008578

United States Department of Energy

Savannah River Site

Interim Record of Decision Amendment for the Chemicals, Metals, and Pesticides Pits (080-170G, 080-171G, 080-180G, 080-181G, 080-182G, 080-183G, 080-190G) (U)

WSRC-RP-2000-4158

Rev. 1.2

November 2001

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

SRS

Prepared for the U. S. Department of Energy under Contract No. DE-AC09-96-SR18500

Printed in the United States of America

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

DECLARATION OF INTERIM RECORD OF DECISION AMENDMENT

This document is an Amendment to the Interim Record of Decision (IROD) for the Chemicals, Metals, and Pesticides (CMP) Pits. It describes changes to the ongoing interim remedial action that are necessary due to site-specific conditions. The IROD Amendment describes:

1. The interim remedial action originally planned;

2. Achievements in implementation of the original plan;

3. Site specific conditions which lead to changes to the original remedial plan; and

4. Proposed modifications to the interim remedial action.

There are three sub-units specified in the original plan in the IROD: ballast area soils, the pits including the vadose zone beneath the pits, and the groundwater hot spot.

Ballast Area Soils

IROD: The original plan was to clean up surface soils contaminated with polychlorinated biphenyls (PCBs) and pesticides by excavation, shipment, and off-SRS treatment and disposal. The original estimate for the volume of contaminated soil was 1300 yd^3.

Work Completed: Approximately 256 yd^3 of contaminated soil have been excavated.

Conditions that Led to the Amendment:

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

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

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

CMP Pits and Vadose Zone beneath the Pits

IROD: The original plan was to remove volatile organic compound (VOC) contamination from the vadose zone beneath the pits by soil vapor extraction (SVE) and reduce leaching of contaminants into the groundwater and prevent exposure of human and ecological receptors to contaminated soil by placement of an asphalt cover.

Work Completed: Installation of an SVE remediation system to remove VOCs from the vadose zone is nearly complete. Start up of the system is planned for 2001.

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

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

Groundwater Hot Spot

IROD: The original plan was to use a combination of air sparging and SVE (AS/SVE) to remove the highest concentrations of VOCs from the water table in the vicinity of the pits.

Work Completed: The SVE portion of the remedial system has been installed.

Conditions that Led to the Amendment:

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

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

Proposed Change: Eliminate air sparging as part of the Interim Action. Complete characterization of the groundwater plume. Evaluate alternatives for groundwater remediation as part of a feasibility study. Propose a remedy as part of the operable unit final action.

Authorizing Signatures

12/19/2001
Date

~~Gregory P. Rudy~~ C. A. Hansen
~~Manager~~ Acting Manager, SR
U.S. Department of Energy, Savannah River Operations Office

1/29/02
Date

Richard D. Green
Division Director
Waste Management Division
U. S. Environmental Protection Agency - Region IV

3/8/02
Date

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

This page was intentionally left blank

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF APPENDICES

ACRONYMS AND ABBREVIATIONS

AOC	area of contamination
ARAR	applicable, or relevant and appropriate requirement
AS	air sparging
BRA	baseline risk assessment
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CMP Pits	Chemicals, Metals and Pesticides Pits
CPT	cone penetrometer test
DNAPL	dense non-aqueous phase liquid
gpd	gallons per day
HBL	health-based level
IAPP	Interim Action Proposed Plan
ICMI	Interim Corrective Measures Implementation
IRAO	Interim Remedial Action Objective
IROD	Interim Record of Decision
LDR	land disposal restriction
MCL	maximum contaminant level
MDL	method detection limit
mg/kg	milligram per kilogram
NCP	National Oil and Substances Pollution Contingency Plan
NEPA	National Environmental Policy Act
O&M	operation and maintenance
OSHA	Occupational Safety and Health Act
OU	operable unit
PCB	polychlorinated biphenyl
PCE	tetrachloroethylene
PPE	Personal protective equipment
PRG	preliminary remediation goal
RAWP	Remedial Action Work Plan
RCRA	Resource Conservation and Recovery Act
RD	remedial design
RDR	Remedial Design Report
RFI/RI	RCRA Facility Investigation/Remedial Investigation Report with Baseline Risk
RG	remedial goal
ROD	Record of Decision
SB/PP	Statement of Basis/Proposed Plan
SCDHEC	South Carolina Department of Health and Environmental Control
scfm	standard cubic feet per minute
SCHWMR	South Carolina Hazardous Waste Management Regulations
SDWA	Safe Drinking Water Act
SRS	Savannah River Site
SVE	soil vapor extraction
TCE	trichloroethylene
TCLP	toxicity characteristic leaching procedure
TSCA	Toxic Substance Control Act
TSS	total suspended solids
ug/kg	microgram per kilogram
ug/l	microgram per liter
US DOE	U.S. Department of Energy
US EPA	U.S. Environmental Protection Agency
VOC	volatile organic compound
WSRC	Westinghouse Savannah River Company, LLC

This page was intentionally left blank

I. INTRODUCTION AND STATEMENT OF PURPOSE

Savannah River Site

The Savannah River Site (SRS) occupies approximately 310 square miles of land adjacent to the Savannah River, principally in Aiken and Barnwell counties of South Carolina. The U.S. Department of Energy (US DOE) owns SRS, which is currently managed and operated by Westinghouse Savannah River Company, LLC (WSRC). SRS has historically produced tritium, plutonium, and other special nuclear materials for national defense and the space program. The processes required to meet these needs have produced both chemical and radioactive wastes.

Chemicals, Metals, and Pesticides Pits Location, Description, and Process History

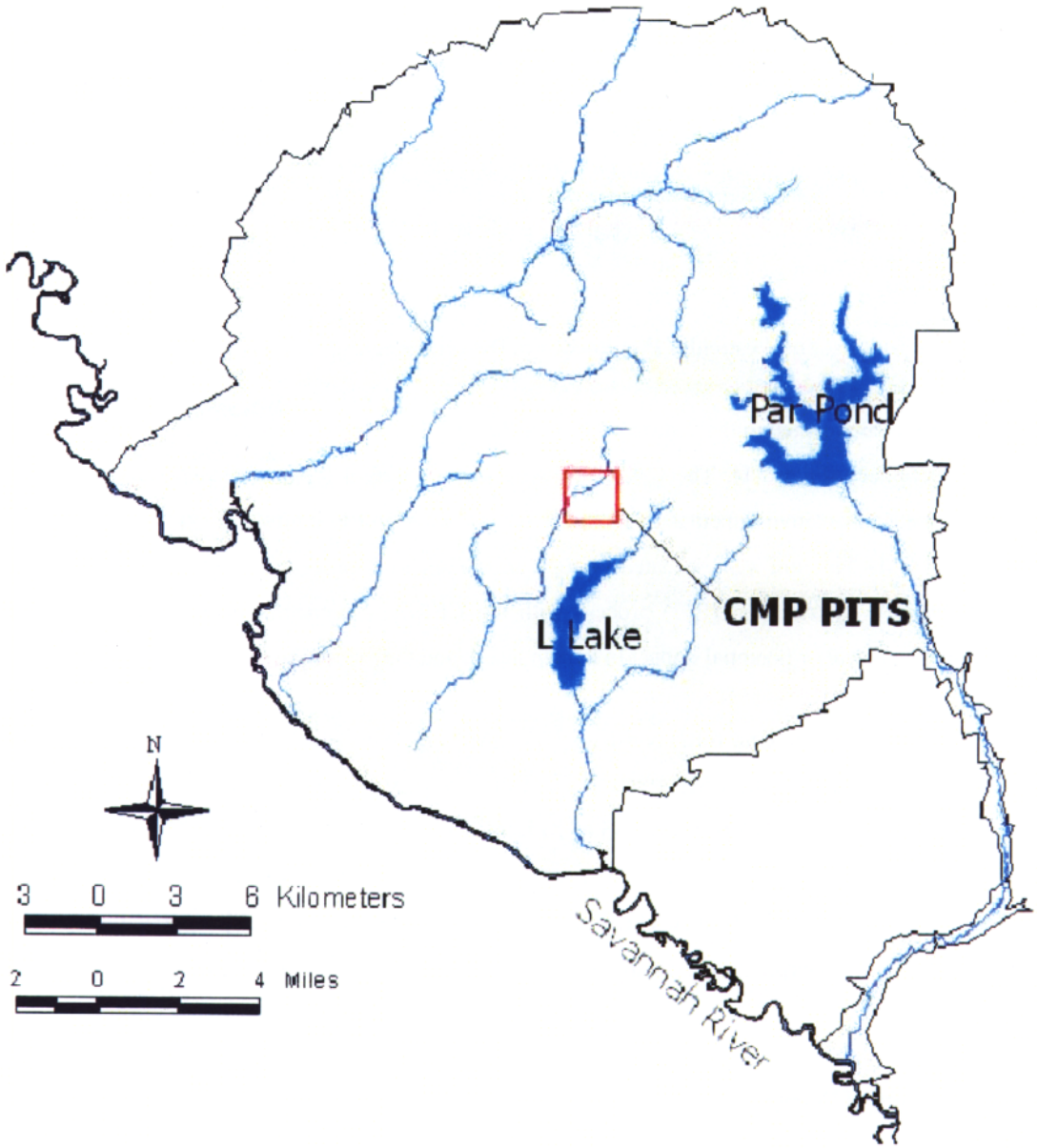
The CMP Pits are located in the central portion of the SRS in Barnwell County more than seven miles from the site boundary (Figure 1). The CMP Pits were identified as a Resource Conservation and Recovery Act/Comprehensive Environmental Response, Compensation and Liability Act (RCRA/CERCLA) unit in 1989. The CMP Pits unit was evaluated through an investigation process that integrates and combines the RCRA Facility Investigation (RFI) process with the CERCLA Remedial Investigation (RI) process to determine the actual or potential impact to human health and the environment.

The CMP Pits Operable Unit (OU) consists of the CMP Pits and soils, ballast area soils, and groundwater (Figure 2). When active, the CMP Pits consisted of seven unlined pits, placed in two rows, on top of a knoll. The pits were 10 to 15 feet wide, 45 to 70 feet long, and 10 to 15 feet deep. The ballast area, located at the northern edge of the knoll, is an area of soil contamination that extends down the side slope of the knoll for a distance of 20 to 30 feet. The groundwater sub-unit was conceptually separated into two sections for remedial action purposes, the groundwater hot spot and the distal portion of the groundwater plume (distal plume).

