year 2006 is \$129,610.

XI. Protectiveness Statement(s)

The selected remedy provides human protection at the KRSB OU by preventing human exposure to highly contaminated basin soils through performing stabilization treatment, filling the basins, and using land use controls. No COCs were detected in surface soils outside of the basins. The selected remedy will also provide protection to the environment at the KRSB OU by preventing or limiting the contact of plants and animals to contamination through the grouting of the process sewer line and the construction of the 6-ft thick soil cover system.

XII. Next Review

The next five-year review is scheduled for February 12, 2014.

ATTACHMENT 1

List of Documents Reviewed

WSRC-RP-92-16, *Phase II Remedial Investigation Work Plan for the K-Area Reactor Seepage Basin*, Revision 1, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

WSRC-RP-96-871, *Remedial Investigation Report and Baseline Risk Assessment for the K-Reactor Seepage Basin (904-65G) (U)*, Revision 1.1, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

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

WSRC-RP-99-4200, *Explanation of Significant Difference (ESD) for the Plug-In ROD In Situ Stabilization with a Low Permeability Soil Cover System for Radiological Contaminants in Soil-K-Area Reactor Seepage Basin (U)*, Revision 1.1, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

WSRC-RP-99-4205, *Unit-Specific Plug-In Technical Evaluation Report for the K-Area Reactor Seepage Basin Operable Unit (U)*, Revision 0, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

WSRC-RP-2002-4030, *Post-Construction Report (PCR) Final Remediation Report (FRR) for the K-Area Reactor Seepage Basin (Bldg. 904-65G) Operable Unit (U)*, Revision 0, March, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

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ATTACHMENT 2

Five-Year Review Site Inspection Checklist

| I. SITE INFORMATION | | | |
|---|---|----------------------|-----------------------|
| Site Name: | K-Area Reactor Seepage Basins (904-65G) Operable Unit (OU) | Date of Inspection: | 9/05/2007 |
| Location and Region: | Savannah River Site, USEPA IV | EPA ID: | SC1890008989 |
| Agency, office, or company leading the five-year review: | United States Department of Energy | CERCLIS OU No.: | 55 |
| | | Weather/Temperature: | clear and sunny, 90°F |
| Remedy Includes: (Check all that apply) <div><input checked="" type="checkbox"/> Cover System <input type="checkbox"/> Monitored Natural Attenuation</div> <div><input checked="" type="checkbox"/> Access controls <input type="checkbox"/> Groundwater Containment</div> <div><input checked="" type="checkbox"/> Institutional Controls <input type="checkbox"/> Vertical Barrier Walls</div> <div><input type="checkbox"/> Groundwater pump and treatment</div> <div><input type="checkbox"/> Surface water collection and treatment</div> <div><input checked="" type="checkbox"/> Other: <u>In-Situ Stabilization</u></div> | | | |
| Attachments: <input type="checkbox"/> Inspection team roster attached <input type="checkbox"/> Site map attached | | | |
| II. INTERVIEWS (Check all that apply) | | | |
| 1. O & M site manager | | | |
| | (Name) _____ | (Title) _____ | (Date) _____ |
| Interviewed: | <input type="checkbox"/> at site <input type="checkbox"/> at office <input type="checkbox"/> by phone | Phone No. _____ | |
| Problems, suggestions: | <input type="checkbox"/> report attached _____ | | |
| 2. O & M staff | | | |
| | (Name) _____ | (Title) _____ | (Date) _____ |
| Interviewed: | <input type="checkbox"/> at site <input type="checkbox"/> at office <input type="checkbox"/> by phone | Phone No. _____ | |
| Problems, suggestions: | <input type="checkbox"/> report attached _____ | | |

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Five-Year Review Site Inspection Checklist (Continued)

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

| | | | |
|---|---|--|---|
| <input type="checkbox"/> O & M Manual | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A |
| <input checked="" type="checkbox"/> As-built drawings | <input checked="" type="checkbox"/> Readily available | <input checked="" type="checkbox"/> Up to date | <input type="checkbox"/> N/A |
| <input type="checkbox"/> Maintenance Logs | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A |

Remarks: See Waste Unit Inspection and Maintenance, ER-SOP-019

Five-Year Review Site Inspection Checklist (Continued)

| | | | | | | |
|--|---|-------------------------------------|---|---|--|---|
| 2. Site-Specific Health and Safety Plan | | | | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A |
| <input type="checkbox"/> Contingency plan/emergency response plan | | | | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A |
| Remarks: <u>Routine O&M activities do not require a SSHASP under 29 CFR 1910.1201, HAZWOPER.</u> | | | | | | |
| 3. O & M and OSHA Training Records | | | | <input checked="" type="checkbox"/> Readily available | <input checked="" type="checkbox"/> Up to date | <input type="checkbox"/> N/A |
| Remarks: _____ | | | | | | |
| 4. Permits and Service Agreements | | | | | | |
| <input type="checkbox"/> Air discharge permit | <input checked="" type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A | | | |
| <input type="checkbox"/> Effluent discharge | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A | | | |
| <input type="checkbox"/> Waste Disposal, POTW | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A | | | |
| <input type="checkbox"/> Other permits | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A | | | |
| Remarks: _____ | | | | | | |
| 5. Gas Generation Records | | | | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A |
| Remarks: _____ | | | | | | |
| 6. Settlement Monument Records | | | | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A |
| Remarks: _____ | | | | | | |
| 7. Groundwater Monitoring Records | | | | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A |
| Remarks: _____ | | | | | | |
| 8. Leachate Extraction Records | | | | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A |
| Remarks: _____ | | | | | | |
| 9. Discharge Compliance Records | | | | | | |
| <input type="checkbox"/> Air | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A | | | |
| <input type="checkbox"/> Water (effluent) | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A | | | |
| Remarks: _____ | | | | | | |
| 10. Daily Access/Security Logs | | | | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A |
| Remarks: _____ | | | | | | |

Five-Year Review Site Inspection Checklist (Continued)

IV. O & M Costs

1. O & M Organization

- ☐ State in-house ☐ Contractor for State
☐ PRP in-house ☐ Contractor for PRP
 x Other: SRS

2. O & M Cost Records

- ☐ Readily available ☐ Up to date ☐ Funding mechanism/agreement in place
 x Other: Project cost data is summarized in Section X of attached review: WSRC-RP-2007-4063.

Total annual cost by year for review period if available

| | | | |
|----------------------|--------------------|------------------|---|
| From _____ (Date) | To _____ (Date) | _____ Total cost | <input type="checkbox"/> Breakdown attached |
| From _____ (Date) | To _____ (Date) | _____ Total cost | <input type="checkbox"/> Breakdown attached |
| From _____ (Date) | To _____ (Date) | _____ Total cost | <input type="checkbox"/> Breakdown attached |
| From _____ (Date) | To _____ (Date) | _____ Total cost | <input type="checkbox"/> Breakdown attached |
| From _____ (Date) | To _____ (Date) | _____ Total cost | <input type="checkbox"/> Breakdown attached |

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

Describe costs and reasons: _____

V. ACCESS AND INSTITUTIONAL CONTROLS

x Applicable ☐ N/A

A. Fencing

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

Five-Year Review Site Inspection Checklist (Continued)

| | | | |
|--|--|--|---|
| B. Other Access Restrictions | | | |
| 1. Signs and other security measures | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> N/A | |
| Remarks: <u>Signs at this site are in good condition.</u> | | | |
| C. Institutional Controls | | | |
| 1. Implementation and enforcement | | | |
| Site conditions imply ICs not properly implemented: | <input type="checkbox"/> Yes | <input checked="" type="checkbox"/> No | <input type="checkbox"/> N/A |
| Site conditions imply ICs not being fully enforced: | <input type="checkbox"/> Yes | <input checked="" type="checkbox"/> No | <input type="checkbox"/> N/A |
| Type of monitoring (e.g., self-reporting, drive-by): | Field Walk Down | | |
| Frequency: | Annually | | |
| Responsible party/agent: | DOE Savannah River Field Office | | |
| Contact: | W. G. Erickson | Waste Area Group Manager | 09/3/07 (803) 952-8408 |
| | (Name) | (Title) | (Date) (Phone No.) |
| Reporting is up-to-date: | <input checked="" type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="checkbox"/> N/A |
| Reports are verified by the lead agency: | <input checked="" type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="checkbox"/> N/A |
| Specific requirements in deed of decision documents have been met: | <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input checked="" type="checkbox"/> N/A |
| Violations have been reported: | <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input checked="" type="checkbox"/> N/A |
| Other problems or suggestions: | <input type="checkbox"/> Report attached | | |
| <hr/> <hr/> <hr/> | | | |
| 2. Adequacy | | | |
| <input checked="" type="checkbox"/> ICs are adequate | <input type="checkbox"/> ICs are inadequate | <input type="checkbox"/> N/A | |
| Remarks: <hr/> <hr/> | | | |
| D. General | | | |
| 1. Vandalism/trespassing | | | |
| <input type="checkbox"/> Location shown on site map | <input checked="" type="checkbox"/> No vandalism evident | | |
| Remarks: <hr/> <hr/> | | | |
| 2. Land use changes onsite | | | |
| <input checked="" type="checkbox"/> N/A | | | |
| Remarks: <hr/> <hr/> | | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | | |
|--|--|--|--|
| 3. Land use changes offsite <input checked="" type="checkbox"/> N/A Remarks _____ _____ | | | |
| VI. GENERAL SITE CONDITIONS | | | |
| A. Roads <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A | | | |
| 1. Roads damaged <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Roads adequate <input type="checkbox"/> N/A Remarks _____ _____ | | | |
| B. Other site Conditions Remarks _____ _____ _____ | | | |
| VII. COVERS SYSTEMS <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A | | | |
| A. Soil Surface | | | |
| 1. Settlement (Low spots) <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Settlement not evident Areal extent _____ Depth _____ Remarks _____ _____ | | | |
| 2. Cracks <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Cracking not evident Lengths _____ Widths _____ Depths _____ Remarks _____ _____ | | | |
| 3. Erosion <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Erosion not evident Areal extent _____ Depth _____ Remarks _____ _____ | | | |
| 4. Holes <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Holes not evident Areal extent _____ Depth _____ Remarks _____ _____ | | | |
| 5. Vegetative Cover <input checked="" type="checkbox"/> Grass <input type="checkbox"/> Cover properly established <input checked="" type="checkbox"/> No signs of stress <input type="checkbox"/> Trees/shrubs (indicate size and location on a diagram) Remarks _____ _____ | | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | |
|--|---|---|
| 6. | Alternative Cover (armored rock, concrete, etc.) | x N/A |
| Remarks _____ | | |
| | | |
| 7. | Bulges | <input type="checkbox"/> Location shown on site map x Bulges not evident |
| Areal extent _____ Height _____ | | |
| Remarks _____ | | |
| | | |
| 8. | Wet Areas/Water Damage | x Wet areas/water damage not evident |
| <input type="checkbox"/> Wet Areas <input type="checkbox"/> Location shown on site map Areal extent _____ | | |
| <input type="checkbox"/> Ponding <input type="checkbox"/> Location shown on site map Areal extent _____ | | |
| <input type="checkbox"/> Seeps <input type="checkbox"/> Location shown on site map Areal extent _____ | | |
| <input type="checkbox"/> Soft subgrade <input type="checkbox"/> Location shown on site map Areal extent _____ | | |
| Remarks _____ | | |
| | | |
| 9. | Slope Instability | <input type="checkbox"/> Slides <input type="checkbox"/> Location shown on site map x No evidence of slope instability |
| Areal extent _____ | | |
| Remarks _____ | | |
| | | |
| B. Benches <input type="checkbox"/> Applicable x 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 | <input type="checkbox"/> Location shown on site map <input type="checkbox"/> N/A or okay |
| Remarks _____ | | |
| | | |
| 2. | Bench Breached | <input type="checkbox"/> Location shown on site map <input type="checkbox"/> N/A or okay |
| Remarks _____ | | |
| | | |
| 3. | Bench Overtopped | <input type="checkbox"/> Location shown on site map <input type="checkbox"/> N/A or okay |
| Remarks _____ | | |
| | | |

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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 _____

Five-Year Review Site Inspection Checklist (Continued)

| | | | |
|--|--|---|---|
| D. Cover Penetrations <input type="checkbox"/> Applicable x N/A | | | |
| 1. Gas Vents <input type="checkbox"/> Active <input type="checkbox"/> Passive | | | |
| <input type="checkbox"/> Properly secured/locked | <input type="checkbox"/> Functioning | <input type="checkbox"/> Routinely sampled | <input type="checkbox"/> Good condition |
| <input type="checkbox"/> Evidence of leakage at penetration | <input type="checkbox"/> Needs Maintenance | <input type="checkbox"/> N/A | |
| Remarks _____ | | | |
| | | | |
| 2. Gas Monitoring Probes | | | |
| <input type="checkbox"/> Properly secured/locked | <input type="checkbox"/> Functioning | <input type="checkbox"/> Routinely sampled | <input type="checkbox"/> Good condition |
| <input type="checkbox"/> Evidence of leakage at penetration | <input type="checkbox"/> Needs Maintenance | <input type="checkbox"/> N/A | |
| Remarks _____ | | | |
| | | | |
| 3. Monitoring Wells | | | |
| <input type="checkbox"/> Properly secured/locked | <input type="checkbox"/> Functioning | <input type="checkbox"/> Routinely sampled | <input type="checkbox"/> Good condition |
| <input type="checkbox"/> Evidence of leakage at penetration | <input type="checkbox"/> Needs Maintenance | <input type="checkbox"/> N/A | |
| Remarks _____ | | | |
| | | | |
| 4. Leachate Extraction Wells | | | |
| <input type="checkbox"/> Properly secured/locked | <input type="checkbox"/> Functioning | <input type="checkbox"/> Routinely sampled | <input type="checkbox"/> Good condition |
| <input type="checkbox"/> Evidence of leakage at penetration | <input type="checkbox"/> Needs Maintenance | <input type="checkbox"/> N/A | |
| Remarks _____ | | | |
| | | | |
| 5. Settlement Monuments <input type="checkbox"/> Located <input type="checkbox"/> Routinely surveyed <input type="checkbox"/> N/A | | | |
| Remarks _____ | | | |
| | | | |
| E. Gas Collection and Treatment <input type="checkbox"/> Applicable x N/A | | | |
| 1. Gas Treatment Facilities | | | |
| <input type="checkbox"/> Flaring | <input type="checkbox"/> Thermal destruction | <input type="checkbox"/> Collection for reuse | |
| <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance | | |
| Remarks _____ | | | |
| | | | |
| 2. Gas Collection Wells, Manifolds and Piping | | | |
| <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance | | |
| Remarks _____ | | | |
| | | | |

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| | | | |
|---|--|-----------------------------|--|
| 3. Gas Monitoring Facilities (e.g., gas monitoring of adjacent homes or buildings) | | | |
| <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A | | | |
| Remarks _____ _____ | | | |
| F. Cover Drainage Layer <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A | | | |
| 1. Outlet Pipes Inspected <input type="checkbox"/> Functioning <input type="checkbox"/> N/A | | | |
| Remarks _____ _____ | | | |
| 2. Outlet Rock Inspected <input type="checkbox"/> Functioning <input type="checkbox"/> N/A | | | |
| Remarks _____ _____ | | | |
| G. Detention/sedimentation Ponds <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A | | | |
| 1. Siltation Areal extent _____ Depth _____ <input type="checkbox"/> N/A | | | |
| <input type="checkbox"/> Siltation not evident | | | |
| Remarks _____ _____ | | | |
| 2. Erosion Areal extent _____ Depth _____ <input type="checkbox"/> N/A | | | |
| <input type="checkbox"/> Erosion not evident | | | |
| Remarks _____ _____ | | | |
| 3. Outlet Works <input type="checkbox"/> Functioning <input type="checkbox"/> N/A | | | |
| Remarks _____ _____ | | | |
| 4. Dam <input type="checkbox"/> Functioning <input type="checkbox"/> N/A | | | |
| Remarks _____ _____ | | | |
| H. Retaining Walls <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A | | | |
| 1. Deformations <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Deformation not evident | | | |
| Horizontal displacement _____ | | Vertical displacement _____ | |
| Rotational displacement _____ | | | |
| Remarks _____ _____ | | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | |
|--|---|--|
| 2. Degradation | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> Deformation not evident |
| Remarks _____ | | |
| I. Perimeter Ditches/Off-Site Discharge <input type="checkbox"/> Applicable x N/A | | |
| 1. Siltation | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> Siltation not evident |
| Areal extent _____ Depth _____ | | |
| Remarks _____ | | |
| 2. Vegetative Growth | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> Siltation not evident |
| <input type="checkbox"/> Vegetation does not impede flow | | |
| Areal extent _____ Type _____ | | |
| Remarks _____ | | |
| 3. Erosion | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> Erosion not evident |
| Areal extent _____ Depth _____ | | |
| Remarks _____ | | |
| 4. Discharge Structure | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> N/A |
| Remarks _____ | | |
| VIII. VERTICAL BARRIER WALLS <input type="checkbox"/> Applicable x N/A | | |
| 1. Settlement | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> Settlement not evident |
| Areal extent _____ Depth _____ | | |
| Remarks _____ | | |
| 2. Performance Monitoring | Type of Monitoring _____ | <input type="checkbox"/> Performance not monitored |
| Frequency _____ <input type="checkbox"/> Evidence of breaching Head differential _____ | | |
| Remarks _____ | | |

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Five-Year Review Site Inspection Checklist (Continued)

| | | | |
|---|---|--|---|
| IX. GROUNDWATER/SURFACE WATER REMEDIES | | <input type="checkbox"/> Applicable | <input checked="" type="checkbox"/> N/A |
| A. Groundwater Extraction Wells, Pumps, and Pipelines | | <input type="checkbox"/> Applicable | <input type="checkbox"/> N/A |
| 1. Pumps, Wellhead Plumbing, and Electrical | | | |
| <input type="checkbox"/> Good condition | <input type="checkbox"/> All required wells located | <input type="checkbox"/> Needs Maintenance | <input type="checkbox"/> N/A |
| Remarks _____ | | | |
| 2. Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances | | | |
| <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance | | |
| Remarks _____ | | | |
| 3. Spare Parts and Equipment | | | |
| <input type="checkbox"/> Readily available | <input type="checkbox"/> Good condition | <input type="checkbox"/> Requires upgrade | <input type="checkbox"/> Needs to be provided |
| Remarks _____ | | | |
| B. Surface Water Collection Structures, Pumps, and Pipelines | | <input type="checkbox"/> Applicable | <input type="checkbox"/> N/A |
| 1. Collection Structures, Pumps, and Electrical | | | |
| <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance | | |
| Remarks _____ | | | |
| 2. Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances | | | |
| <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance | | |
| Remarks _____ | | | |
| 3. Spare Parts and Equipment | | | |
| <input type="checkbox"/> Readily available | <input type="checkbox"/> Good condition | <input type="checkbox"/> Requires upgrade | <input type="checkbox"/> Needs to be provided |
| Remarks _____ | | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | |
|---|--|---|
| C. Treatment System | <input type="checkbox"/> Applicable | <input type="checkbox"/> N/A |
| 1. Treatment Train (Check components that apply) | | |
| <input type="checkbox"/> Metals removal | <input type="checkbox"/> Oil/water separation | <input type="checkbox"/> Bioremediation |
| <input type="checkbox"/> Air stripping | <input type="checkbox"/> Carbon adsorbers | |
| <input type="checkbox"/> Filters _____ | | |
| <input type="checkbox"/> Additive (e.g., chelation agent, flocculent) _____ | | |
| <input type="checkbox"/> Others _____ | | |
| <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance | |
| <input type="checkbox"/> Sampling ports properly marked and functional | | |
| <input type="checkbox"/> Sampling/maintenance log displayed and up to date | | |
| <input type="checkbox"/> Equipment properly identified | | |
| <input type="checkbox"/> Quantity of groundwater treated annually _____ | | |
| <input type="checkbox"/> Quantity of surface water treated annually _____ | | |
| Remarks _____ | | |
| _____ | | |
| 2. Electrical Enclosures and Panels (properly rated and functional) | | |
| <input type="checkbox"/> N/A | <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance |
| Remarks _____ | | |
| _____ | | |
| 3. Tanks, Vaults, Storage Vessels | | |
| <input type="checkbox"/> N/A | <input type="checkbox"/> Good condition | <input type="checkbox"/> Proper secondary containment |
| <input type="checkbox"/> Needs Maintenance | | |
| Remarks _____ | | |
| _____ | | |
| 4. Discharge Structure and Appurtenances | | |
| <input type="checkbox"/> N/A | <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance |
| Remarks _____ | | |
| _____ | | |
| 5. Treatment Building(s) | | |
| <input type="checkbox"/> N/A | <input type="checkbox"/> Good condition (esp. roof and doorways) | <input type="checkbox"/> Needs repair |
| <input type="checkbox"/> Chemicals and equipment properly stored | | |
| Remarks _____ | | |
| _____ | | |

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Five-Year Review Site Inspection Checklist (Continued)

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 remedy for this OU is institutional controls, In situ stabilization treatment, and a soil cover system.

The remedy functioning as designed because in situ stabilization will treat the PTSM and a soil cover with institutional controls will provide access controls.

Five-Year Review Site Inspection Checklist (Continued)

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.

The implemented remedy includes consolidation of PTSM material in the unit in-situ stabilization of PTSM, a low-permeability soil cover system, institutional controls and grouting pipelines

The remedies are functioning as designed since the in-situ stabilization treats the PTSM and the soil cover and institutional controls provides access controls.

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.

N/A

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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 second 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 2007 through September 2007. 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 |
|--------------------------------------|--------------------|
| RI Field Start | March 3, 1997 |
| Remedial Investigation (RI) Complete | May 27, 1999 |
| Record of Decision (ROD) Issuance | August 31, 2000 |
| Remedial Action Start | September 11, 2000 |
| Final Remediation Report (FRR) | June 13, 2000 |
| Previous Five-Year Review | February 12, 2004 |

Note: The remedial action for the L- and P-Area Bingham Pump Outage Pits was land use controls; as such, the remedial action followed the approval of the Final Remediation Report (FRR).

III. Background

Physical Characteristics

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) with dimensions of 472 x 26 ft. The mean depth of each pit is approximately 13 ft.

Land and Resource Use

The L and P BPOPs are located in a potential residential zone and are close to, but outside of, the industrial use zone. However, 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.

History of Contamination

The L and P BPOPs are burial pits that contain waste debris 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.. 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 mR/hr with no detected alpha activity. The buried waste is categorized as low-level threat waste because of the absence of free liquids or mobile or highly toxic material.

Groundwater is included as a subunit for the OU. No CMCOs were identified as potential sources of groundwater contamination, and no COCs were identified in the groundwater.

Initial Response

The unit was returned to grade by covering the debris with 4 ft of backfill. This cover material was placed at a time preceding the preparation of the formal Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) documentation; the cover system was placed prior to the CERCLA investigation.

IV. Remedial Actions

Remedy Selection

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

Remedy Implementation

The remedial action at the L and P BPOPs was implemented 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.

Operations and Maintenance

Semi-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. All other routine maintenance activities (i.e., mowing, etc.) and corrective actions have been implemented and documented.

V. Progress Since Last Review

This is the second five-year Record of Decision (ROD) review that the L and P BOPs have undergone. Since the previous review in June of 2003, no additional action has been required at this 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 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. 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 RAOs 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 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.

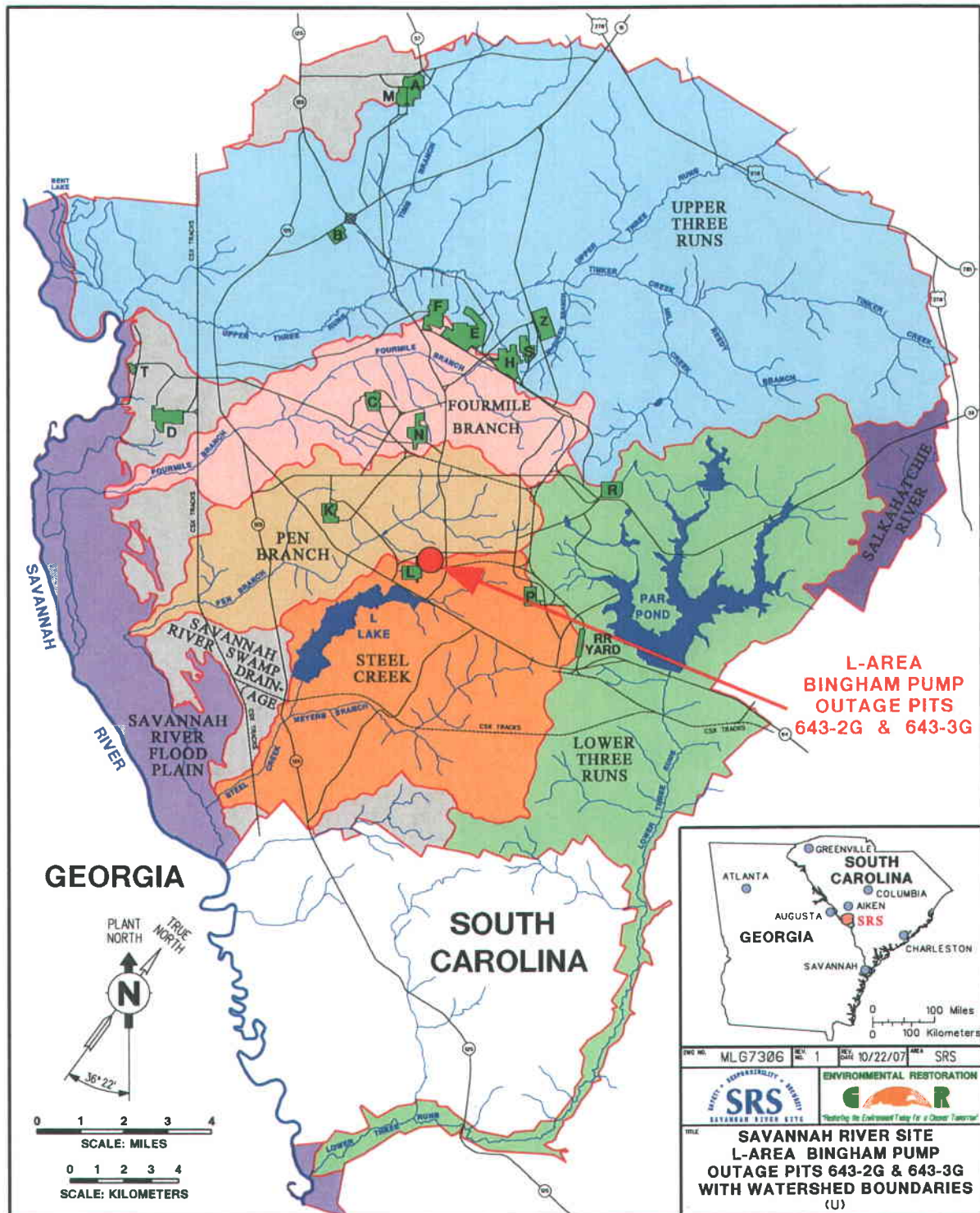


Figure 1. Location of the L-Area Bingham Pump Outage Pits at SRS

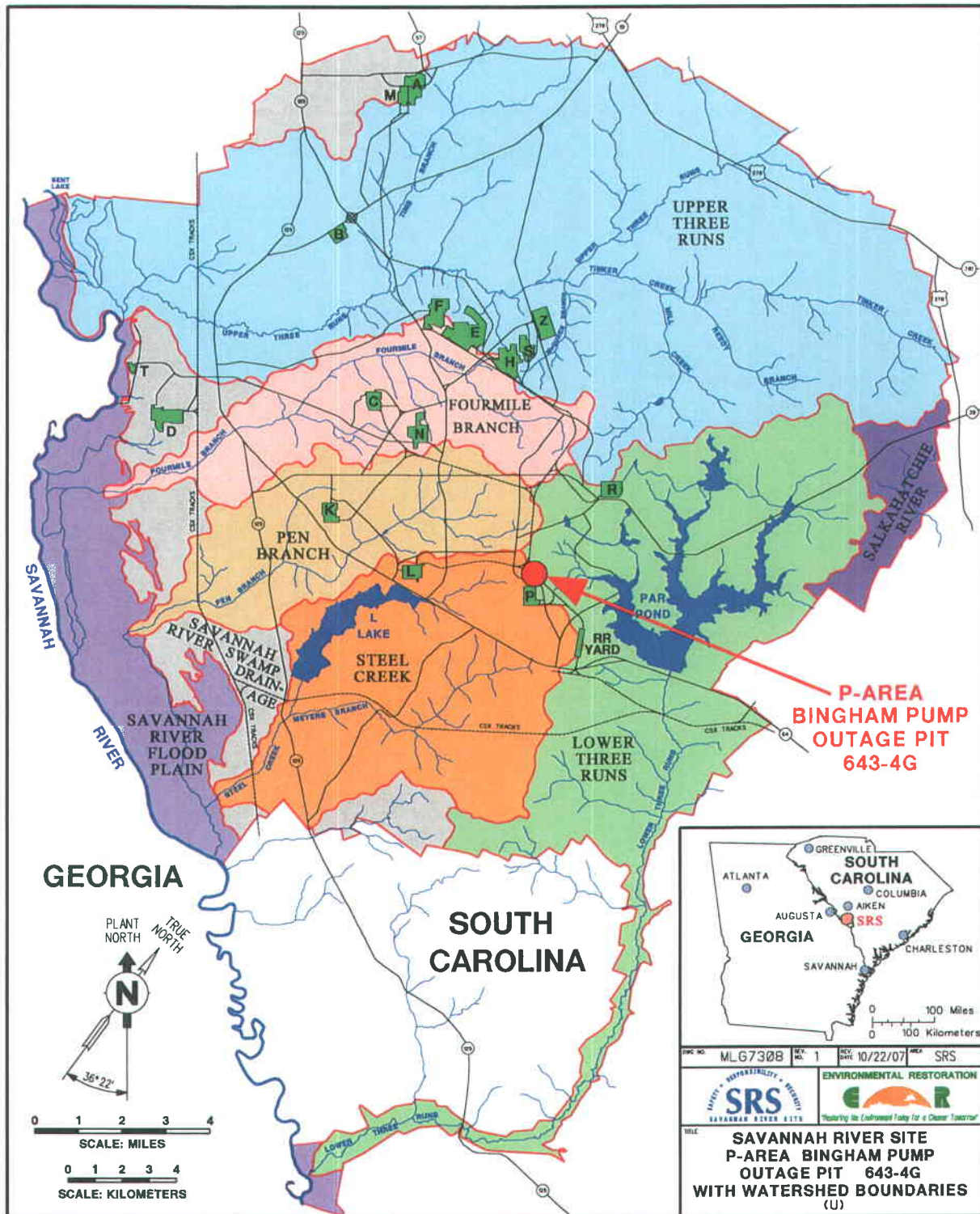


Figure 2. Location of the P-Area Bingham Pump Outage Pit at SRS

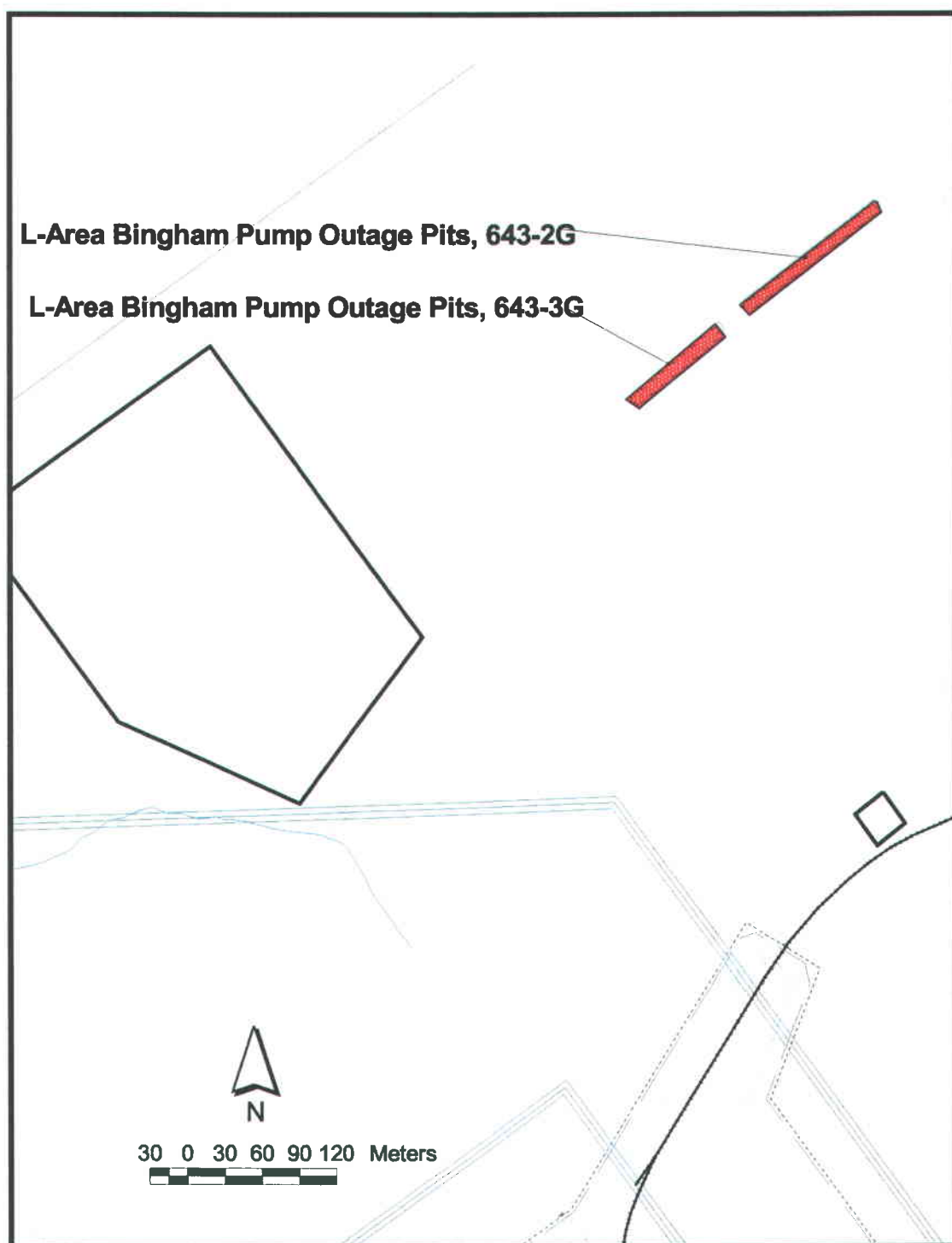


Figure 3. Layout of L-Area Bingham Pump Outage Pit

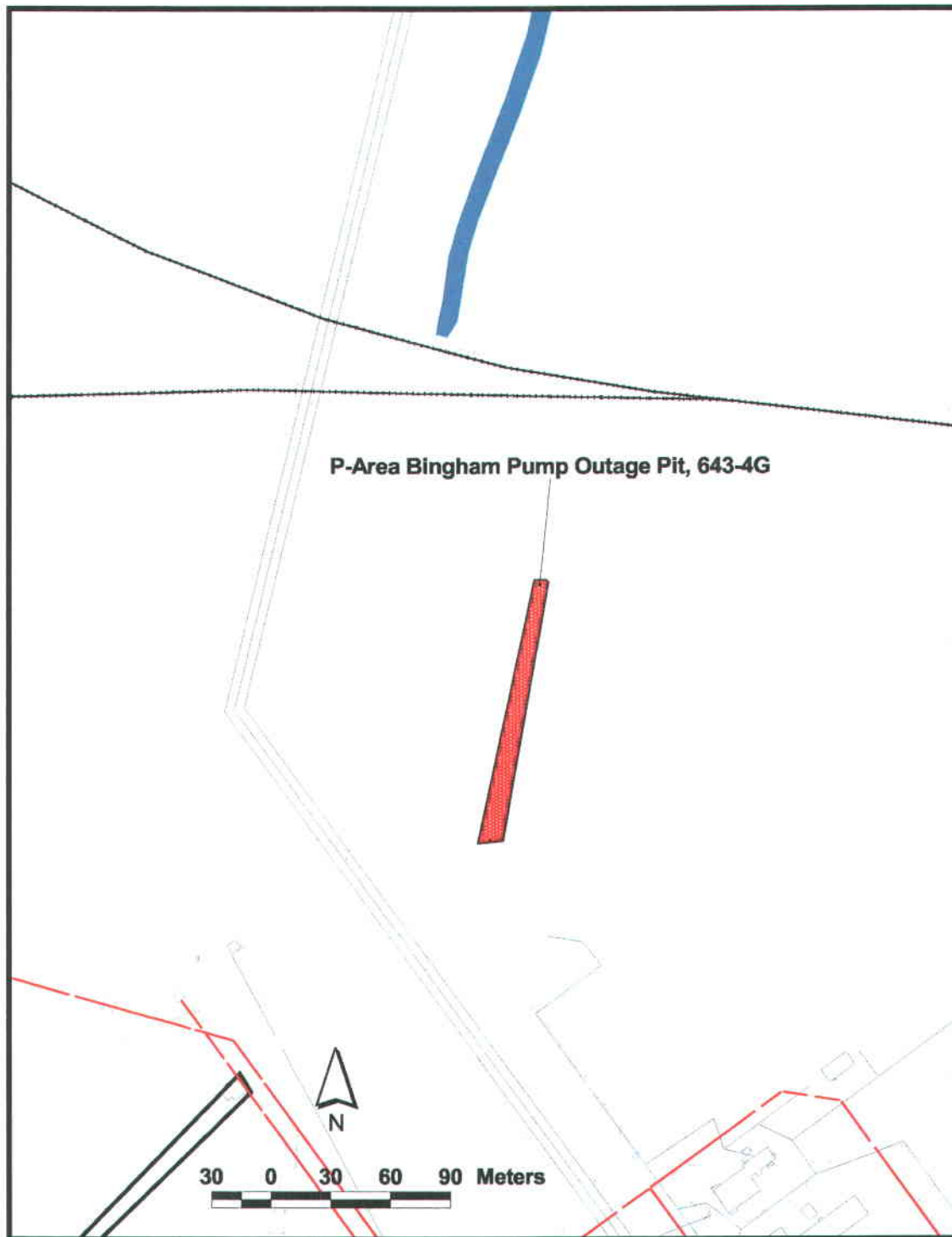


Figure 4. Layout of the P-Area Bingham Pump Outage Pit

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. Project Costs

Costs associated with the selected remedy for the L&P BPOP OU includes operation and maintenance costs of institutional controls. The estimated operation and maintenance cost associated with the selected remedy is \$141,500, which was discounted at 5% per year. This is a present worth cost, including 30 years of maintenance activities. After characterization and effectiveness of the remedy was evaluated, the actual operation and maintenance cost for the L&P BPOP was assessed. The total actual operation and maintenance cost from project support and other post construction expense to fiscal year 2006 is \$71,620.

XI. Protectiveness Statement(s)

The remedy of institutional controls at the L&P BPOP is protective of human health and the environment. This remedy, upon implementation of land use controls pursuant to the Land Use Control Assurance Plan (LUCAP), 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 United States Department of Energy (USDOE) controls the OU. These controls 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).

XII. Next Review

The next five-year review is scheduled for February 12, 2014.

ATTACHMENT 1

List of Documents Reviewed

WSRC-RP-98-4015, 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)*, Revision 1, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

WSRC-RP-2000-4030, *Final Remediation Report for the L- and P-Area Bingham Pump Outage Pits (643-2G, 643-3G, and 643-4G)*, Revision 0, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

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ATTACHMENT 2

Five-Year Review Site Inspection Checklist

| I. SITE INFORMATION | | | | | | | | | | | | | | | |
|--|--|------------------------------------|---|---------------------------------------|--|--|--|--|---|---|--|---|--|---------------------------------------|--|
| Site Name: | L-Area Bingham Pump Outage Pit | Date of Inspection: | 9/10/2007 | | | | | | | | | | | | |
| Location and Region: | Savannah River Site, USEPA IV | EPA ID: | SC1890008989 | | | | | | | | | | | | |
| Agency, office, or company leading the five-year review: | United States Department of Energy | CERCLIS OU No.: | 226, 26 | | | | | | | | | | | | |
| | | Weather/Temperature: | clear and sunny, 90°F | | | | | | | | | | | | |
| Remedy Includes: (Check all that apply) <table><tr><td><input type="checkbox"/> Cover System</td><td><input type="checkbox"/> Monitored Natural Attenuation</td></tr><tr><td><input type="checkbox"/> Access controls</td><td><input type="checkbox"/> Groundwater Containment</td></tr><tr><td><input checked="" type="checkbox"/> Institutional Controls</td><td><input type="checkbox"/> Vertical Barrier Walls</td></tr><tr><td><input type="checkbox"/> Groundwater pump and treatment</td><td></td></tr><tr><td><input type="checkbox"/> Surface water collection and treatment</td><td></td></tr><tr><td><input type="checkbox"/> Other: _____</td><td></td></tr></table> | | | | <input type="checkbox"/> Cover System | <input type="checkbox"/> Monitored Natural Attenuation | <input type="checkbox"/> Access controls | <input type="checkbox"/> Groundwater Containment | <input checked="" type="checkbox"/> Institutional Controls | <input type="checkbox"/> Vertical Barrier Walls | <input type="checkbox"/> Groundwater pump and treatment | | <input type="checkbox"/> Surface water collection and treatment | | <input type="checkbox"/> Other: _____ | |
| <input type="checkbox"/> Cover System | <input type="checkbox"/> Monitored Natural Attenuation | | | | | | | | | | | | | | |
| <input type="checkbox"/> Access controls | <input type="checkbox"/> Groundwater Containment | | | | | | | | | | | | | | |
| <input checked="" type="checkbox"/> Institutional Controls | <input type="checkbox"/> Vertical Barrier Walls | | | | | | | | | | | | | | |
| <input type="checkbox"/> Groundwater pump and treatment | | | | | | | | | | | | | | | |
| <input type="checkbox"/> Surface water collection and treatment | | | | | | | | | | | | | | | |
| <input type="checkbox"/> Other: _____ | | | | | | | | | | | | | | | |
| Attachments: <input type="checkbox"/> Inspection team roster attached <input type="checkbox"/> Site map attached | | | | | | | | | | | | | | | |
| II. INTERVIEWS (Check all that apply) | | | | | | | | | | | | | | | |
| 1. O & M site manager | | | | | | | | | | | | | | | |
| | _____ (Name) | _____ (Title) | _____ (Date) | | | | | | | | | | | | |
| Interviewed: | <input type="checkbox"/> at site | <input type="checkbox"/> at office | <input type="checkbox"/> by phone Phone No. _____ | | | | | | | | | | | | |
| Problems, suggestions: | <input type="checkbox"/> report attached _____ | | | | | | | | | | | | | | |
| 2. O & M staff | | | | | | | | | | | | | | | |
| | _____ (Name) | _____ (Title) | _____ (Date) | | | | | | | | | | | | |
| Interviewed: | <input type="checkbox"/> at site | <input type="checkbox"/> at office | <input type="checkbox"/> by phone Phone No. _____ | | | | | | | | | | | | |
| Problems, suggestions: | <input type="checkbox"/> report attached _____ | | | | | | | | | | | | | | |

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Five-Year Review Site Inspection Checklist (Continued)

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

| | | | |
|---|--|-------------------------------------|------------------------------|
| <input type="checkbox"/> O & M Manual | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |
| x As-built drawings | x Readily available | x Up to date | <input type="checkbox"/> N/A |
| <input type="checkbox"/> Maintenance Logs | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |

Remarks: See Waste Unit Inspection and Maintenance, ER-SOP-019

Five-Year Review Site Inspection Checklist (Continued)

| | | | |
|--|--|-------------------------------------|-------|
| 2. Site-Specific Health and Safety Plan | | | |
| <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A | |
| <input type="checkbox"/> Contingency plan/emergency response plan | | | |
| <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A | |
| Remarks: <u>Routine O&M activities do not require a SSHASP under 29 CFR 1910.1201, HAZWOPER.</u> | | | |
| 3. O & M and OSHA Training Records | | | |
| x Readily available | x Up to date | <input type="checkbox"/> N/A | |
| Remarks _____ | | | |
| 4. Permits and Service Agreements | | | |
| <input type="checkbox"/> Air discharge permit | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |
| <input type="checkbox"/> Effluent discharge | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |
| <input type="checkbox"/> Waste Disposal, POTW | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |
| <input type="checkbox"/> Other permits | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |
| Remarks _____ | | | |
| 5. Gas Generation Records | | | |
| <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A | |
| Remarks _____ | | | |
| 6. Settlement Monument Records | | | |
| <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A | |
| Remarks _____ | | | |
| 7. Groundwater Monitoring Records | | | |
| <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A | |
| Remarks _____ | | | |
| 8. Leachate Extraction Records | | | |
| <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A | |
| Remarks _____ | | | |
| 9. Discharge Compliance Records | | | |
| <input type="checkbox"/> Air | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |
| <input type="checkbox"/> Water (effluent) | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |
| Remarks _____ | | | |
| 10. Daily Access/Security Logs | | | |
| <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A | |
| Remarks _____ | | | |

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IV. O & M Costs

1. O & M Organization

- ☐ State in-house ☐ Contractor for State
☐ PRP in-house ☐ Contractor for PRP
x Other: SRS

2. O & M Cost Records

- ☐ Readily available ☐ Up to date ☐ Funding mechanism/agreement in place
x Other: Project cost data is summarized in Section X of attached review: WSRC-RP-2007-4063.

Total annual cost by year for review period if available

| | | | |
|----------------------|--------------------|------------|---|
| From _____ (Date) | To _____ (Date) | _____ | <input type="checkbox"/> Breakdown attached |
| | | Total cost | |
| From _____ (Date) | To _____ (Date) | _____ | <input type="checkbox"/> Breakdown attached |
| | | Total cost | |
| From _____ (Date) | To _____ (Date) | _____ | <input type="checkbox"/> Breakdown attached |
| | | Total cost | |
| From _____ (Date) | To _____ (Date) | _____ | <input type="checkbox"/> Breakdown attached |
| | | Total cost | |
| From _____ (Date) | To _____ (Date) | _____ | <input type="checkbox"/> Breakdown attached |
| | | Total cost | |

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

Describe costs and reasons: _____

V. ACCESS AND INSTITUTIONAL CONTROLS

x Applicable ☐ N/A

A. Fencing

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

Remarks _____

Five-Year Review Site Inspection Checklist (Continued)

| | | | | |
|---|---------------------------------|--|--|---|
| B. Other Access Restrictions | | | | |
| 1. Signs and other security measures <input type="checkbox"/> Location shown on site map <input type="checkbox"/> N/A | | | | |
| Remarks: <u>Signs at this site are in good condition.</u> | | | | |
| C. Institutional Controls | | | | |
| 1. Implementation and enforcement | | | | |
| Site conditions imply ICs not properly implemented: | | <input type="checkbox"/> Yes | <input checked="" type="checkbox"/> No | <input type="checkbox"/> N/A |
| Site conditions imply ICs not being fully enforced: | | <input type="checkbox"/> Yes | <input checked="" type="checkbox"/> No | <input type="checkbox"/> N/A |
| Type of monitoring (e.g., self-reporting, drive-by): | | Field Walk Down | | |
| Frequency: | Semi-Annually | | | |
| Responsible party/agent: | DOE Savannah River Field Office | | | |
| Contact: | W. G. Erickson | Waste Area Group Manager | 09/3/07 | (803) 952-8408 |
| | (Name) | (Title) | (Date) | (Phone No.) |
| Reporting is up-to-date: | | <input checked="" type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="checkbox"/> N/A |
| Reports are verified by the lead agency: | | <input checked="" type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="checkbox"/> N/A |
| Specific requirements in deed of decision documents have been met: | | <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input checked="" type="checkbox"/> N/A |
| Violations have been reported: | | <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input checked="" type="checkbox"/> N/A |
| Other problems or suggestions: | | <input type="checkbox"/> Report attached | | |
| <hr/> <hr/> | | | | |
| 2. Adequacy <input checked="" type="checkbox"/> ICs are adequate <input type="checkbox"/> ICs are inadequate <input type="checkbox"/> N/A | | | | |
| Remarks <hr/> | | | | |
| <hr/> | | | | |
| D. General | | | | |
| 1. Vandalism/trespassing <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> No vandalism evident | | | | |
| Remarks <hr/> | | | | |
| <hr/> | | | | |
| 2. Land use changes onsite <input checked="" type="checkbox"/> N/A | | | | |
| Remarks <hr/> | | | | |
| <hr/> | | | | |

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| | |
|--|---------------------------|
| 3. Land use changes offsite <input checked="" type="checkbox"/> N/A | |
| Remarks _____ | |
| VI. GENERAL SITE CONDITIONS | |
| A. Roads <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A | |
| 1. Roads damaged <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Roads adequate <input type="checkbox"/> N/A | |
| Remarks _____ | |
| B. Other site Conditions | |
| Remarks _____ | |
| VII. COVERS SYSTEMS <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A | |
| A. Soil Surface | |
| 1. Settlement (Low spots) <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Settlement not evident | |
| Areal extent _____ | Depth _____ |
| Remarks _____ | |
| 2. Cracks <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Cracking not evident | |
| Lengths _____ | Widths _____ Depths _____ |
| Remarks _____ | |
| 3. Erosion <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Erosion not evident | |
| Areal extent _____ | Depth _____ |
| Remarks _____ | |
| 4. Holes <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Holes not evident | |
| Areal extent _____ | Depth _____ |
| Remarks _____ | |
| 5. Vegetative Cover <input type="checkbox"/> Grass <input type="checkbox"/> Cover properly established <input type="checkbox"/> No signs of stress | |
| <input type="checkbox"/> Trees/shrubs (indicate size and location on a diagram) | |
| Remarks _____ | |

Five-Year Review Site Inspection Checklist (Continued)

| | | |
|--|---|--------------------|
| 6. Alternative Cover (armored rock, concrete, etc.) <input type="checkbox"/> N/A | | |
| Remarks _____ | | |
| 7. Bulges <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Bulges not evident | | |
| Areal extent _____ Height _____ | | |
| Remarks _____ | | |
| 8. Wet Areas/Water Damage <input type="checkbox"/> Wet areas/water damage not evident | | |
| <input type="checkbox"/> Wet Areas | <input type="checkbox"/> Location shown on site map | Areal extent _____ |
| <input type="checkbox"/> Ponding | <input type="checkbox"/> Location shown on site map | Areal extent _____ |
| <input type="checkbox"/> Seeps | <input type="checkbox"/> Location shown on site map | Areal extent _____ |
| <input type="checkbox"/> Soft subgrade | <input type="checkbox"/> Location shown on site map | Areal extent _____ |
| Remarks _____ | | |
| 9. Slope Instability <input type="checkbox"/> Slides <input type="checkbox"/> Location shown on site map <input type="checkbox"/> No evidence of slope instability | | |
| Areal extent _____ | | |
| Remarks _____ | | |
| B. Benches <input type="checkbox"/> Applicable <input type="checkbox"/> 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 <input type="checkbox"/> Location shown on site map <input type="checkbox"/> N/A or okay | | |
| Remarks _____ | | |
| 2. Bench Breached <input type="checkbox"/> Location shown on site map <input type="checkbox"/> N/A or okay | | |
| Remarks _____ | | |
| 3. Bench Overtopped <input type="checkbox"/> Location shown on site map <input type="checkbox"/> N/A or okay | | |
| Remarks _____ | | |

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| | | |
|--|---|--|
| C. Letdown Channels <input type="checkbox"/> Applicable <input type="checkbox"/> 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 <input type="checkbox"/> Location shown on site map <input type="checkbox"/> No evidence of settlement Areal extent _____ Depth _____ Remarks _____ _____ | |
| 2. | Material Degradation <input type="checkbox"/> Location shown on site map <input type="checkbox"/> No evidence of degradation Material type _____ Areal extent _____ Remarks _____ _____ | |
| 3. | Erosion <input type="checkbox"/> Location shown on site map <input type="checkbox"/> No evidence of erosion Areal extent _____ Depth _____ Remarks _____ _____ | |
| 4. | Undercutting <input type="checkbox"/> Location shown on site map <input type="checkbox"/> No evidence of undercutting Areal extent _____ Depth _____ Remarks _____ _____ | |
| 5. | Obstructions Type _____ <input type="checkbox"/> No obstructions <input type="checkbox"/> Location shown on site map Areal extent _____ Size _____ Remarks _____ _____ | |
| 6. | Excessive Vegetative Growth Type _____ <input type="checkbox"/> No evidence of excessive growth <input type="checkbox"/> Vegetation in channels does not obstruct flow <input type="checkbox"/> Location shown on site map Areal extent _____ Remarks _____ _____ | |

Five-Year Review Site Inspection Checklist (Continued)

| | | | |
|--|--|---|---|
| D. Cover Penetrations <input type="checkbox"/> Applicable <input type="checkbox"/> N/A | | | |
| 1. Gas Vents <input type="checkbox"/> Active <input type="checkbox"/> Passive | | | |
| <input type="checkbox"/> Properly secured/locked | <input type="checkbox"/> Functioning | <input type="checkbox"/> Routinely sampled | <input type="checkbox"/> Good condition |
| <input type="checkbox"/> Evidence of leakage at penetration | <input type="checkbox"/> Needs Maintenance | <input type="checkbox"/> N/A | |
| Remarks _____ | | | |
| | | | |
| 2. Gas Monitoring Probes | | | |
| <input type="checkbox"/> Properly secured/locked | <input type="checkbox"/> Functioning | <input type="checkbox"/> Routinely sampled | <input type="checkbox"/> Good condition |
| <input type="checkbox"/> Evidence of leakage at penetration | <input type="checkbox"/> Needs Maintenance | <input type="checkbox"/> N/A | |
| Remarks _____ | | | |
| | | | |
| 3. Monitoring Wells | | | |
| <input type="checkbox"/> Properly secured/locked | <input type="checkbox"/> Functioning | <input type="checkbox"/> Routinely sampled | <input type="checkbox"/> Good condition |
| <input type="checkbox"/> Evidence of leakage at penetration | <input type="checkbox"/> Needs Maintenance | <input type="checkbox"/> N/A | |
| Remarks _____ | | | |
| | | | |
| 4. Leachate Extraction Wells | | | |
| <input type="checkbox"/> Properly secured/locked | <input type="checkbox"/> Functioning | <input type="checkbox"/> Routinely sampled | <input type="checkbox"/> Good condition |
| <input type="checkbox"/> Evidence of leakage at penetration | <input type="checkbox"/> Needs Maintenance | <input type="checkbox"/> N/A | |
| Remarks _____ | | | |
| | | | |
| 5. Settlement Monuments <input type="checkbox"/> Located <input type="checkbox"/> Routinely surveyed <input type="checkbox"/> N/A | | | |
| Remarks _____ | | | |
| | | | |
| E. Gas Collection and Treatment <input type="checkbox"/> Applicable <input type="checkbox"/> N/A | | | |
| 1. Gas Treatment Facilities | | | |
| <input type="checkbox"/> Flaring | <input type="checkbox"/> Thermal destruction | <input type="checkbox"/> Collection for reuse | |
| <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance | | |
| Remarks _____ | | | |
| | | | |
| 2. Gas Collection Wells, Manifolds and Piping | | | |
| <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance | | |
| Remarks _____ | | | |
| | | | |

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| | | | |
|---|--|---|--|
| 3. Gas Monitoring Facilities (e.g., gas monitoring of adjacent homes or buildings) | | | |
| <input type="checkbox"/> Good condition | | <input type="checkbox"/> Needs Maintenance | |
| | | <input type="checkbox"/> N/A | |
| Remarks _____ _____ | | | |
| F. Cover Drainage Layer | | | |
| | | <input type="checkbox"/> Applicable | <input type="checkbox"/> N/A |
| 1. Outlet Pipes Inspected | | | |
| | | <input type="checkbox"/> Functioning | <input type="checkbox"/> N/A |
| Remarks _____ _____ | | | |
| 2. Outlet Rock Inspected | | | |
| | | <input type="checkbox"/> Functioning | <input type="checkbox"/> N/A |
| Remarks _____ _____ | | | |
| G. Detention/sedimentation Ponds | | | |
| | | <input type="checkbox"/> Applicable | <input type="checkbox"/> N/A |
| 1. Siltation | | | |
| Areal extent _____ | | Depth _____ | |
| | | <input type="checkbox"/> N/A | |
| <input type="checkbox"/> Siltation not evident | | | |
| Remarks _____ _____ | | | |
| 2. Erosion | | | |
| Areal extent _____ | | Depth _____ | |
| | | <input type="checkbox"/> N/A | |
| <input type="checkbox"/> Erosion not evident | | | |
| Remarks _____ _____ | | | |
| 3. Outlet Works | | | |
| | | <input type="checkbox"/> Functioning | <input type="checkbox"/> N/A |
| Remarks _____ _____ | | | |
| 4. Dam | | | |
| | | <input type="checkbox"/> Functioning | <input type="checkbox"/> N/A |
| Remarks _____ _____ | | | |
| H. Retaining Walls | | | |
| | | <input type="checkbox"/> Applicable | <input type="checkbox"/> N/A |
| 1. Deformations | | | |
| | | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> Deformation not evident |
| Horizontal displacement _____ | | Vertical displacement _____ | |
| Rotational displacement _____ | | | |
| Remarks _____ _____ | | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | |
|--|---|--|
| 2. Degradation | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> Deformation not evident |
| Remarks _____ | | |
| | | |
| 1. Perimeter Ditches/Off-Site Discharge | <input type="checkbox"/> Applicable | <input type="checkbox"/> N/A |
| 1. Siltation | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> Siltation not evident |
| Areal extent _____ | Depth _____ | |
| Remarks _____ | | |
| | | |
| 2. Vegetative Growth | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> Siltation not evident |
| <input type="checkbox"/> Vegetation does not impede flow | | |
| Areal extent _____ | Type _____ | |
| Remarks _____ | | |
| | | |
| 3. Erosion | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> Erosion not evident |
| Areal extent _____ | Depth _____ | |
| Remarks _____ | | |
| | | |
| 4. Discharge Structure | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> N/A |
| Remarks _____ | | |
| | | |
| VIII. VERTICAL BARRIER WALLS <input type="checkbox"/> Applicable x N/A | | |
| 1. Settlement | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> Settlement not evident |
| Areal extent _____ | Depth _____ | |
| Remarks _____ | | |
| | | |
| 2. Performance Monitoring | Type of Monitoring _____ | <input type="checkbox"/> Performance not monitored |
| Frequency _____ | <input type="checkbox"/> Evidence of breaching | Head differential _____ |
| Remarks _____ | | |
| | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | | |
|---|--|-------------------------------------|---|
| IX. GROUNDWATER/SURFACE WATER REMEDIES | | <input type="checkbox"/> Applicable | <input checked="" type="checkbox"/> N/A |
| A. Groundwater Extraction Wells, Pumps, and Pipelines | | <input type="checkbox"/> Applicable | <input type="checkbox"/> N/A |
| 1. Pumps, Wellhead Plumbing, and Electrical <input type="checkbox"/> Good condition <input type="checkbox"/> All required wells located <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A Remarks _____ _____ | | | |
| 2. Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____ _____ | | | |
| 3. Spare Parts and Equipment <input type="checkbox"/> Readily available <input type="checkbox"/> Good condition <input type="checkbox"/> Requires upgrade <input type="checkbox"/> Needs to be provided Remarks _____ _____ | | | |
| B. Surface Water Collection Structures, Pumps, and Pipelines | | <input type="checkbox"/> Applicable | <input type="checkbox"/> N/A |
| 1. Collection Structures, Pumps, and Electrical <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____ _____ | | | |
| 2. Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____ _____ | | | |
| 3. Spare Parts and Equipment <input type="checkbox"/> Readily available <input type="checkbox"/> Good condition <input type="checkbox"/> Requires upgrade <input type="checkbox"/> Needs to be provided Remarks _____ _____ | | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | |
|---|--|---|
| C. Treatment System | <input type="checkbox"/> Applicable | <input type="checkbox"/> N/A |
| 1. Treatment Train (Check components that apply) | | |
| <input type="checkbox"/> Metals removal | <input type="checkbox"/> Oil/water separation | <input type="checkbox"/> Bioremediation |
| <input type="checkbox"/> Air stripping | <input type="checkbox"/> Carbon adsorbers | |
| <input type="checkbox"/> Filters _____ | | |
| <input type="checkbox"/> Additive (e.g., chelation agent, flocculent) _____ | | |
| <input type="checkbox"/> Others _____ | | |
| <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance | |
| <input type="checkbox"/> Sampling ports properly marked and functional | | |
| <input type="checkbox"/> Sampling/maintenance log displayed and up to date | | |
| <input type="checkbox"/> Equipment properly identified | | |
| <input type="checkbox"/> Quantity of groundwater treated annually _____ | | |
| <input type="checkbox"/> Quantity of surface water treated annually _____ | | |
| Remarks _____ | | |
| _____ | | |
| 2. Electrical Enclosures and Panels (properly rated and functional) | | |
| <input type="checkbox"/> N/A | <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance |
| Remarks _____ | | |
| _____ | | |
| 3. Tanks, Vaults, Storage Vessels | | |
| <input type="checkbox"/> N/A | <input type="checkbox"/> Good condition | <input type="checkbox"/> Proper secondary containment |
| <input type="checkbox"/> Needs Maintenance | | |
| Remarks _____ | | |
| _____ | | |
| 4. Discharge Structure and Appurtenances | | |
| <input type="checkbox"/> N/A | <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance |
| Remarks _____ | | |
| _____ | | |
| 5. Treatment Building(s) | | |
| <input type="checkbox"/> N/A | <input type="checkbox"/> Good condition (esp. roof and doorways) | <input type="checkbox"/> Needs repair |
| <input type="checkbox"/> Chemicals and equipment properly stored | | |
| Remarks _____ | | |
| _____ | | |

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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 remedy for this OU is institutional controls with a no action for groundwater.

As part of the Land Use Controls (institutional controls), signs were posted at the L BPOP. This remedy is functioning as intended and the inspection verified the accuracy and legibility of identification signs, visible subsidence or erosion of the waste unit, proper vegetative growth, mowing, etc. All other routine maintenance activities and corrective actions have been implemented and documented.

Five-Year Review Site Inspection Checklist (Continued)

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.

Implementation of the Institutional Controls alternative required both short- and long-term actions, which are protective of human health and the environment. For the short-term signs were posted at the Waste Unit, which indicate that this area was used for the disposal of waste material and contains buried waste. In addition, existing SRS access controls are used to maintain this site for industrial use only.

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.

N/A

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ATTACHMENT 3**Five-Year Review Site Inspection Checklists for P BPOP**

| I. SITE INFORMATION | | | |
|--|---|-----------------------------|------------------------------|
| Site Name: | P-Area Bingham Pump Outage Pit | Date of Inspection: | 9/24/2007 |
| Location and Region: | Savannah River Site, USEPA IV | EPA ID: | SC1890008989 |
| Agency, office, or company leading the five-year review: | United States Department of Energy | CERCLIS OU No.: | 39 |
| | | Weather/Temperature: | clear and sunny, 90°F |
| Remedy Includes: (Check all that apply) <div style="display: flex; flex-wrap: wrap;"> <div style="width: 50%;"> <input type="checkbox"/> Landfill cover/containment <input type="checkbox"/> Access controls <input checked="" type="checkbox"/> Institutional Controls <input type="checkbox"/> Groundwater pump and treatment <input type="checkbox"/> Surface water collection and treatment <input type="checkbox"/> Other: In Situ Stabilization </div> <div style="width: 50%;"> <input type="checkbox"/> Monitored Natural Attenuation <input type="checkbox"/> Groundwater Containment <input type="checkbox"/> Vertical Barrier Walls </div> </div> | | | |
| Attachments: <input type="checkbox"/> Inspection team roster attached <input type="checkbox"/> Site map attached | | | |
| II. INTERVIEWS (Check all that apply) | | | |
| 1. O & M site manager <div style="display: flex; justify-content: space-between; margin-top: 5px;"> <div style="width: 30%;">(Name) _____</div> <div style="width: 30%;">(Title) _____</div> <div style="width: 30%;">(Date) _____</div> </div> <div style="margin-top: 10px;"> Interviewed: <input type="checkbox"/> at site <input type="checkbox"/> at office <input type="checkbox"/> by phone Phone No. _____ </div> <div style="margin-top: 5px;"> Problems, suggestions: <input type="checkbox"/> report attached _____ </div> | | | |
| 2. O & M staff <div style="display: flex; justify-content: space-between; margin-top: 5px;"> <div style="width: 30%;">(Name) _____</div> <div style="width: 30%;">(Title) _____</div> <div style="width: 30%;">(Date) _____</div> </div> <div style="margin-top: 10px;"> Interviewed: <input type="checkbox"/> at site <input type="checkbox"/> at office <input type="checkbox"/> by phone Phone No. _____ </div> <div style="margin-top: 5px;"> Problems, suggestions: <input type="checkbox"/> report attached _____ </div> | | | |

Five-Year Review Site Inspection Checklist (Continued)

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

| | | | |
|---|--|-------------------------------------|------------------------------|
| <input type="checkbox"/> O & M Manual | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |
| x As-built drawings | x Readily available | x Up to date | <input type="checkbox"/> N/A |
| <input type="checkbox"/> Maintenance Logs | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |

Remarks: See Waste Unit Inspection and Maintenance report, ER-SOP-019

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| | | | |
|--|--|-------------------------------------|-------|
| 2. Site-Specific Health and Safety Plan | | | |
| <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A | |
| <input type="checkbox"/> Contingency plan/emergency response plan | | | |
| <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A | |
| Remarks: <u>See Waste Unit Inspection and Maintenance report, ER-SOP-019</u> | | | |
| <hr/> | | | |
| 3. O & M and OSHA Training Records | | | |
| x Readily available | x Up to date | <input type="checkbox"/> N/A | |
| Remarks: _____ | | | |
| <hr/> | | | |
| 5. Permits and Service Agreements | | | |
| <input type="checkbox"/> Air discharge permit | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |
| <input type="checkbox"/> Effluent discharge | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |
| <input type="checkbox"/> Waste Disposal, POTW | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |
| <input type="checkbox"/> Other permits | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |
| Remarks: _____ | | | |
| <hr/> | | | |
| 5. Gas Generation Records | | | |
| <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A | |
| Remarks: _____ | | | |
| <hr/> | | | |
| 6. Settlement Monument Records | | | |
| <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A | |
| Remarks: _____ | | | |
| <hr/> | | | |
| 7. Groundwater Monitoring Records | | | |
| <input type="checkbox"/> Readily available | € Up to date | x N/A | |
| Remarks: _____ | | | |
| <hr/> | | | |
| 8. Leachate Extraction Records | | | |
| <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A | |
| Remarks: _____ | | | |
| <hr/> | | | |
| 9. Discharge Compliance Records | | | |
| <input type="checkbox"/> Air | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |
| <input type="checkbox"/> Water (effluent) | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |
| Remarks: _____ | | | |
| <hr/> | | | |
| 10. Daily Access/Security Logs | | | |
| x Readily available | <input type="checkbox"/> Up to date | <input type="checkbox"/> N/A | |
| Remarks: _____ | | | |
| <hr/> | | | |

Five-Year Review Site Inspection Checklist (Continued)

| IV. O & M Costs | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|----------|------------|---|------------|----------|--|---|--------|--------|------------|--|------------|----------|--|---|--------|--------|------------|--|------------|----------|--|---|--------|--------|------------|--|------------|----------|--|---|--------|--------|------------|--|------------|----------|--|---|--------|--------|------------|--|
| 3. O & M Organization <div style="display: flex; justify-content: space-between; margin-top: 10px;"><div><input type="checkbox"/> State in-house</div><div><input type="checkbox"/> Contractor for State</div></div> <div style="display: flex; justify-content: space-between; margin-top: 10px;"><div><input type="checkbox"/> PRP in-house</div><div><input type="checkbox"/> Contractor for PRP</div></div> <div style="margin-top: 10px;"><input checked="" type="checkbox"/> Other <u>SRS</u></div> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4. O & M Cost Records <div style="margin-top: 10px;"><input type="checkbox"/> Readily available <input type="checkbox"/> Up to date <input type="checkbox"/> Funding mechanism/agreement in place</div> <div style="margin-top: 10px;"><input type="checkbox"/> Other: <u>Project cost data is summarized in Section X of attached report, WSRC-RP-2007-4063</u></div> <div style="margin-top: 20px; text-align: center;">Total annual cost by year for review period if available</div> <table style="width: 100%; border-collapse: collapse;"><tbody><tr><td style="width: 20%;">From _____</td><td style="width: 20%;">To _____</td><td style="width: 40%;"></td><td style="width: 20%; text-align: right;"><input type="checkbox"/> Breakdown attached</td></tr><tr><td style="text-align: center;">(Date)</td><td style="text-align: center;">(Date)</td><td style="text-align: center;">Total cost</td><td></td></tr><tr><td>From _____</td><td>To _____</td><td></td><td style="text-align: right;"><input type="checkbox"/> Breakdown attached</td></tr><tr><td style="text-align: center;">(Date)</td><td style="text-align: center;">(Date)</td><td style="text-align: center;">Total cost</td><td></td></tr><tr><td>From _____</td><td>To _____</td><td></td><td style="text-align: right;"><input type="checkbox"/> Breakdown attached</td></tr><tr><td style="text-align: center;">(Date)</td><td style="text-align: center;">(Date)</td><td style="text-align: center;">Total cost</td><td></td></tr><tr><td>From _____</td><td>To _____</td><td></td><td style="text-align: right;"><input type="checkbox"/> Breakdown attached</td></tr><tr><td style="text-align: center;">(Date)</td><td style="text-align: center;">(Date)</td><td style="text-align: center;">Total cost</td><td></td></tr><tr><td>From _____</td><td>To _____</td><td></td><td style="text-align: right;"><input type="checkbox"/> Breakdown attached</td></tr><tr><td style="text-align: center;">(Date)</td><td style="text-align: center;">(Date)</td><td style="text-align: center;">Total cost</td><td></td></tr></tbody></table> | | | | From _____ | To _____ | | <input type="checkbox"/> Breakdown attached | (Date) | (Date) | Total cost | | From _____ | To _____ | | <input type="checkbox"/> Breakdown attached | (Date) | (Date) | Total cost | | From _____ | To _____ | | <input type="checkbox"/> Breakdown attached | (Date) | (Date) | Total cost | | From _____ | To _____ | | <input type="checkbox"/> Breakdown attached | (Date) | (Date) | Total cost | | From _____ | To _____ | | <input type="checkbox"/> Breakdown attached | (Date) | (Date) | Total cost | |
| From _____ | To _____ | | <input type="checkbox"/> Breakdown attached | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| (Date) | (Date) | Total cost | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| From _____ | To _____ | | <input type="checkbox"/> Breakdown attached | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| (Date) | (Date) | Total cost | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| From _____ | To _____ | | <input type="checkbox"/> Breakdown attached | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| (Date) | (Date) | Total cost | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| From _____ | To _____ | | <input type="checkbox"/> Breakdown attached | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| (Date) | (Date) | Total cost | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| From _____ | To _____ | | <input type="checkbox"/> Breakdown attached | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| (Date) | (Date) | Total cost | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4. Unanticipated or Unusually High O & M Costs During Review Period Describe costs and reasons: _____ _____ _____ _____ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| V. ACCESS AND INSTITUTIONAL CONTROLS <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| A. Fencing | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1. Fencing Damaged <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Gates secured <input checked="" type="checkbox"/> N/A Remarks _____ _____ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

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| | | | | |
|---|--|--|--|---|
| B. Other Access Restrictions | | | | |
| 1. Signs and other security measures <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> N/A | | | | |
| Remarks: <u>Signs at this unit are in good condition</u> | | | | |
| C. Institutional Controls | | | | |
| 3. Implementation and enforcement | | | | |
| Site conditions imply ICs not properly implemented: | | | <input type="checkbox"/> Yes | <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A |
| Site conditions imply ICs not being fully enforced: | | | <input type="checkbox"/> Yes | <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A |
| Type of monitoring (e.g., self-reporting, drive-by): | | | Field Walk Down | |
| Frequency: Semi-Annually | | | | |
| Responsible party/agent: DOE Savannah River Field Office | | | | |
| Contact: G. R. Hannah | | | Waste Area Group Manager | 09/3/07 (803) 952-7873 |
| (Name) | | | (Title) | (Date) (Phone No.) |
| Reporting is up-to-date: | | | <input checked="" type="checkbox"/> Yes | <input type="checkbox"/> No <input type="checkbox"/> N/A |
| Reports are verified by the lead agency: | | | <input checked="" type="checkbox"/> Yes | <input type="checkbox"/> No <input type="checkbox"/> N/A |
| Specific requirements in deed of decision documents have been met: | | | <input type="checkbox"/> Yes | <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A |
| Violations have been reported: | | | <input type="checkbox"/> Yes | <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A |
| Other problems or suggestions: | | | <input type="checkbox"/> Report attached | |
| | | | | |
| | | | | |
| | | | | |
| 2. Adequacy <input checked="" type="checkbox"/> ICs are adequate <input type="checkbox"/> ICs are inadequate <input type="checkbox"/> N/A | | | | |
| Remarks | | | | |
| | | | | |
| D. General | | | | |
| 1. Vandalism/trespassing <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> No vandalism evident | | | | |
| Remarks | | | | |
| | | | | |
| 2. Land use changes onsite <input checked="" type="checkbox"/> N/A | | | | |
| Remarks | | | | |
| | | | | |

Five-Year Review Site Inspection Checklist (Continued)

| | |
|--|--|
| 3. Land use changes offsite <input checked="" type="checkbox"/> N/A | |
| Remarks _____ | |
| _____ | |
| VI. GENERAL SITE CONDITIONS | |
| A. Roads <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A | |
| 1. Roads damaged <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Roads adequate <input type="checkbox"/> N/A | |
| Remarks _____ | |
| _____ | |
| B. Other site Conditions | |
| Remarks _____ | |
| _____ | |
| _____ | |
| VII. SOIL COVERS <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A | |
| A. Soil Surface | |
| 1. Settlement (Low spots) <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Settlement not evident | |
| Areal extent _____ Depth _____ | |
| Remarks _____ | |
| _____ | |
| 2. Cracks <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Cracking not evident | |
| Lengths _____ Widths _____ Depths _____ | |
| Remarks _____ | |
| _____ | |
| 3. Erosion <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Erosion not evident | |
| Areal extent _____ Depth _____ | |
| Remarks _____ | |
| _____ | |
| 4. Holes <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Holes not evident | |
| Areal extent _____ Depth _____ | |
| Remarks _____ | |
| _____ | |
| 5. Vegetative Cover <input type="checkbox"/> Grass <input type="checkbox"/> Cover properly established <input type="checkbox"/> No signs of stress | |
| <input type="checkbox"/> Trees/shrubs (indicate size and location on a diagram) | |
| Remarks _____ | |
| _____ | |

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| | | | |
|--|---|------------------------------|------------------------|
| 6. | Alternative Cover (armored rock, concrete, etc.) | <input type="checkbox"/> N/A | Remarks _____ _____ |
| 7. | Bulges <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Bulges not evident Areal extent _____ Height _____ Remarks _____ _____ | | |
| 8. | Wet Areas/Water Damage <input type="checkbox"/> Wet areas/water damage not evident <input type="checkbox"/> Wet Areas <input type="checkbox"/> Location shown on site map Areal extent _____ <input type="checkbox"/> Ponding <input type="checkbox"/> Location shown on site map Areal extent _____ <input type="checkbox"/> Seeps <input type="checkbox"/> Location shown on site map Areal extent _____ <input type="checkbox"/> Soft subgrade <input type="checkbox"/> Location shown on site map Areal extent _____ Remarks _____ _____ | | |
| 9. | Slope Instability <input type="checkbox"/> Slides <input type="checkbox"/> Location shown on site map <input type="checkbox"/> No evidence of slope instability Areal extent _____ Remarks _____ _____ | | |
| B. Benches <input type="checkbox"/> Applicable <input type="checkbox"/> 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 <input type="checkbox"/> Location shown on site map <input type="checkbox"/> N/A or okay Remarks _____ _____ | | |
| 2. | Bench Breached <input type="checkbox"/> Location shown on site map <input type="checkbox"/> N/A or okay Remarks _____ _____ | | |
| 3. | Bench Overtopped <input type="checkbox"/> Location shown on site map <input type="checkbox"/> N/A or okay Remarks _____ _____ | | |

Five-Year Review Site Inspection Checklist (Continued)

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 _____

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| | | | |
|---|--|--|--|
| D. Cover Penetrations <input type="checkbox"/> Applicable <input type="checkbox"/> N/A | | | |
| 1. Gas Vents <input type="checkbox"/> Active <input type="checkbox"/> Passive <input type="checkbox"/> Properly secured/locked <input type="checkbox"/> Functioning <input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition <input type="checkbox"/> Evidence of leakage at penetration <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A Remarks _____ _____ | | | |
| 2. Gas Monitoring Probes <input type="checkbox"/> Properly secured/locked <input type="checkbox"/> Functioning <input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition <input type="checkbox"/> Evidence of leakage at penetration <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A Remarks _____ _____ | | | |
| 3. Monitoring Wells <input type="checkbox"/> Properly secured/locked <input type="checkbox"/> Functioning <input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition <input type="checkbox"/> Evidence of leakage at penetration <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A Remarks _____ _____ | | | |
| 4. Leachate Extraction Wells <input type="checkbox"/> Properly secured/locked <input type="checkbox"/> Functioning <input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition <input type="checkbox"/> Evidence of leakage at penetration <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A Remarks _____ _____ | | | |
| 5. Settlement Monuments <input type="checkbox"/> Located <input type="checkbox"/> Routinely surveyed <input type="checkbox"/> N/A Remarks _____ _____ | | | |
| E. Gas Collection and Treatment <input type="checkbox"/> Applicable <input type="checkbox"/> N/A | | | |
| 1. Gas Treatment Facilities <input type="checkbox"/> Flaring <input type="checkbox"/> Thermal destruction <input type="checkbox"/> Collection for reuse <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____ _____ | | | |
| 2. Gas Collection Wells, Manifolds and Piping <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____ _____ | | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | | |
|--|--|--|--|
| 3. Gas Monitoring Facilities (e.g., gas monitoring of adjacent homes or buildings) <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A Remarks _____ _____ | | | |
| F. Cover Drainage Layer <input type="checkbox"/> Applicable <input type="checkbox"/> N/A | | | |
| 1. Outlet Pipes Inspected <input type="checkbox"/> Functioning <input type="checkbox"/> N/A Remarks _____ _____ | | | |
| 2. Outlet Rock Inspected <input type="checkbox"/> Functioning <input type="checkbox"/> N/A Remarks _____ _____ | | | |
| G. Detention/sedimentation Ponds <input type="checkbox"/> Applicable <input type="checkbox"/> N/A | | | |
| 1. Siltation Areal extent _____ Depth _____ <input type="checkbox"/> N/A <input type="checkbox"/> Siltation not evident Remarks _____ _____ | | | |
| 2. Erosion Areal extent _____ Depth _____ <input type="checkbox"/> N/A <input type="checkbox"/> Erosion not evident Remarks _____ _____ | | | |
| 3. Outlet Works <input type="checkbox"/> Functioning <input type="checkbox"/> N/A Remarks _____ _____ | | | |
| 4. Dam <input type="checkbox"/> Functioning <input type="checkbox"/> N/A Remarks _____ _____ | | | |
| H. Retaining Walls <input type="checkbox"/> Applicable <input type="checkbox"/> N/A | | | |
| 1. Deformations <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Deformation not evident Horizontal displacement _____ Vertical displacement _____ Rotational displacement _____ Remarks _____ _____ | | | |

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| | | |
|---|---|--|
| 2. Degradation | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> Deformation not evident |
| Remarks _____ | | |
| I. Perimeter Ditches/Off-Site Discharge | | |
| | <input type="checkbox"/> Applicable | <input type="checkbox"/> N/A |
| 5. Siltation | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> Siltation not evident |
| Areal extent _____ Depth _____ | | |
| Remarks _____ | | |
| 6. Vegetative Growth | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> Siltation not evident |
| <input type="checkbox"/> Vegetation does not impede flow | | |
| Areal extent _____ Type _____ | | |
| Remarks _____ | | |
| 7. Erosion | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> Erosion not evident |
| Areal extent _____ Depth _____ | | |
| Remarks _____ | | |
| 8. Discharge Structure | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> N/A |
| Remarks _____ | | |
| VIII. VERTICAL BARRIER WALLS | | |
| | <input type="checkbox"/> Applicable | <input checked="" type="checkbox"/> N/A |
| 1. Settlement | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> Settlement not evident |
| Areal extent _____ Depth _____ | | |
| Remarks _____ | | |
| 4. Performance Monitoring | Type of Monitoring _____ <input type="checkbox"/> Performance not monitored | |
| Frequency _____ <input type="checkbox"/> Evidence of breaching Head differential _____ | | |
| Remarks _____ | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | | | | |
|---|--|---|--|--|---|
| IX. GROUNDWATER/SURFACE WATER REMEDIES | | | | <input type="checkbox"/> Applicable | <input checked="" type="checkbox"/> N/A |
| A. Groundwater Extraction Wells, Pumps, and Pipelines | | | | <input type="checkbox"/> Applicable | <input type="checkbox"/> N/A |
| 1. Pumps, Wellhead Plumbing, and Electrical | | | | | |
| <input type="checkbox"/> Good condition | | <input type="checkbox"/> All required wells located | | <input type="checkbox"/> Needs Maintenance | |
| <input type="checkbox"/> N/A | | | | | |
| Remarks _____ | | | | | |
| _____ | | | | | |
| 2. Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances | | | | | |
| <input type="checkbox"/> Good condition | | <input type="checkbox"/> Needs Maintenance | | | |
| Remarks _____ | | | | | |
| _____ | | | | | |
| 3. Spare Parts and Equipment | | | | | |
| <input type="checkbox"/> Readily available | | <input type="checkbox"/> Good condition | | <input type="checkbox"/> Requires upgrade | |
| <input type="checkbox"/> Needs to be provided | | | | | |
| Remarks _____ | | | | | |
| _____ | | | | | |
| B. Surface Water Collection Structures, Pumps, and Pipelines | | | | <input type="checkbox"/> Applicable | <input type="checkbox"/> N/A |
| 1. Collection Structures, Pumps, and Electrical | | | | | |
| <input type="checkbox"/> Good condition | | <input type="checkbox"/> Needs Maintenance | | | |
| Remarks _____ | | | | | |
| _____ | | | | | |
| 2. Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances | | | | | |
| <input type="checkbox"/> Good condition | | <input type="checkbox"/> Needs Maintenance | | | |
| Remarks _____ | | | | | |
| _____ | | | | | |
| 3. Spare Parts and Equipment | | | | | |
| <input type="checkbox"/> Readily available | | <input type="checkbox"/> Good condition | | <input type="checkbox"/> Requires upgrade | |
| <input type="checkbox"/> Needs to be provided | | | | | |
| Remarks _____ | | | | | |
| _____ | | | | | |

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| | | |
|---|-------------------------------------|------------------------------|
| C. Treatment System | <input type="checkbox"/> Applicable | <input type="checkbox"/> N/A |
| 1. Treatment Train (Check components that apply) | | |
| <input type="checkbox"/> Metals removal <input type="checkbox"/> Oil/water separation <input type="checkbox"/> Bioremediation | | |
| <input type="checkbox"/> Air stripping <input type="checkbox"/> Carbon adsorbers | | |
| <input type="checkbox"/> Filters _____ | | |
| <input type="checkbox"/> Additive (e.g., chelation agent, flocculent) _____ | | |
| <input type="checkbox"/> Others _____ | | |
| <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance | | |
| <input type="checkbox"/> Sampling ports properly marked and functional | | |
| <input type="checkbox"/> Sampling/maintenance log displayed and up to date | | |
| <input type="checkbox"/> Equipment properly identified | | |
| <input type="checkbox"/> Quantity of groundwater treated annually _____ | | |
| <input type="checkbox"/> Quantity of surface water treated annually _____ | | |
| Remarks _____ | | |
| 2. Electrical Enclosures and Panels (properly rated and functional) | | |
| <input type="checkbox"/> N/A <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance | | |
| Remarks _____ | | |
| 3. Tanks, Vaults, Storage Vessels | | |
| <input type="checkbox"/> N/A <input type="checkbox"/> Good condition <input type="checkbox"/> Proper secondary containment <input type="checkbox"/> Needs Maintenance | | |
| Remarks _____ | | |
| 4. Discharge Structure and Appurtenances | | |
| <input type="checkbox"/> N/A <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance | | |
| Remarks _____ | | |
| 5. Treatment Building(s) | | |
| <input type="checkbox"/> N/A <input type="checkbox"/> Good condition (esp. roof and doorways) <input type="checkbox"/> Needs repair | | |
| <input type="checkbox"/> Chemicals and equipment properly stored | | |
| Remarks _____ | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | | |
|---|--|---|---|
| 6. Monitoring Wells | | | |
| <input type="checkbox"/> Properly secured/locked | <input type="checkbox"/> Functioning | <input type="checkbox"/> Routinely sampled | <input type="checkbox"/> Good condition |
| <input type="checkbox"/> All required wells located | <input type="checkbox"/> Needs Maintenance | <input type="checkbox"/> N/A | |
| Remarks _____ | | | |
| D. Monitoring Data <input type="checkbox"/> Applicable <input type="checkbox"/> N/A | | | |
| 1. Monitoring Data | | | |
| <input type="checkbox"/> Is routinely submitted on time | | <input type="checkbox"/> Is of acceptable quality | |
| 2 Monitoring data suggests: | | | |
| <input type="checkbox"/> Groundwater plume is effectively contained | | <input type="checkbox"/> Contaminant concentrations are declining | |
| E. Monitored Natural Attenuation <input type="checkbox"/> Applicable <input type="checkbox"/> N/A | | | |
| 1. Monitoring Wells (Natural attenuation remedy) | | | |
| <input type="checkbox"/> Properly secured/locked | <input type="checkbox"/> Functioning | <input type="checkbox"/> Routinely sampled | <input type="checkbox"/> Good condition |
| <input type="checkbox"/> All required wells located | <input type="checkbox"/> Needs Maintenance | <input type="checkbox"/> 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 institutional controls with a no action for groundwater. | | | |
| As part of the Land Use Controls (institutional controls), signs were posted at the P BPOP. This remedy is functioning as intended and the inspection verified the accuracy and legibility of identification signs, visible subsidence or erosion of the waste unit, proper vegetative growth, mowing, etc. All other routine maintenance activities and corrective actions have been implemented and documented. | | | |

Five-Year Review Site Inspection Checklist (Continued)**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.

Implementation of the Institutional Controls alternative required both short- and long-term actions, which are protective of human health and the environment. For the short-term signs were posted at the Waste Unit, which indicate that this area was used for the disposal of waste material and contains buried waste. In addition, existing SRS access controls are used to maintain this site for industrial use only.

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.

N/A

L-AREA BURNING/ RUBBLE PIT (131-L), GAS CYLINDER DISPOSAL FACILITY (131-2L), AND L-AREA RUBBLE PILE (131-3L) OPERABLE UNIT

I. Introduction

This is the first five-year review for the L-Area Burning/ Rubble Pit (131-L), Gas Cylinder Disposal Facility (131-2L), and L-Area Rubble Pile (131-3L) (LBRP/GCDF/LRP) Operable Unit (OU). This review was conducted from August 2007 through September 2007. This report documents the results of the review.

II. OU Chronology

Table 1 lists the chronology of site events for the LBRP, GCDF, and LRP OU.

Table 1. Chronology of OU Events

| Event | Date |
|-----------------------------------|------------------|
| RFI/RI Field Start | October 31, 1997 |
| Record of Decision (ROD) issuance | January 15, 2002 |
| Remedial Action start | April 15, 2003 |
| Remedial Action complete | March 6, 2004 |
| Previous Five-Year Review | None |

III. Background

Physical Characteristics

The LBRP, GCDF, and LRP OU consists of five subunits: (1) LBRP, a single burning/rubble pit; (2) GCDF, an area where gas cylinders were placed and vented; (3) LRP, an area of rubble piles; (4) LRP Ditch, a natural drainage ditch north of the rubble piles; and (5) groundwater. The OU is located in the interior of Savannah River Site (SRS) approximately 6 miles from the nearest SRS boundary (Figure 1). The LBRP, GCDF, and LRP OU are located close to the industrially developed area of L-Reactor Area, one of several inactive nuclear reactor areas at SRS. LBRP and GCDF are approximately 1,320 ft northwest of L-Reactor Area (Figure 1); LRP is located approximately 1,700 ft northwest of the L-Area perimeter fence. The ground surface at LBRP and GCDF is nearly level. At LRP, the topography slopes gently (3 percent grade) to the north-northwest toward LRP Ditch, which is approximately 5 ft wide and 3 ft deep.

The OU has been assessed through characterization and a series of documents written by United States Department of Energy (USDOE) and approved by the regulatory agencies (South Carolina Department of Health and Environmental Control [SCDHEC] and United States Environmental Protection Agency [USEPA]). These documents include a Work Plan (WSRC 1997), Resource Conservation Recovery Act (RCRA) Facility Investigation (RFI)/Remedial Investigation (RI) report with Baseline Risk Assessment (BRA) (WSRC 2000), and a Statement of Basis/Proposed Plan (SB/PP) (WSRC 2001). A Corrective Measures Study/Feasibility Study (CMS/FS) was not prepared because USDOE, SCDHEC, and USEPA agreed that the problem warranting action and the scope of the problem at each subunit was well-defined and that the list of likely response actions was short enough to proceed directly from the RFI/RI/BRA to the SB/PP. The types of assessments typically done in a CMS/FS were included in Appendix A of the SB/PP.

Land and Resource Use

The LBRP, GCDF and LRP OU is located in an industrial area.

History of Contamination

LBRP

LBRP is a 230 ft x 29 ft x 10 ft burial trench that was used from 1951 to 1973 for periodic burning of combustible wastes. Information obtained from historical records and from characterization of similar burning/rubble pits at SRS indicates that materials such as wood, cardboard, paper, plastics, rubber, rags, waste oils, degreasers, and organic liquids of unknown use and origin were disposed in the pit and burned on a monthly basis. Waste burning was discontinued in 1973, and a soil layer was placed over the pit contents. The pit continued to receive non-salvageable wastes such as lumber, wood, concrete, scrap metal, cable, electrical wiring, zinc-mercury and lead-acid batteries, non-returnable empty drums, wallboard, brick, asphalt, tile, cans and bottles, rubber and plastic items, a transformer that did not contain polychlorinated biphenyls (PCBs), and

other debris. Historical records indicate that LBRP was the only rubble pit at SRS to receive batteries. When the pit reached capacity in 1978, it was filled to grade with clean soil. In April 1998, exploratory trenching identified numerous zinc-mercury and lead-acid batteries and other debris in the northwest end of the pit.

A time-critical removal action at LBRP was implemented in 1998 with the primary objective of removing all principal threat source materials (PTSM) from the pit. Approximately 450 zinc-mercury batteries, 870 lead-acid batteries, a non-PCB transformer, and other miscellaneous debris were removed from the northwestern half of the pit. In addition to the batteries and pit debris, 1 to 2 ft of soil was removed from the floor of the northwest end of the pit. The resulting final excavation was approximately 11 ft deep and approximately 18 ft wide at grade and 10 ft wide at the bottom. After confirmatory sampling from the base of the excavation determined that no contaminated soil that represents a future residential human health risk $> 10^{-6}$ remained, the excavation was backfilled with clean soil and returned to grade.

GCDF

GCDF is 14 ft wide by 27 ft long. GCDF was used until the mid- to late-1970s as a location for venting gas cylinders. Records indicate that 28 gas cylinders containing hazardous gases had been placed in GCDF in 1977.

In 1997, a time-critical removal action was performed at GCDF with the primary objective of removing the gas cylinders. Visual inspection revealed puncture holes in the cylinders and confirmed that the cylinders were empty and that no PTSM (e.g., hazardous gases remained inside. All of the cylinders, as well as concrete, asphalt, and approximately 1 ft of soil from the footprint of GCDF, were removed and dispositioned as non-hazardous solid waste.

Soil samples collected from the excavation footprint confirmed that there is no problem warranting further action. The excavated area was backfilled to grade with clean soil in July 1998.

LRP

LRP is approximately 500 ft long by 120 ft wide. LRP originally consisted of 15 rubble and soil piles randomly scattered throughout the area. The disposal history is largely unknown. Based on the sizes and shapes of the rubble piles, disposal practices at LRP likely consisted of dumping truckloads of waste on the land surface.

In 1997, a time-critical removal action was performed at LRP to recover assorted cans, bottles, incandescent and fluorescent lights, light ballasts, railroad ties, electrical wiring, and scrap metal. Approximately 200 yd³ of non-hazardous waste (paper, plastic, metal, wood, etc.), 1.7 yd³ of hazardous waste (miscellaneous paint), and 47 yd³ of Toxic Substances Control Act (TSCA) waste (PCB-contaminated soil) were removed, transported, and disposed of at CERCLA Off-Site-Rule-approved facilities. About 250 yd³ of soil and debris remained stockpiled at LRP. Soil sampling after the 1997 removal action indicated there is contamination in the soil at the footprints of the original piles.

LRP Ditch

LRP Ditch in the vicinity of LRP is generally dry. Approximately 650 ft downgradient of LRP, LRP Ditch intersects the water table and is a perennial stream below that point.

No waste was placed in LRP Ditch. The ditch was assessed as part of this OU because it could have received stormwater runoff from LRP and, therefore, could have been contaminated. Results demonstrate that LRP Ditch has not been impacted by the OU because no constituents warranting remedial action (refined constituents of concern [RCOCs]) were identified in the RFI/RI/BRA.

Groundwater

Groundwater was assessed because it may have been impacted by leaching from one or more of the source units (LBRP, GCDF, and/or LRP). Groundwater is contaminated by a small, diffuse plume of carbon tetrachloride and chloroform. In addition, groundwater modeling indicates that the plume will not discharge to surface water at

levels above regulatory standards in the future. The plume is moving to the west, with local groundwater flow toward Pen Branch and the LRP Ditch. The depth to groundwater is 35 ft.

IV. Remedial Actions

Remedy Selection

The LBRP, GCDF, and LRP OU contain five subunits. The RFI/RI/BRA identified contamination warranting remediation in two of these subunits, the LRP and groundwater. The selected remedy for LRP is Removal/Disposal with institutional controls contingent on confirmation sampling. The selected remedy for the groundwater subunit is Groundwater Mixing Zone with institutional controls until the maximum contaminant level (MCL) is attained. The purposes of the selected institutional controls are 1) to prevent residential use of the LRP subunit (unless cleanup is sufficient for unrestricted use) and 2) to prevent use of the groundwater subunit as a drinking water source until MCLs are attained. This investigation showed that there are no constituents at the other three subunits – LBRP, GCDF, and LRP Ditch – that pose a threat to human health or the environment warranting remediation, and that they are available for unrestricted use. Therefore no institutional controls or other remedial action is being selected for the LBRP, GCDF, and LRP Ditch subunits.

The original design was based on achieving industrial remedial goals (RGs); however, the remedial action (RA) achieved residential RGs. Due to the immobile nature of the contaminants, removal of contaminated soil/debris resulted in meeting the residential RGs. Now that the residential RGs have been achieved institutional controls are not required for the LRP; therefore, no access control warning signs were installed at this OU.

Remedy Implementation

The selected remedy for the subunits LRP and groundwater entailed the following:

- Remove the stockpiles of soil/debris and contaminated soils under the piles at LRP (approximately 750 yd³ of non-hazardous waste and 320 yd³ of suspect hazardous waste). If confirmatory sampling results indicate that contamination above anticipated (residential) remedial goals (RGs) remains after removal, implement institutional controls including long-term site maintenance and site controls (warning signs and land use restrictions).
- Treat the groundwater plume in-situ by natural processes and implement a compliance monitoring strategy.
- Implement institutional controls (environmental monitoring, site maintenance, and land use controls) as long as groundwater concentrations exceed MCLs.

Removal/disposal of contaminated soil/debris at LRP will protect future industrial workers and ecological receptors from exposure to RCOCs. This will allow future industrial land use of the site and will be protective of the environment.

Based on the confirmatory and RFI/RI/BRA characterization data, the entire waste unit has now met residential RGs. Therefore, the project team determined that the surrounding soil in the waste unit could be used as clean fill for the excavations. The waste unit was then graded and seeded in accordance with the CMI/RAIP without using off-unit fill material.

Monitoring of the groundwater plume will verify that the contaminant concentrations decrease through natural processes to levels below MCLs, consistent with cleanup objectives. This remedy was selected because existing groundwater data and modeling indicate the plume is small and diffuse and is expected to attenuate below MCLs within five years.

The groundwater mixing zone application established a monitoring well network to include plume and compliance boundary wells. The analytical monitoring program includes the monitoring network wells, constituents to be analyzed, compliance trigger levels, and sampling frequency. Figure 2 illustrates the location of all these monitoring

points. Monitoring started the first quarter of 2003 with quarterly sampling. Beginning the first quarter of 2004, samples events are semi-annual with annual monitoring reports as per Mixing Zone Application. CCL4 is the constituents of concern for this OU, however, degradation products are being monitored to watch for changes in constituent proportions, which could signal possible biological degradation products in the GMZ. Based on 2006 monitoring data, the requirements of the Mixing Zone continue to be satisfied. The CCL4 and CHCL3 contamination of shallow groundwater at LBRP remains below the MZCL (13 µg/L) at plume wells and below the MCL (5 µg/L) at compliance wells. The seepage samples from a nearby stream continue to be non-detect.

V. Progress Since Last Review

This is the first review for this OU; therefore, this section does not apply. In 2008, an agreement was reached to combine the reports for K, L, and P Burning/ Rubble Pit (BRP) OU data reports into an annual letter with a detailed groundwater report every fifth year beginning June 30, 2012.

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 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 will prevent human exposure to contaminated media.
- The assumptions used at the time of the remedy selection are still valid.

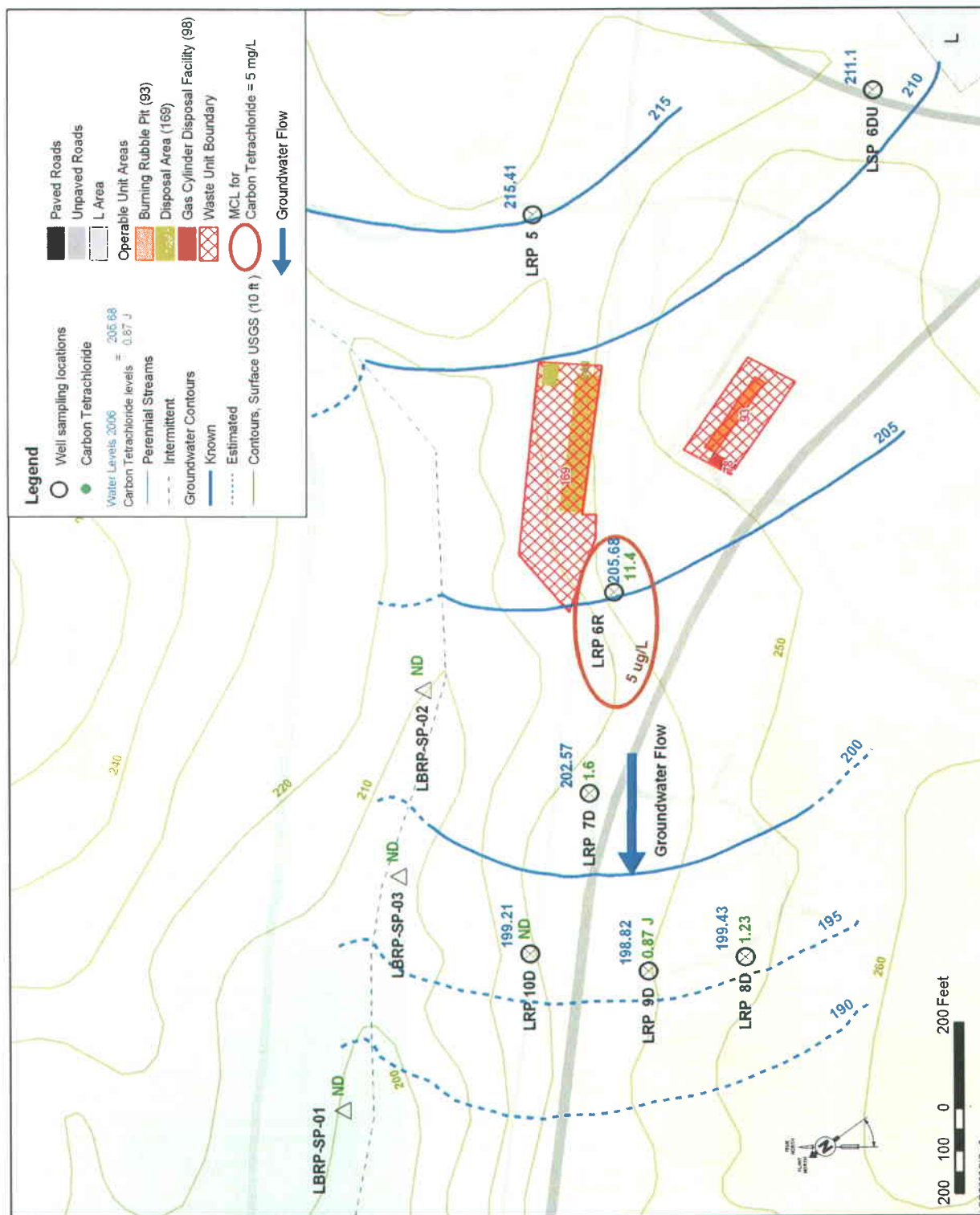


Figure 2. LBRP, GCDF, LRP, monitoring wells, plume location and Water Table Surface

- No other information has come to light that could call into question the protectiveness of the remedy.
- The Groundwater Mixing Zone remedy is designed to monitor the natural In Situ remediation process to ensure that the groundwater will not exceed MCLs at the compliance point.
- The Removal/Disposal remedy for the LRP will fully meet 40 CFR 761 (TSCA) for treatment of soils contaminated with PCBs.
- The RAOs of the LRP soil/debris remedy were established to attain the industrial RGs and protect ecological receptors. Because contamination above residential RGs is generally co-located with contamination above industrial risk-based standards, removal of soil exceeding industrial RGs resulted in the removal of soil exceeding residential RGs. Residential RGs were attained; thus, institutional controls at LRP will be required only until concentrations of CCL4 are less than the MCL.

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. Project Costs

Costs associated with the selected remedy for the LBRP, RP &GCDF OU include operation and maintenance costs of institutional controls and groundwater mixing zone monitoring. The estimated operation and maintenance cost associated with the selected remedy is \$70,000, which was discounted at 7% per year. This is a present worth cost, including 30 years of maintenance activities. After characterization and effectiveness of the remedy was evaluated, the actual operation and maintenance cost for the LBRP, RP &

GCDF was assessed. The total actual operation and maintenance cost from project support and other post construction expense to fiscal year 2006 is \$100,004.

XI. Protectiveness Statement(s)

The selected remedy of Removal/Disposal with Institutional Controls for LRP is protective of human health and the environment. This Removal/Disposal remedy would be protective because no contamination above minimum RGs would remain. The selected remedy of Groundwater Mixing Zone with Institutional Controls for the groundwater subunit is also protective of human health and the environment. The Groundwater Mixing Zone remedy is protective because monitoring would track the evolution of the plume as it attenuates. Exposure pathways that could result in unacceptable risks are controlled by the institutional controls in place while USDOE controls the OU. These controls 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).

XII. Next Review

The next five-year review is scheduled for February 12, 2014.

