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United States Department of Energy

Savannah River Site

Corrective Measures Implementation Report/Post-Construction Report/Final Remediation Report (CMIR/PCR/FRR) for Closure of SRL Seepage Basins Operable Unit (904-53G1, -53G2, -54G, and -55G) (U)

WSRC-RP-2001-4123

Revision 1

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DISCLAIMER

CERTIFICATION

CORRECTIVE MEASURES IMPLEMENTATION REPORT/POST-CONSTRUCTION REPORT/FINAL REMEDIATION REPORT FOR CLOSURE OF SRL SEEPAGE BASINS OPERABLE UNIT (904-53G1, -53G2, -54G, AND –55G) WSRC-RP-2001-4123, REVISION.1, FEBRUARY 2002

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TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF ACRONYMS AND ABBREVIATIONS

ASTM	American Society of Testing and Materials
BSRI	Bechtel Savannah River Inc.
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CMI/RAIP	Corrective Measures Implementation/Remedial Action Implementation Plan
CMIR/PCR/FRR	Corrective Measures Implementation Report/ Post-Construction Report/Final Remediation Report
DOT	Department of Transportation
ERD	Environmental Restoration Division
FFA	Federal Facility Agreement
LUCAP	Land Use Control Assurance Plan
LUCIP	Land Use Control Implementation Plan
NCP	National Oil and Hazardous Substances Contingency Plan
OU	operable unit
pCi/g	picocuries per gram
PTSM	principal threat source material
QA	Quality Assurance
RAO	remedial action objective
RCRA	Resource Conservation and Recovery Act
RFI/RI/BRA/FCMS/FS	RCRA Facility Investigation/Remedial Investigation/Baseline Risk Assessment and Focused Corrective Measures Study/Feasibility Study
ROD	Record of Decision
SCDHEC	South Carolina Department of Health and Environmental Control
SMSRP	Stormwater Management and Sediment Reduction Plan
SRL	Savannah River Laboratory
SRLSB	Savannah River Laboratory Seepage Basins
SRS	Savannah River Site
USDOE	United States Department of Energy
USEPA	United States Environmental Protection Agency
WSRC	Westinghouse Savannah River Company LLC

1.0 INTRODUCTION

1.1 Purpose and Scope

This Corrective Measures Implementation Report/Post-Construction Report /Final Remediation Report (CMIR/PCR/FRR) has been completed in accordance with the requirements for submittal of regulatory documents as identified in the Federal Facility Agreement (FFA) (FFA 1993). The purpose of the CMIR/PCR/FRR is to document compliance with technical and statutory requirements and to provide a consolidated record of all removal and remedial activities that have taken place during implementation of the selected corrective measure/remedial action for the Savannah River Laboratory Seepage Basins (SRLSBs) at the Savannah River Site (SRS). These activities are documented in the approved SRLSB Record of Decision (ROD) (WRSC 1999b) and Corrective Measures Implementation/Remedial Action Implementation Plan (CMI/RAIP) (WSRC 1999c).

This CMIR/PCR/FRR was completed after the final inspection of the completed construction activities and a determination that the remedy is ready for operation and function. The SRS notified the United States Environmental Protection Agency (USEPA) Region IV office and the South Carolina Department of Health and Environmental Control (SCDHEC) regarding the completion of the aforementioned final inspection and the operation and function determination. This CMIR/PCR/FRR is being submitted to the USEPA and SCDHEC for approval in accordance with FFA requirements.

Since the final remedial action for the operable unit (OU) has been completed and the remedial action objectives (RAOs) have been met, this report serves as the CMIR/PCR/FRR. Land use requirements are listed in the USEPA- and SCDHEC-approved CMI/RAIP for the SRLSBs (WSRC 1999c). The Land Use Control Implementation Plan (LUCIP) defines those remedial action-related activities (e.g., maintenance and institutional control activities) that will be conducted following the SRLSB closure (Appendix A).

On December 8, 1999, the remedial action began. A copy of the United States Department of Energy (USDOE) Savannah River correspondence for the start date is provided in Appendix B. The CMIR/PCR/FRR provides a summary of the construction activities performed in accordance with the approved CMI/RAIP. The report includes the following items:

- A brief description of the OU background, including a brief statement on the RAOs
- An overview of the selected remedy
- A chronology of the completed events related to the remediation of the OU
- A summary of the construction activities performed
- Deviations from the original design per the approved CMI/RAIP
- Performance standards and quality control inspections, including a summary of performance test results documenting verification of the compliance with the acceptance criteria in the CMI/RAIP
- Verification and certification of SRLSB closure
- As-built drawings
- Post-construction activities (i.e., inspection and maintenance activities)
- Summary of project costs

1.2 Operable Unit Background

The SRLSB OU is located in the northwestern section of SRS, about 4,000 feet from the nearest SRS boundary and 4,500 feet from the nearest residence (Figure 1). The area of the SRLSB OU is approximately 2.15 acres. The SRLSB OU consists of four unlined basins that were used from 1954 to 1982 (Figure 2).

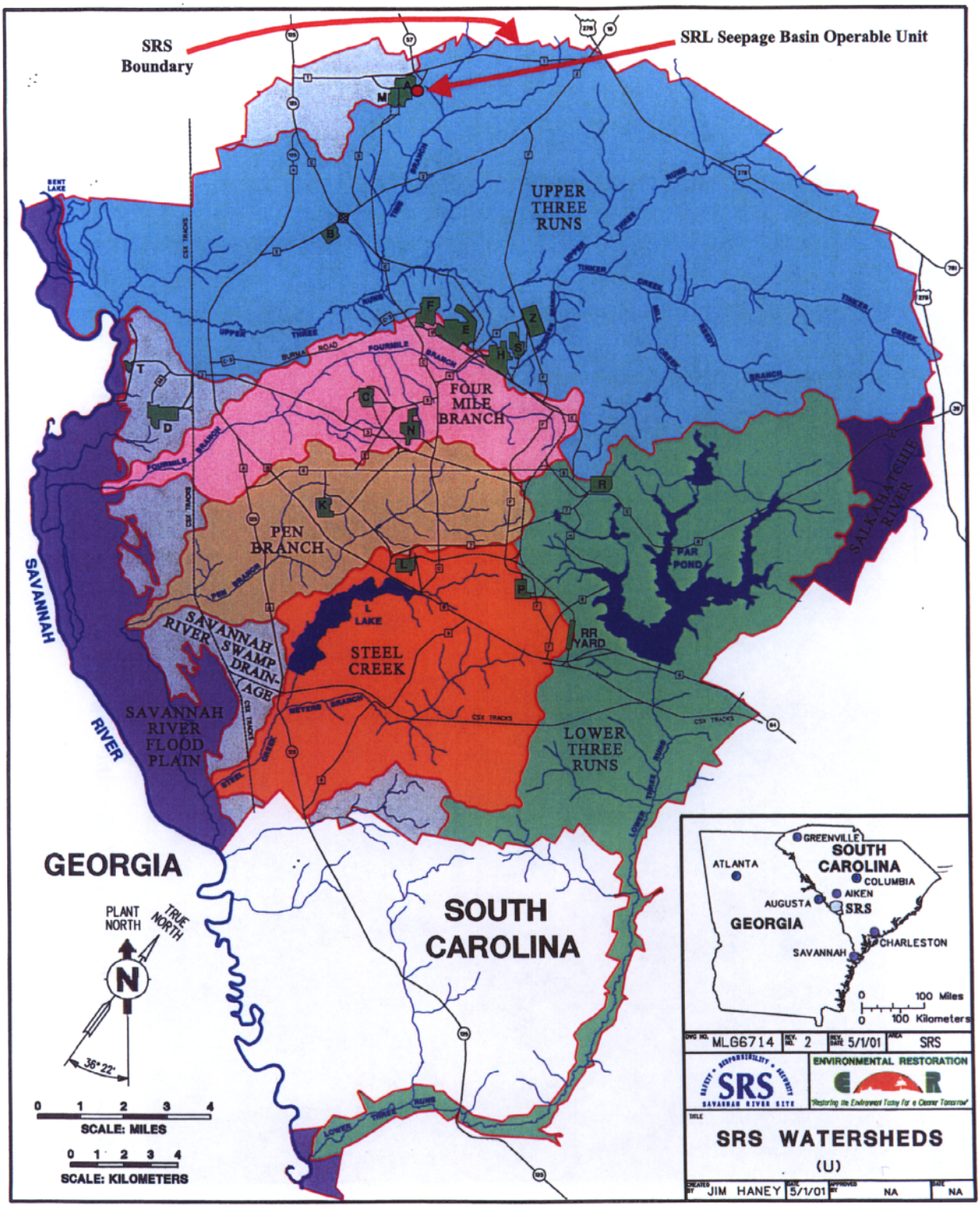


Figure 1. Savannah River Site and Major Facilities

Figure 2. Aerial View September 1997 after the Vegetation was Removed, Prior to Remediation Start

The basins received low-level radioactive liquid waste generated in Savannah River Laboratory (SRL) Buildings 735-A and 773-A.

Basins 1 and 2 were placed in operation in 1954, and Basins 3 and 4 were added in 1958 and 1960, respectively. Waste was transferred from the laboratories to the basins via a 900-foot long, 10-inch diameter, clay process sewer line that discharged into the western end of Basin 1. The four basins are connected by a series of sequential overflow channels.

In November 1999, the USEPA and SCDHEC approved the ROD (WSRC 1999b). The ROD documented selection of excavation and off-SRS disposal of all soil above the 1×10^{-3} industrial risk [principal threat source material (PTSM)] as the corrective measure/remedial action. The SRLSB CMI/RAIP (WSRC 1999c) was approved by USEPA and SCDHEC in October 1999 and November 1999, respectively. The CMI/RAIP provided the design details for excavation, backfill, permitting requirements, construction strategy, requirements for health and safety, waste management, contamination control, decontamination, quality assurance (QA), quality control inspection, field data collection, maintenance and institutional controls, and project closeout.

This corrective measure/remedial action meets the RAOs of protecting human health and the environment by eliminating surficial soil and removing all PTSM. Residual contamination (at levels below 1×10^{-3} risk) remains in place. The soils in the basins do not pose a leachability risk to groundwater as determined in the Resource Conservation and Recovery Act (RCRA) Facility Investigation/Remedial Investigation/Baseline Risk Assessment and Focused Corrective Measures Study/Feasibility Study (RFI/RI/BRA/FCMS/FS) (WSRC 1998). The remedial goal for the OU was to significantly reduce the potential exposure to future industrial receptors through removal of all PTSM. The basins were backfilled with clean soil and a vegetative layer was placed over all four basins. These actions, combined with short-term and long-term institutional controls, have eliminated any risk to the industrial worker.

1.3 Remedial Action Objectives

1.3.1 Remedial Action Objectives

Based on the risk posed by radionuclides in the SRLSB soils, the general 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
- Remove all PTSM from Basins 1, 2, and 3
- Reduce risk to soil invertebrates from the ingestion of chromium in the surface soils of Basin 1.

1.3.2 Selected Remedial Action

The CMI/RAIP provides the design details of the remedial action for the SRLSBs. The key elements of the selected remedial action and the associated design, as identified in the ROD and CMI/RAIP for the SRLSB soils, are listed below:

- Excavation of all PTSM from the basin bottoms and berms of Basins 1, 2, and 3, the process sewer line, and the 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

1.4 Chronology of Events

The chronology of events for the SRLSB project is shown below in Table 1.