Interim Record of Decision

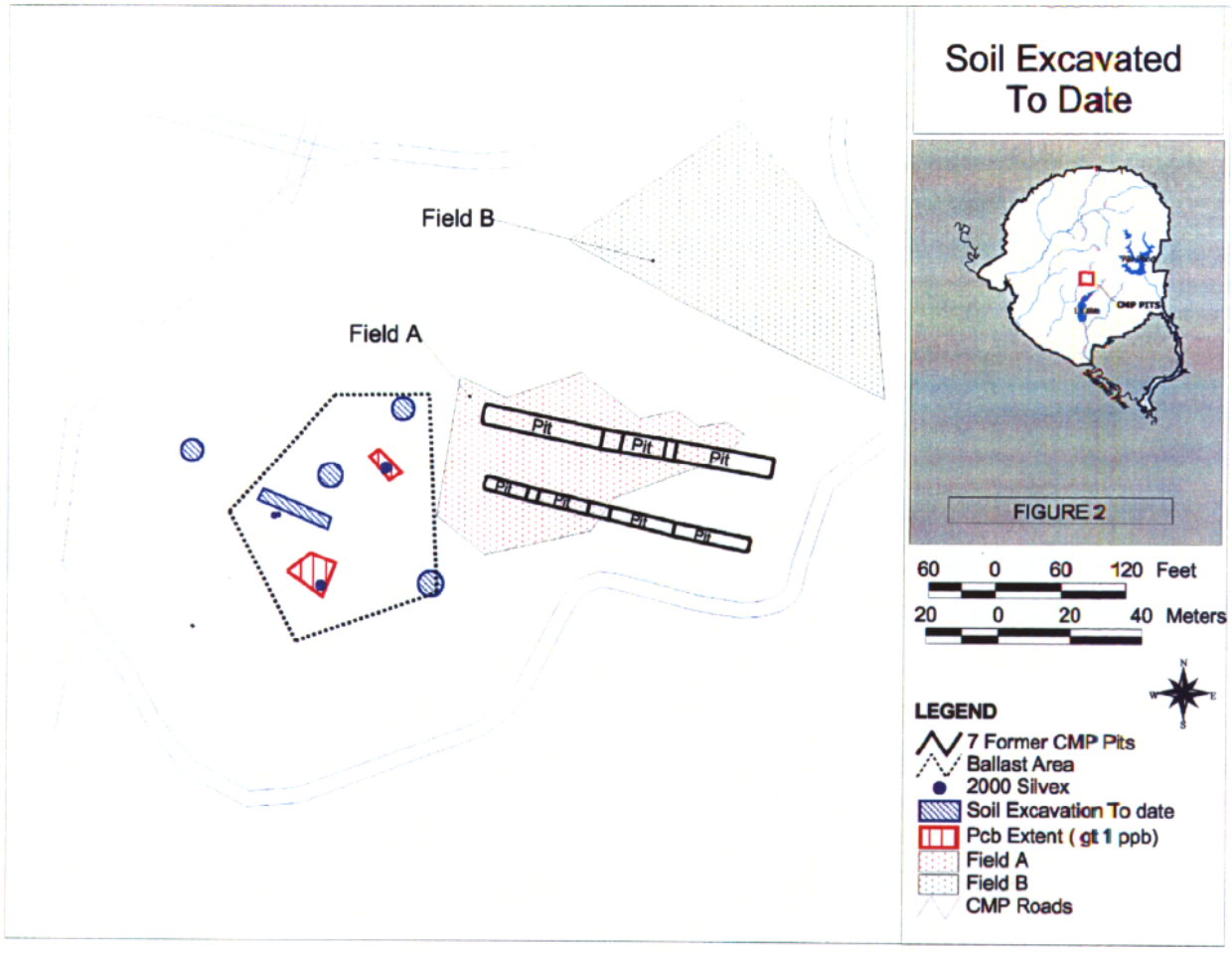
An interim record of decision (IROD) was approved in August 1999 for soil excavation and disposal for ballast area soils, soil vapor extraction (SVE) in the CMP Pits vadose zone soils, and air sparging (AS) with SVE in the groundwater hot spot (WSRC 1999a) (Figure 2). These interim remedial actions are described in Section III.

Figure 1. CMP Pits Location



CMP Pits Operable Unit is located north of L-Reactor Area near Pen Branch.

Figure 2. CMP Pits Operable Unit



The relative location of the CMP Pits, the two SVE well fields, and the previously defined boundaries of the ballast area are depicted in the figure. Areas identified with hatched lines (red and blue) indicate the areas of highest PCB concentrations. These locations were slated for the first removal of soil excavation. Five areas (shown in blue) have already been excavated. Two of the areas (shown in red) have not been excavated because Silvex was detected in soil samples. Dots denote the location of the Silvex hits.

Unit-specific circumstances have impacted implementation of the IROD remedy. These unforeseen circumstances have been determined by the core team to require a fundamental change in the scope and performance of the remedy selected in the IROD. The core team is composed of decision makers from the U.S. Environmental Protection Agency (US EPA), South Carolina Department of Health and Environmental Control (SCDHEC), and US DOE. This IROD amendment is necessary to comply with National Oil and Substance Pollution Contingency Plan (NCP) Section 300.435(c)(2)(ii) and CERCLA Section 117. A fundamental change in the selected remedy necessitates issuance of this IROD Amendment as specified in the NCP, Section 300.435(c)(2)(ii). The opportunity for public review and comment on this IROD Amendment as required by CERCLA §117 is described in Section VIII.

Administrative Record

New information obtained since approval of the original IROD meets the requirements specified to amend the IROD. Information presented in this IROD Amendment will become part of the Administrative Record File in accordance with the requirements of the NCP, Section 300.825(a)(2), because it (1) supports the need to significantly alter the response actions, (2) is not contained elsewhere in the Administrative Record File, and (3) was not available for public review and comment at the time of the comment period for the *Interim Action Proposed Plan for the Chemicals, Metals, and Pesticides (CMP) Pits* (WSRC, 1999b).

The Administrative Record File is available at the following locations:

U. S. Department of Energy Public Reading Room Gregg-Graniteville Library University of South Carolina-Aiken 171 University Parkway Aiken, South Carolina 29801 (803) 641-3465	Thomas Cooper Library Government Documents Department University of South Carolina Columbia, South Carolina 29208 (803) 777-4866

The RCRA Administrative Record file for SCDHEC is available for review by the public at the following locations:

The South Carolina Department of Health and Environmental Control Bureau of Land and Waste Management 8901 Farrow Road Columbia, South Carolina 29203 (803) 896-4000	Lower Savannah District Environmental Quality Control Office 206 Beaufort Street, Northeast Aiken, South Carolina 29801 (803) 641-7670

II. CMP PITS OPERABLE UNIT COMPLIANCE HISTORY

CMP Pits Operable Unit Operational History

The CMP Pits, placed into operation in August 1971, were designated to receive chemicals, metals, and pesticides. Formal disposal records were not maintained. Partial disposal records for these pits indicate disposal of trichloroethylene (TCE), tetrachloroethylene (PCE), and pesticides. There is evidence that fluorescent light ballasts, typically filled with heat transfer oil containing polychlorinated biphenyls (PCBs), were disposed during April 1979. The pits were backfilled and closed in December 1979.

Groundwater monitoring indicates the presence of PCE and TCE in the water table aquifer. Soil samples indicate that soils beneath the unit are contaminated with VOCs to a depth of approximately 65 feet.

SRS initiated a remedial action in 1984 with the concurrence of SCDHEC. The contents of all of the pits were excavated and drums of buried chemicals were removed. Contaminated soil was excavated until total VOC concentrations were less than 100 milligrams per kilogram (mg/kg) and pesticide concentrations were less than 25 mg/kg. However, elevated levels of some constituents remain in the soil.

The pits were backfilled in October 1984 with soil believed to be clean and compacted to approximately four feet below the existing ground surface. A low infiltration cap consisting of 80-mil high-density polyethylene was installed and covered with approximately 3 feet of fill (soil believed to be clean) and one foot of topsoil. A 1 to 2-foot drainage ditch outside of the capped area was excavated around the entire site and lined with gravel. Following completion of the drainage ditch, the site was seeded.

PCB-contamination of the ballast area soil is believed to be associated with the 1984 removal action. At that time, the contents of the pits were stockpiled in the ballast area. The lighting ballasts observed at or near the surface were removed from the area during the characterization activities in 1995. The ballasts were disposed of as potential PCB-contaminated waste material in keeping with all applicable federal, state and local government regulations and guidelines.

Results of the recent investigation performed during the interim action phase indicated that the surface soils at the pits and pits' perimeter areas also have pesticide contamination. Such contamination may be related to soil excavated during the 1984 remedial action and used for backfill in these areas. Those excavated soils were considered as clean fill material at that time.

CMP Pits Operable Unit Compliance History

An RFI/RI characterization and a baseline risk assessment (BRA) were conducted for the unit between 1994 and 1997 (WSRC 1994), and the results were presented in the RFI/RI/BRA report (WSRC 1997). This report was approved by US EPA and SCDHEC in October 1997. An Interim Action Proposed Plan (IAPP) (WSRC 1999b) was approved in March 1999. The IROD was approved in August 1999. The interim action began in December 1999.

III. BASIS FOR THIS IROD AMENDMENT

Information obtained after implementation of the selected interim remedy led to the conclusion that revision of the remedy for each sub-unit is necessary. The information supporting that conclusion follows:

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

- Data from soil samples collected to support the ballast excavation work indicate that the total volume of contaminated soil is in excess of 4000 yd^3. This is significantly greater than the originally estimated volume of 1300 yd^3.

- Analysis of soil data from soil cores, soil gas measurements, and Ribbon NAPL samples collected to support the installation of the SVE system indicates DNAPLs, not a part of the original conceptual site model, may be present. More characterization is needed.

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

- Data from groundwater samples and cone penetrometer test (CPT) lithology pushes collected to support the installation of the SVE system indicates that the hot spot plume is larger and deeper than originally thought. More characterization is needed.

IV. DESCRIPTION OF SIGNIFICANT DIFFERENCES BETWEEN THE SELECTED REMEDY AND THE REVISED REMEDY

The original ballast area interim remedy was to clean up surface soils contaminated with PCBs and pesticides by excavation, shipment, and off-SRS treatment and disposal. The estimated volume of contaminated soil was 1300 yd^3. For the vadose zone, the original interim remedy was removal of VOC contamination from the vadose zone soils beneath the pits by SVE and placement of an asphalt cover to reduce leaching of contaminants into the groundwater and prevent exposure of human and ecological receptors to contaminated soil. The original groundwater interim remedy was to use a combination of AS/SVE to remove the highest concentrations of VOCs from the water table in the vicinity of the pits. Changes in the interim remedies are necessary as a result of site-specific conditions encountered during implementation. These changes are discussed in the following sections.

Ballast Area

Pesticides and PCBs are identified as ballast area surface soil contaminants (WSRC 1997). One interim remedial action objective (IRAO) was established (WSRC 1999a):

- Prevent direct contact with PCB- and pesticide-contaminated surface soils, such that the contaminants of concern are not a continued significant risk to human health and the ecology.

