United States
Environmental Protection
Agency

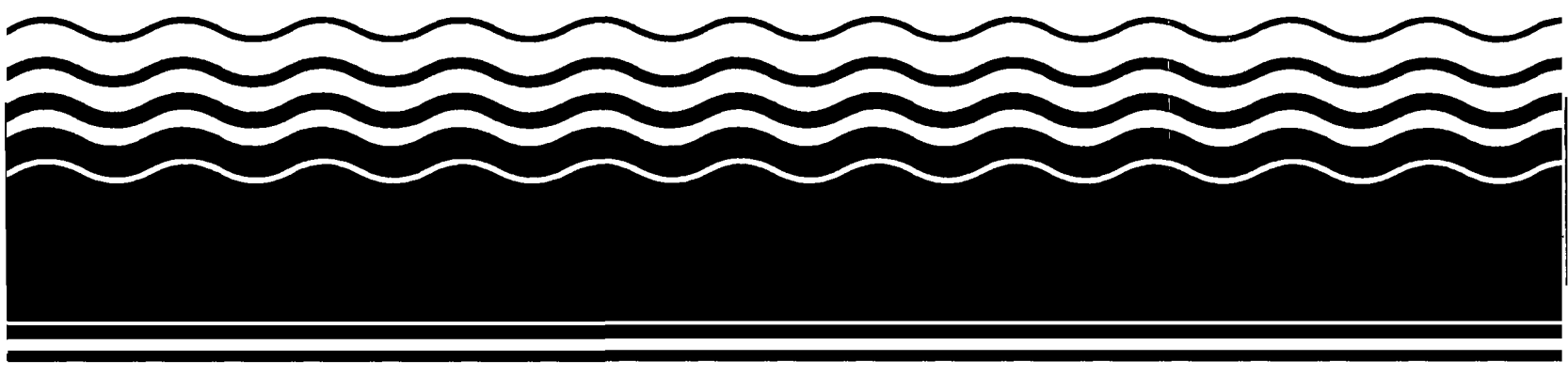
Office of
Emergency and
Remedial Response

EPA/ROD/R04-92/108
June 1992

EPA

# Superfund Record of Decision:

# Savannah River (USDOE) (Operable Unit 1), SC



## NOTICE

The appendices listed in the index that are not found in this document have been removed at the request of the issuing agency. They contain material which supplement, but adds no further applicable information to the content of the document. All supplemental material is, however, contained in the administrative record for this site.

50272-101

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4. Title and Subtitle
SUPERFUND RECORD OF DECISION
Savannah River (USDOE) (Operable Unit 1), SC
First Remedial Action

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16. Abstract (Limit: 200 words)

The 300-square-mile Savannah River site (SRS) is a Department of Energy (DOE) facility located in Aiken, Barnwell, and Allendale Counties, South Carolina, 20 miles south of Aiken, South Carolina, and 25 miles southeast of Augusta, Georgia. Land use in the surrounding area is primarily agricultural. The Savannah River Site is a secured facility with no residents. The site, co-operated by the Westinghouse Savannah River Company, is a national defense-related facility producing tritium, plutonium, and other special nuclear materials. From 1958 to 1985, SRS used a northwest portion of the site, termed the "M-area," as a hazardous waste management facility (HWMF). The M-area HWMF or OU1 consisted of an unlined surface impoundment (settling basin), a process sewer line, an overflow drainage/seepage area, and an area known as Lost Lake, which represents a special ecological environment known as Carolina Bay. Manufacturing wastes from aluminum-forming and metal-finishing operations conducted onsite were discharged through the sewer line to the basin, where metals such as uranium, nickel, lead, and aluminum settled out of solution. Any basin overflow went to the drainage/seepage area and then on to Lost Lake. Use of this system ended in 1985, when a new wastewater treatment facility was installed. This interim ROD

(See Attached Page)

17. Document Analysis a. Descriptors
Record of Decision - Savannah River USDOE) (Operable Unit 1), SC
First Remedial Action - Final
Contaminated Media: soil, sludge, sw
Key Contaminants: VOCs (PCE, TCE), metals (lead), acids, radioactive materials (uranium)

b. Identifiers/Open-Ended Terms

c. COSATI Field/Group

| 18. Availability Statement | 19. Security Class (This Report) None | 21. No. of Pages 34 |
|---|---|---|
| | 20. Security Class (This Page) None | 22. Price |

(See ANSI-Z39.18) *See Instructions on Reverse*

OPTIONAL FORM 272 (4-77)
(Formerly NTIS-35)
Department of Commerce

Abstract (Continued)

integrates previously completed RCRA closure activities that were required and approved by the South Carolina Department of Health and Environmental Control. Future RODs will address final remedial actions for other contaminated media, including the vadose zone and ground water, associated with the M-area HWMF. The primary contaminants of concern affecting soil, sludge, and surface water are VOCs, including TCE and PCE; metals, including lead; acids; and radioactive materials, including uranium.

The selected remedial action for this site includes pumping and onsite treatment of any standing water that remained in the basin; excavating, dewatering, and stabilizing approximately 37,000 cubic yards of basin sludge using Portland cement; placing, consolidating, and compacting the stabilized sludge into the basin; discharging the sludge effluent from the dewatering process offsite to a permitted NPDES outfall; consolidating approximately 39,700 cubic yards of contaminated soil excavated from the seepage area, Lost Lake, and a portion of the sewer line into the basin; installing and maintaining a low permeability cap over the settling basin, which includes a surface soil layer that will be graded and vegetated to promote drainage; monitoring ground water; and implementing institutional controls including deed restrictions. The estimated present worth cost for this remedial action ranges from $3,000,000 to $5,000,000, which includes an annual O&M cost of $20,000 for 30 years.

PERFORMANCE STANDARDS OR GOALS:

No chemical-specific clean-up goals were provided in this interim ROD, but will be provided for the final M-area HWMF remedial action. The goal of this interim ROD is to integrate prior RCRA decisions into the CERCLA process. The goal of the remediation is to minimize the migration of contaminants to the ground water and eliminate surface transport pathways.

WSRC-RP-92-743

# INTERIM ACTION RECORD OF DECISION
# REMEDIAL ALTERNATIVE SELECTION

**M-Area Hazardous Waste Management Facility Operable Unit**

**Savannah River Site** (O.U.1)
**Aiken County, South Carolina**

Prepared by:

U.S. Department of Energy
Savannah River Field Office
Aiken, South Carolina

# DECLARATION FOR THE INTERIM ACTION RECORD OF DECISION

## *Site Name and Location*

M-Area Hazardous Waste Management Facility (HWMF) Operable Unit

Savannah River Site

Aiken County, South Carolina

Appendix C of the draft Federal Facility Agreement (FFA) refers to this operable unit as the M-Area Settling Basin, M-Area/Lost Lake (Building Numbers 904-51G, 904-112G).

## *Statement of Basis and Purpose*

This document presents the selected interim remedial action for the M-Area HWMF Operable Unit at the Savannah River Site (SRS), which was developed in accordance with the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), and to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). This decision is based on the administrative record file for this specific operable unit.