Table 1. Chronology of Events

Activity	Date
Approval of the ROD	November 1999
Approval of the CMI/RAIP	November 1999
Remedial Action Start	December 8, 1999
Performed initial survey	December 9, 1999
Began clearing and grubbing	January 24, 2000
Began work on stormwater management	January 26, 2000
Began backfill of Basin 4	February 23, 2000
Began removal of process sewer line and backfill	March 29, 2000
Began initial confirmatory sampling/screening process sewer	April 4, 2000
Began Basin 1 excavation	June 8, 2000
Began Basin 2 excavation	June 8, 2000
Began initial confirmatory sampling/screening basins	July 6, 2000
Began preparation of PTSM in Basin 3 for packaging and rail shipment and excavation of Basin 3	July 17, 2000
Began loading PTSM in Lift-Liners™	August 5, 2000
Began rail car loading	August 14, 2000
Began backfill compaction testing	March 10, 2000
Began backfill in Basin 1	July 25, 2000
Began backfill in Basin 2	July 25, 2000
Began backfill in Basin 3	September 12, 2000
Received first shipment of PTSM at Envirocare	September 22, 2000
Began final grading and installation of sedimentation basin	November 6, 2000
Performed as-built survey	July 2001
Performed regulatory walkdown/final inspection	July 10, 2001

The post-construction activities to be performed at the SRLSB are discussed in Section 7.0 of this document. These activities include annual inspections and repairs as needed, etc.

2.0 CONSTRUCTION ACTIVITIES

2.1 Project Team

This section provides an overview of the subcontractors comprising the SRLSB project team, the major construction events, and a chronology of the events taking place during implementation of the remedial action at the SRLSB OU. The project efforts were initially subcontracted to Avisco Inc. The project team consisted of the following parties:

Company	Responsibility
Bechtel Savannah River Inc. (BSRI) Savannah River Site, Aiken, SC	Project management
Avisco Inc. Nashville, TN.	Prime Subcontractor/Constructor
American Technologies Inc. Oak Ridge, TN	Quality Assurance/Radiological Control/Safety
Zhagrus Environmental Inc. Salt Lake City, UT	Waste management and shipping
Envirocare Salt Lake City, UT	Waste disposal
CSRA Testing and Engineering Co. Inc. Augusta, GA	Soils Testing
Westinghouse Savannah River Company LLC (WSRC) Savannah River Site, Aiken, SC	Provide field radiological oversight of the subcontractor
General Engineering Laboratory Charleston, SC (onsite mobile lab)	Confirmation sampling analysis
Exploration Resources Inc. Athens, GA	Data validation and verification

After completing approximately 90% of the backfilling of Basin 4 and approximately 60% of the process sewer line excavation, Avisco Inc. informed WSRC/BSRI that they could not perform/complete the task. All parties agreed to terminate the contract. In order to meet the project's planned commitments/milestones, SRS forces were mobilized. The new project team comprised the following parties:

Company	Responsibility
BSRI Savannah River Site, Aiken, SC	Project management/Constructor/ Radiological Control/QA/Safety
Zhagrus Environmental Inc. Salt Lake City, Utah	Waste management and shipping
Envirocare Salt Lake City, Utah	Waste disposal
WSRC Savannah River Site, Aiken, SC	Field radiological control
Raytheon Engineers and Constructors Aiken, SC	Soils testing
General Engineering Laboratory Charleston, SC	Confirmation sampling analysis (onsite mobile lab)
Exploration Resources Inc Athens, GA	Data validation and verification

Closeout of the Avisco Inc. subcontract and the concomitant mobilization of BSRI forces resulted in a three-week delay in the project schedule. To offset the delay, BSRI used overtime and double shifts, and committed additional construction forces to the project. Since Avisco's original responsibilities included waste management and shipping, BSRI was required to place a subcontract directly with Zhagrus Environmental Inc. to handle all waste acceptance with Envirocare of Utah, to make all transportation arrangements, and to provide oversight of the packaging and shipment loading. Despite the project's schedule delay, execution of the project went as planned in the ROD and all other project documents.

2.2 Construction Equipment

The equipment used to perform this effort consisted of standard heavy equipment used in the construction industry for site work-related activities. The specific equipment used at the site included backhoes, track hoes, excavators, bulldozers, dump trucks, soil compactors, and cranes.

The containers used for packaging and shipment of PTSM were Lift-Liners™, a soft-sided double-polyethylene liner packaging that meets appropriate Department of Transportation (DOT) material packaging requirements for the SRLSB soils. The liners are designed to contain up to a maximum of 9 cubic yards and/or 24,000 pounds of material. The liners met all requirements for shipment and disposal of the materials at Envirocare.

2.3 Stormwater Management

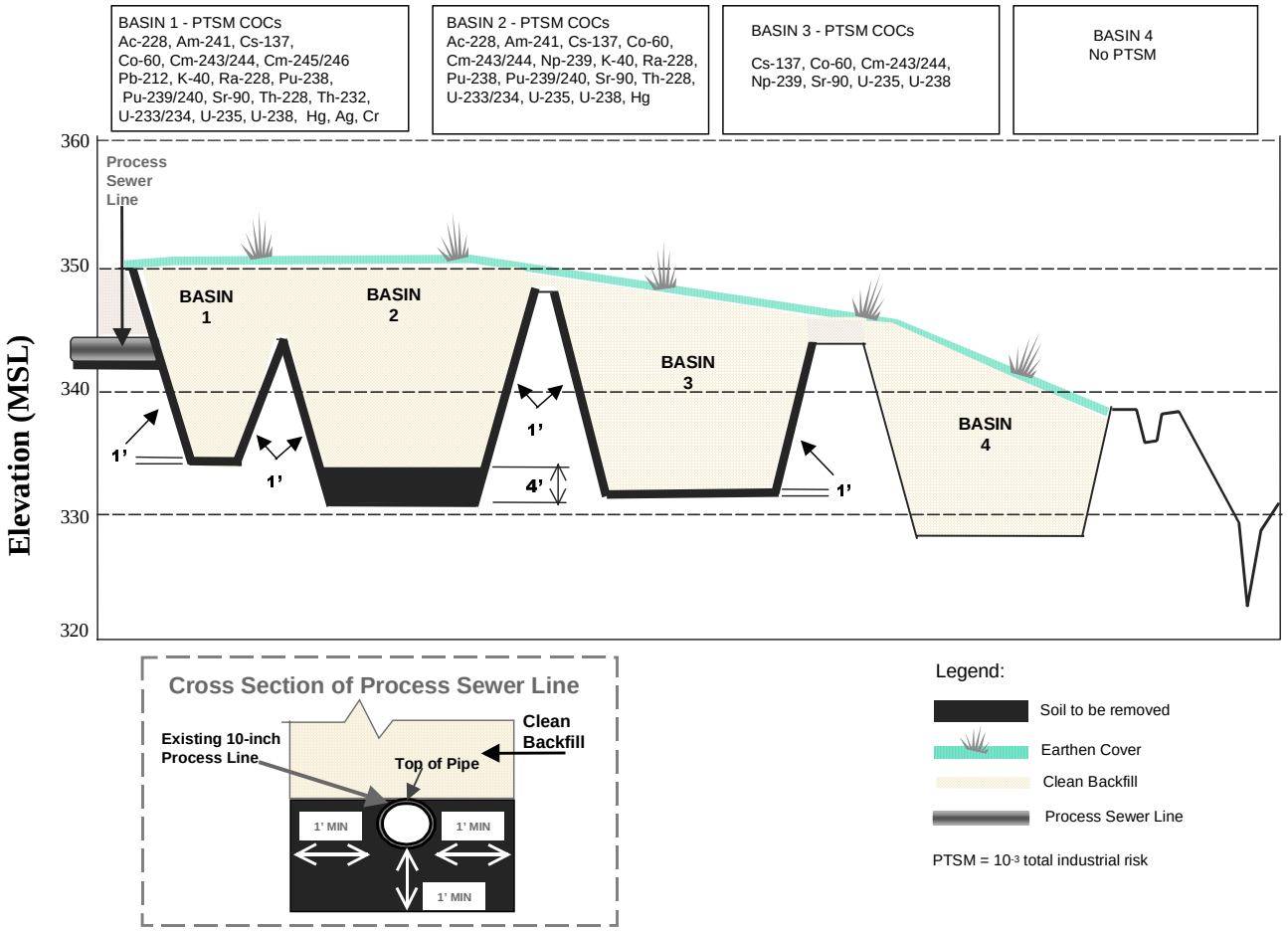
All stormwater management was performed in accordance with the *Stormwater Management and Sediment Reduction Plan/Pollution Prevention Plan SRL Seepage Basins Remediation* (WSRC 1999d). The corrective measures/remedial actions in the Stormwater Management and Sediment Reduction Plan (SMSRP) comply with all federal and state requirements for erosion control and stormwater management. The stormwater management system was designed to convey stormwater runoff away from the SRLSB OU during and following backfill operations. The design required the installation of three drainage ditches, drainage structures with manholes, underground piping, and a temporary sedimentation basin. The drainage channel system is designed to convey a 25-year 24-hour storm event.

2.4 Excavation

Based on the approved ROD, soil was to be excavated at the depth of 1 foot in the berm and bottom of Basins 1 and 3, and at the depth of 1 foot in the berm and 4 feet in the bottom of Basin 2. In addition to the SRL process sewer line itself, 1 foot of soil from the sides and 1 foot underlying the sewer line was to be excavated. Deeper intervals were to be excavated at the basins or the process sewer line if residual areas of elevated concentrations existed. The PTSM constituents of concern, estimated soil depths to be removed, and proposed backfill elevations are shown on Figure 3. Soil was not removed from Basin 4 since there was no PTSM present in this basin. Prior to any excavation or soil removal, all existing utilities, monitoring wells, benchmarks, survey control points, and existing structures were located with non-obtrusive equipment such as ground penetrating radar to ensure the accurate location of all subsurface interferences. Protective measures were taken to maintain the integrity of exposed items, including existing groundwater monitoring wells and other structures.

2.4.1 Process Sewer Line

The removal of the process sewer line included the pipe and associated contaminated soils from Basin 1 to the first manhole (Figure 4). The initial plan entailed excavation of approximately 1 foot of soil from the sides of the sewer line and 1 foot of soil below the process sewer line. During the actual excavation, 1 foot, 6 inches of soil was removed from each side of the pipe to accommodate commercially available equipment. The excavated pipe and contaminated soils were placed in Basin 3 for preparation for DOT shipping and classification. Following soil and sewer line removal, surfaces of the pipeline trench were screened. Confirmatory soil samples were taken for analysis before the trenches were backfilled. All soils exceeding the 1×10^{-3} industrial worker health-risk level



SRL Seepage Basins and Process Sewer Line Showing PTSM COCs, Soil to be Removed, and Proposed Backfill Elevations

Figure 3. Planned Soil Removal and Backfill Elevations

Figure 4. Sewerline Excavation across Road A-1 at Night

were removed in accordance with the remedial action confirmatory sampling requirements (Section 2.5) before the excavated areas were backfilled. Because none of the soil samples exceeded the 1×10^{-3} industrial worker health-risk level, no additional soil was removed from the bottom of the process sewer line trench.