ATTACHMENT 1

List of Documents Reviewed

USDOE, 2008. Memo from Brian T. Hennessey to Donald Siron and Robert H. Pope, Subject: Submittal of the Proposal to Standardize Sampling and Reporting Requirements of Groundwater Data for P, L, and K Area Burning/Rubble Pit Operable Units, CERCLIS Numbers 59, 56, 40; ARF # 15055

WSRC-RP-97-100, *RFI/RI Work Plan for the L-Area Burning Rubble Pit (131-L), Gas Cylinder Disposal Facility (131-2L), and Rubble Pile (131-3L) (U)*, Revision 1.1, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

WSRC-RP-99-4154, *Groundwater Flow and Transport Modeling for the L-Area Burning/Rubble Pit (131-L), L-Area Rubble Pile (131-3L), and L-Area Gas Cylinder Disposal Facility (131-2L)*, Revision 0, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

WSRC-RP-98-4076, *RCRA Facility Investigation/ Remedial Investigation Report with Baseline Risk Assessment for the L-Area Burning Rubble Pit (131-L), Gas Cylinder Disposal Facility (131-2L), and L-Area Rubble Pile (131-3L) (U)*, Revision 1, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

WSRC-RP-98-4194, *Statement of Basis/Proposed Plan for the L-Area Burning/Rubble Pit (131-L), Gas Cylinder Disposal Facility (131-2L), and L-Area Rubble Pile (131-3L) (U)*, Rev. 1.1, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

WSRC-RP-98-4195, *Record of Decision Remedial Alternative Selection for the L-Area Burning/Rubble Pit (131-L), Gas Cylinder Disposal Facility (131-2L), and L-Area Rubble Pile (131-3L) (U)*, Revision 1.1, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

ATTACHMENT 2

Five-Year Review Site Inspection Checklist

| I. SITE INFORMATION | | | | | | | | | | | | | | | |
|---|---|------------------------------------|---|---------------------------------------|---|--|--|--|---|---|--|---|--|--|--|
| Site Name: | L-Area Burning/Rubble Pit, Gas Cylinder Disposal Facility, and L-Area Rubble Pile | Date of Inspection: | 9/10/2007 | | | | | | | | | | | | |
| Location and Region: | Savannah River Site, USEPA IV | EPA ID: | SC1890008989 | | | | | | | | | | | | |
| Agency, office, or company leading the five- year review: | United States Department of Energy | CERCLIS OU No.: | 56 | | | | | | | | | | | | |
| | | Weather/Temperature: | clear and sunny, 90°F | | | | | | | | | | | | |
| Remedy Includes: (Check all that apply) <table><tbody><tr><td><input type="checkbox"/> Cover System</td><td><input checked="" type="checkbox"/> Monitored Natural Attenuation</td></tr><tr><td><input type="checkbox"/> Access controls</td><td><input type="checkbox"/> Groundwater Containment</td></tr><tr><td><input checked="" type="checkbox"/> Institutional Controls</td><td><input type="checkbox"/> Vertical Barrier Walls</td></tr><tr><td><input type="checkbox"/> Groundwater pump and treatment</td><td></td></tr><tr><td><input type="checkbox"/> Surface water collection and treatment</td><td></td></tr><tr><td><input checked="" type="checkbox"/> Other: Removal/Disposal (Rubble Pile); Groundwater Mixing Zone (groundwater)</td><td></td></tr></tbody></table> | | | | <input type="checkbox"/> Cover System | <input checked="" type="checkbox"/> Monitored Natural Attenuation | <input type="checkbox"/> Access controls | <input type="checkbox"/> Groundwater Containment | <input checked="" type="checkbox"/> Institutional Controls | <input type="checkbox"/> Vertical Barrier Walls | <input type="checkbox"/> Groundwater pump and treatment | | <input type="checkbox"/> Surface water collection and treatment | | <input checked="" type="checkbox"/> Other: Removal/Disposal (Rubble Pile); Groundwater Mixing Zone (groundwater) | |
| <input type="checkbox"/> Cover System | <input checked="" type="checkbox"/> Monitored Natural Attenuation | | | | | | | | | | | | | | |
| <input type="checkbox"/> Access controls | <input type="checkbox"/> Groundwater Containment | | | | | | | | | | | | | | |
| <input checked="" type="checkbox"/> Institutional Controls | <input type="checkbox"/> Vertical Barrier Walls | | | | | | | | | | | | | | |
| <input type="checkbox"/> Groundwater pump and treatment | | | | | | | | | | | | | | | |
| <input type="checkbox"/> Surface water collection and treatment | | | | | | | | | | | | | | | |
| <input checked="" type="checkbox"/> Other: Removal/Disposal (Rubble Pile); Groundwater Mixing Zone (groundwater) | | | | | | | | | | | | | | | |
| Attachments: <input type="checkbox"/> Inspection team roster attached <input type="checkbox"/> Site map attached | | | | | | | | | | | | | | | |
| II. INTERVIEWS (Check all that apply) | | | | | | | | | | | | | | | |
| 1. O & M site manager | | | | | | | | | | | | | | | |
| | (Name) _____ | (Title) _____ | (Date) _____ | | | | | | | | | | | | |
| Interviewed: | <input type="checkbox"/> at site | <input type="checkbox"/> at office | <input type="checkbox"/> by phone Phone No. _____ | | | | | | | | | | | | |
| Problems, suggestions: | <input type="checkbox"/> report attached _____ | | | | | | | | | | | | | | |
| 2. O & M staff | | | | | | | | | | | | | | | |
| | (Name) _____ | (Title) _____ | (Date) _____ | | | | | | | | | | | | |
| Interviewed: | <input type="checkbox"/> at site | <input type="checkbox"/> at office | <input type="checkbox"/> by phone Phone No. _____ | | | | | | | | | | | | |
| Problems, suggestions: | <input type="checkbox"/> report attached _____ | | | | | | | | | | | | | | |

Five-Year Review Site Inspection Checklist (Continued)

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

| | | | |
|---|--|-------------------------------------|------------------------------|
| <input type="checkbox"/> O & M Manual | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input type="checkbox"/> N/A |
| x As-built drawings | x Readily available | x Up to date | <input type="checkbox"/> N/A |
| <input type="checkbox"/> Maintenance Logs | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |

Remarks: See Waste Unit Inspection and Maintenance, ER-SOP-019

Five-Year Review Site Inspection Checklist (Continued)

| | | | |
|---|--|---|---|
| 2. Site-Specific Health and Safety Plan | | | |
| <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A | |
| <input type="checkbox"/> Contingency plan/emergency response plan | | | |
| <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A | |
| Remarks: <u>Routine O&M activities do not require an SSHASP under 29 CFR 1910.1201, HAZWOPER.</u> | | | |
| 3. O & M and OSHA Training Records | | | |
| <input checked="" type="checkbox"/> Readily available | <input checked="" type="checkbox"/> Up to date | <input type="checkbox"/> N/A | |
| Remarks _____ | | | |
| 4. Permits and Service Agreements | | | |
| <input type="checkbox"/> Air discharge permit | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A |
| <input type="checkbox"/> Effluent discharge | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A |
| <input type="checkbox"/> Waste Disposal, POTW | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A |
| <input type="checkbox"/> Other permits | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A |
| Remarks _____ | | | |
| 5. Gas Generation Records | | | |
| <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A | |
| Remarks _____ | | | |
| 6. Settlement Monument Records | | | |
| <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A | |
| Remarks _____ | | | |
| 7. Groundwater Monitoring Records | | | |
| <input checked="" type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input type="checkbox"/> N/A | |
| Remarks: <u>Annual Mixing Zone Report and data is posted on ERDMS</u> | | | |
| 8. Leachate Extraction Records | | | |
| <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A | |
| Remarks _____ | | | |
| 9. Discharge Compliance Records | | | |
| <input type="checkbox"/> Air | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A |
| <input type="checkbox"/> Water (effluent) | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A |
| Remarks _____ | | | |
| 10. Daily Access/Security Logs | | | |
| <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A | |
| Remarks _____ | | | |

Five-Year Review Site Inspection Checklist (Continued)

IV. O & M Costs

1. O & M Organization

- ☐ State in-house ☐ Contractor for State
☐ PRP in-house ☐ Contractor for PRP
x Other: SRS

2. O & M Cost Records

- ☐ Readily available ☐ Up to date ☐ Funding mechanism/agreement in place

x Other: Project cost data is summarized in Section X of attached review: WSRC-RP-2007-4063.

Total annual cost by year for review period if available

| | | | |
|------------|----------|------------|---|
| From _____ | To _____ | _____ | <input type="checkbox"/> Breakdown attached |
| (Date) | (Date) | Total cost | |
| From _____ | To _____ | _____ | <input type="checkbox"/> Breakdown attached |
| (Date) | (Date) | Total cost | |
| From _____ | To _____ | _____ | <input type="checkbox"/> Breakdown attached |
| (Date) | (Date) | Total cost | |
| From _____ | To _____ | _____ | <input type="checkbox"/> Breakdown attached |
| (Date) | (Date) | Total cost | |
| From _____ | To _____ | _____ | <input type="checkbox"/> Breakdown attached |
| (Date) | (Date) | Total cost | |

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

Describe costs and reasons: _____

V. ACCESS AND INSTITUTIONAL CONTROLS

x Applicable ☐ N/A

A. Fencing

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

Remarks _____

Five-Year Review Site Inspection Checklist (Continued)

B. Other Access Restrictions

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

Remarks: Signs at this site are in good condition.

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: Annually

Responsible party/agent: DOE Savannah River Field Office

Contact: W. G. Erickson Waste Area Group Manager 09/3/07 (803) 952-8408
(Name) (Title) (Date) (Phone No.)

Reporting 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

Five-Year Review Site Inspection Checklist (Continued)

| | |
|---|--|
| 3. Land use changes offsite <input checked="" type="checkbox"/> N/A | |
| Remarks _____ | |
| _____ | |
| VI. GENERAL SITE CONDITIONS | |
| A. Roads <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A | |
| 1. Roads damaged <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Roads adequate <input type="checkbox"/> N/A | |
| Remarks _____ | |
| _____ | |
| B. Other site Conditions | |
| Remarks _____ | |
| _____ | |
| _____ | |
| VII. COVERS SYSTEMS <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A | |
| A. Soil Surface | |
| 1. Settlement (Low spots) <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Settlement not evident | |
| Areal extent _____ Depth _____ | |
| Remarks _____ | |
| _____ | |
| 2. Cracks <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Cracking not evident | |
| Lengths _____ Widths _____ Depths _____ | |
| Remarks _____ | |
| _____ | |
| 3. Erosion <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Erosion not evident | |
| Areal extent _____ Depth _____ | |
| Remarks _____ | |
| _____ | |
| 4. Holes <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Holes not evident | |
| Areal extent _____ Depth _____ | |
| Remarks _____ | |
| _____ | |
| 5. Vegetative Cover <input checked="" type="checkbox"/> Grass <input type="checkbox"/> Cover properly established <input type="checkbox"/> No signs of stress | |
| <input type="checkbox"/> Trees/shrubs (indicate size and location on a diagram) | |
| Remarks _____ | |
| _____ | |

Five-Year Review Site Inspection Checklist (Continued)

| | | |
|--|---|--------------------|
| 6. Alternative Cover (armored rock, concrete, etc.) <input type="checkbox"/> N/A | | |
| Remarks _____ | | |
| 7. Bulges <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Bulges not evident | | |
| Areal extent _____ Height _____ | | |
| Remarks _____ | | |
| 8. Wet Areas/Water Damage <input type="checkbox"/> Wet areas/water damage not evident | | |
| <input type="checkbox"/> Wet Areas | <input type="checkbox"/> Location shown on site map | Areal extent _____ |
| <input type="checkbox"/> Ponding | <input type="checkbox"/> Location shown on site map | Areal extent _____ |
| <input type="checkbox"/> Seeps | <input type="checkbox"/> Location shown on site map | Areal extent _____ |
| <input type="checkbox"/> Soft subgrade | <input type="checkbox"/> Location shown on site map | Areal extent _____ |
| Remarks _____ | | |
| 9. Slope Instability <input type="checkbox"/> Slides <input type="checkbox"/> Location shown on site map <input type="checkbox"/> No evidence of slope instability | | |
| Areal extent _____ | | |
| Remarks _____ | | |
| B. Benches <input type="checkbox"/> Applicable <input type="checkbox"/> 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 <input type="checkbox"/> Location shown on site map <input type="checkbox"/> N/A or okay | | |
| Remarks _____ | | |
| 2. Bench Breached <input type="checkbox"/> Location shown on site map <input type="checkbox"/> N/A or okay | | |
| Remarks _____ | | |
| 3. Bench Overtopped <input type="checkbox"/> Location shown on site map <input type="checkbox"/> N/A or okay | | |
| Remarks _____ | | |

Five-Year Review Site Inspection Checklist (Continued)

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 _____

Five-Year Review Site Inspection Checklist (Continued)

| | | | |
|--|--|---|---|
| D. Cover Penetrations <input type="checkbox"/> Applicable <input type="checkbox"/> N/A | | | |
| 1. Gas Vents <input type="checkbox"/> Active <input type="checkbox"/> Passive | | | |
| <input type="checkbox"/> Properly secured/locked | <input type="checkbox"/> Functioning | <input type="checkbox"/> Routinely sampled | <input type="checkbox"/> Good condition |
| <input type="checkbox"/> Evidence of leakage at penetration | <input type="checkbox"/> Needs Maintenance | <input type="checkbox"/> N/A | |
| Remarks _____ | | | |
| _____ | | | |
| 2. Gas Monitoring Probes | | | |
| <input type="checkbox"/> Properly secured/locked | <input type="checkbox"/> Functioning | <input type="checkbox"/> Routinely sampled | <input type="checkbox"/> Good condition |
| <input type="checkbox"/> Evidence of leakage at penetration | <input type="checkbox"/> Needs Maintenance | <input type="checkbox"/> N/A | |
| Remarks _____ | | | |
| _____ | | | |
| 3. Monitoring Wells | | | |
| <input type="checkbox"/> Properly secured/locked | <input type="checkbox"/> Functioning | <input type="checkbox"/> Routinely sampled | <input type="checkbox"/> Good condition |
| <input type="checkbox"/> Evidence of leakage at penetration | <input type="checkbox"/> Needs Maintenance | <input type="checkbox"/> N/A | |
| Remarks _____ | | | |
| _____ | | | |
| 4. Leachate Extraction Wells | | | |
| <input type="checkbox"/> Properly secured/locked | <input type="checkbox"/> Functioning | <input type="checkbox"/> Routinely sampled | <input type="checkbox"/> Good condition |
| <input type="checkbox"/> Evidence of leakage at penetration | <input type="checkbox"/> Needs Maintenance | <input type="checkbox"/> N/A | |
| Remarks _____ | | | |
| _____ | | | |
| 5. Settlement Monuments <input type="checkbox"/> Located <input type="checkbox"/> Routinely surveyed <input type="checkbox"/> N/A | | | |
| Remarks _____ | | | |
| _____ | | | |
| E. Gas Collection and Treatment <input type="checkbox"/> Applicable <input type="checkbox"/> N/A | | | |
| 1. Gas Treatment Facilities | | | |
| <input type="checkbox"/> Flaring | <input type="checkbox"/> Thermal destruction | <input type="checkbox"/> Collection for reuse | |
| <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance | | |
| Remarks _____ | | | |
| _____ | | | |
| 2. Gas Collection Wells, Manifolds and Piping | | | |
| <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance | | |
| Remarks _____ | | | |
| _____ | | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | |
|--|--|--|
| 3. Gas Monitoring Facilities (e.g., gas monitoring of adjacent homes or buildings) <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A Remarks _____ _____ | | |
| F. Cover Drainage Layer <input type="checkbox"/> Applicable <input type="checkbox"/> N/A | | |
| 1. Outlet Pipes Inspected <input type="checkbox"/> Functioning <input type="checkbox"/> N/A Remarks _____ _____ | | |
| 2. Outlet Rock Inspected <input type="checkbox"/> Functioning <input type="checkbox"/> N/A Remarks _____ _____ | | |
| G. Detention/sedimentation Ponds <input type="checkbox"/> Applicable <input type="checkbox"/> N/A | | |
| 1. Siltation Areal extent _____ Depth _____ <input type="checkbox"/> N/A <input type="checkbox"/> Siltation not evident Remarks _____ _____ | | |
| 2. Erosion Areal extent _____ Depth _____ <input type="checkbox"/> N/A <input type="checkbox"/> Erosion not evident Remarks _____ _____ | | |
| 3. Outlet Works <input type="checkbox"/> Functioning <input type="checkbox"/> N/A Remarks _____ _____ | | |
| 4. Dam <input type="checkbox"/> Functioning <input type="checkbox"/> N/A Remarks _____ _____ | | |
| H. Retaining Walls <input type="checkbox"/> Applicable <input type="checkbox"/> N/A | | |
| 1. Deformations <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Deformation not evident Horizontal displacement _____ Vertical displacement _____ Rotational displacement _____ Remarks _____ _____ | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | |
|---|---|--|
| 2. Degradation | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> Deformation not evident |
| Remarks _____ | | |
| _____ | | |
| I. Perimeter Ditches/Off-Site Discharge <input type="checkbox"/> Applicable <input type="checkbox"/> N/A | | |
| 1. Siltation | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> Siltation not evident |
| Areal extent _____ Depth _____ | | |
| Remarks _____ | | |
| _____ | | |
| 2. Vegetative Growth | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> Siltation not evident |
| <input type="checkbox"/> Vegetation does not impede flow | | |
| Areal extent _____ Type _____ | | |
| Remarks _____ | | |
| _____ | | |
| 3. Erosion | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> Erosion not evident |
| Areal extent _____ Depth _____ | | |
| Remarks _____ | | |
| _____ | | |
| 4. Discharge Structure | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> N/A |
| Remarks _____ | | |
| _____ | | |
| VIII. VERTICAL BARRIER WALLS <input type="checkbox"/> Applicable <input type="checkbox"/> N/A | | |
| 1. Settlement | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> Settlement not evident |
| Areal extent _____ Depth _____ | | |
| Remarks _____ | | |
| _____ | | |
| 2. Performance Monitoring | Type of Monitoring _____ | <input type="checkbox"/> Performance not monitored |
| Frequency _____ <input type="checkbox"/> Evidence of breaching Head differential _____ | | |
| Remarks _____ | | |
| _____ | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | | |
|---|---|--|---|
| IX. GROUNDWATER/SURFACE WATER REMEDIES | | <input checked="" type="checkbox"/> Applicable | <input type="checkbox"/> N/A |
| A. Groundwater Extraction Wells, Pumps, and Pipelines | | <input type="checkbox"/> Applicable | <input checked="" type="checkbox"/> N/A |
| 1. Pumps, Wellhead Plumbing, and Electrical | | | |
| <input type="checkbox"/> Good condition | <input type="checkbox"/> All required wells located | <input type="checkbox"/> Needs Maintenance | <input type="checkbox"/> N/A |
| Remarks _____ | | | |
| _____ | | | |
| 2. Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances | | | |
| <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance | | |
| Remarks _____ | | | |
| _____ | | | |
| 3. Spare Parts and Equipment | | | |
| <input type="checkbox"/> Readily available | <input type="checkbox"/> Good condition | <input type="checkbox"/> Requires upgrade | <input type="checkbox"/> Needs to be provided |
| Remarks _____ | | | |
| _____ | | | |
| B. Surface Water Collection Structures, Pumps, and Pipelines | | <input type="checkbox"/> Applicable | <input checked="" type="checkbox"/> N/A |
| 1. Collection Structures, Pumps, and Electrical | | | |
| <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance | | |
| Remarks _____ | | | |
| _____ | | | |
| 2. Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances | | | |
| <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance | | |
| Remarks _____ | | | |
| _____ | | | |
| 3. Spare Parts and Equipment | | | |
| <input type="checkbox"/> Readily available | <input type="checkbox"/> Good condition | <input type="checkbox"/> Requires upgrade | <input type="checkbox"/> Needs to be provided |
| Remarks _____ | | | |
| _____ | | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | | |
|---|--|---|--|
| C. Treatment System | <input type="checkbox"/> Applicable | <input type="checkbox"/> N/A | |
| 1. Treatment Train (Check components that apply) | | | |
| <input type="checkbox"/> Metals removal | <input type="checkbox"/> Oil/water separation | <input type="checkbox"/> Bioremediation | |
| <input type="checkbox"/> Air stripping | <input type="checkbox"/> Carbon adsorbers | | |
| <input type="checkbox"/> Filters _____ | | | |
| <input type="checkbox"/> Additive (e.g., chelation agent, flocculent) _____ | | | |
| <input type="checkbox"/> Others _____ | | | |
| <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance | | |
| <input type="checkbox"/> Sampling ports properly marked and functional | | | |
| <input type="checkbox"/> Sampling/maintenance log displayed and up to date | | | |
| <input type="checkbox"/> Equipment properly identified | | | |
| <input type="checkbox"/> Quantity of groundwater treated annually _____ | | | |
| <input type="checkbox"/> Quantity of surface water treated annually _____ | | | |
| Remarks _____ | | | |
| _____ | | | |
| 2. Electrical Enclosures and Panels (properly rated and functional) | | | |
| <input type="checkbox"/> N/A | <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance | |
| Remarks _____ | | | |
| _____ | | | |
| 3. Tanks, Vaults, Storage Vessels | | | |
| <input type="checkbox"/> N/A | <input type="checkbox"/> Good condition | <input type="checkbox"/> Proper secondary containment | <input type="checkbox"/> Needs Maintenance |
| Remarks _____ | | | |
| _____ | | | |
| 4. Discharge Structure and Appurtenances | | | |
| <input type="checkbox"/> N/A | <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance | |
| Remarks _____ | | | |
| _____ | | | |
| 5. Treatment Building(s) | | | |
| <input type="checkbox"/> N/A | <input type="checkbox"/> Good condition (esp. roof and doorways) | <input type="checkbox"/> Needs repair | |
| <input type="checkbox"/> Chemicals and equipment properly stored | | | |
| Remarks _____ | | | |
| _____ | | | |

Five-Year Review Site Inspection Checklist (Continued)

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 LBRP, RP & GCDF OU contains five subunits. Two of these subunits, the LRP and groundwater, warrant remediation. The remediation for LRP is Removal/Disposal with institutional controls contingent on confirmation sampling. And the selected remedy for the groundwater subunit is Groundwater Mixing Zone with institutional controls until the maximum contaminant level is attained. The 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 remedy for LRP and groundwater are functioning as intended.

Five-Year Review Site Inspection Checklist (Continued)

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.

Removal/disposal of contaminated soil/debris at LRP will protect future industrial workers and ecological receptors from exposure to refined constituents of concern. This will allow future industrial land use of the site and will be protective of the environment

Monitoring data appears to be consistent with the modeling predictions from the GWMZ application. The concentrations should continue to decrease within the heart of the plume 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.

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.

N/A

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**L-AREA HOT SHOP (707-G, 712-G, 717-G, 080-1G) (INCLUDING CML-003
SANDBLAST AREA) OPERABLE UNIT**

I. Introduction

This is the first five-year review for the L-Area Hot Shop (including CML-003 Sandblast Area) (LAHS) Operable Unit (OU). This review was conducted from August 2007 through September 2007. This report documents the results of the review.

II. OU Chronology

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

Table 1. Chronology of OU Events

| Event | Date |
|-----------------------------------|------------------------------|
| RFI/RI Field Start | June 5, 2000 |
| Record of Decision (ROD) issuance | August 17, 2003 |
| Remedial Action Start/Completed | August 5, 2004/June 16, 2005 |
| Previous Five-Year Reviews | None |

III. Background

Physical Characteristics

L Area is located in the south-central portion of Savannah River Site (SRS), north of L-Lake (Figure 1). The LAHS OU is located at the southeast corner of the L-Reactor Area. The LAHS originally consisted of temporary buildings constructed in the 1950s. During the 1960s, the temporary buildings were removed to make way for three permanent buildings (Buildings 712-G, 717-G, 707-G) and two storage areas (Buildings 080-1G and 080-2G).

- Building 712-G was used to decontaminate equipment
- Building 717-G was used for the repair of equipment
- Building 080-1G housed a tool room

- Building 080-2G was used for temporary drum storage
- Building 707-G was an administration building with a lunchroom, a change room, and a lavatory

Building 712-G consisted of a concrete pad with two concrete walls and large steel doors at either end. Equipment was brought to the outside door of the pad and suspended from a monorail; it was then moved along the pad via the monorail to a wash area where it was hosed down and decontaminated. The equipment was then carried along the monorail and passed through the second set of doors into Building 717-G, where it was repaired. Repair equipment included welding tables, a lathe, a mill, a radial drill, a drill press, a grinder, a hacksaw, and a sink. The buildings were last used in 1983 and were removed in 1993. Currently, the LAHS consists of the following (shown in Figure 2):

- A concrete slab with associated drainlines on which three interconnected buildings (Buildings 712-G, 717-G, and 707-G) and a former storage area (Building 080-1G) were constructed.
- A concrete slab (Building 080-2G) outside the eastern perimeter fence used as a temporary drum storage area.
- The CML-003 Sandblast Area, reportedly used during operation of L Reactor for sandblasting non-radioactive equipment and metals. LAHS concrete slabs are contained within the footprint of the CML-003 Sandblast Area.

The location is currently vacant except for the concrete pad, which was painted to fix remnant radioactive contamination. The concrete pad is approximately 9,670 ft². Grassy fields surround the concrete pad. A fence controls access to the area containing the concrete slab. The area inside the fence is approximately 62,700 ft².

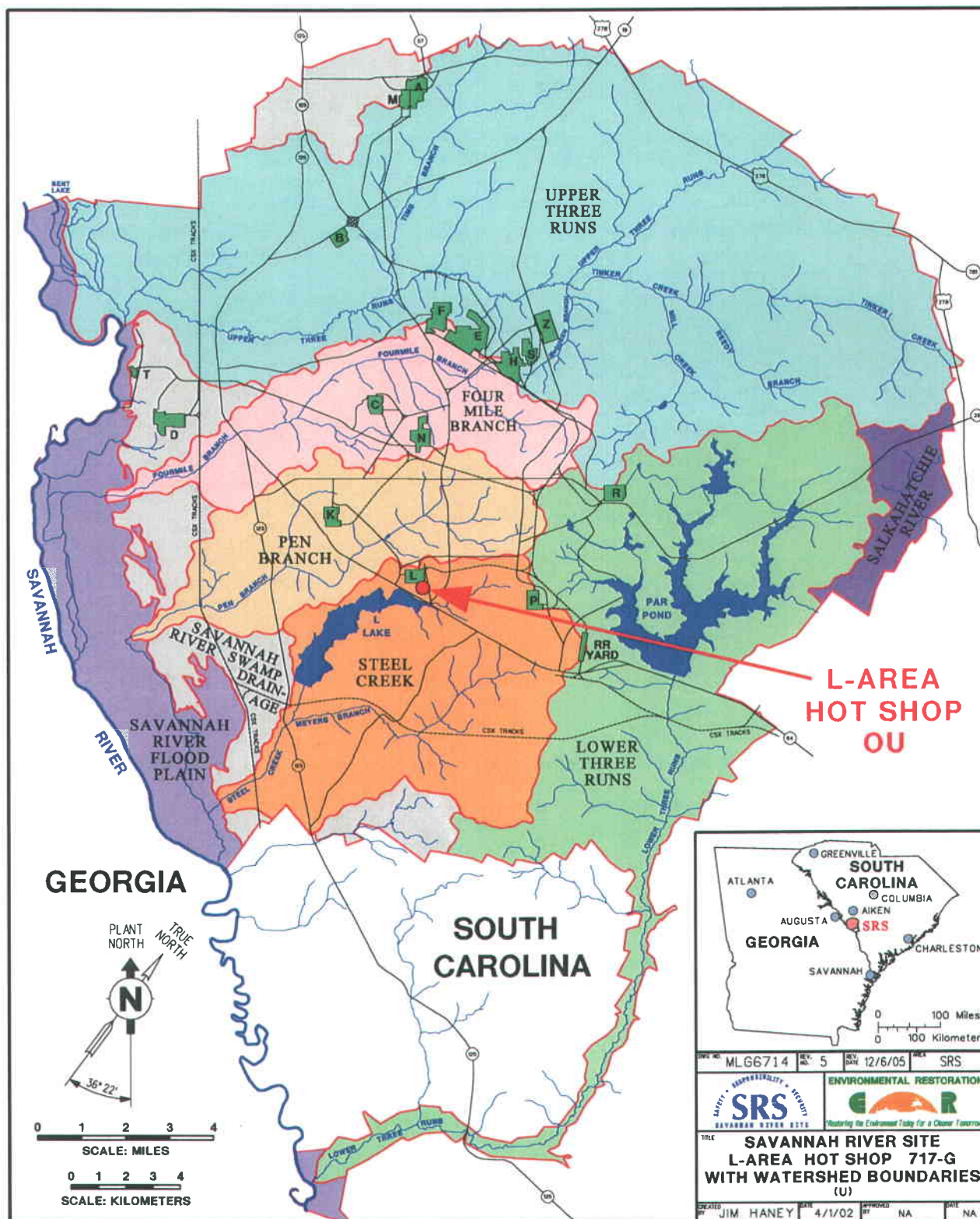


Figure 1. Location of the L-Area Hot Shop Operable Unit at SRS

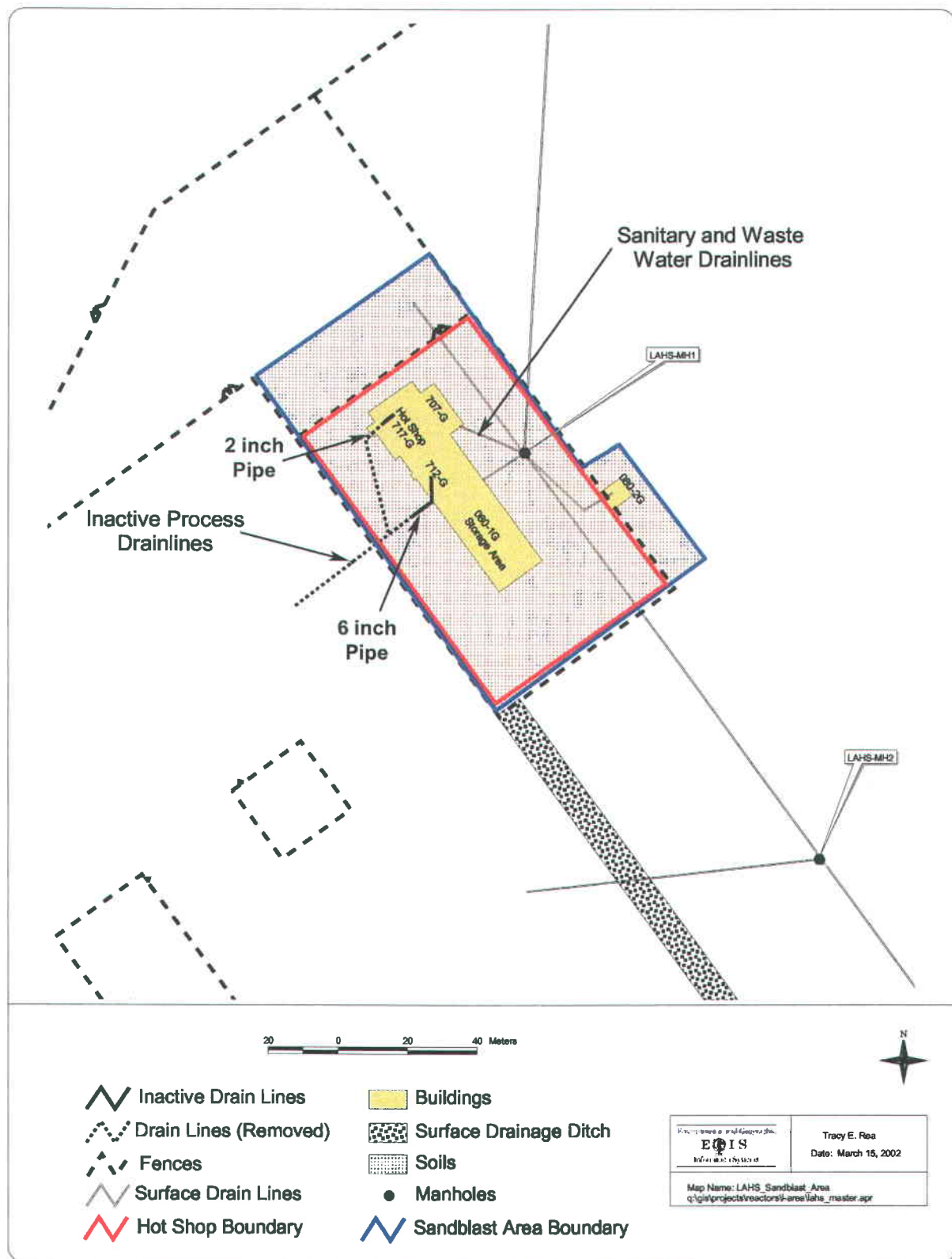


Figure 2. L-Area Hot Shop Operable Unit

LAHS also includes manholes and piping, as follows:

- Two manholes with associated underground pipelines, one located inside and one outside of the LAHS perimeter fence were used for transporting sanitary wastewater (For locations of manholes, see Figure 2).
- Two additional inactive process drainlines, one 6-inch pipe located in the concrete slab/decontamination area (the former Building 712-G) and one 2-inch pipe located in the concrete slab/hot shop (the former Building 717-G) were connected to the L-Area Oil and Chemical Basin (LAOCB).

Land and Resource Use

The LAHS OU is located in an industrial area. The future land use for LAHS OU is anticipated to remain industrial.

History of Contamination

The L-Area Hot Shop was primarily used for repairing the equipment brought into the interconnected buildings from the reactor areas. The exact composition of the waste material (primarily radionuclides) is not known; however, radionuclides deposited on the concrete floors of the LAHS buildings and the associated storage facilities and in the drainlines appear to be the primary source material. The field investigations conducted at LAHS OU reveal that the primary sources of potential contamination include the floor slab in former Buildings 712-G, 717-G, and 080-1G; former Drum Storage Area (080-2G); residue from the former high-efficiency particulate air (HEPA) filter vents from the hot shop buildings, sandblast area (CML-003) operations; the process drainlines connected to former Buildings 712-G and 717-G; and Manholes 1 and 2 (including sanitary drainlines from 707-G) associated with LAHS OU.

Initial Response

In 1998, as a part of the LAOCB remedial action and decontamination and decommissioning (D&D), the LAHS process drainlines were grouted and removed up to a cut-off point approximately 10 ft from the slab. The 2-inch drainline was removed except for 30 ft extending out from the slab, as shown in Figure 2 (dotted line). The 6-inch drainline was also completely removed except for 30 ft of this drainline extending past the edge of the slab. Those portions of the 6-inch drainline and the 2-inch drainline remaining in or beneath the slab are included in the LAHS OU.

IV. Remedial Actions

Remedy Selection

The LAHS buildings were last used in 1983 and removed in 1993. The CERCLA remedial actions addressed the remaining contaminated slabs, underground drainlines, and soil. The selected remedial action for the LAHS OU included the following key elements:

- Break up and remove the LAHS concrete slab (former buildings 707-G, 712-G, 717-G, and 080-1G) and any associated contaminated soil.
- Remove the grouted 6 inch cast-iron IP drainline underneath and extending out from under the slab of 712-G, and any associated contaminated soil.
- Remove the grouted 2-inch cast-iron IP drainline beneath and extending out from under the slab of 717-G and any associated contaminated soil.
- Contaminated soils, where present, will be excavated until the surface soils in the excavated areas are field screened/sampled to the threshold values of 20 pCi/g for gross alpha and 50 pCi/g for nonvolatile beta.

- Cut both IP drainlines into segments suitable for transportation and disposal.
- Transport the contaminated concrete debris and soil resulting from removal operations and cut segments of both drainlines to P-Area Reactor Seepage Basin #3 for final disposal.
- Implement institutional controls via access controls, notification, and field inspection/maintenance to maintain site for industrial activities and prevent unauthorized access to the unit.

Remedy Implementation

The Corrective Measures Implementation /Remedial Action Implementation Plan (CMI/RAIP), rev 1 was approved on October 22, 2003. The Record of Decision revision 1.1 was issued on November 3, 2003. The remedial action started on August 5, 2004. Transportation of the contaminated debris to the P Reactor Seepage Basin #3 began on January 31, 2005. The final load was transported on March 7, 2005. Radiological surveys of the excavated areas began on March 21, 2005, and confirmatory soil sampling was conducted on March 29, 2005. Excavated areas were backfilled, topsoil was placed, and sod was planted. The job was physically complete on June 16, 2005. The details of implementation of the remedial actions are documented in the Post-Construction Report (PCR)/Corrective Measures Implementation Report (CMIR)/Final Remediation Report (FRR) for L-Area Hot Shop (LAHS) Operable Unit, Revision 1, dated January 2006.

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 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 will prevent human exposure to contaminated media.
- 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.
- The selected remedy completely achieves the cleanup level by removing the contaminated portion of the concrete slab and all of the inactive process drainlines associated with LAHS 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. Project Costs

Costs associated with the selected remedy for the LAHS OU includes operation and maintenance costs of institutional controls. The estimated operation and maintenance cost associated with the selected remedy is \$42,970. This is a present worth cost, including 30 years of maintenance activities. After characterization and effectiveness of

the remedy was evaluated, the actual operation and maintenance cost for the LAHS was assessed. The total actual operation and maintenance cost from project support and other post-construction expense to fiscal year 2006 is \$41,950.

XI. Protectiveness Statement(s)

The selected remedy of Decontamination, Removal, Offsite Disposal and Institutional Controls for LAHS is protective of human health and the environment. This remedy will provide complete protection to human health and the environment by removing all of the inactive process drainlines as well as the contaminated portion of the concrete slab. Exposure pathways that could result in unacceptable risks are controlled by the institutional controls in place while United States Department of Energy (USDOE) controls the OU. These controls 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).

XII. Next Review

The next five-year review is scheduled for February 12, 2014.

ATTACHMENT 1

List of Documents Reviewed

WSRC-RP-99-4061, *RFI/RI Work Plan for the L-Area Hot Shop (including CML-003 Sandblast Area) Operable Unit (U)*, Revision 1.2, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

WSRC-RP-2001-4172, *RFI/RI Work Plan Addendum – Investigation Results and Risk Assessment for the L-Area Hot Shop (Including the CML-003 Sandblast Area) Operable Unit (U)*, Revision 1.1, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

WSRC-RP-2001-4173, *Statement of Basis/Proposed Plan for the L-Area Hot Shop (Including CML-003 Sandblast Area) Operable Unit (U)*, Revision 1.2, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

WSRC-RP-2002-4025, *Record of Decision Remedial Alternative Selection for the L-Area Hot Shop (Including CML-003 Sandblast Area) Operable Unit (U)*, Revision 1.1, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

ATTACHMENT 2

Five-Year Review Site Inspection Checklist

| I. SITE INFORMATION | | | |
|---|--|------------------------------------|---|
| Site Name: | L-Area Hot Shop Operable Unit (OU) | Date of Inspection: | 9/10/2007 |
| Location and Region: | Savannah River Site, USEPA IV | EPA ID: | SC1890008989 |
| Agency, office, or company leading the five-year review: | United States Department of Energy | CERCLIS OU No.: | 76 |
| | | Weather/Temperature: | clear and sunny, 90°F |
| Remedy Includes: (Check all that apply) <input type="checkbox"/> Cover System <input type="checkbox"/> Access controls <input checked="" type="checkbox"/> Institutional Controls <input type="checkbox"/> Groundwater pump and treatment <input type="checkbox"/> Surface water collection and treatment <input checked="" type="checkbox"/> Other: <u>Removal/Disposal of pipelines and pad</u> <input type="checkbox"/> Monitored Natural Attenuation <input type="checkbox"/> Groundwater Containment <input type="checkbox"/> Vertical Barrier Walls | | | |
| Attachments: <input type="checkbox"/> Inspection team roster attached <input type="checkbox"/> Site map attached | | | |
| II. INTERVIEWS (Check all that apply) | | | |
| 1. O & M site manager | | | |
| | (Name) _____ | (Title) _____ | (Date) _____ |
| Interviewed: | <input type="checkbox"/> at site | <input type="checkbox"/> at office | <input type="checkbox"/> by phone Phone No. _____ |
| Problems, suggestions: | <input type="checkbox"/> report attached _____ | | |
| 2. O & M staff | | | |
| | (Name) _____ | (Title) _____ | (Date) _____ |
| Interviewed: | <input type="checkbox"/> at site | <input type="checkbox"/> at office | <input type="checkbox"/> by phone Phone No. _____ |
| Problems, suggestions: | <input type="checkbox"/> 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: <input type="checkbox"/> Report attached _____ | | | |

Five-Year Review Site Inspection Checklist (Continued)

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

| | | | |
|---|--|-------------------------------------|------------------------------|
| <input type="checkbox"/> O & M Manual | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |
| x As-built drawings | x Readily available | x Up to date | <input type="checkbox"/> N/A |
| <input type="checkbox"/> Maintenance Logs | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |

Remarks: See Waste Unit Inspection and Maintenance, ER-SOP-019

| | | | |
|---|--|-------------------------------------|-------|
| 2. Site-Specific Health and Safety Plan | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |
| <input type="checkbox"/> Contingency plan/emergency response plan | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |

Remarks: Routine O&M activities do not require a SSHASP under 29 CFR 1910.1201, HAZWOPER.

| | | | |
|---|---------------------|--------------|------------------------------|
| 3. O & M and OSHA Training Records | x Readily available | x Up to date | <input type="checkbox"/> N/A |
|---|---------------------|--------------|------------------------------|

Remarks _____

Five-Year Review Site Inspection Checklist (Continued)

| | | | |
|---|---|--|--|
| 4. Permits and Service Agreements | | | |
| <input type="checkbox"/> Air discharge permit | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |
| <input type="checkbox"/> Effluent discharge | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |
| <input type="checkbox"/> Waste Disposal, POTW | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |
| <input type="checkbox"/> Other permits | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |
| Remarks _____ | | | |
| | | | |
| 5. Gas Generation Records | | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date x N/A |
| Remarks _____ | | | |
| | | | |
| 6. Settlement Monument Records | | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date x N/A |
| Remarks _____ | | | |
| | | | |
| 7. Groundwater Monitoring Records | | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date x N/A |
| Remarks _____ | | | |
| | | | |
| 8. Leachate Extraction Records | | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date x N/A |
| Remarks _____ | | | |
| | | | |
| 9. Discharge Compliance Records | | | |
| <input type="checkbox"/> Air | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |
| <input type="checkbox"/> Water (effluent) | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |
| Remarks _____ | | | |
| | | | |
| 10. Daily Access/Security Logs | | x Readily available | <input type="checkbox"/> Up to date <input type="checkbox"/> N/A |
| Remarks _____ | | | |
| | | | |
| IV. O & M Costs | | | |
| 1. O & M Organization | | | |
| <input type="checkbox"/> State in-house | <input type="checkbox"/> Contractor for State | | |
| <input type="checkbox"/> PRP in-house | <input type="checkbox"/> Contractor for PRP | | |
| x Other: <u>SRS</u> | | | |
| | | | |

Five-Year Review Site Inspection Checklist (Continued)

2. O & M Cost Records

☐ Readily available ☐ Up to date ☐ Funding mechanism/agreement in place

x Other: Project cost data is summarized in Section X of attached review: WSRC-RP-2007-4063.

Total annual cost by year for review period if available

| | | | |
|----------------------|--------------------|------------|---|
| From _____ (Date) | To _____ (Date) | _____ | <input type="checkbox"/> Breakdown attached |
| | | Total cost | |
| From _____ (Date) | To _____ (Date) | _____ | <input type="checkbox"/> Breakdown attached |
| | | Total cost | |
| From _____ (Date) | To _____ (Date) | _____ | <input type="checkbox"/> Breakdown attached |
| | | Total cost | |
| From _____ (Date) | To _____ (Date) | _____ | <input type="checkbox"/> Breakdown attached |
| | | Total cost | |
| From _____ (Date) | To _____ (Date) | _____ | <input type="checkbox"/> Breakdown attached |
| | | Total cost | |

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

Describe costs and reasons: _____

V. ACCESS AND INSTITUTIONAL CONTROLS

x Applicable ☐ N/A

A. Fencing

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

Remarks _____

B. Other Access Restrictions

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

Remarks: Signs at this site are in good condition. _____

Five-Year Review Site Inspection Checklist (Continued)

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: Annually

Responsible party/agent: DOE Savannah River Field Office

Contact: W. G. Erickson Waste Area Group Manager 09/3/07 (803) 952-8408
(Name) (Title) (Date) (Phone No.)

Reporting 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 _____

Five-Year Review Site Inspection Checklist (Continued)

| VI. GENERAL SITE CONDITIONS | | | |
|---|--|--|--|
| A. Roads <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A | | | |
| 1. Roads damaged <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Roads adequate <input type="checkbox"/> N/A | | | |
| Remarks _____ | | | |
| _____ | | | |
| B. Other site Conditions | | | |
| Remarks _____ | | | |
| _____ | | | |
| _____ | | | |
| VII. COVERS SYSTEMS <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A | | | |
| A. Soil Surface | | | |
| 1. Settlement (Low spots) <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Settlement not evident | | | |
| Areal extent _____ Depth _____ | | | |
| Remarks _____ | | | |
| _____ | | | |
| 2. Cracks <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Cracking not evident | | | |
| Lengths _____ Widths _____ Depths _____ | | | |
| Remarks _____ | | | |
| _____ | | | |
| 3. Erosion <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Erosion not evident | | | |
| Areal extent _____ Depth _____ | | | |
| Remarks _____ | | | |
| _____ | | | |
| 4. Holes <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Holes not evident | | | |
| Areal extent _____ Depth _____ | | | |
| Remarks _____ | | | |
| _____ | | | |
| 5. Vegetative Cover <input type="checkbox"/> Grass <input type="checkbox"/> Cover properly established <input type="checkbox"/> No signs of stress | | | |
| <input type="checkbox"/> Trees/shrubs (indicate size and location on a diagram) | | | |
| Remarks _____ | | | |
| _____ | | | |
| 6. Alternative Cover (armored rock, concrete, etc.) <input type="checkbox"/> N/A | | | |
| Remarks _____ | | | |
| _____ | | | |

Five-Year Review Site Inspection Checklist (Continued)

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.)

Five-Year Review Site Inspection Checklist (Continued)

| | | |
|---|--|--|
| 1. Settlement | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> No evidence of settlement |
| Areal extent _____ Depth _____ | | |
| Remarks _____ | | |
| | | |
| 2. Material Degradation | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> No evidence of degradation |
| Material type _____ Areal extent _____ | | |
| Remarks _____ | | |
| | | |
| 3. Erosion | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> No evidence of erosion |
| Areal extent _____ Depth _____ | | |
| Remarks _____ | | |
| | | |
| 4. Undercutting | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> No evidence of undercutting |
| Areal extent _____ Depth _____ | | |
| Remarks _____ | | |
| | | |
| 5. Obstructions | Type _____ | <input type="checkbox"/> No obstructions |
| <input type="checkbox"/> Location shown on site map | Areal extent _____ | Size _____ |
| Remarks _____ | | |
| | | |
| 6. Excessive Vegetative Growth | Type _____ | |
| <input type="checkbox"/> No evidence of excessive growth | <input type="checkbox"/> Vegetation in channels does not obstruct flow | |
| <input type="checkbox"/> Location shown on site map | Areal extent _____ | |
| Remarks _____ | | |
| | | |
| D. Cover Penetrations | <input type="checkbox"/> Applicable | <input type="checkbox"/> N/A |
| | | |
| 1. Gas Vents | <input type="checkbox"/> Active | <input type="checkbox"/> Passive |
| <input type="checkbox"/> Properly secured/locked | <input type="checkbox"/> Functioning | <input type="checkbox"/> Routinely sampled |
| <input type="checkbox"/> Evidence of leakage at penetration | <input type="checkbox"/> Needs Maintenance | <input type="checkbox"/> Good condition |
| Remarks _____ | | |
| | | |

Five-Year Review Site Inspection Checklist (Continued)

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 _____

Five-Year Review Site Inspection Checklist (Continued)

| | | | |
|--|---|--|------------------------------|
| F. Cover Drainage Layer <input type="checkbox"/> Applicable <input type="checkbox"/> N/A | | | |
| 1. Outlet Pipes Inspected | <input type="checkbox"/> Functioning | <input type="checkbox"/> N/A | |
| Remarks _____ | | | |
| | | | |
| 2. Outlet Rock Inspected | <input type="checkbox"/> Functioning | <input type="checkbox"/> N/A | |
| Remarks _____ | | | |
| | | | |
| G. Detention/sedimentation Ponds <input type="checkbox"/> Applicable <input type="checkbox"/> N/A | | | |
| 1. Siltation | Areal extent _____ | Depth _____ | <input type="checkbox"/> N/A |
| <input type="checkbox"/> Siltation not evident | | | |
| Remarks _____ | | | |
| | | | |
| 2. Erosion | Areal extent _____ | Depth _____ | <input type="checkbox"/> N/A |
| <input type="checkbox"/> Erosion not evident | | | |
| Remarks _____ | | | |
| | | | |
| 3. Outlet Works | <input type="checkbox"/> Functioning | <input type="checkbox"/> N/A | |
| Remarks _____ | | | |
| | | | |
| 4. Dam | <input type="checkbox"/> Functioning | <input type="checkbox"/> N/A | |
| Remarks _____ | | | |
| | | | |
| H. Retaining Walls <input type="checkbox"/> Applicable <input type="checkbox"/> N/A | | | |
| 1. Deformations | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> Deformation not evident | |
| Horizontal displacement _____ | | Vertical displacement _____ | |
| Rotational displacement _____ | | | |
| Remarks _____ | | | |
| | | | |
| 2. Degradation | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> Deformation not evident | |
| Remarks _____ | | | |
| | | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | | | |
|--|--|--|-------------------------------------|------------------------------|
| I. Perimeter Ditches/Off-Site Discharge | | | <input type="checkbox"/> Applicable | <input type="checkbox"/> N/A |
| 1. Siltation <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Siltation not evident | | | | |
| Areal extent _____ Depth _____ | | | | |
| Remarks _____ | | | | |
| 2. Vegetative Growth <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Siltation not evident | | | | |
| <input type="checkbox"/> Vegetation does not impede flow | | | | |
| Areal extent _____ Type _____ | | | | |
| Remarks _____ | | | | |
| 3. Erosion <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Erosion not evident | | | | |
| Areal extent _____ Depth _____ | | | | |
| Remarks _____ | | | | |
| 4. Discharge Structure <input type="checkbox"/> Location shown on site map <input type="checkbox"/> N/A | | | | |
| Remarks _____ | | | | |
| VIII. VERTICAL BARRIER WALLS <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A | | | | |
| 1. Settlement <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Settlement not evident | | | | |
| Areal extent _____ Depth _____ | | | | |
| Remarks _____ | | | | |
| 2. Performance Monitoring Type of Monitoring _____ <input type="checkbox"/> Performance not monitored | | | | |
| Frequency _____ <input type="checkbox"/> Evidence of breaching Head differential _____ | | | | |
| Remarks _____ | | | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | | |
|---|---|--|---|
| IX. GROUNDWATER/SURFACE WATER REMEDIES | | <input type="checkbox"/> Applicable | <input checked="" type="checkbox"/> N/A |
| A. Groundwater Extraction Wells, Pumps, and Pipelines | | <input type="checkbox"/> Applicable | <input type="checkbox"/> N/A |
| 1. Pumps, Wellhead Plumbing, and Electrical | | | |
| <input type="checkbox"/> Good condition | <input type="checkbox"/> All required wells located | <input type="checkbox"/> Needs Maintenance | <input type="checkbox"/> N/A |
| Remarks _____ | | | |
| _____ | | | |
| 2. Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances | | | |
| <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance | | |
| Remarks _____ | | | |
| _____ | | | |
| 3. Spare Parts and Equipment | | | |
| <input type="checkbox"/> Readily available | <input type="checkbox"/> Good condition | <input type="checkbox"/> Requires upgrade | <input type="checkbox"/> Needs to be provided |
| Remarks _____ | | | |
| _____ | | | |
| B. Surface Water Collection Structures, Pumps, and Pipelines | | <input type="checkbox"/> Applicable | <input type="checkbox"/> N/A |
| 1. Collection Structures, Pumps, and Electrical | | | |
| <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance | | |
| Remarks _____ | | | |
| _____ | | | |
| 2. Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances | | | |
| <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance | | |
| Remarks _____ | | | |
| _____ | | | |
| 3. Spare Parts and Equipment | | | |
| <input type="checkbox"/> Readily available | <input type="checkbox"/> Good condition | <input type="checkbox"/> Requires upgrade | <input type="checkbox"/> Needs to be provided |
| Remarks _____ | | | |
| _____ | | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | |
|---|--|--|
| C. Treatment System | <input type="checkbox"/> Applicable | <input type="checkbox"/> N/A |
| 1. Treatment Train (Check components that apply) | | |
| <input type="checkbox"/> Metals removal | <input type="checkbox"/> Oil/water separation | <input type="checkbox"/> Bioremediation |
| <input type="checkbox"/> Air stripping | <input type="checkbox"/> Carbon adsorbers | |
| <input type="checkbox"/> Filters _____ | | |
| <input type="checkbox"/> Additive (e.g., chelation agent, flocculent) _____ | | |
| <input type="checkbox"/> Others _____ | | |
| <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance | |
| <input type="checkbox"/> Sampling ports properly marked and functional | | |
| <input type="checkbox"/> Sampling/maintenance log displayed and up to date | | |
| <input type="checkbox"/> Equipment properly identified | | |
| <input type="checkbox"/> Quantity of groundwater treated annually _____ | | |
| <input type="checkbox"/> Quantity of surface water treated annually _____ | | |
| Remarks _____ | | |
| | | |
| 2. Electrical Enclosures and Panels (properly rated and functional) | | |
| <input type="checkbox"/> N/A | <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance |
| Remarks _____ | | |
| | | |
| 3. Tanks, Vaults, Storage Vessels | | |
| <input type="checkbox"/> N/A | <input type="checkbox"/> Good condition | <input type="checkbox"/> Proper secondary containment <input type="checkbox"/> Needs Maintenance |
| Remarks _____ | | |
| | | |
| 4. Discharge Structure and Appurtenances | | |
| <input type="checkbox"/> N/A | <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance |
| Remarks _____ | | |
| | | |
| 5. Treatment Building(s) | | |
| <input type="checkbox"/> N/A | <input type="checkbox"/> Good condition (esp. roof and doorways) | <input type="checkbox"/> Needs repair |
| <input type="checkbox"/> Chemicals and equipment properly stored | | |
| Remarks _____ | | |
| | | |

Five-Year Review Site Inspection Checklist (Continued)

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 remedy for this OU is Decontamination, Removal (All of the Process Drainlines), Offsite Disposal (Non-SRS Disposal) and Institutional Controls.

The selected remedies are effective and functioning as designed.

Five-Year Review Site Inspection Checklist (Continued)

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.

Decontamination, Removal, Offsite Disposal and Institutional Controls are permanently reducing the unacceptable risk associated with the concrete slab and the drainlines under industrial land use, are readily implementable, and provide only a slight short term risk to the remedial workers, which can easily be reduced to acceptable levels through the use of personal protection equipment and strict adherence to SRS procedures.

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.

N/A

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L-AREA OIL AND CHEMICAL BASIN (904-83G) AND L-AREA ACID/CAUSTIC BASIN (904-79G) OPERABLE UNIT

I. Introduction

This is the second five-year review for the L-Area Oil and Chemical Basin (904-83G) and L-Area Acid/Caustic Basin (LAOCB and LAACB) Operable Unit (OU). This review was conducted from August 2007 through September 2007. This report documents the results of the review.

II. OU Chronology

Table 1 lists the chronology of site events for the LAOCB and LAACB.

Table 1. Chronology of OU Events

| Event | Date |
|-----------------------------------|------------------------------|
| RFI/RI Field Start | 1993 |
| Focused CMS/FS Rev 1.1 Submittal | February 24, 1997 |
| Record of Decision (ROD) Issuance | January 5, 1998 |
| Remedial Action Start/Complete | August 31, 1998/ May 7, 2001 |
| Previous Five-Year Review | February 12, 2004 |

III. Background

Physical Characteristics

The LAOCB and LAACB are located within the Savannah River Site (SRS), approximately 300 ft south of the L-Area Reactor perimeter fence and 1,250 ft north of L Lake (Figure 1). 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. It 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 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.

Land and Resource Use

The current and anticipated future land use is industrial.

History of Contamination

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) extending 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.

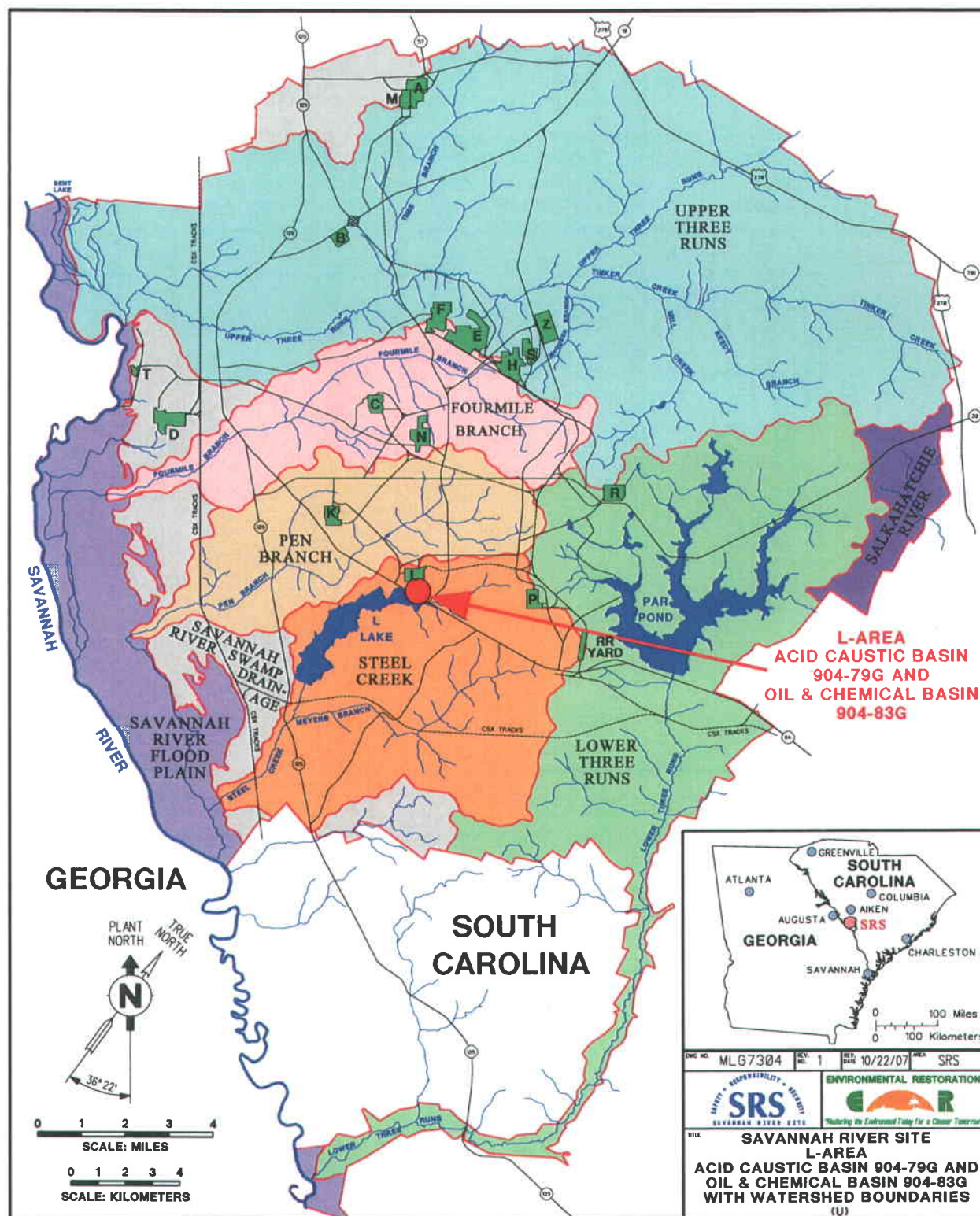


Figure 1. Location of the L-Area Oil and Chemical Basin OU at SRS

Initial Response

A comprehensive groundwater OU was created as the L-Area Southern Groundwater OU because of 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. Groundwater at this OU is being addressed holistically as part of the LASG OU.

IV. Remedial Actions

Remedy Selection

Due to the risks associated with the LAOCB soil, In-Situ Stabilization and Capping is the selected remedy. This remedy meets 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 remedy at the LAOCB pipeline is In-Situ Stabilization and Disposal in the LAOCB. This alternative also meets 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 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 2 below summarizes the design changes. These deviations did not adversely impact the final closure of the LAOCB OU.

Table 2. 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-in pipe section at northeast section, located outside L-Area Hot Shop fence, and placement in the basin. |
| 4 | Removal of additional 6-in 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. |

V. Progress Since Last Review

This is the second five-year ROD review that the LAOCB has undergone. Since the previous review in June of 2003, no additional action has been required at this OU.



Figure 2. Photo of the Remediated LAOCB

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 concentrations for COCs in the two active wells are lower (some are non-detect) than earlier values at the site. See Table 3 for well sampling data.
- 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, constituents of concern, and risk assessment methodologies have not changed in a way that affects 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. Project Costs

Costs associated with the selected remedy for the LAOCB and LAACB OU includes operation and maintenance costs of the soil cover and institutional controls. The estimated operation and maintenance cost associated with the selected remedy is \$430,000. This is a present worth cost, including 30 years of maintenance activities. After characterization and effectiveness of the remedy was evaluated, the actual operation and maintenance cost for the LAOCB and LAACB was assessed. The total actual operation and maintenance cost from project support and other post construction expense to fiscal year 2006 is \$698.

Table 3. Cap Performance for LAOCB (Cap completed 2/2001). Monitoring Wells LCO 6DL, LCO 7DL.

| LAOCB All the data (1994-2005) | | | | | |
|-----------------------------------|------------------|------------|---------|---------|-------------|
| Samples (N) | | STATION ID | | | |
| Analyte Name | Qualified Detect | LCO 5DL | LCO 6DL | LCO 7DL | Grand Total |
| Carbon-14 | ND | 5 | 3 | 8 | 16 |
| | yes | 1 | 7 | | 8 |
| Chloroform | ND | 3 | 13 | 11 | 27 |
| | yes | 5 | 2 | 1 | 8 |
| Chloromethane (Methylchloride) | ND | 1 | 9 | 6 | 16 |
| | yes | 5 | 4 | 6 | 15 |
| Promethium-147 | ND | 2 | 1 | 2 | 5 |
| | yes | | 1 | | 1 |
| Tetrachloroethylen (PCE) | ND | | 2 | 3 | 5 |
| | yes | 8 | 13 | 11 | 32 |
| Trichloroethylene (TCE) | ND | 1 | 7 | 7 | 15 |
| | yes | 6 | 6 | 5 | 17 |
| Tritium | ND | 1 | 1 | 1 | 3 |
| | yes | 8 | 15 | 13 | 36 |
| Uranium-233/234 | ND | 2 | 2 | 2 | 6 |
| Grand Total | | 48 | 86 | 76 | 210 |
| Max RESULT | | STATION ID | | | |
| Analyte Name | Qualified Detect | LCO 5DL | LCO 6DL | LCO 7DL | Site Max |
| Carbon-14 | yes | 383 | 32600 | | 32600 |
| Chloroform | yes | 0.21 | 0.21 | 0.06 | 0.21 |
| Chloromethane (Methylchloride) | yes | 9.1 | 3.22 | 3.15 | 9.1 |
| Promethium-147 | yes | | 17 | | 17 |
| Tetrachloroethylen (PCE) | yes | 21.5 | 15 | 8.75 | 21.5 |
| Trichloroethylene (TCE) | yes | 6.68 | 3.52 | 8.66 | 8.66 |
| Tritium | yes | 6.53 | 82.98 | 46.75 | 82.98 |

| Post Construction Data (2001 – 2005) | | | | |
|--|------------------|------------|---------|-------------|
| Samples (N) | | STATION ID | | |
| Analyte Name | Qualified Detect | LCO 6DL | LCO 7DL | Grand Total |
| Carbon-14 | ND | | 2 | 2 |
| | yes | 4 | | 4 |
| Chloroform | ND | 5 | 5 | 10 |
| Chloromethane (Methylchloride) | ND | 5 | 5 | 10 |
| Tetrachloroethylen (PCE) | ND | | 2 | 2 |
| | yes | 5 | 3 | 8 |
| Trichloroethylene (TCE) | ND | 4 | 2 | 6 |
| | yes | 1 | 3 | 4 |
| Tritium | yes | 6 | 5 | 11 |
| Grand Total | | 30 | 27 | 57 |
| | | | | |
| Max RESULT | | STATION ID | | |
| Analyte Name | Qualified Detect | LCO 6DL | LCO 7DL | Site Max |
| Carbon-14 | yes | 5850 | | 5850 |
| Tetrachloroethylen (PCE) | yes | 11.5 | 1.56 | 11.5 |
| Trichloroethylene (TCE) | yes | 0.17 | 0.53 | 0.53 |
| Tritium | yes | 20.9 | 2.77 | 20.9 |
| Grant Total | | 5850 | 2.77 | 5850 |
| The concentrations for COCs in the 2 active wells are lower or non-detect than earlier values at the site. | | | | |

XI. 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 the Land Use Control Assurance Plan (LUCAP), 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 United States Department of Energy (USDOE) controls the OU. These controls 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).

XII. Next Review

The next five-year review is scheduled for February 12, 2014.

ATTACHMENT 1

Documents Reviewed

WSRC-RP-97-178, *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)*, Revision 1, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

WSRC-RP-97-844, *Corrective Measures Implementation/Remedial Design Report/Remedial Action Work Plan (CMI/RDR/RAWP) for L-Area Oil and Chemical Basin (904-83G) (U)*, Revision 1.4, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

WSRC-RP-2001-4078, *Post-Construction Report (PCR)/Final Remediation Report (FRR) for the L-Area Oil and Chemical Basin Operable Unit (Bldg. 904-83G) (U)*, Revision 0, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC.

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ATTACHMENT 2

Five-Year Review Site Inspection Checklist

| I. SITE INFORMATION | | | | | | | | | | | | | | | |
|---|---|------------------------------------|---|--|--|--|--|--|---|---|--|---|--|--|--|
| Site Name: | L-Area Oil and Chemical Basin & L-Area Acid/Caustic Basin Operable Unit | Date of Inspection: | 9/10/2007 | | | | | | | | | | | | |
| Location and Region: | SRS, USEPA Region IV | EPA ID: | SC1890008989 | | | | | | | | | | | | |
| Agency, office, or company leading the five-year review: | United States Department of Energy | CERCLIS OU No.: | 17 | | | | | | | | | | | | |
| | | Weather/Temperature: | Clear and Sunny, 90°F | | | | | | | | | | | | |
| Remedy Includes: (Check all that apply) <table><tbody><tr><td><input checked="" type="checkbox"/> Cover System</td><td><input type="checkbox"/> Monitored Natural Attenuation</td></tr><tr><td><input type="checkbox"/> Access controls</td><td><input type="checkbox"/> Groundwater Containment</td></tr><tr><td><input checked="" type="checkbox"/> Institutional Controls</td><td><input type="checkbox"/> Vertical Barrier Walls</td></tr><tr><td><input type="checkbox"/> Groundwater pump and treatment</td><td></td></tr><tr><td><input type="checkbox"/> Surface water collection and treatment</td><td></td></tr><tr><td><input checked="" type="checkbox"/> Other: In-Situ Stabilization</td><td></td></tr></tbody></table> | | | | <input checked="" type="checkbox"/> Cover System | <input type="checkbox"/> Monitored Natural Attenuation | <input type="checkbox"/> Access controls | <input type="checkbox"/> Groundwater Containment | <input checked="" type="checkbox"/> Institutional Controls | <input type="checkbox"/> Vertical Barrier Walls | <input type="checkbox"/> Groundwater pump and treatment | | <input type="checkbox"/> Surface water collection and treatment | | <input checked="" type="checkbox"/> Other: In-Situ Stabilization | |
| <input checked="" type="checkbox"/> Cover System | <input type="checkbox"/> Monitored Natural Attenuation | | | | | | | | | | | | | | |
| <input type="checkbox"/> Access controls | <input type="checkbox"/> Groundwater Containment | | | | | | | | | | | | | | |
| <input checked="" type="checkbox"/> Institutional Controls | <input type="checkbox"/> Vertical Barrier Walls | | | | | | | | | | | | | | |
| <input type="checkbox"/> Groundwater pump and treatment | | | | | | | | | | | | | | | |
| <input type="checkbox"/> Surface water collection and treatment | | | | | | | | | | | | | | | |
| <input checked="" type="checkbox"/> Other: In-Situ Stabilization | | | | | | | | | | | | | | | |
| Attachments: <input type="checkbox"/> Inspection team roster attached <input type="checkbox"/> Site map attached | | | | | | | | | | | | | | | |
| II. INTERVIEWS (Check all that apply) | | | | | | | | | | | | | | | |
| 1. O & M site manager | | | | | | | | | | | | | | | |
| | (Name) _____ | (Title) _____ | (Date) _____ | | | | | | | | | | | | |
| Interviewed: | <input type="checkbox"/> at site | <input type="checkbox"/> at office | <input type="checkbox"/> by phone Phone No. _____ | | | | | | | | | | | | |
| Problems, suggestions: | <input type="checkbox"/> report attached _____ | | | | | | | | | | | | | | |
| 2. O & M staff | | | | | | | | | | | | | | | |
| | (Name) _____ | (Title) _____ | (Date) _____ | | | | | | | | | | | | |
| Interviewed: | <input type="checkbox"/> at site | <input type="checkbox"/> at office | <input type="checkbox"/> by phone Phone No. _____ | | | | | | | | | | | | |
| Problems, suggestions: | <input type="checkbox"/> report attached _____ | | | | | | | | | | | | | | |

Five-Year Review Site Inspection Checklist (Continued)

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: See Waste Unit Inspection and Maintenance, ER-SOP-019

Five-Year Review Site Inspection Checklist (Continued)

| | | | |
|---|--|-------------------------------------|-------|
| 2. Site-Specific Health and Safety Plan | | | |
| <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A | |
| <input type="checkbox"/> Contingency plan/emergency response plan <input type="checkbox"/> Readily available <input type="checkbox"/> Up to date x N/A | | | |
| Remarks: <u>Routine O&M activities do not require a SSHASP under 29 CFR 1910.1201, HAZWOPER.</u> | | | |
| 3. O & M and OSHA Training Records | | | |
| x Readily available | x Up to date | <input type="checkbox"/> N/A | |
| Remarks _____ | | | |
| 4. Permits and Service Agreements | | | |
| <input type="checkbox"/> Air discharge permit | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |
| <input type="checkbox"/> Effluent discharge | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |
| <input type="checkbox"/> Waste Disposal, POTW | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |
| <input type="checkbox"/> Other permits | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |
| Remarks _____ | | | |
| 5. Gas Generation Records | | | |
| <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A | |
| Remarks _____ | | | |
| 6. Settlement Monument Records | | | |
| <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A | |
| Remarks _____ | | | |
| 7. Groundwater Monitoring Records | | | |
| <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A | |
| Remarks _____ | | | |
| 8. Leachate Extraction Records | | | |
| <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A | |
| Remarks _____ | | | |
| 9. Discharge Compliance Records | | | |
| <input type="checkbox"/> Air | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |
| <input type="checkbox"/> Water (effluent) | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |
| Remarks _____ | | | |
| 10. Daily Access/Security Logs | | | |
| <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A | |
| Remarks _____ | | | |

Five-Year Review Site Inspection Checklist (Continued)

IV. O & M Costs

1. O & M Organization

- ☐ State in-house ☐ Contractor for State
☐ PRP in-house ☐ Contractor for PRP

x Other: SRS

2. O & M Cost Records

- ☐ Readily available ☐ Up to date ☐ Funding mechanism/agreement in place

x Other: Project cost data is summarized in Section X of attached review: WSRC-RP-2007-4063.

Total annual cost by year for review period if available

| | | | |
|------------|----------|------------|---|
| From _____ | To _____ | _____ | <input type="checkbox"/> Breakdown attached |
| (Date) | (Date) | Total cost | |
| From _____ | To _____ | _____ | <input type="checkbox"/> Breakdown attached |
| (Date) | (Date) | Total cost | |
| From _____ | To _____ | _____ | <input type="checkbox"/> Breakdown attached |
| (Date) | (Date) | Total cost | |
| From _____ | To _____ | _____ | <input type="checkbox"/> Breakdown attached |
| (Date) | (Date) | Total cost | |
| From _____ | To _____ | _____ | <input type="checkbox"/> Breakdown attached |
| (Date) | (Date) | Total cost | |

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

Describe costs and reasons: _____

V. ACCESS AND INSTITUTIONAL CONTROLS

x Applicable ☐ N/A

A. Fencing

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

Remarks _____

Five-Year Review Site Inspection Checklist (Continued)

B. Other Access Restrictions

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

Remarks: Signs at this site are in good condition.

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: Semi-Annually

Responsible party/agent: DOE Savannah River Field Office

Contact: W. G. Erickson Waste Area Group Manager 09/3/07 (803) 952-8408
(Name) (Title) (Date) (Phone No.)

Reporting 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

Five-Year Review Site Inspection Checklist (Continued)

| | |
|--|--------------|
| 3. Land use changes offsite <input checked="" type="checkbox"/> N/A | |
| Remarks _____ | |
| _____ | |
| VI. GENERAL SITE CONDITIONS | |
| A. Roads <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A | |
| 1. Roads damaged <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Roads adequate <input type="checkbox"/> N/A | |
| Remarks _____ | |
| _____ | |
| B. Other site Conditions | |
| Remarks _____ | |
| _____ | |
| VII. COVERS SYSTEMS <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A | |
| A. Soil Surface | |
| 1. Settlement (Low spots) <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Settlement not evident | |
| Areal extent _____ | Depth _____ |
| Remarks _____ | |
| _____ | |
| 2. Cracks <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Cracking not evident | |
| Lengths _____ | Widths _____ |
| Depths _____ | |
| Remarks _____ | |
| _____ | |
| 3. Erosion <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Erosion not evident | |
| Areal extent _____ | Depth _____ |
| Remarks _____ | |
| _____ | |
| 4. Holes <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Holes not evident | |
| Areal extent _____ | Depth _____ |
| Remarks _____ | |
| _____ | |
| 5. Vegetative Cover <input checked="" type="checkbox"/> Grass <input type="checkbox"/> Cover properly established <input checked="" type="checkbox"/> No signs of stress | |
| <input type="checkbox"/> Trees/shrubs (indicate size and location on a diagram) | |
| Remarks _____ | |
| _____ | |

Five-Year Review Site Inspection Checklist (Continued)

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

Remarks _____

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

Areal extent _____ Height _____

Remarks _____

8. **Wet Areas/Water Damage** x 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 x No evidence of slope instability

Areal extent _____

Remarks _____

- B. Benches** ☐ Applicable x 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 _____

Five-Year Review Site Inspection Checklist (Continued)

| | | |
|---|--|--|
| C. Letdown Channels <input type="checkbox"/> Applicable x 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 | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> No evidence of settlement |
| Areal extent _____ Depth _____ | | |
| Remarks _____ | | |
| 2. Material Degradation | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> No evidence of degradation |
| Material type _____ Areal extent _____ | | |
| Remarks _____ | | |
| 3. Erosion | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> No evidence of erosion |
| Areal extent _____ Depth _____ | | |
| Remarks _____ | | |
| 4. Undercutting | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> No evidence of undercutting |
| Areal extent _____ Depth _____ | | |
| Remarks _____ | | |
| 5. Obstructions | Type _____ | <input type="checkbox"/> No obstructions |
| <input type="checkbox"/> Location shown on site map | Areal extent _____ | Size _____ |
| Remarks _____ | | |
| 6. Excessive Vegetative Growth | Type _____ | |
| <input type="checkbox"/> No evidence of excessive growth | <input type="checkbox"/> Vegetation in channels does not obstruct flow | |
| <input type="checkbox"/> Location shown on site map | Areal extent _____ | |
| Remarks _____ | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | | |
|--|--|---|---|
| D. Cover Penetrations <input type="checkbox"/> Applicable x N/A | | | |
| 1. Gas Vents <input type="checkbox"/> Active <input type="checkbox"/> Passive | | | |
| <input type="checkbox"/> Properly secured/locked | <input type="checkbox"/> Functioning | <input type="checkbox"/> Routinely sampled | <input type="checkbox"/> Good condition |
| <input type="checkbox"/> Evidence of leakage at penetration | <input type="checkbox"/> Needs Maintenance | <input type="checkbox"/> N/A | |
| Remarks _____ | | | |
| | | | |
| 2. Gas Monitoring Probes | | | |
| <input type="checkbox"/> Properly secured/locked | <input type="checkbox"/> Functioning | <input type="checkbox"/> Routinely sampled | <input type="checkbox"/> Good condition |
| <input type="checkbox"/> Evidence of leakage at penetration | <input type="checkbox"/> Needs Maintenance | <input type="checkbox"/> N/A | |
| Remarks _____ | | | |
| | | | |
| 3. Monitoring Wells | | | |
| <input type="checkbox"/> Properly secured/locked | <input type="checkbox"/> Functioning | <input type="checkbox"/> Routinely sampled | <input type="checkbox"/> Good condition |
| <input type="checkbox"/> Evidence of leakage at penetration | <input type="checkbox"/> Needs Maintenance | <input type="checkbox"/> N/A | |
| Remarks _____ | | | |
| | | | |
| 4. Leachate Extraction Wells | | | |
| <input type="checkbox"/> Properly secured/locked | <input type="checkbox"/> Functioning | <input type="checkbox"/> Routinely sampled | <input type="checkbox"/> Good condition |
| <input type="checkbox"/> Evidence of leakage at penetration | <input type="checkbox"/> Needs Maintenance | <input type="checkbox"/> N/A | |
| Remarks _____ | | | |
| | | | |
| 5. Settlement Monuments <input type="checkbox"/> Located <input type="checkbox"/> Routinely surveyed <input type="checkbox"/> N/A | | | |
| Remarks _____ | | | |
| | | | |
| E. Gas Collection and Treatment <input type="checkbox"/> Applicable x N/A | | | |
| 1. Gas Treatment Facilities | | | |
| <input type="checkbox"/> Flaring | <input type="checkbox"/> Thermal destruction | <input type="checkbox"/> Collection for reuse | |
| <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance | | |
| Remarks _____ | | | |
| | | | |
| 2. Gas Collection Wells, Manifolds and Piping | | | |
| <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance | | |
| Remarks _____ | | | |
| | | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | | |
|--|--|--|--|
| 3. Gas Monitoring Facilities (e.g., gas monitoring of adjacent homes or buildings) <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A Remarks _____ _____ | | | |
| F. Cover Drainage Layer <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A | | | |
| 1. Outlet Pipes Inspected <input type="checkbox"/> Functioning <input type="checkbox"/> N/A Remarks _____ _____ | | | |
| 2. Outlet Rock Inspected <input type="checkbox"/> Functioning <input type="checkbox"/> N/A Remarks _____ _____ | | | |
| G. Detention/sedimentation Ponds <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A | | | |
| 1. Siltation Areal extent _____ Depth _____ <input type="checkbox"/> N/A <input type="checkbox"/> Siltation not evident Remarks _____ _____ | | | |
| 2. Erosion Areal extent _____ Depth _____ <input type="checkbox"/> N/A <input type="checkbox"/> Erosion not evident Remarks _____ _____ | | | |
| 3. Outlet Works <input type="checkbox"/> Functioning <input type="checkbox"/> N/A Remarks _____ _____ | | | |
| 4. Dam <input type="checkbox"/> Functioning <input type="checkbox"/> N/A Remarks _____ _____ | | | |
| H. Retaining Walls <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A | | | |
| 1. Deformations <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Deformation not evident Horizontal displacement _____ Vertical displacement _____ Rotational displacement _____ Remarks _____ _____ | | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | |
|--|---|--|
| 2. Degradation | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> Deformation not evident |
| Remarks _____ | | |
| I. Perimeter Ditches/Off-Site Discharge <input type="checkbox"/> Applicable x N/A | | |
| 1. Siltation | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> Siltation not evident |
| Areal extent _____ Depth _____ | | |
| Remarks _____ | | |
| 2. Vegetative Growth | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> Siltation not evident |
| <input type="checkbox"/> Vegetation does not impede flow | | |
| Areal extent _____ Type _____ | | |
| Remarks _____ | | |
| 3. Erosion | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> Erosion not evident |
| Areal extent _____ Depth _____ | | |
| Remarks _____ | | |
| 4. Discharge Structure | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> N/A |
| Remarks _____ | | |
| VIII. VERTICAL BARRIER WALLS <input type="checkbox"/> Applicable x N/A | | |
| 1. Settlement | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> Settlement not evident |
| Areal extent _____ Depth _____ | | |
| Remarks _____ | | |
| 2. Performance Monitoring | Type of Monitoring _____ | <input type="checkbox"/> Performance not monitored |
| Frequency _____ <input type="checkbox"/> Evidence of breaching Head differential _____ | | |
| Remarks _____ | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | | |
|---|--|--|---|
| IX. GROUNDWATER/SURFACE WATER REMEDIES | | <input checked="" type="checkbox"/> Applicable | <input type="checkbox"/> N/A |
| A. Groundwater Extraction Wells, Pumps, and Pipelines | | <input type="checkbox"/> Applicable | <input checked="" type="checkbox"/> N/A |
| 1. Pumps, Wellhead Plumbing, and Electrical <input type="checkbox"/> Good condition <input type="checkbox"/> All required wells located <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A Remarks _____ _____ | | | |
| 2. Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____ _____ | | | |
| 3. Spare Parts and Equipment <input type="checkbox"/> Readily available <input type="checkbox"/> Good condition <input type="checkbox"/> Requires upgrade <input type="checkbox"/> Needs to be provided Remarks _____ _____ | | | |
| B. Surface Water Collection Structures, Pumps, and Pipelines | | <input type="checkbox"/> Applicable | <input checked="" type="checkbox"/> N/A |
| 1. Collection Structures, Pumps, and Electrical <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____ _____ | | | |
| 2. Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____ _____ | | | |
| 3. Spare Parts and Equipment <input type="checkbox"/> Readily available <input type="checkbox"/> Good condition <input type="checkbox"/> Requires upgrade <input type="checkbox"/> Needs to be provided Remarks _____ _____ | | | |

Five-Year Review Site Inspection Checklist (Continued)

| C. Treatment System | <input type="checkbox"/> Applicable | <input checked="" type="checkbox"/> N/A |
|--|--|--|
| 1. Treatment Train (Check components that apply) | | |
| <input type="checkbox"/> Metals removal | <input type="checkbox"/> Oil/water separation | <input type="checkbox"/> Bioremediation |
| <input type="checkbox"/> Air stripping | <input type="checkbox"/> Carbon adsorbers | |
| <input type="checkbox"/> Filters | | |
| <input type="checkbox"/> Additive (e.g., chelation agent, flocculent) | | |
| <input type="checkbox"/> Others | | |
| <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance | |
| <input type="checkbox"/> Sampling ports properly marked and functional | | |
| <input type="checkbox"/> Sampling/maintenance log displayed and up to date | | |
| <input type="checkbox"/> Equipment properly identified | | |
| <input type="checkbox"/> Quantity of groundwater treated annually | | |
| <input type="checkbox"/> Quantity of surface water treated annually | | |
| Remarks | | |
| 2. Electrical Enclosures and Panels (properly rated and functional) | | |
| <input type="checkbox"/> N/A | <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance |
| Remarks | | |
| 3. Tanks, Vaults, Storage Vessels | | |
| <input type="checkbox"/> N/A | <input type="checkbox"/> Good condition | <input type="checkbox"/> Proper secondary containment <input type="checkbox"/> Needs Maintenance |
| Remarks | | |
| 4. Discharge Structure and Appurtenances | | |
| <input type="checkbox"/> N/A | <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance |
| Remarks | | |
| 5. Treatment Building(s) | | |
| <input type="checkbox"/> N/A | <input type="checkbox"/> Good condition (esp. roof and doorways) | <input type="checkbox"/> Needs repair |
| <input type="checkbox"/> Chemicals and equipment properly stored | | |
| Remarks | | |

Five-Year Review Site Inspection Checklist (Continued)

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

Remarks: Monitoring data evaluates the effectiveness of the cover system

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 and capping for the LAOCB soil and in-situ stabilization and disposal for the LAOCB pipeline, to provide a permanent reduction in contaminant mobility and potential future impacts to groundwater.

The remedies are functioning as designed because in-situ stabilization is treating the PTSM and a soil cover with institutional controls will provide access controls.

Five-Year Review Site Inspection Checklist (Continued)

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.

N/A

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L- AND C- AREA REACTOR SEEPAGE BASINS (904-67G AND 904-64G) OPERABLE UNITS

I. Introduction

This is the first five-year review for the L- Area Reactor Seepage Basins (LRSB) and C- Area Reactor Seepage Basin (CSRB) Operable Unit (OU). This review was conducted from August 2007 through September 2007. This report documents the results of the review.

II. OU Chronology

Table 1 lists the chronology of site events for the LRSB and CSRB OUs.

Table 1. Chronology of OU Events

| Event | Date |
|---|-------------------|
| Plug-In Record of Decision (ROD) | November 29, 1999 |
| CSRB Explanation of Significant Difference (ESD) Issuance | August 3, 2000 |
| C&L RSB ROD Amendment | October 23, 2002 |
| Remedial Action Start | April 22, 2003 |
| Previous Five-Year Reviews | None |

III. Background

L-Area Reactor Seepage Basins

Physical Characteristics

The LRSB OU is located in the central portion of Savannah River Site (SRS), southeast of the L-Reactor facility (Figure 1). The unit includes the basin, concrete pad, buffer area, perimeter, and process sewer line. The LRSB is located in an industrial zone identified in the proposed SRS future land use map of the SRS Federal Facility Agreement (FFA) Implementation Plan. The basin is adjacent to a nuclear facility and has been selected to remain an industrial use area.



The LRSB is an L-shaped unlined earthen basin with dimensions of 200 ft on each outer side of the L-shape, 36 ft in width, and 7 ft in depth (Figure 2). The basin has not been backfilled to grade and is currently open.

Land and Resource Use

The LRSB OU is located in an industrial area. The future land use for LRSB OU is anticipated to remain industrial.

History of Contamination

A process sewer line that is approximately 450 ft long extends from the disassembly basin with the L-Reactor facility to the discharge point at the north end of the basin. In 1958, the process sewer line began conveying low-level radioactive purge water from the L-Area Reactor disassembly basin to the seepage basin. The LRSB received purge water from 1958 to 1968 and from 1985 to 1988. The L-Area Reactor was not in operation from 1969 to 1984 and no purge water was generated. However, from 1985 to 1988, mixed-bed deionizers and sand filters intercepted the purge water before it was discharged into the LRSB. In 1988, L Reactor was placed on warm standby; in 1993, it was placed in shutdown status and has not been restarted.

The LRSB has been contaminated with radionuclides from past activities at SRS. The cumulative radiological risk to the industrial worker from the LRSB is 3×10^{-3} . Radiological risk assessments for humans are more conservative than ecological health risk assessments. Therefore, only human health risk evaluations were considered. At LRSB, the primary contaminant remaining in the basin soil is cobalt-60, which has a half-life of 5.27 years. Currently, the level of contamination in the soil at the LRSB creates a risk in excess of 1×10^{-3} ; that is, it may cause one additional incidence of cancer in every 1,000 people that become exposed to the radionuclides. This level of contamination is considered potential threat source material (PTSM). No other contaminant exceeded the PTSM threshold. PTSM is present to a depth of 1 ft in LRSB.

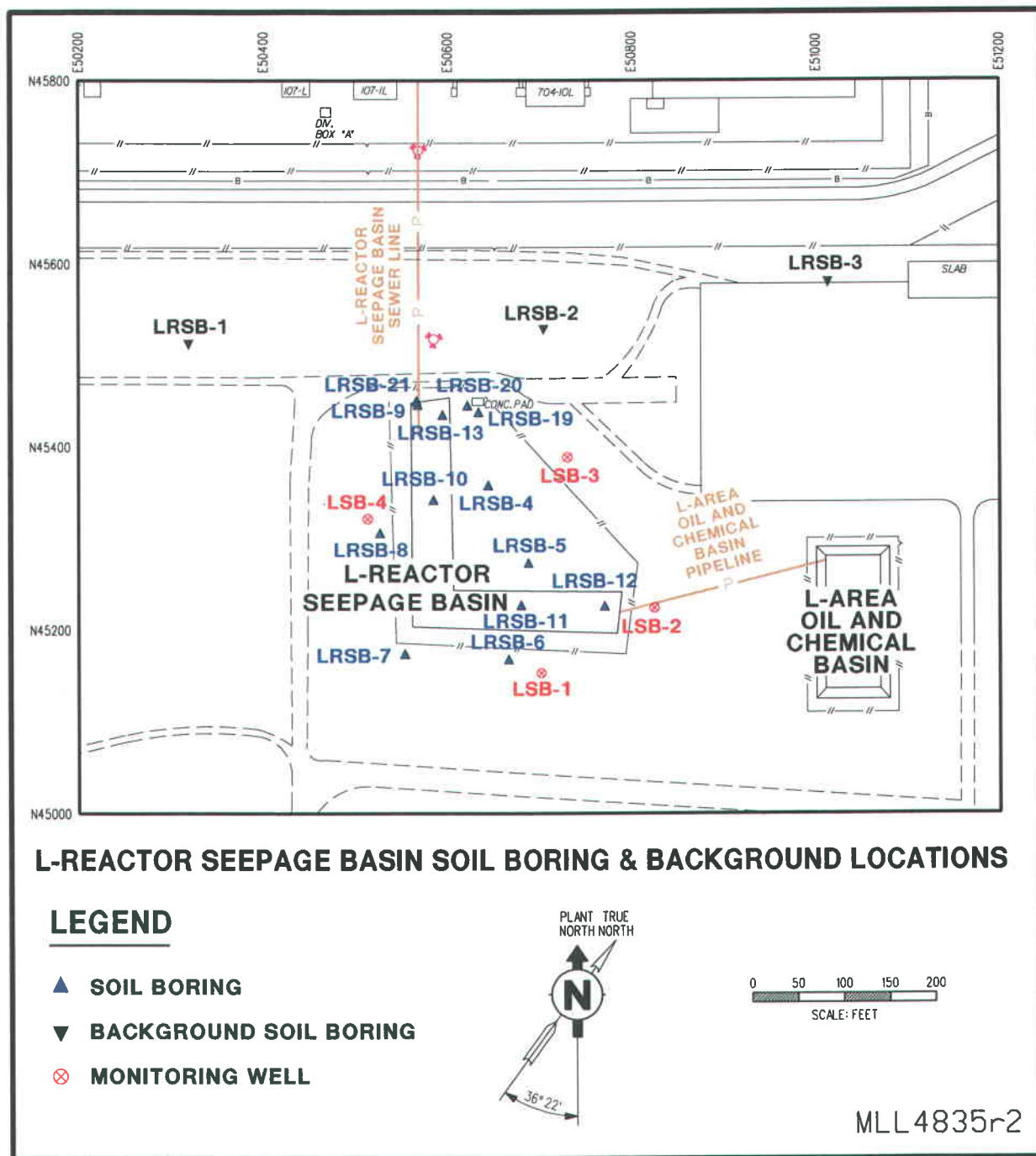


Figure 2. Layout of the LRSB

Additionally, at the LRSB, strontium-90 was detected at depth (7 to 10 ft below land surface [bls]) in the buffer area at a concentration (4.8 pCi/g) approximately equal to the average strontium-90 concentration in the basin (4.03 pCi/g). Strontium-90 is not in contact with the groundwater. Because strontium-90 was identified as a potential threat to future groundwater due to migration through the basin soils, it is also identified as a contaminant migration concern for the buffer area.

C-Area Reactor Seepage Basins

Physical Characteristics

The CRSB OU is located in the central portion of SRS in the western portion of C Area (Figure 1). Three unlined (earthen) basins constructed in 1957 comprise the CRSB OU. The basins are in an open fenced area with sparse vegetative cover. Basin #1 is L-shaped and was constructed with an approximate outside dimension of 250 by 35 ft in the north-south direction, approximately 180 by 35 ft in the east-west direction, and a depth of 7 ft bls. Basin #2 was constructed with an approximate outside dimension of 300 x 60 ft and a depth of 11 ft bls. Basin #3 was constructed with approximate outside dimensions of 180 x 90 ft and a depth of 12 ft bls (Figure 3). The ground slopes southwestward toward an unnamed tributary of Fourmile Branch approximately 600 ft to SRS west. Groundwater beneath CRSB is not included as a subunit of this OU. Groundwater will be evaluated within the C-Area Groundwater OU.

Land and Resource Use

The CRSB OU is located in an industrial area. The future land use for CRSB OU is anticipated to remain industrial.

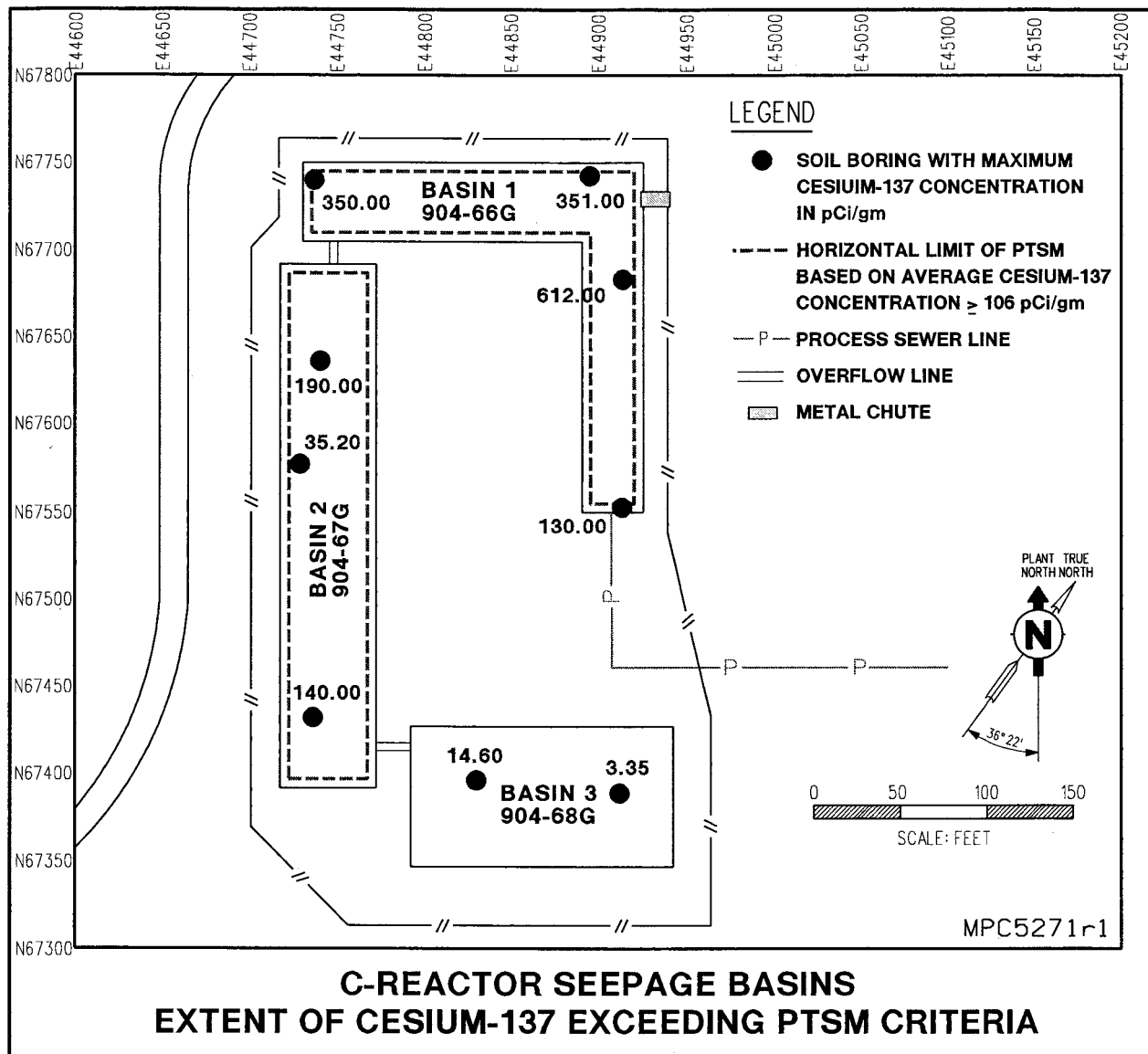


Figure 3. Layout of the CRSB

History of Contamination

The seepage basins were used from 1959 to 1970 to dispose of low-level radioactive process purge water from the reactor disassembly basin. In 1963, disassembly basin wastewater was deionized and filtered prior to discharge, which reduced radioactivity and removed solids and sludges. The seepage basins were not used from 1971 to 1977 while purge water was mixed with large volumes of heat exchanger cooling water and discharged to area streams. After improvements for processing disassembly basin water, purge water discharges to the seepage basins resumed in 1978. The C-Reactor was shut down for repairs in 1985, placed on cold standby in 1987, and followed by shutdown. The seepage basins have not received wastewater since 1986.

IV. Remedial Actions

Remedy Selection

The plug-in strategy established a common remedy to be used for OUs that have similar histories and similar characteristics. The approved Technical Evaluation Report and Explanation of Significant Difference for the CRSB and Technical Evaluation Report and amended plug-in Proposed Plan for the LRSB documented that the basins meet the plug-in criteria. Because the CRSB and LRSB meet all plug-in criteria, components of the plug-in remedy will be used at the CRSB and LRSB.

Remedy Implementation

The original selected remedy in the plug-in ROD consists of institutional controls, in situ stabilization of PTSM, a low-permeability soil cover system, consolidation of contaminated soil, and grouting of pipelines. Table 2 compares the original plug-in remedy with the amended remedy as applied at the LRSB and CRSB basin #2.

Table 2. Expected Outcome for Each Alternative

| Components of the Original Plug-in remedy | Amended Remedy for LRSB | Amended Remedy for Basin #2 at CRSB |
|--|--|--|
| In situ stabilization to stabilize PTSM | In situ stabilization will not be performed. USDOE will continue to own and operate the SRS for as long as PTSM is present (through the year 2006) and will provide access controls to prevent exposure to the current PTSM. | In situ stabilization will not be performed. USDOE will continue to own and operate the SRS for as long as PTSM is present (through the year 2002) in Basin #2 and will provide access controls to prevent exposure to the current PTSM. |
| Land use controls (institutional control) to prevent disturbance of the cover system and excavation of the PTSM. Residential or agricultural use of the area will be prohibited. | In addition, a fence will be erected around the LRSB for the time period that the contaminated soil would be considered PTSM, and warning signs will be posted. | In addition, a fence will be erected around the CRSB basin #2 for the time period that the contaminated soil would be considered PTSM, and warning signs will be posted. |
| Contaminated Soil Consolidation and pipeline grouting | No change from the Plug-in-ROD. | No change from the plug-in ROD. |
| Soil Cover System | No change from the Plug-in-ROD. | No change from the plug-in-ROD. |

The amended remedy is identical to the plug-in remedy in all respects except for the following:

1. PTSM will not require in situ stabilization when it can be demonstrated that the radioactive contamination will naturally decay to a level that no longer poses a 1×10^{-3} risk to future industrial workers within a short time period during which the United States Department of Energy (USDOE) will likely continue to own and operate SRS.
2. A fence and warning signs will be placed around the LRSB and CRSB basin #2 until the risk posed has been reduced to below 1×10^{-3} for future industrial workers.

The amended remedy eliminates in situ stabilization from the original remedy. In situ stabilization by grouting will be performed to treat the PTSM soils in basin #1 only of the CRSB OU. No stabilization will be performed on the PTSM soils in basin #2 of

the CRSB OU or LRSB OU. No stabilization will be performed in basin #3 of the CRSB OU because the soils are not considered to be PTSM.

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
- Inspected the unit to confirm protectiveness of the remedial action
- Reviewed changes in standards and to-be-considered guidance
- Reviewed data to verify that the PTSM has radioactively decayed to less than 1×10^{-3} risk

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 LRSB and CRSB basin #2 have PTSM based on the concentrations of cobalt-60 and cesium-137 respectively. The risk from PTSM reduced over time due to radioactive decay to below of 1×10^{-3} in the year 2006 for LRSB and 2002 for CRSB basin #2.

- The assumptions used at the time of the Amended Plug-in remedy selection are still valid.
- No other 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.

X. Project Costs

Costs associated with the selected remedy for LRSB and CRSB include operation and maintenance costs of the cover and institutional controls. The estimated operation and maintenance cost associated with the selected remedy is \$988,530 which was discounted at 3.9% per year. This is a present worth cost, including 30 years of maintenance activities. After characterization and effectiveness of the remedy were evaluated, the actual operation and maintenance cost for the LRSB and CRSB was assessed. The total actual operation and maintenance cost from project support and other post construction expense to fiscal year 2006 is \$108,079.

XI. Protectiveness Statement(s)

The implementation of the remedial action is protective of human health and the environment because the PTSM in the LRSB and in CRSB Basin #2 has radioactively decayed to levels that no longer pose a 1×10^{-3} risk to future industrial workers in 2002 for CRSB Basin #2 and in 2006 for LRSB. While the LRSB and CRSB Basin #2 pose a risk of 1×10^{-3} or more, access controls, site use controls at SRS, low permeability soil

cover, and a fence with warning signs surrounding the LRSB and CRSB Basin #2 were used to effectively protect human health and the environment.

XII. Next Review

The next five-year review is scheduled for February 12, 2014.

ATTACHMENT 1

List of Documents Reviewed

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

WSRC-RP-2000-4032, *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)*, Revision 1.1, Savannah River Site, Westinghouse Savannah River Company, Aiken, SC

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

WSRC-RP-2002-4063, *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)*, Revision 1, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

ATTACHMENT 2

Five-Year Review Site Inspection Checklist

| I. SITE INFORMATION | | | |
|--|--|------------------------------------|--|
| Site Name: | L-Area Reactor Seepage Basins (904-64G) Operable Unit (OU) and C-Area Reactor Seepage Basin (904-67G) Operable Unit (OU) | Date of Inspection: | 9/10/2007 |
| Location and Region: | Savannah River Site, USEPA IV | EPA ID: | SC1890008989 |
| Agency, office, or company leading the five-year review: | United States Department of Energy | CERCLIS OU No.: | 65 |
| | | Weather/Temperature: | clear and sunny, 88°F |
| Remedy Includes: (Check all that apply) | | | |
| <input checked="" type="checkbox"/> Cover System <input type="checkbox"/> Monitored Natural Attenuation | | | |
| <input checked="" type="checkbox"/> Access controls <input type="checkbox"/> Groundwater Containment | | | |
| <input checked="" type="checkbox"/> Institutional Controls <input type="checkbox"/> Vertical Barrier Walls | | | |
| <input type="checkbox"/> Groundwater pump and treatment | | | |
| <input type="checkbox"/> Surface water collection and treatment | | | |
| <input type="checkbox"/> Other | | | |
| _____ | | | |
| _____ | | | |
| _____ | | | |
| Attachments: <input type="checkbox"/> Inspection team roster attached <input type="checkbox"/> Site map attached | | | |
| II. INTERVIEWS (Check all that apply) | | | |
| 1. O & M site manager | | | |
| | _____ (Name) | _____ (Title) | _____ (Date) |
| Interviewed: | <input type="checkbox"/> at site | <input type="checkbox"/> at office | <input type="checkbox"/> by phone Phone No. _____ |
| Problems, suggestions: | <input type="checkbox"/> report attached _____ | | |
| _____ | | | |
| 2. O & M staff | | | |
| | _____ (Name) | _____ (Title) | _____ (Date) |
| Interviewed: | <input type="checkbox"/> at site | <input type="checkbox"/> at office | <input type="checkbox"/> by phone Phone No. _____ |
| Problems, suggestions: | <input type="checkbox"/> report attached _____ | | |
| _____ | | | |

Five-Year Review Site Inspection Checklist for LRSB (Continued)

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 _____

Five-Year Review Site Inspection Checklist for LRSB (Continued)

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: See Waste Unit Inspection and Maintenance, ER-SOP-019

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: Routine O&M activities do not require a SSHASP under 29 CFR 1910.1201, HAZWOPER

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: _____

Five-Year Review Site Inspection Checklist for LRSB (Continued)

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: Project cost data is summarized in Section X of attached review: WSRC-RP-2007-4063

Total annual cost by year for review period if available

| | | | |
|--------------------|------------------|------------|---|
| From _____ Date | To _____ Date | _____ | <input type="checkbox"/> Breakdown attached |
| | | Total cost | |
| From _____ Date | To _____ Date | _____ | <input type="checkbox"/> Breakdown attached |
| | | Total cost | |
| From _____ Date | To _____ Date | _____ | <input type="checkbox"/> Breakdown attached |
| | | Total cost | |
| From _____ Date | To _____ Date | _____ | <input type="checkbox"/> Breakdown attached |
| | | Total cost | |
| From _____ Date | To _____ Date | _____ | <input type="checkbox"/> Breakdown attached |
| | | Total cost | |

Five-Year Review Site Inspection Checklist for LRSB (Continued)

3. 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 at this site are in good condition.

