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EPA Superfund
Record of Decision:

SAVANNAH RIVER SITE (USDOE)
EPA ID: SC1890008989
OU 58
AIKEN, SC
11/20/2001

United States Department of Energy

Savannah River Site

Record of Decision
Remedial Alternative Selection for the Ford Building Seepage Basin (FBSB) (904-91G) Operable Unit (U)

WSRC-RP-2000-4156

Revision 1

August 2001

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

Ford Building Seepage Basin (904-91G) Operable Unit

WSRC-RP-2000-4156
Revision 1

August 2001

Savannah River Site
Aiken, South Carolina

Prepared by:

Westinghouse Savannah River Company LLC
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U. S. Department of Energy under Contract DE-AC09-96SR18500
Savannah River Operations Office
Aiken, South Carolina

DECLARATION FOR THE RECORD OF DECISION

Unit Name and Location
Ford Building Seepage Basin (904-91G) Operable Unit

Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS) Identification Number: OU-75

Savannah River Site

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

Aiken, South Carolina
United States Department of Energy

The Ford Building Seepage Basin (FBSB) 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) (WSRC 1993a) for the Savannah River Site (SRS). The following media are associated with this OU: soil and groundwater. However, the results of the groundwater investigation, including collection of groundwater samples and analyses, have revealed that the groundwater associated with the FBSB OU is not contaminated.

Statement of Basis and Purpose

This decision document presents the selected remedy for the FBSB OU at SRS in Aiken, South Carolina. The remedy was chosen in accordance with CERCLA, as amended by the Superfund Amendments Reauthorization Act (SARA), and, to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). This decision is based on the Administrative Record File for this site.

The State of South Carolina concurs with the selected remedy.

Assessment of the Site

The response action selected in this Record of Decision (ROD) is necessary to protect the public health or welfare or the environment from actual or threatened releases of hazardous substances into the environment.

Description of the Selected Remedy

The preferred alternative for the FBSB is alternative 2: Excavate, Disposition, Backfill, Vegetative Cover, and Institutional Controls, including five-year CERCLA ROD reviews.

The selected remedy (alternative 2) entails the following:

- Excavate the contaminated soil exceeding 1 x 10-6 risk (for industrial worker) from the Tank/Process Sewer Line Area (approximately 179 m3 [237 yd3] and disposition the soil into the seepage basin along with the vegetation existing in the basin

- Remove the containerized soil from two B-12 boxes and a 55-gallon drum (approximately 2.1 m3 [2.8 yd3]) and disposition the waste into the seepage basin

- Backfill the remaining volume of the seepage basin (approximately 504 m3 [667 yd3]) and the excavated area of the Tank/Process Sewer Line Area with clean soil from an SRS borrow pit

- Grade the clean soil to match the surrounding topography and cover the backfilled areas with vegetative cover to minimize erosion

There is no principal threat source material (PTSM) at the OU.

Time to complete construction is estimated to be six months.

Additionally, institutional controls to include deed restriction/notification, erect warning signs, and five-year CERCLA ROD reviews are included in this remedy. The FBSB is located approximately in the middle of SRS. The United States Department of Energy (USDOE) controls access to SRS through fencing, security gates and badging requirements. SRS activities at any specific OU are controlled through the site use/site clearance program. The field conditions will be evaluated to determine the need to modify the programs or to identify whether further remedial action is appropriate during the five-year ROD review.

The excavation/removal of the contaminated soil from the Tank/Process Sewer Line Area will protect future industrial workers from exposure to refined COCs (cesium-137 and cobalt-60). Disposing of the containerized soil in the basin will take care of waste that is currently present at the FBSB OU. Backfilling the remaining volume of the seepage basin with clean soil transported from an SRS borrow pit will protect future industrial workers from exposure to refined COCs (arsenic, cesium-137, cobalt-60, and europium-154) and protect current terrestrial ecological receptors from direct contact with aroclor-1254. The vegetative cover provided over the backfilled soils will minimize stormwater percolation and erosion. Since the waste is left in place in the seepage basin, the future land use will be restricted to industrial use and will preclude unrestricted residential use of the land.

The South Carolina Department of Health and Environmental Control (SCDHEC) has modified the SRS RCRA permit to incorporate this remedy.

The FBSB is an OU located within the Pen Branch Watershed. In addition to the FBSB OU, there are many OUs within the watershed. Under the overall site management strategy, all the source control and groundwater OUs located within the watershed will be evaluated to determine their impacts, if any, on the associated streams and wetlands.

SRS will manage all source control units to prevent impact to the watershed. Upon disposition of all source control and groundwater OUs within the watershed, a final comprehensive ROD for the Pen Branch Watershed will be pursued.

The results of the field investigations and soil samplings, conducted to completely characterize the FBSB OU, show that the FBSB OU has not impacted the groundwater. The groundwater does not outcrop in the vicinity of the FBSB OU.

The risk assessments and the contaminant migration analyses also reveal that groundwater associated with the FBSB OU does not pose an unacceptable risk to human health and the environment. The contaminant migration analysis identified no refined CM COCs; therefore, the FBSB OU groundwater requires no remedial activities. The contaminated soils associated with the FBSB OU are being addressed in this ROD. Therefore, the FBSB OU will not impact the response actions of other OUs at SRS.

Statutory Determination

Based on the RCRA Facility Investigation/Remedial Investigation/Baseline Risk Assessment (RFI/RI/BRA) for the FBSB OU, Rev. 1 report (WSRC 2000), the FBSB OU poses risks to human health and the environment. Therefore, alternative 2 has been identified as the preferred remedy for the FBSB OU.

The selected remedy is protective of human health and the environment, complies with federal and state requirements that are applicable or relevant and appropriate to the remedial action, and is cost-effective. This remedy, however, does not satisfy the statutory preference for treatment as a principal element of the remedy because treatment of the refined COCs associated with the FBSB OU was not found to be practicable.

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 is protective of human health and the environment.

Per the USEPA – Region IV Land Use Controls (LUCs) Policy, a LUC Assurance Plan (LUCAP) for SRS has been developed and approved by the regulators. In addition, a LUC Implementation Plan (LUCID) for the FBSB OU will be developed and submitted to the regulators for their approval with the post- ROD documentation. The LUCIP will detail how SRS will implement, maintain, and monitor the LUC elements of the FBSB OU preferred alternative to ensure that the remedy remains protective of human health and the environment.

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 when contamination remains 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 and/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 will be prepared, certified by a professional land surveyor, and recorded with the appropriate county recording agency. The FBSB OU is located in Barnwell County.

Data Certification Checklist

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

- There is no PTSM at this OU (see pages 31, 55, 62 and 65 in the text)
- Contaminants of concern (COCs) and their respective concentrations (see pages 32, 42, 56, and 57 (Tables 8 and 9) in the text)
- Baseline risk represented by the COCs (see page 64 [Table 17] of the text)
- Cleanup levels established for the COCs and the basis for the levels (see page 64 [Table 17] in the text)
- Current and future land and groundwater use assumptions used in the Baseline Risk Assessment (BRA) and ROD (see pages 50 and 52 through 54 in the text)
- Land and groundwater use that will be available at the site as a result of the selected remedy (see pages 73 and 85 in the text)
- 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 pages 82 through 84 in the text and also see Appendix A)
- Decision factor(s) that led to selecting the remedy (see pages 81 and 82 in the text)

8/21/01

Date

Thomas F. Heenan
Assistant Manager for Environment, Science and Technology
U. S. Department of Energy, Savannah River Operations Office

11/20/01

Date

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

2/14/02

Date

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

DECISION SUMMARY REMEDIAL ALTERNATIVE SELECTION (U)

Ford Building Seepage Basin (904-91G) Operable Unit
WSRC-RP-2000-4156 Revision 1

August 2001

Savannah River Site Aiken, South Carolina

Prepared by:
Westinghouse Savannah River Company LLC
for the
U. S. Department of Energy under Contract DE-AC09-96SR18500
Savannah River Operations Office Aiken, South Carolina

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LIST OF ACRONYMS AND ABBREVIATIONS

ARAR	applicable or relevant and appropriate requirement
bls	below land surface
BRA	Baseline Risk Assessment
CAB	Citizens Advisory Board
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CERCLIS	Comprehensive Environmental Response, Compensation, and Liability Information System
Ci	curie
cm	centimeter
CMCOC	contaminant migration constituent of concern
CMCOPC	contaminant migration constituent of potential concern
COC	constituent of concern
CSM	conceptual site model
FBSB	Ford Building Seepage Basin
FFA	Federal Facility Agreement
ft	feet
gal	gallon
GPR	ground penetrating radar
HSWA	Hazardous and Solid Waste Amendments
in	inch
IRIS	Integrated Risk Information System, USEPA
km	kilometer
km2	square kilometer
L	liter
LDR	Land Disposal Restriction
LLC	Limited Liability Company
LUC	Land Use Control
LUCAP	Land Use Controls Assurance Plan
LUCIP	Land Use Controls Implementation Plan
m	meter
m3	cubic meter
MCL	maximum contaminant level
mg/kg	milligram/kilogram
mi	mile
mi2	square mile
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NEPA	National Environmental Protection Act
NPL	National Priorities List
O&M	operating and maintenance
OU	operable unit
PCB	polychlorinated biphenyl
pCi	pico curie
PCR	Post Construction Report
ppm	parts per million
PSL	Process Sewer Line
PTSM	principal threat source material
RAO	remedial action objective
RBC	risk-based concentrations
RCRA	Resource Conservation and Recovery Act
RfD	reference doses
RFI	RCRA Facility Investigation
RFI/RI	RCRA Facility Investigation/Remedial Investigation
RI	Remedial Investigation
RGO	remedial goal option
RME	reasonable maximum exposure
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 Regulations
SRS	Savannah River Site
SVOC	semi-volatile organic constituent
SWMU	solid waste management unit
TAL	target analyte list
TCL	target compound list
TCLP	Toxicity Characteristic Leaching Procedure
USC	unit specific constituent
UCL	upper confidence limit
USDOE	United States Department of Energy
USEPA	United States Environmental Protection Agency
VOC	volatile organic constituent
WSRC	Westinghouse Savannah River Company LLC
yd3	cubic yards

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

Unit Name, Location, and Brief Description

Ford Building Seepage Basin (904- 91G) Operable Unit
Comprehensive Environmental Response, Compensation, and Liability
Information System (CERCLIS) Identification Number: OU-75
Savannah River Site
Comprehensive Environmental Response, Compensation and Liability Act
(CERCLA) Identification Number: SC1890008989
Aiken, South Carolina
United States Department of Energy

The Savannah River Site (SRS) occupies approximately 800 km2 (310 mi2) 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 CERCLA, are currently present in the environment at SRS.

The Federal Facility Agreement (FFA) (WSRC 1993a) for SRS lists the Ford Building Seepage Basin (904-91G) operable unit (FBSB OU) as a Resource Conservation and Recovery Act (RCRA)/ CERCLA unit requiring further evaluation. The FBSB OU required further evaluation through an investigation process that integrates and combines the RCRA facility investigation (RFI) process with the CERCLA remedial investigation (RI) process to determine the actual or potential impact of releases of hazardous substances to human health and 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 program 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 the SCDHEC, which was most recently renewed on September 5, 1995. Module IV of the Hazardous and Solid Waste Amendments (HSWA) portion of the RCRA permit mandates corrective action requirements for non-regulated solid waste management units subject to RCRA 3004(u).

On December 21, 1989, SRS 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 has negotiated an FFA (WSRC 1993a) with United States Environmental Protection Agency (USEPA) and SCDHEC to coordinate remedial activities at SRS into one comprehensive strategy that fulfills these dual regulatory requirements. USDOE functions as the lead agency for remedial activities at SRS, with concurrence by the

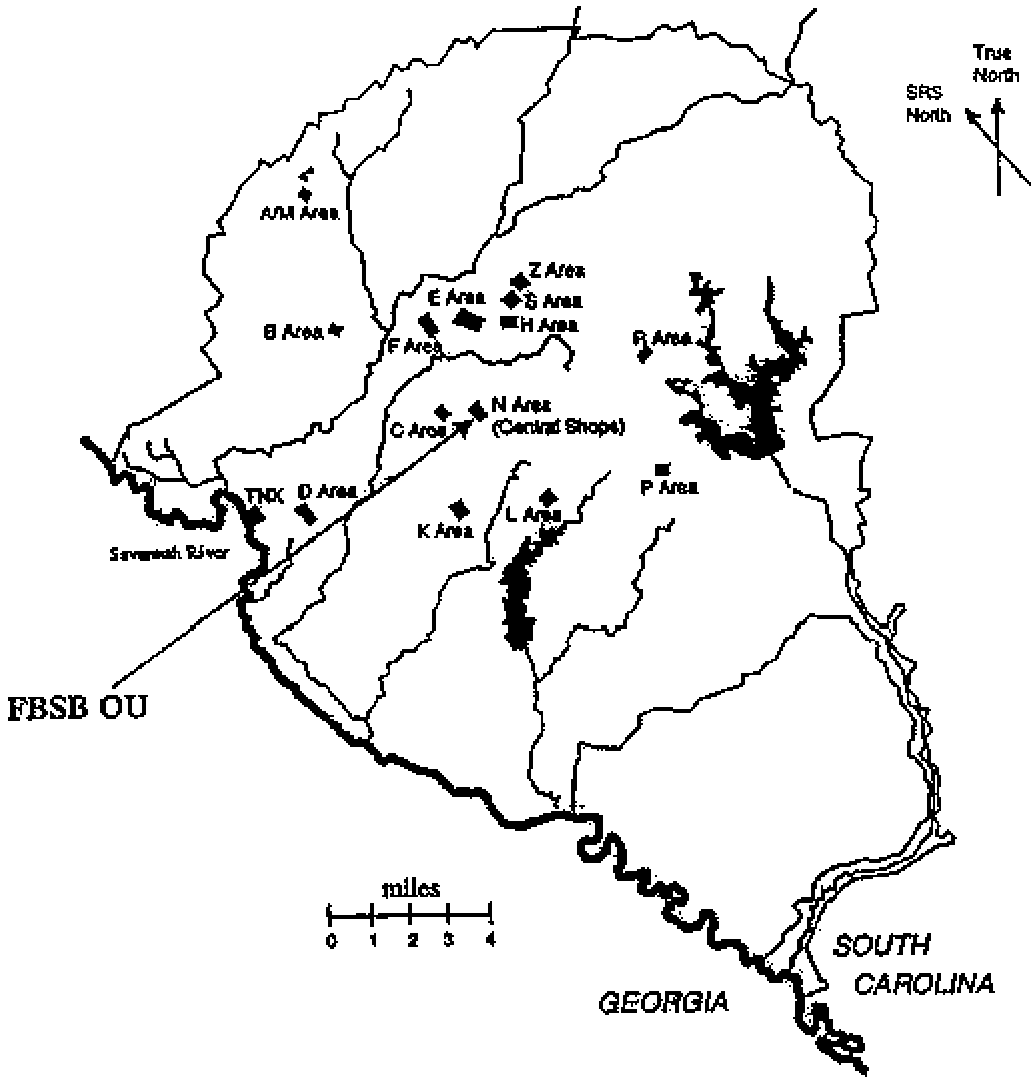


Figure 1. Location of the Savannah River Site and Major SRS Facilities

USEPA - Region IV and SCDHEC.

Operable Unit Operational and Compliance History

The FBSB is located approximately 610 m (2,000 ft) northwest of the intersection of Roads C and 6 (Figure 2). The FBSB and its associated components were constructed in 1964 to receive wastewater from the Ford Building. At the Ford Building, wastewater was generated during the reconfiguration, repair, and scrapping of reactor heat exchangers and other process equipment. The seepage basin operated until 1984. The retention tank, pumping station, and process piping line were removed in 1998. The removal action was performed consistent with the FFA. USDOE is the lead agency for removal actions; other work is agreed to by the three parties including USEPA, USDOE, and SCDHEC. As a result of the removal action of 1998, approximately 2.1 m3 (2.8 yd3) of radiologically contaminated soil was containerized. The containerized soil is addressed in this ROD. There was no cited violation at the FBSB OU. All work was scheduled with oversight of regulatory authorities.

The FBSB OU, as shown in Figures 3 and 4, include the following eight components:

- a 5-cm (2 in) diameter, 18.3 m (60 ft) long, steel, underground pipeline (Ford Building process sewer line) that carried wastewater from the Ford Building to the underground retention tank (removed in 1998)
- a 22,710 L (6,000 gal), underground, steel, retention tank containing sludge and wastewater (removed in 1998)
- a 5-cm (2 in) diameter, 32.9 m (108 ft) long steel underground pipeline (Ford Building process sewer line removed in 1998) that carried wastewater from the underground retention tank to the seepage basin
- a pumping station (removed in 1998) to remove fluids from the retention tank
- an unlined, 568,000-L (150,000 gal) seepage basin
- a delisted National Pollutant Discharge Elimination System (NPDES) outfall CS-008 and associated riprap-lined earthen drainage ditch
- an underground 20-cm (8 in) diameter abandoned fire hydrant line that was cut during construction of the seepage basin
- groundwater associated with the unit

The groundwater flow direction is indicated in Figure 4.

The seepage basin, which is defined by orange balls, is 37 by 24 m (120 by 80 ft) at ground level, approximately 18 by 7.8 m (60 by 25 ft) at the floor level, and approximately 3 m (10 ft) deep. The basin is fenced and marked with signs identifying it as a RCRA/CERCLA unit. Waste disposal records show that the basin received approximately 1,439,800 L (380,400 gal) of wastewater from 1964 to 1984. During this period, the dominant radionuclide released was tritium (470 curies [Ci]) along with smaller amounts of cobalt-60, strontium-90, cesium- 37, and unidentified alpha emitters. In addition to radionuclides, trace amounts of nonradioactive surfactants, and organic and inorganic constituents may have been released into the basin (WSRC 1991). There is no record that the basin ever overflowed.

NPDES Outfall CS-008 and its associated drainage ditch were permitted for interior cooling water and exterior stormwater runoffs from the Ford Building (WSRC 1993b). It is unlikely that Ford Building process sewer water was ever released to the outfall; however, it has been included in the OU to verify that it was not contaminated by Ford Building operations. After operations at the Ford Building ceased in 1984, the outfall was permitted as a stormwater outfall. The outfall has subsequently been de-listed.

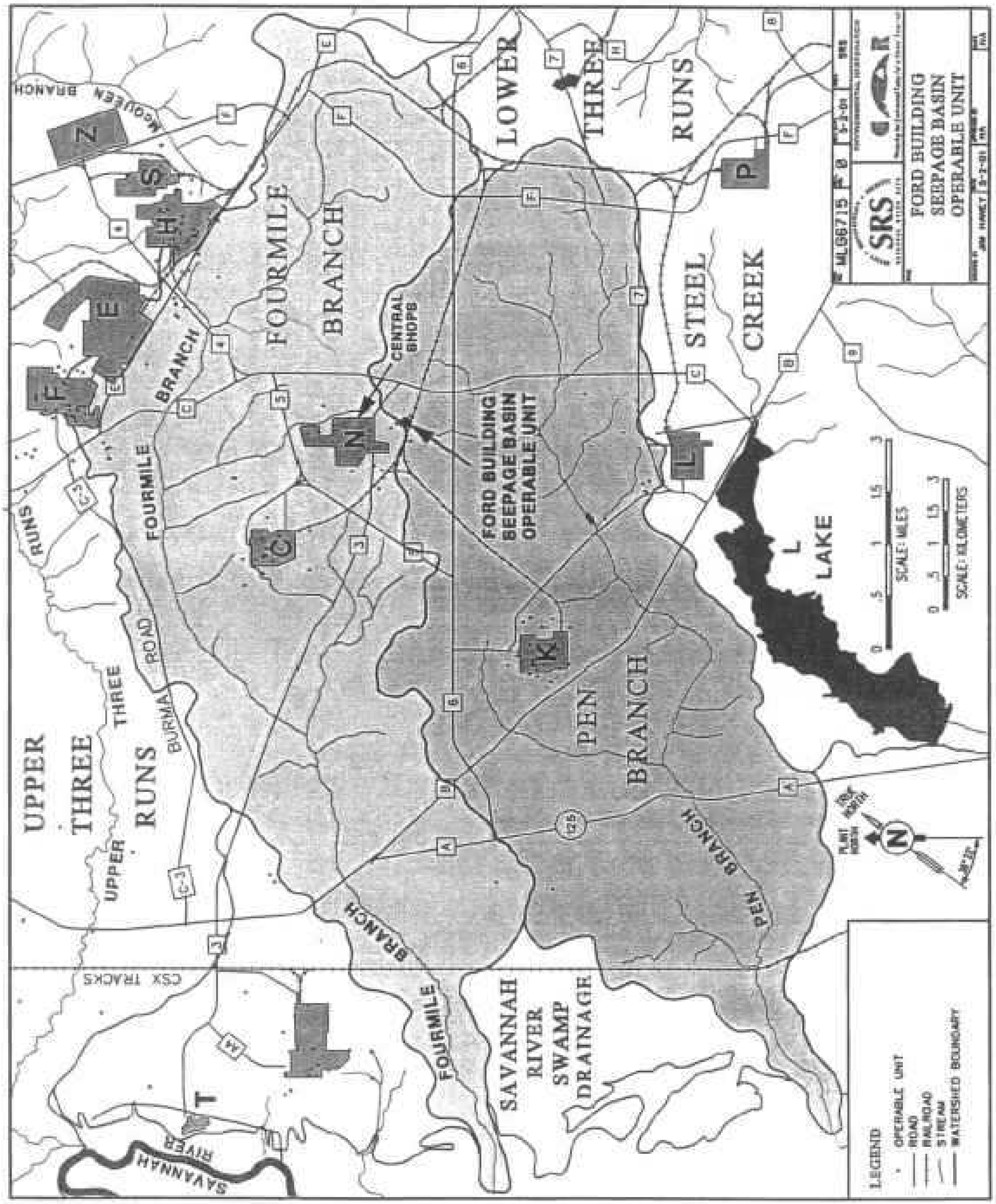


Figure 2. Pen Branch Integrator Operable Unit, with Included Operable Units

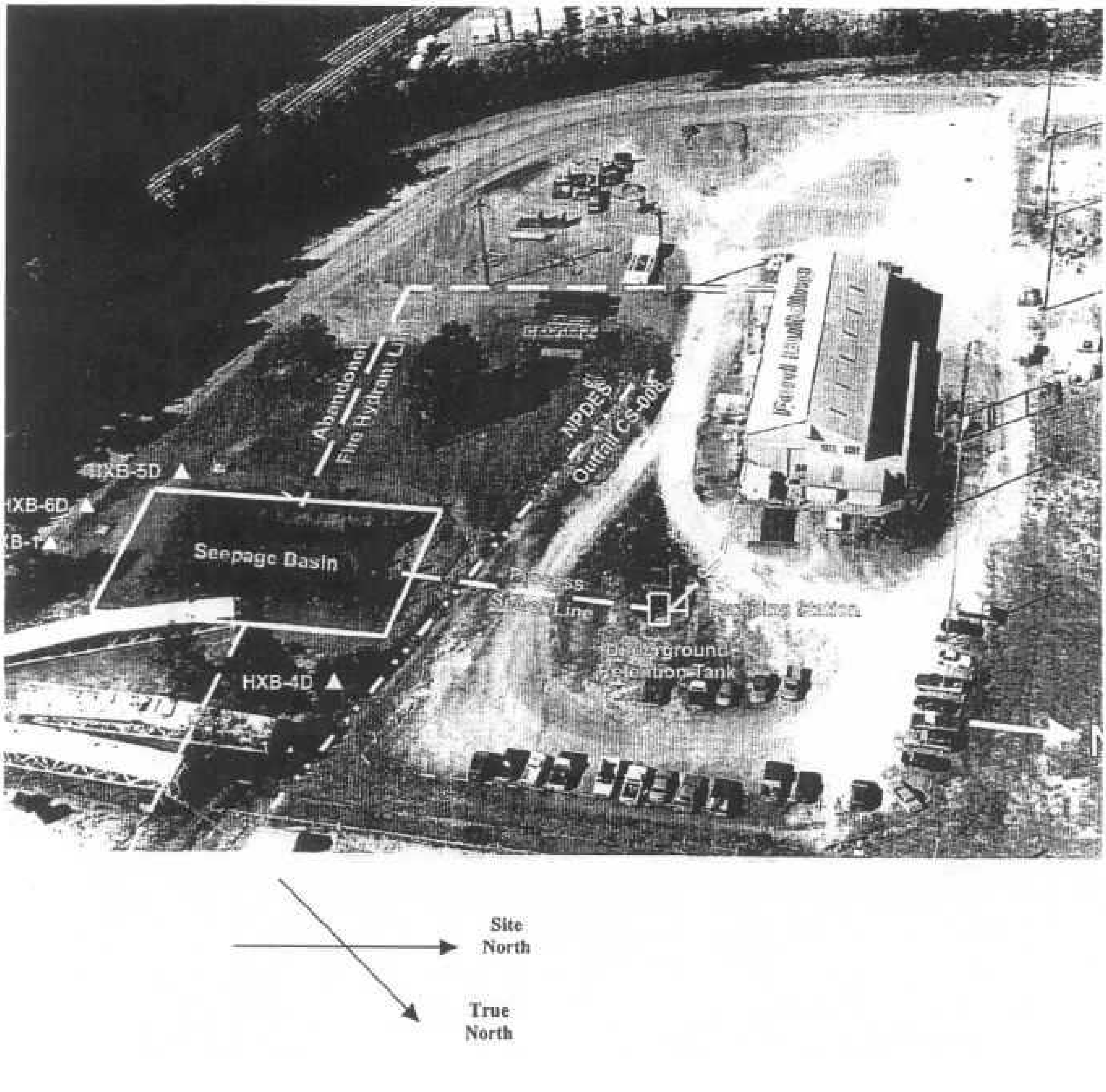


Figure 3. **Oblique Aerial Photograph of the Ford Building Seepage Basin Operable Unit, April 1966**