2.4.2 Basins

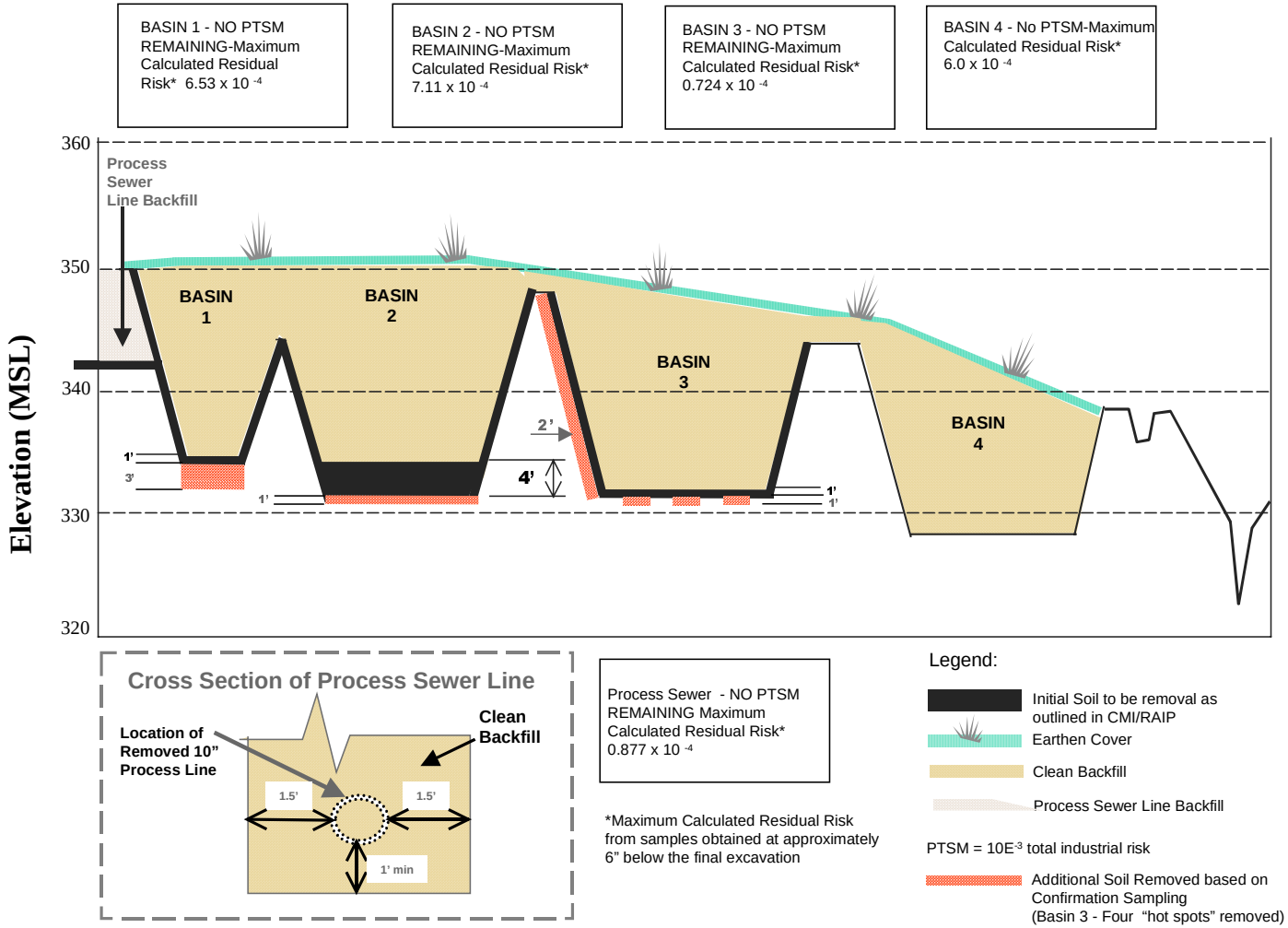
After removal of soil at the planned depths from the basin bottoms and berms (Figure 5), residual contamination greater than 1×10^{-3} industrial risk was found in the bottom of Basins 1 and 2. Due to the location, screening data, and number of "hot spots," additional soil was removed from the bottom of Basins 1 and 2. One foot of additional soil was removed from Basin 2 and 3 feet of additional soil from Basin 1. During the excavation activities, soils from Basin 1 and Basin 2 were placed in Basin 3 in preparation for DOT shipping and classification (Figure 6). After preparation and testing for DOT classification, the soil from the process sewer line, Basin 1, Basin 2, and one foot of soil from the bottom and berms (side slopes) of Basin 3 were loaded into Lift-Liners™ (Figures 7 and 8). Basin 3 was then screened and one foot of additional soil was removed from three "hot spots" in the bottom of Basin 3 and two feet of additional soil from a hot spot in the berm (Figure 9). A summary of the verification sampling results for the Process Sewer Line, Basins 1, 2, and 3 are documented in Sections 4.1.1, 4.1.2, 4.1.3, and 4.1.4, respectively.

Figure 5. Excavation in Basin 2

Figure 6. Principal Threat Source Material in Basin 3

Figure 7. Lift-Liner Loading Area

Figure 8. Lift-Liner Loading



SRL Seepage Basins and Process Sewer Line Showing Actual Soil Removed and Final Backfill Elevations

Figure 9. Actual Soil Removal and Backfill Elevations

2.5 Confirmatory Soil Screening, Sampling and Analysis

After the initial planned excavation for the process sewer line and the basins, the sampling sectors (grids) were marked, and the locations were surveyed and numbered. A portable gamma radiation detection device (sodium iodide crystal) was used along the length of the process sewer line and at the grid-line intersections in each basin (Figure 10) to identify/screen residual areas of elevated gamma radiation. Instrument response measurements (counts to radioactivity) were taken for a designated period of time at the intersections of the grid lines. Confirmation soil samples were taken from the screen locations that revealed elevated gamma radiation or that failed the screening determination when compared to concentrations that would exceed a 1×10^{-3} risk for industrial receptors. A cumulative risk was calculated for each soil sampling location. Additional soil was removed when the cumulative risks were in excess of 1×10^{-3}, which is indicative of PTSM (see Section 4.1). This process of removing the soil hot spots (hot spot excavation, taking a soil sample, and performing a risk calculation) was repeated until concentrations which resulted in a risk less than 1×10^{-3} were achieved. All hot spot material (PTSM) was packaged and shipped to Envirocare for disposal along with the other PTSM removed from the basins.

2.6 Backfill/Vegetative Layer

After soil and pipeline removal and confirmation that all PTSM had been removed, the process sewer trench and basins were backfilled with clean soil. The soil backfill system consisted of common backfill and a vegetative layer. Basins 1 and 2 were filled as one unit with a minimum of 6 feet of backfill common to Basins 1 and 2. Basins 3 and 4 were filled individually. Constructability issues (i.e., construction sequencing, rainfall, erosion controls, etc.) resulted in the planned execution and a minimum of 2 feet of common contiguous fill being placed on all four basins (Figure 9). The cover over the basins consisted of two layers: a common fill compacted to a minimum 95% density and a topsoil/common-fill vegetative layer of a minimum 6 inch thickness (Figures 11 and 12). The common fill material was obtained from designated site borrow

Figure 10. Screening for Gamma Radiation

Figure 11. Compacting of Soil in Basins 1 and 2

Figure 12. Placement of Vegetative Layer

areas. Radiological screens/surveys were performed on the soils prior to and during placement. The soils were placed in 9- to 12-inch lifts, compacted, and tested. Quality control testing was performed and documented for the soils throughout the project in accordance with the project specifications.

After placement of the backfill material, the vegetative layer was begun. The vegetative layer included a minimum 6-inch layer of top soil/common soil mix, fertilizer, lime, appropriate seed, and mulch. The graded topsoil cover is contiguous to all four basins (Figure 9). Soil moisture was maintained until the vegetative layer had been established (Figure 13). The final cover was sloped to promote drainage away from the SRLSB, thus allowing the system to function with minimal maintenance. Site restoration was completed in accordance with project specifications, and repairs were made to all areas disturbed during the course of construction.

2.7 Transportation and Disposal

The SRLSB ROD required PTSM to be excavated, transported, and disposed of at an approved, licensed, out-of-state, low-level waste disposal facility (WSRC 1999b). A current Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Offsite Rule Determination for Envirocare, Utah was obtained from USEPA for all shipments and copies can be found in the Administrative Record file. The PTSM included soils from Basins 1, 2, and 3 and the process sewer line. The initial estimated volume of soil to be removed was 3,207 cubic meters. An additional volume of 1,543 cubic meters of soil was removed based on the results of confirmatory sampling, for a total of 4,750 cubic meters. Lift-Liners™ were used to package the PTSM at the SRLSBs. Each lift liner was weighed at SRS as they were loaded and readied for rail shipment. A total of 98 rail cars, containing 741 lift liners of PTSM, were shipped to and accepted for disposal at Envirocare in Utah (Figure 14). Job control waste was packaged in four B-12 and five B-25 containers with 45 cubic feet and 90 cubic feet capacity, respectively. These containers were also shipped

Figure 13. Aerial View after Completion

Figure 14. Rail Car Loading

to and disposed of at Envirocare. All shipments to and waste acceptance at Envirocare went without incident. A copy of the Certificate of Disposal from Envirocare of Utah Inc. can be found in Appendix C. This was the first time Envirocare received, accepted, and disposed of waste materials packaged in Lift-Liners™.

3.0 DEVIATIONS FROM ORIGINAL DESIGN

The project successfully removed all soil above the 1 x 10^{-3} industrial risk (PTSM) and constructed the soil cover in accordance with the CMI/RAIP (WSRC 1999c). The following summarizes the changes implemented during construction:

- Basins 1, 2, and 3: Additional soil removal was required based on the results of the confirmatory sampling outlined in the CMI/RAIP. As stated, confirmation sampling required additional soil removal following the removal of the initial foot of soil from Basin 1. During the removal of additional soil from Basin 1, over excavation of soil (3 feet vs. 1 foot) was required to achieve a solid base. This was due to inclement weather conditions and the limited workspace in the bottom of Basin 1.

  One additional foot of soil was removed from the bottom of Basin 2. One foot of additional soil was removed from three "hot spots" in the bottom of Basin 3 and 2 feet of additional soil from a hot spot in the berm.

- Process Sewer Line: To accommodate commercially available equipment, 1 foot 6 inches of soil was removed from each side of the process sewer line.

- Confirmation Sampling: Minor changes were implemented to accommodate available construction equipment (additional soil removal), utilization of definitive data for all risk calculations, and additional soil sampling.

The project team reviewed the above deviations and determined the changes to be minor since most actions were necessitated by the approved soil sampling confirmation plan and/or to assure the completeness of the remediation per the

RAOs. The soil removal/cover project did not entail any non-conforming conditions.

4.0 VERIFICATION SAMPLING, TESTING AND ANALYSIS, PERFORMANCE STANDARDS, AND CONSTRUCTION QUALITY CONTROL

The performance requirements and acceptance criteria for the remediation of SRLSBs are defined in the ROD (WSRC 1999b) and the CMI/RAIP (WSRC 1999c). The requirements and criteria are listed below:

- Removal and disposal of all PTSM greater than 1×10^{-3} industrial risk from the basins and process sewer line

- Elimination of surficial soil exposure by backfilling all four basins and by providing a well-graded vegetative cover

- Maintenance and institutional controls of the covered basins to prevent unauthorized access/exposure to residual contaminated soils less than 1×10^{-3} industrial risk.

4.1 Confirmatory Soil Screening, Sampling and Analysis

The confirmatory sampling was based on the selected remedy for the SRLSB OU as described in the approved ROD (WSRC 1999b). Section XI of the ROD states: "During the excavation process, confirmation soil sampling will be conducted in the berms and bottoms of the basins and the process sewer line trench. If the sampling reveals soils constituting risk greater than 1×10^{-3} industrial risk (principal threat source material) remaining at depths greater than anticipated, those soil areas, or "hot spots," will be excavated and disposed of off SRS." A confirmatory sampling plan was submitted to the regulators as part of the CMI/RAIP (WSRC 1999c).

For all baseline risk assessment scenarios in the approved RFI/RI/BRA/FCMS/FS (WSRC 1998), cesium-137 was the predominant risk driver, contributing over 70% of the total media risk. Actinium-228, cobalt-60, curium-243/244, plutonium-239/240, radium-228, and thorium-228 contributed the major portion of the remaining risk. The remedial goal for the SRLSB OU was the removal of material at concentrations yielding a risk value in excess of 1×10^{-3} for industrial receptors, or all PTSM. The concentration of cesium-137 at 105 pCi/g is equivalent to a risk of 1×10^{-3} for industrial receptors. Since cesium-137 contributes at least 70% of the risk, 70% of 105 pCi/g (i.e., 74 pCi/g) was established as a trigger level. Therefore, the screening trigger level for the gamma radiation detection device was established at counts per minute, yielding a cesium-137 concentration greater than 74 pCi/g. This level determined where soil was expected to have residual areas of elevated concentrations and soil samples would be taken. Gamma spectroscopy analysis was performed for all soil samples. The estimated risk due to gamma radiation was calculated for each confirmation soil sample. If the combined risk for industrial receptors for all the analytes in the sample was greater than 1×10^{-3}, the area surrounding the sample area was excavated further.