## *Description of the Selected Remedy*

The selected interim action remedy involves the stabilization and placement of all contaminated materials under a low permeability cap. This remedy prevents physical exposure to contaminants and mitigates further migration of contaminants to the groundwater by minimizing a liquid medium pathway (rainwater percolation) for transport.

A risk evaluation is currently being developed for the M-Area HWMF Operable Unit. A final remedy will be selected following the evaluation of any post-closure risks and will be contained in the final Record of Decision (ROD).

The major components of the remedial action include:

- Dewatering the basin.
- Treating basin liquid and discharging the liquid to a permitted outfall.
- Waste consolidation by stabilizing and compacting dewatered basin sludge.
- Excavation of a portion of the process sewer line and associated soils and contaminated soils from the seepage area and areas of Lost Lake.
- Consolidation and compaction of excavated contaminated materials on top of the stabilized sludge within the basin.
- Installing a low permeability cap system over the basin.

***Declaration Statement***

The interim action is hereby selected by mutual agreement of the U.S. Department of Energy and the U.S. Environmental Protection Agency. This interim action is protective of human health and the environment, complies with Federal and State applicable or relevant and appropriate requirements (ARARs) for this limited-scope action, and is cost-effective. This action is interim and is not intended to utilize permanent solutions and alternative treatment (or resource recovery) technologies to the maximum extent practicable for the M-Area HWMF Operable Unit. Because this action does not constitute the final remedy for the M-Area HWMF Operable Unit, the statutory preference for remedies that employ treatment that reduces toxicity, mobility, or volume as a principal element, although partially addressed in this remedy, will be fully addressed by the final response action.

Subsequent actions are planned to address fully the threats posed by the conditions at the M-Area HWMF. Because this remedy may result in hazardous substances remaining within the operable unit above health-based levels, a five-year review will be conducted to ensure that the remedy continues to provide adequate protection of human health and the environment after commencement of the remedial action. Because this is an interim action ROD, review of this operable unit and of this remedy will be conducted by the Environmental Protection Agency (EPA) until a final remedial alternative for the M-Area HWMF Operable Unit is selected.

6/25/92
Date

L. C. Sjostrom
Assistant Manager for Environmental
Restoration and Waste Management
U.S. Department of Energy

JUN 29 1992
Date

Greer C. Tidwell
Regional Administrator,
U.S. Environmental Protection Agency
Region IV

# SUMMARY OF INTERIM ACTION REMEDIAL ALTERNATIVE SELECTION

**M-Area Hazardous Waste Management Facility Operable Unit**

**Savannah River Site**
**Aiken County, South Carolina**

Prepared by:

U.S. Department of Energy
Savannah River Field Office
Aiken, South Carolina

# DECISION SUMMARY
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## I. Site and Operable Unit Names, Locations, and Descriptions

The Savannah River Site (SRS) occupies approximately 300 square miles adjacent to the Savannah River, principally in Aiken and Barnwell Counties of South Carolina (Figure 1). SRS is a secured facility with no permanent residents. The site is approximately 25 miles southeast of Augusta, Georgia, and 20 miles south of Aiken, South Carolina. The average population density in the counties surrounding SRS ranges from 23-560 people per square mile with the largest concentration in the Augusta, Georgia, metropolitan area. Based on 1980 census data (1990 data not available), the population within a 50-mile (80 km) radius of SRS is approximately 555,100.

SRS is owned by the United States Department of Energy (DOE). Westinghouse Savannah River Company (WSRC) is a co-operator, providing management and operation services for DOE. SRS produces tritium, plutonium, and other special nuclear materials for national defense. The site also provides nuclear materials for the space program, and conducts medical, industrial, and research efforts. The A/M Area, located in the northwest portion of the SRS (Figure 1), contains nuclear fuel fabrication buildings, office buildings, and research areas.

The M-Area Hazardous Waste Management Facility (HWMF) is a source-specific operable unit within the A/M Area Fundamental Study Area. The M-Area HWMF includes an unlined surface impoundment (settling basin), a portion of an inactive process sewer line, drainage and seepage areas, and a Carolina bay known as Lost Lake (Figure 2). The nearest plant boundary is approximately 5800 feet northwest of the M-Area HWMF.

