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United States Department of Energy

Savannah River Site

Record of Decision Remedial Alternative Selection for the Heavy Equipment Wash Basin and Central Shops Burning/Rubble Pit (631-5G) Operable Unit (U)

CERCLIS Number: 53

WSRC-RP-2003-4185

Revision 1.1

October2004

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

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

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

RECORD OF DECISION
REMEDIAL ALTERNATIVE SELECTION (U)

HEAVY EQUIPMENT WASH BASIN AND CENTRAL SHOPS BURNING/RUBBLE PIT (631-5G) (U)

OPERABLE UNIT

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Savannah River Operations Office
Aiken, South Carolina

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DECLARATION FOR THE RECORD OF DECISION

Unit Name and Location

Heavy Equipment Wash Basin and Central Shops Burning/Rubble Pit (631-5G) Operable Unit

Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS) Identification Number: 53

Savannah River Site

Comprehensive Environmental Response, Compensation, and Liability Act Identification Number: SC1 890 008 989

Aiken, South Carolina

United States Department of Energy

The Heavy Equipment Wash Basin (HEWB)/Central Shops Burning/Rubble Pit (631-5G) (CSBRP-5G) Operable Unit (OU) is listed as a Resource Conservation and Recovery Act (RCRA) 3004(u) Solid Waste Management Unit/Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) unit in Appendix C of the Federal Facility Agreement (FFA) for the Savannah River Site (SRS).

The FFA is a legally binding agreement between regulatory agencies, including United States Environmental Protection Agency (USEPA), South Carolina Department of Health and Environmental Control (SCDHEC), and the regulated entity United States Department of Energy (USDOE) that establishes the responsibilities and schedules for the comprehensive remediation of the SRS.

The media associated with the HEWB/CSBRP-5G OU are soil and groundwater. However, soil is the only medium addressed in this Record of Decision (ROD) since the groundwater beneath HEWB/CSBRP-5G OU is being managed under the Central Shops (N-Area) Groundwater OU and, therefore, is not addressed in this ROD for the HEWB/CSBRP-5G OU. The HEWB/CSBRP-5G OU consists of three subunits: (1) the CSBRP-5G, (2) the HEWB, and (3) the HEWB Overflow Discharge Area.

Statement of Basis and Purpose

This decision document presents the selected remedy for the HEWB/CSBRP-5G OU located at the SRS in Barnwell County, South Carolina. The remedy was chosen in accordance with CERCLA, as amended by Superfund Amendments Reauthorization Act (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 site.

The USEPA, SCDHEC and USDOE concur with the selected remedy.

Assessment of the Site

There has been a release of hazardous substances at the HEWB/CSBRP-5G OU into the environment. The response action selected in this Record of Decision (ROD) is necessary to protect public health, welfare, and the environment from an actual or threatened release of hazardous substances to the environment.

Description of the Selected Remedy

For two of the subunits (the CSBRP-5G and the HEWB Overflow Discharge Area) No Action has been selected for the remedial alternative. Although chemical contaminants were identified, the contaminant concentrations do not pose risk to human health and the environment based on unrestricted land use assumption. These two subunits are capable of supporting unrestricted (residential) use without any remedial actions.

For the HEWB subunit, Institutional Controls has been selected as the remedy.

The selected remedy for the HEWB subunit entails the following action:

Implement Institutional Controls in accordance with the Land Use Control Assurance Plan (LUCAP) for SRS, which will include erecting warning signs, conducting periodic field inspections, Site Use Program controls, and security surveillance measures. The Institutional

Controls implemented and enforced through the LUCAP will prevent the future industrial worker from excavating contaminated media. The Institutional Control will be in place for at least 30 years. The conditions at the unit will be re-assessed during the five year statutory review.

No principal threat source material (PTSM) is present at the HEWB/CSBRP-5G OU.

Currently, the HEWB is an inactive basin and no process water is entering the basin. The Institutional Controls will prevent residential land use.

Due to the complexity of multiple contaminant areas, the SRS is divided into integrated operable units (IOUs) for the purpose of managing a comprehensive cleanup strategy. Waste units within an IOU are evaluated and remediated individually.

The HEWB/CSBRP-5G OU is located within the Fourmile Branch Integrated Operable Unit (Fourmile Branch IOU, see Figure 1), which is not a "source control" unit; i.e., the unit does not contain contaminated soil that could act as a source of future contamination to the groundwater through leaching). In addition to the HEWB/CSBRP-5G OU, there are many OUs within the Fourmile Branch Watershed. All the source control and groundwater OUs located within this watershed will be evaluated to determine their impacts, if any, to the associated streams and wetlands. SRS will manage all source control units to prevent impact to the watershed. Upon disposition of all OUs within the Fourmile Branch IOU, a final comprehensive ROD for the Fourmile Branch Watershed will be pursued.

The RCRA Permit will be revised to reflect selection of the final remedy using the procedures under 40 Code of Federal Regulations (CFR) Part 270, and South Carolina Hazardous Waste Management Regulation (SCHWMR) R.61-79.264.101, 270.

Statutory Determinations

Based on the findings of the RCRA Facility Investigation/Remedial Investigation (RFI/RI) with Baseline Risk Assessment (BRA) for the HEWB/CSBRP-5G OU, Revision 1, report (WSRC 2003), there is no unacceptable risk to human health and the environment based on an

unrestricted (residential) land use scenario at two of the three subunits (the CSBRP-5G and the HEWB Overflow Discharge Area) associated with the HEWB/CSBRP-5G OU. At the third subunit (HEWB), six refined constituents of concern (COCs) have been identified; however, all refined COCs are human health COCs (HHCOCs). These findings are based on an unrestricted (hypothetical resident) future land use scenario. Therefore, remedial actions, as discussed in the ***Description of the Selected Remedy*** have been identified for the HEWB/CSBRP-5G OU.

Because this remedy will result in hazardous substances, pollutants, or contaminants remaining on-site above levels that allow for unlimited use and unrestricted exposure, a statutory review will be conducted within five years after initiation of remedial action to ensure that the remedy is protective of human health and the environment.

The selected remedy is protective of human health and the environment, complies with Federal and State requirements that are legally applicable or relevant and appropriate to the remedial actions, and is cost-effective. This remedy does not satisfy the statutory preference for treatment as a principal element of the remedy and does not utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable since no remedial action is required beyond the Institutional Controls to maintain the site for industrial use. The Institutional Controls will restrict the land use of the HEWB to industrial use only and ensure protection of human health and the environment. The combined risk posed by the six refined COCs identified for the HEWB under unrestricted residential use is greater than 1.0×10^{-6} (risk = 2.7×10^{-5}). The 1.0×10^{-6} risk level is the point of departure above which remedial alternatives are generally evaluated. Although no RCOCs were identified for the industrial worker scenario, the combined risk for the six constituents that were identified as residential RCOCs would equate to a risk of 4.7×10^{-6} for the future industrial worker. A minimal action (institutional controls) has been evaluated and will be implemented to ensure that residential exposure to the HEWB soil contaminants is prevented. The Institutional Controls will be in place for at least 30 years. The conditions at the unit will be re-assessed during the Five-year statutory reviews.

In the long term, if the property is ever transferred to nonfederal ownership, the U.S. Government will take those actions necessary pursuant to Section 120(h) of CERCLA. Those actions will include a deed notification disclosing former waste management and disposal activities as well as remedial actions taken on the site. The contract for sale and the deed will contain the notification required by CERCLA Section 120(h). The deed notification shall, in perpetuity, notify any potential purchaser that the property has been used for the management and disposal of waste. These requirements are also consistent with the intent of the RCRA deed notification requirements at final closure of a RCRA facility if contamination will remain at the unit.

The deed shall also include deed restrictions precluding residential use of the property. However, the need for these deed restrictions may be reevaluated at the time of transfer in the event that exposure assumptions differ or the residual contamination no longer poses an unacceptable risk under residential use. Any reevaluation of the need for the deed restrictions will be done through an amended ROD with USEPA and SCDHEC review and approval.

In addition, if the site is ever transferred to nonfederal ownership, a survey plat of the OU (HEWB Subunit only) will be prepared, certified by a professional land surveyor, and recorded with the appropriate county recording agency. The HEWB/CSBRP-5G OU is located in Barnwell County.

The selected remedy for the HEWB/CSBRP-5G OU (for the HEWB subunit only) leaves hazardous substances in place that pose a potential future risk and will require land use restrictions for an indefinite period of time. As agreed on March 30, 2000, among the USDOE, USEPA, and SCDHEC, SRS is implementing a LUCAP to ensure that the Land Use Controls (LUCs) required by numerous remedial decisions at SRS are properly maintained and periodically verified. The unit-specific Land Use Control Implementation Plan (LUCIP) incorporated by reference into this ROD will provide details and specific measures required to implement and maintain the LUCs selected as part of this remedy. The USDOE is responsible for implementing, maintaining, monitoring, reporting upon, and enforcing the LUCs selected under this ROD. The LUCIP, developed as part of this action, will be submitted concurrently

with the Final Remediation Report (FRR), as required in the FFA for review and approval by USEPA and SCDHEC. Upon final approval, the LUCIP will be appended to the LUCAP and is considered incorporated by reference into the ROD, establishing LUC implementation and maintenance requirements enforceable under CERCLA. The approved LUCIP will establish implementation, monitoring, maintenance, reporting, and enforcement requirements for the unit. The LUCIP will remain in effect unless and until modifications are approved as needed to be protective of human health and the environment. LUCIP modification will only occur through another CERCLA document.

Data Certification Checklist

This is to certify that this ROD provides the following information:

- There is no PTSM at this OU (see Section VII in the Decision Summary)
- COCs and their respective concentrations (see Section VII and Table 6 in the Decision Summary)
- Baseline risk represented by the COCs (see Section VII and Table 8 in the Decision Summary)
- No cleanup levels were established for the COCs (for clarification, see Section VIII in the Decision Summary)
- Current and future land and groundwater use assumptions used in the BRA and ROD (see Section IV in the Decision Summary)
- Land and groundwater use that will be available at the site as a result of the selected remedy (see Section XI in the Decision Summary)

- Estimated capital, operation and maintenance, and total present worth cost; discount rate; and the number of years over which the remedy cost estimates are projected (see Section IX in the Decision Summary)

- Decision factors that led to selecting the remedy (see Section X in the Decision Summary)

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11-9-04
Date

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

11/22/04
Date

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

1/07/05
Date

Robert W. King, Jr.
Deputy Commissioner
Environmental Quality Control
South Carolina Department of Health and Environmental Control

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DECISION SUMMARY
REMEDIAL ALTERNATIVE SELECTION (U)

HEAVY EQUIPMENT WASH BASIN AND CENTRAL SHOPS BURNING/RUBBLE PIT (631-5G) (U)

OPERABLE UNIT

CERCLIS Number: 53

WSRC-RP-2003-4185
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October 2004

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LIST OF ACRONYMS AND ABBREVIATIONS

ac	acre
ARAR	applicable or relevant and appropriate requirement
bgs	below ground surface
BRA	baseline risk assessment
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act, 1980
CERCLIS	Comprehensive Environmental Response, Compensation, and Liability Information System
cm	centimeter
CMCOC	contaminant migration constituent of concern
CMI/RAIP	Corrective Measures Study/Remedial Action Implementation Plan
CMS/FS	corrective measures study/feasibility study
COC	constituent of concern
COPC	constituent of potential concern
CPT	cone penetrometer testing
CSBRP	Central Shops Burning/Rubble Pit
CSM	conceptual site model
FFA	Federal Facility Agreement
FID	flame ionization detector
ft	feet
ft^3	cubic feet
gal/min	gallon per minute
GPR	ground penetrating radar
ha	hectare
HEMA	Heavy Equipment Maintenance Area
HEWA	Heavy Equipment Wash Area
HEWB	Heavy Equipment Wash Basin
HHCOC	human health constituent of concern
HI	hazard index
IOU	Integrator Operable Unit
HQ	hazard quotient
HSWA	Hazardous and Solid Waste Amendment
in	inch

LIST OF ACRONYMS AND ABBREVIATIONS (Continued)

km	kilometer
km^2	square kilometer
L/min	liter per minute
LUC	land use control
LUCAP	Land Use Control Assurance Plan
LUCIP	Land Use Control Implementation Plan
m	meter
m^2	square meter
m^3	cubic meter
MCL	maximum contaminant level
mi	mile
mi^2	square mile
msl	mean sea level
NCP	National Oil and Hazardous Substance Pollution Contingency Plan
NEPA	National Environmental Policy Act
NPDES	National Pollutant Discharge Elimination System
NPL	National Priorities List
OU	operable unit
O&M	Operation and Maintenance
PCB	polychlorinated biphenyl
PID	photo ionization detector
PRG	preliminary remedial goal
PTSM	principal threat source material
RAO	remedial action objective
RBA	risk-based activity
RBC	risk-based concentration
RCRA	Resource Conservation and Recovery Act, 1976
RfD	reference dose
RFI	RCRA Facility Investigation
RG	remedial goal

LIST OF ACRONYMS AND ABBREVIATIONS (Continued)

RI	Remedial Investigation
ROD	Record of Decision
SARA	Superfund Amendments Reauthorization Act
SB/PP	Statement of Basis/Proposed Plan
SCDHEC	South Carolina Department of Health and Environmental Control
SCHWMR	South Carolina Hazardous Waste Management Regulation
SRFS	Savannah River Forest Service
SRS	Savannah River Site
SVOC	semi-volatile organic compound
TAL	target analyte list
TCL	target compound list
TIC	tentatively identified compound
TES	Threatened, endangered, and sensitive
UCL	upper confidence level
USC	unit specific constituent
USDOE	United States Department of Energy
USEPA	United States Environmental Protection Agency
VOC	volatile organic compound
WSRC	Westinghouse Savannah River Company LLC

I. SAVANNAH RIVER SITE AND OPERABLE UNIT NAME, LOCATION, AND DESCRIPTION

Unit Name, Location, and Brief Description

Heavy Equipment Wash Basin and Central Shops Burning/Rubble Pit (631-5G) Operable Unit

Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS) Identification Number: 53

Savannah River Site

Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Identification Number: SC1890008989

Aiken, South Carolina

United States Department of Energy

Savannah River Site (SRS) occupies approximately 800 km^2 (310 mi^2) of land adjacent to the Savannah River, principally in Aiken and Barnwell counties of South Carolina (Figure 1). SRS is located approximately 40 km (25 mi) southeast of Augusta, Georgia, and 32 km (20 mi) south of Aiken, South Carolina.

The United States Department of Energy (USDOE) owns SRS, which historically produced tritium, plutonium, and other special nuclear materials for national defense and the space program. Chemical and radioactive wastes are byproducts of nuclear material production processes. Hazardous substances, as defined by the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), are currently present in the environment at SRS.

The Federal Facility Agreement (FFA) (FFA 1993) for SRS lists the Heavy Equipment Wash Basin (HEWB) and Central Shops Burning/Rubble Pit (631-5G) (CSBRP-5G) Operable Unit (OU) as a Resource Conservation and Recovery Act (RCRA)/CERCLA unit requiring further evaluation. The HEWB/CSBRP-5G OU requires further evaluation through an investigation process that integrates and combines the RCRA Facility Investigation (RFI) process with the CERCLA Remedial Investigation (RI) process to

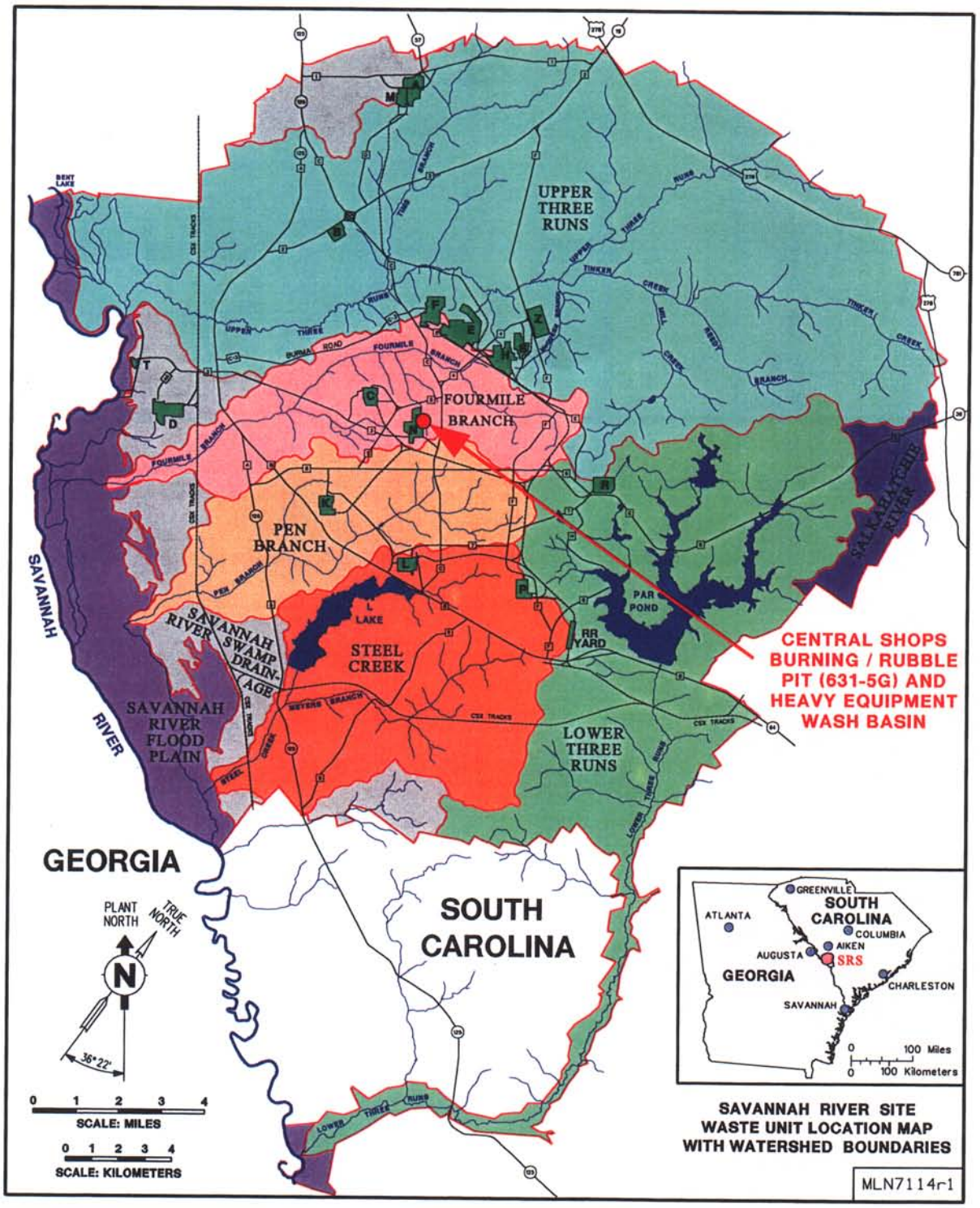

Figure 1. **Location of Heavy Equipment Wash Basin/Central Shops Burning/Rubble Pit 631-5G OU at SRS**

determine the actual or potential impact to human health and the environment resulting from releases of hazardous substances to the environment.

II. SITE AND OPERABLE UNIT COMPLIANCE HISTORY

SRS Operational and Compliance History

The primary mission of SRS has been to produce tritium, plutonium, and other special nuclear materials for our nation's defense programs. Production of nuclear materials for the defense programs was discontinued in 1988. SRS has provided nuclear materials for the space program as well as for medical, industrial, and research efforts up to the present. Chemical and radioactive wastes are byproducts of nuclear material production processes. These wastes have been treated, stored, and, in some cases, disposed of at SRS. Past disposal practices have resulted in soil and groundwater contamination.

Hazardous waste materials handled at SRS are managed under RCRA, a comprehensive law requiring responsible management of hazardous waste. Certain SRS activities require South Carolina Department of Health and Environmental Control (SCDHEC) operating or post-closure permits under RCRA. SRS received a RCRA hazardous waste permit from SCDHEC, which was issued on September 30, 2003. Module VIII of the Hazardous and Solid Waste Amendments (HSWA) portion of the RCRA permit mandates corrective action requirements for non-regulated solid waste management units subject to RCRA 3004(u).

On December 21, 1989, SRS was included on the National Priorities List (NPL). The inclusion created a need to integrate the established RFI program with CERCLA requirements to provide for a focused environmental program. In accordance with Section 120 of CERCLA 42 USC Section 9620, USDOE negotiated an FFA (FFA 1993) with the United States Environmental Protection Agency (USEPA) and SCDHEC to coordinate remedial activities at SRS as one comprehensive strategy to

fulfill these dual regulatory requirements. USDOE functions as the lead agency for remedial activities at SRS, with concurrence by USEPA - Region IV and SCDHEC.