4.1.1 Process Sewer Line

The sampling approach at the process sewer line was based on the geometry of the area to be sampled, plus any existing characterization data, and was used to identify residual areas of elevated contamination concentration. The approach entailed screening soils directly underlying pipeline junctions or at locations where approximately 20 feet of pipeline had been removed. In fact, screening was performed at approximately every pipeline junction, averaging almost every 4 feet. Nine soil samples, SRLRA-42-01 through SRLRA-48-01A, SRLSA-66-01, and SRLSA-67-01, were taken from the process sewer line along with one additional sample for quality control purposes. (See Table 2 and Figure 15). None of the soil samples showed concentrations which resulted in risks above 1×10^{-3} for industrial receptors; therefore no additional soil was removed from the area beneath the process sewer line. The soil removed during pipeline excavation was placed in Basin 3.

Table 2. Process Sewer Line - Total Calculated Radiological Risk Values as Determined During Confirmation Sampling

	After 1st foot of soil removal and pipe	
Location	Sample ID	Value (E-04)
1	SRLRA-42-01	0.659033658
2	SRLRA-43-01	0.796952095
3	SRLRA-44-01	0.625140831
4	SRLRA-45-01	0.358660841
5	SRLRA-46-01	0.732975961
6	SRLRA-47-01	0.365412349
7	SRLRA-48-01	0.625116358
Duplicate	SRLRA-48-01A	0.774359118
8	SRLRA-66-01	0.813584167
9	SRLRA-67-01	0.877153199

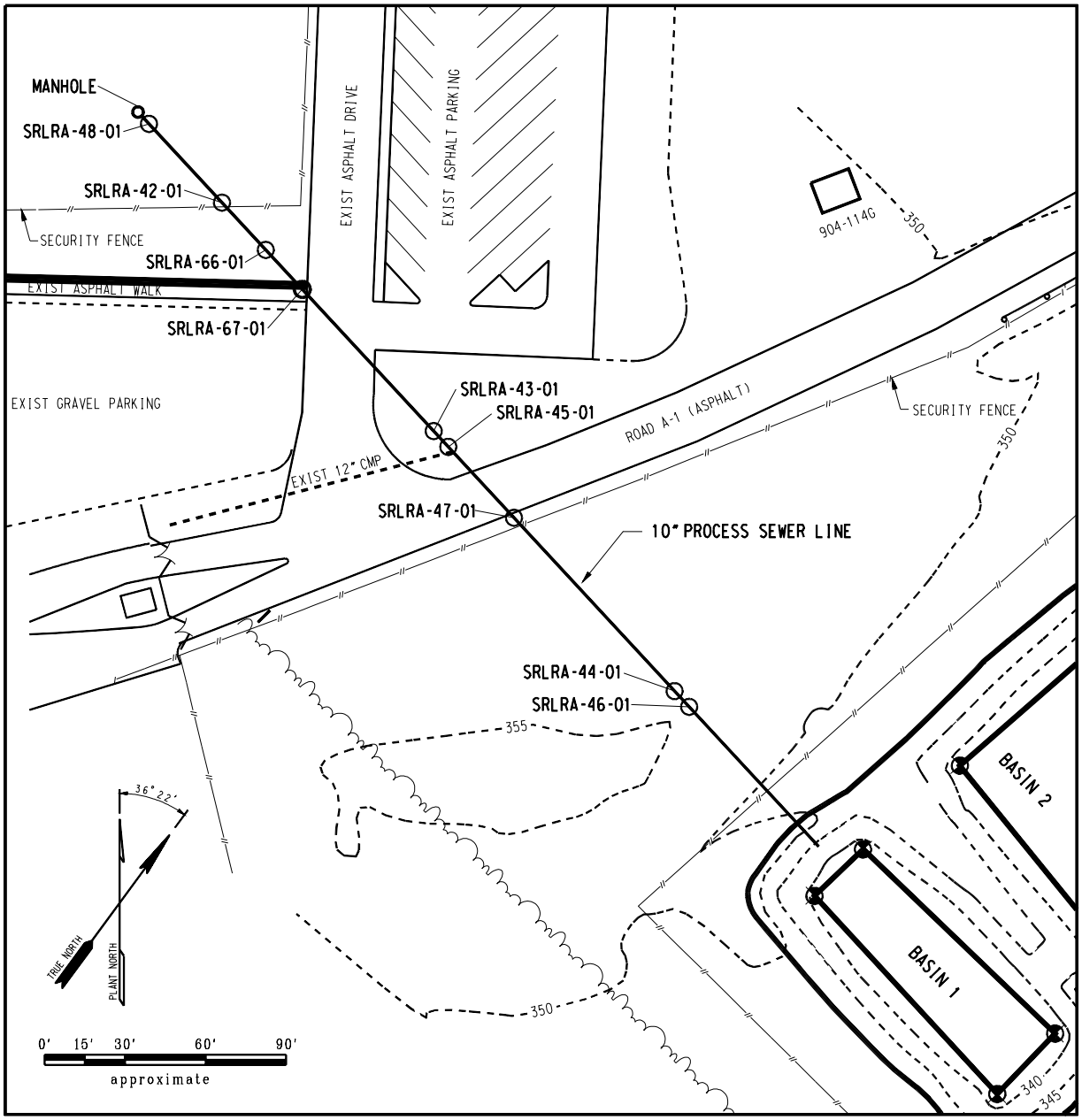


Figure 15. Process Sewer Line Soil Sampling Locations

4.1.2 Basin 1

Following the removal of the initial 1 foot of soil from the bottom and berms, Basin 1 was divided into a grid and twenty-three locations were screened (Figure 16). Locations 1, 2, 3, and 4 had elevated readings (counts per minute exceeding trigger levels), and soil samples were analyzed by gamma spectroscopy. All four soil samples, SRLRA-49-01 through SRLRA-52-01, showed concentrations whose risk values were greater than 1×10^{-3}. Additional soil was excavated from the bottom of Basin 1 based on the distribution of the sample locations and the screening data. After the removal of additional soil from the bottom of Basin 1 (approximately 3 feet), four soil samples, SRLRA-62-01 through SRLRA-65-01, were obtained at those locations where the previous high readings occurred, along with an additional quality control sample, SRLRA-65-01A. None of the second round of soil samples had concentrations whose calculated risks were above 1×10^{-3} for industrial receptors; therefore, no additional soil was removed. All of the excavated soil was placed in Basin 3. Table 3 provides a summary of the total calculated radiological risk values.

Table 3. Basin 1 - Total Calculated Radiological Risk Values as Determined During Confirmation Sampling

	After removal of 1st foot of soil		After removal of additional soil	
Location	Sample ID	Value (E-04)	Sample ID	Value (E-04)
1	SRLRA-49-01	126.2689113	SRLRA-62-01	0.613221846
2	SRLRA-50-01	159.2449444	SRLRA-63-01	0.594339638
3	SRLRA-51-01	528.9528827	SRLRA-64-01	0.764854039
4	SRLRA-52-01	211.2035356	SRLRA-65-01	5.386329156
Duplicate			SRLRA-65-01A	3.086135741

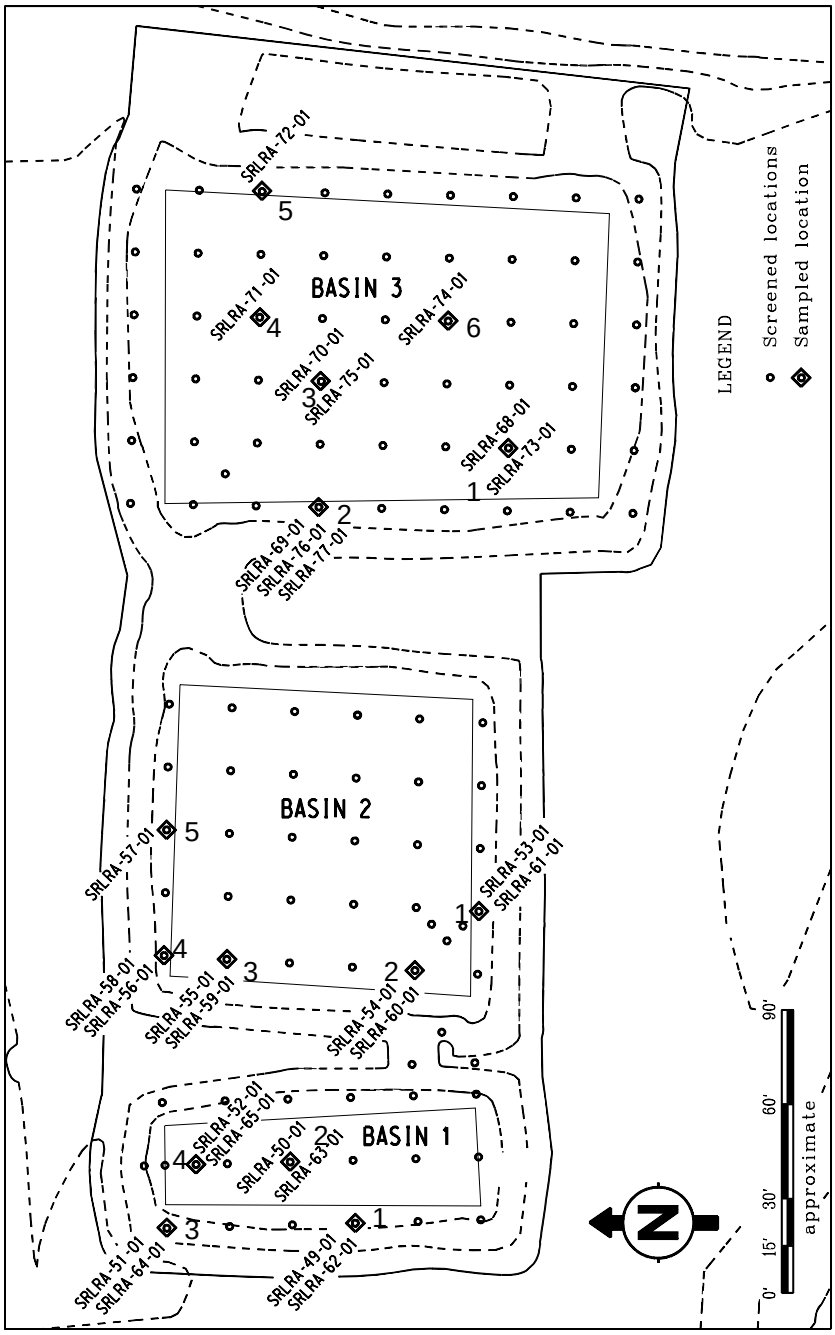


Figure 16. Basins 1, 2, and 3 Sampling Locations

4.1.3 Basin 2

After the initial 4 feet of soil had been removed from the bottom of Basin 2 and 1 foot had been removed from the berm, the basin was divided into a grid and thirty-three locations were screened with the gamma radiation detection device (Figure 16). Soil samples were taken at locations 1, 2, 3, and 4 where counts exceeding trigger levels were detected. An additional quality control sample was also obtained at location 4. All five samples, SRLRA-53-01 through SRLRA-56-01A, had concentrations that calculated risk values greater than 1×10^{-3}. Because of the overall distribution and level (counts per minute) of the screening data in the basin bottom, an additional foot of soil was excavated from the bottom of Basin 2. Table 4 shows the risk values for all sample locations.