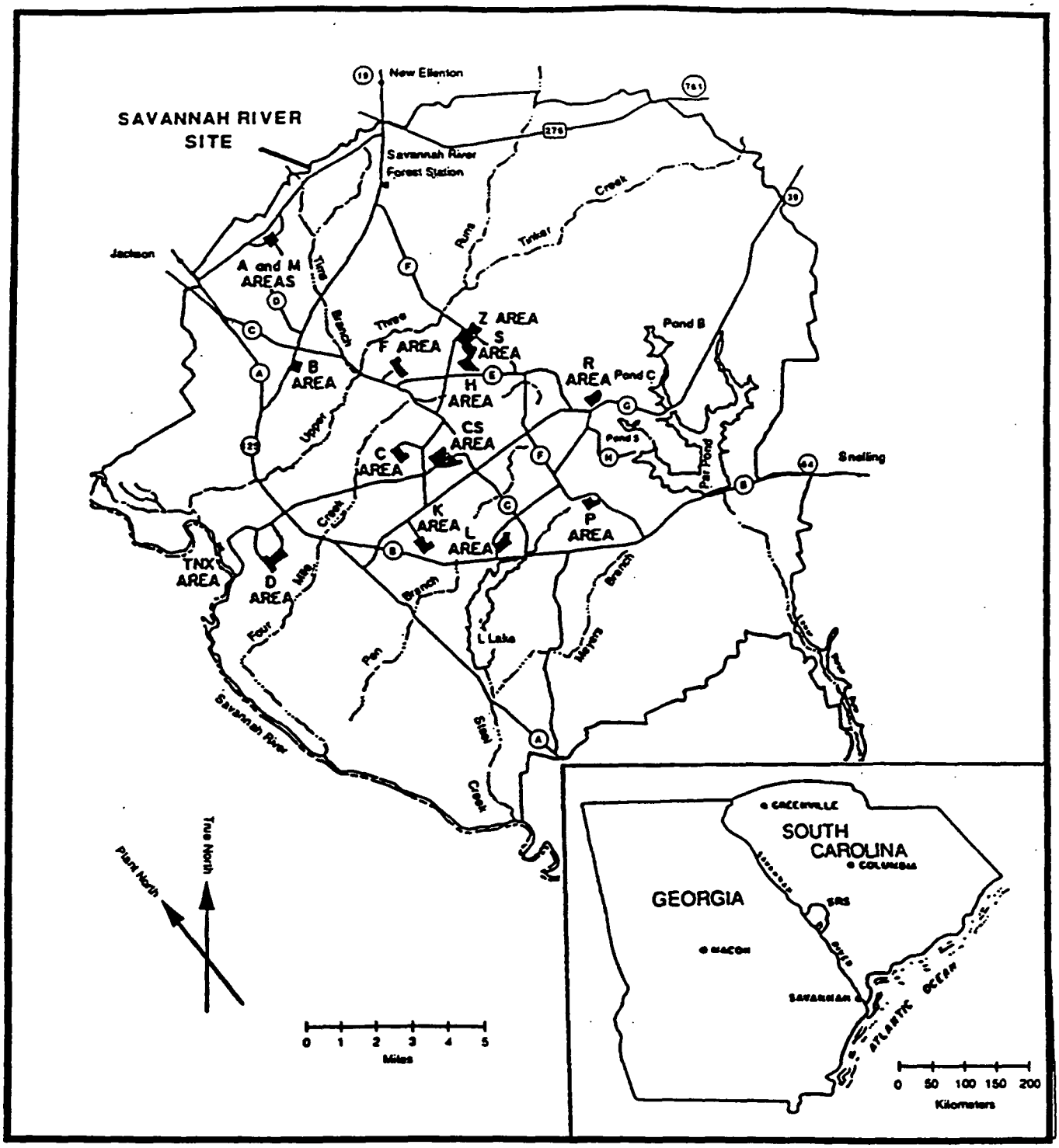


Figure 1 Location of the Savannah River Site (SRS)
(Source: Modified from the Savannah River Environmental Report, 1990)

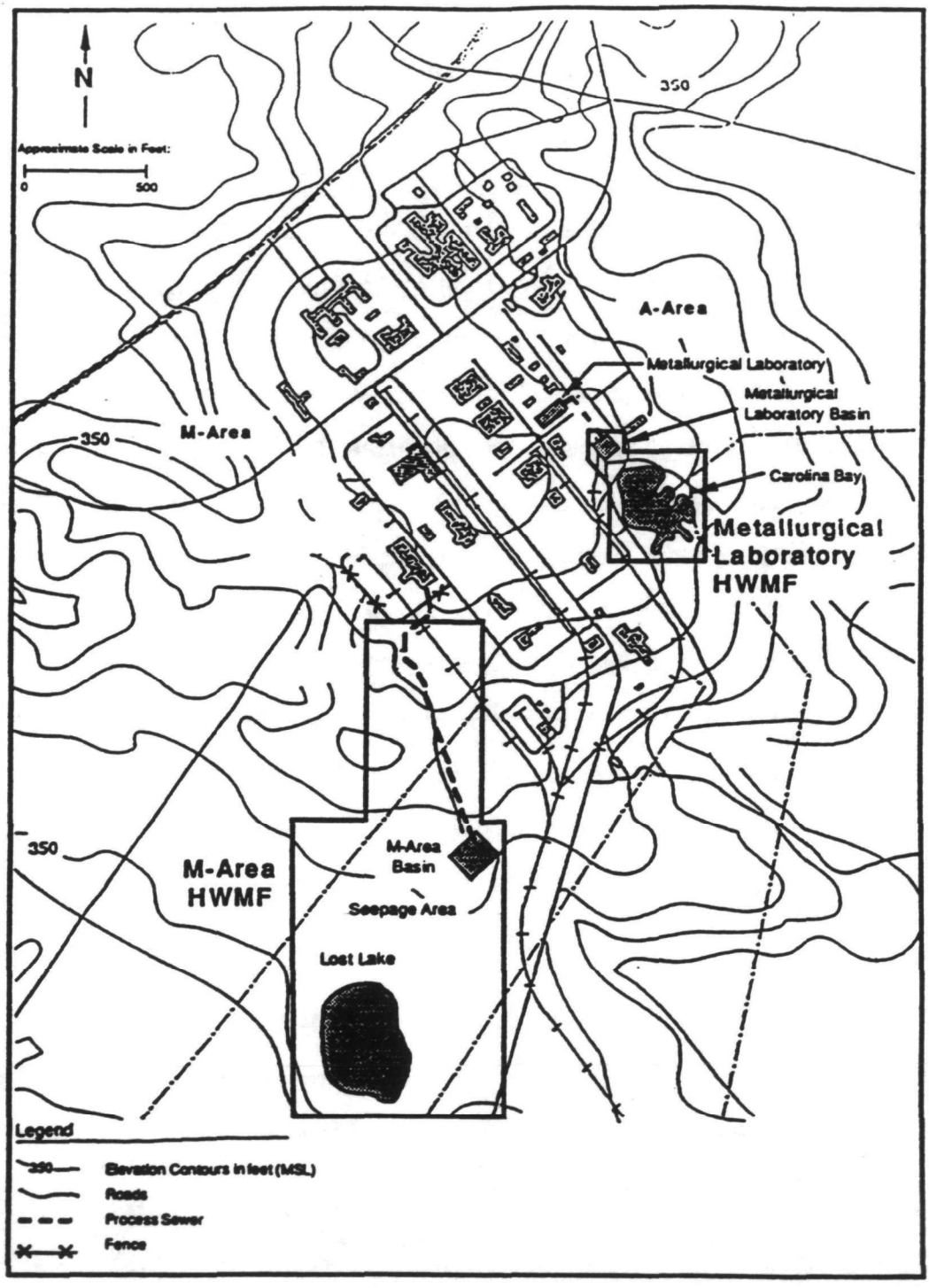


Figure 2 M-Area HWMF
(Source: Modified from the SRS Vadose Zone Characterization, 1990)

## II. Operable Unit History and Compliance History

### *Operable Unit History*

The M-Area settling basin was constructed in 1958 to settle out metals (primarily uranium, nickel, lead and aluminum) discharged from M-Area manufacturing operations. The manufacturing processes consisted of aluminum forming and metal finishing processes which produced fuel and targets for SRS reactors. Waste effluents from the aluminum forming and metal finishing processes were discharged from three production buildings and two support laboratories to the settling basin through a process sewer line. The waste effluents generally contained hydroxides, precipitates of aluminum, uranium, nickel, lead and other metals, solvents (1,1,1-trichloroethane, trichloroethylene, and tetrachloroethylene), acids, and caustics. Very low concentrations (<50 ppm) of polychlorinated biphenols (PCBs) were detected in the early 1980s in soils in an isolated portion of the drainage ditch downstream of the basin. No PCBs are known to have ever been detected in the basin. The drainage ditch soils were excavated and stabilized with cement in the basin during closure activities.

The basin dimensions were approximately 330 feet by 280 feet (surface dimensions) by 17 feet (depth) with a volumetric capacity of approximately eight million gallons. Overflow from the settling basin was directed to a natural seepage area and ultimately to Lost Lake. In July 1985, a permitted wastewater treatment facility was placed in operation and discharges to the settling basin were discontinued.

*Compliance History*

Remedial actions were started at the M-Area HWMF under the Resource Conservation and Recovery Act (RCRA). In 1985, a RCRA Closure Plan was submitted to the South Carolina Department of Health and Environmental Control (SCDHEC). The closure plan underwent several revisions prior to approval by SCDHEC in 1987. A Part B Permit Application for M-Area operations and for post-closure of the M-Area HWMF was also submitted to SCDHEC. In September 1987, DOE received a Hazardous Waste Permit (SC1-890-008-984) for container storage areas and post-closure care of the M-Area HWMF. Closure of the operable unit was initiated in 1988 and completed in 1990. In 1991, the closure certification was accepted by SCDHEC as being in compliance with RCRA requirements.