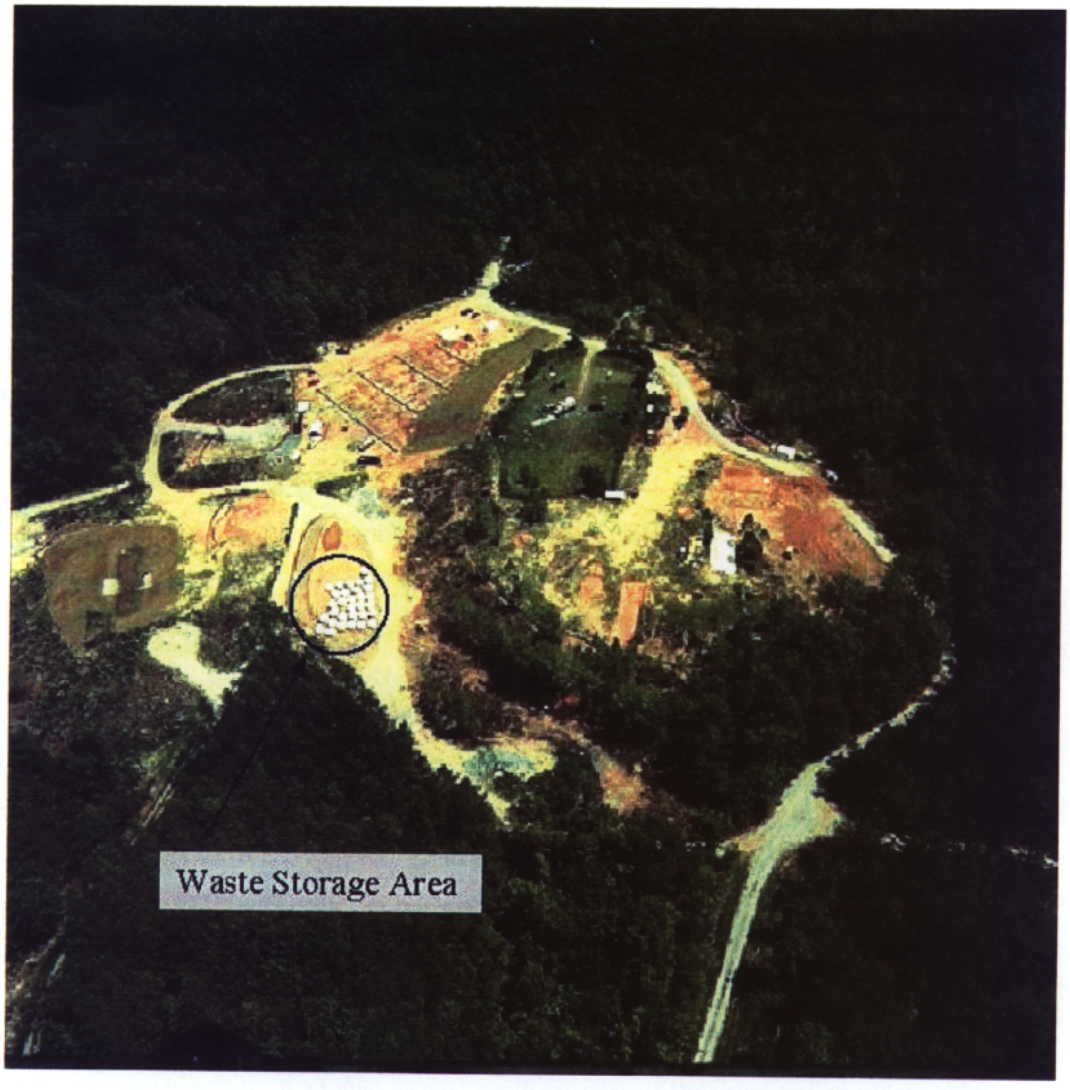
The remedy selected in the IROD for the ballast area was removal of PCB- and pesticide-contaminated soils, treatment in an approved incinerator facility, and disposal at a RCRA Subtitle C facility. After removal of the soil, the area was to be sampled and analyzed to confirm the clean-up goals were met and then backfilled to grade (WSRC 1999a).

Removal of pesticide- and PCB-contaminated soil began in May 2000. Approximately 256 yd^3 of soil was excavated and placed in containers and moved to the waste storage area located within the CMP Pits OU (area of contamination [AOC]) (Figures 3 and 4). Prior to transport for treatment and disposal the excavated soil was analyzed to verify it met waste acceptance criteria. Approximately 216 yd^3, of excavated soil met the waste acceptance criteria and were shipped for treatment and disposal to a commercial RCRA Subtitle C permitted incinerator, in compliance with the CERCLA Offsite Rule. The analysis also showed that Silvex (2,4,5-TP), a RCRA listed waste (F027), was present in approximately 40 yd^3 of soil in the waste storage area. No RCRA Subtitle C treatment and disposal options for environmental media containing Silvex are currently available in the United States because no incinerator in the U.S. has an approved permit to

Figure 3. Ballast Area Waste Storage Area

Excavated soils are stored in Lift-Liner™ bags. Each bag contains approximately eight cubic yards. Here soils are staged awaiting shipment for off-site incineration. 256 yd^3 have been excavated. Excavation has been stopped pending resolution of treatment and disposal issues.

Figure 4. Waste Storage Area Location



Pesticide- and PCB-contaminated soil was excavated from the Ballast Area and containerized. The waste containers were relocated to the waste storage area located within the AOC.

incinerate wastes containing Silvex. This soil will remain in the waste storage area within the CMP Pits OU where it will be properly identified and managed. It will be remediated as part of the final remedy.

Additional sampling and analysis in two areas confirmed Silvex is present (Figure 2). Excavation has ceased until an alternate remedy for the soil can be identified. The contaminated soil volume was originally estimated to be 1300 yd^3. Data from soil samples collected to support the excavation work indicate that the total volume of contaminated soil is in excess of 4000 yd^3 and the extent of contamination has not been completely defined. Additional sampling and analysis is necessary to determine the extent of this contamination.

Because there are no RCRA treatment or disposal facilities currently available that are permitted to receive the Silvex-contaminated soil, and because of the increase in the estimated volume of contaminated soil, the IROD remedy requires revision:

- Soil excavation will be eliminated as part of the interim action, because the presence of Silvex precludes treatment. Interim controls (grass and silt barriers) will be used to reduce erosion. Alternative technologies for on-unit remediation will be evaluated, and the full extent of the contaminated soils will be characterized before a final remedy can be selected for the ballast area soils.

Because the total area of contamination has been reduced as a result of the IROD activity, the exposure potential and the opportunities for bio-uptake and stormwater runoff have been reduced. Deferring removal to the final action does not present an imminent threat to human health and the environment because (1) current access restrictions at SRS prevent residential use of the unit, (2) the unit does not provide a habitat for ecological receptors, and (3) erosion control measures have been put in place to mitigate erosion and distribution of contaminants.

The IRAO for the ballast area soils (to prevent direct contact with PCB- and pesticide-contaminated soils) will be met in the short term through the use of institutional controls at the waste site to prevent human exposure. Ecological risks at the site are mitigated by the fact that this area is now a construction site and not a habitat. Final remedial goals will be determined and met by the final action.

Vadose Zone

High concentrations of VOCs (principally PCE) have been identified in the vadose zone under two of the chemical pits. The lateral extent of this contamination within the vadose zone is confined to the boundary of

these two chemical pits while the vertical extent reaches the water table (WSRC 1997). Pesticides have also been detected in the subsurface soil beneath the pits.

There are two interim remedial objectives (WSRC 1999a):

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

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

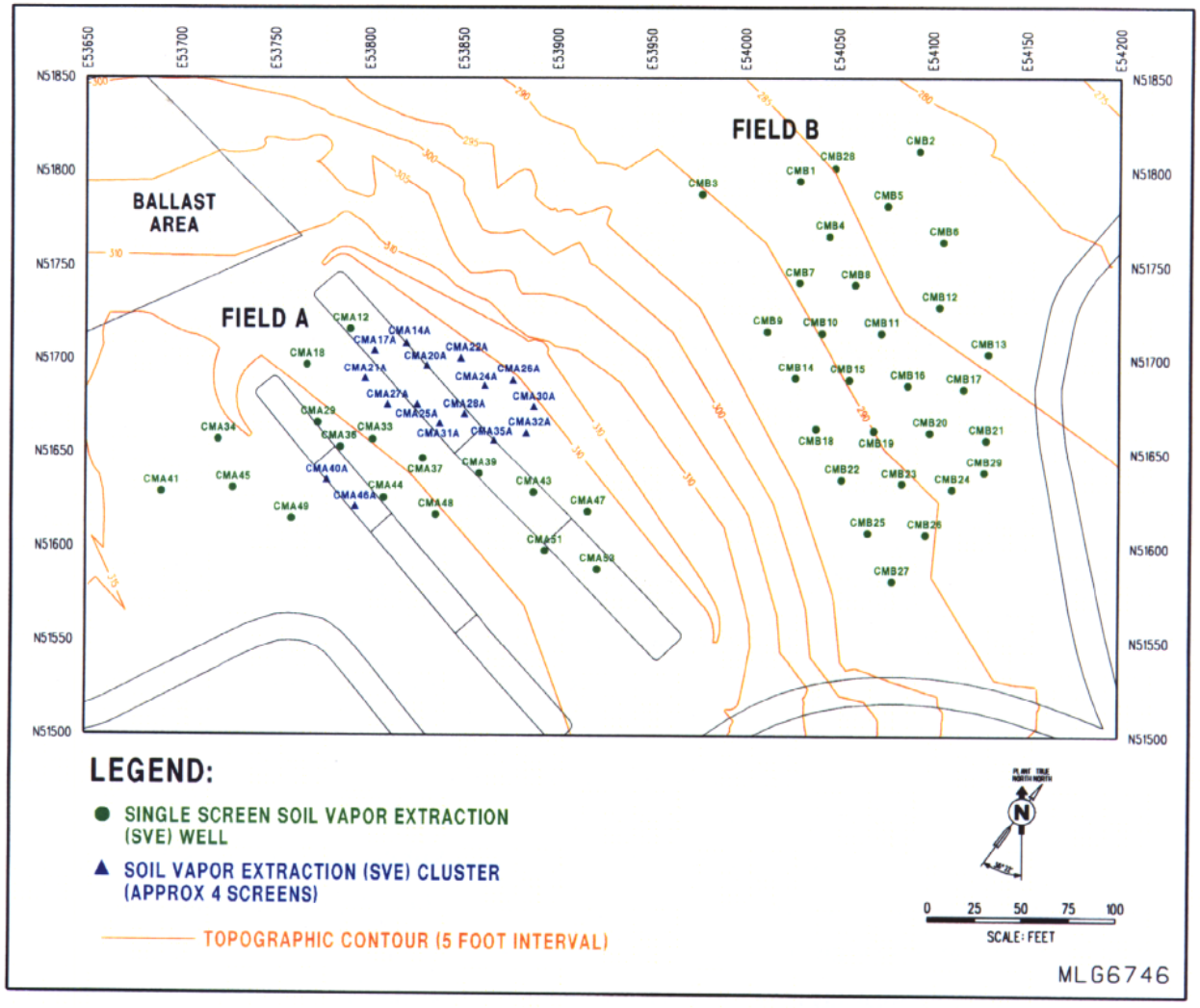
The remedy selected in the IROD consisted of two parts: an SVE system to remove VOC soil contamination beneath the pits area and an asphalt cover over the pits area to control infiltration (WSRC 1999a).

Installation of the SVE system in the pits area is proceeding according to the IROD. Seventy-eight SVE wells have been installed (Figure 5). The SVE treatment unit has been installed. Additional soil investigation at Field A will be performed to bound the VOC contamination greater than 2,000 ug/kg and to determine the extent of the DNAPL. The investigation will be performed per the CMP Pits Data Gap Characterization Sampling and Analysis Plan (WSRC 2001). The results of this investigation will determine the number of additional SVE wells required to achieve the IRAO. The asphalt cover has not been placed.

DNAPL is believed to be present in the vadose zone at the CMP Pits based on results that indicate soil samples contain a greater contaminant mass than can be sustained in the aqueous, solid (sorbed phase), and gaseous phases. Essentially, the contaminant mass is greater than the mass that would exist if all fluid phases were at the solubility limit. The results of soil sampling (wireline sampling) show the maximum PCE concentration in soil was approximately 1200 mg/kg.

Additional data collected per the Data Gap Characterization Sampling and Analysis Plan (WSRC 2001) will be compiled and presented in an RI Addendum. More aggressive remedial technologies may be warranted as part of the final remedy. A CMS/FS, SB/PP, and ROD will be developed to identify an appropriate final remedial action, which may include modification and enhancements to the SVE systems. These will likely be compatible with the SVE system installed as part of this interim remedial action.