Table 4. Basin 2 - Total Calculated Radiological Risk Values as Determined During Confirmation Sampling

Basin 2 Total Calculated Radiological Risk Values				
Location	After removal of first 4 feet of soil		After removal of an additional foot of soil	
	Sample ID	Value (E-04)	Sample ID	Value (E-04)
1	SRLRA-53-01	69.86752092	SRLRA-61-01	6.37051944
2	SRLRA-54-01	13.23754623	SRLRA-60-01	3.159242116
3	SRLRA-55-01	18.58567602	SRLRA-59-01	0.640280737
4	SRLRA-56-01	17.85327448	SRLRA-58-01	1.459188356
Duplicate	SRLRA-56-01A	16.32094205		
5			SRLRA-57-01	0.371395077

After removal of the additional foot of soil, four soil samples, SRLRA-58-01 through SRLRA-61-01, were obtained at the same locations where the previous readings were the highest. An additional quality control soil sample, SRLRA-57-01, was taken at location 5 (Figure 16) on the northern berm. None of the soil sample results showed concentrations whose calculated risks were above 1×10^{-3} for industrial receptors; therefore, no additional soil was removed. All of the excavated soil was placed in Basin 3.

4.1.4 Basin 3

All soil removed from Basin 1, Basin 2, and the SRL process sewer line was moved into Basin 3. The soil, which also included 1 foot of soil from the side slopes (berm) and the upper foot of soil from the bottom of Basin 3, was prepared for DOT shipping and classification purposes in Basin 3. Loading of the soil into the Lift-Liners™ began on August 5, 2000.

After all the soil was removed, Basin 3 was screened in the same fashion as Basin 1 and Basin 2. Fifty-five locations in Basin 3 were surveyed and screened. Five locations with elevated counts were sampled and analyzed by gamma spectroscopy (Figures 16 and 17). Of the five screening locations sampled, based on prior screening, sampling, and analytical data, sample SRLRA-70-01 at location 3 was expected to fail and require additional excavation (Table 5). Samples at locations 1, 2, 4, and 5 were expected to pass, have no remaining PTSM, and require no additional excavation (SRLRA-68-01, SRLRA-69-01, SRLRA-71-01, and SRLRA-72-01). Screening indicated that soil samples SRLRA-68-01 and SRLRA-69-01 were in the borderline range, and soil samples SRLRA-71-01 and SRLRA-72-01 were in the low range. Laboratory analysis showed soil samples SRLRA-68-01 and SRLRA-69-01 as having failed (PTSM remaining) and SRLRA-70-01, SRLRA-71-01, and SRLRA-72-01 as passing (no PTSM remaining). Because soil samples SRLRA-68-01 and SRLRA-69-01 had failed, a conservative approach was taken. The soil was removed from sample location 3, SRLRA-70-01, because screening values indicated concentrations

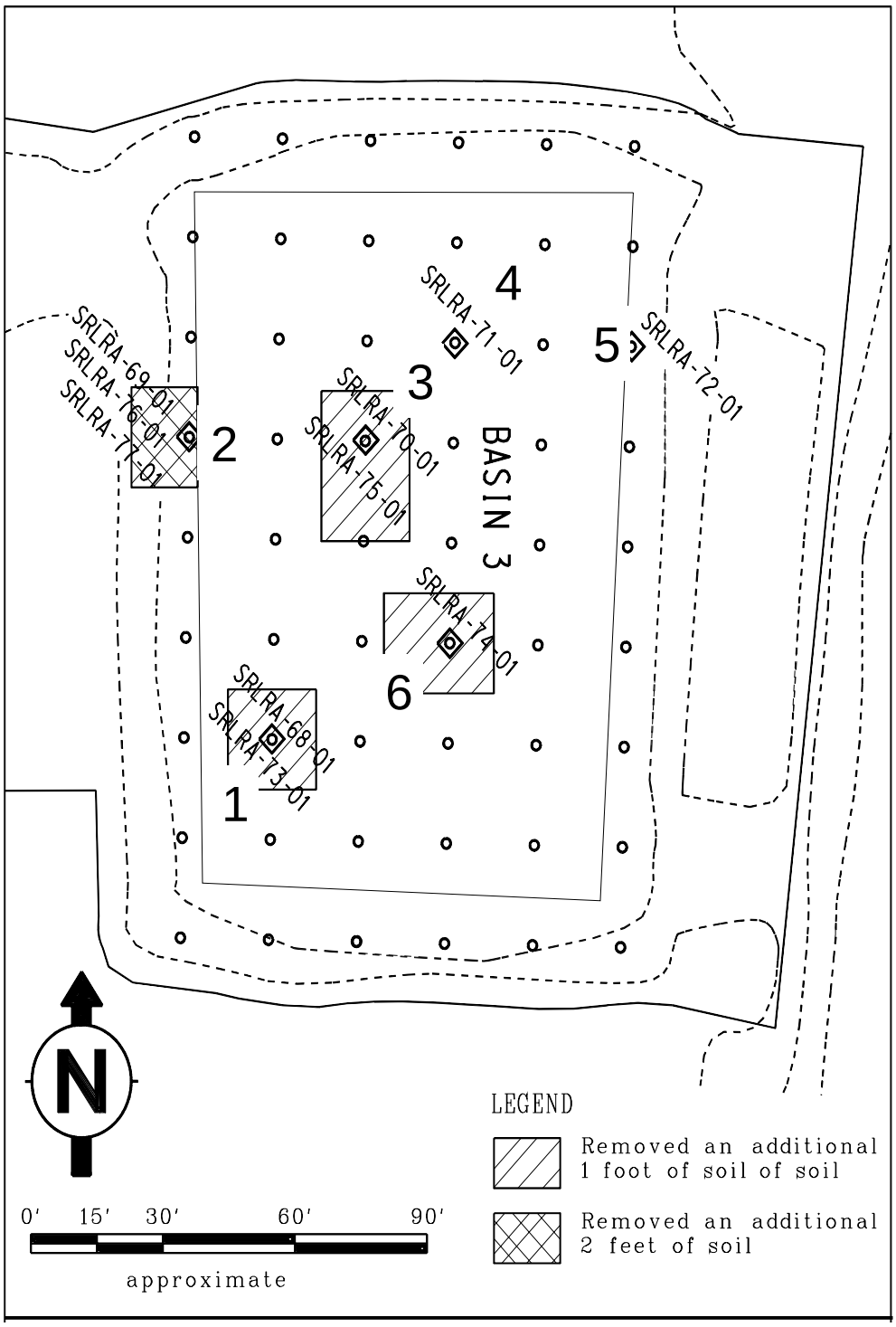


Figure 17. Basin 3 Sampling and Additional Excavation Locations

exceeding the screening trigger limit. Soil was also removed from sample location 6 because the screening values were similar to the values at locations 1 and 2. In summary, one additional foot of soil was removed from locations 1, 2, 3, and 6.

After removal of one additional foot of soil from locations 1, 2, 3, and 6, a confirmatory soil sample was obtained from each of the removal areas (SRLRA-73-01 through SRLRA-76-01). The confirmatory soil sample from the side slope near the basin inlet (location 2, Figure 17) had calculated risks above 1×10^{-3} for industrial receptors and additional soil was removed.

After removal of the additional soil from location 2, another confirmatory soil sample, SRLRA-77-01, was obtained. The results from that sample revealed soil concentrations with combined calculated risks less than 1×10^{-3} for industrial receptors so no additional soil was removed.

Table 5. Basin 3 - Total Calculated Radiological Risk Values as Determined During Confirmation Sampling

Location	After first foot of soil removal		2nd removal 1 foot of soil from 4 locations		3rd removal action location 2	
	Sample ID	Value (E-04)	Sample ID	Value (E-04)	Sample ID	Value (E-04)
1	SRLRA-68-01	20.55312393	SRLRA-73-01	0.581634094		
2	SRLRA-69-01	38.02463937	SRLRA-76-01	16.35307371	SRLRA-77-01	0.491117654
3	SRLRA-70-01	0.755420006	SRLRA-75-01	0.390864857		
4	SRLRA-71-01	0.729957639				
5	SRLRA-72-01	0.574882588				
6			SRLRA-74-01	0.434658244		
Duplicate			SRLRA-74-01A	0.557228811		

4.2 Quality Control Inspections

All backfill operations conformed to the requirements and acceptance criteria per the design specifications. The backfill materials were obtained from designated SRS borrow areas. Prior to use, the adequacy of the backfill material from the borrow area was verified by testing per applicable American Society of Testing and Materials (ASTM) requirements. Backfilling of the excavated areas did not begin until all soils exceeding the 1×10^{-3} industrial worker health-risk level were removed in accordance with the remedial action confirmatory sampling requirements. Backfilling was performed in accordance with the following requirements:

- The common backfill was placed in layers compacted to a minimum of 95% minimum dry density in accordance with ASTM D698, Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort.

- The vegetative layer consists of a nominal thickness of 6 inches, 50% (±10%) topsoil and 50% (±10%) common backfill material.

- The vegetative layer was seeded with locally adapted perennial grasses at sufficient density to minimize soil erosion.

- The final surface of the soil fill system has a minimum slope of 3%, and no greater than 5%.

- Final side slopes of the soil cover system are not steeper than 4:1 for minimum soil erosion and easy access by maintenance equipment.

The soils were placed in 9- to 12-inch lifts, compacted, and tested. Quality control testing was performed and documented for the soils placed throughout the project in accordance with project specifications. The soil was tested for gradation, moisture content, in-place density, and plasticity index. Areas that did not meet the project specifications were reworked and retested until the criteria were met. Once backfilling, compacting, and grading were completed, topsoil was placed

and a satisfactory stand of perennial grass cover, suitable for local weather conditions, was established. The as-built configuration of the soil cover is included in Attachment A. The cover system was completed in accordance with the design requirements and met all acceptance requirements.

5.0 FINAL INSPECTION AND CERTIFICATION OF OU CLOSURE

5.1 Certification of SRLSB Closure – Achievement of Remedial Action Objectives

The selected RAOs and components of the corrective measure/remedial action (see Section 1.3) are documented in the ROD (WSRC 1999b). The acceptance criteria for the various components of the remedial action (eliminating or removing all PTSM and eliminating surficial soil exposure) were developed based on the functional requirements/objectives for those components. These criteria, as well as the detailed field implementation plan, are reported in the approved CMI/RAIP (WSRC 1999c). If the implementation plan is executed in a manner that meets the acceptance criteria, the remedial action will reduce the risks to the potential future worker or resident. Carcinogenic risks include exposure from direct radiation, ingestion of soil, and ingestion of produce grown in the soil of basin bottoms and berms, which are contaminated with radionuclides. Non-carcinogenic risks are driven primarily by ingestion of Basin 1 soils contaminated with chromium and mercury.

Field implementation of the remedial action was performed in accordance with the aforementioned CMI/RAIP, which was strategically developed for the successful accomplishment of the RAOs. Pertinent sections of this CMIR/PCR/FRR summarize the field implementation process. As stated in Section 4.0, the results of the inspections and verification sampling, analysis, and testing of the components to this remedial action implementation process indicate that the results satisfactorily met or exceeded the established acceptance criteria. Those results also indicate that any observed deviations from the original design had no significant adverse effect on the functional quality and integrity of the closed unit. The results of the analytical sampling and testing have been

documented and the records are on file at SRS ERD Document Control in the SRL Seepage Basins Project File.

The records include soil test results (gradation, moisture, and compaction), estimated risk calculations for confirmatory sampling, and confirmation sampling analytical data validation results. The project file also contains the shipping records including the waste manifest, bill of lading, container and waste description, a QA checklist for shipment, and Envirocare's acceptance of the waste.

The project was executed under the direction of an SRS Person-In-Charge/Subcontract Technical Representative who was regularly assisted by the project team, which consisted of representatives from various SRS-Environmental Restoration Division (ERD) functional areas including engineering, construction, QA, regulatory compliance, safety, waste management, and project management. The project team performed regular reviews of test results and conducted field observations of the subcontractor's work throughout the project. The reviews and the rationale stated above provides verification that the SRLSB remedial action was conducted within the project specifications and has achieved the performance goals and RAOs as stated in the ROD. The RAOs listed in the ROD are as follows:

- Eliminate exposure of the future industrial worker to radiochemical, mercury and chromium contamination in the surface soils of Basins 1, 2, 3, and 4.

- Remove all PTSM from Basins 1, 2, and 3.