Closure activities specifically included removal and treatment of any standing water remaining in the basin; discharge of the effluent to the NPDES-permitted M-004 Outfall; excavation, dewatering, and stabilization of the basin sludge with Portland cement; placement, consolidation and compaction of stabilized sludge in the basin; excavation of a portion of the process sewer line and contaminated soils associated with the sewer line, drainage ditch, seepage area and Lost Lake; placement and compaction of contaminated materials in the basin; construction of a low permeability cap over the settling basin; and restoration of the area.

Remedial activities at the M-Area HWMF became subject to CERCLA when the entire SRS facility was placed on the National Priorities List (NPL) in December 1989. Due to the multiple source areas in close proximity and the co-mingling of contaminants emanating from these source areas, the A/M Area has been designated a Fundamental Study Area.

The purpose of this designation is to facilitate the coordination of remedy selection decisions for the operable units in this area. The M-Area HWMF has been designated as a source-specific operable unit within the A/M Area Fundamental Study Area.

## III. Highlights of Community Participation

No comments were received during the public review period.

## IV. Scope and Role of Operable Unit within the Site Strategy

The selected remedy involves the placement of all contaminated materials under a low permeability cap. The remedy prevents physical exposure to contaminants and mitigates further migration of contaminants from the settling basin to groundwater by minimizing a liquid medium pathway (rainwater percolation) for transport.

The interim action is consistent with any planned future actions for this operable unit.

Groundwater remediation is addressed in the ROD for the A/M Area Groundwater Operable Unit.

## V. Summary of Operable Unit Characteristics

Waste effluents from aluminum forming and metal finishing processes were discharged from three production buildings and two support laboratories to the M-Area settling basin through a process sewer line. The waste effluents generally contained hydroxides, precipitates of aluminum, uranium, nickel, lead and other metals, solvents (1,1,1-trichloroethane, trichloroethylene, and tetrachloroethylene), acids, and caustics. Cracks in the sewer pipeline allowed some effluent to leak into the ground, contaminating underlying

soils. The pipeline was slip-lined after cracks and misalignments were discovered in 1983, and an inactive portion was excavated in 1989 as part of the settling basin closure.

Contamination was detected in groundwater, surface water, soil, sediments, and air prior to closure of the M-Area HWMF. Constituents evaluated in a 1985 risk analysis include aluminum, barium, cadmium, chromium, copper, cyanide, lead, lithium, mercury, nickel, nitrate, phosphate, silver, sodium, zinc, depleted uranium, PCBs, tetrachloroethylene, 1,1-dichloroethylene, trichloroethane, and bis(2-ethylhexyl)phthalate. Chemical analyses indicate that elevated levels (hundreds of parts per million) of contaminants appear to be restricted to the area beneath the M-Area HWMF and the A/M Area. Very low concentrations of PCBs (< 50 ppm) were detected in the early 1980s in soils in an isolated portion of the drainage ditch downstream of the basin. No PCBs are known to have ever been detected in the basin.

The volume of waste within the settling basin was estimated to be 37,800 cubic yards. The volume of contaminated soils and dried sludge in the overflow ditch, seepage area, process sewer line, and Lost Lake was estimated to be 39,700 cubic yards.

## VI. Summary of Operable Unit Risks

A risk evaluation is currently being developed for the M-Area HWMF Operable Unit. The risk evaluation will be based on available data. A previous risk analysis performed in 1985 for the M-Area HWMF was used in the development of closure alternatives. The results of the previous risk analysis and available closure and post-closure data will also be utilized, as appropriate, for evaluation of potential post-closure risk.

As noted in Section V, constituents evaluated in the 1985 risk analysis included aluminum, barium, cadmium, chromium, copper, cyanide, lead, lithium, mercury, nickel, nitrate,

phosphate, silver, sodium, zinc, depleted uranium, PCBs, tetrachloroethylene, 1,1-dichloroethylene, trichloroethane, and bis(2-ethylhexyl)phthalate. Chemical analyses indicate that elevated levels (hundreds of parts per million) of contaminants appear to be restricted to the vadose and groundwater zones beneath the M-Area HWMF and the A/M Area.

Risk assessment work conducted in 1985 to evaluate closure options for the M-Area HWMF indicated that contamination was present in groundwater, surface water, soil, sediments, and air. The M-Area risk evaluation program currently under development also is considering these media. However, the current risk work addresses potential risks through these media based on post-closure conditions. Furthermore, the risk evaluation work is being conducted in two parts based on media-specific units within the A/M Area Fundamental Study Area.

Contaminated sediments and surface soils of the M-Area HWMF were excavated and placed in the basin during closure. The basin then was covered with a low permeability soil cap. Therefore, current exposure through surface soil and sediment pathways is minimized because of this soil remediation. This aspect of sediment and surface soil exposure pathways will be addressed in detail in the risk evaluation for surface pathways.

The potential pathways for human exposure are through surface, subsurface, and atmospheric transport of contaminants. However, as noted above, the extent to which soil and sediment remediation have eliminated surface and associated atmospheric pathways is being evaluated in the M-Area risk evaluation. Subsurface contamination associated with the M-Area HWMF groundwater is currently being addressed as part of the on-going A/M Area Groundwater Corrective Action Program. Therefore, M-Area HWMF subsurface unit

risks will be addressed as part of the separate risk assessment for the A/M Area Groundwater Operable Unit.

Potential human health risks associated with surface pathways will be evaluated further in the risk evaluation under development. Because these media were remediated during closure, the risk evaluation should show reduced or no potential for risks from these media.

Results of the ecological assessment conducted in 1985 indicate that adverse effects on river quality and wildlife for any of the three closure alternatives examined would be insignificant. The risk evaluation currently under development will characterize any ecological affects for post-closure conditions. Lost Lake is currently being monitored for any ecological impacts from closure activities. Results of this monitoring program will be included in future reviews of the operable unit.

## VII. Description of Alternatives

Remedial alternatives were developed for the M-Area HWMF based on effective technologies available at the time the RCRA Closure Plan was prepared. The RCRA Closure Plan was initially submitted to SCDHEC in 1984 and was approved, following several revisions, in 1988. Options regarding the M-Area HWMF evaluated at that time included:

**Alternative 1**

No Action

**Alternative 2**

No Waste Removal, Waste consolidation, Treatment, and Closure

**Alternative 3**

Waste Removal and Closure

Alternative 2 was selected within the RCRA closure process in 1988 as the most technically effective of the three alternatives for protection of human health and the environment. Closure of the M-Area HWMF was begun in 1988 and completed in 1990 utilizing a modification of the components of Alternative 2. The closure was certified in 1991 by SCDHEC as being in compliance with RCRA and state requirements. The closure is currently considered an interim action under CERCLA. However, upon completion of the risk evaluation, SRS will submit appropriate documentation to EPA, SCDHEC, and the public requesting that the alternative be designated a final action. This section contains a description of each of the three alternatives as they were developed and considered under NCP guidelines.