Figure 5. Soil Vapor Extraction Well Locations



The IROD remedy will be revised by eliminating installation of the asphalt cover as part of the interim action. This will allow further characterization in the pit area. SVE will be conducted as identified in the IROD.

The expected outcome from the revised interim remedy is identical to the original interim remedy. The expected effectiveness of SVE remains the same.

The IRAOs are to reduce the source and reduce migration. The IRAOs are met by the installation and operation of the SVE system. Removing VOCs from the vadose zone will effectively reduce the source and reduce migration of contamination to groundwater.

Groundwater Hot Spot

The groundwater hot spot beneath and adjacent to the CMP Pits is defined by total VOC contamination in excess of 1,000 ug/L (WSRC 1997).

There is one IRAO (WSRC 1999a):

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

The remedy selected in the IROD for the groundwater hot spot was a combination of AS/SVE (Figures 6 and 7) to remove the highest concentrations of VOCs from the water table in the vicinity of the pits (Figure 2) (WSRC 1999a). The concept of AS/SVE for groundwater remediation is depicted in Figure 8. Air pumped into the sparge well bubbles through the contaminated groundwater and removes VOCs in much the same way that an air stripper works. The SVE well vacuums the air out to the vadose zone and removes the VOCs from the subsurface. The SVE portion of the remedial system has been installed. Installation of the air sparge portion of the system has been halted due to site-specific conditions.

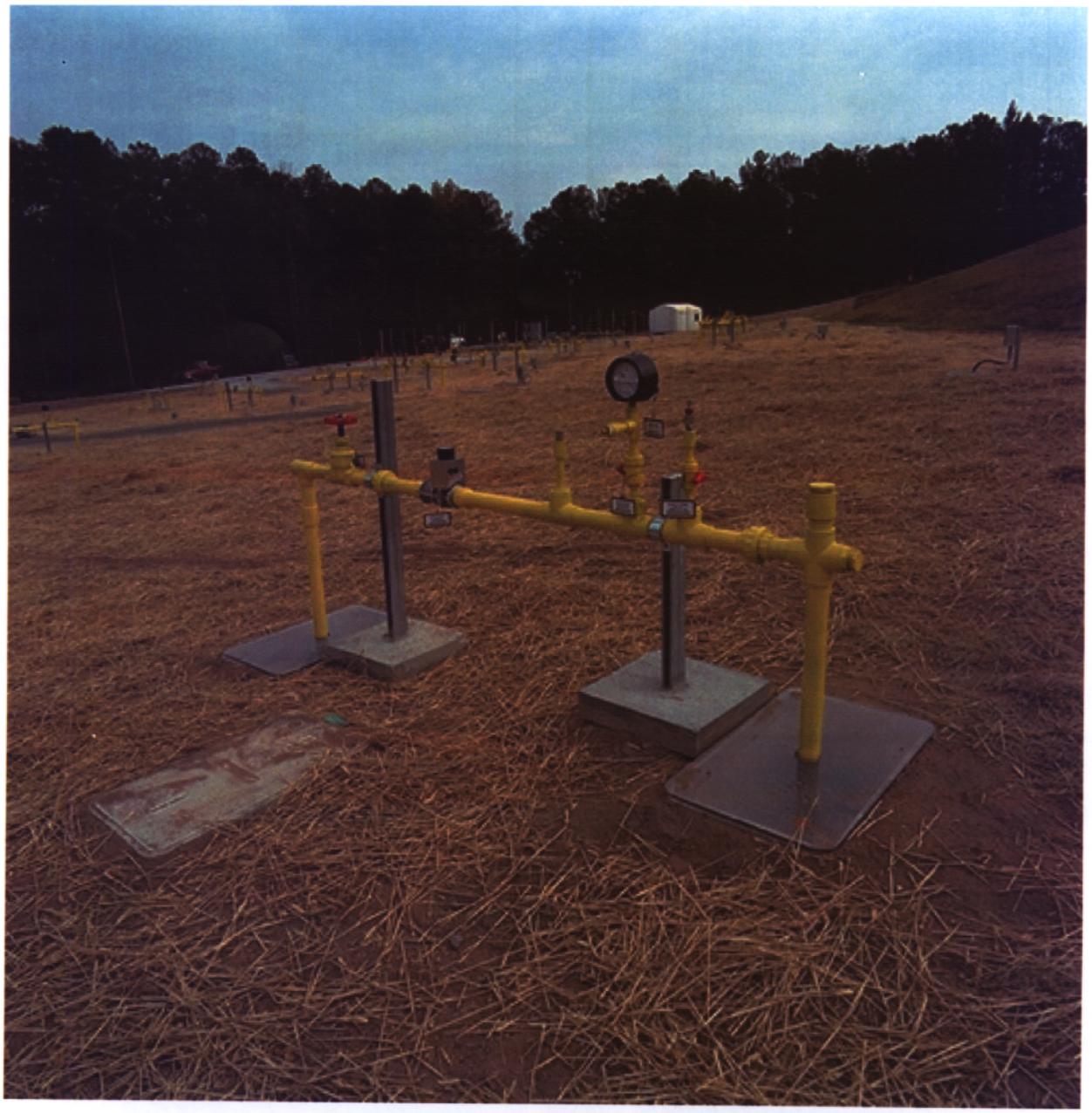
The water table in the vicinity of the CMP pits has dropped significantly (over ten feet in some locations) since the characterization of the site and the selection of the interim remedy. Figure 9 shows that at current water table levels, there is not enough water to sparge in the zone originally targeted for remediation.

Field testing indicates that air sparging deeper in the groundwater below the clay layer will not work because the clay layer is too impermeable to allow gas bubbles to travel through it (Figure 10). Thus, the combination of decreased water levels and the presence of the low permeability clay layer make it infeasible to deploy the selected technology.

Figure 6. Field B Construction

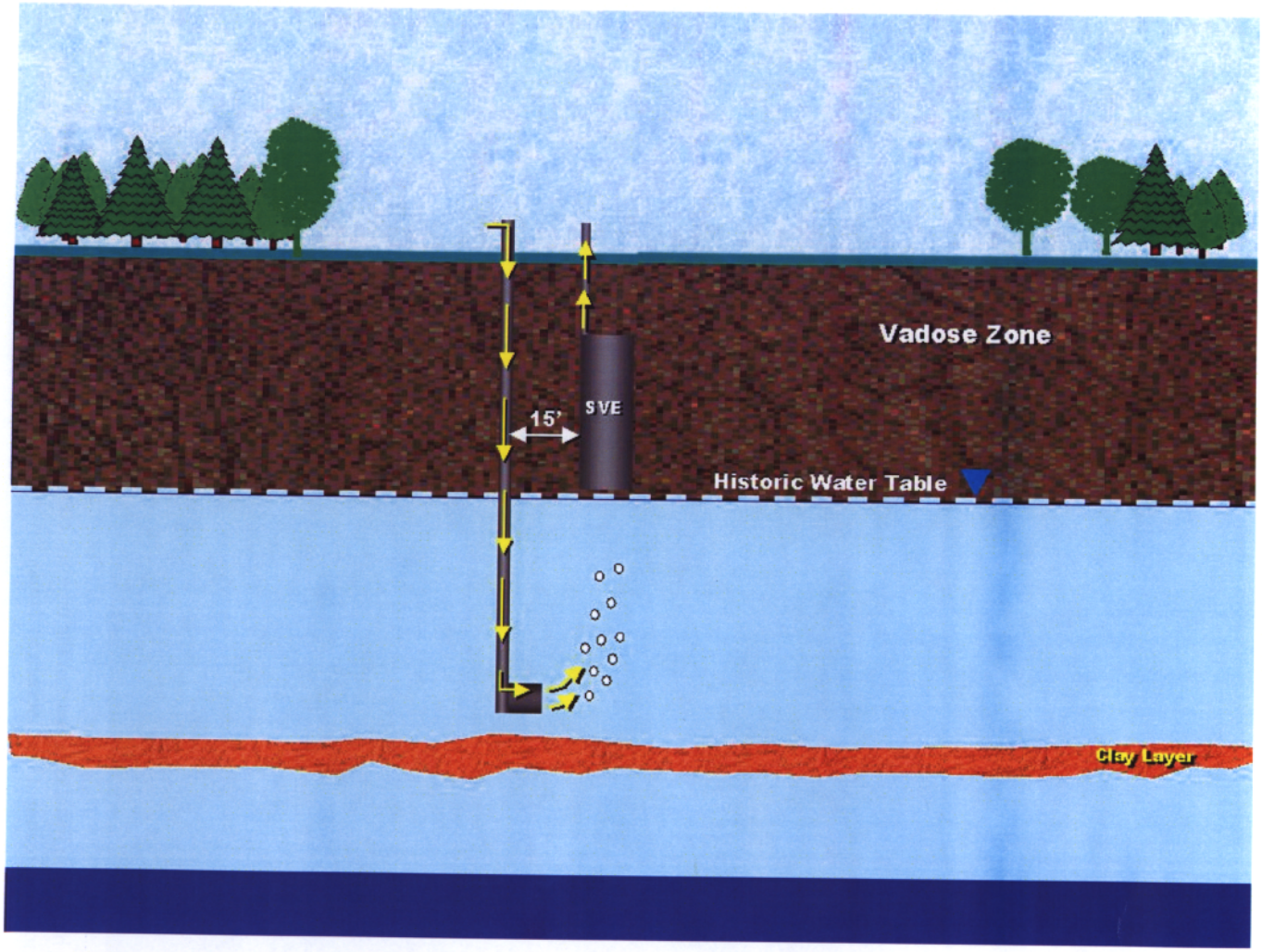
This photograph was taken during construction of the AS/SVE remedial system in Field B. The open trenches show the location of the underground piping for the remedial system. The cement pad is the location for one of the treatment units.