- Reduce risk to soil invertebrates from ingestion of chromium in the surface soils of Basin 1.

5.2 Final Inspection for Acceptance of SRLSB Closure

The SRLSB project was completed on May 15, 2001, in accordance with the performance requirements and project specifications. A final joint walkdown was

performed on July 10, 2001. This final walkdown included representatives from the USDOE (T. Johnson and R. Rimando), USEPA [K. Feely and K. Davis (Parallax, Inc.)], SCDHEC (C. Gorman, H. Cathcart, A. Coffey, B. Corder, K. Long, T. Millings, and G. Simones), and SRLSB Project Team (R. Socha, WSRC and S. McFalls, WSRC). One minor finding was noted which was to add additional identification (warning) signs around the unit. The minor item has been corrected as shown in Attachment 2 of Appendix A.

Based on the aforementioned walkdown and the successful achievement of the RAOs, it is concluded that the SRLSB closure has been completed satisfactorily in accordance with the requirements of the SRLSB ROD. In accordance with the ROD, applicable post-closure activities (e.g., land use control, 5-year ROD reviews, etc.) will be performed as described in Section 7.0 of this CMIR/PCR/FRR.

6.0 AS-BUILT DRAWINGS

The following SRLSB as-built drawings are included in Attachment A of this document.

- SK-C-5387: SRLSB Remediation, Soil and Process Line Removal, Excavation As-Built, Plan View (U)
- SK-C-5388: SRLSB Remediation Grading Plan As-Built (U)
- SK-C-5389: SRLSB Remediation Sections and Details (U)

7.0 POST-CONSTRUCTION ACTIVITIES

In accordance with the SRS Land-Use Control Assurance Plan (LUCAP) (WSRC 1999a), a unit-specific SRLSB LUCIP was developed and is provided in Appendix A. The plan identifies the area that will be under restriction (via a survey plat certified by a professional land surveyor), each land use control objective for the waste unit (e.g., prohibit residential use, etc.), and the specific

controls and mechanisms required to achieve each identified objective. No operational processes are required for this remedial action. The plan will be implemented by SRS ERD Operations and includes inspection, repair, and institutional controls.

7.1 Maintenance and Institutional Control of the Soil Cover

The SRS ERD Operations Department will assume custodianship of the SRLSB soil cover after the CMIR/PCR/FRR has been approved and will begin regular annual maintenance inspections at that time. Using a formal inspection process, trained personnel perform routine inspections to assess the condition of the soil cover. Maintenance of the soil cover (e.g., repair as a result of erosion, subsidence, burrowing animals, vehicular activity, etc.) will be coordinated by ERD Operations. ERD Operations will also continue inspections and maintenance as required by the SMSRP for the SRLSB until permanent vegetation is established.

The backfilled basins will be maintained in accordance with the inspection sheet for the SRLSB found in the LUCIP (Appendix A). The plan will be implemented by SRS ERD Operations and includes the following actions:

Inspection - ERD Operations will perform annual visual inspections for evidence of erosion. Inspection records will be kept in the operations record file for future access.

Repair - ERD Operations will repair erosion damage and maintain the warning signs at the unit.

Institutional controls – ERD Operations will enforce SRS institutional controls through maintenance and inspection of the SRLSB unit.

7.2 5-Year ROD Reviews

Section 300.430(f)(4)(ii) of the National Oil and Hazardous Substances Contingency Plan (NCP) requires that a 5-year remedy review of the ROD be performed if the hazardous substances, pollutants, and contaminants above levels that allow for unlimited use and unrestricted exposure remain in the OU. The three Parties, USDOE, USEPA, and SCDHEC, have determined that a 5-year review of the ROD for the SRLSB OU will be performed to ensure the continued protection of human health and the environment.

8.0 PROJECT COSTS

Table 6 below compares the summary of actual remedial action project costs to the original remedial action cost estimate.

The remedial action costs were 57.3% higher than the original estimate in the ROD. Approximately half of the increase in cost was related to the 48% increase in the volume of soil removal required by confirmation sampling. The additional soil removal resulted in additional confirmation sampling and analysis, additional backfill, additional material packaging, and transportation cost. The remainder of the cost increases can be attributed to the change in contractors and the cost of rail transportation to Envirocare was under estimated.

Table 6. Remedial Action Cost Estimated Vs. Actual

	Original Cost (ROD)			Remedial Action Cost Actual		
Item	Units	Qty	Total Cost ($1000)	Units	Qty	Total Cost ($1000)
Direct Capital Cost						
Site Work						
Work Plan	LS	1	$ 20	LS	1	$ 31
Mob/Demob	LS	1	15	LS	1	33
Equipment Decon	LS	1	5	LS	1	118
Decontamination Pad	Basin	3	23	Basin	3	0
Excavate and Load	m^3	3,207	105	m^3	4,750	316
Confirmation Analysis	30 m^3	107	17	30 m^3	107	140
Rail Transportation	m^3	3,207	436	m^3	4,750	1,061
Waste Acceptance Criteria Analysis	m^3	3,207	42	m^3	4,750	0
Rail Packaging & Disposal	m^3	3,207	1,219	m^3	4,750	1,668
Backfill Cover	m^3	45,846	264	m^3	47,449	799
Vegetative Layer	m^3	10,000	25	m^3	10,000	67
			2,171			4,233
Indirect Capital Cost Health & Safety, Insurance, Overhead (60% of Direct Capital Cost)			1,303			1,277
Total Capital Cost			3,474			5,510
Institutional Controls			80			*80
Total Cost			$ 3,554			$5,590 *estimated
Difference between total remedial action cost and ROD estimate				$2,036,000 or 57.3%		

9.0 REFERENCES

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

WSRC, 1998. *RCRA Facility Investigation/Remedial Investigation/Baseline Risk Assessment and Focused Corrective Measures Study/Feasibility Study for the SRL Seepage Basins Operable Unit (904-53G, -54G, and –55G) (U)*, WSRC-RP-97-846, Rev. 1.1, Westinghouse Savannah River Company, Aiken, South Carolina, September.

WSRC, 1999a. *Land Use Control Assurance Plan for the Savannah River Site*, WSRC-RP-98-4125, Rev. 1.1, Westinghouse Savannah River Company, Aiken, South Carolina, August.

WSRC, 1999b. *Record of Decision, Remedial Alternative Selection for the SRL Seepage Basins Operable Unit (904-53G1, -53G2, -54G and –55G) (U)*, WSRC-RP-97-848, Rev. 1.1, Westinghouse Savannah River Company, Aiken, South Carolina, October.

WSRC, 1999c. *Corrective Measures Implementation/Remedial Action Implementation Plan for Closure of SRL Seepage Basins Operable Unit (904-53G1, -53G2, -54G and –55G) (U)*, WSRC-RP-99-04026, Rev. 1, Westinghouse Savannah River Company, Aiken, South Carolina, October.

WSRC, 1999d. Stormwater Management and Sediment Reduction Plan/Pollution Prevention Plan SRL Seepage Basins Remediation (U), Rev 0, C-ERP-A-00005, Westinghouse Savannah River Company, Aiken, South Carolina, August.

WSRC, 2000a. SRL Seepage Basins: Remedial Action Confirmatory Sampling (U), ERD-EN-99-0022, Rev. 1, Westinghouse Savannah River Company, Aiken, South Carolina, July.

WSRC, 2000b. SRL Seepage Basins Remedial Action Confirmatory Sampling Summary Report, ERD-EN-2000-0108, Rev. 0, Westinghouse Savannah River Company, Aiken, South Carolina, October.

10.0 APPENDICES

10.1 Appendix A – Unit-Specific LUCIP for SRL Seepage Basins Including SRLSB Survey Plat

10.2 Appendix B - Copy of DOE-SRS Correspondence Establishing Remedial Action Start Date

10.3 Appendix C - Copy of Certificate of Disposal

11.0 ATTACHMENTS

11.1 Attachment A – As-built Drawings

APPENDIX A
UNIT-SPECIFIC LAND USE CONTROL IMPLEMENTATION PLAN FOR SRL SEEPAGE BASINS INCLUDING SRLSB SURVEY PLAT

The SRL Seepage Basin (SRLSB) Land Use Control Implementation Plan (LUCIP) will be appended to the Savannah River Site (SRS) Land Use Control Assurance Plan (LUCAP). SRS is responsible for implementing the land use controls (LUCs) (e.g., inspections, maintenance, etc.) outlined in this unit-specific LUCIP.

1.0 REMEDY SELECTION

The SRLSB unit consists of four unlined basins that received low-level radioactive wastewater from SRL until 1982. Basins 1 and 2 were placed in operation in 1954, and Basins 3 and 4 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 Buildings 735-A and 773-A. Waste was transferred from the laboratories to the basins via a 900-foot long, 10-inch diameter, clay, process sewer line pipe.

Characterization of the SRLSB revealed that the highest concentrations of contaminants and the contaminants with the highest potential risk were primarily restricted to surface and subsurface soils within the unit. It was determined that the SRLSB does not represent a source of contamination to groundwater.

The remedy for the SRLSB was excavation and off-SRS disposal of all principal threat source material, soil above the 1×10^{-3} industrial worker health risk level. The remedy entailed the following actions:

a) Excavation of approximately 4 feet of soil from the bottom and 1 foot of soil from the berms of Basin 1

b) Excavation of approximately 5 feet of soil from the bottom and approximately 1 foot from the berms of Basin 2

c) Excavation of approximately 1 foot from the bottom and berms of Basin 3

d) No soil was removed from Basin 4

e) Removal of the process sewer pipeline and associated soils from Basin 1 to the first manhole

f) Backfill of all four basins and the process sewer trench with clean soil. The soil cover was then vegetated to prevent erosion. The depth of the clean soil is nominally between 9 to 19 feet

g) Transportation and disposal of all excavated soil and the pipeline to Envirocare of Utah, Inc., an approved, licensed, off-SRS low-level waste disposal facility

According to the *Savannah River Site Future Use Project Report* (USDOE 1996), "residential uses of SRS land should be prohibited". The Conceptual Site Model (CSM), Figure A-1, was revised to reflect the implementation of the remedy. Since it shows some remaining residual risk that would preclude unrestricted land use, LUCs are needed to maintain the future land use (industrial) and to ensure continued protection of human health and the environment. The LUCs were developed based on there being some residual risk remaining and that the residual risk is located 10 to 14 feet below the final grade.