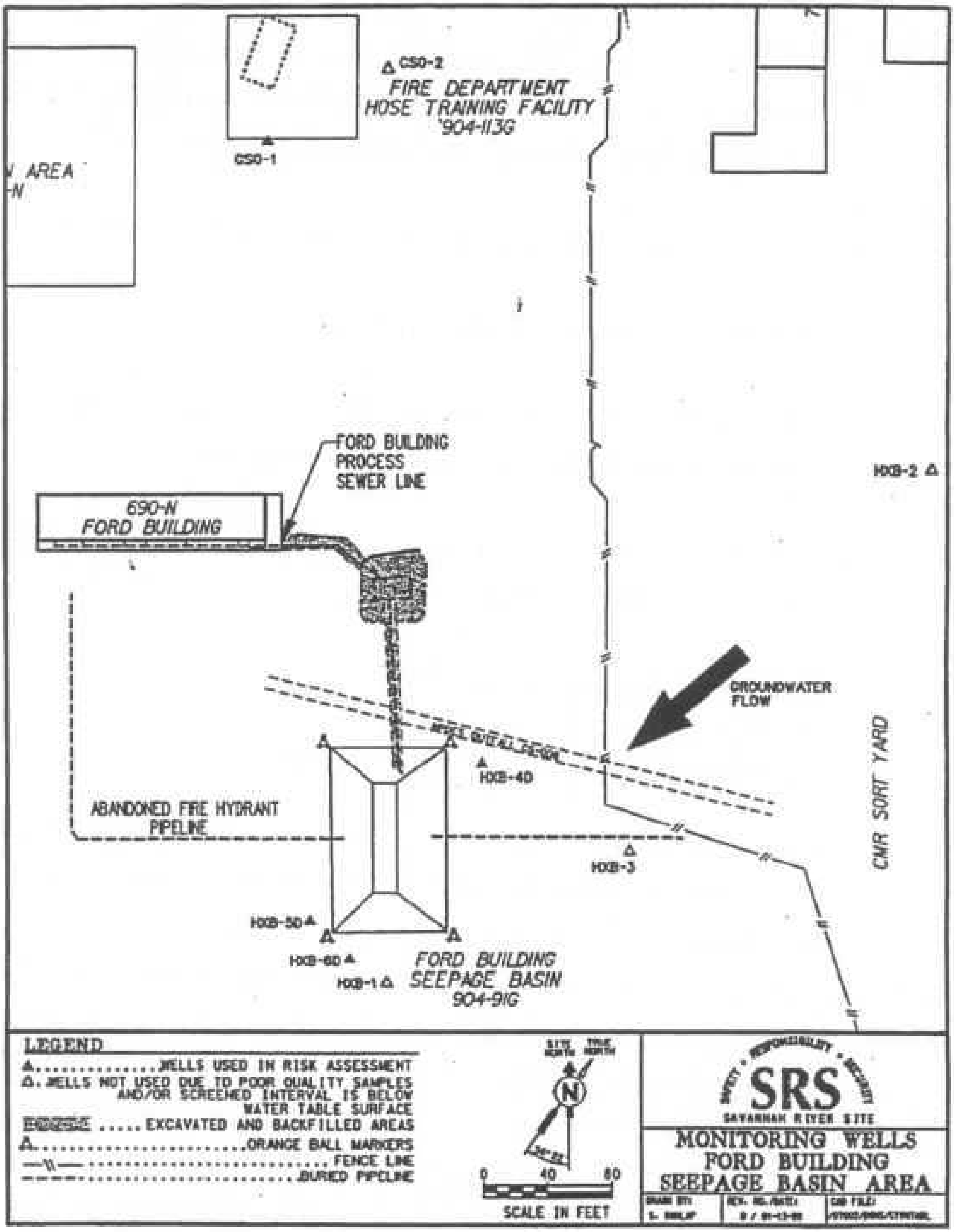


Figure 4. Location of Monitoring Wells Near the FBSB OU

The visual field observations conducted during the FBSB OU field investigations indicate that the ends of the fire hydrant pipeline are not sealed and may have been left open during operation of the seepage basin. Consequently, fluids from the seepage basin may have entered the pipeline during basin operation.

The FBSB OU is within the Pen Branch watershed (Figure 2), an area that lies on a nearly flat interfluvial divide, equidistant from the Pen Branch stream valley to the southeast and the Fourmile Branch stream valley to the northwest. The water table is approximately 13 to 16 m (42 to 52 ft) below land surface (bls) and flows southwest.

The FBSB OU is an industrialized area that has been extensively disturbed by SRS operations since the early 1950s. The ground surface within the physical boundary of FBSB OU is virtually level and covered by roads, buildings, and grass. Most of the land has been cleared, though a few isolated trees remain in the area around the seepage basin and pine tree saplings and shrub grow within the basin itself (Figure 3). The FBSB OU offers habitat for small mammals (e.g., shrews) and their associated predators, which are birds that feed at ground level on insects, seeds, and berries (e.g., robins) and birds that feed in flight (e.g., hawks).

The NPDES ditch is a riprap-lined earthen ditch with little vegetation. The retention tank, pumping station, and process sewer line have been removed, and the area has been backfilled to grade with soil excavated during the removal action. A portion of the surface soil excavated at the retention tank was identified as contaminated based on radiological surveys. This soil was not returned to the excavation. It is currently stored in containers at the unit and will be addressed in all remedial decisions and final actions at the unit.

A threatened, endangered, and sensitive species survey and evaluation was conducted in October 1998 for the FBSB OU. No effects were identified for any federally listed endangered or threatened species. The survey did reveal marginal- to- suitable habitat for several sensitive species; however, the survey did not reveal the presence of these species (USFS 1998).

A small, forested area exists to the south of the unit across an unpaved roadway. A heavily forested pine habitat exists further south of the unit. The forested areas are dominated by loblolly pine (Pinus taeda) and mixed hardwoods including water oak (Quercus nigra), white oak (Quercus alba), sycamore (Plantanus occidentalis) and others. Ground cover includes Japanese honeysuckle (Lonicera japonica), poison ivy (Rhus radicans) and other low-growing vegetation. The forested areas provide habitat for species that feed and/or nest in pole-stage pine canopies (i.e., songbirds and fox squirrels [Sciurus niger]). Dense mid- and ground-story growth provides habitat for old-field mice (Peromyscus Polionotus), raccoons (Procyon lotor), Eastern cottontail rabbit (Sylvilagus loridanus), white-tailed deer (Odocoileus virginianus) and songbirds (WSRC 1997).

The FBSB OU does not contain wetlands nor water wells that could be used as a drinking water supply.

The retention tank, the pumping station, and process sewer line were excavated and removed in 1998 (WSRC 1998). The approximate area of removal is shown in Figure 4. The area above the retention tank had surface soil contamination and fixed contamination on an aboveground vent pipe. Based on radiological surveys at the retention tank, localized surface soil contamination was identified. The contaminated soils (approximately 2.1 m^3 [2.8 yd^3]) were identified as waste and were containerized in two B-12 boxes and one 55-gallon drum for sampling and dispositioning per SRS Waste Management procedures. The containerized soil still remains at the unit and is being addressed in this ROD as part of the final remedial action for this unit. The remaining (underlying) soils were removed and segregated in 0.6 m (2 ft) lifts. The segregated soils were stored onsite for use as backfill. Soils excavated with the process sewer line were also stored onsite for use as backfill. The balance of the backfill was sourced from the Central Shops borrow pit, a known unimpacted area. After excavation, a visual and radiological screening survey was conducted to identify any specific areas potentially impacted by wastewater releases. A Ludlum Model 2221 Sodium Iodide detector calibrated for cesium- 137 was used to survey the floor of the process sewer line and retention tank excavations. The surveys showed no areas of potential contamination (WSRC 1998). Following the visual and radiological surveys, soil samples were collected from the floor of the excavations as part of the Phase II investigation (discussed in Section V).

Once the radiological surveys and sampling were complete, excavated material was used as backfill. Along the process sewer line, the soils were backfilled to grade in the same general source area. At the retention tank, the soils were also backfilled to grade in 0.6 m (2ft) lifts in the same vertical order as they were removed.

The tank and associated piping removed during the removal action are identified as mixed waste containing polychlorinated biphenyls (PCBs) and low- level radioactive waste. The tank and the piping are being held at the SRS Mixed Waste Storage Facility until final disposition is determined.

III. HIGHLIGHTS OF COMMUNITY PARTICIPATION

Both RCRA and CERCLA require the public to 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 alternative for addressing the FBSB OU soils and groundwater. The Administrative Record File must be established at or near the facility at issue.

The SRS Public Involvement Plan (USDOE 1994) is designed to facilitate public involvement in the decision-making process for permitting, closure, and the selection of remedial alternatives. The SRS Public Involvement Plan addresses the 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 Ford Building Seepage Basin (FBSB) (904-91G) Operable Unit (U)(WSRC 2001)*, a part of the Administrative Record File, highlights key aspects of the investigation and identifies the preferred action for addressing the FBSB 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
8901 Farrow Road
Columbia, South Carolina 29203
(803) 896-4000

Lower 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 newspaper. The public comment period was also announced on local radio stations.

The Statement of Basis/Proposed Plan (SB/PP) 45-day public comment period began on April 6, 2001, and ended on May 20, 2001. A Responsiveness Summary, prepared to address any comments received during the public comment period, is provided in Appendix B of the ROD. It will also be available in the final RCRA permit.

IV. SCOPE AND ROSE OF THE OPERABLE UNITE WITH IN THE SITE STRATEGY

RCRA/CERCLA Programs at SRS

RCRA/CERCLA units (including the FBSB OU) at SRS are subject to a multi-stage RI Process that integrates the requirements of RCRA and CERCLA as outlined in the FFA (WSRC 1993a). The RCRA/CERCLA processes are summarized below:

- investigation and characterization of potentially impacted environmental media (such as soil, groundwater, and surface water) comprising the waste site and surrounding areas
- evaluation of risk to human health and local ecological community
- screening of possible remedial actions to identify the technology selected to protect human health and environment
- implementation of the selected alternative
- documentation that the remediation has been performed competently
- evaluation of the effectiveness of the technology

The steps of this process are interactive in nature and include decision points that require concurrence between USDOE as owner/manager, USEPA and SCDHEC as regulatory oversight agencies, and the public (see Figure 5).

Operable Unit Remedial Strategy

The overall strategy for addressing the FBSB OU was to (1) characterize the waste unit, delineating the nature and extent of contamination and identifying the media of concern

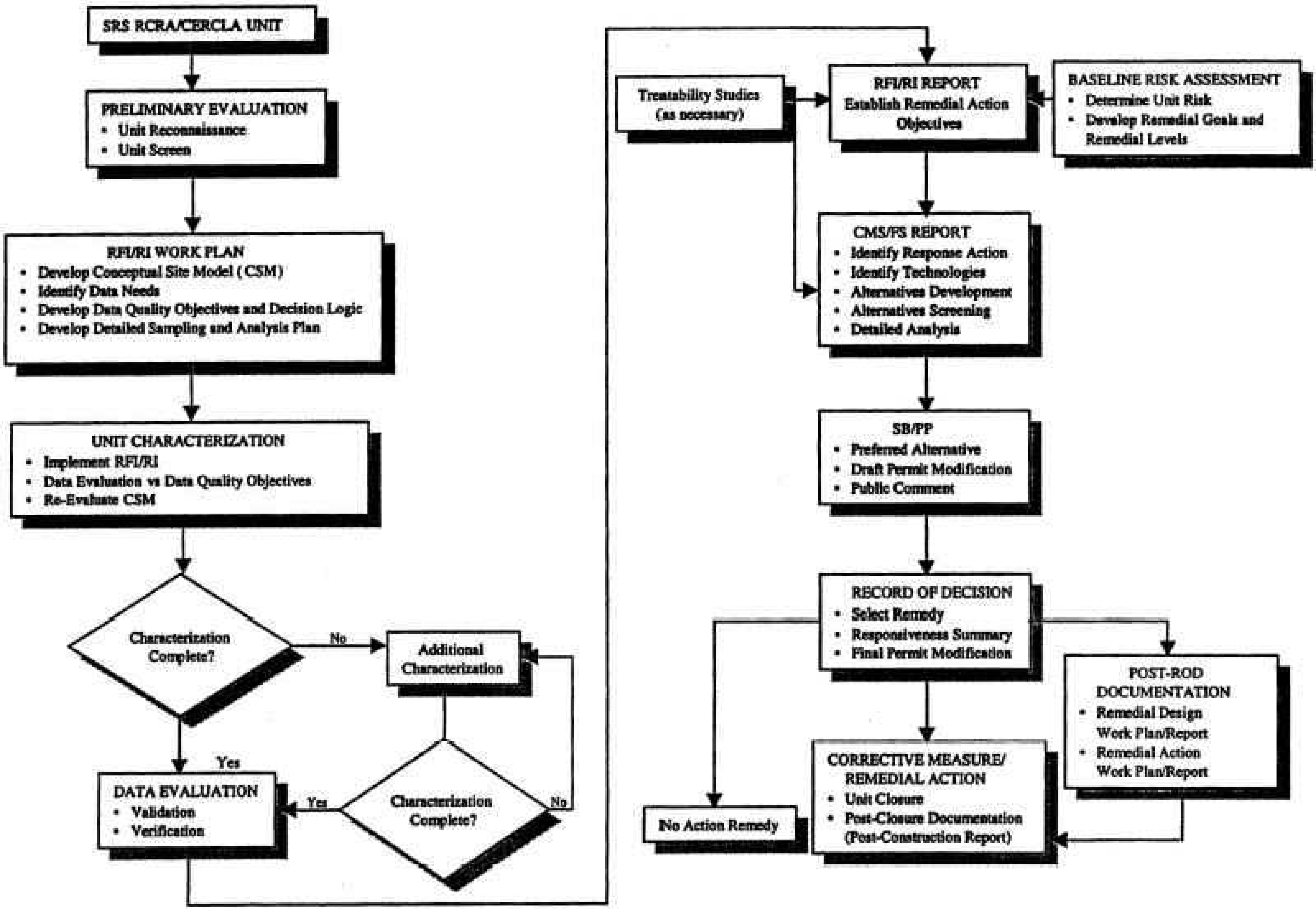


Figure 5. RCRA/CERCLA Logic and Documentation

(perform the RFI/ RI); (2) perform a BRA to evaluate media of concern, constituents of concern (COCs), exposure pathways, and characterize potential risks; and (3) evaluate and perform a final action to remediate, as needed, the identified media of concern.

The FBSB is located within the Pen Branch watershed. In addition to the FBSB OU unit, there are many OUs within the watershed. All the source control and groundwater OUs located within the 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 source control and groundwater OUs within the watershed, a final comprehensive ROD for the Pen Branch Watershed will be pursued.

The results of the field investigations and soil samplings conducted during Phase I and Phase II of the development of the RFI/RI/BRA report (WSRC 2000) have indicated that the groundwater has not been impacted by the FBSB OU. The groundwater does not outcrop in the vicinity of the FBSB OU.

The risk assessments and the contaminant migration analyses have also revealed that there is negligible risk to human health and the environment associated with the FBSB OU groundwater. The contaminant migration analysis identified no CM COCs associated with the OU and, therefore, the FBSB OU groundwater requires no remedial activities. The contaminated soils associated with FBSB OU are being addressed in this ROD. Therefore, the FBSB OU will not impact the response actions of other OUs at SRS.

V. OPERABLE UNIT CHARACTERISTICS

Conceptual Site Model (CSM) for the FBSB OU

The waste disposal records for the seepage basin show that the basin received approximately 1,439,800 L (380,400 gal) of wastewater generated at the Ford Building during the 1964 to 1984 operational period. The waste disposal records also show that wastewater was sent to the retention tank near the Ford Building process sewer line. If required release action levels established by SRS were not exceeded, the wastewater collected in the retention tank was released to the seepage basin via the Ford Building process sewer line. If the wastewater exceeded action levels, it was loaded into containers via the sampling station and transferred by truck to Waste Management Operations for disposal (WSRC 1991). The retention tank, the pumping station and the process sewer line were removed during 1998. Therefore, the primary sources of contamination associated with the FBSB OU currently include the FBSB and the Tank/Process Sewer Line soils. Two additional potential, although highly unlikely, primary sources include the NPDES Outfall CS-008 and the abandoned fire hydrant line, which was cut during the construction of the FBSB. The NPDES Outfall CS-008 (referred to as NPDES Ditch) was permitted for external stormwater and internal building cooling water discharges during the operational period of the Ford Building. The cooling water was associated with the building heating and ventilation system. It is possible, although unlikely, that process wastewater could have been released to the NPDES Ditch via the building drains.

The abandoned fire hydrant line intersected the basin walls throughout the operational history of the seepage basin. Thus, it is possible that wastewater within the basin rose above the fire hydrant line and entered the line through gravity flow.

Primary Sources of Contamination

The field investigations and the operational records revealed four potential primary sources of contamination: FBSB, Tank/ Process Sewer Line, NPDES Ditch, and fire hydrant line. Conceptual site models (CSMs) were developed for these four sources. The CSM for groundwater is not included because the groundwater associated with the FBSB OU has not been impacted. The CSMs are shown in Figures 6 through 9, for each primary source of contamination. The CSMs identify the primary release mechanisms, media of concern, and potential receptors. The CSMs also identify the secondary contamination sources, secondary release mechanisms, exposure media, exposure routes, and potential human and ecological receptors. As is apparent from Figures 6 through 9, for each primary and secondary source of contamination, the release mechanisms are different due to the varied operational histories and due to the physical characteristics of each source.

Contaminants may have been released from the FBSB (shown in Figure 6) by the following primary release mechanisms:

- Direct release to basin surface soil and infiltration/ percolation of the waste constituents to subsurface soil.

The primary release mechanisms for the Tank/ Process Sewer Lines (shown in Figure 7) are

- Drips/spilling from the pumping station to the surface soil

- Leaking from the tank or pipelines to the subsurface soil

The primary release mechanism at the NPDES Ditch (shown in Figure 8) is

- Direct release of wastewater and runoff/deposition of contaminants from the Ford Building to the drainage ditch surface soil

If wastewater entered the fire hydrant line, it would not have been pressurized flow. Therefore, based on the pipe location (>1.2 m (>4 ft) deep), the primary release mechanism for the fire hydrant line is leaking to deep soil shown in Figure 9.

Impacted Environmental Media

The following environmental media may have been impacted by the release of primary source material, resulting in secondary sources of contamination:

- Surface soil, subsurface soil, and deep soil at the FBSB

- Surface soil, subsurface soil, and deep soil at the Tank/ Process Sewer Line

- Surface soil, subsurface soil, and deep soil at the NPDES Ditch

- Deep soil at the fire hydrant line

Migration Pathways

Infiltration/percolation and excavation/bioturbation allows for contaminant migration between surface and subsurface soil. Both are considered secondary contaminant sources at the FBSB, Tank/Process Sewer Line, and NPDES Ditch. At the fire hydrant line the primary source releases, if any, were to deep soil and were not under pressure, so the only secondary source is deep soil.