Operable Unit Operational and Compliance History

Central Shops Area (also known as N Area) is located in the central part of SRS, within the Fourmile Branch Watershed, approximately 10 km (6 mi) from the nearest (western) site boundary (Figure 1). The HEWB/CSBRP-5G OU with its three subunits (CSBRP 631-5G, HEWB, and HEWB Overflow Discharge Area) is located in the northeastern part of the Central Shops (Figure 2).

The HEWB and the HEWB Overflow Discharge Area may be accessed by a gravel road (leading to the CSBRP 631-2G [Central Shops Scrap Lumber Pile]) adjacent to and parallel to the Heavy Equipment Maintenance Area (HEMA) fence. The CSBRP-5G can also be accessed by a gravel road adjacent to the HEMA fence line. The HEMA is southwest of the HEWB and is still an actively operating industrial area.

Central Shops Burning/Rubble Pit 631-5G

The CSBRP-5G is a burning/rubble pit similar to other SRS burning/rubble pits and was initially grouped with other inactive neighboring burning/rubble pits (631-1G and 631-3G). However, in 1998 it was combined with the HEWB to allow investigation of a suspected groundwater plume beneath the pit. The plume was thought to originate near the HEWB and to contain volatile organic compounds (VOCs) (trichloroethylene).

Historically, the pit was approximately 122 x 12 x 6 m (430 x 35 x 18 ft) and estimated to contain 3,410 m^3 (120,400 ft^3) of trash by volume. The pit received waste materials including asbestos, used batteries, and empty paint cans along with ash, paper, and glass at various times from 1951 until 1973. Waste was also burned periodically at CSBRP-5G from 1951 until 1973 when a layer of soil was placed over the ashes. The pit continued to receive rubble such as paper, empty paint cans, lumber, and empty galvanized steel

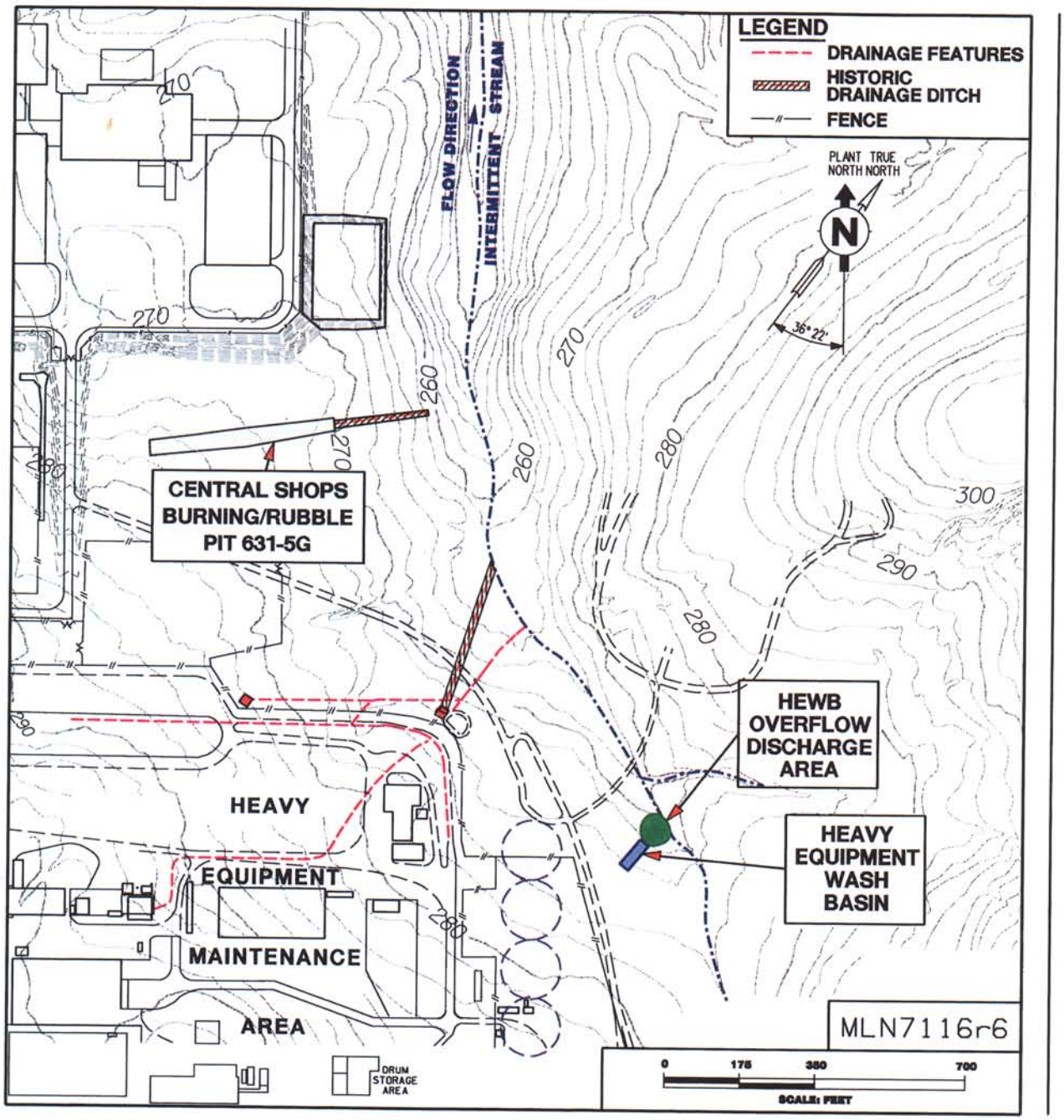

Figure 2. **Layout of the Heavy Equipment Wash Basin/Central Shops Burning/Rubble Pit 631-5G OU**

barrels. Waste disposal ceased altogether in 1973 when the pit reached capacity and was covered with 0.6 to 0.9 m (2 to 3 ft) of soil and brought to grade. Surface grade is approximately 84 m (276 ft) above mean sea level (msl) (WSRC 1998) (Figure 2).

Prior to 1951, the pit area was used as farmland. The area that covers the pit is presently a grass/shrub field of .15 ha (.37 ac) with moderate relief. A prominent drainage ditch exists at the lower (north-eastern) end of the pit (see Figure 2). This ditch bottom appears to have been excavated to the same elevation as the bottom of the original pit. It traverses approximately 90 m (300 ft) downgradient through an adjacent woodland to the intermittent stream, which eventually flows together with Fourmile Branch in the Fourmile Branch Watershed (Figure 1).

Heavy Equipment Wash Basin

The HEWB is located within the wooded area upgradient and approximately 30 m (100 ft) southwest of the intermittent stream. It is approximately 30 m (100 ft) northeast of the fenced area associated with the HEMA. The basin itself is roughly 9 x 18 m (30 x 60 ft) with an earthen berm 1 to 1.5 m (4 to 5 ft) high, an area of 0.016 ha (0.04 ac). It accommodates a volume of 140 m^3 (3,800 ft^3) of standing water at full capacity. From 1950 until the early 1970s, the HEWB received Heavy Equipment Wash Area (HEWA) effluent wash water together with sanitary wastewater from Central Shops. HEWA was a facility set up in the maintenance area to clean equipment prior to their maintenance. After the construction of the Central Shops Sanitary Wastewater Treatment Plant in the early 1970s, the wash water from the HEWA ceased going to HEWB. Since 1981, the HEWB has not received water from Central Shops and the associated facilities.

Historically, during day shifts the HEWB received approximately 38 L/min (10 gal/min) of wastewater five days a week. The wastewater contained traces of oil, grease, and detergents, plus significant levels of solids that were allowed to settle in the basin. According to the wastewater permit, about one-half of the resulting wash water was lost through infiltration/evaporation.

HEWB Overflow Discharge Area

A high overflow discharge culvert was installed under the berm at the northern end of the HEWB, probably at the time of construction. Permitted discharges from the HEWB were released to the Overflow Discharge Area, a relatively flat open woodland within the floodplain of the intermittent stream (Figure 2). Portions of the releases have either infiltrated the soil surface or have traveled surficially to the stream. This same floodplain serves as a conduit for occasional excess stormwater flow accumulating upgradient from the unit.

Site Characteristics

The HEWB/CSBRP-5G OU is located in the Central Shops area within the Fourmile Branch watershed (see Figure 1). Surface waters appear to drain into an intermittent stream, which feeds directly into Fourmile Branch about 3.2 km (2 mi) to the northwest, approximately 54.9 m (180 ft) above msl. Fourmile Branch drains into the Savannah River approximately 14.9 km (9 mi) downstream of the HEWB/CSBRP-5G OU.

The HEWB/CSBRP-5G OU is located at a ground surface elevation between approximately 79.2 and 85.3 m (260 and 280 ft) above msl (see Figure 2). The HEWB/CSBRP-5G OU is situated in and around the Central Shops industrial area. The ground surface slopes gently from the HEWB to the northeast toward the intermittent stream. The ground surface slopes eastward from the CSBRP-5G toward the intermittent stream.

The backfill material near CSBRP-5G belongs to the Udorthent soil series (Figure 3). Udorthent soils are disturbed soils that include firm and friable substratum in industrialized areas. The Udorthent series is difficult to define because the diagnostic horizons used to classify soils have been destroyed or rearranged by heavy equipment to such an extent that the horizons cannot be identified.

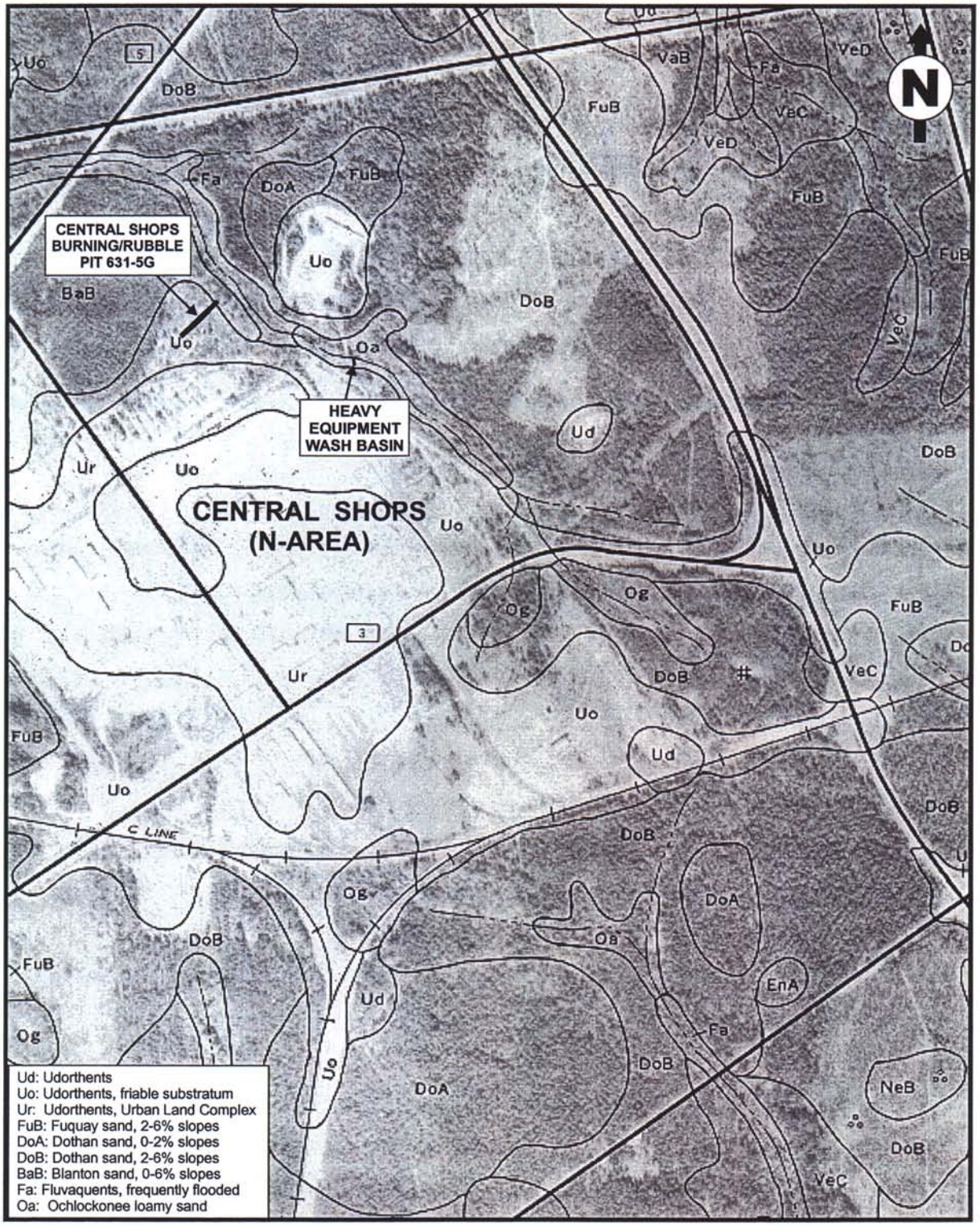

Figure 3. Major Soil Types of the Northern Central Shops Area

The properties of Udorthent soils can change dramatically within a few feet. The layers with similar color and texture are generally 7.6 to 15.2 cm (3 to 6 in) thick. The surface layer is generally sandy clay loam. The upper part of the underlying material is generally a few centimeters of sandy material; the next part is 10.2 to 12.7 cm (4 to 5 in) of sandy loam; and the lower part to a depth of 1.8 m (6 ft) or more is sandy clay loam. In some areas, the textures are nearly the same throughout the profile, but the colors are different within a few inches. Slopes are generally 0 to 6 percent. Udorthent soils generally include varying amounts of gravel, sand, and clay. The gravels and sands tend to enhance infiltration of rainwater, and the clays tend to inhibit the migration of metals.

Undisturbed surface soils (0 to 0.9 m [0 to 3 ft]) in the vicinity are associated with the Ochlockonee series, which consists of well-drained, sandy soils. Ochlockonee loamy sand is occasionally flooded during periods of high rainfall and is often found on flood plains and in low areas adjacent to small drainages. This sand does not have a well-defined channel in most areas. Generally, the slopes are less than 2 percent. The surface layer is brown loamy sand about 15.2 cm (6 in) thick. At 15.2 to 30.5 cm (6 to 12 in) deep, the subsoil is a brown loamy sand with many coarse distinct reddish-yellow pockets of sand. At 30.5 to 71.1 cm (12 to 28 in) deep, the subsurface soil is a brown sandy loam with a few medium prominent light-yellowish-brown mottles. At 71.1 to 78.7 cm (28 to 31 in) deep, the brown sandy loam has common coarse prominent light-yellowish-brown mottles. At 78.7 to 86.4 cm (31 to 34 in) deep, the subsurface soil is a very dark grayish-brown loam with a few fine prominent strong brown mottles. At 86.4 to 94.0 cm (34 to 37 in) deep, the subsurface soil is a brown loam with many coarse prominent reddish-brown mottles, and at 94.0 to 112.0 cm (37 to 44 in) deep, the subsurface soil is a reddish-brown loam with a stratum of brown silt loam.

At 112.0 to 152.0 cm (44 to 60 in) deep, the soil is a brown sandy loam with a few medium distinct strata of reddish-yellow loamy sand. Ochlockonee loamy sand is moderately permeable and strongly acidic throughout.

Unconsolidated sands and clays of the Upland unit of the Barnwell Group crops out around CSBRP-5G. A large exposure of silty sand of the Upland unit is present in the walls of a 4.6-m (15-ft) deep stormwater runoff ditch located approximately 76 m (250 ft) west of CSBRP-5G. The exposure reveals the geologic profile at the elevation of CSBRP-5G and provides the best exposure of the Upland unit at Central Shops. Other outcrops are present along the intermittent stream, which has an elevation of approximately 79 ± 3 m (260 ± 10 ft) above msl adjacent to both CSBRP-5G and the HEWB. These exposures consist of plastic clay that may represent the underlying Late Eocene Tobacco Road Formation. Drill cuttings and geotechnical results from boreholes near the CSBRP-5G and the HEWB indicate that most of the shallow profile is variegated silty and clayey sand with minor amounts of clay and gravel. Interstitial clay is common, comprising about 15 to 30 percent of most sand layers. Other low permeability sediments in the vadose zone are composed of clayey sand with up to 45 percent interstitial clay. These sediments represent discontinuous lenses, which may control infiltration of water locally. A clayey sand at approximately 83.2 m (273 ft) above msl appears to be locally present at Central Shops and may result in the periodic occurrence of a perched water zone at CSBRP-5G, the HEWB, and seeps near the intermittent stream. Locally, continuous low permeability lenses are present at varying elevations in the vicinity of the HEWB/CSBRP-5G OU. These layers may act as local barriers to infiltration of precipitation to the water table. In addition, they may control the flow of subsurface water draining from the HEWB/CSBRP-5G OU, conducting the flow along the upper surface of the lens and away from the pit and basin margins before discharging the water either to a surface seep or to the water table.

The water table wells in the vicinity of the HEWB/CSBRP-5G OU indicate a northwesterly flow direction. Historic water level measurements indicate that the water table flow direction in 2001 is more westerly than was observed in 1998 due to a depressed water table caused by drought conditions. The groundwater flow direction is northwest in the lower aquifer zone.

Based on field observations and a literature review, two major vegetative community types are identified within the HEWB/CSBRP-5G OU area. The old field vegetative community is characterized by a succession from weedy annual and biennial herbs to perennial grasses. Species identified in the old field community include wax myrtle (*Myrica cerifera*), cottonwood (*Populus deltoides*), hawthorn (*Crataegus* spp.), and wild plum (*Prunus* spp.). This community type is present in the areas surrounding the HEWB and CSBRP-5G.

The mixed forest community comprises loblolly pine (*Pinus taeda*) and various hardwood species, including oaks (*Quercus* spp.), sweetgum (*Liquidambar styraciflua*), sycamore (*Plantus occidentalis*), and red maple (*Acer rubrum*). The understory consists of shrubs, vines and grasses, including sumacs (*Rhus* spp.), muscadine (*Vitis rotundifolia*), hollies (*Ilex* spp.), blackberry (*Rubus* spp.), and green briar (*Smilax* spp.). Ground cover is sparse over portions of the area, consisting mainly of fallen leaves and pine needles. This community type is located in the vicinity of the HEWB although the HEWB itself is barren.

Animal species inhabiting the OU and surrounding study area were observed during ecological surveys conducted during the summers of 1997 and 1998. Some of the vegetative community types identified near the HEWB/CSBRP-5G OU function as the available wildlife habitat and support a variety of wildlife. The large continuous area covered by upland forest with well-developed overstory and the variety of plant species in this community make this area attractive to a variety of wildlife species.

Mammalian species that have been observed near the HEWB/CSBRP-5G OU or that have the potential to use nearby habitats include the Southern short-tailed shrew (*Blarina carolinensis*), white-tailed deer (*Odocoileus virginianus*), Eastern cottontail rabbit (*Sylvilagus floridanus*), swamp rabbit (*Sylvilagus aquaticus*), and raccoon (*Procyon lotor*). Due to the extent of the forested community type and its continuity with offsite communities, resident populations of these species are likely to be present.

A variety of bird species, including wild turkey (*Meleagris gallopavo*), great blue heron (*Ardea herodias*), green heron (*Butorides striatus*), red-shouldered hawk (*Buteo lineatus*), red-tailed hawk (*Buteo jamaicensis*), and American robin (*Turdus migratorius*), may potentially be found near the HEWB/CSBRP-5G OU. As with the mammals, the extent of the forested community type increases the likelihood that many species are present as resident populations.

According to the *Reptiles and Amphibians of the Savannah River Site* (Gibbons and Patterson 1978) and the *SRS Ecology Environmental Information Document* (WSRC 1998), there are over forty species of amphibians that might reasonably be expected to exist at SRS. The nature of the habitats at the HEWB/CSBRP-5G OU leads to the expectation that herpetofauna may potentially be present. Amphibious species that may occur include a variety of frogs (*Rana* spp. and *Hyl*a spp.) and toads (*Bufo* spp.). Reptiles that could occur include Eastern Box turtle (*Terrapene carolina*) and other species of turtle, green anole (*Anolis carolinensis*), and black rat snake (*Elaphe obsoleta*).

There are no aquatic areas associated with the HEWB/CSBRP-5G OU. The intermittent nature of the water associated with the intermittent stream and National Pollutant Discharge Elimination System (NPDES) outfalls limits the diversity of aquatic life likely to be present in areas adjacent to the OU. Mosquitofish (*Gambusia* spp.) have been observed occasionally in the stream.

In 1998, a threatened and endangered or sensitive (TES) species survey was conducted at the OU by the Savannah River Forest Station (SRFS). SRFS files were examined to determine past or present occurrences of any threatened and endangered species at or around the OU. Records reviewed included aerial photographs, vegetative stand data, soils information, and existing TES species records. This review was followed by a field survey for any plant or animal threatened and endangered species determined to potentially occur at the unit. The field survey was based on recorded observations or the presence of required habitat elements.