Figure 7. Soil Vapor Extraction Well Piping (Field B)



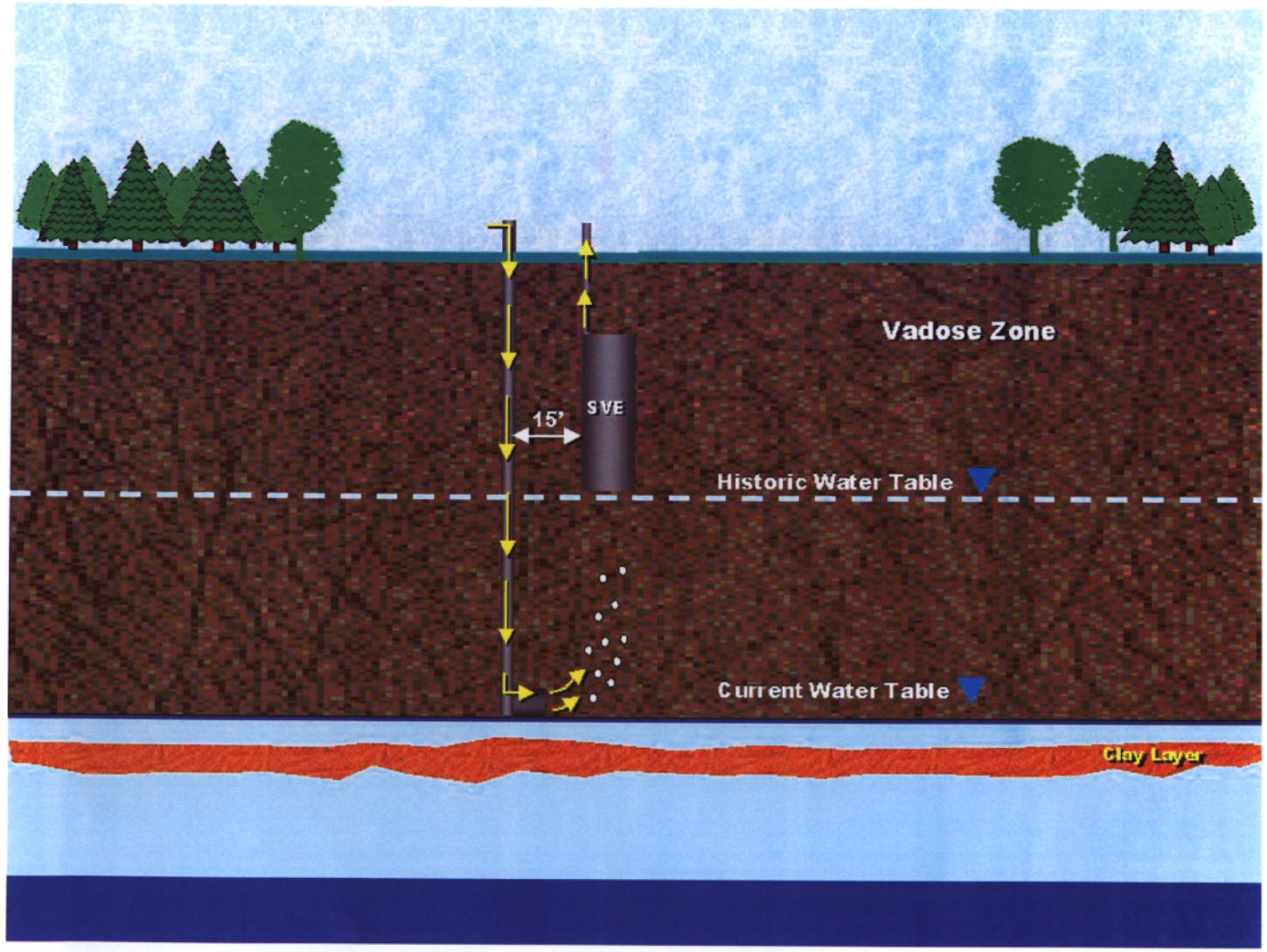
SVE wells have been installed as part of the interim action. Each well is screened in the subsurface and plumbed to a vacuum extraction treatment unit. Screen locations have been chosen to target the highest concentrations of VOCs in the vadose zone.

Figure 8. Groundwater Remediation Concept



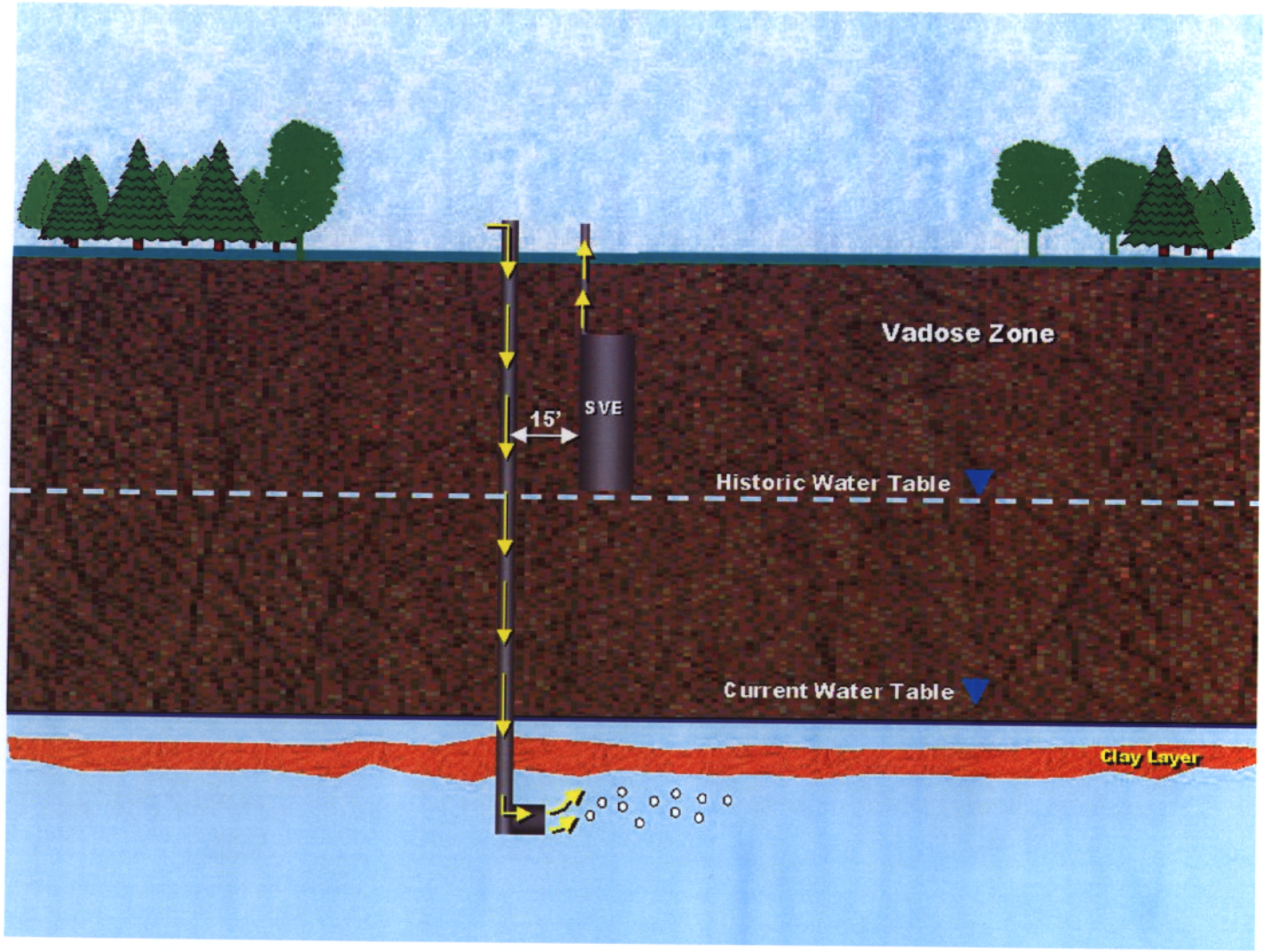
This cartoon depicts the concept of AS/SVE for groundwater remediation. Air pumped into the sparge well bubbles through the contaminated groundwater and removes VOCs in much the same way that an air stripper works. The SVE well vacuums the air out of the vadose zone and removes the VOCs from the subsurface.

Figure 9. Current Groundwater Conditions



This cartoon depicts the current water table conditions at CMP Pits. There is not enough water above the clay layer to sparge. In addition, testing indicates that sparging below the clay layer will not work because the clay layer is too impermeable to allow gas bubbles to move through it.

Figure 10. Tracer Test Result



Tracer test results show that sparging below the clay layer will not work because the clay layer is too impermeable to allow gas bubbles to move through it.

Groundwater remediation will be eliminated as part of the interim action. In addition, data from groundwater and CPT samples collected in support of installing the AS/SVE system indicate that the groundwater hot spot plume is larger and deeper than originally thought. More characterization and an evaluation of alternate remedies will be required before a final action for groundwater can be identified.

The IRAO (treat groundwater in the vicinity of the pits) will not be met in this interim action. However, SVE wells have been screened in the zone that was previously saturated with contaminated water. This will allow VOCs that may have been stranded by the retreating water level to be removed by SVE. Final remedial goals will be established and met as part of the final action.

Changes in the Expected Outcome That Will Result from the IROD Amendment

This amendment to the IROD will not result in any permanent impact to the expected outcome for the CMP Pits interim remedy actions. The final remedy will address all remaining contamination at the unit and issues such as final cleanup levels and institutional controls.

The remedy selected in the IROD was partially implemented. However, unforeseen circumstances were encountered during implementation of the remedial action which necessitate revision of the remedy. Table 1 compares the interim and revised interim remedies.

Post IROD Documentation

Consistent with Section 4.3.2 of the Interim Corrective Measures Implementation/Remedial Design/Remedial Design Report/Remedial Action Work Plan (ICMI/RD/RDR/RAWP) (WSRC 2000), all major changes to the remedial design were communicated to US EPA and SCDHEC prior the field implementation of those changes. Similar additional design changes will be necessary, consistent with the revised scope of the interim remedial action as described in pertinent sections of this IROD Amendment.

Considering the ongoing nature of the design changes, all changes from the original design (per the approved ICMI/RD/RDR/RAWP, Rev. 1), made during the field implementation of the interim action for this project will be addressed in the Interim Post-Construction Report document.

Table 1. Expected Outcome for Each Alternative

Sub-unit	Interim Remedy	Revised Interim Remedy
Ballast Area soils	Excavate and Dispose Off-SRS all PCB-contaminated soil at concentrations above RGs	Eliminate further excavation. Evaluate technologies for on-unit treatment
Vadose Zone Soils	Treat soils beneath the pits area using SVE Install an asphalt cover over the pits area for infiltration control	Treat soils beneath the pits area using SVE (No change) Eliminate installation of an asphalt cover
Groundwater Hot Spot	Treat the groundwater in the area where the total VOC concentration exceeds 1,000 ug/L using an AS/SVE system	Remove air sparge as a component of the remediation system. Complete characterization of the groundwater plume. Evaluate alternatives for groundwater remediation.

Waste Management

Environmental media (soil and water) at the CMP Pits contains RCRA listed waste that is subject to applicable RCRA requirements until determined to no longer contain hazardous waste. Environmental media and/or secondary waste will be determined to no longer contain listed hazardous waste by direct comparison to the health-based limits (HBLs) in Table 2.

Soil HBLs in Table 2 are based upon the lower of (1) the EPA Region IX Preliminary Remediation Goals for the residential exposure scenario or (2) the RCRA toxicity characteristic level (due to the 20-fold dilution factor inherent in the TCLP analysis of solids, the RCRA TCLP values are multiplied by 20). Due to analytical method limitations, groundwater (as defined by South Carolina Regulation 61-68) HBLs are based upon the higher of (1) Safe Drinking Water Act MCLs or (2) US EPA RCRA (SW-846) analytical minimum detection levels (MDLs).

Management options for all types of wastes anticipated to be generated during the implementation of this IROD Amendment and characterization to support final remediation are contained in Table 3 for waste streams resulting from soil-related activities and Table 4 for waste streams resulting from groundwater-related activities. Consistent with this IROD Amendment, all soils will remain uncontainerized on the unit pending completion of the RCRA/CERCLA process. Secondary waste would remain on-unit pending final remedial decision only if no off-unit treatment options were available (i.e. presence of F027 above HBLs).