Based on the operational history and screening data obtained at the FBSB, the FBSB never overflowed so it is unlikely that the soil adjacent to the FBSB was impacted. Therefore adjacent soil at the FBSB is not shown as a secondary source of contamination. The impacted environmental media serve both as a reservoir via chemical bonding for potential biotic uptake and as a secondary release mechanism of contaminants. Secondary environmental release mechanisms may include the following:

- Release of volatile constituents from the soil

- Generation of contaminated fugitive dust by wind or other surface soil disturbance

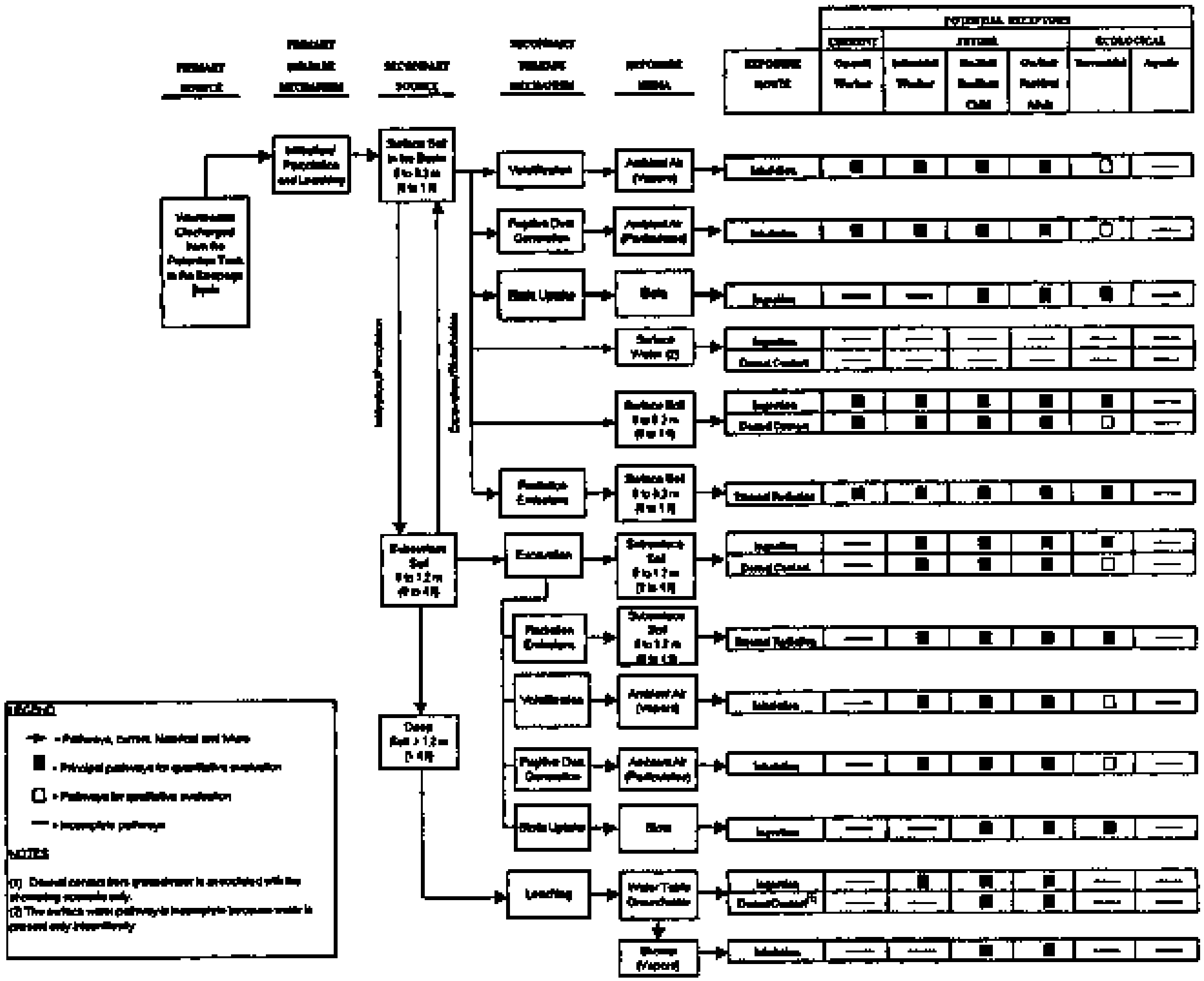


Figure 6. Conceptual Site Model for the Ford Building Seepage Basin

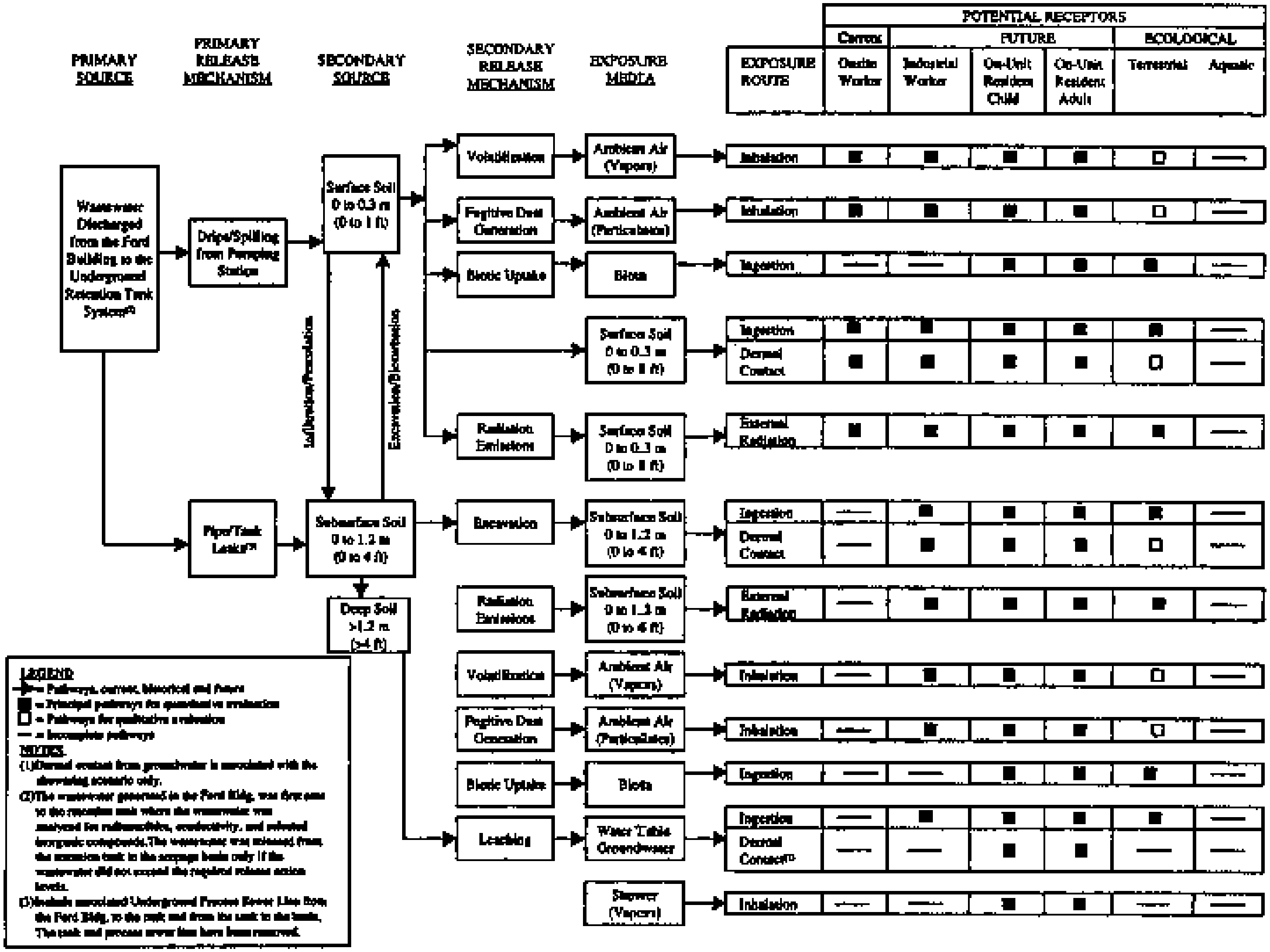


Figure 7. **Conceptual Site Model for the Tank/Process Sewer Line**

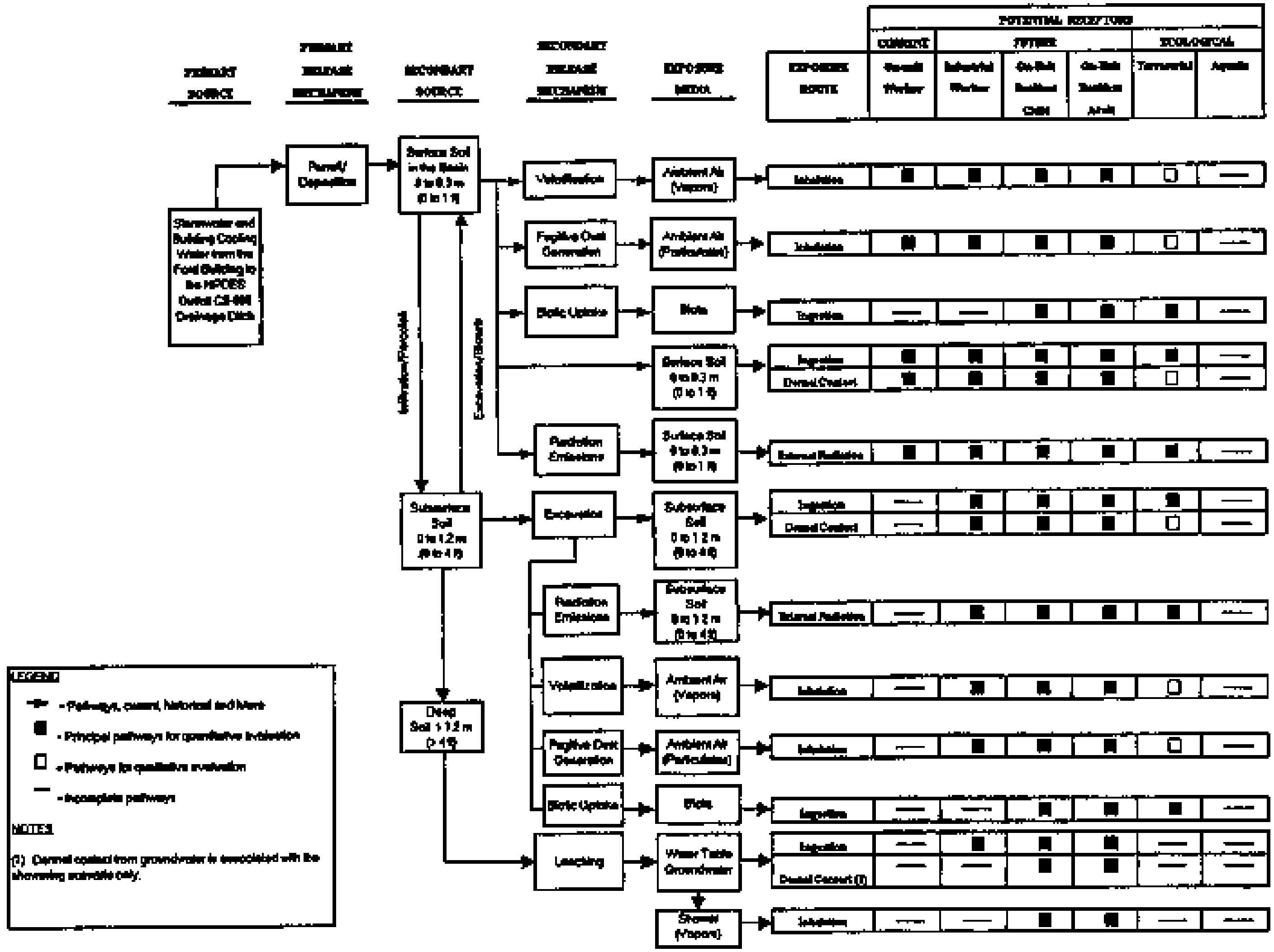


Figure 8. Conceptual Site Model for the NPDES Ditch

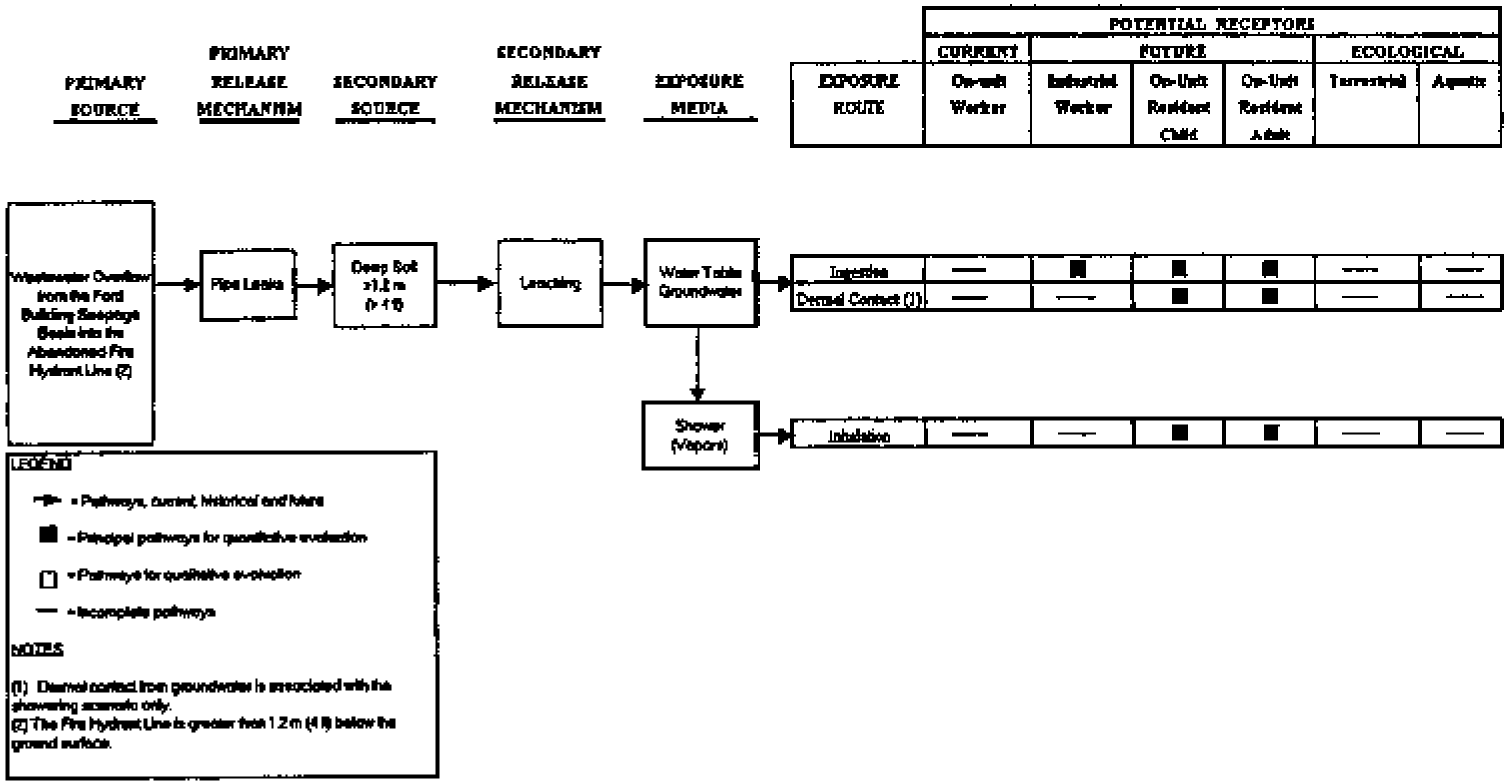


Figure 9. Conceptual Site Model for the Fire Hydrant Line

- Biotic uptake
- Radiation emissions
- Leaching

Exposure Pathways

Contact with contaminated environmental media creates the exposure pathways to human and ecological receptors that are evaluated in the BRA. As depicted in Figures 6 through 9, these include contact with some or all of the following:

- Ambient air (particulates and vapor)
- Surface and subsurface soil
- Biota
- Groundwater

The FBSB occasionally collects standing water from rainfall. However, this water is not considered a chronic exposure medium since it is transient.

The exposure route describes how a chemical comes in contact with a receptor. Exposure routes for human and ecological receptors at the FBSB OU and associated areas may include the following:

- Inhalation of volatile emissions and particulate emissions from soil
- Ingestion of contaminated media, including soil, groundwater, and homegrown produce
- Dermal contact with contaminated media, including soil and groundwater
- Inhalation of volatiles while showering
- Exposure to external radiation from soil

Potential Receptors

The general public is not considered to be a potential receptor because SRS procedures prohibit casual access to SRS. The FBSB OU is located 11.6 km (7.2 mi) from the nearest SRS boundary; the long distances and access restrictions make all pathways for the general public incomplete. The most likely human receptors are current, on-unit workers who periodically perform site maintenance and groundwater sample collection. Future land-use planning at SRS will likely designate this area for industrial (non-nuclear) use and prohibit residential development through deed restrictions. Citizens Advisory Board (CAB) Recommendation No. 2, dated January 24, 1995, recommends that the area surrounding the FBSB OU (N Area) remain industrial (non-nuclear) for future land use. The CAB recommendation agrees that the most likely receptor is the on-unit industrial worker.

Ecological receptors at the FBSB OU are limited to terrestrial biota (plants, invertebrates, birds, small and large mammals, and mid-level and top predators) that inhabit the wooded and grassy areas near the FBSB OU. Aquatic biota such as aquatic plants and fish are not present at the FBSB OU, and therefore are not receptors. Ecological receptors include, but are not limited to, earthworms, amphibians, songbirds, raptors, southern short-tailed shrews (*Blarina carolinensis*), old field mice (*Peromyscus polionotus*), raccoons (*Procyon lotor*), fox squirrels (*Sciurus niger*), Eastern cottontail rabbits (*Sylvilagus floridanus*), and white-tailed deer (*Odocoileus virginianus*). A complete list of species identified in the area is given in the *Threatened, Endangered and*

Sensitive Species Listing for Central Shops Burning/Rubble Pit (Waste Site #90) (USFS 1994). Although a recent survey revealed marginal to suitable habitat for several sensitive species, the survey did not reveal any definite presence of these species (USFS 1998).

Media Assessment

The RFI/RI/BRA report (WSRC 2000) contains the detailed information and analytical data for all the investigations conducted and samples taken in the media assessment of the FBSB OU. This document is available in the Administrative Record File (see Section III of this document).

For the purpose of RI and risk assessment, the eight FBSB OU components discussed in Section II of this document have been grouped into five subunits, as follows:

- FBSB and its surrounding area (Seepage Basin Area)
- Tank/Process Sewer Line Area
- Fire Hydrant Line
- PDES Ditch
- Groundwater

The investigations conducted to characterize FBSB OU soils and groundwater are summarized in Table 1 and described as follows:

Soil Investigations

The soil investigations of the FBSB OU were conducted in several stages. The activities include the following:

- Background Investigations
  - 1996, two background soil samples were collected; (five background borings obtained during the field investigations for the Ford Building Waste Unit and Fire Department Training Facility located near and north of the Ford Building conducted in May 1996 were also used for characterizing the FBSB OU soils)
- Primary Source Investigations
  - 1996, soil sludge samples collected from the retention tank
  - 1998, soil samples collected during the removal of retention tank, pumping station, and process sewer line
- Secondary Source Investigations
  - 1991 and 1996, ground penetrating radar (GPR) surveys
  - 1996 Phase I a total of 11 soil samples (4 from FBSB, 2 from retention tank, 2 background and 3 from fire hydrant line)
  - 1998 Phase II, a total of 29 soil samples (11 collected from FBSB, 3 from retention tank and pumping station, 7 from process sewer line, 3 from NPDES drainage ditch and 5 from background locations)

Additionally, in 1997 two radiological walkover surveys were conducted to evaluate whether FBSB OU wastewater had impacted surface soil in selected areas at the seepage basin.

The majority of the soil characterization data pertaining to FBSB OU were collected during Phase I and Phase II investigations conducted in 1996 and 1998, respectively. During both phases, soil samples were collected from the FBSB and its associated units.

Table 1. History of Environmental Activities Performed at the FBSB OU*

Investigation Dates	Media Sampled or Activity	Locations	Description
1985	Soil	12 locations in and around seepage basin	3 in basin floor, 6 in basin walls, 2 along process sewer line, 1 background (All qualitative)
1991 and 1996	GPR surveys	FBSB OU	Abandoned fire hydrant line
1994 - 1996	Groundwater	HXB and CSO Wells	Two to five times, limited analyses
Phase I: 1996	Soil	FBSB	4 samples locations
		FBSB retention tank	2 samples locations
		FBSB retention tank contents	1 water, 1 sludge/water 1 sludge sample
		FBSB fire hydrant line	3 sample locations
		Background	2 sample locations
	Surface Water	Standing water in basin	1 sample (for qualitative use)
	Perched Water	Below retention tank	1 sample (for qualitative use)
Phase II: 1997 – 1998	Soil	FBSB	3 from floor, 4 from walls, 4 from rim
		FBSB retention tank/ pumping station**	3 locations
		Process sewer line**	7 locations
		Fire Hydrant Line	None taken in Phase II
		NPDES Drainage Ditch	3 locations
		Background	5 locations
	Groundwater	Background Wells	HXB-4D and CSO-1 sampled twice
	Groundwater	Downgradient Wells	HXB-5D and HXB-6D sampled twice
1997	Radiological Walkover Surveys	FBSB and associated areas	Cs-137 screen
1998	Source Removal	Retention Tank/Process Sewer Line/Pumping Station	Removed tank, process sewer line, and pumping station.

* All work was done per the FFA. The removal (in 1998) was done under USDOE lead agency authority. Other activities were approved per the FFA.
**Samples were collected after source removal.
GPR = Ground Penetrating Radar
FBSB = Ford Building Seepage Basin
NPDES Ditch = Drainage ditch associated with NPDES Outfall

At the FBSB, the soil samples were collected from the basin floor, beneath the basin, basin walls, and from around the perimeter of the basin. At the Tank/Process Sewer Line, soil samples were collected from various locations along the sewer lines as well as at the retention tank. Since the samples used in the risk assessment were collected following the removal of the tank and process sewer line, they represent current conditions. At the abandoned fire hydrant line and the NPDES Ditch, soil samples were collected at biased locations, the locations with the highest potential for contamination. Seven background soil samples were also collected from the locations not inspected during historical activities associated with FBSB OU. All soil samples collected were analyzed for target analyte list (TAL) inorganics, target compound list (TCL) semivolatile organic compounds (SVOCs), TCL volatile organic compounds (VOCs), TCL pesticides/PCB dioxins/furans, and radionuclides (if sample exceeded alpha and beta trigger levels).

During Phase I investigations, each boring, for soil sample collection purposes, included six planned sampling interval depths: interval one was 0 to 0.3 m (0 to 1 ft); interval two was 0.3 to 1.2 m (1 to 4 ft); interval three was 1.2 to 2.1 m. (4 to 7 ft); interval four was 3.7 to 4.6 m (12 to 15 ft); interval five was 6.1 to 7 m (20 to 23 ft); and interval six was 8.5 to 9.5 m (28 to 31 ft) bls. However, some minor variations to the sample interval length were made in the field to provide adequate sample volume for quality control samples.