In addition to the SRFS consultation, an informal consultation with the South Carolina Department of Natural Resources Heritage Trust program and a review of the literature (Baston, Angerman, and Jones 1985; Knox and Sharitz 1990; and Radford, Ahles, and Bell 1968) did not indicate locations for any threatened or endangered species (as listed by the U.S. Fish and Wildlife Service). In 1993, rare plant surveys conducted by various SRFS personnel did not identify new locations for the smooth purple coneflower (*Echinacea laevigata*) (federally listed endangered species). The walk-through survey conducted in July 1998 did not reveal any population of smooth purple coneflower within the designated surveyed area either. This survey period (July) is optimal for detecting this species because of the presence of showy flowers. This species has adapted to open meadows and forest habitat. Current conditions within the OU appear to be too competitive for the establishment and successful survival of this species. However, the dry oak-pine woodland habitat does provide suitable conditions for the smooth purple coneflower, and many habitat associates are present. Currently, no red-cockaded woodpeckers (*Picoides borealis*) are known to exist in the surveyed area, and the habitat currently is not suitable to support this species. The closest bald eagle (*Haliaeetus leucocephalus*) nest is near L Lake, over 6.4 km (4 mi) south of the OU. No eagles have been sighted in the surveyed area; moreover, habitat features would not attract them. Similarly, the surveyed area does not include habitat for the wood stork (*Mycteria americana*), American alligator (*Alligator mississippiensis*), and shortnose sturgeon (*Acipenser brevirostrum*). These animals have not been known to occur in this area, and they are not expected to be present in the future.

Survey, consultations, and literature reviews conducted by the Savannah River Institute identified no sensitive plant locations (USFS 1998). The surveys did reveal suitable habitat for some species in areas adjacent to the CSBRP-5G. Little opportunity exists for the establishment of threatened or endangered floral species. The dry oak-pine woodland has soil and habitat conditions suitable for milk-pea (*Astragalus villosus*), sandhill milk-pea (*Astragalus michauxii*), Carolina larkspur (*Delphinium carolinianum*), striped onion (*Allium cuthbertii*), American nailwort (*Paronychia americana*), common dawn flower

(*Stylisima patens*), blue false-indigo (*Baptisia cinerea*), lance-leaf false-indigo (*Baptisia lanceolata*), and sandhill lily (*Nolina georgiana).*

The adjacent mesic upland forest and stream bottom forest provide suitable conditions for sweet pitcher plant (*Sarracena rubra*), Indian olive (*Nestronia umbellata*), spicebush (*Lindera subcoriacea*), Carolina trillium (*Trillium pusillum*), striped onion (*Allium cuthbertii*), and green fringed orchid (*Platanthera lacera*). Each of these species is found in mesic-to-moist shady habitats beneath a mature hardwood canopy.

As is apparent from Figure 4, the HEWB/CSBRP-5G OU is located within the Central Shops industrial area and is anticipated to remain an industrial area well into the future.

Although there are monitoring wells in the vicinity of the HEWB/CSBRP-5G OU, there are no wells that can be used as a drinking water source.

Removal Action

No removal action of any kind has taken place at the unit. Presently, the CSBRP-5G subunit is covered with green shrubs. No wastewater remains in the HEWB subunit, and no rainwater enters the basin from outside.

III. HIGHLIGHTS OF COMMUNITY PARTICIPATION

Both RCRA and CERCLA require that the public be given an opportunity to review and comment on the draft permit modification and proposed remedial alternative. Public participation requirements are listed in South Carolina Hazardous Waste Management Regulation (SCHWMR) R.61-79.124 and Sections 113 and 117 of CERCLA (42 USC Sections 9613 and 9617). These requirements include establishment of an Administrative Record File that documents the investigation and selection of the remedial alternatives for addressing the HEWB/CSBRP-5G OU soil. The Administrative Record File must be established at or near the facility at issue.

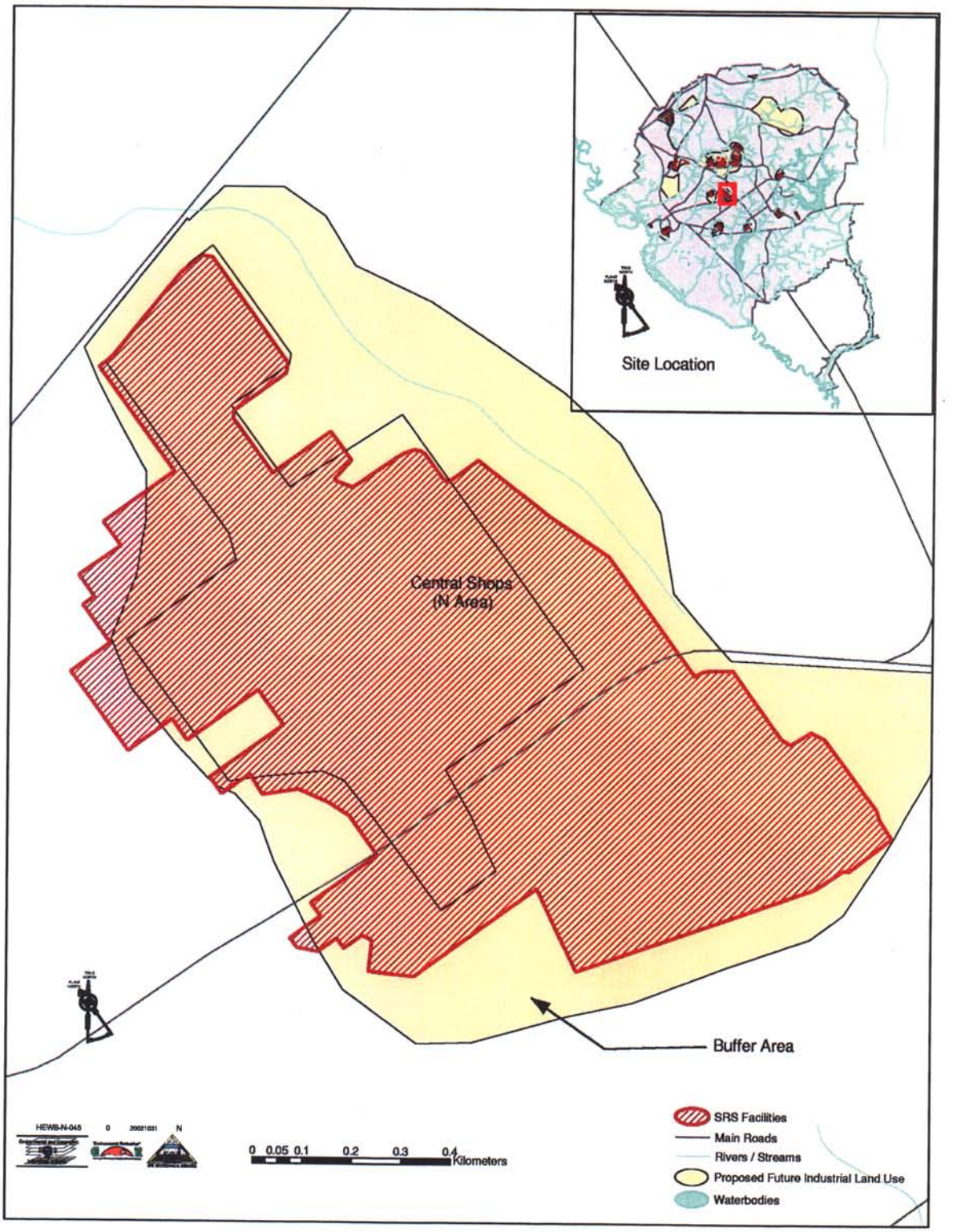

Figure 4. Proposed Savannah River Site Future Land Use

The SRS Public Involvement Plan (USDOE 1994) is designed to facilitate public involvement in the decision-making process for permitting, closure, and selection of remedial alternatives. The SRS Public Involvement Plan addresses requirements of RCRA, CERCLA, and the National Environmental Policy Act, 1969 (NEPA). SCHWMR R.61-79.124 and Section 117(a) of CERCLA, as amended, require the advertisement of the draft permit modification and notice of any proposed remedial action and provide the public an opportunity to participate in the selection of the remedial action. The Statement of Basis/Proposed Plan (SB/PP) for the HEWB/CSBRP-5G (080-16G) OU, Revision 1.1 (WSRC 2004), a part of the Administrative Record File, highlights key aspects of the investigation and identifies the preferred action for addressing the HEWB/CSBRP-5G OU.

The FFA Administrative Record File, which contains the information pertaining to the selection of the response action, 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
8911 Farrow Road
Columbia, South Carolina 29203
(803) 896-4000

Edisto Savannah District
Environmental Quality Control Office
206 Beaufort Street, Northeast
Aiken, South Carolina 29802
(803) 641-7670

The public was notified of the public comment period through the *SRS Environmental Bulletin*, a newsletter sent to citizens in South Carolina and Georgia, and through notices in the *Aiken Standard*, the *Allendale Citizen Leader*, the *Augusta Chronicle*, the *Barnwell*

People-Sentinel, and *The State* newspapers. The public comment period was also announced on local radio stations.

The SB/PP 45-day public comment began February 27, 2004, and ended April 11, 2004. No comments were received during the public comment period.

IV. SCOPE AND ROLE OF THE OPERABLE UNIT WITHIN THE SITE STRATEGY

Due to the complexity of multiple contaminant areas, the SRS is divided into Integrator Operable Units (IOUs) for the purpose of managing a comprehensive cleanup strategy. Waste units within an IOU are evaluated and remediated individually.

The HEWB/CSBRP-5G OU is located within the Fourmile Branch IOU (Fourmile Branch Watershed, see Figure 1), which is not a "source control" unit; i.e., the unit does not contain contaminated soil that could act as a source of future contamination to the groundwater through leaching). In addition to the HEWB/CSBRP-5G OU, there are many OUs within the Fourmile Branch Watershed. All the source control and groundwater OUs located within this watershed will be evaluated to determine their impacts, if any, to the associated streams and wetlands. SRS will manage all source control units to prevent impact to the watershed. Upon disposition of all OUs within the Fourmile Branch IOU, a final comprehensive ROD for the Fourmile Branch Watershed will be pursued.

Groundwater

The groundwater beneath the HEWB/CSBRP-5G OU is not included in this unit and is included in a separate OU, the Central Shops (N Area) Groundwater OU.

Soils

The risk assessments revealed that the risk to human health and the environment at two of the three subunits (CSBRP-5G and HEWB Overflow Discharge Area) associated with the

HEWB/CSBRP-5G OU, based on unrestricted land use, is negligible. No refined constituents of concern (COCs) have been identified for human health or ecological receptors at the two subunits. Since no refined COCs are associated with CSBRP-5G and HEWB Overflow Discharge Area, a No Action alternative is the preferred alternative for these subunits. This means no action will be taken at these two subunits, and these will remain in their present conditions.

For the third subunit, HEWB, an Institutional Controls alternative is recommended because six COCs were identified and present a combined risk of 2.7×10^{-5} when unrestricted use is considered. This presents a condition that warrants Institutional Controls to prevent unrestricted use, consistent with the LUCAP for the SRS. The HEWB/CSBRP-5G OU is located within an industrial land use area and is expected to remain an industrial area in the future. Therefore, the HEWB/CSBRP-5G OU with institutional controls will not impact the response actions of other OUs at SRS.

V. OPERABLE UNIT CHARACTERISTICS

Conceptual Site Model for the HEWB/CSBRP-5G OU

The conceptual site models (CSMs) for the HEWB/CSBRP-5G OU are presented in Figures 5 through 7. The components of the CSMs are described in the following sections.

Primary Sources of Contamination and Release Mechanisms

(a) Central Shops Burning/Rubble Pit 631-5G

The primary sources of contamination at CSBRP-5G included debris and rubble. During operation of the pit, the waste was burned periodically, layered with soil over the ashes, and then filled to capacity with debris. A clayey fill layer, varying in thickness from

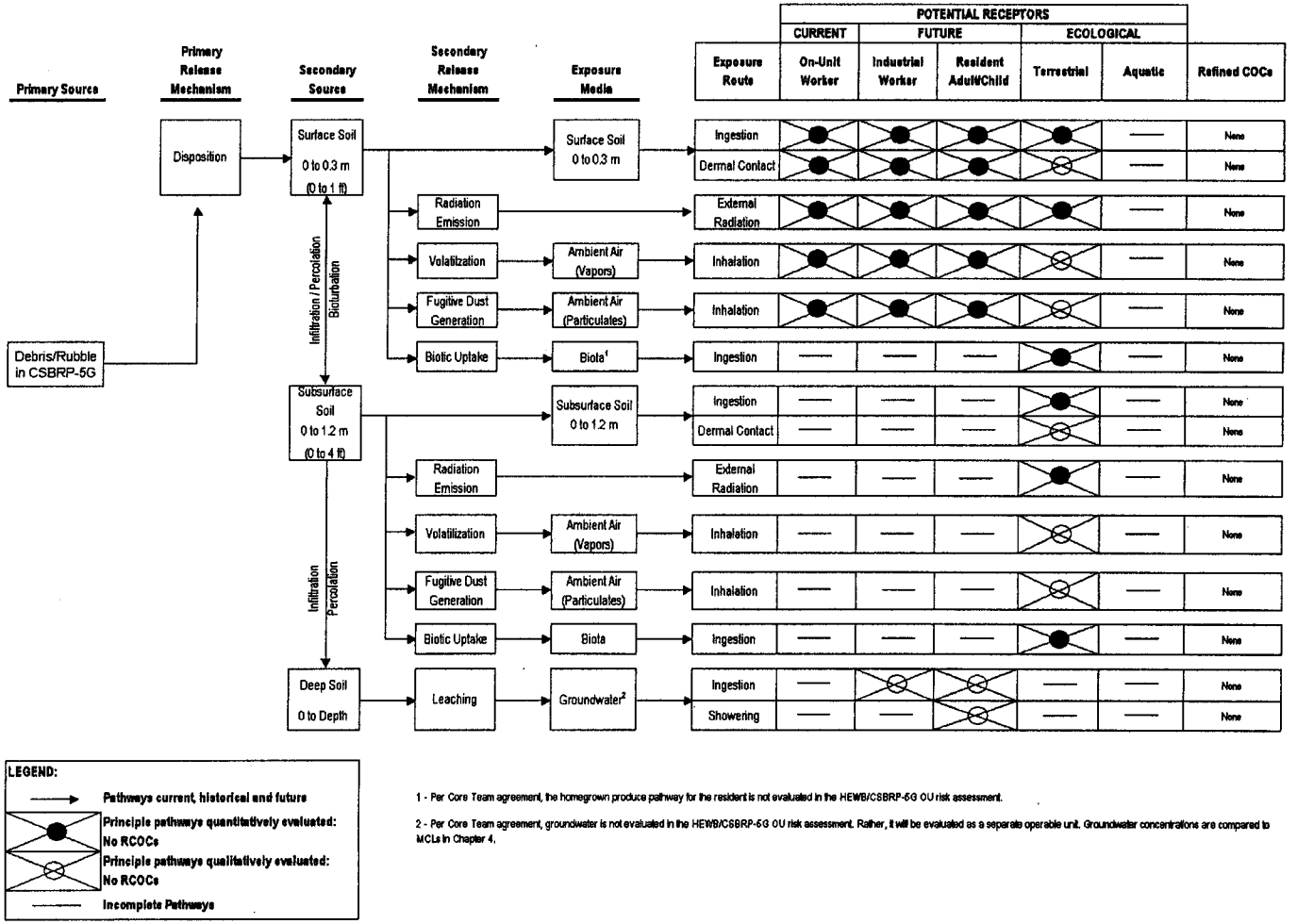

Figure 5. Conceptual Site Model for the Central Shops Burning/Rubble Pit 631-5G

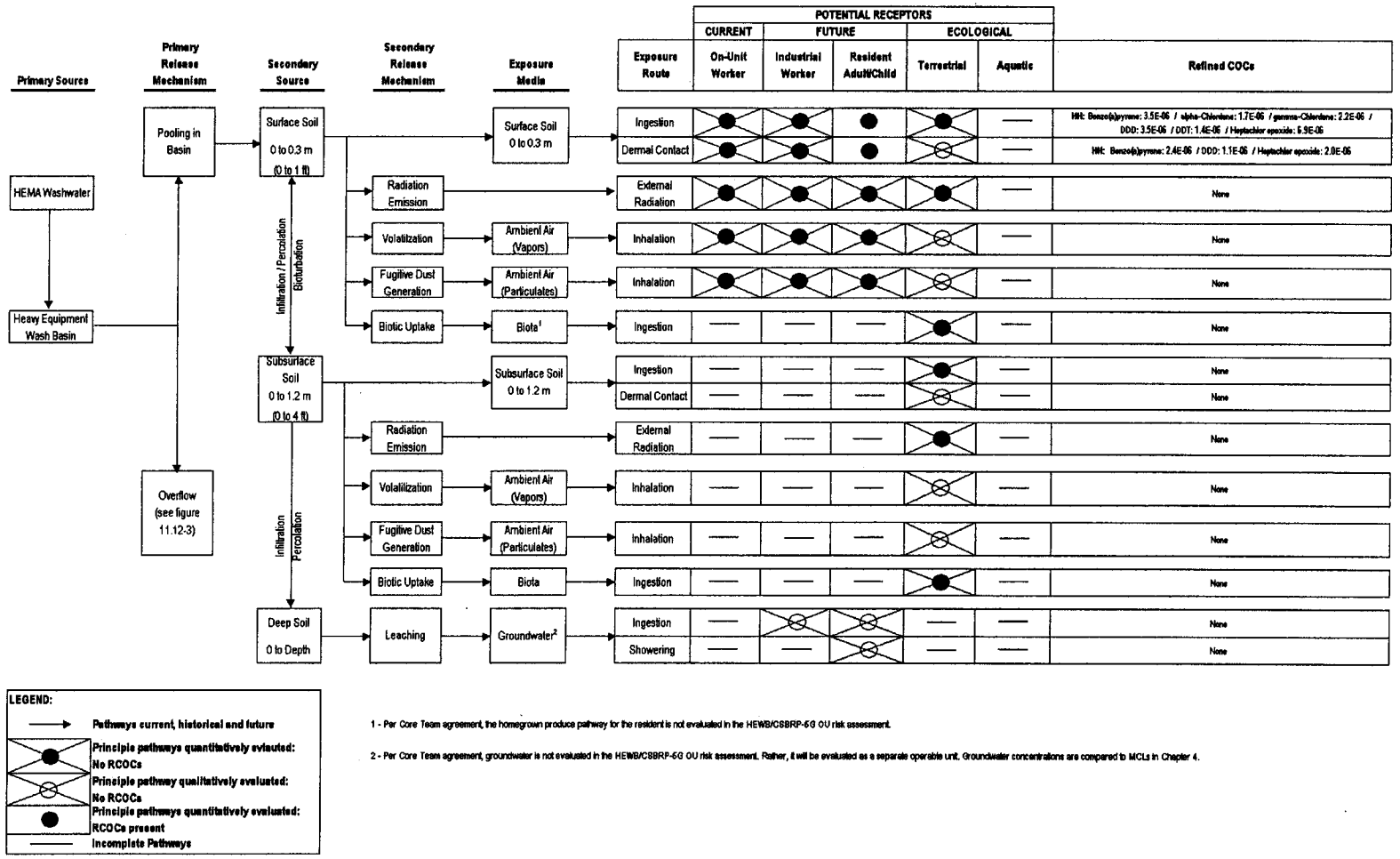

Figure 6. Conceptual Site Model for the Heavy Equipment Wash Basin

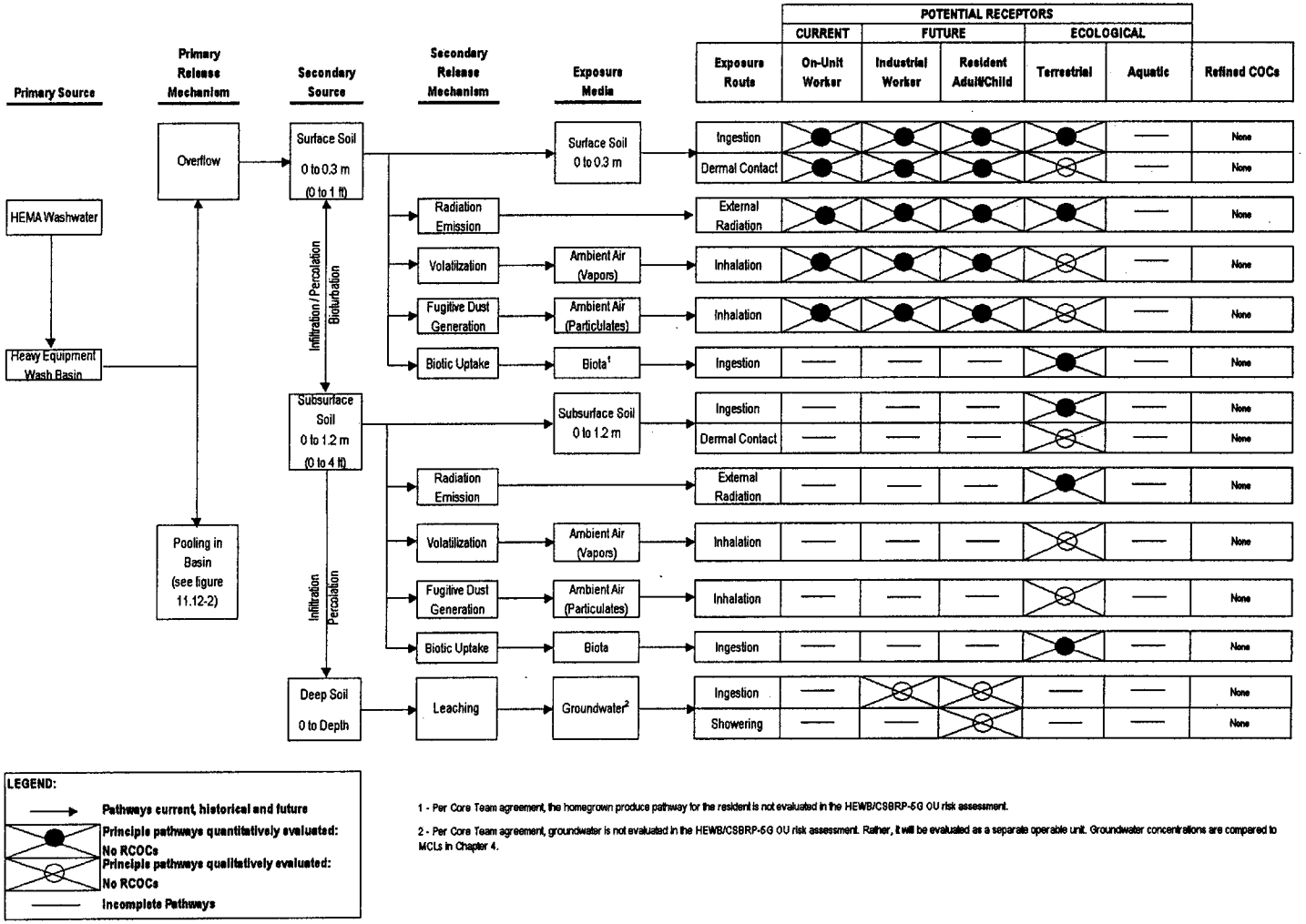

Figure 7. Conceptual Site Model for the HEWB Overflow Discharge Areas

0.3 to 0.6 m (1 to 2 ft), was placed over the debris. A layer of topsoil 0.3 m (1 ft) thick was placed over the top of the clayey fill. Waste observed during investigative trenching included burned wood, ash, metal, glass, and wire. However, investigations at CSBRP-5G did not reveal any hazardous waste (WSRC 1998).