V. EVALUATION OF ALTERNATIVES

Evaluation Criteria

In selecting the IROD remedy, nine criteria derived from the statutory requirements of CERCLA Section 121 were used to evaluate and compare the interim remedy approved in the IROD (WSRC 1999a) and the revised remedy presented in this IROD Amendment. The interim remedy and the revised interim remedy for each sub-unit are presented and compared in Table 1. Seven of the criteria are used to evaluate all alternatives, based on human health and environmental protection, cost, feasibility, and implementability issues. Comparative evaluations of all the remedial action alternatives against these seven

Table 2. CMP Pits Environmental Media Listed Wastes

Hazardous Contaminant	Waste Code	Soil HBL (mg/kg)	Ground-water HBL (mg/l)	CAS No.
Freon 11 (Trichlorofluoromethane)	F001, F002	390	0.001*	75-69-4
Methylene chloride	F002, U080	8.9	0.001*	75-09-2
TCE (Trichloroethylene)	U228, F001, F002	2.8	0.005	79-01-6
PCE (Tetrachloroethylene)	U210, F001, F002	5.7	0.005	127-18-4
Toluene	U220, F005	520	1.0	108-88-3
Lindane (Gamma-HCH)	U129	0.44	0.002*	58-89-9
Chlordane	U036	0.6 TCLP**	0.002	12789-03-6
Endrin	P051	0.4 TCLP**	0.002	72-20-8
Toxaphene	P123	0.44	0.005	8001-35-2
DDT	U061	1.7	0.002*	50-29-3
DDD	U060	2.4	0.002*	72-54-8
Dieldrin	P037	0.03	0.002*	60-57-1
Heptachlor	P059	0.11	0.002*	76-44-8
Methoxychlor	U247	200 TCLP**	0.04	72-43-5
1,4 Dioxane	U108	44	0.0061	123-91-1
2,4-D (Dichlorophenoxyacetic Acid)	F027	200 TCLP **	0.07	94-75-7
2,4,5-TP (Silvex)	F027	20 TCLP **	0.05	93-72-1
2,4,5-Trichlorophenol	F027	6,100	0.002*	95-95-4
2,4,5-T (Trichlorophenoxyacetic Acid)	F027	610	0.0061	93-76-5

*RCRA MDL used in lieu of MCL
** RCRA toxicity characteristic level used

Table 3. Contaminated Soil and Secondary Waste Management

Environmental Media	Media Management	Secondary Waste & Equipment	Secondary Waste Disposal Options
Soils above HBLs (see Table 2)	Manage uncontainerized on unit pending final remedial decision	Solids (1) above soils HBLs	1) Manage off unit as hazardous waste; 2) Manage on unit pending final remedial decision
		Solids (1) below soils HBLs	Based on the Contained-In Policy, waste would no longer contain RCRA listed waste and could be disposed as non-hazardous waste.
		Slurries (2) above soils HBLs	1) Settling followed by M-1 Stripper; 2) Discharge to contaminated soil stockpile for future treatment; 3) Containerize on unit pending final remedial decision; 4) Manage off unit as hazardous waste
		Slurries (2) below soil HBLs	Discharge to ground
		Equipment	Decon and verify below soils HBLs
Soils below HBLs (see Table 2)	Managed in place on unit	Solids (1)	Based on the Contained-In Policy, waste would no longer contain RCRA listed waste and could be disposed as non-hazardous waste.
		Slurries (2)	Discharge to ground
		Equipment	Based on Contained-In Policy, equipment would not contain listed waste and will be released for reuse.

Note 1: Solid secondary waste is defined as personal protective equipment (PPE), SVE filters, job control waste, etc. generated while performing soils, vadose unit, and saturated unit investigation and operation.

Note 2: Slurries include well installation slurries, well abandonment slurries, and well development water with Total Suspended Solids (TSS) in excess of 100 ppm, decontamination fluids from vadose unit activities, and condensate from vadose unit SVEs.

Table 4. Contaminated Groundwater and Secondary Waste Management

Environmental Media	Media Disposal Options	Secondary Waste & Equipment	Secondary Waste Disposal Options
Groundwater above HBLs (see Table 2)	1) Treat at M-1 air stripper; 2) Discharge to contaminated soil stockpile for future treatment; 3) Manage off unit as a hazardous waste	Solids (3) above soils HBLs	1) Manage off unit as hazardous waste; 2) Manage on unit pending final remedial decision
		Solids (3) below the soils HBLs	Based on the Contained-In Policy, waste would no longer contain a listed waste and could be disposed as a non-hazardous waste.
		Liquids (4) above groundwater HBLs	1) M-1 stripper; 2) Discharge to contaminated soil stockpile for future treatment; 3) Containerize on unit pending final remedial decision; 4) Manage off unit as hazardous waste
		Liquids (4) below groundwater HBLs	Discharge to the ground
		Equipment	Decon and verify below soils HBLs
Groundwater below HBLs (see Table 2)	Discharge to the ground	Solids (3)	Based on the Contained-In Policy, waste would no longer contain a listed waste
		Liquids (4)	Discharge to ground
		Equipment	Based on the Contained-In Policy, equipment would not contain listed waste and will be released for reuse.

Note 3: Solid secondary waste is defined as PPE and job control waste generated while performing groundwater sampling and characterization.

Note 4: Liquid secondary waste is defined as purgewater generated while performing groundwater sampling and characterization and well development water where TSS is less than 100 ppm.

criteria are detailed in the IAPP (WSRC 1999a). The selected interim remedy was further evaluated based on the final two criteria: state acceptance and community acceptance. The criteria are as follows:

- Overall Protection of Human Health and the Environment
- Compliance with applicable or relevant and appropriate requirements (ARARs)
- Long-Term Effectiveness and Permanence
- Reduction of Toxicity, Mobility, or Volume through Treatment
- Short-Term Effectiveness
- Implementability
- Cost
- State Acceptance
- Community Acceptance

Comparative Alternative Analysis

The interim remedy and the revised remedy were evaluated against the nine criteria and their effectiveness in meeting IRAOs. The action-specific, chemical-specific, and location-specific ARARs are shown in Table 5. Key ARARs are highlighted in Table 5. The summaries of this evaluation for the revised interim remedy for the ballast area, vadose zone, and groundwater hot spot are presented in Tables 6, 7, and 8, respectively.

The selected interim remedy for the ballast area, Excavation/Disposal of Ballast Area soil, was determined to be protective of human health and the environment since it removed the PCB- and pesticide-contaminated soil. Because the total area of contamination has been reduced as a result of the IROD activity, the exposure potential and the opportunities for bio-uptake and stormwater runoff have been reduced. Deferring removal to the final action does not present an imminent threat to human health and the

Table 5. Chemical-, Action-, Location- Specific ARARs

Citation(s)	Status	Requirement Summary	Reason for Inclusion	Applicable Remedial Alternative
Chemical				
40 CFR 141 - MCLs and MCLGs and SC R.61-58.5 - MCLs and MCLGs (1)	**Relevant and Appropriate**	**MCLs and MCLGs for groundwater that may be a source of drinking water**	**MCLs should generally be met for cleanup of groundwater under the CERCLA program. MCLs are an ARAR that is relevant but will not be met due to the interim remedy waiver.**	**Groundwater Hot Spot: Evaluate alternatives for groundwater remediation as part of a feasibility study**
40 CFR 143.3 Secondary Drinking Water Standards	Relevant and Appropriate	Establishes levels for contaminants that affect the aesthetic qualities of drinking water	Secondary Drinking Water Standards potentially relevant for setting remediation levels	Groundwater Hot Spot: Evaluate alternatives for groundwater remediation as part of a feasibility study
40 CFR 261 and SC R. 61-79.261 Identification and Listing of RCRA Hazardous Waste	Applicable	Defines criteria for determining whether a waste is RCRA hazardous waste.	All waste media that are actively managed must be tested to determine if they are RCRA characteristic wastes. Discarded pesticides and chemicals are RCRA listed hazardous wastes.	Ballast Area: Evaluate technologies for on unit treatment in a feasibility study and propose an alternative remedial action for the contaminated soils as part of the final action.
40 CFR 268 Land Disposal Restrictions (LDRs) (RCRA)	Applicable	Prohibits land disposal and specifies treatment standards for specific RCRA hazardous wastes	Movement of excavated materials from their original location triggers the RCRA LDRs. Pesticides and solvents are RCRA listed wastes.	Ballast Area: Evaluate technologies for on unit treatment in a feasibility study and propose an alternative remedial action for the contaminated soils as part of the final action.
40 CFR 761, (TSCA) (1)	**Relevant and Appropriate**	**Identifies cleanup levels and disposal requirements for cleaning, decontaminating, or removing PCB remediation waste.**	**§761.61(a)(4)(I)(A) identifies <1mg/kg as the cleanup level for high occupancy areas without further conditions. Requirements for water are in §761.79(b)(1). Disposal requirements specified in §761.61(a)(5)(i)(B)(2)(ii), §761.61(a)(5)(i)(B)(2)(iii) or §761.61(b)(2)(i). EPA-IV policy consistent with §761.61(c) allows storage of containerized/packaged PCB bulk remediation waste up to 180 days from containerization within AOC.**	**Ballast Area: Evaluate technologies for on unit treatment in a feasibility study and propose an alternative remedial action for the contaminated soils as part of the final action.**
SC R.61-62.5 Air Quality Standards	Applicable	Establishes air quality standards for emissions	Standard 2 Toxic Air Pollutants and Standard 8 Ambient Air Quality Standards	Vadose Zone: Proceed with the operation of the SVE system and evaluate additional remedies, such as a cover system, as part of the final action

Table 5. Chemical-, Action-, Location- Specific ARARs (Continued)

Citation(s)	Status	Requirement Summary	Reason for Inclusion	Applicable Remedial Alternative
SC R.61-68 Water Classification	Relevant and Appropriate	States official classified water uses for all surface and groundwater in South Carolina.	Mandates meeting MCLs for groundwater unless a Mixing Zone is established. Groundwater Mixing Zone guidance allows developing alternative compliance levels for groundwater	Vadose Zone: Proceed with the operation of the SVE system and evaluate additional remedies, such as a cover system, as part of the final action
Action				
40 CFR 50.6, Federal Air Regulations	Applicable	The concentration of particulate matter (PM_{10}) in ambient air shall not exceed 50 $\mu g/m^3$ (annual arithmetic mean) or 150 $\mu g/m^3$ (24-hour average concentration).	Earth-moving activities will generate airborne dust that will have the potential to exceed the levels specified. Dust suppression will likely be required to minimize dust emissions.	Ballast Area: Evaluate technologies for on unit treatment in a feasibility study and propose an alternative remedial action for the contaminated soils as part of the final action. Vadose Zone: Proceed with the operation of the SVE system and evaluate additional remedies, such as a cover system, as part of the final action
SC R.61-9 NPDES Permits	Applicable	Requires notification of intent to discharge storm water from construction associated with industrial activity that will result in a land disturbance of 5 acres or more and/or industrial activities and sets the requirements for the control of storm water discharges	Potentially applicable if stormwater is discharged during construction activities.	Ballast Area: Evaluate technologies for on unit treatment in a feasibility study and propose an alternative remedial action for the contaminated soils as part of the final action. Vadose Zone: Proceed with the operation of the SVE system and evaluate additional remedies, such as a cover system, as part of the final action
SC R.61-62.1 Air Permit Requirements	Applicable	Requires Construction and Operating permits for sources of air pollution	SVE unit require permits for construction and operation	Vadose Zone: Proceed with the operation of the SVE system and evaluate additional remedies, such as a cover system, as part of the final action
SC R.61-62.6 Fugitive Dust	Applicable	Fugitive particulate material shall be controlled	Construction activities shall minimize fugitive particulate emissions. Earth-moving activities have the potential to generate airborne particulate matter	Ballast Area: Evaluate technologies for on unit treatment in a feasibility study and propose an alternative remedial action for the contaminated soils as part of the final action. Vadose Zone: Proceed with the operation of the SVE system and evaluate additional remedies, such as a cover system, as part of the final action