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: Annually

Responsible party/agent: WSRC

Contact: W. G. Erickson Waste Area Group Manager 09/3/07 (803) 952-8408
(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

Five-Year Review Site Inspection Checklist for LRSB (Continued)

| | | | |
|---|--|--|------------------------------|
| 2. Adequacy | <input checked="" type="checkbox"/> ICs are adequate | <input type="checkbox"/> ICs are inadequate | <input type="checkbox"/> N/A |
| Remarks _____ | | | |
| D. General | | | |
| 1. Vandalism/trespassing | <input type="checkbox"/> Location shown on site map | <input checked="" type="checkbox"/> No vandalism evident | |
| Remarks _____ | | | |
| 2. Land use changes onsite | <input checked="" type="checkbox"/> N/A | | |
| Remarks _____ | | | |
| 3. Land use changes offsite | <input checked="" type="checkbox"/> N/A | | |
| Remarks _____ | | | |
| VI. GENERAL SITE CONDITIONS | | | |
| A. Roads | <input checked="" type="checkbox"/> Applicable | <input type="checkbox"/> N/A | |
| 1. Roads damaged | <input type="checkbox"/> Location shown on site map | <input checked="" type="checkbox"/> Roads adequate | <input type="checkbox"/> N/A |
| Remarks _____ | | | |
| B. Other site Conditions | | | |
| Remarks _____ | | | |
| _____ | | | |
| _____ | | | |
| VII. COVER SYSTEMS | | | |
| <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A | | | |
| A. Soil Surface | | | |
| 1. Settlement (Low spots) | <input type="checkbox"/> Location shown on site map | <input checked="" type="checkbox"/> Settlement not evident | |
| Areal extent _____ | Depth _____ | | |
| Remarks _____ | | | |
| 2. Cracks | <input type="checkbox"/> Location shown on site map | <input checked="" type="checkbox"/> Cracking not evident | |
| Lengths _____ | Widths _____ | Depths _____ | |
| Remarks _____ | | | |

Five-Year Review Site Inspection Checklist for LRSB (Continued)

| | | |
|---|---|--|
| 3. Erosion | <input type="checkbox"/> Location shown on site map | <input checked="" type="checkbox"/> Erosion not evident |
| Areal extent _____ Depth _____ | | |
| Remarks _____ | | |
| 4. Holes | <input type="checkbox"/> Location shown on site map | <input checked="" type="checkbox"/> Holes not evident |
| Areal extent _____ Depth _____ | | |
| Remarks _____ | | |
| 5. Vegetative Cover | <input checked="" type="checkbox"/> Grass <input type="checkbox"/> Cover properly established | <input checked="" type="checkbox"/> No signs of stress |
| <input type="checkbox"/> Trees/shrubs (indicate size and location on a diagram) | | |
| Remarks _____ | | |
| 6. Alternative Cover (armored rock, concrete, etc.) | <input checked="" type="checkbox"/> N/A | |
| Remarks _____ | | |
| 7. Bulges | <input type="checkbox"/> Location shown on site map | <input checked="" type="checkbox"/> Bulges not evident |
| Areal extent _____ Height _____ | | |
| Remarks _____ | | |
| 8. Wet Areas/Water Damage | <input checked="" type="checkbox"/> Wet areas/water damage not evident | |
| <input type="checkbox"/> Wet Areas | <input type="checkbox"/> Location shown on site map | Areal extent _____ |
| <input type="checkbox"/> Ponding | <input type="checkbox"/> Location shown on site map | Areal extent _____ |
| <input type="checkbox"/> Seeps | <input type="checkbox"/> Location shown on site map | Areal extent _____ |
| <input type="checkbox"/> Soft subgrade | <input type="checkbox"/> Location shown on site map | Areal extent _____ |
| Remarks _____ | | |
| 9. Slope Instability | <input type="checkbox"/> Slides <input type="checkbox"/> Location shown on site map | <input checked="" type="checkbox"/> No evidence of slope instability |
| Areal extent _____ | | |
| Remarks _____ | | |

Five-Year Review Site Inspection Checklist for LRSB (Continued)

| | | |
|---|---|--|
| B. Benches <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> 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 | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> N/A or okay Remarks _____ |
| 2. Bench Breached | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> N/A or okay Remarks _____ |
| 3. Bench Overtopped | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> N/A or okay Remarks _____ |
| C. Letdown Channels <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> 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 | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> No evidence of settlement Areal extent _____ Depth _____ Remarks _____ |
| 2. Material Degradation | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> No evidence of degradation Material type _____ Areal extent _____ Remarks _____ |
| 3. Erosion | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> No evidence of erosion Areal extent _____ Depth _____ Remarks _____ |
| 4. Undercutting | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> No evidence of undercutting Areal extent _____ Depth _____ Remarks _____ |

Five-Year Review Site Inspection Checklist for LRSB (Continued)

| | | | |
|--|--|--|--|
| 5. Obstructions | | Type _____ | <input type="checkbox"/> No obstructions |
| <input type="checkbox"/> Location shown on site map | | Areal extent _____ | |
| Size _____ | | | |
| Remarks _____ | | | |
| 6. Excessive Vegetative Growth | | Type _____ | |
| <input type="checkbox"/> No evidence of excessive growth | | | |
| <input type="checkbox"/> Vegetation in channels does not obstruct flow | | | |
| <input type="checkbox"/> Location shown on site map | | Areal extent _____ | |
| Remarks _____ | | | |
| D. Cover Penetrations | | <input type="checkbox"/> Applicable | <input checked="" type="checkbox"/> N/A |
| 1. Gas Vents | | <input type="checkbox"/> Active | <input type="checkbox"/> Passive |
| <input type="checkbox"/> Properly secured/locked | <input type="checkbox"/> Functioning | <input type="checkbox"/> Routinely sampled | <input type="checkbox"/> Good condition |
| <input type="checkbox"/> Evidence of leakage at penetration | <input type="checkbox"/> Needs Maintenance | <input type="checkbox"/> N/A | |
| Remarks _____ | | | |
| 2. Gas Monitoring Probes | | | |
| <input type="checkbox"/> Properly secured/locked | <input type="checkbox"/> Functioning | <input type="checkbox"/> Routinely sampled | <input type="checkbox"/> Good condition |
| <input type="checkbox"/> Evidence of leakage at penetration | <input type="checkbox"/> Needs Maintenance | <input type="checkbox"/> N/A | |
| Remarks _____ | | | |
| 3. Monitoring Wells | | | |
| <input type="checkbox"/> Properly secured/locked | <input type="checkbox"/> Functioning | <input type="checkbox"/> Routinely sampled | <input type="checkbox"/> Good condition |
| <input type="checkbox"/> Evidence of leakage at penetration | <input type="checkbox"/> Needs Maintenance | <input type="checkbox"/> N/A | |
| Remarks _____ | | | |
| 4. Leachate Extraction Wells | | | |
| <input type="checkbox"/> Properly secured/locked | <input type="checkbox"/> Functioning | <input type="checkbox"/> Routinely sampled | <input type="checkbox"/> Good condition |
| <input type="checkbox"/> Evidence of leakage at penetration | <input type="checkbox"/> Needs Maintenance | <input type="checkbox"/> N/A | |
| Remarks _____ | | | |

Five-Year Review Site Inspection Checklist for LRSB (Continued)

| | | |
|--|--|--|
| 5. Settlement Monuments <input type="checkbox"/> Located <input type="checkbox"/> Routinely surveyed <input type="checkbox"/> N/A | | |
| Remarks _____ | | |
| E. Gas Collection and Treatment <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A | | |
| 1. Gas Treatment Facilities | | |
| <input type="checkbox"/> Flaring <input type="checkbox"/> Thermal destruction <input type="checkbox"/> Collection for reuse | | |
| <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance | | |
| Remarks _____ | | |
| 2. Gas Collection Wells, Manifolds and Piping | | |
| <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance | | |
| Remarks _____ | | |
| 3. Gas Monitoring Facilities (e.g., gas monitoring of adjacent homes or buildings) | | |
| <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A | | |
| Remarks _____ | | |
| F. Cover Drainage Layer <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A | | |
| 1. Outlet Pipes Inspected <input type="checkbox"/> Functioning <input type="checkbox"/> N/A | | |
| Remarks _____ | | |
| 2. Outlet Rock Inspected <input type="checkbox"/> Functioning <input type="checkbox"/> N/A | | |
| Remarks _____ | | |
| G. Detention/sedimentation Ponds <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A | | |
| 1. Siltation Areal extent _____ Depth _____ <input type="checkbox"/> N/A | | |
| <input type="checkbox"/> Siltation not evident | | |
| Remarks _____ | | |

Five-Year Review Site Inspection Checklist for LRSB (Continued)

| | | | |
|--|---|--|------------------------------|
| 2. Erosion | Areal extent _____ | Depth _____ | <input type="checkbox"/> N/A |
| <input type="checkbox"/> Erosion not evident | | | |
| Remarks _____ | | | |
| 3. Outlet Works | <input type="checkbox"/> Functioning | <input type="checkbox"/> N/A | |
| Remarks _____ | | | |
| 4. Dam | <input type="checkbox"/> Functioning | <input type="checkbox"/> N/A | |
| Remarks _____ | | | |
| H. Retaining Walls <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A | | | |
| 1. Deformations | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> Deformation not evident | |
| Horizontal displacement _____ | | Vertical displacement _____ | |
| Rotational displacement _____ | | | |
| Remarks _____ | | | |
| 2. Degradation | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> Deformation not evident | |
| Remarks _____ | | | |
| I. Perimeter Ditches/Off-Site Discharge <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A | | | |
| 1. Siltation | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> Siltation not evident | |
| Areal extent _____ | | Depth _____ | |
| Remarks _____ | | | |
| 2. Vegetative Growth | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> Siltation not evident | |
| <input type="checkbox"/> Vegetation does not impede flow | | | |
| Areal extent _____ | | Type _____ | |
| Remarks _____ | | | |
| 3. Erosion | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> Erosion not evident | |
| Areal extent _____ | | Depth _____ | |
| Remarks _____ | | | |

Five-Year Review Site Inspection Checklist for LRSB (Continued)

| | | | |
|---|--|---|---|
| 4. Discharge Structure | | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> N/A |
| Remarks _____ | | | |
| VIII. VERTICAL BARRIER WALLS | | | |
| | | <input type="checkbox"/> Applicable | <input checked="" type="checkbox"/> N/A |
| 1. Settlement | | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> Settlement not evident |
| Areal extent _____ | | Depth _____ | |
| Remarks _____ | | | |
| 2. Performance Monitoring | | Type of Monitoring _____ | |
| <input type="checkbox"/> Performance not monitored | | | |
| Frequency _____ | | <input type="checkbox"/> Evidence of breaching | |
| Head differential _____ | | | |
| Remarks _____ | | | |
| IX. GROUNDWATER/SURFACE WATER REMEDIES | | | |
| | | <input type="checkbox"/> Applicable | <input checked="" type="checkbox"/> N/A |
| A. Groundwater Extraction Wells, Pumps, and Pipelines | | <input type="checkbox"/> Applicable | <input type="checkbox"/> N/A |
| 1. Pumps, Wellhead Plumbing, and Electrical | | | |
| <input type="checkbox"/> Good condition | | <input type="checkbox"/> All required wells located | <input type="checkbox"/> Needs Maintenance |
| <input type="checkbox"/> N/A | | | |
| Remarks _____ | | | |
| 2. Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances | | | |
| <input type="checkbox"/> Good condition | | <input type="checkbox"/> Needs Maintenance | |
| Remarks _____ | | | |
| 3. Spare Parts and Equipment | | | |
| <input type="checkbox"/> Readily available | | <input type="checkbox"/> Good condition | <input type="checkbox"/> Requires upgrade |
| <input type="checkbox"/> Needs to be provided | | | |
| Remarks _____ | | | |
| B. Surface Water Collection Structures, Pumps, and Pipelines | | <input type="checkbox"/> Applicable | <input type="checkbox"/> N/A |
| 1. Collection Structures, Pumps, and Electrical | | | |
| <input type="checkbox"/> Good condition | | <input type="checkbox"/> Needs Maintenance | |
| Remarks _____ | | | |

Five-Year Review Site Inspection Checklist for LRSB (Continued)

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 _____

Five-Year Review Site Inspection Checklist for LRSB (Continued)

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.

Five-Year Review Site Inspection Checklist for LRSB (Continued)

| XI. OVERALL OBSERVATIONS | |
|---|--|
| A. Implementation of the Remedy | |
| <p>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.).</p> <p>The remedy for this OU is institutional controls, contaminated soil consolidation and pipeline grouting, and a soil cover system.</p> <p>The remedy seems to be fully established and functioning as designed.</p> | |
| B. Adequacy of O & M | |
| <p>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.</p> <p>PTSM in the LRSB will radioactively decay to levels that no longer pose a 1×10^{-3} risk to future industrial workers within a relatively short time - as early as 2006 for LRSB. USDOE, USEPA, and SCDHEC also agreed that the current access controls and site use controls at SRS would effectively protect human health and the environment; therefore, a low permeability soil cover is an appropriate remedy for the LRSB.</p> | |
| C. Early Indicators of Potential Remedy Failure | |
| <p>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.</p> <p>N/A</p> | |
| D. Opportunities for Optimization | |
| <p>Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy.</p> <p>N/A</p> | |

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L-AREA SOUTHERN GROUNDWATER OPERABLE UNIT

I. Introduction

This is the first five-year review of the remedial actions implemented at the L-Area Southern Groundwater (LASG) Operable Unit (OU) located at the Savannah River Site (SRS). This report documents the results of the review conducted from August 2007 through September 2007.

II. OU Chronology

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

Table 1. Chronology of OU Events

| Event | Date |
|--------------------------------------|----------------|
| RFI/RI Field Start | August 2, 2000 |
| Remedial Investigation (RI) Complete | July 26, 2004 |
| CMS/FS Rev 1.1 Submittal | April 10, 2006 |
| Record of Decision (ROD) Issuance | April 26, 2007 |
| Remedial Action Scheduled Start | April 30, 2008 |
| Previous Five-Year Reviews | None |

III. Background

Physical Characteristics

L Area is located in the south central portion of the SRS in Barnwell County, South Carolina (see Figure 1). LASG OU encompasses all of the groundwater from the L- Area groundwater divide south to L Lake. The original pre-characterization LASG OU outline covered about 1,250 acres and included several remediated/depleted source units, which supported past production activities. Past activities at these source units have resulted in groundwater contamination beneath LASG OU.

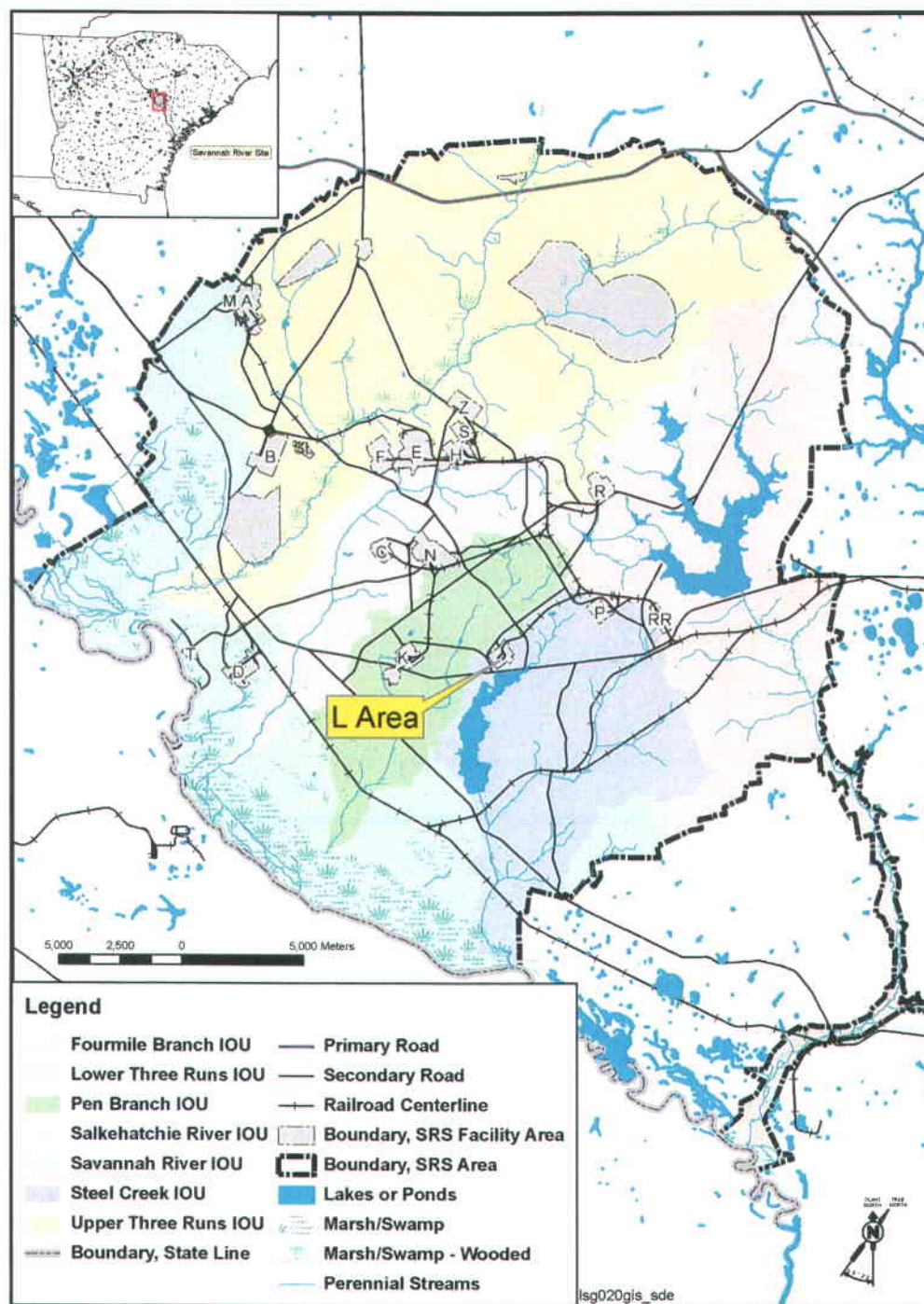


Figure 1. Location of the L-Area Southern Groundwater OU at SRS

Land and Resource Use

As the result of characterization activities, SRS has identified the areas in which groundwater contamination exceeds applicable maximum contaminant levels (MCLs) and developed a land use controls (LUCs) outline. The LUC outline (Figure 2), comprising approximately 950 acres, includes all groundwater contaminated above MCLs within the OU and under adjacent portions of L Lake. Restrictions on the use of groundwater within the LUC outline will be enforced as long as contaminant levels exceed MCLs. Figure 2 also identifies facilities around L Area, including historical sources.

The only pathway with RCOCs is to future industrial workers and residents. The exposure routes are ingestion, dermal contact, and inhalation. This pathway will only be possible if institutional controls are not maintained. Groundwater contamination was evaluated against MCLs based on SCR 61-58.5, which is protective for both future residential and future industrial scenarios. The conceptual site model is considered a hypothetical future residential scenario, but institutional controls will preclude future residential use of LASG OU groundwater. Currently, on-site land use of L Area is industrial and will continue to remain an industrial area in the future.

History of Contamination

The primary historical sources of contamination in the groundwater in the LASG OU have been remediated or depleted. Subsurface soils beneath these remediated waste sites were the secondary sources of groundwater contamination.

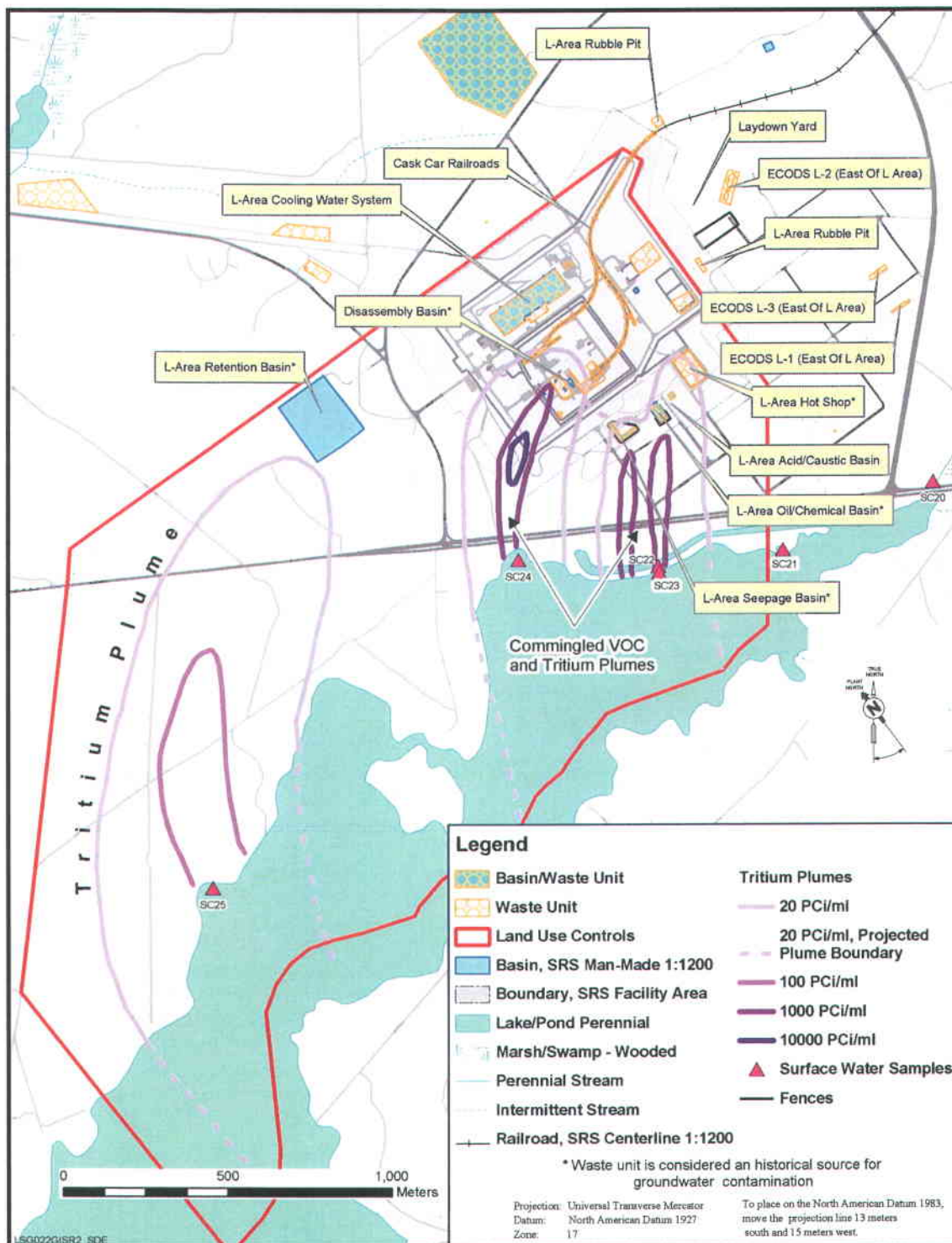


Figure 2. Layout of the L-Area Southern Groundwater Operable Unit with Tritium Plumes

Initial Response

The first groundwater monitoring wells at L Area was installed in November 1981 at the L- Area Oil and Chemical Basin (LAOCB). Groundwater characterization included the review of analytical data from 93 monitoring wells and 109 cone penetrometer technology (CPT) locations within the LASG OU (see Figure 3) between January 2000 and January 2004 (most of the sampling occurred in 2000. The refined constituents of concern (RCOCs) for groundwater at LASG OU are tritium, tetrachloroethylene (PCE), and trichloroethylene (TCE). Tritium was produced in the reactor and the volatile organic compounds (VOCs) were used as solvents and degreasers. The tritium plumes are shown in Figure 2.

The highest contaminant levels observed in local groundwater, broken into three groups (Pre- remedial investigation [RI], RI, and Post-RI), are summarized in the following insert; CPT data are included in the pre-RI data set.

| RCOC | MCL | Pre-RI 1981 - 1999 | RI Jan '00 – Jul '04 | Post-RI Jul 26, 2004 - present |
|----------------------------|-----------|-----------------------|-------------------------|-----------------------------------|
| Range of dates for RI Work | | Prior to 2001 | 2001 - 2004 | 2005 - 2006 |
| Tritium | 20 pCi/mL | 26,200 | 5,850 | 1230 |
| PCE | 5 µg/L | 165 | 58 | 60 |
| TCE | 5 µg/L | 124 | 9 | 21 |

The bulk of contaminated groundwater is confined to the portion of the Upper Three Runs aquifer above the tan clay. Operation activities in L Area have resulted in three contaminant plumes in the local groundwater:

- the western tritium plume, which originated at the L-Area Emergency Retention Basin (LAERB);
- the southwest commingled VOCs and tritium plume, which originated in the vicinity of the L-Area Disassembly Basin (LADB); and
- the southeast commingled VOCs and tritium plume, with likely sources in L-Area Reactor Seepage Basin (LRSB), LAOCB, and L-Area Hot Spot (LAHS).

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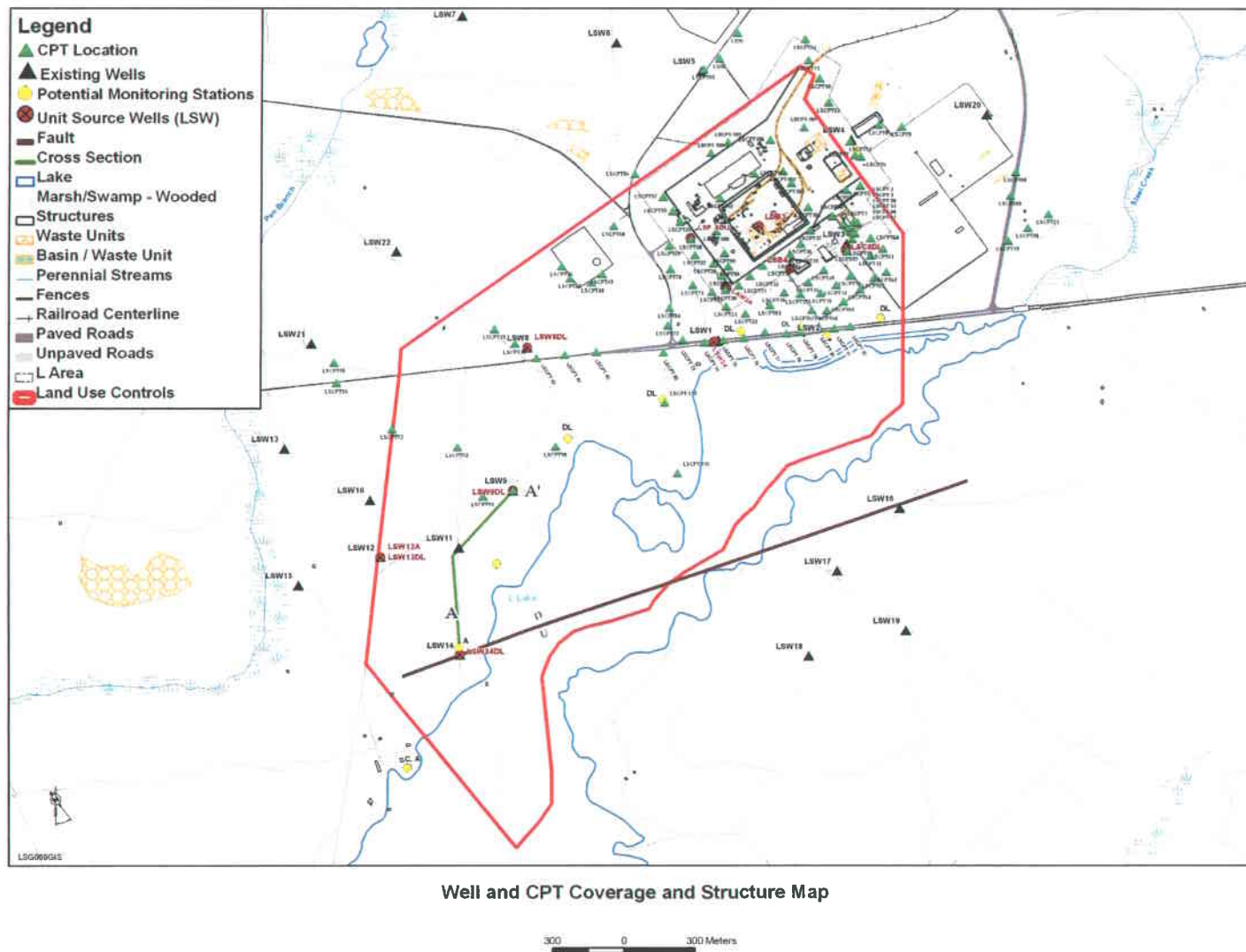


Figure 3. Well and CPT Coverage and Structure Map

Figures 2, 4, and 5 show the LASG OU plumes. The western plume is only contaminated with tritium while the two plumes directly downgradient southwest and southeast of L Area are contaminated with tritium, PCE, and TCE. The analytical results for tritium are summarized in Table 2. Surface water sample stations are shown on Figure 2; SC26 and SC27 are at the L Lake dam standpipe and spillway, respectively. PCE and TCE have not been detected in the surface water.

IV. Remedial Actions

Remedy Selection

The scope of the LASG OU remedial action is limited to local groundwater in three known contaminant plumes. The LASG OU remedial action will address both of the commingled VOCs and tritium plumes of L Area and the tritium plume west of the L Area.

The final overall strategy for addressing the LASG OU is to implement monitored natural attenuation (MNA)/ institutional controls as the final remedy to remediate groundwater contamination at LASG OU. The natural attenuation process will be evaluated based on groundwater monitoring data.

Remedy Implementation

There are no active, continuing sources of groundwater contamination at the LASG OU. There is no practicable treatment technology for tritium in groundwater. Natural attenuation processes (dispersion, dilution, and radioactive decay) are occurring at the LASG OU and are effective in reducing contaminant concentrations below remedial goals.

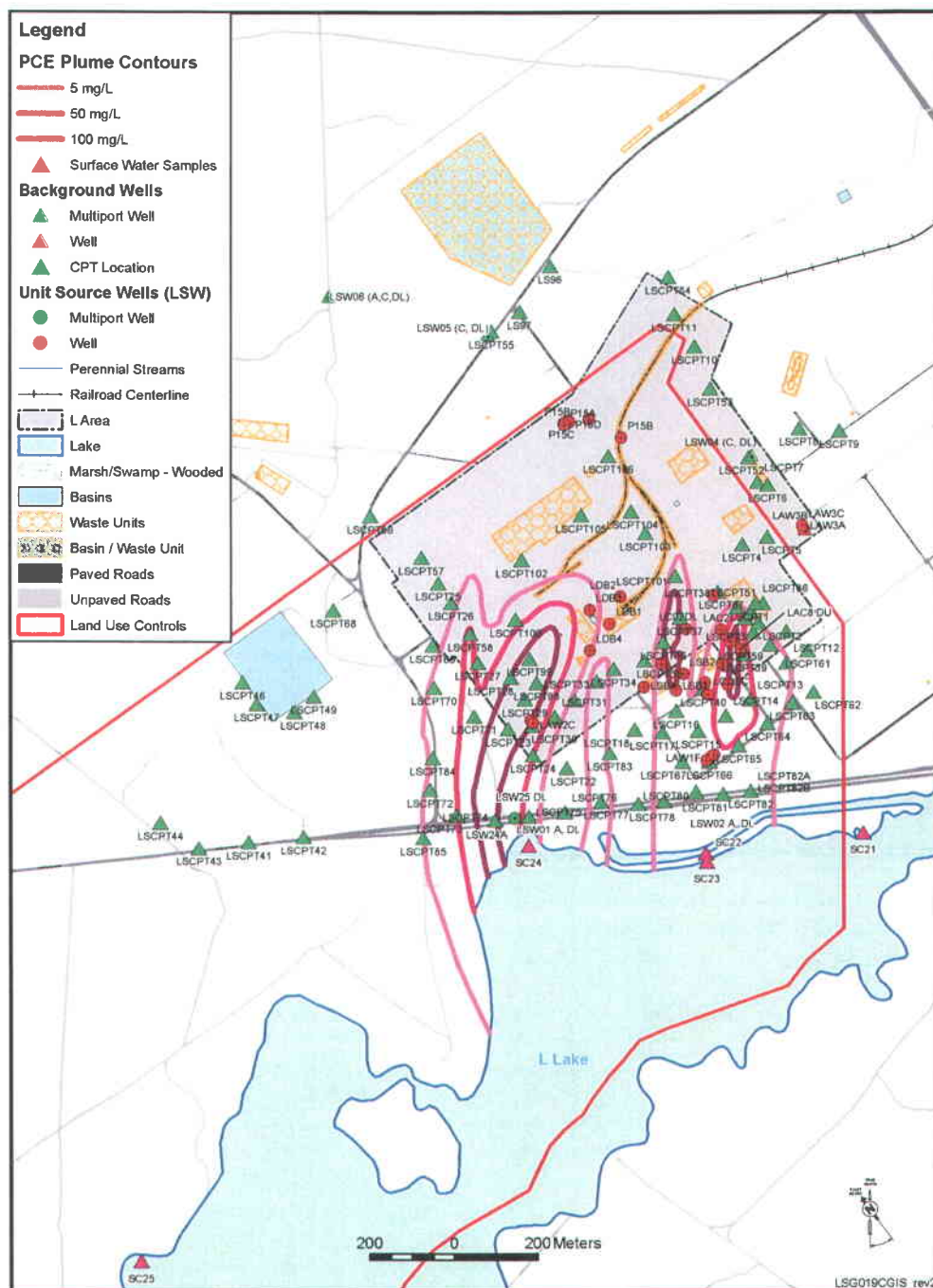


Figure 4. PCE Plumes in the LASG OU



Table 2. Analytical Results for Tritium (pCi/mL) in L Lake

| Station ID | 10/2005 | 6/2006 | 12/2006 | 5/2007 |
|------------|-------------|-------------|-------------|-------------|
| SC20 | 16.5 | 14.2 | 58.1 | 14.2 |
| SC21 | 14.3 | 13.9 | 14.2 | 13.8 |
| SC22 | J0.984* | 2.14 | J2.1 | 4.27 |
| SC23 | 30 | 19.5 | 234 | 33.5 |
| SC24 | 22.1 | 53.2 | 257 | 34.3 |
| SC25 | 13.3 | 9.8 | 12 | 11.9 |
| SC26 | 11.3 | 12.9 | 12.8 | 12.7 |
| SC27 | 11.9 | 11.9 | 9.24 | 12 |

*The "J" qualifier on a value indicates that the analyte was positively identified in the sample at a concentration below the quantitation limit; the reported value is estimated. Note: Results in bold face type exceed the 20 pCi/mL MCL for tritium.

Institutional controls at LASG OU consist of general site access controls, groundwater use restrictions, the SRS Site Use/Site Clearance program, and deed restrictions and notifications. The natural processes of dispersion, dilution, and radioactive decay are monitored at selected groundwater monitoring wells and surface water monitoring stations. Institutional controls will prevent exposure of human health receptors.

V. Progress Since Last Review

This is the first review for the LASG 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
- Reviewed changes in standards and to-be-considered guidance

VII. Technical Assessment

The conclusions are as follows:

- The selected remedy (MNA/institutional controls) 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 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.

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. Project Costs

Costs associated with the selected remedy for LSGW include operation and maintenance costs of institutional controls and natural attenuation monitoring. The estimated operation and maintenance cost associated with the selected remedy is \$3,327,850, which was discounted at 3.9% per year. This is a present worth cost, including 30 years of maintenance activities. This estimate is an order-of-magnitude engineering cost estimate that is expected to be within +50 to -30 percent of the actual project cost. The remedy is currently under construction; therefore, the actual operation and maintenance cost for the LSGW cannot be assessed at this time.

XI. Protectiveness Statement(s)

The natural attenuation (dispersion, dilution, and radioactive decay) and institutional controls remedy continues to provide protection to human health and the environment.

XII. Next Review

The next five-year review is scheduled for February 12, 2014.

ATTACHMENT 1

Documents Reviewed

WSRC-RP-2003-4171, *RCRA Facility Investigation/Remedial Investigation for the L-Area Southern Groundwater Operable Unit (U)*, Revision 1.1, 2005, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

WSRC-RP-2006-4052, *Record of Decision for the L-Area Southern Groundwater Operable Unit (NBN) (U)*, Revision 1.1, 2007, Washington Savannah River Company, Savannah River Site, Aiken, SC

WSRC-RP-2007-4050, *Corrective Measures Implementation/ Remedial Action Implementation Plan for the L- Area Southern Groundwater Operable Unit (NBN) (U)*. Revision 0, Washington Savannah River Company, Savannah River Site, Aiken, SC

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M-AREA HAZARDOUS WASTE MANAGEMENT FACILITY OPERABLE UNIT

I. Introduction

The review for this unit is conducted under the Savannah River Site (SRS) Resource Conservation and Recovery Act (RCRA) program. The Comprehensive Environmental Response, Compensation, and Liability Act (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 five-year review for the M-Area Hazardous Waste Management Facility (HWMF) Operable Unit (OU). A five-year review scheduled for September 2001 was not completed due to oversight. This review was conducted from August 2007 through September 2007. This report documents the results of the review.

II. OU Chronology

Table 1 lists the chronology of site events for the M-Area HWMF OU.

Table 1. Chronology of OU Events

| Event | Date |
|---|---------------|
| RCRA Closure Plan Approved by SCDHEC | 1987 |
| Remediation Action Start | 1988 |
| Basin Closure Completed | 1990 |
| Interim Record of Decision (ROD) Issuance | June 29, 1992 |
| Previous Five-Year Review | June 30, 1997 |

III. Background

Physical Characteristics

The M Area of the SRS is located near the northwest edge of SRS (Figure 1). The Site layout is provided in Figure 2.

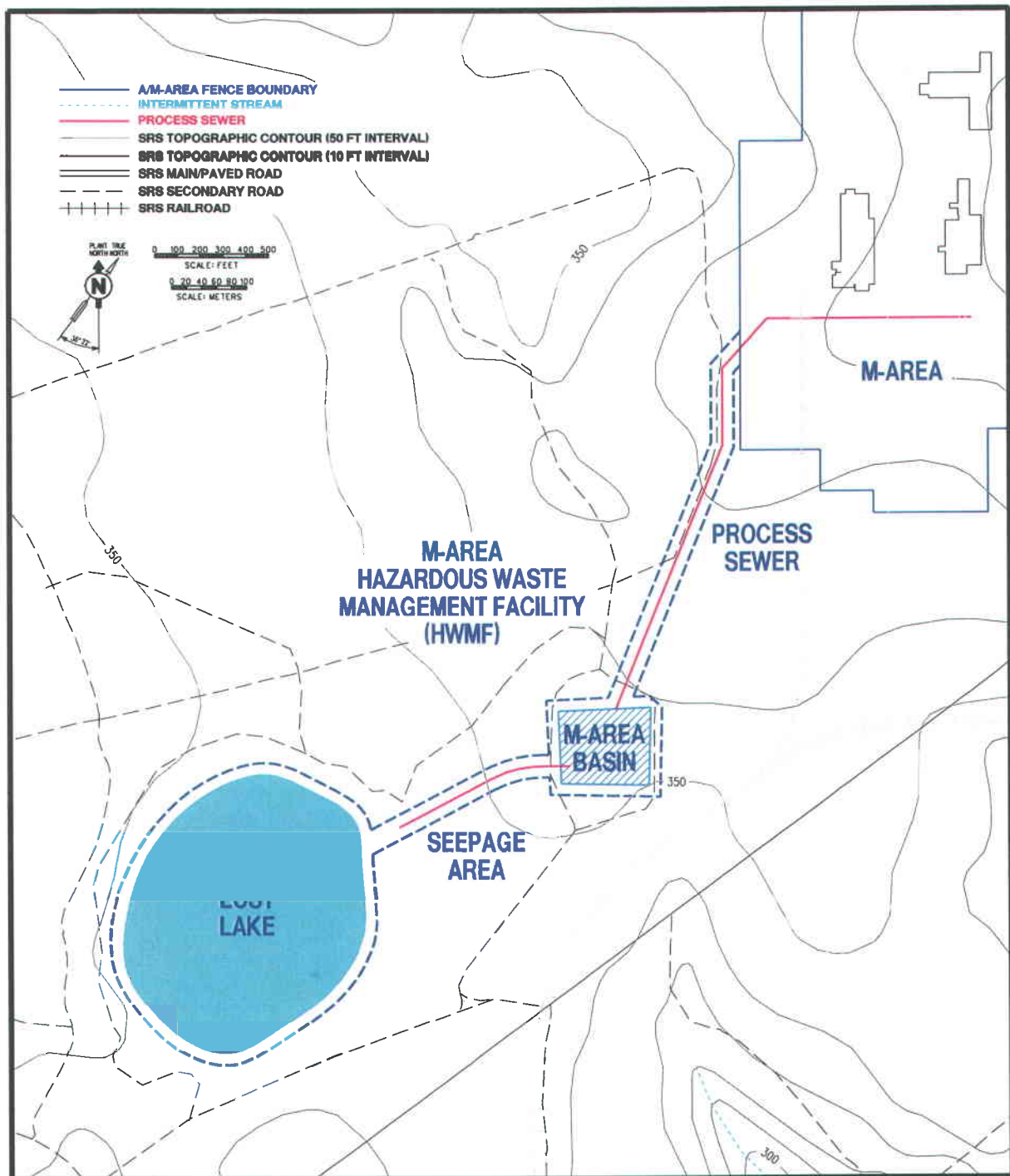


Figure 2. Site Layout for M-Area HWMF

Land and Resource Use

The M-Area HWMF OU is located in an industrial area. The future land use for M-Area HWMF OU is anticipated to remain industrial.

History of Contamination

The M Area contained manufacturing facilities for nuclear fuel components, offices and research facilities. The manufacturing processes consisted of aluminum-forming and metal-finishing processes used to produce fuel and targets for the SRS reactors. Waste effluents were discharged from three production buildings and two support laboratories to a settling basin through an underground process sewer line. The waste effluents consisted of hydroxides, precipitates of aluminum, uranium, nickel, lead and other metals, solvents, acids, and caustics. Cracks in the sewer line allowed some of the effluent to leak into the ground, contaminating underlying soils. The pipe line was slip-lined in 1983 after the cracks were discovered. The basin dimensions were approximately 330 ft by 280 ft by 17 ft deep with a volumetric capacity of approximately 8-million gallons. Overflow from the basin was directed to a natural seepage area and ultimately to the Lost Lake. In July 1985, a permitted wastewater treatment facility was placed in operation and discharges to the settling basin were discontinued.

The M-Area HWMF has been designated as a source-specific OU within the A/M Area Fundamental Study Area. The M-Area HWMF consists of an unlined surface impoundment (settling basin), a portion of an inactive process sewer line, drainage and seepage areas, and a Carolina Bay known as the Lost Lake.

Groundwater is not addressed under this OU. Per the Interim Action Record of Decision (ROD), the M-Area HWMF groundwater is being addressed under the 2003 RCRA Part B Permit Renewal by SCDHEC.

IV. Remedial Actions

Remedy Selection

The major components of the remedial action included the following:

- Dewatering the basin
- Treating the basin liquid and discharging the liquid to a permitted outfall
- Consolidating waste by stabilizing and compacting dewatered basin sludge
- Excavating a portion of the process sewer line and associated soils and contaminated soils from the seepage area and areas of Lost Lake
- Consolidating and compacting excavated contaminated materials on top of the stabilized sludge within the basin
- Installing a low permeability cap system over the basin

Remedy Implementation

These actions were completed in 1990, and the basin closure was certified in 1991.

V. Progress Since Last Review

This is the second five-year review for this OU. No review was conducted in 2003 due to an oversight. Since the previous review in June of 1997, the following actions have been completed:

- Annual inspections and maintenance to the basin cover as required by the RCRA Closure Plan

- Annual surveys of the basin cover to verify that no subsidence has occurred

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
- Ensured that all actions required under the RCRA Permit were implemented

VII. Technical Assessment

The conclusions for this review are as follows:

- The MHWMF OU is being maintained as required to ensure the effectiveness of the remedial action.
- 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.

VIII. Issues

There are no issues

IX. Recommendations and Follow-up Actions

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

X. Project Costs

Costs associated with the selected remedy for MHWMF include operation and maintenance costs of the soil cover and institutional controls. RCRA documentation does not require estimated project costs to be prepared. Therefore, none are included in this remedy review.

XI. Protectiveness Statement(s)

The remedy of stabilizing the basin contents, consolidating contaminated materials in the basin, and installing and maintaining a low permeability cap is expected to be protective of human health and the environment. Subsequent 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).

XII. Next Review

The next five-year review is scheduled for February 12, 2014.

ATTACHMENT 1

List of Documents Reviewed

DPST-85-703, *Environmental Information Document M-Area Settling Basin and Vicinity*, 1987, E.I. DuPont de Nemours & Co., Savannah River Laboratory, Aiken, SC

ESH-ERG-910001, *M-Area Settling Basin Inactive Process Sewers to Manhole 1*, 081-M, 1991, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

WSRC-RP-92-743, *Interim Action Record of Decision Remedial Alternative Selection M-Area Hazardous Waste Management Facility Operable Unit*, Rev. 0, 1992, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

WSRC-TR-93-369, *Post-Test Evaluation of the Geology, Geochemistry, Microbiology, and Hydrology of the In Situ Air Stripping Demonstration Site at the Savannah River Site*, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

WSRC-IM-91-53, *1992 RCRA Part B Permit Application, Volume III, M-Area Hazardous Waste Management*, Rev. 17, 2002, Washington Savannah River Company, Savannah River Site, Aiken, SC

WSRC-IM-98-30, *2000 RCRA Part B Permit Renewal Application: M-Area and Metallurgical Laboratory Hazardous Waste Management Facilities (M-Area and Met Lab HWMFs) Post-closure*, Volume III, Rev. 1, 2006, Washington Savannah River Company, Savannah River Site, Aiken, SC

WSRC-RP-2007-4001, *M-Area and Metallurgical Lab HWMF's Groundwater Monitoring and Corrective Action Report (U)*, Rev. 0, 2007, Washington Savannah River Company, Savannah River Site, Aiken, SC

ATTACHMENT 2

Five-Year Review Site Inspection Checklist for MHWMF

| I. SITE INFORMATION | | | | | | | | | | | | | | | |
|---|--|--|--|--|--|---|--|--|---|---|--|---|--|--|--|
| Site Name: | M-Area HWMF | Date of Inspection: | 10/24/2007 | | | | | | | | | | | | |
| Location and Region: | SRS, USEPA Region IV | EPA ID: | SC1890008989 | | | | | | | | | | | | |
| Agency, office, or company leading the five-year review: | USDOE | CERCLIS OU No.: | 1 | | | | | | | | | | | | |
| | | Weather/Temperature: | | | | | | | | | | | | | |
| Remedy Includes: (Check all that apply) <table><tbody><tr><td><input checked="" type="checkbox"/> Cover System</td><td><input type="checkbox"/> Monitored Natural Attenuation</td></tr><tr><td><input checked="" type="checkbox"/> Access controls</td><td><input type="checkbox"/> Groundwater Containment</td></tr><tr><td><input checked="" type="checkbox"/> Institutional Controls</td><td><input type="checkbox"/> Vertical Barrier Walls</td></tr><tr><td><input type="checkbox"/> Groundwater pump and treatment</td><td></td></tr><tr><td><input type="checkbox"/> Surface water collection and treatment</td><td></td></tr><tr><td colspan="2"><input checked="" type="checkbox"/> Other: <u>Excavation, disposal</u></td></tr></tbody></table> | | | | <input checked="" type="checkbox"/> Cover System | <input type="checkbox"/> Monitored Natural Attenuation | <input checked="" type="checkbox"/> Access controls | <input type="checkbox"/> Groundwater Containment | <input checked="" type="checkbox"/> Institutional Controls | <input type="checkbox"/> Vertical Barrier Walls | <input type="checkbox"/> Groundwater pump and treatment | | <input type="checkbox"/> Surface water collection and treatment | | <input checked="" type="checkbox"/> Other: <u>Excavation, disposal</u> | |
| <input checked="" type="checkbox"/> Cover System | <input type="checkbox"/> Monitored Natural Attenuation | | | | | | | | | | | | | | |
| <input checked="" type="checkbox"/> Access controls | <input type="checkbox"/> Groundwater Containment | | | | | | | | | | | | | | |
| <input checked="" type="checkbox"/> Institutional Controls | <input type="checkbox"/> Vertical Barrier Walls | | | | | | | | | | | | | | |
| <input type="checkbox"/> Groundwater pump and treatment | | | | | | | | | | | | | | | |
| <input type="checkbox"/> Surface water collection and treatment | | | | | | | | | | | | | | | |
| <input checked="" type="checkbox"/> Other: <u>Excavation, disposal</u> | | | | | | | | | | | | | | | |
| Attachments: <input type="checkbox"/> Inspection team roster attached <input type="checkbox"/> Site map attached | | | | | | | | | | | | | | | |
| II. INTERVIEWS (Check all that apply) | | | | | | | | | | | | | | | |
| 1. O & M Site Manager | <u>Wayne Gleaton</u> (Name) | <u>Post Closure Manager</u> (Title) | <u>10-23-2007</u> (Date) | | | | | | | | | | | | |
| Interviewed: | <input type="checkbox"/> at site | <input type="checkbox"/> at office | <input checked="" type="checkbox"/> by phone Phone No. <u>803-557-8838</u> | | | | | | | | | | | | |
| Problems, suggestions: | <input type="checkbox"/> report attached _____ | | | | | | | | | | | | | | |
| 2. O & M Staff | <u>Richard Feagin</u> (Name) | <u>Post-Closure Waste Site Inspector/Maintenance Coord.</u> (Title) | <u>8-23-2007</u> (Date) | | | | | | | | | | | | |
| Interviewed: | <input type="checkbox"/> at site | <input type="checkbox"/> at office | <input checked="" type="checkbox"/> by phone Phone No. <u>803-952-4416</u> | | | | | | | | | | | | |
| Problems, suggestions: | <input type="checkbox"/> report attached _____ | | | | | | | | | | | | | | |

Five-Year Review Site Inspection Checklist (Continued)

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

- | | | | |
|---|--|-------------------------------------|------------------------------|
| <input type="checkbox"/> O & M Manual | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |
| x As-built drawings | x Readily available | x Up to date | <input type="checkbox"/> N/A |
| <input type="checkbox"/> Maintenance Logs | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |

Remarks: See Waste Unit Inspection and Maintenance, ER-SOP-019

Five-Year Review Site Inspection Checklist (Continued)

| | | | |
|--|--|-------------------------------------|---|
| 2. Site-Specific Health and Safety Plan <input type="checkbox"/> Readily available <input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A | | | |
| <input type="checkbox"/> Contingency plan/emergency response plan <input type="checkbox"/> Readily available <input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A | | | |
| Remarks: <u>Routine O&M activities do not require a SSHASP under 29 CFR 1910.120, HAZWOPER. A</u> <u>SSHASP is prepared in needed.</u> | | | |
| 3. O & M and OSHA Training Records <input checked="" type="checkbox"/> Readily available <input checked="" type="checkbox"/> Up to date <input type="checkbox"/> N/A | | | |
| Remarks: _____ | | | |
| 4. Permits and Service Agreements | | | |
| <input type="checkbox"/> Air discharge permit | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A |
| <input type="checkbox"/> Effluent discharge | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A |
| <input type="checkbox"/> Waste Disposal, POTW | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A |
| <input type="checkbox"/> Other permits | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A |
| Remarks: _____ | | | |
| 5. Gas Generation Records <input type="checkbox"/> Readily available <input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A | | | |
| Remarks: _____ | | | |
| 6. Settlement Monument Records <input type="checkbox"/> Readily available <input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A | | | |
| Remarks: _____ | | | |
| 7. Groundwater Monitoring Records <input type="checkbox"/> Readily available <input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A | | | |
| Remarks: _____ | | | |
| 8. Leachate Extraction Records <input type="checkbox"/> Readily available <input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A | | | |
| Remarks: _____ | | | |
| 9. Discharge Compliance Records | | | |
| <input type="checkbox"/> Air | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A |
| <input type="checkbox"/> Water (effluent) | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A |
| Remarks: _____ | | | |
| 10. Daily Access/Security Logs <input type="checkbox"/> Readily available <input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A | | | |
| Remarks: _____ | | | |

Five-Year Review Site Inspection Checklist (Continued)

IV. O & M Costs

1. O & M Organization

- ☐ State in-house ☐ Contractor for State
☐ PRP in-house ☐ Contractor for PRP
x Other SRS

2. O & M Cost Records

- ☐ Readily available ☐ Up to date ☐ Funding mechanism/agreement in place
x Other: Project cost data is summarized in Section X of attached review: WSRC-RP-2007-4063.

Total annual cost by year for review period if available

| | | |
|---------------------|------------|---|
| From _____ To _____ | _____ | <input type="checkbox"/> Breakdown attached |
| (Date) (Date) | Total cost | |
| From _____ To _____ | _____ | <input type="checkbox"/> Breakdown attached |
| (Date) (Date) | Total cost | |
| From _____ To _____ | _____ | <input type="checkbox"/> Breakdown attached |
| (Date) (Date) | Total cost | |
| From _____ To _____ | _____ | <input type="checkbox"/> Breakdown attached |
| (Date) (Date) | Total cost | |
| From _____ To _____ | _____ | <input type="checkbox"/> Breakdown attached |
| (Date) (Date) | Total cost | |

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

Describe costs and reasons: _____

V. ACCESS AND INSTITUTIONAL CONTROLS

x Applicable ☐ N/A

A. Fencing

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

Remarks: Fencing is in good condition.

Five-Year Review Site Inspection Checklist (Continued)

B. Other Access Restrictions

1. Signs and Other Security Measures ☐ Location shown on site map ☐ N/A

Remarks: Signs at this site are in good condition.

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: Quarterly

Responsible party/agent: DOE Savannah River Field Office

Contact: Karen Adams, Waste Area Group Manager 09/3/07 803-952-7871
(Name) (Title) (Date) (Phone No.)

Reporting 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: _____

Five-Year Review Site Inspection Checklist (Continued)

| | |
|---|--------------|
| 3. Land Use Changes Offsite <input checked="" type="checkbox"/> N/A | |
| Remarks _____ | |
| | |
| VI. GENERAL SITE CONDITIONS | |
| A. Roads <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A | |
| 1. Roads Damaged <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Roads adequate <input type="checkbox"/> N/A | |
| Remarks _____ | |
| | |
| B. Other Site Conditions | |
| Remarks _____ | |
| | |
| VII. COVERS SYSTEMS <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A | |
| A. Landfill Surface | |
| 1. Settlement (Low spots) <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Settlement not evident | |
| Areal extent _____ | Depth _____ |
| Remarks: _____ | |
| | |
| 2. Cracks <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Cracking not evident | |
| Lengths _____ | Widths _____ |
| Depths _____ | |
| Remarks _____ | |
| | |
| 3. Erosion <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Erosion not evident | |
| Areal extent _____ | Depth _____ |
| Remarks _____ | |
| | |
| 4. Holes <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Holes not evident | |
| Areal extent _____ | Depth _____ |
| Remarks _____ | |
| | |
| 5. Vegetative Cover <input type="checkbox"/> Grass <input type="checkbox"/> Cover properly established <input type="checkbox"/> No signs of stress | |
| <input type="checkbox"/> Trees/shrubs (indicate size and location on a diagram) | |
| Remarks: <u>Grass is established but dry due to lack of rain.</u> | |
| | |

Five-Year Review Site Inspection Checklist (Continued)

| | | | |
|--|---|--------------------|--|
| 6. Alternative Cover (armored rock, concrete, etc.) x N/A | | | |
| Remarks: _____ _____ | | | |
| 7. Bulges <input type="checkbox"/> Location shown on site map x Bulges not evident | | | |
| Areal extent _____ Height _____ | | | |
| Remarks _____ _____ | | | |
| 8. Wet Areas/Water Damage x Wet areas/water damage not evident | | | |
| <input type="checkbox"/> Wet Areas | <input type="checkbox"/> Location shown on site map | Areal extent _____ | |
| <input type="checkbox"/> Ponding | <input type="checkbox"/> Location shown on site map | Areal extent _____ | |
| <input type="checkbox"/> Seeps | <input type="checkbox"/> Location shown on site map | Areal extent _____ | |
| <input type="checkbox"/> Soft subgrade | <input type="checkbox"/> Location shown on site map | Areal extent _____ | |
| Remarks _____ _____ | | | |
| 9. Slope Instability <input type="checkbox"/> Slides <input type="checkbox"/> Location shown on site map x No evidence of slope instability | | | |
| Areal extent _____ | | | |
| Remarks _____ _____ | | | |
| B. Benches <input type="checkbox"/> Applicable x 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 <input type="checkbox"/> Location shown on site map <input type="checkbox"/> N/A or okay | | | |
| Remarks _____ _____ | | | |
| 2. Bench Breached <input type="checkbox"/> Location shown on site map <input type="checkbox"/> N/A or okay | | | |
| Remarks _____ _____ | | | |
| 3. Bench Overtopped <input type="checkbox"/> Location shown on site map <input type="checkbox"/> N/A or okay | | | |
| Remarks _____ _____ | | | |

Five-Year Review Site Inspection Checklist (Continued)

C. Letdown Channels

☐ Applicable x 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 _____

Five-Year Review Site Inspection Checklist (Continued)

| | | | |
|--|--|---|---|
| D. Cover Penetrations <input type="checkbox"/> Applicable x N/A | | | |
| 1. Gas Vents <input type="checkbox"/> Active <input type="checkbox"/> Passive | | | |
| <input type="checkbox"/> Properly secured/locked | <input type="checkbox"/> Functioning | <input type="checkbox"/> Routinely sampled | <input type="checkbox"/> Good condition |
| <input type="checkbox"/> Evidence of leakage at penetration | <input type="checkbox"/> Needs Maintenance | <input type="checkbox"/> N/A | |
| Remarks _____ | | | |
| | | | |
| 2. Gas Monitoring Probes | | | |
| <input type="checkbox"/> Properly secured/locked | <input type="checkbox"/> Functioning | <input type="checkbox"/> Routinely sampled | <input type="checkbox"/> Good condition |
| <input type="checkbox"/> Evidence of leakage at penetration | <input type="checkbox"/> Needs Maintenance | <input type="checkbox"/> N/A | |
| Remarks _____ | | | |
| | | | |
| 3. Monitoring Wells (within surface area of landfill) | | | |
| <input type="checkbox"/> Properly secured/locked | <input type="checkbox"/> Functioning | <input type="checkbox"/> Routinely sampled | <input type="checkbox"/> Good condition |
| <input type="checkbox"/> Evidence of leakage at penetration | <input type="checkbox"/> Needs Maintenance | <input type="checkbox"/> N/A | |
| Remarks _____ | | | |
| | | | |
| 4. Leachate Extraction Wells | | | |
| <input type="checkbox"/> Properly secured/locked | <input type="checkbox"/> Functioning | <input type="checkbox"/> Routinely sampled | <input type="checkbox"/> Good condition |
| <input type="checkbox"/> Evidence of leakage at penetration | <input type="checkbox"/> Needs Maintenance | <input type="checkbox"/> N/A | |
| Remarks _____ | | | |
| | | | |
| 5. Settlement Monuments <input type="checkbox"/> Located <input type="checkbox"/> Routinely surveyed <input type="checkbox"/> N/A | | | |
| Remarks _____ | | | |
| | | | |
| E. Gas Collection and Treatment <input type="checkbox"/> Applicable x N/A | | | |
| 1. Gas Treatment Facilities | | | |
| <input type="checkbox"/> Flaring | <input type="checkbox"/> Thermal destruction | <input type="checkbox"/> Collection for reuse | |
| <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance | | |
| Remarks _____ | | | |
| | | | |
| 2. Gas Collection Wells, Manifolds and Piping | | | |
| <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance | | |
| Remarks _____ | | | |
| | | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | | |
|---|--|--|--|
| 3. Gas Monitoring Facilities (e.g., gas monitoring of adjacent homes or buildings) | | | |
| <input type="checkbox"/> Good condition | | <input type="checkbox"/> Needs Maintenance | |
| | | <input type="checkbox"/> N/A | |
| Remarks _____ | | | |
| | | | |
| F. Cover Drainage Layer x Applicable <input type="checkbox"/> N/A | | | |
| 1. Outlet Pipes Inspected x Functioning <input type="checkbox"/> N/A | | | |
| Remarks _____ | | | |
| | | | |
| 2. Outlet Rock Inspected <input type="checkbox"/> Functioning <input type="checkbox"/> N/A | | | |
| Remarks _____ | | | |
| | | | |
| G. Detention/sedimentation Ponds <input type="checkbox"/> Applicable x N/A | | | |
| 1. Siltation Areal extent _____ Depth _____ <input type="checkbox"/> N/A | | | |
| <input type="checkbox"/> Siltation not evident | | | |
| Remarks _____ | | | |
| | | | |
| 2. Erosion Areal extent _____ Depth _____ <input type="checkbox"/> N/A | | | |
| <input type="checkbox"/> Erosion not evident | | | |
| Remarks _____ | | | |
| | | | |
| 3. Outlet Works <input type="checkbox"/> Functioning <input type="checkbox"/> N/A | | | |
| Remarks _____ | | | |
| | | | |
| 4. Dam <input type="checkbox"/> Functioning <input type="checkbox"/> N/A | | | |
| Remarks _____ | | | |
| | | | |
| H. Retaining Walls <input type="checkbox"/> Applicable x N/A | | | |
| 1. Deformations <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Deformation not evident | | | |
| Horizontal displacement _____ | | Vertical displacement _____ | |
| Rotational displacement _____ | | | |
| Remarks _____ | | | |
| | | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | |
|--|---|--|
| 2. Degradation | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> Deformation not evident |
| Remarks _____ | | |
| I. Perimeter Ditches/Off-Site Discharge <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A | | |
| 1. Siltation | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> Siltation not evident |
| Areal extent _____ Depth _____ | | |
| Remarks _____ | | |
| 2. Vegetative Growth | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> Siltation not evident |
| x Vegetation does not impede flow | | |
| Areal extent _____ Type _____ | | |
| Remarks _____ | | |
| 3. Erosion | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> Erosion not evident |
| Areal extent _____ Depth _____ | | |
| Remarks _____ | | |
| 4. Discharge Structure | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> N/A |
| Remarks _____ | | |
| VIII. VERTICAL BARRIER WALLS <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A | | |
| 1. Settlement | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> Settlement not evident |
| Areal extent _____ Depth _____ | | |
| Remarks _____ | | |
| 2. Performance Monitoring | Type of Monitoring _____ | <input type="checkbox"/> Performance not monitored |
| Frequency _____ <input type="checkbox"/> Evidence of breaching Head differential _____ | | |
| Remarks _____ | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | | |
|---|---|--|---|
| IX. GROUNDWATER/SURFACE WATER REMEDIES | | <input type="checkbox"/> Applicable | <input checked="" type="checkbox"/> N/A |
| A. Groundwater Extraction Wells, Pumps, and Pipelines | | <input type="checkbox"/> Applicable | <input type="checkbox"/> N/A |
| 1. Pumps, Wellhead Plumbing, and Electrical | | | |
| <input type="checkbox"/> Good condition | <input type="checkbox"/> All required wells located | <input type="checkbox"/> Needs Maintenance | <input type="checkbox"/> N/A |
| Remarks _____ | | | |
| _____ | | | |
| 2. Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances | | | |
| <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance | | |
| Remarks _____ | | | |
| _____ | | | |
| 3. Spare Parts and Equipment | | | |
| <input type="checkbox"/> Readily available | <input type="checkbox"/> Good condition | <input type="checkbox"/> Requires upgrade | <input type="checkbox"/> Needs to be provided |
| Remarks _____ | | | |
| _____ | | | |
| B. Surface Water Collection Structures, Pumps, and Pipelines | | <input type="checkbox"/> Applicable | <input type="checkbox"/> N/A |
| 1. Collection Structures, Pumps, and Electrical | | | |
| <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance | | |
| Remarks _____ | | | |
| _____ | | | |
| 2. Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances | | | |
| <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance | | |
| Remarks _____ | | | |
| _____ | | | |
| 3. Spare Parts and Equipment | | | |
| <input type="checkbox"/> Readily available | <input type="checkbox"/> Good condition | <input type="checkbox"/> Requires upgrade | <input type="checkbox"/> Needs to be provided |
| Remarks _____ | | | |
| _____ | | | |

Five-Year Review Site Inspection Checklist (Continued)

| C. Treatment System | | <input type="checkbox"/> Applicable | <input type="checkbox"/> N/A |
|---|---|--|------------------------------|
| 1. Treatment Train (Check components that apply) | | | |
| <input type="checkbox"/> Metals removal | <input type="checkbox"/> Oil/water separation | <input type="checkbox"/> Bioremediation | |
| <input type="checkbox"/> Air stripping | <input type="checkbox"/> Carbon adsorbers | | |
| <input type="checkbox"/> Filters _____ | | | |
| <input type="checkbox"/> Additive (e.g., chelation agent, flocculent) _____ | | | |
| <input type="checkbox"/> Others _____ | | | |
| <input type="checkbox"/> Good condition | | <input type="checkbox"/> Needs Maintenance | |
| <input type="checkbox"/> Sampling ports properly marked and functional | | | |
| <input type="checkbox"/> Sampling/maintenance log displayed and up to date | | | |
| <input type="checkbox"/> Equipment properly identified | | | |
| <input type="checkbox"/> Quantity of groundwater treated annually _____ | | | |
| <input type="checkbox"/> Quantity of surface water treated annually _____ | | | |
| Remarks _____ | | | |
| _____ | | | |
| 2. Electrical Enclosures and Panels (properly rated and functional) | | | |
| <input type="checkbox"/> N/A | | <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance | |
| Remarks _____ | | | |
| _____ | | | |
| 3. Tanks, Vaults, Storage Vessels | | | |
| <input type="checkbox"/> N/A | | <input type="checkbox"/> Good condition <input type="checkbox"/> Proper secondary containment <input type="checkbox"/> Needs Maintenance | |
| Remarks _____ | | | |
| _____ | | | |
| 4. Discharge Structure and Appurtenances | | | |
| <input type="checkbox"/> N/A | | <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance | |
| Remarks _____ | | | |
| _____ | | | |
| 5. Treatment Building(s) | | | |
| <input type="checkbox"/> N/A | | <input type="checkbox"/> Good condition (esp. roof and doorways) <input type="checkbox"/> Needs repair | |
| <input type="checkbox"/> Chemicals and equipment properly stored | | | |
| Remarks _____ | | | |
| _____ | | | |

Five-Year Review Site Inspection Checklist (Continued)

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.).

The remedy of stabilizing the basin contents, consolidating contaminated materials in the basin, and installing and maintaining a low permeability cap is expected to be protective of human health and the environment. Subsequent exposure pathways that could result in unacceptable risks are being controlled through institutional controls.

Five-Year Review Site Inspection Checklist (Continued)

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.

Warning signs are posted at the unit and institutional controls to maintain future industrial land use only have been implemented through the LUCIP. The area vegetation, fencing, and signs are maintained through regular inspections and an established maintenance program.

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.

N/A

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M-AREA INACTIVE PROCESS SEWER LINE OPERABLE UNIT

I. Introduction

The review for this unit is conducted under the Savannah River Site (SRS) Resource Conservation and Recovery Act (RCRA) program. The Comprehensive Environmental Response, Compensation, and Liability Act (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 first five-year review for the M-Area Inactive Process Sewer Line (MIPSL) Operable Unit (OU). This review was conducted from August 2007 through September 2007 and this report documents the results of that review.

II. OU Chronology

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

Table 1. Chronology of OU Events

| Event | Date |
|--------------------------------------|---------------|
| Characterization Field Start | July 28, 2003 |
| Approval of Record of Decision (ROD) | February 2007 |
| Remedial action start | June 25, 2007 |
| Previous Five-Year Review | None |

III. Background

Physical Characteristics

M Area is located in the northwest portion of SRS (Figure 1). The MIPSL OU comprises portions of the M-Area Settling Basin Inactive Process Sewer to Manhole 1, including the segment of pipe from the slab of the 320-M Alloy Building to the Former Security Fence (passing through Manholes 3A, 2A, 1N, 1A, and 1) and the segment of pipeline starting adjacent to the slab of the 322-M Metallurgical Laboratory (starting just south of the pipeline between 322-M and Manhole 6A) and extending to the A-014 Outfall (passing through Manholes 8, 9, 10, 11, 12, 13, and 14) (Figure 2).

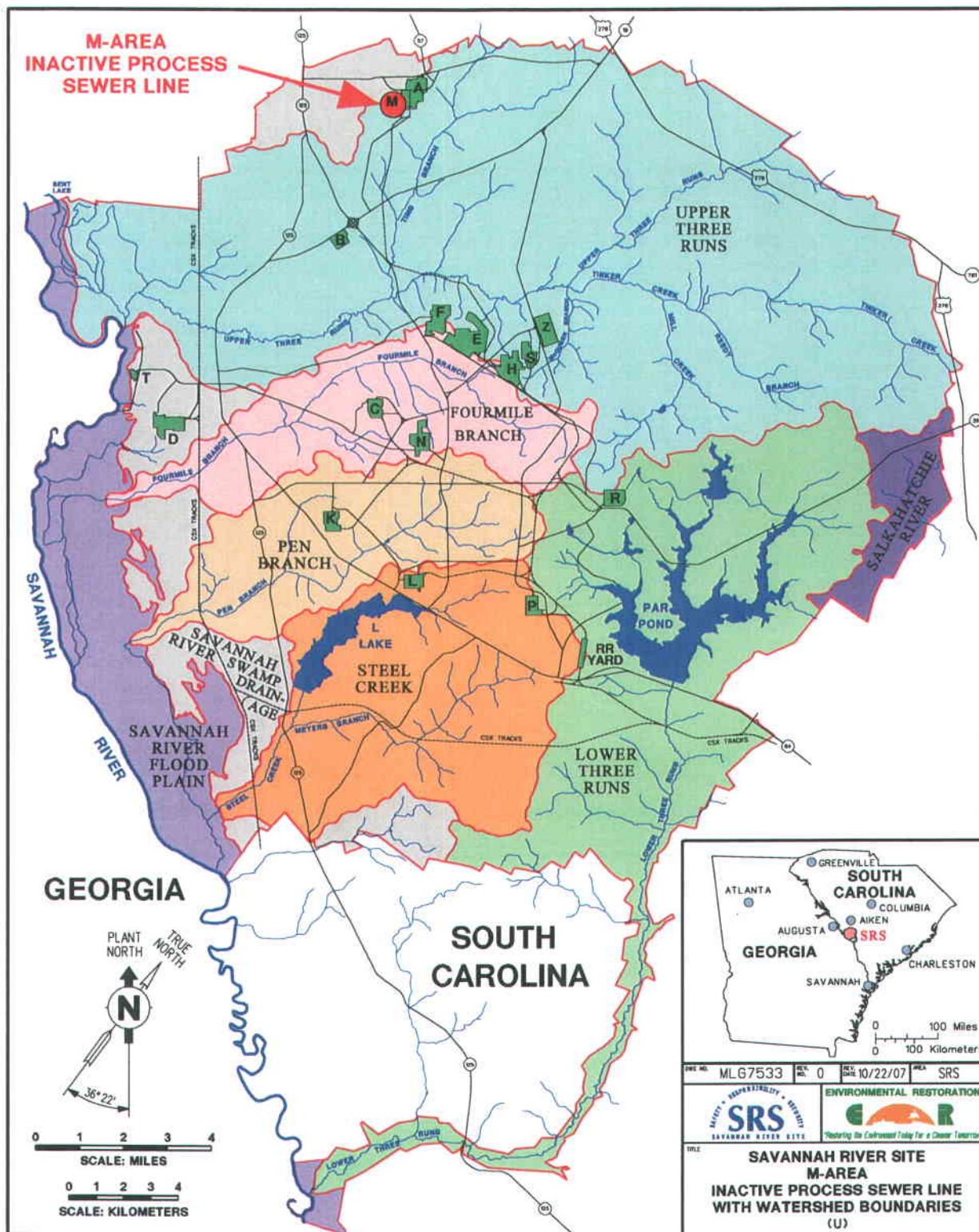


Figure 1. M-Area Inactive Sewer Line OU at Savannah River Site

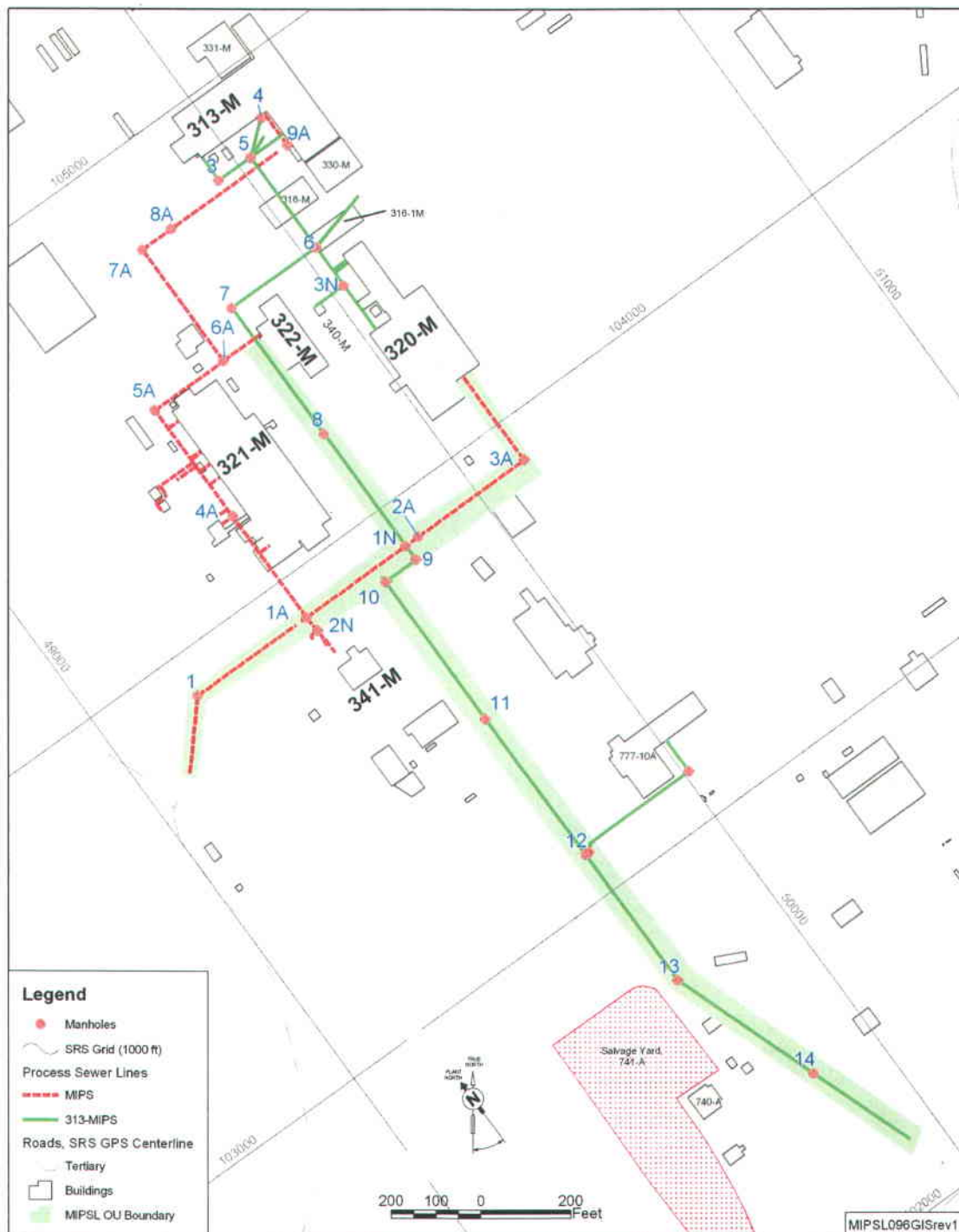


Figure 2. Layout of the MIPSOU

Land and Resource Use

The MIPS L OU is located in an industrial area. The future land use for MIPS L OU is anticipated to remain industrial.

History of Contamination

From 1958 until early 1985, several M-Area facilities (313-M, 320-M, and 321-M) manufactured reactor fuel and target assemblies. Associated operations included support buildings, maintenance operations, laboratories, and infrastructure for managing waste. Effluents from M Area were transported through two separate networks of vitrified clay pipes (Figure 2). The M-Area Inactive Process Sewer (MIPS) network discharged waste to the M-Area Settling Basin, and the 313-MIPS network released waste to the A-014 Outfall, which flowed to a tributary of Tims Branch. In May 1982, the 313-MIPS process waters were diverted from Tims Branch to conjoin with MIPS process waters already flowing to the M-Area Settling Basin, increasing the flow from an average of 430,000 to 800,000 gallons per day. In November 1982, process waters from 313-MIPS were redirected back to Tims Branch through the A-014 Outfall, resulting in a reduction of the flow to the M-Area Settling Basin to 250,000 gallons per day by the end of 1982.

The MIPS L OU includes approximately 3,800 ft of underground piping [1,283 ft of the MIPS and 2,520 ft of 313-MIPS] and extends from the edges of the buildings (or former buildings) to the downstream discharge points of each line (Figure 2). Sewer pipes are made of vitrified clay, with diameters ranging from 12 to 30 inches and pipe depths ranging from about 7 to 12 ft below ground surface (bgs). High density polyethylene (HDPE) pipe liner, installed inside portions of the MIPS and 313-MIPS pipelines in 1983, ranges from 6 to 12 inches in diameter.

Pre-cast concrete or brick manholes along the MIPS and 313-MIPS allowed access to the pipelines for inspection, maintenance, effluent sampling, etc. The manholes are spaced approximately 350 to 400 ft apart along the MIPS and 313-MIPS sewer lines. An engineering review examined the construction, effluent capacity, and operational history

for the MIPS and 313-MIPS and found little probability of process overflows at the manholes.

M-Area effluent wastes included chlorinated solvents (used for degreasing fuel and target assemblies), acids, caustics, heavy metals, and minor amounts of radioactive constituents. Specific constituents of interest include trichloroethylene (TCE), tetrachloroethylene (PCE), 1,1,1-trichloroethane (1,1,1-TCA), aluminum, copper, iron, lead, magnesium, manganese, mercury, nickel, zinc, and uranium.

Initial Response

Extensive characterization activities established that contamination was limited to the soil around the sewer line and manholes at depths greater than 4 ft bgs. Four locations were identified where PCE and TCE could migrate downwards to impact the underlying groundwater at levels exceeding maximum contaminant levels (MCLs). A vadose zone analytical model (VZCOMML™) was used to establish contaminant migration (CM) remedial goal objectives (RGOs); i.e., the soil concentration that is predicted not to impact groundwater above MCLs of 0.307 mg/kg PCE and 0.0408 mg/kg TCE.

IV. Remedial Actions

Remedy Selection

The scope of the MIPS OU remedial action is limited to vadose zone soils. The manholes and sewer line will be sealed with cement and abandoned in place. The response actions discussed in this Record of Decision (ROD) are final remedial actions. Groundwater is not considered part of the scope for the MIPS OU. Any groundwater contamination resulting from the MIPS OU will be regulated by the SRS RCRA Part B Permit and addressed by the requirements of the M-Area and Metallurgical Laboratory Hazardous Waste Management Facilities Groundwater Monitoring and Corrective Action agreement.

The final remedial action objective (RAO) for the vadose zone soil is to prevent TCE and PCE from leaching to groundwater above MCLs. For PCE and TCE, the CM RGO is the

final RG and represents the most restrictive cleanup goal since there were no other RGOs established based on the applicable or appropriate and relevant requirement (ARAR) comparison, principal threat source material (PTSM) evaluation, human health risk assessment and ecological risk assessment. Final RGs are consistent with industrial land use although prevention of contaminants leaching to groundwater above MCLs is also protective in a hypothetical residential scenario. The final RG for PCE is 0.307 mg/kg and the final RG for TCE is 0.0408 mg/kg.

Remedy Implementation

The major components of the remedial action included the following:

- Hydraulic fracturing to improve the permeability of the fine-grained soils where residual contamination remains.
- Active soil vapor extraction at the fracturing wells to remove contaminant mass.
- Phased soil vapor extraction of the more permeable soil beneath fine-grained soils to prevent downward migration of contaminants.
- Institutional controls to ensure the protectiveness of the remedy.

These actions are in the construction phase at this time.

V. Progress Since Last Review

This is the first five-year review for this OU. The project is in the construction phase and is progressing according to the Post-ROD Implementation Schedule published in the Corrective Measures Implementation (CMI)/Remedial Action Implementation Plan (RAIP).

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

- Ensured that all actions required under the RCRA Permit were implemented

VII. Technical Assessment

The remedy is currently under construction. The OU is being maintained as required to ensure the effectiveness of the remedial action.

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. Project Costs

Costs associated with the selected remedy for the M-Area Inactive Sewer Lines include operation and maintenance costs of institutional controls. The estimated operation and maintenance cost associated with the selected remedy is \$3,606,071. The costs were discounted as follows: 2.1% for the first two years, 3.1% for the next seven years, and 3.4% for the final eight years of the active remedy. This estimate is an order-of-magnitude engineering cost estimate that is expected to be within +50 to -30 percent of the actual project cost. The remedy is currently under construction; therefore, the actual operation and maintenance cost for the MIPS L OU cannot be assessed at this time.

XI. Protectiveness Statement(s)

The remedies identified in the final ROD are expected to be protective of human health and the environment. 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).

XII. Next Review

The next five-year review is scheduled for February 12, 2014.

ATTACHMENT 1

List of Documents Reviewed

ERD-EN-2003-0169, *M Area Inactive Process Sewer Line (MIPSL) and 313 M Area Inactive Process Sewer (313-MIPS) Manhole Overflow Evaluation (U)*, 2003, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

WSRC-RP-2004-4214, *RCRA Facility Investigation/Remedial Investigation (RFI/RI) Work Plan, RFI/RI Report with Baseline Risk Assessment, and Corrective Measures Study/Feasibility Study (CMS/FS) for the M Area Inactive Process Sewer Lines (081-M) (U)*, Revision 1.1, 2005, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

WSRC-RP-2006-4001, *Record of Decision Remedial Alternative selection for the M-Area Inactive Process Sewer Lines Operable Unit (U)*, Rev. 1, Washington Savannah River Company, Savannah River Site, Aiken, SC

WSRC-RP-2005-4076, *Statement of Basis/Proposed Plan for the M Area Inactive Process Sewer Lines Operable Unit (081-M) (U)*, Revision 1.1, 2006, Washington Savannah River Company, Savannah River Site, Aiken, SC

WSRC-RP-2006-4068, *Land Use Control Implementation Plan (LUCIP) for the M-Area Inactive Process Sewer Lines Operable Unit (081-M) (U)*, Revision 1, Washington Savannah River Company, Savannah River Site, Aiken, SC

WSRC-RP-2006-4048, *Corrective Measures Implementation/Remedial Action Implementation Plan (CMI/RAIP) for the M-Area Inactive Process Sewer Lines (081-M) (U)*, Revision 1, Washington Savannah River Company, Savannah River Site, Aiken, SC

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ATTACHMENT 2

Five-Year Review Site Inspection Checklist for MIPS L

| I. SITE INFORMATION | | | | | | | | | | | | | | | |
|--|--|--|-----------------------------|---------------------------------------|--|---|--|--|---|---|--|---|--|---|--|
| Site Name: | M-Area Inactive Process Sewer Line | Date of Inspection: | 10/24/2007 | | | | | | | | | | | | |
| Location and Region: | SRS, USEPA Region IV | EPA ID: | SC1890008989 | | | | | | | | | | | | |
| Agency, office, or company leading the five-year review: | USDOE | CERCLIS No.: | 92 | | | | | | | | | | | | |
| | | Weather/Temperature: | | | | | | | | | | | | | |
| Remedy Includes: (Check all that apply) <table><tbody><tr><td><input type="checkbox"/> Cover System</td><td><input type="checkbox"/> Monitored Natural Attenuation</td></tr><tr><td><input checked="" type="checkbox"/> Access controls</td><td><input type="checkbox"/> Groundwater Containment</td></tr><tr><td><input checked="" type="checkbox"/> Institutional Controls</td><td><input type="checkbox"/> Vertical Barrier Walls</td></tr><tr><td><input type="checkbox"/> Groundwater pump and treatment</td><td></td></tr><tr><td><input type="checkbox"/> Surface water collection and treatment</td><td></td></tr><tr><td><input checked="" type="checkbox"/> Other: <u>Soil Vapor Extraction</u></td><td></td></tr></tbody></table> | | | | <input type="checkbox"/> Cover System | <input type="checkbox"/> Monitored Natural Attenuation | <input checked="" type="checkbox"/> Access controls | <input type="checkbox"/> Groundwater Containment | <input checked="" type="checkbox"/> Institutional Controls | <input type="checkbox"/> Vertical Barrier Walls | <input type="checkbox"/> Groundwater pump and treatment | | <input type="checkbox"/> Surface water collection and treatment | | <input checked="" type="checkbox"/> Other: <u>Soil Vapor Extraction</u> | |
| <input type="checkbox"/> Cover System | <input type="checkbox"/> Monitored Natural Attenuation | | | | | | | | | | | | | | |
| <input checked="" type="checkbox"/> Access controls | <input type="checkbox"/> Groundwater Containment | | | | | | | | | | | | | | |
| <input checked="" type="checkbox"/> Institutional Controls | <input type="checkbox"/> Vertical Barrier Walls | | | | | | | | | | | | | | |
| <input type="checkbox"/> Groundwater pump and treatment | | | | | | | | | | | | | | | |
| <input type="checkbox"/> Surface water collection and treatment | | | | | | | | | | | | | | | |
| <input checked="" type="checkbox"/> Other: <u>Soil Vapor Extraction</u> | | | | | | | | | | | | | | | |
| Attachments: <input type="checkbox"/> Inspection team roster attached <input type="checkbox"/> Site map attached | | | | | | | | | | | | | | | |
| II. INTERVIEWS (Check all that apply) | | | | | | | | | | | | | | | |
| 1. O & M Site Manager | <u>Wayne Gleaton</u> (Name) | <u>Post Closure Manager</u> (Title) | <u>10-23-2007</u> (Date) | | | | | | | | | | | | |
| Interviewed: | <input type="checkbox"/> at site <input type="checkbox"/> at office <input checked="" type="checkbox"/> by phone | Phone No. <u>803-557-8838</u> | | | | | | | | | | | | | |
| Problems, suggestions: | <input type="checkbox"/> report attached _____ | | | | | | | | | | | | | | |
| 2. O & M Staff | <u>Richard Feagin</u> (Name) | <u>Post-Closure Waste Site Inspector/Maintenance Coord.</u> (Title) | <u>8-23-2007</u> (Date) | | | | | | | | | | | | |
| Interviewed: | <input type="checkbox"/> at site <input type="checkbox"/> at office <input checked="" type="checkbox"/> by phone | Phone No. <u>803-952-4416</u> | | | | | | | | | | | | | |
| Problems, suggestions: | <input type="checkbox"/> report attached _____ | | | | | | | | | | | | | | |

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Five-Year Review Site Inspection Checklist (Continued)

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

x N/A

☐ As-built drawings☐ Readily available☐ Up to date

x N/A

☐ Maintenance Logs☐ Readily available☐ Up to date

x N/A

Remarks: The remedial system is under construction and has not started up yet.

Five-Year Review Site Inspection Checklist (Continued)

| | | | |
|--|---|--|---|
| 2. Site-Specific Health and Safety Plan | | | |
| <input checked="" type="checkbox"/> Readily available | <input checked="" type="checkbox"/> Up to date | <input type="checkbox"/> N/A | |
| <input checked="" type="checkbox"/> Contingency plan/emergency response plan to date | <input checked="" type="checkbox"/> Readily available | <input checked="" type="checkbox"/> Up to date | |
| <input type="checkbox"/> N/A | | | |
| Remarks: <u>Project activities – Project Safety & Health Description for M-Area Process Sewer Line</u> <u>Remediation Q-SHP-2006-00013. Routine O&M activities do not require a SSHASP under 29</u> <u>CFR 1910.120, HAZWOPER. A SSHASP is prepared in needed.</u> | | | |
| 3. O & M and OSHA Training Records | | | |
| <input checked="" type="checkbox"/> Readily available | <input checked="" type="checkbox"/> Up to date | <input type="checkbox"/> N/A | |
| Remarks: _____ | | | |
| 4. Permits and Service Agreements | | | |
| <input checked="" type="checkbox"/> Air discharge permit | <input checked="" type="checkbox"/> Readily available | <input checked="" type="checkbox"/> Up to date | <input type="checkbox"/> N/A |
| <input type="checkbox"/> Effluent discharge | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A |
| <input type="checkbox"/> Waste Disposal, POTW | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A |
| <input checked="" type="checkbox"/> Other permits | <input checked="" type="checkbox"/> Readily available | <input checked="" type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A |
| Remarks: <u>UIC Permit for fracturing</u> | | | |
| 5. Gas Generation Records | | | |
| <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A | |
| Remarks: _____ | | | |
| 6. Settlement Monument Records | | | |
| <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A | |
| Remarks: _____ | | | |
| 7. Groundwater Monitoring Records | | | |
| <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A | |
| Remarks: _____ | | | |
| 8. Leachate Extraction Records | | | |
| <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A | |
| Remarks: _____ | | | |
| 9. Discharge Compliance Records | | | |
| <input type="checkbox"/> Air | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A |
| <input type="checkbox"/> Water (effluent) | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A |
| Remarks: <u>The SVEU is under construction at this time.</u> | | | |
| 10. Daily Access/Security Logs | | | |
| <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A | |
| Remarks: _____ | | | |

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Five-Year Review Site Inspection Checklist (Continued)

| IV. O & M Costs | | | |
|---|--------------------|---------------------|---|
| 1. O & M Organization <input type="checkbox"/> State in-house <input type="checkbox"/> Contractor for State <input type="checkbox"/> PRP in-house <input type="checkbox"/> Contractor for PRP <input checked="" type="checkbox"/> Other <u>SRS</u> | | | |
| 2. O & M Cost Records <input type="checkbox"/> Readily available <input type="checkbox"/> Up to date <input type="checkbox"/> Funding mechanism/agreement in place <input checked="" type="checkbox"/> Other: <u>Project cost data is summarized in Section X of attached review: WSRC-RP-2007-4063.</u> | | | |
| Total annual cost by year for review period if available | | | |
| From _____ (Date) | To _____ (Date) | _____ Total cost | <input type="checkbox"/> Breakdown attached |
| From _____ (Date) | To _____ (Date) | _____ Total cost | <input type="checkbox"/> Breakdown attached |
| From _____ (Date) | To _____ (Date) | _____ Total cost | <input type="checkbox"/> Breakdown attached |
| From _____ (Date) | To _____ (Date) | _____ Total cost | <input type="checkbox"/> Breakdown attached |
| From _____ (Date) | To _____ (Date) | _____ Total cost | <input type="checkbox"/> Breakdown attached |
| 3. Unanticipated or Unusually High O & M Costs During Review Period Describe costs and reasons: _____ _____ _____ _____ | | | |
| V. ACCESS AND INSTITUTIONAL CONTROLS <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A | | | |
| A. Fencing | | | |
| 1. Fencing Damaged <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Gates secured <input checked="" type="checkbox"/> N/A Remarks _____ _____ | | | |

Five-Year Review Site Inspection Checklist (Continued)

B. Other Access Restrictions

1. **Signs and Other Security Measures** ☐ Location shown on site map ☐ N/A

Remarks: Signs at this site are under construction.

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: Daily during initial operation, subsequent schedule to be determined after startup and operation

Responsible party/agent: DOE

Contact: Rita Stubblefield, Waste Area Group Manager 09/3/2007 803-952-7817
(Name) (Title) (Date) (Phone No.)

Reporting 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: _____

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Five-Year Review Site Inspection Checklist (Continued)

| VI. GENERAL SITE CONDITIONS | | | |
|---|--|--|--|
| A. Roads <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A | | | |
| 1. Roads Damaged <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Roads adequate <input type="checkbox"/> N/A | | | |
| Remarks _____ _____ | | | |
| B. Other Site Conditions | | | |
| Remarks _____ _____ _____ | | | |
| VII. COVERS SYSTEMS <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A | | | |
| A. Landfill Surface | | | |
| 1. Settlement (Low spots) <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Settlement not evident | | | |
| Areal extent _____ Depth _____ | | | |
| Remarks: _____ _____ | | | |
| 2. Cracks <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Cracking not evident | | | |
| Lengths _____ Widths _____ Depths _____ | | | |
| Remarks _____ _____ | | | |
| 3. Erosion <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Erosion not evident | | | |
| Areal extent _____ Depth _____ | | | |
| Remarks _____ _____ | | | |
| 4. Holes <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Holes not evident | | | |
| Areal extent _____ Depth _____ | | | |
| Remarks _____ _____ | | | |
| 5. Vegetative Cover <input type="checkbox"/> Grass <input type="checkbox"/> Cover properly established <input type="checkbox"/> No signs of stress | | | |
| <input type="checkbox"/> Trees/shrubs (indicate size and location on a diagram) | | | |
| Remarks: _____ _____ | | | |
| 6. Alternative Cover (armored rock, concrete, etc.) <input type="checkbox"/> N/A | | | |
| Remarks: _____ _____ | | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | |
|--|---|--------------------|
| 7. Bulges <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Bulges not evident | | |
| Areal extent _____ Height _____ | | |
| Remarks _____ | | |
| 8. Wet Areas/Water Damage <input type="checkbox"/> Wet areas/water damage not evident | | |
| <input type="checkbox"/> Wet Areas | <input type="checkbox"/> Location shown on site map | Areal extent _____ |
| <input type="checkbox"/> Ponding | <input type="checkbox"/> Location shown on site map | Areal extent _____ |
| <input type="checkbox"/> Seeps | <input type="checkbox"/> Location shown on site map | Areal extent _____ |
| <input type="checkbox"/> Soft subgrade | <input type="checkbox"/> Location shown on site map | Areal extent _____ |
| Remarks _____ | | |
| 9. Slope Instability <input type="checkbox"/> Slides <input type="checkbox"/> Location shown on site map <input type="checkbox"/> No evidence of slope instability | | |
| Areal extent _____ | | |
| Remarks _____ | | |
| B. Benches <input type="checkbox"/> Applicable x 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 <input type="checkbox"/> Location shown on site map <input type="checkbox"/> N/A or okay | | |
| Remarks _____ | | |
| 2. Bench Breached <input type="checkbox"/> Location shown on site map <input type="checkbox"/> N/A or okay | | |
| Remarks _____ | | |
| 3. Bench Overtopped <input type="checkbox"/> Location shown on site map <input type="checkbox"/> N/A or okay | | |
| Remarks _____ | | |

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Five-Year Review Site Inspection Checklist (Continued)

C. Letdown Channels

☐ Applicable x 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 _____

Five-Year Review Site Inspection Checklist (Continued)

| | | | |
|--|--|---|---|
| D. Cover Penetrations <input type="checkbox"/> Applicable x N/A | | | |
| 1. Gas Vents <input type="checkbox"/> Active <input type="checkbox"/> Passive | | | |
| <input type="checkbox"/> Properly secured/locked | <input type="checkbox"/> Functioning | <input type="checkbox"/> Routinely sampled | <input type="checkbox"/> Good condition |
| <input type="checkbox"/> Evidence of leakage at penetration | <input type="checkbox"/> Needs Maintenance | <input type="checkbox"/> N/A | |
| Remarks _____ | | | |
| | | | |
| 2. Gas Monitoring Probes | | | |
| <input type="checkbox"/> Properly secured/locked | <input type="checkbox"/> Functioning | <input type="checkbox"/> Routinely sampled | <input type="checkbox"/> Good condition |
| <input type="checkbox"/> Evidence of leakage at penetration | <input type="checkbox"/> Needs Maintenance | <input type="checkbox"/> N/A | |
| Remarks _____ | | | |
| | | | |
| 3. Monitoring Wells (within surface area of landfill) | | | |
| <input type="checkbox"/> Properly secured/locked | <input type="checkbox"/> Functioning | <input type="checkbox"/> Routinely sampled | <input type="checkbox"/> Good condition |
| <input type="checkbox"/> Evidence of leakage at penetration | <input type="checkbox"/> Needs Maintenance | <input type="checkbox"/> N/A | |
| Remarks _____ | | | |
| | | | |
| 4. Leachate Extraction Wells | | | |
| <input type="checkbox"/> Properly secured/locked | <input type="checkbox"/> Functioning | <input type="checkbox"/> Routinely sampled | <input type="checkbox"/> Good condition |
| <input type="checkbox"/> Evidence of leakage at penetration | <input type="checkbox"/> Needs Maintenance | <input type="checkbox"/> N/A | |
| Remarks _____ | | | |
| | | | |
| 5. Settlement Monuments <input type="checkbox"/> Located <input type="checkbox"/> Routinely surveyed <input type="checkbox"/> N/A | | | |
| Remarks _____ | | | |
| | | | |
| E. Gas Collection and Treatment <input type="checkbox"/> Applicable x N/A | | | |
| 1. Gas Treatment Facilities | | | |
| <input type="checkbox"/> Flaring | <input type="checkbox"/> Thermal destruction | <input type="checkbox"/> Collection for reuse | |
| <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance | | |
| Remarks _____ | | | |
| | | | |
| 2. Gas Collection Wells, Manifolds and Piping | | | |
| <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance | | |
| Remarks _____ | | | |
| | | | |

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| | | | |
|--|--|--|--|
| 3. Gas Monitoring Facilities (e.g., gas monitoring of adjacent homes or buildings) <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A Remarks _____ _____ | | | |
| F. Cover Drainage Layer <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A | | | |
| 1. Outlet Pipes Inspected <input type="checkbox"/> Functioning <input type="checkbox"/> N/A Remarks _____ _____ | | | |
| 2. Outlet Rock Inspected <input type="checkbox"/> Functioning <input type="checkbox"/> N/A Remarks _____ _____ | | | |
| G. Detention/sedimentation Ponds <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A | | | |
| 1. Siltation Areal extent _____ Depth _____ <input type="checkbox"/> N/A <input type="checkbox"/> Siltation not evident Remarks _____ _____ | | | |
| 2. Erosion Areal extent _____ Depth _____ <input type="checkbox"/> N/A <input type="checkbox"/> Erosion not evident Remarks _____ _____ | | | |
| 3. Outlet Works <input type="checkbox"/> Functioning <input type="checkbox"/> N/A Remarks _____ _____ | | | |
| 4. Dam <input type="checkbox"/> Functioning <input type="checkbox"/> N/A Remarks _____ _____ | | | |
| H. Retaining Walls <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A | | | |
| 1. Deformations <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Deformation not evident Horizontal displacement _____ Vertical displacement _____ Rotational displacement _____ Remarks _____ _____ | | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | |
|---|---|--|
| 2. Degradation | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> Deformation not evident |
| Remarks _____ | | |
| I. Perimeter Ditches/Off-Site Discharge <input type="checkbox"/> Applicable x N/A | | |
| 1. Siltation | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> Siltation not evident |
| Areal extent _____ Depth _____ | | |
| Remarks _____ | | |
| 2. Vegetative Growth | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> Siltation not evident |
| x Vegetation does not impede flow | | |
| Areal extent _____ Type _____ | | |
| Remarks _____ | | |
| 3. Erosion | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> Erosion not evident |
| Areal extent _____ Depth _____ | | |
| Remarks _____ | | |
| 4. Discharge Structure | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> N/A |
| Remarks _____ | | |
| VIII. VERTICAL BARRIER WALLS <input type="checkbox"/> Applicable x N/A | | |
| 1. Settlement | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> Settlement not evident |
| Areal extent _____ Depth _____ | | |
| Remarks _____ | | |
| 2. Performance Monitoring | Type of Monitoring _____ | <input type="checkbox"/> Performance not monitored |
| Frequency _____ <input type="checkbox"/> Evidence of breaching Head differential _____ | | |
| Remarks _____ | | |

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Five-Year Review Site Inspection Checklist (Continued)

| | | | |
|--|--|-------------------------------------|---|
| IX. GROUNDWATER/SURFACE WATER REMEDIES | | <input type="checkbox"/> Applicable | <input checked="" type="checkbox"/> N/A |
| A. Groundwater Extraction Wells, Pumps, and Pipelines | | <input type="checkbox"/> Applicable | <input type="checkbox"/> N/A |
| 1. Pumps, Wellhead Plumbing, and Electrical <input type="checkbox"/> Good condition <input type="checkbox"/> All required wells located <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A Remarks _____ | | | |
| 2. Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____ | | | |
| 3. Spare Parts and Equipment <input type="checkbox"/> Readily available <input type="checkbox"/> Good condition <input type="checkbox"/> Requires upgrade <input type="checkbox"/> Needs to be provided Remarks _____ | | | |
| B. Surface Water Collection Structures, Pumps, and Pipelines | | <input type="checkbox"/> Applicable | <input type="checkbox"/> N/A |
| 1. Collection Structures, Pumps, and Electrical <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____ | | | |
| 2. Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____ | | | |
| 3. Spare Parts and Equipment <input type="checkbox"/> Readily available <input type="checkbox"/> Good condition <input type="checkbox"/> Requires upgrade <input type="checkbox"/> Needs to be provided Remarks _____ | | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | |
|---|--|---|
| C. Treatment System | <input type="checkbox"/> Applicable | <input type="checkbox"/> N/A |
| 1. Treatment Train (Check components that apply) | | |
| <input type="checkbox"/> Metals removal | <input type="checkbox"/> Oil/water separation | <input type="checkbox"/> Bioremediation |
| <input type="checkbox"/> Air stripping | <input type="checkbox"/> Carbon adsorbers | |
| <input type="checkbox"/> Filters _____ | | |
| <input type="checkbox"/> Additive (e.g., chelation agent, flocculent) _____ | | |
| <input type="checkbox"/> Others _____ | | |
| <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance | |
| <input type="checkbox"/> Sampling ports properly marked and functional | | |
| <input type="checkbox"/> Sampling/maintenance log displayed and up to date | | |
| <input type="checkbox"/> Equipment properly identified | | |
| <input type="checkbox"/> Quantity of groundwater treated annually _____ | | |
| <input type="checkbox"/> Quantity of surface water treated annually _____ | | |
| Remarks _____ | | |
| _____ | | |
| 2. Electrical Enclosures and Panels (properly rated and functional) | | |
| <input type="checkbox"/> N/A | <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance |
| Remarks _____ | | |
| _____ | | |
| 3. Tanks, Vaults, Storage Vessels | | |
| <input type="checkbox"/> N/A | <input type="checkbox"/> Good condition | <input type="checkbox"/> Proper secondary containment |
| | | <input type="checkbox"/> Needs Maintenance |
| Remarks _____ | | |
| _____ | | |
| 4. Discharge Structure and Appurtenances | | |
| <input type="checkbox"/> N/A | <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance |
| Remarks _____ | | |
| _____ | | |
| 5. Treatment Building(s) | | |
| <input type="checkbox"/> N/A | <input type="checkbox"/> Good condition (esp. roof and doorways) | <input type="checkbox"/> Needs repair |
| <input type="checkbox"/> Chemicals and equipment properly stored | | |
| Remarks _____ | | |
| _____ | | |

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Five-Year Review Site Inspection Checklist (Continued)

| |
|---|
| 6. Monitoring Wells (pump and treatment remedy) <input type="checkbox"/> Properly secured/locked <input type="checkbox"/> Functioning <input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition <input type="checkbox"/> All required wells located <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A Remarks _____ _____ |
| D. Monitoring Data |
| 1. Monitoring Data <input type="checkbox"/> Is routinely submitted on time <input type="checkbox"/> Is of acceptable quality |
| 2 Monitoring Data Suggests: <input type="checkbox"/> Groundwater plume is effectively contained <input type="checkbox"/> Contaminant concentrations are declining |
| E. Monitored Natural Attenuation |
| 1. Monitoring Wells (Natural attenuation remedy) <input type="checkbox"/> Properly secured/locked <input type="checkbox"/> Functioning <input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition <input type="checkbox"/> All required wells located <input type="checkbox"/> Needs Maintenance x N/A Remarks _____ _____ |
| X. OTHER REMEDIES |
| A. Soil Vapor Extraction Systems x Applicable <input type="checkbox"/> N/A |
| 1. Blowers, Wellhead Plumbing, and Electrical x Good condition x All required wells located <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A Remarks: <u>System is under construction.</u> |
| 2. Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances x Good condition <input type="checkbox"/> Needs Maintenance Remarks: <u>System is under construction.</u> |
| 3. Spare Parts and Equipment <input type="checkbox"/> Readily available <input type="checkbox"/> Good condition <input type="checkbox"/> Requires upgrade x Needs to be provided Remarks: <u>System is under construction.</u> |

Five-Year Review Site Inspection Checklist (Continued)

| XI. OVERALL OBSERVATIONS | |
|--|--|
| A. Implementation of the Remedy | <p>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.).</p> <p>The final remedial action objective (RAO) for the vadose zone soil is to prevent TCE and PCE from leaching to groundwater above MCLs. The remedies identified in the final ROD are expected to be protective of human health and the environment. Exposure pathways that could result in unacceptable risks are being controlled through institutional controls.</p> |
| B. Adequacy of O&M | <p>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.</p> <p>The remedial systems are under construction</p> |
| C. Early Indicators of Potential Remedy Failure | <p>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.</p> <p>N/A</p> |
| D. Opportunities for Optimization | <p>Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy.</p> <p>N/A</p> |

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METALLURGICAL LABORATORY (904-110G) HAZARDOUS WASTE MANAGEMENT FACILITY OPERABLE UNIT

I. Introduction

The review for this unit is conducted under the Savannah River Site (SRS) Resource Conservation and Recovery Act (RCRA) program. The Comprehensive Environmental Response, Compensation, and Liability Act (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 third such five-year review for the Metallurgical Laboratory Hazardous Waste Management Facility (HWMF) Operable Unit (OU). This review was conducted from August 2007 through September 2007. This report documents the results of the review.

