
United States Department of Energy

Savannah River Site



RECEIVED

JUN 02 2011

SITE ASSESSMENT,
REMEDICATION &
REVITALIZATION

**Record of Decision
Remedial Alternative Selection for the
Gunsite 012 Operable Unit (NBN) (U)**

CERCLIS Number: 78

SRNS-RP-2010-01232

Revision 1

March 2011

Prepared by:
Savannah River Nuclear Solutions, LLC
Savannah River Site
Aiken, SC 29808

DISCLAIMER

This document was prepared in conjunction with work accomplished under Contract No. DE-AC09-08SR22470 with the U.S. Department of Energy.

This work was prepared under an agreement with and funded by the U.S. Government. Neither the U.S. Government or its employees, nor any of its contractors, subcontractors or their employees, makes any express or implied: 1. warranty or assumes any legal liability for the accuracy, completeness, or for the use or results of such use of any information, product, or process disclosed; or 2. representation that such use or results of such use would not infringe privately owned rights; or 3. endorsement or recommendation of any specifically identified commercial product, process, or service. Any views and opinions of authors expressed in this work do not necessarily state or reflect those of the United States Government, or its contractors, or subcontractors.

Printed in the United States of America

**Prepared for
U.S. Department of Energy
and
Savannah River Nuclear Solutions, LLC
Aiken, South Carolina**

**RECORD OF DECISION
REMEDIAL ALTERNATIVE SELECTION (U)**

Gunsite 012 Operable Unit (NBN) (U)

CERCLIS Number: 78

**SRNS-RP-2010-01232
Revision 1**

March 2011

**Savannah River Site
Aiken, South Carolina**

Prepared by:

Savannah River Nuclear Solutions, LLC
for the
U. S. Department of Energy under Contract DE-AC09-08SR22470
Savannah River Operations Office
Aiken, South Carolina

ROD for the Gunsite 012 (NBN) (U)
Savannah River Site
March 2011

SRNS-RP-2010-01232
Rev. 1

This page was intentionally left blank.

DECLARATION FOR THE RECORD OF DECISION

Unit Name and Location

Gunsite 012 Operable Unit (OU) (NBN)

Comprehensive Environmental Response, Compensation, and Liability Information System
(CERCLIS) Identification Number: OU - 78

Savannah River Site (SRS)

Comprehensive Environmental Response, Compensation and Liability Act (CERCLA)

Identification Number: SC1 890 008 989

Aiken, South Carolina

United States Department of Energy

The Gunsite 012 Operable Unit (OU) is listed as a Resource Conservation and Recovery Act (RCRA) 3004(u) Solid Waste Management Unit/CERCLA unit in Appendix C of the Federal Facility Agreement (FFA) for the Savannah River Site (SRS). The Gunsite 012 OU comprises three RCRA/CERCLA Units: Gunsite 012 Rubble Pile (NBN), Rubble Pile Across From Gunsite 012 (NBN), and ECODS G-3 (Adjacent to Gunsite 012)(NBN). In 1995, the Gunsite 012 Rubble Pile and the Rubble Pile Across from Gunsite 012 were listed as separate units in the FFA. A Site Evaluation field investigation was performed on the two units in 1997 and a single, combined report was issued in 1998. The term "rubble pile" was likely acquired from old site inventories and did not accurately describe these two units since no rubble piles were found. The 1998 report recommended that both units be further evaluated under the RCRA Facility Investigation/Remedial Investigation (RFI/RI) Program, and they were placed on FFA Appendix C RCRA/CERCLA Units. The ECODS G-3 (Adjacent to Gunsite 012) was an early construction and operational disposal site in which construction debris was placed. The ECODS G-3 (Adjacent to Gunsite 012) was merged with the other two units into the FFA in 2000. The three RCRA/ CERCLA units are referred to as the Gunsite 012 OU.

The FFA is a legally binding agreement between regulatory agencies [U.S. Environmental Protection Agency (USEPA) and South Carolina Department of Health and Environmental Control (SCDHEC)] and regulated entities [U.S. Department of Energy (USDOE)] that establishes the responsibilities and schedules for the comprehensive remediation of SRS. The media associated with this OU are soil and groundwater.

Statement of Basis and Purpose

This decision document presents the selected remedial action for the RCRA/CERCLA units, including their corresponding subunits within the Gunsite 012 OU, in Aiken County, South Carolina, which 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 information contained in the Administrative Record File for this site. The USEPA, SCDHEC and USDOE concur with the selected remedy.

Assessment of the Site

Based on the *RCRA Facility Investigation/Remedial Investigation with Baseline Risk Assessment and Corrective Measures Study/Feasibility Study (RFI/RI/BRA/CMS/FS)* report, the Gun Emplacement Area Subunit and the ECODS G-3 were determined to pose no impact to human health or the environment based on an unrestricted land use scenario. Therefore, the remedy of No Action has been selected for their corresponding RCRA/CERCLA units, the Rubble Pile Across from Gunsite 012 (NBN) and the ECODS G-3 (Adjacent to Gunsite 012) (NBN), in this Record of Decision (ROD).

The Groundwater Subunit was determined to pose no impact to human health or the environment based on an unrestricted land use scenario. The remedy of No Action has been selected for the groundwater of the Gunsite 012 OU.

Polycyclic aromatic hydrocarbons (PAHs) are present in soil at the Building Pad Subunit and antimony is present in soil at the Parking Area Subunit, which pose an unacceptable exposure

risk based on an unrestricted land use scenario. For this reason, land use controls (LUCs) will be part of the selected remedy to prevent unrestricted land use for the Gunsite 012 OU.

Because there has been a release of hazardous substances into the environment at the Gunsite 012 OU, 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 current land use for the Gunsite 012 OU is industrial with the USDOE maintaining control of the land as long as necessary to keep the selected remedy fully protective of human health and the environment. The selected remedy for the Gunsite 012 OU is LUCs to prevent unrestricted land use.

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

- Prevent unrestricted use of the Building Pad Subunit and the Parking Area Subunit;
- Prohibit the development and use of property for residential housing, elementary and secondary schools, child care facilities and playgrounds.

The RCRA permit will be revised to reflect selection of the final remedy using the procedures under 40 CFR Part 270, and SCHWMR R.61-79.264.101; 270.

Statutory Determinations

Based on the unit RFI/RI/BRA/CMS/FS report (SRNS 2010b), the Gunsite 012 OU poses a threat to human health and the environment. Therefore, LUCs have been selected as the remedy for the Gunsite 012 OU. The future land use of the Gunsite 012 OU will be industrial.

In accordance with Section 121(c) of CERCLA and NCP §300.430(f)(5)(iii)(c), a statutory review will be conducted within 5 years of initiation of the remedial action, and every 5 years thereafter, to ensure that the remedy continues to be protective of human health and the environment.

In the long term, if the property, or any portion thereof, is ever transferred from the DOE, the U.S. Government and/or DOE will take those actions necessary pursuant to Section 120(h)(1) of CERCLA. Those actions will include in any contract, deed, or other transfer document, notice of the type and quantity of any hazardous substances that were known to have been stored (for more than one year), released, or disposed of on the property. The notice will also include the time at which the storage, release, or disposal took place to the extent such information is available.

In addition, if the property, or any portion thereof, is ever transferred by deed, the U.S. Government will also satisfy the requirements of CERCLA 120(h)(3). The requirements include: a description of the remedial action taken, a covenant, and an access clause. 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.

LUCs will be implemented through the following:

- The contract, deed, or other transfer document shall also include restrictions precluding residential use of the property. However, the need for these 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 LUCs 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.