Alternative 1: No Action

Under the No Action Alternative, the settling basin would be allowed to dry by natural evaporation. The soils in the drainage ditch, seepage area, and Lost Lake would remain in place. The groundwater monitoring program would continue for a 30-year period or as required to remediate the A/M Area groundwater.

Treatment Components. No treatment would be instituted for the No Action Alternative. Materials within the settling basin and contaminated soils associated with the drainage ditch, the sewer line, and Lost Lake would remain in place.

Engineering Controls. With the exception of continued groundwater monitoring, no engineering controls would be required under the No Action Alternative. As stated in the approved Application for Post-Closure Permit, the existing groundwater monitoring

network would be utilized to monitor groundwater in the vicinity of the M-Area HWMF. Post-closure monitoring will be continued for 30 years following the date of completing closure plus any additional time required to separately remediate the A/M Area groundwater.

Institutional Controls. Public access to areas within SRS is controlled by existing security personnel. Access specifically to the M-Area HWMF would be restricted through an exclusion fence, which surrounds the immediate area of the settling basin. Exclusion fence maintenance would occur on a periodic basis. Additionally, a deed restriction of the M-Area HWMF would be maintained with the Aiken County zoning authority as specified in South Carolina Hazardous Waste Management Regulation (SCHWMR) R.61-79.264.119. A survey plat indicating the location and dimensions of the basin and the type and quantity of waste within the basin would be filed with the Aiken County zoning authority as specified in SCHWMR R.61-79.264.120.

Quantity of Waste. Waste within the settling basin and contaminated soils associated with the drainage ditch, the sewer line, and Lost Lake would remain in place under the No Action Alternative. The volume of waste that would remain within the settling basin is estimated to be 37,800 cubic yards.

Implementation Requirements. The No Action Alternative requires no special implementation procedures and can be initiated immediately.

Estimated Construction and Operation and Maintenance (O&M) Costs. Additional monitoring wells would not be installed under the No Action Alternative. Costs for this alternative were originally estimated to be:

- Capital Cost $0

- Annual O&M Costs $20,000

ARARs Associated with the Considered Alternative. The No Action Alternative would allow the continued migration of chemical residuals associated with the basin to groundwater within the A/M Area. Risks to human health would still exist due to associated surface migration pathways.

## Alternative 2: No Waste Removal, Waste Consolidation, Treatment, and Closure

This alternative involves pumping and treating any standing water remaining in the basin; excavating, dewatering, and stabilizing the basin sludge with Portland cement; placement, consolidation and compaction of stabilized sludge into the basin; discharging the effluent to the NPDES permitted M-004 Outfall; consolidation by excavating and placing contaminated soils associated with the seepage area, a portion of the sewer line, and Lost Lake into the basin; and installing a low permeability cap over the settling basin.

Treatment Components. The free liquid in the settling basin and Lost Lake would be pumped to a permitted temporary wastewater treatment facility (WTF) for processing. The treatment steps of the WTF would consist of pH adjustment, polymer addition, clarification by precipitation, and filtration. Following treatment, the effluent would be discharged at the NPDES-permitted M-004 Outfall. Pumping rates would not exceed historical overflow rates (200 to 300 gallons per minute) so as not to disturb the underlying sludge layer.

Sludge dewatering would take place by dredging and pumping sludge materials through a filter press. The filter cake resulting from this operation alone would have a solids content on the order of 65% (i.e., the consistency of clay). The filter cake (sludge) would then be further stabilized by the addition of kiln dust and Type I Portland Cement, and the mixture

would be placed back into the basin. Air entrainment would be minimized by design of the pumping apparatus.

Engineering Controls. Following placement of the stabilized sludge, contaminated soils and material from surrounding areas including Lost Lake will be excavated and placed within the basin, on top of the stabilized sludge. Areas from which contaminated media would be removed are shown in Figure 3. A low permeability cap would then be placed over the settling basin as an engineering control. The cap would be designed and constructed to provide a permeability of no more than $1.0 \times 10^{-7}$ cm/s. The RCRA cap installed over the M-Area settling basin would consist of an impermeable layer overlain by a drainage layer which would, in turn, be protected by a layer of soil. The impermeable layer would include 24 inches of compacted clay and a synthetic Hypalon® membrane. The drainage layer would consist of open-graded stone and incorporate a perimeter drain. It would be overlain by a synthetic geotextile filter fabric to prevent soil particles from migrating into the drainage layer and clogging the interstices of the stone. The surface soil layer would be sloped to promote drainage and vegetated to minimize potential for erosion. A schematic of the soil cap is presented in Figure 4.

In accordance with the approved post-closure permit application, the existing groundwater monitoring network would be utilized to monitor groundwater in the vicinity of the M-Area HWMF. Groundwater monitoring will continue for 30 years following completion of closure (1990) of the settling basin plus any additional time required to complete on-going remediation of A/M Area groundwater.

Institutional Controls. Institutional controls would be identical to those described in Alternative 1.