The Phase II investigation conducted at FBSB also included a cesium-137 radiological walkover survey to identify areas with elevated radiological levels and select biased locations for definitive-level soil sampling. Similar to Phase I soil samples, the definitive-level samples were analyzed for TAL inorganics, TCL SVOCs, TCL VOCs, pesticides/PCBs, dioxins/furans and radionuclides. The sample collection intervals in the FBSB were generally 0 to 0.3 m (0 to 1 ft), 0.3 to 1.2 m (1 to 4 ft), 1.2 to 2.1 m (4 to 7 ft), 2.1 to 3 m (7 to 10 ft), 3 to 3.9 m (10 to 13 ft), 3.9 to 4.9 m (13 to 16 ft), and 4.9 to 5.8 m (16 to 19 ft). However, for other subunits some changes in intervals were made wherever needed.

Groundwater Investigation

To characterize the FBSB OU groundwater and to identify the potential impact to the surrounding water table aquifer, the groundwater investigations included the following:

- Background Investigation

  - Groundwater samples collected during 1998

- Exposure Pathway Investigation

  - Groundwater samples collected to identify the potential impact of the FBSB OU associated groundwater to the surrounding water table aquifer.

Seven existing groundwater-monitoring wells in the vicinity of the FBSB and one new monitoring well were used for the FBSB OU groundwater characterization. For the locations of monitoring wells, refer to Figure 4. Two rounds of groundwater sampling and analyses, 30 days apart, were conducted, during Phase II.

Assessment Investigation Results

Soils

The COCs associated with the FBSB OU soils were determined using standard SRS risk assessment protocols for the surface, subsurface, and deep soil exposure groups. Contaminant migration constituents of concerns (CMCOCs) were identified through contaminant fate and transport analyses using CSMs to assess the potential for adverse health effects to humans and the environment. The CSMs are depicted in Figures 6 through 9. The results of the characterization and assessment have been summarized in the

RFI/RI/BRA report (WSRC 2000).

Tables 2 through 7 provide a review of the process employed in determining the refined COCs to be retained for further remedial evaluation of the FBSB, the Tank/ Process Sewer Line, the NPDES Ditch, fire hydrant line, combined soil (soil pertaining to all three depth ranges), and groundwater, respectively. The process entailed several steps. First, from the detected constituents, unit- specific constituents (USCs) were identified. USCs were determined by comparing each detected constituent concentration found in the soil against its respective twice- average background concentration for all depth intervals. Second, the USCs were further screened to reflect risk to human health or the environment and thereby determine preliminary COCs. The preliminary COCs, in addition to risk- based COCs, included applicable or relevant and appropriate requirement (ARAR) based COCs and CMCOCs. Risk- based COCs were determined in accordance with CERCLA guidance. Finally, the preliminary COCs were carried into a formal uncertainty analysis, and refined COCs were determined.

The key findings are described below.

- No PTSM or primary source materials are present at the FBSB OU.
- Five refined COCs are identified for the Seepage Basin Area Subunit. The refined COCs include arsenic, aroclor-1254, cesium-137, cobalt-60, and europium-154. Out of five refined COCs, four are human health COCs (arsenic, cesium-137, cobalt-60, and europium-154) and are identified for the future industrial workers exposed to surface soil (0 to 0.3 m [0 to 1 ft bls]), subsurface soil (0.3 m to 1.2 m [1 to 4 ft bls]), and deep soil (1.2 to 2.1 m [4 to 7 ft bls]) associated with the Seepage Basin Area. The refined COC (aroclor-1254) is identified as an ecological COC for Seepage Basin Area surface soil.
- Only two human health refined COCs (cesium-137 and cobalt-60) are identified for the Tank/Process Sewer Line Area surface and subsurface soils.
- No refined CMCOCs are identified in the FBSB OU vadose zone.
- No refined COCs are identified for the Fire Hydrant Line
- No refined COCs are identified for the NPDES Ditch.

Figure 10 presents a schematic cross- section of the FBSB OU, showing the refined COCs. Figures 11 through 13 present the extent of contamination in the soils at the Seepage Basin Area, and Figures 14 and 15 present the extent of contamination in soils at the Tank/Process Sewer Line Area.

Groundwater

The results of the groundwater analyses have revealed no refined COCs for the FBSB OU groundwater.

Site-Specific Factors

No site-specific factors affect the preferred remedial action for the FBSB OU.

Contaminant Transport Analysis

Figure 16 presents the CSM for contaminant migration analysis performed for the FBSB OU. The analysis of contaminant fate and transport was based on the data collected from soil sampling investigations conducted in 1996 and 1998 (Phase I and Phase II, respectively). The analysis was performed to determine each contaminant migration constituent of potential concern (CMCOPC) potential for leaching to groundwater, to predict the migration data for each CMCOPC, and to project concentrations delivered to the receptor location via

Table 2. Overview of the COC Process - FBSB

Detected Constituent in Soil	USC	ARAR COC	CM COPC	CM COC	COPC	COC	COPC	COC	Refined COC
TAL Inorganics									
Aluminum	X				X		X	X	
Arsenic	X				X	X	X		X (HH)*
Barium	X								
Beryllium	X								
Calcium	X						X		
Chromium	X				X		X	X	
Cobalt	X								
Copper	X								
Cyanide	X								
Iron	X				X	X	X		
Lead	X								
Magnesium	X						X		
Manganese	X						X		
Mercury	X				X		X		
Nickel	X								
Potassium	X						X		
Selenium	X						X		
Silver	X								
Thallium	X								
Vanadium					X		X		
Zinc	X						X		
TCL Semivolatiles									
Benzo(a)anthracene	X						X		
Benzo(a)pyrene	X								
Benzo(b)fluoranthene	X						X		
Benzo(g,h,i)perylene	X						X		
Benzo(k)fluoranthene	X						X		
Chrysene	X						X		
Dibenzo(a,h)anthracene	X						X		
Diethyl phthalate	X						X		
Fluoranthene	X						X		
Fluorene	X								
Indeno(1,2,3-c,d)pyrene	X						X		
Phenanthrene	X								
Pyrene	X						X		
TCL Volatiles									
1,1,1-Trichloroethane	X						X		
Acetone	X						X		
Dichloromethane (Methylene chloride)	X								
Ethylbenzene	X								
Tetrachloroethene	X								
Toluene	X								
Trichloroethene (TCE)	X								
Vinyl acetate	X								
Xylenes (total)	X								

Table 2. Overview of the COC Process - FBSB (Contd.)

Detected Constituent in Soil	USC	ARAR COC	CM COPC	CM COC	COPC	COC	COPC	COC	Refined COC
Pesticides/PCBs and Dioxins/Furans									
Aldrin	X								
Aroclor-1254	X	X			X	X	X	X	X(E)*
Aroclor-1260	X				X		X		
Dieldrin	X						X		
Endosulfan II	X						X		
alpha-Benzene hexachloride	X		X						
alpha-Chlordane	X						X		
gamma-Chlordane	X						X		
p,p'-DDE	X								
p,p'-DDT	X						X		
Radionuclides									
Actinium-228	X								
Americium-241	X				X	X			
Carbon-14	X								
Cesium-137	X				X	X			X (HH)
Cobalt-60	X				X	X			X(HH)
Curium-243/244	X								
Europium-154	X				X	X			X(HH)
Lead-212	X								
Plutonium-238	X								
Plutonium-239/240	X								
Potassium-40	X		X	X	X	X			
Radium-226	X				X	X			
Radium-228	X				X	X			
Sodium-22	X				X	X			
Strontium-90	X		X						
Thorium-228	X				X	X			
Thorium-230	X								
Thorium-232	X								
Uranium-233/234	X								
Uranium-235	X								
Uranium-238	X				X				
Zirconium-95	X				X	X			

*HH = Human Health (future industrial worker)
E = Ecological
USC = Unit Specific Constituent
ARAR COC = ARAR Constituent of Concern
CMCOPC = Contaminant Migration Constituent of Potential Concern
COC = Constituent of Concern
COPC = Constituent of Potential Concern

Table 3. Overview of the COC Process — Tank/Process Sewer Line

Detected Constituent in Soil	**USC**	**ARAR COC**	**CM COPC**	**CM COC**	**COPC**	**COC**	**COPC**	**COC**	**Refined COC**
TAL Inorganics									
Aluminum	X				X		X	X	
Arsenic	X								
Barium	X								
Beryllium	X								
Calcium	X						X		
Chromium	X				X		X	X	
Cobalt	X								
Copper	X								
Cyanide	X								
Iron	X				X		X		
Lead	X						X		
Magnesium	X						X		
Manganese	X								
Mercury	X						X		
Nickel	X								
Potassium	X						X		
Sodium	X								
Thallium	X								
Vanadium	X				X		X		
Zinc	X								
TCL Semivolatiles									
Bis(2-ethylhexyl) phthalate	X								
TCL Volatiles									
1,1-Dichloroethene	X								
2-Butanone (MEK)	X								
Acetone	X								
Bromomethane (Methyl bromide)	X								
Chloroform	X								
Chloromethane (Methyl chloride)	X								
Dichloromethane (Methylene chloride)	X								
Toluene	X								
Pesticides/PCBs and Dioxins/Furans									
Aroclor 1254	X						X		
p,p’-DDD	X						X		
p,p’-DDE	X								
p,p’-DDT	X						X		
Radionuclides									
Cesium-137	X				X	X			X (HH)*
Cobalt-60	X				X	X			X (HH)
Curium-242	X								
Curium-243/244	X								
Curium-245/246	X								
Iodine-129	X		X	X					
Neptunium-237	X								
Plutonium-238	X								
Plutonium-239/240	X								
Potassium-40	X		X	X	X	X			

Table 3. Overview of the COC Process — Tank/Process Sewer Line (Cont'd)

Detected Constituent in Soil	USC	ARAR COC	CM COPC	CM COC	COPC	COC	COPC	COC	Refined COC
Promethium-146	X								
Promethium-147	X								
Radium-226	X				X	X			
Strontium-90	X								
Technetium-99	X								
Thorium-228	X								
Thorium-230	X								
Thorium-232	X								
Uranium-233/234	X								
Uranium-235	X								
Uranium-238	X								

*HH = Human Health (future industrial worker)
USC = Unit Specific Constituent
ARAR COC = ARAR Constituent of Concern
CMCOPC = Contaminant Migration Constituent of Potential Concern
COC = Constituent Of Concern
COPC = Constituent of Potential Concern

Table 4. Overview of the COC Process — NPDES Ditch

Detected Constituent in Soil	USC	ARAR COC	CM COPC	CM COC	COPC	COC	COPC	COC	Refined COC
TAL Inorganics									
Aluminum	X				X		X	X	
Arsenic	X				X	X			
Barium	X								
Beryllium	X								
Calcium	X						X		
Chromium	X				X		X	X	
Cobalt	X								
Copper	X								
Iron	X				X	X	X		
Magnesium	X						X		
Manganese	X				X		X		
Nickel	X								
Potassium	X						X		
Thallium	X								
Vanadium					X		X		
Zinc	X						X		
TCL Semivolatiles									
Di-n-butyl phthalate	X						X		
Diethyl phthalate	X						X		
TCL Volatiles									
1,1,1-Trichloroethane	X						X		
1,1-Dichloroethene	X						X		
Acetone	X						X		
Chlorobenzene	X								
Tetrachloroethene	X						X		
Toluene	X								
Trichloroethene (TCE)	X								
Pesticides/PCBs and Dioxins/Furans									
p,p’-DDE	X								
p,p’-DDT	X								
Radionuclides									
Potassium-40	X		X	X	X	X			
Radium-226	X				X	X			
Strontium-90	X		X						
Thorium-228					X	X			
Thorium-230	X								
Uranium-235	X				X				
Uranium-238	X				X				

USC = Unit Specific Constituent
ARAR COC = ARAR Constituent of Concern
CMCOPC = Contaminant Migration Constituent of Potential Concern
COC = Constituent of Concern
COPC = Constituent of Potential Concern

Table 5. Overview of the COC Process – Fire Hydrant Line

Detected Constituent in Soil	USC	ARAR COC	CM COPC	CM COC	COPC	COC	COPC	COC	Refined COC
TAL Inorganics									
Aluminum	X								
Barium	X								
Beryllium	X								
Calcium	X								
Chromium	X								
Copper	X								
Cyanide	X								
Iron	X								
Lead	X		X						
Magnesium	X								
Manganese	X								
Mercury	X		X						
Nickel	X								
Potassium	X								
Selenium	X								
Vanadium	X								
Zinc	X								
TCL Semivolatiles									
Diethyl phthalate	X								
TCL Volatiles									
2-Butanone (MEK)	X								
2-Hexanone	X								
Chloroform	X								
Dichloromethane (Methylene chloride)	X								
Toluene	X								
Trichloroethene (TCE)	X								
Pesticides/PCBs and Dioxins/Furans									
Aroclor 1254	X								
Dieldrin	X								
alpha-Chlordane	X								
gamma-Chlordane	X								
p,p’-DDD	X								
p,p’-DDE	X								
p,p’-DDT	X								
Radionuclides									
Cesium-137	X								
Plutonium-238	X								
Plutonium-239/240	X								
Potassium-40	X		X	X					
Radium-226	X								
Strontium-90	X								
Uranium-238	X								

USC = Unit Specific Constituent
ARAR COC = ARAR Constituent of Concern
CMCOPC = Contaminant Migration Constituent of Potential Concern
COC = Constituent of Concern
COPC = Constituent of Potential Concern

Table 6. Overview of the COC Process – Combined Soil

Detected Constituent in Soil	USC	ARAR COC	CM COPC	CM COC	COPC	COC	COPC	COC	Refined COC
TAL Inorganics									
Aluminum					X				
Arsenic					X	X			X (HH)*
Barium									
Beryllium									
Calcium									
Chromium					X				
Cobalt									
Copper									
Cyanide									
Iron					X				
Lead									
Magnesium									
Manganese					X				
Mercury					X				
Nickel									
Potassium									
Selenium									
Silver									
Thallium									
Vanadium					X				
Zinc									
TCL Semivolatiles									
Benzo(a)anthracene									
Benzo(a)pyrene									
Benzo(b)fluoranthene									
Benzo(g,h,i)perylene									
Benzo(k)fluoranthene									
Chrysene									
Di-n-butyl phthalate									
Dibenzo(a,h)anthracene									
Diethyl phthalate									
Fluoranthene									
Fluorene									
Indeno(1,2,3-c,d)pyrene									
Phenanthrene									
Pyrene									
TCL Volatiles									
1,1,1-Trichloroethane									
1,1-Dichloroethene									
2-Butanone (MEK)									
Acetone									
Chlorobenzene									
Dichloromethane (Methylene chloride)									
Ethylbenzene									
Tetrachloroethene									
Toluene									
Trichloroethene (TCE)									
Xylenes (total)									

Table 6. Overview of the COC Process – Combined Soil (Cont'd)

Detected Constituent in Soil	USC	ARAR COC	CM COPC	CM COC	COPC	COC	COPC	COC	Refined COC
Pesticide/PCBs and Dioxins/Furans									
Aroclor 1254					X				
Aroclor 1260					X				
Dieldrin									
Endosulfan II									
alpha-Chlordane									
gamma-Chlordane									
p,p'-DDD									
p,p'-DDE									
p,p'-DDT									
Radionuclides									
Americium-241					X				
Carbon-14									
Cesium-137					X	X			X (HH)*
Cobalt-60					X	X			X (HH)
Curium-242									
Curium-243/244									
Europium-154					X	X			X (HH)
Iodine-129									
Neptunium-237									
Plutonium-238									
Plutonium-239/240									
Potassium-40					X	X			
Promethium-147									
Radium-226					X	X			
Radium-228					X	X			
Sodium-22					X	X			
Strontium-90									
Technetium-99									
Thorium-228					X	X			
Thorium-230									
Thorium-232									
Uranium-235					X				
Uranium-238					X				
Zirconium-95					X	X			

*HH Human Health (future, industrial worker)
USC = Unit Specific Constituent
ARAR COC = ARAR Constituent of Concern
CMCOPC = Contaminant Migration Constituent of Potential Concern
COC = Constituent of Concern
COPC = Constituent of Potential Concern

Table 7. Overview of the COC Process – Groundwater

Detected Constituent in Groundwater	USC	ARAR COC	CM COPC	CM COC	COPC	COC	COPC	COC	Refined COC
Sulfate	X								
Total Organic Halogens	X								
TAL Inorganics (mg/L)									
Aluminum	X								
Barium									
Cadmium	X								
Calcium	X								
Chromium	X				X				
Cobalt									
Copper									
Iron	X								
Lead									
Magnesium									
Manganese	X								
Mercury	X								
Nickel									
Potassium									
Silica, total recoverable									
Silver	X								
Sodium	X								
Vanadium	X								
Zinc	X								
TCL Volatiles (mg/L)									
Bromodichloromethane	X				X				
Chloroform	X				X	X			
Radionuclides (pCi/L)									
Carbon-14	X								
Potassium-40	X				X	X			
Radium-226									
Radium-228									
Tritium									

USC = Unit Specific Constituent
ARAR COC = ARAR Constituent of Concern
CMCOPC = Contaminant Migration Constituent of Potential Concern
COC = Constituent of Concern
COPC = Constituent of Potential Concern

vadose zone pore water and groundwater. The analyses were conducted according to the January 22, 1998, SRS contaminant migration protocols. The CM COPCs were selected from the USCs by a screening process that involved a series of screening steps, including soil leachability screening and modeling. After CMCOPCs were identified through the soil leachability screening process, they were further evaluated using the SESOIL, a vadose zone contaminant transport model summarized in Figure 17. The results of the analysis revealed that concentrations of constituents detected in the FBSB OU soils would not exceed their maximum contaminant levels (MCLs) within 1,000-year modeling period. 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 contaminant migration analysis identified no refined CMCOCs. Therefore the FBSB OU soils do not pose a migration threat to groundwater.

VI. CURRENT AND POTENTIAL FUTURE SITE AND RESOURCE USES

Land Users

Current Land Use

Currently the FBSB OU is not in use. Access to the SRS is controlled by USDOE. General public access is prohibited and site access is limited by security personnel and fences. Once within the SRS boundaries, access to the FBSB OU is not restricted. The FBSB OU is not fenced and is located in the Central Shops Area approximately 11.5 km (7.2 mi) from the closest site boundary. The area surrounding the unit is heavily industrialized. The seepage basin is delineated with orange marker balls, fenced in and marked with signs identifying the unit as a RCRA/CERCLA unit. The Ford Building (690-N), a parking lot, and two roadways are nearby. Because the area is not attractive to the typical trespasser (adolescent age up to 16 years), the level of security at the SRS site, and no evidence of casual trespassing (e.g., people, litter, or campsites), the trespasser scenario has not been conducted for the FBSB OU. The only potential occasion visitors to the FBSB OU would be the known on-unit workers who come to the area on an infrequent or occasional basis. The known on-unit workers are defined as SRS employees who work at or in the vicinity of the FBSB OU under current land use conditions and include, but are not limited to, researchers, environmental samplers, or personnel in close proximity to the unit. However, these receptors, which may be involved in the excavation or collection of contaminated media, would be following the SRS procedures and protocols for sampling at hazardous waste units.

Groundwater near the FBSB OU is not currently used for consumption by the on-unit workers. The potentially exposed receptor evaluated for the current land use scenario is the known on-unit worker.

Future Land Use

According to the *Savannah River Site: Future Use Project Report* (USDOE 1996), “residential uses of SRS land should be prohibited.” The report’s future-use recommendation is “future industrial,” which is essentially unchanged from the current land use. Residential use of this waste unit is not anticipated for the future; however, a residential land use scenario has been evaluated as a conservative measure to facilitate comparison with other sites as desired by risk managers.

Under industrial land use, the most likely human receptors will be industrial workers. However, until deed notifications are established, the possibility exists that new buildings could be constructed, and the area at or near the FBSB OU could be converted to residential use in the future. Although residential development is unlikely, a hypothetical residential exposure scenario for both adults and children has been evaluated to allow comparison. This is in accordance with USEPA - Region IV guidance (USEPA 1995), which states that residential development cannot be entirely ruled out. However, future use of the land is not likely to change from current use.