II. OU Chronology

Table 1 lists the chronology of site events for the Metallurgical Laboratory HWMF OU.

Table 1. Chronology of OU Events

| Event | Date |
|---|-------------------------------------|
| Consent Decree (mandated OU is Subject to RCRA) | 1988 |
| Corrective Action Start | 1991 |
| RCRA Closure Certified | 1991 |
| Interim Record of Decision (ROD) Issuance | June 29, 1992 |
| Previous Five-Year Reviews | June 30, 1997 and February 12, 2004 |

III. Background

Physical Characteristics

M Area is located near the northwest edge of SRS (Figure 1). M Area contained manufacturing facilities for nuclear fuel components, offices and research facilities. The Metallurgical Laboratory HWMF OU includes an abandoned portion of a process sewer line, a seepage basin, a drainage outfall, and a Carolina Bay. See Figure 2 for Site layout

of Metallurgical Laboratory Hazardous Waste Management Facility Operable Unit. The nearest plant boundary is located approximately three-fourths of a mile northwest of this OU. The Metallurgical Laboratory HWMF has been designated as a source-specific OU within the Upper Three Runs Watershed.

Land and Resource Use

The Metallurgical Laboratory HWMF OU is located in an industrial area. The future land use for Metallurgical Laboratory HWMF OU is anticipated to remain industrial.

History of Contamination

The Metallurgical Laboratory HWMF began receiving effluent from the Savannah River Laboratory Equipment Engineering Division Metallurgical Laboratory 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 non-hazardous effluent. All flow to the Metallurgical Laboratory Basin was terminated on November 8, 1985, when the process sewer line was plugged. The Metallurgical Laboratory HWMF and underlying groundwater is being addressed under the 2003 RCRA Part B Permit Renewal administered by SCDHEC.

IV. Remedial Actions

Remedy Selection

The selected remedy for this unit as identified in the Record of Decision (ROD) under CERCLA is excavation of the process sewer line, closure of the basin using a low permeability cap, and evaluation of the Carolina Bay.

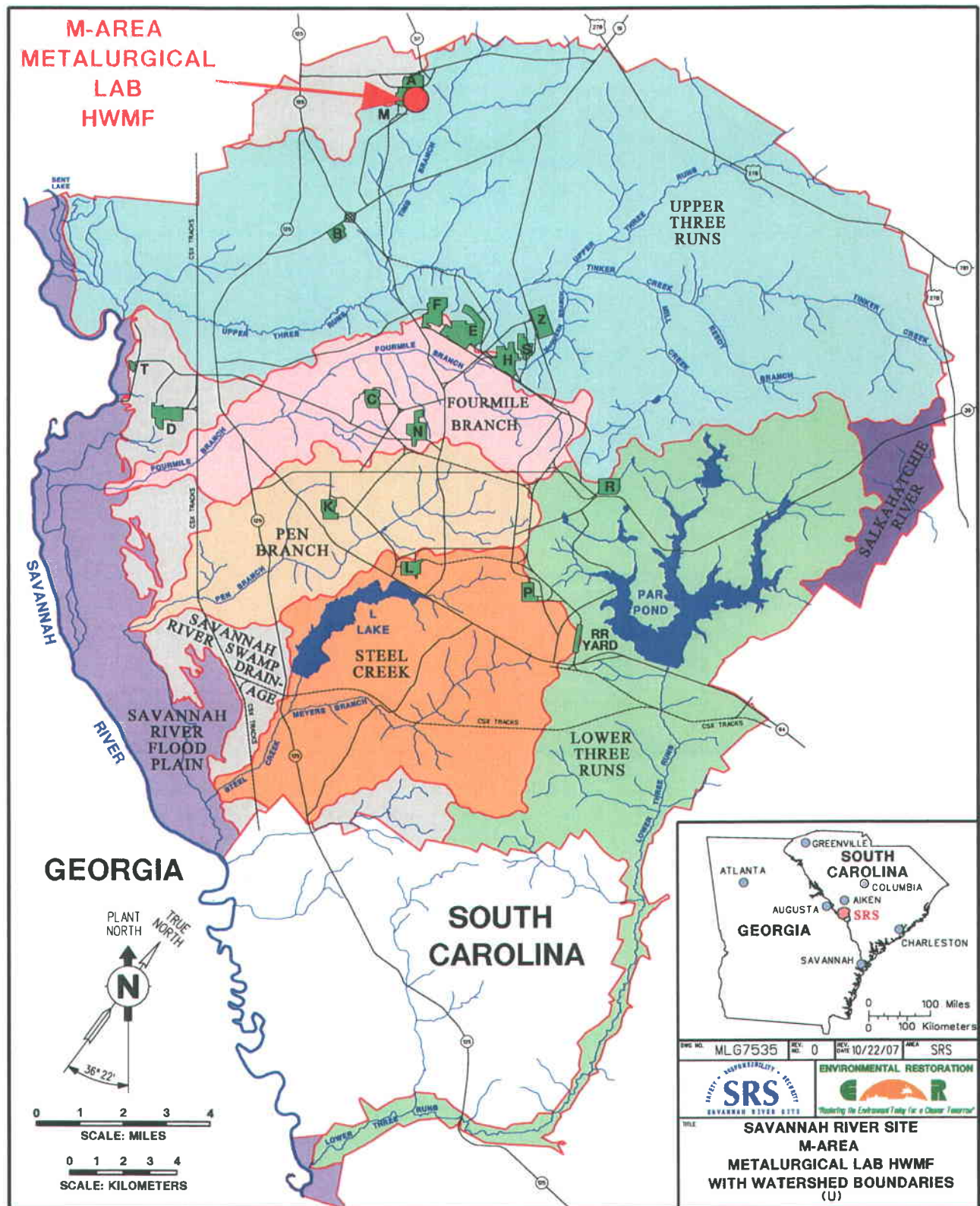


Figure 1. Metallurgical Laboratory Hazardous Waste Management Facility at SRS

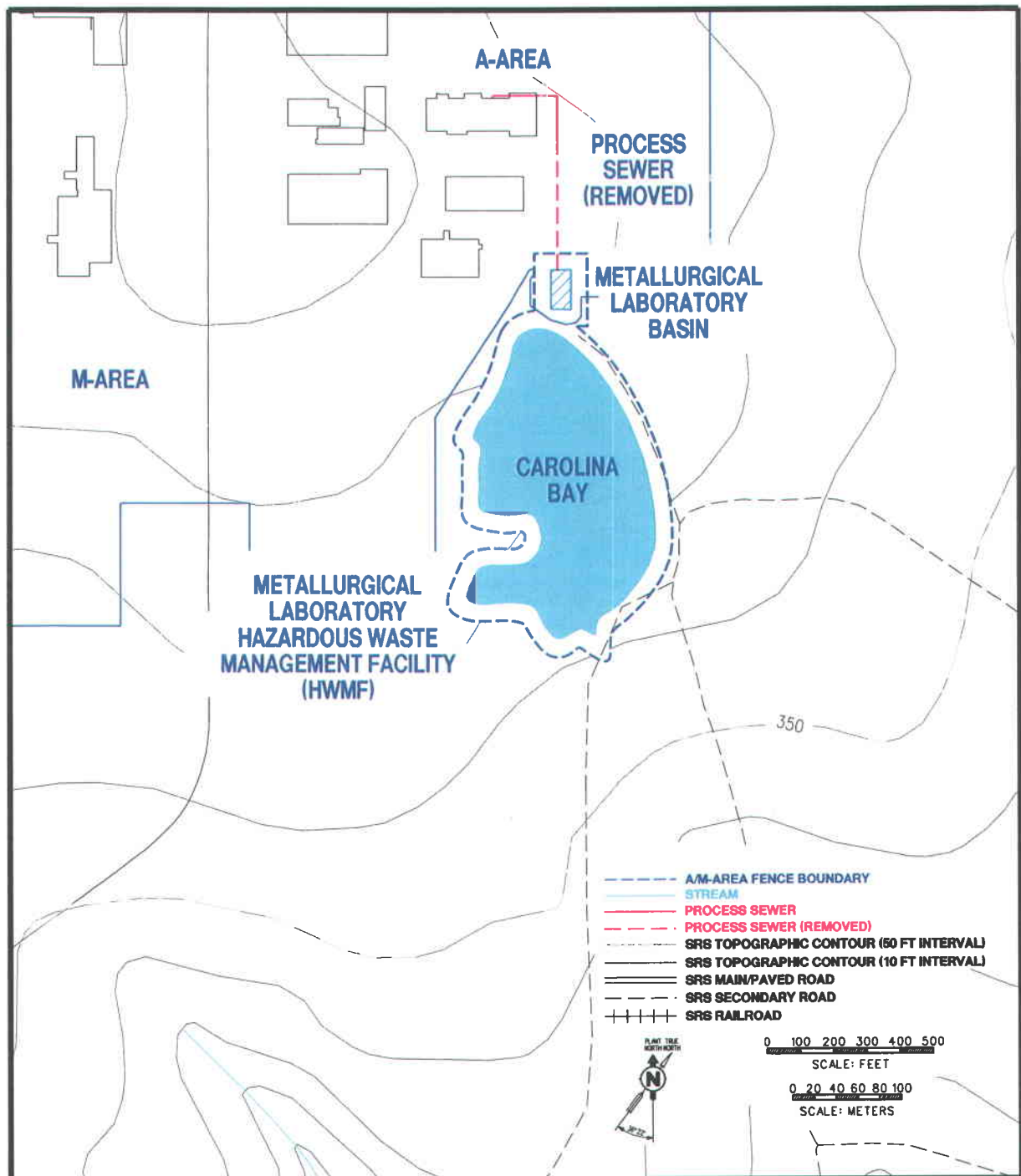


Figure 2. Site Layout of Metallurgical Laboratory Hazardous Waste Management Facility at SRS

V. Progress Since Last Review

The process sewer line was excavated and placed in the basin and a low permeability cover was placed on the basin in 1991. This is the third five-year review for this OU. The following actions have been completed:

- Annual inspections and maintenance to the basin cap and to the Carolina Bay as required by the RCRA Closure Plan
- Annual subsidence survey reports
- Characterization of the Met Lab Carolina Bay for human health risks was completed in 1991 and for ecological risks in 1993. Surface sediments and soil to a depth of 2 ft were contaminated with metals and organics. Risks were found to be acceptable and no further remedial action was recommended.

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
- Ensured that all actions required under the RCRA Permit were implemented

VII. Technical Assessment

The OU is being maintained as required to ensure the effectiveness of the remedial action.

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. Project Costs

Costs associated with the selected remedy for Metallurgical Lab include operation and maintenance costs of the cover and institutional controls. RCRA documentation does not require estimated project costs to be prepared. Therefore, none are included in this remedy review.

XI. Protectiveness Statement(s)

The excavation of the process sewer line, closure of the basin using a low permeability cap, and verification that no remedial action is necessary at the Carolina Bay are protective of human health and the environment. Subsequent 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).

XII. Next Review

The next five-year review is scheduled for February 12, 2014.

ATTACHMENT 1

List of Documents Reviewed

WSRC-RP-92-745, *Interim Action Record of Decision Remedial Alternative Selection, Metallurgical Laboratory Hazardous Waste Management Facility Operable Unit (U)*, Revision 0, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

WSRC-RP-92-423-11, *Metallurgical Laboratory Hazardous Waste Management Facility Carolina Bay Closure Volume II*, Revision 11, April 1994, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

WSRC-C1, *Environmental Restoration Administrative Procedure*, ER-WS-003, "Waste Site Maintenance Inspections (U)," Attachment 1, Waste Site Maintenance Checklist, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

WSRC-C3, *Metallurgical Laboratory HWMF Post Closure Inspection Procedure, Environmental Restoration Standard Operating Procedures Manual*, Procedure ER-SOP-010 (Met Lab Basin) and 014 (Carolina Bay), August 2, 2002, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

ER-SOP-014, *Environmental Restoration Standard Operating Procedure*, Rev. 0 – 2, "Waste Site Maintenance Inspections (U)," Attachment 1, ER Inspection Data Sheet for Waste Sites, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

Met Lab Settling Basin 904-110G Subsidence Monitor Survey Logs

Soil and Groundwater Closure Projects, Standard Operating Procedures, Met Lab HWMF Field Inspection Checklist, ER-IDS-019-020, Metallurgical Laboratory HWMF Post Closure Inspection (U), Revs. 0 and 1, Westinghouse Savannah River Company, Aiken, SC

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ATTACHMENT 2

Five-Year Review Site Inspection Checklist for MetLab

| I. SITE INFORMATION | | | | | | | | | | | | | | | |
|--|--|--|---|--|--|---|--|--|---|---|--|---|--|--|--|
| Site Name: | Metallurgical Laboratory HWMF | Date of Inspection: | 10/24/2007 | | | | | | | | | | | | |
| Location and Region: | SRS, USEPA Region IV | EPA ID: | SC1890008989 | | | | | | | | | | | | |
| Agency, office, or company leading the five- year review: | USDOE | CERCLIS OU No.: | 2 | | | | | | | | | | | | |
| | | Weather/Temperature: | | | | | | | | | | | | | |
| Remedy Includes: (Check all that apply) <table><tbody><tr><td><input checked="" type="checkbox"/> Cover System</td><td><input type="checkbox"/> Monitored Natural Attenuation</td></tr><tr><td><input checked="" type="checkbox"/> Access controls</td><td><input type="checkbox"/> Groundwater Containment</td></tr><tr><td><input checked="" type="checkbox"/> Institutional Controls</td><td><input type="checkbox"/> Vertical Barrier Walls</td></tr><tr><td><input type="checkbox"/> Groundwater pump and treatment</td><td></td></tr><tr><td><input type="checkbox"/> Surface water collection and treatment</td><td></td></tr><tr><td><input checked="" type="checkbox"/> Other: <u>Excavation, disposal</u></td><td></td></tr></tbody></table> | | | | <input checked="" type="checkbox"/> Cover System | <input type="checkbox"/> Monitored Natural Attenuation | <input checked="" type="checkbox"/> Access controls | <input type="checkbox"/> Groundwater Containment | <input checked="" type="checkbox"/> Institutional Controls | <input type="checkbox"/> Vertical Barrier Walls | <input type="checkbox"/> Groundwater pump and treatment | | <input type="checkbox"/> Surface water collection and treatment | | <input checked="" type="checkbox"/> Other: <u>Excavation, disposal</u> | |
| <input checked="" type="checkbox"/> Cover System | <input type="checkbox"/> Monitored Natural Attenuation | | | | | | | | | | | | | | |
| <input checked="" type="checkbox"/> Access controls | <input type="checkbox"/> Groundwater Containment | | | | | | | | | | | | | | |
| <input checked="" type="checkbox"/> Institutional Controls | <input type="checkbox"/> Vertical Barrier Walls | | | | | | | | | | | | | | |
| <input type="checkbox"/> Groundwater pump and treatment | | | | | | | | | | | | | | | |
| <input type="checkbox"/> Surface water collection and treatment | | | | | | | | | | | | | | | |
| <input checked="" type="checkbox"/> Other: <u>Excavation, disposal</u> | | | | | | | | | | | | | | | |
| Attachments: <input type="checkbox"/> Inspection team roster attached <input type="checkbox"/> Site map attached | | | | | | | | | | | | | | | |
| II. INTERVIEWS (Check all that apply) | | | | | | | | | | | | | | | |
| 1. O & M Site Manager | <u>Wayne Gleaton</u> (Name) | <u>Post Closure Manager</u> (Title) | <u>10-23-2007</u> (Date) | | | | | | | | | | | | |
| Interviewed: | <input type="checkbox"/> at site | <input type="checkbox"/> at office | <input checked="" type="checkbox"/> by phone Phone No. <u>803-557-8838</u> | | | | | | | | | | | | |
| Problems, suggestions: | <input type="checkbox"/> report attached _____ | | | | | | | | | | | | | | |
| 2. O & M Staff | <u>Richard Feagin</u> (Name) | <u>Post-Closure Waste Site Inspector/Maintenance Coord.</u> (Title) | <u>8-23-2007</u> (Date) | | | | | | | | | | | | |
| Interviewed: | <input type="checkbox"/> at site | <input type="checkbox"/> at office | <input checked="" type="checkbox"/> by phone Phone No. <u>803-952-4416</u> | | | | | | | | | | | | |
| Problems, suggestions: | <input type="checkbox"/> report attached _____ | | | | | | | | | | | | | | |

Five-Year Review Site Inspection Checklist (Continued)

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

- | | | | |
|---|---|--|---|
| <input type="checkbox"/> O & M Manual | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A |
| <input checked="" type="checkbox"/> As-built drawings | <input checked="" type="checkbox"/> Readily available | <input checked="" type="checkbox"/> Up to date | <input type="checkbox"/> N/A |
| <input type="checkbox"/> Maintenance Logs | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A |

Remarks: See Waste Unit Inspection and Maintenance, ER-SOP-019

Five-Year Review Site Inspection Checklist (Continued)

| | | | | |
|---|--|---|--|---|
| 2. Site-Specific Health and Safety Plan | | <input checked="" type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A |
| <input type="checkbox"/> Contingency plan/emergency response plan | | <input checked="" type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A |
| Remarks: <u>Routine O&M activities do not require a SSHASP under 29 CFR 1910.120, HAZWOPER. A</u> <u>SSHASP is prepared as needed.</u> | | | | |
| 3. O & M and OSHA Training Records | | <input checked="" type="checkbox"/> Readily available | <input checked="" type="checkbox"/> Up to date | <input type="checkbox"/> N/A |
| Remarks: _____ | | | | |
| 4. Permits and Service Agreements | | | | |
| <input type="checkbox"/> Air discharge permit | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A | |
| <input type="checkbox"/> Effluent discharge | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A | |
| <input type="checkbox"/> Waste Disposal, POTW | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A | |
| <input type="checkbox"/> Other permits | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A | |
| Remarks: _____ | | | | |
| 5. Gas Generation Records | | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A |
| Remarks: _____ | | | | |
| 6. Settlement Monument Records | | <input checked="" type="checkbox"/> Readily available | <input checked="" type="checkbox"/> Up to date | <input type="checkbox"/> N/A |
| Remarks: _____ | | | | |
| 7. Groundwater Monitoring Records | | <input checked="" type="checkbox"/> Readily available | <input checked="" type="checkbox"/> Up to date | <input type="checkbox"/> N/A |
| Remarks: _____ | | | | |
| 8. Leachate Extraction Records | | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A |
| Remarks: _____ | | | | |
| 9. Discharge Compliance Records | | | | |
| <input type="checkbox"/> Air | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A | |
| <input type="checkbox"/> Water (effluent) | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A | |
| Remarks: _____ | | | | |
| 10. Daily Access/Security Logs | | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A |
| Remarks: _____ | | | | |

Five-Year Review Site Inspection Checklist (Continued)

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: Project cost data is summarized in Section X of attached review: WSRC-RP-2007-4063.

Total annual cost by year for review period if available

| | | | |
|------------|----------|------------|---|
| From _____ | To _____ | _____ | <input type="checkbox"/> Breakdown attached |
| (Date) | (Date) | Total cost | |
| From _____ | To _____ | _____ | <input type="checkbox"/> Breakdown attached |
| (Date) | (Date) | Total cost | |
| From _____ | To _____ | _____ | <input type="checkbox"/> Breakdown attached |
| (Date) | (Date) | Total cost | |
| From _____ | To _____ | _____ | <input type="checkbox"/> Breakdown attached |
| (Date) | (Date) | Total cost | |
| From _____ | To _____ | _____ | <input type="checkbox"/> Breakdown attached |
| (Date) | (Date) | Total cost | |

3. 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: Fencing is in good condition.

Five-Year Review Site Inspection Checklist (Continued)

B. Other Access Restrictions

1. Signs and Other Security Measures ☐ Location shown on site map ☐ N/A

Remarks: Signs are in good condition.

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: Annual

Responsible party/agent: DOE

Contact: Karen Adams, Waste Area Group Manager 09/3/07 803-952-7871
(Name) (Title) (Date) (Phone No.)

Reporting 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:

Five-Year Review Site Inspection Checklist (Continued)

| | |
|--|---------------------------|
| 3. Land use Changes Offsite <input checked="" type="checkbox"/> N/A | |
| Remarks _____ | |
| _____ | |
| VI. GENERAL SITE CONDITIONS | |
| A. Roads <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A | |
| 1. Roads Damaged <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Roads adequate <input type="checkbox"/> N/A | |
| Remarks _____ | |
| _____ | |
| B. Other Site Conditions | |
| Remarks _____ | |
| _____ | |
| _____ | |
| VII. COVERS SYSTEMS <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A | |
| A. Landfill Surface | |
| 1. Settlement (Low spots) <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Settlement not evident | |
| Areal extent _____ | Depth _____ |
| Remarks: _____ | |
| _____ | |
| 2. Cracks <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Cracking not evident | |
| Lengths _____ | Widths _____ Depths _____ |
| Remarks _____ | |
| _____ | |
| 3. Erosion <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Erosion not evident | |
| Areal extent _____ | Depth _____ |
| Remarks _____ | |
| _____ | |
| 4. Holes <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Holes not evident | |
| Areal extent _____ | Depth _____ |
| Remarks _____ | |
| _____ | |
| 5. Vegetative Cover <input type="checkbox"/> Grass <input type="checkbox"/> Cover properly established <input type="checkbox"/> No signs of stress | |
| <input type="checkbox"/> Trees/shrubs (indicate size and location on a diagram) | |
| Remarks: <u>Grass is established but dry due to lack of rain.</u> | |
| _____ | |

Five-Year Review Site Inspection Checklist (Continued)

| | |
|--|--|
| 6. Alternative Cover (armored rock, concrete, etc.) <input checked="" type="checkbox"/> N/A | |
| Remarks: _____ _____ | |
| 7. Bulges <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Bulges not evident | |
| Areal extent _____ Height _____ | |
| Remarks _____ _____ | |
| 8. Wet Areas/Water Damage <input checked="" type="checkbox"/> Wet areas/water damage not evident | |
| <input type="checkbox"/> Wet Areas <input type="checkbox"/> Location shown on site map Areal extent _____ | |
| <input type="checkbox"/> Ponding <input type="checkbox"/> Location shown on site map Areal extent _____ | |
| <input type="checkbox"/> Seeps <input type="checkbox"/> Location shown on site map Areal extent _____ | |
| <input type="checkbox"/> Soft subgrade <input type="checkbox"/> Location shown on site map Areal extent _____ | |
| Remarks _____ _____ | |
| 9. Slope Instability <input type="checkbox"/> Slides <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> No evidence of slope instability | |
| Areal extent _____ | |
| Remarks _____ _____ | |
| B. Benches <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> 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 <input type="checkbox"/> Location shown on site map <input type="checkbox"/> N/A or okay | |
| Remarks _____ _____ | |
| 2. Bench Breached <input type="checkbox"/> Location shown on site map <input type="checkbox"/> N/A or okay | |
| Remarks _____ _____ | |
| 3. Bench Overtopped <input type="checkbox"/> Location shown on site map <input type="checkbox"/> N/A or okay | |
| Remarks _____ _____ | |

Five-Year Review Site Inspection Checklist (Continued)

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 _____

Five-Year Review Site Inspection Checklist (Continued)

| | | | |
|--|--|---|---|
| D. Cover Penetrations <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A | | | |
| 1. Gas Vents <input type="checkbox"/> Active <input type="checkbox"/> Passive | | | |
| <input type="checkbox"/> Properly secured/locked | <input type="checkbox"/> Functioning | <input type="checkbox"/> Routinely sampled | <input type="checkbox"/> Good condition |
| <input type="checkbox"/> Evidence of leakage at penetration | <input type="checkbox"/> Needs Maintenance | <input type="checkbox"/> N/A | |
| Remarks _____ | | | |
| 2. Gas Monitoring Probes | | | |
| <input type="checkbox"/> Properly secured/locked | <input type="checkbox"/> Functioning | <input type="checkbox"/> Routinely sampled | <input type="checkbox"/> Good condition |
| <input type="checkbox"/> Evidence of leakage at penetration | <input type="checkbox"/> Needs Maintenance | <input type="checkbox"/> N/A | |
| Remarks _____ | | | |
| 3. Monitoring Wells | | | |
| <input type="checkbox"/> Properly secured/locked | <input type="checkbox"/> Functioning | <input type="checkbox"/> Routinely sampled | <input type="checkbox"/> Good condition |
| <input type="checkbox"/> Evidence of leakage at penetration | <input type="checkbox"/> Needs Maintenance | <input type="checkbox"/> N/A | |
| Remarks _____ | | | |
| 4. Leachate Extraction Wells | | | |
| <input type="checkbox"/> Properly secured/locked | <input type="checkbox"/> Functioning | <input type="checkbox"/> Routinely sampled | <input type="checkbox"/> Good condition |
| <input type="checkbox"/> Evidence of leakage at penetration | <input type="checkbox"/> Needs Maintenance | <input type="checkbox"/> N/A | |
| Remarks _____ | | | |
| 5. Settlement Monuments <input type="checkbox"/> Located <input type="checkbox"/> Routinely surveyed <input type="checkbox"/> N/A | | | |
| Remarks _____ | | | |
| E. Gas Collection and Treatment <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A | | | |
| 1. Gas Treatment Facilities | | | |
| <input type="checkbox"/> Flaring | <input type="checkbox"/> Thermal destruction | <input type="checkbox"/> Collection for reuse | |
| <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance | | |
| Remarks _____ | | | |
| 2. Gas Collection Wells, Manifolds and Piping | | | |
| <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance | | |
| Remarks _____ | | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | | |
|--|--|--|--|
| 3. Gas Monitoring Facilities (e.g., gas monitoring of adjacent homes or buildings) <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A Remarks _____ _____ | | | |
| F. Cover Drainage Layer <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A | | | |
| 1. Outlet Pipes Inspected <input checked="" type="checkbox"/> Functioning <input type="checkbox"/> N/A Remarks _____ _____ | | | |
| 2. Outlet Rock Inspected <input checked="" type="checkbox"/> Functioning <input type="checkbox"/> N/A Remarks _____ _____ | | | |
| G. Detention/sedimentation Ponds <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A | | | |
| 1. Siltation Areal extent _____ Depth _____ <input type="checkbox"/> N/A <input type="checkbox"/> Siltation not evident Remarks _____ _____ | | | |
| 2. Erosion Areal extent _____ Depth _____ <input type="checkbox"/> N/A <input type="checkbox"/> Erosion not evident Remarks _____ _____ | | | |
| 3. Outlet Works <input type="checkbox"/> Functioning <input type="checkbox"/> N/A Remarks _____ _____ | | | |
| 4. Dam <input type="checkbox"/> Functioning <input type="checkbox"/> N/A Remarks _____ _____ | | | |
| H. Retaining Walls <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A | | | |
| 1. Deformations <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Deformation not evident Horizontal displacement _____ Vertical displacement _____ Rotational displacement _____ Remarks _____ _____ | | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | |
|--|---|---|
| 2. Degradation | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> Deformation not evident |
| Remarks _____ | | |
| I. Perimeter Ditches/Off-Site Discharge <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A | | |
| 1. Siltation | <input type="checkbox"/> Location shown on site map | <input checked="" type="checkbox"/> Siltation not evident |
| Areal extent _____ Depth _____ | | |
| Remarks _____ | | |
| 2. Vegetative Growth | <input type="checkbox"/> Location shown on site map | <input checked="" type="checkbox"/> Siltation not evident |
| <input checked="" type="checkbox"/> Vegetation does not impede flow | | |
| Areal extent _____ Type _____ | | |
| Remarks _____ | | |
| 3. Erosion | <input type="checkbox"/> Location shown on site map | <input checked="" type="checkbox"/> Erosion not evident |
| Areal extent _____ Depth _____ | | |
| Remarks _____ | | |
| 4. Discharge Structure | <input type="checkbox"/> Location shown on site map | <input checked="" type="checkbox"/> N/A |
| Remarks _____ | | |
| VIII. VERTICAL BARRIER WALLS <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A | | |
| 1. Settlement | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> Settlement not evident |
| Areal extent _____ Depth _____ | | |
| Remarks _____ | | |
| 2. Performance Monitoring | Type of Monitoring _____ | <input type="checkbox"/> Performance not monitored |
| Frequency _____ <input type="checkbox"/> Evidence of breaching Head differential _____ | | |
| Remarks _____ | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | | |
|--|--|-------------------------------------|---|
| IX. GROUNDWATER/SURFACE WATER REMEDIES | | <input type="checkbox"/> Applicable | <input checked="" type="checkbox"/> N/A |
| A. Groundwater Extraction Wells, Pumps, and Pipelines | | <input type="checkbox"/> Applicable | <input type="checkbox"/> N/A |
| 1. Pumps, Wellhead Plumbing, and Electrical | | | |
| <input type="checkbox"/> Good condition <input type="checkbox"/> All required wells located <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A | | | |
| Remarks _____ | | | |
| _____ | | | |
| 2. Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances | | | |
| <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance | | | |
| Remarks _____ | | | |
| _____ | | | |
| 3. Spare Parts and Equipment | | | |
| <input type="checkbox"/> Readily available <input type="checkbox"/> Good condition <input type="checkbox"/> Requires upgrade <input type="checkbox"/> Needs to be provided | | | |
| Remarks _____ | | | |
| _____ | | | |
| B. Surface Water Collection Structures, Pumps, and Pipelines | | <input type="checkbox"/> Applicable | <input type="checkbox"/> N/A |
| 1. Collection Structures, Pumps, and Electrical | | | |
| <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance | | | |
| Remarks _____ | | | |
| _____ | | | |
| 2. Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances | | | |
| <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance | | | |
| Remarks _____ | | | |
| _____ | | | |
| 3. Spare Parts and Equipment | | | |
| <input type="checkbox"/> Readily available <input type="checkbox"/> Good condition <input type="checkbox"/> Requires upgrade <input type="checkbox"/> Needs to be provided | | | |
| Remarks _____ | | | |
| _____ | | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | | |
|---|--|---|--|
| C. Treatment System | <input type="checkbox"/> Applicable | <input type="checkbox"/> N/A | |
| 1. Treatment Train (Check components that apply) | | | |
| <input type="checkbox"/> Metals removal | <input type="checkbox"/> Oil/water separation | <input type="checkbox"/> Bioremediation | |
| <input type="checkbox"/> Air stripping | <input type="checkbox"/> Carbon adsorbers | | |
| <input type="checkbox"/> Filters _____ | | | |
| <input type="checkbox"/> Additive (e.g., chelation agent, flocculent) _____ | | | |
| <input type="checkbox"/> Others _____ | | | |
| <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance | | |
| <input type="checkbox"/> Sampling ports properly marked and functional | | | |
| <input type="checkbox"/> Sampling/maintenance log displayed and up to date | | | |
| <input type="checkbox"/> Equipment properly identified | | | |
| <input type="checkbox"/> Quantity of groundwater treated annually _____ | | | |
| <input type="checkbox"/> Quantity of surface water treated annually _____ | | | |
| Remarks _____ | | | |
| | | | |
| 2. Electrical Enclosures and Panels (properly rated and functional) | | | |
| <input type="checkbox"/> N/A | <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance | |
| Remarks _____ | | | |
| | | | |
| 3. Tanks, Vaults, Storage Vessels | | | |
| <input type="checkbox"/> N/A | <input type="checkbox"/> Good condition | <input type="checkbox"/> Proper secondary containment | <input type="checkbox"/> Needs Maintenance |
| Remarks _____ | | | |
| | | | |
| 4. Discharge Structure and Appurtenances | | | |
| <input type="checkbox"/> N/A | <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance | |
| Remarks _____ | | | |
| | | | |
| 5. Treatment Building(s) | | | |
| <input type="checkbox"/> N/A | <input type="checkbox"/> Good condition (esp. roof and doorways) | <input type="checkbox"/> Needs repair | |
| <input type="checkbox"/> Chemicals and equipment properly stored | | | |
| Remarks _____ | | | |
| | | | |

Five-Year Review Site Inspection Checklist (Continued)

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.).

The excavation of the process sewer line, closure of the basin using a low permeability cap, and verification that no remedial action is necessary at the Carolina Bay are protective of human health and the environment.

Subsequent exposure pathways that could result in unacceptable risks are being controlled through institutional controls.

Five-Year Review Site Inspection Checklist (Continued)

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.

The OU is being maintained as required to insure the effectiveness of the remedial action.

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.

N/A

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MIXED WASTE MANAGEMENT FACILITY (643-28E) OPERABLE UNIT

I. Introduction

The review for this unit is conducted under the Savannah River Site (SRS) Resource Conservation Recovery Act (RCRA) program. The Comprehensive Environmental Response, Compensation, and Liability Act (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 third five-year Record of Decision (ROD) review for the Mixed Waste Management Facility (MWMF) Operable Unit (OU). This review was conducted from September 2007 through October 2007. This report documents the results of the review.

II. OU Chronology

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

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 and February 12, 2004 |

III. Background

Physical Characteristics

The MWMF is a source-specific OU in the Upper Three Runs Watershed. The MWMF consists of 118 slit trenches, one engineered low-level trench, and a naval core barrel mound. It is located in the center of SRS between F and H Areas. Figure 1 shows the MWMF at SRS. Figure 2 shows the Site layout.

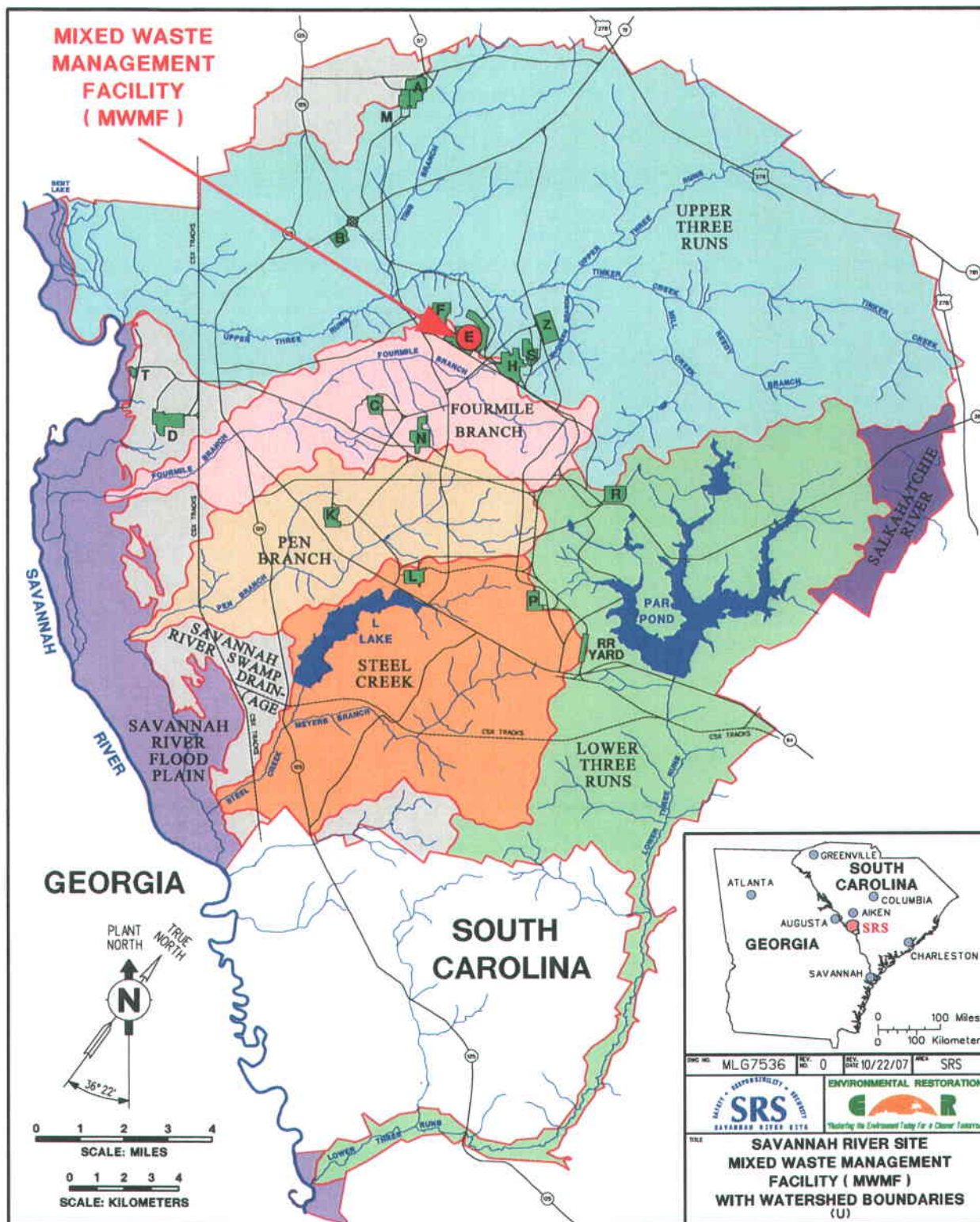


Figure 1. Mixed Waste Management Facility at Savannah River Site

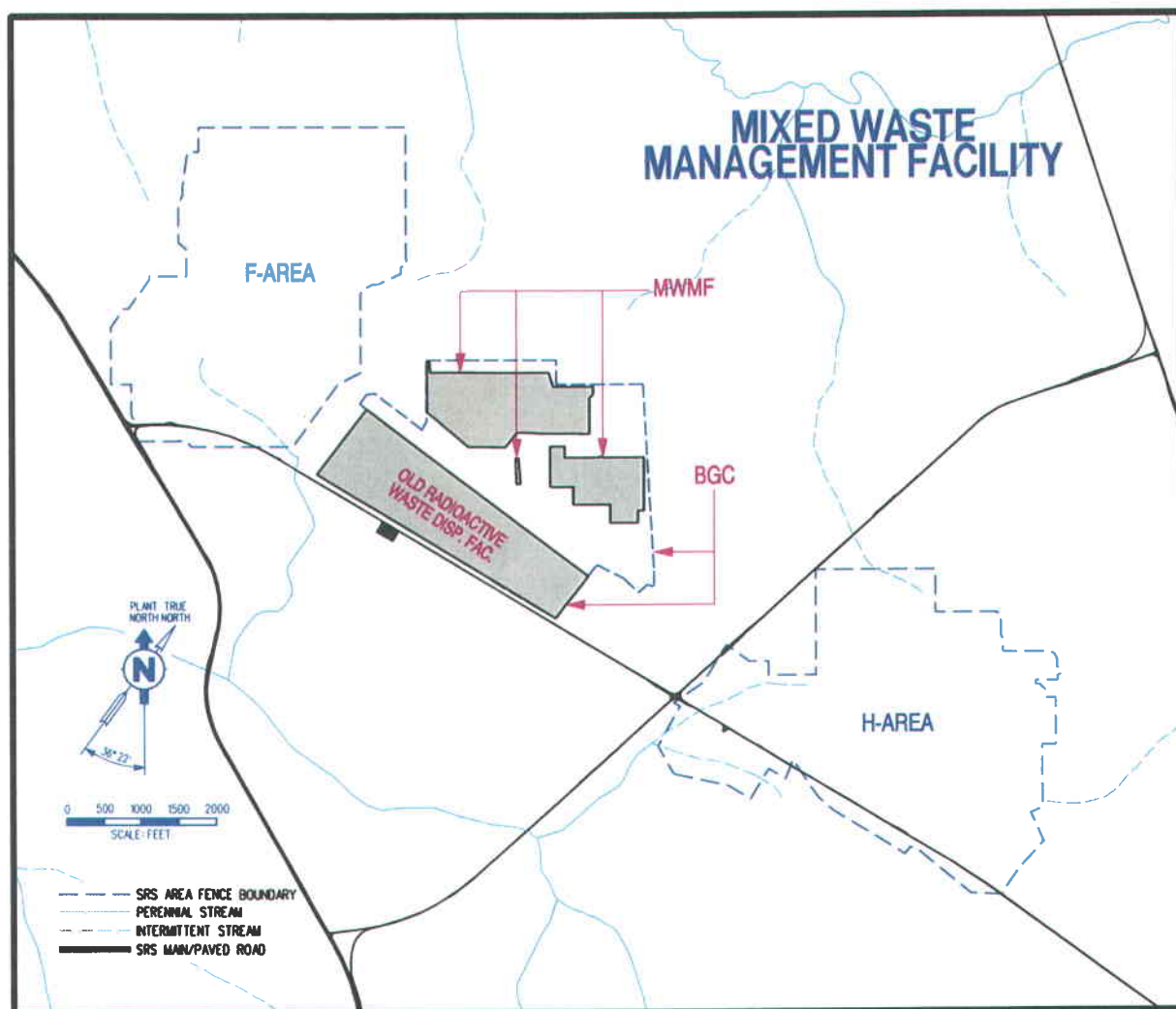


Figure 2. Site Layout of Mixed Waste Management Facility

Land and Resource Use

The MWMF OU is located in an industrial area. The future land use for MWMF OU is anticipated to remain industrial.

History of Contamination

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 SRS. Some of these materials are classified under RCRA as mixed waste containing both hazardous and radioactive components.

Waste from SRS was disposed of in the form of job control waste and sent to the MWMF (e.g., 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). The primary constituents of concern are tritium, lead, trichloroethylene (TCE) and uranium.

IV. Remedial Actions

Remedy Selection

The selected remedy for this unit as identified in the ROD is no further action under CERCLA.

V. Progress Since Last Review

This is the third five-year review for this OU. Since the previous review in September of 2003, the following actions were completed:

- Annual inspections and maintenance were performed for the soil cover as required by the RCRA Closure Plan

- Groundwater monitoring and corrective action were performed as required by the RCRA Post-Closure Care Plan

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
- Ensured 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. Project Costs

Costs associated with the selected remedy for MWMF include operation and maintenance costs of groundwater monitoring and institutional controls. RCRA documentation does not require estimated project costs to be prepared. Therefore, none are included in this remedy review.

XI. Protectiveness Statement(s)

The remedy of no further action under CERCLA is protective of human health and the environment.

XII. Next Review

The next five-year review is scheduled for February 12, 2014.

ATTACHMENT 1

List of Documents Reviewed

WSRC-RP-93-1511, *Final Record of Decision Remedial Alternative Selection for Mixed Waste Management Facility (U)*, Revision 1, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

WSRC-IM-98-30, 2000 RCRA Part B Permit Renewal Application for Volume VII, 1998, Mixed Waste Management Facility Postclosure

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ATTACHMENT 2

Five-Year Review Site Inspection Checklist

| I. SITE INFORMATION | | | |
|---|--|--|--|
| Site Name: | Mixed Waste Management Facility | Date of Inspection: | 9/26/2007 |
| Location and Region: | SRS, USEPA Region IV | EPA ID: | SC1890008989 |
| Agency, office, or company leading the five-year review: | USDOE | CERCLIS OU No.: | |
| | | Weather/Temperature: | |
| Remedy Includes: (Check all that apply) <div style="display: flex; flex-wrap: wrap;"><div style="width: 50%;"><input checked="" type="checkbox"/> Cover System</div><div style="width: 50%;"><input type="checkbox"/> Monitored Natural Attenuation</div><div style="width: 50%;"><input type="checkbox"/> Access controls</div><div style="width: 50%;"><input type="checkbox"/> Groundwater Containment</div><div style="width: 50%;"><input checked="" type="checkbox"/> Institutional Controls</div><div style="width: 50%;"><input type="checkbox"/> Vertical Barrier Walls</div><div style="width: 50%;"><input type="checkbox"/> Groundwater pump and treatment</div><div style="width: 50%;"></div><div style="width: 50%;"><input type="checkbox"/> Surface water collection and treatment</div><div style="width: 50%;"></div><div style="width: 50%;"><input type="checkbox"/> Other: _____</div><div style="width: 50%;"></div></div> | | | |
| Attachments: <input type="checkbox"/> Inspection team roster attached <input type="checkbox"/> Site map attached | | | |
| II. INTERVIEWS (Check all that apply) | | | |
| 1. O & M Site Manager | <u>Wayne Gleaton</u> (Name) | <u>Mgr., Post-Closure Maintenance</u> (Title) | <u>10/2/07</u> (Date) |
| Interviewed: | <input type="checkbox"/> at site | <input type="checkbox"/> at office | <input type="checkbox"/> by phone Phone No. <u>(803) 557-8838</u> |
| Problems, suggestions: | <input type="checkbox"/> report attached _____ | | |
| 2. O & M Staff | <u>R. Feagin</u> (Name) | <u>Post-Closure Maintenance</u> (Title) | <u>9/26/07</u> (Date) |
| Interviewed: | <input checked="" type="checkbox"/> at site | <input type="checkbox"/> at office | <input type="checkbox"/> by phone Phone No. <u>(803) 952-6706</u> |
| Problems, suggestions: | <input type="checkbox"/> report attached _____ | | |

Five-Year Review Site Inspection Checklist (Continued)

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

| | | | |
|---|--|-------------------------------------|------------------------------|
| <input type="checkbox"/> O & M Manual | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |
| x As-built drawings | x Readily available | x Up to date | <input type="checkbox"/> N/A |
| <input type="checkbox"/> Maintenance Logs | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |

Remarks: See Waste Unit Inspection and Maintenance, ER-SOP-019.

Five-Year Review Site Inspection Checklist (Continued)

| | | | |
|--|--|-------------------------------------|-------|
| 2. Site-Specific Health and Safety Plan | | | |
| <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A | |
| <input type="checkbox"/> Contingency plan/emergency response plan | | | |
| <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A | |
| Remarks: <u>Routine O&M activities do not require an SSHASP under 29 CFR 1910.1201, HAZWOPER</u> | | | |
| 3. O & M and OSHA Training Records | | | |
| x Readily available | x Up to date | <input type="checkbox"/> N/A | |
| Remarks _____ | | | |
| 4. Permits and Service Agreements | | | |
| <input type="checkbox"/> Air discharge permit | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |
| <input type="checkbox"/> Effluent discharge | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |
| <input type="checkbox"/> Waste Disposal, POTW | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |
| <input type="checkbox"/> Other permits | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |
| Remarks _____ | | | |
| 5. Gas Generation Records | | | |
| <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A | |
| Remarks _____ | | | |
| 6. Settlement Monument Records | | | |
| x Readily available | x Up to date | <input type="checkbox"/> N/A | |
| Remarks _____ | | | |
| 7. Groundwater Monitoring Records | | | |
| <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A | |
| Remarks _____ | | | |
| 8. Leachate Extraction Records | | | |
| <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A | |
| Remarks _____ | | | |
| 9. Discharge Compliance Records | | | |
| <input type="checkbox"/> Air | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |
| <input type="checkbox"/> Water (effluent) | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |
| Remarks _____ | | | |
| 10. Daily Access/Security Logs | | | |
| <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A | |
| Remarks _____ | | | |

Five-Year Review Site Inspection Checklist (Continued)

IV. O & M Costs

1. O & M Organization

- ☐ State in-house ☐ Contractor for State
☐ PRP in-house ☐ Contractor for PRP
x Other SRS

2. O & M Cost Records

- ☐ Readily available ☐ Up to date ☐ Funding mechanism/agreement in place
x Other: Project cost data is summarized in Section X of attached review: WSRC-RP-2007-4063

Total annual cost by year for review period if available

| | | |
|---------------------|------------|---|
| From _____ To _____ | _____ | <input type="checkbox"/> Breakdown attached |
| (Date) (Date) | Total cost | |
| From _____ To _____ | _____ | <input type="checkbox"/> Breakdown attached |
| (Date) (Date) | Total cost | |
| From _____ To _____ | _____ | <input type="checkbox"/> Breakdown attached |
| (Date) (Date) | Total cost | |
| From _____ To _____ | _____ | <input type="checkbox"/> Breakdown attached |
| (Date) (Date) | Total cost | |
| From _____ To _____ | _____ | <input type="checkbox"/> Breakdown attached |
| (Date) (Date) | Total cost | |

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

Describe costs and reasons:

V. ACCESS AND INSTITUTIONAL CONTROLS

x Applicable ☐ N/A

A. Fencing

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

Remarks _____

Five-Year Review Site Inspection Checklist (Continued)

B. Other Access Restrictions

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

Remarks: Signs at this site are in good condition.

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 walkdown

Frequency: As specified in the Post Construction Report (PCR), visual inspection monthly.

Responsible party/agent: USDOE – Savannah River Field Office

Contact: P. Prater USDOE - Waste Area Group Manager (803) 952-9333
(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

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 _____

Five-Year Review Site Inspection Checklist (Continued)

| | | | |
|--|--|---------------|--|
| 3. Land use changes offsite <input checked="" type="checkbox"/> N/A | | | |
| Remarks _____ | | | |
| VI. GENERAL SITE CONDITIONS | | | |
| A. Roads <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A | | | |
| 1. Roads damaged <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Roads adequate <input type="checkbox"/> N/A | | | |
| Remarks _____ | | | |
| B. Other site Conditions | | | |
| Remarks: <u>N/A</u> | | | |
| VII. COVER SYSTEMS <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A | | | |
| A. Landfill Surface <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A | | | |
| 1. Settlement (Low spots) <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Settlement not evident | | | |
| Areal extent _____ | | Depth _____ | |
| Remarks _____ | | | |
| 2. Cracks <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Cracking not evident | | | |
| Lengths _____ | | Widths _____ | |
| Depths _____ | | Remarks _____ | |
| 3. Erosion <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Erosion not evident | | | |
| Areal extent _____ | | Depth _____ | |
| Remarks _____ | | | |
| 4. Holes <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Holes not evident | | | |
| Areal extent _____ | | Depth _____ | |
| Remarks _____ | | | |
| 5. Vegetative Cover <input type="checkbox"/> Grass <input checked="" type="checkbox"/> Cover properly established <input checked="" type="checkbox"/> No signs of stress | | | |
| <input type="checkbox"/> Trees/shrubs (indicate size and location on a diagram) | | | |
| Remarks _____ | | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | |
|--|---|--------------------|
| 6. Alternative Cover (armored rock, concrete, etc.) x N/A | | |
| Remarks: _____ | | |
| 7. Bulges <input type="checkbox"/> Location shown on site map x Bulges not evident | | |
| Areal extent _____ Height _____ | | |
| Remarks _____ | | |
| 8. Wet Areas/Water Damage x Wet areas/water damage not evident | | |
| <input type="checkbox"/> Wet Areas | <input type="checkbox"/> Location shown on site map | Areal extent _____ |
| <input type="checkbox"/> Ponding | <input type="checkbox"/> Location shown on site map | Areal extent _____ |
| <input type="checkbox"/> Seeps | <input type="checkbox"/> Location shown on site map | Areal extent _____ |
| <input type="checkbox"/> Soft subgrade | <input type="checkbox"/> Location shown on site map | Areal extent _____ |
| Remarks _____ | | |
| 9. Slope Instability <input type="checkbox"/> Slides <input type="checkbox"/> Location shown on site map x No evidence of slope instability | | |
| Areal extent _____ | | |
| Remarks _____ | | |
| B. Benches <input type="checkbox"/> Applicable x 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 <input type="checkbox"/> Location shown on site map <input type="checkbox"/> N/A or okay | | |
| Remarks _____ | | |
| 2. Bench Breached <input type="checkbox"/> Location shown on site map <input type="checkbox"/> N/A or okay | | |
| Remarks _____ | | |
| 3. Bench Overtopped <input type="checkbox"/> Location shown on site map <input type="checkbox"/> N/A or okay | | |
| Remarks _____ | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | |
|--|---|--|
| C. Letdown Channels <input type="checkbox"/> Applicable x 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 | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> No evidence of settlement |
| Areal extent _____ Depth _____ Remarks _____ _____ | | |
| 2. Material Degradation | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> No evidence of degradation |
| Material type _____ Areal extent _____ Remarks _____ _____ | | |
| 3. Erosion | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> No evidence of erosion |
| Areal extent _____ Depth _____ Remarks _____ _____ | | |
| 4. Undercutting | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> No evidence of undercutting |
| Areal extent _____ Depth _____ Remarks _____ _____ | | |
| 5. Obstructions | Type _____ | <input type="checkbox"/> No obstructions |
| <input type="checkbox"/> Location shown on site map Areal extent _____ Size _____ Remarks _____ _____ | | |
| 6. Excessive Vegetative Growth | Type _____ | |
| <input type="checkbox"/> No evidence of excessive growth <input type="checkbox"/> Vegetation in channels does not obstruct flow <input type="checkbox"/> Location shown on site map Areal extent _____ Remarks _____ _____ | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | | |
|--|--|---|---|
| D. Cover Penetrations <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A | | | |
| 1. Gas Vents <input type="checkbox"/> Active <input type="checkbox"/> Passive | | | |
| <input type="checkbox"/> Properly secured/locked | <input type="checkbox"/> Functioning | <input type="checkbox"/> Routinely sampled | <input type="checkbox"/> Good condition |
| <input type="checkbox"/> Evidence of leakage at penetration | <input type="checkbox"/> Needs Maintenance | <input checked="" type="checkbox"/> N/A | |
| Remarks _____ | | | |
| 2. Gas Monitoring Probes | | | |
| <input type="checkbox"/> Properly secured/locked | <input type="checkbox"/> Functioning | <input type="checkbox"/> Routinely sampled | <input type="checkbox"/> Good condition |
| <input type="checkbox"/> Evidence of leakage at penetration | <input type="checkbox"/> Needs Maintenance | <input checked="" type="checkbox"/> N/A | |
| Remarks _____ | | | |
| 3. Monitoring Wells | | | |
| <input type="checkbox"/> Properly secured/locked | <input type="checkbox"/> Functioning | <input type="checkbox"/> Routinely sampled | <input type="checkbox"/> Good condition |
| <input type="checkbox"/> Evidence of leakage at penetration | <input type="checkbox"/> Needs Maintenance | <input checked="" type="checkbox"/> N/A | |
| Remarks: <u>Tow Monitoring Wells are out of service because of MOX costruction.</u> | | | |
| 4. Leachate Extraction Wells | | | |
| <input type="checkbox"/> Properly secured/locked | <input type="checkbox"/> Functioning | <input type="checkbox"/> Routinely sampled | <input type="checkbox"/> Good condition |
| <input type="checkbox"/> Evidence of leakage at penetration | <input type="checkbox"/> Needs Maintenance | <input checked="" type="checkbox"/> N/A | |
| Remarks _____ | | | |
| 5. Settlement Monuments <input checked="" type="checkbox"/> Located <input checked="" type="checkbox"/> Routinely surveyed <input type="checkbox"/> N/A | | | |
| Remarks _____ | | | |
| E. Gas Collection and Treatment <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A | | | |
| 1. Gas Treatment Facilities | | | |
| <input type="checkbox"/> Flaring | <input type="checkbox"/> Thermal destruction | <input type="checkbox"/> Collection for reuse | |
| <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance | | |
| Remarks _____ | | | |
| 2. Gas Collection Wells, Manifolds and Piping | | | |
| <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance | | |
| Remarks _____ | | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | | |
|---|--|--|--|
| 3. Gas Monitoring Facilities (e.g., gas monitoring of adjacent homes or buildings) | | | |
| <input type="checkbox"/> Good condition | | <input type="checkbox"/> Needs Maintenance | |
| | | <input type="checkbox"/> N/A | |
| Remarks _____ | | | |
| | | | |
| F. Cover Drainage Layer <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A | | | |
| 1. Outlet Pipes Inspected <input checked="" type="checkbox"/> Functioning <input type="checkbox"/> N/A | | | |
| Remarks _____ | | | |
| | | | |
| 2. Outlet Rock Inspected <input type="checkbox"/> Functioning <input checked="" type="checkbox"/> N/A | | | |
| Remarks _____ | | | |
| | | | |
| G. Detention/sedimentation Ponds <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A | | | |
| 1. Siltation Areal extent _____ Depth _____ <input type="checkbox"/> N/A | | | |
| <input checked="" type="checkbox"/> Siltation not evident | | | |
| Remarks _____ | | | |
| | | | |
| 2. Erosion Areal extent _____ Depth _____ <input type="checkbox"/> N/A | | | |
| <input checked="" type="checkbox"/> Erosion not evident | | | |
| Remarks _____ | | | |
| | | | |
| 3. Outlet Works <input checked="" type="checkbox"/> Functioning <input type="checkbox"/> N/A | | | |
| Remarks _____ | | | |
| | | | |
| 4. Dam <input type="checkbox"/> Functioning <input checked="" type="checkbox"/> N/A | | | |
| Remarks _____ | | | |
| | | | |
| H. Retaining Walls <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A | | | |
| 1. Deformations <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Deformation not evident | | | |
| Horizontal displacement _____ | | Vertical displacement _____ | |
| Rotational displacement _____ | | | |
| Remarks _____ | | | |
| | | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | |
|---|---|--|
| 2. Degradation | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> Deformation not evident |
| Remarks _____ | | |
| I. Perimeter Ditches/Off-Site Discharge x Applicable <input type="checkbox"/> N/A | | |
| 1. Siltation | <input type="checkbox"/> Location shown on site map | x Siltation not evident |
| Areal extent _____ Depth _____ | | |
| Remarks _____ | | |
| 2. Vegetative Growth | <input type="checkbox"/> Location shown on site map | x Siltation not evident |
| x Vegetation does not impede flow | | |
| Areal extent _____ Type _____ | | |
| Remarks _____ | | |
| 3. Erosion | <input type="checkbox"/> Location shown on site map | x Erosion not evident |
| Areal extent _____ Depth _____ | | |
| Remarks _____ | | |
| 4. Discharge Structure | <input type="checkbox"/> Location shown on site map | x N/A |
| Remarks _____ | | |
| VIII. VERTICAL BARRIER WALLS <input type="checkbox"/> Applicable x N/A | | |
| 1. Settlement | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> Settlement not evident |
| Areal extent _____ Depth _____ | | |
| Remarks _____ | | |
| 2. Performance Monitoring | Type of Monitoring _____ | <input type="checkbox"/> Performance not monitored |
| Frequency _____ <input type="checkbox"/> Evidence of breaching Head differential _____ | | |
| Remarks _____ | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | | |
|---|---|--|---|
| IX. GROUNDWATER/SURFACE WATER REMEDIES | | <input type="checkbox"/> Applicable | <input checked="" type="checkbox"/> N/A |
| A. Groundwater Extraction Wells, Pumps, and Pipelines | | <input type="checkbox"/> Applicable | <input checked="" type="checkbox"/> N/A |
| 1. Pumps, Wellhead Plumbing, and Electrical | | | |
| <input type="checkbox"/> Good condition | <input type="checkbox"/> All required wells located | <input type="checkbox"/> Needs Maintenance | <input type="checkbox"/> N/A |
| Remarks _____ | | | |
| _____ | | | |
| 2. Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances | | | |
| <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance | | |
| Remarks _____ | | | |
| _____ | | | |
| 3. Spare Parts and Equipment | | | |
| <input type="checkbox"/> Readily available | <input type="checkbox"/> Good condition | <input type="checkbox"/> Requires upgrade | <input type="checkbox"/> Needs to be provided |
| Remarks _____ | | | |
| _____ | | | |
| B. Surface Water Collection Structures, Pumps, and Pipelines | | <input type="checkbox"/> Applicable | <input checked="" type="checkbox"/> N/A |
| 1. Collection Structures, Pumps, and Electrical | | | |
| <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance | | |
| Remarks _____ | | | |
| _____ | | | |
| 2. Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances | | | |
| <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance | | |
| Remarks _____ | | | |
| _____ | | | |
| 3. Spare Parts and Equipment | | | |
| <input type="checkbox"/> Readily available | <input type="checkbox"/> Good condition | <input type="checkbox"/> Requires upgrade | <input type="checkbox"/> Needs to be provided |
| Remarks _____ | | | |
| _____ | | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | | |
|--|--|---|--|
| C. Treatment System | <input type="checkbox"/> Applicable | <input checked="" type="checkbox"/> N/A | |
| 1. Treatment Train (Check components that apply) | | | |
| <input type="checkbox"/> Metals removal | <input type="checkbox"/> Oil/water separation | <input type="checkbox"/> Bioremediation | |
| <input type="checkbox"/> Air stripping | <input type="checkbox"/> Carbon adsorbers | | |
| <input type="checkbox"/> Filters | | | |
| <input type="checkbox"/> Additive (e.g., chelation agent, flocculent) | | | |
| <input type="checkbox"/> Others | | | |
| <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance | | |
| <input type="checkbox"/> Sampling ports properly marked and functional | | | |
| <input type="checkbox"/> Sampling/maintenance log displayed and up to date | | | |
| <input type="checkbox"/> Equipment properly identified | | | |
| <input type="checkbox"/> Quantity of groundwater treated annually | | | |
| <input type="checkbox"/> Quantity of surface water treated annually | | | |
| Remarks: <u>Existing system has been upgraded.</u> | | | |
| 2. Electrical Enclosures and Panels (properly rated and functional) | | | |
| <input type="checkbox"/> N/A | <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance | |
| Remarks | | | |
| 3. Tanks, Vaults, Storage Vessels | | | |
| <input type="checkbox"/> N/A | <input type="checkbox"/> Good condition | <input type="checkbox"/> Proper secondary containment | <input type="checkbox"/> Needs Maintenance |
| Remarks | | | |
| 4. Discharge Structure and Appurtenances | | | |
| <input type="checkbox"/> N/A | <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance | |
| Remarks | | | |
| 5. Treatment Building(s) | | | |
| <input type="checkbox"/> N/A | <input type="checkbox"/> Good condition (esp. roof and doorways) | <input type="checkbox"/> Needs repair | |
| <input type="checkbox"/> Chemicals and equipment properly stored | | | |
| Remarks | | | |

Five-Year Review Site Inspection Checklist (Continued)

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 x N/A

1. Monitoring Data

- x Is routinely submitted on time ☐ Is of acceptable quality

2. Monitoring Data Suggests:

- x Groundwater plume is effectively contained ☐ Contaminant concentrations are declining
(plume concentrations are not increasing with time)

E. Monitored Natural Attenuation ☐ Applicable x N/A

1. Monitoring Wells (Natural attenuation remedy)

- x Properly secured/locked x Functioning x 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 for this site is: low-permeability soil cover system; institutional controls. The cover system is intact, long term grasses has be fully established. Soil cover system remedy appears to be functioning as designed. Drainage channel function adequately.

Five-Year Review Site Inspection Checklist (Continued)

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.

The remedy for this site is low permeability soil cover system and institutional controls. The cover system is intact. Long-term grass has to be fully established. The soil cover system appears to be functioning as designed. The drainage channel functions adequately.

D. Opportunities for Optimization

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

No recommendation at this time.

N/A

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OLD F-AREA SEEPAGE BASIN (904-49G) OPERABLE UNIT

I. Introduction

This is the third five-year review for the Old F-Area Seepage Basin (OFASB) (904-49G) Operable Unit (OU). This review was conducted from August 2007 through September 2007. This report documents the results of the review.

II. OU Chronology

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

Table 1. Chronology of OU Events

| Event | Date |
|--|--|
| RFI/RI Start | 1993 |
| CMS/FS Rev 1 Submitted | February 13, 1996 |
| Final ROD Issuance | June 19, 1997 |
| ESD Approved | September 15, 1998 |
| Remedial Action Start/Complete | September 10, 1998 / November 17, 2000 |
| Decision to Manage Groundwater as a Part of GSA Western Groundwater OU | August 2002 |
| Previous Five-Year Reviews | June 30, 1997 & February 12, 2004 |

III. Background

Physical Characteristics

The OFASB is located approximately 600 ft north of F Area and 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 ft long by 200 ft wide and 13 ft deep).

Land and Resource Use

The current and future anticipated land use for the OFASB is industrial.

History of Contamination

The OFASB 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).



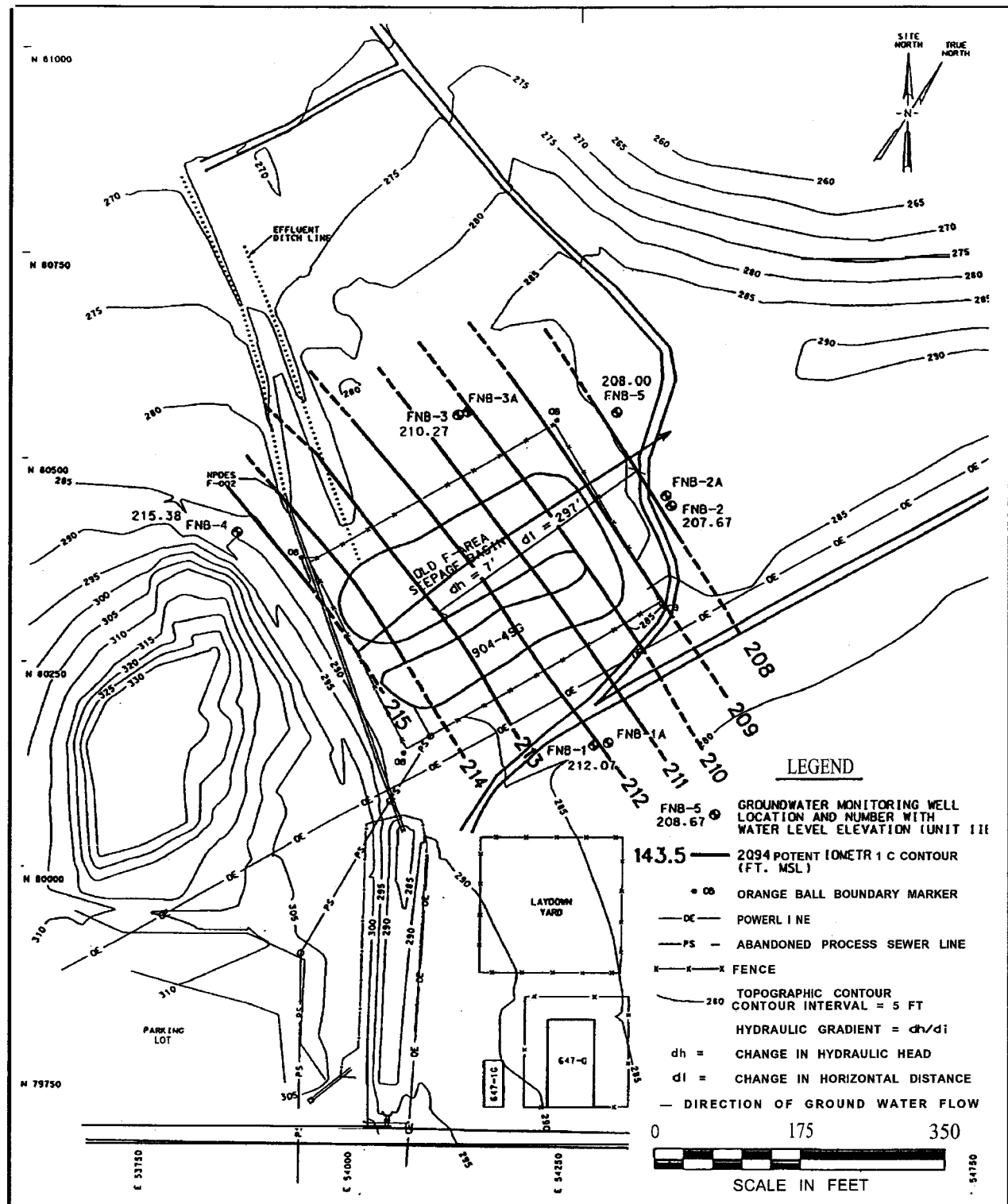


Figure 2. Topographic and Water Table Potentiometric Map of the OFASB

Initial Response

Characterization data were collected for analysis. Analytical data pertaining to the OFASB indicated that radionuclide-contaminated soils associated with the OFASB were principal threat wastes that posed risk to both the future resident and industrial worker. These radionuclide risks were primarily associated with external radiation from the top 2 ft of the former basin bottom soils. Major contaminants included cesium-137 and mercury. The top 2 ft of the former basin bottom soils contained 53% of the cesium-137 and 97% of the mercury. Groundwater monitoring data also revealed that iodine-129, nitrate, strontium-90, and tritium were present in the groundwater above maximum contaminant levels (MCLs). Uranium was also detected above proposed MCLs. Although radium had been decreasing over time, it has also exceeded MCLs. The groundwater plume was detected in eight local wells associated with the OFASB. The groundwater plume in the water table aquifer migrated beyond the surface boundaries of the OFASB by more than 200 ft toward the Upper Three Runs Creek, which is more than 2,500 ft to the north.

Based on the risk analysis, the OFASB soils posed a significant risk to human health. The significant carcinogenic risk to the potential future resident and worker was driven by exposure from direct radiation in the basin soils. These soils were contaminated with cesium-137 to a depth of 0 to 2 ft and overflow ditchline soils to a depth of 0 to 2 ft. Significant carcinogenic risks to the potential future resident were also driven by exposure from ingestion of groundwater contaminated with iodine-129, tritium, strontium-90, and radium-228 in the water table aquifer.

IV. Remedial Actions

Remedy Selection

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 (GWMZ) application modeling estimates that MCLs will be achieved throughout the entire groundwater aquifer in approximately 200 years)
- Achieve State of South Carolina GWMZ 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 GWMZ 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 were (1) removal of vegetation (approximately 285 yd³) with disposal at an off-unit facility; (2) implementation of institutional controls for the pipeline and pipeline soils; (3) removal of the top 2 ft of ditchline soils with placement in the OFASB; (4) in situ grouting of the top 2 ft of basin bottom soils and ditchline soils placed in the basin (approximately 4,600 yd³); (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 3); and (7) installation of a monitoring

well network, monitoring of groundwater through a groundwater alternate concentration limit/groundwater mixing zone (GWMZ) demonstration, and institutional controls (see Figure 4).

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.

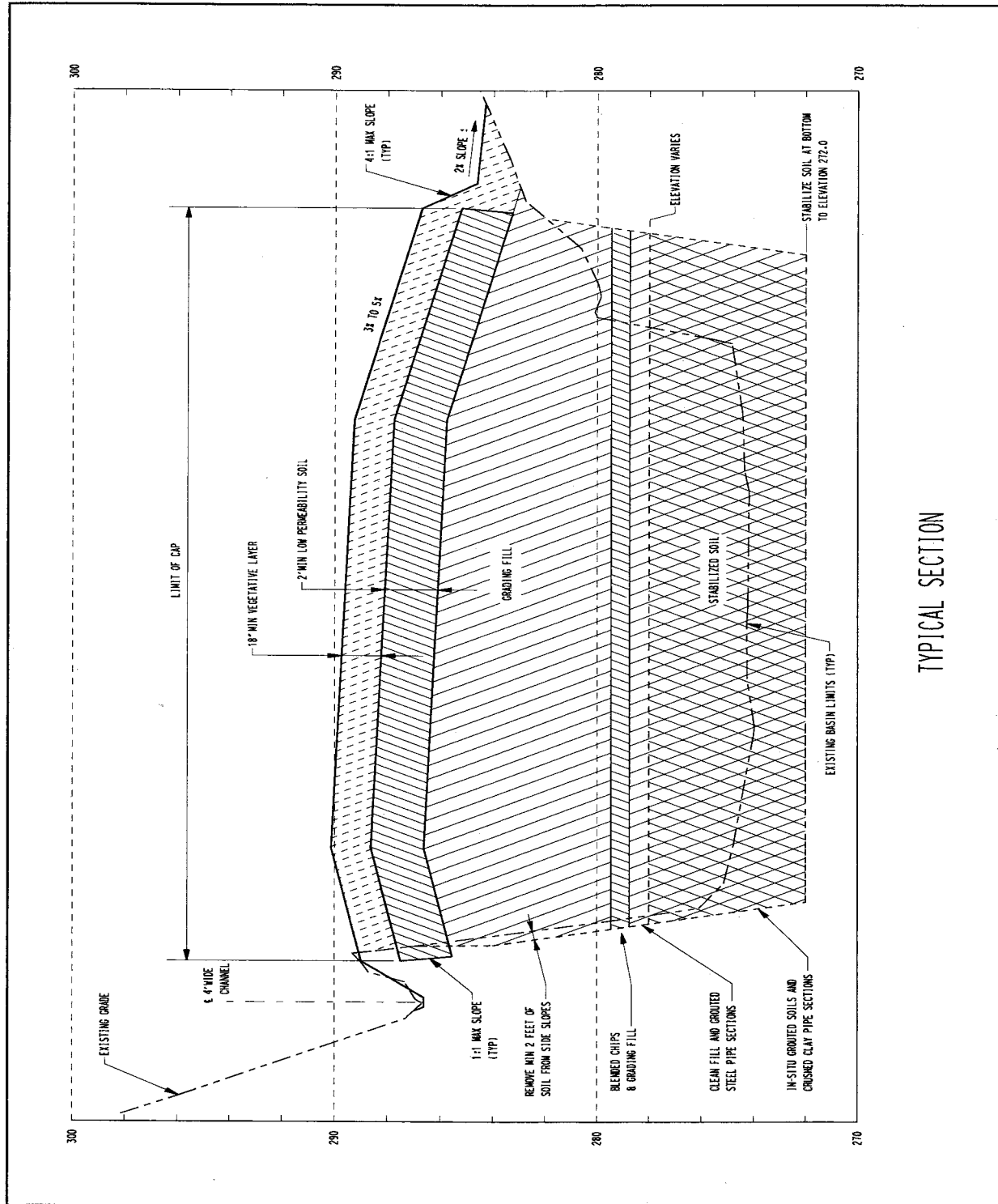


Figure 3. Cross-Section of the Soil Cover System over the OFASB

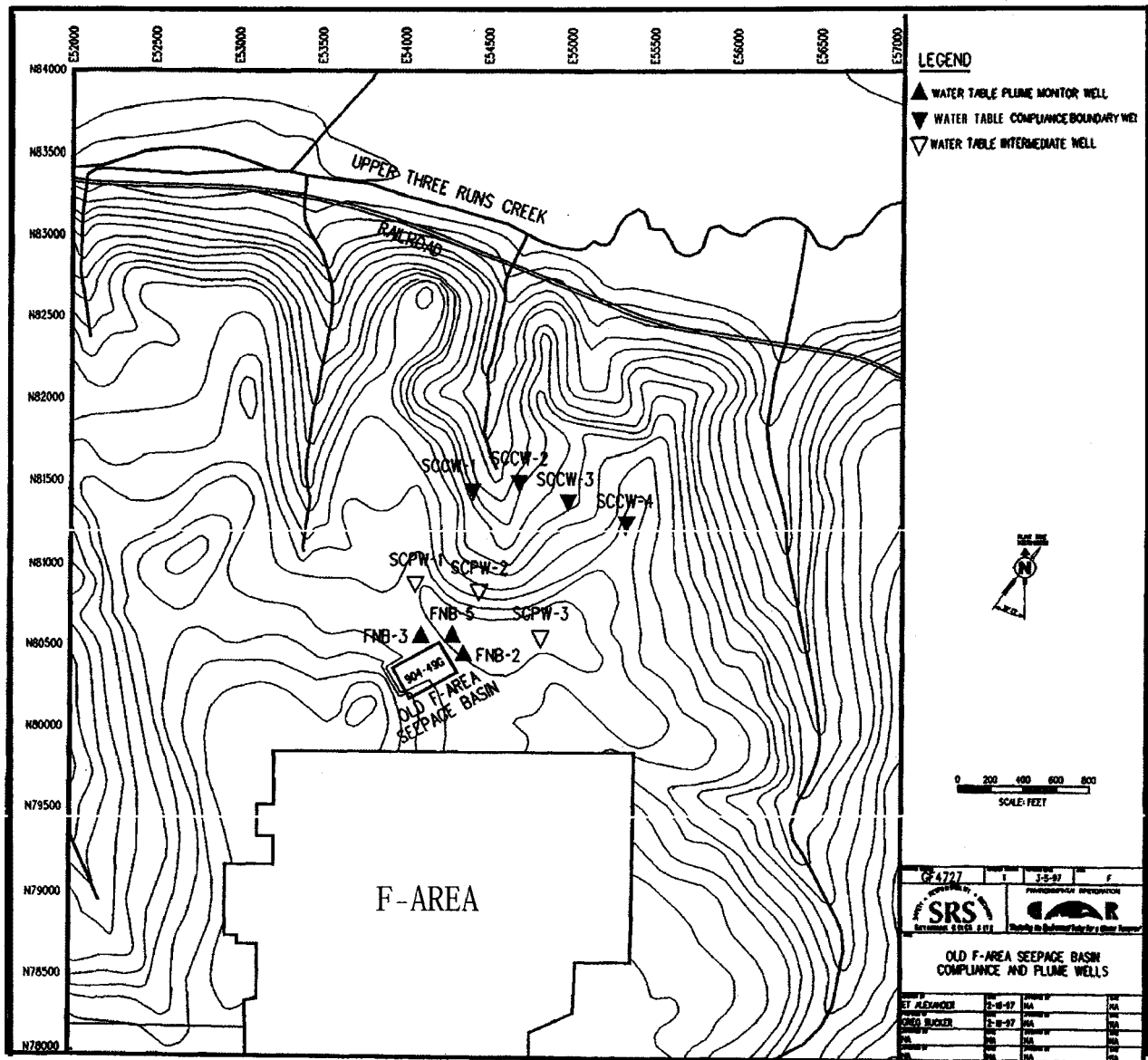


Figure 4. Location of OFASB Groundwater Mixing Zone Plume Wells, Intermediate Wells, and Compliance Boundary Wells

Remedy Implementation

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 disposed 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 GWMZ application, three plume wells, four compliance wells, and three intermediate wells will be sampled semi-annually (subject to review) and results reported annually to the United States Environmental Protection Agency (USEPA) and South Carolina Department of Health and Environmental Control (SCDHEC). 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. 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 source. The results from that characterization indicated the groundwater was being impacted by the F-Area Separation Facility rather than by the OFASB. The sampling results were submitted to the regulatory agencies by October 2001.

This led to the Core Team decision that a Mixing Zone Application would not be appropriate for this OU. In August 2002, a core team of representatives from the United States Department of Energy (USDOE), USEPA, and SCDHEC met to review data for managing groundwater associated with the OFASB OU. The decision was made to separate the groundwater from the surface unit and manage it as part of larger General Separation Area (GSA) Western Groundwater OU. Therefore, groundwater is no longer part of the F-Area 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.

V. Progress Since Last Review

This is the third five-year review for the OFASB. Since the previous review in June 2003 the following actions were completed:

- Annual inspection and maintenance were performed for the soil cover, drainage channel, and subsurface pipe line.

VI. Five-Year Review Process

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

- 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.

VIII. Issues

There are no issues for this OU. The effectiveness of the groundwater remedial action was an issue. Since F-Area groundwater is managed as part of the GSA Western Groundwater OU, there are no issues for this OU.

IX. Recommendations and Follow-up Actions

There is no recommendation or follow-up action for this OU.

X. Project Costs

Costs associated with the selected remedy for OFSB include operation and maintenance costs of the soil cover, groundwater mixing zone monitoring, and institutional controls. The estimated operation and maintenance cost associated with the selected remedy is \$500,000. This is a present worth cost, including 30 years of maintenance activities. After characterization and effectiveness of the remedy were evaluated, the actual operation and maintenance cost for the OFSB was assessed. The total actual operation and maintenance cost from project support and other post construction expense to fiscal year 2006 is \$107,393.

XI. 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 OFASB. 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 OFASB would be remediated under the GSA Western

Groundwater OU. 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.

XII. Next Review

The next five-year review is scheduled for February 12, 2014.

ATTACHMENT 1

List of Documents Reviewed

WSRC-RP-96-872, *Record of Decision Remedial Alternative Selection for the Old F-Area Seepage Basin (904-49G)* (U), Revision 1.1, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

WSRC-RP-98-4123, *Explanation of Significant Differences to the Revision 1.1 Record of Decision for the Old F-Area Seepage Basin* (U), Revision 1, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

WSRC-RP-2000-4100, *Post-Construction Report for the Old F-Area Seepage Basin (904-49G)* (U), Revision 1, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

WSRC-RP-2003-4136, *Record of Decision Amendment for the Old F-Area Seepage Basin (904-49G)* (U), Revision 1, 2003, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

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ATTACHMENT 2

Five-Year Review Site Inspection Checklist

| I. SITE INFORMATION | | | |
|---|---|--|--------------------------|
| Site Name: | Old F-Area Seepage Basin | Date of Inspection: | 9/25/2007 |
| Location and Region: | Savannah River Site, USEPA IV | EPA ID: | SC1890008989 |
| Agency, office, or company leading the five-year review: | United States Department of Energy | CERCLIS OU No.: | 16 |
| | | Weather/Temperature: | |
| Remedy Includes: (Check all that apply) <div style="display: flex; flex-wrap: wrap; padding: 10px;"> <div style="width: 50%;"> <input checked="" type="checkbox"/> Cover system <input type="checkbox"/> Access controls <input checked="" type="checkbox"/> Institutional Controls <input type="checkbox"/> Groundwater pump and treatment <input type="checkbox"/> Surface water collection and treatment <input checked="" type="checkbox"/> Other: <u>(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.</u> </div> <div style="width: 50%;"> <input type="checkbox"/> Monitored Natural Attenuation <input type="checkbox"/> Groundwater Containment <input type="checkbox"/> Vertical Barrier Walls </div> </div> | | | |
| Attachments: <input type="checkbox"/> Inspection team roster attached <input type="checkbox"/> Site map attached | | | |
| II. INTERVIEWS (Check all that apply) | | | |
| 1. O & M Site Manager | <u>Wayne Gleaton</u> (Name) | <u>Mgr., Post-Closure Maintenance</u> (Title) | <u>9/25/07</u> (Date) |
| Interviewed: | <input type="checkbox"/> at site <input type="checkbox"/> at office <input type="checkbox"/> by phone Phone No. <u>(803) 557-8838</u> | | |
| Problems, suggestions: | <input type="checkbox"/> report attached _____ | | |
| 2. O & M Staff | <u>R. Feagin</u> (Name) | <u>Post-Closure Maintenance</u> (Title) | <u>9/25/07</u> (Date) |
| Interviewed: | <input checked="" type="checkbox"/> at site <input type="checkbox"/> at office <input type="checkbox"/> by phone Phone No. <u>(803) 952-6706</u> | | |
| Problems, suggestions: | <input type="checkbox"/> report attached _____ | | |

Five-Year Review Site Inspection Checklist (Continued)

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

| | | | |
|---|--|-------------------------------------|------------------------------|
| <input type="checkbox"/> O & M Manual | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |
| x As-built drawings | x Readily available | x Up to date | <input type="checkbox"/> N/A |
| <input type="checkbox"/> Maintenance Logs | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |

Remarks: See Waste Unit and Maintenance, ER-SOP-019

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| | | | | | | |
|--|--|-------------------------------------|---|---|--|---|
| 2. Site-Specific Health and Safety Plan | | | | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A |
| <input type="checkbox"/> Contingency plan/emergency response plan | | | | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A |
| Remarks: <u>Routine O&M activities do not require an SSHASP under 29 CFR 1910.1201, HAZWOPER</u> | | | | | | |
| 3. O & M and OSHA Training Records | | | | <input checked="" type="checkbox"/> Readily available | <input checked="" type="checkbox"/> Up to date | <input type="checkbox"/> N/A |
| Remarks _____ | | | | | | |
| 4. Permits and Service Agreements | | | | | | |
| <input type="checkbox"/> Air discharge permit | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A | | | |
| <input type="checkbox"/> Effluent discharge | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A | | | |
| <input type="checkbox"/> Waste Disposal, POTW | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A | | | |
| <input type="checkbox"/> Other permits | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A | | | |
| Remarks _____ | | | | | | |
| 5. Gas Generation Records | | | | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A |
| Remarks _____ | | | | | | |
| 6. Settlement Monument Records | | | | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A |
| Remarks _____ | | | | | | |
| 7. Groundwater Monitoring Records | | | | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A |
| Remarks _____ | | | | | | |
| 8. Leachate Extraction Records | | | | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A |
| Remarks _____ | | | | | | |
| 9. Discharge Compliance Records | | | | | | |
| <input type="checkbox"/> Air | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A | | | |
| <input type="checkbox"/> Water (effluent) | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A | | | |
| Remarks _____ | | | | | | |
| 10. Daily Access/Security Logs | | | | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A |
| Remarks _____ | | | | | | |

Five-Year Review Site Inspection Checklist (Continued)

IV. O & M Costs

1. O & M Organization

- ☐ State in-house ☐ Contractor for State
☐ PRP in-house ☐ Contractor for PRP
x Other: SRS

2. O & M Cost Records

- ☐ Readily available ☐ Up to date ☐ Funding mechanism/agreement in place
x Other: Project cost data is summarized in Section X of attached review: WSRC-RP-2007-4063

Total annual cost by year for review period if available

| | | | |
|------------|----------|------------|---|
| From _____ | To _____ | _____ | <input type="checkbox"/> Breakdown attached |
| (Date) | (Date) | Total cost | |
| From _____ | To _____ | _____ | <input type="checkbox"/> Breakdown attached |
| (Date) | (Date) | Total cost | |
| From _____ | To _____ | _____ | <input type="checkbox"/> Breakdown attached |
| (Date) | (Date) | Total cost | |
| From _____ | To _____ | _____ | <input type="checkbox"/> Breakdown attached |
| (Date) | (Date) | Total cost | |

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

Describe costs and reasons: _____

V. ACCESS AND INSTITUTIONAL CONTROLS

x Applicable ☐ N/A

A. Fencing

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

Remarks _____

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| | | | |
|--|---|--|---|
| B. Other Access Restrictions | | | |
| 1. Signs and other security measures <input type="checkbox"/> Location shown on site map <input type="checkbox"/> N/A | | | |
| Remarks: <u>Signs at this site are in good condition</u> | | | |
| C. Institutional Controls | | | |
| 1. Implementation and enforcement | | | |
| Site conditions imply ICs not properly implemented: | | <input type="checkbox"/> Yes | <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A |
| Site conditions imply ICs not being fully enforced: | | <input type="checkbox"/> Yes | <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A |
| Type of monitoring (e.g., self-reporting, drive-by): | | field walkdown | |
| Frequency: | monthly for first 2 years and semi-annually after 2 years | | |
| Responsible party/agent: | USDOE - Savannah River Field Office | | |
| Contact: | M. Prater (Name) | USDOE -Waste Area Group Manager (Title) | (803) 952-9333 (Phone No.) |
| Report is up-to-date: | | <input checked="" type="checkbox"/> Yes | <input type="checkbox"/> No <input type="checkbox"/> N/A |
| Reports are verified by the lead agency: | | <input checked="" type="checkbox"/> Yes | <input type="checkbox"/> No <input type="checkbox"/> N/A |
| Specific requirements in deed of decision documents have been met: | | <input type="checkbox"/> Yes <input type="checkbox"/> No | <input checked="" type="checkbox"/> N/A |
| Violations have been reported: | | <input type="checkbox"/> Yes <input type="checkbox"/> No | <input checked="" type="checkbox"/> N/A |
| Other problems or suggestions: | | <input type="checkbox"/> Report attached | |
| Inspection data sheet attached | | | |
| | | | |
| | | | |
| | | | |
| 2. Adequacy <input checked="" type="checkbox"/> ICs are adequate <input type="checkbox"/> ICs are inadequate <input type="checkbox"/> N/A | | | |
| Remarks: _____ | | | |
| | | | |
| D. General | | | |
| 1. Vandalism/trespassing <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> No vandalism evident | | | |
| Remarks: _____ | | | |
| | | | |
| 2. Land use changes onsite <input checked="" type="checkbox"/> N/A | | | |
| Remarks: _____ | | | |
| | | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | | |
|---|--|--------------|--|
| 3. Land use changes offsite <input checked="" type="checkbox"/> N/A | | | |
| Remarks _____ | | | |
| VI. GENERAL SITE CONDITIONS | | | |
| A. Roads <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A | | | |
| 1. Roads damaged <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Roads adequate <input type="checkbox"/> N/A | | | |
| Remarks _____ | | | |
| B. Other site Conditions | | | |
| Remarks: N/A | | | |
| MOX facility is under construction outside near Old F-Area Seepage Basin. | | | |
| VII. COVER SYSTEMS <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A (Applicable for low permeability soil cover system covering grouted soil in basin) | | | |
| A. Landfill Surface <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A | | | |
| 1. Settlement (Low spots) <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Settlement not evident | | | |
| Areal extent _____ | | Depth _____ | |
| Remarks _____ | | | |
| 2. Cracks <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Cracking not evident | | | |
| Lengths _____ | | Widths _____ | |
| | | Depths _____ | |
| Remarks _____ | | | |
| 3. Erosion <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Erosion not evident | | | |
| Areal extent _____ | | Depth _____ | |
| Remarks _____ | | | |
| 4. Holes <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Holes not evident | | | |
| Areal extent _____ | | Depth _____ | |
| Remarks _____ | | | |
| 5. Vegetative Cover <input checked="" type="checkbox"/> Grass <input checked="" type="checkbox"/> Cover properly established <input checked="" type="checkbox"/> No signs of stress | | | |
| <input type="checkbox"/> Trees/shrubs (indicate size and location on a diagram) | | | |
| Remarks _____ | | | |

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| | | |
|--|---|---|
| 6. | Alternative Cover (armored rock, concrete, etc.) | x N/A |
| Remarks: _____ | | |
| | | |
| 7. | Bulges | <input type="checkbox"/> Location shown on site map x Bulges not evident |
| Areal extent _____ | | Height _____ |
| Remarks _____ | | |
| | | |
| 8. | Wet Areas/Water Damage | x Wet areas/water damage not evident |
| <input type="checkbox"/> Wet Areas | | <input type="checkbox"/> Location shown on site map Areal extent _____ |
| <input type="checkbox"/> Ponding | | <input type="checkbox"/> Location shown on site map Areal extent _____ |
| <input type="checkbox"/> Seeps | | <input type="checkbox"/> Location shown on site map Areal extent _____ |
| <input type="checkbox"/> Soft subgrade | | <input type="checkbox"/> Location shown on site map Areal extent _____ |
| Remarks _____ | | |
| | | |
| 9. | Slope Instability | <input type="checkbox"/> Slides <input type="checkbox"/> Location shown on site map x No evidence of slope instability |
| Areal extent _____ | | |
| Remarks _____ | | |
| | | |
| B. Benches | | |
| | | <input type="checkbox"/> Applicable x 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 | <input type="checkbox"/> Location shown on site map <input type="checkbox"/> N/A or okay |
| Remarks _____ | | |
| | | |
| 2. | Bench Breached | <input type="checkbox"/> Location shown on site map <input type="checkbox"/> N/A or okay |
| Remarks _____ | | |
| | | |
| 3. | Bench Overtopped | <input type="checkbox"/> Location shown on site map <input type="checkbox"/> N/A or okay |
| Remarks _____ | | |
| | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | |
|---|--|--|
| C. Letdown Channels <input type="checkbox"/> Applicable x 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 | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> No evidence of settlement |
| Areal extent _____ Depth _____ | | |
| Remarks _____ | | |
| 2. Material Degradation | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> No evidence of degradation |
| Material type _____ Areal extent _____ | | |
| Remarks _____ | | |
| 3. Erosion | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> No evidence of erosion |
| Areal extent _____ Depth _____ | | |
| Remarks _____ | | |
| 4. Undercutting | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> No evidence of undercutting |
| Areal extent _____ Depth _____ | | |
| Remarks _____ | | |
| 5. Obstructions | Type _____ | <input type="checkbox"/> No obstructions |
| <input type="checkbox"/> Location shown on site map | Areal extent _____ | Size _____ |
| Remarks _____ | | |
| 6. Excessive Vegetative Growth | Type _____ | |
| <input type="checkbox"/> No evidence of excessive growth | <input type="checkbox"/> Vegetation in channels does not obstruct flow | |
| <input type="checkbox"/> Location shown on site map | Areal extent _____ | |
| Remarks _____ | | |

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| | | |
|---|-------------------------------------|---|
| D. Cover Penetrations | <input type="checkbox"/> Applicable | <input checked="" type="checkbox"/> N/A |
| 1. Gas Vents <input type="checkbox"/> Active <input type="checkbox"/> Passive <input type="checkbox"/> Properly secured/locked <input type="checkbox"/> Functioning <input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition <input type="checkbox"/> Evidence of leakage at penetration <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A Remarks _____ _____ | | |
| 2. Gas Monitoring Probes <input type="checkbox"/> Properly secured/locked <input type="checkbox"/> Functioning <input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition <input type="checkbox"/> Evidence of leakage at penetration <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A Remarks _____ _____ | | |
| 3. Monitoring Wells (within surface area of landfill) <input type="checkbox"/> Properly secured/locked <input type="checkbox"/> Functioning <input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition <input type="checkbox"/> Evidence of leakage at penetration <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A Remarks _____ _____ | | |
| 4. Leachate Extraction Wells <input type="checkbox"/> Properly secured/locked <input type="checkbox"/> Functioning <input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition <input type="checkbox"/> Evidence of leakage at penetration <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A Remarks _____ _____ | | |
| 5. Settlement Monuments <input type="checkbox"/> Located <input type="checkbox"/> Routinely surveyed <input type="checkbox"/> N/A Remarks _____ _____ | | |
| E. Gas Collection and Treatment <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A | | |
| 1. Gas Treatment Facilities <input type="checkbox"/> Flaring <input type="checkbox"/> Thermal destruction <input type="checkbox"/> Collection for reuse <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____ _____ | | |
| 2. Gas Collection Wells, Manifolds and Piping <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____ _____ | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | |
|--|--|--|
| 3. Gas Monitoring Facilities (e.g., gas monitoring of adjacent homes or buildings) <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A Remarks _____ _____ | | |
| F. Cover Drainage Layer <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A | | |
| 1. Outlet Pipes Inspected <input type="checkbox"/> Functioning <input type="checkbox"/> N/A Remarks _____ _____ | | |
| 2. Outlet Rock Inspected <input type="checkbox"/> Functioning <input type="checkbox"/> N/A Remarks _____ _____ | | |
| G. Detention/sedimentation Ponds <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A | | |
| 1. Siltation Areal extent _____ Depth _____ <input type="checkbox"/> N/A <input type="checkbox"/> Siltation not evident Remarks _____ _____ | | |
| 2. Erosion Areal extent _____ Depth _____ <input type="checkbox"/> N/A <input type="checkbox"/> Erosion not evident Remarks _____ _____ | | |
| 3. Outlet Works <input type="checkbox"/> Functioning <input type="checkbox"/> N/A Remarks _____ _____ | | |
| 4. Dam <input type="checkbox"/> Functioning <input type="checkbox"/> N/A Remarks _____ _____ | | |
| H. Retaining Walls <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A | | |
| 1. Deformations <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Deformation not evident Horizontal displacement _____ Vertical displacement _____ Rotational displacement _____ Remarks _____ _____ | | |

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Five-Year Review Site Inspection Checklist (Continued)

| | | |
|---|---|--|
| 2. Degradation Remarks _____ _____ | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> Deformation not evident |
| I. Perimeter Ditches/Off-Site Discharge x Applicable <input type="checkbox"/> N/A | | |
| 1. Siltation Areal extent _____ Depth _____ Remarks _____ _____ | <input type="checkbox"/> Location shown on site map | x Siltation not evident |
| 2. Vegetative Growth x Vegetation does not impede flow Areal extent _____ Type _____ Remarks _____ _____ | <input type="checkbox"/> Location shown on site map | x Siltation not evident |
| 3. Erosion Areal extent _____ Depth _____ Remarks _____ _____ | <input type="checkbox"/> Location shown on site map | x Erosion not evident |
| 4. Discharge Structure Remarks _____ _____ | <input type="checkbox"/> Location shown on site map | x N/A |
| VIII. VERTICAL BARRIER WALLS <input type="checkbox"/> Applicable x N/A | | |
| 1. Settlement Areal extent _____ Depth _____ Remarks _____ _____ | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> Settlement not evident |
| 2. Performance Monitoring Type of Monitoring _____ <input type="checkbox"/> Performance not monitored Frequency _____ <input type="checkbox"/> Evidence of breaching Head differential _____ Remarks _____ _____ | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | | |
|--|--|-------------------------------------|---|
| IX. GROUNDWATER/SURFACE WATER REMEDIES | | <input type="checkbox"/> Applicable | <input checked="" type="checkbox"/> N/A |
| A. Groundwater Extraction Wells, Pumps, and Pipelines | | <input type="checkbox"/> Applicable | <input checked="" type="checkbox"/> N/A |
| 1. Pumps, Wellhead Plumbing, and Electrical | | | |
| <input type="checkbox"/> Good condition <input type="checkbox"/> All required wells located <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A | | | |
| Remarks _____ | | | |
| _____ | | | |
| 2. Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances | | | |
| <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance | | | |
| Remarks _____ | | | |
| _____ | | | |
| 3. Spare Parts and Equipment | | | |
| <input type="checkbox"/> Readily available <input type="checkbox"/> Good condition <input type="checkbox"/> Requires upgrade <input type="checkbox"/> Needs to be provided | | | |
| Remarks _____ | | | |
| _____ | | | |
| B. Surface Water Collection Structures, Pumps, and Pipelines | | <input type="checkbox"/> Applicable | <input checked="" type="checkbox"/> N/A |
| 1. Collection Structures, Pumps, and Electrical | | | |
| <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance | | | |
| Remarks _____ | | | |
| _____ | | | |
| 2. Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances | | | |
| <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance | | | |
| Remarks _____ | | | |
| _____ | | | |
| 3. Spare Parts and Equipment | | | |
| <input type="checkbox"/> Readily available <input type="checkbox"/> Good condition <input type="checkbox"/> Requires upgrade <input type="checkbox"/> Needs to be provided | | | |
| Remarks _____ | | | |
| _____ | | | |

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Five-Year Review Site Inspection Checklist (Continued)

| | | |
|---|-------------------------------------|---|
| C. Treatment System | <input type="checkbox"/> Applicable | <input checked="" type="checkbox"/> N/A |
| 1. Treatment Train (Check components that apply) <input type="checkbox"/> Metals removal <input type="checkbox"/> Oil/water separation <input type="checkbox"/> Bioremediation <input type="checkbox"/> Air stripping <input type="checkbox"/> Carbon adsorbers <input type="checkbox"/> Filters _____ <input type="checkbox"/> Additive (e.g., chelation agent, flocculent) _____ <input type="checkbox"/> Others _____ <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> Sampling ports properly marked and functional <input type="checkbox"/> Sampling/maintenance log displayed and up to date <input type="checkbox"/> Equipment properly identified <input type="checkbox"/> Quantity of groundwater treated annually _____ <input type="checkbox"/> Quantity of surface water treated annually _____ Remarks _____ | | |
| 2. Electrical Enclosures and Panels (properly rated and functional) <input type="checkbox"/> N/A <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____ | | |
| 3. Tanks, Vaults, Storage Vessels <input type="checkbox"/> N/A <input type="checkbox"/> Good condition <input type="checkbox"/> Proper secondary containment <input type="checkbox"/> Needs Maintenance Remarks _____ | | |
| 4. Discharge Structure and Appurtenances <input type="checkbox"/> N/A <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____ | | |
| 5. Treatment Building(s) <input type="checkbox"/> N/A <input type="checkbox"/> Good condition (esp. roof and doorways) <input type="checkbox"/> Needs repair <input type="checkbox"/> Chemicals and equipment properly stored Remarks _____ | | |

Five-Year Review Site Inspection Checklist (Continued)

| | |
|--|--|
| 6. Monitoring Wells (pump and treatment remedy) <input type="checkbox"/> Properly secured/locked <input type="checkbox"/> Functioning <input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition <input type="checkbox"/> All required wells located <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A Remarks _____ _____ | |
| D. Monitoring Data <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A | |
| 1. Monitoring Data <input type="checkbox"/> Is routinely submitted on time <input type="checkbox"/> Is of acceptable quality | |
| 2. Monitoring Data Suggests: <input type="checkbox"/> Groundwater plume is effectively contained <input type="checkbox"/> Contaminant concentrations are declining | |
| E. Monitored Natural Attenuation <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A | |
| 1. Monitoring Wells (Natural attenuation remedy) <input type="checkbox"/> Properly secured/locked <input type="checkbox"/> Functioning <input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition <input type="checkbox"/> All required wells located <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> 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 for this site is: (1) In-situ grouting of basin bottom soils and ditch line soils placed in basin; (2) backfill of the basin with clean soil with compaction to grade; (3) low-permeability soil cover system; (4) institutional controls. The cover system is intact, long term grasses has be fully established. The in-situ grouting and soil cover system remedy appears to be functioning as designed. Drainage channel function adequately. _____ | |

Five-Year Review Site Inspection Checklist (Continued)**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 be monitored under General Separation Area Western Groundwater Operable Unit.

D. Opportunities for Optimization

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

N/A

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. This review was conducted from August 2007 through September 2007. This report documents the results of the review.

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 | February 1, 1995 – March 15, 2001 |
| Previous Five-Year Reviews | June 30, 1997 and February 12, 2004 |

III. Background

Physical Characteristics

The PAR Pond unit consists of the PAR Pond Reservoir, a series of pre-cooler ponds and canals, and Lower Three Runs Creek. PAR Pond OU is a 2,640 acre man-made reservoir and is located south of R Area and east of P Area (see Figure 1). The easternmost shore is approximately 1.5 miles from the eastern SRS boundary. The length of the Lower Runs Creek from the outfall of PAR Pond to the Savannah River is approximately 20 miles.

Land and Resource Use

The current and anticipated future land use is industrial.