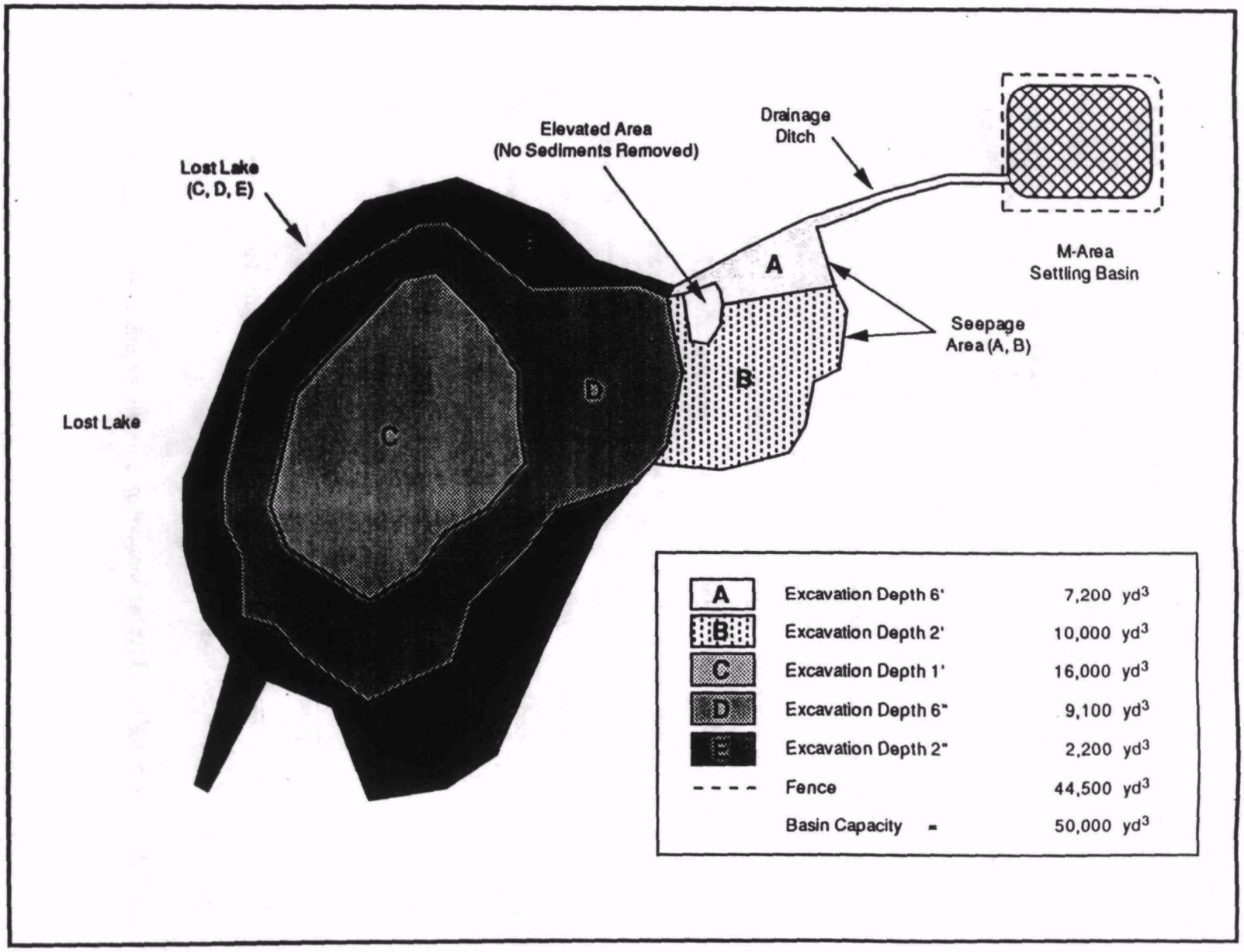


Figure 3 Areas of Contaminated Soil Removal from the M-Area HWMF

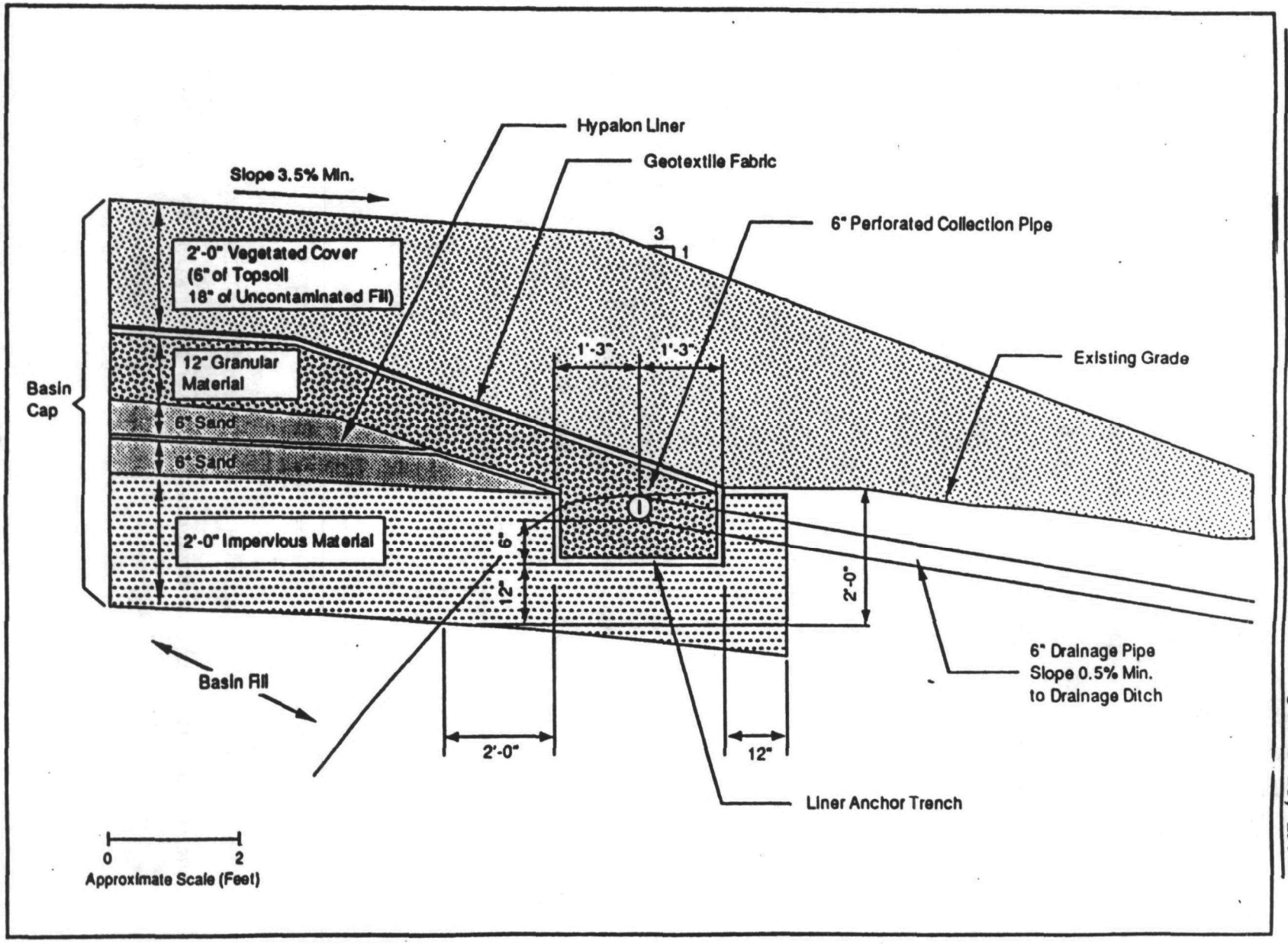


Figure 4 Schematic Diagram of the M-Area HWMF Cap

Quantity of Waste. The contaminated soils and dried sludge from the overflow ditch, seepage area, and Lost Lake would be excavated, and a portion of the process sewer line, manholes, and approximately 2 feet of soil beneath the sewer line between the settling basin and manhole No. 1 would be removed (Figure 3, Section II). The total volume of soil to be excavated is shown below:

| | |
|---|---|
| Overflow ditch | 6,700 $yd^3$ |
| Remainder of seepage area | 9,800 $yd^3$ |
| Lost Lake | 22,100 $yd^3$ |
| Process sewer, manholes, and soil | 1,100 $yd^3$ |
| TOTAL | 39,700 $yd^3$ |

All excavated materials would be placed in the settling basin and compacted to support the basin cap. Common fill would be added to level the material to the top of the basin. The estimated amount of materials currently within the settling basin was 37,800 cubic yards.

Implementation Requirements. Construction of a cap is a commonly implemented operation that has been accomplished at numerous sites. Clearing and grubbing would be required for access of heavy machinery. Liner installation would be scheduled during suitable climatic conditions. The estimated construction schedule for complete closure of the M-Area HWMF was originally estimated to be 18 to 24 months.