Environmental release mechanisms at CSBRP-5G varied. Contaminants may have been released from primary source materials by several primary release mechanisms. Water is the most likely mechanism and includes the following:

- Water runoff on to the surface soil outside the CSBRP during waste disposal operations
- Infiltration of the primary source to the subsurface and groundwater

(b) Heavy Equipment Wash Basin

The primary source of contamination at the HEWB was sanitary wastewater from Central Shops, including the Heavy Equipment Wash Area (HEWA). Some dissolved/suspended contaminants may have settled into basin soils. No wastewater remains in the basin.

(c) Heavy Equipment Wash Basin Overflow Discharge Area

The primary source of contamination in the Overflow Discharge Area was overflow of wastewater from the HEWB.

Secondary Sources of Contamination and Release Mechanisms

Environmental media impacted by the release of potential contamination from the primary sources become secondary sources. The following potential secondary sources of contamination exist at the HEWB/CSBRP-5G OU:

- Surface, subsurface, and deep soil at the CSBRP-5G
- Surface, subsurface soil, and deep soil in the HEWB
- Surface, subsurface, and deep soil in the HEWB Overflow Discharge Area

Secondary sources (soils of the three OU subunits) may have released contamination to other media. No radiological contamination is known to be present so there are no potential radiological emissions. While the following potential secondary release mechanisms exist, only the water-related transport is deemed significant:

- Release of volatile constituents from the soil (volatilization)
- Generation of contaminated fugitive dust by wind or other surface soil disturbance
- Biotic uptake
- Bioturbation between surface and subsurface soils
- Infiltration/percolation/leaching to groundwater

(a) Central Shops Burning/Rubble Pit 631-5G

The most significant secondary release mechanism affecting CSBRP-5G is expected to be leaching of constituents to deeper soils. Near-surface mechanisms such as volatilization, dust generation, biotic uptake, and stormwater runoff/erosion are not likely to be significant secondary release mechanisms because the pit debris was covered with a layer of soil periodically, both during and after disposal activities ceased. The fill is thought to have retarded or prohibited the release and dispersion of contaminants from surficial processes such as stormwater runoff, water, and wind erosion. The fact that the pit surface was below grade during disposal operations and

that waste material was not deposited above grade would also prohibit dispersion of contaminants from surficial processes. It appears that the floor of CSBRP-5G was connected directly to a drainage ditch constructed during disposal operations, possibly resulting in water-containing contaminants released directly to the drainage ditch and subsequent delivery to the intermittent stream.

(b) Heavy Equipment Wash Basin

The most significant secondary release mechanism affecting HEWB is expected to be water-transported contaminants leaching to deep soil. Near-surface mechanisms such as volatilization, dust generation, and stormwater runoff/erosion are not likely to be significant secondary release mechanisms because the bottom of the basin is surrounded on all sides by a berm greater than 1.5 m (5 ft) high, and pooled water is trapped within the basin.

(c) Heavy Equipment Wash Basin Overflow Discharge Area

The Overflow Discharge Area is the channel that lies immediately downgradient of the HEWB overflow pipe in the area of the intermittent stream flood plain. Wastewater discharged from the HEWB through the Overflow Discharge Area, then to the nearby intermittent stream. The most significant release mechanism presently affecting the Overflow Discharge Area is expected to be infiltration/percolation/leaching of wastewater to the soil. Near-surface mechanisms such as volatilization, dust generation, and stormwater runoff/erosion are not likely to be significant secondary releases.

Exposure Pathways, Exposure Routes, and Receptors

Contact with contaminated environmental media creates the exposure pathways to human health and ecological receptors that are evaluated in a BRA. The following potential exposure pathways were identified at the HEWB/CSBRP-5G OU:

- ambient air (vapors and particulates) in the vicinity of the HEWB/CSBRP-5G OU
- biota in the vicinity of the HEWB/CSBRP-5G OU
- surface, subsurface, and/or deep soil in and around the HEWB/CSBRP-5G OU
- groundwater contaminated by infiltration of contaminated water to the water table

Media Assessment

The RFI/RI/BRA report (WSRC 2003) contains detailed information and analytical data for all the investigations conducted and samples taken in the media assessment of the HEWB/CSBRP-5G OU. This document is available in the Administrative Record File (see Section III of this document).

For the purpose of characterizing the HEWB/CSBRP-5G OU, the unit was divided into the following three subunits:

- Central Shops Burning/Rubble Pit 631-5G
- Heavy Equipment Wash Basin
- Heavy Equipment Wash Basin Overflow Discharge Area

The investigations conducted to characterize the HEWB/CSBRP-5G OU included a background investigation, a primary source investigation, a secondary source investigation, and geotechnical characteristics investigation.

The investigations conducted to characterize the HEWB/CSBRP-5G OU are briefly described in the following sections.

Soil Investigations

The soil investigations of the HEWB/CSBRP-5G OU were conducted in several stages. Table 1 summarizes all the environmental activities conducted at the HEWB/CSBRP-5G OU. The activities include the following:

- Background Investigation

During the pre-work plan characterization of the HEWB/CSBRP-5G OU, background samples were collected from sample locations NHEB-1 to -4 (for sample locations, see Figure 8). Samples collected included surface soil samples from 0 to 0.3 m (0 to 1 ft), subsurface soil samples from 0.3 to 1.2 m (1 to 4 ft), and deep soil samples below 1.2 m (4 ft) to the water table.

- Unit Investigation

(a) Central Shops Burning/Rubble Pit 631-5G

Preliminary investigations conducted at CSBRP-5G included a ground penetrating radar (GPR) survey and soil-gas sampling. The GPR survey performed in 1990 confirmed the presence of waste disposition within the pit. Soil-gas sampling conducted between October 1990 and November 1991 included 83 samples (for sample locations refer to Figure 9). Soil-gas samples were collected from depths 0.9 to 1.2 m (3 to 4 ft) below ground surface (bgs). Soil-gas samples for mercury were collected from a depth of 0.6 to 0.9 m (2 to 3 ft) bgs.

Phase I pre-work plan characterization was performed in November 1996. Fifteen soil samples were collected from four boreholes CSBRP-04, -11, -12 and -13 (for sample locations, see Figure 8), and analyzed for target analyte list (TAL) inorganics, target compound list (TCL) VOCs, TCL semi-volatile organic compounds (SVOCs), pesticides/polychlorinated biphenyls (PCBs)/dioxins and radionuclides.

Table 1. History of Disposal and Characterization Activities at the Central Shops Burning/Rubble Pit 631-5G, Heavy Equipment Wash Basin and Overflow Discharge Area

Dates	Event	Location	Sampling
1951 to 1970	HEWB Used As Sanitary Waste Basin	HEWB and HEWB Overflow Discharge Area	NA
1951	Waste Disposal Began at the CSBRP	Pit 631-5G	NA
1973	Waste Disposal Ceased, Pit Capped With Soil	Pit 631-5G	NA
1981 to Present	Wash Water No Longer Discharged to the HEWB	Operation of Current Wash Facility in Central Shops	NA
October 1990 to November 1991	Soil Gas Survey	Over Pit	83 Samples
1992	GPR Survey	Over Pit	Unknown
CSBRP Phase I: June and July 1996	Soil Sampling	Streams and Ponded Area	15 Location, 78 Samples
CSBRP Phase IA: March and April 1997	Surface Water Sampling	Intermittent Stream	6 Samples
	Sediment Sampling	Streams and Ponded Area	6 Samples
CSBRP Phase II: October 1997 to June 1998	Soil Sampling	In and Around Pit 631-5G	33 Locations, 108 Samples
	Monitoring Well Installation CSR-7,8,9,10,11 DL and DU	Plume Boundary in Upper Zone of UTR Aquifer	10 Wells
	Soil Coring	Monitoring Well Boreholes	5 Coreholes
	Groundwater Sampling	Monitoring Wells Around Pits	17 Wells, 2 Events
	Surface Water Sampling	Streams and Ponded Area	8 Samples
	Sediment Sampling	Streams and Ponded Area	8 Samples
	Trenching	Pit 631-5G	2 Trenches
	GPR Survey	Over Pit 631-5G	Pit Boundary Delineation
	CPT Groundwater Sampling	Around Pits	40 Pushes, 109 Samples
	CPT Lithologic Logging	Around Pits	12 Lithologic Pushes
Phase I Characterization 1998	HEWB Soil/Sediment Sampling	Locations NHEB-26, 37, 39, 40, and 41 at HEWB	10 HEWB Soil/Sediment Samples, 1 Surface Water Sample at NHEB-37
June 2001 to April 2002 RFI/RI Characterization	HEWB Overflow Discharge Area Soil/Sediment Sampling	Locations NHEB-100 and -101 at HEWB Overflow Discharge Area,	4 Soil/Sediment 0-1 and 1-4 ft
	Monitoring Wells Installed at HEWB to Confirm the Contaminant Migration Modeling	Downgradient of HEWB	NEB-12D and NEB-13D

GPR – Ground Penetrating Radar, CPT – Cone Penetrometer Test, NA – Not Applicable

Under the 1998 RFI/RI Work Plan characterization, two trenches were dug to determine if hazardous material was buried at the unit (Figure 10). These trenches were perpendicular to the long axis of the pit and approximately 2.4 m (8 ft) wide at the top and 1.2 m (4 ft) wide at the base. Trenching on both the north and the south ends of the pit revealed the area and depth of burned wood, metal, glass, and wire debris. A GPR survey was performed during the trenching to ensure that trenching had reached the edge of the pit.

During the Phase II characterization, 108 soil samples were collected from 36 locations (including four background locations) at varying depths (for sample locations, see Figure 8). The sample locations included CSBRP-04, CSBRP-11 through -13, CSBRP-25 and -26, CSBRP-30 through -32, CSBRP -52 and -53, CSBRP-59 through -63, CSBRP -89 through -96, NHEB-26, NHEB-36 and -37, NHEB-39 through -41 and NHEB-100 and -101. The background locations included CSBRP-04 and CSBRP-11 through -13. The samples collected at locations CSBRP-89 through -96 were screened in the field with a photoionization detector (PID) and flame ionization detector (FID) to determine if VOCs were present in the 0- to 1.2-m (0 to 4 ft) deep soil. All samples were analyzed for TAL inorganics, TCL VOCs, TCL SVOCs, pesticides/PCBs, and radionuclides.

Geotechnical samples were collected at location CSBRP-59 to determine the hydraulic characteristics of the soils beneath the pit. Additionally, temporary piezometers were installed to determine the direction of groundwater flow beneath the pit.

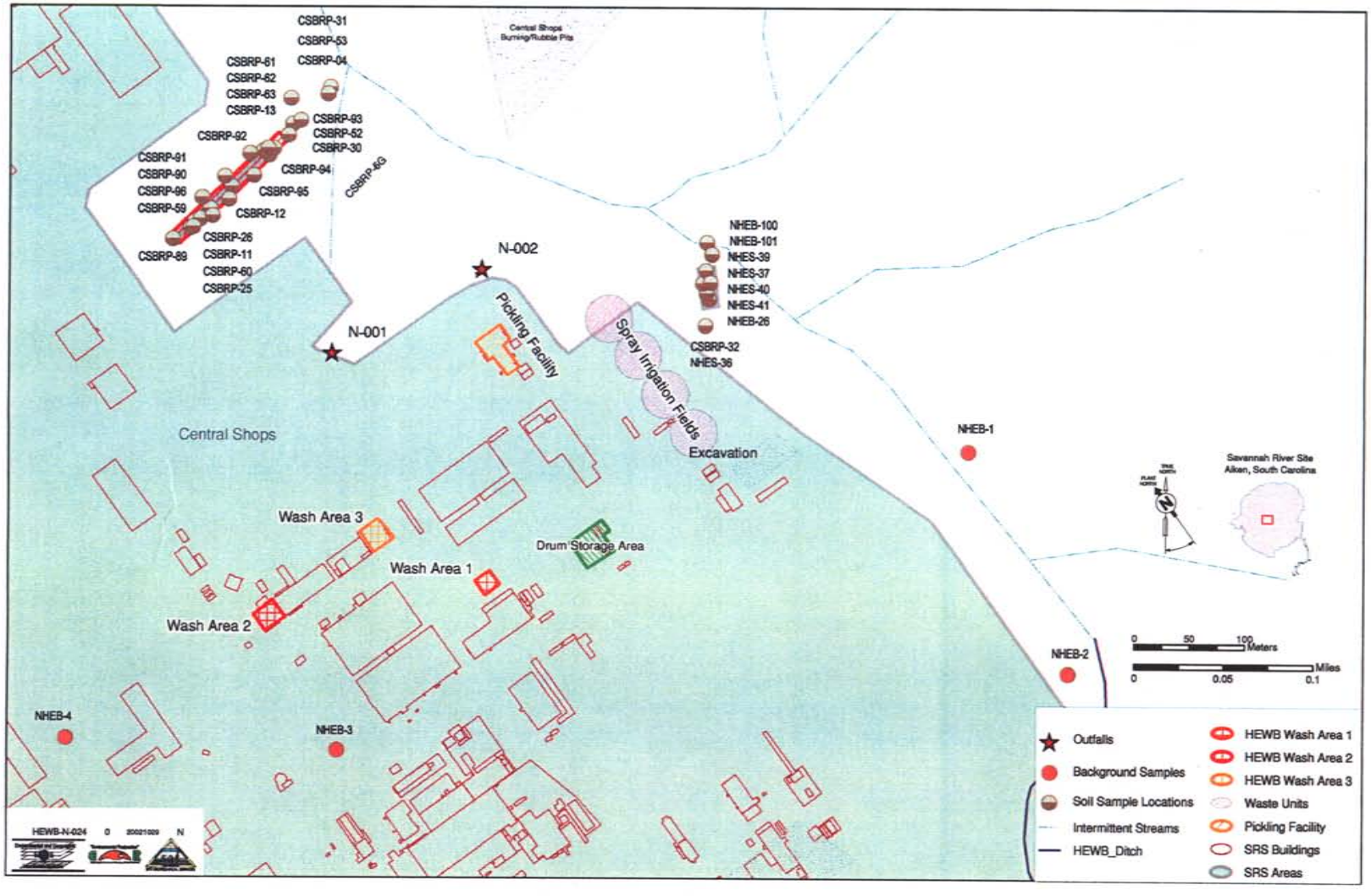

Figure 8. Locations of Soil Samples at the HEWB/CSBRP-5G OU

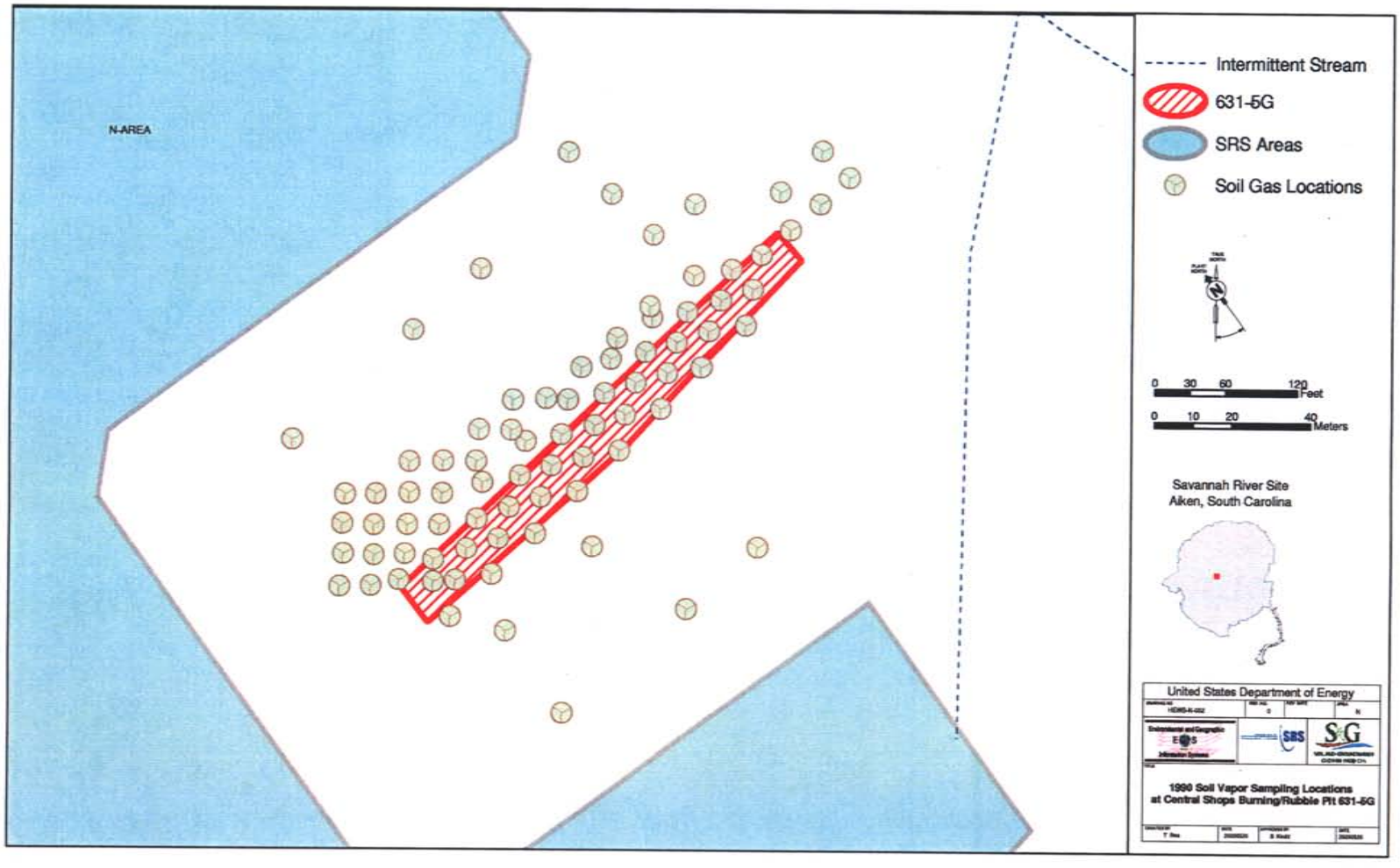

Figure 9. Soil-Gas Sampling Locations at Central Shops Burning Rubble Pit 631-5G Taken in 1990