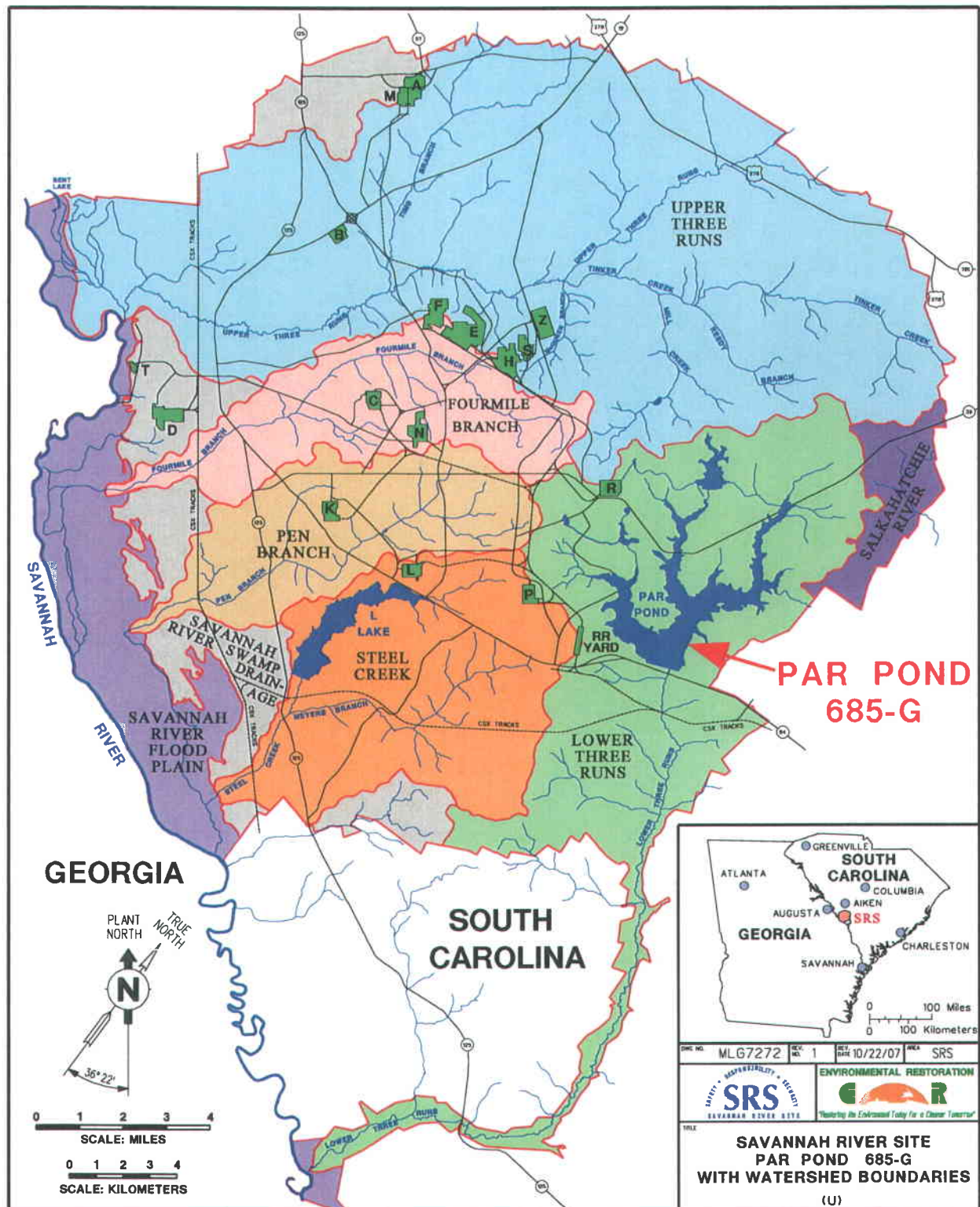


Figure 1. Location of the PAR Pond OU at SRS

History of Contamination

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.

Initial Response

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, 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 (\pm 1 ft) to 181 ft mean sea level (msl). The 181-ft level was chosen to reduce the risk and consequences of potential flooding in downstream communities in the unlikely event of a dam failure. 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.

IV. Remedial Actions

Remedy Selection

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 (i.e., re-fill the pond to 195 ft msl minimum and maintain) and monitor.
- 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 interim action ROD was to refill the pond to full pool and maintain the level at 200 ft msl, thus submerging the exposed sediments. The Environmental Assessment concluded that the pool surface height at the elevation of 195 ft msl could be maintained without any adverse environmental impacts. The level of 200 ft was to be further evaluated under a National Environmental Policy Act (NEPA) Environmental Assessment. 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 gpm as described in the interim action ROD. 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. Re-suspension of sediments was minimized. A minimum flow of 10 cfs was maintained to Lower Three Runs during the refill. During the refill, the 2 ft 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.

V. Progress Since Last Review

This is the second five-year ROD review that the Par Pond OU has undergone. Since the previous review in June of 2003, no additional action has been required at this OU.

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 the unit to confirm protectiveness of the remedial action
- Reviewed changes in standard and to-be-considered guidance

VII. 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 of the pond is being monitored and 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 has been identified to call into question the protectiveness of the remedy. Land use, exposure pathways, constituents 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 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. Project Costs

Implementation of this alternative requires pumping for refilling and maintaining the reservoir at the 200+/- 1-ft level. Annual pumping costs for refilling and maintaining Par Pond at the 200+/- 1-ft level are estimated to be \$360,000. The pumping cost extended over a 30-year period at a discount rate of 5 percent would be approximately \$5,500,000. The cost is an incremental estimated cost (part of the total cost) associated with the operation of the Site Cooling Water Distribution System that maintains water to par Pond, L Lake, and the reactors. The river water system will remain in service, at this time, regardless of the action chosen for Par Pond. Therefore, SRS would still incur the cost associated with the operation of the pumps.

XI. 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). Upon implementation of land use controls pursuant to the Land Use Control Assurance Plan (LUCAP), this remedy 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. The controls 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).

XII. Next Review

The next five-year review is scheduled for February 12, 2014.

ATTACHMENT 1

List of Documents Reviewed

DOE/EA-1070, *Environmental Assessment for the Natural Fluctuation of Water Level in PAR Pond and Reduced Water Flow in Steel Creek Below L-Lake at the Savannah River Site*, August 1995, Department of Energy, Savannah River Site, Aiken, SC

WSRC-RP-93-1549, *Interim Action Record of Decision Remedial Alternative Selection for the PAR Pond Unit (685-G) (U)*, Rev. 0, 1993, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

WSRC-RP-95-0384, *Remedial Design/Remedial Action Plan for the PAR Pond Source Control Operable Unit Interim Action*, Rev. 1, 1996, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

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ATTACHMENT 2

Five-Year Review Site Inspection Checklist

| I. SITE INFORMATION | | | |
|---|--|---|--|
| Site Name: | Par Pond (685-G) | Date of Inspection: | 05/01/08 |
| Location and Region: | Savannah River Site, USEPA IV | EPA ID: | SC1890008989 |
| Agency, office, or company leading the five-year review: | United States Department of Energy | CERCLIS OU No.: | 35 |
| | | Weather/Temperature: | Clear and sunny, 75°F |
| Remedy Includes: (Check all that apply) | | | |
| <input type="checkbox"/> Cover System <input type="checkbox"/> Monitored Natural Attenuation | | | |
| <input type="checkbox"/> Access controls <input type="checkbox"/> Groundwater Containment | | | |
| <input checked="" type="checkbox"/> Institutional Controls <input type="checkbox"/> Vertical Barrier Walls | | | |
| <input type="checkbox"/> Groundwater pump and treatment | | | |
| <input type="checkbox"/> Surface water collection and treatment | | | |
| <input checked="" type="checkbox"/> Other: <u>Fill pond to full pool and maintain water level at 200 feet msl.</u> | | | |
| Attachments: <input type="checkbox"/> Inspection team roster attached <input type="checkbox"/> Site map attached | | | |
| II. INTERVIEWS (Check all that apply) | | | |
| 1. O & M Site Manager | | | |
| | (Name) | (Title) | (Date) |
| Interviewed: | <input type="checkbox"/> at site | <input type="checkbox"/> at office | <input type="checkbox"/> by phone Phone No. _____ |
| Problems, suggestions: | <input type="checkbox"/> report attached _____ | | |
| 2. O & M Staff | | | |
| | <u>Richard Swygart</u> (Name) | <u>Infrastructure & Maintenance Engineer</u> (Title) | <u>5/1/08</u> (Date) |
| Interviewed: | <input checked="" type="checkbox"/> at site | <input type="checkbox"/> at office | <input checked="" type="checkbox"/> by phone Phone No. _____ |
| Problems, suggestions: | <input type="checkbox"/> report attached _____ | | |

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Five-Year Review Site Inspection Checklist (Continued)

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: _____

Five-Year Review Site Inspection Checklist (Continued)

| | | | |
|--|--|---|---|
| 2. Site-Specific Health and Safety Plan | | | |
| <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A | |
| <input checked="" type="checkbox"/> Contingency plan/emergency response plan | | | |
| <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A | |
| Remarks: _____ | | | |
| 3. O & M and OSHA Training Records | | | |
| <input checked="" type="checkbox"/> Readily available | <input checked="" type="checkbox"/> Up to date | <input type="checkbox"/> N/A | |
| Remarks: _____ | | | |
| 4. Permits and Service Agreements | | | |
| <input type="checkbox"/> Air discharge permit | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A |
| <input type="checkbox"/> Effluent discharge | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A |
| <input type="checkbox"/> Waste Disposal, POTW | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A |
| <input type="checkbox"/> Other permits (See Remarks) | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A |
| Remarks: _____ | | | |
| 5. Gas Generation Records | | | |
| <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A | |
| Remarks: _____ | | | |
| 6. Settlement Monument Records | | | |
| <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A | |
| Remarks: _____ | | | |
| 7. Groundwater Monitoring Records | | | |
| <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A | |
| Remarks: _____ | | | |
| 8. Leachate Extraction Records | | | |
| <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A | |
| Remarks: _____ | | | |
| 9. Discharge Compliance Records | | | |
| <input type="checkbox"/> Air | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A |
| <input type="checkbox"/> Water (effluent) | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A |
| Remarks: _____ | | | |
| 10. Daily Access/Security Logs | | | |
| <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A | |
| Remarks: _____ | | | |

Five-Year Review Site Inspection Checklist (Continued)

| IV. O & M Costs | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--|----------|------------|---|------------|----------|--|---|--------|--------|------------|--|--|--|--|--|------------|----------|--|---|--------|--------|------------|--|--|--|--|--|------------|----------|--|---|--------|--------|------------|--|--|--|--|--|------------|----------|--|---|--------|--------|------------|--|--|--|--|--|------------|----------|--|---|--------|--------|------------|--|
| 1. O & M Organization <div style="display: flex; justify-content: space-between; margin-top: 10px;"><div><input type="checkbox"/> State in-house</div><div><input type="checkbox"/> Contractor for State</div></div> <div style="display: flex; justify-content: space-between; margin-top: 10px;"><div><input type="checkbox"/> PRP in-house</div><div><input type="checkbox"/> Contractor for PRP</div></div> <div style="margin-top: 10px;"><input checked="" type="checkbox"/> Other: <u>SRS</u></div> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2. O & M Cost Records <div style="display: flex; justify-content: space-between; margin-top: 10px;"><div><input type="checkbox"/> Readily available</div><div><input type="checkbox"/> Up to date</div><div><input type="checkbox"/> Funding mechanism/agreement in place</div></div> <div style="margin-top: 10px;"><input checked="" type="checkbox"/> Other: <u>Project cost data is summarized in Section X of attached review: WSRC-RP-2007-4063.</u></div> <div style="margin-top: 20px; text-align: center;">Total annual cost by year for review period if available</div> <table style="width: 100%; border-collapse: collapse;"><tr><td style="width: 20%;">From _____</td><td style="width: 20%;">To _____</td><td style="width: 40%;"></td><td style="width: 20%; text-align: right;"><input type="checkbox"/> Breakdown attached</td></tr><tr><td style="text-align: center;">(Date)</td><td style="text-align: center;">(Date)</td><td style="text-align: center;">Total cost</td><td></td></tr><tr><td colspan="4" style="height: 10px;"></td></tr><tr><td>From _____</td><td>To _____</td><td></td><td style="text-align: right;"><input type="checkbox"/> Breakdown attached</td></tr><tr><td style="text-align: center;">(Date)</td><td style="text-align: center;">(Date)</td><td style="text-align: center;">Total cost</td><td></td></tr><tr><td colspan="4" style="height: 10px;"></td></tr><tr><td>From _____</td><td>To _____</td><td></td><td style="text-align: right;"><input type="checkbox"/> Breakdown attached</td></tr><tr><td style="text-align: center;">(Date)</td><td style="text-align: center;">(Date)</td><td style="text-align: center;">Total cost</td><td></td></tr><tr><td colspan="4" style="height: 10px;"></td></tr><tr><td>From _____</td><td>To _____</td><td></td><td style="text-align: right;"><input type="checkbox"/> Breakdown attached</td></tr><tr><td style="text-align: center;">(Date)</td><td style="text-align: center;">(Date)</td><td style="text-align: center;">Total cost</td><td></td></tr><tr><td colspan="4" style="height: 10px;"></td></tr><tr><td>From _____</td><td>To _____</td><td></td><td style="text-align: right;"><input type="checkbox"/> Breakdown attached</td></tr><tr><td style="text-align: center;">(Date)</td><td style="text-align: center;">(Date)</td><td style="text-align: center;">Total cost</td><td></td></tr></table> | | | | From _____ | To _____ | | <input type="checkbox"/> Breakdown attached | (Date) | (Date) | Total cost | | | | | | From _____ | To _____ | | <input type="checkbox"/> Breakdown attached | (Date) | (Date) | Total cost | | | | | | From _____ | To _____ | | <input type="checkbox"/> Breakdown attached | (Date) | (Date) | Total cost | | | | | | From _____ | To _____ | | <input type="checkbox"/> Breakdown attached | (Date) | (Date) | Total cost | | | | | | From _____ | To _____ | | <input type="checkbox"/> Breakdown attached | (Date) | (Date) | Total cost | |
| From _____ | To _____ | | <input type="checkbox"/> Breakdown attached | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| (Date) | (Date) | Total cost | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| From _____ | To _____ | | <input type="checkbox"/> Breakdown attached | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| (Date) | (Date) | Total cost | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| From _____ | To _____ | | <input type="checkbox"/> Breakdown attached | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| (Date) | (Date) | Total cost | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| From _____ | To _____ | | <input type="checkbox"/> Breakdown attached | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| (Date) | (Date) | Total cost | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| From _____ | To _____ | | <input type="checkbox"/> Breakdown attached | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| (Date) | (Date) | Total cost | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3. Unanticipated or Unusually High O & M Costs During Review Period Describe costs and reasons: _____ _____ _____ _____ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| V. ACCESS AND INSTITUTIONAL CONTROLS <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| A. Fencing | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1. Fencing Damaged <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Gates secured <input checked="" type="checkbox"/> N/A Remarks: _____ _____ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

Five-Year Review Site Inspection Checklist (Continued)

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 walkdown

Frequency: Annually

Responsible party/agent: USDOE - Savannah River Field Office

Contact: Brian Hennessey, USDOE - Waste Area Group Manager (803) 952-8365
(Name) (Title) (Phone No.)

Reporting 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: _____

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Five-Year Review Site Inspection Checklist (Continued)

| | |
|---|--|
| 3. Land Use Changes Offsite <input checked="" type="checkbox"/> N/A Remarks _____ _____ | |
| VI. GENERAL SITE CONDITIONS | |
| A. Roads <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A | |
| 1. Roads Damaged <input checked="" type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Roads adequate <input type="checkbox"/> N/A Remarks _____ _____ | |
| B. Other Site Conditions Remarks _____ _____ | |
| VII. COVERS SYSTEMS <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A | |
| A. Landfill Surface <input type="checkbox"/> Applicable <input type="checkbox"/> N/A | |
| 1. Settlement (Low spots) <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Settlement not evident Areal extent _____ Depth _____ Remarks: _____ _____ | |
| 2. Cracks <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Cracking not evident Lengths _____ Widths _____ Depths _____ Remarks _____ _____ | |
| 3. Erosion <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Erosion not evident Areal extent _____ Depth _____ Remarks _____ _____ | |
| 4. Holes <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Holes not evident Areal extent _____ Depth _____ Remarks _____ _____ | |
| 5. Vegetative Cover <input type="checkbox"/> Grass <input type="checkbox"/> Cover properly established <input type="checkbox"/> No signs of stress <input type="checkbox"/> Trees/shrubs (indicate size and location on a diagram) Remarks: _____ _____ | |

Five-Year Review Site Inspection Checklist (Continued)

| | | | |
|--|--|--|--|
| 6. Alternative Cover (armored rock, concrete, etc.) <input type="checkbox"/> N/A | | | |
| Remarks: _____ | | | |
| 7. Bulges <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Bulges not evident | | | |
| Areal extent _____ | | Height _____ | |
| Remarks _____ | | | |
| 8. Wet Areas/Water Damage <input type="checkbox"/> Wet areas/water damage not evident | | | |
| <input type="checkbox"/> Wet Areas <input type="checkbox"/> Location shown on site map Areal extent _____ | | | |
| <input type="checkbox"/> Ponding | | <input type="checkbox"/> Location shown on site map Areal extent _____ | |
| <input type="checkbox"/> Seeps | | <input type="checkbox"/> Location shown on site map Areal extent _____ | |
| <input type="checkbox"/> Soft subgrade | | <input type="checkbox"/> Location shown on site map Areal extent _____ | |
| Remarks _____ | | | |
| 9. Slope Instability <input type="checkbox"/> Slides <input type="checkbox"/> Location shown on site map <input type="checkbox"/> No evidence of slope instability | | | |
| Areal extent _____ | | | |
| Remarks _____ | | | |
| B. Benches <input type="checkbox"/> Applicable <input type="checkbox"/> 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 <input type="checkbox"/> Location shown on site map <input type="checkbox"/> N/A or okay | | | |
| Remarks _____ | | | |
| 2. Bench Breached <input type="checkbox"/> Location shown on site map <input type="checkbox"/> N/A or okay | | | |
| Remarks _____ | | | |
| 3. Bench Overtopped <input type="checkbox"/> Location shown on site map <input type="checkbox"/> N/A or okay | | | |
| Remarks _____ | | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | | |
|--|--|---|--|
| D. Cover Penetrations | | <input type="checkbox"/> Applicable | <input type="checkbox"/> N/A |
| 1. Gas Vents <input type="checkbox"/> Active <input type="checkbox"/> Passive | | | |
| <input type="checkbox"/> Properly secured/locked | <input type="checkbox"/> Functioning | <input type="checkbox"/> Routinely sampled | <input type="checkbox"/> Good condition |
| <input type="checkbox"/> Evidence of leakage at penetration | <input type="checkbox"/> Needs Maintenance | <input type="checkbox"/> N/A | |
| Remarks _____ | | | |
| 2. Gas Monitoring Probes | | | |
| <input type="checkbox"/> Properly secured/locked | <input type="checkbox"/> Functioning | <input type="checkbox"/> Routinely sampled | <input type="checkbox"/> Good condition |
| <input type="checkbox"/> Evidence of leakage at penetration | <input type="checkbox"/> Needs Maintenance | <input type="checkbox"/> N/A | |
| Remarks _____ | | | |
| 3. Monitoring Wells (within surface area of landfill) | | | |
| <input type="checkbox"/> Properly secured/locked | <input type="checkbox"/> Functioning | <input type="checkbox"/> Routinely sampled | <input type="checkbox"/> Good condition |
| <input type="checkbox"/> Evidence of leakage at penetration | <input type="checkbox"/> Needs Maintenance | <input type="checkbox"/> N/A | |
| Remarks _____ | | | |
| 4. Leachate Extraction Wells | | | |
| <input type="checkbox"/> Properly secured/locked | <input type="checkbox"/> Functioning | <input type="checkbox"/> Routinely sampled | <input type="checkbox"/> Good condition |
| <input type="checkbox"/> Evidence of leakage at penetration | <input type="checkbox"/> Needs Maintenance | <input type="checkbox"/> N/A | |
| Remarks _____ | | | |
| 5. Settlement Monuments | | <input type="checkbox"/> Located | <input type="checkbox"/> Routinely surveyed <input type="checkbox"/> N/A |
| Remarks _____ | | | |
| E. Gas Collection and Treatment | | <input type="checkbox"/> Applicable | <input type="checkbox"/> N/A |
| 1. Gas Treatment Facilities | | | |
| <input type="checkbox"/> Flaring | <input type="checkbox"/> Thermal destruction | <input type="checkbox"/> Collection for reuse | |
| <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance | | |
| Remarks _____ | | | |
| 2. Gas Collection Wells, Manifolds and Piping | | | |
| <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance | | |
| Remarks _____ | | | |

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| | | | |
|---|--|--|--|
| 3. Gas Monitoring Facilities (e.g., gas monitoring of adjacent homes or buildings) <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A Remarks _____ | | | |
| F. Cover Drainage Layer <input type="checkbox"/> Applicable <input type="checkbox"/> N/A | | | |
| 1. Outlet Pipes Inspected <input type="checkbox"/> Functioning <input type="checkbox"/> N/A Remarks: _____ | | | |
| 2. Outlet Rock Inspected <input type="checkbox"/> Functioning <input type="checkbox"/> N/A Remarks _____ | | | |
| G. Detention/sedimentation Ponds <input type="checkbox"/> Applicable <input type="checkbox"/> N/A | | | |
| 1. Siltation Areal extent _____ Depth _____ <input type="checkbox"/> N/A <input type="checkbox"/> Siltation not evident Remarks _____ | | | |
| 2. Erosion Areal extent _____ Depth _____ <input type="checkbox"/> N/A <input type="checkbox"/> Erosion not evident Remarks _____ | | | |
| 3. Outlet Works <input type="checkbox"/> Functioning <input type="checkbox"/> N/A Remarks _____ | | | |
| 4. Dam <input type="checkbox"/> Functioning <input type="checkbox"/> N/A Remarks _____ | | | |
| H. Retaining Walls <input type="checkbox"/> Applicable <input type="checkbox"/> N/A | | | |
| 1. Deformations <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Deformation not evident Horizontal displacement _____ Vertical displacement _____ Rotational displacement _____ Remarks _____ | | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | |
|--|--|--|
| 2. Degradation <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Deformation not evident | | |
| Remarks _____ | | |
| I. Perimeter Ditches/Off-Site Discharge <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A | | |
| 1. Siltation <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Siltation not evident | | |
| Areal extent _____ Depth _____ | | |
| Remarks _____ | | |
| 2. Vegetative Growth <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Siltation not evident | | |
| o Vegetation does not impede flow | | |
| Areal extent _____ Type _____ | | |
| Remarks _____ | | |
| 3. Erosion <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Erosion not evident | | |
| Areal extent _____ Depth _____ | | |
| Remarks _____ | | |
| 4. Discharge Structure <input type="checkbox"/> Location shown on site map <input type="checkbox"/> N/A | | |
| Remarks _____ | | |
| VIII. VERTICAL BARRIER WALLS <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A | | |
| 1. Settlement <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Settlement not evident | | |
| Areal extent _____ Depth _____ | | |
| Remarks _____ | | |
| 2. Performance Monitoring Type of Monitoring _____ <input type="checkbox"/> Performance not monitored | | |
| Frequency _____ <input type="checkbox"/> Evidence of breaching Head differential _____ | | |
| Remarks _____ | | |

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| | | | |
|---|---|--|---|
| IX. GROUNDWATER/SURFACE WATER REMEDIES | | <input type="checkbox"/> Applicable | <input checked="" type="checkbox"/> N/A |
| A. Groundwater Extraction Wells, Pumps, and Pipelines | | <input type="checkbox"/> Applicable | <input type="checkbox"/> N/A |
| 1. Pumps, Wellhead Plumbing, and Electrical | | | |
| <input type="checkbox"/> Good condition | <input type="checkbox"/> All required wells located | <input type="checkbox"/> Needs Maintenance | <input type="checkbox"/> N/A |
| Remarks _____ | | | |
| 2. Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances | | | |
| <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance | | |
| Remarks _____ | | | |
| 3. Spare Parts and Equipment | | | |
| <input type="checkbox"/> Readily available | <input type="checkbox"/> Good condition | <input type="checkbox"/> Requires upgrade | <input type="checkbox"/> Needs to be provided |
| Remarks _____ | | | |
| B. Surface Water Collection Structures, Pumps, and Pipelines | | <input type="checkbox"/> Applicable | <input type="checkbox"/> N/A |
| 1. Collection Structures, Pumps, and Electrical | | | |
| <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance | | |
| Remarks _____ | | | |
| 2. Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances | | | |
| <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance | | |
| Remarks _____ | | | |
| 3. Spare Parts and Equipment | | | |
| <input type="checkbox"/> Readily available | <input type="checkbox"/> Good condition | <input type="checkbox"/> Requires upgrade | <input type="checkbox"/> Needs to be provided |
| Remarks _____ | | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | |
|---|--|--|
| C. Treatment System | <input type="checkbox"/> Applicable | <input type="checkbox"/> N/A |
| 1. Treatment Train (Check components that apply) | | |
| <input type="checkbox"/> Metals removal | <input type="checkbox"/> Oil/water separation | <input type="checkbox"/> Bioremediation |
| <input type="checkbox"/> Air stripping | <input type="checkbox"/> Carbon adsorbers | |
| <input type="checkbox"/> Filters _____ | | |
| <input type="checkbox"/> Additive (e.g., chelation agent, flocculent) _____ | | |
| <input type="checkbox"/> Others _____ | | |
| <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance | |
| <input type="checkbox"/> Sampling ports properly marked and functional | | |
| <input type="checkbox"/> Sampling/maintenance log displayed and up to date | | |
| <input type="checkbox"/> Equipment properly identified | | |
| <input type="checkbox"/> Quantity of groundwater treated annually _____ | | |
| <input type="checkbox"/> Quantity of surface water treated annually _____ | | |
| Remarks _____ | | |
| 2. Electrical Enclosures and Panels (properly rated and functional) | | |
| <input type="checkbox"/> N/A | <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance |
| Remarks _____ | | |
| 3. Tanks, Vaults, Storage Vessels | | |
| <input type="checkbox"/> N/A | <input type="checkbox"/> Good condition | <input type="checkbox"/> Proper secondary containment <input type="checkbox"/> Needs Maintenance |
| Remarks _____ | | |
| 4. Discharge Structure and Appurtenances | | |
| <input type="checkbox"/> N/A | <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance |
| Remarks _____ | | |
| 5. Treatment Building(s) | | |
| <input type="checkbox"/> N/A | <input type="checkbox"/> Good condition (esp. roof and doorways) | <input type="checkbox"/> Needs repair |
| <input type="checkbox"/> Chemicals and equipment properly stored | | |
| Remarks _____ | | |

Five-Year Review Site Inspection Checklist (Continued)

| | |
|--|--|
| 6. Monitoring Wells <input type="checkbox"/> Properly secured/locked <input type="checkbox"/> Functioning <input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition <input type="checkbox"/> All required wells located <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A Remarks _____ | |
| D. Monitoring Data <input type="checkbox"/> Applicable <input type="checkbox"/> N/A | |
| 1. Monitoring Data <input type="checkbox"/> Is routinely submitted on time <input type="checkbox"/> Is of acceptable quality | |
| 2 Monitoring Data Suggests: <input type="checkbox"/> Groundwater plume is effectively contained <input type="checkbox"/> Contaminant concentrations are declining | |
| E. Monitored Natural Attenuation <input type="checkbox"/> Applicable <input type="checkbox"/> N/A | |
| 1. Monitoring Wells (Natural attenuation remedy) <input type="checkbox"/> Properly secured/locked <input type="checkbox"/> Functioning <input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition <input type="checkbox"/> All required wells located <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> 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 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. | |

Five-Year Review Site Inspection Checklist (Continued)

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.

D. Opportunities for Optimization

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

N/A

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P-AREA BURNING/RUBBLE PIT (131-P) OPERABLE UNIT

I. Introduction

This is the first five-year review for the P-Area Burning/Rubble Pit (131-P) (PBRP) Operable Unit (OU). This review was conducted from August 2007 through September 2007. This report documents the results of the review.

II. OU Chronology

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

Table 1. Chronology of OU Events

| Event | Date |
|-------------------------------------|-------------------|
| RFI/RI Field Start | March 25, 1998 |
| Record of Decision (ROD) Issuance | August 12, 2002 |
| Remedial Action (RA) Start | November 14, 2003 |
| RA Construction Activities Complete | February 12, 2004 |
| Previous Five-Year Reviews | None |

III. Background

Physical Characteristics

The PBRP OU is located in the interior of Savannah River Site (SRS) approximately 5.2 miles from the nearest SRS boundary (Figure 1). The PBRP OU consists of five subunits: (1) PBRP, a single burning/rubble pit; (2) a small drainage ditch near PBRP; (3) a seepage line located along an embankment of Steel Creek; (4) a segment of Steel Creek adjacent to the OU; and (5) groundwater in the water table aquifer. See Figure 2 for Site layout of PBRP OU.

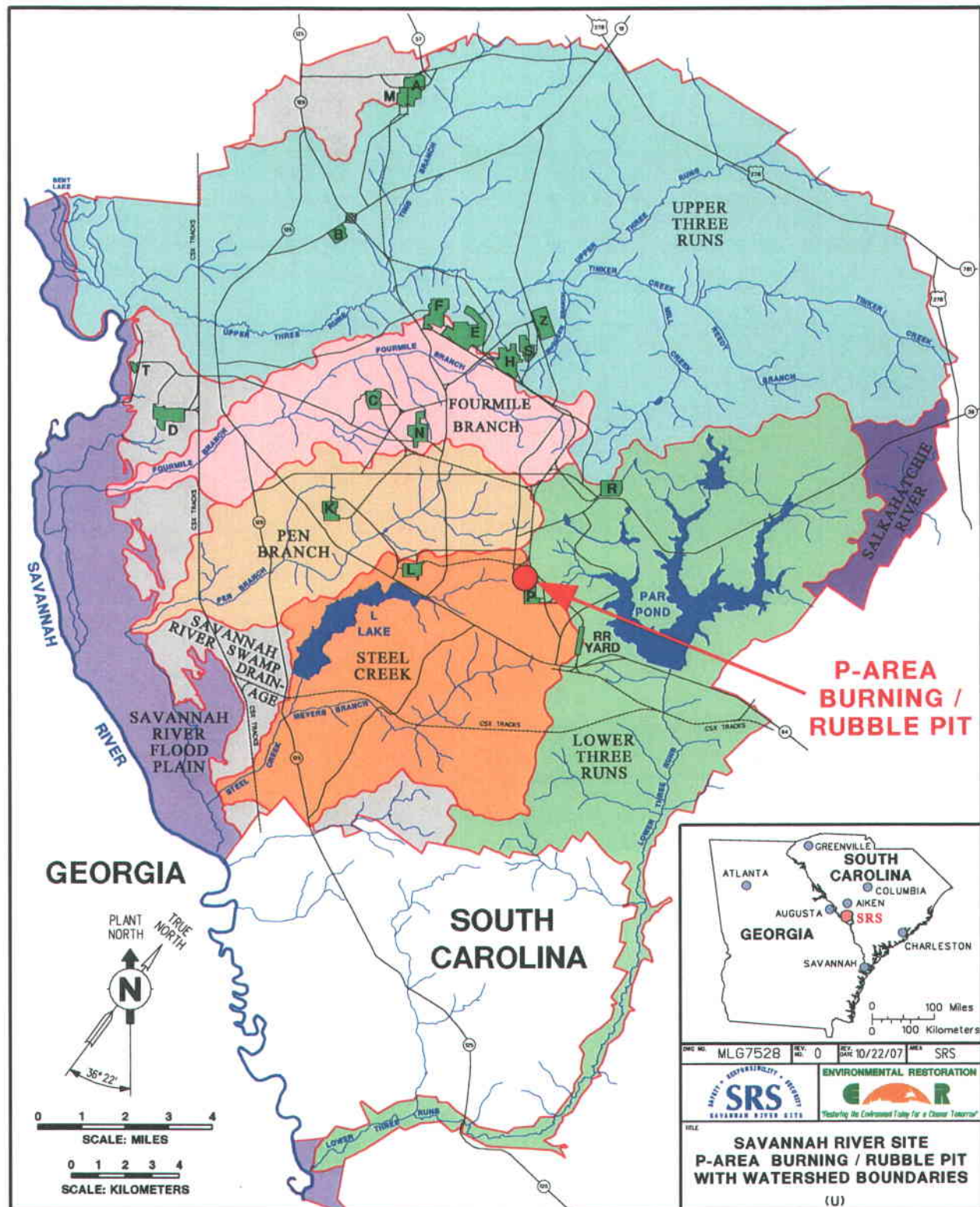


Figure 1. Location of the PBRP at SRS

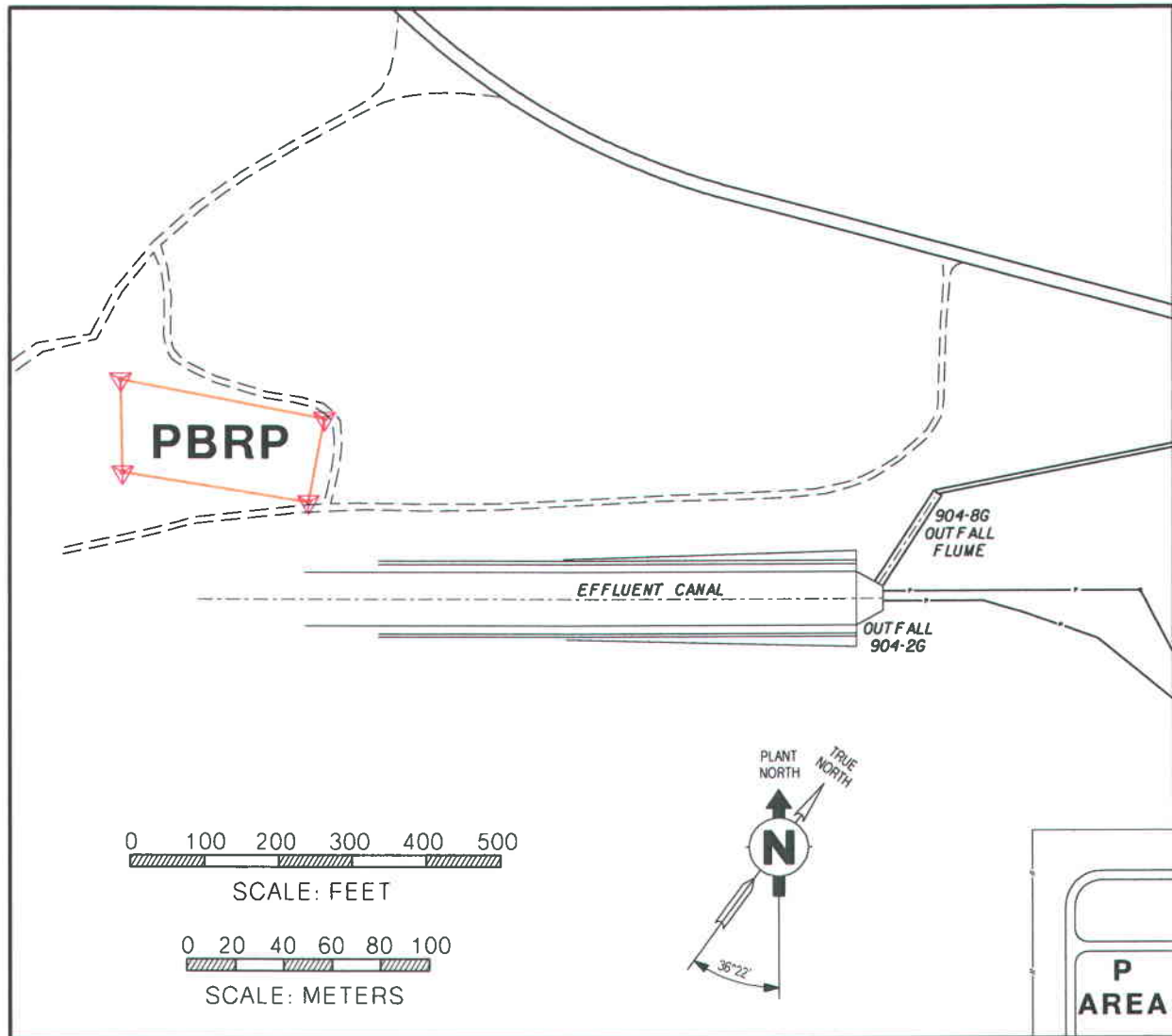


Figure 2. Site Layout of P-Area Burning/Rubble Pit (131-P) Operable Unit

The land surface at PBRP slopes gently to the south. Approximately 150 ft to the south of the unit is a steep embankment of Steel Creek. The embankment drops 25 ft in elevation over a lateral distance of 100 ft. The embankment is punctuated by a terrace located 10 ft above the elevation of Steel Creek. The terrace is 25 ft wide and contains a seepline. Steel Creek is at the base of the embankment. The OU has been assessed through characterization and a series of documents written by United States Department of Energy (USDOE) and approved by the regulatory agencies (South Carolina Department of Health and Environmental Control [SCDHEC] and United States Environmental Protection Agency [USEPA]). These documents include a Work Plan, Resource Conservation and Recovery Act (RCRA) Facility Investigation/Remedial Investigation (RFI/RI) Report with Baseline Risk Assessment (BRA), and a Statement of Basis/Proposed Plan (SB/PP). A Corrective Measures Study/Feasibility Study (CMS/FS) was not prepared because USDOE, SCDHEC, and USEPA agreed that the problem warranting action and the scope of the problem were well-defined and that the list of likely response actions was short enough to proceed directly from the RFI/RI/BRA to the SB/PP. The types of assessments typically done in a CMS/FS were included in Appendix A of the SB/PP.

Land and Resource Use

The PBRP OU is located in an industrial area. The future land use for PBRP OU is anticipated to remain industrial.

History of Contamination

PBRP

PBRP is a single, inactive burial pit approximately 200 ft long by 30 ft wide. The depth of the pit ranges from 8 ft below land surface (bls) in the western end to 11 ft bls in the eastern end. From 1951 to 1973, PBRP was used for periodic burning of combustible materials. Disposal records of individual burials were not kept for this unit; however, information obtained from historical records and from characterization of similar

burning/rubble pits at SRS indicate that materials such as wood, cardboard, paper, plastics, rubber, rags, oils and organic liquids of unknown origins were disposed of in the pit and burned on a monthly basis. In 1973, burning in open pits was discontinued at SRS, and a soil layer was placed over the pit contents. The pit continued to receive inert debris such as construction materials. When the pit reached capacity in 1978, the debris was covered with approximately 4 ft of clean soil to grade. No removal actions have been performed at the unit. Currently, PBRP is covered by grassy vegetation and several pine trees. The area around the pit is wooded.

Ditch

No waste was placed in the ditch. The ditch was assessed as part of this OU to determine if runoff and erosion from PBRP had impacted it. The ditch is approximately 75 ft to the southwest of PBRP. It is 1 to 2 ft deep and may, at times, receive surface water runoff from the vicinity of the western end of PBRP. Surface water occasionally collects in the ditch, but the ditch is generally dry. Any water in the ditch quickly infiltrates, becomes lost to evapotranspiration, or flows south into a tributary of Steel Creek.

Seepage

No waste was placed along the seepage. The seepage was assessed as part of this OU to determine if leaching and seepage from PBRP had impacted it. The seepage is present on a terrace approximately 10 ft above Steel Creek. The area identified as the seepage is approximately 10 ft wide and 200 ft long. Surface water is locally present at the seepage for much of the year. However, the seepage is not a significant source of surface water, as most of the seepage area has surface water only after heavy rainfall events, and the seepage occasionally dries up completely in the summer. When surface water is present, it is usually in a small part of the seepage area and is never more than a few inches deep. Surface water at the seepage either infiltrates or is lost to evapotranspiration. There is no visible evidence such as channeling and erosion to indicate that the surface water at the seepage flows regularly into Steel Creek. Field data indicate the seepage is attributable to

an ephemeral water layer above a localized clay lens. It is not an outcrop of the water table aquifer.

Steel Creek

No waste associated with PBRP was placed in Steel Creek. A segment of Steel Creek adjacent to PBRP was assessed to determine if runoff or seepage from PBRP had impacted it.

Steel Creek is approximately 225 ft south of PBRP. Prior to 1997, cooling water, process sewer water, and stormwater runoff from P Area were discharged to Steel Creek at a location upgradient of PBRP. In addition, groundwater in the water table aquifer under P Area discharges to Steel Creek. Consequently, Steel Creek has been contaminated by upgradient sources in P Area unrelated to the PBRP OU. All process/cooling water discharges were discontinued February 1997. Steel Creek still flows from stormwater runoff and groundwater seepage at a reduced rate. There is a narrow (<25 ft wide) floodplain along Steel Creek. Water is present in Steel Creek throughout the year. During most of the year, the elevation of the water table is approximately the same as the elevation of the Steel Creek streambed. Consequently, Steel Creek is a discharge point for the water table aquifer.

Groundwater

The water table aquifer represents the “upper” aquifer zone of the Upper Three Runs aquifer and is composed of silt and clay. The top of the water table is approximately 23 ft bls. The upper aquifer zone is approximately 57 ft thick; it extends from the water table to a locally continuous clay layer (the “tan clay”) at a depth of approximately 80 ft bls. The general groundwater flow direction is to the west. The water table aquifer discharges to Steel Creek 250 ft south of PBRP.

IV. Remedial Actions

Remedy Selection

The RFI/RI/BRA identified contamination warranting remediation in two subunits: PBRP and groundwater. The selected remedy for PBRP is Engineered Cover System with BaroBalls™, Natural Biodegradation, and Institutional Controls. The selected remedy for groundwater is Continued Monitoring and Reporting to verify that a discernable plume above maximum contaminant levels (MCLs) does not develop. There is no principal threat source material at this OU.

The selected remedy entails the following:

- Cover the burning/rubble pit with an engineered cover system (e.g., native soil cover with a hydraulic conductivity of approximately 10^{-5} cm/sec) to (1) prevent exposure to contaminants in surface soil, (2) reduce rainwater infiltration and resulting leaching, and (3) slow the rate of contaminant migration through the soil to groundwater so that there is more time for natural processes such as biodegradation to reduce the leachability risk.
- Install passive soil venting wells (BaroBalls™) to allow volatile organic compounds (VOCs) in the soil to vent to the atmosphere instead of leaching to groundwater.
- Monitor the groundwater quality to confirm that a discernable groundwater plume above MCLs does not develop.
- Implement institutional controls (site maintenance, warning signs, and land use controls) to prevent unauthorized intrusion into the buried contamination.

The RFI/RI/BRA determined that there is no problem warranting action (there are no refined constituents of concern [RCOCs]) for the small drainage ditch near PBRP, the seepage line located along an embankment of Steel Creek, or the segment of Steel Creek adjacent to the OU; therefore, No Action is selected for these subunits. No Action has

been selected for the ditch and seepage because these subunits have not been impacted. Although Steel Creek is contaminated, No Action was selected for this subunit because the contamination did not originate from PBRP; contamination in Steel Creek is being addressed separately under the Integrator Operable Unit (IOU) program.

Remedy Implementation

An engineered cover system was constructed to provide sufficient infiltration control to prevent inorganics and polychlorinated biphenyls (PCBs) from leaching to groundwater above MCLs/risk-based concentrations (RBCs) within 1,000 years. As long as biodegradation and volatilization are occurring, they, along with the cover's infiltration reduction, would also prevent VOCs and semivolatile organic compounds (SVOCs) from migrating to groundwater above MCLs/RBCs. There is evidence of biodegradation at the unit because sampling during the RFI/RI confirmed the presence of organic biodegradation products at the unit. Volatilization of organics to the atmosphere (via soil gas) is occurring through natural processes under current baseline conditions. However, with the low permeability cover in place, volatilization will be reduced by the cover.

A soil vapor extraction system such as BaroBallsTM was constructed to offset reduced volatilization due to the low permeability cover. The BaroBallsTM system is a simple valve that opens and closes based on differences between atmospheric and soil-gas pressures, allowing gas to flow from a well to the atmosphere. The BaroBallsTM system increases the effectiveness of barometric pumping by preventing the inflow of air into a venting well when atmospheric pressure reverses, a condition that can reduce contaminant removal by diluting and dispersing the pollutant.

The institutional controls that are implemented consist of site maintenance (repair of erosion damage, cover maintenance, and warning signs) and site controls (SRS Site Use and Site Clearance Programs, which restrict invasive and permanent installation activities at the waste unit). Institutional controls will maintain the integrity of the engineered cover, which in turn will maintain the effectiveness of the cover to mitigate leaching.

This selected cover system remedy provides a barrier between human receptors and the buried human health RCOCs and prevents groundwater from exceeding MCLs/RBCs. PBRP is available for industrial land use with land use restrictions.

The PBRP will require an extended remedial action period of groundwater monitoring and reporting until the groundwater concerns are diminished.

Operations and Maintenance

The selected remedy of Continued Monitoring and Reporting for groundwater was chosen because it is anticipated that groundwater concentrations will decrease with time through natural processes. This remedy relies on natural processes to attenuate contaminants. Natural processes may reduce contaminant mass (through destructive processes such as biodegradation and chemical transformations), reduce contaminant concentrations (through simple dilution or dispersion), or bind contaminants to soil particles so the contamination does not spread or migrate very far (absorption). Under this remedy, groundwater is monitored to verify that concentrations of 1,1-dichloroethene and trichloroethene continue to decline and that a discernable plume above MCLs does not develop. This is achieved by continued quarterly monitoring of selected wells (PRP-5, PRP-6, and PRP-7) and annual reporting. Sampling will continue until there are no MCL exceedances in the downgradient wells (PRP-6 and PRP-7) for a period of three consecutive years (six semi-annual sampling events). Institutional controls will be implemented as long as groundwater concentrations exceed MCLs. The expected outcome of this remedy is that groundwater concentrations will drop below MCLs and a groundwater plume above MCLs will not develop. Upon attenuation of groundwater contamination to levels below MCLs, groundwater will be available for unrestricted use.

All of the analytes in the soil vapor monitoring suite were below the 10 ppmv shutdown criteria for individual analytes proposed in the Corrective Measures Implementation/Remedial Action Implementation Plan (CMI/RAIP) during the period covered by this report. Soil vapor conditions at PBRP have been monitored since 1Q01. Thus, in the 2006 Effectiveness Monitoring Report, SRS proposed to continue operation

of a passive BaroBall™ system but to suspend soil vapor monitoring. Shutdown criteria for the BaroBall™ system have already been attained and demonstrated for six years, but continued operation of the BaroBalls™ may help to control the migration of constituents of concern (COCs) and reduce contaminant concentrations in local groundwater. Since the BaroBalls™ are part of a passive system that is already in place, it makes sense to continue operation of the system to recover any residual vapor phase VOC contamination before it reaches the water table. This proposal was accepted by the regulators with approval of the report in 2007.

The response action is to continue to monitor selected wells (PRP-6, PRP-7, and PRP-5) on a quarterly schedule and issue an annual monitoring report (Effectiveness Monitoring Report). If four quarters of no MCL exceedances are observed, sampling will be reduced to semi-annual sampling. Sampling will continue until there are no MCL exceedances in well PRP-6 and PRP-7 for a period of 3 years.

Based on 2006 monitoring data, the only analytes in the suite that exceeded MCLs or action levels were 1,1-DCE (maximum 35 µg/L/MCL 7 µg/L, PRP 6 9/21/05) and trichloroethylene (TCE) (maximum 9.1 µg/L/MCL 5 µg/L, PRP 6 9/21/05). The long-term trends of contaminant concentrations for analytes such as 1,1,1-TCA, 1,1-DCE, tetrachloroethylene (PCE), and TCE show very pronounced declines. MCL exceedances by 1,1-DCE and TCE indicate that some additional time will be required for contamination present in the groundwater to be degraded beneath PBRP.

In September 2004, the Post-Construction Report (PCR) documented the completion of the construction of the RA for the closure of PBRP.

V. Progress Since Last Review

This is the first review for this OU; therefore, this section does not apply. In 2008, an agreement was reached to combine the reports for K, L, and P Burning/ Rubble Pit (BRP) OU data reports into an annual letter with a detailed groundwater report every fifth year beginning June 30, 2012.

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 RA
- Inspected unit to confirm protectiveness of the selected RA
- Reviewed changes in standards and to-be-considered guidance

VII. Technical Assessment

The conclusions for this review are as follows:

- Operation of the passive BaroBall™ system will continue until groundwater monitoring objectives are met. It is estimated that remedial goals will be attained within five years. The BaroBall™ system will be abandoned when the groundwater monitoring system is abandoned.
- Cover system is expected to continue to prevent inorganics and PCBs from leaching to groundwater above MCLs/RBCs. The post construction data shows no change in groundwater concentrations. See Table 2 for Cap Performance data. The cover is also providing a barrier between human receptors and the buried human health RCOCs.
- Institutional controls will continue to prevent human exposure to contaminated media.
- 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.

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Table 2. Cap Performance for PBRP (Cap completed 6/8/2004). Monitoring Wells PRP 5, PRP 6, PRP 7.

The post construction data reflect the maximum, qualified-detection concentrations for COCs since the cap was completed in 2004 (12 sample events). There have been 16 sample events for PRP 5, pre- and post-cap construction (from 5/98 through 8/07). The data show no change in groundwater concentrations. Dibenzofuran has been consistently non-detect.

| PBRP All the Data | | | | | |
|------------------------------|----------------------------|-------------------|--------------|--------------|--------------------|
| SAMPLES (N) | | STATION ID | | | |
| Analyte Name | Qualified Detection | PRP 5 | PRP 6 | PRP 7 | Grand Total |
| Antimony | ND | 16 | 12 | 12 | 40 |
| | Yes | | 1 | | 1 |
| Chromium | ND | 14 | 3 | 4 | 21 |
| | Yes | 2 | 10 | 8 | 20 |
| Copper | ND | 8 | | 2 | 10 |
| | Yes | 8 | 13 | 10 | 31 |
| Dibenzofuran | ND | 15 | 12 | 12 | 39 |
| Nickel | ND | 11 | 1 | 1 | 13 |
| | Yes | 5 | 12 | 11 | 28 |
| Zinc | ND | 4 | | | 4 |
| | Yes | 12 | 13 | 12 | 37 |
| Grand Total | | 95 | 77 | 72 | 244 |

| Post Construction Data | | | | | |
|-------------------------------|----------------------------|-------------------|--------------|--------------|--------------------|
| SAMPLES (N) | | STATION ID | | | |
| Analyte Name | Qualified Detection | PRP 5 | PRP 6 | PRP 7 | Grand Total |
| Antimony | ND | 12 | 12 | 12 | 36 |
| | Yes | | 1 | | 1 |
| Chromium | ND | 11 | 3 | 4 | 18 |
| | Yes | 1 | 10 | 8 | 19 |
| Copper | ND | 6 | | 2 | 8 |
| | Yes | 6 | 13 | 10 | 29 |
| Dibenzofuran | ND | 12 | 12 | 12 | 36 |
| Nickel | ND | 8 | 1 | 1 | 10 |
| | Yes | 4 | 12 | 11 | 27 |
| Zinc | ND | 3 | | | 3 |
| | Yes | 9 | 13 | 12 | 34 |
| Grand Total | | 72 | 77 | 72 | 221 |

| Max RESULT | | STATION ID | | | |
|---------------------|----------------------------|-------------------|--------------|--------------|-----------------|
| Analyte Name | Qualified Detection | PRP 5 | PRP 6 | PRP 7 | Site Max |
| Antimony | Yes | 6.23 | | | 6.23 |
| Chromium | Yes | 6.3 | 8 | 4.6 | 8 |
| Copper | Yes | 15.2 | 36. | 22.6 | 36.2 |
| Nickel | Yes | 4.5 | 18.2 | 10.5 | 18.2 |
| Zinc | Yes | 33.2 | 41 | 102 | 102 |

| Max RESULT | | STATION ID | | | |
|---------------------|----------------------------|-------------------|--------------|--------------|-----------------|
| Analyte Name | Qualified Detection | PRP 5 | PRP 6 | PRP 7 | Site Max |
| Antimony | Yes | 6.23 | | | 6.23 |
| Chromium | Yes | 1.42 | 8 | 4.6 | 8 |
| Copper | Yes | 2.3 | 36.2 | 22.6 | 36.2 |
| Nickel | Yes | 1.26 | 18.2 | 10.5 | 18.2 |
| Zinc | Yes | 4.7 | 41 | 102 | 102 |

- **Issues**

There are no issues for this OU.

- **Recommendations and Follow-up Actions**

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

X. Project Costs

Costs associated with the selected remedy for PBRP include operation and maintenance costs of the soil cover, groundwater monitoring, and institutional controls. The estimated operation and maintenance cost associated with the selected remedy is \$188,000, which was discounted at 7% per year.

This is a present worth cost, including 30 years of maintenance activities. After characterization and effectiveness of the remedy were evaluated, the actual operation and maintenance cost for the PBRP was assessed. The total actual operation and maintenance cost from project support and other post-construction expense to fiscal year 2006 is \$105,662.

XI. Protectiveness Statement(s)

The selected remedy of Engineered Cover System with BaroBalls™, Natural Biodegradation, and Institutional Controls for PBRP is protective of human health and the environment. This remedy is protective because human health RCOCs are covered to prevent exposure; infiltration and leaching of contaminant migration RCOCs will be reduced enough to prevent groundwater from being impacted above MCLs/RBCs in the future; and the cover over the contaminated soils will mitigate erosion and redistribution of pit soils. As for groundwater, the selected remedy of Continued monitoring and

Reporting for groundwater is also protective of human health and the environment. This remedy is protective because monitoring will track the attenuation of contaminants and will identify a plume in the unlikely event that a discernable plume develops. Exposure pathways that could result in unacceptable risks are controlled by the institutional controls in place while USDOE controls the OU. These controls 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).

XII. Next Review

The next five-year review is scheduled for February 12, 2014.

ATTACHMENT 1

List of Documents Reviewed

USDOE, 2008. Memo from Brian T. Hennessey to Donald Siron and Robert H. Pope, Subject: Submittal of the Proposal to Standardize Sampling and Reporting Requirements of Groundwater Data for P, L, and K Area Burning/Rubble Pit Operable Units, CERCLIS Numbers 59, 56, 40; ARF # 15055

WSRC-RP-97-192, *RFI/RI Work Plan for the P-Area Burning/Rubble Pit (131-P) (U)*, Revision 1.1, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

WSRC-RP-98-4174, *RFI/RI/BRA for the P-Area Burning Rubble Pit (131-P) (U)*, , Revision 1.1, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

WSRC-RP-2000-4196, *Statement of Basis/Proposed Plan for the P-Area Burning/Rubble Pit (131-P) (U)*, Revision 1, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

WSRC-RP-2000-4197, *Record of Decision Remedial Alternative Selection for the P-Area Burning/Rubble Pit (131-P) Operable Unit (U)*, Revision 1, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

WSRC-RP-2002-4216, *Corrective Measures Implementation/Remedial Action Implementation Plan (CMI/RAIP) for the P-Area Burning Rubble Pit (PBRP) (131-P) (U)*, Revision 0, March, Westinghouse Savannah River Company, Aiken, SC

WSRC-RP-2004-4051, *Post-Construction Report for the P-Area Burning Rubble Pit (PBRP) (131-P) (U)*, Revision 1, September, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

WSRC-RP-2006-4057, *Post-ROD Effectiveness Monitoring Report for the P-Area Burning/Rubble Pit (131-P) (U)*, Revision 1, September, Washington Savannah River Company, Aiken, SC

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ATTACHMENT 2

Five-Year Review Site Inspection Checklist

| I. SITE INFORMATION | | | |
|--|---|------------------------------------|---|
| Site Name: | P-Area Burning/Rubble Pit (131-P), Operable Unit (OU) | Date of Inspection: | 9/24/2007 |
| Location and Region: | SRS, USEPA Region IV | EPA ID: | SC1890008989 |
| Agency, office, or company leading the five-year review: | United States Department of Energy | CERCLIS OU No.: | 59 |
| | | Weather/Temperature: | Clear and Sunny, 90°F |
| Remedy Includes: (Check all that apply) <div><input checked="" type="checkbox"/> Cover system <input type="checkbox"/> Access controls <input checked="" type="checkbox"/> Institutional Controls <input type="checkbox"/> Groundwater pump and treatment <input type="checkbox"/> Surface water collection and treatment <input checked="" type="checkbox"/> Other: Natural Biodegradation; Baroballs™; Groundwater Monitoring</div> <div><input type="checkbox"/> Monitored Natural Attenuation <input type="checkbox"/> Groundwater Containment <input type="checkbox"/> Vertical Barrier Walls</div> | | | |
| Attachments: <input type="checkbox"/> Inspection team roster attached <input type="checkbox"/> Site map attached | | | |
| II. INTERVIEWS (Check all that apply) | | | |
| 1. O & M Site Manager | | | |
| | _____ (Name) | _____ (Title) | _____ (Date) |
| Interviewed: | <input type="checkbox"/> at site | <input type="checkbox"/> at office | <input type="checkbox"/> by phone Phone No. _____ |
| Problems, suggestions: | <input type="checkbox"/> report attached _____ | | |
| 2. O & M Staff | | | |
| | _____ (Name) | _____ (Title) | _____ (Date) |
| Interviewed: | <input type="checkbox"/> at site | <input type="checkbox"/> at office | <input type="checkbox"/> by phone Phone No. _____ |
| Problems, suggestions: | <input type="checkbox"/> report attached _____ | | |

Five-Year Review Site Inspection Checklist (Continued)

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

| | | | |
|---|---|--|---|
| <input type="checkbox"/> O & M Manual | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A |
| <input checked="" type="checkbox"/> As-built drawings | <input checked="" type="checkbox"/> Readily available | <input checked="" type="checkbox"/> Up to date | <input type="checkbox"/> N/A |
| <input type="checkbox"/> Maintenance Logs | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A |

Remarks: See Waste Unit Inspection and Maintenance, ER-SOP-019

Five-Year Review Site Inspection Checklist (Continued)

| | | | | | | |
|--|--|-------------------------------------|---|---|--|---|
| 2. Site-Specific Health and Safety Plan | | | | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A |
| <input type="checkbox"/> Contingency plan/emergency response plan | | | | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A |
| Remarks: <u>Routine O&M activities do not require an SSHASP under 29 CFR 1910.1201, HAZWOPER</u> | | | | | | |
| 3. O & M and OSHA Training Records | | | | <input checked="" type="checkbox"/> Readily available | <input checked="" type="checkbox"/> Up to date | <input type="checkbox"/> N/A |
| Remarks _____ | | | | | | |
| 4. Permits and Service Agreements | | | | | | |
| <input type="checkbox"/> Air discharge permit | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A | | | |
| <input type="checkbox"/> Effluent discharge | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A | | | |
| <input type="checkbox"/> Waste Disposal, POTW | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A | | | |
| <input type="checkbox"/> Other permits | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A | | | |
| Remarks _____ | | | | | | |
| 5. Gas Generation Records | | | | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A |
| Remarks _____ | | | | | | |
| 6. Settlement Monument Records | | | | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A |
| Remarks _____ | | | | | | |
| 7. Groundwater Monitoring Records | | | | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A |
| Remarks _____ | | | | | | |
| 8. Leachate Extraction Records | | | | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A |
| Remarks _____ | | | | | | |
| 9. Discharge Compliance Records | | | | | | |
| <input type="checkbox"/> Air | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A | | | |
| <input type="checkbox"/> Water (effluent) | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A | | | |
| Remarks _____ | | | | | | |
| 10. Daily Access/Security Logs | | | | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A |
| Remarks _____ | | | | | | |

Five-Year Review Site Inspection Checklist (Continued)

| IV. O & M Costs | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--|----------|------------|---|------------|----------|--|---|--------|--------|------------|--|------------|----------|--|---|--------|--------|------------|--|------------|----------|--|---|--------|--------|------------|--|------------|----------|--|---|--------|--------|------------|--|------------|----------|--|---|--------|--------|------------|--|
| 1. O & M Organization <div style="display: flex; justify-content: space-between;"> <div><input type="checkbox"/> State in-house</div> <div><input type="checkbox"/> Contractor for State</div> </div> <div style="display: flex; justify-content: space-between;"> <div><input type="checkbox"/> PRP in-house</div> <div><input type="checkbox"/> Contractor for PRP</div> </div> <div style="margin-top: 5px;"> x Other: <u>SRS</u> </div> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2. O & M Cost Records <div style="display: flex; justify-content: space-between;"> <div><input type="checkbox"/> Readily available</div> <div><input type="checkbox"/> Up to date</div> <div><input type="checkbox"/> Funding mechanism/agreement in place</div> </div> <div style="margin-top: 5px;"> x Other: <u>Project cost data summarized in Section X of attached review: WSRC-RP-2007-4063</u> </div> <div style="margin-top: 20px; text-align: center;"> Total annual cost by year for review period if available </div> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%;">From _____</td> <td style="width: 20%;">To _____</td> <td style="width: 40%;"></td> <td style="width: 20%; text-align: right;"><input type="checkbox"/> Breakdown attached</td> </tr> <tr> <td style="text-align: center;">(Date)</td> <td style="text-align: center;">(Date)</td> <td style="text-align: center;">Total cost</td> <td></td> </tr> <tr> <td>From _____</td> <td>To _____</td> <td></td> <td style="text-align: right;"><input type="checkbox"/> Breakdown attached</td> </tr> <tr> <td style="text-align: center;">(Date)</td> <td style="text-align: center;">(Date)</td> <td style="text-align: center;">Total cost</td> <td></td> </tr> <tr> <td>From _____</td> <td>To _____</td> <td></td> <td style="text-align: right;"><input type="checkbox"/> Breakdown attached</td> </tr> <tr> <td style="text-align: center;">(Date)</td> <td style="text-align: center;">(Date)</td> <td style="text-align: center;">Total cost</td> <td></td> </tr> <tr> <td>From _____</td> <td>To _____</td> <td></td> <td style="text-align: right;"><input type="checkbox"/> Breakdown attached</td> </tr> <tr> <td style="text-align: center;">(Date)</td> <td style="text-align: center;">(Date)</td> <td style="text-align: center;">Total cost</td> <td></td> </tr> <tr> <td>From _____</td> <td>To _____</td> <td></td> <td style="text-align: right;"><input type="checkbox"/> Breakdown attached</td> </tr> <tr> <td style="text-align: center;">(Date)</td> <td style="text-align: center;">(Date)</td> <td style="text-align: center;">Total cost</td> <td></td> </tr> </table> | | | | From _____ | To _____ | | <input type="checkbox"/> Breakdown attached | (Date) | (Date) | Total cost | | From _____ | To _____ | | <input type="checkbox"/> Breakdown attached | (Date) | (Date) | Total cost | | From _____ | To _____ | | <input type="checkbox"/> Breakdown attached | (Date) | (Date) | Total cost | | From _____ | To _____ | | <input type="checkbox"/> Breakdown attached | (Date) | (Date) | Total cost | | From _____ | To _____ | | <input type="checkbox"/> Breakdown attached | (Date) | (Date) | Total cost | |
| From _____ | To _____ | | <input type="checkbox"/> Breakdown attached | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| (Date) | (Date) | Total cost | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| From _____ | To _____ | | <input type="checkbox"/> Breakdown attached | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| (Date) | (Date) | Total cost | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| From _____ | To _____ | | <input type="checkbox"/> Breakdown attached | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| (Date) | (Date) | Total cost | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| From _____ | To _____ | | <input type="checkbox"/> Breakdown attached | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| (Date) | (Date) | Total cost | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| From _____ | To _____ | | <input type="checkbox"/> Breakdown attached | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| (Date) | (Date) | Total cost | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3. Unanticipated or Unusually High O & M Costs During Review Period Describe costs and reasons: _____ _____ _____ _____ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| V. ACCESS AND INSTITUTIONAL CONTROLS | | | x Applicable <input type="checkbox"/> N/A | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| A. Fencing | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1. Fencing Damaged <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Gates secured <input type="checkbox"/> N/A Remarks _____ _____ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | | | |
|--|---------------------------------|--|--|---|
| B. Other Access Restrictions | | | | |
| 1. Signs and other security measures <input type="checkbox"/> Location shown on site map <input type="checkbox"/> N/A | | | | |
| Remarks: <u>Signs at this site are in good condition.</u> | | | | |
| C. Institutional Controls | | | | |
| 1. Implementation and enforcement | | | | |
| Site conditions imply ICs not properly implemented: | | <input type="checkbox"/> Yes | <input checked="" type="checkbox"/> No | <input type="checkbox"/> N/A |
| Site conditions imply ICs not being fully enforced: | | <input type="checkbox"/> Yes | <input checked="" type="checkbox"/> No | <input type="checkbox"/> N/A |
| Type of monitoring (e.g., self-reporting, drive-by): | | Field Walk Down | | |
| Frequency: | Quarterly | | | |
| Responsible party/agent: | DOE Savannah River Field Office | | | |
| Contact: | K. M. Adams (Name) | Waste Area Group Manager (Title) | 09/3/07 (Date) | (803) 952-7871 (Phone No.) |
| Reporting is up-to-date: | | <input checked="" type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="checkbox"/> N/A |
| Reports are verified by the lead agency: | | <input checked="" type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="checkbox"/> N/A |
| Specific requirements in deed of decision documents have been met: | | <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input checked="" type="checkbox"/> N/A |
| Violations have been reported: | | <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input checked="" type="checkbox"/> N/A |
| Other problems or suggestions: | | <input type="checkbox"/> Report attached | | |
| <hr/> <hr/> <hr/> | | | | |
| 2. Adequacy <input checked="" type="checkbox"/> ICs are adequate <input type="checkbox"/> ICs are inadequate <input type="checkbox"/> N/A | | | | |
| Remarks <hr/> <hr/> | | | | |
| D. General | | | | |
| 1. Vandalism/trespassing <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> No vandalism evident | | | | |
| Remarks <hr/> <hr/> | | | | |
| 2. Land use changes onsite <input checked="" type="checkbox"/> N/A | | | | |
| Remarks <hr/> <hr/> | | | | |

Five-Year Review Site Inspection Checklist (Continued)

| | |
|--|---------------------------|
| 3. Land use changes offsite <input checked="" type="checkbox"/> N/A | |
| Remarks _____ | |
| VI. GENERAL SITE CONDITIONS | |
| A. Roads <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A | |
| 1. Roads damaged <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Roads adequate <input type="checkbox"/> N/A | |
| Remarks _____ | |
| B. Other site Conditions | |
| Remarks _____ | |
| VII. COVER SYSTEMS <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A | |
| A. Soil Surface | |
| 1. Settlement (Low spots) <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Settlement not evident | |
| Areal extent _____ | Depth _____ |
| Remarks _____ | |
| 2. Cracks <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Cracking not evident | |
| Lengths _____ | Widths _____ Depths _____ |
| Remarks _____ | |
| 3. Erosion <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Erosion not evident | |
| Areal extent _____ | Depth _____ |
| Remarks _____ | |
| 4. Holes <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Holes not evident | |
| Areal extent _____ | Depth _____ |
| Remarks _____ | |
| 5. Vegetative Cover <input checked="" type="checkbox"/> Grass <input type="checkbox"/> Cover properly established <input checked="" type="checkbox"/> No signs of stress | |
| <input type="checkbox"/> Trees/shrubs (indicate size and location on a diagram) | |
| Remarks _____ | |

Five-Year Review Site Inspection Checklist (Continued)

| | | |
|--|---|--------------------|
| 6. Alternative Cover (armored rock, concrete, etc.) x N/A | | |
| Remarks _____ | | |
| 7. Bulges <input type="checkbox"/> Location shown on site map x Bulges not evident | | |
| Areal extent _____ Height _____ | | |
| Remarks _____ | | |
| 8. Wet Areas/Water Damage x Wet areas/water damage not evident | | |
| <input type="checkbox"/> Wet Areas | <input type="checkbox"/> Location shown on site map | Areal extent _____ |
| <input type="checkbox"/> Ponding | <input type="checkbox"/> Location shown on site map | Areal extent _____ |
| <input type="checkbox"/> Seeps | <input type="checkbox"/> Location shown on site map | Areal extent _____ |
| <input type="checkbox"/> Soft subgrade | <input type="checkbox"/> Location shown on site map | Areal extent _____ |
| Remarks _____ | | |
| 9. Slope Instability <input type="checkbox"/> Slides <input type="checkbox"/> Location shown on site map x No evidence of slope instability | | |
| Areal extent _____ | | |
| Remarks _____ | | |
| B. Benches <input type="checkbox"/> Applicable x 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 <input type="checkbox"/> Location shown on site map <input type="checkbox"/> N/A or okay | | |
| Remarks _____ | | |
| 2. Bench Breached <input type="checkbox"/> Location shown on site map <input type="checkbox"/> N/A or okay | | |
| Remarks _____ | | |
| 3. Bench Overtopped <input type="checkbox"/> Location shown on site map <input type="checkbox"/> N/A or okay | | |
| Remarks _____ | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | |
|--|---|--|
| C. Letdown Channels <input type="checkbox"/> Applicable x 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 <input type="checkbox"/> Location shown on site map <input type="checkbox"/> No evidence of settlement Areal extent _____ Depth _____ Remarks _____ _____ | |
| 2. | Material Degradation <input type="checkbox"/> Location shown on site map <input type="checkbox"/> No evidence of degradation Material type _____ Areal extent _____ Remarks _____ _____ | |
| 3. | Erosion <input type="checkbox"/> Location shown on site map <input type="checkbox"/> No evidence of erosion Areal extent _____ Depth _____ Remarks _____ _____ | |
| 4. | Undercutting <input type="checkbox"/> Location shown on site map <input type="checkbox"/> No evidence of undercutting Areal extent _____ Depth _____ Remarks _____ _____ | |
| 5. | Obstructions Type _____ <input type="checkbox"/> No obstructions <input type="checkbox"/> Location shown on site map Areal extent _____ Size _____ Remarks _____ _____ | |
| 6. | Excessive Vegetative Growth Type _____ <input type="checkbox"/> No evidence of excessive growth <input type="checkbox"/> Vegetation in channels does not obstruct flow <input type="checkbox"/> Location shown on site map Areal extent _____ Remarks _____ _____ | |

Five-Year Review Site Inspection Checklist (Continued)

| | | | |
|--|--|---|---|
| D. Cover Penetrations <input type="checkbox"/> Applicable x N/A | | | |
| 1. Gas Vents <input type="checkbox"/> Active <input type="checkbox"/> Passive | | | |
| <input type="checkbox"/> Properly secured/locked | <input type="checkbox"/> Functioning | <input type="checkbox"/> Routinely sampled | <input type="checkbox"/> Good condition |
| <input type="checkbox"/> Evidence of leakage at penetration | <input type="checkbox"/> Needs Maintenance | <input type="checkbox"/> N/A | |
| Remarks _____ | | | |
| | | | |
| 2. Gas Monitoring Probes | | | |
| <input type="checkbox"/> Properly secured/locked | <input type="checkbox"/> Functioning | <input type="checkbox"/> Routinely sampled | <input type="checkbox"/> Good condition |
| <input type="checkbox"/> Evidence of leakage at penetration | <input type="checkbox"/> Needs Maintenance | <input type="checkbox"/> N/A | |
| Remarks _____ | | | |
| | | | |
| 3. Monitoring Wells | | | |
| <input type="checkbox"/> Properly secured/locked | <input type="checkbox"/> Functioning | <input type="checkbox"/> Routinely sampled | <input type="checkbox"/> Good condition |
| <input type="checkbox"/> Evidence of leakage at penetration | <input type="checkbox"/> Needs Maintenance | <input type="checkbox"/> N/A | |
| Remarks _____ | | | |
| | | | |
| 4. Leachate Extraction Wells | | | |
| <input type="checkbox"/> Properly secured/locked | <input type="checkbox"/> Functioning | <input type="checkbox"/> Routinely sampled | <input type="checkbox"/> Good condition |
| <input type="checkbox"/> Evidence of leakage at penetration | <input type="checkbox"/> Needs Maintenance | <input type="checkbox"/> N/A | |
| Remarks _____ | | | |
| | | | |
| 5. Settlement Monuments <input type="checkbox"/> Located <input type="checkbox"/> Routinely surveyed <input type="checkbox"/> N/A | | | |
| Remarks _____ | | | |
| | | | |
| E. Gas Collection and Treatment <input type="checkbox"/> Applicable x N/A | | | |
| 1. Gas Treatment Facilities | | | |
| <input type="checkbox"/> Flaring | <input type="checkbox"/> Thermal destruction | <input type="checkbox"/> Collection for reuse | |
| <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance | | |
| Remarks _____ | | | |
| | | | |
| 2. Gas Collection Wells, Manifolds and Piping | | | |
| <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance | | |
| Remarks _____ | | | |
| | | | |

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Five-Year Review Site Inspection Checklist (Continued)

| | | | |
|---|--|--|---|
| 3. Gas Monitoring Facilities (e.g., gas monitoring of adjacent homes or buildings) | | | |
| <input type="checkbox"/> Good condition | | <input type="checkbox"/> Needs Maintenance | <input type="checkbox"/> N/A |
| Remarks _____ _____ | | | |
| F. Cover Drainage Layer | | | |
| | | <input type="checkbox"/> Applicable | <input checked="" type="checkbox"/> N/A |
| 1. Outlet Pipes Inspected | | | |
| <input type="checkbox"/> Functioning | | <input type="checkbox"/> N/A | |
| Remarks _____ _____ | | | |
| 2. Outlet Rock Inspected | | | |
| <input type="checkbox"/> Functioning | | <input type="checkbox"/> N/A | |
| Remarks _____ _____ | | | |
| G. Detention/sedimentation Ponds | | | |
| | | <input type="checkbox"/> Applicable | <input checked="" type="checkbox"/> N/A |
| 1. Siltation | | | |
| Areal extent _____ | | Depth _____ | <input type="checkbox"/> N/A |
| <input type="checkbox"/> Siltation not evident | | | |
| Remarks _____ _____ | | | |
| 2. Erosion | | | |
| Areal extent _____ | | Depth _____ | <input type="checkbox"/> N/A |
| <input type="checkbox"/> Erosion not evident | | | |
| Remarks _____ _____ | | | |
| 3. Outlet Works | | | |
| <input type="checkbox"/> Functioning | | <input type="checkbox"/> N/A | |
| Remarks _____ _____ | | | |
| 4. Dam | | | |
| <input type="checkbox"/> Functioning | | <input type="checkbox"/> N/A | |
| Remarks _____ _____ | | | |
| H. Retaining Walls | | | |
| | | <input type="checkbox"/> Applicable | <input checked="" type="checkbox"/> N/A |
| 1. Deformations | | | |
| <input type="checkbox"/> Location shown on site map | | <input type="checkbox"/> Deformation not evident | |
| Horizontal displacement _____ | | Vertical displacement _____ | |
| Rotational displacement _____ | | | |
| Remarks _____ _____ | | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | |
|--|---|--|
| 2. Degradation | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> Deformation not evident |
| Remarks _____ | | |
| I. Perimeter Ditches/Off-Site Discharge x Applicable <input type="checkbox"/> N/A | | |
| 1. Siltation | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> Siltation not evident |
| Areal extent _____ Depth _____ | | |
| Remarks _____ | | |
| 2. Vegetative Growth | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> Siltation not evident |
| <input type="checkbox"/> Vegetation does not impede flow | | |
| Areal extent _____ Type _____ | | |
| Remarks _____ | | |
| 3. Erosion | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> Erosion not evident |
| Areal extent _____ Depth _____ | | |
| Remarks _____ | | |
| 4. Discharge Structure | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> N/A |
| Remarks: <u>A discharge structure is located approximately 75 feet to the southwest of PBRP. Discharge structure is generally dry.</u> | | |
| VIII. VERTICAL BARRIER WALLS <input type="checkbox"/> Applicable x N/A | | |
| 1. Settlement | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> Settlement not evident |
| Areal extent _____ Depth _____ | | |
| Remarks _____ | | |
| 2. Performance Monitoring | Type of Monitoring _____ | <input type="checkbox"/> Performance not monitored |
| Frequency _____ <input type="checkbox"/> Evidence of breaching Head differential _____ | | |
| Remarks _____ | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | | |
|---|--|--|---|
| IX. GROUNDWATER/SURFACE WATER REMEDIES | | <input checked="" type="checkbox"/> Applicable | <input type="checkbox"/> N/A |
| A. Groundwater Extraction Wells, Pumps, and Pipelines | | <input type="checkbox"/> Applicable | <input checked="" type="checkbox"/> N/A |
| 1. Pumps, Wellhead Plumbing, and Electrical <input type="checkbox"/> Good condition <input type="checkbox"/> All required wells located <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A Remarks _____ _____ | | | |
| 2. Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____ _____ | | | |
| 3. Spare Parts and Equipment <input type="checkbox"/> Readily available <input type="checkbox"/> Good condition <input type="checkbox"/> Requires upgrade <input type="checkbox"/> Needs to be provided Remarks _____ _____ | | | |
| B. Surface Water Collection Structures, Pumps, and Pipelines | | <input type="checkbox"/> Applicable | <input checked="" type="checkbox"/> N/A |
| 1. Collection Structures, Pumps, and Electrical <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____ _____ | | | |
| 2. Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____ _____ | | | |
| 3. Spare Parts and Equipment <input type="checkbox"/> Readily available <input type="checkbox"/> Good condition <input type="checkbox"/> Requires upgrade <input type="checkbox"/> Needs to be provided Remarks _____ _____ | | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | | |
|---|--|---|--|
| C. Treatment System | <input type="checkbox"/> Applicable | <input checked="" type="checkbox"/> N/A | |
| 1. Treatment Train (Check components that apply) | | | |
| <input type="checkbox"/> Metals removal | <input type="checkbox"/> Oil/water separation | <input type="checkbox"/> Bioremediation | |
| <input type="checkbox"/> Air stripping | <input type="checkbox"/> Carbon adsorbers | | |
| <input type="checkbox"/> Filters _____ | | | |
| <input type="checkbox"/> Additive (e.g., chelation agent, flocculent) _____ | | | |
| <input type="checkbox"/> Others _____ | | | |
| <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance | | |
| <input type="checkbox"/> Sampling ports properly marked and functional | | | |
| <input type="checkbox"/> Sampling/maintenance log displayed and up to date | | | |
| <input type="checkbox"/> Equipment properly identified | | | |
| <input type="checkbox"/> Quantity of groundwater treated annually _____ | | | |
| <input type="checkbox"/> Quantity of surface water treated annually _____ | | | |
| Remarks _____ | | | |
| _____ | | | |
| 2. Electrical Enclosures and Panels (properly rated and functional) | | | |
| <input type="checkbox"/> N/A | <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance | |
| Remarks _____ | | | |
| _____ | | | |
| 3. Tanks, Vaults, Storage Vessels | | | |
| <input type="checkbox"/> N/A | <input type="checkbox"/> Good condition | <input type="checkbox"/> Proper secondary containment | <input type="checkbox"/> Needs Maintenance |
| Remarks _____ | | | |
| _____ | | | |
| 4. Discharge Structure and Appurtenances | | | |
| <input type="checkbox"/> N/A | <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance | |
| Remarks _____ | | | |
| _____ | | | |
| 5. Treatment Building(s) | | | |
| <input type="checkbox"/> N/A | <input type="checkbox"/> Good condition (esp. roof and doorways) | <input type="checkbox"/> Needs repair | |
| <input type="checkbox"/> Chemicals and equipment properly stored | | | |
| Remarks _____ | | | |
| _____ | | | |

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Five-Year Review Site Inspection Checklist (Continued)

| | | | |
|--|---|---|---|
| 6. Monitoring Wells | | | |
| <input type="checkbox"/> Properly secured/locked | <input type="checkbox"/> Functioning | <input type="checkbox"/> Routinely sampled | <input type="checkbox"/> Good condition |
| <input type="checkbox"/> All required wells located | <input type="checkbox"/> Needs Maintenance | <input type="checkbox"/> N/A | |
| Remarks: _____ | | | |
| D. Monitoring Data <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A | | | |
| 1. Monitoring Data | | | |
| <input checked="" type="checkbox"/> Is routinely submitted on time | | <input checked="" type="checkbox"/> Is of acceptable quality | |
| 2 Monitoring data suggests: | | | |
| <input checked="" type="checkbox"/> Groundwater plume is effectively contained | | <input type="checkbox"/> Contaminant concentrations are declining | |
| E. Monitored Natural Attenuation <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A | | | |
| 1. Monitoring Wells (Natural attenuation remedy) | | | |
| <input type="checkbox"/> Properly secured/locked | <input type="checkbox"/> Functioning | <input type="checkbox"/> Routinely sampled | <input type="checkbox"/> Good condition |
| <input type="checkbox"/> All required wells located | <input type="checkbox"/> Needs Maintenance | <input type="checkbox"/> 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. | | | |
| SOIL VAPOR EXTRACTION REMEDIES | | <input checked="" type="checkbox"/> Applicable | <input type="checkbox"/> N/A |
| A. Groundwater Extraction Wells, Pumps, and Pipelines | | <input checked="" type="checkbox"/> Applicable | <input type="checkbox"/> N/A |
| 1. Pumps, Wellhead Plumbing, and Electrical | | | |
| <input checked="" type="checkbox"/> Good condition | <input type="checkbox"/> All required wells located | <input type="checkbox"/> Needs Maintenance | <input type="checkbox"/> N/A |
| Remarks: <u>Soil Vapor Extraction System via Baroballs™</u> | | | |
| 2. Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances | | | |
| <input checked="" type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance | | |
| Remarks: _____ | | | |
| 3. Spare Parts and Equipment | | | |
| <input checked="" type="checkbox"/> Readily available | <input type="checkbox"/> Good condition | <input type="checkbox"/> Requires upgrade | <input type="checkbox"/> Needs to be provided |
| Remarks: _____ | | | |

Five-Year Review Site Inspection Checklist (Continued)

| XI. OVERALL OBSERVATIONS |
|--|
| A. Implementation of the Remedy |
| <p>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.).</p> <p>The PBRP consists of two subunits that warrant remediation: PBRP and groundwater. The remedy for the PBRP is Engineered Cover System with BaroBalls™, Natural Biodegradation, and Institutional Controls. The selected remedy for groundwater is Continued Monitoring and Reporting to verify that a discernable plume above maximum contaminant levels (MCLs) does not develop.</p> <p>The remedy, engineered cover system, is functioning as designed as indicated by the post construction well sampling data that show no change in groundwater concentrations. The soil cover and institutional controls are providing access controls.</p> |
| B. Adequacy of O & M |
| <p>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.</p> <p>_____</p> <p>_____</p> <p>_____</p> |
| C. Early Indicators of Potential Remedy Failure |
| <p>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.</p> <p>N/A</p> <p>_____</p> <p>_____</p> <p>_____</p> |
| D. Opportunities for Optimization |
| <p>Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy.</p> <p>N/A</p> <p>_____</p> <p>_____</p> <p>_____</p> |

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P-AREA REACTOR SEEPAGE BASINS (904-61G, 904-62G, 904-63G) OPERABLE UNIT

I. Introduction

This is the first five-year review for the P-Area Reactor Seepage Basins (PRSB) (904-61G, 904-62G, and 904-63G) Operable Unit (OU). This review was conducted from August 2007 through September 2007. This report documents the results of the review.

II. OU Chronology

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

Table 1. Chronology of OU Events

| Event | Date |
|--|---------------------------------|
| Plug-in Record of Decision (ROD) | November 29, 1999 |
| Explanation of Significant Difference (ESD) Issuance | September 24, 2003 |
| Remedial Action Start/Complete | June 30, 2004/November 15, 2005 |
| Previous Five-Year Reviews | None |

III. Background

Physical Characteristics

The PRSB OU is located in the central portion of Savannah River Site (SRS) west of P Area (Figure 1). The basins are in an open area with vegetative cover, which was planted as a part of the low permeability geosynthetic closure cover. The ground slopes southwestward toward Steel Creek, approximately 2,500 ft to SRS west. The PRSBs are located in an industrial zone identified in the proposed SRS future land use map of the SRS Federal Facility Agreement (FFA) Implementation Plan. The basins are adjacent to a nuclear facility and have been selected to remain an industrial use area. See Figure 2 for a plan view of the basins.

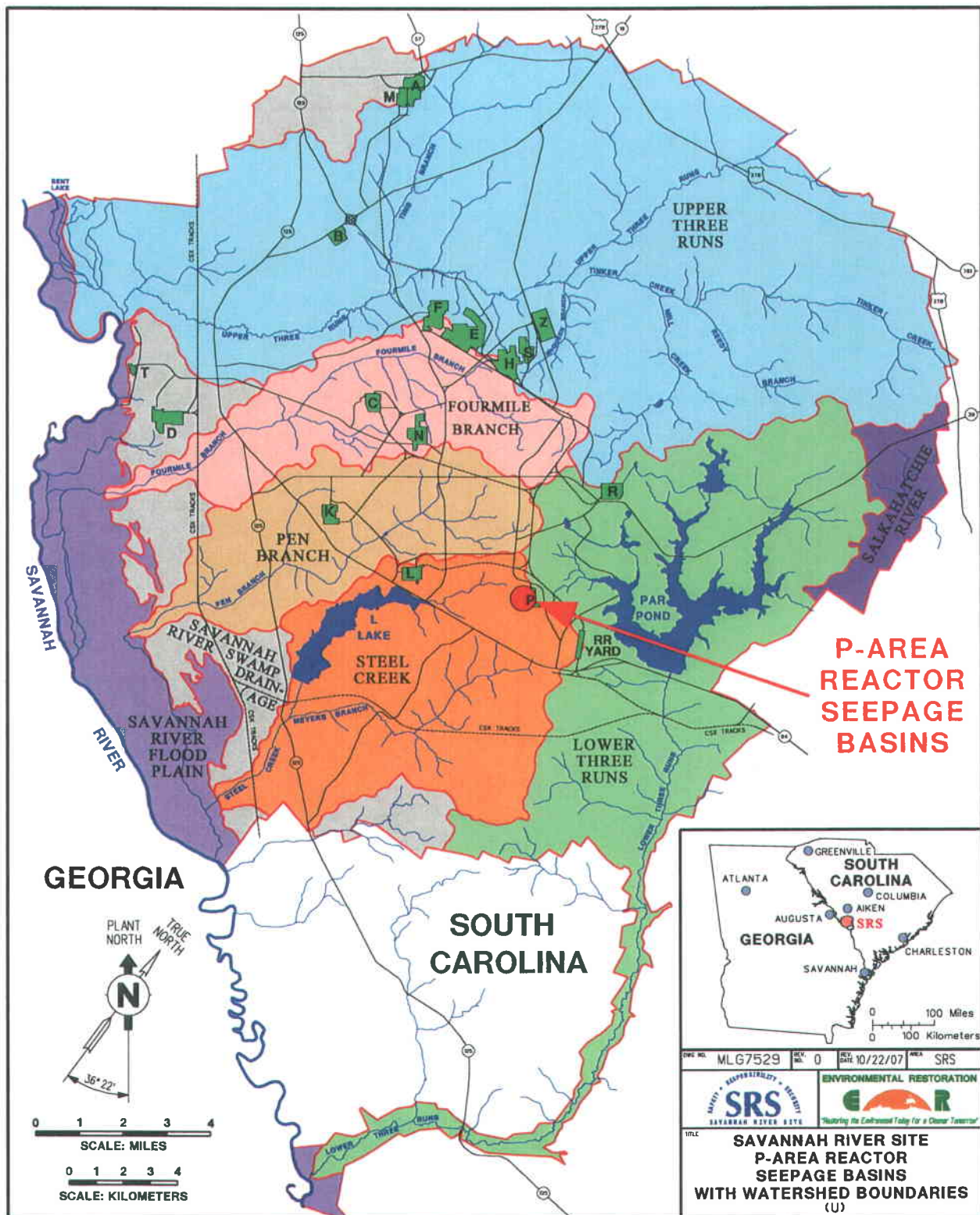


Figure 1. P-Area Reactor Seepage Basins

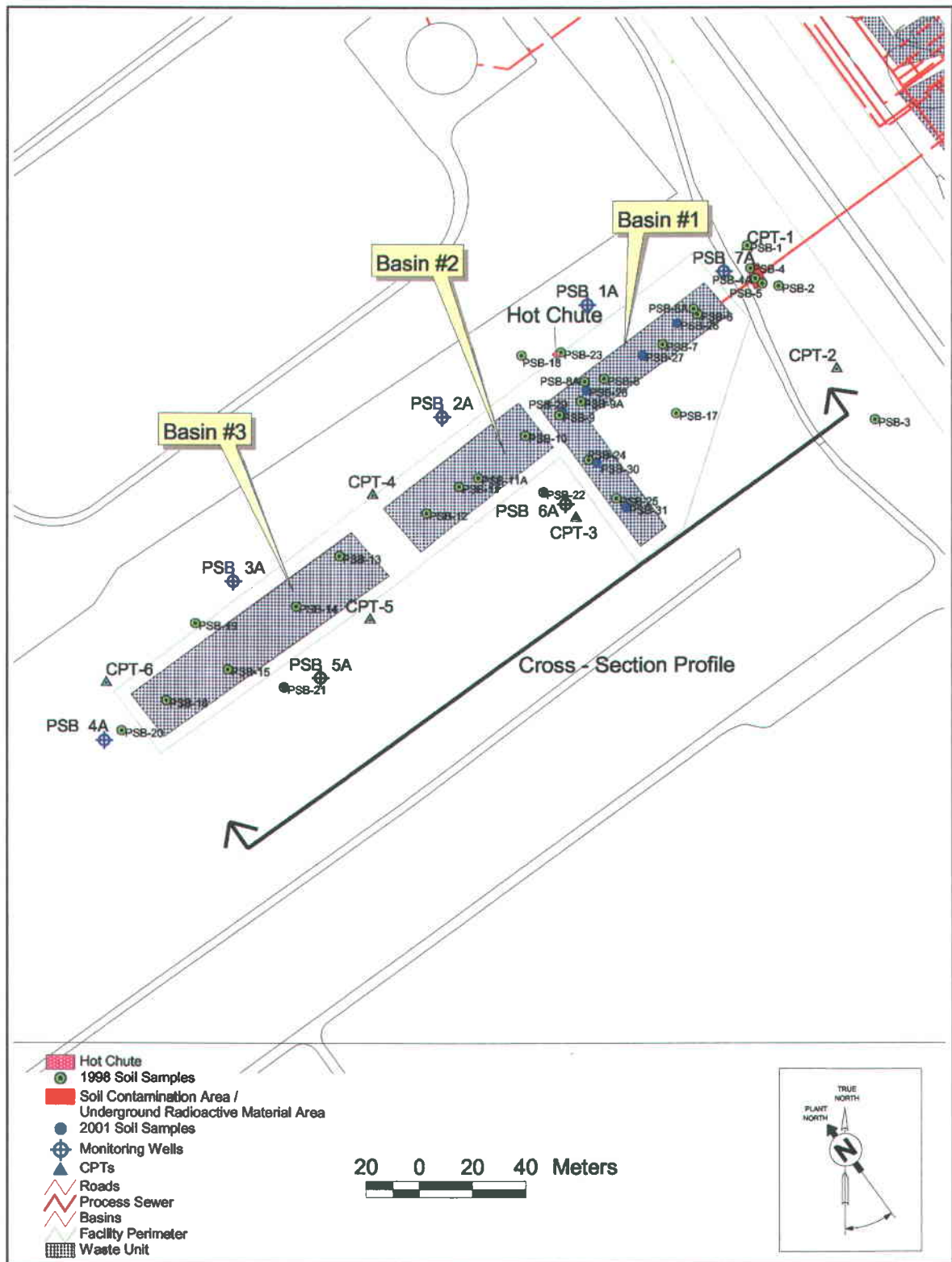


Figure 2. Plan View of P-Area Reactor Seepage Basins

Three unlined (earthen) basins constructed in 1957 comprise the PRSB OU. Basin #1 is L-shaped and was constructed with approximate outside dimensions of 211 x 50 ft in the north-south direction and 254 x 50 ft in the east-west direction, at a depth of 13 to 17 ft below land surface (bls). Basin #2 was constructed with approximate outside dimensions of 211 x 70 ft at a depth of 8 ft bls. Basin #3 was constructed with approximate outside dimensions of 340 x 70 ft at a depth of 9 ft bls.

Two inactive process sewer lines (IPSLs) extend from the disassembly basin within P Reactor to the eastern end of Basin 1. These IPSLs existed to feed the seepage basin. One is of high density polyethylene (HDPE) while the other is carbon steel. Both IPSLs are 3 inches in diameter, approximately 660 ft in length, with one having been constructed of HDPE and the other constructed of carbon steel. From 1957 until 1970 and from 1978 until 1991, the process sewer lines conveyed low-level radioactive purge water from the P-Area Reactor Disassembly Basin to the seepage basins. Historical records indicate that the original IPSL leaked in an area east of Basin 1, contaminating the soils in a 15 by 30 ft (450 ft²) area. A second line was installed as a replacement and, the contaminated soils at the original leak site were not removed during this installation. This area is posted was an Underground Radioactive Material Area (URMA) and a Soil Contamination Area (SCA).

Cascade overflow pipes connect Basin #1 to Basin #2 and Basin #2 to Basin #3. The cascade overflow pipes are 12 inches in diameter and are made of corrugated steel. Flow between the basins was via the cascade overflow pipes positioned near the top of the basin walls.

Land and Resource Use

The PRSB OU is located in an industrial area. The future land use for PRSB OU is anticipated to remain industrial.

History of Contamination

The seepage basins were used from 1957 to 1970 to dispose of low-level radioactive process purge water from the reactor disassembly basin. In 1963, disassembly basin wastewater was deionized and filtered prior to discharge, which reduced radioactivity and removed solids and sludges. The seepage basins were not used from 1971 to 1977 and the disassembly basin purge water was mixed with large volumes of heat exchanger cooling water and discharged to area streams. General maintenance was performed on the disassembly basin, and purge water discharges to the seepage basins resumed in 1978. The seepage basins did not receive wastewater after the P-Reactor was shut down for repairs in 1991.

Waste disposal records indicate that the main basin (Basin #1) received aqueous radioactive waste. Radionuclides in the wastewater from the disassembly basin, sumps, tanks, and drums included tritium, chromium-51, cobalt-60, cesium-134, cesium-137, and other beta-gamma (b/g) fission products. The records show most of the radioactivity in reactor seepage basin discharge water was due to tritium, cesium-137, cobalt-60, and strontium-90. During the entire operation of the PRSBs, it is estimated that 70,000 curies (Ci) of tritium, 4.74 Ci of strontium-90, 19.5 Ci of cesium-137, and 0.835 Ci of other b/g emitters were released to the PRSBs.

The groundwater has been identified as a separate OU and is, therefore, considered outside the scope of the PRSB remedial action. It is addressed in a separate ROD for the P-Area Reactor Groundwater OU.

Initial Response

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 principal threat source material (PTSM) was selected as the common remedy in the Plug-In ROD approved in October 1999. The plug-in ROD process streamlines the normal CERCLA documentation process for units that are similar and meet criteria defined in the Plug-In ROD. In lieu of an RFI/RI/BRA, a Technical Evaluation Report (TER) is prepared that uses characterization data to verify that the plug-in unit meets the Plug-In ROD criteria. In lieu of Proposed Plan and ROD documents, an Explanation of Significant Difference (ESD) document is submitted. The approved ESD is the document that amends the approved Plug-In ROD to include the individual plug-in unit – in this case, the PRSB. An ESD to apply the Plug-In ROD remedy at the PRSB OU was approved in March 2003.

IV. Remedial Actions

Remedy Selection

Because the PRSB OU meets all Plug-In criteria, the Plug-In remedy of in situ stabilization with a low permeability membrane cover system was used at the PRSBs. The remedy consists of five components:

- ***Institutional controls*** consist of near- and long-term actions. These actions are consistent with industrial land use and the PRSB Land Use Control Implementation Plan (LUCIP). For the near term, signs and existing SRS access controls are used to prevent disturbance of the geosynthetic closure cover. In the long term, if the property is ever transferred to nonfederal ownership, the United States Government will take those actions necessary pursuant to Section 120(h) of Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), which will likely include deed restrictions precluding residential use or excavation within the boundaries of the unit.
- ***Consolidation*** of contaminated soil in the SCA/URMA area and any contaminated soils encountered during removal of the IPSLs were excavated and placed in Basin #1 and Basin #2 for inclusion in the stabilization/solidification (S/S) treatment.

- *The IPSLs* were grouted, excavated, and placed in Basin #1 to stabilize any potential contamination left inside the process pipelines and to prevent access by small animals.
- *Solidification/Stabilization (S/S)* of Basin #1 and Basin #2 was accomplished via grouting. The S/S component of the remedy was not applicable to Basin #3 since PTSM level contamination was not detected in that basin. Mixing of the soils and the necessary chemical additives was performed with a pug mill. Basin #1 soils were grouted to a depth of 10 ft at the eastern end of the basin, with the grout decreasing to 2 ft at the southern leg of the basin. Operational difficulties made grouting beyond a depth of 10 ft impracticable. The untreated PTSM, which extends to a depth of 19 ft, resides in a low permeability clay that retards contaminant mobility. The geosynthetic closure cover system and the S/S grouted soils above the untreated PTSM will prevent access and exposure to the untreated PTSM. Basin #2 soils were grouted to a depth of 4 ft below the basin bottom. The remedial action as described by the ESD did not include grouting Basin #3 since no PTSM was present.
- A *low-permeability geosynthetic closure cover* was placed over all three of the PRSBs to prevent human exposure to the contaminated basin soils and to reduce water infiltration. The low permeability geosynthetic closure cover system over the PRSBs has a lower permeability than the surrounding soils. To protect potential receptors, the minimum cover thickness from the waste is at least 6 ft as measured through the low permeability geosynthetic closure cover.

Remedy Implementation

In situ stabilization with a low permeability synthetic membrane cover system is the final action for the source term for each OU. This action meets the following remedial action objectives (RAOs):

- Prevent human exposure to highly 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 ft) outside the basin by establishing 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 MCLs or risk-based concentrations (when MCLs are not available). The soil RGs are back calculated based on these values. The groundwater is not part of this unit and will be addressed in the P-Area Reactor Groundwater OU.
- Protect the ecological receptors indigenous to the area by preventing or limiting contact with contaminated basin soils and pipelines, and preventing the plant and animals from bringing contaminants up towards the surface.

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
- Inspected unit to confirm protectiveness of the selected remedial action.

VII. Technical Assessment

The conclusions for this review are as follows:

- The remedy is functioning as intended by the decision documents because stabilization is treating the PTSM, and the low permeability synthetic closure cover system with institutional controls is providing access controls.
- The IPSLs were completely grouted, excavated, and placed in Basin #1 for S/S treatment, immobilizing any contamination and preventing access by small animals.
- No other information has come to light that could call into question the protectiveness of the remedy.
- The low permeability synthetic cover was successfully placed over the basins and is reducing infiltration through the stabilized soil, preventing contaminant migration to groundwater and exposure of human and ecological receptors to radionuclides in the basin soils.
- In-situ S/S treatment of PRSB-contaminated PTSM wastes in Basins #1 and #2 prevents exposure to the PTSM by converting the waste into a form less susceptible to uptake by receptors. Application of this remedy stabilizes PTSM from Basins #1 and #2 to the extent practicable. No PTSM was present in Basin #3.

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. Project Costs

Costs associated with the selected remedy for PRSB include operation and maintenance costs of the soil cover and institutional controls. The estimated operation and maintenance cost associated with the selected remedy is \$596,000, which was discounted

at 3.9% per year. This is a present worth cost, including 30 years of maintenance activities. This estimate is an order-of-magnitude engineering cost estimate that is expected to be within +50 to -30 percent of the actual project cost. The remedy was under construction in fiscal year 2006; therefore, the actual operation and maintenance cost for the PRSB cannot be assessed at this time.

XI. Protectiveness Statement(s)

The implemented remedy provides protection to human health, ecological receptors, and the environment at the PRSB OU. The in-situ remedy satisfies the RAOs by preventing human exposure to highly contaminated soils, preventing the release of COCs in the soil to groundwater beneath the unit, and protecting the ecological receptors indigenous to the area. The low permeability synthetic membrane cover system applied to Basins #1 and #2 reduces infiltration and also prevents human and ecological exposure to the contaminated basin soils.

XII. Next Review

The next five-year review is scheduled for February 12, 2014.