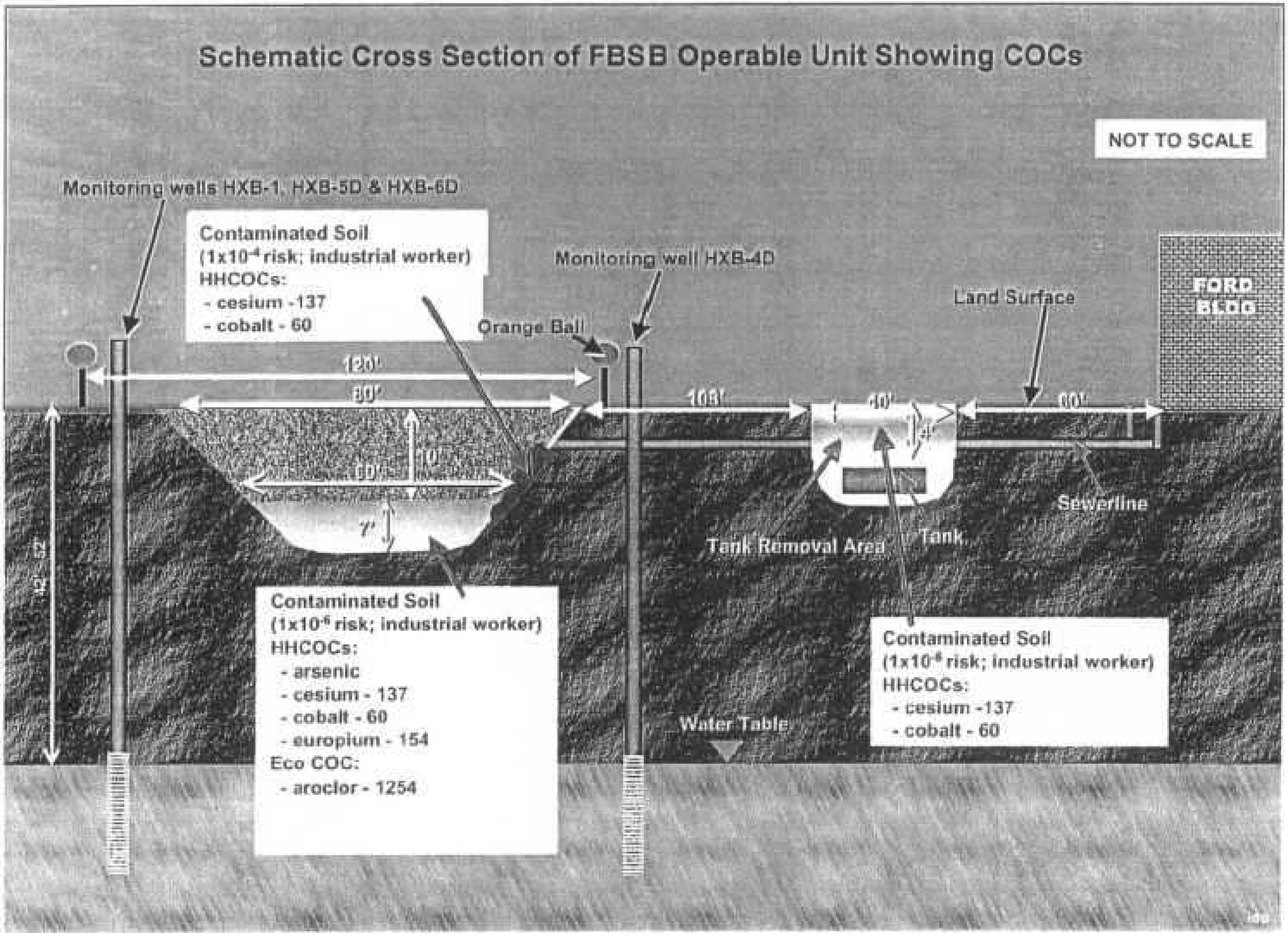


Figure 10. **Schematic Cross Section of FBSB Operable Unit Showing COCs**

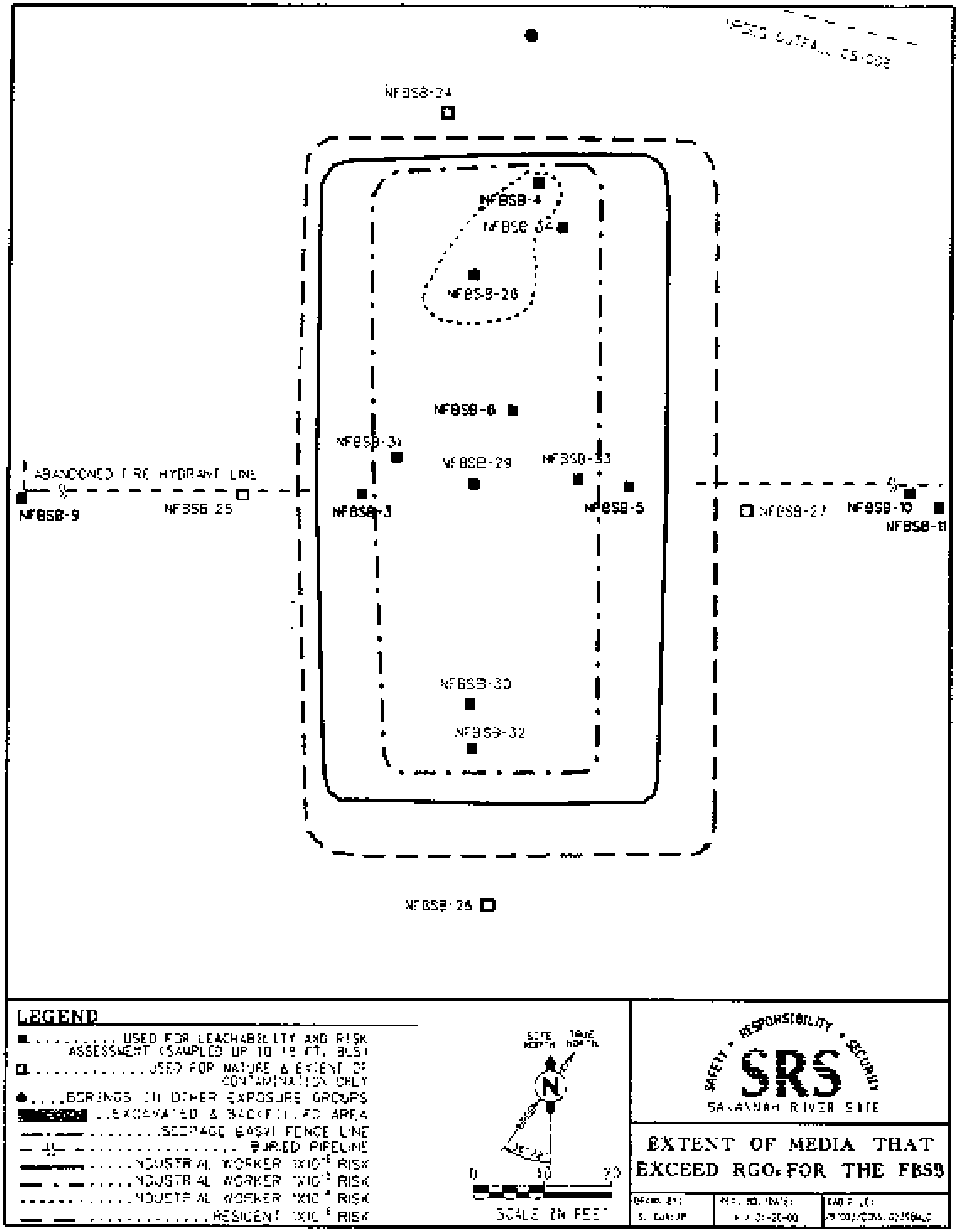


Figure 11. Total Extent of Contamination - Soils at the FBSB

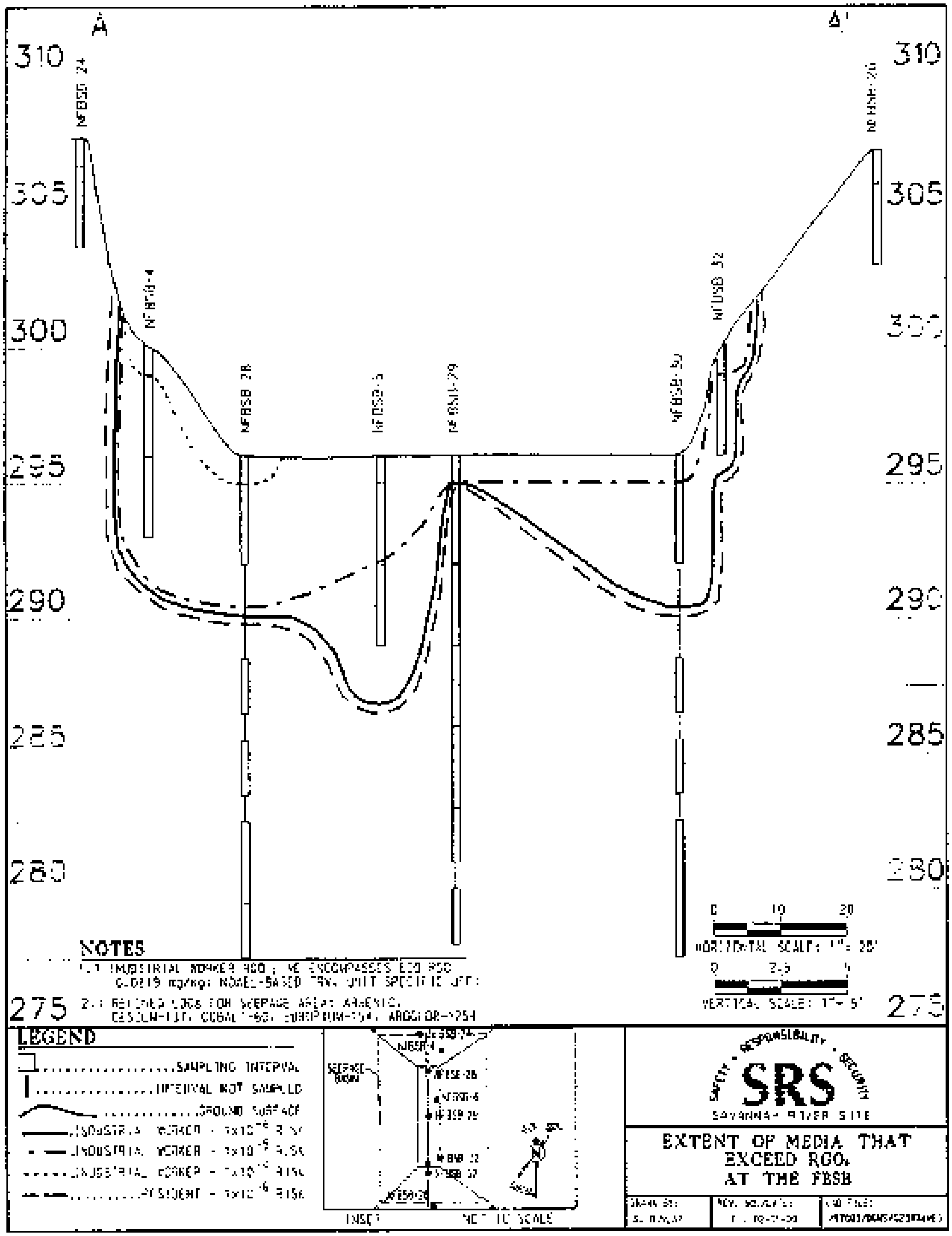


Figure 12. Total Extent of Contamination - Soils at the FBSB North-South Cross Section

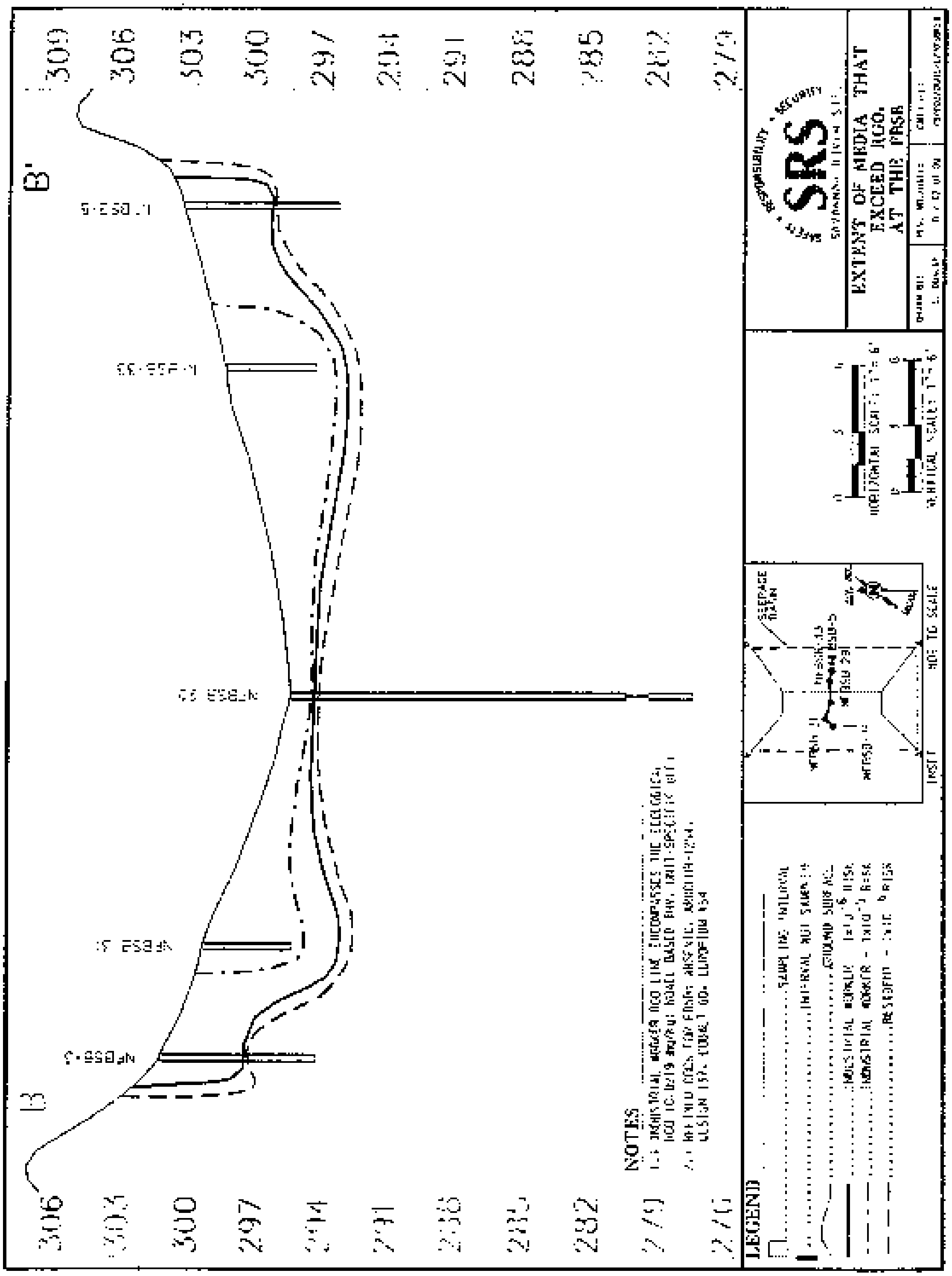


Figure 13. Total Extent of Contamination - Soils at the FBSB East-West Cross Section

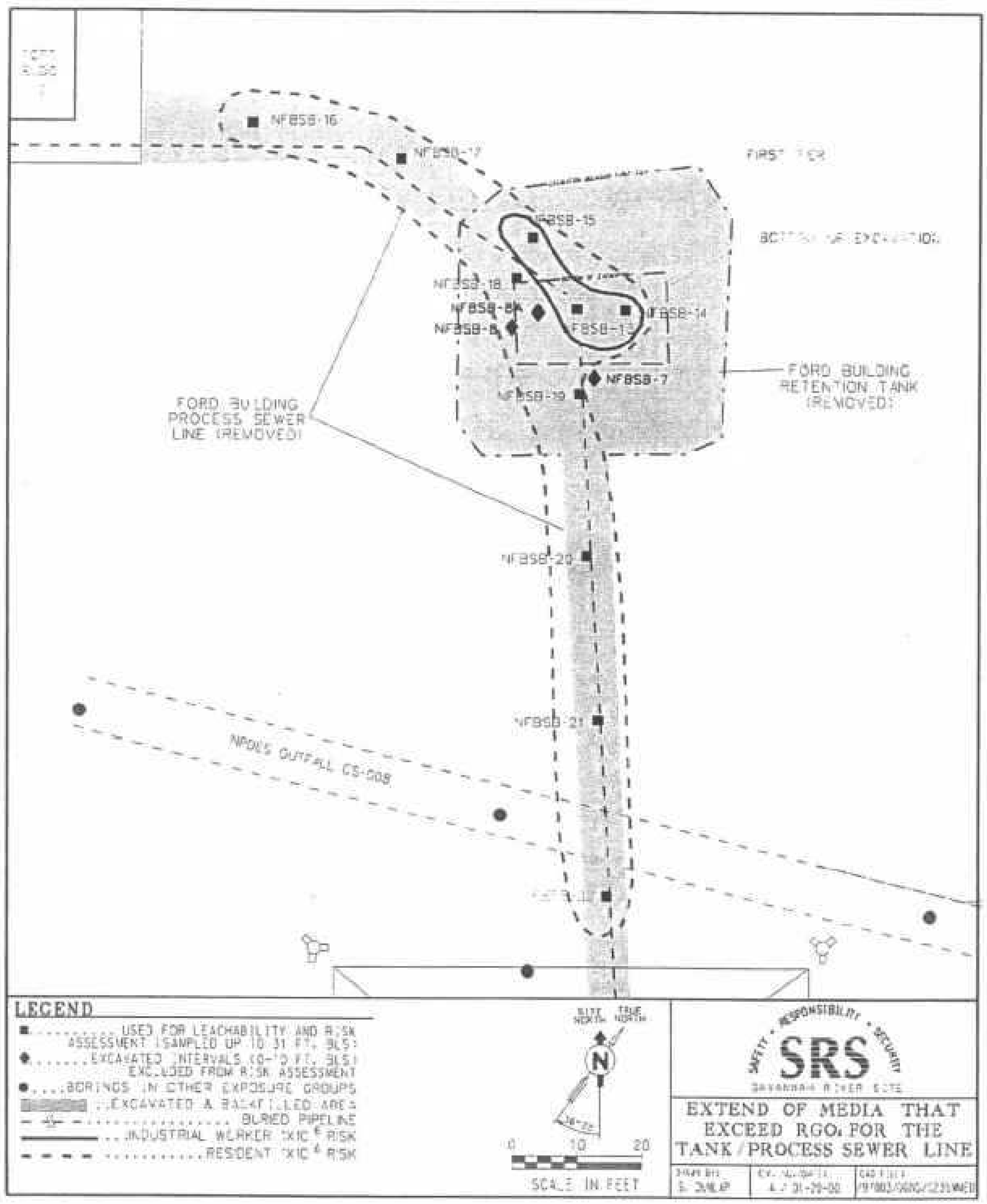


Figure 14. Total Extension of Contamination - Soils at the Tank/Process Sewer Line Area

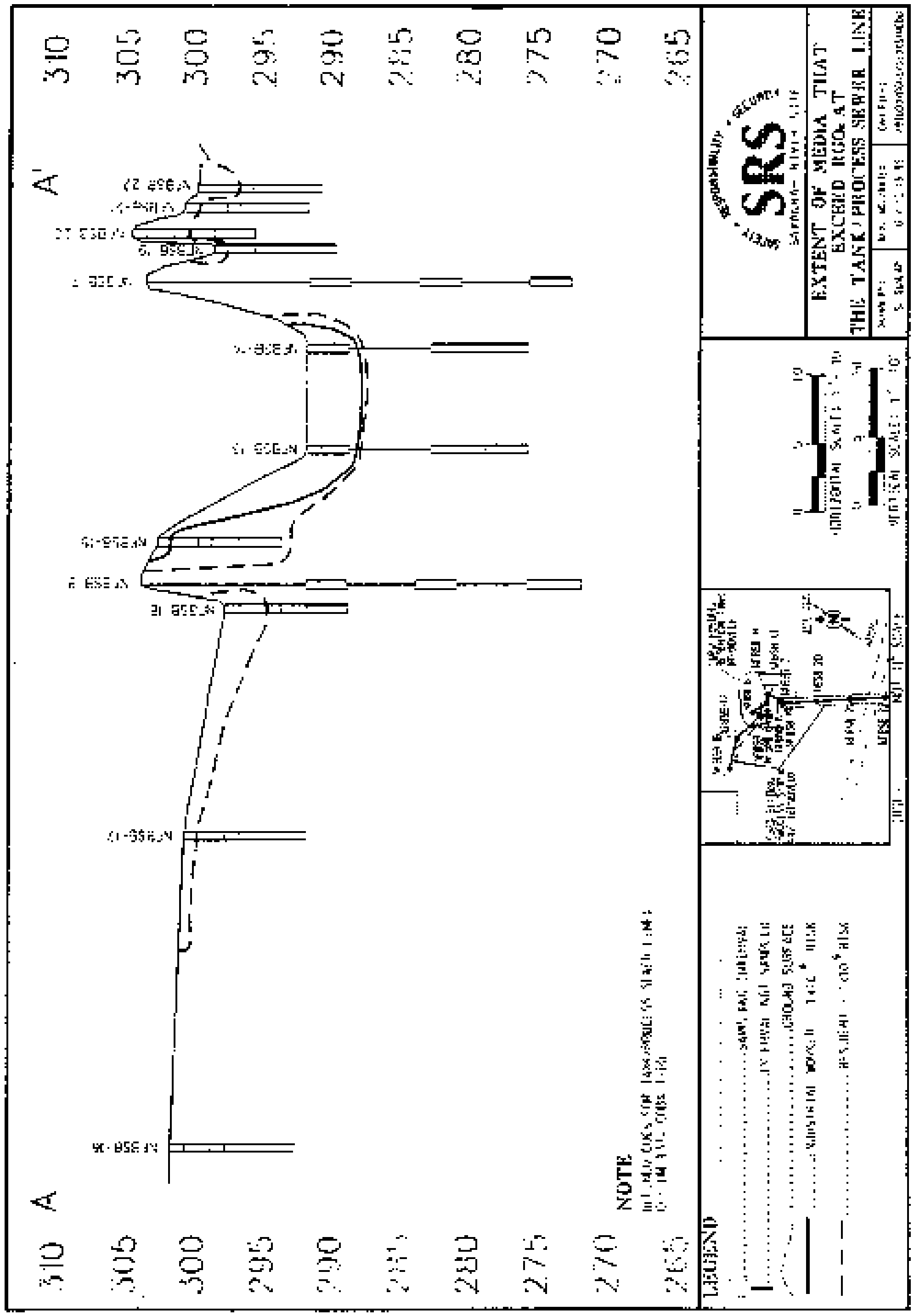


Figure 15. Total Extent of Contamination - Soils at the Tank/Process Sewer Line Area Cross Section Along the Length of the Sewer Line