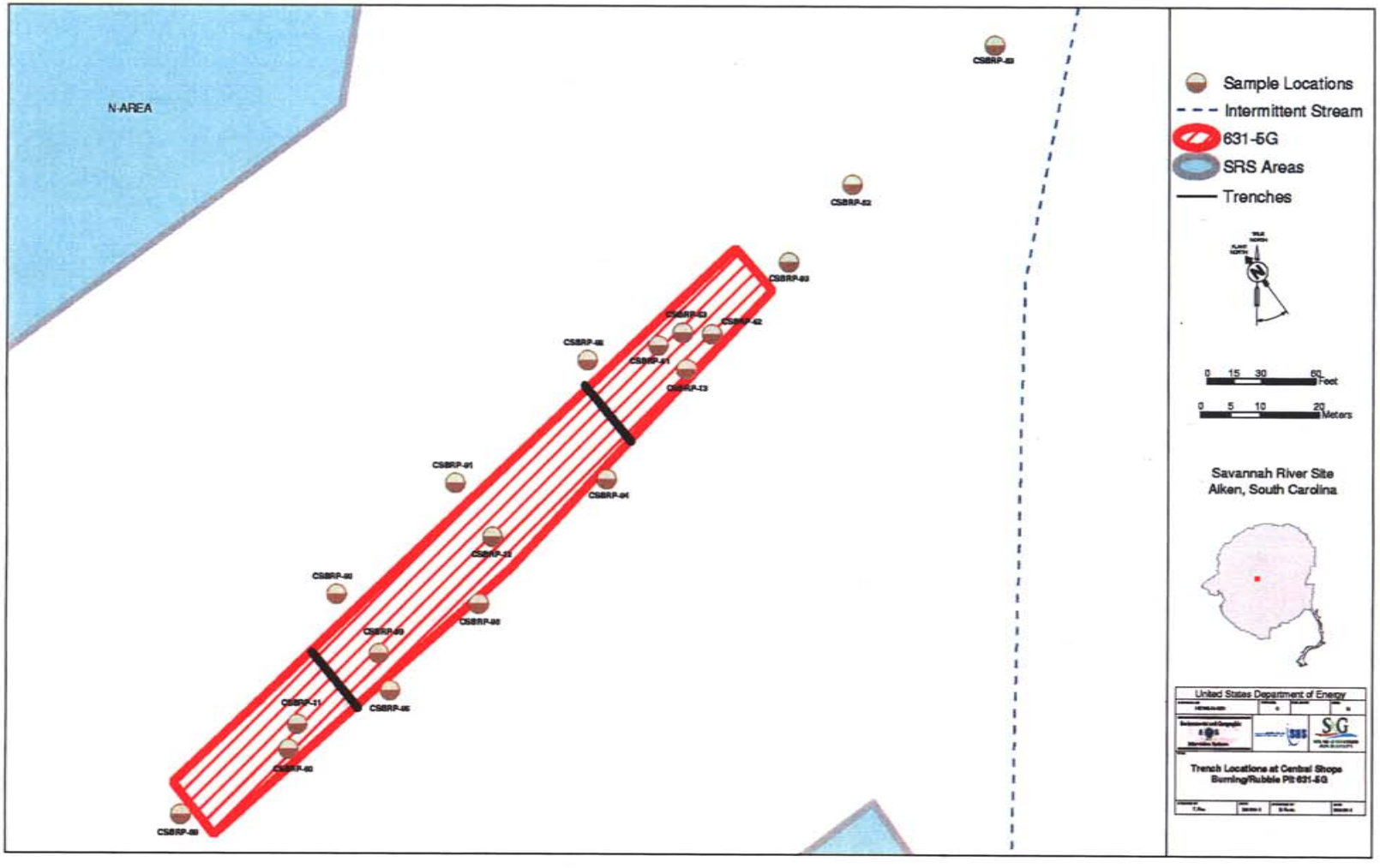

Figure 10. Trench Locations at Central Shops Burning/Rubble Pit 631-5G

(b) Heavy Equipment Wash Basin

Since the primary sources of contamination related to HEWB were the sanitary wastewater released from the Central Shops from 1951 to 1971 and wastewater resulting from heavy equipment cleaning operations from 1951 to 1981, no sanitary waste water was present during the characterization of the HEWB and HEWB Overflow Discharge Area.

During the Phase I characterization at the HEWB and HEWB Overflow Discharge Area, five sample locations (NHEB-26, NHES-37 -39, -40, and -41) and one surface water sample from NHES-37 were sampled within HEWB (for sample locations, see Figure 11). Locations NHES-39, -40, and -41 were sampled in the 0- to 0.3-m (0 to 1 ft) and 0.3- to 1.2-m (1 to 4 ft) intervals. Location NHEB-26 was sampled in the 0- to 0.3-m (0 to 1 ft), 0.3- to 1.2-m (1 to 4 ft), and 1.2- to 2.7-m (4 to 9 ft) intervals. NHES-37 was sampled from 0 to 0.1-m (0 to 0.5 ft) and a water sample from pooled water at that location. All samples were analyzed for TAL metals, TCL VOCs, SVOCs, pesticides/PCBs with tentatively identified compounds (TICs) and radionuclides.

Two monitoring wells (well NEB-12D and -13D) as shown in Figure 11 were installed downgradient of the HEWB to verify the contaminant migration model, which indicated that no migration of contaminants would occur in the water table.

(c) Heavy Equipment Wash Basin Overflow Discharge Area

Soil samples were collected in the HEWB Overflow Discharge Area during the phase II RFI/RI Work Plan characterization in 2001 at locations NHEB-100 and NHEB-101 (for sample locations, see Figure 11). The samples were collected at 0- to 0.3-m (0 to 1 ft) and 0.3- to 1.2-m (1 to 4 ft) intervals. All samples were analyzed for TAL metals, TCL VOCs, SVOCs, and pesticides/PCBs with TICs.

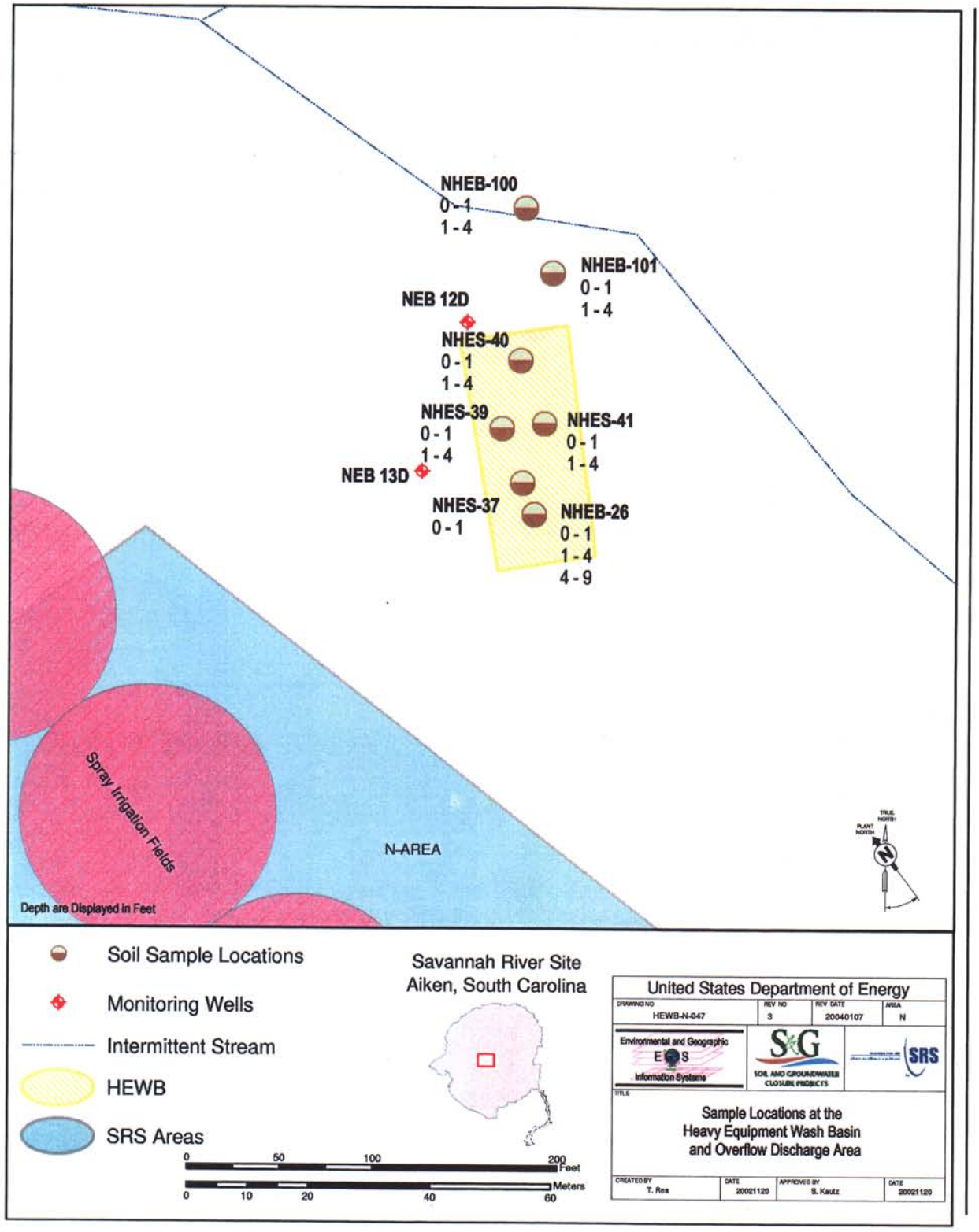

Figure 11. Location of Soil Samples at the HEWB and HEWB Overflow Discharge Area

Geotechnical Characteristics Investigation

The geotechnical samples were collected from below the pit at CSBRP-5G between 4.3 and 5.0m, (14 and 16.5 ft) bgs during the 1998 Work Plan characterization (for sample location, see Figure 10). The samples were collected with Shelby tubes and analyzed for the following parameters:

- Porosity
- Falling head permeability
- Moisture content
- Bulk density
- Specific gravity
- Cation exchange capacity
- Particle size (sieve and hydrometer)
- Total organic carbon
- pH

Groundwater Investigations

Since the groundwater beneath the HEWB/CSBRP-5G OU is included in a separate Central Shops (N Area) Groundwater OU, a discussion on groundwater investigation is not included in this ROD.

Media Assessment Results

Soil

The COCs associated with the HEWB/CSBRP-5G OU soils were determined by applying standard SRS characterization and risk assessment (human health and ecological) protocols to the unit data for surface, subsurface, and deep soils. Unrestricted (hypothetical future resident) and industrial land use were applied in calculating the human health risks. The calculated risks (2.7×10^{-5}) were within the USEPA target range of 1.0×10^{-4} to 1.0×10^{-6} (assuming unrestricted use), and below 1×10^{-6} for industrial use. The 1.0×10^{-6} risk level is considered a point of departure above which alternatives will generally be evaluated. No contaminant migration constituents of concern (CMCOCs) were identified through contaminant fate and transport analyses.

The target range of 1.0×10^{-4} to 1.0×10^{-6} is for site-related exposure and represents the incremental probability of an individual's developing cancer over a lifetime as a result of exposure to a carcinogen. An excess lifetime cancer risk of 1.0×10^{-6} indicates that an individual experiencing the reasonable maximum exposure estimate has a 1 in 1,000,000 (one million) chance of developing cancer as a result of site-related exposure. This is referred to as an "excess lifetime cancer risk" because it would be in addition to the risks of cancer individuals face from other causes such as smoking or exposure to too much sun. The chance of an individual developing cancer from all other causes has been estimated to be as high as one in three. Likewise, the cancer risk of 1.0×10^{-4} indicates a chance that 1 in 10,000 (ten thousand) will develop cancer. A risk exceeding 1.0×10^{-6} normally warrants an evaluation of cleanup alternatives that will reduce risk.

The potential for noncarcinogenic effects is evaluated by comparing an exposure level over a specified time period (e.g., lifetime) with a reference dose (RfD) derived for a similar exposure period. An RfD represents a level that an individual may be exposed to that is not expected to cause any deleterious effect. The ratio of exposure to toxicity is called a hazard quotient (HQ). An HQ<1 indicates that a receptor's dose of a single contaminant is less than the RfD and that toxic noncarcinogenic effects from that

chemical are unlikely. The hazard index (HI) is generated by adding the HQs for all COCs that affect the same target organ (e.g., liver) or that act through the same mechanism of action within a medium or across all media to which a given individual may reasonably be exposed. An HI<1 indicates that, based on the sum of all HQs from different contaminants and exposure routes, toxic noncarcinogenic effects from all contaminants are unlikely. An HI>1 indicates that site-related exposures may present a risk to human health.

Six refined COCs were identified for the HEWB subunit. No refined COCs were identified for the other two subunits. The results of the characterization and assessment have been summarized in the RFI/RI/BRA report (WSRC 2003).

Tables 2 through 4 provide the results from the screening process used to determine the refined COCs to be retained for further remedial action at the HEWB/CSBRP-5G OU. The process entailed the following steps:

1. From the detected constituents, unit-specific constituents (USCs) were identified.

2. USCs were determined by comparing each constituent concentration found in the soil against its respective twice average background concentration for all depth intervals. The USCs were used to determine the preliminary CMCOCs.

3. The risk-based preliminary COCs (human health COCs (HHCOCs) and ecological COCs) were determined in accordance with CERCLA guidance and protocols.

4. The applicable or relevant and appropriate requirement (ARAR) COCs were determined using RCRA/CERCLA screening values/standards.

5. Potential threat source material (PTSM) was evaluated by screening the maximum concentration or activity of each USC against either the USEPA Region IX Preliminary Remediation Goals (PRGs) or risk-based activity (RBA). PTSM was also evaluated based on the contamination potential for migrating to the groundwater.

6. All the preliminary COCs were carried into a formal uncertainty analysis to determine if there were any refined COCs.

The refined COCs are those constituents for which remediation may be warranted. Soil was the only medium for which refined COCs were identified at the HEWB/CSBRP-5G OU. The key findings are summarized in the following sections.

(a) Central Shops Burning/Rubble Pit 631-5G

None of the following exist at the CSBRP-5G subunit: PTSM, CMCOCs, ecological COCs, or HHCOCs.

(b) Heavy Equipment Wash Basin

None of the following exist at the HEWB subunit: PTSM, CMCOCs, or ecological COCs.

- Six HHCOCs are present in the surface soil (0 to 0.3 m [0 to 1 ft]) within the wash basin. These include benzo(a)pyrene (maximum concentration 0.472 mg/kg; residential RGO, 0.0519 mg/kg location NHEB-26); alpha-chlordane (maximum concentration 3.16 mg/kg; residential RGO, 1.28 mg/kg; sample location NHES-41); gamma-chlordane (maximum concentration 3.98 mg/kg; residential RGO 1.28 mg/kg; sample location NHES-37); heptachlor epoxide (maximum concentration 0.772 mg/kg; residential RGO 0.0542 mg/kg; sample location NHES-37); p,p'-DDD (maximum concentration 14.8 mg/kg; residential RGO 2.04 mg/kg; sample location NHES-41); and p, p'-DDT (maximum concentration 4.2 mg/kg; residential RGO 1.44 mg/kg; sample location NHES-41). For risk-based RGOs, refer to Table 5.

Table 2. Overview of the COC Process for Soil at the CSBRP 631-5G

Detected Constituent	Nature and Extent			Fate & Transport			Human Health		Ecological		Refined COC
	USC	ARAR COC	PTSM COC	Tier 1 CM COPC	Tier 2 CM COPC	CM COC	COPC	COC	COPC	COC	
Pesticides/PCBs											
Aldrin	X										None
Dieldrin	X										
Endosulfan II	X										
Methoxychlor (Mariate)	X										
Octachlorodibenzo-p-dioxin	X										
alpha-Benzene hexachloride	X										
alpha-Chlordane	X										
gamma-Chlordane	X										
p,p'-DDD	X										
p,p'-DDE	X										
p,p'-DDT	X										
Radionuclides											
Actinium-228											
Cesium-137	X						X	X			
Europium-155	X										
Gross Alpha											
Lead-212											
Non-volatile Beta	X										
Potassium-40	X						X	X			
Ruthenium-106	X										
TAL Inorganics											
Aluminum	X						X				
Antimony	X										
Arsenic	X						X	X			
Barium	X						X				
Beryllium	X										
Calcium	X										
Chromium	X										
Cobalt	X										
Copper	X										
Cyanide	X						X				
Iron	X						X				
Lead	X	X									
Magnesium	X										
Manganese	X						X				
Mercury	X										
Nickel	X										
Potassium	X										
Selenium											
Silver	X										
Sodium	X										
Thallium	X										
Vanadium											
Zinc	X										
TCL Semivolatiles											
Benzoic acid	X										
Bis(2-ethylhexyl) phthalate	X										
Di-n-butyl phthalate	X										
Di-n-octyl phthalate	X										
TCL Volatiles											
1,2-Dichloroethene (total)	X										
2-Butanone (MEK)	X										
Acetone											
Benzene	X										
Bromomethane (Methyl bromide)	X										
Carbon disulfide	X										
Carbon tetrachloride	X										
Chloroform	X										
Chloromethane (Methyl chloride)	X										
Tetrachloroethene	X										
Toluene	X										
Trichloroethene (TCE)	X										
Xylenes (total)	X										

COPC – Constituent of Potential Concern

Table 3. Overview of COC Process for Soil at HEWB

Detected Constituent	Nature and Extent			Fate & Transport			Human Health		Ecological		Refined COC
	USC	ARAR COC	PTSM COC	Tier 1 CM COPC	Tier 2 CM COPC	CM COC	COPC	COC	COPC	COC	
Pesticides/PCBs											
Endosulfan sulfate	X										
Heptachlor epoxide	X						X	X			X
alpha-Chlordane	X						X	X			X
gamma-Chlordane	X						X	X			X
p,p'-DDD	X						X	X			X
p,p'-DDE	X						X				
p,p'-DDT	X						X	X			X
Radionuclides											
Actinium-228											
Cesium-137	X						X	X			
Gross Alpha											
Lead-212											
Non-volatile Beta											
Potassium-40							X	X			
Radium-226							X	X			
Radium-228											
Sodium-22	X						X	X			
Uranium-233/234											
Uranium-238							X	X			
TAL Inorganics											
Aluminum							X				
Arsenic											
Barium	X			X	X						
Beryllium	X										
Cadmium	X										
Calcium	X										
Chromium	X										
Cobalt											
Copper	X										
Cyanide											
Iron											
Lead	X										
Magnesium	X										
Manganese	X										
Mercury	X										
Nickel	X										
Potassium											
Selenium											
Silver	X										
Sodium											
Vanadium											
Zinc	X										
TCL Semivolatiles											
Anthracene	X										
Benzo(a)anthracene	X						X				
Benzo(a)pyrene	X						X	X			X
Benzo(b)fluoranthene	X						X				
Benzo(g,h,i)perylene	X										
Chrysene	X						X				
Fluoranthene	X										
Indeno(1,2,3-c,d)pyrene	X						X				
Phenanthrene	X										
Pyrene	X										
TCL Volatiles											
Acetone											
Benzene	X										
Chlorobenzene	X										
Toluene	X										

COPC – Constituent of Potential Concern

Table 4. Overview of the COC Process for Soils in the HEWB Overflow Discharge Area

Detected Constituent	Nature and Extent			Fate & Transport			Human Health		Ecological		Refined COC
	USC	ARAR COC	PTSM COC	Tier 1 CM COPC	Tier 2 CM COPC	CM COC	COPC	COC	COPC	COC	
Pesticides/PCBs											
Aroclor 1254	X										None
alpha-Chlordane	X										
gamma-Chlordane	X										
p,p'-DDD	X										
p,p'-DDE	X										
p,p'-DDT	X										
TAL Inorganics											
Aluminum											
Arsenic											
Barium	X										
Calcium	X										
Chromium											
Cobalt											
Copper	X										
Iron							X				
Lead	X										
Magnesium											
Manganese	X						X				
Mercury	X										
Nickel											
Potassium											
Silver	X										
Sodium	X										
Vanadium											
Zinc	X										
TCL Semivolatiles											
Bis(2-ethylhexyl) phthalate	X										
TCL Volatiles											
2-Butanone (MEK)	X										
Acetone											

COPC – Constituent of Potential Concern

- (c) Heavy Equipment Wash Basin Overflow Discharge Area

None of the following exist at the HEWB Overflow Discharge Area: PTSM, CMCOCs, HHCOCs, and ecological COCs.