ROD for the Gunsite 012 (NBN) (U)
Savannah River Site
March 2011

SRNS-RP-2010-01232
Rev. 1
Declaration v of viii

In the event of a property lease or interagency agreement, the equivalent restrictions will be implemented as required by CERCLA Section 120(h). The selected remedy for the Gunsite 012 OU leaves hazardous substances in place that pose a potential future risk and will require land use restrictions for as long as necessary to keep the selected remedy fully protective of human health and the environment. As agreed on March 30, 2000, among the USDOE, USEPA, and SCDHEC, SRS is implementing a Land Use Control Assurance Plan (LUCAP) to ensure that the LUCs required by numerous remedial decisions at SRS are properly maintained and periodically verified. The unit-specific Land Use Control Implementation Plan (LUCIP) incorporated by reference into this ROD will provide details and specific measures required to implement and maintain the LUCs selected as part of this remedy. The USDOE is responsible for implementing, maintaining, monitoring, reporting upon, and enforcing the LUCs selected under this ROD. The LUCIP, developed as part of this action, will be submitted concurrently with the Corrective Measures Implementation (CMI)/Remedial Action Implementation Plan (RAIP), as required in the FFA for review and approval by USEPA and SCDHEC. Upon final approval, the LUCIP will be appended to the LUCAP and is considered incorporated by reference into the ROD, establishing LUC implementation and maintenance requirements enforceable under CERCLA. The approved LUCIP will establish implementation, monitoring, maintenance, reporting, and enforcement requirements for the unit. The LUCIP will remain in effect unless and until modifications are approved by the USEPA and SCDHEC as needed to be protective of human health and the environment. LUCIP modification will only occur through another CERCLA document.

Data Certification Checklist

This ROD certifies that the following information is either provided in this ROD or an explanation is provided for information that is not included.

Refined Constituents of Concern (RCOCs) and their respective concentrations (*Section VIII*);

Baseline risk represented by the RCOCs (*Section VIII*);

Cleanup levels established for the RCOCs and the basis for the levels (*Section VII*);

ROD for the Gunsite 012 (NBN) (U)
Savannah River Site
March 2011

SRNS-RP-2010-01232
Rev. 1
Declaration vi of viii

Current and reasonably anticipated future land and groundwater use assumptions used in the BRA and ROD (*Section VI*);

Potential land and groundwater use that will be available at the site as a result of the selected remedy (*Section VI*);

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 (*Section X*);

Key decision factor(s) that led to selecting the remedy (i.e., describe how the selected remedy provides the best balance of tradeoffs with respect to the balancing and modifying criteria) (*Section XI*); and

How source materials constituting principal threats are addressed (*Section VII*)

ROD for the Gunsite 012 (NBN) (U)
Savannah River Site
March 2011

SRNS-RP-2010-01232
Rev. 1
Declaration vii of viii

4/25/11 Karen Guevara
Date Karen Guevara
Assistant Manager for Closure Project
U. S. Department of Energy
Savannah River Operations Office

*slm
6/13/2011* *5*
4/25/11 [Signature]
Date Franklin E. Hill
Director
Superfund Division
U. S. Environmental Protection Agency - Region 4

6/9/11 Daphne G. Neel
Date Daphne G. Neel
Bureau Chief
Bureau of Land and Waste Management
South Carolina Department of Health and Environmental Control

ROD for the Gunsite 012 (NBN) (U)
Savannah River Site
March 2011

SRNS-RP-2010-01232
Rev. 1
Declaration viii of viii

This page was intentionally left blank.

ROD for the Gunsite 012 (NBN) (U)
Savannah River Site
March 2011

SRNS-RP-2010-01232
Rev. 1

DECISION SUMMARY
REMEDIAL ALTERNATIVE SELECTION (U)

Gunsite 012 Operable Unit (NBN)

CERCLIS Number: 78

SRNS-RP-2010-01232
Revision 1

March 2011

Savannah River Site
Aiken, South Carolina

Prepared By:

Savannah River Nuclear Solutions, LLC
for the
U. S. Department of Energy under Contract DE-AC09-96SR18500
Savannah River Operations Office
Aiken, South Carolina

ROD for the Gunsite 012 (NBN) (U)
Savannah River Site
March 2011

SRNS-RP-2010-01232
Rev. 1

This page was intentionally left blank.

TABLE OF CONTENTS

| <u>Section</u> | <u>Page</u> |
|--|-------------|
| I. SAVANNAH RIVER SITE AND OPERABLE UNIT NAME, LOCATION, AND DESCRIPTION | 1 |
| II. SITE AND OPERABLE UNIT COMPLIANCE HISTORY | 2 |
| III. HIGHLIGHTS OF COMMUNITY PARTICIPATION..... | 10 |
| IV. SCOPE AND ROLE OF THE OPERABLE UNIT | 12 |
| V. OPERABLE UNIT CHARACTERISTICS..... | 13 |
| VI. CURRENT AND POTENTIAL FUTURE SITE AND RESOURCE USES..... | 17 |
| VII. SUMMARY OF OPERABLE UNIT RISKS..... | 17 |
| VIII. REMEDIAL ACTION OBJECTIVES AND REMEDIAL GOALS..... | 24 |
| IX. DESCRIPTION OF ALTERNATIVES..... | 26 |
| X. COMPARATIVE ANALYSIS OF ALTERNATIVES..... | 28 |
| XI. THE SELECTED REMEDY..... | 33 |
| XII. STATUTORY DETERMINATIONS | 37 |
| XIII. EXPLANATION OF SIGNIFICANT CHANGES | 38 |
| XIV. RESPONSIVENESS SUMMARY..... | 38 |
| XV. POST-ROD DOCUMENT SCHEDULE AND DESCRIPTION..... | 38 |
| XVI. REFERENCES..... | 39 |

LIST OF FIGURES

| <u>Figure</u> | <u>Page</u> |
|--|-------------|
| FIGURE 1. LOCATION OF THE SAVANNAH RIVER SITE..... | 41 |
| FIGURE 2. LOCATION OF THE GUNSITE 012 OU WITHIN THE SAVANNAH RIVER SITE | 42 |
| FIGURE 3. LAYOUT OF THE GUNSITE 012 OU WITHIN THE LOWER THREE RUNS WATERSHED | 43 |
| FIGURE 4. RCRA/CERCLA UNITS OF THE GUNSITE 012 OU | 44 |
| FIGURE 5. GUNSITE 012 OU SUBUNITS AND FEATURES | 45 |
| FIGURE 6. AERIAL PHOTOGRAPH OF GUNSITE 012 DURING OPERATION..... | 46 |
| FIGURE 7. SEPTIC SYSTEM AT GUNSITE 012..... | 47 |
| FIGURE 8. PRE-WORK PLAN AND WORK PLAN CHARACTERIZATION SAMPLE LOCATIONS..... | 48 |
| FIGURE 9. BENZO(A)PYRENE DISTRIBUTION IN SOILS | 49 |
| FIGURE 10. GROUNDWATER SAMPLE LOCATION..... | 50 |
| FIGURE 11. CONCEPTUAL SITE MODEL FOR THE BUILDING PAD SUBUNIT | 51 |
| FIGURE 12. CONCEPTUAL SITE MODEL FOR THE PARKING AREA SUBUNIT..... | 52 |
| FIGURE 13. CONCEPTUAL SITE MODEL FOR THE GUN EMPLACEMENT AREA SUBUNIT..... | 53 |
| FIGURE 14. CONCEPTUAL SITE MODEL FOR THE ECODS-G3 SUBUNIT | 54 |
| FIGURE 15. AREA OF LAND USE CONTROL FOR ALTERNATIVE 2 – LAND USE CONTROLS | 55 |
| FIGURE 16. SOIL REMOVAL AREA FOR ALTERNATIVE 3 – EXCAVATION AND REMOVAL OF CONTAMINATED SOILS | 56 |
| FIGURE 17. IMPLEMENTATION SCHEDULE | 57 |