Cap maintenance can be readily implemented. Periodic cap maintenance would involve cutting grass and clearing any accumulation in the drainage swales. Inspections would be required to determine whether repairs to the cap, drainage system, or exclusion fence are required.

Estimated Construction and Operation and Maintenance Costs. The estimated cost for Alternative 2 was originally estimated to be:

- Capital Cost $3,000,000 - $5,000,000
- Annual O&M Costs $20,000

ARARs Associated with the Considered Alternative. Alternative 2 requires remedial activity that may impact surface water and potential wetland areas. To ensure consistency with the Clean Water Act, erosion control must be employed through Best Management Practices to mitigate or minimize impacts to surface water from remedial activities. Also, remedial activities must be controlled to minimize the effects to wetland functions and beneficial values.

Federal RCRA regulations regarding capping would be relevant and appropriate for implementation of Alternative 2. The single synthetic liner would meet the equivalent performance standard of SCHWMR R.61-79.265.310. These requirements include the following:

- provide long-term minimization of migration of contaminants
- function with minimum maintenance
- promote drainage and minimize erosion or abrasion of the cover
- accommodate settling and subsidence to maintain cover integrity
- have a permeability less than that of natural subsurface soils.

Materials being handled in this remedy may contain both hazardous and radioactive components and may have to be handled as mixed waste (53 FR 37045, September 23, 1988).

Alternative 3: Waste Removal and Closure

Under this alternative, the liquid in the settling basin would be processed through the permitted wastewater treatment facility and discharged to NPDES outfall M-004. Contaminated soils would be excavated from the settling basin and seepage area, a portion of the sewer line, and Lost Lake. Soils and sludges would be placed in a treatment, storage and disposal (TSD) facility within SRS. The settling basin would be backfilled with clean fill.

Treatment Components. The remaining liquid in the basin would be processed through the permitted WTF and discharged to NPDES outfall M-004. The gelatinous sludge layer in the basin would be stabilized to facilitate removal and handling. The sludge would be treated with absorbants or drying agents to produce a material that could be removed by normal excavation methods.

Contaminated soils and sludges would be removed from the basin, overflow ditch, seepage area, and Lost Lake. Also the process sewer line, manholes, and 2 feet of soil beneath the sewer line between the basin and manhole No. 1 would be removed (Figure 3, Section II). The soils removed from the basin and vicinity would be placed in a TSD facility within SRS.

Engineering Controls. The basin and vicinity would be backfilled with clean fill material under Alternative 3. The area of the basin would then be covered with topsoil and graded and seeded for erosion control.

Institutional Controls. No exclusion fence, deed restriction or other institutional controls would be required under this alternative.

Quantity of Waste. Original estimates of the total volume of material required to be removed from the basin and vicinity were as follows:

| | |
|---|---|
| Sludge/soil beneath basin | 14,400 $yd^3$ |
| Stabilized sludge | 5,900 $yd^3$ |
| Overflow ditch and adjacent seepage area | 6,700 $yd^3$ |
| Remainder of seepage area | 9,800 $yd^3$ |
| Lost Lake | 22,100 $yd^3$ |
| Process sewer, manholes, and soil | 1,100 $yd^3$ |
| TOTAL | 60,000 $yd^3$ |

Implementation Requirements. Implementation of this alternative requires standard excavation equipment and procedures. However, approximately 3,000 truck loads of materials containing chemical and possibly radioactive constituents would be hauled from the unit to a permitted TSD facility within SRS. Approximately 3,000 truck loads of clean fill would be hauled back to the unit. Clearing and grubbing would be required for heavy equipment access and staging areas. Maintenance of the basin and vicinity could easily be implemented following closure. The time required for complete closure of the M-Area HWMF under this alternative was originally estimated to be 18 to 24 months.

Estimated Construction and Operation and Maintenance Costs. The costs for implementation of Alternative 3 were originally estimated to be:

- Capital Cost $150,000,000
- Annual O&M Costs $20,000

The capital cost reflects values associated with removal and temporary storage at a TSD facility and final disposal on SRS property.

ARARs Associated with the Considered Alternative. As described in Alternative 2, erosion control measures and management practices to minimize impacts to wetlands would have to be employed during remedial activities.

Removed materials contain both hazardous and radioactive components and would have to be handled as mixed waste. Treatment, storage and disposal of hazardous components are regulated under SCHWMR R.61-79.264. The radioactive components are controlled under DOE Order 5820.2A, RCRA regulations (40 CFR §§ 193 and 764), and Atomic Energy Act (AEA) regulations (10 CFR § 61). Shipment of hazardous and radioactive substances is regulated under Department of Transportation regulations (49 CFR §§ 100 to 177), and DOE internally controls the shipment of radioactive wastes under DOE Order 1540.1.

## VIII. Summary of Comparative Analysis of Alternatives

The NCP (40 CFR§300.430 (e) (g)) sets forth nine evaluation criteria that provide the basis for evaluating alternatives and subsequent selection of a remedy. The criteria are:

- Overall protection of human health and the environment
- Compliance with ARARs
- Long-term effectiveness and permanence
- Reduction of toxicity , mobility, or volume through treatment
- Short-term effectiveness

- Implementability
- Cost
- State acceptance
- Community acceptance

Overall Protection of Human Health and the Environment. Alternative 1, the No Action Alternative, would allow continued leaching of chemical residuals associated with the basin and surrounding media to the groundwater.

Alternative 2, No Waste Removal, Waste consolidation, Treatment, and Closure, achieves overall protection by minimizing potential exposure to contaminated media and minimizes the transport of chemical residuals to groundwater. This is accomplished through stabilization of the sludge in a cement matrix, waste consolidation by excavation and placement of surrounding contaminated soils in the basin, and installation of a low permeability cap over the basin.

Alternative 3, Waste Removal and Closure, achieves overall protection of human health by removing contaminated media associated with the seepage basin. However, under this alternative the contaminated media is transported to a TSD facility at another location within SRS. Potential risks associated with exposure to the chemical residuals are, in effect, relocated.

Compliance with Applicable or Relevant and Appropriate Requirements (ARARs). No chemical-specific action levels exist for chemical residuals in soils. The No Action Alternative would, however, allow continued leaching of chemical residuals to the

groundwater within the A/M Area and potentially cause exceedance of promulgated groundwater standards.

Alternative 2 would control incidental exposure to chemical residuals at the M-Area HWMF. A particular action-specific ARAR for Alternative 2 is the regulations regarding capping, SCHWMR R.61-79.265. The cap for this alternative must be designed and installed according to RCRA requirements to comply with the action-specific ARAR. Capping would help achieve groundwater chemical-specific requirements because it would minimize leaching of chemical residuals to groundwater.

Under Alternative 3, the removed materials must be stored at a storage facility designed to meet the TSD facility requirements set forth under regulations SCHWMR R.61-79.264.