Site-Specific Factors

No site-specific factors requiring special consideration that might affect the remedial action for the HEWB/CSBRP-SG OU are present at the site.

Contaminant Transport Analysis

The vadose zone contaminant migration CSMs used to analyze contaminant fate and transport are presented in Figures 12 and 13. The analysis was based on the lithological information, groundwater levels, and geotechnical data collected from investigations conducted in 2001 and 2002 (see Table 1). The results of the migration model reveal that the concentrations of constituents detected in the HEWB/CSBRP-5G OU soils will not exceed their maximum contaminant levels (MCLs) or risk-based concentrations (RBCs) within the 1,000-year modeling period. The MCL is the maximum concentration of a substance allowed in water that is delivered to any user of a public water supply as required by the Safe Drinking Water Act. The CSMs identified no refined CMCOCs. Therefore, the HEWB/CSBRP-5G OU soils do not pose a migration threat to groundwater.

Table 5. Summary of Risk-Based RGOs for HEWB/CSBRP-5G OU Soil

Refined COCs	Units	Type of RCOC					Risk Based RGOs					Most Restrictive RGO[f]
		ARAR	PTSM	CM	HH	ECO	ARAR RGO[a]	PTSM RGO[b]	CM RGO[c]	HH RGO[d]	ECO RGO[e]	
CSBRP-5G												
None												
HEWB												
Benzo(a)pyrene	mg/kg				X		NA	NA	NA	5.19E-02	NA	5.19E-02
alpha-Chordane	mg/kg				X		NA	NA	NA	1.28E+00	NA	1.28E+00
gamma-Chlordane	mg/kg				X		NA	NA	NA	1.28E+00	NA	1.28E+00
Heptachlor epoxide	mg/kg				X		NA	NA	NA	5.42E-02	NA	5.42E-02
p,p'-DDD	mg/kg				X		NA	NA	NA	2.04E+00	NA	2.04E+00
p,p'-DDT	mg/kg				X		NA	NA	NA	1.44E+00	NA	1.44E+00
HEWB Overflow Discharge Area												
None												

Type of RCOC:
ARAR = Applicable or relevant and appropriate requirements
PTSM = Principal threat source material
CM = Contaminant migration
HH = Human health
ECO = Ecological

a- No refined ARAR COCs are present.
b- No refined PTSM COCs are present.
c- No refined contaminant migration COCs are present.
d- Human health RGOs (lesser of risk and hazard-based values).
e- No refined ecological COCs are present.
f- Most restrictive RGOs are set to the lowest of the ARAR, PTSM, CM, HH, and ECO risk-based RGOs.

NA = Not applicable

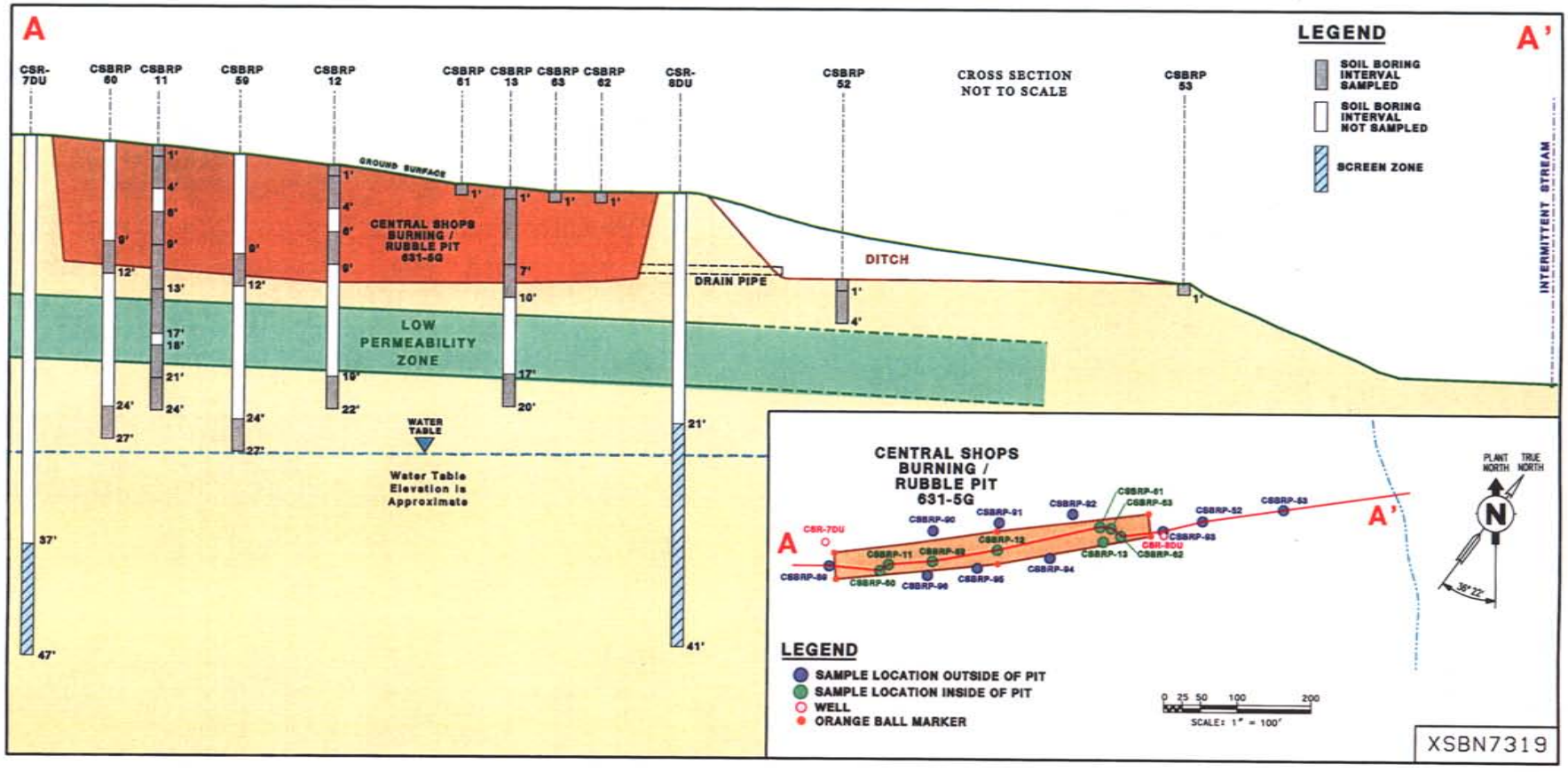

Figure 12. Contaminant Migration Conceptual Site Model for CSBRP-5G

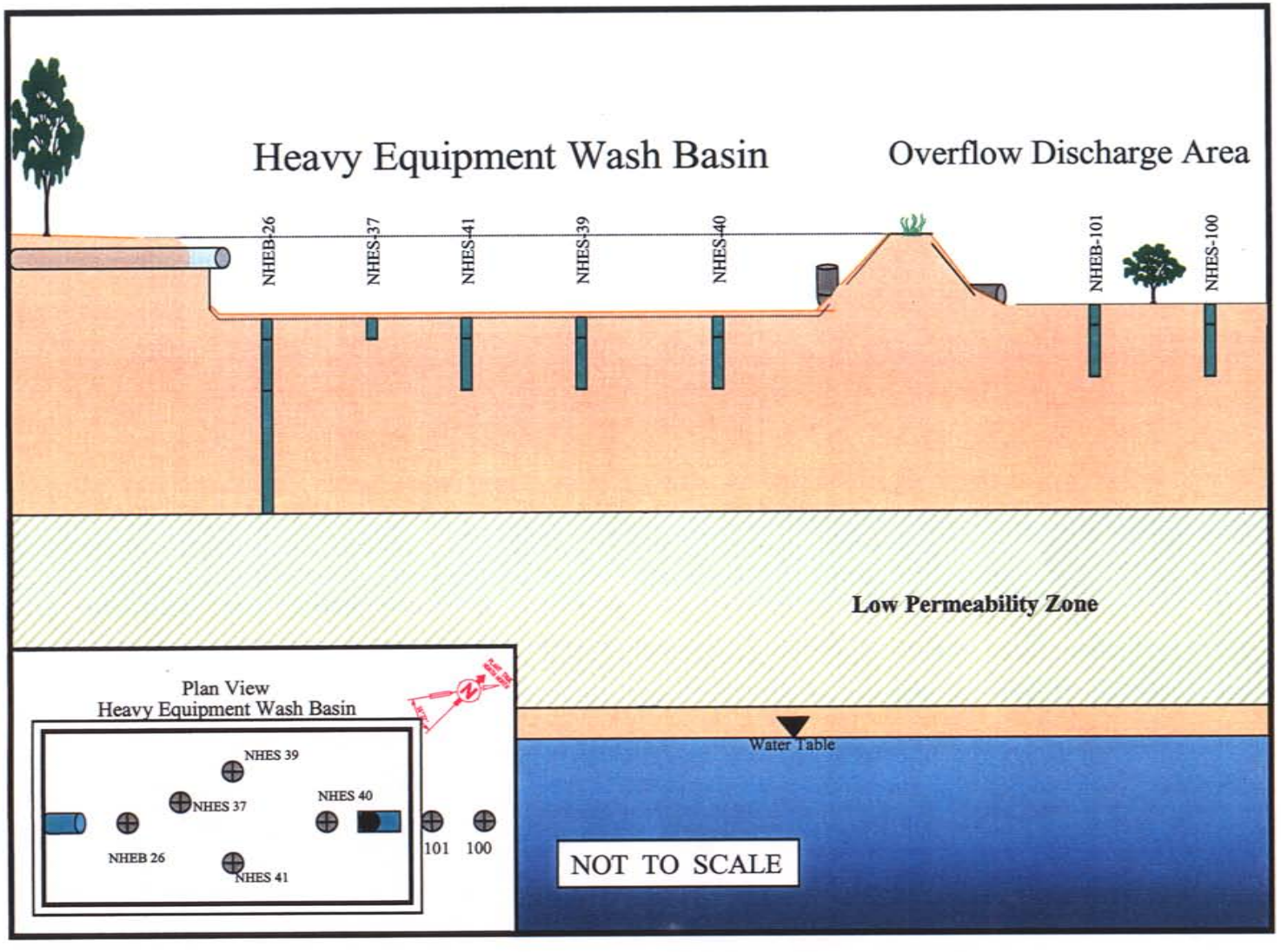

Figure 13. Contaminant Migration Conceptual Site Model for HEWB

VI. CURRENT AND POTENTIAL FUTURE SITE AND RESOURCE USES

Land Uses

Current Land Use

Currently, the HEWB/CSBRP-5G OU is an inactive waste unit. It is located within N Area (Central Shops), approximately 600 m (2,000 ft) south of the industrial area (see Figures 1 and 2). Access to SRS is controlled by USDOE. The potential receptor for exposure to constituents associated with the HEWB/CSBRP-5G OU is the known on-unit worker who comes to the area on an infrequent or occasional basis. Known on-unit workers are defined as SRS employees who work at or in the vicinity of the HEWB/CSBRP-5G OU under current land use conditions. A known on-unit worker may be a researcher, environmental sampler, or other SRS personnel who work in close proximity to the unit. Although these receptors may be involved in the excavation or collection of contaminated media, they would be using SRS procedures and protocols to minimize exposure to potential contaminants.

Future Land Use

According to the *Savannah River Site Future Use Project Report* (USDOE 1996) the preferred future land use for the area where the HEWB/CSBRP-5G OU is located is designated as industrial with buffer (see Figure 4). Therefore, the potential receptor for exposure to constituents associated with the HEWB/CSBRP-5G OU is the hypothetical on-unit industrial worker.

The hypothetical on-unit industrial worker is an adult who works in an outdoor industrial setting that is in direct proximity to the contaminated media for the majority of his or her time.

Groundwater Uses/Surface Water Uses

Groundwater beneath the HEWB/CSBRP-5G OU is not used for any type of human consumption. Furthermore, it is unlikely that this groundwater will be used for human consumption in the future. Although there are monitoring wells in the vicinity of the HEWB/CSBRP-5G OU, the future land use will remain industrial use only and not residential or agriculture use. The groundwater that flows beneath the HEWB/CSBRP-5G OU discharges into the Fourmile Branch.

There are no distinct surface water features on the unit, and no drainage or surface runoff features that indicate that the surface runoff is being used for irrigation or any other beneficial uses.

VII. SUMMARY OF OPERABLE UNIT RISKS

Baseline Risk Assessment

As a component of the RFI/RI process, a BRA was performed for the HEWB/CSBRP-5G OU. The BRA included human health and ecological risk assessments. The results of the risk assessments are summarized in the following paragraphs.

Exposure Routes

The probable exposure routes for the HEWB/CSBRP-5G OU include the following:

- Ingestion (surface soil)
- Inhalation (or soil particles and vapors)
- Dermal contact (surface soil)
- External radiation (surface soil)

Receptors (Human and Ecological)

Human and ecological receptors were identified based on physical and operational knowledge of the site and local demographics as well as known and hypothetical future land uses.

Human receptors evaluated in the BRA included the following:

- Known on-unit worker
- Hypothetical on-unit industrial worker
- Hypothetical future on-unit resident (adult and child)

The known on-unit worker who comes to the area on an infrequent or occasional basis is a potential receptor for exposure to constituents associated with HEWB/CSBRP-5G OU. Known on-unit workers are defined as SRS employees who work at or in the vicinity of the OU under current land use conditions. A known on-unit worker may be a researcher, environmental sampler, or other SRS personnel in close proximity to the unit. These receptors may be involved in excavation or collection of contaminated media and would be using SRS procedures and protocols for sampling at hazardous waste units.

The hypothetical on-unit industrial exposure scenario addresses long-term risks to workers who are exposed to unit-related constituents while working within an industrial setting. The hypothetical on-unit industrial worker is an adult who works the majority of the time in an outdoor industrial setting that is in direct proximity to the contaminated media.

The hypothetical future on-unit resident exposure scenario evaluates long-term risks to individuals who might have unrestricted use of the unit. It assumes that residents live on-unit and are chronically exposed (both indoors and outdoors) to unit-related constituents. The hypothetical future on-unit resident includes adults and children who

are exposed to all the contaminated media. For noncarcinogenic exposures to residents, child and adult receptors are evaluated separately. However, for all carcinogenic exposures to residents, a weighted-average child/adult is evaluated. This scenario assumes that children in the first six years of life are a more sensitive population and, therefore, assigns a greater weight to this proportion of the 70-year lifetime exposure.

Ecological receptors may include the following:

- Terrestrial ecological receptors (e.g., soil-dwelling invertebrates (earthworms), insectivorous mammals (short-tailed shrews), and insectivorous birds (American robins)

Summary of Human Health Risk Assessment

Identification of COCs

Table 6 summarizes the refined COCs for the hypothetical future residents associated with surface soils pertaining to HEWB/CSBRP-5G OU and includes maximum detected concentrations, detection frequencies, and exposure point concentrations at a 95% upper confidence level (UCL).

Toxicity Assessment

Table 7 summarizes the cancer toxicity data associated with soils pertaining to HEWB/CSBRP-5G OU, based on unrestricted use/unlimited exposure.

Exposure Assessment

Table 8 summarizes the risk to a hypothetical future resident exposed to COCs present in the surface soils pertaining to HEWB/CSBRP-5G OU.

Table 6. Summary of Constituents of Concern and Medium-Specific Exposure Point Concentrations for HEWB/CSBRP -5G OU

Scenario Timeframe: **Future**
Medium: **Soil**
Exposure Medium: **Surface Soil**
HEWB Subunit

Exposure Route	Constituent of Concern	Concentration Detected		Units	Frequency of Detection	Exposure Point Concentration	Exposure Point Concentration Units	Statistical Measure
		Min	Max					
Soil Onsite – Direct Contact	Benzo(a) pyrene	0.472	0.472	mg/kg	1/5	0.306	mg/kg	95% UCL
	Alpha-Chlordane	0.192	3.16	mg/kg	5/5	3.16	mg/kg	Max
	Gamma-Chlordane	0.224	3.98	mg/kg	5/5	3.98	mg/kg	Max
	Heptachlor epoxide	0.772	0.772	mg/kg	1/5	0.484	mg/kg	95% UCL
	p,p'-DDD	14.8	14.8	mg/kg	1/5	9.27	mg/kg	95% UCL
	p,p"-DDT	4.20	4.20	mg/kg	1/5	2.63	mg/kg	95% UCL

95% UCL – 95 percent upper confidence limit

Max – maximum concentration

Table 7. Cancer Toxicity Data Summary for HEWB/CSBRP-5G OU – HEWB Subunit

Pathway: Ingestion, Dermal						
Constituent of Concern	**Oral Cancer Slope Factor**	**Dermal Cancer Slope Factor**	**Slope Factor Units**	**Weight of Evidence/ Cancer Guideline Description**	**Source**	**Date[1] (M/D/Y)**
Benzo(a)pyrene	7.30	23.5	(mg/kg)/day	B2	IRIS/RAIS	06/01/02
Alpha-chlordene	0.35	0.70	(mg/kg)/day	B2	IRIS/RAIS	06/01/02
Gamma-chlordene	0.35	0.70	(mg/kg)/day	B2	IRIS/RAIS	06/01/02
Heptachlor epoxide	9.1	12.60	(mg/kg)/day	B2	IRIS/RAIS	06/01/02
p,p'-DDD	0.24	0.34	(mg/kg)/day	B2	IRIS/RAIS	06/01/02
p,p'-DDT	0.34	0.49	(mg/kg)/day	B2	IRIS/RAIS	06/01/02

Pathway: Inhalation							
Constituent of Concern	**Unit Risk**	**Units**	**Inhalation Cancer Slope Factor**	**Slope Factor Units**	**Weight of Evidence/ Cancer Guideline Description**	**Source**	**Date[1] (M/D/Y)**
Benzo(a)pyrene	8.8×10^{-4}	$m^3/\mu g$	3.10	(mg/kg)/day	B2	NCEA/[2] IRIS/ RAIS	06/01/02
Alpha-chlordane	1.0×10^{-4}	$m^3/\mu g$	0.35	(mg/kg)/day	B2	IRIS/ RAIS	06/01/02
Gamma chlordane	1.0×10^{-4}	$m^3/\mu g$	0.35	(mg/kg)/day	B2	IRIS/ RAIS	06/01/02
Heptachlor epoxide	2.6×10^{-3}	$m^3/\mu g$	9.1	(mg/kg)/day	B2	IRIS/ RAIS	06/01/02
p,p'-DDD	9.7×10^{-5}	$m^3/\mu g$	0.34	(mg/kg)/day	B2	IRIS/[3] RAIS	06/01/02
p,p'-DDT	9.7×10^{-5}	$m^3/\mu g$	0.34	(mg/kg)/day	B2	IRIS/ RAIS	06/01/02

Key **EPA Group**
IRIS: **Integrated Risk Information System, USEPA**
NCEA: **National Center for Environmental Assessment, USEPA**
RAIS: **Risk Assessment Information System**

1. The date the database was searched.
2. Inhalation slope factor of benzo(a)pyrene was taken from NCEA as cited in EPA 1995.
3. Used p,p'-DDT as a surrogate.

B2- Probable human carcinogen – indicates sufficient evidence in animals and inadequate or no evidence in humans.

Table 8. Risk Characterization Summary – Carcinogens for HEWB/CSBRP-5G OU

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult
HEWB Subunit

Medium	Exposure Medium	Exposure Route	Constituent of Concern	Carcinogenic Risk			
				Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	Soil Onsite Direct Contact	Benzo(a)pyrene	3.50×10^{-6}	2.46×10^{-11}	2.40×10^{-6}	5.90×10^{-6}
			Alpha-chlordene	1.73×10^{-6}	2.87×10^{-11}	7.38×10^{-7}	2.47×10^{-6}
			Gamma-chlordene	2.18×10^{-6}	3.60×10^{-11}	9.29×10^{-7}	3.11×10^{-6}
			Heptachlor epoxide	$6..90 \times 10^{-6}$	1.14×10^{-11}	2.03×10^{-6}	8.93×10^{-6}
			p,p'-DDD	3.48×10^{-6}	8.19×10^{-11}	1.06×10^{-6}	4.54×10^{-6}
			p,p'-DDT	1.40×10^{-6}	2.37×10^{-11}	4.26×10^{-7}	1.83×10^{-6}
							Soil Risk Total $=2.68 \times 10^{-5}$

Risk Characterization

Cancer risks are evaluated using the USEPA target range of 1.0×10^{-4} to 1.0×10^{-6} for incremental cancer risk. Risk levels above 1.0×10^{-4} are generally considered significant. Cancer risk above 1.0×10^{-6} is considered a point of departure above which remedial alternatives will generally be evaluated. Cancer risks less than 1.0×10^{-6} are considered to be of little concern in terms of evaluating human health risk.