ATTACHMENT 1

List of Documents Reviewed

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

WSRC-RP-2002-4082, *Unit-Specific Plug-In Technical Evaluation Report for the P-Area Reactor Seepage Basin (904-61G, 904-62G, and 904-63G) Operable Unit (U)*, Revision 1.1, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

WSRC-RP-2002-4105, *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- P-Area Reactor Seepage Basin Operable Unit (U)*, Revision 1.1, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

WSRC-RP-2005-4088, *Post-Construction Report (PCR)/Final Remediation Report (FRR) for the P-Reactor Seepage Basins (U)*, Revision 1, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

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ATTACHMENT 2

Five-Year Review Site Inspection Checklist for PRSB

| I. SITE INFORMATION | | | | | | | | | | | | | | | |
|---|--|------------------------------------|---|--|--|---|--|--|---|---|--|---|--|--|--|
| Site Name: | P-Area Reactor Seepage Basin Operable Unit (OU) | Date of Inspection: | 9/24/2007 | | | | | | | | | | | | |
| Location and Region: | SRS, USEPA Region IV | EPA ID: | SC1890008989 | | | | | | | | | | | | |
| Agency, office, or company leading the five-year review: | United States Department of Energy | CERCLIS OU No.: | 66 | | | | | | | | | | | | |
| | | Weather/Temperature: | Clear and Sunny, 90°F | | | | | | | | | | | | |
| Remedy Includes: (Check all that apply) <table><tbody><tr><td><input checked="" type="checkbox"/> Cover system</td><td><input type="checkbox"/> Monitored Natural Attenuation</td></tr><tr><td><input checked="" type="checkbox"/> Access controls</td><td><input type="checkbox"/> Groundwater Containment</td></tr><tr><td><input checked="" type="checkbox"/> Institutional Controls</td><td><input type="checkbox"/> Vertical Barrier Walls</td></tr><tr><td><input type="checkbox"/> Groundwater pump and treatment</td><td></td></tr><tr><td><input type="checkbox"/> Surface water collection and treatment</td><td></td></tr><tr><td colspan="2"><input checked="" type="checkbox"/> Other: <u>In Situ Stabilization; consolidation; grouting</u></td></tr></tbody></table> | | | | <input checked="" type="checkbox"/> Cover system | <input type="checkbox"/> Monitored Natural Attenuation | <input checked="" type="checkbox"/> Access controls | <input type="checkbox"/> Groundwater Containment | <input checked="" type="checkbox"/> Institutional Controls | <input type="checkbox"/> Vertical Barrier Walls | <input type="checkbox"/> Groundwater pump and treatment | | <input type="checkbox"/> Surface water collection and treatment | | <input checked="" type="checkbox"/> Other: <u>In Situ Stabilization; consolidation; grouting</u> | |
| <input checked="" type="checkbox"/> Cover system | <input type="checkbox"/> Monitored Natural Attenuation | | | | | | | | | | | | | | |
| <input checked="" type="checkbox"/> Access controls | <input type="checkbox"/> Groundwater Containment | | | | | | | | | | | | | | |
| <input checked="" type="checkbox"/> Institutional Controls | <input type="checkbox"/> Vertical Barrier Walls | | | | | | | | | | | | | | |
| <input type="checkbox"/> Groundwater pump and treatment | | | | | | | | | | | | | | | |
| <input type="checkbox"/> Surface water collection and treatment | | | | | | | | | | | | | | | |
| <input checked="" type="checkbox"/> Other: <u>In Situ Stabilization; consolidation; grouting</u> | | | | | | | | | | | | | | | |
| Attachments: <input type="checkbox"/> Inspection team roster attached <input type="checkbox"/> Site map attached | | | | | | | | | | | | | | | |
| II. INTERVIEWS (Check all that apply) | | | | | | | | | | | | | | | |
| 1. O & M Site Manager | | | | | | | | | | | | | | | |
| | _____ (Name) | _____ (Title) | _____ (Date) | | | | | | | | | | | | |
| Interviewed: | <input type="checkbox"/> at site | <input type="checkbox"/> at office | <input type="checkbox"/> by phone Phone No. _____ | | | | | | | | | | | | |
| Problems, suggestions: | <input type="checkbox"/> report attached _____ | | | | | | | | | | | | | | |
| 2. O & M Staff | | | | | | | | | | | | | | | |
| | _____ (Name) | _____ (Title) | _____ (Date) | | | | | | | | | | | | |
| Interviewed: | <input type="checkbox"/> at site | <input type="checkbox"/> at office | <input type="checkbox"/> by phone Phone No. _____ | | | | | | | | | | | | |
| Problems, suggestions: | <input type="checkbox"/> report attached _____ | | | | | | | | | | | | | | |

Third Five-Year Remedy Review Report (U)
P-Area Reactor Seepage Basins OU
Savannah River Site, December 2008

WSRC-RP-2007-4063

Rev. 1.1

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Five-Year Review Site Inspection Checklist (Continued)

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

| | | | |
|---|--|-------------------------------------|------------------------------|
| <input type="checkbox"/> O & M Manual | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |
| x As-built drawings | x Readily available | x Up to date | <input type="checkbox"/> N/A |
| <input type="checkbox"/> Maintenance Logs | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |

Remarks: See Waste Unit Inspection and Maintenance, ER-SOP-019

Five-Year Review Site Inspection Checklist (Continued)

| | | | |
|--|--|-------------------------------------|-------|
| 2. Site-Specific Health and Safety Plan | | | |
| <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A | |
| <input type="checkbox"/> Contingency plan/emergency response plan | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |
| Remarks: <u>Routine O&M activities do not require an SSHASP under 29 CFR 1910.1201, HAZWOPER</u> | | | |
| 3. O & M and OSHA Training Records | | | |
| x Readily available | x Up to date | <input type="checkbox"/> N/A | |
| Remarks _____ | | | |
| 4. Permits and Service Agreements | | | |
| <input type="checkbox"/> Air discharge permit | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |
| <input type="checkbox"/> Effluent discharge | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |
| <input type="checkbox"/> Waste Disposal, POTW | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |
| <input type="checkbox"/> Other permits | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |
| Remarks _____ | | | |
| 5. Gas Generation Records | | | |
| <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A | |
| Remarks _____ | | | |
| 6. Settlement Monument Records | | | |
| <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A | |
| Remarks _____ | | | |
| 7. Groundwater Monitoring Records | | | |
| <input type="checkbox"/> Readily available | <input checked="" type="checkbox"/> Up to date | x N/A | |
| Remarks _____ | | | |
| 8. Leachate Extraction Records | | | |
| <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A | |
| Remarks _____ | | | |
| 9. Discharge Compliance Records | | | |
| <input type="checkbox"/> Air | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |
| <input type="checkbox"/> Water (effluent) | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |
| Remarks _____ | | | |
| 10. Daily Access/Security Logs | | | |
| <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A | |
| Remarks _____ | | | |

Five-Year Review Site Inspection Checklist (Continued)

IV. O & M Costs

1. O & M Organization

- ☐ State in-house ☐ Contractor for State
☐ PRP in-house ☐ Contractor for PRP
 x Other: SRS

2. O & M Cost Records

- ☐ Readily available ☐ Up to date ☐ Funding mechanism/agreement in place

x Other: Project cost data is summarized in Section X of attached review: WSRC-RP-2007-4063

Total annual cost by year for review period if available

| | | | |
|------------|----------|------------|---|
| From _____ | To _____ | | <input type="checkbox"/> Breakdown attached |
| (Date) | (Date) | Total cost | |
| From _____ | To _____ | | <input type="checkbox"/> Breakdown attached |
| (Date) | (Date) | Total cost | |
| From _____ | To _____ | | <input type="checkbox"/> Breakdown attached |
| (Date) | (Date) | Total cost | |
| From _____ | To _____ | | <input type="checkbox"/> Breakdown attached |
| (Date) | (Date) | Total cost | |
| From _____ | To _____ | | <input type="checkbox"/> Breakdown attached |
| (Date) | (Date) | Total cost | |

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

Describe costs and reasons: _____

V. ACCESS AND INSTITUTIONAL CONTROLS

x Applicable ☐ N/A

A. Fencing

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

Remarks _____

Five-Year Review Site Inspection Checklist (Continued)

| | | | | | |
|---|---------------------------------|--------------------------|--|--|---|
| B. Other Access Restrictions | | | | | |
| 1. Signs and other security measures <input type="checkbox"/> Location shown on site map <input type="checkbox"/> N/A | | | | | |
| Remarks: Signs at this site are in good condition. | | | | | |
| C. Institutional Controls | | | | | |
| 1. Implementation and enforcement | | | | | |
| Site conditions imply ICs not properly implemented: | | | <input type="checkbox"/> Yes | <input checked="" type="checkbox"/> No | <input type="checkbox"/> N/A |
| Site conditions imply ICs not being fully enforced: | | | <input type="checkbox"/> Yes | <input checked="" type="checkbox"/> No | <input type="checkbox"/> N/A |
| Type of monitoring (e.g., self-reporting, drive-by): | | | Field Walk Down | | |
| Frequency: | Semi-Annually | | | | |
| Responsible party/agent: | DOE Savannah River Field Office | | | | |
| Contact: | K. M. Adams | Waste Area Group Manager | 09/3/07 | (803) 952-7871 | |
| | (Name) | (Title) | (Date) | (Phone No.) | |
| Reporting is up-to-date: | | | <input checked="" type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="checkbox"/> N/A |
| Reports are verified by the lead agency: | | | <input checked="" type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="checkbox"/> N/A |
| Specific requirements in deed of decision documents have been met: | | | <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input checked="" type="checkbox"/> N/A |
| Violations have been reported: | | | <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input checked="" type="checkbox"/> N/A |
| Other problems or suggestions: | | | <input type="checkbox"/> Report attached | | |
| | | | | | |
| | | | | | |
| | | | | | |
| 2. Adequacy <input checked="" type="checkbox"/> ICs are adequate <input type="checkbox"/> ICs are inadequate <input type="checkbox"/> N/A | | | | | |
| Remarks | | | | | |
| | | | | | |
| D. General | | | | | |
| 1. Vandalism/trespassing <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> No vandalism evident | | | | | |
| Remarks | | | | | |
| | | | | | |
| 2. Land use changes onsite <input checked="" type="checkbox"/> N/A | | | | | |
| Remarks | | | | | |
| | | | | | |

Five-Year Review Site Inspection Checklist (Continued)

| | |
|--|---------------------------|
| 3. Land use changes offsite <input checked="" type="checkbox"/> N/A | |
| Remarks _____ | |
| | |
| VI. GENERAL SITE CONDITIONS | |
| A. Roads <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A | |
| 1. Roads damaged <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Roads adequate <input type="checkbox"/> N/A | |
| Remarks _____ | |
| | |
| B. Other site Conditions | |
| Remarks _____ | |
| | |
| | |
| VII. COVER SYSTEMS <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A | |
| A. Soil Surface | |
| 1. Settlement (Low spots) <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Settlement not evident | |
| Areal extent _____ | Depth _____ |
| Remarks _____ | |
| | |
| 2. Cracks <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Cracking not evident | |
| Lengths _____ | Widths _____ Depths _____ |
| Remarks _____ | |
| | |
| 3. Erosion <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Erosion not evident | |
| Areal extent _____ | Depth _____ |
| Remarks _____ | |
| | |
| 4. Holes <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Holes not evident | |
| Areal extent _____ | Depth _____ |
| Remarks _____ | |
| | |
| 5. Vegetative Cover <input checked="" type="checkbox"/> Grass <input type="checkbox"/> Cover properly established <input checked="" type="checkbox"/> No signs of stress | |
| <input type="checkbox"/> Trees/shrubs (indicate size and location on a diagram) | |
| Remarks _____ | |
| | |

Five-Year Review Site Inspection Checklist (Continued)

| | | | |
|--|---|--------------------|---|
| 6. Alternative Cover (armored rock, concrete, etc.) | | | x N/A |
| Remarks _____ | | | |
| | | | |
| 7. Bulges | | | <input type="checkbox"/> Location shown on site map x Bulges not evident |
| Areal extent _____ | | Height _____ | |
| Remarks _____ | | | |
| | | | |
| 8. Wet Areas/Water Damage | | | x Wet areas/water damage not evident |
| <input type="checkbox"/> Wet Areas | <input type="checkbox"/> Location shown on site map | Areal extent _____ | |
| <input type="checkbox"/> Ponding | <input type="checkbox"/> Location shown on site map | Areal extent _____ | |
| <input type="checkbox"/> Seeps | <input type="checkbox"/> Location shown on site map | Areal extent _____ | |
| <input type="checkbox"/> Soft subgrade | <input type="checkbox"/> Location shown on site map | Areal extent _____ | |
| Remarks _____ | | | |
| | | | |
| 9. Slope Instability | | | <input type="checkbox"/> Slides <input type="checkbox"/> Location shown on site map x No evidence of slope instability |
| Areal extent _____ | | | |
| Remarks _____ | | | |
| | | | |
| B. Benches | | | <input type="checkbox"/> Applicable x 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 | | | <input type="checkbox"/> Location shown on site map <input type="checkbox"/> N/A or okay |
| Remarks _____ | | | |
| | | | |
| 2. Bench Breached | | | <input type="checkbox"/> Location shown on site map <input type="checkbox"/> N/A or okay |
| Remarks _____ | | | |
| | | | |
| 3. Bench Overtopped | | | <input type="checkbox"/> Location shown on site map <input type="checkbox"/> N/A or okay |
| Remarks _____ | | | |
| | | | |

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Five-Year Review Site Inspection Checklist (Continued)

| | | |
|--|--|--|
| C. Letdown Channels <input type="checkbox"/> Applicable x 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 Areal extent _____ Depth _____ Remarks _____ | <input type="checkbox"/> Location shown on site map <input type="checkbox"/> No evidence of settlement | |
| 2. Material Degradation Material type _____ Areal extent _____ Remarks _____ | <input type="checkbox"/> Location shown on site map <input type="checkbox"/> No evidence of degradation | |
| 3. Erosion Areal extent _____ Depth _____ Remarks _____ | <input type="checkbox"/> Location shown on site map <input type="checkbox"/> No evidence of erosion | |
| 4. Undercutting Areal extent _____ Depth _____ Remarks _____ | <input type="checkbox"/> Location shown on site map <input type="checkbox"/> No evidence of undercutting | |
| 5. Obstructions <input type="checkbox"/> Location shown on site map Type _____ Areal extent _____ <input type="checkbox"/> No obstructions Size _____ Remarks _____ | | |
| 6. Excessive Vegetative Growth <input type="checkbox"/> No evidence of excessive growth <input type="checkbox"/> Vegetation in channels does not obstruct flow <input type="checkbox"/> Location shown on site map Areal extent _____ Remarks _____ | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | | |
|--|--|---|---|
| D. Cover Penetrations <input type="checkbox"/> Applicable x N/A | | | |
| 1. Gas Vents <input type="checkbox"/> Active <input type="checkbox"/> Passive | | | |
| <input type="checkbox"/> Properly secured/locked | <input type="checkbox"/> Functioning | <input type="checkbox"/> Routinely sampled | <input type="checkbox"/> Good condition |
| <input type="checkbox"/> Evidence of leakage at penetration | <input type="checkbox"/> Needs Maintenance | <input type="checkbox"/> N/A | |
| Remarks _____ | | | |
| | | | |
| 2. Gas Monitoring Probes | | | |
| <input type="checkbox"/> Properly secured/locked | <input type="checkbox"/> Functioning | <input type="checkbox"/> Routinely sampled | <input type="checkbox"/> Good condition |
| <input type="checkbox"/> Evidence of leakage at penetration | <input type="checkbox"/> Needs Maintenance | <input type="checkbox"/> N/A | |
| Remarks _____ | | | |
| | | | |
| 3. Monitoring Wells | | | |
| <input type="checkbox"/> Properly secured/locked | <input type="checkbox"/> Functioning | <input type="checkbox"/> Routinely sampled | <input type="checkbox"/> Good condition |
| <input type="checkbox"/> Evidence of leakage at penetration | <input type="checkbox"/> Needs Maintenance | <input type="checkbox"/> N/A | |
| Remarks _____ | | | |
| | | | |
| 4. Leachate Extraction Wells | | | |
| <input type="checkbox"/> Properly secured/locked | <input type="checkbox"/> Functioning | <input type="checkbox"/> Routinely sampled | <input type="checkbox"/> Good condition |
| <input type="checkbox"/> Evidence of leakage at penetration | <input type="checkbox"/> Needs Maintenance | <input type="checkbox"/> N/A | |
| Remarks _____ | | | |
| | | | |
| 5. Settlement Monuments <input type="checkbox"/> Located <input type="checkbox"/> Routinely surveyed <input type="checkbox"/> N/A | | | |
| Remarks _____ | | | |
| | | | |
| E. Gas Collection and Treatment <input type="checkbox"/> Applicable x N/A | | | |
| 1. Gas Treatment Facilities | | | |
| <input type="checkbox"/> Flaring | <input type="checkbox"/> Thermal destruction | <input type="checkbox"/> Collection for reuse | |
| <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance | | |
| Remarks _____ | | | |
| | | | |
| 2. Gas Collection Wells, Manifolds and Piping | | | |
| <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance | | |
| Remarks _____ | | | |
| | | | |

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| | | | |
|---|--|--|--|
| 3. Gas Monitoring Facilities (e.g., gas monitoring of adjacent homes or buildings) | | | |
| <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A | | | |
| Remarks _____ _____ | | | |
| F. Cover Drainage Layer <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A | | | |
| 1. Outlet Pipes Inspected <input type="checkbox"/> Functioning <input type="checkbox"/> N/A | | | |
| Remarks _____ _____ | | | |
| 2. Outlet Rock Inspected <input type="checkbox"/> Functioning <input type="checkbox"/> N/A | | | |
| Remarks _____ _____ | | | |
| G. Detention/sedimentation Ponds <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A | | | |
| 1. Siltation Areal extent _____ | | Depth _____ <input type="checkbox"/> N/A | |
| <input type="checkbox"/> Siltation not evident | | | |
| Remarks _____ _____ | | | |
| 2. Erosion Areal extent _____ | | Depth _____ <input type="checkbox"/> N/A | |
| <input type="checkbox"/> Erosion not evident | | | |
| Remarks _____ _____ | | | |
| 3. Outlet Works <input type="checkbox"/> Functioning <input type="checkbox"/> N/A | | | |
| Remarks _____ _____ | | | |
| 4. Dam <input type="checkbox"/> Functioning <input type="checkbox"/> N/A | | | |
| Remarks _____ _____ | | | |
| H. Retaining Walls <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A | | | |
| 1. Deformations <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Deformation not evident | | | |
| Horizontal displacement _____ | | Vertical displacement _____ | |
| Rotational displacement _____ | | | |
| Remarks _____ _____ | | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | |
|---|---|--|
| 2. Degradation | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> Deformation not evident |
| Remarks _____ _____ | | |
| I. Perimeter Ditches/Off-Site Discharge <input type="checkbox"/> Applicable x N/A | | |
| 1. Siltation | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> Siltation not evident |
| Areal extent _____ Depth _____ | | |
| Remarks _____ _____ | | |
| 2. Vegetative Growth | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> Siltation not evident |
| <input type="checkbox"/> Vegetation does not impede flow | | |
| Areal extent _____ Type _____ | | |
| Remarks _____ _____ | | |
| 3. Erosion | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> Erosion not evident |
| Areal extent _____ Depth _____ | | |
| Remarks _____ _____ | | |
| 4. Discharge Structure | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> N/A |
| Remarks _____ _____ | | |
| VIII. VERTICAL BARRIER WALLS <input type="checkbox"/> Applicable x N/A | | |
| 1. Settlement | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> Settlement not evident |
| Areal extent _____ Depth _____ | | |
| Remarks _____ _____ | | |
| 2. Performance Monitoring | Type of Monitoring _____ | <input type="checkbox"/> Performance not monitored |
| Frequency _____ <input type="checkbox"/> Evidence of breaching Head differential _____ | | |
| Remarks _____ _____ | | |

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Five-Year Review Site Inspection Checklist (Continued)

| | | | |
|--|--|-------------------------------------|---|
| IX. GROUNDWATER/SURFACE WATER REMEDIES | | <input type="checkbox"/> Applicable | <input checked="" type="checkbox"/> N/A |
| A. Groundwater Extraction Wells, Pumps, and Pipelines | | <input type="checkbox"/> Applicable | <input type="checkbox"/> N/A |
| 1. Pumps, Wellhead Plumbing, and Electrical | | | |
| <input type="checkbox"/> Good condition <input type="checkbox"/> All required wells located <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A | | | |
| Remarks _____ | | | |
| 2. Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances | | | |
| <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance | | | |
| Remarks _____ | | | |
| 3. Spare Parts and Equipment | | | |
| <input type="checkbox"/> Readily available <input type="checkbox"/> Good condition <input type="checkbox"/> Requires upgrade <input type="checkbox"/> Needs to be provided | | | |
| Remarks _____ | | | |
| B. Surface Water Collection Structures, Pumps, and Pipelines | | <input type="checkbox"/> Applicable | <input type="checkbox"/> N/A |
| 1. Collection Structures, Pumps, and Electrical | | | |
| <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance | | | |
| Remarks _____ | | | |
| 2. Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances | | | |
| <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance | | | |
| Remarks _____ | | | |
| 3. Spare Parts and Equipment | | | |
| <input type="checkbox"/> Readily available <input type="checkbox"/> Good condition <input type="checkbox"/> Requires upgrade <input type="checkbox"/> Needs to be provided | | | |
| Remarks _____ | | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | |
|---|-------------------------------------|------------------------------|
| C. Treatment System | <input type="checkbox"/> Applicable | <input type="checkbox"/> N/A |
| 1. Treatment Train (Check components that apply) | | |
| <input type="checkbox"/> Metals removal | | |
| <input type="checkbox"/> Oil/water separation | | |
| <input type="checkbox"/> Bioremediation | | |
| <input type="checkbox"/> Air stripping | | |
| <input type="checkbox"/> Carbon adsorbers | | |
| <input type="checkbox"/> Filters _____ | | |
| <input type="checkbox"/> Additive (e.g., chelation agent, flocculent) _____ | | |
| <input type="checkbox"/> Others _____ | | |
| <input type="checkbox"/> Good condition | | |
| <input type="checkbox"/> Needs Maintenance | | |
| <input type="checkbox"/> Sampling ports properly marked and functional | | |
| <input type="checkbox"/> Sampling/maintenance log displayed and up to date | | |
| <input type="checkbox"/> Equipment properly identified | | |
| <input type="checkbox"/> Quantity of groundwater treated annually _____ | | |
| <input type="checkbox"/> Quantity of surface water treated annually _____ | | |
| Remarks _____ | | |
| _____ | | |
| 2. Electrical Enclosures and Panels (properly rated and functional) | | |
| <input type="checkbox"/> N/A | | |
| <input type="checkbox"/> Good condition | | |
| <input type="checkbox"/> Needs Maintenance | | |
| Remarks _____ | | |
| _____ | | |
| 3. Tanks, Vaults, Storage Vessels | | |
| <input type="checkbox"/> N/A | | |
| <input type="checkbox"/> Good condition | | |
| <input type="checkbox"/> Proper secondary containment | | |
| <input type="checkbox"/> Needs Maintenance | | |
| Remarks _____ | | |
| _____ | | |
| 4. Discharge Structure and Appurtenances | | |
| <input type="checkbox"/> N/A | | |
| <input type="checkbox"/> Good condition | | |
| <input type="checkbox"/> Needs Maintenance | | |
| Remarks _____ | | |
| _____ | | |
| 5. Treatment Building(s) | | |
| <input type="checkbox"/> N/A | | |
| <input type="checkbox"/> Good condition (esp. roof and doorways) | | |
| <input type="checkbox"/> Needs repair | | |
| <input type="checkbox"/> Chemicals and equipment properly stored | | |
| Remarks _____ | | |
| _____ | | |

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Five-Year Review Site Inspection Checklist (Continued)

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 remedy for this OU consists of institutional controls, Consolidation, In situ stabilization treatment, Grouting and a soil cover system. In situ stabilization with a low permeability closure cover system is the final action for the source term for each operable unit.

The remedy is functioning as designed because in situ stabilization is treating the PTSM and a soil cover with institutional controls is providing access controls.

Five-Year Review Site Inspection Checklist (Continued)

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.

N/A

R-AREA BINGHAM PUMP OUTAGE PITS (643-8G, 643-9G, 643-10G) AND R-AREA UNKNOWN PITS #1, #2, #3 OPERABLE UNIT

I. Introduction

This is the first five-year review for the R-Area Bingham Pump Outage Pits (643-8G, 643-9G, 643-10G) (RBPOPs) and R-Area Unknown Pits #1, #2, #3 (RUNKs-1, -2, -3) Operable Unit (OU). This review was conducted from August 2007 through September 2007. This report documents the results of the review.

II. OU Chronology

Table 1 lists the chronology of site events for the RBPOPs and RUNKs OU.

Table 1. Chronology of OU Events

| Event | Date |
|-----------------------------------|-------------------|
| RI Field Start | March 3, 1997 |
| Record of Decision (ROD) Issuance | November 19, 2002 |
| Remedial Action Start | April 16, 2003 |
| Remedial Action Complete | August 25, 2003 |
| Previous Five-Year Reviews | None |

III. Background

Physical Characteristics

The RBPOPs and RUNKs OU consists of six pits including three known pits called RBPOPs (643-8G, 643-9G, and 643-10G) and three pits with unknown or incomplete histories called RUNKs (RUNK-1, RUNK-2, and RUNK-3). See Figure 2. The sum of the areas for each pit is 0.9 acres; the area of a polygon around all the pits, which includes the areas between the pits, is 1.75 acres. The OU is located on the northeast side of R Area (Figure 1).

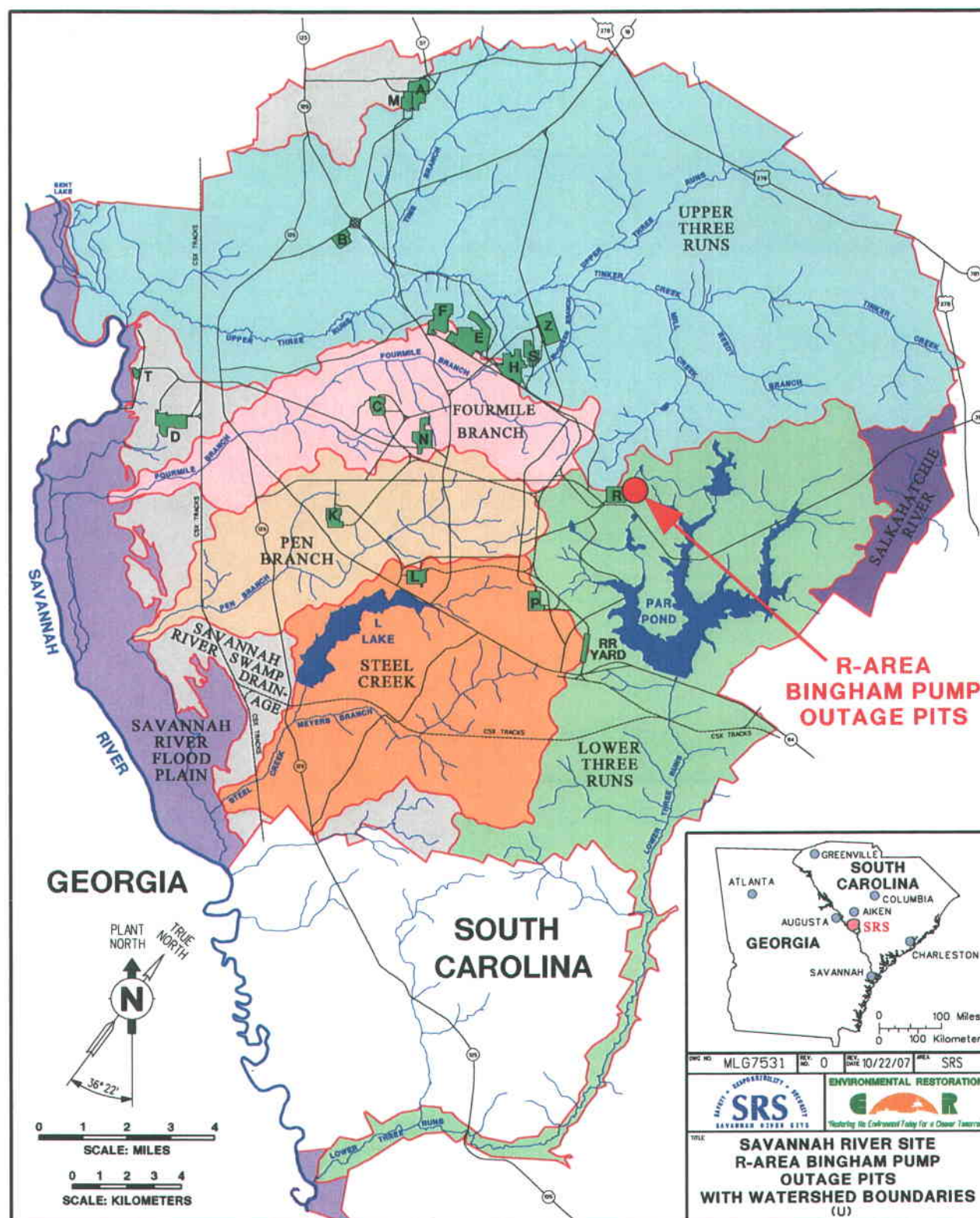


Figure 1. Location of the RBPOPs and RUNKs Operable Unit at SRS

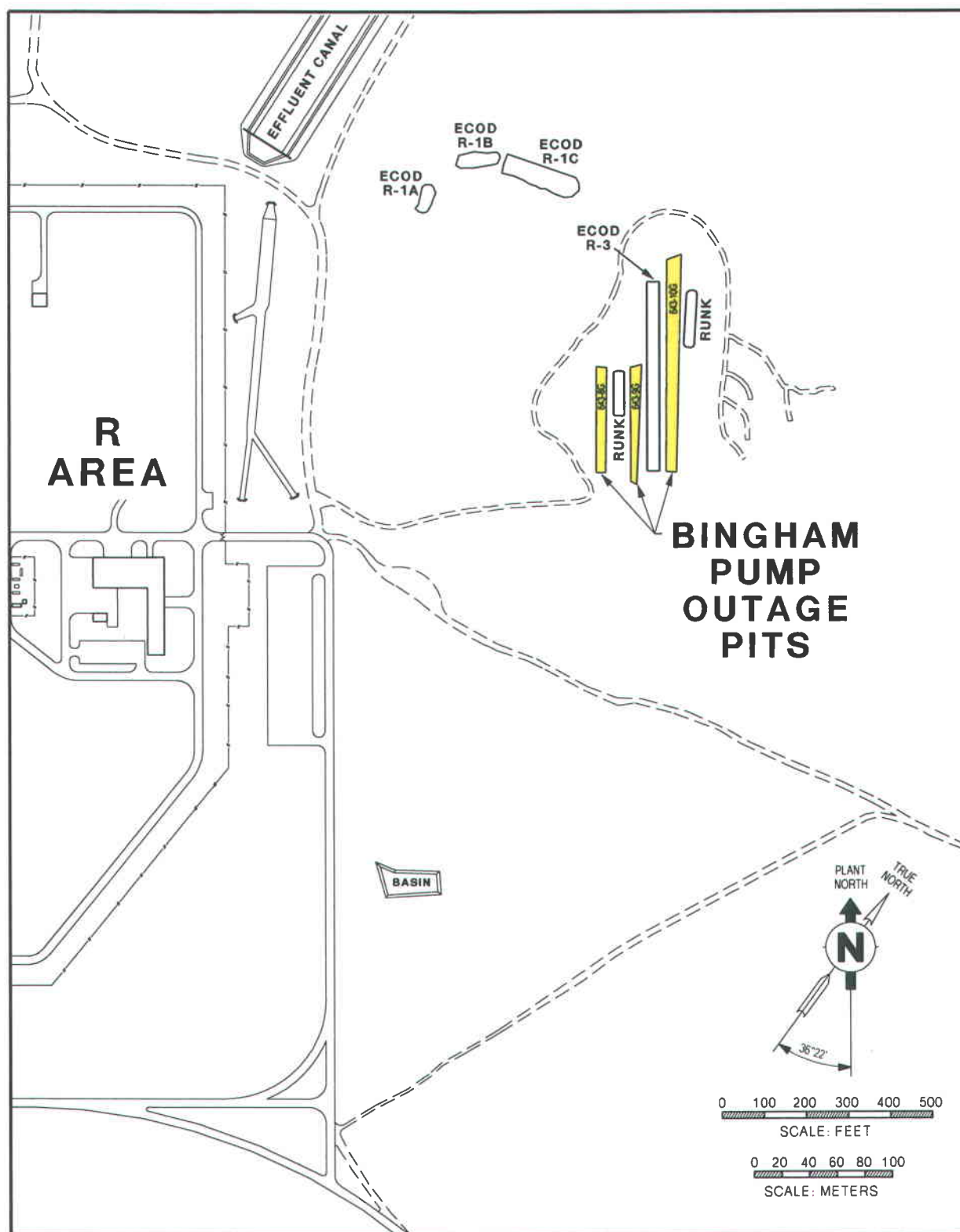


Figure 2. Site Layout for RBPOPs and RUNKs Operable Unit

The land surface at RBPOPs and RUNKs OU is gently sloping and covered by grassy vegetation. Dense vegetation and trees are located around the unit. The habitats at the OU generally do not meet the needs of most threatened, endangered, or sensitive species. No unique or sensitive ecosystems have been identified.

Land and Resource Use

The proximity of the RBPOPs and RUNKs to the heavy industrial area and the presence of buried debris at the unit make the OU unsuitable for residential use. United States Department of Energy (USDOE), United States Environmental Protection Agency (USEPA), and South Carolina Department of Health and Environmental Control (SCDHEC) agree that industrial land use restrictions are appropriate for the RBPOPs and RUNKs OU area. The future land use of the RBPOPs and RUNKs OU is anticipated to be the same as the current land use (industrial use and control by the federal government).

History of Contamination

Historical aerial photographs indicate RUNK-2 predates the RBPOPs and was in existence as early as 1953. Construction debris has been verified in RUNK-2 based upon a magnetic survey, ground penetrating radar (GPR) surveys, and soil sampling in the pit. A historical photograph indicates that liquid wastes were also introduced into the pit but no containerized liquids were discovered during characterization. Historical photographs indicate that RUNK-2 was closed in 1956.

The RBPOPs were constructed during 1957 and 1958 when major modifications were made to primary and secondary Savannah River Site (SRS) reactor cooling water systems. The outages of the cooling water systems that occurred as a result of these modifications became known as Bingham Pump Outages. Wastes generated during these outages were segregated based on levels of radioactivity. Higher activity waste was sent to the SRS Burial Ground Complex in E Area while lower activity waste was buried in the RBPOPs. Waste disposed in the RBPOPs consisted of miscellaneous construction materials such as pipes, cables, ladders, concrete, and miscellaneous hardware. The

RBPOPs were closed in the late 1950s by backfilling with approximately 4 ft of cover soil. The cover material was placed at a time preceding the preparation of the formal CERCLA documentation. The cover system was placed prior to the CERCLA.

RUNK-1 and RUNK-3 were discovered in 1993 during a GPR survey of the area. The survey indicated that these areas had been previously disturbed, but their history is unknown. Magnetic surveys of these RUNKs indicated they do not contain metallic debris, and furthermore, no metallic or non-metallic debris was encountered during soil sampling. Due to the lack of any identified debris, it is possible that no debris was ever placed in these two RUNKs.

Initial Response

Characterization of RBPOPs and RUNKs was performed through a series of sampling events. The unit investigation confirmed that miscellaneous debris remains buried in the unit. Soil contaminants identified as refined constituents of concern (RCOCs) include polycyclic aromatic hydrocarbon (PAHs) (benzo[b]fluoranthene, indeno[1,2,3-c,d]pyrene, dibenzo[a,h]anthracene, benzo[a]pyrene, and benzo[a]anthracene) and radionuclides (cobalt-60 and cesium-137). These contaminants are primarily in the RBPOPs and RUNK-2. Soils around the perimeter of the unit are generally uncontaminated.

Basis for Taking Action

The amount of unit-related contamination in the perimeter soils, if any, is minimal and not readily discernible from ambient background levels. There are no Resource Conservation and Recovery Act (RCRA) listed or characteristic wastes at the unit. The combined volume of the six pits, from land surface to the base of the pits, is 14,000 yd³.

There is no principal threat source material (PTSM) (highly mobile or highly toxic source materials that require a bias toward treatment alternatives) at the RBPOPs and RUNKs OU. The contamination is largely isolated by backfill with its exposure limited by land use restrictions; the waste is categorized as a low-level threat.

USDOE, USEPA, and SCDHEC agreed in the ROD for the RBPOPs and RUNKs that groundwater at the OU will be evaluated separately in association with the R-Area Groundwater OU.

IV. Remedial Actions

Remedy Selection

Institutional controls were selected as the remedial action for the RBPOPs and RUNKs OU.

Remedy Implementation

The selected remedy entails the following:

- **Site maintenance:** Site maintenance will consist of inspections of the OU and maintenance of drainage features to minimize the formation of large gullies. Minor earthwork will be performed as needed to repair any erosion damage that may occur. Site maintenance will also include mowing.
- **Access controls:** Access controls will include security measures such as posting and maintenance of warning signs. Signs will be posted around the OU with a legend warning of the hazard. They will be posted at appropriate locations in sufficient numbers to be seen from any approach. Administrative controls (land use restrictions) will be implemented to restrict human exposure to contaminants remaining at the unit.

The Final Remediation Report (FRR) was issued in August 2003 to document the completion of the remedial action for the closure of RBPOPs and RUNKs OU. Since the remedial action for this OU involved only institutional controls and the placement of signs with no other construction scope, neither a Remedial Action Implementation Report nor a Post-Construction Report were required.

V. Progress Since Last Review

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

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 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.

X. Project Costs

Costs associated with the selected remedy for the R BPOP OU includes operation and maintenance costs of institutional controls. The estimated operation and maintenance cost associated with the selected remedy is \$75,799, which was discounted at 5% per year. This is a present worth cost, including 30 years of maintenance activities. After characterization and effectiveness of the remedy was evaluated, the actual operation and maintenance cost for the R BPOP was assessed. The total actual operation and maintenance cost from project support and other post construction expense to fiscal year 2006 is \$123,092.

XI. Protectiveness Statement(s)

The remedy of institutional controls at the RBPOPs and RUNKs is protective of human health and the environment. This remedy includes land use restrictions, which prevent industrial development of the unit, thus preventing the future industrial worker exposure scenario. Land use controls also prevent unauthorized excavation and exposure to contaminated debris that may remain buried in the unit. The implemented remedy achieves the degree of cleanup and protection specified in the ROD for all exposures to human health and the environment.

XII. Next Review

The next five-year review is scheduled for February 12, 2014.

ATTACHMENT 1

List of Documents Reviewed

WSRC-RP-98-4106, *Remedial Investigation Report with Baseline Risk Assessment for the R-Area Bingham Pump Outage Pits and the R-Area Unknowns (U)*, Revision 1, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

WSRC-RP-2001-4128, *Proposed Plan for the R-Area Bingham Pump Outage Pits (643-8G, 643-9G, 643-10G) and R-Area Unknown Pits #1, #2, #3 (RUNK-1, -2, -3) (U)*, Revision 0, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

WSRC-RP-2001-4129, *Record of Decision Remedial Alternative Selection for the R-Area Bingham Pump Outage Pits (643-8G, -9G, -10G) and R-Area Unknown Pits #1, #2, #3 (RUNK-1, -2, -3) (U)*, Revision 1.1, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

WSRC-RP-2003-4061, Final Remediation Report (FRR) for the R-Area Bingham Pump Outage Pits (643-8G, -9G, -10G) and R-Area Unknown Pits #1, #2, #3 (RUNK 1, -2, -3) (U), Revision 1, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

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ATTACHMENT 2

Five-Year Review Site Inspection Checklist for RBPOPs and RUNKs

| I. SITE INFORMATION | | | | | | | | | | | | | | | |
|---|---|------------------------------------|---|---------------------------------------|--|--|--|--|---|---|--|---|--|---------------------------------------|--|
| Site Name: | R-Area Bingham Pump Outage Pits and R-Area Unknown Pits | Date of Inspection: | 10/17/2007 | | | | | | | | | | | | |
| Location and Region: | SRS, USEPA Region IV | EPA ID: | SC1890008989 | | | | | | | | | | | | |
| Agency, office, or company leading the five-year review: | United States Department of Energy | CERCLIS OU No.: | 38 | | | | | | | | | | | | |
| | | Weather/Temperature: | Clear and Sunny, 83°F | | | | | | | | | | | | |
| Remedy Includes: (Check all that apply) <table><tbody><tr><td><input type="checkbox"/> Cover System</td><td><input type="checkbox"/> Monitored Natural Attenuation</td></tr><tr><td><input type="checkbox"/> Access controls</td><td><input type="checkbox"/> Groundwater Containment</td></tr><tr><td><input checked="" type="checkbox"/> Institutional Controls</td><td><input type="checkbox"/> Vertical Barrier Walls</td></tr><tr><td><input type="checkbox"/> Groundwater pump and treatment</td><td></td></tr><tr><td><input type="checkbox"/> Surface water collection and treatment</td><td></td></tr><tr><td><input type="checkbox"/> Other: _____</td><td></td></tr></tbody></table> | | | | <input type="checkbox"/> Cover System | <input type="checkbox"/> Monitored Natural Attenuation | <input type="checkbox"/> Access controls | <input type="checkbox"/> Groundwater Containment | <input checked="" type="checkbox"/> Institutional Controls | <input type="checkbox"/> Vertical Barrier Walls | <input type="checkbox"/> Groundwater pump and treatment | | <input type="checkbox"/> Surface water collection and treatment | | <input type="checkbox"/> Other: _____ | |
| <input type="checkbox"/> Cover System | <input type="checkbox"/> Monitored Natural Attenuation | | | | | | | | | | | | | | |
| <input type="checkbox"/> Access controls | <input type="checkbox"/> Groundwater Containment | | | | | | | | | | | | | | |
| <input checked="" type="checkbox"/> Institutional Controls | <input type="checkbox"/> Vertical Barrier Walls | | | | | | | | | | | | | | |
| <input type="checkbox"/> Groundwater pump and treatment | | | | | | | | | | | | | | | |
| <input type="checkbox"/> Surface water collection and treatment | | | | | | | | | | | | | | | |
| <input type="checkbox"/> Other: _____ | | | | | | | | | | | | | | | |
| Attachments: <input type="checkbox"/> Inspection team roster attached <input type="checkbox"/> Site map attached | | | | | | | | | | | | | | | |
| II. INTERVIEWS (Check all that apply) | | | | | | | | | | | | | | | |
| 1. O & M Site Manager | | | | | | | | | | | | | | | |
| | _____ (Name) | _____ (Title) | _____ (Date) | | | | | | | | | | | | |
| Interviewed: | <input type="checkbox"/> at site | <input type="checkbox"/> at office | <input type="checkbox"/> by phone Phone No. _____ | | | | | | | | | | | | |
| Problems, suggestions: | <input type="checkbox"/> report attached _____ | | | | | | | | | | | | | | |
| 2. O & M Staff | | | | | | | | | | | | | | | |
| | _____ (Name) | _____ (Title) | _____ (Date) | | | | | | | | | | | | |
| Interviewed: | <input type="checkbox"/> at site | <input type="checkbox"/> at office | <input type="checkbox"/> by phone Phone No. _____ | | | | | | | | | | | | |
| Problems, suggestions: | <input type="checkbox"/> report attached _____ | | | | | | | | | | | | | | |

Five-Year Review Site Inspection Checklist (Continued)

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

| | | | |
|---|--|-------------------------------------|------------------------------|
| <input type="checkbox"/> O & M Manual | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |
| x As-built drawings | x Readily available | x Up to date | <input type="checkbox"/> N/A |
| <input type="checkbox"/> Maintenance Logs | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |

Remarks: See Waste Unit Inspection and Maintenance, ER-SOP-019

Five-Year Review Site Inspection Checklist (Continued)

| | | | |
|--|--|-------------------------------------|-------|
| 2. Site-Specific Health and Safety Plan | | | |
| <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A | |
| <input type="checkbox"/> Contingency plan/emergency response plan | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |
| Remarks: <u>Routine O&M activities do not require a SSHASP under 29 CFR 1910.1201, HAZWOPER.</u> | | | |
| 3. O & M and OSHA Training Records | | | |
| x Readily available | x Up to date | <input type="checkbox"/> N/A | |
| Remarks: _____ | | | |
| 4. Permits and Service Agreements | | | |
| <input type="checkbox"/> Air discharge permit | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |
| <input type="checkbox"/> Effluent discharge | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |
| <input type="checkbox"/> Waste Disposal, POTW | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |
| <input type="checkbox"/> Other permits | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |
| Remarks: _____ | | | |
| 5. Gas Generation Records | | | |
| <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A | |
| Remarks: _____ | | | |
| 6. Settlement Monument Records | | | |
| <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A | |
| Remarks: _____ | | | |
| 7. Groundwater Monitoring Records | | | |
| <input type="checkbox"/> Readily available | x Up to date | x N/A | |
| Remarks: _____ | | | |
| 8. Leachate Extraction Records | | | |
| <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A | |
| Remarks: _____ | | | |
| 9. Discharge Compliance Records | | | |
| <input type="checkbox"/> Air | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |
| <input type="checkbox"/> Water (effluent) | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |
| Remarks: _____ | | | |
| 10. Daily Access/Security Logs | | | |
| <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A | |
| Remarks: _____ | | | |

Five-Year Review Site Inspection Checklist (Continued)

IV. O & M Costs

1. O & M Organization

- ☐ State in-house ☐ Contractor for State
☐ PRP in-house ☐ Contractor for PRP
x Other SRS

2. O & M Cost Records

- ☐ Readily available ☐ Up to date ☐ Funding mechanism/agreement in place
x Other: Project cost data is summarized in Section X of attached review: WSRC-RP-2007-4063.

Total annual cost by year for review period if available

| | | |
|---------------------|------------|---|
| From _____ To _____ | _____ | <input type="checkbox"/> Breakdown attached |
| (Date) (Date) | Total cost | |
| From _____ To _____ | _____ | <input type="checkbox"/> Breakdown attached |
| (Date) (Date) | Total cost | |
| From _____ To _____ | _____ | <input type="checkbox"/> Breakdown attached |
| (Date) (Date) | Total cost | |
| From _____ To _____ | _____ | <input type="checkbox"/> Breakdown attached |
| (Date) (Date) | Total cost | |
| From _____ To _____ | _____ | <input type="checkbox"/> Breakdown attached |
| (Date) (Date) | Total cost | |

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

Describe costs and reasons:

V. ACCESS AND INSTITUTIONAL CONTROLS

x Applicable ☐ N/A

A. Fencing

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

Remarks _____

Five-Year Review Site Inspection Checklist (Continued)

| | | | |
|---|---------------|--|---|
| B. Other Access Restrictions | | | |
| 1. Signs and Other Security Measures <input type="checkbox"/> Location shown on site map <input type="checkbox"/> N/A | | | |
| Remarks: <u>Signs are in good condition.</u> | | | |
| C. Institutional Controls | | | |
| 1. Implementation and Enforcement | | | |
| Site conditions imply ICs not properly implemented: | | <input type="checkbox"/> Yes | <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A |
| Site conditions imply ICs not being fully enforced: | | <input type="checkbox"/> Yes | <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A |
| Type of monitoring (e.g., self-reporting, drive-by): | | Field Walk Down | |
| Frequency: | | Semi-Annually | |
| Responsible party/agent: | | DOE Savannah River Field Office | |
| Contact: | N/A (Name) | N/A (Title) | N/A (Date) |
| | | N/A (Phone No.) | |
| Reporting is up-to-date: | | <input checked="" type="checkbox"/> Yes | <input type="checkbox"/> No <input type="checkbox"/> N/A |
| Reports are verified by the lead agency: | | <input checked="" type="checkbox"/> Yes | <input type="checkbox"/> No <input type="checkbox"/> N/A |
| Specific requirements in deed of decision documents have been met: | | <input type="checkbox"/> Yes | <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A |
| Violations have been reported: | | <input type="checkbox"/> Yes | <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A |
| Other problems or suggestions: | | <input type="checkbox"/> Report attached | |
| <u>Construction of the ash pile soil cover and additional SVE wells has not been completed yet.</u> | | | |
| 2. Adequacy <input checked="" type="checkbox"/> ICs are adequate <input type="checkbox"/> ICs are inadequate <input type="checkbox"/> N/A | | | |
| Remarks: _____ | | | |
| D. General | | | |
| 1. Vandalism/Trespassing <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> No vandalism evident | | | |
| Remarks: _____ | | | |
| 2. Land Use Changes Onsite <input checked="" type="checkbox"/> N/A | | | |
| Remarks: _____ | | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | | |
|---|--|--------------|--|
| 3. Land Use Changes Offsite <input checked="" type="checkbox"/> N/A | | | |
| Remarks _____ | | | |
| _____ | | | |
| VI. GENERAL SITE CONDITIONS | | | |
| A. Roads <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A | | | |
| 1. Roads Damaged <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Roads adequate <input type="checkbox"/> N/A | | | |
| Remarks _____ | | | |
| _____ | | | |
| B. Other Site Conditions | | | |
| Remarks _____ | | | |
| _____ | | | |
| _____ | | | |
| VII. COVERS SYSTEMS <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A | | | |
| A. Soil Surface | | | |
| 1. Settlement (Low spots) <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Settlement not evident | | | |
| Areal extent _____ | | Depth _____ | |
| Remarks: _____ | | | |
| _____ | | | |
| 2. Cracks <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Cracking not evident | | | |
| Lengths _____ | | Widths _____ | |
| | | Depths _____ | |
| Remarks _____ | | | |
| _____ | | | |
| 3. Erosion <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Erosion not evident | | | |
| Areal extent _____ | | Depth _____ | |
| Remarks _____ | | | |
| _____ | | | |
| 4. Holes <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Holes not evident | | | |
| Areal extent _____ | | Depth _____ | |
| Remarks _____ | | | |
| _____ | | | |
| 5. Vegetative Cover <input type="checkbox"/> Grass <input type="checkbox"/> Cover properly established <input type="checkbox"/> No signs of stress | | | |
| <input type="checkbox"/> Trees/shrubs (indicate size and location on a diagram) | | | |
| Remarks _____ | | | |
| _____ | | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | |
|--|---|--------------------|
| 6. Alternative Cover (armored rock, concrete, etc.) <input type="checkbox"/> N/A | | |
| Remarks: _____ | | |
| 7. Bulges <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Bulges not evident | | |
| Areal extent _____ Height _____ | | |
| Remarks _____ | | |
| 8. Wet Areas/Water Damage <input type="checkbox"/> Wet areas/water damage not evident | | |
| <input type="checkbox"/> Wet Areas | <input type="checkbox"/> Location shown on site map | Areal extent _____ |
| <input type="checkbox"/> Ponding | <input type="checkbox"/> Location shown on site map | Areal extent _____ |
| <input type="checkbox"/> Seeps | <input type="checkbox"/> Location shown on site map | Areal extent _____ |
| <input type="checkbox"/> Soft subgrade | <input type="checkbox"/> Location shown on site map | Areal extent _____ |
| Remarks _____ | | |
| 9. Slope Instability <input type="checkbox"/> Slides <input type="checkbox"/> Location shown on site map <input type="checkbox"/> No evidence of slope instability | | |
| Areal extent _____ | | |
| Remarks _____ | | |
| B. Benches <input type="checkbox"/> Applicable <input type="checkbox"/> 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 <input type="checkbox"/> Location shown on site map <input type="checkbox"/> N/A or okay | | |
| Remarks _____ | | |
| 2. Bench Breached <input type="checkbox"/> Location shown on site map <input type="checkbox"/> N/A or okay | | |
| Remarks _____ | | |
| 3. Bench Overtopped <input type="checkbox"/> Location shown on site map <input type="checkbox"/> N/A or okay | | |
| Remarks _____ | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | |
|--|---|--|
| C. Letdown Channels <input type="checkbox"/> Applicable <input type="checkbox"/> 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 | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> No evidence of settlement |
| Areal extent _____ Depth _____ Remarks _____ _____ | | |
| 2. Material Degradation | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> No evidence of degradation |
| Material type _____ Areal extent _____ Remarks _____ _____ | | |
| 3. Erosion | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> No evidence of erosion |
| Areal extent _____ Depth _____ Remarks _____ _____ | | |
| 4. Undercutting | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> No evidence of undercutting |
| Areal extent _____ Depth _____ Remarks _____ _____ | | |
| 5. Obstructions | Type _____ | <input type="checkbox"/> No obstructions |
| <input type="checkbox"/> Location shown on site map Areal extent _____ Size _____ Remarks _____ _____ | | |
| 6. Excessive Vegetative Growth | Type _____ | |
| <input type="checkbox"/> No evidence of excessive growth <input type="checkbox"/> Vegetation in channels does not obstruct flow <input type="checkbox"/> Location shown on site map Areal extent _____ Remarks _____ _____ | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | | |
|--|--|---|---|
| D. Cover Penetrations <input type="checkbox"/> Applicable <input type="checkbox"/> N/A | | | |
| 1. Gas Vents <input type="checkbox"/> Active <input type="checkbox"/> Passive | | | |
| <input type="checkbox"/> Properly secured/locked | <input type="checkbox"/> Functioning | <input type="checkbox"/> Routinely sampled | <input type="checkbox"/> Good condition |
| <input type="checkbox"/> Evidence of leakage at penetration | <input type="checkbox"/> Needs Maintenance | <input type="checkbox"/> N/A | |
| Remarks _____ | | | |
| _____ | | | |
| 2. Gas Monitoring Probes | | | |
| <input type="checkbox"/> Properly secured/locked | <input type="checkbox"/> Functioning | <input type="checkbox"/> Routinely sampled | <input type="checkbox"/> Good condition |
| <input type="checkbox"/> Evidence of leakage at penetration | <input type="checkbox"/> Needs Maintenance | <input type="checkbox"/> N/A | |
| Remarks _____ | | | |
| _____ | | | |
| 3. Monitoring Wells | | | |
| <input type="checkbox"/> Properly secured/locked | <input type="checkbox"/> Functioning | <input type="checkbox"/> Routinely sampled | <input type="checkbox"/> Good condition |
| <input type="checkbox"/> Evidence of leakage at penetration | <input type="checkbox"/> Needs Maintenance | <input type="checkbox"/> N/A | |
| Remarks _____ | | | |
| _____ | | | |
| 4. Leachate Extraction Wells | | | |
| <input type="checkbox"/> Properly secured/locked | <input type="checkbox"/> Functioning | <input type="checkbox"/> Routinely sampled | <input type="checkbox"/> Good condition |
| <input type="checkbox"/> Evidence of leakage at penetration | <input type="checkbox"/> Needs Maintenance | <input type="checkbox"/> N/A | |
| Remarks _____ | | | |
| _____ | | | |
| 5. Settlement Monuments <input type="checkbox"/> Located <input type="checkbox"/> Routinely surveyed <input type="checkbox"/> N/A | | | |
| Remarks _____ | | | |
| _____ | | | |
| E. Gas Collection and Treatment <input type="checkbox"/> Applicable <input type="checkbox"/> N/A | | | |
| 1. Gas Treatment Facilities | | | |
| <input type="checkbox"/> Flaring | <input type="checkbox"/> Thermal destruction | <input type="checkbox"/> Collection for reuse | |
| <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance | | |
| Remarks _____ | | | |
| _____ | | | |
| 2. Gas Collection Wells, Manifolds and Piping | | | |
| <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance | | |
| Remarks _____ | | | |
| _____ | | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | | |
|--|--|--|--|
| 3. Gas Monitoring Facilities (e.g., gas monitoring of adjacent homes or buildings) <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A Remarks _____ _____ | | | |
| F. Cover Drainage Layer <input type="checkbox"/> Applicable <input type="checkbox"/> N/A | | | |
| 1. Outlet Pipes Inspected <input type="checkbox"/> Functioning <input type="checkbox"/> N/A Remarks _____ _____ | | | |
| 2. Outlet Rock Inspected <input type="checkbox"/> Functioning <input type="checkbox"/> N/A Remarks _____ _____ | | | |
| G. Detention/sedimentation Ponds <input type="checkbox"/> Applicable <input type="checkbox"/> N/A | | | |
| 1. Siltation Areal extent _____ | | Depth _____ <input type="checkbox"/> N/A <input type="checkbox"/> Siltation not evident Remarks _____ _____ | |
| 2. Erosion Areal extent _____ | | Depth _____ <input type="checkbox"/> N/A <input type="checkbox"/> Erosion not evident Remarks _____ _____ | |
| 3. Outlet Works <input type="checkbox"/> Functioning <input type="checkbox"/> N/A Remarks _____ _____ | | | |
| 4. Dam <input type="checkbox"/> Functioning <input type="checkbox"/> N/A Remarks _____ _____ | | | |
| H. Retaining Walls <input type="checkbox"/> Applicable <input type="checkbox"/> N/A | | | |
| 1. Deformations <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Deformation not evident Horizontal displacement _____ Vertical displacement _____ Rotational displacement _____ Remarks _____ _____ | | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | |
|--|--|--|
| 2. Degradation <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Deformation not evident | | |
| Remarks _____ | | |
| I. Perimeter Ditches/Off-Site Discharge <input type="checkbox"/> Applicable <input type="checkbox"/> N/A | | |
| 1. Siltation <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Siltation not evident | | |
| Areal extent _____ Depth _____ | | |
| Remarks _____ | | |
| 2. Vegetative Growth <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Siltation not evident | | |
| <input type="checkbox"/> Vegetation does not impede flow | | |
| Areal extent _____ Type _____ | | |
| Remarks _____ | | |
| 3. Erosion <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Erosion not evident | | |
| Areal extent _____ Depth _____ | | |
| Remarks _____ | | |
| 4. Discharge Structure <input type="checkbox"/> Location shown on site map <input type="checkbox"/> N/A | | |
| Remarks _____ | | |
| VIII. VERTICAL BARRIER WALLS <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A | | |
| 1. Settlement <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Settlement not evident | | |
| Areal extent _____ Depth _____ | | |
| Remarks _____ | | |
| 2. Performance Monitoring Type of Monitoring _____ <input type="checkbox"/> Performance not monitored | | |
| Frequency _____ <input type="checkbox"/> Evidence of breaching Head differential _____ | | |
| Remarks _____ | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | | | | |
|---|--|---|--|--|---|
| IX. GROUNDWATER/SURFACE WATER REMEDIES | | | | <input type="checkbox"/> Applicable | <input checked="" type="checkbox"/> N/A |
| A. Groundwater Extraction Wells, Pumps, and Pipelines | | | | <input type="checkbox"/> Applicable | <input type="checkbox"/> N/A |
| 1. Pumps, Wellhead Plumbing, and Electrical | | | | | |
| <input type="checkbox"/> Good condition | | <input type="checkbox"/> All required wells located | | <input type="checkbox"/> Needs Maintenance | |
| <input type="checkbox"/> N/A | | | | | |
| Remarks _____ | | | | | |
| 2. Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances | | | | | |
| <input type="checkbox"/> Good condition | | <input type="checkbox"/> Needs Maintenance | | | |
| Remarks _____ | | | | | |
| 3. Spare Parts and Equipment | | | | | |
| <input type="checkbox"/> Readily available | | <input type="checkbox"/> Good condition | | <input type="checkbox"/> Requires upgrade | |
| <input type="checkbox"/> Needs to be provided | | | | | |
| Remarks _____ | | | | | |
| B. Surface Water Collection Structures, Pumps, and Pipelines | | | | <input type="checkbox"/> Applicable | <input type="checkbox"/> N/A |
| 1. Collection Structures, Pumps, and Electrical | | | | | |
| <input type="checkbox"/> Good condition | | <input type="checkbox"/> Needs Maintenance | | | |
| Remarks _____ | | | | | |
| 2. Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances | | | | | |
| <input type="checkbox"/> Good condition | | <input type="checkbox"/> Needs Maintenance | | | |
| Remarks _____ | | | | | |
| 3. Spare Parts and Equipment | | | | | |
| <input type="checkbox"/> Readily available | | <input type="checkbox"/> Good condition | | <input type="checkbox"/> Requires upgrade | |
| <input type="checkbox"/> Needs to be provided | | | | | |
| Remarks _____ | | | | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | |
|---|--|--|
| C. Treatment System <input type="checkbox"/> Applicable <input type="checkbox"/> N/A | | |
| 1. Treatment Train (Check components that apply) | | |
| <input type="checkbox"/> Metals removal | <input type="checkbox"/> Oil/water separation | <input type="checkbox"/> Bioremediation |
| <input type="checkbox"/> Air stripping | <input type="checkbox"/> Carbon adsorbers | |
| <input type="checkbox"/> Filters _____ | | |
| <input type="checkbox"/> Additive (e.g., chelation agent, flocculent) _____ | | |
| <input type="checkbox"/> Others _____ | | |
| <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance | |
| <input type="checkbox"/> Sampling ports properly marked and functional | | |
| <input type="checkbox"/> Sampling/maintenance log displayed and up to date | | |
| <input type="checkbox"/> Equipment properly identified | | |
| <input type="checkbox"/> Quantity of groundwater treated annually _____ | | |
| <input type="checkbox"/> Quantity of surface water treated annually _____ | | |
| Remarks _____ | | |
| _____ | | |
| 2. Electrical Enclosures and Panels (properly rated and functional) | | |
| <input type="checkbox"/> N/A | <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance |
| Remarks _____ | | |
| _____ | | |
| 3. Tanks, Vaults, Storage Vessels | | |
| <input type="checkbox"/> N/A | <input type="checkbox"/> Good condition | <input type="checkbox"/> Proper secondary containment <input type="checkbox"/> Needs Maintenance |
| Remarks _____ | | |
| _____ | | |
| 4. Discharge Structure and Appurtenances | | |
| <input type="checkbox"/> N/A | <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance |
| Remarks _____ | | |
| _____ | | |
| 5. Treatment Building(s) | | |
| <input type="checkbox"/> N/A | <input type="checkbox"/> Good condition (esp. roof and doorways) | <input type="checkbox"/> Needs repair |
| <input type="checkbox"/> Chemicals and equipment properly stored | | |
| Remarks _____ | | |
| _____ | | |

Five-Year Review Site Inspection Checklist (Continued)

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 remedial action for this unit is institutional controls.

The institutional controls are in place and being implemented to provide access control and prevent exposures as intended by the decision documents.

Five-Year Review Site Inspection Checklist (Continued)

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.

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, and further groundwater assessment as necessary.

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.

N/A

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R-AREA BURNING/RUBBLE PITS (131-R, 131-1R) AND RUBBLE PILE (631-25G) OPERABLE UNIT

I. Introduction

This is the first five-year review for the R-Area Burning/Rubble Pits (131-R and 131-1R) and Rubble Pile (631-25G) (RBRP/RRP) Operable Unit (OU). This review was conducted from August 2007 through September 2007. This report documents the results of the review.

II. OU Chronology

Table 1 lists the chronology of site events for the RBRP/RRP OU.

Table 1. Chronology of OU Events

| Event | Date |
|-------------------------------------|--------------------|
| RFI/RI Field Start | October 1, 2001 |
| Record of Decision (ROD) issuance | October 4, 2004 |
| Remedial Action (RA) start | September 22, 2005 |
| RA construction activities complete | January 25, 2006 |
| Previous Five-Year Reviews | None |

III. Background

Physical Characteristics

The RBRP/RRP OU is located at Savannah River Site (SRS), approximately 7.3 km (4.5 mi) from the nearest SRS boundary (Figure 1). The OU includes five subunits: RBRP [pit 131-R (Closed Pit) and pit 131-1R (Open Pit)], the pit perimeter soils, RRP (pile 631-25G and soil beneath the pile), wetland, and groundwater in the vicinity. There were no prior removals or remedial actions for this OU. Figure 2 depicts the site layout of the RBRP/RRP.

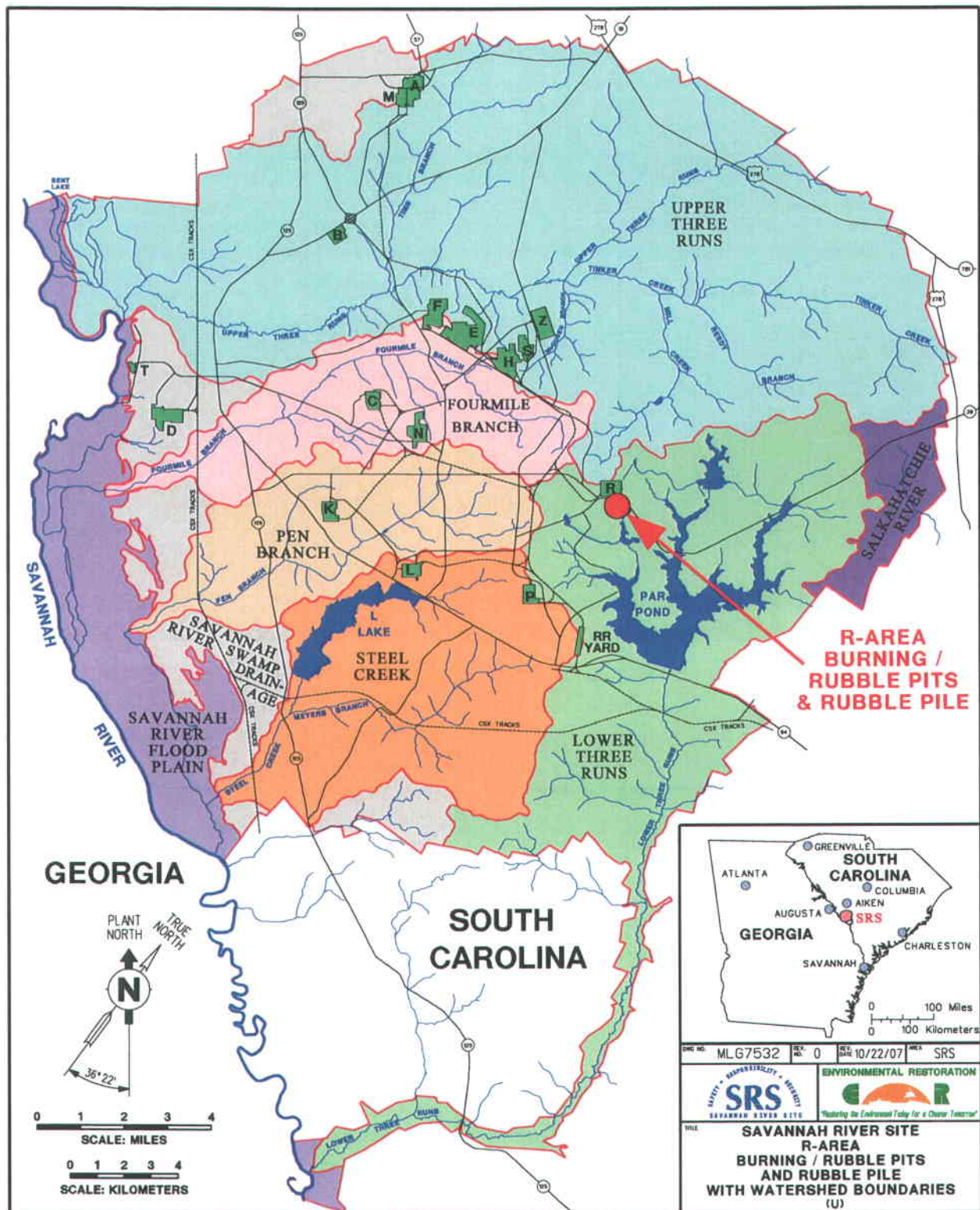


Figure 1. Location of the RBRP/RRP at SRS

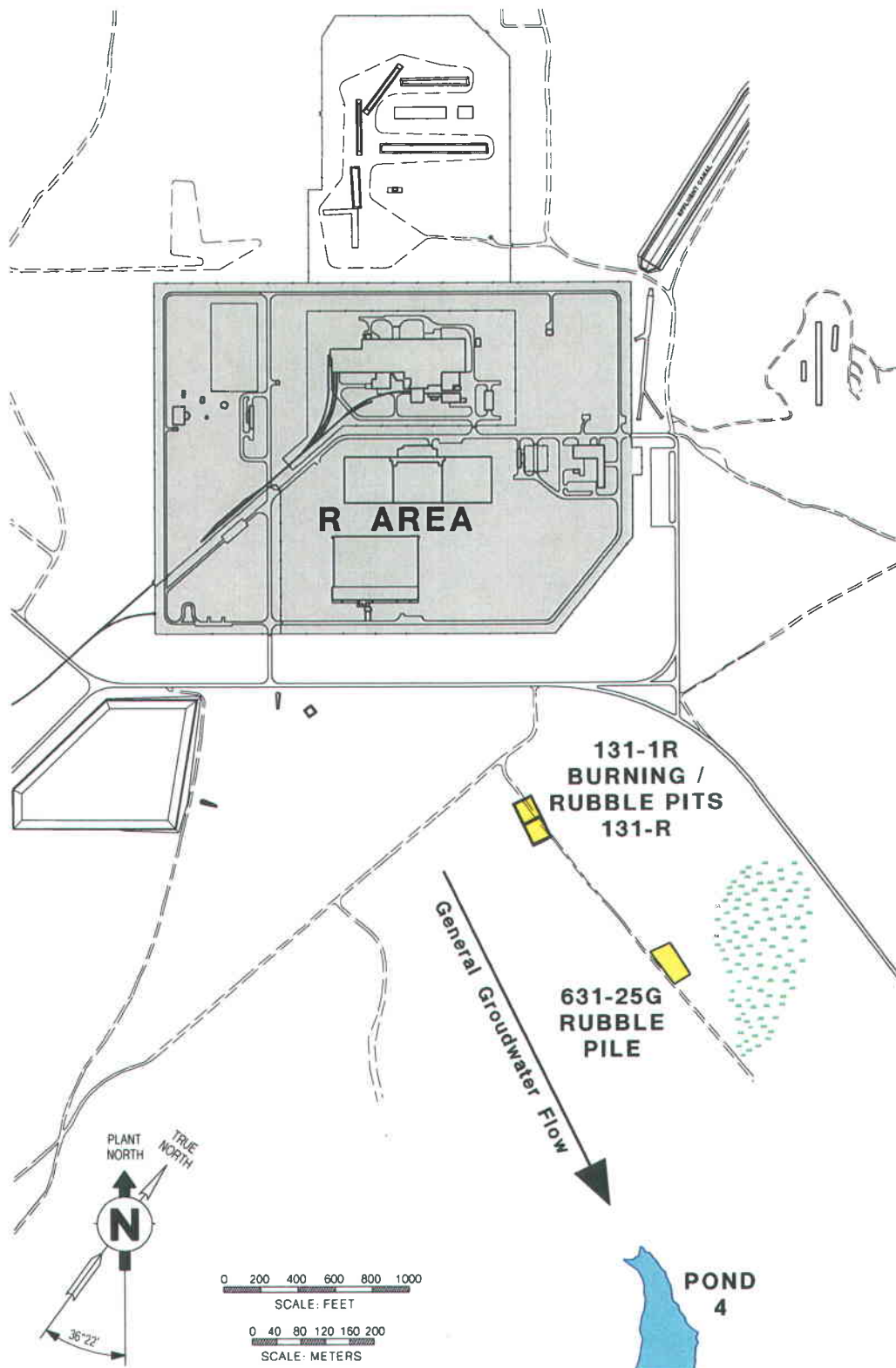


Figure 2. Layout of the RBRP/RRP at SRS

Land and Resource Use

The RBRP/RRP OU is located in an industrial area. The future land use for RBRP/RRP OU is anticipated to remain industrial.

History of Contamination

RBRP-Pit 131-R and 131-1R and Perimeter Soils

RBRP is located 1,100 ft southeast of R-Reactor Area. RBRP comprises two parallel burial trenches, each approximately 230 x 30 ft. One of the pits (131-R) was backfilled with soil to grade. When operational, this pit was 13 ft deep. The other pit (131-1R) remained open until 2005. When operational, the open pit was 10 ft deep, but waste disposal and subsequent erosion of the side slopes into the pit brought the current floor of the pit to 8 ft below local grade. The combined area of both pits was 13,800 ft².

Few historical records of specific activities at RBRP are known to exist; however, the general operational history of burning/rubble pits at SRS is known. Burning/rubble pits at SRS were used from 1951 to 1973 for periodic burning of combustible wastes such as wood, cardboard, paper, plastics, rubber, rags, oils, and organic liquids of unknown use or origin. Burning in open pits at SRS was discontinued in 1973; after that time, the pits that were still active continued to receive inert debris such as scrap metal and construction materials. Disposal in burning/rubble pits at SRS ended by 1983. Because R Area ceased operation in May 1964, disposal activities at RBRP probably ceased before 1964 or shortly thereafter. A historical document search indicates that RBRP was active in 1959 and suggests that low-level radiological waste was inadvertently placed in the pit. Concrete monuments, typical of those used to mark radiological waste burial sites, are installed at both ends of the closed pit 131-R. However, no radiological contamination has been found at RBRP.

RRP – Pile and Soil Beneath Pile

The RRP is an area of approximately 0.7 acre where miscellaneous debris was placed on the ground, forming one contiguous pile generally 2 to 3 ft deep. RRP is 2,300 ft southeast of R-Reactor Area. Disposal practices at the unit likely consisted of dumping truckloads of waste on the land surface. An abandoned road constructed prior to SRS operations passes through the southwestern corner of RRP. The road was paved, and residual asphalt is visible. RRP was in the process of being cleaned up under the SRS general maintenance housekeeping program in January 1991 when workers discovered protective boot covers similar to those used in radioactive work among the debris. The work was halted, and a radiation survey was performed on February 3, 1991. No detectable contamination was found, indicating the boot covers were disposed of as clean waste. The pile consists of a mixture of debris and soil. Debris identified in the pile includes miscellaneous construction materials, friable asbestos material, stainless steel shavings, empty 55-gallon drums, approximately fifteen 25-gallon containers, railroad ties, building insulation, floor and ceiling tiles, lawn wastes, light bulbs, coiled metal, and small amounts of coal and ash. Friable asbestos is present in a large portion of the unit, which has been barricaded to prevent unprotected personnel from entering the area. The disposal dates are unknown, but because R Area was shut down in May 1964, disposal activities probably ceased before 1964 or shortly thereafter.

Wetland

A delineated wetland borders RRP on the east. The wetland is addressed as a subunit based on its proximity to the rubble pile. The wetland was dry during Pre-Work Plan characterization in 2000. However, it became saturated during the spring of 2003 and is now occasionally wet. No pathways such as ditches have been identified that would transport contamination from RRP to the wetland. Although no pathways for contaminant transport have been identified, the wetland is assessed as a subunit that could have been impacted by RRP. The total area of the wetland is approximately 13 acres. Characterization of the wetland (1999 to 2000) indicated that there is no problem

warranting action in the wetland area because no constituents of concern (COCs) were identified.

Groundwater

Groundwater flow is southeast toward Pond 4. The water table aquifer is believed to discharge to Pond 4, approximately 2,600 ft southeast of the unit. Groundwater monitoring data indicates that there are no COCs for groundwater. All groundwater monitoring well data is below detection limits for contaminants. There is no groundwater problem warranting action for the RBRP/RRP OU.

IV. Remedial Actions

Remedy Selection

The RCRA Facility Investigation/Remedial Investigation (RFI/RI) with Baseline Risk Assessment (BRA) concluded that only the RBRP and RRP sub-units have RCOCs and need remedial action. Therefore, remedial action objectives (RAOs) are developed for these sub-units. No RCOCs were identified for the perimeter pit soils, groundwater, or wetland; thus, RAOs are not developed for these sub-units.

The RAOs for RBRP are as follows:

- prevent contaminants from leaching to groundwater above maximum contaminant levels/preliminary remediation goals (MCLs/PRGs)
- prevent future industrial worker and residential exposure to soil contaminants
- prevent ecological receptors from exposure to soil contaminants

The RAOs for RRP are as follows:

- prevent constituents from leaching to groundwater above MCLs/PRGs
- prevent ecological receptors from exposure to pile and soil contaminants

- prevent future industrial worker exposure to lead and friable asbestos; and to prevent residential exposure to soil contaminants

The selected remedy for the RBRP/RRP is consolidation of Resource Conservation and Recovery Act (RCRA) non-hazardous rubble pile material into/over the open rubble pit subunit, low permeability cover over the combination (pits and non-hazardous pile material), offsite disposal of any RCRA hazardous pile materials, and institutional controls (IC) for 131-R/131-1R.

The selected remedy included the following:

- Excavation of the soil that exceeds the industrial RG levels from the rubble pile material (including 1 ft beneath the rubble pile). The soil removed was segregated as RCRA hazardous and RCRA non-hazardous based on RCRA requirements. The non-hazardous soil was placed into the open R-Area Burning Rubble Pits subunit. The open pit was backfilled to grade with rubble pile material, placing any remaining RCRA non-hazardous rubble pile material over both pits.
- A low permeability cover system was installed over both pits.
- Institutional controls consist of long-term site maintenance (repair of erosion damage and maintaining warning signs) and site controls (deed notifications/restrictions). The objective of institutional controls is to prevent residential use of property that is identified as a waste unit used for hazardous material management. The land use controls ensure no construction on, excavation of, or breaching of the low-permeability cover. Institutional controls and/or land use controls included in the selected remedy to achieve this objective are property record notices and restrictions, other notices, Site Use Program controls, warning signs, and security surveillance measures.

Groundwater monitoring data indicates that there are no COCs for groundwater. All groundwater monitoring data is below detection limits for contaminants. No remedial action was warranted for groundwater for the RBRP/RRP OU.

Remedy Implementation

The field implementation (construction) of the RA at the RBRP/RRP OU was completed in accordance with the approved Corrective Measures Implementation/ Remedial Action Implementation Plan (CMI/RAIP). Therefore, the RAOs established in the ROD have been met.

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 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 will prevent human exposure to contaminated media.
- The assumptions used at the time of the remedy selection are still valid.
- The transfer of contaminants to groundwater above MCLs has been prevented by the consolidation of RCRA non-hazardous rubble pile material into/over the open rubble pit subunit, the installation of a low permeability geosynthetic closure cover system over the combination (pits and non-hazardous pile material), and the offsite disposal of RCRA hazardous pile materials. Post construction well sampling data indicate no

change in groundwater contaminant concentrations. See Table 2 for well sampling data.

- No other 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.

X. Project Costs

Costs associated with the selected remedy for RBRP & RP include operation and maintenance costs of the soil cover and institutional controls. The estimated operation and maintenance cost associated with the selected remedy is \$101,084, which was discounted at 3.9% per year. This is a present worth cost, including 30 years of maintenance activities. The remedy was under construction in fiscal year 2006; therefore, the actual operation and maintenance cost cannot be assessed at this time.

Table 2. Cap Performance for RBRP (Cap completed Nov, 2005). Monitoring Wells: RRP 3 and RRP 4.

| RBRP: All the Data (1984-2007) | | | | |
|--------------------------------|---------------------|------------|-------|-------------|
| SAMPLES (N) | | STATION ID | | |
| ANALYTE NAME | Qualified Detection | RRP 3 | RRP 4 | Grand Total |
| CADMIUM | ND | 16 | 17 | 33 |
| | Yes | 2 | 2 | 4 |
| COPPER | ND | 6 | 7 | 13 |
| | Yes | 12 | 6 | 18 |
| LEAD | ND | 21 | 27 | 48 |
| | Yes | 8 | 4 | 12 |
| TETRACHLOROETHYLENE (PCE) | ND | 18 | 15 | 33 |
| | Yes | 2 | 2 | 4 |
| THALLIUM | ND | 5 | 5 | 10 |
| | Yes | 2 | 2 | 4 |
| Grand Total | | 92 | 87 | 179 |

| RBRP: All the Data (1984-2007) | | | | |
|--------------------------------|---------------------|------------|-------|-------------|
| Max RESULT | | STATION ID | | |
| ANALYTE NAME | Qualified Detection | RRP 3 | RRP 4 | Grand Total |
| CADMIUM | ND | 12 | 12 | 12 |
| | Yes | 25 | 25 | 25 |
| COPPER | ND | 43 | 33 | 43 |
| | Yes | 67.9 | 60 | 67.9 |
| LEAD | ND | 26 | 47 | 47 |
| | Yes | 23.8 | 20 | 23.8 |
| TETRACHLOROETHYLENE (PCE) | ND | 5 | 2 | 5 |
| | Yes | 1 | 1 | 1 |
| THALLIUM | ND | 20 | 20 | 20 |
| | Yes | 20 | 20 | 20 |

Third Five-Year Review Report (U)
R- Area Burning/Rubble Pits and Rubble Pile OU (U)
Savannah River Site, December 2008

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Table 2. Cap Performance for RBRP (Cap completed Nov, 2005). Monitoring Wells: RRP 3 and RRP 4. (Continued)

| RBRP: Post Construction Data (2007) | | | | |
|-------------------------------------|----------------------|------------|-------|-------------|
| Max RESULT | | STATION ID | | |
| ANALYTE NAME | Qualified Detections | RRP 3 | RRP 4 | Grand Total |
| COPPER | Yes | 1.93 | 7.31 | 7.31 |
| LEAD | Yes | | 2.07 | 2.07 |
| Grand Total | | 1.93 | 7.31 | 7.31 |

There is only **one** sample event since the Cap was completed (6/7/2006). The only qualified detections in RRP 3 and RRP 4 since 2001 are lead and copper. However, these analytes were consistently detected before the Cap was emplaced and are likely due to rusting/leaching from brass fittings in the well pumps.

XI. Protectiveness Statement(s)

The selected remedy of Consolidation for RBRP/RRP is protective of human health and the environment. This remedy is protective because receptors will not be exposed to contamination above the appropriate remedial goals (RGs). This remedy is also protective because of the permanent removal of RCRA hazardous waste from RRP. Exposure pathways that could result in unacceptable risks are controlled by the low permeability cover system and the institutional controls in place while USDOE controls the OU. These controls 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).

XII. Next Review

The next five-year review is scheduled for February 12, 2014.

ATTACHMENT 1

Documents Reviewed

WSRC-RP-2000-4046, *RCRA Facility Investigation/Remedial Investigation Work Plan for the R-Area Burning/Rubble Pits (131-R and 131-1R) and Rubble Pile (631-25G) (U)*, Revision 1, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

WSRC-RP-2002-4183, *RCRA Facility Investigation/Remedial Investigation Work Plan Addendum Including Baseline Risk Assessment for the R-Area Burning/Rubble Pits (131-R AND 131-1R) and Rubble Pile (631-25G) Operable Unit*, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

WSRC-RP-2003-4117, *Statement of Basis/Proposed Plan for the R-Area Burning/Rubble Pits (131-R and 131-1R) and Rubble Pile (631-25G) Operable Unit (U)*, Revision 1.1, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

WSRC-RP-2004-4004, *Record of Decision Remedial Alternative Selection for the R-Area Burning/Rubble Pits (131-R and 131-1R) and Rubble Pile (631-25G) Operable Unit (U)*, Revision 1, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

WSRC-RP-2006-4002, *Post-Construction Report/Corrective Measures Implementation Report/Final Remediation Report for the R-Area Burning/Rubble Pits (131-R And 131-1R) and R-Area Rubble Pile (631-25G) Operable Unit (U)*, Washington Savannah River Company, Savannah River Site, Aiken, SC

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ATTACHMENT 2

Five-Year Review Site Inspection Checklist for RBRP & RP

| I. SITE INFORMATION | | | |
|---|---|------------------------------------|---|
| Site Name: | R-Area Burning/Rubble Pits and Rubble Pile Operable Unit (OU) | Date of Inspection: | 9/24/2007 |
| Location and Region: | SRS, USEPA Region IV | EPA ID: | SC1890008989 |
| Agency, office, or company leading the five-year review: | United States Department of Energy | CERCLIS OU No.: | 43 |
| | | Weather/Temperature: | Clear and Sunny, 90°F |
| Remedy Includes: (Check all that apply) <div style="display: flex; flex-wrap: wrap;"><div style="width: 50%;"><input checked="" type="checkbox"/> Cover system <input type="checkbox"/> Access controls <input checked="" type="checkbox"/> Institutional Controls <input type="checkbox"/> Groundwater pump and treatment <input type="checkbox"/> Surface water collection and treatment <input checked="" type="checkbox"/> Other: ExcavationConsolidation</div><div style="width: 50%;"><input type="checkbox"/> Monitored Natural Attenuation <input type="checkbox"/> Groundwater Containment <input type="checkbox"/> Vertical Barrier Walls</div></div> | | | |
| Attachments: <input type="checkbox"/> Inspection team roster attached <input type="checkbox"/> Site map attached | | | |
| II. INTERVIEWS (Check all that apply) | | | |
| 1. O & M Site Manager | | | |
| | _____ (Name) | _____ (Title) | _____ (Date) |
| Interviewed: | <input type="checkbox"/> at site | <input type="checkbox"/> at office | <input type="checkbox"/> by phone Phone No. _____ |
| Problems, suggestions: | <input type="checkbox"/> report attached _____ | | |
| 2. O & M Staff | | | |
| | _____ (Name) | _____ (Title) | _____ (Date) |
| Interviewed: | <input type="checkbox"/> at site | <input type="checkbox"/> at office | <input type="checkbox"/> by phone Phone No. _____ |
| Problems, suggestions: | <input type="checkbox"/> report attached _____ | | |

Five-Year Review Site Inspection Checklist (Continued)

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

| | | | |
|---|--|-------------------------------------|------------------------------|
| <input type="checkbox"/> O & M Manual | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |
| x As-built drawings | x Readily available | x Up to date | <input type="checkbox"/> N/A |
| <input type="checkbox"/> Maintenance Logs | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |

Remarks: See Waste Unit Inspection and Maintenance, ER-SOP-019

Five-Year Review Site Inspection Checklist (Continued)

| | | | |
|--|--|-------------------------------------|-------|
| 2. Site-Specific Health and Safety Plan | | | |
| <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A | |
| <input type="checkbox"/> Contingency plan/emergency response plan | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |
| Remarks: <u>Routine O&M activities do not require an SSHASP under 29 CFR 1910.1201, HAZWOPER</u> | | | |
| 3. O & M and OSHA Training Records | | | |
| x Readily available | x Up to date | <input type="checkbox"/> N/A | |
| Remarks _____ | | | |
| 4. Permits and Service Agreements | | | |
| <input type="checkbox"/> Air discharge permit | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |
| <input type="checkbox"/> Effluent discharge | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |
| <input type="checkbox"/> Waste Disposal, POTW | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |
| <input type="checkbox"/> Other permits | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |
| Remarks _____ | | | |
| 5. Gas Generation Records | | | |
| <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A | |
| Remarks _____ | | | |
| 6. Settlement Monument Records | | | |
| <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A | |
| Remarks _____ | | | |
| 7. Groundwater Monitoring Records | | | |
| <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A | |
| Remarks _____ | | | |
| 8. Leachate Extraction Records | | | |
| <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A | |
| Remarks _____ | | | |
| 9. Discharge Compliance Records | | | |
| <input type="checkbox"/> Air | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |
| <input type="checkbox"/> Water (effluent) | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |
| Remarks _____ | | | |
| 10. Daily Access/Security Logs | | | |
| <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A | |
| Remarks _____ | | | |

Five-Year Review Site Inspection Checklist (Continued)

| IV. O & M Costs | | | | | | | | | | | | | | | | | | | | | | | |
|---|--------------------|------------|---|----------------------|--------------------|------------|---|----------------------|--------------------|------------|---|----------------------|--------------------|------------|---|----------------------|--------------------|------------|---|----------------------|--------------------|------------|---|
| 1. O & M Organization <div style="display: flex; justify-content: space-between; margin-top: 10px;"><div><input type="checkbox"/> State in-house</div><div><input type="checkbox"/> Contractor for State</div></div> <div style="display: flex; justify-content: space-between; margin-top: 10px;"><div><input type="checkbox"/> PRP in-house</div><div><input type="checkbox"/> Contractor for PRP</div></div> <div style="margin-top: 10px;">x Other: <u>SRS</u></div> | | | | | | | | | | | | | | | | | | | | | | | |
| 2. O & M Cost Records <div style="display: flex; justify-content: space-between; margin-top: 10px;"><div><input type="checkbox"/> Readily available</div><div><input type="checkbox"/> Up to date</div><div><input type="checkbox"/> Funding mechanism/agreement in place</div></div> <div style="margin-top: 10px;">x Other: <u>Project cost data is summarized in Section X of attached review: WSRC-RP-2007-4063</u></div> <div style="margin-top: 20px; text-align: center;">Total annual cost by year for review period if available</div> <table style="width: 100%; border-collapse: collapse;"><tbody><tr><td style="width: 20%;">From _____ (Date)</td><td style="width: 20%;">To _____ (Date)</td><td style="width: 40%; border-bottom: 1px solid black; text-align: center;">Total cost</td><td style="width: 20%; text-align: right;"><input type="checkbox"/> Breakdown attached</td></tr><tr><td>From _____ (Date)</td><td>To _____ (Date)</td><td style="border-bottom: 1px solid black; text-align: center;">Total cost</td><td style="text-align: right;"><input type="checkbox"/> Breakdown attached</td></tr><tr><td>From _____ (Date)</td><td>To _____ (Date)</td><td style="border-bottom: 1px solid black; text-align: center;">Total cost</td><td style="text-align: right;"><input type="checkbox"/> Breakdown attached</td></tr><tr><td>From _____ (Date)</td><td>To _____ (Date)</td><td style="border-bottom: 1px solid black; text-align: center;">Total cost</td><td style="text-align: right;"><input type="checkbox"/> Breakdown attached</td></tr><tr><td>From _____ (Date)</td><td>To _____ (Date)</td><td style="border-bottom: 1px solid black; text-align: center;">Total cost</td><td style="text-align: right;"><input type="checkbox"/> Breakdown attached</td></tr></tbody></table> | | | | From _____ (Date) | To _____ (Date) | Total cost | <input type="checkbox"/> Breakdown attached | From _____ (Date) | To _____ (Date) | Total cost | <input type="checkbox"/> Breakdown attached | From _____ (Date) | To _____ (Date) | Total cost | <input type="checkbox"/> Breakdown attached | From _____ (Date) | To _____ (Date) | Total cost | <input type="checkbox"/> Breakdown attached | From _____ (Date) | To _____ (Date) | Total cost | <input type="checkbox"/> Breakdown attached |
| From _____ (Date) | To _____ (Date) | Total cost | <input type="checkbox"/> Breakdown attached | | | | | | | | | | | | | | | | | | | | |
| From _____ (Date) | To _____ (Date) | Total cost | <input type="checkbox"/> Breakdown attached | | | | | | | | | | | | | | | | | | | | |
| From _____ (Date) | To _____ (Date) | Total cost | <input type="checkbox"/> Breakdown attached | | | | | | | | | | | | | | | | | | | | |
| From _____ (Date) | To _____ (Date) | Total cost | <input type="checkbox"/> Breakdown attached | | | | | | | | | | | | | | | | | | | | |
| From _____ (Date) | To _____ (Date) | Total cost | <input type="checkbox"/> Breakdown attached | | | | | | | | | | | | | | | | | | | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | | | |
|--|---------------------------------|---|--|--|
| B. Other Access Restrictions | | | | |
| 1. Signs and other security measures | | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> N/A | |
| Remarks: <u>Signs at this site are in good condition.</u> | | | | |
| C. Institutional Controls | | | | |
| 1. Implementation and enforcement | | | | |
| Site conditions imply ICs not properly implemented: | | <input type="checkbox"/> Yes | <input checked="" type="checkbox"/> No | <input type="checkbox"/> N/A |
| Site conditions imply ICs not being fully enforced: | | <input type="checkbox"/> Yes | <input checked="" type="checkbox"/> No | <input type="checkbox"/> N/A |
| Type of monitoring (e.g., self-reporting, drive-by): | | Field Walk Down | | |
| Frequency: | Annually | | | |
| Responsible party/agent: | DOE Savannah River Field Office | | | |
| Contact: | R. Stubblefield (Name) | Waste Area Group Manager (Title) | 09/3/07 (Date) | (803) 952-7817 (Phone No.) |
| Reporting is up-to-date: | | <input checked="" type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="checkbox"/> N/A |
| Reports are verified by the lead agency: | | <input checked="" type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="checkbox"/> N/A |
| Specific requirements in deed of decision documents have been met: | | <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input checked="" type="checkbox"/> N/A |
| Violations have been reported: | | <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input checked="" type="checkbox"/> N/A |
| Other problems or suggestions: | | <input type="checkbox"/> Report attached | | |
| | | | | |
| | | | | |
| | | | | |
| 2. Adequacy | | | | |
| <input checked="" type="checkbox"/> ICs are adequate | | <input type="checkbox"/> ICs are inadequate | | <input type="checkbox"/> N/A |
| Remarks: _____ | | | | |
| | | | | |
| D. General | | | | |
| 1. Vandalism/trespassing | | <input type="checkbox"/> Location shown on site map | | <input checked="" type="checkbox"/> No vandalism evident |
| Remarks: _____ | | | | |
| | | | | |
| | | | | |
| 2. Land use changes onsite | | <input checked="" type="checkbox"/> N/A | | |
| Remarks: _____ | | | | |
| | | | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | | |
|--|--|--------------|--|
| 3. Land use changes offsite <input checked="" type="checkbox"/> N/A | | | |
| Remarks _____ | | | |
| | | | |
| VI. GENERAL SITE CONDITIONS | | | |
| A. Roads <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A | | | |
| 1. Roads damaged <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Roads adequate <input type="checkbox"/> N/A | | | |
| Remarks _____ | | | |
| | | | |
| B. Other site Conditions | | | |
| Remarks _____ | | | |
| | | | |
| | | | |
| VII. COVER SYSTEMS <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A | | | |
| A. Soil Surface | | | |
| 1. Settlement (Low spots) <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Settlement not evident | | | |
| Areal extent _____ | | Depth _____ | |
| Remarks _____ | | | |
| | | | |
| 2. Cracks <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Cracking not evident | | | |
| Lengths _____ | | Widths _____ | |
| | | Depths _____ | |
| Remarks _____ | | | |
| | | | |
| 3. Erosion <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Erosion not evident | | | |
| Areal extent _____ | | Depth _____ | |
| Remarks _____ | | | |
| | | | |
| 4. Holes <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Holes not evident | | | |
| Areal extent _____ | | Depth _____ | |
| Remarks _____ | | | |
| | | | |
| 5. Vegetative Cover <input checked="" type="checkbox"/> Grass <input type="checkbox"/> Cover properly established <input checked="" type="checkbox"/> No signs of stress | | | |
| <input type="checkbox"/> Trees/shrubs (indicate size and location on a diagram) | | | |
| Remarks _____ | | | |
| | | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | |
|---|--|------------------------------------|
| 6. | Alternative Cover (armored rock, concrete, etc.) | x N/A |
| Remarks _____ | | |
| 7. | Bulges <input type="checkbox"/> Location shown on site map | x Bulges not evident |
| Areal extent _____ Height _____ Remarks _____ | | |
| 8. | Wet Areas/Water Damage <input checked="" type="checkbox"/> Wet areas/water damage not evident | |
| <input type="checkbox"/> Wet Areas <input type="checkbox"/> Location shown on site map Areal extent _____ <input type="checkbox"/> Ponding <input type="checkbox"/> Location shown on site map Areal extent _____ <input type="checkbox"/> Seeps <input type="checkbox"/> Location shown on site map Areal extent _____ <input type="checkbox"/> Soft subgrade <input type="checkbox"/> Location shown on site map Areal extent _____ Remarks _____ | | |
| 9. | Slope Instability <input type="checkbox"/> Slides <input type="checkbox"/> Location shown on site map | x No evidence of slope instability |
| Areal extent _____ Remarks _____ | | |
| B. Benches <input type="checkbox"/> Applicable x 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 <input type="checkbox"/> Location shown on site map <input type="checkbox"/> N/A or okay | |
| Remarks _____ | | |
| 2. | Bench Breached <input type="checkbox"/> Location shown on site map <input type="checkbox"/> N/A or okay | |
| Remarks _____ | | |
| 3. | Bench Overtopped <input type="checkbox"/> Location shown on site map <input type="checkbox"/> N/A or okay | |
| Remarks _____ | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | |
|---|--|--|
| C. Letdown Channels <input type="checkbox"/> Applicable x 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 | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> No evidence of settlement |
| Areal extent _____ Depth _____ | | |
| Remarks _____ | | |
| 2. Material Degradation | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> No evidence of degradation |
| Material type _____ Areal extent _____ | | |
| Remarks _____ | | |
| 3. Erosion | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> No evidence of erosion |
| Areal extent _____ Depth _____ | | |
| Remarks _____ | | |
| 4. Undercutting | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> No evidence of undercutting |
| Areal extent _____ Depth _____ | | |
| Remarks _____ | | |
| 5. Obstructions | Type _____ | <input type="checkbox"/> No obstructions |
| <input type="checkbox"/> Location shown on site map | Areal extent _____ | Size _____ |
| Remarks _____ | | |
| 6. Excessive Vegetative Growth | Type _____ | |
| <input type="checkbox"/> No evidence of excessive growth | <input type="checkbox"/> Vegetation in channels does not obstruct flow | |
| <input type="checkbox"/> Location shown on site map | Areal extent _____ | |
| Remarks _____ | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | | |
|--|--|---|---|
| D. Cover Penetrations <input type="checkbox"/> Applicable x N/A | | | |
| 1. Gas Vents <input type="checkbox"/> Active <input type="checkbox"/> Passive | | | |
| <input type="checkbox"/> Properly secured/locked | <input type="checkbox"/> Functioning | <input type="checkbox"/> Routinely sampled | <input type="checkbox"/> Good condition |
| <input type="checkbox"/> Evidence of leakage at penetration | <input type="checkbox"/> Needs Maintenance | <input type="checkbox"/> N/A | |
| Remarks _____ | | | |
| _____ | | | |
| 2. Gas Monitoring Probes | | | |
| <input type="checkbox"/> Properly secured/locked | <input type="checkbox"/> Functioning | <input type="checkbox"/> Routinely sampled | <input type="checkbox"/> Good condition |
| <input type="checkbox"/> Evidence of leakage at penetration | <input type="checkbox"/> Needs Maintenance | <input type="checkbox"/> N/A | |
| Remarks _____ | | | |
| _____ | | | |
| 3. Monitoring Wells | | | |
| <input type="checkbox"/> Properly secured/locked | <input type="checkbox"/> Functioning | <input type="checkbox"/> Routinely sampled | <input type="checkbox"/> Good condition |
| <input type="checkbox"/> Evidence of leakage at penetration | <input type="checkbox"/> Needs Maintenance | <input type="checkbox"/> N/A | |
| Remarks _____ | | | |
| _____ | | | |
| 4. Leachate Extraction Wells | | | |
| <input type="checkbox"/> Properly secured/locked | <input type="checkbox"/> Functioning | <input type="checkbox"/> Routinely sampled | <input type="checkbox"/> Good condition |
| <input type="checkbox"/> Evidence of leakage at penetration | <input type="checkbox"/> Needs Maintenance | <input type="checkbox"/> N/A | |
| Remarks _____ | | | |
| _____ | | | |
| 5. Settlement Monuments <input type="checkbox"/> Located <input type="checkbox"/> Routinely surveyed <input type="checkbox"/> N/A | | | |
| Remarks _____ | | | |
| _____ | | | |
| E. Gas Collection and Treatment <input type="checkbox"/> Applicable x N/A | | | |
| 1. Gas Treatment Facilities | | | |
| <input type="checkbox"/> Flaring | <input type="checkbox"/> Thermal destruction | <input type="checkbox"/> Collection for reuse | |
| <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance | | |
| Remarks _____ | | | |
| _____ | | | |
| 2. Gas Collection Wells, Manifolds and Piping | | | |
| <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance | | |
| Remarks _____ | | | |
| _____ | | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | | |
|--|--|--|--|
| 3. Gas Monitoring Facilities (e.g., gas monitoring of adjacent homes or buildings) <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A Remarks _____ _____ | | | |
| F. Cover Drainage Layer <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A | | | |
| 1. Outlet Pipes Inspected <input type="checkbox"/> Functioning <input type="checkbox"/> N/A Remarks _____ _____ | | | |
| 2. Outlet Rock Inspected <input type="checkbox"/> Functioning <input type="checkbox"/> N/A Remarks _____ _____ | | | |
| G. Detention/sedimentation Ponds <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A | | | |
| 1. Siltation Areal extent _____ Depth _____ <input type="checkbox"/> N/A <input type="checkbox"/> Siltation not evident Remarks _____ _____ | | | |
| 2. Erosion Areal extent _____ Depth _____ <input type="checkbox"/> N/A <input type="checkbox"/> Erosion not evident Remarks _____ _____ | | | |
| 3. Outlet Works <input type="checkbox"/> Functioning <input type="checkbox"/> N/A Remarks _____ _____ | | | |
| 4. Dam <input type="checkbox"/> Functioning <input type="checkbox"/> N/A Remarks _____ _____ | | | |
| H. Retaining Walls <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A | | | |
| 1. Deformations <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Deformation not evident Horizontal displacement _____ Vertical displacement _____ Rotational displacement _____ Remarks _____ _____ | | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | |
|--|---|--|
| 2. Degradation | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> Deformation not evident |
| Remarks _____ | | |
| I. Perimeter Ditches/Off-Site Discharge <input type="checkbox"/> Applicable x N/A | | |
| 1. Siltation | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> Siltation not evident |
| Areal extent _____ Depth _____ | | |
| Remarks _____ | | |
| 2. Vegetative Growth | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> Siltation not evident |
| <input type="checkbox"/> Vegetation does not impede flow | | |
| Areal extent _____ Type _____ | | |
| Remarks _____ | | |
| 3. Erosion | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> Erosion not evident |
| Areal extent _____ Depth _____ | | |
| Remarks _____ | | |
| 4. Discharge Structure | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> N/A |
| Remarks _____ | | |
| VIII. VERTICAL BARRIER WALLS <input type="checkbox"/> Applicable x N/A | | |
| 1. Settlement | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> Settlement not evident |
| Areal extent _____ Depth _____ | | |
| Remarks _____ | | |
| 2. Performance Monitoring | Type of Monitoring _____ | <input type="checkbox"/> Performance not monitored |
| Frequency _____ <input type="checkbox"/> Evidence of breaching Head differential _____ | | |
| Remarks _____ | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | | |
|---|--|-------------------------------------|------------------------------|
| IX. GROUNDWATER/SURFACE WATER REMEDIES | | x Applicable | <input type="checkbox"/> N/A |
| A. Groundwater Extraction Wells, Pumps, and Pipelines | | <input type="checkbox"/> Applicable | x N/A |
| 1. Pumps, Wellhead Plumbing, and Electrical <input type="checkbox"/> Good condition <input type="checkbox"/> All required wells located <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A Remarks _____ _____ | | | |
| 2. Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____ _____ | | | |
| 3. Spare Parts and Equipment <input type="checkbox"/> Readily available <input type="checkbox"/> Good condition <input type="checkbox"/> Requires upgrade <input type="checkbox"/> Needs to be provided Remarks _____ _____ | | | |
| B. Surface Water Collection Structures, Pumps, and Pipelines | | <input type="checkbox"/> Applicable | x N/A |
| 1. Collection Structures, Pumps, and Electrical <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____ _____ | | | |
| 2. Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____ _____ | | | |
| 3. Spare Parts and Equipment <input type="checkbox"/> Readily available <input type="checkbox"/> Good condition <input type="checkbox"/> Requires upgrade <input type="checkbox"/> Needs to be provided Remarks _____ _____ | | | |

Five-Year Review Site Inspection Checklist (Continued)

| C. Treatment System | | <input type="checkbox"/> Applicable | <input checked="" type="checkbox"/> N/A |
|---|--|---|--|
| 1. Treatment Train (Check components that apply) | | | |
| <input type="checkbox"/> Metals removal | <input type="checkbox"/> Oil/water separation | <input type="checkbox"/> Bioremediation | |
| <input type="checkbox"/> Air stripping | <input type="checkbox"/> Carbon adsorbers | | |
| <input type="checkbox"/> Filters _____ | | | |
| <input type="checkbox"/> Additive (e.g., chelation agent, flocculent) _____ | | | |
| <input type="checkbox"/> Others _____ | | | |
| <input type="checkbox"/> Good condition | | <input type="checkbox"/> Needs Maintenance | |
| <input type="checkbox"/> Sampling ports properly marked and functional | | | |
| <input type="checkbox"/> Sampling/maintenance log displayed and up to date | | | |
| <input type="checkbox"/> Equipment properly identified | | | |
| <input type="checkbox"/> Quantity of groundwater treated annually _____ | | | |
| <input type="checkbox"/> Quantity of surface water treated annually _____ | | | |
| Remarks _____ | | | |
| _____ | | | |
| 2. Electrical Enclosures and Panels (properly rated and functional) | | | |
| <input type="checkbox"/> N/A | <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance | |
| Remarks _____ | | | |
| _____ | | | |
| 3. Tanks, Vaults, Storage Vessels | | | |
| <input type="checkbox"/> N/A | <input type="checkbox"/> Good condition | <input type="checkbox"/> Proper secondary containment | <input type="checkbox"/> Needs Maintenance |
| Remarks _____ | | | |
| _____ | | | |
| 4. Discharge Structure and Appurtenances | | | |
| <input type="checkbox"/> N/A | <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance | |
| Remarks _____ | | | |
| _____ | | | |
| 5. Treatment Building(s) | | | |
| <input type="checkbox"/> N/A | <input type="checkbox"/> Good condition (esp. roof and doorways) | <input type="checkbox"/> Needs repair | |
| <input type="checkbox"/> Chemicals and equipment properly stored | | | |
| Remarks _____ | | | |
| _____ | | | |

Five-Year Review Site Inspection Checklist (Continued)

| | |
|---|---|
| 6. Monitoring Wells | |
| <input type="checkbox"/> Properly secured/locked | <input type="checkbox"/> Functioning <input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition |
| <input type="checkbox"/> All required wells located | <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A |
| Remarks _____ | |
| D. Monitoring Data <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A | |
| 1. Monitoring Data | |
| <input checked="" type="checkbox"/> Is routinely submitted on time | <input checked="" type="checkbox"/> Is of acceptable quality |
| 2 Monitoring Data Suggests: | |
| <input type="checkbox"/> Groundwater plume is effectively contained | <input checked="" type="checkbox"/> Contaminant concentrations are declining |
| Remarks: <u>Monitoring Data evaluates the effectiveness of the cover system.</u> | |
| E. Monitored Natural Attenuation <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A | |
| 1. Monitoring Wells (Natural attenuation remedy) | |
| <input type="checkbox"/> Properly secured/locked | <input type="checkbox"/> Functioning <input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition |
| <input type="checkbox"/> All required wells located | <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> 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 selected remedy consists of excavation and offsite disposal of RCRA hazardous waste material, and consolidation of RCRA non-hazardous waste under a low-permeability cover system. | |
| The remedy is effective and functioning as designed, as indicated by post construction well sampling data. | |

Five-Year Review Site Inspection Checklist (Continued)

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.

N/A

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R-AREA REACTOR SEEPAGE BASINS (904-57G, -58G, -59G, -60G, -103G, -104G) OPERABLE UNIT

I. Introduction

This is the first five-year review for the R-Area Reactor Seepage Basins (RRSB) (904-57G, -58G, -59G, -60G, -103G, -104G) and 108-4R Overflow Basin Operable Unit (OU). This review was conducted from August 2007 through September 2007. This report documents the results of the review.

II. OU Chronology

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

Table 1. Chronology of OU Events

| Event | Date |
|--|------------------|
| RFI/RI Field Start/Complete | 1995 - 2000 |
| Removal Action and Asphalt Cover Completed | 1996 |
| CMS/FS Rev 1 Submittal | January 30, 2003 |
| Record of Decision (ROD) Issuance | March 18, 2004 |
| Remedial Action Start | March 4, 2005 |
| Previous Five-Year Reviews | None |

III. Background

Physical Characteristics

R-Area is located in the east-central portion of Savannah River Site (SRS), west of Par Pond. The RRSB OU is located at the northern portion of the R-Reactor Area (Figures 1 and 2). The RRSB OU is located north of the R Reactor and straddles the boundary between the Upper Three Runs (UTR) and Lower Three Runs (LTR) watersheds. All six basins were constructed between June 1957 and March 1958 and received an estimated 5-million gallons of purge water from the R-Reactor disassembly basin. A non-routine discharge due to a calorimeter test failure in 1957 released approximately 2,700 curies (Ci) of radionuclides primarily to Basin 1 with Basins 2 through 5 receiving a lesser amount.