LIST OF TABLES

| <u>Table</u> | | <u>Page</u> |
|--------------|---|-------------|
| TABLE 1. | SUMMARY OF REFINED CONSTITUENTS OF CONCERN AND MEDIUM-SPECIFIC EXPOSURE POINT CONCENTRATIONS..... | 58 |
| TABLE 2. | CANCER TOXICITY DATA SUMMARY | 59 |
| TABLE 3. | NON-CANCER TOXICITY DATA SUMMARY..... | 60 |
| TABLE 4. | RISK CHARACTERIZATION SUMMARY – CARCINOGENS..... | 61 |
| TABLE 5. | RISK CHARACTERIZATION SUMMARY – NON-CARCINOGENS..... | 62 |
| TABLE 6. | BUILDING PAD SUBUNIT REMEDIAL GOALS FOR HH RCOCS..... | 63 |
| TABLE 7. | PARKING AREA SUBUNIT REMEDIAL GOALS FOR HH RCOCS | 63 |
| TABLE 8. | COMPARATIVE ANALYSIS OF ALTERNATIVES FOR THE GUNSITE 012 OU | 64 |
| TABLE 9. | ALTERNATIVE A-1 — NO ACTION..... | 65 |
| TABLE 10. | ALTERNATIVE A-2 —LAND USE CONTROLS..... | 66 |
| TABLE 11. | ALTERNATIVE A-3 — EXCAVATION AND REMOVAL OF CONTAMINATED SOIL .. | 67 |
| TABLE 12. | LAND USE CONTROLS FOR THE GUNSITE 012 OU | 68 |

LIST OF ATTACHMENTS

| | | |
|------------------------------|--|----|
| <u>Appendix A</u> | | |
| Responsiveness Summary | | A1 |

ROD for the Gunsite 012 (NBN) (U)
Savannah River Site
March 2011

SRNS-RP-2010-01232
Rev. 1
Page vi of viii

This page was intentionally left blank.

LIST OF ACRONYMS AND ABBREVIATIONS

| | |
|-----------------|--|
| ARAR | applicable or relevant and appropriate requirement |
| bls | Below land surface |
| BRA | Baseline Risk Assessment |
| BTEX | Benzene, toluene, ethyl benzene, xylenes |
| CERCLA | Comprehensive Environmental Response, Compensation and Liability Act |
| CERCLIS | Comprehensive Environmental Response, Compensation, and Liability Information System |
| CFR | Code of Federal Regulation |
| CM | contaminant migration |
| CMI/RAIP | Corrective Measures Implementation/Remedial Action Implementation Plan |
| COC | constituent of concern |
| COPC | constituent of potential concern |
| CPT | Cone Penetrometer Technology |
| CSM | conceptual site model |
| EPC | Exposure Point Concentration |
| ERA | Ecological Risk Assessment |
| ESD | Explanation of significant difference |
| FFA | Federal Facility Agreement |
| ft | feet |
| GSC | Groundwater-specific constituent |
| HH | Human Health |
| HHRA | Human Health Risk Assessment |
| HI | hazard index |
| HQ | hazard quotient |
| HSWA | Hazardous and Solid Waste Amendments |
| IOU | Integrator Operable Unit |
| km | kilometer |
| km ² | square kilometer |
| LLC | Limited Liability Company |
| LTR | Lower Three Runs |
| m | meter |
| MCL | maximum contaminant level |
| mg/kg | milligram per kilogram |
| mi | mile |
| mi ² | square mile |

LIST OF ACRONYMS AND ABBREVIATIONS *(Continued)*

| | |
|--------|--|
| NCP | National Oil and Hazardous Substances Pollution Contingency Plan |
| NEPA | National Environmental Policy Act |
| NTC | Non-Time Critical |
| NPL | National Priorities List |
| OU | Operable unit |
| PAH | polycyclic aromatic hydrocarbon |
| PCB | polychlorinated biphenyl |
| PTSM | principal threat source material |
| RAGs | Risk Assessment Guidance for Superfund |
| UAZ | Upper aquifer zone |
| UCL | Upper Confidence Limit |
| RAO | Remedial action objective |
| RCOC | Refined constituent of concern |
| RCRA | Resource Conservation and Recovery Act |
| RFI | RCRA Facility Investigation |
| RFI/RI | RCRA Facility Investigation/Remedial Investigation |
| RGO | Remedial Goal Objective |
| RI | Remedial Investigation |
| ROD | Record of Decision |
| RSL | regional screening level |
| 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 |
| SRNS | Savannah River Nuclear Solutions, LLC |
| SRS | Savannah River Site |
| USDOE | U.S. Department of Energy |
| USEPA | U.S. Environmental Protection Agency |
| VOC | volatile organic compound |
| WSRC | Washington Savannah River Company, LLC |

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

Gunsite 012 Operable Unit (OU) (NBN)

Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS) Identification Number: OU- 78

Savannah River Site

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

Aiken, South Carolina

United States Department of Energy (USDOE)

Savannah River Site (SRS) occupies approximately 802.9 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 40.2 km (25 mi) southeast of Augusta, Georgia, and 32.1 km (20 mi) south of Aiken, South Carolina.

The 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 by-products 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) (FFA 1993) for the SRS lists the Gunsite 012 Operable Unit (OU) as a Resource Conservation and Recovery Act (RCRA) 3004 (u) Solid Waste Management Unit/CERCLA unit requiring further evaluation.

The Gunsite 012 Operable Unit (OU) is inclusive of the following three RCRA/CERCLA units as listed in the SRS FFA Appendix C RCRA/CERCLA Units:

- Gunsite 012 Rubble Pile (NBN)

- Rubble Pile Across from Gunsite 012 (NBN)
- Early Construction Operation Disposal Site (ECODS) G-3 (Adjacent to Gunsite 012) (NBN)

The Gunsite 012 OU (Figure 2) was evaluated through an investigation process that integrates and combines the RCRA corrective action process with the CERCLA remedial process to determine the actual or potential impact to human health and the environment of releases of hazardous substances to the environment.

II. SITE AND OPERABLE UNIT COMPLIANCE HISTORY

SRS Operational and Compliance History

The primary mission of SRS has been to produce tritium, plutonium, and other special nuclear materials for our nation's defense programs. Production of nuclear materials for the defense 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 by-products of nuclear material production processes. These wastes have been treated, stored and, in some cases, disposed 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 30, 2003. Module VIII of the Hazardous and Solid Waste Amendments (HSWA) portion of the RCRA permit mandates corrective action requirements for non-regulated solid waste management units subject to RCRA 3004(u).

On December 21, 1989, SRS was included on the National Priorities List (NPL). The inclusion created a need to integrate the established RCRA facility investigation (RFI) program with CERCLA requirements to provide for a focused environmental program. In accordance with Section 120 of CERCLA 42 United States Code Section 9620, USDOE has negotiated an FFA (FFA 1993) with the U.S. Environmental Protection Agency (USEPA) and SCDHEC to coordinate remedial activities at SRS as one comprehensive strategy that fulfills these dual regulatory requirements. USDOE functions as the lead agency for remedial activities at SRS, with concurrence by the USEPA - Region 4 and the SCDHEC.