For noncancerous effects, an HI greater than 1 has been defined as the initial level of concern for adverse noncarcinogenic health effects (USEPA 1989) and an HI of 3 has been defined as an additional higher level of concern. For noncarcinogens, these health effects are evaluated for the target organ within a given medium.

A review of the analytical data contained in the RFI/RI/BRA for the HEWB/CSBRP-5G OU report (WSRC 2003) indicates that the data are of sufficient quality for use in the risk assessment evaluation.

Based on the existing analytical data, an evaluation was conducted to estimate the human health and environmental problems that could result from the current physical and waste characteristics of the HEWB/CSBRP-5G OU. The results of the assessment are discussed in the following paragraphs.

(a) Central Shops Burning/Rubble Pit 631-5G

The results of the assessment indicated that the concentrations of all the constituents analyzed were below USEPA RBCs and the calculated risks were below the USEPA target risk range of 1.0×10^{-4} to 1.0×10^{-6} (or HQs less than 0.1 for non-cancer constituents), assuming unrestricted land use. (For an explanation of carcinogenic and non-carcinogenic risk values, refer to the media assessment results in Section V). Hence, no refined HHCOCs are present at CSBRP-5G. The CSBRP-5G subunit poses no health risks and is suitable for unrestricted use.

(b) Heavy Equipment Wash Basin

The results of the assessment indicate that six refined COCs are present in the surface soil (0 to 0.3 m [0 to 1 ft] bgs within the wash basin. These include benzo(a)pyrene (total risks, hypothetical future resident 5.9 x 10^{-6}); alpha-chlordane (total risks, hypothetical future resident 2.5 x 10^{-6}); gamma-chlordane (total risks, hypothetical future resident 3.1 x 10^{-6}); heptachlor epoxide (total risks, hypothetical future resident 8.9 x 10^{-6}); p,p'-DDD (total risks, hypothetical future resident 4.5 x 10^{-6}); and p,p'-DDT (total risks, hypothetical future resident 1.8 x 10^{-6}). These risk values reveal that all six refined COCs identified in the surface soil pose a combined risk to the hypothetical future resident greater than 1 X 10^{-6} (risk = 2.7 x 10^{-5}). Although no RCOCs were identified for the industrial worker scenario, the sum of the risk for the six constituents that were identified as residential RCOCs, would equate to a risk of 4.7 x 10^{-6} for the future industrial worker.

(c) Heavy Equipment Wash Basin Overflow Discharge Area

The assessment results indicated that the constituent concentrations analyzed were below USEPA RBCs, and the calculated risks were below the USEPA target risk range of 1.0 x 10^{-4} to 1.0 x 10^{-6}, assuming unrestricted land use. Hence, there are no refined HHCOCs. The HEWB Overflow Discharge Area subunit poses no health risk and is suitable for unrestricted land use.

Summary of Ecological Risk Assessment

The purpose of the ecological risk assessment component of the BRA is to evaluate the likelihood that adverse ecological effects may occur or are occurring as a result of exposure to unit-related constituents based on a line-of-evidence approach. The ecological risk assessment has concluded that no refined COCs are associated with any of the three subunits of the HEWB/CSBRP-5G OU and, therefore, the unit poses a negligible risk to ecological receptors.

Summary of Contaminant Fate and Transport Analysis

The vadose zone CSM used to analyze contaminant fate and transport is presented in Figures 12 and 13. The analysis was based on the lithological information, groundwater levels, and geotechnical data collected from investigations conducted in 2001 and in 2002 (see Table 1). The results of the migration model reveal that the concentrations of constituents detected in the HEWB/CSBRP-5G OU soils will not exceed their MCLs or RBCs within the 1,000-year modeling period. The MCL is the maximum concentration of a substance allowed in water that is delivered to any user of a public water supply as required by the Safe Drinking Water Act. The CSM identified no refined CMCOCs. Therefore, the HEWB/CSBRP-5G OU soils do not pose a migration threat to groundwater.

Discussion of Principal Threat Source Material (PTSM)

The concept of principal threat waste as developed by USEPA (USEPA 1991) was applied to USCs. No PTSM COCs associated with HEWB/CSBRP-5G OU were identified based on toxicity or mobility.

Risk Assessment Summary

The risk assessments and contaminant fate and transport analysis establish that the risk associated with two of the three subunits (namely, CSBRP-5G and HEWB Overflow Discharge Area) of the HEWB/CSBRP-5G OU are negligible. The human health risks associated with the third subunit (HEWB) fall within the target range for unrestricted use/unrestricted exposure; however, the combined risk posed by the six refined COCs present at the HEWB exceeds 1.0×10^{-6} for unrestricted (hypothetical future resident) land use.

Conclusions

The anticipated future use of the land is industrial, consistent with the SRS Future Use Plan and SRS Long Range Comprehensive Plan. Under industrial use and exposure, the unit poses no unacceptable risk, and no cleanup is needed.

The most conservative exposure assumptions are associated with residential (unrestricted) use. Residential use is not foreseeable at the HEWB, nor is it consistent with the SRS Future Use Plan and SRS Long Range Comprehensive Plan. However, risk assessment considers both the reasonably anticipated future use and the hypothetical residential (unrestricted) use, in order to determine whether restrictions on future use are necessary for protectiveness, due to the presence of contaminants.

Under unrestricted land use, no refined COCs are identified for two of the three subunits; the CSBRP-5G and the HEWB Overflow Discharge Area. For the third subunit (the HEWB), the risk associated with six identified refined COCs falls within the risk management range for unrestricted use/unrestricted exposure. As discussed in the risk assessment summary, the combined risk posed by these refined COCs exceeds 1.0×10^{-6} for unrestricted land use (i.e. residential risk = 2.7×10^{-5}). Although no RCOCs were identified for the industrial worker scenario, the combined risk for the six constituents identified as residential RCOCs would equate to a risk of 4.7×10^{-6} for the future industrial worker. Because residential use of any part of the SRS (but particularly the areas that are historically or currently industrial) is not reasonably anticipated or foreseeable, risk to a hypothetical future resident exceeding 1.0×10^{-6} does not warrant a response action by DOE. Rather, such a risk warrants DOE's commitment, in a ROD, to the land use controls described in the LUCAP for the SRS. When industrial use is considered, no problems warranting action are associated with ARARs, PTSM, human health analysis, ecological analysis, or contaminant migration analysis at any subunit within the HEWB/CSBRP-5G OU.

VIII. REMEDIAL ACTION OBJECTIVES AND REMEDIAL GOALS

Remedial action objectives (RAOs) are unit-specific quantitative goals that define the extent of cleanup required to achieve the goal of protecting human health and the environment. The RAOs are based on the nature and extent of contamination, threatened resources, and the potential for human, environmental or ecological exposure, and ARARs. The RAOs are designed to protect human health, environmental resources, and the ecology (i.e., biota exposure) from unacceptable exposure to COCs and are used as the framework for developing remedial alternatives.

Remedial goals (RGs) are the final acceptable exposure levels that are determined on the basis of the results of the BRA and evaluation of the expected exposures and associated risks for each alternative.

The No Action alternative is identified as the preferred remedial alternative for CSBRP-5G and HEWB Overflow Discharge Area subunits. Since a No Action alternative is identified for these subunits, no RAOs have been developed, and no RGs have been established.

Six refined COCs identified at the HEWB subunit are present at concentrations which represent a combined risk greater than 1.0×10^{-6}. Therefore, residential exposure must be prevented. Because residential use of any part of the SRS (but particularly the areas that are historically or currently industrial) is not reasonably anticipated or foreseeable, risk to a hypothetical future resident exceeding 1.0×10^{-6} does not warrant a response action by DOE. Rather, such a risk warrants DOE's commitment, in a ROD, to the land use controls described in the LUCAP for the SRS.

IX. DESCRIPTION OF ALTERNATIVES

CSBRP-5G and HEWB Overflow Discharge Area

Based on the unit characterization data and risk assessment results, the risks associated with the CSBRP-5G and HEWB Overflow Discharge Area subunits are negligible. For

this reason, a No Action alternative is identified as the selected remedial alternative. No other alternatives were developed for consideration and evaluation for these two subunits.

HEWB

Based on the unit characterization data and risk assessment results for the HEWB subunit, Institutional Controls are required to prevent hypothetical residential exposure to HEWB soil contaminants. The following alternatives were developed for consideration:

- No Action
- Institutional Controls

Remedy Components, Common Elements, and Distinguishing Features of Each Alternative

Alternative 1, No Action

Estimated Present Worth Cost: $0

Construction Time to Complete: N/A

Time To Achieve RAO: N/A

Description of Alternative

This alternative entails leaving the HEWB subunit soils in the current condition with no additional controls.

The No Action alternative is required by the National Oil and Hazardous Substance Pollution Contingency Plan (NCP) to serve as a baseline for comparison with other remediation alternatives.

The No Action alternative does not meet the RAO for the HEWB.

Alternative 2, Institutional Controls

Present Worth Cost: $103,000

Construction Time to Complete: N/A

Time To Achieve RAO: N/A

Description of Alternative

This alternative will include Institutional Controls that will be implemented in accordance with the LUCAP for SRS. Controls will include erecting warning signs and periodic field inspections.

Because this remedy will result in hazardous substances, pollutants, or contaminants remaining onsite above levels that allow for unlimited use and unrestricted exposure, a statutory review will be conducted within five-years after initiation of the remedial action to ensure that the remedy continues to provide adequate protection of human health and the environment.

A LUCIP will be developed for the HEWB/CSBRP-5G OU (for the HEWB subunit only) and will be submitted to the regulators for their approval with the post-ROD documentation. The area included in the LUCIP is shown in Figure 14.

The LUCIP will provide details and specific measures required for Land Use Controls (LUCs) selected as a part of this remedy. USDOE is responsible for implementing, maintaining, monitoring, reporting upon, and enforcing the LUCs selected under this

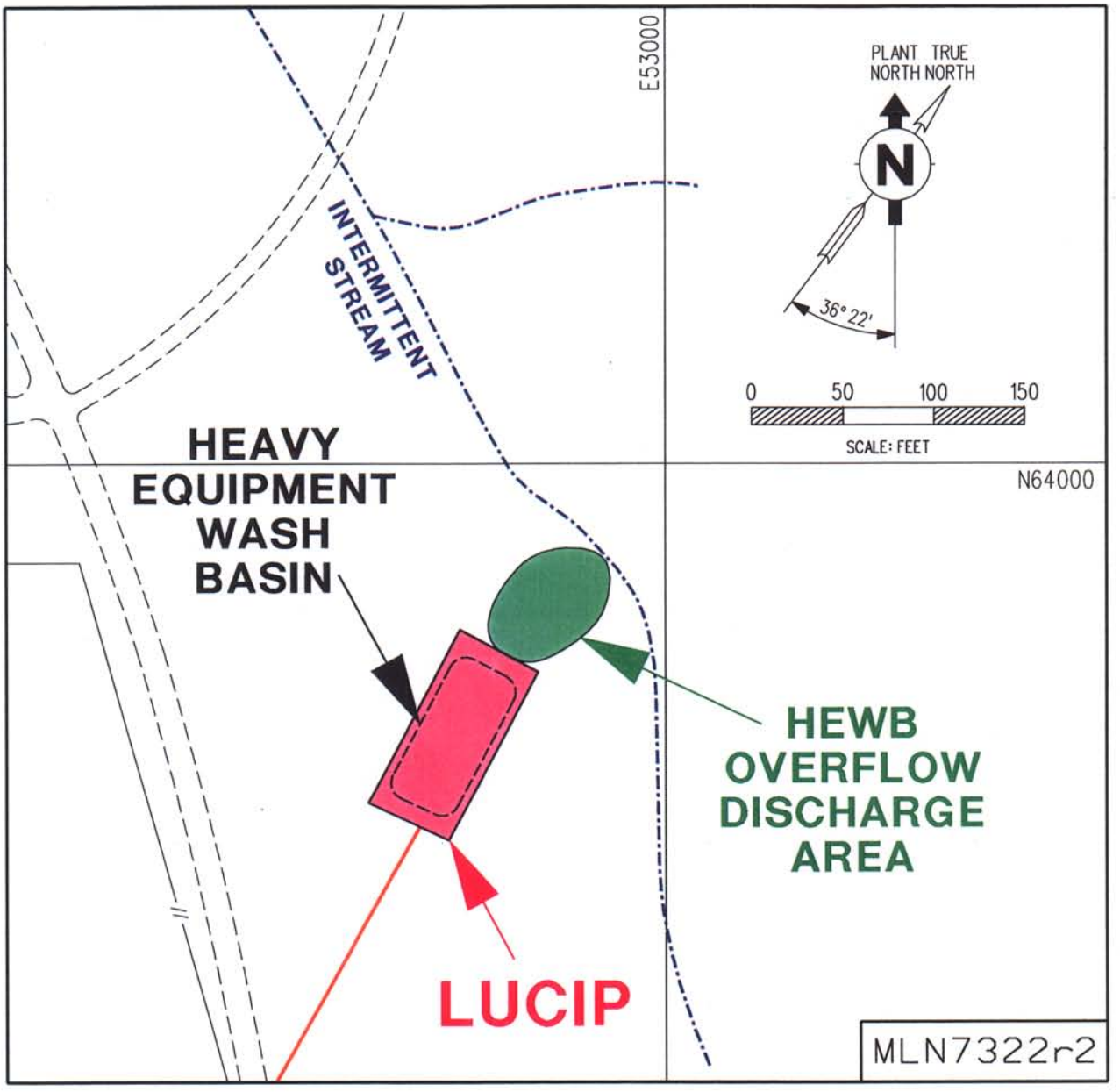

Figure 14. HEWB Area Under Land Use Control Implementation Plan

ROD. The LUCIP developed as a part of this action will be submitted concurrently with the Final Remediation Report (FRR), as required in the FFA for review and approval by USEPA and SCDHEC. Upon final approval, the LUCIP will be appended to the LUCAP and considered incorporated by reference into the ROD, establishing LUC implementation and maintenance requirements enforceable under CERCLA. The LUCIP will remain in effect until modified as needed to be protective of human health and the environment. LUCIP modification will only occur through another CERCLA document.

In the long term, if the property is ever transferred to nonfederal ownership, the U.S. Government will take those actions necessary pursuant to Section 120(h) of CERCLA. Those actions will include a deed notification disclosing former waste management and disposal activities as well as remedial actions taken on the site. The deed notification shall, in perpetuity, notify any potential purchaser that the property has been used for the management and disposal of waste. These requirements are also consistent with the intent of the RCRA deed notification requirements at final closure of a RCRA facility if contamination will remain at the unit.

The deed shall also include deed restrictions precluding residential use of the property. However, the need for these deed restrictions may be reevaluated at the time of transfer in the event that exposure assumptions differ or the residual contamination no longer poses an unacceptable risk under residential use. Any reevaluation of the need for the deed restrictions will be done through an amended ROD with USEPA and SCDHEC review and approval.

In addition, if the site is ever transferred to nonfederal ownership, a survey plat of the HEWB/CSBRP OU (for the HEWB subunit only) will be prepared, certified by a professional land surveyor, and recorded with the appropriate county recording agency. The HEWB/CSBRP-5G OU is located in Barnwell County.

The remedial action that is being proposed will meet the previously mentioned RAO (see Section VIII of this ROD).

X. COMPARATIVE ANALYSIS OF ALTERNATIVES

The proposed action (Alternative 2, Institutional Controls) has been evaluated against the nine USEPA evaluation criteria (see insert box) and compared with the No Action alternative. The nine criteria are categorized into three groups: threshold criteria, primary balancing criteria, and modifying criteria. The threshold criteria must be satisfied in order for an alternative to be eligible for selection. The primary balancing criteria are used to weigh major tradeoffs among the alternatives. Generally, the modifying criteria are taken into account after public comment is received on the SB/PP.

Threshold Criteria

Overall Protection of Human Health and the Environment

The proposed action (Institutional Controls) protects human health and the environment by reducing the exposure of potentially contaminated soils through Institutional Controls.

The No Action alternative is not protective of human health and the environment. Under the No Action alternative, no further action will be taken at the unit, and the unit will be left in its current condition.

EVALUATION CRITERIA FOR SUPERFUND REMEDIAL ALTERNATIVES
THRESHOLD CRITERIA
Overall Protection of Human Health and the Environment determines whether an alternative eliminates, reduces, or controls threats to public health and the environment through institutional controls, engineering controls, or treatment.
Compliance with ARARs evaluates whether the alternative meets Federal and State environmental statutes, regulations, and other requirements that pertain to the site, or whether a waiver is justified.
BALANCING CRITERIA
Long-Term Effectiveness and Permanence considers the ability of an alternative to maintain protection of human health and the environment over time.
Reduction of Toxicity, Mobility, or Volume of Contaminants through Treatment evaluates an alternative's use of treatment to reduce the harmful effects of principal contaminants, their ability to move in the environment, and the amount of contamination present.
Short-Term Effectiveness considers the length of time needed to implement an alternative and the risks the alternative poses to workers, residents, and the environment during implementation.

Implementability considers the technical and administrative feasibility of implementing the alternative, including factors such as the relative availability of goods and services.
Cost includes estimated capital and annual operations and maintenance costs, as well as present worth cost. Present worth cost is the total cost of an alternative over time in terms of today's dollar value. Cost estimates are expected to be accurate within a range of +50 to –30 percent.
MODIFYING CRITERIA
State/Support Agency Acceptance considers whether the State agrees with the analyses and recommendations, as described in the RI/FS and Proposed Plan.
Community Acceptance considers whether the local community agrees with the analyses and preferred alternative. Comments received on the Proposed Plan are an important indicator of community acceptance.

Compliance with ARARs

No ARARs are associated with this proposed action. The proposed action and No Action alternative meet these criteria equally.

Primary Balancing Criteria

Long-Term Effectiveness and Permanence

The proposed action provides long-term effectiveness since the Institutional Controls will be implemented for at least 30 years. No Action does not provide any long-term effectiveness or permanence.

Reduction of Toxicity, Mobility, or Volume through Treatment

The proposed action does not provide treatment. The buried wastes at the HEWB/CSBRP-5G OU do not require treatment. Treatment is not necessary because, based on the conclusions of the RFI/RI/BRA investigation, the levels of the COCs identified do not pose a threat to groundwater. The threat to human exposure (future industrial workers) can be adequately addressed through LUCs. No Action also does not involve treatment. Since neither alternative entails treatment, neither will reduce toxicity, mobility, or volume.

Short-Term Effectiveness

No action will not expose remedial workers to hazard because no remedial activity is being performed.

The proposed action will not present a significant risk to the remedial workers during implementation. Because the remedial activity is Institutional Controls only, workers would not be exposed to COCs.

Implementability

No Action is fully implementable as it requires no remedial activity. The proposed action is easily implementable since it involves only Institutional Controls, including erecting warning signs and compliance with Section 3.8 of the LUCAP (WSRC 1999).

Cost

The cost for the No Action alternative is $0. The present value cost for the proposed action (Institutional Controls) is $103,000. Details of the cost estimate for the proposed action are included in Appendix C. This cost assumes all initial construction activities will be completed within the first year. Five-year CERCLA reviews for 30 years are also included. The interest rate used for projecting the maintenance and inspection costs to the present value was 3.9%.

Modifying Criteria

State Acceptance

The approval of the proposed action by SCDHEC and USEPA constitutes preliminary acceptance of the preferred alternative by the state regulatory agencies. Final approval of a remedial alternative is determined after the comment period when the ROD is signed.

Community Acceptance

The SB/PP public comment period began on February 27, 2004, and ended on April 11, 2004. No public comments were received; therefore, community acceptance of the proposed action has been granted.

XI. THE SELECTED REMEDY

Detailed Description of the Selected Remedy

Based upon the characterization data and risk evaluation contained in the RFI/RI/BRA report (WSRC 2003), RAOs, and the detailed evaluation of the alternatives, the selected remedy for the HEWB/CSBRP-5G OU (for the HEWB subunit only) is Institutional Controls. This remedy will be carried out by implementing the LUCAP (WSRC 1999). The objective of the Institutional Controls remedy is to prevent residential land use. This objective will be achieved by implementing controlled access to the HEWB subunit through SRS the site use/site clearance program, installing warning signs, conducting periodic inspection and maintenance, and evaluating the need for deed notification/restrictions if the property is ever transferred to non-federal ownership.

The selected remedy entails the following:

- Implement Institutional Controls in accordance with the LUCAP for SRS. The controls will include erecting warning signs and periodic field inspections.

- Perform five-year CERCLA remedy reviews.

There is no additional proposed alternative (other than the No Action alternative) for this OU so a comparison was only made between the Institutional Controls alternative and the No Action alternative. The proposed action (Institutional Controls) was selected because it offers the most cost-effective method of managing the low risks associated with the HEWB/CSBRP-5G OU (for the HEWB subunit only).