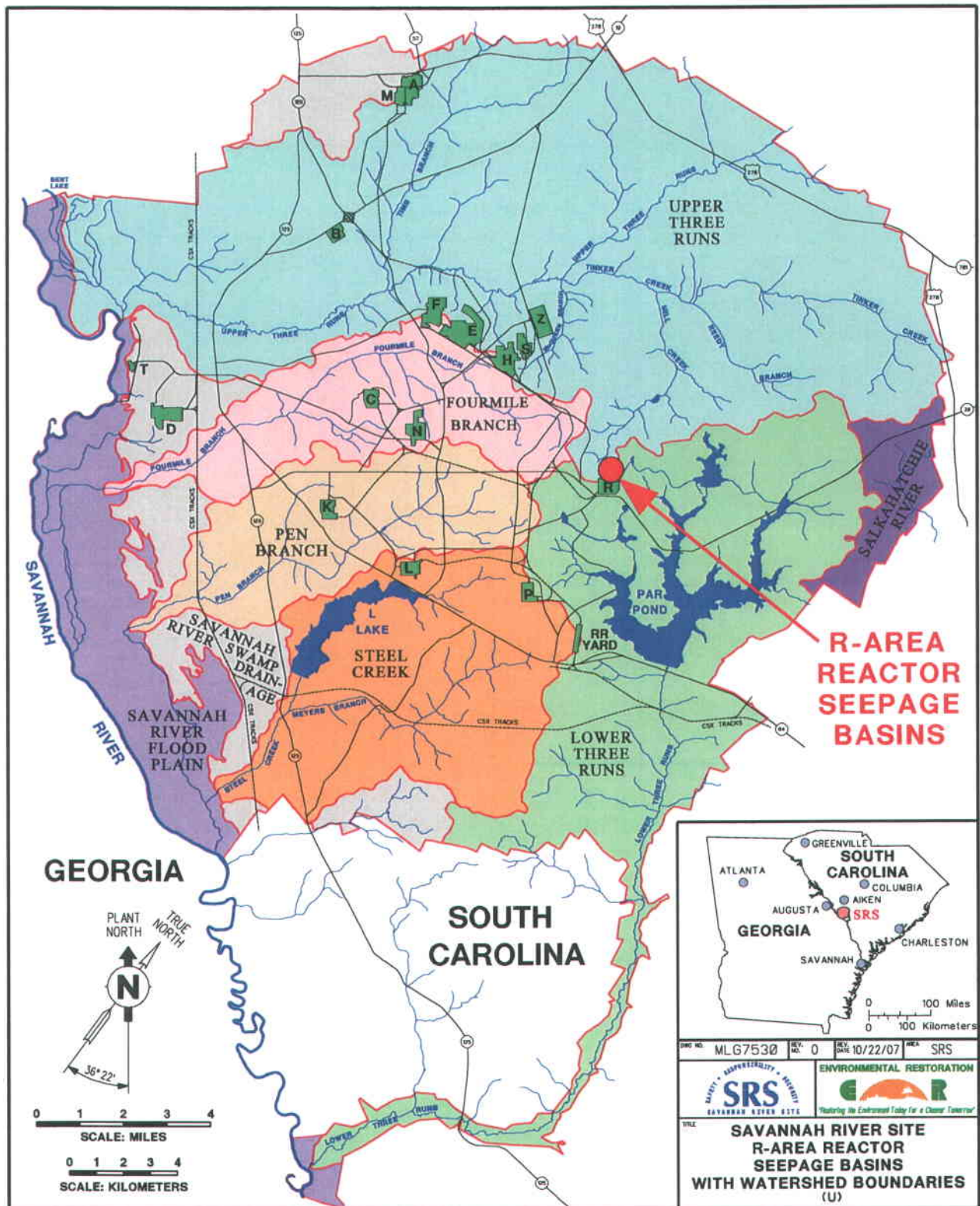


Figure 1. R-Area Reactor Seepage Basins Operable Unit

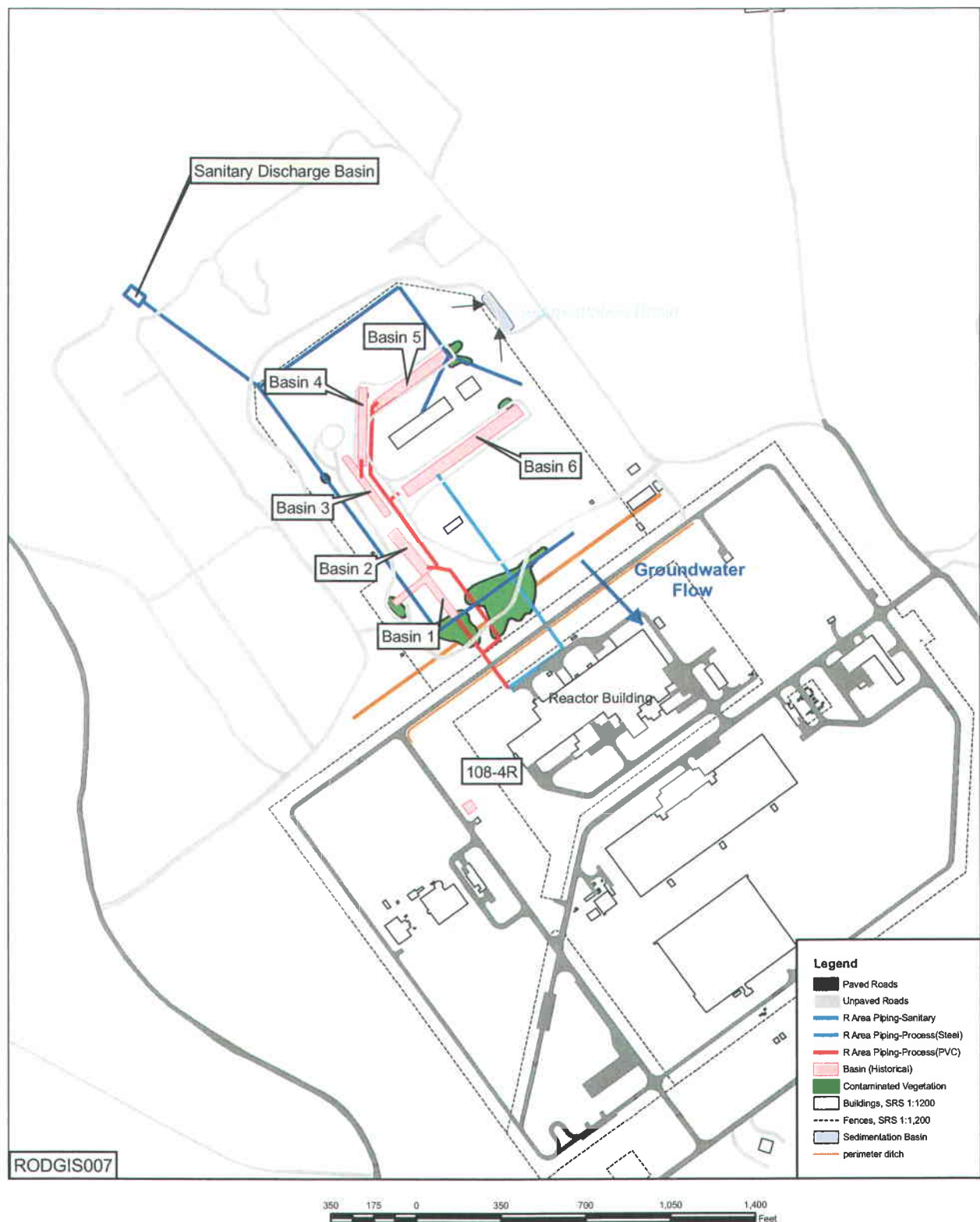


Figure 2. General Layout of the RRSB OU with Pipelines

Land and Resource Use

The RRSB OU is located in an industrial area. The future land use for RRSB OU is anticipated to remain industrial.

History of Contamination

Primary radionuclides present were strontium-90 (Sr-90) and cesium-137 (Cs-137). The abandoned process sewer lines extend from the R-Reactor disassembly basin to Basins 1 and 6. A sanitary sewer system was breached during the construction of Basins 1 and 5 and received the contaminated water discharged to the basins.

Basins 1 through 5 were all deactivated and backfilled by 1960. R Reactor was closed in 1964, and Basin 6 was deactivated that same year. Basin 6 was backfilled in 1977. In addition, between 1960 and 1963 (exact date unknown), clay dikes and caps were constructed around Basin 1 and northwest of Basin 3 to contain lateral movement of radionuclides and reduce infiltration. Currently, the RRSB consists of the following (shown in Figures 1 and 2):

- Seepage Basins 1 through 6
- Abandoned Process Sewer Lines
- Sanitary Sewer System (sewer lines and sanitary discharge lagoon)
- Surface Water and Sediment
- RRSB Groundwater, and
- 108-4R Overflow Basin

Surface drainage from the northwestern portion of the unit moves towards Mill Creek in the UTR watershed; and surface drainage from the southeastern portion of the unit moves towards the R-Area Effluent Canal, which discharges into the LTR watershed.

The 108-4R overflow basin was constructed to collect overflow from two adjacent underground storage tanks (USTs) within a vault (108-3R) that stored diesel fuel for standby generators in the R Reactor. The USTs were removed in March 1990, and associated piping was abandoned in place after being flushed and purged as directed by South Carolina Department of Health and Environmental Control (SCDHEC). Groundwater samples taken during excavation of the USTs indicated no detectable levels of contamination.

Initial Response

In 1996, the existing cover over the basins was contaminated with radioactive soil, vegetation, and fire ant mounds. The surface contamination was being spread by surface water runoff and wind. As documented in the Removal Site Evaluation Report for the R-Reactor Seepage Basin, Erosion Control, and Asphalt Cover Refurbishment (WSRC-RP-96-141), the spread of contamination over the ground surface warranted action. During the summer of 1996, a removal action was performed. The RRSB was treated with the herbicides RoundupTM and Garland 4TM and with the insecticides AmdroTM and SpikeTM prior to placing approximately 1.5 ft of clean soil over the existing asphalt emulsion and recontouring the surface to promote drainage. Following compaction, a 4-in layer of asphalt was placed over the clean soil, bringing the unit to its present condition. The area of the existing asphalt cover is 10.7 acres. No other removal action or remedial action has been conducted at the RRSB OU under CERCLA or any other authorities.

Basis for Taking Action

The primary source of contamination from, and within, the RRSB is purge water that was released to the seepage basins via process sewer lines. The purge water, containing tritium, Cs-137, Sr-90, and other radionuclides, originated from the reactor disassembly basin. An estimated total of 18,200,000 L (4,808,000 gal) of purge water containing approximately 3,276 Ci total activity was released to the seepage basins during their operation. The total activity cited here includes the 2,700 Ci identified following the 1957 release. Because of the large quantity of radioactivity in these historical releases, it

has been concluded that the subsurface soil associated with the basin bottoms, the process sewer lines, and the contaminated sections of the sanitary sewer line be considered PTSM..

IV. Remedial Actions

Remedy Selection

The selected remedy for the RRSB was as follows:

- Construction of a reinforced-concrete intruder barrier system over PTSM contained in the basins and PTSM waste trench, which consolidated waste from outside the RRSB boundary fence.
- Construction of an asphalt biobarrier over contaminated vegetation

Figure 3 depicts a conceptual layout of the remedy.

Remedy Implementation

This remedy entailed placing a reinforced-concrete intruder barrier over all PTSM. The intruder barrier will prevent future industrial workers or residents exposure by placing a hardened cover to deter digging or drilling into the buried contamination. The barrier was placed above the existing asphalt cover. The extent of PTSM has been determined using only Cs-137 because the extent of Sr-90 is encompassed by that of Cs-137. All contaminated process and sanitary sewer lines and associated soil located outside of the OU boundary were excavated and disposed of on-unit and covered with the intruder barrier. Contaminated vegetation was also disposed of (buried) on-unit under an asphalt biobarrier. The biobarrier will prevent subsurface soil contaminants from reaching the surface via biotic uptake or bioturbation by placing a cover over areas where contaminated vegetation was discovered to prevent the creation of any new contaminated vegetation. Monuments were placed around the perimeter of the intruder barrier to warn potential intruders of the presence of hazardous material. The 1.2 revision of the Groundwater

Mixing Zone application was approved in December 2004. Under South Carolina Water Classifications and Standards, Regulation 61-68, a mixing zone will establish an area that encompasses the contaminated groundwater. The mixing zone is monitored to ensure that the contamination does not migrate beyond its established boundaries and to follow the progress of radioactive decay in bringing contamination to maximum contaminant levels (MCLs). This process is calculated to take approximately 300 to 400 years.



Figure 3. Conceptual Layout of the Selected Remedy

Institutional controls have been implemented by the following:

- Access controls and groundwater land use controls to prevent exposure to on-site workers via the Site Use Program, Site Clearance Program, work control, worker training, worker briefing of health and safety requirements, a six-ft boundary fence and warning signs located at the waste unit boundaries.
- Access controls to prevent exposure to trespassers, including security procedures and equipment, 24-hour surveillance system, artificial or natural barriers, control entry systems, and warning signs in place at the SRS boundary.

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
- Inspected unit to confirm protectiveness of the selected remedial action

VII. Technical Assessment

Although the remedial action is not completed, the assumptions made in selecting the remedy are still valid, and thus the remedy will be protective. These assumptions include the following:

- Institutional controls will prevent human exposure to contaminated media. Access to the RRSB is restricted by a boundary fence.

- A mixing zone will ensure that groundwater does not exceed MCLs beyond compliance points.

No other 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

The remedy will be evaluated periodically based on groundwater monitoring data.

X. Project Costs

Costs associated with the selected remedy for RRSB include operation and maintenance costs of the cover, groundwater mixing zone monitoring, and institutional controls. The estimated operation and maintenance cost associated with the selected remedy is \$13,789,000, which was discounted at 3.9% per year. This is a present worth cost, including 30 years of maintenance activities. This estimate is an order-of-magnitude engineering cost estimate that is expected to be within +50 to -30 percent of the actual project cost. The remedy construction completion was confirmed by a final walkdown in January 2008.

XI. Protectiveness Statement(s)

The selected remedy at the RRSB OU is protective of human health and the environment. This remedy, upon implementation of land use controls pursuant to the Land Use Control Assurance Plan (LUCAP), is 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 United States Department of Energy (USDOE)

controls the OU. These controls 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).

XII. Next Review

The next five-year review is scheduled for February 12, 2014.

ATTACHMENT 1

List of Documents Reviewed

WSRC-RP-98-314, *RCRA Facility Investigation/Remedial Investigation Report with Baseline Risk Assessment for the R-Area Reactor Seepage Basins/ 108-4R Overflow Basin Operable Unit (U)*, Revision 1, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

WSRC-RP-2003-4002, *Proposed Plan for the R-Area Reactor Seepage Basins/108-4R Overflow Basins Operable Unit (U)*, Revision 1, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

WSRC-RP-2003-4093, *Record of Decision for the R-Area Reactor Seepage Basins (904-57G, -58G, -59G, -60G, -103G, -104G) and 108-4R Overflow Basin Operable Unit (U)*, Revision 1, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

WSRC, 2004b. *R-Area Reactor Seepage Basins and 108-4R Overflow Basin Operable Unit Mixing Zone (U)*, WSRC-RP-2002-4053, Revision 1.2, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

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ATTACHMENT 2

Five-Year Review Site Inspection Checklist for RRSB

| I. SITE INFORMATION | | | |
|--|--|------------------------------------|---|
| Site Name: | R-Area Reactor Seepage Basins Operable Unit (OU) | Date of Inspection: | 9/24/2007 |
| Location and Region: | Savannah River Site, USEPA IV | EPA ID: | SC1890008989 |
| Agency, office, or company leading the five-year review: | United States Department of Energy | CERCLIS OU No.: | 25 |
| | | Weather/Temperature: | clear and sunny, 90°F |
| Remedy Includes: (Check all that apply) <div style="display: flex; flex-wrap: wrap;"><div style="width: 50%;"><input checked="" type="checkbox"/> Cover System <input checked="" type="checkbox"/> Access controls <input checked="" type="checkbox"/> Institutional Controls <input type="checkbox"/> Groundwater pump and treatment <input type="checkbox"/> Surface water collection and treatment <input checked="" type="checkbox"/> Other: <u>Mixing Zone (groundwater); Excavation/Disposal of process and sewer lines</u></div><div style="width: 50%;"><input checked="" type="checkbox"/> Monitored Natural Attenuation <input type="checkbox"/> Groundwater Containment <input type="checkbox"/> Vertical Barrier Walls</div></div> | | | |
| Attachments: <input type="checkbox"/> Inspection team roster attached <input type="checkbox"/> Site map attached | | | |
| II. INTERVIEWS (Check all that apply) | | | |
| 1. O & M Site Manager | | | |
| | _____ (Name) | _____ (Title) | _____ (Date) |
| Interviewed: | <input type="checkbox"/> at site | <input type="checkbox"/> at office | <input type="checkbox"/> by phone Phone No. _____ |
| Problems, suggestions: | <input type="checkbox"/> report attached _____ | | |
| 2. O & M Staff | | | |
| | _____ (Name) | _____ (Title) | _____ (Date) |
| Interviewed: | <input type="checkbox"/> at site | <input type="checkbox"/> at office | <input type="checkbox"/> by phone Phone No. _____ |
| Problems, suggestions: | <input type="checkbox"/> report attached _____ | | |

Five-Year Review Site Inspection Checklist (Continued)

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

| | | | |
|---|--|-------------------------------------|------------------------------|
| <input type="checkbox"/> O & M Manual | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |
| x As-built drawings | x Readily available | x Up to date | <input type="checkbox"/> N/A |
| <input type="checkbox"/> Maintenance Logs | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |

Remarks: See Waste Unit Inspection and Maintenance, ER-SOP-019

Five-Year Review Site Inspection Checklist (Continued)

| | | | |
|---|--|---|---|
| 2. Site-Specific Health and Safety Plan | | | |
| <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A | |
| <input type="checkbox"/> Contingency plan/emergency response plan | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A |
| Remarks: <u>Routine O&M activities do not require an SSHASP under 29 CFR 1910.1201, HAZWOPER.</u> | | | |
| 3. O & M and OSHA Training Records | | | |
| <input checked="" type="checkbox"/> Readily available | <input checked="" type="checkbox"/> Up to date | <input type="checkbox"/> N/A | |
| Remarks: _____ | | | |
| 4. Permits and Service Agreements | | | |
| <input type="checkbox"/> Air discharge permit | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A |
| <input type="checkbox"/> Effluent discharge | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A |
| <input type="checkbox"/> Waste Disposal, POTW | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A |
| <input checked="" type="checkbox"/> Other permits | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A |
| Remarks <u>A revision 1.2 mixing zone application was approved on December 2004</u> | | | |
| 5. Gas Generation Records | | | |
| <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A | |
| Remarks: _____ | | | |
| 6. Settlement Monument Records | | | |
| <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A | |
| Remarks: _____ | | | |
| 7. Groundwater Monitoring Records | | | |
| <input checked="" type="checkbox"/> Readily available | <input checked="" type="checkbox"/> Up to date | <input type="checkbox"/> N/A | |
| Remarks <u>Administrative Record File</u> | | | |
| 8. Leachate Extraction Records | | | |
| <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A | |
| Remarks: _____ | | | |
| 9. Discharge Compliance Records | | | |
| <input type="checkbox"/> Air | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A |
| <input type="checkbox"/> Water (effluent) | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A |
| Remarks: _____ | | | |
| 10. Daily Access/Security Logs | | | |
| <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A | |
| Remarks: _____ | | | |

Five-Year Review Site Inspection Checklist (Continued)

| IV. O & M Costs | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|----------|------------|---|------------|----------|--|---|--------|--------|------------|--|------------|----------|--|---|--------|--------|------------|--|------------|----------|--|---|--------|--------|------------|--|------------|----------|--|---|--------|--------|------------|--|------------|----------|--|---|--------|--------|------------|--|
| 1. O & M Organization <div style="display: flex; justify-content: space-between; margin-top: 10px;"><div><input type="checkbox"/> State in-house</div><div><input type="checkbox"/> Contractor for State</div></div> <div style="display: flex; justify-content: space-between; margin-top: 10px;"><div><input type="checkbox"/> PRP in-house</div><div><input type="checkbox"/> Contractor for PRP</div></div> <div style="margin-top: 10px;">x Other: <u>SRS</u></div> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2. O & M Cost Records <div style="display: flex; justify-content: space-between; margin-top: 10px;"><div><input type="checkbox"/> Readily available</div><div><input type="checkbox"/> Up to date</div><div><input type="checkbox"/> Funding mechanism/agreement in place</div></div> <div style="margin-top: 10px;">x Other: <u>Project cost data is summarized in Section X of attached review: WSRC-RP-2007-4063.</u></div> <div style="margin-top: 20px; text-align: center;">Total annual cost by year for review period if available</div> <table style="width: 100%; border-collapse: collapse;"><tbody><tr><td style="width: 20%;">From _____</td><td style="width: 20%;">To _____</td><td style="width: 40%;"></td><td style="width: 20%; text-align: right;"><input type="checkbox"/> Breakdown attached</td></tr><tr><td style="text-align: center;">(Date)</td><td style="text-align: center;">(Date)</td><td style="text-align: center;">Total cost</td><td></td></tr><tr><td>From _____</td><td>To _____</td><td></td><td style="text-align: right;"><input type="checkbox"/> Breakdown attached</td></tr><tr><td style="text-align: center;">(Date)</td><td style="text-align: center;">(Date)</td><td style="text-align: center;">Total cost</td><td></td></tr><tr><td>From _____</td><td>To _____</td><td></td><td style="text-align: right;"><input type="checkbox"/> Breakdown attached</td></tr><tr><td style="text-align: center;">(Date)</td><td style="text-align: center;">(Date)</td><td style="text-align: center;">Total cost</td><td></td></tr><tr><td>From _____</td><td>To _____</td><td></td><td style="text-align: right;"><input type="checkbox"/> Breakdown attached</td></tr><tr><td style="text-align: center;">(Date)</td><td style="text-align: center;">(Date)</td><td style="text-align: center;">Total cost</td><td></td></tr><tr><td>From _____</td><td>To _____</td><td></td><td style="text-align: right;"><input type="checkbox"/> Breakdown attached</td></tr><tr><td style="text-align: center;">(Date)</td><td style="text-align: center;">(Date)</td><td style="text-align: center;">Total cost</td><td></td></tr></tbody></table> | | | | From _____ | To _____ | | <input type="checkbox"/> Breakdown attached | (Date) | (Date) | Total cost | | From _____ | To _____ | | <input type="checkbox"/> Breakdown attached | (Date) | (Date) | Total cost | | From _____ | To _____ | | <input type="checkbox"/> Breakdown attached | (Date) | (Date) | Total cost | | From _____ | To _____ | | <input type="checkbox"/> Breakdown attached | (Date) | (Date) | Total cost | | From _____ | To _____ | | <input type="checkbox"/> Breakdown attached | (Date) | (Date) | Total cost | |
| From _____ | To _____ | | <input type="checkbox"/> Breakdown attached | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| (Date) | (Date) | Total cost | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| From _____ | To _____ | | <input type="checkbox"/> Breakdown attached | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| (Date) | (Date) | Total cost | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| From _____ | To _____ | | <input type="checkbox"/> Breakdown attached | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| (Date) | (Date) | Total cost | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| From _____ | To _____ | | <input type="checkbox"/> Breakdown attached | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| (Date) | (Date) | Total cost | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| From _____ | To _____ | | <input type="checkbox"/> Breakdown attached | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| (Date) | (Date) | Total cost | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3. Unanticipated or Unusually High O & M Costs During Review Period Describe costs and reasons: _____ _____ _____ _____ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| V. ACCESS AND INSTITUTIONAL CONTROLS x Applicable <input type="checkbox"/> N/A | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| A. Fencing | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1. Fencing Damaged <input type="checkbox"/> Location shown on site map x Gates secured <input type="checkbox"/> N/A Remarks _____ _____ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | | | |
|--|---------------------------------|--|--|---|
| B. Other Access Restrictions | | | | |
| 1. Signs and other security measures <input type="checkbox"/> Location shown on site map <input type="checkbox"/> N/A | | | | |
| Remarks: <u>Signs at this site are in good condition.</u> | | | | |
| C. Institutional Controls | | | | |
| 1. Implementation and enforcement | | | | |
| Site conditions imply ICs not properly implemented: | | <input type="checkbox"/> Yes | <input checked="" type="checkbox"/> No | <input type="checkbox"/> N/A |
| Site conditions imply ICs not being fully enforced: | | <input type="checkbox"/> Yes | <input checked="" type="checkbox"/> No | <input type="checkbox"/> N/A |
| Type of monitoring (e.g., self-reporting, drive-by): | | Field Walk Down | | |
| Frequency: | Annually | | | |
| Responsible party/agent: | DOE Savannah River Field Office | | | |
| Contact: | R. Stubblefield (Name) | Waste Area Group Manager (Title) | 09/3/07 (Date) | (803) 952-7817 (Phone No.) |
| Reporting is up-to-date: | | <input checked="" type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="checkbox"/> N/A |
| Reports are verified by the lead agency: | | <input checked="" type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="checkbox"/> N/A |
| Specific requirements in deed of decision documents have been met: | | <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input checked="" type="checkbox"/> N/A |
| Violations have been reported: | | <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input checked="" type="checkbox"/> N/A |
| Other problems or suggestions: | | <input type="checkbox"/> Report attached | | |
| <hr/> <hr/> <hr/> | | | | |
| 2. Adequacy <input checked="" type="checkbox"/> ICs are adequate <input type="checkbox"/> ICs are inadequate <input type="checkbox"/> N/A | | | | |
| Remarks <hr/> <hr/> | | | | |
| D. General | | | | |
| 1. Vandalism/trespassing <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> No vandalism evident | | | | |
| Remarks <hr/> <hr/> | | | | |
| 2. Land use changes onsite <input checked="" type="checkbox"/> N/A | | | | |
| Remarks <hr/> <hr/> | | | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | | |
|--|--|--------------|--|
| 3. Land use changes offsite <input checked="" type="checkbox"/> N/A | | | |
| Remarks _____ | | | |
| VI. GENERAL SITE CONDITIONS | | | |
| A. Roads <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A | | | |
| 1. Roads damaged <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Roads adequate <input type="checkbox"/> N/A | | | |
| Remarks _____ | | | |
| B. Other site Conditions | | | |
| Remarks _____ | | | |
| VII. COVERS SYSTEM <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A | | | |
| A. Soil Surface <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A | | | |
| 1. Settlement (Low spots) <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Settlement not evident | | | |
| Areal extent _____ | | Depth _____ | |
| Remarks _____ | | | |
| 2. Cracks <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Cracking not evident | | | |
| Lengths _____ | | Widths _____ | |
| | | Depths _____ | |
| Remarks _____ | | | |
| 3. Erosion <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Erosion not evident | | | |
| Areal extent _____ | | Depth _____ | |
| Remarks _____ | | | |
| 4. Holes <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Holes not evident | | | |
| Areal extent _____ | | Depth _____ | |
| Remarks _____ | | | |
| 5. Vegetative Cover <input type="checkbox"/> Grass <input checked="" type="checkbox"/> Cover properly established <input checked="" type="checkbox"/> No signs of stress | | | |
| <input type="checkbox"/> Trees/shrubs (indicate size and location on a diagram) | | | |
| Remarks _____ | | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | |
|--|---|--------------------|
| 6. Alternative Cover (armored rock, concrete, etc.) <input type="checkbox"/> N/A | | |
| Remarks: <u>The cover system includes a concrete intruder barrier, an asphalt bioturbation barrier, and the existing asphalt cover.</u> | | |
| 7. Bulges <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Bulges not evident | | |
| Areal extent _____ Height _____ | | |
| Remarks _____ | | |
| 8. Wet Areas/Water Damage <input checked="" type="checkbox"/> Wet areas/water damage not evident | | |
| <input type="checkbox"/> Wet Areas | <input type="checkbox"/> Location shown on site map | Areal extent _____ |
| <input type="checkbox"/> Ponding | <input type="checkbox"/> Location shown on site map | Areal extent _____ |
| <input type="checkbox"/> Seeps | <input type="checkbox"/> Location shown on site map | Areal extent _____ |
| <input type="checkbox"/> Soft subgrade | <input type="checkbox"/> Location shown on site map | Areal extent _____ |
| Remarks _____ | | |
| 9. Slope Instability <input type="checkbox"/> Slides <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> No evidence of slope instability | | |
| Areal extent _____ | | |
| Remarks _____ | | |
| B. Benches <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> 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 <input type="checkbox"/> Location shown on site map <input type="checkbox"/> N/A or okay | | |
| Remarks _____ | | |
| 2. Bench Breached <input type="checkbox"/> Location shown on site map <input type="checkbox"/> N/A or okay | | |
| Remarks _____ | | |
| 3. Bench Overtopped <input type="checkbox"/> Location shown on site map <input type="checkbox"/> N/A or okay | | |
| Remarks _____ | | |

Five-Year Review Site Inspection Checklist (Continued)

| | |
|---|--------------------|
| C. Letdown Channels <input type="checkbox"/> Applicable x 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 <input type="checkbox"/> Location shown on site map <input type="checkbox"/> No evidence of settlement | |
| Areal extent _____ | Depth _____ |
| Remarks _____ | |
| _____ | |
| 2. Material Degradation <input type="checkbox"/> Location shown on site map <input type="checkbox"/> No evidence of degradation | |
| Material type _____ | Areal extent _____ |
| Remarks _____ | |
| _____ | |
| 3. Erosion <input type="checkbox"/> Location shown on site map <input type="checkbox"/> No evidence of erosion | |
| Areal extent _____ | Depth _____ |
| Remarks _____ | |
| _____ | |
| 4. Undercutting <input type="checkbox"/> Location shown on site map <input type="checkbox"/> No evidence of undercutting | |
| Areal extent _____ | Depth _____ |
| Remarks _____ | |
| _____ | |
| 5. Obstructions Type _____ <input type="checkbox"/> No obstructions | |
| <input type="checkbox"/> Location shown on site map Areal extent _____ | Size _____ |
| Remarks _____ | |
| _____ | |
| 6. Excessive Vegetative Growth Type _____ | |
| <input type="checkbox"/> No evidence of excessive growth <input type="checkbox"/> Vegetation in channels does not obstruct flow | |
| <input type="checkbox"/> Location shown on site map Areal extent _____ | |
| Remarks _____ | |
| _____ | |

Five-Year Review Site Inspection Checklist (Continued)

| | | | |
|--|---|---|--|
| D. Cover Penetrations <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A | | | |
| 1. Gas Vents <input type="checkbox"/> Active <input type="checkbox"/> Passive | | | |
| <input type="checkbox"/> Properly secured/locked | <input type="checkbox"/> Functioning | <input type="checkbox"/> Routinely sampled | <input type="checkbox"/> Good condition |
| <input type="checkbox"/> Evidence of leakage at penetration | <input type="checkbox"/> Needs Maintenance | <input checked="" type="checkbox"/> N/A | |
| Remarks _____ | | | |
| | | | |
| 2. Gas Monitoring Probes | | | |
| <input type="checkbox"/> Properly secured/locked | <input type="checkbox"/> Functioning | <input type="checkbox"/> Routinely sampled | <input type="checkbox"/> Good condition |
| <input type="checkbox"/> Evidence of leakage at penetration | <input type="checkbox"/> Needs Maintenance | <input checked="" type="checkbox"/> N/A | |
| Remarks _____ | | | |
| | | | |
| 3. Monitoring Wells | | | |
| <input checked="" type="checkbox"/> Properly secured/locked | <input checked="" type="checkbox"/> Functioning | <input checked="" type="checkbox"/> Routinely sampled | <input checked="" type="checkbox"/> Good condition |
| <input type="checkbox"/> Evidence of leakage at penetration | <input type="checkbox"/> Needs Maintenance | <input type="checkbox"/> N/A | |
| Remarks _____ | | | |
| | | | |
| 4. Leachate Extraction Wells | | | |
| <input type="checkbox"/> Properly secured/locked | <input type="checkbox"/> Functioning | <input type="checkbox"/> Routinely sampled | <input type="checkbox"/> Good condition |
| <input type="checkbox"/> Evidence of leakage at penetration | <input type="checkbox"/> Needs Maintenance | <input checked="" type="checkbox"/> N/A | |
| Remarks _____ | | | |
| | | | |
| 5. Settlement Monuments <input checked="" type="checkbox"/> Located <input checked="" type="checkbox"/> Routinely surveyed <input type="checkbox"/> N/A | | | |
| Remarks _____ | | | |
| | | | |
| E. Gas Collection and Treatment <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A | | | |
| 1. Gas Treatment Facilities | | | |
| <input type="checkbox"/> Flaring | <input type="checkbox"/> Thermal destruction | <input type="checkbox"/> Collection for reuse | |
| <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance | | |
| Remarks _____ | | | |
| | | | |
| 2. Gas Collection Wells, Manifolds and Piping | | | |
| <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance | | |
| Remarks _____ | | | |
| | | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | |
|--|--|--|
| 3. Gas Monitoring Facilities (e.g., gas monitoring of adjacent homes or buildings) <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A Remarks _____ _____ | | |
| F. Cover Drainage Layer <input type="checkbox"/> Applicable x N/A | | |
| 1. Outlet Pipes Inspected <input type="checkbox"/> Functioning <input type="checkbox"/> N/A Remarks _____ _____ | | |
| 2. Outlet Rock Inspected <input type="checkbox"/> Functioning <input type="checkbox"/> N/A Remarks _____ _____ | | |
| G. Detention/sedimentation Ponds <input type="checkbox"/> Applicable x N/A | | |
| 1. Siltation Areal extent _____ Depth _____ <input type="checkbox"/> N/A <input type="checkbox"/> Siltation not evident Remarks _____ _____ | | |
| 2. Erosion Areal extent _____ Depth _____ <input type="checkbox"/> N/A <input type="checkbox"/> Erosion not evident Remarks _____ _____ | | |
| 3. Outlet Works <input type="checkbox"/> Functioning <input type="checkbox"/> N/A Remarks _____ _____ | | |
| 4. Dam <input type="checkbox"/> Functioning <input type="checkbox"/> N/A Remarks _____ _____ | | |
| H. Retaining Walls <input type="checkbox"/> Applicable x N/A | | |
| 1. Deformations <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Deformation not evident Horizontal displacement _____ Vertical displacement _____ Rotational displacement _____ Remarks _____ _____ | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | |
|---|---|--|
| 2. Degradation | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> Deformation not evident |
| Remarks _____ | | |
| I. Perimeter Ditches/Off-Site Discharge x Applicable <input type="checkbox"/> N/A | | |
| 1. Siltation | x Location shown on site map | x Siltation not evident |
| Areal extent _____ Depth _____ | | |
| Remarks _____ | | |
| 2. Vegetative Growth | <input type="checkbox"/> Location shown on site map | x Siltation not evident |
| x Vegetation does not impede flow | | |
| Areal extent _____ Type _____ | | |
| Remarks _____ | | |
| 3. Erosion | <input type="checkbox"/> Location shown on site map | x Erosion not evident |
| Areal extent _____ Depth _____ | | |
| Remarks _____ | | |
| 4. Discharge Structure | <input type="checkbox"/> Location shown on site map | x N/A |
| Remarks _____ | | |
| VIII. VERTICAL BARRIER WALLS <input type="checkbox"/> Applicable x N/A | | |
| 1. Settlement | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> Settlement not evident |
| Areal extent _____ Depth _____ | | |
| Remarks _____ | | |
| 2. Performance Monitoring | Type of Monitoring _____ | <input type="checkbox"/> Performance not monitored |
| Frequency _____ <input type="checkbox"/> Evidence of breaching Head differential _____ | | |
| Remarks _____ | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | | |
|---|--|--|---|
| IX. GROUNDWATER/SURFACE WATER REMEDIES | | <input checked="" type="checkbox"/> Applicable | <input type="checkbox"/> N/A |
| A. Groundwater Extraction Wells, Pumps, and Pipelines | | <input type="checkbox"/> Applicable | <input checked="" type="checkbox"/> N/A |
| 1. Pumps, Wellhead Plumbing, and Electrical <input type="checkbox"/> Good condition <input type="checkbox"/> All required wells located <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A Remarks _____ _____ | | | |
| 2. Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____ _____ | | | |
| 3. Spare Parts and Equipment <input type="checkbox"/> Readily available <input type="checkbox"/> Good condition <input type="checkbox"/> Requires upgrade <input type="checkbox"/> Needs to be provided Remarks _____ _____ | | | |
| B. Surface Water Collection Structures, Pumps, and Pipelines | | <input type="checkbox"/> Applicable | <input checked="" type="checkbox"/> N/A |
| 1. Collection Structures, Pumps, and Electrical <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____ _____ | | | |
| 2. Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____ _____ | | | |
| 3. Spare Parts and Equipment <input type="checkbox"/> Readily available <input type="checkbox"/> Good condition <input type="checkbox"/> Requires upgrade <input type="checkbox"/> Needs to be provided Remarks _____ _____ | | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | |
|---|--|--|
| C. Treatment System | <input type="checkbox"/> Applicable | <input checked="" type="checkbox"/> N/A |
| 1. Treatment Train (Check components that apply) | | |
| <input type="checkbox"/> Metals removal | <input type="checkbox"/> Oil/water separation | <input type="checkbox"/> Bioremediation |
| <input type="checkbox"/> Air stripping | <input type="checkbox"/> Carbon adsorbers | |
| <input type="checkbox"/> Filters _____ | | |
| <input type="checkbox"/> Additive (e.g., chelation agent, flocculent) _____ | | |
| <input type="checkbox"/> Others _____ | | |
| <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance | |
| <input type="checkbox"/> Sampling ports properly marked and functional | | |
| <input type="checkbox"/> Sampling/maintenance log displayed and up to date | | |
| <input type="checkbox"/> Equipment properly identified | | |
| <input type="checkbox"/> Quantity of groundwater treated annually _____ | | |
| <input type="checkbox"/> Quantity of surface water treated annually _____ | | |
| Remarks _____ | | |
| _____ | | |
| 2. Electrical Enclosures and Panels (properly rated and functional) | | |
| <input type="checkbox"/> N/A | <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance |
| Remarks _____ | | |
| _____ | | |
| 3. Tanks, Vaults, Storage Vessels | | |
| <input type="checkbox"/> N/A | <input type="checkbox"/> Good condition | <input type="checkbox"/> Proper secondary containment <input type="checkbox"/> Needs Maintenance |
| Remarks _____ | | |
| _____ | | |
| 4. Discharge Structure and Appurtenances | | |
| <input type="checkbox"/> N/A | <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance |
| Remarks _____ | | |
| _____ | | |
| 5. Treatment Building(s) | | |
| <input type="checkbox"/> N/A | <input type="checkbox"/> Good condition (esp. roof and doorways) | <input type="checkbox"/> Needs repair |
| <input type="checkbox"/> Chemicals and equipment properly stored | | |
| Remarks _____ | | |
| _____ | | |

Five-Year Review Site Inspection Checklist (Continued)

6. Monitoring Wells

- ☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ All required wells located ☐ Needs Maintenance ☐ N/A

Remarks _____

D. Monitoring Data x Applicable ☐ N/A

1. Monitoring Data

x Is routinely submitted on time x Is of acceptable quality

2 Monitoring Data Suggests:

☐ Groundwater plume is effectively contained x Contaminant concentrations are declining

E. Monitored Natural Attenuation x Applicable ☐ N/A

1. Monitoring Wells (Natural attenuation remedy)

x Properly secured/locked x Functioning x Routinely sampled x Good condition
x 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 selected remedy for the R-Area Reactor Seepage Basin is the installation of a reinforced concrete intruder barrier system over PTSM with granitic monuments, installation of an asphalt bioturbation barrier over contaminated vegetation areas, excavation and consolidation on-unit of PTSM outside boundary fence, mixing zone for groundwater, and institutional controls.

At the time of observation, the remedy was scheduled for completion in November 2007. The final walkdown inspection was performed on January 30, 2008.

Five-Year Review Site Inspection Checklist (Continued)

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.

N/A

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SILVERTON ROAD WASTE UNIT (731-3A) OPERABLE UNIT

I. Introduction

This is the third five-year review for the Silverton Road Waste Unit (731-3A) (SRWU) Operable Unit (OU). This review was conducted from August 2007 through September 2007. This report documents the results of the review.

II. OU Chronology

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

Table 1. Chronology of OU Events

| Event | Date |
|--|-------------------------------------|
| RFI/RI Start | 1993 |
| CMS/FS Rev 1.1 Submitted | August 21, 1996 |
| Record of Decision (ROD) Issuance | April 22, 1997 |
| Remedial Action Start/Complete | July 7, 1998/ September 9, 1998 |
| Explanation of Significant Difference (ESD) to the ROD | March 27, 2005 |
| Previous Five-Year Reviews | June 30, 1997 and February 12, 2004 |

III. Background

Physical Characteristics

The SRWU OU, 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.

Land and Resource Use

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.

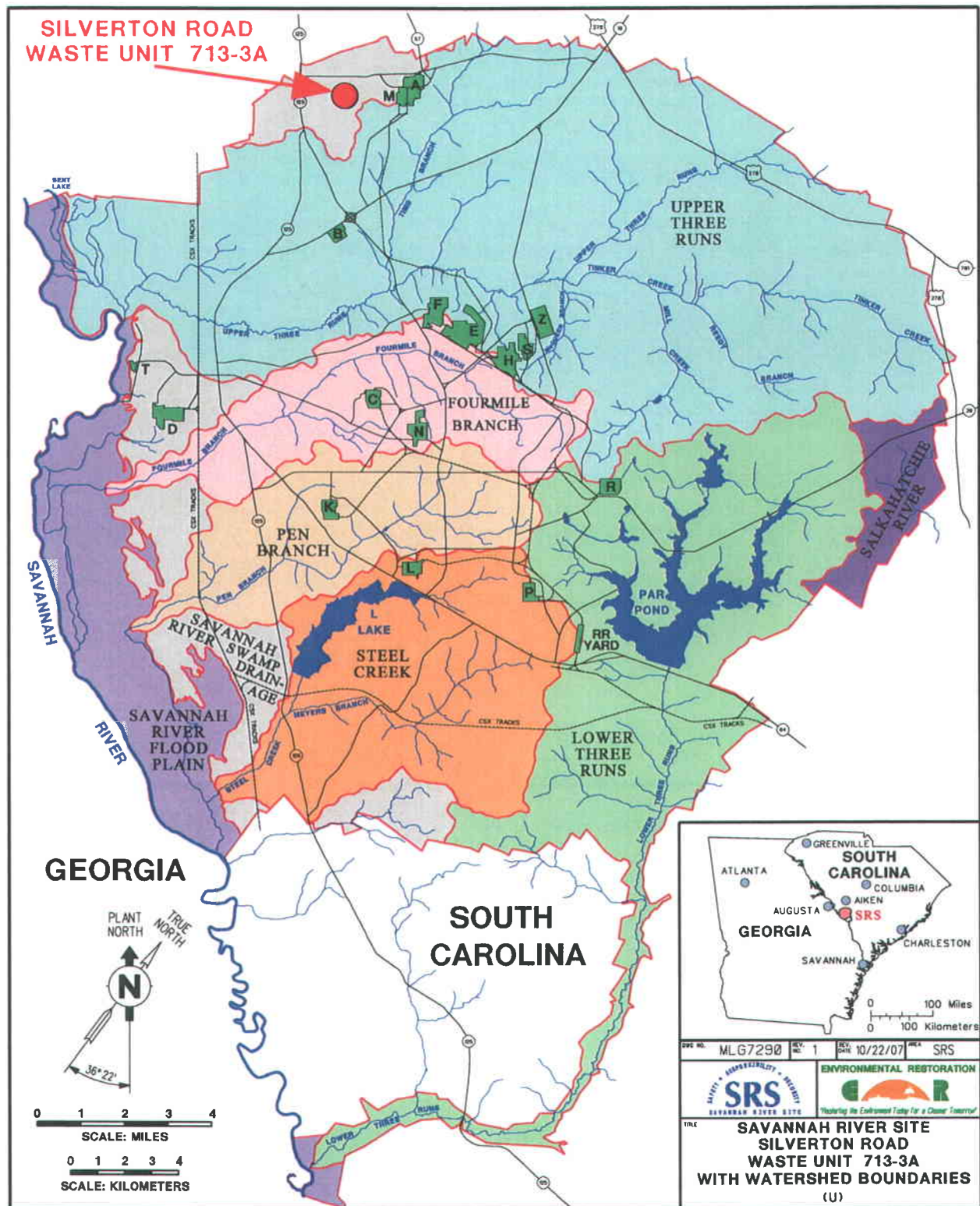


Figure 1. Location of the Silverton Road Waste Unit

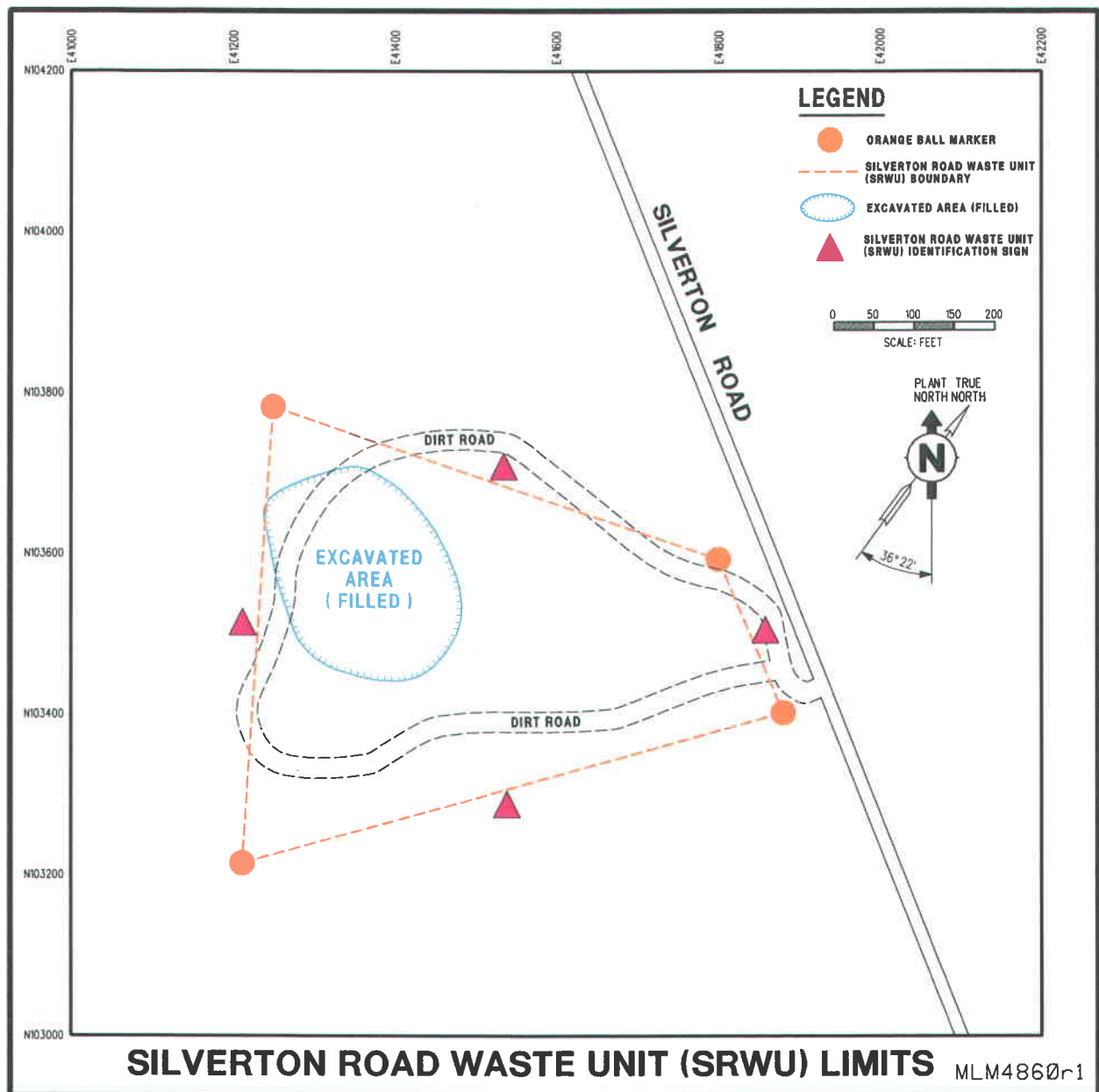


Figure 2. Layout of the Silverton Road Waste Unit (SRWU) with Limits

History of Contamination

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 byproducts.

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.

Initial Response

The cover material was placed at a time preceding the preparation of the formal CERCLA documentation. The cover system was placed prior to the CERCLA investigation.

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 2. 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 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 ft²). Using an average estimated depth of 6 ft for the excavated area, the approximate waste volume of the SRWU is 2,700,000 ft³.

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 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 OUs and is not within the scope of the ROD. The groundwater in the lower aquifers was evaluated as part of the 1995 RCRA Permit for the A/M Area Western Sector Corrective Action Program.

IV. Remedial Actions

Remedy Selection

Prior to SRS ownership, the SRWU 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 and future administrative controls will limit the use of the SRWU area to industrial uses only.

The preferred alternative for the SRWU consisted of Institutional Controls with groundwater monitoring.

Remedy Implementation

Implementation of the Institutional Controls alternative requires 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 to indicate that this area was used to dispose 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 exceedances in MCLs, no remedial action with groundwater monitoring was deemed appropriate for the SRWU "M Area" groundwater aquifer. A confirmatory groundwater-monitoring program was established to ensure that this is the appropriate remedial action for the "M Area" groundwater aquifer.

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.

Under the confirmatory groundwater program, ten monitoring wells, including three new wells, were selected to monitor the extent of the contaminant plume and the severity of the contamination. The monitoring wells included background wells SRW-16C, -17DR, -18, and -19; sidegradient wells SRW-2 and -4; and down gradient wells SRW-7, -8, -9, and -12C. In accordance with the FRR, groundwater samples were collected from the ten monitoring wells twice a year during the 2nd and 4th quarters of each calendar year, beginning in the fourth quarter of 1998. The samples were analyzed for 1,2-DCA, carbon tetrachloride, dichloromethane, tetrachloroethylene (PCE), and trichloroethylene (TCE). The data were submitted annually for regulatory review as part of the Federal Facility Agreement (FFA) Annual Progress Report. The FRR stated that analytes that did not exceed background concentrations or Safe Drinking Water Act MCLs, as applicable, for four sequential monitoring events would be proposed for removal from the list for subsequent monitoring with concurrence from the USEPA and the SCDHEC. The data for the SRWU have been reviewed based on these criteria (WSRC 2003).

The last MCL exceedance occurred in the 4th quarter 1999 at SRW 7 for carbon tetrachloride. Carbon tetrachloride was not detected above the MCL (5 µg/L) for the next four sequential monitoring events. Furthermore, the data show that none of the constituents of concern (COCs) in the groundwater have been detected above MCLs from May 2000 through May 2003, and trends are decreasing or stable. Thus, the requirements of the FRR have been met. The SRWU Technical Evaluation was submitted to the USEPA and SCDHEC on March 31, 2003. USEPA and SCDHEC reviewed the document and provided their approval to discontinue groundwater monitoring on May 6, 2003, and June 17, 2003, respectively.

SRS submitted the SRWU well abandonment program plan to SCDHEC on March 23, 2004. Twenty groundwater wells were requested and approved for abandonment. Seven

of the twenty wells were being sampled as part of the SRWU confirmatory groundwater-monitoring program. The other thirteen wells were no longer required as part of any other groundwater monitoring program. SCDHEC approved the well abandonment program plan for all twenty wells on April 7, 2004. The twenty wells were abandoned from May 20, 2004, through June 29, 2004.

V. Progress Since Last Review

This is the third five-year ROD review that the SRWU has undergone. Since the previous review in June of 2003, the original remedy has been modified through an ESD to discontinue the confirmatory groundwater monitoring program. An evaluation of the groundwater-monitoring program has indicated that the monitoring is no longer required as the remedial goals for groundwater have been reached. The institutional controls, included in the original remedy, will still be required for the SRWU soils.

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 guidance

VII. Technical Assessment

The operating procedures currently implemented continue to maintain the effectiveness of the institutional controls 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 walkdowns, 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 have been completed.

The exposure assumptions, toxicity data, and cleanup levels used at the time of remedy selection are still valid. There have been no changes in standards or to-be-considered guidance 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

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

X. Project Costs

Costs associated with the selected remedy for Silverton Road OU include operation and maintenance costs of institutional controls. The estimated operation and maintenance cost associated with the selected remedy is \$18,060. This is a present worth cost, including 30 years of maintenance activities. After characterization and effectiveness of the remedy was evaluated, the actual operation and maintenance cost for the Silverton Road OU was assessed. The total actual operation and maintenance cost from project support and other post construction expense to fiscal year 2006 is \$263,806.

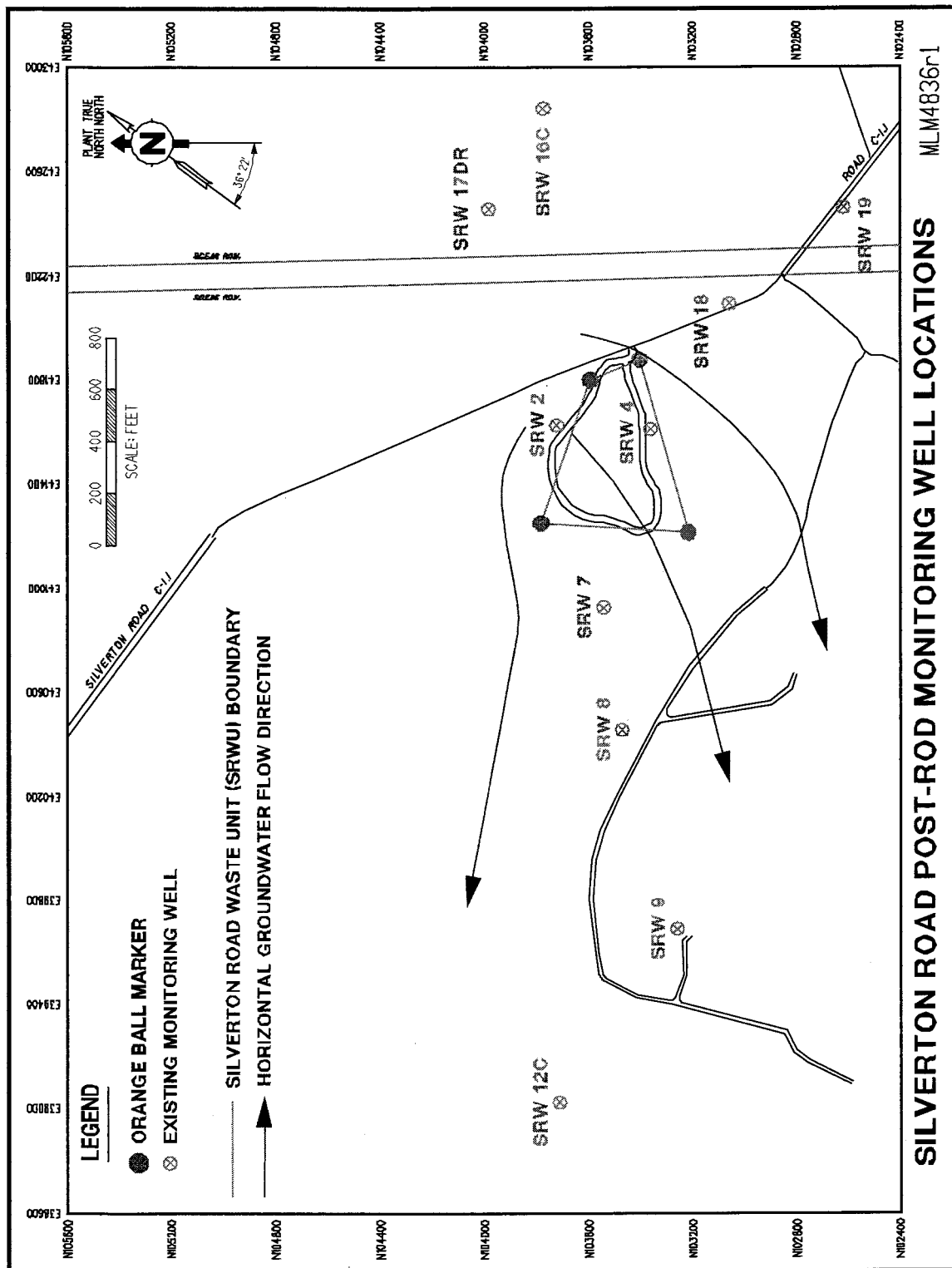


Figure 3. Silvertown Road Post-ROD Monitoring Well Locations

XI. Protectiveness Statement(s)

The modified remedy at SRWU, Institutional Controls for the soils, is protective of human health and the environment; and exposure pathways that could result in unacceptable risks are being controlled. The institutional controls include warning signs that are posted at the waste unit, use of existing SRS access controls for trespassers, use of the SRS Site Use and Site Clearance Programs for on-site workers, and land use restrictions. The modified remedy will maintain future industrial land use and prevent unrestricted use of the area.

XII. Next Review

The next five-year review is scheduled for February 12, 2014.

ATTACHMENT 1

List of Documents Reviewed

WSRC-RP-96-100, *Corrective Measures Study/Feasibility Study for the Silverton Road Waste Unit (731-3A) (U)*, Revision 1.1, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

WSRC-RP-95-215, *Final Baseline Risk Assessment for the Silverton Road Waste Unit (U)*, Rev. 1.1, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

WSRC-RP-95-214, *Final RFI/RI Report for the Silverton Road Waste Unit (U)*, Rev. 1.2, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

WSRC-RP-96-171, *Record of Decision Remedial Alternative Selection for the Silverton Road Waste Unit (731-3A) (U)*, Rev. 1, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

WSRC-RP-97-153, *Final Remediation Report for the Silverton Road Waste Unit (731-3A) (U)*, Rev. 1.1, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

WSRC-RP-2003-4037, *Technical Evaluation for Groundwater Monitoring at the Silverton Road Waste Unit (731-3A) (U)*, Rev. 0, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

WSRC- RP-2004-4092, *Explanation of Significant Difference (ESD) to the Revision 1 Record of Decision Remedial Alternative Selection for the Silverton Road Waste Unit (731-3A) (U)*, Rev. 1.1, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

ATTACHMENT 2

**Five-Year Review Site Inspection Checklist for
Silverton Road Waste Unit**

| I. SITE INFORMATION | | | | | | | | | | | | | | | |
|---|--|------------------------------------|---|---------------------------------------|--|--|--|--|---|---|--|---|--|---------------------------------------|--|
| Site Name: | Silverton Road Waste Unit (731-3A) | Date of Inspection: | 9/25/2007 | | | | | | | | | | | | |
| Location and Region: | Savannah River Site, USEPA IV | EPA ID: | SC1890008989 | | | | | | | | | | | | |
| Agency, office, or company leading the five-year review: | United States Department of Energy | CERCLIS OU: | 13 | | | | | | | | | | | | |
| | | Weather/Temperature: | clear and sunny, 91°F | | | | | | | | | | | | |
| Remedy Includes: (Check all that apply) <table><tbody><tr><td><input type="checkbox"/> Cover system</td><td><input type="checkbox"/> Monitored Natural Attenuation</td></tr><tr><td><input type="checkbox"/> Access controls</td><td><input type="checkbox"/> Groundwater Containment</td></tr><tr><td><input checked="" type="checkbox"/> Institutional Controls</td><td><input type="checkbox"/> Vertical Barrier Walls</td></tr><tr><td><input type="checkbox"/> Groundwater pump and treatment</td><td></td></tr><tr><td><input type="checkbox"/> Surface water collection and treatment</td><td></td></tr><tr><td><input type="checkbox"/> Other: _____</td><td></td></tr></tbody></table> | | | | <input type="checkbox"/> Cover system | <input type="checkbox"/> Monitored Natural Attenuation | <input type="checkbox"/> Access controls | <input type="checkbox"/> Groundwater Containment | <input checked="" type="checkbox"/> Institutional Controls | <input type="checkbox"/> Vertical Barrier Walls | <input type="checkbox"/> Groundwater pump and treatment | | <input type="checkbox"/> Surface water collection and treatment | | <input type="checkbox"/> Other: _____ | |
| <input type="checkbox"/> Cover system | <input type="checkbox"/> Monitored Natural Attenuation | | | | | | | | | | | | | | |
| <input type="checkbox"/> Access controls | <input type="checkbox"/> Groundwater Containment | | | | | | | | | | | | | | |
| <input checked="" type="checkbox"/> Institutional Controls | <input type="checkbox"/> Vertical Barrier Walls | | | | | | | | | | | | | | |
| <input type="checkbox"/> Groundwater pump and treatment | | | | | | | | | | | | | | | |
| <input type="checkbox"/> Surface water collection and treatment | | | | | | | | | | | | | | | |
| <input type="checkbox"/> Other: _____ | | | | | | | | | | | | | | | |
| Attachments: <input type="checkbox"/> Inspection team roster attached <input type="checkbox"/> Site map attached | | | | | | | | | | | | | | | |
| II. INTERVIEWS (Check all that apply) | | | | | | | | | | | | | | | |
| 1. O & M Site Manager | | | | | | | | | | | | | | | |
| | _____ (Name) | _____ (Title) | _____ (Date) | | | | | | | | | | | | |
| Interviewed: | <input type="checkbox"/> at site | <input type="checkbox"/> at office | <input type="checkbox"/> by phone Phone No. _____ | | | | | | | | | | | | |
| Problems, suggestions: | <input type="checkbox"/> report attached _____ | | | | | | | | | | | | | | |
| 2. O & M Staff | | | | | | | | | | | | | | | |
| | _____ (Name) | _____ (Title) | _____ (Date) | | | | | | | | | | | | |
| Interviewed: | <input type="checkbox"/> at site | <input type="checkbox"/> at office | <input type="checkbox"/> by phone Phone No. _____ | | | | | | | | | | | | |
| Problems, suggestions: | <input type="checkbox"/> report attached _____ | | | | | | | | | | | | | | |

Five-Year Review Site Inspection Checklist (Continued)

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

| | | | |
|---|--|-------------------------------------|------------------------------|
| <input type="checkbox"/> O & M Manual | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |
| x As-built drawings | x Readily available | x Up to date | <input type="checkbox"/> N/A |
| <input type="checkbox"/> Maintenance Logs | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |

Remarks: See Waste Unit Inspection and Maintenance, ER-SOP-019

Five-Year Review Site Inspection Checklist (Continued)

| | | | |
|--|--|-------------------------------------|-------|
| 2. Site-Specific Health and Safety Plan | | | |
| <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A | |
| <input type="checkbox"/> Contingency plan/emergency response plan | | | |
| <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A | |
| Remarks: <u>Routine O&M activities do not require an SSHASP under 29 CFR 1910.1201, HAZWOPER</u> | | | |
| 3. O & M and OSHA Training Records | | | |
| x Readily available | x Up to date | <input type="checkbox"/> N/A | |
| Remarks _____ | | | |
| 4. Permits and Service Agreements | | | |
| <input type="checkbox"/> Air discharge permit | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |
| <input type="checkbox"/> Effluent discharge | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |
| <input type="checkbox"/> Waste Disposal, POTW | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |
| <input type="checkbox"/> Other permits | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |
| Remarks _____ | | | |
| 5. Gas Generation Records | | | |
| <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A | |
| Remarks _____ | | | |
| 6. Settlement Monument Records | | | |
| <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A | |
| Remarks _____ | | | |
| 7. Groundwater Monitoring Records | | | |
| <input type="checkbox"/> Readily available | x Up to date | x N/A | |
| Remarks _____ | | | |
| 8. Leachate Extraction Records | | | |
| <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A | |
| Remarks _____ | | | |
| 9. Discharge Compliance Records | | | |
| <input type="checkbox"/> Air | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |
| <input type="checkbox"/> Water (effluent) | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |
| Remarks _____ | | | |
| 10. Daily Access/Security Logs | | | |
| <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A | |
| Remarks _____ | | | |

Five-Year Review Site Inspection Checklist (Continued)

IV. O & M Costs

1. O & M Organization

- ☐ State in-house ☐ Contractor for State
☐ PRP in-house ☐ Contractor for PRP
x Other: SRS

2. O & M Cost Records

- ☐ Readily available ☐ Up to date ☐ Funding mechanism/agreement in place
x Other: Project cost data is summarized in Section X of attached review: WSRC-RP-2007-4063

Total annual cost by year for review period if available

| | | |
|---------------------|------------|---|
| From _____ To _____ | _____ | <input type="checkbox"/> Breakdown attached |
| (Date) (Date) | Total cost | |
| From _____ To _____ | _____ | <input type="checkbox"/> Breakdown attached |
| (Date) (Date) | Total cost | |
| From _____ To _____ | _____ | <input type="checkbox"/> Breakdown attached |
| (Date) (Date) | Total cost | |
| From _____ To _____ | _____ | <input type="checkbox"/> Breakdown attached |
| (Date) (Date) | Total cost | |
| From _____ To _____ | _____ | <input type="checkbox"/> Breakdown attached |
| (Date) (Date) | Total cost | |

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

Describe costs and reasons: _____

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

A. Fencing

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

Remarks _____

Five-Year Review Site Inspection Checklist (Continued)

B. Other Access Restrictions

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

Remarks: Signs at this site are in good condition.

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: Semi-Annually

Responsible party/agent: DOE Savannah River Field Office

Contact: K. M. Adams Waste Area Group Manager 09/3/07 (803) 952-7871
(Name) (Title) (Date) (Phone No.)

Reporting 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

Five-Year Review Site Inspection Checklist (Continued)

| | | | |
|---|--|--------------|--|
| 3. Land use changes offsite <input checked="" type="checkbox"/> N/A | | | |
| Remarks _____ | | | |
| | | | |
| VI. GENERAL SITE CONDITIONS | | | |
| A. Roads <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A | | | |
| 1. Roads damaged <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Roads adequate <input type="checkbox"/> N/A | | | |
| Remarks _____ | | | |
| | | | |
| B. Other site Conditions | | | |
| Remarks _____ | | | |
| | | | |
| | | | |
| VII. COVER SYSTEMS <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A | | | |
| A. Soil Surface | | | |
| 1. Settlement (Low spots) <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Settlement not evident | | | |
| Areal extent _____ | | Depth _____ | |
| Remarks _____ | | | |
| | | | |
| 2. Cracks <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Cracking not evident | | | |
| Lengths _____ | | Widths _____ | |
| | | Depths _____ | |
| Remarks _____ | | | |
| | | | |
| 3. Erosion <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Erosion not evident | | | |
| Areal extent _____ | | Depth _____ | |
| Remarks _____ | | | |
| | | | |
| 4. Holes <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Holes not evident | | | |
| Areal extent _____ | | Depth _____ | |
| Remarks _____ | | | |
| | | | |
| 5. Vegetative Cover <input type="checkbox"/> Grass <input checked="" type="checkbox"/> Cover properly established <input type="checkbox"/> No signs of stress | | | |
| <input type="checkbox"/> Trees/shrubs (indicate size and location on a diagram) | | | |
| Remarks _____ | | | |
| | | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | |
|--|---|--------------------|
| 6. Alternative Cover (armored rock, concrete, etc.) <input type="checkbox"/> N/A | | |
| Remarks: _____ | | |
| 7. Bulges <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Bulges not evident | | |
| Areal extent _____ Height _____ | | |
| Remarks _____ | | |
| 8. Wet Areas/Water Damage <input type="checkbox"/> Wet areas/water damage not evident | | |
| <input type="checkbox"/> Wet Areas | <input type="checkbox"/> Location shown on site map | Areal extent _____ |
| <input type="checkbox"/> Ponding | <input type="checkbox"/> Location shown on site map | Areal extent _____ |
| <input type="checkbox"/> Seeps | <input type="checkbox"/> Location shown on site map | Areal extent _____ |
| <input type="checkbox"/> Soft subgrade | <input type="checkbox"/> Location shown on site map | Areal extent _____ |
| Remarks _____ | | |
| 9. Slope Instability <input type="checkbox"/> Slides <input type="checkbox"/> Location shown on site map <input type="checkbox"/> No evidence of slope instability | | |
| Areal extent _____ | | |
| Remarks _____ | | |
| B. Benches <input type="checkbox"/> Applicable <input type="checkbox"/> 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 <input type="checkbox"/> Location shown on site map <input type="checkbox"/> N/A or okay | | |
| Remarks _____ | | |
| 2. Bench Breached <input type="checkbox"/> Location shown on site map <input type="checkbox"/> N/A or okay | | |
| Remarks _____ | | |
| 3. Bench Overtopped <input type="checkbox"/> Location shown on site map <input type="checkbox"/> N/A or okay | | |
| Remarks _____ | | |

Five-Year Review Site Inspection Checklist (Continued)

C. Letdown Channels

☐ Applicable ☐ N/A

(Channel lined with erosion control matts, 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 _____

Five-Year Review Site Inspection Checklist (Continued)

| | | | |
|--|--|---|---|
| D. Cover Penetrations <input type="checkbox"/> Applicable <input type="checkbox"/> N/A | | | |
| 1. Gas Vents <input type="checkbox"/> Active <input type="checkbox"/> Passive | | | |
| <input type="checkbox"/> Properly secured/locked | <input type="checkbox"/> Functioning | <input type="checkbox"/> Routinely sampled | <input type="checkbox"/> Good condition |
| <input type="checkbox"/> Evidence of leakage at penetration | <input type="checkbox"/> Needs Maintenance | <input type="checkbox"/> N/A | |
| Remarks _____ | | | |
| | | | |
| 2. Gas Monitoring Probes | | | |
| <input type="checkbox"/> Properly secured/locked | <input type="checkbox"/> Functioning | <input type="checkbox"/> Routinely sampled | <input type="checkbox"/> Good condition |
| <input type="checkbox"/> Evidence of leakage at penetration | <input type="checkbox"/> Needs Maintenance | <input type="checkbox"/> N/A | |
| Remarks _____ | | | |
| | | | |
| 3. Monitoring Wells | | | |
| <input type="checkbox"/> Properly secured/locked | <input type="checkbox"/> Functioning | <input type="checkbox"/> Routinely sampled | <input type="checkbox"/> Good condition |
| <input type="checkbox"/> Evidence of leakage at penetration | <input type="checkbox"/> Needs Maintenance | <input type="checkbox"/> N/A | |
| Remarks _____ | | | |
| | | | |
| 4. Leachate Extraction Wells | | | |
| <input type="checkbox"/> Properly secured/locked | <input type="checkbox"/> Functioning | <input type="checkbox"/> Routinely sampled | <input type="checkbox"/> Good condition |
| <input type="checkbox"/> Evidence of leakage at penetration | <input type="checkbox"/> Needs Maintenance | <input type="checkbox"/> N/A | |
| Remarks _____ | | | |
| | | | |
| 5. Settlement Monuments <input type="checkbox"/> Located <input type="checkbox"/> Routinely surveyed <input type="checkbox"/> N/A | | | |
| Remarks _____ | | | |
| | | | |
| E. Gas Collection and Treatment <input type="checkbox"/> Applicable <input type="checkbox"/> N/A | | | |
| 1. Gas Treatment Facilities | | | |
| <input type="checkbox"/> Flaring | <input type="checkbox"/> Thermal destruction | <input type="checkbox"/> Collection for reuse | |
| <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance | | |
| Remarks _____ | | | |
| | | | |
| 2. Gas Collection Wells, Manifolds and Piping | | | |
| <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance | | |
| Remarks _____ | | | |
| | | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | | |
|--|--|--|--|
| 3. Gas Monitoring Facilities (e.g., gas monitoring of adjacent homes or buildings) <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A Remarks _____ _____ | | | |
| F. Cover Drainage Layer <input type="checkbox"/> Applicable <input type="checkbox"/> N/A | | | |
| 1. Outlet Pipes Inspected <input type="checkbox"/> Functioning <input type="checkbox"/> N/A Remarks _____ _____ | | | |
| 2. Outlet Rock Inspected <input type="checkbox"/> Functioning <input type="checkbox"/> N/A Remarks _____ _____ | | | |
| G. Detention/sedimentation Ponds <input type="checkbox"/> Applicable <input type="checkbox"/> N/A | | | |
| 1. Siltation Areal extent _____ Depth _____ <input type="checkbox"/> N/A <input type="checkbox"/> Siltation not evident Remarks _____ _____ | | | |
| 2. Erosion Areal extent _____ Depth _____ <input type="checkbox"/> N/A <input type="checkbox"/> Erosion not evident Remarks _____ _____ | | | |
| 3. Outlet Works <input type="checkbox"/> Functioning <input type="checkbox"/> N/A Remarks _____ _____ | | | |
| 4. Dam <input type="checkbox"/> Functioning <input type="checkbox"/> N/A Remarks _____ _____ | | | |
| H. Retaining Walls <input type="checkbox"/> Applicable <input type="checkbox"/> N/A | | | |
| 1. Deformations <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Deformation not evident Horizontal displacement _____ Vertical displacement _____ Rotational displacement _____ Remarks _____ _____ | | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | |
|--|---|---|
| 2. Degradation | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> Deformation not evident |
| Remarks _____ | | |
| _____ | | |
| 1. Perimeter Ditches/Off-Site Discharge | <input type="checkbox"/> Applicable | <input type="checkbox"/> N/A |
| 1. Siltation | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> Siltation not evident |
| Areal extent _____ | Depth _____ | |
| Remarks _____ | | |
| _____ | | |
| 2. Vegetative Growth | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> Siltation not evident |
| <input type="checkbox"/> Vegetation does not impede flow | | |
| Areal extent _____ | Type _____ | |
| Remarks _____ | | |
| _____ | | |
| 3. Erosion | <input type="checkbox"/> Location shown on site map | <input checked="" type="checkbox"/> Erosion not evident |
| Areal extent _____ | Depth _____ | |
| Remarks _____ | | |
| _____ | | |
| 4. Discharge Structure | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> N/A |
| Remarks _____ | | |
| _____ | | |
| VIII. VERTICAL BARRIER WALLS | | |
| | <input type="checkbox"/> Applicable | <input checked="" type="checkbox"/> N/A |
| 1. Settlement | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> Settlement not evident |
| Areal extent _____ | Depth _____ | |
| Remarks _____ | | |
| _____ | | |
| 2. Performance Monitoring | Type of Monitoring _____ | <input type="checkbox"/> Performance not monitored |
| Frequency _____ | <input type="checkbox"/> Evidence of breaching | Head differential _____ |
| Remarks _____ | | |
| _____ | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | | |
|---|--|-------------------------------------|---|
| IX. GROUNDWATER/SURFACE WATER REMEDIES | | <input type="checkbox"/> Applicable | <input checked="" type="checkbox"/> N/A |
| A. Groundwater Extraction Wells, Pumps, and Pipelines | | <input type="checkbox"/> Applicable | <input type="checkbox"/> N/A |
| 1. Pumps, Wellhead Plumbing, and Electrical <input type="checkbox"/> Good condition <input type="checkbox"/> All required wells located <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A Remarks _____ _____ | | | |
| 2. Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____ _____ | | | |
| 3. Spare Parts and Equipment <input type="checkbox"/> Readily available <input type="checkbox"/> Good condition <input type="checkbox"/> Requires upgrade <input type="checkbox"/> Needs to be provided Remarks _____ _____ | | | |
| B. Surface Water Collection Structures, Pumps, and Pipelines | | <input type="checkbox"/> Applicable | <input type="checkbox"/> N/A |
| 1. Collection Structures, Pumps, and Electrical <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____ _____ | | | |
| 2. Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____ _____ | | | |
| 3. Spare Parts and Equipment <input type="checkbox"/> Readily available <input type="checkbox"/> Good condition <input type="checkbox"/> Requires upgrade <input type="checkbox"/> Needs to be provided Remarks _____ _____ | | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | |
|---|--|---|
| C. Treatment System | <input type="checkbox"/> Applicable | <input type="checkbox"/> N/A |
| 1. Treatment Train (Check components that apply) | | |
| <input type="checkbox"/> Metals removal | <input type="checkbox"/> Oil/water separation | <input type="checkbox"/> Bioremediation |
| <input type="checkbox"/> Air stripping | <input type="checkbox"/> Carbon adsorbers | |
| <input type="checkbox"/> Filters _____ | | |
| <input type="checkbox"/> Additive (e.g., chelation agent, flocculent) _____ | | |
| <input type="checkbox"/> Others _____ | | |
| <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance | |
| <input type="checkbox"/> Sampling ports properly marked and functional | | |
| <input type="checkbox"/> Sampling/maintenance log displayed and up to date | | |
| <input type="checkbox"/> Equipment properly identified | | |
| <input type="checkbox"/> Quantity of groundwater treated annually _____ | | |
| <input type="checkbox"/> Quantity of surface water treated annually _____ | | |
| Remarks _____ | | |
| _____ | | |
| 2. Electrical Enclosures and Panels (properly rated and functional) | | |
| <input type="checkbox"/> N/A | <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance |
| Remarks _____ | | |
| _____ | | |
| 3. Tanks, Vaults, Storage Vessels | | |
| <input type="checkbox"/> N/A | <input type="checkbox"/> Good condition | <input type="checkbox"/> Proper secondary containment |
| | | <input type="checkbox"/> Needs Maintenance |
| Remarks _____ | | |
| _____ | | |
| 4. Discharge Structure and Appurtenances | | |
| <input type="checkbox"/> N/A | <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance |
| Remarks _____ | | |
| _____ | | |
| 5. Treatment Building(s) | | |
| <input type="checkbox"/> N/A | <input type="checkbox"/> Good condition (esp. roof and doorways) | <input type="checkbox"/> Needs repair |
| <input type="checkbox"/> Chemicals and equipment properly stored | | |
| Remarks _____ | | |
| _____ | | |

Five-Year Review Site Inspection Checklist (Continued)

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 remedy for this OU is institutional controls with a period of groundwater monitoring.

A summary report, including the data and interpretation, was submitted to SCDHEC, DOE, and USEPA following each monitoring event. During five consecutive monitoring and reporting cycles over the last five years, none of the constituents of concern exceeded its MCL; therefore, in 2004, SCDHEC, DOE, and USEPA concurred with terminating the groundwater monitoring.

Five-Year Review Site Inspection Checklist (Continued)

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.

Implementation of the Institutional Controls alternative required both short- and long-term actions, which are protective of human health and the environment. For the short-term signs were posted at the Waste Unit, which indicate that this area was used for the disposal of waste material and contains buried waste. In addition, existing SRS access controls are used to maintain this site for industrial use only.

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.

N/A

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SAVANNAH RIVER LABORATORY SEEPAGE BASINS (904-53G, -54G, AND -55G) OPERABLE UNIT

I. Introduction

The review for this unit is conducted under the Savannah River Site (SRS) Resource Conservation and Recovery Act (RCRA) program. The Comprehensive Environmental Response, Compensation, and Liability Act (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 five-year review for the Savannah River Lab Seepage Basins (SRLSB) Operable Unit (OU). This review was conducted from August 2007 through September 2007. This report documents the results of the review

II. OU Chronology

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

Table 1. Chronology of OU Events

| Event | Date |
|--|--------------------|
| Consent Decree, Civil Action No. 1:85-2583-6 | 1988 |
| RFI/RI Field Start | September 25, 1996 |
| Removal Action Start | August 22, 1997 |
| Record of Decision (ROD) issuance | November 1999 |
| Remedial Action Complete | August 20, 2003 |
| Previous Five-Year Review | February 12, 2004 |

III. Background

Physical Characteristics

The SRLSB OU is located within the northwestern section of Savannah River Site (SRS), approximately 4,000 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

National Laboratory (SRNL). The settings to the north, east, and south of the basins are wooded. Tims Branch is located north of the basins and an unnamed intermittent stream is immediately east of them. The area to the west is cleared and vegetated with low grasses. The four basins (Figure 2) cover a total area of approximately 92,000 ft². A berm of undisturbed soil separated each of the four basins.

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 50 ft from the northern edge 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.

Land and Resource Use

The current and future land use at the SRLSB is industrial and will be controlled by the USDOE. A Land Use Control Implementation Plan (LUCIP) has been prepared and approved by USDOE, South Carolina Department of Health and Environmental Control (SCDHEC), and United States Environmental Protection Agency (USEPA) and is appended to the SRS Land Use Assurance Plan (LUCAP). The controls specified by the LUCIP include existing administrative controls for the SRLSB OU which is access controls that include posting identification signs and performing annual field inspections in accordance with the unit specific inspection checklist.

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.

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Figure 2. Layout of the SRL Seepage Basins Operable Unit (904-53G, -54G, and -55G) after Construction Completion August 2001

History of Contamination

The four basins were connected by a series of sequential overflow channels designed to receive wastewater by overflow from Basin 1 to Basin 4; water overflow moved sequentially from Basin 1 to Basin 2 to Basin 3 and then 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.

Basins 1 and 2 (904-53G) were placed in 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 ft³ (3.4 x 10⁷ gal) of wastewater, or about 162,000 ft³/yr (1.2 x 10⁶ gal). The total capacity of the basins is 850,000 ft³ (6.3 x 10⁶ gal). There is no record of overflow out of the basins and no account of any local ground surface seeps. The wastewater seeped into the ground within the basins as designed.

Initial Response

Over the years, large trees had grown in and around the basins. The removal of the vegetation at the SRLSBs was initiated on August 22, 1997, and completed on October 15, 1997, as a 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 (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 performed as a separate action under United States Department of Energy (USDOE) removal action authority.

Basis for Taking Action

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. Characterization data is presented in the *RCRA Facility Investigation/Remedial*

Investigation Report including Baseline Risk Assessment and Focused Corrective Measures Study/Feasibility Study for the SRL Seepage Basins OU (904-53G, -54G, and -55G) (U), WSRC-RR-97-846, Rev. 1.1 (September 1998). Samples in the basins were collected to a depth of 4 ft with one boring advanced in each basin to a depth of 20 ft or to auger refusal. The RI/BRA reported that contaminations were present above background levels in some holes at a depth of 20 ft. As stated in the ROD, the remedial action removed any contamination above PTSM levels. Residual contaminations (defined as levels below 1×10^{-3} risk) remained in place and were backfilled with clean soil and an earthen cover placed over the four basins.

Basin operation and resulting soil contamination have 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. Since the remaining contamination is at depth, the remedial action will prevent contaminant movement into Tims Branch.

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). 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. This ecological RG is in addition to the Human Health Industrial RG (1501.00 mg/kg) for chromium, listed in Table 2 below.

Table 2. Final Human Health-Industrial RGs for the SRLSB Soil

| Final COC | Units | RG | Final COC | Units | RG |
|-------------------|--------------|-----------|---------------------|--------------|-----------|
| Actinium-228 | pCi/g | 0.070 | Radium-228 | pCi/g | 0.067 |
| Americium-241 | pCi/g | 8.080 | Strontium-90 | pCi/g | 57.130 |
| Cesium-137 | pCi/g | 0.110 | Thorium-228 | pCi/g | 0.035 |
| Cobalt-60 | pCi/g | 0.020 | Thorium-230 | pCi/g | 85.380 |
| Curium-243/244 | pCi/g | 1.600 | Thorium-232 | pCi/g | 98.000 |
| Lead-212 | pCi/g | 0.700 | Uranium-233/234 | pCi/g | 71.000 |
| Neptunium-239 | pCi/g | 0.900 | Uranium-235 | pCi/g | 0.830 |
| Plutonium-238 | pCi/g | 10.857 | Uranium-238 | pCi/g | 3.100 |
| Plutonium-239/240 | pCi/g | 10.130 | Hexavalent Chromium | mg/kg | 1501.000 |
| Potassium-40 | pCi/g | 0.400 | Mercury | mg/kg | 47.000 |

IV. Remedial Actions

Remedy Selection

The Record of Decision (ROD) was issued on November 1999. The ROD addressed final actions necessary to close the four Savannah River Lab Basins. Based on the risk posed by radionuclides in the SRLSB soils, the general remedial action objectives (RAOs), as identified in the ROD, to ensure protection of human health and the environment are as follows:

- Eliminate exposure of the future industrial worker to radiochemical constituents, mercury, and chromium in the soils of Basins 1, 2, 3, and 4
- No soil removal was required for Basin 4. The remaining contamination is at depth and at concentrations less than PTSM criteria.
- Reduce risk to soil invertebrates from the ingestion of chromium in the surface soils of Basin 1.

The remedial actions chosen are listed below.

- Excavation of all PTSM from the basin bottoms and berms of Basins 1, 2, and 3 and the process sewer line and associated soils from Basin 1 to the first manhole

- No soil will be removed from Basin 4
- Perform confirmatory soil sampling and analysis to ensure all PTSM is removed
- Backfill of all four basins and the process sewer trench with clean soil, followed by vegetation of the soil surface to prevent erosion.
- Transportation and disposal of all excavated soil and sewer line pipe to Envirocare of Utah, Inc., an approved, licensed, out-of-state, low-level waste disposal facility
- Maintenance and institutional controls of the covered basins to prevent unauthorized access

Remedy Implementation

The remedial actions are complete. All PTSM has been removed and properly disposed. Soil covers have been placed over the basins and the process sewer trench. Institutional Controls have been established. Remaining radionuclides will decay over time by half-life. No modeling has been performed to provide a specific time frame for decrease in radioactivity. No CMCOCs were indicated by contaminant migration modeling.

V. Progress Since Last Review

This is the second five-year review for this OU. Since the previous review in 2003, the following actions were completed:

- Continued periodic inspections and maintenance of the basin cover.
- Continued annual surveys of the basin cover to verify that no subsidence has occurred.

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

- Ensured that all actions required under the RCRA Permit were implemented.

VII. Technical Assessment

The removal of contaminated soil and the installation of soil covers have met the RAOs of protecting human health and the environment by eliminating surficial soil exposure and removing all PTSM. Residual contamination (at levels below 1×10^{-3} risk) will remain in place. These actions combined with both short-term and long-term institutional controls will eliminate any risk to the industrial worker. Periodic routine inspections and maintenance activities have maintained the integrity of the soil covers. The SRLSB OU remedy is functioning as intended by the decision documents.

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. Project Costs

Costs associated with the selected remedy for SRLSB include operation and maintenance costs of the cover and institutional controls. The estimated operation and maintenance cost associated with the selected remedy is \$80,000. This is a present worth cost, including 30 years of maintenance activities. After characterization and effectiveness of the remedy was evaluated, the actual operation and maintenance cost for the SRLSB was assessed. The total actual operation and maintenance cost from project support and other post-construction expense to fiscal year 2006 is \$13,032.

XI. 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 re-vegetation 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.

XII. Next Review

The next five-year review is scheduled for February 12, 2014.

ATTACHMENT 1

List of Documents Reviewed

WSRC-RP-97-847, *Statement of Basis/Proposed Plan for the SRL Seepage Basins Operable Unit (904-53G1, -53G2, -54G, and -55G) (U)*, Revision 1.1, 1998, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

WSRC-RP-97-846, *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)*, Revision 1.1, 1998, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

WSRC-RP-98-4125, *Land Use Control Assurance Plan for the Savannah River Site*, Revision 0, 1999, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

WSRC-RP-97-848, *Record of Decision, Remedial Alternative Selection for the SRL Seepage Basins Operable Unit (904-53G1, -53G2, -54G and -55G) (U)*, Revision 1.1, 1999, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

WSRC-RP-99-04026, *Corrective Measures Implementation/Remedial Action Implementation Plan for Closure of SRL Seepage Basins Operable Unit (904-53G1, -53G2, -54G and -55G) (U)*, Revision 1, 1999, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

WSRC-RP-2001-4123, *Corrective Measure Implementation Report/Post-Construction Report/Final Remediation Report (CMI/PCR/FRR) for Closure of SRL Seepage Basins Operable Unit (904-53G1, -53G2, -54G, and -55G) (U)*, Revision 0, 2001, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

SRL Seepage Basins Operable Unit (904-53G1, -53G2, -54G, and -55G) Subsidence Monitor Survey Logs

ATTACHMENT 1 *(Continued)*

List of Documents Reviewed

Soil and Groundwater Closure Projects, Standard Operating Procedures, Field Inspection Checklist SRL Seepage Basins Operable Unit (904-53G1, -53G2, -54G, and -55G) (U), ER-IDS-019-011, Rev. 0 - 2, Washington Savannah River Company, Savannah River Site, Aiken, SC

Long Form Radiation Survey Sheet, Semi-annual routine A-Area SRL Seepage Basin Inactive process sewer Line, OSR-4-17A

Radiological Walkdown Program, RW-SO-ER-98-34 Rev. 4, Radiological Observation, A-Area SRL Seepage Basin

ATTACHMENT 2

Five-Year Review Site Inspection Checklist for SRLSB

| I. SITE INFORMATION | | | |
|--|---|--|---|
| Site Name: | SRL Seepage Basins (904-53G, 1 & 2, -54G, and -55G) | Date of Inspection: | 10/24/2007 |
| Location and Region: | SRS, USEPA Region IV | EPA ID: | SC1890008989 |
| Agency, office, or company leading the five-year review: | USDOE | CERCLIS OU No.: | 47 |
| | | Weather/Temperature: | |
| Remedy Includes: (Check all that apply) <div style="display: flex; flex-wrap: wrap;"><div style="width: 50%;"><input checked="" type="checkbox"/> Cover System <input checked="" type="checkbox"/> Access controls <input checked="" type="checkbox"/> Institutional Controls <input type="checkbox"/> Groundwater pump and treatment <input type="checkbox"/> Surface water collection and treatment <input checked="" type="checkbox"/> Other: <u>Excavation, disposal</u></div><div style="width: 50%;"><input type="checkbox"/> Monitored Natural Attenuation <input type="checkbox"/> Groundwater Containment <input type="checkbox"/> Vertical Barrier Walls</div></div> | | | |
| Attachments: <input type="checkbox"/> Inspection team roster attached <input type="checkbox"/> Site map attached | | | |
| II. INTERVIEWS (Check all that apply) | | | |
| 1. O & M Site Manager | <u>Wayne Gleaton</u> (Name) | <u>Post Closure Manager</u> (Title) | <u>10-23-2007</u> (Date) |
| Interviewed: | <input type="checkbox"/> at site | <input type="checkbox"/> at office | <input type="checkbox"/> by phone Phone No. _____ |
| Problems, suggestions: | <input type="checkbox"/> report attached _____ | | |
| 2. O & M Staff | <u>Richard Feagin</u> (Name) | <u>Post-Closure Waste Site Inspector/Maintenance Coord.</u> (Title) | <u>8-23-2007</u> (Date) |
| Interviewed: | <input type="checkbox"/> at site | <input type="checkbox"/> at office | <input type="checkbox"/> by phone Phone No. _____ |
| Problems, suggestions: | <input type="checkbox"/> report attached _____ | | |

Five-Year Review Site Inspection Checklist (Continued)

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

| | | | |
|---|--|-------------------------------------|------------------------------|
| <input type="checkbox"/> O & M Manual | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |
| x As-built drawings | x Readily available | x Up to date | <input type="checkbox"/> N/A |
| <input type="checkbox"/> Maintenance Logs | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |

Remarks: See Waste Unit Inspection and Maintenance, ER-SOP-019

Five-Year Review Site Inspection Checklist (Continued)

| | | | |
|---|--|-------------------------------------|-------|
| 2. Site-Specific Health and Safety Plan | | | |
| <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A | |
| <input type="checkbox"/> Contingency plan/emergency response plan | | | |
| <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A | |
| Remarks: <u>Routine O&M activities do not require a SSHASP under 29 CFR 1910.120, HAZWOPER. A SSHASP is prepared as needed.</u> | | | |
| 3. O & M and OSHA Training Records | | | |
| x Readily available | x Up to date | <input type="checkbox"/> N/A | |
| Remarks: _____ | | | |
| 4. Permits and Service Agreements | | | |
| <input type="checkbox"/> Air discharge permit | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |
| <input type="checkbox"/> Effluent discharge | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |
| <input type="checkbox"/> Waste Disposal, POTW | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |
| <input type="checkbox"/> Other permits (See Remarks) | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |
| Remarks: _____ | | | |
| 5. Gas Generation Records | | | |
| <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A | |
| Remarks: _____ | | | |
| 6. Settlement Monument Records | | | |
| <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A | |
| Remarks: _____ | | | |
| 7. Groundwater Monitoring Records | | | |
| <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A | |
| Remarks: _____ | | | |
| 8. Leachate Extraction Records | | | |
| <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A | |
| Remarks: _____ | | | |
| 9. Discharge Compliance Records | | | |
| <input type="checkbox"/> Air | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |
| <input type="checkbox"/> Water (effluent) | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |
| Remarks: _____ | | | |
| 10. Daily Access/Security Logs | | | |
| <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A | |
| Remarks: _____ | | | |

Five-Year Review Site Inspection Checklist (Continued)

| IV. O & M Costs | | | |
|---|--------------------|---------------------|---|
| 1. O & M Organization <div style="display: flex; justify-content: space-between;"> <div> <input type="checkbox"/> State in-house <input type="checkbox"/> PRP in-house <input checked="" type="checkbox"/> Other <u>SRS</u> </div> <div> <input type="checkbox"/> Contractor for State <input type="checkbox"/> Contractor for PRP </div> </div> | | | |
| 2. O & M Cost Records <input type="checkbox"/> Readily available <input type="checkbox"/> Up to date <input type="checkbox"/> Funding mechanism/agreement in place <input checked="" type="checkbox"/> Other: <u>Project cost data is summarized in Section X of attached review: WSRC-RP-2007-4063.</u> | | | |
| Total annual cost by year for review period if available | | | |
| From _____ (Date) | To _____ (Date) | _____ Total cost | <input type="checkbox"/> Breakdown attached |
| From _____ (Date) | To _____ (Date) | _____ Total cost | <input type="checkbox"/> Breakdown attached |
| From _____ (Date) | To _____ (Date) | _____ Total cost | <input type="checkbox"/> Breakdown attached |
| From _____ (Date) | To _____ (Date) | _____ Total cost | <input type="checkbox"/> Breakdown attached |
| From _____ (Date) | To _____ (Date) | _____ Total cost | <input type="checkbox"/> Breakdown attached |
| 3. Unanticipated or Unusually High O & M Costs During Review Period Describe costs and reasons: _____ _____ _____ _____ | | | |
| V. ACCESS AND INSTITUTIONAL CONTROLS | | | <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A |
| A. Fencing | | | |
| 1. Fencing Damaged <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Gates secured <input checked="" type="checkbox"/> N/A Remarks: <u>Fencing in good condition.</u> | | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | | |
|--|-----------------------|--|-------------------------|
| B. Other Access Restrictions | | | |
| 1. Signs and Other Security Measures <input type="checkbox"/> Location shown on site map <input type="checkbox"/> N/A | | | |
| Remarks: <u>Signs at this site are in good condition.</u> | | | |
| C. Institutional Controls | | | |
| 1. Implementation and Enforcement | | | |
| Site conditions imply ICs not properly implemented: | | <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A | |
| Site conditions imply ICs not being fully enforced: | | <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A | |
| Type of monitoring (e.g., self-reporting, drive-by): | | Walk Down | |
| Frequency: | | Annually | |
| Responsible party/agent: | | DOE Savannah River Field Office | |
| Contact: | K. M. Adams (Name) | Waste Area Manager (Title) | 10/23/07 (Date) |
| | | | 952-7871 (Phone No.) |
| Reporting is up-to-date: | | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A | |
| Reports are verified by the lead agency: | | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A | |
| Specific requirements in deed of decision documents have been met: | | <input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A | |
| Violations have been reported: | | <input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A | |
| Other problems or suggestions: | | <input type="checkbox"/> Report attached | |
| <hr/> | | | |
| 2. Adequacy <input checked="" type="checkbox"/> ICs are adequate <input type="checkbox"/> ICs are inadequate <input type="checkbox"/> N/A | | | |
| Remarks: <hr/> | | | |
| <hr/> | | | |
| D. General | | | |
| 1. Vandalism/Trespassing <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> No vandalism evident | | | |
| Remarks <hr/> | | | |
| <hr/> | | | |
| 2. Land Use Changes Onsite <input checked="" type="checkbox"/> N/A | | | |
| Remarks <hr/> | | | |
| <hr/> | | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | | |
|--|--|--------------|--|
| 3. Land Use Changes Offsite <input checked="" type="checkbox"/> N/A | | | |
| Remarks _____ | | | |
| VI. GENERAL SITE CONDITIONS | | | |
| A. Roads <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A | | | |
| 1. Roads Damaged <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Roads adequate <input type="checkbox"/> N/A | | | |
| Remarks _____ | | | |
| B. Other Site Conditions | | | |
| Remarks _____ | | | |
| VII. COVERS SYSTEMS <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A | | | |
| A. Landfill Surface | | | |
| 1. Settlement (Low spots) <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Settlement not evident | | | |
| Areal extent _____ | | Depth _____ | |
| Remarks: _____ | | | |
| 2. Cracks <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Cracking not evident | | | |
| Lengths _____ | | Widths _____ | |
| | | Depths _____ | |
| Remarks _____ | | | |
| 3. Erosion <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Erosion not evident | | | |
| Areal extent _____ | | Depth _____ | |
| Remarks _____ | | | |
| 4. Holes <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Holes not evident | | | |
| Areal extent _____ | | Depth _____ | |
| Remarks _____ | | | |
| 5. Vegetative Cover <input checked="" type="checkbox"/> Grass <input type="checkbox"/> Cover properly established <input type="checkbox"/> No signs of stress | | | |
| <input type="checkbox"/> Trees/shrubs (indicate size and location on a diagram) | | | |
| Remarks: <u>Grass is established but dry due to lack of rain.</u> | | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | |
|--|---|--------------------|
| 6. Alternative Cover (armored rock, concrete, etc.) <input type="checkbox"/> N/A | | |
| Remarks: _____ | | |
| 7. Bulges <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Bulges not evident | | |
| Areal extent _____ Height _____ | | |
| Remarks _____ | | |
| 8. Wet Areas/Water Damage <input checked="" type="checkbox"/> Wet areas/water damage not evident | | |
| <input type="checkbox"/> Wet Areas | <input type="checkbox"/> Location shown on site map | Areal extent _____ |
| <input type="checkbox"/> Ponding | <input type="checkbox"/> Location shown on site map | Areal extent _____ |
| <input type="checkbox"/> Seeps | <input type="checkbox"/> Location shown on site map | Areal extent _____ |
| <input type="checkbox"/> Soft subgrade | <input type="checkbox"/> Location shown on site map | Areal extent _____ |
| Remarks _____ | | |
| 9. Slope Instability <input type="checkbox"/> Slides <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> No evidence of slope instability | | |
| Areal extent _____ | | |
| Remarks _____ | | |
| B. Benches <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> 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 <input type="checkbox"/> Location shown on site map <input type="checkbox"/> N/A or okay | | |
| Remarks _____ | | |
| 2. Bench Breached <input type="checkbox"/> Location shown on site map <input type="checkbox"/> N/A or okay | | |
| Remarks _____ | | |
| 3. Bench Overtopped <input type="checkbox"/> Location shown on site map <input type="checkbox"/> N/A or okay | | |
| Remarks _____ | | |

Five-Year Review Site Inspection Checklist (Continued)

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 _____

Five-Year Review Site Inspection Checklist (Continued)

| | | | |
|--|--|---|---|
| D. Cover Penetrations <input type="checkbox"/> Applicable x N/A | | | |
| 1. Gas Vents <input type="checkbox"/> Active <input type="checkbox"/> Passive | | | |
| <input type="checkbox"/> Properly secured/locked | <input type="checkbox"/> Functioning | <input type="checkbox"/> Routinely sampled | <input type="checkbox"/> Good condition |
| <input type="checkbox"/> Evidence of leakage at penetration | <input type="checkbox"/> Needs Maintenance | <input type="checkbox"/> N/A | |
| Remarks _____ | | | |
| 2. Gas Monitoring Probes | | | |
| <input type="checkbox"/> Properly secured/locked | <input type="checkbox"/> Functioning | <input type="checkbox"/> Routinely sampled | <input type="checkbox"/> Good condition |
| <input type="checkbox"/> Evidence of leakage at penetration | <input type="checkbox"/> Needs Maintenance | <input type="checkbox"/> N/A | |
| Remarks _____ | | | |
| 3. Monitoring Wells (within surface area of landfill) | | | |
| <input type="checkbox"/> Properly secured/locked | <input type="checkbox"/> Functioning | <input type="checkbox"/> Routinely sampled | <input type="checkbox"/> Good condition |
| <input type="checkbox"/> Evidence of leakage at penetration | <input type="checkbox"/> Needs Maintenance | <input type="checkbox"/> N/A | |
| Remarks _____ | | | |
| 4. Leachate Extraction Wells | | | |
| <input type="checkbox"/> Properly secured/locked | <input type="checkbox"/> Functioning | <input type="checkbox"/> Routinely sampled | <input type="checkbox"/> Good condition |
| <input type="checkbox"/> Evidence of leakage at penetration | <input type="checkbox"/> Needs Maintenance | <input type="checkbox"/> N/A | |
| Remarks _____ | | | |
| 5. Settlement Monuments <input type="checkbox"/> Located <input type="checkbox"/> Routinely surveyed <input type="checkbox"/> N/A | | | |
| Remarks _____ | | | |
| E. Gas Collection and Treatment <input type="checkbox"/> Applicable x N/A | | | |
| 1. Gas Treatment Facilities | | | |
| <input type="checkbox"/> Flaring | <input type="checkbox"/> Thermal destruction | <input type="checkbox"/> Collection for reuse | |
| <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance | | |
| Remarks _____ | | | |
| 2. Gas Collection Wells, Manifolds and Piping | | | |
| <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance | | |
| Remarks _____ | | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | |
|---|--|--|
| 3. Gas Monitoring Facilities (e.g., gas monitoring of adjacent homes or buildings) | | |
| <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance | <input type="checkbox"/> N/A |
| Remarks _____ _____ | | |
| F. Cover Drainage Layer | | |
| <input type="checkbox"/> Applicable | | x N/A |
| 1. Outlet Pipes Inspected | | |
| <input type="checkbox"/> Functioning | <input type="checkbox"/> N/A | |
| Remarks _____ _____ | | |
| 2. Outlet Rock Inspected | | |
| <input type="checkbox"/> Functioning | <input type="checkbox"/> N/A | |
| Remarks _____ _____ | | |
| G. Detention/sedimentation Ponds | | |
| <input type="checkbox"/> Applicable | | x N/A |
| 1. Siltation | | |
| Areal extent _____ | Depth _____ | <input type="checkbox"/> N/A |
| <input type="checkbox"/> Siltation not evident | | |
| Remarks _____ _____ | | |
| 2. Erosion | | |
| Areal extent _____ | Depth _____ | <input type="checkbox"/> N/A |
| <input type="checkbox"/> Erosion not evident | | |
| Remarks _____ _____ | | |
| 3. Outlet Works | | |
| <input type="checkbox"/> Functioning | <input type="checkbox"/> N/A | |
| Remarks _____ _____ | | |
| 4. Dam | | |
| <input type="checkbox"/> Functioning | <input type="checkbox"/> N/A | |
| Remarks _____ _____ | | |
| H. Retaining Walls | | |
| <input type="checkbox"/> Applicable | | x N/A |
| 1. Deformations | | |
| <input type="checkbox"/> Location shown on site map | | <input type="checkbox"/> Deformation not evident |
| Horizontal displacement _____ | Vertical displacement _____ | |
| Rotational displacement _____ | | |
| Remarks _____ _____ | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | |
|--|---|--|
| 2. Degradation | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> Deformation not evident |
| Remarks _____ | | |
| _____ | | |
| I. Perimeter Ditches/Off-Site Discharge <input type="checkbox"/> Applicable x N/A | | |
| 1. Siltation | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> Siltation not evident |
| Areal extent _____ Depth _____ | | |
| Remarks _____ | | |
| _____ | | |
| 2. Vegetative Growth | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> Siltation not evident |
| x Vegetation does not impede flow | | |
| Areal extent _____ Type _____ | | |
| Remarks _____ | | |
| _____ | | |
| 3. Erosion | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> Erosion not evident |
| Areal extent _____ Depth _____ | | |
| Remarks _____ | | |
| _____ | | |
| 4. Discharge Structure | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> N/A |
| Remarks _____ | | |
| _____ | | |
| VIII. VERTICAL BARRIER WALLS <input type="checkbox"/> Applicable x N/A | | |
| 1. Settlement | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> Settlement not evident |
| Areal extent _____ Depth _____ | | |
| Remarks _____ | | |
| _____ | | |
| 2. Performance Monitoring | Type of Monitoring _____ | <input type="checkbox"/> Performance not monitored |
| Frequency _____ <input type="checkbox"/> Evidence of breaching Head differential _____ | | |
| Remarks _____ | | |
| _____ | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | | |
|---|--|-------------------------------------|---|
| IX. GROUNDWATER/SURFACE WATER REMEDIES | | <input type="checkbox"/> Applicable | <input checked="" type="checkbox"/> N/A |
| A. Groundwater Extraction Wells, Pumps, and Pipelines | | <input type="checkbox"/> Applicable | <input type="checkbox"/> N/A |
| 1. Pumps, Wellhead Plumbing, and Electrical <input type="checkbox"/> Good condition <input type="checkbox"/> All required wells located <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A Remarks _____ _____ | | | |
| 2. Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____ _____ | | | |
| 3. Spare Parts and Equipment <input type="checkbox"/> Readily available <input type="checkbox"/> Good condition <input type="checkbox"/> Requires upgrade <input type="checkbox"/> Needs to be provided Remarks _____ _____ | | | |
| B. Surface Water Collection Structures, Pumps, and Pipelines | | <input type="checkbox"/> Applicable | <input type="checkbox"/> N/A |
| 1. Collection Structures, Pumps, and Electrical <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____ _____ | | | |
| 2. Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____ _____ | | | |
| 3. Spare Parts and Equipment <input type="checkbox"/> Readily available <input type="checkbox"/> Good condition <input type="checkbox"/> Requires upgrade <input type="checkbox"/> Needs to be provided Remarks _____ _____ | | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | |
|--|--|---|
| C. Treatment System | <input type="checkbox"/> Applicable | <input type="checkbox"/> N/A |
| 1. Treatment Train (Check components that apply) | | |
| <input type="checkbox"/> Metals removal | <input type="checkbox"/> Oil/water separation | <input type="checkbox"/> Bioremediation |
| <input type="checkbox"/> Air stripping | <input type="checkbox"/> Carbon adsorbers | |
| <input type="checkbox"/> Filters | | |
| <input type="checkbox"/> Additive (e.g., chelation agent, flocculent) | | |
| <input type="checkbox"/> Others | | |
| <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance | |
| <input type="checkbox"/> Sampling ports properly marked and functional | | |
| <input type="checkbox"/> Sampling/maintenance log displayed and up to date | | |
| <input type="checkbox"/> Equipment properly identified | | |
| <input type="checkbox"/> Quantity of groundwater treated annually | | |
| <input type="checkbox"/> Quantity of surface water treated annually | | |
| Remarks | | |
| <hr/> | | |
| 2. Electrical Enclosures and Panels (properly rated and functional) | | |
| <input type="checkbox"/> N/A | <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance |
| Remarks | | |
| <hr/> | | |
| 3. Tanks, Vaults, Storage Vessels | | |
| <input type="checkbox"/> N/A | <input type="checkbox"/> Good condition | <input type="checkbox"/> Proper secondary containment |
| | | <input type="checkbox"/> Needs Maintenance |
| Remarks | | |
| <hr/> | | |
| 4. Discharge Structure and Appurtenances | | |
| <input type="checkbox"/> N/A | <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance |
| Remarks | | |
| <hr/> | | |
| 5. Treatment Building(s) | | |
| <input type="checkbox"/> N/A | <input type="checkbox"/> Good condition (esp. roof and doorways) | <input type="checkbox"/> Needs repair |
| <input type="checkbox"/> Chemicals and equipment properly stored | | |
| Remarks | | |
| <hr/> | | |

Five-Year Review Site Inspection Checklist (Continued)

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.).