Operable Unit Operational and Compliance History

Gunsite 012 OU is located northeast of the geographical center of the SRS and about 4.75 km (3 mi) from the nearest site boundary (Figure 2). The Gunsite 012 OU is located within the Lower Three Runs (LTR) watershed, approximately 274 m (300 yd) southeast of Pond B (Figure 3). The area is flat to gently rolling and approximately 853 m (280 ft) above mean sea level.

Gunsites were anti-aircraft gun emplacements that operated from 1955 to 1957 to provide physical protection for SRS against possible enemy air attack. Before being made obsolete by intercontinental missiles, military personnel manned 75-mm and 90-mm anti-aircraft gun emplacements and support facilities. The Gunsite 012 was one of five central gunsites that featured 90-mm anti-aircraft guns as well as extensive administrative support facilities, including barracks, mess halls, office buildings, and motor pools.

The Gunsite 012 comprises three RCRA/CERCLA units:

- Gunsite 012 Rubble Pile (NBN);
- Rubble Pile Across From Gunsite 012 (NBN); and
- ECODS G-3 [Adjacent to Gunsite 012] (NBN).

In 1995, the Gunsite 012 Rubble Pile (NBN) and the Rubble Pile Across from Gunsite 012 (NBN) were listed as separate units in the FFA. A Site Evaluation field investigation was performed on the two units in 1997 and a single, combined report was issued in 1998 (WSRC 1998). The term "rubble pile" was likely acquired from old site inventories and did not accurately describe these two units since no rubble piles were found. The 1998 report recommended that both units be further evaluated under the RFI/RI Program, and they were placed on FFA Appendix C RCRA/CERCLA Units. The ECODS G-3 (Adjacent to Gunsite 012) was an early construction and operational disposal site in which construction debris was placed. The ECODS G-3 (Adjacent to Gunsite 012) was merged with the other two units into the FFA in 2000 (WSRC 2008). The three RCRA/CERCLA units are referred to as the Gunsite 012 OU.

The Gunsite 012 OU was partitioned into subunits during the RFI/RI process to support characterization and data analysis activities. These subunits included four (4) soil subunits entitled the Building Pad Subunit, Parking Area Subunit, Gun Emplacement Area Subunit, and ECODS G-3 Subunit and one (1) Groundwater Subunit. Figure 4 illustrates the relationship of the subunit delineation to the three original RCRA/CERCLA units. The Gunsite 012 Rubble Pile (NBN) comprises both the Building Pad and the Parking Area Subunits. The Rubble Pile Across from Gunsite 012 (NBN) is encompassed by the Gun Emplacement Area Subunit. The ECODS G-3 (Adjacent to Gunsite 012) (NBN) is included within the subunit of the same name, ECODS G-3. Figure 5 provides an illustration of the surface subunits and their features. Figure 6 provides an aerial photograph of the Gunsite 012 during its operational years.

Descriptions of the RCRA/CERCLA units with its corresponding surface subunits are as follows:

Gunsite 012 Rubble Pile (NBN)

The Gunsite 012 Rubble Pile (NBN) RCRA/CERCLA unit contains the Building Pad Subunit and the Parking Area Subunit (refer to Figure 5), both discussed in further detail below:

Building Pad Subunit

The Building Pad Subunit (Figure 5) of the Gunsite 012 Rubble Pile (NBN) consisted of four barracks for approximately 200 men, a mess hall, two administrative buildings, fuel storage tanks, an underground septic system, a drinking water well and a water storage tank. The subunit is approximately 2 ha (5 ac) in size.

The buildings were dismantled in 1961 and the Building Pad Subunit now consists of the concrete slab foundations from the four barracks, the mess hall, the two administrative buildings, the drinking water well, and water storage tank, as well as the remaining sidewalks and driveways, and the former locations of seven underground storage tanks. The storage tanks contained fuel and were associated with each building (barracks, mess hall, administrative buildings). They were 7,571 L (2,000 gal) tanks, buried 2.4 m (8 ft) below surface level and located between 6.1 and 12.2 m (20 and 40 ft) from the building they supported. The date that the tanks were removed is unknown; however, a 1997 ground penetrating radar analysis showed that no tanks remain at the Building Pad Subunit (SRNS 2010b). Likewise, the RFI/RI characterization borings did not find any underground tanks at these seven locations. These tanks were most likely removed prior to 1990.

The drinking water well was disconnected and capped after dismantlement of the Gunsite buildings to prevent use. To ensure no pathway exists into the subsurface, the well was completely abandoned and grouted to surface in April 2010.

The underground septic system (Figure 7) consisted of approximately 944.9 m (3,100 ft) of 20.3 cm (8 in) diameter vitrified pipe and a 37,854 L (10,000 gal) septic tank. Septic

lines extended from each of the administrative buildings and barracks and joined at a point to empty into the septic tank located to the west of Gunsite 012. From the septic tank, the septic lines ran about 487.7 m (1,600 ft) to the southwest to discharge near an unnamed tributary flowing into Pond C. The analysis of samples taken in relation to the septic system provides sufficient screening for any potential impact or contamination from the septic system. Based on existing soil and groundwater samples and analysis, no contaminants were identified. Monitoring of any potential impact from the discharge of the septic system into the unnamed tributary is beyond the scope of this OU and will be included in the ongoing investigation and monitoring of the LTR Integrator Operable Unit (IOU) (SRNS 2009b).

The soil characterization of Gunsite 012 OU was conducted in May 2007 during pre-Work Plan characterization and in November 2007 during Work Plan characterization. Sixty-six soil samples (Figure 8) were collected at a variety of depths [0 to 0.3 m, 0.3 to 1.3 m, 2.6 to 4.0 m, and 4.0 to 5.0 m (0 to 1 ft, 1 to 4 ft, 8 to 12 ft, and 12 to 15 ft)]. Characterization of this area showed that polycyclic aromatic hydrocarbons (PAHs) existed in the 0 to 0.3 m (0 to 1 ft) soil. Primarily, six (6) PAH compounds (benzo[a]anthracene, benzo[a]pyrene, benzo [b]fluoranthene, benzo[k]fluoranthene, dibenz[ah]anthracene, and indeno[1,2,3-cd]pyrene) were identified within the Building Pad Subunit.

In addition to the PAH contamination, asbestos was determined to pose a potential risk to human health. Asphalt floor tiles containing asbestos were used in the barracks, administrative buildings, and mess hall. During dismantlement of the buildings, some of the floor tiles were scraped off the pads and placed in piles (floor tile pads) on the ground between two of the pads (Figure 5). The asphalt floor tile piles had an estimated area of 29 m² (308 ft²). In addition, asbestos was found in the adhesive and tar material that remain on the building pads.

During an interactive scoping process involving USDOE, USEPA and SCDHEC, it was agreed to conduct both a non time critical (NTC) removal action and a maintenance

action at the Building Pad Subunit. The NTC removal action was documented in the *Removal Site Evaluation Report/Engineering Evaluation/Cost Analysis (RSER/EE/CA) for Asphalt Floor Tile Piles at Gunsite 012 Operable Unit* (SRNS 2009a). The NTC removal action was specific for the removal of the asbestos-containing floor tiles that were placed on the soil in addition to raking/scraping of the adjoining soil areas as necessary. SRS also performed a maintenance action to remove the remaining floor tiles adhering to the building pads including the associated adhesive and tar material located on the building pads and expansion joints. All materials removed during both the NTC removal action and maintenance action (asbestos floor tiles, floor tile adhesive, and asphalt) were properly disposed of in an appropriate landfill (SRNS 2009a).