Table 5. Chemical-, Action-, Location- Specific ARARs (Continued)

Citation(s)	Status	Requirement Summary	Reason for Inclusion	Applicable Remedial Alternative
SC R61-71, Well Construction Standards	Applicable	Prescribes minimum standards for the construction of groundwater wells	Standards for installation and abandonment of groundwater.	Vadose Zone: Proceed with the operation of the SVE system and evaluate additional remedies, such as a cover system, as part of the final action
SC R.61-67 Standards for Wastewater Facility Construction	Applicable	Permits to construct wastewater treatment and transportation systems. Permit to operate prior to startup and licensing of operators.	SVE units require permit to operate.	Vadose Zone: Proceed with the operation of the SVE system and evaluate additional remedies, such as a cover system, as part of the final action
SC R.72-300 Standards for Stormwater Management and Sediment Reduction.	Applicable	Stormwater management and sediment control plan for land disturbances	Excavation activities require an erosion control plan.	Ballast Area: Evaluate technologies for on unit treatment in a feasibility study and propose an alternative remedial action for the contaminated soils as part of the final action. Vadose Zone: Proceed with the operation of the SVE system and evaluate additional remedies, such as a cover system, as part of the final action
29 CFR 1910 Occupational Worker Safety (OSHA)	Applicable	Identifies health and safety requirements for remediation workers.	Worker activities involving hazardous materials must be conducted according to a project health and safety plan.	Ballast Area: Evaluate technologies for on unit treatment in a feasibility study and propose an alternative remedial action for the contaminated soils as part of the final action. Vadose Zone: Proceed with the operation of the SVE system and evaluate additional remedies, such as a cover system, as part of the final action
Location				
16 USC 703	Applicable	The remedial action must be conducted in a manner that minimizes impacts to migratory birds and their habitats.	Migratory bird populations may be present in the vicinity of the SRS.	Ballast Area: Evaluate technologies for on unit treatment in a feasibility study and propose an alternative remedial action for the contaminated soils as part of the final action. Vadose Zone: Proceed with the operation of the SVE system and evaluate additional remedies, such as a cover system, as part of the final action

Table 5. Chemical-, Action-, Location- Specific ARARs (Continued)

Citation(s)	Status	Requirement Summary	Reason for Inclusion	Applicable Remedial Alternative
Executive Order 11990	Applicable	The remedial action must minimize the destruction, loss, or degradation of wetlands.	Wetlands are located in the vicinity of the CMP Pits; however, they will be unaffected by this action.	Ballast Area: Evaluate technologies for on unit treatment in a feasibility study and propose an alternative remedial action for the contaminated soils as part of the final action. Vadose Zone: Proceed with the operation of the SVE system and evaluate additional remedies, such as a cover system, as part of the final action

Note 1. Key ARARs are highlighted in bold type.

Table 6. Summary of the Ballast Area Remedy Evaluation

Comparative Alternative Analysis for the Ballast Area Surface Soils		
Criterion	**IROD Remedy Excavation/Disposal of 4000 yd^3**	**Revised Remedy Limited Excavation/Disposal of 216 yd^3**
Overall Protection of Human Health and the Environment		
Human Health	Protective	Partially protective; not all contaminated soil removed; final action will be protective
Environment	Protective	Partially protective; not all contaminated soil removed; final action will be protective
Control of Source Release	Controlled	Partial control; size of contaminated area reduced
Compliance With ARARs		
Chemical-specific	Meets ARARs, TSCA, Disposal of PCBs High Occupancy, and RGs without further conditions	Compliance with ARARs deferred to final remedy
Location-specific	N/A	N/A
Action-specific	Does not meet ARARs. RCRA regulation for hazardous waste treatment not met	Compliance with ARARs deferred to final remedy
Long-Term Effectiveness and Permanence		
Magnitude of residual risks	Human Health and Ecological remedial goals met, no land use control required	Risks to future resident reduced; residual risks will be addressed under a final ROD
Adequacy of controls	Adequate	Adequate for limited area of soil excavation
Permanence	Permanent	Permanent for limited area of soil excavation
Reduction of Toxicity, Mobility, or Volume through Treatment		
Treatment process used and materials treated	PCB- and pesticide-contaminated soil to be incinerated.	PCB- and pesticide-contaminated soil from limited excavation has been treated (incinerated).
Degree of expected reduction in toxicity, mobility, or volume	Excavation would remove all soil contamination	Limited excavation has removed some soil contamination
Amount of hazardous materials destroyed or treated	Would treat 4000 yd^3 of Ballast Area soil and destroy 8.8 kg of contaminants	Would treat approximately 216 yd^3 of ballast area soil and destroy 3.6 kg of contaminants
Degree to which treatment is irreversible	Contaminant removal and treatment are irreversible	Contaminant removal and treatment are irreversible for the limited excavation area.

Table 6. Summary of the Ballast Area Remedy Evaluation (Continued)

Comparative Alternative Analysis for the Ballast Area Surface Soils		
Criterion	**IROD Remedy** **Excavation/Disposal**	**Revised Remedy** **Limited Excavation/Disposal**
Reduction of Toxicity, Mobility, or Volume through Treatment (Continued)		
Types and quantities of residuals remaining after treatment	Sampling derived waste (minor volumes)	Remaining 3000+ yd^3 of contaminated soil
Short-term effectiveness		
Risks to workers	Moderate; potential risk due to inhalation or direct contact during soil excavation; disturbance and handling of contaminated soil; OSHA and applicable work safety and health regulations will be followed	Moderate; potential risk due to inhalation or direct contact during soil excavation; disturbance and handling of contaminated soil; OSHA and applicable work safety and health regulations will be followed
Risk to community	Minimal; off-site transport of contaminated soil	Minimal; off-site transport of contaminated soil
Risk to environment	Moderate; potential risk due to soil erosion during Ballast Area excavation; spills during off-site transport and disposal of soils	Moderate; potential risk due to soil erosion during Ballast Area excavation; spills during off-site transport and disposal of soils
Time to achieve remedial action objectives	9 months	Not until final remedy (2005 or later)
Implementability		
Availability of materials, equipment, contractors	Equipment available to excavate contaminated soil. No incinerator permitted for Silvex.	Readily available
Ability to construct and operate the technology	Well demonstrated and commonly used technologies	Well demonstrated and commonly used technologies
Ability to obtain permits/approvals from other agencies	Not implementable. Treatment of soils containing Silvex is not permitted.	Implementable
Ability to monitor effectiveness of remedy	Implementable; soil screening required during excavation	Implementable; soil screening required during excavation
Ease of undertaking additional actions (if required)	Compatible	Compatible
Time to implement	9 months	2 months
Cost		
Present Worth Capital Cost	$4,600,000	$1,366,000
Present Worth O&M Cost	$0	$0
Total Present Worth Cost	$4,600,000	$1,366,000

Table 7. Summary of the Vadose Zone Remedy Evaluation

Comparative Alternative Analysis for the Pits Area Vadose Zone		
Criterion	**IROD Remedy Soil Vapor Extraction with Asphalt Cover**	**Revised Remedy Soil Vapor Extraction**
Overall Protection of Human Health and the Environment		
Human Health	Protective	Protective
Environment	Protective	Protective
Compliance With ARARs		
Chemical-specific	Meets ARARs. SC Air Pollution Regulations and Standards, applied to Construction and Operating Permit, Visible Emissions, and Ambient and Toxic Air Pollutant Requirements	Meets ARARs. SC Air Pollution Regulations and Standards, applied to Construction and Operating Permit, Visible Emissions, and Ambient and Toxic Air Pollutant Requirements
Location-specific	Meets ARARs. Measures required to prevent impact to neighboring wetlands (Pen Branch)	Meets ARARs. Measures required to prevent impact to neighboring wetlands (Pen Branch)
Action-specific	Meets ARARs. SC Toxic Air Pollutant regulations apply to air emissions; SC Fugitive Particulate regulations apply to dust emissions; SC Construction and Operating permits apply to well construction; RCRA LDRs for all PPE and treatment residues contaminated above health based levels	Meets ARARs. SC Toxic Air Pollutant regulations apply to air emissions; SC Fugitive Particulate regulations apply to dust emissions; SC Construction and Operating permits apply to well construction; RCRA LDRs for all PPE and treatment residues contaminated above health based levels
Long-Term Effectiveness and Permanence		
Magnitude of residual risks	Residual risks reduced over current conditions; soil contamination reduced 100-fold.	Residual risks reduced over current conditions; soil contamination reduced 100-fold.
Adequacy of controls	Adequate as long as institutional controls are continued	Adequate as long as institutional controls are continued
Permanence	Permanent	Permanent
Reduction of Toxicity, Mobility, or Volume through Treatment		
Treatment process used and materials treated	SVE of Pits Area Soils to remove VOCs	SVE of Pits Area Soils to remove VOCs
Degree of expected reduction in toxicity, mobility, or volume	SVE would reduce volume (mass) of contaminants in Pits Area soil, significantly reduce mobility to groundwater and reduce discharge to air through treatment, asphalt cover will reduce mobility	SVE would reduce volume (mass) of contaminants in Pits Area soil, significantly reduce mobility to groundwater and reduce discharge to air through treatment
Amount of hazardous materials destroyed or treated	Would treat 9,900 yd^3 of Pits Area soil and reduce volume (mass) by 14,240 kg	Would treat 9,900 yd^3 of Pits Area soil and reduce volume (mass) by 14,240 kg

Table 7. Summary of the Vadose Zone Remedy Evaluation (Continued)

Comparative Alternative Analysis for the Pits Area Vadose Zone		
Criterion	**IROD Remedy Soil Vapor Extraction with Asphalt Cover**	**Revised Remedy Soil Vapor Extraction**
Short-term effectiveness		
Degree to which treatment is irreversible	Contaminant removal and treatment are irreversible	Contaminant removal and treatment are irreversible
Types and quantities of residuals remaining after treatment	SVE air emissions (300 scfm); condensate (1 gallons per day [gpd]); soil cuttings (30 yd^3)	SVE air emissions (300 scfm); condensate (1 gpd); soil cuttings (30 yd^3)
Risks to workers	Minimal; potential risk due to inhalation or direct contact during extraction point installation; potential vapor inhalation during SVE system operation; OSHA and applicable work safety and health regulations will be followed	Minimal; potential risk due to inhalation or direct contact during extraction point installation; potential vapor inhalation during SVE system operation; OSHA and applicable work safety and health regulations will be followed
Risk to community	Negligible; no public areas near unit	Negligible; no public areas near unit
Risk to environment	Minimal; potential risk during direct push installation of SVE points; permitted air emissions	Minimal; potential risk during direct push installation of SVE points; permitted air emissions
Time to achieve remedial action objectives	72 months	72 months
Implementability		
Availability of materials, equipment, contractors	Readily available	Readily available
Ability to construct and operate the technology	Straightforward, commonly used technologies	Straightforward, commonly used technologies
Ability to obtain permits/approvals from other agencies	Implementable; air emissions permit required; 5-year remedy reviews required	Implementable; air emissions permit required; 5-year remedy reviews required
Ability to monitor effectiveness of remedy	Readily implementable; groundwater monitoring required; air quality monitoring of SVE emissions required	Readily implementable; groundwater monitoring required; air quality monitoring of SVE emissions required
Ease of undertaking additional actions (if required)	Not completely incompatible; SVE wells would penetrate existing cap requiring placement of an asphalt cover over the site. Further characterization work wold be more costly and difficult	Compatible
Time to implement	12 months construct/test	12 months construct/test