2.0 LAND USE CONTROLS

For SRLSB, the LUC objective necessary to ensure protectiveness of the remedy is:

> Controlled access to the SRLSB unit in accordance with the current site use/site clearance programs, including signs posted in the area to indicate that soil beneath the unit has been contaminated with radionuclides

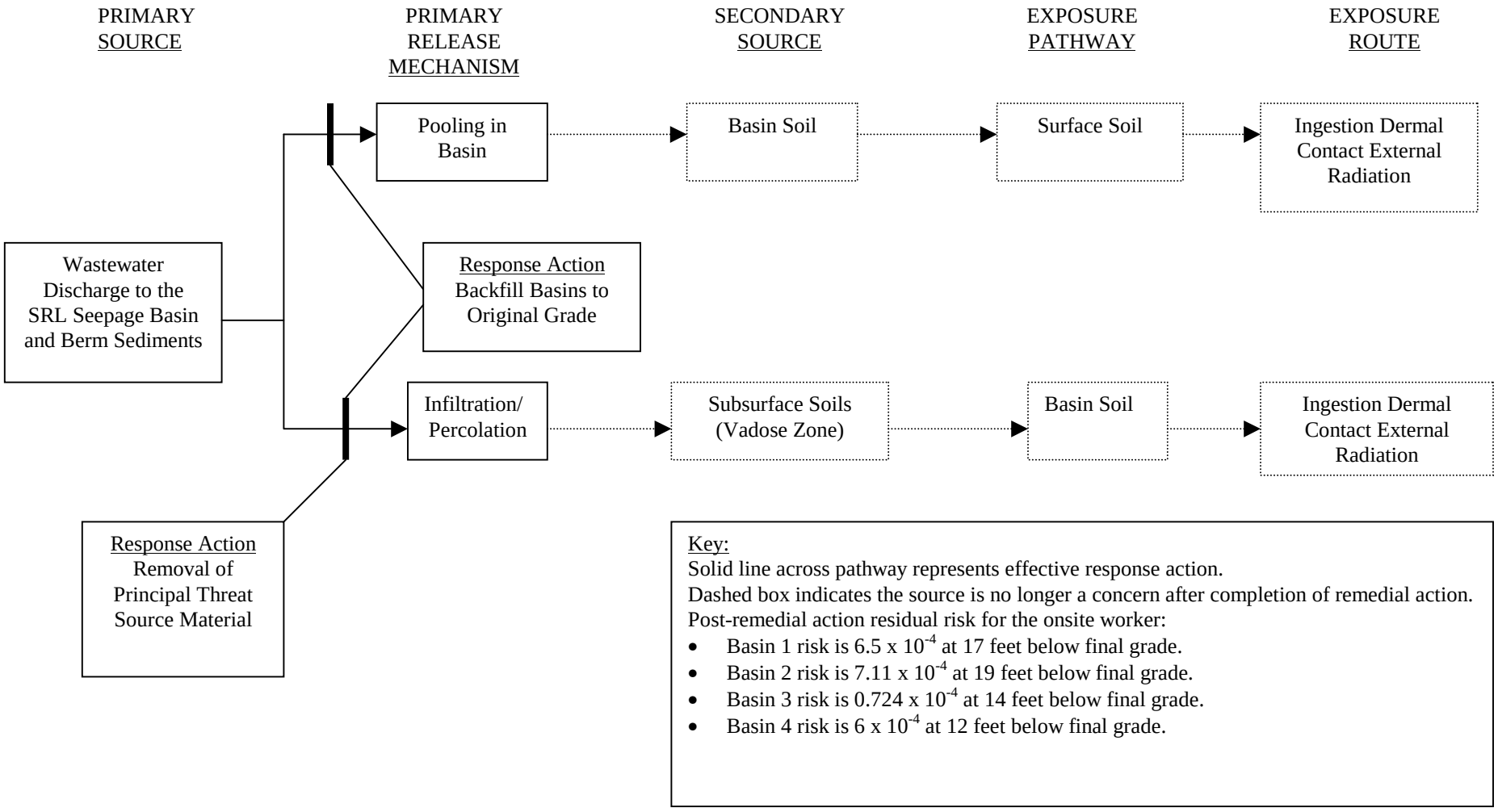


Figure A-1. Conceptual Site Model for the SRL Seepage Basin

The elements of the institutional control corrective action, which consists of land restrictions without any engineering controls, are composed of deed notifications when the parcel is transferred from federal ownership (Section 2.1), access controls that include posting of identification signs (Section 2.2), and field walkdowns for general site conditions (Section 2.3). These LUCs will be implemented in perpetuity for this operable unit.

Each element of the institutional controls corrective action is discussed below.

2.1 Deed Notification

A deed notification shall be filed in the appropriate county records in accordance with CERCLA 120(h), which requires the government to create a deed when land on which any hazardous substance was stored, released, or disposed is transferred to non-federal ownership. In the event the property is transferred, a deed notification will be filed with Aiken County. Per CERCLA 120(h)(3)(A), the deed shall contain, to the extent practical, such information as is available based on the complete search of agency files, including the following:

- A notice of the type and quantity of such hazardous substances;
- Notice of the time at which such storage, release, or disposal took place;
- A description of the remedial action taken, if any.

Per CERCLA 120(h)(3)(B), the deed shall also contain a covenant warranting that

- All remedial action necessary to protect human health and the environment with respect to any such substance remaining on the property has been taken before the date of such transfer.
- Any additional remedial action found to be necessary after the date of such transfer shall be conducted by the United States Government.

- A clause granting the United States Government access to the property in any case in which remedial action or corrective action is found to be necessary after the date of such transfer.

RCRA permit requirements are applicable for this waste unit per the SRS Federal Facility Agreement, Appendix C.

2.2 Access Controls

2.2.1 On-Site Workers

In accordance with WSRC 1D, *Site Infrastructure and Services Manual*, Procedure 3.02, *Site Real Property Configuration Control*, use of all lands and waters on the SRS shall be coordinated via the Site Use Program. No use of land (i.e., excavation or any other land use) shall be undertaken without prior approval documented by a Site Use Permit. Also, in accordance with Procedure 3.02, all work at SRS that adds to or modifies features or facilities portrayed on the SRS development maps (i.e., plot plans of facilities/utilities at SRS) is authorized by a Site Clearance Permit before any excavation activities. All Site Clearance requests are reviewed to verify that either an approved Site Use Permit has been obtained or that an existing Site Use Permit has sanctioned the request. Verification of USDOE approval for intended land use must be obtained before issuance of a Site Clearance Permit. The Site Use and Site Clearance processes are applicable to all activities and personnel on site (including subcontractors). The processes are controlled within the SRS Quality Assurance Program.

The SRS identifies all buildings and facilities on maps used in the Site Use/Site Clearance Program and includes a 200-foot buffer zone around each facility. This waste unit is identified on these maps as a CERCLA facility.

Any work proposed in these areas will be strictly controlled and workers will be appropriately trained and briefed about health and safety requirements if work is deemed necessary for maintenance. Any changes in the use or disturbance of the SRLSB will be cleared with the USEPA and SCDHEC before disturbance occurs.

To prevent unknowing entry and to ensure that unrestricted use of the waste unit does not occur while under ownership of the government, identification signs will be posted at the unit. The signs will be legible from a distance of at least 25 feet and located around the basin as shown on the SRLSB Remediation Grading Plan As-Built (U) (SK-C-5388, Attachment 2 of this LUCIP). Also provided in this LUCIP is the SRLSB Survey Plat (Attachment 3) which shows only the boundary signs.

The signs will read:

> SRL Seepage Basins (904-53G (1&2), -54G, and -55G)
> "Danger – Unauthorized Personnel Keep Out. This unit was used to manage hazardous substances. Do not dig or excavate. Do not enter without contacting the waste site custodian."
> Custodian: Manager, Post Closure Maintenance
> Phone: (803) 952-6882

2.2.2 Trespassers

Additionally, while under the ownership of the USDOE, access control of the entire SRS will continue to be maintained in accordance with the 1992 RCRA Part B Permit Renewal Application, Volume I, Section F.1. This section describes the 24-hour surveillance system (R.61-79.264.14(b)(1)), artificial or natural barriers (R.61-79.264.14(b)(2)(i)), control entry systems (R.61-79.264.14(b)(2)(ii)), and warning signs (R.61-79.264.14(c)) in place at the SRS boundary to comply with the security requirements for a RCRA-permitted facility.

2.3 Field Walkdowns and Maintenance for Institutional Controls

Monitoring will be performed to verify that LUCIP requirements are being met. Based on the amount of fill placed (9 to 19 feet), that the basins (holes) have been backfilled with clean soils, and the surrounding area being virgin, wooded and well established, once vegetation is established on the backfilled basins, erosion to depths that would expose the residual is not expected. Based on this, annual monitoring of the SRLSB OU will be conducted. These inspections will look for items such as accuracy and legibility of signs, visible subsidence or erosion of the

waste unit, proper vegetative growth, etc. Subsidence or erosion will be corrected by backfilling the affected area with clean soil and seeding the area to prevent further erosion. The results of any events and/or action that could indicate some potential compromise of institutional controls will be documented in the Federal Facility Agreement Annual Progress Report. All other routine maintenance activities will be documented and maintained in files that are subject to USEPA and SCDHEC review and audit. A copy of the completed inspection form is maintained in the Environmental Restoration Division administrative record files.

Inspections at the SRLSB will be performed to ensure that institutional controls remain protective and consistent with all remedial action objectives. Annual inspections will be conducted. The SRL Seepage Basins (904-53G (1 & 2), -54G, and -55G) Inspection Sheet is included in Attachment 1 of this LUCIP.

ATTACHMENT 1
SRL SEEPAGE BASINS INSPECTION SHEET
SRL SEEPAGE BASINS (904-53G (1 & 2), -54G, and -55G) INSPECTION SHEET

A = Satisfactory **X = Unsatisfactory (Comments required)**	**A or X**	**Comments of Corrective Action Taken (See Maintenance Register for Corrected Items)**
Check for potential encroachments (Ensure that there is no building on the site).		
Does the site have brush or woody vegetation that needs cutting and disposal?		
Does the site need to have the grass cut?		
Verify that the roads are accessible.		
Verify that the waste unit's signs are correct and legible.		
Does the site show signs of erosion or subsidence? Are there any signs of burrowing animals (holes)?		
Does the site have adequate vegetative cover?		
Check the integrity of drainage ditches (around the area) for the presence of excessive erosion, sediment buildup, and any debris restricting water flow.		
Does the site need general cleanup (housekeeping)?		

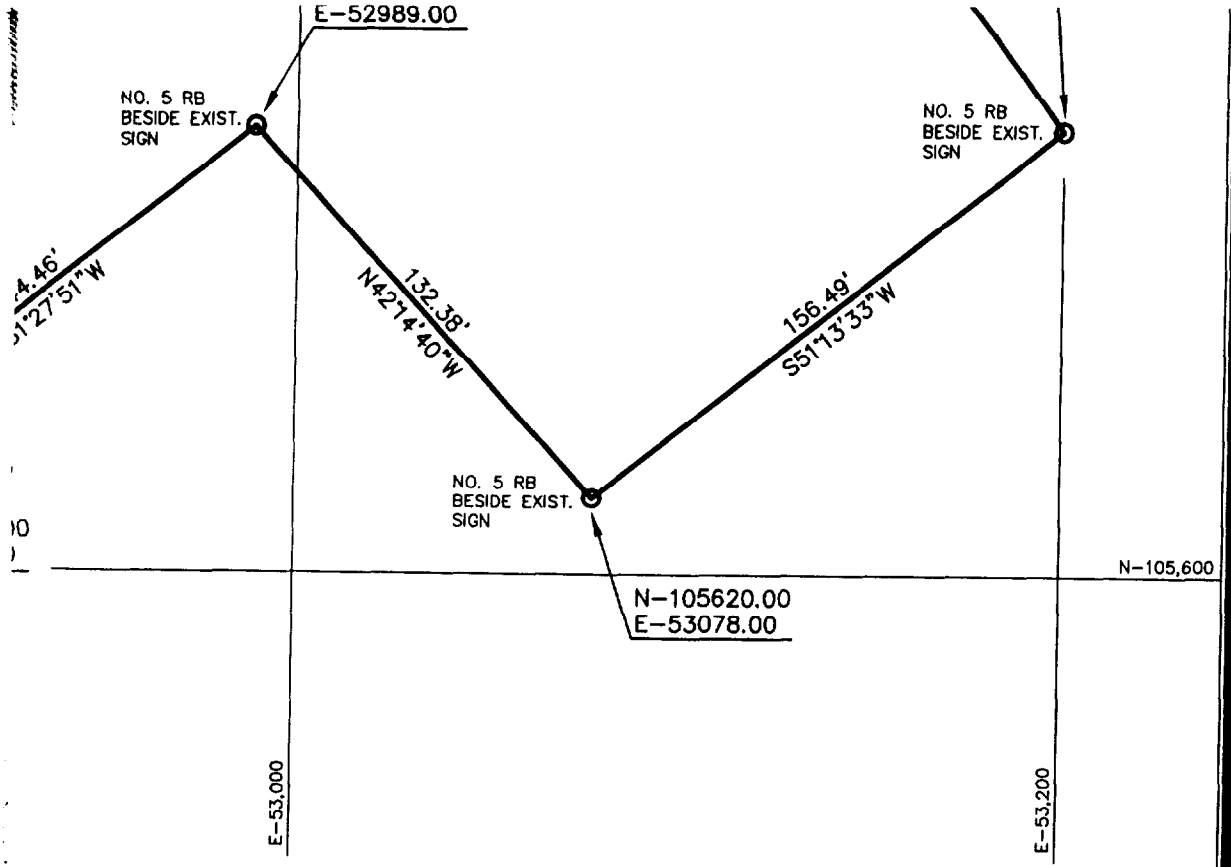
Inspected By:_____/_____Date/Time:_____/____
(Print Name) (Signature)

Post Closure Manager:_____/_____Date/Time:_____/____
(Print Name) (Signature)

Note: USEPA and SCDHEC must be notified within 30 days of identification of any area where any breach or compromise of restrictions place on this institutional control operable unit has occurred

ATTACHMENT 2

ATTACHMENT 3



BOUNDARY SURVEY

OF

SRL SEEPAGE BASIN AREA

PROPERTY LOCATED AT SAVANNAH RIVER SITE

PREPARED FOR

ESTINGHOUSE SAVANNAH RIVER COMPANY

BUILDING 730-2B RM. 3007 AIKEN, S. C. 29808
C/O MARK CRIST (803)952-6021

OF: AIKEN STATE OF: S. CAROLINA

SCALE: 1" = 50' DWN. BY: JMB DATE: 25 JULY 2001

PREPARED BY

John M. Bailey & Associates, P.C.