Parking Area Subunit

The Parking Area Subunit (Figure 5) of the Gunsite 012 Rubble Pile (NBN) is adjacent to the Building Pad Subunit. The Parking Area Subunit consists of the remains of the old gravel parking lot and the disposal trench that is located within the trees to the northeast of the parking lot. The parking lot was periodically sprayed with an asphalt emulsion to suppress dust. From 1992 to 1997, the parking lot was used as a storage area for creosote-treated railroad crossties and utility poles. The railroad crossties and utility poles were removed in January 1997. The subunit is approximately 1.6 ha (4 ac) in size.

Figure 8 shows the soil sample locations from the May 2007 pre-Work Plan characterization and the November 2007 Work Plan characterization. Thirty-three (33) soil samples were collected at a variety of depths [0 to 0.3 m, 0.3 to 1.3 m, 2.6 to 4.0 m, and 4.0 to 5.0 m (0 to 1 ft, 1 to 4 ft, 8 to 12 ft, and 12 to 15 ft)].

Based on the characterization events, PAHs were found in the 0- to 0.3 m (0- to 1 ft) soil in the gravel parking lot. As was the case for the Building Pad Subunit, the same six (6) PAHs were found with benzo[a]pyrene as the predominant component. However, it was determined that the low levels of PAHs were similar to PAH levels expected in any

parking lot in the United States and no remedial response was needed. For comparison, Figure 9 shows the distribution of benzo[a]pyrene in the Gunsite 012 OU.

Additionally, antimony was determined to exist in the top 1.3 m (4 ft) of soil in the disposal trench. The existence of antimony in the ditch appears to have originated from the scraps of metal and/or cans and buckets deposited within the disposal trench from past uses.

Some pesticides, as well as xylene, were identified in the sampling; however, all detects were well below any action limits.

Rubble Pile Across From Gunsite 012 (NBN)

The Rubble Pile Across from the Gunsite 012 (NBN) RCRA/CERCLA unit contains the Gun Emplacement Area Subunit (Figure 5) discussed in further detail below.

Gun Emplacement Area Subunit

The Gun Emplacement Area Subunit characterization encompassed the four circular gun emplacements and the Rubble Pile Across from Gunsite 012 (NBN). The pad footprint was the location of the generator building that may have also been used for limited chemical storage. The pad is located about halfway between the gun emplacements and the Gunsite 012 Rubble Pile (NBN). The generator building also had an Underground Storage Tank (UST) for generator fuel which was removed prior to 1990.

Figure 8 shows the soil sample locations from the May 2007 pre-Work Plan characterization and the November 2007 Work Plan characterization. Fifteen (15) soil samples were collected at a variety of depths [0 to 0.3 m, 0.3 to 1.3 m, 2.6 to 4.0 m, and 4.0 to 5.0 m (0 to 1 ft, 1 to 4 ft, 8 to 12 ft, and 12 to 15 ft)].

Characterization activities identified one PAH, and trace amounts of petroleum analytes. All results were below action levels for industrial or unrestricted use.

ECODS G-3 (Adjacent to Gunsite 012) (NBN)

The ECODS G-3 (Adjacent to Gunsite 012) (NBN) RCRA/CERCLA unit (refer to Figure 5) contains the ECODS G-3 Subunit discussed in further detail below.

ECODS G-3 Subunit

The ECODS G-3 Subunit is located in the southwest corner of the OU approximately 61 m (200 ft) southwest of the Gunsite 012 Rubble Pile (NBN). During construction of Gunsite 012, construction waste seems to have been disposed in the ECODS G-3 facility.

Figure 8 displays the soil sample locations from the May 2007 pre-Work Plan characterization and the November 2007 Work Plan characterization. Three (3) soil samples were collected at depths of 0 to 0.3 m, 0.3 to 1.3 m, 2.6 to 4.0 m, and 4.0 to 5.0 m (0 to 1 ft, 1 to 4 ft, 8 to 12 ft, and 12 to 15 ft).

Trace amounts of PAHs, petroleum analytes, solvents, pesticides, polychlorinated biphenyls (PCBs) and metals were identified in this subunit. All concentrations were below action levels for industrial or unrestricted use.

Groundwater

Groundwater Subunit

Although the groundwater is not a unit listed on the FFA, the groundwater underlying the Gunsite 012 OU was included as part of the RCRA/CERCLA investigation process and identified as the Groundwater Subunit.

The water table at the Gunsite 012 is 10.6 to 13.7 m (35 to 45 ft) below land surface. Due to the presence of the reservoir and knowledge of the variability of the groundwater in the Gunsite 012 area from work plan characterization, it is expected that groundwater flows radially from the OU towards the east, south, and southwest. Twelve (12) groundwater samples were collected during the May 2007 pre-Work Plan

characterization and the November 2007 Work Plan characterization to support the conclusions of the contaminant migration analysis. Based on early screening conducted at the Gunsite 012 OU, as well as knowledge of soil contaminant characteristics, only a narrow range of groundwater contaminants was expected and the groundwater analysis was limited to volatile organic compounds (VOCs), benzene, toluene, ethyl benzene, and xylene (BTEX) components. No exceedances of the most likely contaminants were found and no additional sampling of the groundwater was performed. Trace levels of trichloroethylene, acetone, methyl ethyl acetone, and carbon disulfide were detected; however, all detects were below action levels. The contaminant migration analysis did not identify any problems for transport of soil contaminants into groundwater. The sample locations from the two groundwater sampling activities are shown in Figure 10. The results of the groundwater analysis are provided in the RFI/RI/BRA/CMS/FS document (SRNS 2010b).

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 United States Code 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 Gunsite 012 OU soils. The Administrative Record File must be established at or near the facility at issue.

The SRS FFA Community Involvement Plan (WSRC 2006) is designed to facilitate public involvement in the decision-making process for permitting, closure, and the selection of remedial alternatives. The SRS FFA Community 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 Gunsite 012 OU, a part of the Administrative Record File, highlights key aspects of the investigation and identifies the preferred action for addressing the Gunsite 012 OU.

The FFA Administrative Record File, which contains the information pertaining to the selection of the response action, is available at the following locations:

U.S. Department of Energy
Public Reading Room
Gregg-Graniteville Library
University of South Carolina – Aiken
171 University Parkway
Aiken, South Carolina 29801
(803) 641-3465

Thomas Cooper Library
Government Documents Department
University of South Carolina
Columbia, South Carolina 29208
(803) 777-4866

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

The South Carolina Department of
Health and Environmental Control
Bureau of Land and Waste
Management
8911 Farrow Road
Columbia, South Carolina 29203
(803) 896-4000

The South Carolina Department of Health
and Environmental Control –Region 5
Aiken Environmental Quality Control Office
206 Beaufort Street, Northeast
Aiken, South Carolina 29801
(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 SB/PP 45-day public comment period began on December 20, 2010, and ended on February 3, 2011. A Responsiveness Summary, prepared to address any comments received during the public comment period, is provided in Appendix A of the Record of Decision (ROD). A Responsiveness Summary will also be available in the final RCRA Permit. No public comments were received.

IV. SCOPE AND ROLE OF THE OPERABLE UNIT

Due to the complexity and size of multiple waste units in different areas, the SRS is divided into watersheds for the purpose of managing a comprehensive cleanup strategy. The SRS is segregated into six watersheds: Upper Three Runs, Lower Three Runs, Fourmile Branch, Steel Creek, Pen Branch, and the Savannah River. In addition, the SRS also identifies six IOUs, which are the surface water bodies and associated wetlands that correspond to the six respective watersheds. Waste units within a watershed may be evaluated and remediated individually or grouped with other waste units and evaluated as part of a larger Area OU. Upon disposition of all the waste units within a watershed, a final comprehensive ROD for the corresponding IOU (i.e., surface water and associated wetlands) will be pursued with additional public involvement. The Gunsite 012 OU is located within the LTR watershed (Figure 3).