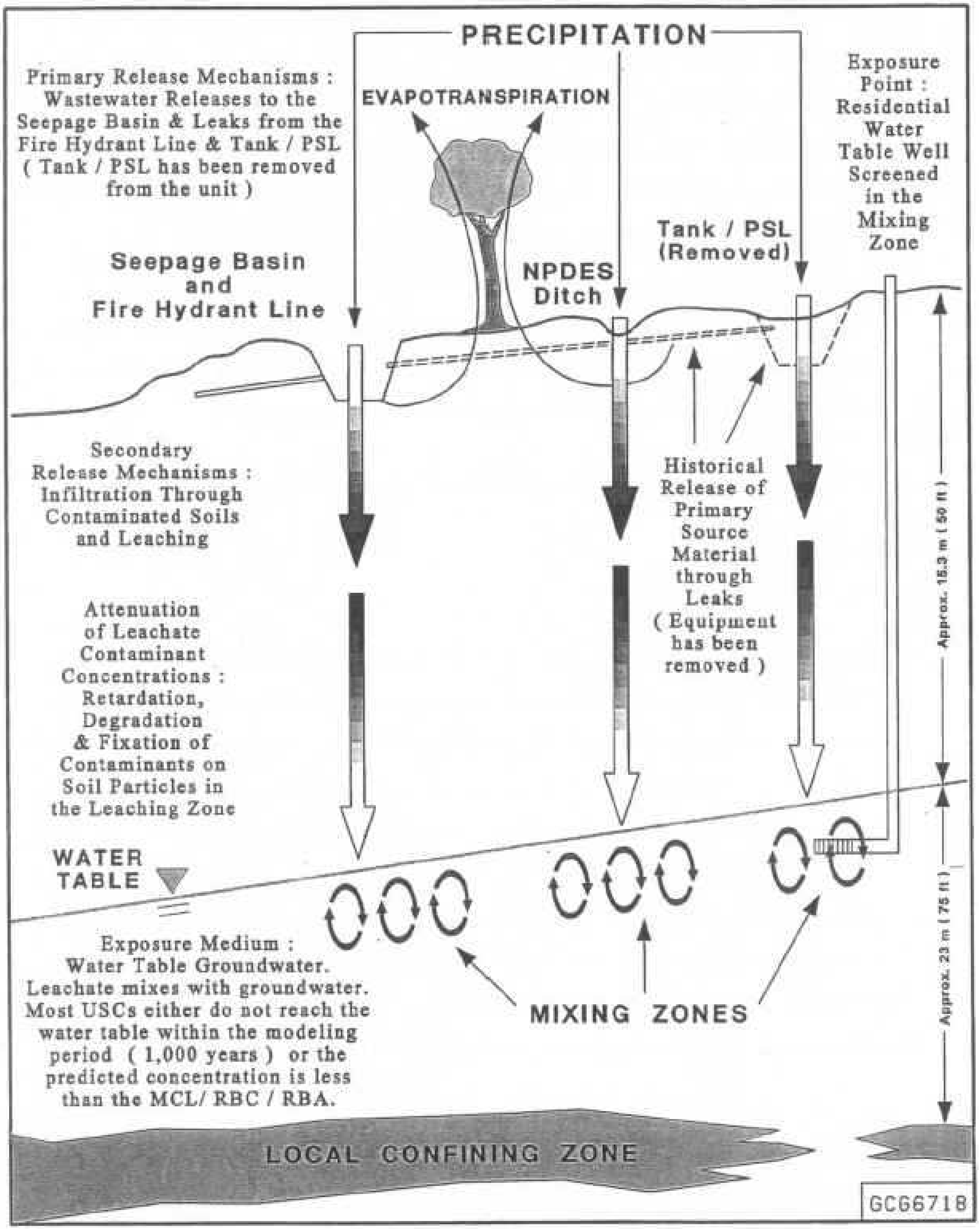


Figure 16. Contaminant Migration Conceptual Model

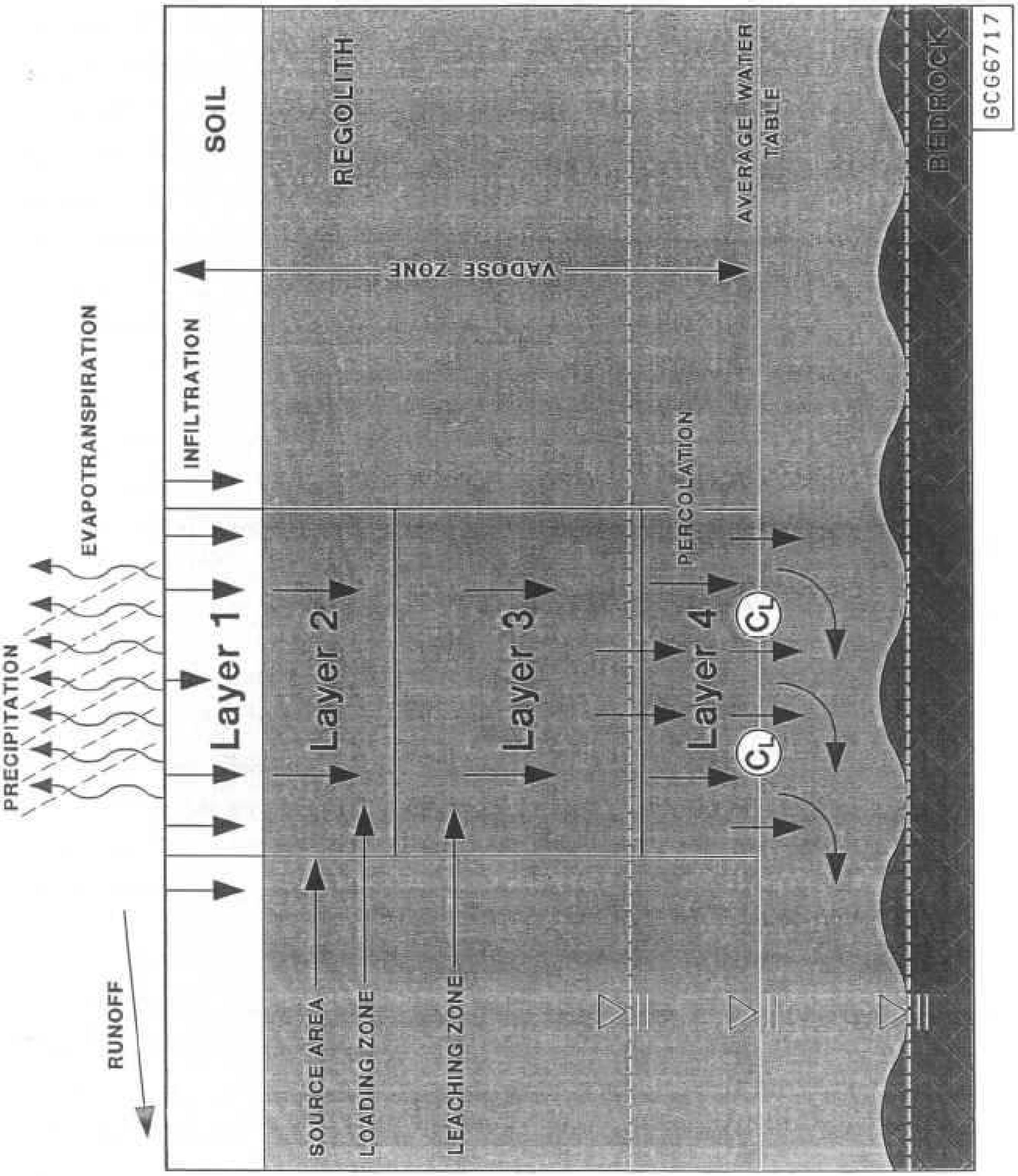


Figure 17. Conceptual Vadose Zone Model used by SESOIL

Because institutional controls preventing the excavation of contaminated soil cannot be guaranteed, the future scenario assumes the possible excavation of soil depths of 0 to 1.2m (0 to 4 ft) and subsequent spreading of this soil on the surface as a result of construction activities. Approximately 1.2 m (4 ft) is considered a reasonable depth for a residual contractor to excavate during construction in the SRS area.

The potentially exposed receptors that are evaluated for the future land use scenario include the following:

- Hypothetical on-unit industrial worker (adult)

- Hypothetical on-unit resident (adult and child)

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 in an outdoor industrial setting in direct proximity to the contaminated media for the majority of the time.

The hypothetical on-unit resident exposure scenario evaluates the long-term risks to individuals expected to have unrestricted use at the unit. It assumes that residents live on-unit and are chronically exposed (both indoors and outdoors) to unit-related constituents. The hypothetical on-unit resident includes adults and children who are exposed to all the contaminated media. As noted above, for all noncarcinogenic exposures to residents, a child and an adult are the receptors that are evaluated. For all carcinogenic exposures to residents, a weighted average child/adult is evaluated. This assumes that a portion of the overall lifetime exposure to carcinogens occurs at a higher level of intensity during the first six years of a child’s life.

Based on the contaminated media and anticipated activities at the response points, the probable exposure routes for the FBSB OU are the following:

- Ingestion (surface and subsurface soil, groundwater, and biota)

- Inhalation (of particles and vapors)

- Dermal exposure (surface and subsurface soil and groundwater)

- External radiation (surface and subsurface soil)

Groundwater Uses/Surface Water Uses

SRS does not use the Congaree aquifer for drinking water or irrigation purposes and currently controls any drilling in this area. Therefore, as long as USDOE maintains control of SRS, the aquifer beneath the FBSB OU will not be used as a potential drinking water source or for irrigation.

There are no distinct surface water features on the unit nor are there any drainage or surface runoff features which indicate that the surface runoff is being used for irrigation and other beneficial uses.

VII. SUMMARY OF OPERABLE UNIT RISKS

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

Summary of the Human Health Risk Assessment

Based on the existing analytical data, an evaluation was conducted to estimate the human

Table 8. Summary of Refined COCs and Their Medium-Specific Exposure Point Concentrations Associated with the FBSB OU

Scenario Timeframe:		**Future**						
Medium:		**Soil**						
Exposure Medium:		**Surface Soil**						
		Concentration Detected						
Exposure Point	**Constituent of Concern**	**Min**	**Max**	**Units**	**Frequency of Detection**	**Exposure Point Concentration**	**Exposure Point Concentration Units**	**Statistical Measure**
Seepage Basin Area								
Soil Onsite Direct Contact	Arsenic	1.52	2.32	ppm	7/11	1.88	ppm	95% UCL
	Aroclor- 1254	0.019	1.63	ppm	6/11	1.63	ppm	Max
	Cesium-137	0.01	32.8	pCi/g	10/11	32.8	pCi/g	Max
	Cobalt-60	0.04	3.86	pCi/g	10/11	3.86	pCi/g	Max
	Europium-154	0.112	0.112	pCi/g	1/8	0.0478	pCi/g	Max
Tank/Process Sewer Line								
Soil Onsite Direct Contact	Cesium-137	0.029	0.709	pCi/g	10/10	0.265	pCi/g	95% UCL
	Cobalt-60	0.027	0.089	pCi/g	3/8	0.047	pCi/g	95% UCL

ppm = parts per million
95% UCL = 95% Upper Confidence Limit
Max = Maximum Concentration

Table 9. Summary of Refined COCs and Their Medium-Specific Exposure Point Concentrations Associated with the FBSB OU

Scenario Timeframe:	**Future**							
Medium:	**Soil**							
Exposure Medium:	**Surface Soil**							
		Concentration Detected						
Exposure Point	**Constituent of Concern**	**Min**	**Max**	**Units**	**Frequency of Detection**	**Exposure Point Concentration**	**Exposure Point Concentration Units**	**Statistical Measure**
Seepage Basin Area								
Soil Onsite Direct Contact	Arsenic	0.97	23.8	ppm	16/22	5.83	ppm	95% UCL
	Aroclor- 1254	0.019	1.63	ppm	11/22	1.63	ppm	Max
	Cesium-137	0.01	32.8	pCi/g	18/22	32.8	pCi/g	Max
	Cobalt-60	0.03	3.86	pCi/g	17/22	3.86	pCi/g	Max
	Europium- 154	0.11	0.11	pCi/g	1/18	0.11	pCi/g	Max
Tank/Process Sewer Line								
Soil Onsite Direct Contact	Cesium-137	0.025	0.709	pCi/g	18/20	0.238	pCi/g	95% UCL
	Cobalt-60	0.0151	0.089	pCi/g	6/18	0.025	pCi/g	95% UCL

ppm = parts per million
95% UCL = 95% Upper Confidence Limit
Max = Maximum Concentration

Table 10. Cancer Toxicity Data Summary for the FBSB OU

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 (M/D/Y)**
Arsenic	1.50	1.88	(mg/kg)/day	A	IRIS	01/01/98
Aroclor-1254	2.00	2.22	(mg/kg)day	B2	IRIS	01/01/98

Pathway: Inhalation							
Constituent of Concern	**Unit Risk**	**Units**	**Inhalation Cancer Slope Factor**	**Units**	**Weight of Evidence/ Cancer Guideline Description**	**Source**	**Date (M/D/Y)**
Arsenic	4.3×10^{-3}	m^3/µg	1.51	(mg/kg)/ day	A	IRIS	01/01/98
Aroclor-1254	5.7×10^{-4}	m^3/µg	2.00	(mg/kg)/ day	B2	IRIS	01/01/98

Pathway: External (Radiation)						
Constituent of Concern	**Cancer Slope or Conversion Factor**	**Exposure Route**	**Units**	**Weight of Evidence/ Cancer Guideline Description**	**Source**	**Date (M/D/Y)**
Cesium-137	2.09×10^{-6}	External (Radiation)	g/y – pCi	A	HEAST	07/01/95
Cobalt-60	9.76×10^{-6}	External (Radiation)	g/y – pCi	A	HEAST	07/01/95
Europium-154	4.65×10^{-6}	External (Radiation)	g/y – pCi	A	HEAST	07/01/95

Key EPA Group **IRIS: Integrated Risk Information System, USEPA**	A- Humann carcinogen B2- Probable human carcinogen – indicates sufficient evidence in animals and inadequate or no evidence in humans

Table 11. Non-Cancer Toxicity Data Summary for the FBSB OU

Pathway: Ingestion, Dermal									
Constituent of Concern	**Chronic/ Subchronic**	**Oral RfD Value**	**Oral RfD Units**	**Dermal RfD**	**Dermal RfD Units**	**Primary Target Organ**	**Combined Uncertainty/ Modifying Factors**	**Sources of RfD: Target Organ**	**Dates of RfD: Target Organ (M/D/Y)**
Arsenic	Chronic	3.0×10^{-4}	mg/kg – day	2.4×10^{4}	mg/kg – ay	skin	3	IRIS	10/01/98
Arochlor-1254	Chronic	2.0×10^{-5}	mg/kg – day	1.8×10^{5}	mg/kg – day	eye	300	IRIS	10/01/98
Pathway: Inhalation									
Constituent of Concern	**Chronic/ Subchronic**	**Inhalation RfC**	**Inhalation RfC Units**	**Inhalation RfD**	**Inhalation RfD Units**	**Primary Target Organ**	**Combined Uncertainty/ Modifying Factors**	**Sources of RfC:RfD: Target Organ**	**Dates (M/D/Y)**
Arsenic	---	None	---	None	---	---	---	---	---
Aroclor-1254	---	None	---	None	---	---	---	---	---

Key

---: no information available
IRIS: Integrated Risk Information System, USEPA
RfDs: reference dose
RfC reference concentration

Table 12. Risk Characterization Summary – Carcinogens (Radionuclides) for the FBSB OU

Scenario Timeframe:	Future							
Receptor Population:	Industrial Worker							
Receptor Age:	Adult							
Medium	**Exposure Medium**	**Exposure Route**	**Constituent of Concern**		**Carcinogenic Risk**			
				Ingestion	**Inhalation**	**Dermal**	**External (Radiation)**	**Exposure Routes Total**
Surface Soil	SurfaceSoil (FBSB)	Soil Onsite-Direct Contact	Cesium-137	3.24E-07	1.69E-11	--	3.13E-04	3.13E-04
			Cobalt-60	2.28E-08	7.17E-12	--	1.72E-04	1.72E-04
			Europium-154	1.40E-10	1.18E-13	--	1.01E-06	1.01E-06
							Soil Risk Total=	**4.86E-04**

Key
--: Toxicity criteria are not available to quantitatively address this route of exposure.

Table 13. Risk Characterization Summery – Carcinogens (Radionuclides) for the FBSB OU

Scenario Timeframe:	Future							
Receptor Population:	Industrial Worker							
Receptor Age:	Adult							
Medium	**Exposure Medium**	**Exposure Route**	**Constituent of Concern**		**Carcinogenic Risk**			
				Ingestion	**Inhalation**	**Dermal**	**External (Radiation)**	**Exposure Routes Total**
Surface Soil	SurfaceSoil (FBSB)	Soil Onsite-Direct Contact	Cesium-137	3.24E-07	1.69E-11		3.13E-04	3.13E-04
			Cobalt-60	2.28E-08	7.17E-12		1.72E-04	1.72E.04
							Soil Risk Total=	**4.85E-04**

Key
--: Toxicity criteria are not available to quantitatively address this route of exposure.

Table 14. Risk Characterization Summary – Carcinogens (Radionuclides) for the FBSB OU

Scenario Timeframe:	Future							
Receptor Population:	Industrial Worker							
Receptor Age:	Adult							
Medium	**Exposure Medium**	**Exposure Route**	**Constituent of Concern**		**Carcinogenic Risk**			
				Ingestion	**Inhalation**	**Dermal**	**External (Radiation)**	**Exposure Routes Total**
Surface Soil	SurfaceSoil (Tank/Process Sewer Line Area)	Soil Onsite-Direct Contact	Cesium-137	2.62E-09	1.37E-13	--	2.53E-06	2.53E-06
			Cobalt-60	2.79E-10	8.79E-14	--	2.11E-06	2.11E-06
							Soil Risk Total=	**4.64E-06**

Key

--: Toxicity criteria are not available to quantitatively address this route of exposure.

Table 15. Risk Characterization Summary – Carcinogens (Radionuclides) for the FBSB OU

Scenario Timeframe:	Future							
Receptor Population:	Industrial Worker							
Receptor Age:	Adult							
Medium	**Exposure Medium**	**Exposure Route**	**Constituent of Concern**	**Carcinogenic Risk**				
				Ingestion	**Inhalation**	**Dermal**	**External (Radiation)**	**Exposure Routes Total**
Subsurface Soil	SurfaceSoil (Tank/Process Sewer Line Area)	Soil Onsite-Direct Contact	Cesium-137	2.35E-09	1.23E-13	--	2.27E-06	2.27E-06
			Cobalt-60	1.48E-10	4.64E-14	--	1.11E-06	1.11E-06
							Soil Risk Total=	**3.38E-06**

Key

--: Toxicity criteria are not available to quantitatively address this route of exposure.

health and environmental problems that could result from the current physical and waste characteristics of the FBSB OU.

Seepage Basin Area

The results of the assessment indicate that aroclor-1254, cesium-137, cobalt-60, and europium-154 are present in the surface soil (0 to 0.3 m [0 to 1 ft bls]) within the Seepage Basin Area. Cesium-137, cobalt-60, and europium-154 pose human health risks (greater than 1 x 10-6) to future industrial workers exposed to surface soil. Aroclor-1254 represents an ecological risk to insectivorous mammals, represented by the shrew. Arsenic, cesium-137, cobalt-60 and europium-154 are present in the subsurface soil (0.3 to 1.2 m [1 to 4 ft bls]) beneath the Seepage Basin Area and present human health risks (greater than 1 x 10-6) to future industrial workers exposed to subsurface soil.

PTSM is not present at the Seepage Basin Area.

Tables 8 and 9 summarize the refined COCs associated with the Seepage Basin Area and include their maximum detected concentrations, detection frequencies, exposure point concentrations and maximum exposures at 95% upper confidence level (UCL). Tables 10 and 11 summarize the cancer and non- cancer toxicity data associated with the Seepage Basin Area soils.

Tables 12 through 16 summarize the risks associated with the Seepage basin Area COCs for the industrial worker. See Figures 11, 12, and 13 for the extent of contamination in the soils at the Seepage Basin Area.

Table 16. Risk Characterization Summary - Carcinogen (Nonradionuclides) for the FBSB OU

Scenario Timeframe: Future
Receptor Population: Industrial Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Route	Constituent of Concern	Carcinogenic Risk			
				Ingestion	Inhalation	Dermal	Exposure Routes Total
Subsurface Soil	Surface Soil (FBSB)	Soil Onsite-Direct Contact	Arsenic	1.53E-06	1.33E-09	1.22E-07	1.65E-06

Soil Risk Total= 1.65E-06

Key
--: Toxicity criteria are not available to quantitatively address this route of exposure.

Tank/Process Sewer Line Area

Cesium-137 and cobalt-60 remained in the soil after the removal of the Retention Tank, Pumping Station, and Process Sewer Line. However, the results of the soil sampling and analyses reveal that these contaminants are present only at the tank removal area portion of the Tank/Process Sewer Line Area and pose human health risks to future industrial workers exposed to surface and subsurface soils. However, no PTSM is present at the Tank/Process Sewer Line Area.

Tables 8 and 9 summarize the refined COCs associated with the Tank/Process Sewer Line Area and includes their maximum detected concentrations, detection frequencies, exposure point concentrations and maximum exposures at 95% UCL.

Tables 10 and 11 summarize the cancer and non-cancer toxicity data associated with the

Tank/Process Sewer Line Area soils.

Tables 12 through 16 summarize the risks associated with the Tank/Process Sewer Line Area COCs for the industrial worker. See Figures 14 and 15 for the extent of contamination in soils at the Tank/Process sewer Line Area.

Containerized Soil

Approximately 2.1 m3 (2.8 yd3) of soil that originated during remediation of the Tank/Process Sewer Line Area is containerized at the FBSB OU in two B-12 containers and in one 55-gallon drum. The containerized soil exceeds the background radiological levels as measured with a hand- held meter. The soils were likely contaminated by liquid concentrate below a vent line associated with the retention tank. Sample results indicate that radiological constituents as well as PCBs are present in the containerized soils. The total PCB concentration level is approximately 1.5 mg/kg (ppm), which is less than the USEPA recommended 10 to 25 ppm concentration for industrial land use. The radiological (cesium-137) and chemical contaminants (PCBs) are similar to the maximum concentration observed in the seepage basin and would place the containerized soil in the 1 x 10-4 risk range.

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 weight-of-evidence approach. Based on the analytical data pertaining to the FBSB OU, aroclor-1254 is the only refined COC present at the seepage basin that may pose ecological risk to insectivorous mammals (shrew). See Table 17 for ecological Risks and the RG for aroclor-1254.

Summary of Contaminant Migration

The results of the contaminant migration conceptual models as shown in Figures 16 and 17 reveal that concentrations of constituents detected in the FBSB OU soils will not exceed their MCLs within the 1,000-year modeling period; hence, there are no CMCOCs associated with FBSB OU. The FBSB OU soils do not pose a migration threat to groundwater.

Principal Threat Source Material

No PTSM is associated with FBSB OU.

Conclusion

The risk assessments and contaminant fate and transport analysis conclude that no PTSM exists at the FBSB OU. However, the soils associated with two of the five FBSB OU subunits, namely the Seepage Basin Area and the Tank/Process Sewer Line Area, may pose risks to human health and the environment. Hence, actual or threatened releases of hazardous substances from this site, if not addressed by implementing the response action selected in the ROD, may present a current or potential threat to public health, welfare, or the environment.

VIII. REMEDIAL ACTION OBJECTIVES AND REMEDIAL GOALS

The RFI/RI/BRA report (WSRC 2000) has concluded that only one medium of concern, soil, needs remedial action. The soil medium of concern is located in the Seepage Basin Area (surface and subsurface) and Tank/Process Sewer Line Area (limited to a 4-foot depth). Therefore, the remedial action objectives (RAOs) were established for soils associated with Seepage Basin Area and Tank/Process Sewer Line Area subunits.