Table 7. Summary of the Vadose Zone Remedy Evaluation (Continued)

Comparative Alternative Analysis for the Pits Area Vadose Zone		
Criterion	**IROD Remedy Soil Vapor Extraction with Asphalt Cover**	**Revised Remedy Soil Vapor Extraction**
Cost		
Present Worth Capital Cost	$674,000	$3,030,000
Present Worth O&M Cost	$469,000	$510,000
Total Present Worth Cost	$1,143,000	$3,530,000

Table 8. Summary of the Groundwater Hot Spot Remedy Evaluation

Comparative Alternative Analysis for the Pits Area Groundwater Hot Spot		
Criterion	**IROD Remedy Air Sparging with Soil Vapor Extraction**	**Revised Remedy No Further Action**
Overall Protection of Human Health and the Environment		
Human Health	Protective if site-specific conditions make air sparging implementable.	Not protective. Compliance deferred to final remedy
Environment	Protective if site-specific conditions make air sparging implementable.	Not protective. Compliance deferred to final remedy
Compliance With ARARs		
Chemical-specific	Protective if site-specific conditions make air sparging implementable.	Not compliant. Compliance deferred to final remedy
Location-specific	Protective if site-specific conditions make air sparging implementable.	Not compliant. Compliance deferred to final remedy
Action-specific	SC Toxic Air Pollutant regulations apply to air emissions; SC Fugitive Particulate regulations apply to dust emissions; SC Construction and Operating permits apply to well construction; LDRs for all PPE and treatment residues found to be above health based levels	SC Toxic Air Pollutant regulations apply to air emissions; SC Fugitive Particulate regulations apply to dust emissions; SC Construction and Operating permits apply to well construction; LDRs for all PPE and treatment residues found to be above health based levels
Long-Term Effectiveness and Permanence		
Magnitude of residual risks	Residual risks reduced; groundwater contamination reduced 100-fold if site-specific conditions make air sparging implementable.	No reduction
Adequacy of controls	Not adequately protective of future resident or environment	Not protective
Permanence	Permanently removes contaminants in groundwater if site-specific conditions make air sparging implementable.	N/A There are no remedy components
Reduction of Toxicity, Mobility, or Volume through Treatment		
Treatment process used and materials treated	In situ AS of groundwater	None. Treatment deferred to final remedy
Degree of expected reduction in toxicity, mobility, or volume	Air sparging would reduce volume (mass) of contaminants in groundwater hot spot if site-specific conditions make air sparging implementable.	None. Treatment deferred to final remedy
Amount of hazardous materials destroyed or treated	Would treat 10 million gallons of groundwater in situ and reduce volume (mass) by 130 kg if site-specific conditions make air sparging implementable.	None. Treatment deferred to final remedy

Table 8. Summary of the Groundwater Hot Spot Remedy Evaluation (Continued)

Comparative Alternative Analysis for the Pits Area Groundwater Hot Spot		
Criterion	**IROD Remedy Air Sparging with Soil Vapor Extraction**	**Revised Remedy No Further Action**
Reduction of Toxicity, Mobility, or Volume through Treatment (Continued)		
Degree to which treatment is irreversible	Contaminant removal and treatment are irreversible.	N/A
Types and quantities of residuals remaining after treatment	Distal plume would remain above MCLs, Treatment of distal plume deferred to final remedy.	Hot spot and distal plume remain above MCLs. Treatment deferred to final remedy.
Short-term effectiveness		
Risks to workers	Minimal; potential risk from installation of AS and SVE points using direct push technology; potential vapor inhalation during sparging system operation; OSHA and applicable work safety and health regulations will be followed	None
Risk to community	Negligible; no public areas near unit; off-site transport of spent carbon	None
Risk to environment	Minimal; potential risk during injection/extraction point installation; permitted air emissions	None
Time to achieve remedial action objectives	N/A	N/A
Implementability		
Availability of materials, equipment, contractors	Readily available	N/A
Ability to construct and operate the technology	Site specific conditions impact operability of AS	N/A
Ability to obtain permits/approvals from other agencies	Implementable; air emissions permit required; 5-year remedy reviews required	N/A
Ability to monitor effectiveness of remedy	Readily implementable; groundwater monitoring required; air quality monitoring of sparging offgas emissions required	N/A
Ease of undertaking additional actions (if required)	Not incompatible; some AS wells would penetrate existing cap	Compatible
Time to implement	N/A	N/A
Cost		
Present Worth Capital Cost	$1,129,000	$0
Present Worth O&M Cost	$3,607,000	$0
Total Present Worth Cost	$4,736,000	$0

environment because (1) current access restrictions at SRS prevent residential use of the unit, (2) the unit does not provide a habitat for ecological receptors, and (3) erosion control measures have been put in place to mitigate erosion and distribution of contaminants.

The selected interim remedy for the vadose zone, In Situ SVE and Asphalt Cover, was protective of human health and the environment by removing VOC contamination from the vadose zone and reducing the leaching of contamination to the groundwater. The revised remedy is equally protective of human health and the environment.

The selected interim remedy for the groundwater hot spot, AS with SVE, was protective of human health and the environment by reducing VOC contamination from the groundwater hot spot, even though attainment of MCLs was not anticipated until implementation of the final action. The revised remedy defers groundwater treatment to the final remedy, since the proposed remedy is not feasible due to site-specific conditions. Protection of human health and the environment will be achieved by the final remedy.

State Acceptance

SCDHEC and US EPA approval of this IROD Amendment constitutes concurrence with the proposed revised interim remedy.

Community Acceptance

Community acceptance of the revised interim remedy was assessed by giving the public an opportunity to comment on this IROD Amendment during the public comment period. Public input is documented in the Responsiveness Summary of this IROD Amendment (Appendix A). The IROD Amendment will be presented to the SRS Citizen Advisory Board in an open public meeting.

VI. SUPPORT AGENCY COMMENTS

Given the significant changes between the original interim remedy and the revised interim remedy, US EPA and SCDHEC recommended that an IROD Amendment (as opposed to an Explanation of Significant Differences or other document) be used to document the revised remedy decision.

VII. STATUTORY DETERMINATIONS

Based on the CMP Pits RFI/RI/BRA, the CMP Pits OU poses a risk to human health and the environment (WSRC 1997).

The revised remedy, in conjunction with the anticipated final remedy, satisfies the statutory requirements in CERCLA Section 121. This revised interim action is protective of human health and the environment, complies with Federal and State applicable or relevant and appropriate requirements for this limited-scope action, and is cost-effective. Although this interim action is not intended to fully address the statutory mandate for permanence and treatment to the maximum extent practicable, this interim action utilizes treatment and thus is in furtherance of that statutory mandate. Because this action does not constitute the final remedy for the CMP Pits OU, 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 addressed by the final response action. Subsequent actions are planned to address fully the threats posed by the conditions at the CMP Pits OU. Because this revised remedy will result in hazardous substances remaining on site above HBLs, a review will be conducted to ensure that the remedy continues to provide adequate protection of human health and the environment within five years after commencement of the remedial action. Because this is an interim action ROD Amendment, review of this site and of this remedy will be continuing as final remedial alternatives for the CMP Pits OU are developed.

VIII. PUBLIC PARTICIPATION COMPLIANCE

Both RCRA and CERCLA require that the public receive an opportunity to review and comment on the proposed interim remedial alternative. Public participation requirements, listed in South Carolina Hazardous Waste Management Regulation (SCHWMR) R.61-79.124 and in CERCLA, Sections 113 and 117, include establishment of an administrative record file at or near the facility at issue. The file documents the investigation and selection of the remedial alternatives for addressing the CMP Pits.

The SRS Public Involvement Plan (US DOE 1994) addresses RCRA, CERCLA, and National Environmental Policy Act (NEPA) requirements and supports public involvement in the decision-making process for permitting, closure, and the selection of remedial alternatives. SCHWMR R.61-79.124 and CERCLA Section 117(a), as amended, require the advertisement of the draft permit modification, if needed, and notice of any proposed remedial action and provide the public an opportunity to participate in the selection of the remedial action. The IAPP (WSRC 1999b), a part of the administrative record file, highlights key aspects of the investigation and identifies the preferred action for addressing the CMP Pits. A

30-day public comment period for the IAPP began March 15, 1999 and ended April 13, 1999. The IAPP was presented to the SRS Citizen Advisory Board in open public meetings on March 22 and 23, 1999. A Responsiveness Summary was prepared to address comments received during the public comment period. The Responsiveness Summary was included in Appendix A of the IROD (WSRC 1999a).

A revised IAPP will not be prepared for these revisions to the remedies selected in the IROD. This IROD Amendment was made available for public comment and review as specified in the SRS Public Involvement Plan (US DOE 1994). A Responsiveness Summary, prepared to address comments received during the public comment period, is provided in Appendix A of this IROD Amendment.

IX. REFERENCES

US DOE, 1994. *Public Involvement, A Plan for the Savannah River Site*, Savannah River Operations Office, Aiken, South Carolina.

WSRC, 1994a. RCRA *Facility Investigation/Remedial Investigation Work Plan for the Chemicals, Metals and Pesticides (CMP) Pits (U)*, WSRC-RP-91-1106, Revision 1, Westinghouse Savannah River Company, Savannah River Site, Aiken, South Carolina, (July).

WSRC, 1997. RCRA *Facility Investigation/Remedial Investigation Report with Baseline Risk Assessment for the Chemicals, Metals and Pesticides (CMP) Pits (080-17G, 080-17.1G, 080-18.1G, 080-18.2G, 080-18.3G, & 080-19G) (U)*, Volumes I and II, WSRC-RP-96-00112, Revision 1.2, Westinghouse Savannah River Company, Savannah River Site, Aiken, South Carolina, (August).

WSRC, 1999a. *Interim Record of Decision Remedial Action Alternative Selection for the Chemicals, Metals and Pesticides Pits (080-17G, 080-17.1G, 080-18G, 080-18.1G, 080-18.2G, 080-18.3G, 080-19G) (U)*, WSRC-RP-98-4192, Revision 1.1, Westinghouse Savannah River Company, Savannah River Site, Aiken, South Carolina, (August).

WSRC, 1999b. *Interim Action Proposed Plan for the Chemicals, Metals and Pesticides (CMP) Pits (U)*, WSRC-RP-98-4130, Revision 1.1, Westinghouse Savannah River Company, Savannah River Site, Aiken, South Carolina, (March).

WSRC, 2000. *Interim Corrective Measures Implementation/Remedial Design/Remedial Design Report/Remedial Action Work Plan for Chemicals, Metals, and Pesticides (CMP) Pits Operable Unit (080-17G, 080-17.1G, 080-18G, 080-18.1G, 080-18.2G, 080-18.3G, 080-19G) (U)*, WSRC-RP-99-00332, Revision 1, Westinghouse Savannah River Company, Savannah River Site, Aiken, South Carolina, (January).

WSRC, 2001. *Chemicals, Metals, and Pesticides Pits Operable Unit Data Gap Sampling and Analysis Plan*, WSRC-RP-2001-4062, Revision 0, Westinghouse Savannah River Company, Savannah River Site, Aiken, South Carolina, (April).

APPENDIX A

RESPONSIVENESS SUMMARY

APPENDIX A - RESPONSIVENESS SUMMARY

The 45-day public comment period for this IROD Amendment for the CMP Pits began on September 27, 2001 and ended on November 11, 2001.

No comments were received.