The Gunsite 012 OU is not considered a "source control" unit; i.e., the unit does not contain contaminated soils that could act as a source of future contamination to the groundwater through leaching. In addition to the Gunsite 012 OU, there are many OUs within the LTR Watershed. Upon disposition of all OUs within the watershed of the LTR IOU, a final ROD for the LTR IOU will be pursued.

V. OPERABLE UNIT CHARACTERISTICS

This section presents the Conceptual Site Model (CSM), provides an overview of the characterization activities, and presents the characterization results and constituents of concern (COCs).

Conceptual Site Model for the Gunsite 012 OU

The CSM for the Gunsite 012 OU are presented in Figures 11 through 14. A CSM identifies known and suspected sources of contamination, types of contaminants and potentially affected media, known and potential routes of migration, and known and potential human and ecological receptors.

The primary sources of potential contamination at the Gunsite 012 OU were releases due to construction, operation, or dismantling of the gunsite facilities. Spills, leaks, accidental releases, or simply site operations may have resulted in a primary source of contamination from hazardous substances used and/or stored at the gunsite.

If the primary source were to contact other media, secondary sources of contamination could be created through several release mechanisms. Typically, the potential secondary release mechanisms include release of volatile constituents from the soil (volatilization), generation of contaminated fugitive dust by wind or other surface soil disturbance, biotic uptake, bioturbation between surface and subsurface soils and infiltration/percolation/leaching to groundwater. Contact with contaminated environmental media creates pathways for both human and ecological receptors. These are assessed in the risk evaluation. The exposure media at this OU include ambient air (vapor and particulates), soils, groundwater, and biota.

Human receptors for risk assessment purposes include the future industrial worker and hypothetical future on-unit resident. The general public is not considered to be a potential human receptor because the unit is located approximately 4.75 km (3 mi) from the nearest SRS boundary. Access by the general public has been prohibited by strict,

long-term entry control procedures and site security inspections. The long distances and access restrictions make all pathways for the general public incomplete.

Media Assessment

Historic investigation and characterization activities at the OU have included soil and groundwater analysis. The sample locations are provided in Figures 8 and 10 respectively.

Soil Investigation

The collection of soil samples determined the nature and extent of soil contamination at the Gunsite 012 OU associated with those subunits identified for investigation. A biased sampling strategy was developed based on historical use knowledge, structure locations, and previous site screening. Shallow soil samples, 0 to 1.2 m (0 to 4 ft) below land surface (bls), were collected using manual methods (Stainless Steel hand auger), and deeper interval samples, 1.2 to 4.6 m (4 to 15 ft) bls, were collected using Macro-Core[®] samplers, a Geoprobe[®] Direct Push Technology, with a track mounted Geoprobe[®]. Additional inferred lithology data was collected using Cone Penetrometer Technology (CPT) methods. Additional information regarding the sampling and analysis plan and methods is documented in the Gunsite 012 OU RFI/RI Work Plan (WSRC 2008).

Groundwater Investigation

Groundwater samples were collected to determine the nature and extent of groundwater contamination at the Gunsite 012 OU. Data collection was conducted in the Upper aquifer zone (UAZ) using CPT methods.

To determine if a constituent was a groundwater-specific constituent (GSC), groundwater results were compared to USEPA maximum contaminant levels (MCLs). Constituents with no detectable results were removed from further evaluation. Results flagged with a "J" qualifier are considered estimated values and were included in the GSC determination. In the event an MCL was not available, USEPA 2009 Regional Screening Levels (RSLs) for tap water were used.

Media Assessment Results

In summary, Gunsite 012 OU was investigated to determine the nature and extent of contamination, the risks to an industrial worker and the environment, the presence of principal threat source material (PTSM), and if there is any contaminant migration concerns. Soil and Groundwater samples were collected, evaluated, and screened against appropriate regulatory thresholds and protocols to identify Constituents of Concern (COCs) that would warrant further remedial action. The following sections summarize the sampling results.

Soil

PAHs and asbestos were determined to be problems warranting action within the soil media in the Building Pad Subunit. As described in Section II, a NTC removal action and maintenance action were used to remove the asbestos contamination. The remaining contamination at the Building Pad Subunit includes six (6) PAH compounds, located within the soil at 0 to 0.3 m (0 to 1 ft), that exceeded a risk level $>1E-06$ for the future resident. These six PAH constituents include benzo[a]anthracene, benzo[a]pyrene, benzo[b]fluoranthene, benzo[k]fluoranthene, dibenz[ah]anthracene, and indeno[1,2,3-cd]pyrene and were quantitatively identified as human health (HH) refined constituents of concern (RCOCs) for the future resident (unrestricted) scenario. It was determined that these six PAH constituents do not pose an unacceptable risk to the future industrial worker and no remedial action was needed under an industrial setting.

Antimony, with a hazard quotient (HQ) of 2.7, was identified as a HH RCOC in surface soil at the Parking Area Subunit for the future resident scenario. The incidental ingestion pathway is the primary route of exposure for this constituent. No constituents were identified as RCOCs based on the industrial worker scenario.

There were no RCOCs identified for the Gun Emplacement Area, ECODS G-3 subunit, or the Groundwater subunits.

Groundwater

No groundwater analytes were detected above MCLs. There are no contaminants in the Groundwater Subunit that would require a remedial action.

Site-Specific Factors

No site-specific factors requiring special consideration that might affect the remedial action for the Gunsite 012 OU are present at the unit.

Contaminant Transport Analysis

Gunsite 012 OU analytical data from soil sampling underwent a contaminant migration (CM) evaluation in order to identify CM COCs. Subunit-specific analyte concentrations and sample depths are input into a simple one-dimensional vadose zone transport model (CMScreen) in order to predict travel times to groundwater and maximum future analyte concentrations in groundwater. The procedure and results are described in detail in Appendix D of the Gunsite 012 RFI/RI/BRA/CMS/FS (SRNS 2010b) (*Contaminant Migrations Constituents of Concern Evaluation of Pre-Characterization and Phase 1 Characterization Samples*) and summarized here.

Constituents with soil concentrations that are predicted to contaminate groundwater at a concentration above MCLs (or RSLs in the absence of a MCL) are retained as CM constituents of potential concern (COPCs). CM COPCs that are predicted to have a mean travel time to groundwater less than 1,000 years are retained as CM COCs. There were no CM COCs identified for Gunsite 012 OU.

Details of the CM analysis are provided in Appendix D of the Gunsite 012 RFI/RI/BRA/CMS/FS (SRNS 2010b).

VI. CURRENT AND POTENTIAL FUTURE SITE AND RESOURCE USES

Land Uses

The Gunsite 012 OU is not located within any administrative or industrial area as defined by the SRS Land Use Control Assurance Plan (LUCAP) (WSRC 1999) and is, therefore, not subject to area specific land use restrictions. However, use of all lands on the SRS is coordinated through the SRS Site Use Program and access control for the entire SRS is maintained in accordance with the 2000 RCRA Part B Permit Renewal Application which describes security procedures including the 24-hour surveillance system, control entry systems, and access control warning signs at the SRS boundary. More specific restrictions are dependent on a number of factors including the type of contamination present and the anticipated future land use. Because of its location in an area not designated for industrial use, the HH risk assessment for Gunsite 012 was evaluated for both the future industrial worker and resident (e.g., unrestricted land use) scenarios to support risk management decisions. Future unrestricted land use at SRS is not anticipated.