Table 17. Summary of Refined COCs that Exceeded Remedial Goals (RGs) and RGs Associated with Contaminated Media at FBSB OU

Impacted Media/ Type of COC	Refined COCs	Risks/Hazards (All Pathways)	Remedial Goals[(a)]	Scenario/Route	Unit Specific Average Background
FBSB Basin Soils					
Surface Soils/Eco	Aroclor-1254	Eco HQ = 74.6[(b)] (Direct Contact)[(d)]	0.0219 mg/kg [(c)]	Ecological Insectivorous Mammal (shrew)	Not detected
Surface Soils/HH_{ind} Subsurface Soils/HH_{ind}	Cesium-137	Risk = 3.13×10^{-4} (External Radiation = 3.13×10^{-4})	0.105 pCi/g*	On-Unit Industrial Worker (External)	0.0478 pCi/g
Surface Soils/HH_{ind} Subsurface Soils/HH_{ind}	Cobalt-60	Risk = 1.72×10^{4} (External Radiation = 1.72×10^{-4})	0.0224 pCi/g*	On-Unit Industrial Worker (External)	Not detected
Surface Soils/HH_{ind} Subsurface Soils/HH_{ind}	Europium-154	Risk = 1.01×10^{-6} (External Radiation = 1.01×10^{-6})	0.0473 pCi/g*	On-Unit Industrial Worker (External)	Not detected
Subsurface Soils/HH_{ind}	Arsenic	Risk= 1.60×10^{-6} (Ingestion = 1.53×10^{-6})	3.53 mg/kg**	On-Unit Industrial Worker (Ingestion)	2.35 mg/kg
Total Risks/Hazards: HQ = 74.6; Risk = 4.88×10^{-4}					
Tank/Process Sewer Line Soils					
Surface Soils/HH_{ind} Subsurface Soils/HH_{ind}	Cesium-137	Risk = 2.53×10^{-6} (External Radiation = 2.53×10^{-6})	0.105 pCi/g*	On-Unit Industrial Worker (External)	0.0478 pCi/g
Surface Soils/HH_{ind} Subsurface Soils/HH_{ind}	Cobalt-60	Risk= 2.11×10^{-6} (External Radiation = 2.11×10^{-6})	0.0224 pCi/g*	On-Unit Industrial Worker (External)	Not detected
Total Risks/Hazards: Risk = 4.64×10^{-6}					

HH_{ind} = Human health COC for the future industrial worker
Eco = Ecological
(a) The Remedial Goal was determined using the most restrictive RGO. Most restrictive RGO is set to the lowest of the ARARs, contaminant migration (CM), HH (industrial worker based on 1.0E^{-6}), and Eco RGOs. However, if the lowest RGO is less than the average background value, the RGO is set at the average background.
(b) Most conservative hazard quotient (HQ) based on operable unit maximum concentration.
(c) Average background is from a 0 to 4-ft depth soil interval.
(d) Major risk contributor

Basis for Risk and RGO Values — RGOs are based on the most conservative surface or subsurface soil risk value as follows:
* Risk and RGO are presented for the industrial worker, surface soil exposure.
** Risk and RGO are presented for the industrial worker, subsurface soil exposure.

Based on the RFI/RI/BRA, the following RAOs have been established for the FBSB OU:

- Protect future industrial workers at the Seepage Basin Area from exposure to three defined COCs (cesium-137, cobalt-60, and europium-154) that exceed RGOs in surface soils 0 to 0.3 m (0 to 1 ft) deep and four refined COCs (arsenic, cesium-137, cobalt-60, and europium-154 that exceed RGOs in subsurface soils 0.3 m to 12 m (1 to 4 ft) deep (see Table 17 for RGOs).

- Protect current terrestrial ecological receptors (insectivorous mammals) at the Seepage Basin Area from exposure to the sole ecological COC, aroclor-1254, at levels above the RGO of 0.0219 mg/kg (see Table 17).

- Protect future industrial workers at the Tank/Process Sewer Line Area from exposure to cesium-137 and cobalt-60 that exceed RGOs in surface and subsurface soils (see Table 17).

The RGs for all the refined COCs included in Table 14 are based on ARARs, human health (industrial worker risk level of 1 x 10-6), and ecological risk analysis. The lowest value of each unit-specific RG was selected for each specific refined COC and compared to its unit-specific average background value. If the lowest unit-specific RG value from ARARs, or from human health or ecological risk analysis was less than the unit-specific average background value, only then was the RG value set to the unit-specific average background value. For the FBSB OU, all RGs established exceed their specific refined-COC background values (see Table 17).

IX. DESCRIPTION OF ALTERNATIVES

To satisfy the RAOs, various treatment processes and technologies that can be used to remediate the contaminated soils associated with the FBSB OU were considered and evaluated. After screening, the treatment processes and technologies considered most suitable were combined to develop alternatives. Four alternatives, including No Action, were developed. A detailed analysis was conducted to determine the most appropriate alternative for the FBSB OU. For additional information regarding the development and evaluation of alternatives, their estimated costs, and their detailed evaluation, refer to the SB/PP for the Ford Building Seepage Basin (FBSB) (904-91G) Operable Unit (U) (WSRC 2001). The costs were estimated using 7% interest rate and 30-year time period. For 5-year CERCLA ROD reviews, the 30-year time period was used for cost estimating purposes only. There is no time limit on the requirement to provide 5- year ROD reviews.

The four alternatives developed and evaluated are briefly described below.

Alternative 1- No Action

- Total estimated cost: $105,000 (the estimated costs are present worth costs).

- Construction time to complete: N/A

This alternative entails the following actions:

- Leave the Seepage Basin Area soils and Tank/Process Sewer Line Area soils in the current condition with no additional controls

- Disposition the containerized soil in accordance with SRS hazardous and radioactive waste management procedures

- Perform five-year CERCLA ROD reviews

Table 18. Chemical-, Action-, Location-Specific ARARs – FBSB OU

Citation(s)	Status	Requirement Summary	Reason for Inclusion	Alternative
Chemical				
40 CFR 761, (TSCA) /EPA Directive 9355.4-01 FS, August 1990	Relevant and Appropriate	Identifies cleanup levels and disposal requirements for cleaning, decontaminating, or removing PCB remediation waste.	EPA directive identifies 10-25 ppm PCB as the cleaning levels for industrial areas.	1,2
40 CFR 761, (TSCA)	Applicable	Notification requirements for shipping bulk PCB remediation waste	§761.61(a)(5)(I)(B)(iv)	3, 4
40 CFR 261 and SC R 61-79.261. Identification and Listing of RCRA Hazardous	Applicable	Defines criteria for determining whether a waste is RCRA hazardous waste.	Any waste media that are actively managed or shipped offsite must be tested to determine if they are RCRA characteristic wastes. Discarded pesticides and chemicals are RCRA listed hazardous wastes.	3, 4
40 CFR 263 SC R.61 - 79.263 Standards Applicable to Transporters of Hazardous Waste	Applicable	Identifies transporter requirements including manifests, record keeping, and actions for accidental waste discharges.	Applicable to offsite transportation of RCRA hazardous waste.	3, 4
40 CFR 264 Standards for Owners and Operators of Hazardous Waste TSDs	Applicable	General performance standards for Treatment, Storage and Disposal facilities.	Applicable to contaminated soil treated offsite.	3, 4
40 CFR 268 Land Disposal Restrictions (LDRs) (RCRA)	Applicable	Prohibits land disposal and specifies treatment standards for specific RCRA hazardous wastes.	Movement of excavated materials from their original location triggers the RCRA LDRs. Pesticides and solvents are RCRA listed waste.	3,4
Action				
40 CFR 50.6	Applicable	The concentration of particulate matter (PM_{10}) in ambient air shall not exceed 50 ug/m^3(annual arithmetic mean) or 150 ug/m^3 (24-hour average concentration	Earth-moving activities will generate airborne dust that will have the potential to exceed the levels specified. Dust suppression will likely be required to minimum dust emissions.	2,3,4
40 CFR 107,171-179 DOT Hazardous Materials Transportation Regulations	Applicable	Specifies requirements for handling, packaging, labeling, and transporting wastes containing DOT hazardous substance.	Applicable to contaminated soil or investigation-derived wastes shipped offsite.	2,3,4
40 CPR 165 (FIFRA) Disposal of pesticides	Applicable	Identifies acceptable and unacceptable methods of disposal for organic and inorganic pesticides.	Incineration is recommended for organic pesticides except those that contain mercury, lead, cadmium, and arsenic.	3,4
SC R.61-9 NPDES Permits	Applicable	Requires notification of intent to discharge storm water from construction associated with industrial activity that will result in a land disturbance of 5 acres or more and/or industrial activities and sets the requirements for the control of storm water discharges.	Potentially applicable if stormwater is discharged during construction activities.	2,3,4

Table 18. Chemical-, Action-, Location-Specific ARARS – FBSB OU (Cont'd)

Citation(s)	Status	Requirement Summary	Reason for Inclusion	Alternative
SC R 621.62.6, Section III	Applicable	Particulate matter must be controlled in such a manner and to the degree that it does not create an undesirable level of air pollution.	Earth-moving activities have the potential to generate airborne particulate matter.	2,3,4
DOE Order 5820.2A, Chapter III	TBC	Low-level radioactive waste must be managed in a manner that protects public health and safety, assures that external exposure to the waste does not exceed 25 mrem/yr to any member of the public, and protects groundwater resources.	Contaminated soil generated during this remedial action will likely be considered low-level radioactive waste.	2,3,4
SC R.72-300 Standards for Stormwater Management and Sediment Reduction disturbing activities.	Applicable	Stormwater management and sediment control plan for land disturbances	Excavation activities will require an erosion control plan.	2,3,4
29 CFR 1910 Occupational Worker Safety (OSHA)	Applicable	Identifies health and safety requirements for remediation workers.	Worker activities involving hazardous materials must be conducted according to a project health and safety plan.	2,3,4
Location				
16 USC 1531	Applicable	The remedical action must be conducted in a manner to conserve endangered or threatened species.	There are threatened and endangered species at the SRS; however, this action will not affect these species.	2,3,4
16 USC 661	Applicable	The remedial action must be conducted in a manner to protect fish or wildlife.	This remedial action has no potential to affect wildlife in the vicinity of the FBSB OU. The action will not affect fish located at the SRS or in nearby bodies of water.	2,3,4
16 USC 703	Applicable	The remedial action must be conducted in a manner that minimizes impacts to migratory birds and their habitats.	Migratory bird populations may be present in the vicinity of the SRS. However, this action will not impact the migratory birds and their habitats.	2,3,4
Executive Order 11990	Applicable	The remedial action must minimize the destruction, loss, or degredation of wetlands.	Wetlands are located in the vicinity of the SRS; however, they will be unaffected by this action.	2,3,4

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.

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

The salient features of the No Action alternative are as follows:

- This alternative would not be protective of human health and the environment.

- There is no reduction of risk except due to natural attenuation and this alternative would not eliminate future routes for human exposure.

- Institutional controls are not included in this alternative; however, this alternative includes five-year ROD reviews.

- There are no operating and maintenance (O&M) activities involved in this alternative.

- This alternative will not comply with ARARs. The key relevant and appropriate ARAR associated with this alternative is the cleanup level and disposal requirements for PCB. USEPA identified 10 to 25 ppm PCB in soil as the cleanup levels for industrial areas. For more discussion of ARARs, refer to Table 18.

- This alternative is the least effective in the long term.

- This alternative does not result in reduction of toxicity, mobility, or volume of waste.

The expected outcome of this alternative if this alternative alone were selected:

- This alternative will not reduce the risk to human health and the environment from direct exposure to external radiation and also will not eliminate ecological risk to insectivorous mammals.

- The site will not be available for the intended industrial land use for over 100 years.

- The groundwater at FBSB OU is not contaminated; its use is not restricted.

Alternative 2 – Excavate, Disposition, Backfill, Vegetative Cover, and Institutional Controls

- Total estimated cost: $508,000

- Construction time to complete: six months

This alternative entails the following actions:

- Excavate the contaminated soil exceeding 1 x 10-6 risk from the Tank/Process Sewer Line Area (approximately 179m 3 [237 yd3])

- Disposition the soil into the seepage basin along with the vegetation existing in the basin

- Remove the containerized soil from the two B-12 boxes and one 55-gallon drum (approximately 2.1 m3 [2.8 yd3]) and disposition the waste into the seepage basin

- Backfill the remaining volume of the seepage basin (approximately 504 m3 [667 yd3]) and the excavated area of the Tank/Process Line Area with clean soil

- Grade the clean soil to match the surrounding topography and then cover the backfilled areas with vegetative cover to minimize erosion

Additionally, institutional controls, per Section 3.2 of the LUCAP will be implemented, warning signs, and five-year CERCLA ROD reviews are included in this alternative.

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

The common elements of this alternative, as compared to alternatives 3 and 4, include the following:

- This alternative will be protective of human health and the environment.

- This alternative will reduce risk and will eliminate future routes for human exposure.

- This alternative will comply with ARARs. The key chemical-specific ARAR associated with this alternative is the cleanup levels for PCB (10 to 25 ppm) in soil for industrial areas. The key action-specific ARARs are related to the generation of airborne dust (particulate matter), transportation of hazardous waste, and stormwater discharge and sediment control requirements during construction activities. The key location-specific ARARs associated with this alternative include protection of threatened and endangered species, protection of fish and wildlife, and minimization of impact on migratory birds and their habitats and wetlands. For an additional discussion of ARARs, refer to Table 18.

- This alternative is effective in the long term with land-use restrictions.

- Since no treatment is involved, the alternative will not result in reduction of toxicity, mobility or volume of waste.

The distinguishing features of this alternative include the following:

- This alternative includes institutional controls and five-year ROD reviews.

- This alternative includes O&M costs.

Expected outcome of this alternative if this alternative alone were selected:

- This alternative will eliminate the risk to human health and the environment from direct exposure to external radiation and eliminate ecological risk to insectivorous mammals.

- The site is expected to be available for industrial land use after six months.

- The groundwater at FBSB is not contaminated; its use is not restricted.

Alternative 3 – Removal, including Tank/Process Sewer Line Area, Offsite Disposal (Off-SRS Disposal), Backfill, and Vegetative Cover

- Total estimated cost: $1,540,000
- Construction time: 6 months

This alternative entails the following actions:

- Remove the contaminated soils from the Seepage Basin Area (exceeding 1 x 10-6 risk) (approximately 1,274 m3 [1,685 yd3]) and Tank/Process Sewer Line Area (exceeding 1 x 10-6 risk) (approximately 179 m3 [237 yd3])
- Transport the contaminated soil, properly packed, to an offsite disposal facility (such as Envirocare)
- Backfill the seepage basin and the excavated area of the Tank/Process Sewer Line Area with clean soil
- Grade the backfilled areas to match the surrounding topography
- Construct vegetative covers over the backfilled areas to minimize erosion

Additionally, the containerized soil will be removed from the FBSB OU and dispositioned with the contaminated soil excavated from the Seepage Basin Area and the Tank/Process Sewer Line Area.

Because this remedy will <u>not</u> result in hazardous substances, pollutants, or contaminants remaining onsite above levels that allow for unlimited intended use and unrestricted exposure, institutional controls including five-year CERCLA ROD reviews are not included in this alternative.

The common elements of this alternative, as compared to alternatives 2 and 4, include the following:

- This alternative will be protective of human health and the environment.
- This alternative will reduce the risk and will eliminate future routes for human exposure.
- This alternative will comply with ARARs. The key chemical-specific ARARs associated with this alternative are related to handling, transporting, and disposing of RCRA hazardous waste. The key action-specific ARARs are the same as for alternative 2 and are related to the generation of airborne dust (particulate matter), transportation of hazardous waste, and stormwater discharge and sediment control requirements during construction activities. The key location-specific ARARs associated with this alternative are also same as for alternative 2 and include protection of threatened and endangered species, protection of fish and wildlife, and minimization of impact on migratory birds and their habitats and wetlands. For an additional discussion of ARARs, refer to Table 18.
- Since no treatment is involved, this alternative will not directly reduce toxicity, mobility, and volume of waste. However, in this alternative contaminated soil is removed from the site for off-unit/offsite disposal, indirectly reducing toxicity, mobility, and volume of waste.

The distinguishing features of this alternative include the following:

- This alternative offers the most long-term effectiveness without land-use restrictions and is a permanent solution.
- This alternative lessens the footprints of the contaminated areas.
- This alternative does not include institutional controls and five-year ROD reviews.
- This alternative has no O&M costs.

The expected outcome of this alternative if this alternative alone were selected:

- This alternative will eliminate the risk to human health and the environment from direct exposure to external radiation and eliminate ecological risk to insectivorous mammals.
- The site is expected to be available for industrial land use in six months.
- The groundwater at FBSB OU is not contaminated; its use is not restricted.

Alternative 4 - Removal, Offsite Disposal (Off-SRS Disposal), Excavate, Backfill, Vegetative Cover, and Institutional Controls

- Total estimated cost: $632,000
- Construction time to complete: Three months

This alternative is similar to alternative 3 discussed above except that only the soil exceeding 1 x 10-4 risk will be removed from the seepage basin (approximately 57 m3 [75 yd3]) and transported to an offsite disposal facility (such as Envirocare) along with the containerized soil. The contaminated soil in the Tank/Process Sewer Line Area will be excavated and dispositioned in the seepage basin. The remaining volume of the seepage basin and the excavated area of the Tank/Process Sewer Line Area will be backfilled with clean soil and graded to match the surrounding topography. A vegetative cover will be provided over the backfilled areas to minimize erosion. However, institutional controls, per Section 3.2 of the LUCAP will be implemented, including five-year ROD reviews (included in alternative 2) are also included in this alternative.

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

Since alternative 4 is similar to alternative 3 (both require excavating the contaminated soil and offsite disposal, only the amount of soil in alternative 4 is less than in alternative 3), a separate comparison of common elements and features or ARARs is unnecessary.

The expected outcome of the alternative if this alternative alone were selected:

- This alternative will reduce the risk to human health from direct exposure to external radiation to the 1 x 10-4 level. However, ecological risk to insectivorous mammals will be eliminated.
- The site is expected to be available for industrial land use in three months.
- The groundwater at FBSB OU is not contaminated; its use is not restricted.

X. COMPARATIVE ANALYSIS OF ALTERNATIVES

The four alternatives have been evaluated against the nine CERCLA evaluation criteria which provide the basis for evaluating the alternatives and selecting a remedy. The nine criteria are listed below:

- Threshold criteria:
  - Overall protection of human health and the environment
  - Compliance with ARARs
- Balancing criteria:
  - Long-term effectiveness and permanence
  - Reduction of toxicity, mobility, or volume through treatment
  - Short-term effectiveness
  - Implementability
  - Cost
- **Modifying criteria**:
  - State acceptance
  - Community acceptance

Table 19 provides a summary of this evaluation. The results of the evaluation are briefly discussed below.

Overall Protection of Human Health and the Environment: All alternatives are protective except alternative 1, No Action.

Compliance with ARARs: All alternatives meet the ecological ARAR (aroclor-1254) except alternative 1, No Action. For alternative 2, the disposal of the containerized waste into the seepage basin complies with the USEPA guidance/ regulations for PCBs. For ARARs, see Table 18.

Arsenic was identified as a human health COC for the subsurface soils (1 to 4 ft depth interval) at the FBSB based on the concentrations detected in the sludge samples collected within the basin. Arsenic was detected in 16 of 22 soil/sludge samples in concentrations ranging from 0.97 to 23.8 mg/kg and exceeded the maximum SRS background concentration (6.90 mg/kg) in only two samples (detected concentrations of 20.8 and 23.8 mg/kg) both being sludge samples collected within the area to be remediated. It is important to recognize that arsenic concentrations within the sludge are less than 20 times the Toxicity Characteristic Leaching Procedure (TCLP) limits, indicating that arsenic concentrations would not cause the basin soils to be characteristically hazardous. The original waste stream was not hazardous waste.

The Land Disposal Restrictions (LDRs) would not apply to the FBSB OU since the sludge is not being removed from the basin. It was not originally a hazardous waste and current analysis indicates it would not fail TCLP. Only the soil within the area of contamination, (the Tank/ Process Sewer Line Area; this soil does not contain arsenic) is being excavated and disposed into the basin.

Table 19. Alternatives Evaluation Summary

	CERCLA Evaluation Criteria[a]						
Alternative[b]	Overall Protection of Human Health and the Environment	Compliance with ARARs[c]	Long-term Effectiveness and Performance	Reduction of Toxicity, Mobility, or Volume through Treatment	Short-term Effectiveness	Implementability	Cost
1. No Action	Not Protective	Does not comply with ARARs	Least Effective	No	Most Effective	Not Applicable	$105K
2. Excavation, Backfilling, Vegetative Cover and Institutional Controls	Protective	Complies with ARARs	Effective with Land Use Restrictions	No Treatment; Same as Alternatives 3 and 4	Effective, Least Personnel Exposure	Readily Implementable	$508K
3. Removal Including Tank/Process Sewer Line Area. Offsite Disposal (Non-Disposal), Backfilling, and Vegetative Cover (Risk 1 x 10^{-6} soils)	Protective	Complies with ARARs	Most Effective with Land Use Restrictions	No Treatment; Same as Alternatives 2 and 4 (Indirectly reduces)	Effective, Most Personnel Exposure	Most Difficult, Entails Transportation by Railroad	$1,540K
4. Removal, Offsite Disposal (Non-SRS Disposal), Excavation, Backfilling, Vegetation Cover, and Institutional Controls (Risk 1 x 10^{-4} soils)	Protective	Complies with ARARs	Effective with Land Use Restrictions	No Treatment; Same as Alternative 2 and 3 (Indirectly reduces)	Effective, Personnel Exposure Between Alternative 2 and 3	Like Alternative 3, Entails Transportation by Railroad	$632K

(a) Approval of the SB/PP by SCDHEC is considered as State acceptance of the preferred alternative. The community acceptance of the preferred alternative is assessed by giving the public an opportunity to comment on the SB/PP. The public comments are incorporated in the Responsiveness Summary of the ROD.

(b) All alternatives (including No Action) including disposition of 2.1 m^3 (2.8yd^3) of containerized soil. Alternative 2, 3, and 4 include vegetative covers; and alternatives 2 and 4 include institutional controls.

(c) Only one eclolgical-ARAR is associated with FBSB OU

Long-term Effectiveness and Permanence: Alternative 3 offers the most long-term effectiveness without land use restrictions and is a permanent solution. alternatives 2 and 4 are effective with land use restrictions. Alternative 1 (No Action) is the least effective.

Reduction of Toxicity, Mobility, or Volume: Alternatives 2, 3, and 4 are the same in not reducing toxicity, mobility, and volume; however, in alternatives 3 and 4 the contaminated soil is removed from the unit for off- unit/ offsite disposal, indirectly reducing toxicity, mobility, and volume. In alternative 1, no treatment is involved; therefore the alternative does not affect toxicity, mobility, or volume.

Short-term Effectiveness: Alternative 1, No Action, offers the most short-term effectiveness since it does not involve any remedial activities, and no additional risks are posed to the remedial workers or to the environment or to the community. Among alternatives 2, 3, and 4, alternative 2 provides the greatest short-term protection while alternative 3 provides the least. The short-term effectiveness for alternative 4 is between alternatives 2 and 3.

Implementability: Alternative 1 does not involve any action; therefore, implementability is not applicable. Alternative 3 is the most difficult to implement since it entails transportation by railroad. Alternative 2 can be readily implemented since it does not entail any type of transportation. Alternative 4 also entails transportation by railroad and therefore is difficult to implement.