Evaluation of the proposed remedial action using the nine USEPA criteria shows that the proposed action fully meets most of the criteria. The major exception is that it does not provide treatment. However, relative to the contaminated soils at the HEWB subunit, no treatment is required because, based on the conclusions of the RFI/RI/BRA investigation, the levels of the refined COCs identified in the HEWB subunit do not pose a threat to groundwater. The threat to human health can be adequately addressed through LUCs.

USEPA and SCDHEC have concurred with the proposed action.

Institutional controls will be implemented by:

- Access controls to prevent exposure to on-site workers via the Site Use Program, Site Clearance Program, work control, worker training, worker briefing of health and safety requirements and identification signs located at the waste unit boundaries.

- Access controls to prevent exposure to trespassers, as described in the 2000 RCRA Part B Permit Renewal Application, Volume I, Section F.1, which describes the security procedures and equipment, 24-hour surveillance system, artificial or natural barriers, control entry systems, and warning signs in place at the SRS boundary.

For more detailed description of access controls see Table 9.

In the long term, if the property is ever transferred to nonfederal ownership, the U.S. Government will take those actions necessary pursuant to Section 120(h) of CERCLA. Those actions will include a deed notification disclosing former waste management and disposal activities as well as remedial actions taken on the site. The deed notification shall, in perpetuity, notify any potential purchaser that the property has been used for the management and disposal of waste. These requirements are also consistent with the intent of the RCRA deed notification requirements at final closure of a RCRA facility if contamination will remain at the unit.

The deed shall also include deed restrictions precluding residential use of the property. The deed shall contain provisions to ensure that appropriate land use controls remain with the affected area upon any and all transfers. However, the need for these deed restrictions may be reevaluated at the time of transfer in the event that exposure assumptions differ or the residual contamination no longer poses an unacceptable risk under residential use. Any reevaluation of the need for the deed restrictions will be done through an amended ROD with USEPA and SCDHEC review and approval.

In addition, if the site is ever transferred to nonfederal ownership, a survey plat of the OU (the HEWB subunit only) will be prepared, certified by a professional land surveyor, and recorded with the appropriate county recording agency. The HEWB/CSBRP-5G OU is located in Barnwell County.

The selected remedy for the HEWB/CSBRP-5G OU (for the HEWB subunit only) leaves hazardous substances in place that pose a potential future risk and will require land use restrictions for an indefinite period of time. As agreed on March 30, 2000, among the USDOE, USEPA, and SCDHEC, SRS is implementing a LUCAP to ensure that the LUCs required by numerous remedial decisions at SRS are properly maintained and periodically verified. The unit-specific LUCIP referenced in this ROD will provide details and specific measures required to implement and maintain the LUCs selected as part of this remedy. The USDOE is responsible for implementing, maintaining, monitoring, reporting upon, and enforcing the LUCs selected under this ROD. The LUCIP, developed as part of this action, will be submitted concurrently with the FRR as required in the FFA for review and approval by USEPA and SCDHEC. Upon final approval, the LUCIP will be appended to the LUCAP and is considered incorporated by reference into the ROD, establishing LUC implementation and maintenance requirements enforceable under CERCLA. The approved LUCIP will establish implementation, monitoring, maintenance, reporting, and enforcement requirements for the unit. The LUCIP will remain in effect unless and until modifications are approved as needed to be protective of human health and the environment. The deed shall contain provisions to ensure that appropriate land use controls remain with the affected area upon any and all transfers.

Table 9. Land Use Controls for the HEWB/CSBRP-5G OU (for HEWB subunit only)

Type of Control	Purpose of Control	Duration	Implementation	Affected Areas[a]
1. Property Record Notices[b]	Provide notice to anyone searching records about the existence and location of contaminated areas.	Until the concentration of hazardous substances associated with the unit have been reduced to levels that allow for unlimited exposure and unrestricted use	Notice recorded by DOE in accordance with state laws at County Register of Deeds office, if the property or any portion thereof is ever transferred to non-federal ownership.	All waste management areas and other areas where hazardous substances are left in place at levels requiring land use and/or groundwater restrictions.
2. Property record restrictions[c]: A. Land Use B. Groundwater	Restrict use of property by imposing limitations. Prohibit the use of groundwater.	Until the concentration of hazardous substances associated with the unit have been reduced to levels that allow for unlimited exposure and unrestricted use.	Drafted and implemented by DOE upon transfer of affected areas. Recorded by DOE in accordance with state law at County Register of Deeds office.	All waste management areas and other areas where hazardous substances are left in place at levels requiring land use and/or groundwater restrictions.
3. Other Notices[d]	Provide notice to city about the existence and location of waste disposal and residual contamination areas for zoning/planning purposes.	Until the concentration of hazardous substances associated with the unit have been reduced to levels that allow for unlimited exposure and unrestricted use.	Notice recorded by DOE in accordance with state laws at County Register of Deeds office, if the property or any portion thereof is ever transferred to non-federal ownership.	All waste management areas and other areas where hazardous substances are left in place at levels requiring land use and/or groundwater restrictions.
4. Site Use Program[e]	Provide notice to worker/developer (i.e., permit requestor) on extent of contamination and prohibit or limit excavation/penetration activity.	As long as property remains under DOE control.	Implemented by DOE and site contractors. Initiated by permit request.	Remediation systems, all waste management areas, and areas where levels requiring land use and/or groundwater restrictions.
5. Physical Access Controls[f] (e.g., fences, gates, portals)	Control and restrict access to workers and the public to prevent unauthorized access.	Until the concentration of hazardous substances associated with the unit have been reduced to levels that allow for unlimited exposure and unrestricted use.	Controls maintained by DOE.	At select locations throughout SRS.

Table 9. Land Use Controls for the HEWB/CSBRP-5G OU (for HEWB subunit only) (Continued)

Type of Control	Purpose of Control	Duration	Implementation	Affected Areas[a]
6. Warning Signs[g]	Provide notice or warning prevent unauthorized uses.	Until the concentrations of hazardous substances associated with the unit have been reduced to levels that allow for unlimited exposure and unrestricted use.	Signage maintained by DOE.	At select locations throughout SRS.
7. Security Surveillance Measures	Control and monitor access by workers/public.	Until the concentrations of hazardous substances associated with the unit have been reduced to levels that allow for unlimited exposure and unrestricted use.	Established and maintained by DOE Necessity of patrols evaluated upon completion of remedial actions.	Patrol of selected area throughout SRS as necessary.

[a]Affected areas – Specific locations identified in the SRS LUCIP or subsequent post-ROD documents.

[b]Property Record Notices – Refers to any non-enforceable, purely informational document recorded along with the original property acquisition records of DOE and its predecessor agencies that alerts anyone searching property records to important information about residual contamination, waste disposal areas in the property.

[c]Property Record Restrictions – Includes conditions and/or covenants that restrict or prohibit certain uses of real property and are recoded along with original property acquisition records of DOE and its predecessor agencies.

[d]Other Notices – Includes information on the location of waste disposal areas and residual contamination depicted on a survey plat, which is provided to a zoning authority (i.e., city planning commission) for consideration in appropriate zoning decisions for non-DOE property.

[e]Site Use Program – Refers to the internal DOE/DOE contractor administrative program(s) that requires the permit requestor to obtain authorization, usually in the form of a permit, before beginning any excavation/penetration activity (e.g., well drilling) for the purpose of ensuing that the proposed activity will not affect underground utilities/structures, or in the case contaminated soil or groundwater, will not disturb the affected areas without the appropriate precautions and safeguards.

[f]Physical Access Control – Physical barriers or restrictions to entry.

[g]Signs – Posted command, warning or direction.

USDOE has recommended that use of SRS land be controlled; therefore, future residential use and potential residential water usage will be restricted to ensure long-term protectiveness. Land use controls, including institutional controls, will restrict the HEWB subunit to future industrial use and will prohibit residential use of the area. Unauthorized excavation will also be prohibited and the waste unit will remain undisturbed. Land use controls selected as part of this action will be maintained for as long as they are necessary and termination of any land use controls will be subject to CERCLA requirements for documenting changes in remedial actions.

The LUC objectives necessary to ensure the protectiveness of the selected remedy are:

- prevent contact, removal, or excavation of contaminated soil at the HEWB
- prevent residential use of the area; and

Cost Estimate for the Selected Remedy

The cost estimate for the selected remedy (Institutional Controls) is provided in Appendix A. The major costs associated with the selected remedial action include site work and erecting warning signs. The major O&M costs are associated with annual inspections, and maintenance.

The estimated costs are summarized below:

- Total Capital Costs: $20,000
- Total O&M Costs: $83,000
- Total Present Worth Cost: $103,000

The total present worth costs are calculated using a 3.9% discount rate over a 30-year time frame. The 30-year time frame was selected based on the fact that it will take approximately 5 to 45 years (weighted average approximately 30 years) before the individual refined COCs identified at the HEWB subunit no longer pose a threat under the residential (unrestricted) land use scenario (For refined COCs and risks posed by individual refined COCs, see Table 8).

Expected Outcome of the Selected Remedy

Institutional controls will be maintained for protection of human health and the environment at the HEWB subunit by restricting the land use to industrial use only.

XII. STATUTORY DETERMINATIONS

Based on the RFI/RI/BRA report for the HEWB/CSBRP-5G OU (WSRC 2003), there is no unacceptable risk to human health and the environment based on an unrestricted land use scenario at two of the three subunits (the CSBRP-5G and the HEWB Overflow Discharge Area) associated with the HEWB/CSBRP-5G OU. At the third subunit (HEWB), six refined COCs have been identified; however, all refined COCs are HHCOCs. These findings are based on an unrestricted future land use scenario. Therefore, remedial actions have been identified for the HEWB/CSBRP-5G OU.

Based on information currently available, the proposed action provides the best balance of tradeoffs between the No Action and the proposed action with respect to the evaluation criteria. The proposed action satisfies the statutory requirements in CERCLA Section 121(b) to (1) be protective of human health and the environment, (2) comply with ARARs, (3) be cost effective, (4) utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable, and (5) satisfy the preference for treatment as a principal element.

The selected remedy is protective of human health and the environment, complies with Federal and State requirements that are legally applicable or relevant and appropriate to the remedial actions and is cost effective. Criteria 4 and 5 are not applicable to the preferred alternative since for the HEWB/CSBRP-5G OU, no remedial action is required beyond the Institutional Controls to maintain the site for industrial use. The institutional controls will be in place for at least 30 years.

In the long term, if the property is ever transferred to nonfederal ownership, the U.S. Government will take those actions necessary pursuant to Section 120(h) of CERCLA. Those actions will include a deed notification disclosing former waste management and disposal activities as well as remedial actions taken on the site. The contract for sale and the deed will contain the notification required by CERCLA Section 120(h). The deed notification shall, in perpetuity, notify any potential purchaser that the property has been used for the management and disposal of waste. These requirements are also consistent with the intent of the RCRA deed notification requirements at final closure of a RCRA facility if contamination will remain at the unit.

The deed shall also include deed restrictions precluding residential use of the property. However, the need for these deed restrictions may be reevaluated at the time of transfer in the event that exposure assumptions differ or the residual contamination no longer poses an unacceptable risk under residential use. Any reevaluation of the need for the deed restrictions will be done through an amended ROD with USEPA and SCDHEC review and approval.

In addition, if the site is ever transferred to nonfederal ownership, a survey plat of the OU (HEWB subunit only) will be prepared, certified by a professional land surveyor, and recorded with the appropriate county recording agency. The HEWB/CSBRP-5G OU is located in Barnwell County.

Because this remedy will result in hazardous substances, pollutants, or contaminants remaining on-site above levels that allow for unlimited use and unrestricted exposure, a statutory review will be conducted within five years after initiation of remedial action to ensure that the remedy is, or will be, protective of human health and the environment.

XIII. EXPLANATION OF SIGNIFICANT CHANGES

There were no significant changes made to the ROD based on the comments received during the public comment period for the SB/PP.

XIV. RESPONSIVENESS SUMMARY

The Responsiveness Summary will be included as Appendix B of this document.

XV. POST-ROD DOCUMENT SCHEDULE AND DESCRIPTION

The Post-ROD schedule for the agreed upon OU strategy is shown in Figure 15. The schedule for the additional documentation leading to the final ROD, Post-ROD documentation, and the remedial action start date is as follows:

- Submit Rev.. 0 ROD, 4/26/2004.
- Issue final signed ROD, 11/21/2004.

For more details, refer to Figure 15.

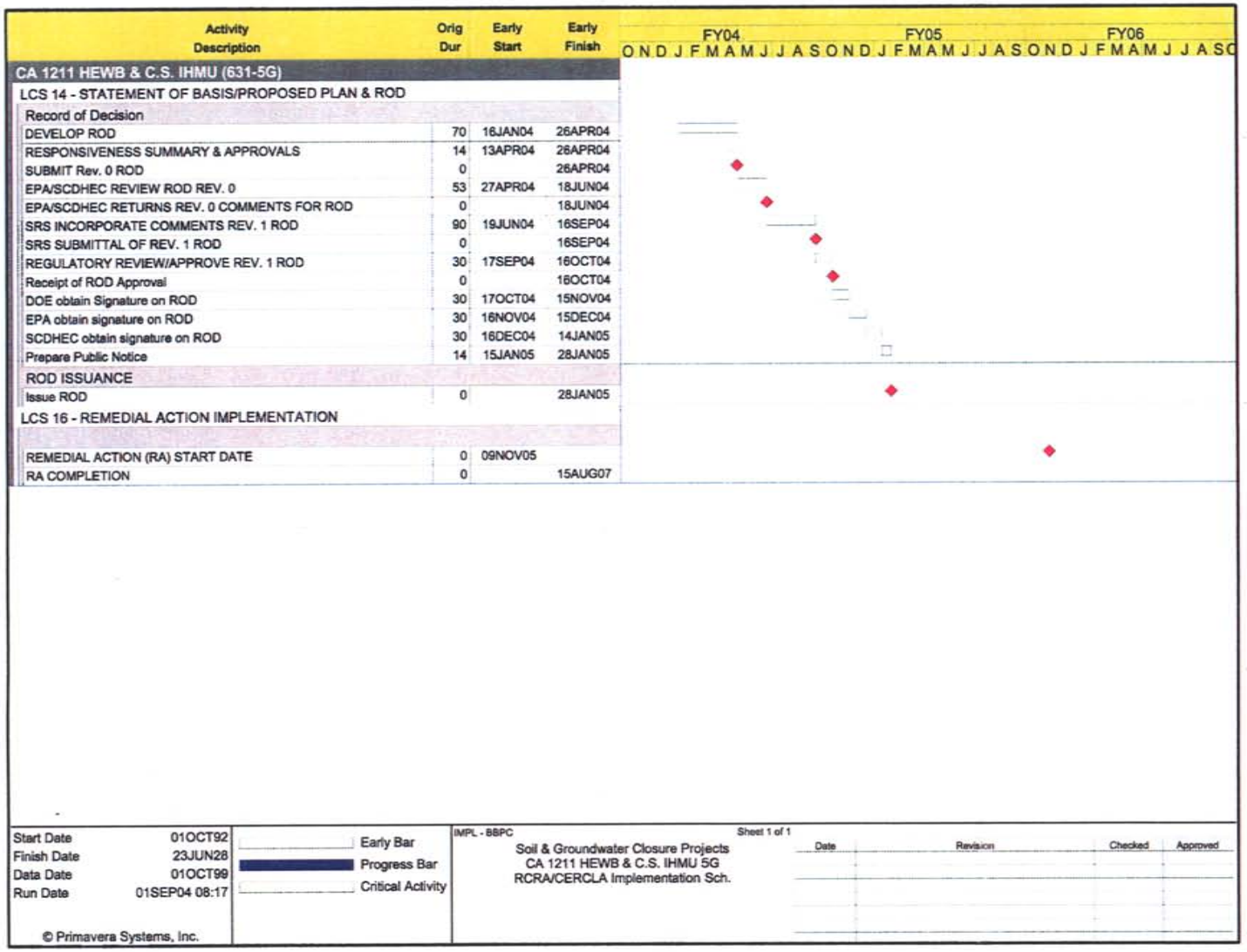

Figure 15. HEWB/CSBRP-5G OU Implementation Schedule

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APPENDIX A

COST ESTIMATE FOR THE SELECTED ACTION

A.0 ESTIMATED COST FOR THE SELECTED ACTION

A.1 RFI/RI/BRA Findings

An RFI/RI/BRA was performed to determine the nature and extent of contamination and the media of concern associated with the HEWB/CSBRP-5G OU. All the field investigations and field sampling activities conducted at the HEWB/CSBRP-5G OU are summarized in Table 1 (see the main text). The results of the field investigations and sampling analyses have concluded that soil is the only medium of concern associated with the HEWB/CSBRP-5G OU. This includes subsurface (0.3 to 1.2-m [1 to 4 ft] bls) and deep (>1.2-m [4 ft] bls) soils associated with three subunits of the HEWB/CSBRP-5G OU; the CSBRP-631-5G, HEWB and HEWB Overflow Discharge Area. The groundwater beneath the HEWB/CSBRP-5G OU is not included. The groundwater is being addressed in a separate OU, Central Shops (N Area) Groundwater OU.

A BRA was also performed to determine human health and ecological risks attributed to the media of concern. The BRA identified no human health refined COCs for CSBRP-5G and HEWB Overflow Discharge Area subunits. Six human health refined COCs were identified for HEWB subunit, including benzo(a)pyrene, alpha chlordane, gamma chlordane, heptachlor epoxide, p,p'-DDD, and p,p'-DDT. Three COCs present a combined risk greater than 1.0×10^{-6} under an unrestricted (residential) land use scenario and warrant a conservative action (Institutional Controls) to prevent residential exposure.

The key findings of the RFI/RI/BRA report are included in Section V of this ROD (see the main text).

A.2 Remedial Action Objectives (RAOs)

Based on the RFI/RI/BRA report (WSRC 2003), the following RAO was identified:

- Prevent residential exposure to HEWB soil contaminants

A.3 General Response Actions/Treatment Alternatives

The following likely response actions were identified:

- No action
- Institutional controls to maintain industrial land use

A.4 Development and Evaluation of Alternatives

As documented in the RFI/RI/BRA report, it was concluded that the HEWB/CSBRP-5G OU soils do not pose a human health risk to the industrial worker beyond Institutional Controls to maintain the site for industrial land use. There is no problem warranting action associated with HEWB/CSBRP-5G OU and, therefore, no additional alternatives were developed or considered for this OU. The Institutional Controls alternative was considered and compared with the No Action alternative. The No Action alternative is required by NCP to serve as a baseline for comparison with the remedial alternatives. The Institutional Controls alternative includes five-year remedy reviews. For evaluation of alternatives, see Section X of this ROD. The proposed action will consist of the following:

- Institutional controls in accordance with the LUCAP for the Savannah River Site will be implemented. Controls will include warning signs and periodic field inspections. Additionally, five-year remedy reviews will be performed.

A.5 Cost Estimate

For detailed cost estimates, refer to Tables A-1.

The cost numbers are rounded to the nearest $10.

The information in the cost estimate summary tables is based on the best available information regarding the anticipated scope of the remedial alternative. Changes in the cost elements are likely to occur as a result of new information and data collected during engineering design of the remedial alternative. Each cost estimate is an order-of-magnitude engineering cost estimate and expected to be within +50 to -30 percent of the actual project cost.

Table A-1. Alternative 2 – Institutional Controls

Item	Comments	Quantity	Unit(s)	Unit Cost ($)	Total Cost ($)
Capital Costs					
Direct Capital Costs					
A. Site Work					
Prepare Work Plans		1			10,000
Site surveys		1	LS		2,000
B. Remedial Action and Other Miscellaneous					
Deed restriction/notification		1	LS		2,000
Install warning signs		4	Each	250	1,000
Other Miscellaneous		1	LS		2,000
				Sub Total	5,000
			TOTAL DIRECT CAPITAL COSTS		**17,000**

Table A-1. Alternative 2 - Institutional Controls (Continued)

Item	Comments	Quantity	Unit(s)	Unit Cost ($)	Total Cost ($)
Indirect Capital Costs					
Engineering (includes LUCIP)	15% including 10% contingencies				2,550
			Total Indirect Capital Costs		2,550
			TOTAL CAPITAL COSTS		**19,550**
Direct O&M Costs					
Annual inspection and maintenance	Assuming 3.9% discount rate, factor = 17.2920	30 years	Each year	2,000	34,590
Five-year statutory reviews	Assuming 4% discount rate, factor = 3.1926	30 years	Every 5 years	15,000	47,890
			Total Direct O&M Costs		82,480
Indirect O&M Costs		0	LS		0
			Total Indirect O&M Costs		0
			TOTAL O&M COSTS8		**2,480**
Present Worth Costs					
Total Capital Costs					19,550
Total O&M Costs					82,480
			TOTAL PRESENT WORTH COST Approximately $103,000		**102,030**

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APPENDIX B

RESPONSIVENESS SUMMARY

(No Comments Received)

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