VII. SUMMARY OF OPERABLE UNIT RISKS

Baseline Risk Assessment

As a component of the RFI/RI process, a baseline risk assessment (BRA) was performed to evaluate risks associated with the GS 12 OU (SRNS 2010b). The BRA estimates what risks the site poses if no action were taken. It provides the basis for taking action and identifies the contaminants and exposure pathways that need to be addressed by the remedial action. The BRA includes human health and ecological risk assessments, fate and transport analysis (i.e., contaminant migration), and a principal threat source material (PTSM) evaluation. This section of the ROD summarizes the results of the BRA for the GS 12 OU (SRNS 2010b).

Summary of Human Health Risk Assessment

The GS 12 OU was assessed as four separate surface soil (0-1 ft) exposure units in the human health risk assessment (HHRA): the Building Pad subunit, the Parking Area subunit, the Gun Emplacement Area subunit, and the ECODS G3 subunit. Although not formally presented in the HHRA, a Groundwater subunit was also evaluated by comparing unit concentrations to MCLs.

In order to support risk management decision-making, both unrestricted (residential) and industrial land use scenarios were considered in the HHRA. The future resident exposure scenario evaluates long term risks to individuals expected to have unrestricted use of the unit. It assumes that residents hypothetically live on the unit and are exposed chronically, both indoors and outdoors, to unit contaminants. The standard exposure assumptions for this scenario are 30 years, 350 days per year, and 24 hours per day.

The future industrial worker exposure scenario is a standard USEPA scenario which addresses long-term-risks to workers who are exposed to unit contaminants within an industrial setting. The exposure assumptions for this scenario are 25 years, 250 days per year, and 8 hours per day.

The primary exposure pathways for evaluation in the HHRA included ingestion, dermal contact, and inhalation of windblown dust and/or volatile constituents in the 0-1 ft surface soil interval. The primary pathway for evaluation of the groundwater media is through ingestion of drinking water.

RSLs are risk-based concentrations used to evaluate and clean up contaminated sites.

The generic USEPA Regional Screening Levels Table, dated April 2009, was the source of RSLs used in the HHRA (USEPA 2009) for the evaluation of soil media. It combines USEPA toxicity values with standard exposure factors to estimate contaminant concentrations in soil that the agency considers protective of humans over a lifetime. RSL concentrations are based on direct contact pathways for which generally accepted

methods, models, and assumptions have been developed (i.e., ingestion, dermal contact, and inhalation) for specific land use conditions. More detailed information can be found at the USEPA Regional Screening Levels website:

http://www.epa.gov/reg3hwmd/risk/human/rb_concentration_table/index.htm.

The first step of the formal HHRA was a screening step to identify human health COPCs. The maximum detected soil concentration for each constituent was compared to a RSL value and SRS background concentration, if appropriate (i.e., for naturally occurring constituents only). Constituents that exceeded the soil media screening criteria were identified as COPCs and were carried forward to the quantified risk evaluation. The COPC screening evaluation is described in more detail in the RFI/RI/BRA document (SRNS 2010b).

The quantitative risk assessment was implemented by a streamlined approach which used the generic RSL lookup table to calculate the human health risk estimates for the GS 12 OU. For carcinogens, the risk estimate was calculated using the following equation:

$$\text{Cancer Risk} = (\text{exposure point concentration} / \text{RSL}) \times 1\text{E-}06$$

The exposure point concentration (EPC) is identified as the lesser of the maximum detected value or the 95% upper confidence limit (UCL) on the mean concentration. Carcinogenic constituents with an individual cancer risk greater than 1E-06 were identified as human health constituents of concern (HH COCs).

For noncarcinogens, the hazard estimate was calculated using the following equation:

$$\text{Noncancer Hazard Quotient} = \text{EPC} / \text{RSL}$$

If the total media hazard index (HI) was less than 1, then no COCs were identified. If the total media HI was greater than or equal to 1 then the constituents were segregated based on relevant target organs. HQs were summed according to target organs. Constituents

were identified as HH COCs if the total organ HQ was greater than or equal to 0.1 and the total organ HI was greater than or equal to 1.

A recommendation of whether or not a HH COC should be carried forward for further remedial evaluation was based on a thorough analysis of each constituent in an uncertainty discussion. COCs that were not eliminated in the refinement process based on a weight-of-evidence evaluation were classified as HH RCOCs. As presented in the RFI/RI/BRA (SRNS 2010b), no RCOCs were identified for the Gun Emplacement Area subunit or the ECODS G3 subunit. RCOCs were only identified for the Building Pad subunit and the Parking Area subunit.

Although not presented in the HHRA, groundwater media was evaluated by performing a comparison of unit concentrations to MCLs. No RCOCs were identified for the Groundwater subunit based on this comparison (SRNS 2010b).

The Risk Assessment Guidance for Superfund (RAGS) Part D tables are presented for the two subunits that have RCOCs identified to support the following human health risk discussion.

Building Pad Subunit

RAGS Part D Tables 1, 2, and 4 pertain to this subunit. Table 1 lists the RCOCs and their exposure point concentrations, Table 2 provides a summary of the cancer toxicity data, and Table 4 (residential scenario) provides the calculated risk levels for the carcinogenic RCOCs. A summary table for the industrial worker is not shown as no RCOCs were identified for this receptor scenario.

Carcinogenic PAHs were identified as HH RCOCs for the future resident scenario at the Building Pad subunit.

More specifically, benzo(a)anthracene (risk = 2.2E-05), benzo(a)pyrene (risk 1.8E-04), benzo(b)fluoranthene (risk = 2.3E-05), benzo(k)fluoranthene (risk = 1.6E-06),

dibenz[ah]anthracene (risk = 3.5E-05) and indeno[1,2,3-cd]pyrene (risk = 9.9E-06) were identified as HH RCOCS for the future resident scenario; the total cumulative risk was 2.7E-04.

For the future industrial worker scenario, the constituents were determined to not pose an unacceptable risk.

Parking Area Subunit

RAGS Part D Tables 1, 3, and 5 pertain to this subunit. Table 1 lists the HH RCOCs and their exposure point concentrations, Table 3 provides a summary of the non-cancer toxicity data, and Table 5 provides the calculated hazard levels for the noncarcinogenic RCOCs.

The PAH constituents identified in the Building Pad subunit were also detected in the Parking Area subunit although their concentrations and corresponding risk estimates in the Parking Area subunit were lower. The PAHs detected in the Parking Area subunit are not related to any transport of constituents from the Building Pad subunit and the primary sources of contamination for the two subunits are much different. PAHs were not identified as HH RCOCs in the weight-of-evidence evaluation because they are ubiquitous in the environment and the concentrations measured in the Parking Area subunit and the corresponding risk estimates were within an acceptable range and were not deemed significant enough to warrant any remedial action (SRNS 2010b). The concentrations of PAHs in the Parking Area subunit are similar to what can be expected in any asphalt parking lot in the United States.

Antimony was identified as a HH COC for the future resident (unrestricted) scenario in the Parking Area subunit with an HQ = 2.7. There was not an unacceptable hazard to the future industrial worker. The high concentrations of antimony (maximum concentration = 128 mg/kg in the 0-1 ft soil interval) are limited to the trench portion of this subunit. Antimony was deemed to pose an unacceptable risk to a hypothetical future resident

under an unrestricted land use scenario in the weight-of-evidence evaluation and was identified as a RCOC.