Long-term Effectiveness and Permanence. Alternative 1 would allow continued leaching of chemical residuals to the groundwater, thus failing to provide a long-term remedy of the M-Area HWMF. Alternative 2 would effectively and permanently minimize the migration of chemical residuals to groundwater through stabilization of sludge materials and installation of the low permeability cap. Use of Alternative 3 would permanently remove sludges and other associated contaminated media from the basin, but the excavated materials would then have to be relocated to a TSD facility within SRS until a permanent treatment or disposal remedy is developed. Cap maintenance for Alternative 2 would continue for at least 30 years (the post-closure care period), with extension of this period reviewed every five years. Maintenance of the exclusion fence would also continue for at least 30 years.

Reduction of Toxicity, Mobility, or Volume Through Treatment. Alternative 1 provides no treatment to reduce the toxicity, mobility, or volume of chemical residuals. Capping under Alternative 2 would significantly reduce the mobility of chemical residuals within the basin

although the volume of contaminants will remain unchanged. This alternative would reduce the toxicity and mobility of chemical residuals through soil stabilization with Portland cement. This treatment would chemically bind soils and chemical residuals into a stable solid block. Alternative 2 would also consolidate waste materials in one location, thereby reducing the surface area of leachable constituents. Alternative 3 reduces the volume of contaminants specifically at the M-Area basin and surrounding media; however, the excavated quantity of waste is relocated to a TSD facility within SRS and will ultimately require treatment and eventual disposal at a future date when a permanent remedy is developed.

Short-term Effectiveness. Implementation of Alternatives 1 or 2 would pose little or no risk to the community or remedial workers through exposure to chemical residuals. Little or no significant environmental impacts would occur from implementation of either of the alternatives. Impacts to Lost Lake would be mitigated through restoration activities. Alternative 3 requires 3,000 truck loads of potentially contaminated material to be transported to another location within SRS. Remedial workers would have the potential for exposure to waste materials due to the transportation. Also, potential accidents resulting from transportation of the materials may expose other SRS employees or contractors.

Construction schedules for the alternatives were originally estimated as follows:

**Alternative 1**

No Action None

**Alternative 2**

No Waste Removal, Waste Consolidation, Treatment, and Closure 18 - 24 Months

**Alternative 3**

| | |
|---|---|
| Waste Removal and Closure | 18 - 24 Months |

The cap under Alternative 2 would be kept in place indefinitely to minimize infiltration of precipitation. Alternative 3 requires no engineering controls.

Implementability. The proposed alternatives would pose no significant construction or operational difficulties. Materials and construction services are readily available for Alternatives 2 and 3. Both Alternatives 2 and 3 would require approval from SCDHEC for certain elements of the remedies (i.e., cap design and TSD facility storage). Periodic inspections and, as necessary, repair of the cap would be required under Alternative 2.

Cost. The originally estimated present worth costs for each alternative are presented below:

| | |
|---|---|
| **Alternative 1** | |
| No Action | $600,000 |
| **Alternative 2** | |
| No Waste Removal, Waste Consolidation, Treatment, and Closure | $3,000,000 - $5,000,000 |
| **Alternative 3** | |
| Waste Removal and Closure | $150,000,000 |

The original estimated costs for all three alternatives include an annual O&M cost of $20,000 for a 30-year period for groundwater monitoring. These costs do not include monitoring beyond the 30-year period potentially required to complete A/M Area groundwater remediation.

State Acceptance. SCDHEC has reviewed the closure and post-closure plans and concurs with the preferred alternative for the M-Area HWMF. The M-Area HWMF was closed

using Alternative 2 in 1990. SCDHEC accepted certification of the M-Area HWMF closure in 1991.

Community Acceptance. (To be addressed by DOE/EPA after the Proposed Plan public comment period.)

## IX. Selected Remedy

The preferred interim action alternative for the M-Area HWMF is Alternative 2: No Waste Removal, Waste Consolidation, Treatment, and Closure. The selected remedy (Alternative 2) involved pumping and treating the standing water remaining in the basin; excavating, dewatering, and stabilizing the sludge in the basin with Portland cement; placement, consolidation and compaction of stabilized sludge into the basin; discharging the effluent to the NPDES-permitted M-004 outfall; waste consolidation by excavating and placing within the basin contaminated soils from the seepage area, a portion of the sewer line, and Lost Lake; and installing a low permeability cap over the settling basin. This alternative implements an interim remedial action to protect human health and the environment. The goal of this remediation was to minimize migration of contaminants to the groundwater and eliminate surface transport pathways. Upon completion of the unit risk evaluation, this interim action will become a final action for review and approval.

## X. Path Forward

Remedial actions regarding the M-Area HWMF are currently being addressed as interim actions. "Path Forward" activities associated with this operable unit include a risk evaluation of the unit and continued monitoring and management of Lost Lake. Upon completion of this risk evaluation, a final remedy will be selected.

## XI. Statutory Determination

The preferred alternative for the M-Area HWMF is Alternative 2: No Waste Removal, Waste Consolidation, Treatment, and Closure. The alternative was selected for its ability to provide overall protection of human health and the environment through reduction of associated risks and compliance with ARARs. The remedy is protective because it prevents physical exposure to contaminants by use of containment and institutional controls and mitigates further migration of contaminants to the groundwater by minimizing a liquid medium pathway (rainwater percolation) for transport.

Alternative 2 appears to provide the best balance with respect to the nine evaluation criteria specified in the NCP. Alternative 2 is more technically effective than Alternative 3 in providing a remedy for the M-Area HWMF and is also more cost-effective. Stabilization and capping under the preferred alternative significantly minimizes the potential for chemical residuals to leach into groundwater. Alternative 2 is preferred over Alternative 3 which reduces the volume of contaminated media associated with the settling basin, relocates the material to a TSD facility within SRS, and would require transportation of approximately 60,000 cubic yards of waste material containing both hazardous and radioactive constituents. This action is interim and the final ROD for this operable unit will address the permanence of the final action and the preference for any treatment utilized in the final action to reduce the mobility toxicity and volume of hazardous substances.

## Appendix A

### References for Development of ROD Format


Crane, Jeffrey L., 1992. "Working Meeting Notice for M-Area RODs, M-Area Groundwater, M-Area Settling Basin, Met Lab Basin," Letter to Chris Bergren (WSRC), U.S. Environmental Protection Agency, Region IV, Atlanta, GA, March 12, 1992.

EPA, 1989. "A Guide to Developing Superfund Records of Decision," OSWER Directive 9335.3-02FS-1, U.S. Environmental Protection Agency, Washington, D.C., November 1989.

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Longest, Henry L., and Bruce M. Diamond, 1990. "Suggested ROD Language for Various Groundwater Remediation Options," OSWER Directive 9283.1-03, U.S. Environmental Protection Agency, Washington, D.C., October 10, 1990.

WSRC, 1990. "RCRA Facility Investigation/Remedial Investigation Program Plan," WSRC-RP-89-994, Chapter 15, Westinghouse Savannah River Company, Aiken, South Carolina, September 1990.

## Appendix B

## Responsiveness Summary

(No comments were received during the public comment review period.)