The removal of contaminated soil and the installation of soil covers have met the remedial action objectives of protecting human health and the environment by eliminating surficial soil exposure, and removing all principal threat source material. Residual contamination (at levels below 1×10^{-3} risk) will remain in place. These actions combined with both short term and long term institutional controls will eliminate any risk to the industrial worker.

Five-Year Review Site Inspection Checklist (Continued)

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.

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. Warning signs are posted at the unit and institutional controls to maintain future industrial land use only have been implemented through the LUCIP. The area vegetation, fencing, and signs are maintained through regular inspections and an established maintenance program.

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.

N/A

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T AREA OPERABLE UNIT

I. Introduction

This is the first five-year review for the T Area Operable Unit (TAOU). This review was conducted from August 2007 through September 2007. This report documents the results of the review.

II. OU Chronology

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

Table 1. Chronology of OU Events

| Event | Date |
|---|---|
| RI/FFS/RA Rev 1.2 Submitted | April 1, 2005 |
| Final Record of Decision (ROD) Issuance | December 21, 2005 |
| Remedial Action Start/Complete | January 13, 2006 and completed October 31, 2006 |
| Previous Five-Year Reviews | None |

III. Background

Physical Characteristics

TAOU is located in the southwestern portion of Savannah River Site (SRS), approximately one-quarter mile east of the Savannah River. T Area is one of several industrial areas at SRS (Figure 1). Figure 2 depicts the site layout of TAOU. The TAOU source OU is listed as a Resource Conservation and Recovery Act (RCRA) 3004(u) Solid Waste Management Unit/ Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) unit in Appendix C of the Federal Facility Agreement (FFA) for SRS.



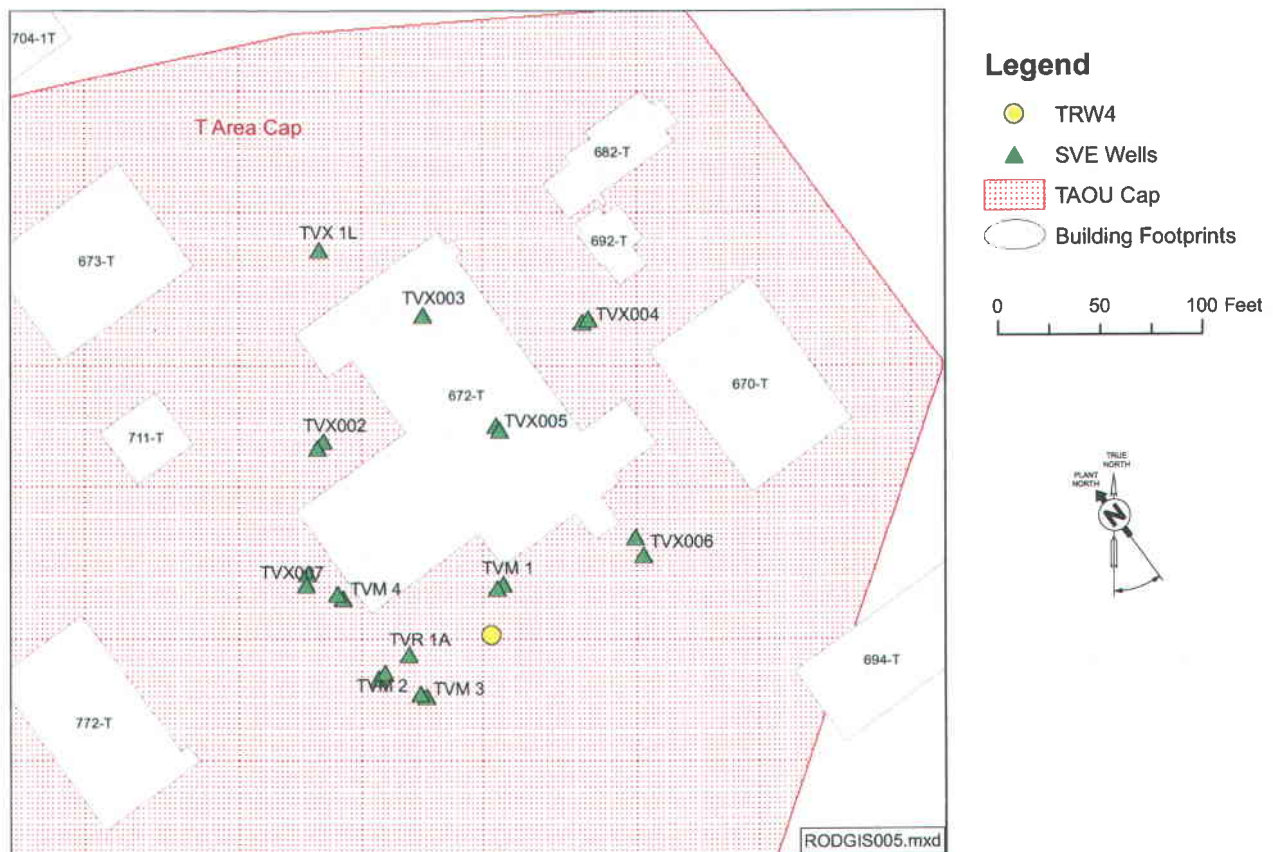


Figure 2. T-Area Operable Unit Pre-Remedial Action Site Plan

Land and Resource Use

The TAOU is located in an industrial area. The future land use for TAOU OU is anticipated to remain industrial.

History of Contamination

T Area was used in the development and testing of processes, facilities, and equipment for various SRS programs. Until 1978, T Area included three main buildings constructed in 1950 (Buildings 677-T, 678-T, and 679-T). After 1978, the area was expanded to include over 30 buildings comprising office administrative buildings, process buildings for large-scale experimental demonstrations, laboratories for research and analytical purposes, pilot-scale facilities, bulk tank storage, industrial wastewater processing facilities, and warehouse storage for a wide range of chemicals and specialty equipment. All of the facilities in T Area have been dismantled and removed (Figure 3) with the following exceptions: the 678-5T pump test facility and ancillary structures, the 702-T telecommunications building, the 906-T air stripper, and a soil vapor extraction (SVE) system.

The TNX Swamp was not used in T-Area industrial processes; however, it was used routinely to manage surface runoff and stormwater. The TNX Swamp was divided into four subunits: the Outfall Delta (OD), the Inner Swamp (IS), the High Ground Swamp, and the Outer Swamp. The TNX Swamp, and the Lower Discharge Gully (LDG) and Swamp Operable Unit (OU) are included as part of the TAOU.

A release of hazardous and radiological substances to the environment has occurred at the TAOU, resulting in soil and sediment contamination. Soil contaminants include mercury, tetrachloroethene, a polychlorinated biphenyl (PCB-1260), cesium-137 and uranium/thorium decay chain radioisotopes. Sediment contaminants include uranium/thorium decay chain radioisotopes (actinium-228, lead-212, radium-228, thorium-228, uranium-233/234, uranium-235, and uranium-238).



Figure 3. Aerial Photograph of T Area

Initial Response

The TAOU is an area-based OU that incorporates most of the T-Area footprint and the TNX Swamp (Figure 2). As such, it includes all of the applicable OUs, Site Evaluation Areas (SEAs), and the dismantled facilities listed in the TAOU Record of Decision (ROD). The TAOU is approximately 66 acres. Before an area-based remedial strategy was implemented, remedial actions and removal actions for some of the waste units now identified under the TAOU were included in previous CERCLA documentation. Remedial decisions for the T-Area waste units and facilities addressed by this document do not affect the remedial actions of other TAOU subunits previously addressed. These actions include the ongoing SVE associated with the TNX Burying Ground (TBG), and operation of the air stripper associated with the TNX-Area Groundwater. These remedies

will continue as proposed in the TNX-Area OU ROD. Progress will continue to be documented in the Annual Groundwater and Effectiveness Monitoring Strategy Report.

IV. Remedial Actions

Remedy Selection

Unit and materials addressed under this ROD included the following:

- Soil excavation under removal action from the Outfall Delta and Inner Swamp, the X001 Outfall Drainage Ditch OU, and Till Field #2 that was stockpiled in the industrial portion of T Area.
- Residual contamination in the Outfall Delta and Inner Swamp
- Residual contamination in the TNX Burying Ground
- Residual concrete contamination at the remaining building slabs
- Uncertainties with potential and residual under-slab soil contamination
- Uncertainties with soil and process sewer line contamination for the TNX Area Process Sewer Lines

Remedy Implementation

The following remedies were implemented for TAOU:

- Placement of a low permeability cap over contaminated soils, contaminated debris and building slabs left in place, and contaminated soils excavated from T-Area facilities under previous removal action and staged for placement beneath the cover

- Treatment of contaminated soil in T-Area swamp with soil amendments to attenuate the leachability of radiological contaminants in the soils. Soil amendments will be reapplied if long-term monitoring indicates that they are losing their effectiveness.
- Implementing institutional controls to manage the TAOU. These controls include access control, periodic inspection and maintenance of the site, and deed restrictions.

V. Progress Since Last Review

This is the first five-year review for the TAOU .

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 guidance

VII. Technical Assessment

The soil cover and soil amendments selected in the ROD as remedial action for the TAOU are functioning as intended. The exposure assumptions, toxicity data, cleanup levels, and remedial action objectives used at the time of remedy selection are still valid.

No 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 condition, or activities that currently prevent the remedy from being protective.

IX. Recommendation and Follow-up Action

There is no recommendation or follow-up action for this OU.

X. Project Costs

Costs associated with the selected remedy for the T-Area OU operation and maintenance costs of the cover and institutional controls. The estimated operation and maintenance cost associated with the selected remedy is \$3,122,000, discounted at 3.9%. This estimate is an order-of-magnitude engineering cost estimate that is expected to be within +50 to -30 percent of the actual project cost. The remedy was under construction in fiscal year 2006; therefore, the actual operation and maintenance cost for the T-Area OU cannot be assessed at this time.

XI. Protectiveness Statement(s)

The soil amendment and soil cover remedy at TAOU is protective of human health and the environment for soil contamination and prevents external exposure to radiological contaminants. Land use controls (site use/site clearance, security measures and warning signs that are posted at the waste unit) are in place and ensure the protectiveness of the remedy and human.

XII. Next Review

The next five-year review is scheduled for February 12, 2014.

ATTACHMENT 1

List of Documents Reviewed

WSRC-RP-2003-4017, *Record of Decision Remedial Alternative Selection for the TNX Area operable Unit*, Revision 1, August 2003 Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

WSRC-RP-2004-4070, *Record of Decision Remedial Alternative Selection for the T-Area operable Unit*, Revision 0, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

WSRC-RP-2005-4003, *Corrective Measure Implementation/Remedial Action Implementation Plan(CMI/RAIP) for the T-Area Operable Unit (U)*, Rev.1, Westinghouse Savannah River Company, Savannah River Site, Aiken SC

WSRC-RP-2006-4005, *Post-Construction Report for T-Area Operable Unit (U)*, Revision 1, Washington Savannah River Company, Savannah River Site, Aiken, SC

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ATTACHMENT 2

Five-Year Review Site Inspection Checklist

| I. SITE INFORMATION | | | |
|--|--|--|--|
| Site Name: | T-Area Operable Unit (TAOU) | Date of Inspection: | 10/23/2007 |
| Location and Region: | SRS, USEPA Region IV | EPA ID: | SC1890008989 |
| Agency, office, or company leading the five-year review: | USDOE | CERCLIS OU No.: | 96 |
| | | Weather/Temperature: | Good |
| Remedy Includes: (Check all that apply) | | | |
| <div><input checked="" type="checkbox"/> Cover system</div> <div><input type="checkbox"/> Access controls</div> <div><input checked="" type="checkbox"/> Institutional Controls</div> <div><input type="checkbox"/> Groundwater pump and treatment</div> <div><input type="checkbox"/> Surface water collection and treatment</div> <div><input type="checkbox"/> Other: _____</div> <div><input checked="" type="checkbox"/> Monitored Natural Attenuation</div> <div><input type="checkbox"/> Groundwater Containment</div> <div><input type="checkbox"/> Vertical Barrier Walls</div> | | | |
| Attachments: <input type="checkbox"/> Inspection team roster attached <input type="checkbox"/> Site map attached | | | |
| II. INTERVIEWS (Check all that apply) | | | |
| 1. O & M Site Manager | <u>Wayne Gleaton</u> (Name) | <u>Mgr Post-Closure Maintenance</u> (Title) | <u> </u> (Date) |
| Interviewed: | <input type="checkbox"/> at site | <input type="checkbox"/> at office | <input type="checkbox"/> by phone Phone No. <u>803-557-8838</u> |
| Problems, suggestions: | <input type="checkbox"/> report attached _____ | | |
| 2. O & M Staff | <u>Richard Feagin</u> (Name) | <u>Post-Closure Maintenance</u> (Title) | <u>8-23-2007</u> (Date) |
| Interviewed: | <input checked="" type="checkbox"/> at site | <input type="checkbox"/> at office | <input checked="" type="checkbox"/> by phone Phone No. <u>803-952-6706</u> |
| Problems, suggestions: | <input type="checkbox"/> report attached _____ | | |

Five-Year Review Site Inspection Checklist (Continued)

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

| | | | |
|---|--|-------------------------------------|------------------------------|
| <input type="checkbox"/> O & M Manual | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |
| x As-built drawings | x Readily available | x Up to date | <input type="checkbox"/> N/A |
| <input type="checkbox"/> Maintenance Logs | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |

Remarks: See Waste Unit Inspection and Maintenance, ER-SOP-019

Five-Year Review Site Inspection Checklist (Continued)

| | | | |
|---|--|-------------------------------------|-------|
| 2. Site-Specific Health and Safety Plan | | | |
| <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A | |
| <input type="checkbox"/> Contingency plan/emergency response plan | | | |
| <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A | |
| Remarks: <u>Routine O&M activities do not require an SSHASP under 29 CFR 1910.1201, HAZWOPER.</u> | | | |
| 3. O & M and OSHA Training Records | | | |
| x Readily available | x Up to date | <input type="checkbox"/> N/A | |
| Remarks: _____ | | | |
| 4. Permits and Service Agreements | | | |
| <input type="checkbox"/> Air discharge permit | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |
| <input type="checkbox"/> Effluent discharge | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |
| <input type="checkbox"/> Waste Disposal, POTW | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |
| <input type="checkbox"/> Other permits | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |
| Remarks: _____ | | | |
| 5. Gas Generation Records | | | |
| <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A | |
| Remarks: _____ | | | |
| 6. Settlement Monument Records | | | |
| <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A | |
| Remarks: _____ | | | |
| 7. Groundwater Monitoring Records | | | |
| <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A | |
| Remarks: _____ | | | |
| 8. Leachate Extraction Records | | | |
| <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A | |
| Remarks: _____ | | | |
| 9. Discharge Compliance Records | | | |
| <input type="checkbox"/> Air | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |
| <input type="checkbox"/> Water (effluent) | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |
| Remarks: _____ | | | |
| 10. Daily Access/Security Logs | | | |
| <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A | |
| Remarks: _____ | | | |

Five-Year Review Site Inspection Checklist (Continued)

| IV. O & M Costs | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|----------|------------|---|------------|----------|--|---|--------|--------|------------|--|--|--|--|--|------------|----------|--|---|--------|--------|------------|--|--|--|--|--|------------|----------|--|---|--------|--------|------------|--|--|--|--|--|------------|----------|--|---|--------|--------|------------|--|--|--|--|--|------------|----------|--|---|--------|--------|------------|--|
| 1. O & M Organization <div style="display: flex; justify-content: space-between; margin-top: 10px;"><div><input type="checkbox"/> State in-house</div><div><input type="checkbox"/> Contractor for State</div></div> <div style="display: flex; justify-content: space-between; margin-top: 10px;"><div><input type="checkbox"/> PRP in-house</div><div><input type="checkbox"/> Contractor for PRP</div></div> <div style="margin-top: 10px;">x Other <u>SRS</u></div> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2. O & M Cost Records <div style="margin-top: 10px;"><input type="checkbox"/> Readily available <input type="checkbox"/> Up to date <input type="checkbox"/> Funding mechanism/agreement in place</div> <div style="margin-top: 10px;">x Other: <u>Project cost data is summarized in Section X of attached review: WSRC-RP-2007-4063.</u></div> <div style="text-align: center; margin-top: 20px;">Total annual cost by year for review period if available</div> <table style="width: 100%; border-collapse: collapse;"><tr><td style="width: 20%;">From _____</td><td style="width: 20%;">To _____</td><td style="width: 40%;"></td><td style="width: 20%; text-align: right;"><input type="checkbox"/> Breakdown attached</td></tr><tr><td style="text-align: center;">(Date)</td><td style="text-align: center;">(Date)</td><td style="text-align: center;">Total cost</td><td></td></tr><tr><td colspan="4" style="height: 10px;"></td></tr><tr><td>From _____</td><td>To _____</td><td></td><td style="text-align: right;"><input type="checkbox"/> Breakdown attached</td></tr><tr><td style="text-align: center;">(Date)</td><td style="text-align: center;">(Date)</td><td style="text-align: center;">Total cost</td><td></td></tr><tr><td colspan="4" style="height: 10px;"></td></tr><tr><td>From _____</td><td>To _____</td><td></td><td style="text-align: right;"><input type="checkbox"/> Breakdown attached</td></tr><tr><td style="text-align: center;">(Date)</td><td style="text-align: center;">(Date)</td><td style="text-align: center;">Total cost</td><td></td></tr><tr><td colspan="4" style="height: 10px;"></td></tr><tr><td>From _____</td><td>To _____</td><td></td><td style="text-align: right;"><input type="checkbox"/> Breakdown attached</td></tr><tr><td style="text-align: center;">(Date)</td><td style="text-align: center;">(Date)</td><td style="text-align: center;">Total cost</td><td></td></tr><tr><td colspan="4" style="height: 10px;"></td></tr><tr><td>From _____</td><td>To _____</td><td></td><td style="text-align: right;"><input type="checkbox"/> Breakdown attached</td></tr><tr><td style="text-align: center;">(Date)</td><td style="text-align: center;">(Date)</td><td style="text-align: center;">Total cost</td><td></td></tr></table> | | | | From _____ | To _____ | | <input type="checkbox"/> Breakdown attached | (Date) | (Date) | Total cost | | | | | | From _____ | To _____ | | <input type="checkbox"/> Breakdown attached | (Date) | (Date) | Total cost | | | | | | From _____ | To _____ | | <input type="checkbox"/> Breakdown attached | (Date) | (Date) | Total cost | | | | | | From _____ | To _____ | | <input type="checkbox"/> Breakdown attached | (Date) | (Date) | Total cost | | | | | | From _____ | To _____ | | <input type="checkbox"/> Breakdown attached | (Date) | (Date) | Total cost | |
| From _____ | To _____ | | <input type="checkbox"/> Breakdown attached | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| (Date) | (Date) | Total cost | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| From _____ | To _____ | | <input type="checkbox"/> Breakdown attached | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| (Date) | (Date) | Total cost | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| From _____ | To _____ | | <input type="checkbox"/> Breakdown attached | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| (Date) | (Date) | Total cost | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| From _____ | To _____ | | <input type="checkbox"/> Breakdown attached | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| (Date) | (Date) | Total cost | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| From _____ | To _____ | | <input type="checkbox"/> Breakdown attached | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| (Date) | (Date) | Total cost | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3. Unanticipated or Unusually High O & M Costs During Review Period Describe costs and reasons: _____ _____ _____ _____ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| V. ACCESS AND INSTITUTIONAL CONTROLS x Applicable <input type="checkbox"/> N/A | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| A. Fencing | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1. Fencing Damaged <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Gates secured x N/A Remarks _____ _____ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

Five-Year Review Site Inspection Checklist (Continued)

B. Other Access Restrictions

1. **Signs and Other Security Measures** ☐ Location shown on site map ☐ N/A

Remarks: Signs at this site are in good condition

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: Remote operating facilities are inspected daily.

Responsible party/agent: DOE

Contact: Rita Stubblefield Waste Area Group Manager 10-25-07 803-952-7817
(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: _____

Five-Year Review Site Inspection Checklist (Continued)

| | | | |
|--|--|--|--|
| 3. Land use Changes Offsite <input checked="" type="checkbox"/> N/A Remarks _____ | | | |
| VI. GENERAL SITE CONDITIONS | | | |
| A. Roads <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A | | | |
| 1. Roads Damaged <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Roads adequate <input type="checkbox"/> N/A Remarks _____ | | | |
| B. Other Site Conditions Remarks: <u>Good</u> | | | |
| VII. COVER SYSTEMS <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A (Applicable for low permeability soil cover system covering grouted soil in basin) | | | |
| A. Landfill Surface <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A | | | |
| 1. Settlement (Low spots) <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Settlement not evident Areal extent _____ Depth _____ Remarks: _____ | | | |
| 2. Cracks <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Cracking not evident Lengths _____ Widths _____ Depths _____ Remarks _____ | | | |
| 3. Erosion <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Erosion not evident Areal extent _____ Depth _____ Remarks _____ | | | |
| 4. Holes <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Holes not evident Areal extent _____ Depth _____ Remarks _____ | | | |
| 5. Vegetative Cover <input checked="" type="checkbox"/> Grass <input checked="" type="checkbox"/> Cover properly established <input checked="" type="checkbox"/> No signs of stress <input type="checkbox"/> Trees/shrubs (indicate size and location on a diagram) Remarks _____ | | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | | |
|--|---|--------------------|---|
| 6. Alternative Cover (armored rock, concrete, etc.) | | | x N/A |
| Remarks: _____ | | | |
| _____ | | | |
| 7. Bulges | | | <input type="checkbox"/> Location shown on site map x Bulges not evident |
| Areal extent _____ | | Height _____ | |
| Remarks _____ | | | |
| _____ | | | |
| 8. Wet Areas/Water Damage | | | x Wet areas/water damage not evident |
| <input type="checkbox"/> Wet Areas | <input type="checkbox"/> Location shown on site map | Areal extent _____ | |
| <input type="checkbox"/> Ponding | <input type="checkbox"/> Location shown on site map | Areal extent _____ | |
| <input type="checkbox"/> Seeps | <input type="checkbox"/> Location shown on site map | Areal extent _____ | |
| <input type="checkbox"/> Soft subgrade | <input type="checkbox"/> Location shown on site map | Areal extent _____ | |
| Remarks _____ | | | |
| _____ | | | |
| 9. Slope Instability | | | <input type="checkbox"/> Slides <input type="checkbox"/> Location shown on site map x No evidence of slope instability |
| Areal extent _____ | | | |
| Remarks _____ | | | |
| _____ | | | |
| B. Benches | | | <input type="checkbox"/> Applicable x 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 | | | <input type="checkbox"/> Location shown on site map <input type="checkbox"/> N/A or okay |
| Remarks _____ | | | |
| _____ | | | |
| 2. Bench Breached | | | <input type="checkbox"/> Location shown on site map <input type="checkbox"/> N/A or okay |
| Remarks _____ | | | |
| _____ | | | |
| 3. Bench Overtopped | | | <input type="checkbox"/> Location shown on site map <input type="checkbox"/> N/A or okay |
| Remarks _____ | | | |
| _____ | | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | |
|---|--|--|
| C. Letdown Channels <input type="checkbox"/> Applicable x 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 | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> No evidence of settlement |
| Areal extent _____ Depth _____ | | |
| Remarks _____ | | |
| 2. Material Degradation | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> No evidence of degradation |
| Material type _____ Areal extent _____ | | |
| Remarks _____ | | |
| 3. Erosion | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> No evidence of erosion |
| Areal extent _____ Depth _____ | | |
| Remarks _____ | | |
| 4. Undercutting | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> No evidence of undercutting |
| Areal extent _____ Depth _____ | | |
| Remarks _____ | | |
| 5. Obstructions | Type _____ | <input type="checkbox"/> No obstructions |
| <input type="checkbox"/> Location shown on site map | Areal extent _____ | Size _____ |
| Remarks _____ | | |
| 6. Excessive Vegetative Growth | Type _____ | |
| <input type="checkbox"/> No evidence of excessive growth | <input type="checkbox"/> Vegetation in channels does not obstruct flow | |
| <input type="checkbox"/> Location shown on site map | Areal extent _____ | |
| Remarks _____ | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | | |
|--|--|--|--|
| D. Cover Penetrations <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A | | | |
| 1. Gas Vents <input type="checkbox"/> Active <input type="checkbox"/> Passive | | | |
| x Properly secured/locked <input type="checkbox"/> Functioning <input type="checkbox"/> Routinely sampled x Good condition | | | |
| <input type="checkbox"/> Evidence of leakage at penetration <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A | | | |
| Remarks _____ | | | |
| 2. Gas Monitoring Probes | | | |
| <input type="checkbox"/> Properly secured/locked <input type="checkbox"/> Functioning <input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition | | | |
| <input type="checkbox"/> Evidence of leakage at penetration <input type="checkbox"/> Needs Maintenance x N/A | | | |
| Remarks _____ | | | |
| 3. Monitoring Wells | | | |
| x Properly secured/locked <input type="checkbox"/> Functioning <input type="checkbox"/> Routinely sampled x Good condition | | | |
| <input type="checkbox"/> Evidence of leakage at penetration <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A | | | |
| Remarks: _____ | | | |
| 4. Leachate Extraction Wells | | | |
| <input type="checkbox"/> Properly secured/locked <input type="checkbox"/> Functioning <input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition | | | |
| <input type="checkbox"/> Evidence of leakage at penetration <input type="checkbox"/> Needs Maintenance x N/A | | | |
| Remarks _____ | | | |
| 5. Settlement Monuments <input type="checkbox"/> Located <input type="checkbox"/> Routinely surveyed x N/A | | | |
| Remarks _____ | | | |
| E. Gas Collection and Treatment <input type="checkbox"/> Applicable x N/A | | | |
| 1. Gas Treatment Facilities | | | |
| <input type="checkbox"/> Flaring <input type="checkbox"/> Thermal destruction <input type="checkbox"/> Collection for reuse | | | |
| <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance | | | |
| Remarks _____ | | | |
| 2. Gas Collection Wells, Manifolds and Piping | | | |
| <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance | | | |
| Remarks _____ | | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | |
|---|--|------------------------------|
| 3. Gas Monitoring Facilities (e.g., gas monitoring of adjacent homes or buildings) | | |
| <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance | <input type="checkbox"/> N/A |
| Remarks _____ | | |
| F. Cover Drainage Layer x Applicable <input type="checkbox"/> N/A | | |
| 1. Outlet Pipes Inspected <input type="checkbox"/> Functioning <input type="checkbox"/> N/A | | |
| Remarks _____ | | |
| 2. Outlet Rock Inspected x Functioning <input type="checkbox"/> N/A | | |
| Remarks _____ | | |
| G. Detention/sedimentation Ponds x Applicable <input type="checkbox"/> N/A | | |
| 1. Siltation Areal extent _____ Depth _____ <input type="checkbox"/> N/A | | |
| x Siltation not evident | | |
| Remarks _____ | | |
| 2. Erosion Areal extent _____ Depth _____ <input type="checkbox"/> N/A | | |
| x Erosion not evident | | |
| Remarks _____ | | |
| 3. Outlet Works x Functioning <input type="checkbox"/> N/A | | |
| Remarks _____ | | |
| 4. Dam <input type="checkbox"/> Functioning x N/A | | |
| Remarks _____ | | |
| H. Retaining Walls <input type="checkbox"/> Applicable x N/A | | |
| 1. Deformations <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Deformation not evident | | |
| Horizontal displacement _____ Vertical displacement _____ | | |
| Rotational displacement _____ | | |
| Remarks _____ | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | |
|--|---|---|
| 2. Degradation | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> Deformation not evident |
| Remarks _____ | | |
| _____ | | |
| I. Perimeter Ditches/Off-Site Discharge <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A | | |
| 1. Siltation | <input type="checkbox"/> Location shown on site map | <input checked="" type="checkbox"/> Siltation not evident |
| Areal extent _____ Depth _____ | | |
| Remarks _____ | | |
| _____ | | |
| 2. Vegetative Growth | <input type="checkbox"/> Location shown on site map | <input checked="" type="checkbox"/> Siltation not evident |
| <input checked="" type="checkbox"/> Vegetation does not impede flow | | |
| Areal extent _____ Type _____ | | |
| Remarks _____ | | |
| _____ | | |
| 3. Erosion | <input type="checkbox"/> Location shown on site map | <input checked="" type="checkbox"/> Erosion not evident |
| Areal extent _____ Depth _____ | | |
| Remarks _____ | | |
| _____ | | |
| 4. Discharge Structure | <input type="checkbox"/> Location shown on site map | <input checked="" type="checkbox"/> N/A |
| Remarks _____ | | |
| _____ | | |
| VIII. VERTICAL BARRIER WALLS <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A | | |
| 1. Settlement | <input type="checkbox"/> Location shown on site map | <input type="checkbox"/> Settlement not evident |
| Areal extent _____ Depth _____ | | |
| Remarks _____ | | |
| _____ | | |
| 2. Performance Monitoring | Type of Monitoring _____ | <input type="checkbox"/> Performance not monitored |
| Frequency _____ <input type="checkbox"/> Evidence of breaching Head differential _____ | | |
| Remarks _____ | | |
| _____ | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | | |
|---|---|--|---|
| IX. GROUNDWATER/SURFACE WATER REMEDIES | | <input type="checkbox"/> Applicable | <input checked="" type="checkbox"/> N/A |
| A. Groundwater Extraction Wells, Pumps, and Pipelines | | <input type="checkbox"/> Applicable | <input checked="" type="checkbox"/> N/A |
| 1. Pumps, Wellhead Plumbing, and Electrical | | | |
| <input type="checkbox"/> Good condition | <input type="checkbox"/> All required wells located | <input type="checkbox"/> Needs Maintenance | <input type="checkbox"/> N/A |
| Remarks _____ | | | |
| _____ | | | |
| 2. Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances | | | |
| <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance | | |
| Remarks _____ | | | |
| _____ | | | |
| 3. Spare Parts and Equipment | | | |
| <input type="checkbox"/> Readily available | <input type="checkbox"/> Good condition | <input type="checkbox"/> Requires upgrade | <input type="checkbox"/> Needs to be provided |
| Remarks _____ | | | |
| _____ | | | |
| B. Surface Water Collection Structures, Pumps, and Pipelines | | <input type="checkbox"/> Applicable | <input checked="" type="checkbox"/> N/A |
| 1. Collection Structures, Pumps, and Electrical | | | |
| <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance | | |
| Remarks _____ | | | |
| _____ | | | |
| 2. Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances | | | |
| <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance | | |
| Remarks _____ | | | |
| _____ | | | |
| 3. Spare Parts and Equipment | | | |
| <input type="checkbox"/> Readily available | <input type="checkbox"/> Good condition | <input type="checkbox"/> Requires upgrade | <input type="checkbox"/> Needs to be provided |
| Remarks _____ | | | |
| _____ | | | |

Five-Year Review Site Inspection Checklist (Continued)

| C. Treatment System | |
|--|--|
| <input type="checkbox"/> Applicable | <input checked="" type="checkbox"/> N/A |
| 1. Treatment Train (Check components that apply) | |
| <input type="checkbox"/> Metals removal | <input type="checkbox"/> Oil/water separation |
| <input type="checkbox"/> Air stripping | <input type="checkbox"/> Carbon adsorbers |
| <input type="checkbox"/> Filters | <input type="checkbox"/> Bioremediation |
| <input type="checkbox"/> Additive (e.g., chelation agent, flocculent) | |
| <input type="checkbox"/> Others | |
| <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance |
| <input type="checkbox"/> Sampling ports properly marked and functional | |
| <input type="checkbox"/> Sampling/maintenance log displayed and up to date | |
| <input type="checkbox"/> Equipment properly identified | |
| <input type="checkbox"/> Quantity of groundwater treated annually | |
| <input type="checkbox"/> Quantity of surface water treated annually | |
| Remarks | |
| 2. Electrical Enclosures and Panels (properly rated and functional) | |
| <input type="checkbox"/> N/A | <input type="checkbox"/> Good condition |
| <input type="checkbox"/> Needs Maintenance | |
| Remarks | |
| 3. Tanks, Vaults, Storage Vessels | |
| <input type="checkbox"/> N/A | <input type="checkbox"/> Good condition |
| <input type="checkbox"/> Proper secondary containment | |
| <input type="checkbox"/> Needs Maintenance | |
| Remarks | |
| 4. Discharge Structure and Appurtenances | |
| <input type="checkbox"/> N/A | <input type="checkbox"/> Good condition |
| <input type="checkbox"/> Needs Maintenance | |
| Remarks | |
| 5. Treatment Building(s) | |
| <input type="checkbox"/> N/A | <input type="checkbox"/> Good condition (esp. roof and doorways) |
| <input type="checkbox"/> Needs repair | |
| <input type="checkbox"/> Chemicals and equipment properly stored | |
| Remarks | |

Five-Year Review Site Inspection Checklist (Continued)

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 x 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 concentration are not increasing with time)

E. Monitored Natural Attenuation ☐ Applicable x 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.

Five-Year Review Site Inspection Checklist (Continued)

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: low-permeability soil cover system; institutional controls, and apply soil amendments in the Outfall Delta and Inner Swamp to attenuate the Leachability of radiological contaminants in soils. The cover system is intact, long term grasses has be fully established. Soil cover system remedy appears to be functioning as designed. Drainage channel function adequately. Soil amendments have been applied and results will be monitored semi-annual through ground water sampling and results be reported in the annual Groundwater and effectiveness Monitoring Report for TNX Area OU.

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.

N/A

D. Opportunities for Optimization

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

N/A

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TNX AREA GROUNDWATER (082-G) OPERABLE UNIT

I. Introduction

This report is the third five-year review for the TNX Area Groundwater (082-G) Operable Unit (OU). The review was conducted from August 2007 through October 2007. This report documents the results of the review.

II. OU Chronology

Table 1 lists the chronology of site events for the TNX Area Groundwater OU.

Table 1. Chronology of OU Events

| Event | Date |
|--|----------------------------------|
| Interim Record of Decision (ROD) Issuance | November 16, 1994 |
| Interim Remedial Action start | September 16, 1996 |
| Explanation of Significant Difference (ESD) Issuance | September 22, 1997 |
| ESD Issuance | February 5, 2002 |
| ROD Issuance | March 25, 2004 |
| ESD Issuance | September 2, 2005 |
| Remedial Action Start/Finish | August 12, 2004/May 4, 2006 |
| Previous Five-Year Reviews | June 30, 1997, February 12, 2004 |

III. Background

Physical Characteristics

TNX area is located in the southwestern portion of Savannah River Site (SRS), approximately one-quarter mile east of the Savannah River (Figure 1). An area-based remedial strategy has been implemented in T-Area; remedial decisions for the T-Area waste units and facilities addressed by the TNX-Area ROD will continue as planned. These remedial actions (RAs) do not affect the RAs of the T-Area ROD. 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).

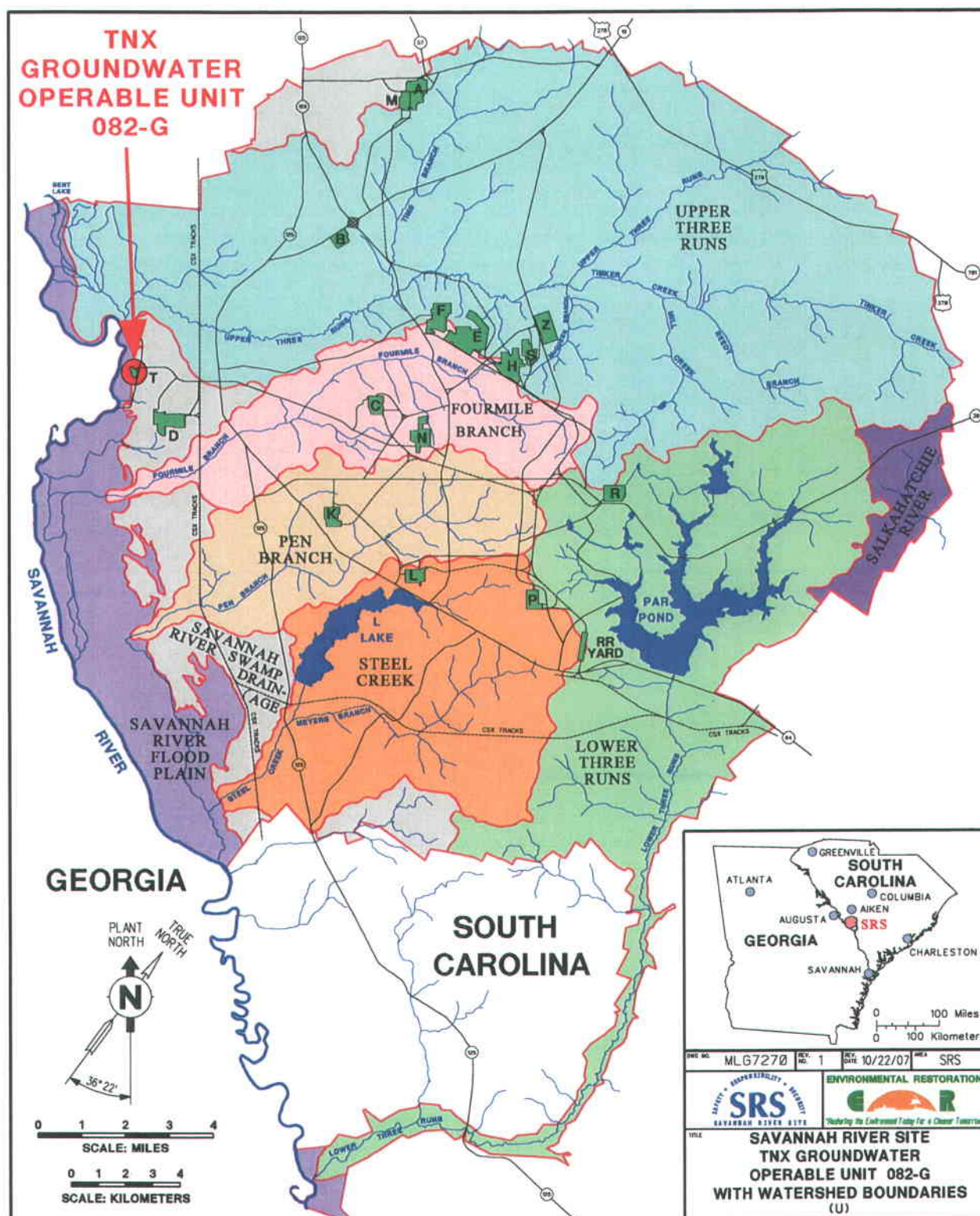


Figure 1. Location of TNX Area Location at Savannah River Site

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TNX Area Groundwater (082-G) Operable Unit
Savannah River Site, December 2008

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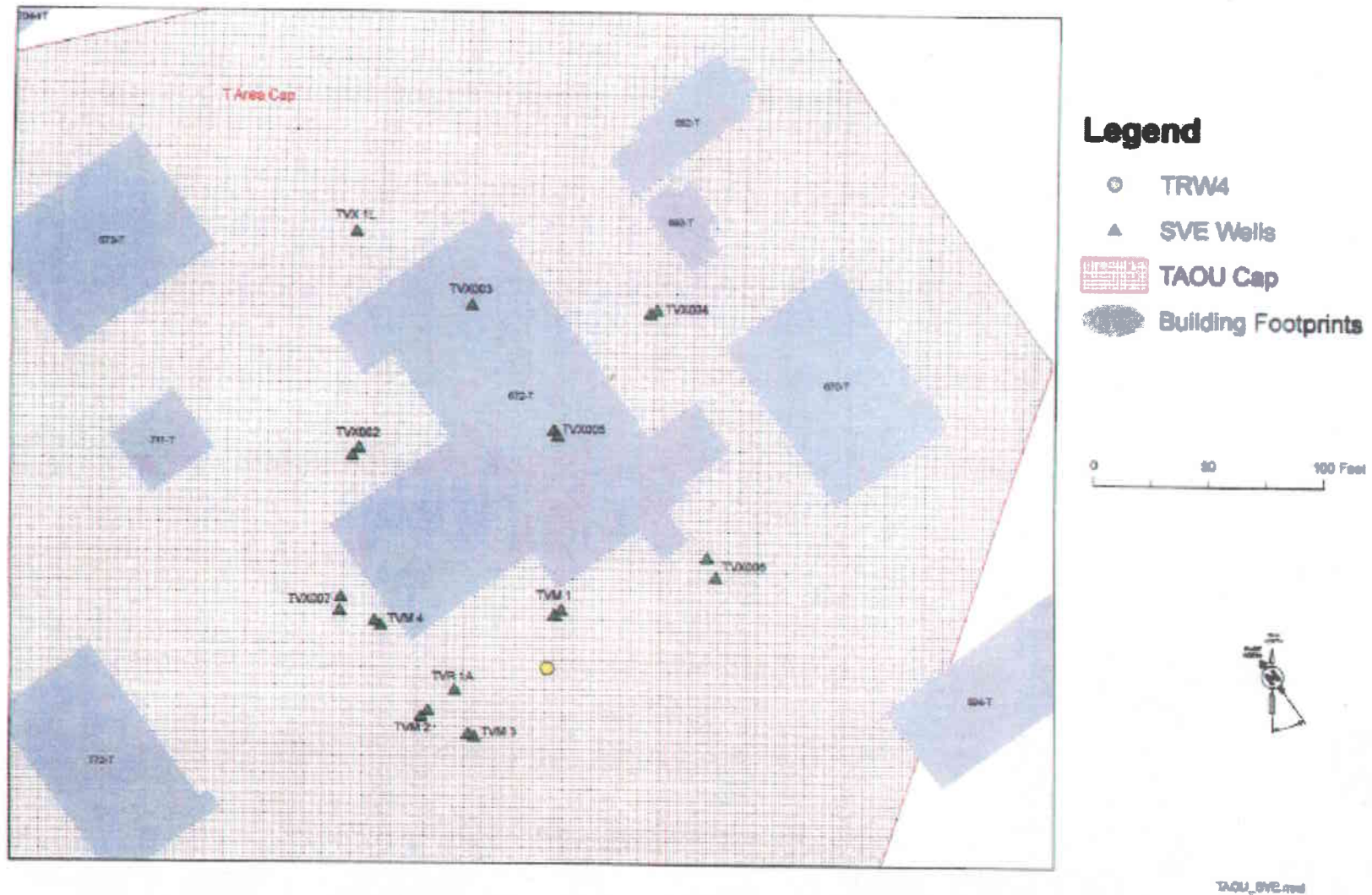


Figure 2. Location of Soil Vapor Extraction Well System OU Characteristics

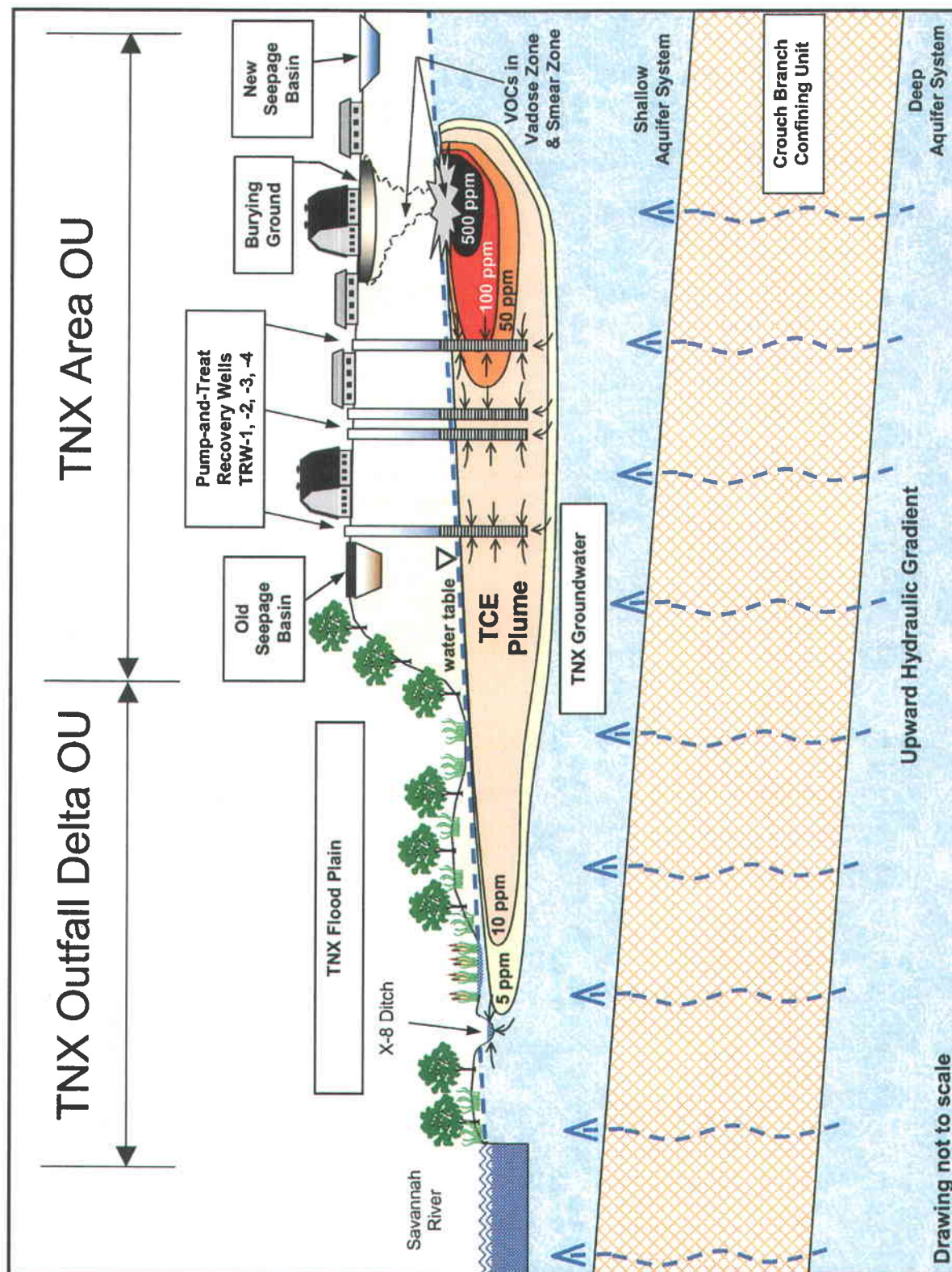


Figure 3. Schematic Cross Section of TNXGW Showing TCE for 4Q2000

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 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.

Land and Resource Use

The TNX OU is located in an industrial area. The future land use for TNX OU is anticipated to remain industrial.

History of Contamination

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 excavation approximately 24 by 53 m (80 by 175 ft). The OTSB includes the following components:

- An Inlet Basin, approximately 13 by 10 m (43 by 33 ft) in size and 2.4 m (8 ft) deep
- A Main Basin, approximately 39 by 25 m (129 by 83 ft) in size and 3 m (10 ft) deep

The OTSB operated from the mid-1950s 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, which resulted in low-level threat source material. A more thorough discussion of the process wastewater constituents can be found in the RCRA Facility Investigation/Remedial Investigation Report with Baseline Risk Assessment for the TNX Area OU. The NTSB is an unlined earthen basin approximately 80 by 120 m (260 by 400 ft) in size. The NTSB includes the following four components:

- An Inlet Basin, 15 by 21 m (50 by 70 ft) in size and 1.2 m (4 ft) deep
- A Main Basin, 21 by 82 m (70 by 270 ft) in size and 2.1 m (7 ft) deep
- An Overflow Discharge Area (ODA), an irregularly shaped area defined by site topography with maximum lengths of 60 m (200 ft) by 41 m (135 ft) and an area of approximately 2,500 m² (27,000 ft²)

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. Metals identified in the three drums were predominantly iron, aluminum, and mercury. They were removed for disposal in the SRS Low-Level Radioactive Waste Disposal Facility, 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 TNX Outfall Delta (TNXOD) OU, extending all the way to the Savannah River. Groundwater at TNX can be divided into two main aquifer systems, one shallow and one deep. 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. The results are summarized in the TNX Area OU RCRA Facility Investigation (RFI)/Remedial Investigation (RI)/Baseline Risk Assessment (BRA).

Results from the RFI/RI/BRA and recent monitoring have demonstrated that the TNXGW is contaminated with chlorinated volatile organic compounds (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 mercury and radium-226 contamination are the result of low pH (acidic) water leaching the naturally occurring radium and mercury from the native clayey soils. 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 $\mu\text{g/L}$ (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.

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.

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 in TNX floodplain in the groundwater. Groundwater is routinely monitored 2Q and 4Q for TCE. The TCE exceedances observed in the flood plain wells are typically within a range of 10 to 40 µg/L. VOCs are not known to be present in surface water in the area.

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.

Initial Response

Even though the RFI/RI/BRA did not identify any COCs or principal threat source material (PTSM) in the TBG and vadose zone based on contaminant concentration and the potential for migration to groundwater. This secondary source material is considered to be a contaminant migration issue, not PTSM.

In 1994, an interim action was chosen to mitigate further migration of the groundwater plume hot spot and to remove contaminants from the groundwater. The selected remedy included an air stripper system and a recirculation well. Due to local geology, the recirculation well did not perform well and in a 1997 Explanation of Significant Difference (ESD) to the IROD, the recirculation well was discontinued. Following a

successful treatability study using Soil Vapor Extraction (SVE), another ESD to the IROD was prepared in 2004 to include SVE as part of the remedy. The 2004 ESD also reduced the groundwater reporting frequency from semiannual to annual.

An edible oil treatability study is being conducted at the TNX Area during 2008 and 2009 to determine if it is possible to degrade the residual VOCs that are present within the water table. During the period of the test the extraction wells and air stripper will not be operated. SRS expects to make a decision about whether edible oil has the ability to degrade the residual VOCs such the long-term remedial strategy for the groundwater in the ROD should be modified. If the data indicate that the oil represents a better remedial solution SRS will notify the USEPA and SCDHEC of a desire to modify the ROD.

IV. Remedial Actions

Remedy Selection

Based on the characteristics of the TNX Area OU, the OU has been subdivided into four major subunits: The NTSB/Inactive Process Sewer Line (IPSL), the TBG/Vadose Zone; the OTSB/IPSL/Discharge Gully (DG) (Upper Discharge Gully [UDG] and Lower Discharge Gully [LDG]); and the TNX Groundwater. The selected alternatives for the TNX Area OU are described below.

NTSB/IPSL

- In situ grouting of the IPSL,
- Discharge of surface water in the NTSB to an approved location (ground surface, permitted outfall, or wastewater treatment)
- Backfill of the Main Basin and Inlet Basin with cleans soil,
- Implementation of institutional controls to ensure the integrity of the backfilled basins and Overflow Discharge Area (ODA) via walkdowns, prevent excavation by the

future industrial worker via access controls, and prevent residential use via property notices and deed restrictions. Institutional controls will remain in place until the Core Team [USDOE, USEPA and SCDHEC concur that no unacceptable risk to receptors is present.

OTSB/IPSL/Discharge Gully

- Removal of existing OTSB backfill
- Excavation of IPSL (where accessible) and associated radiologically contaminated soils for disposal
- Plugging ends of IPSL sections not excavated during this action
- Excavation of the PTSM layer in the OTSB (2- to 3-ft soil interval at the original bottom of the inlet and main basins) with confirmatory sampling
- Backfill of pipeline excavation and replacement of asphalt
- Disposal of PTSM-contaminated soil and pipeline at an approved disposal facility)
- Backfill of the OTSB and DG using the current backfill material where practical
- Placement of engineered cover system (and associated institutional controls) over the OTSB and DG (from the TNX facility to the base of the slope at the TNX OD)
- Monitoring of the subsurface for the presence of perched water in contact with waste exceeding CM RGs under the cover system. A piezometer was installed within the OTSB footprint to be used in monitoring for water under the TAOU cover system. Any water found within the basin footprint would have the potential to be in contact with soils in exceedance of the CM RGs.

TBG/Vadose Zone

- Installation and operation of an active and passive SVE system in the TNX Vadose Zone (Figure 2).

TNX Groundwater

- Extraction of VOCs in the high concentration areas of the vadose zone (i.e., SVE)
- Continued operation of existing pump-and-treat system until monitoring determines that passive remediation (mixing zone) is appropriate.
- Use of mixing zone and institutional controls. Institutional controls will consist of deed restrictions and administrative directives such as the Site Use Program, prohibiting installation of drinking water wells to prevent use of groundwater beneath TNX where concentrations of contaminants are above MCLs. These controls will remain in effect until the Core Team concurs that COC concentrations in groundwater do not present unacceptable risk to receptors.

Remedy Implementation

To control and remediate VOC source material and the groundwater plume, an interim action Record of Decision (IAROD) for the TNXGW was issued on November 16, 1994. The purpose of the interim action was to serve as an incremental step in part of an overall remedy to address groundwater contamination; it was not intended as a final remedy. The remedy selected in the IAROD to achieve the interim remedial goals (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.

Operations and Maintenance

During operation of the air stripper, monitoring to support permit requirements is conducted to ensure compliance with SCDHEC air pollution regulations and to ensure VOC effluent discharges to the X-08C outfall 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 to 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 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. During the first few years of interim action operation, semi-annual reporting provided frequent updates on interim action effectiveness. The current report is an annual report submitted in June of each calendar year.

V. Progress Since Last Review

Since startup in 1996, the 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 former interim action pump-and-treat system was accepted by USEPA and SCDHEC for the final remedial action. The recovery wells of the remedial action system are designed to feed the air stripper at a rate of 80 gpm. The actual operating rate of the four recovery wells were approximately 21, 20, 14, 20 gpm for wells 1 through 4, respectively. See Annual Groundwater Report WSRC-RP-2008-4040 for further details. Water table elevations and the estimated zone of capture associated with the system are presented in Figure 5. The extent of the groundwater TCE plume for the fourth quarter of 2000 is presented in Figure 4. As of July 2007, 275 million gallons of groundwater have been treated and 121 pounds of VOCs have been removed.

documented in the Final ROD for the final remedial action of T-Area OU. SVE is also an effective and cost efficient approach to 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, thereby reducing the source contamination which in the future could impact groundwater.

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 guidance

VII. Technical Assessment

- The remedial action system is operating effectively and continues to achieve the remedial action objectives and RGs, 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.

VIII. Issues

No issues related to current site conditions prevent the remedy from being protective.

Since startup, the performance of the remedial action has continued to be good. The air stripper was shut down for several months while a cap was constructed over the entire TNX area. All buildings and structures were removed in the contaminated areas prior to cap construction. New piping and electrical power feeds were installed between the wells and air stripper. Well TRW-4 was replaced with TRW-4R.

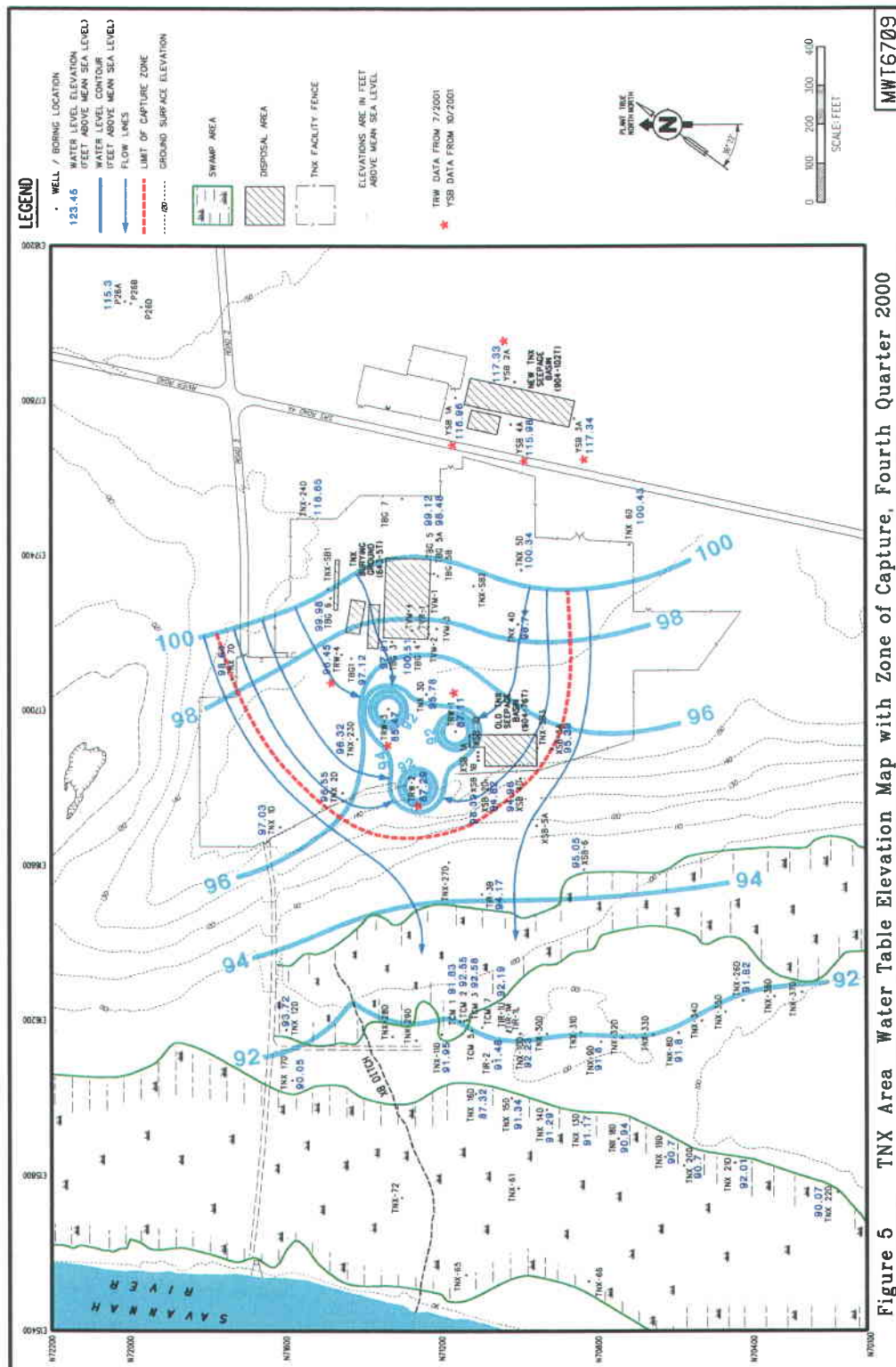


Figure 5. TNX Area Water Table Elevations with Zone of Capture for 4Q2000

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 to 1999) and annual monitoring (1999 to present) except for one exceedance of the mercury MCL (3.55 ppb mercury in well TRW-1 on January 16, 1998).

IX. Recommendations and Follow-up Actions

There are no recommendations or follow-up actions for this OU. An edible oil study is being performed.

X. Project Costs

Costs associated with the selected remedy for TNX GW OU include operation and maintenance costs of groundwater monitoring, the soil cover, institutional controls, and active/passive soil vapor extraction operations. The estimated operation and maintenance cost associated with the selected remedy is \$8,053,000, which was discounted at 3.9% per year. This is a present worth cost, including 30 years of maintenance activities. After characterization and effectiveness of the remedy was evaluated, the actual operation and maintenance cost for the TNX GW was assessed. The total actual operation and maintenance cost from project support and other post-construction expense to fiscal year 2006 is \$1,232,798.

XI. Protectiveness Statement(s)

The remedy is fully protective of human health and the environment. The remedy is removing TCE from the most concentrated portion of the contaminated plume (> 500 g/L TCE). 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 Documents Reviewed

WSRC-TR-94-0375, *Interim Action Record of Decision, Remedial Alternative Selection - TNX Groundwater Operable Unit (U)*, Revision 1, October 1994, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

WSRC-RP-94-1200, *Savannah River Site Federal Facility Agreement Implementation Plan (U)*, Revision 0, December 1996, Westinghouse Savannah River Company, Aiken, SC.

WSRC-RP-97-169, *Explanation of Significant Differences for the TNX Groundwater Operable Unit (U)*, Revision 1, September 1997, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

WSRC-RP-2001-00764, *Explanation of Significant Differences (ESD) to the Revision 1 Interim Record of Decision (IAROD) for the TNX Area Operable Unit Groundwater (U)*, Revision 0, October 2001, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

WSRC-RP-2003-4017, *Record of Decision Remedial Alternative Selection for the TNX Area Operable Unit (U)*, Revision 1, March 2004, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

WSRC-RP-2005-4030, *Explanation of Significant Differences (ESD) to the Revision 1 Record of Decision for the TNX Area Operable Unit (U)*, Revision 1, September 2005, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

WSRC-RP-2008-4040, *2007 Comprehensive TNX Area Annual Groundwater and Effectiveness Monitoring Strategy Report (U)*, June 2008, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

ATTACHMENT 2

Five-Year Review Site Inspection Checklist for TNX

| I. SITE INFORMATION | | | |
|--|-----------------------|----------------------|--------------|
| Site Name: | TNX OU – Air Stripper | Date of Inspection: | 10/22/2007 |
| Location and Region: | SRS, USEPA Region IV | EPA ID: | SC1890008989 |
| Agency, office, or company leading the five-year review: | USDOE | CERCLIS OU No.; | 21 and 29 |
| | | Weather/Temperature: | Clear, ~80°F |
| Remedy Includes: (Check all that apply) <div><input type="checkbox"/> Cover System <input type="checkbox"/> Access controls <input checked="" type="checkbox"/> Institutional Controls <input checked="" type="checkbox"/> Groundwater pump and treatment (T1 Air Stripper, 906T) <input type="checkbox"/> Surface water collection and treatment <input type="checkbox"/> Other: _____</div> <div><input type="checkbox"/> Monitored Natural Attenuation <input type="checkbox"/> Groundwater Containment <input type="checkbox"/> Vertical Barrier Walls</div> | | | |
| Attachments: <input type="checkbox"/> Inspection team roster attached <input type="checkbox"/> Site map attached | | | |
| II. INTERVIEWS (Check all that apply) | | | |
| 1. O & M Site Manager _____ Facility Manager _____ (Name) (Title) (Date) Interviewed: <input type="checkbox"/> at site <input type="checkbox"/> at office <input type="checkbox"/> by phone Phone No. _____ Problems, suggestions: <input type="checkbox"/> report attached _____ | | | |
| 2. O & M Staff _____ Operator in Charge. _____ (Name) (Title) (Date) Interviewed: <input type="checkbox"/> at site <input type="checkbox"/> at office <input type="checkbox"/> by phone Phone No. _____ Problems, suggestions: <input type="checkbox"/> report attached _____ | | | |

Five-Year Review Site Inspection Checklist (Continued)

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

| | | | |
|---------------------|---------------------|--------------|------------------------------|
| x O & M Manual | x Readily available | x Up to date | <input type="checkbox"/> N/A |
| x As-built drawings | x Readily available | x Up to date | <input type="checkbox"/> N/A |
| x Maintenance Logs | x Readily available | x Up to date | <input type="checkbox"/> N/A |

Remarks: Passport _____

Five-Year Review Site Inspection Checklist (Continued)

| | | | |
|---|--|-------------------------------------|------------------------------|
| 2. Site-Specific Health and Safety Plan | | | |
| <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A | |
| <input type="checkbox"/> Contingency plan/emergency response plan <input type="checkbox"/> Readily available <input type="checkbox"/> Up to date x N/A | | | |
| Remarks: <u>Routine O&M activities do not require a SSHASP under 29 CFR 1910.120, HAZWOPER.</u> | | | |
| 3. O & M and OSHA Training Records | | | |
| <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A | |
| Remarks: _____ | | | |
| 4. Permits and Service Agreements | | | |
| <input type="checkbox"/> Air discharge permit | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |
| <input type="checkbox"/> Effluent discharge | x Readily available | x Up to date | <input type="checkbox"/> N/A |
| <input type="checkbox"/> Waste Disposal, POTW | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |
| <input type="checkbox"/> Other permits | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |
| Remarks: <u>SCDHEC Air Quality Permit, NPDES Permit SC 0000175.</u> | | | |
| 5. Gas Generation Records | | | |
| <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A | |
| Remarks: _____ | | | |
| 6. Settlement Monument Records | | | |
| <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A | |
| Remarks: _____ | | | |
| 7. Groundwater Monitoring Records | | | |
| x Readily available | x Up to date | <input type="checkbox"/> N/A | |
| Remarks: _____ | | | |
| 8. Leachate Extraction Records | | | |
| <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A | |
| Remarks: _____ | | | |
| 9. Discharge Compliance Records | | | |
| <input type="checkbox"/> Air | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | x N/A |
| <input type="checkbox"/> Water (effluent) | x Readily available | x Up to date | <input type="checkbox"/> N/A |
| Remarks: _____ | | | |
| 10. Daily Access/Security Logs | | | |
| x Readily available | x Up to date | <input type="checkbox"/> N/A | |
| Remarks: <u>Daily Operational Logs</u> | | | |

Five-Year Review Site Inspection Checklist (Continued)

| IV. O & M Costs | | | | | | | | | | | | | | | | | | | | | | | |
|---|--------------------|---|---|----------------------|--------------------|------------|---|----------------------|--------------------|------------|---|----------------------|--------------------|------------|---|----------------------|--------------------|------------|---|----------------------|--------------------|------------|---|
| 1. O & M Organization <div style="display: flex; justify-content: space-between;"> <div> <input type="checkbox"/> State in-house <input type="checkbox"/> PRP in-house x Other: <u>SRS</u> </div> <div> <input type="checkbox"/> Contractor for State <input type="checkbox"/> Contractor for PRP </div> </div> | | | | | | | | | | | | | | | | | | | | | | | |
| 2. O & M Cost Records <div style="display: flex; justify-content: space-between;"> <div> <input type="checkbox"/> Readily available <input type="checkbox"/> Up to date <input type="checkbox"/> Funding mechanism/agreement in place x Other: <u>Project cost data is summarized in Section X of attached review: WSRC-RP-2007-4063.</u> </div> </div> <div style="text-align: center; margin-bottom: 10px;">Total annual cost by year for review period if available</div> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%;">From _____ (Date)</td> <td style="width: 20%;">To _____ (Date)</td> <td style="width: 30%; border-bottom: 1px solid black;">Total cost</td> <td style="width: 30%;"><input type="checkbox"/> Breakdown attached</td> </tr> <tr> <td>From _____ (Date)</td> <td>To _____ (Date)</td> <td style="border-bottom: 1px solid black;">Total cost</td> <td><input type="checkbox"/> Breakdown attached</td> </tr> <tr> <td>From _____ (Date)</td> <td>To _____ (Date)</td> <td style="border-bottom: 1px solid black;">Total cost</td> <td><input type="checkbox"/> Breakdown attached</td> </tr> <tr> <td>From _____ (Date)</td> <td>To _____ (Date)</td> <td style="border-bottom: 1px solid black;">Total cost</td> <td><input type="checkbox"/> Breakdown attached</td> </tr> <tr> <td>From _____ (Date)</td> <td>To _____ (Date)</td> <td style="border-bottom: 1px solid black;">Total cost</td> <td><input type="checkbox"/> Breakdown attached</td> </tr> </table> | | | | From _____ (Date) | To _____ (Date) | Total cost | <input type="checkbox"/> Breakdown attached | From _____ (Date) | To _____ (Date) | Total cost | <input type="checkbox"/> Breakdown attached | From _____ (Date) | To _____ (Date) | Total cost | <input type="checkbox"/> Breakdown attached | From _____ (Date) | To _____ (Date) | Total cost | <input type="checkbox"/> Breakdown attached | From _____ (Date) | To _____ (Date) | Total cost | <input type="checkbox"/> Breakdown attached |
| From _____ (Date) | To _____ (Date) | Total cost | <input type="checkbox"/> Breakdown attached | | | | | | | | | | | | | | | | | | | | |
| From _____ (Date) | To _____ (Date) | Total cost | <input type="checkbox"/> Breakdown attached | | | | | | | | | | | | | | | | | | | | |
| From _____ (Date) | To _____ (Date) | Total cost | <input type="checkbox"/> Breakdown attached | | | | | | | | | | | | | | | | | | | | |
| From _____ (Date) | To _____ (Date) | Total cost | <input type="checkbox"/> Breakdown attached | | | | | | | | | | | | | | | | | | | | |
| From _____ (Date) | To _____ (Date) | Total cost | <input type="checkbox"/> Breakdown attached | | | | | | | | | | | | | | | | | | | | |
| 3. Unanticipated or Unusually High O & M Costs During Review Period Describe costs and reasons: <u>N/A</u> | | | | | | | | | | | | | | | | | | | | | | | |
| V. ACCESS AND INSTITUTIONAL CONTROLS | | | | | | | | | | | | | | | | | | | | | | | |
| | | x Applicable <input type="checkbox"/> N/A | | | | | | | | | | | | | | | | | | | | | |
| A. Fencing x Applicable <input type="checkbox"/> N/A | | | | | | | | | | | | | | | | | | | | | | | |
| 1. Fencing Damaged x Location shown on site map x Gates secured <input type="checkbox"/> N/A Remarks _____ | | | | | | | | | | | | | | | | | | | | | | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | | |
|--|---|--|---|
| B. Other Access Restrictions <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A | | | |
| 1. Signs and Other Security Measures <input type="checkbox"/> Location shown on site map <input type="checkbox"/> N/A | | | |
| Remarks: <u>Signs at this site are in good condition.</u> | | | |
| C. Institutional Controls | | | |
| 1. Implementation and enforcement | | | |
| Site conditions imply ICs not properly implemented: | | <input type="checkbox"/> Yes | <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A |
| Site conditions imply ICs not being fully enforced: | | <input type="checkbox"/> Yes | <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A |
| Type of monitoring (e.g., self-reporting, drive-by): | | Field Walk Down | |
| Frequency: | Annual | | |
| Responsible party/agent: | DOE | | |
| Contact: | Rita Stubblefield, Waste Area Group Manager | 09/3/07 | 952-7817 |
| | (Name) (Title) | (Date) | (Phone No.) |
| Reporting is up-to-date: | | <input checked="" type="checkbox"/> Yes | <input type="checkbox"/> No <input type="checkbox"/> N/A |
| Reports are verified by the lead agency: | | <input checked="" type="checkbox"/> Yes | <input type="checkbox"/> No <input type="checkbox"/> N/A |
| Specific requirements in deed of decision documents have been met: | | <input type="checkbox"/> Yes | <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A |
| Violations have been reported: | | <input type="checkbox"/> Yes | <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A |
| Other problems or suggestions: | | <input type="checkbox"/> Report attached | |
| | | | |
| 2. Adequacy <input checked="" type="checkbox"/> ICs are adequate <input type="checkbox"/> ICs are inadequate <input type="checkbox"/> N/A | | | |
| Remarks: _____ | | | |
| | | | |
| D. General | | | |
| 1. Vandalism/Trespassing <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> No vandalism evident | | | |
| Remarks: _____ | | | |
| | | | |
| 2. Land Use Changes Onsite <input checked="" type="checkbox"/> N/A | | | |
| Remarks: _____ | | | |
| | | | |

Five-Year Review Site Inspection Checklist (Continued)

| | |
|---|--|
| 3. Land Use Changes Offsite <input checked="" type="checkbox"/> N/A Remarks _____ _____ | |
| VI. GENERAL SITE CONDITIONS | |
| A. Roads <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A | |
| 1. Roads Damaged <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Roads adequate <input type="checkbox"/> N/A Remarks _____ _____ | |
| B. Other Site Conditions Remarks _____ _____ _____ | |
| VII. COVERS SYSTEMS <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A | |
| A. Landfil Surface | |
| 1. Settlement (Low spots) <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Settlement not evident Areal extent _____ Depth _____ Remarks: _____ _____ | |
| 2. Cracks <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Cracking not evident Lengths _____ Widths _____ Depths _____ Remarks _____ _____ | |
| 3. Erosion <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Erosion not evident Areal extent _____ Depth _____ Remarks _____ _____ | |
| 4. Holes <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Holes not evident Areal extent _____ Depth _____ Remarks _____ _____ | |
| 5. Vegetative Cover <input type="checkbox"/> Grass <input type="checkbox"/> Cover properly established <input type="checkbox"/> No signs of stress <input type="checkbox"/> Trees/shrubs (indicate size and location on a diagram) Remarks: _____ _____ | |

Five-Year Review Site Inspection Checklist (Continued)

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 _____

Five-Year Review Site Inspection Checklist (Continued)

C. Letdown Channels

☐ Applicable ☐ N/A

(Channel lined with erosion control matts, 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 _____

Five-Year Review Site Inspection Checklist (Continued)

| | | | |
|--|--|---|---|
| D. Cover Penetrations <input type="checkbox"/> Applicable <input type="checkbox"/> N/A | | | |
| 1. Gas Vents <input type="checkbox"/> Active <input type="checkbox"/> Passive | | | |
| <input type="checkbox"/> Properly secured/locked | <input type="checkbox"/> Functioning | <input type="checkbox"/> Routinely sampled | <input type="checkbox"/> Good condition |
| <input type="checkbox"/> Evidence of leakage at penetration | <input type="checkbox"/> Needs Maintenance | <input type="checkbox"/> N/A | |
| Remarks _____ | | | |
| 2. Gas Monitoring Probes | | | |
| <input type="checkbox"/> Properly secured/locked | <input type="checkbox"/> Functioning | <input type="checkbox"/> Routinely sampled | <input type="checkbox"/> Good condition |
| <input type="checkbox"/> Evidence of leakage at penetration | <input type="checkbox"/> Needs Maintenance | <input type="checkbox"/> N/A | |
| Remarks _____ | | | |
| 3. Monitoring Wells (within surface area of landfill) | | | |
| <input type="checkbox"/> Properly secured/locked | <input type="checkbox"/> Functioning | <input type="checkbox"/> Routinely sampled | <input type="checkbox"/> Good condition |
| <input type="checkbox"/> Evidence of leakage at penetration | <input type="checkbox"/> Needs Maintenance | <input type="checkbox"/> N/A | |
| Remarks _____ | | | |
| 4. Leachate Extraction Wells | | | |
| <input type="checkbox"/> Properly secured/locked | <input type="checkbox"/> Functioning | <input type="checkbox"/> Routinely sampled | <input type="checkbox"/> Good condition |
| <input type="checkbox"/> Evidence of leakage at penetration | <input type="checkbox"/> Needs Maintenance | <input type="checkbox"/> N/A | |
| Remarks _____ | | | |
| 5. Settlement Monuments <input type="checkbox"/> Located <input type="checkbox"/> Routinely surveyed <input type="checkbox"/> N/A | | | |
| Remarks _____ | | | |
| E. Gas Collection and Treatment <input type="checkbox"/> Applicable <input type="checkbox"/> N/A | | | |
| 1. Gas Treatment Facilities | | | |
| <input type="checkbox"/> Flaring | <input type="checkbox"/> Thermal destruction | <input type="checkbox"/> Collection for reuse | |
| <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance | | |
| Remarks _____ | | | |
| 2. Gas Collection Wells, Manifolds and Piping | | | |
| <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance | | |
| Remarks _____ | | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | | |
|---|--|--|------------------------------|
| 3. Gas Monitoring Facilities (e.g., gas monitoring of adjacent homes or buildings) | | | |
| <input type="checkbox"/> Good condition | | <input type="checkbox"/> Needs Maintenance | <input type="checkbox"/> N/A |
| Remarks _____ | | | |
| F. Cover Drainage Layer <input type="checkbox"/> Applicable <input type="checkbox"/> N/A | | | |
| 1. Outlet Pipes Inspected <input type="checkbox"/> Functioning <input type="checkbox"/> N/A | | | |
| Remarks _____ | | | |
| 2. Outlet Rock Inspected <input type="checkbox"/> Functioning <input type="checkbox"/> N/A | | | |
| Remarks _____ | | | |
| G. Detention/sedimentation Ponds <input type="checkbox"/> Applicable <input type="checkbox"/> N/A | | | |
| 1. Siltation Areal extent _____ Depth _____ <input type="checkbox"/> N/A | | | |
| <input type="checkbox"/> Siltation not evident | | | |
| Remarks _____ | | | |
| 2. Erosion Areal extent _____ Depth _____ <input type="checkbox"/> N/A | | | |
| <input type="checkbox"/> Erosion not evident | | | |
| Remarks _____ | | | |
| 3. Outlet Works <input type="checkbox"/> Functioning <input type="checkbox"/> N/A | | | |
| Remarks _____ | | | |
| 4. Dam <input type="checkbox"/> Functioning <input type="checkbox"/> N/A | | | |
| Remarks _____ | | | |
| H. Retaining Walls <input type="checkbox"/> Applicable <input type="checkbox"/> N/A | | | |
| 1. Deformations <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Deformation not evident | | | |
| Horizontal displacement _____ | | Vertical displacement _____ | |
| Rotational displacement _____ | | | |
| Remarks _____ | | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | |
|---|--|--|
| 2. Degradation <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Deformation not evident | | |
| Remarks _____ | | |
| I. Perimeter Ditches/Off-Site Discharge <input type="checkbox"/> Applicable <input type="checkbox"/> N/A | | |
| 1. Siltation <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Siltation not evident | | |
| Areal extent _____ Depth _____ | | |
| Remarks _____ | | |
| 2. Vegetative Growth <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Siltation not evident | | |
| <input type="checkbox"/> Vegetation does not impede flow | | |
| Areal extent _____ Type _____ | | |
| Remarks _____ | | |
| 3. Erosion <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Erosion not evident | | |
| Areal extent _____ Depth _____ | | |
| Remarks _____ | | |
| 4. Discharge Structure <input type="checkbox"/> Location shown on site map <input type="checkbox"/> N/A | | |
| Remarks _____ | | |
| VIII. VERTICAL BARRIER WALLS <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A | | |
| 1. Settlement <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Settlement not evident | | |
| Areal extent _____ Depth _____ | | |
| Remarks _____ | | |
| 2. Performance Monitoring Type of Monitoring _____ <input type="checkbox"/> Performance not monitored | | |
| Frequency _____ <input type="checkbox"/> Evidence of breaching Head differential _____ | | |
| Remarks _____ | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | | |
|--|--|--|---|
| IX. GROUNDWATER/SURFACE WATER REMEDIES | | <input checked="" type="checkbox"/> Applicable | <input type="checkbox"/> N/A |
| A. Groundwater Extraction Wells, Pumps, and Pipelines | | <input checked="" type="checkbox"/> Applicable | <input type="checkbox"/> N/A |
| 1. Pumps, Wellhead Plumbing, and Electrical <input checked="" type="checkbox"/> Good condition <input checked="" type="checkbox"/> All required wells located <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A Remarks: <u>TRW 1, 2, 3, and 4R</u> | | | |
| 2. Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances <input checked="" type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks: _____ | | | |
| 3. Spare Parts and Equipment <input checked="" type="checkbox"/> Readily available <input checked="" type="checkbox"/> Good condition <input type="checkbox"/> Requires upgrade <input type="checkbox"/> Needs to be provided Remarks: _____ | | | |
| B. Surface Water Collection Structures, Pumps, and Pipelines | | <input type="checkbox"/> Applicable | <input checked="" type="checkbox"/> N/A |
| 1. Collection Structures, Pumps, and Electrical <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks: _____ | | | |
| 2. Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks: _____ | | | |
| 3. Spare Parts and Equipment <input type="checkbox"/> Readily available <input type="checkbox"/> Good condition <input type="checkbox"/> Requires upgrade <input type="checkbox"/> Needs to be provided Remarks: _____ | | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | |
|---|--|--|
| C. Treatment System <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A | | |
| 1. Treatment Train (Check components that apply) | | |
| <input type="checkbox"/> Metals removal | <input type="checkbox"/> Oil/water separation | <input type="checkbox"/> Bioremediation |
| <input checked="" type="checkbox"/> Air stripping | <input type="checkbox"/> Carbon adsorbers | |
| <input type="checkbox"/> Filters _____ | | |
| <input type="checkbox"/> Additive (e.g., chelation agent, flocculent) _____ | | |
| <input type="checkbox"/> Others _____ | | |
| <input checked="" type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance | |
| <input checked="" type="checkbox"/> Sampling ports properly marked and functional | | |
| <input checked="" type="checkbox"/> Sampling/maintenance log displayed and up to date | | |
| <input checked="" type="checkbox"/> Equipment properly identified | | |
| <input checked="" type="checkbox"/> Quantity of groundwater treated annually: <u>100 gpm maximum, 75 gpm average</u> | | |
| <input type="checkbox"/> Quantity of surface water treated annually _____ | | |
| Remarks: <u>The discharge is associated with the air stripper in the pump-and-treat system. The water discharged from the basins area is surficial storm water drainage or water discharged from the TAOU Cap drain layer. All basins in T-Area were backfilled as part of the remedy, so no water moves from the basin to outfall X-08C.</u> | | |
| 2. Electrical Enclosures and Panels (properly rated and functional) | | |
| <input type="checkbox"/> N/A | <input checked="" type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance |
| Remarks _____ | | |
| 3. Tanks, Vaults, Storage Vessels | | |
| <input type="checkbox"/> N/A | <input checked="" type="checkbox"/> Good condition | <input type="checkbox"/> Proper secondary containment <input type="checkbox"/> Needs Maintenance |
| Remarks _____ | | |
| 4. Discharge Structure and Appurtenances | | |
| <input checked="" type="checkbox"/> N/A | <input type="checkbox"/> Good condition | <input type="checkbox"/> Needs Maintenance |
| Remarks _____ | | |
| 5. Treatment Building(s) | | |
| <input checked="" type="checkbox"/> N/A | <input type="checkbox"/> Good condition (esp. roof and doorways) | <input type="checkbox"/> Needs repair |
| <input type="checkbox"/> Chemicals and equipment properly stored | | |
| Remarks _____ | | |

Five-Year Review Site Inspection Checklist (Continued)

| | | | | | |
|---|--|---------------------|--|------------------|--|
| 6. Monitoring Wells (pump and treatment remedy) | | | | | |
| x Properly secured/locked | | x Functioning | x Routinely sampled | x Good condition | |
| x All required wells located | | □ Needs Maintenance | | □ N/A | |
| Remarks _____ _____ | | | | | |
| D. Monitoring Data x Applicable □ N/A | | | | | |
| 1. Monitoring Data | | | | | |
| x Is routinely submitted on time | | | x Is of acceptable quality | | |
| 2 Monitoring Data Suggests: | | | | | |
| x Groundwater plume is effectively contained | | | x Contaminant concentrations are declining | | |
| E. Monitored Natural Attenuation □ Applicable x 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.). | | | | | |
| _____ _____ _____ _____ _____ _____ | | | | | |

Five-Year Review Site Inspection Checklist (Continued)

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.

N/A

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APPENDIX A

Decision Documents Issued for SRS

The following tables are included for information only. Table A1 lists the chronology of all decision documents (i.e., RODs, IRODS and ESDs), issued for Savannah River Site (SRS). It also lists the decision document numbers for reference. Table A2 is a summary of the remedial actions included in these decision documents. Figure A1 shows the location of these OUs.

Table A1. Chronology of All RODs, IRODS and ESDs Issued at SRS

| Document Title and Number | Issuance 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, 1994 |
| 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), IROD, WSRC-RP-93-1550, 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, WSRC-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 |
| Gunsite 113 Access Road Unit (631-24G), ROD, WSRC-RP-96-00833, Revision 1 | April 22, 1997 |
| Gunsite 720 Rubble Pit Unit (631-16G), ROD, WSRC-RP-96-00832, Revision 1 | April 22, 1997 |

Table A1. Chronology of All RODs, IRODS and ESDs Issued at SRS (Continued)

| Document Title and Number | Issuance Date |
|--|----------------------|
| 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, WSRC-RP-96-872, Revision 1.1 | June 19, 1997 |
| TNX, ESD, WSRC-RP-97-169, Revision 1 | September 22, 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 |
| Old F-Area Seepage Basin (904-49G), ESD, WSRC-RP-98-4123, Revision 1 | September 15, 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 |
| D-Area Oil Seepage Basin (631-G), ROD, WSRC-RP-97-402, Revision 1 | March 4, 1999 |
| Ford Building Waste Site (643-11G), ROD, WSRC-RP-98-4066, Revision 1 | June 7, 1999 |
| Chemicals, Metals, and Pesticides Pit (080-170G, -171G, -180G, -181G, -182G, -183G, -190G), First Interim ROD, WSRC-RP-2000-4158, Revision 1.1 | November 29, 1999 |
| Plug-In ROD, WSRC-RP-98-4099, Revision 0 | 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 |
| F-Area Retention Basin (281-3F), ESD, WSRC-RP-2000-4079, Revision 1.1 | June 7, 2001 |
| K-Area Burning/Rubble Pit (131-K & 631-20G), ROD, WSRC-RP-97-862, Revision 1 | August 20, 2001 |
| ORWBG Old Solvent Tanks (650-01E – 22E), Interim ROD, WSRC-RP-2000-4193, Revision 1 | September 14, 2001 |
| Ford Building Seepage Basin ROD, WSRC-RP-2000-4156 | February 14, 2002 |
| CMP Pits Interim Action ROD, Amendment, WSRC-RP-2000-4158 | March 8, 2002 |
| K-Area Reactor Seepage Basin ESD, WSRC-RP-99-4200 | September 16, 2002 |
| General Separations Area Consolidation Unit ROD, WSRC-RP-2002-4002 | September 26, 2002 |
| C-Area & L-Area Reactor Seepage Basin ROD Amendment, WSRC-RP-2002-4063 | October 23, 2002 |

Table A1. Chronology of All RODs, IRODs and ESDs Issued at SRS (Continued/End)

| Document Title and Number | Issuance Date |
|---|--------------------|
| L-Area Burning/Rubble Pit (131-L) & Rubble Pile (131-3l) & Gas Cylinder Disposal Facility (131-2l) ROD, WSRC-RP-98-4195 | January 10, 2003 |
| A-Area Burning/Rubble Pits (731-A/1a) and Rubble Pit (731-2a) ESD, WSRC-RP-2001-4281 | January 27, 2003 |
| R-Area Bingham Pump Outage Pits (643-8G, 643-9G and 643-10G) and R-Area Unknown Pits #1, #2, and #3 ROD, WSRC-RP-2001-4129 | April 23, 2003 |
| Central Shops BRP ROD, WSRC-RP-2001-4265, Revision 1.1 | May 19, 2003 |
| TNX Area Groundwater Operable Unit ESD, WSRC-RP-2001-0764 | May 19, 2003 |
| P-Area Burning/Rubble Pit (131-P) ROD, WSRC-RP-2000-4197 | July 1, 2003 |
| A-Area Miscellaneous Rubble Pile (731-6A) ROD, WSRC-RP-2001-4197 | July 21, 2003 |
| P-Area Reactor Seepage Basin (904-61G, 904-62G, 904-63G) ESD, WSRC-RP-2002-4105 | September 24, 2003 |
| CMP Pits Second Interim Action ROD, WSRC-RP-98-4192 | October 7, 2003 |
| CMP Pits Second Interim Action ROD Amendment, WSRC-RP-2001-4232 | October 7, 2003 |
| L-Area Hot Shop (707-G, 712-G, 717-G) ROD, WSRC-RP-2002-4025 | October 21, 2003 |
| R-Area Reactor Seepage Basins (904-57G, 904-58G, 904-59G, 904-60G, 904-103G, 904-104G and 108-4R Overflow Basin) ROD, WSRC-RP-2003-4093 | March 10, 2004 |
| TNX Burying Ground (643-G), New TNX Seepage Basin, Old TNX Seepage Basin and TNX Groundwater (082-G) ROD, WSRC-RP-2003-4017 | March 25, 2004 |
| Old F-Area Seepage Basin (904-49G) ROD Amendment, WSRC-RP-2003-4136 | April 1, 2004 |
| C-Area Reactor Groundwater IROD, WSRC-RP-2004-4022 | September 13, 2004 |
| R-Area Burning/Rubble Pits (131-R, 131-1R) and Rubble Pile (631-25G) ROD, WSRC-RP-2004-4004 | September 13, 2004 |
| D-Area Expanded Operable Unit (Consisting of D-Area Ash Basin, 488-D and D-Area Rubble Pit, 431-2D) ROD, WSRC-RP-2003-4007 | November 15, 2004 |
| Heavy Equipment Wash Basin and Central Shops Burning/Rubble Pit (631-5G) ROD, WSRC-RP-2003-4185 | January 7, 2005 |
| Chemical, Metals, Pesticides Pits (080-170G, -171G, -180G, -181G, -182G, -183G, -190G), ROD, WSRC-RP-2004-4090 | May 2, 2005 |
| Silverton Road Waste Site (713-3A) ESD, WSRC-RP-2004-92 | March 27, 2005 |
| TNX ESD, WSRC-RP-2005-4030 | September 2, 2005 |
| T-Area OU ROD, WSRC-RP-2004-4070 | December 21, 2005 |
| M-Area Inactive Process Sewer Line ROD, WSRC-RP-2006-4001 | May 2, 2007 |
| L-Area Southern Groundwater ROD, WSRC-RP-2006-4052 | May 3, 2007 |
| A-Burning/Rubble Pits and Rubble Pit (731-A, 731-1A, 731-2A) ROD, WSRC-RP-2005-4095 | July 24, 2007 |
| C-Burning/Rubble Pit OU ROD | June 25, 2008 |

Table A2. Summary of Remedial Actions Used at the OUs at SRS

| Operable Unit | Remedial Action |
|---|---|
| No Action/No Further Action | |
| 211-FB Pu-239 Release (081-F) | No Action |
| 716-A Motor Shops Seepage Basin (904-101G) | No Action |
| Burma Road Rubble Pit (231-4F) | No Action |
| Central Shops Burning/Rubble Pit (631-6G) | No Action |
| Central Shops Sludge Lagoon (080-24G) | No Action |
| Fire Department Hose Training Facility (904-113G) | No Action |
| Ford Building Waste Site (643-11G) | No Further Action (Removal) |
| Grace Road Site (631-22G) | No Action |
| Gunsite 113 Access Road Unit (631-24G) | No Action |
| Gunsite 720 Rubble Pit Unit (631-16G) | No Action |
| Hydrofluoric Acid Spill (631-4G) | No Action |
| K-Area and P-Area Sludge Application Site (761-4G, 761-5G) | No Action |
| M-Area West Unit (631-21G) | No Action |
| R-Area Acid/Caustic Basin (904-77G) | No Action |
| Road A Chemical Basin (904-111G) | No Action |
| SRL Oil Test Site (080-16G) | No Action |
| West of SRL "Georgia Fields" Site (631-19G) | No Action |
| 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 (080-170G, -171G, -180G, -181G, -182G, -183G, -190G) | 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 |
| C-Area Reactor Groundwater | Six Phase Electrical Resistance Heating With Soil Vapor Extraction |
| 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 (904-53G, -54G, -55G) | Soil Excavation, Offsite Disposal, Institutional Controls |
| L & 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 |
| A-Area Miscellaneous Rubble Pile (731-6A) | Institutional Controls, Excavation, Soil Vapor Extraction, Soil Cover |
| CMP Pits (080-170G) | Six Phase Electrical Resistance Heating With Soil Vapor Extraction, Passive Soil Vapor Extraction, Institutional Controls and Monitored Natural Attenuation |
| D-Area Expanded OU(488-D, 431-2D) | Geosynthetic Cover, Excavation/Disposal, Groundwater Monitoring and Institutional Controls |
| Ford Building Seepage Basin (643-11G) | Excavation, Backfill and Institutional Controls |
| GSA Consolidation Unit | Excavation, Consolidation, Geosynthetic Cover, Institutional Controls |

Table A2. Summary of Remedial Actions Used at the OUs at SRS (Continued/End)

| | |
|---|---|
| Heavy Equipment Wash Basin and Central Shops Burning/Rubble Pit (631-5G) | Institutional Controls |
| K-Area Reactor Seepage Basin (904-65G) | Consolidation, In-Situ Stabilization With Soil Cover, Institutional Controls |
| L-Area Burning Rubble Pit (131-L), Rubble Pile (131-3L) and Gas Cylinder Disposal Facility (131-2L) | Removal, Institutional Controls, Groundwater Mixing Zone |
| L-Area Hot Shop (707-G, 712-G, 717-G) | Removal/Disposal, Institutional Controls |
| P-Area Burning Rubble Pit (131-P) | Soil Cover With Passive Soil Vapor Extraction, Natural Biodegradation, Institutional Controls, Groundwater Monitoring |
| P-Area Reactor Seepage Basin (904-61G, -62G, -63G) | Consolidation, In-Situ Stabilization With Soil Cover, Institutional Controls |
| R-Area Bingham Pump Outage Pit (131-R, -1R) and Rubble Pile (631-25G) | Excavation, Soil Cover, Institutional Controls |
| R-Area Burning Rubble Pits (131-R, -1R) and Rubble Pile (631-25G) | Excavation, Soil Cover, Institutional Controls |
| R-Area Seepage Basins (904-57G, -58G, -59G, -60G, -103G, -104G) and Overflow Basin (108-4R) | Concrete Intruder Barrier, Asphalt Bioturbation Barrier, Excavation/On-Site Disposal, Mixing Zone, Institutional Controls |
| TNX Groundwater | Excavation/Disposal, In-Situ Soil Stabilization, Backfill, Soil Cover, Soil Vapor Extraction, Recirculation Wells, Air Sparging, Groundwater Monitoring, Institutional Controls |
| T-Area OU | Geosynthetic Cover, Excavation, Backfill, Soil Amendments |

MNA = monitored natural attenuation

SVE = soil vapor extraction

S/S = stabilization/solidification



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Figure A1 - List of Units with Their Map Location Identification

| Unit ID | Unit Name |
|---------|--|
| 1 | Tank 105-C Hazardous Waste Management Facility |
| 3 | F-Area Hazardous Waste Management Facility (F-Area Seepage Basin, 904-41G) |
| 4 | F-Area Hazardous Waste Management Facility (F-Area Seepage Basin, 904-42G) |
| 5 | F-Area Hazardous Waste Management Facility (F-Area Seepage Basin, 904-43G) |
| 7 | H-Area Hazardous Waste Management Facility (H-Area Seepage Basin, 904-44G) |
| 8 | H-Area Hazardous Waste Management Facility (H-Area Seepage Basin, 904-46G) |
| 9 | H-Area Hazardous Waste Management Facility (H-Area Seepage Basin, 904-45G) |
| 10 | H-Area Hazardous Waste Management Facility (H-Area Seepage Basin, 904-56G) |
| 14 | M-Area West, 631-21G |
| 16 | Mixed Waste Management Facility, 643-28E |
| 18 | Old Radioactive Waste Burial Ground, 643-E (Including Solvent Tanks 650-1E-22E) |
| 19 | F & H-Area Hazardous Waste Management Facilities (Groundwater) |
| 23 | M-Area Hazardous Waste Management Facility, A/M Area Groundwater Portion, 904-110G |
| 25 | TNX Groundwater, 082-G |
| 26 | D-Area Oil Seepage Basin, 631G |
| 27 | Warner's Pond, 685-23G |
| 28 | H-Area Retention Basin, 281-3H |
| 29 | HP-52 Ponds, NBN |
| 30 | Burma Road Rubble Pit, 231-4F |
| 31 | Central Shops Burning/Rubble Pit, 631-6G |
| 32 | D-Area Burning/Rubble Pits, 431-1D |
| 33 | D-Area Burning/Rubble Pits, 431-D |
| 34 | F-Area Burning/Rubble Pits, 231-1F |
| 35 | F-Area Burning/Rubble Pits, 231-2F |
| 36 | F-Area Burning/Rubble Pits, 231-F |
| 37 | Grace Road Site, 631-22G |
| 38 | Gunsite 113 Access Road, 631-24G |
| 40 | Gunsite 720 Rubble Pit, 631-16G |
| 41 | Silverton Road Waste Site, 731-3A |
| 42 | Overflow Basin, 108-4R |
| 43 | 211-FB Line PU-239 Release, 081-F |
| 44 | 716-A Motor Shop Seepage Basin, 904-101G |
| 45 | A-Area Burning/Rubble Pits, 731-1A |
| 46 | A-Area Burning/Rubble Pits, 731-A |
| 48 | A-Area Miscellaneous Rubble Pile, 731-6A |
| 49 | A-Area Rubble Pit, 731-2A |
| 51 | C-Area Burning/Rubble Pit, 131-C |
| 52 | C-Area Coal Pile Runoff Basin, 189-C |
| 53 | C-Area Reactor Seepage Basins, 904-66G |
| 54 | C-Area Reactor Seepage Basins, 904-67G |
| 55 | C-Area Reactor Seepage Basins, 904-68G |
| 57 | Central Shops Burning/Rubble Pit, 631-5G |

| Unit ID | Unit Name |
|----------------|---|
| 58 | Central Shops Burning/Rubble Pit, 631-1G |
| 59 | Central Shops Burning/Rubble Pit, 631-3G |
| 60 | Central Shops Sludge Lagoon, 080-24G |
| 61 | CMP Pits, 080-170G |
| 62 | CMP Pits, 080-171G |
| 63 | CMP Pits, 080-180G |
| 64 | CMP Pits, 080-181G |
| 65 | CMP Pits, 080-182G |
| 66 | CMP Pits, 080-183G |
| 67 | CMP Pits, 080-190G |
| 68 | D-Area Ash Basin, 488-D |
| 71 | F-Area Coal Pile Runoff Basin, 289-F |
| 72 | F-Area Hazardous Waste Management Facility (F-Area Inactive Process Sewer Line, 081-1F) |
| 73 | F-Area Retention Basin, 281-3F |
| 74 | Fire Department Hose Training Facility, 904-113G |
| 75 | Ford Building Seepage Basin, 904-91G |
| 76 | Ford Building Seepage Basin, 643-11G |
| 78 | Gas Cylinder Disposal Facility, 131-2L |
| 82 | Hydrofluoric Acid Spill, 631-4G |
| 83 | K-Area Bingham Pump Outage Pit, 430-1G |
| 84 | K-Area Burning/Rubble Pit, 131-K |
| 85 | K-Area Coal Pile Runoff Basin, 189-K |
| 87 | K-Area Reactor Seepage Basin, 904-65G |
| 88 | K-Area Rubble Pile, 631-20G |
| 89 | K-Area Sludge Land Application Site, 761-4G |
| 91 | L-Area Bingham Pump Outage Pits, 643-2G |
| 92 | L-Area Bingham Pump Outage Pits, 643-3G |
| 93 | L-Area Burning/Rubble Pit, 131-L |
| 94 | L-Area Hot Shop, 717-G (including Sandblast Area CML-003, NBN) |
| 95 | L-Area Acid/Caustic Basin, 904-79G |
| 96 | L-Area Oil Chemical Basin, 904-83G |
| 100 | M-Area Inactive Process Sewer Line, 081-M |
| 101 | Miscellaneous Chemical Basin, 731-4B |
| 102 | Metal Burning Pits, 731-5A |
| 103 | Mixed Waste Management Facility (Groundwater) |
| 104 | New TNX Seepage Basin, 901-102G |
| 105 | Old F-Area Seepage Basin, 904-49G |
| 106 | Old TNX Seepage Basin, 904-76G |
| 107 | P-Area Bingham Pump Outage Pit, 643-4G |
| 108 | P-Area Burning/Rubble Pit, 131-P |
| 109 | P-Area Coal Pile Runoff Basin, 189-P |
| 110 | PAR Pond (Including the Pre-Cooler Ponds and Canals), 685-G |
| 111 | PAR Pond Sludge Land Application Site, 761-5G |
| 112 | R-Area Acid/Caustic Basin, 904-77G |

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| Unit ID | Unit Name |
|---------|--|
| 113 | R-Area Bingham Pump Outage Pits, 643-10G |
| 114 | R-Area Bingham Pump Outage Pits, 643-8G |
| 115 | R-Area Bingham Pump Outage Pits, 643-9G |
| 116 | R-Area Burning/Rubble Pits, 131-1R |
| 117 | R-Area Burning/Rubble Pits, 131-R |
| 118 | R-Area Rubble Pile, 631-25G |
| 119 | R-Area Reactor Seepage Basins, 904-103G |
| 120 | R-Area Reactor Seepage Basins, 904-104G |
| 121 | R-Area Reactor Seepage Basins, 904-57G |
| 122 | R-Area Reactor Seepage Basins, 904-58G |
| 123 | R-Area Reactor Seepage Basins, 904-59G |
| 124 | R-Area Reactor Seepage Basins, 904-60G |
| 125 | Road A Chemical Basin, 904-111G |
| 127 | Spill on 1/12/53 of 1/2 Ton of Uranyl Nitrate, NBN |
| 132 | SRL Oil Test Site, 080-16G |
| 133 | SRL Seepage Basins, 904-53G (Basin 1) |
| 134 | SRL Seepage Basins, 904-53G (Basin 2) |
| 135 | SRL Seepage Basins, 904-54G |
| 136 | SRL Seepage Basins, 904-55G |
| 139 | TNX Burying Ground, 643-5G |
| 140 | West of SREL "Georgia Fields" Site, 631-19G |
| 146 | C-Area Reactor Groundwater |
| 169 | L-Area Rubble Pile, 131-3L |
| 273 | D-Area Rubble Pit, 431-2D |
| 306 | K-Area Reactor Seepage Basin, 904-64G |
| 310 | Neutralization Sump, 678-T |
| 317 | P-Area Reactor Seepage Basin, 904-61G |
| 318 | P-Area Reactor Seepage Basin, 904-62G |
| 319 | P-Area Reactor Seepage Basin, 904-63G |
| 405 | Spill on 3/08/78 of Unknown, Seepage Basin Pipe Leak, H-Area Seepage Basin |
| 417 | Spill on 5/01/56 of Unknown, Retention Basin Pipe Leak, NBN |
| 467 | X-001 Outfall Drainage Ditch, NBN |
| 487 | L-Area Southern Groundwater, NBN |
| 500 | TNX Outfall Delta, Lower Discharge Gully and Swamp, NBN |
| 502 | Heavy Equipment Wash Basin, NBN |
| 550 | R-Area Unknown Pit #1 (Runk-1), NBN |
| 551 | R-Area Unknown Pit #2 (Runk-2), NBN |
| 552 | R-Area Unknown Pit #2 (Runk-3), NBN |
| 559 | TNX Process Sewer Lines and Tile Fields as Abandoned, NBN |
| 566 | Old C-Area Burning/Rubble Pit, NBN |

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