Cost: The No Action alternative ($105,000) is the least expensive of all the alternatives, followed by alternative 2 ($ 508,000) and alternative 4 ($632,000). Alternative 3 ($1,540,000) is the most expensive alternative.

State Acceptance: The approval of the SB/PP by SCDHEC constitutes acceptance of the preferred alternative by the state regulatory agency.

Community Acceptance: The SB/PP provides for community involvement through a document review process and a public comment period. Public input is documented in the Responsiveness Summary section of this ROD.

XI. THE SELECTED REMEDY

Detailed Description of the Selected Remedy

Based upon the characterization data and risk evaluations contained in the RFI/RI/BRA report (WSRC 2000), RAOs, and the detailed evaluation of the alternatives, the selected remedy for the FBSB OU is alternative 2. This alternative will entail excavating the contaminated soil at the Tank/Process Sewer Line Area and dispositioning the excavated soil into the seepage basin along with the vegetation existing in the basin; removing the containerized soil and dispositioning the soil into the seepage basin; backfilling the remaining volume of the seepage basin and excavated area of the Tank/Process Sewer Line Area with clean soil from an SRS borrow pit; covering the backfilled areas with vegetative covers; and implementing institutional controls including five-year CERCLA ROD reviews.

Backfilling the seepage basin with the containerized and contaminated soil removed from the Tank/Process Sewer Line Area and clean soil from a borrow pit will address the first and second RAOs (i.e., protect future industrial workers from exposure to refined COCs associated with Seepage Basin Area soils, and protect current terrestrial ecological receptors from direct contact with aroclor-1254). The excavation/removal of contaminated soils from the Tank/ Process Sewer Line Area will address RAO #3 (i.e., protect future industrial workers from exposure to refined COCs associated with Tank/Process Sewer Line Area soils). This alternative will also take care of the containerized soil present at the FBSB OU.

Alternative 2 is preferred since it would be readily implementable, would provide no short-term risks, and would cost significantly less than alternative 3, but provide similar long-term effectiveness. Alternative 4 is comparable in cost but much more difficult to implement.

The selected remedy will be the final action for the FBSB OU; however, the remedy may change as a result of the remedial design or construction processes. Changes to the remedy described in the ROD will be documented in the Administrative Record utilizing a memo, an Explanation of Significant Difference, or ROD Amendment.

Cost Estimate for the Selected Remedy

The costs associated with the selected remedial action include labor and materials needed to excavate (contaminated) soil from the Tank Removal Area and haul, spread and compact the soil in the seepage basin. The cost for excavating the soil will be approximately $3,600 assuming that a total of 240 yd3 of soil will be excavated at the rate of $15 per yd3. Assume that the cost for transporting the contaminated soil will be approximately $50 per yd 3 and the cost for disposal will be approximately $33 per yd3. The combined cost for transporting and disposing the contaminated soil in the seepage basin will be approximately $38,000. The cost for backfilling the remaining volume of the seepage basin with clean soil has been estimated as approximately $40,000. This cost includes hauling the soil from a borrow pit located at SRS. The cost for backfilling the tank removal area has been estimated at approximately $20,000. The total cost for the disposition of containerized soil into the basin for its disposal is estimated at approximately $20,000. These costs also include costs for characterization and recording. The total cost for the remedial action is estimated at approximately $112,000.

Prior to the start of the remedial action, temporary facilities will be required including decontamination pad, erosion controls, silt fence along the basin perimeter, and drainage trenches to divert the drainage flow away from the basin. Some miscellaneous costs, including mobilization/demobilization, surveying the site for constructing the temporary facilities, basin dewatering, etc. will also be involved. These costs are estimated at approximately $180,000.

Dust suppression will be provided across the work site to inhibit airborne contamination. Following backfilling, a layer of topsoil (0.5 ft) will be installed at a cost of approximately $20,000. Site restoration activities include fine grading, grass seeding, and placement of straw mulch. Post construction activities would include a topographical survey of the site and a safety inspection. The costs for these activities are included in the total direct capital costs. The total direct capital costs are estimated at approximately $360,000. The total indirect capital costs are estimated at approximately $32,000.

After the construction activities have been completed, the total costs for the annual inspection and maintenance of the site over 30 years is expected to be$ 61,000. The cost for CERCLA ROD review every 5 years over the 30-year period is expected to be $55,000.

Estimated costs associated with the selected remedy are summarized below:

- Total Capital Costs = $392,000
- Total O&M Costs = $116,000
- Total Present Worth Costs = $508,000

For a detailed estimate, refer to Appendix A of this document.

The total present worth costs are calculated using a 7% discount rate over a 30-year timeframe. The 30-year time frame was selected for cost estimating purposes only. There is no time limit on the requirement to provide 5-year ROD reviews.

Expected Outcome of Selected Remedy

The results of the BRA summarized in the RFI/RI/BRA report (WSRC 2000) indicate that the existing conditions at the FBSB OU pose an excess lifetime cancer risk of 5 x 10-4 from direct exposure to external radiation emitted by refined COCs (cesium-137, cobalt-60, and europium-154) present in the soil at the Seepage Basin Area and a risk of 5 x 10-6 from direct exposure to radiation emitted by cesium-137 and cobalt-60 at the Tank/Process Sewer Line Area (see Table 9). Additionally, aroclor-1254 present in the Seepage Basin Area soil poses an ecological risk (HQ >70) to insectivorous mammals (shrew) by direct contact, and arsenic poses a lifetime cancer risk of 1.6 x 10-6 by ingestion. When implemented the selected remedy will result in the following major outcomes:

- The selected remedy will eliminate the risk to human health and the environment from direct exposure to external radiation and eliminate ecological risk to insectivorous mammals.

- The site is expected to be available for industrial land use after six months as a result of the remedy.

- The groundwater at FBSB OU is not contaminated; its use is not restricted.

XII. STATUTORY DETERMINATION

Based on the RFI/RI/BRA for the FBSB OU, Rev. 1 report (WSRC 2000), the FBSB OU poses risks to human health and the environment. Therefore, alternative 2 has been identified as the preferred remedy for the FBSB OU.

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 action, and is cost-effective. However, because the treatment of the refined COCs associated with the FBSB OU soil was not found to be practicable, this remedy does not satisfy the statutory preference for treatment as a principal element.

Because this remedy will result in hazardous substances remaining onsite above levels that allow for unlimited use and unrestricted exposure, a 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.

Per the USEPA-Region IV Land Use Controls (LUCs) Policy, a LUC Assurance Plan (LUCAP) for SRS has been developed and approved by the regulators. In addition, a LUC Implementation Plan (LUCIP) for the FBSB OU will be developed and submitted to the regulators for their approval with the post-ROD documentation. The LUCIP will detail how SRS will implement, maintain, and monitor the land use control elements of the FBSB OU preferred alternative to ensure that the remedy remains protective of human health and the environment.

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 and/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 will be prepared, certified by a professional land surveyor, and recorded with the appropriate county recording agency. The FBSB OU is located in Barnwell County.

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. Comments that were received during the public comment period are addressed in the Responsiveness Summary included in Appendix B of this document.

XIV. RESPONSIVENESS SUMMARY

The Responsiveness Summary is provided in Appendix B of this document.

XV. POST-ROD DOCUMENTS SCHEDULE AND DESCRIPTION

A schedule for Post-ROD cleanup activities is provided in Figure 18. Post-ROD documentation is as follows:

- Corrective Measures Implementation/ Remedial Action Implementation Plan (CMI/RAIP) Rev. 0 for the FBSB OU will be developed and submitted for USEPA/SCDHEC review 198 calendar days after submittal of the signed ROD (09/19/01). SRS submittal of Rev. 0 CMI/RAIP, 04/05/02

- USEPA/SCDHEC review of Rev. 0 CMI/RAIP_90 days

- SRS revision of the CMI/RAIP will be completed 60 calendar days after receipt of all regulatory comments (09/05/02)

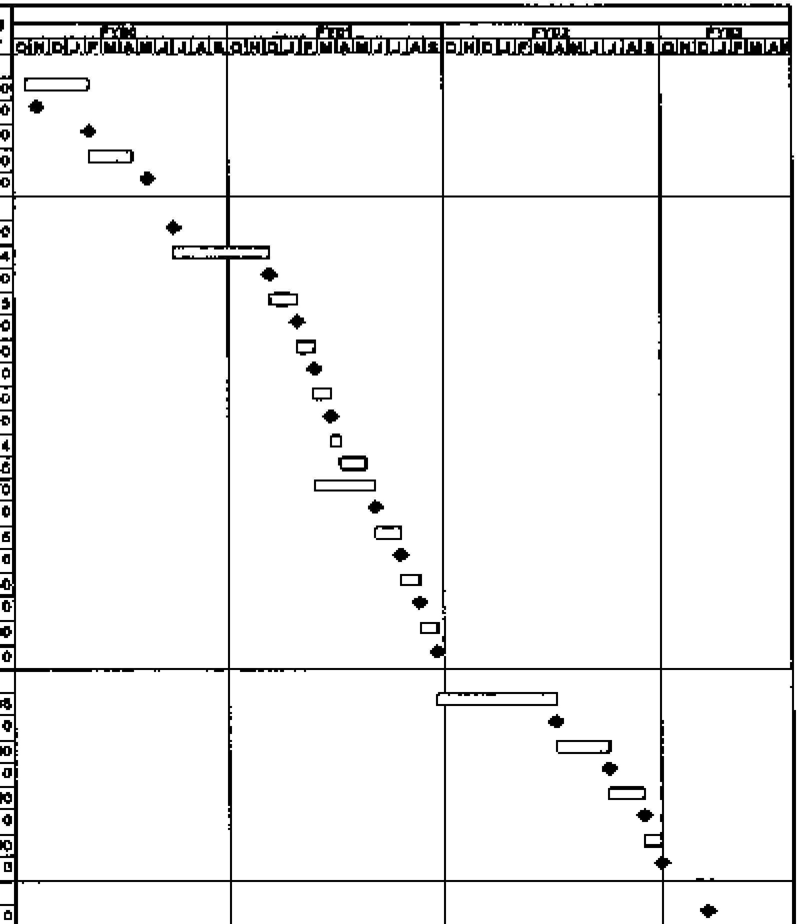
- USEPA/SCDHEC final review and approval of CMI/RAIP (10/02/02)

- Remedial Action start date_12/19/02

- Post-Construction Report (PCR), Rev. 0 will be submitted to USEPA/SCDHEC 90 days after completion of the remedial action and a joint walkdown by the regulators.

For more details, refer to Figure 18.

Activity ID	Activity Description	Early Start	Early Finish	Orig Dur
LCS 7 - RFI/RI/BRA REPORT				
ANP0400541	DEVELOP REV. 1 RFI/RI/BRA	22OCT99A	07FEB00A	110
ANP0400570	COMMENT RESOLUTION MEETING	10NOV99A		0
ANP0400600	SRS SUBMITTAL OF REV. 1 RFI/RI/BRA		07FEB00A	0
ANP0400580	EPA/SCDHEC REVIEW/APPROVAL RFI/RI/BRA	08FEB00A	20APR00A	50
ANP0400587	SRS SUBMITTAL OF REV. 1.1 RFI/RI/BRA		16MAY00A	0
LCS 14 - STATEMENT OF BASIS/PROPOSED PLAN & ROD				
ANP0400658	SB/PP SCOPING MTG.		28JUN00*	0
ANP0400659	SRS DEVELOP REV. 0 SB/PP	29JUN00	08DEC00	164
ANP040065U	SRS SUBMIT REV. 0 SB/PP TO REGULATORS		08DEC00	0
ANP040065Y	EPA/SCDHEC REVIEW SB/PP	08DEC00	22JAN01	45
ANP040065F	RECEIPT OF EPA/SCDHEC COMMENTS		22JAN01	0
ANP0400660	SRS INCORPORATE COMMENTS IN SB/PP	23JAN01	21FEB01	30
ANP0400680	SRS SUBMITTAL OF REV. 1 SB/PP		21FEB01	0
ANP0400900	EPA/SCDHEC FINAL REVIEW & APPROVAL OF SB/PP	21FEB01	22MAR01	30
ANP0400920	RECEIPT OF EPA/SCDHEC APPROVAL OF SB/PP		22MAR01	0
ANP0400940	NOTIFICATION OF PUBLIC COMMENT PERIOD	23MAR01	05APR01	14
ANP0400640	PUBLIC COMMENT PERIOD	06APR01	20MAY01	45
ANP0400970	SRS DEVELOP REV. 0 ROD	23FEB01	04JUN01	70
ANP0400960	SUBMIT REV. 0 ROD		04JUN01	0
ANP0401000	EPA/SCDHEC REVIEW REV. 0 ROD	05JUN01	19JUL01	45
ANP0401050	RECEIVE EPA/SCDHEC COMMENTS REV. 0 ROD		19JUL01	0
ANP0401010	SRS INCORPORATE EPA/SCDHEC COMMENTS ROD	20JUL01	20AUG01	30
ANP0401030	SRS SUBMIT REV.1 ROD		20AUG01	0
ANP0401040	EPA/SCDHEC FINAL REVIEW & APPROVAL	21AUG01	19SEP01	30
ANP0401020	SUBMIT FINAL SIGNED ROD		19SEP01	0
LCS 15 - DETAILED ENG & PRECONST ACTIVITIES				
ANP040150A	Develop Rev. 0 CM/RAIP (Post-Rod Document)	20SEP01	05APR02	198
ANP040150F	SRS submittal of Rev. 0 CM/RAIP		05APR02	0
ANP0401500	EPA/SCDHEC review of Rev. 0 CM/RAIP	06APR02	04JUL02	90
ANP040150J	EPA/SCDHEC returns Rev. 0 comments for CM/RAIP		04JUL02	0
ANP040150K	SRS incorporates EPA/SCDHEC comments CM/RAIP	05JUL02	02SEP02	60
ANP040150L	SRS submittal of Rev.1 CM/RAIP		02SEP02	0
ANP040150M	EPA/SCDHEC final review and approval of CM/RAIP	03SEP02	02OCT02	30
ANP040150N	Submit signed CM/RAIP to EPA/SCDHEC		02OCT02	0
LCS 16 - CONSTRUCTION				
ANP0401695	REMEDIAL ACTION (RA) START DATE	19DEC02		0



Start Date	01OCT92
Finish Date	30MAR04
Data Date	01SEP99
Run Date	29NOV00 09:04

Early Bar
Progress Bar
Critical Activity

1118 Sheet 1 of 1

Environmental Restoration
CA1118 FORD BUILDING SEEPAGE BASIN
RCRA/CERCLA Implementation Schedule

November 27, 2000

Date	Revision	Checked	Approved

Figure 18. FBSB Implementation Schedule

XVI. REFERENCES

USDOE (US Department of Energy) 1994. *Public Involvement, A Plan for the Savannah River Site*, Savannah River Operations Office, Aiken, SC

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USFS, 1998. *Threatened, Endangered, and Sensitive Species Survey and Evaluation of Ford Building Seepage Basin at the Savannah River Site*, Survey by Donald W. Imm and William Jarvis, United States Forest Service, Savannah River Institute

WSRC, 1991. *Phase II RCRA Facility Investigation Plan for the Ford Building Seepage Basin*, WSRC-RP-91-597, Rev. 0, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

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

WSRC, 1993b. *SRS Area Drainage Systems, OSR 3-179, Rev. 12-01-93*, Environmental Protection Department, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

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WSRC, 1998. *Final Technical Oversight for Environmental Services to Execute RFI/RI Work Plan for the Ford Building Seepage Basin (904-91-G)*, WSRC-RP-4182, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

WSRC, 2000. *RFI/RI with BRA for the Ford Building Seepage Basin (904-91G) Operable Unit (U)*, WSRC-RP-98-4096, Rev. 1, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

WSRC, 2001. *Statement of Basis/Propose Plan for the Ford Building Seepage Basin (FBSB) (904-91G) Operable Unit (U)*, WSRC-RP-2000-4120, Rev. 0, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

APPENDIX A

COST ESTIMATE FOR THE SELECTED REMEDY

A.0 COST ESTIMATES

A.1 Alternatives

For the FBSB OU remedial action, the following four alternatives were considered:

Alternative 1: No Action

Alternative 2: Excavate, Disposition, Backfill, Vegetative Cover, and Institutional Controls

Alternative 3: Removal (Soils Exceeding 1 x 10^{-6} Risk) Including Tank/Process Sewer Line Area, Offsite Disposal (Non-SRS Disposal), Backfill, and Vegetative Cover

Alternative 4: Removal (Soil Exceeding 1 x 10^{-4} Risk), Offsite Disposal (Non-SRS Disposal), Excavate, Backfill, Vegetative Cover, and Institutional Controls

In all four alternatives the dispositioning of approximately 75 ft^3 (2.1 m^3) of containerized soil is also included.

A.2 Calculations for Cost Estimation

• Basin Size	-80-ft long and 45-ft wide at the ground level
	-60-ft long and 25-ft wide at the floor level
	-Slope 1:1
	-Depth 10 ft
• Basin Boundary	-As marked by the orange markers balls, approximately 120-ft long and 80-ft wide.

- Total Capacity of the Basin $= [\frac{80\ ft + 60\ ft}{2}] \times [\frac{45\ ft + 25\ ft}{2}] \times 10\ ft$

  = 70 ft x 35 ft x 10 ft

  = 24,500 ft^3 or 907 yd^3

- Excavation at the basin (assuming 2 ft of the basin side will also be excavated)
  = 84 ft x 49 ft x (10 ft + 7 ft) - (70 ft x 35 ft x 10 ft)
  = 45,472 ft^3 = 1,685 yd^3

- Excavation at the Tank Removal Area
  (assuming the area size is 40 ft x 40 ft and total depth to be excavated is 4 ft)

  = Volume of contaminated soil = 40 ft x 40 ft x 4 ft = 6,400 ft^3=237 yd^3

- Containerized Soil = 2.1 m^3 or 2.8 yd^3

- Backfilling the Seepage Basin
  The contaminated soil excavated from the Tank Removal Area will be dispositioned in the Seepage Basin; therefore, the additional clean soil required to backfill the basin = 907 yd^3 – 240 yd^3 = 667 yd^3.

  -Assuming a swell factor of 1.2, the total loose soil volume

  = 667 yd^3 x 1.2 = 800 yd^3.

  - Assuming a compaction factor of 1.2, the loose soil volume actually required from the SRS borrow pit = 800 yd^3 x 1.2 = 960 yd^3.

- Total volume of soil for offsite disposal (Risk 1 x 10^{-4}) = Basin = 25 ft x 20 ft x 4 ft = 2,000 ft^3 = 75 yd^3- Total = 75 yd^3 + 2.8 yd^3 = 78 yd^3

- Backfilling the Tank Removal Area
  Volume of loose soil required = 237 yd^3 x 1.2 x 1.2 = 346 yd^3

- Total volume of soil for offsite disposal (Risk 1 x 10^{-6}) = 1685 yd^3 + 237 yd^3 2.8 yd^3 = 1,925 yd^3

- Additional Cost Items
  -Vegetative Cover
  -Institutional Control

A.3 Cost Estimate

For detailed cost estimate, refer to Table A-1.

For cost estimating purposes the following temporary facilities required for construction and decontamination purposes were included:

- decontamination pad 36 ft x 24 ft
- erosion control (riprap)
- silt fence along the basin perimeter, and
- drainage trenches to divert the drainage flow away from the basin in the required direction

Table A-1. Alternative 2 – Excavate, Disposition, Backfill, Vegetative Cover, and Institutional Controls

ITEM	COMMENTS	QUANITY	UNIT(S)	UNIT COST($)	TOTAL COST ($)
Capital Costs					
Direct Capital Costs					
A. Site Work					
• Mobilization/Demobilization		1	LS	30,000	30,000
• Prepare Work Plans	QA, RD, RA and Waste Management Plan	1	LS	100,000	100,000
• Survey and construct temporary facilities including decontamination pads, erosion controls, drainage trenches, etc.		1	LS	30,000	30,000
• Basin dewatering and other miscellaneous including sampling and analysis of contaminated water		1	LS	20,000	20,000
				Sub Total	180,000
B. Remedial Action					
• Deed restriction/notification		1	LS	2000	2000
• Excavate contaminated soil from Tank Removal Area and stockpile properly for disposal into the basin		240	CY	15	3600
• Transport contaminated soil to the seepage basin for disposal in the basin	Adjust with 1.2 swell factor	288	CY	50	14,400
• Dispose of containerized soil in the basin including characterization and recording		1	LS	20,000	20,000
• Excavate, load and haul clean soil from SRS borrow pit to backfill the Tank Removal Area; spread and compact in 6" layer	Adjust with swell factor; 1.2; and compaction and wastage factor, 1.2	346	CY	40	13,840
• Haul and spread top soil at the Tank Removal Area		30	CY	175	5,250
• Excavate, load and haul clean soil from SRS borrow pit to Seepage Basin, spread and compact in 6" layers	Adjust with 1.2 swell factor and 1.2 compaction and wastage factor	960	CY	40	38,400
• Haul and spread top soil at the Seepage Basin		80	CY	175	14,000
				Sub Total	111,490

Table A-1. Alternate 2 – Excavate, Disposition, Backfill, Vegetative Cover, and Institutional Controls (Cont'd,)ITEM	**COMMENTS**	**QUANITY**	**UNIT(S)**	**UNIT COST($)**	**TOTAL COST ($)**
C. Post Remedial Action and Other Miscellaneous					
• Install warning signs		400	LP	12	4,800
• Provide dust suppression during remedial action			LS	20,000	20,000
• Site restoration		1	LS	2,000	2,000
• Post construction survey, safety inspection, etc. and reporting		1	LS	20,000	20,000
• Equipment decon and wastewater treatment/disposal		1	LS	20,000	20,000
				Sub Total	66,800
			Total Direct Capital Costs		358,290
Indirect Capital Costs					
• Engineering and Management	30% of Indirect Construction Cost (Remedial Costs) including 10% contingencies ($111,490)				33,450
			Total Indirect Capital Costs		33,450
TOTAL CAPITAL COSTS					391,740
O&M Costs					
• Annual inspection and maintenance	Assuming 7% discount rate, factor = 2,1578	30 year	Every 5 years	5,000	62,000
• 5-year CERCLA ROD Review	Assuming 7% discount rate, factor = 2,1578	30 year	Every 5 years	25,000	53,930
TOTAL O&M COSTS					116,000
Present Worth Cost					
TOTAL CAPITAL COSTS					391,740
TOTAL O&M COSTS					116,000
TOTAL PRESENT WORTH COST					507,740
			Say, $508,000		

APPENDIX B

RESPONSIVENESS SUMMARY

RESPONSIVENESS SUMMARY

The 45-day public comment period for the *Statement of Basis/Proposed Plan for the Ford Building Seepage Basin (FBSB) (904-91G) Operable Unit* began on April 6, 2001, and ended on May 20, 2001.

Public Comment

No comments were received from the public.