PROFESSIONAL LAND SURVEYORS
110 WILDE DRIVE, BELVEDERE, S.C. 29841
(803)278-0721

Attachment 3
SRLSB Survey Plat

APPENDIX B

COPY OF DOE-SRS CORRESPONDENCE ESTABLISHING REMEDIAL ACTION START DATE

Department of Energy
Savannah River Operations Office
P.O. Box A
Aiken, South Carolina 29802

DEC 27 1999

Mr. K. A. Collinsworth, Manager
Federal Facility Agreement Section
Division of Site Assessment and Remediation
Bureau of Land and Waste Management
South Carolina Department of Health and Environmental Control
2600 Bull Street
Columbia, SC 29201

Mr. K. B. Feely
Savannah River Site Remedial Project Manager
Waste Management Division
United States Environmental Protection Agency, Region IV
61 Forsyth Street, SW
Atlanta, GA 30303

Dear Mr. Collinsworth and Mr. Feely:

SUBJECT: Submittal of the Remedial Action Start Date for the SRL Seepage Basins (904-53G1, -53G2, -54G, and -55G)

This letter is written to inform the United States Environmental Protection Agency and the South Carolina Department of Health and Environmental Control that the remedial action start for the Basins (904-53G1, -53G2, -54G, and -55G) began on December 8, 1999. This start represents a 14-month acceleration of the remedial action start date in the Federal Facility Agreement. The construction and post-construction activities will be performed in accordance with the approved Corrective Measures Implementation/Remedial Action Implementation Plan for Closure of SRL Seepage Basins Operable Unit (904-53G1, -53G2, -54G, and -55G) (WSRC-RP-99-04026, Revision.1, October 1999).

Questions from you or your staff may be directed to me at (803) 725-7032.

Sincerely,

Brian T. Hennessey
SRS Remedial Project Manager
Environmental Restoration Division

BTH/SLM:sm
OD-00-141

c: A. B. Gould, US DOE-ECD, 703-A
C. V. Anderson, US DOE-ERD, 703-A
C. B. Warren, US EPA-IV
J. L. Corkran, US EPA-IV
J. K. Cresswell, SCDHEC-Columbia
J. T. Litton, SCDHEC-Columbia
M. D. Sherritt, SCDHEC-Columbia
G. K. Taylor, SCDHEC-Columbia
Administrative Record File, 730-2B, Room 1000

APPENDIX C

COPY OF CERTIFICATE OF DISPOSAL

Certificate of Disposal

Envirocare of Utah, Inc.

US Department of Energy
Savannah River Site

This Certificate Acknowledges That The Following Manifested Shipments:

8011-01-0001 through 8011-01-0098

Representing 166,725 Cubic Feet of Low-Level Radioactive Waste
Have Been Permanently Disposed
In Accordance with Envirocare's Radioactive Material License.

Tye Rogers

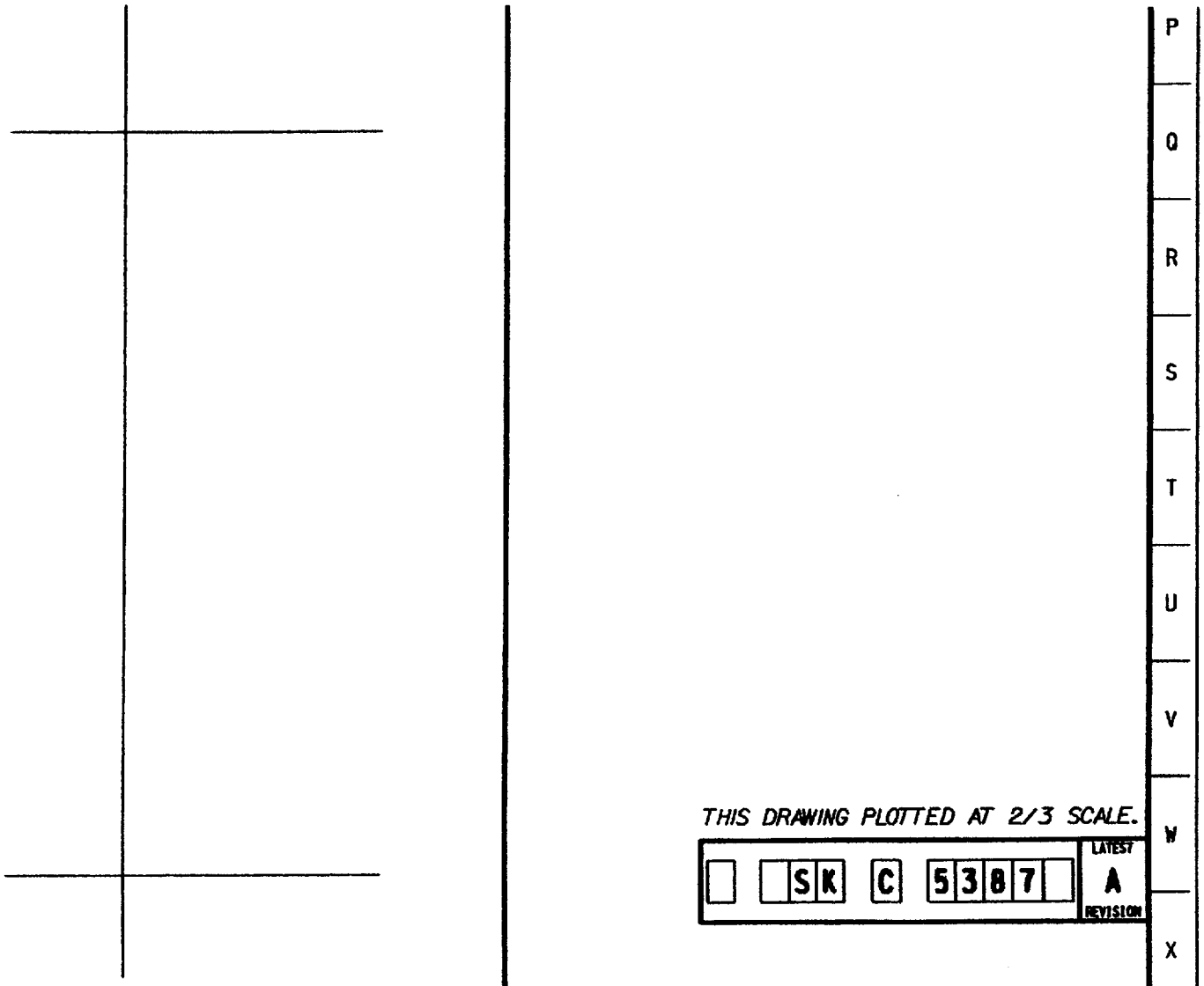
Signature

November 28, 2000

Date

ATTACHMENT A

AS-BUILT DRAWINGS



THIS DRAWING PLOTTED AT 2/3 SCALE.

SK C 5387 — LATEST REVISION A

REFERENCE DRAWINGS	
X-C-5388	GRADING PLAN
X-C-5389	SECTIONS AND DETAILS

REFERENCE STANDARDS

UNITED STATES DEPARTMENT OF ENERGY

SAVANNAH RIVER SITE

BLDG. NO.	SITE CLEARANCE NO.	DESIGN AREA NO.	DESIGN GROUP
904-53,54 & 55G			PE&CD/ER

TITLE

SRL SEEPAGE BASINS REMEDIATION

SOIL AND PROSESS LINE REMOVAL EXCAVATION AS-BUILT

PLAN VIEW (U)

SCALE	SRP DRAWING NO.	SHEET NO.	LATEST REVISION
1" = 30'	SK-C-5387	1 OF 1	A

555556 66
567890 23

PSC= DRAWN BY (ORIG):
PLOT DATE 08/08/01 TIME

LAST CADD REV. BY: R.WILLIAMS
DATE: 08/08/01

Scale shown on this drawing is only applicable when plotted at 30"x42" (actual drawing size)

SRLSB Remediation, Soil and Process Line Removal, Excavation As-Built, Plan View (SK-C-5387)

NUMBER	NORTH	EAST
1	105606	52592
2	105672	52659
3	105735	52725
4	105801	52793
5	105859	52867
6	105911	52941
7	105962	53016
8	105876	53079
9	105799	53138
10	105718	53200
11	105671	53138
12	105620	53078
13	105718	52989
14	105628	52876
15	105655	52848
16	105569	52761
17	105504	52688
18	105553	52639

(TYP @ BOTH ENDS)

THIS DRAWING PLOTTED AT 2/3 SCALE.

SK C 5388 — LATEST REVISION: A

REFERENCE DRAWINGS

R-C-5387	PLAN VIEW
R-C-5389	SECTIONS AND DETAILS

REFERENCE STANDARDS

UNITED STATES DEPARTMENT OF ENERGY

SAVANNAH RIVER SITE

BLDG. NO.	SITE CLEARANCE NO.	DESIGN AREA NO.	DESIGN GROUP
904-53,54 & 55G			PE&CD/ER

TITLE

SRL SEEPAGE BASINS REMEDIATION

GRADING PLAN AS-BUILT (U)

SCALE	SHP DRAWING NO.	SHEET NO.	LATEST REVISION
1" = 30'	SK-C-5388	1 OF 1	A

PSC- DRAWN BY (ORIG): LAST CADD REV. BY: R.WILLIAMS
PLOT DATE 08/08/01 TIME DATE: 08/08/01

Scale shown on this drawing is only applicable when plotted at 30"x42" (actual drawing size)

Attachment 2
SRLSB Remediation Grading Plan As-Built (U) (SK-C-5388)

008319

P
Q
R
S
T
U
V
W
X
Y

THIS DRAWING PLOTTED AT 2/3 SCALE.

									LATEST REVISION
		S	K	C	5	3	8	9	A

REFERENCE DRAWINGS

-5387	PLAN VIEW
-5388	GRADING PLAN

REFERENCE STANDARDS

UNITED STATES DEPARTMENT OF ENERGY

SAVANNAH RIVER SITE

BLDG. NO.	SITE CLEARANCE NO.	DESIGN AREA NO.	DESIGN GROUP
904-53,54 & 55G			PE&CD/ER

TITLE

SRL SEEPAGE BASINS REMEDIATION

SECTIONS AND DETAILS (U)

SCALE	SHP DRAWING NO.	SHEET NO.	LATEST REVISION
AS NOTED	SK-C-5389	1 OF 1	A

5556666
7890123

PSC= DRAWN BY (ORIG):
PLOT DATE 08/08/01 TIME

LAST CADD REV. BY: R.WILLIAMS
DATE: 08/08/01

Scale shown on this drawing is only applicable when plotted at 30"x42" (actual drawing size)

SRLSB Remediation
Sections and Details (U)
(SK-C-5389)