Summary of Ecological Risk Assessment

Ecological risk is associated with the potential for harmful effects to ecological systems resulting from exposure to an environmental stressor. A stressor is any physical, chemical, or biological entity that can induce an adverse response. Stressors may adversely affect specific natural resources or entire ecosystems, including plants and animals, as well as the environment with which they interact. The ecological risk assessment (ERA) estimates the risk potential in the absence of institutional controls or remedial actions at this OU and provides a basis for determining whether or not remedial action is necessary.

The Gunsite 012 OU was assessed as four separate soil exposure units in the ERA: the Building Pad subunit, the Parking Area subunit, the Gun Emplacement Area subunit, and the ECODS G3 subunit. The ERA evaluated surface soils (0-1 ft) and subsurface soils (1-4 ft) for each subunit. The following terrestrial ecological receptors were evaluated: soil invertebrates (represented by the earthworm), herbivorous mammals (represented by the white-footed mouse), insectivorous mammals (represented by the short-tailed shrew), omnivorous mammals (represented by the raccoon), insectivorous birds (represented by the American robin) and carnivorous birds (represented by the red-tailed hawk).

Screening identified primarily metals and PAHs as ecological COPCs based on HQs greater than 1. These constituents were subjected to a weight-of-evidence evaluation which considers the range and magnitude of HQs, the frequency and patterns of detection, comparison to background concentrations, uncertainties in toxicity data, and professional judgment. After applying the additional lines-of-evidence to the evaluation of these COPCs, no constituents were identified as ecological RCOCs as documented in the RFI/RI/BRA (SRNS 2010b). Therefore, no ecological RCOCs for GS 12 OU were identified in either the 0-1 ft or 1-4 ft soil intervals for any subunit.

Summary of the Fate and Transport Analysis

A CM analysis was performed to identify CM COCs. A constituent was identified as a CM COC if leachability modeling predicted the constituent will leach to groundwater and exceed MCLs (or RSLs in the absence of a MCL) within 1,000 years. No CM RCOCs were identified at the Gunsite 012 OU as a result of this evaluation (SRNS 2010b).

Discussion of Principal Threat Source Material (PTSM)

Source material are those materials that include or contain hazardous substances, pollutants, or contaminants that act as a reservoir for migration of contamination to groundwater, surface water, or air that acts as a source for direct exposure. PTSM are defined as those source materials that have a high toxicity or mobility and cannot be reliably contained or present a significant risk to human health or the environment. No threshold level of toxicity/risk has been established to define "principal threat." However, treatment or removal alternatives should be considered for source materials when the cumulative risk for the future industrial worker exceeds $1E-03$ for carcinogens or a HI of 10 for noncarcinogens. The identification of PTSM based on mobility is evaluated under the contaminant migration analysis. In order to determine whether contaminants in soil at the Gunsite 012 OU should be considered PTSM, a simple quantitative assessment evaluating the toxicity of the source was performed. The maximum detected concentration for each constituent from all soil depth intervals was used in the operable unit evaluation. No PTSM RCOCs were identified at the Gunsite 012 OU as a result of this evaluation (SRNS 2010b).

Conclusions

There are no ecological RCOCs, contaminant migration RCOCs, or PTSM for any of the subunits at the Gunsite 012 OU. In addition, no HH RCOCs were identified for the Gun Emplacement Area subunit or ECODS G-3 subunit for either the residential (unrestricted) or industrial land use scenarios, and no RCOCs were identified for the Groundwater

subunit. However, the Building Pad subunit and the Parking Area subunit contain human health RCOs at levels that do not allow for unrestricted use. If not addressed by the Selected Alternative, actual or threatened releases of hazardous substances from the Building Pad subunit and the Parking Area subunit may present a current or potential threat to public health, welfare, or the environment.

VIII. REMEDIAL ACTION OBJECTIVES AND REMEDIAL GOALS

Remedial action objectives (RAOs) are media- or OU-specific objectives for protecting human health and the environment. RAOs usually specify potential receptors and exposure pathways, and are identified during scoping once the conceptual site model is understood. RAOs describe what the cleanup must accomplish and are used as a framework for developing remedial alternatives. The RAOs are based on the nature and extent of contamination, threatened resources, and the potential for human and environmental exposure. RAOs are required for the Building Pad Subunit and the Parking Area Subunit as follows:

Building Pad Subunit

- Prevent future residents from exposure to PAHs in surface soil at concentrations exceeding 1.0E-06 risk.

Parking Area Subunit

- Prevent future residents from exposure to antimony in surface soil at concentrations exceeding HQ > 1.

Remedial Goals

Remedial goals (RGs) provide a measure that the RAO will achieve for a selected remedial action. RGs were calculated for the future residential (unrestricted) receptor to

correspond to a target HQ of 1 or a target cancer risk of 1.0E-06. RGs for the Building Pad Subunit and the Parking Area Subunit are presented in Tables 6 and 7, respectfully.

Applicable or Relevant and Appropriate Requirements

Section 121(d) of CERCLA, as amended by the Superfund Amendments Reauthorization Act (SARA), requires that remedial actions for cleanup of hazardous substances must comply with requirements and standards set forth under federal and state environmental laws and regulations that are applicable or relevant and appropriate (i.e., ARARs). ARARs include only federal or state environmental or facility laws and regulations and do not include occupational safety or worker protection requirements. SARA requires that the remedial action for a site meet all ARARs unless a waiver is invoked.

ARARs consist of two sets of requirements: those that are applicable, and those that are relevant and appropriate. Applicable requirements are those substantive standards that specifically address the situation at a CERCLA site and are promulgated under federal or state environmental laws. If a requirement is not applicable, it may still be relevant and appropriate. "Applicability" is a legal and jurisdictional determination, while the determination of "relevant and appropriate" relies on professional judgment, considering environmental and technical factors at the site. A requirement may be "relevant", in that it covers situations similar to that at the site, but may not be "appropriate" to apply for various reasons and, therefore, not well suited to the site. In some situations, only portions of a requirement or regulation may be judged relevant and appropriate; if a requirement is applicable, however, all substantive parts must be followed. In addition to ARARs, many federal and state environmental and public health programs include criteria, guidance, and proposed standards that are not legally binding but provide useful approaches or recommendations. Such information is required to-be-considered when RGs are developed.

Three alternatives were evaluated for the Gunsite 012 OU and the ARAR evaluation was presented in the SB/PP. There are no ARARs associated with the selected remedy (LUC) for Gunsite 012 OU. Therefore no ARAR evaluation is presented in this ROD.

IX. DESCRIPTION OF ALTERNATIVES

This section presents and summarizes the remedial alternatives for the final remedy for the Gunsite 012 OU. In accordance with the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), it is desirable, when practical, to offer a range of diverse alternatives to compare during the detailed analyses. The range of alternatives includes an option that involves no treatment yet provides protection to human health and the environment by preventing or controlling exposure through LUCs.

The following three (3) remedial alternatives were considered for the Gunsite 012 OU for the Building Pad and Parking Area Subunits:

- Alternative 1: No Action
- Alternative 2: LUCs
- Alternative 3: Excavation and Removal of Contaminated Soils

Alternative 1: No Action

Total Present Worth Cost \$0

As required by the NCP, the No Action alternative is provided as a baseline for comparison. Under this alternative, no efforts would be made to control access, limit exposure, or reduce contaminant toxicity, mobility, or volume. This alternative would leave the Gunsite 012 OU in its current condition with no additional controls. This alternative is not effective in achieving the RAOs, and there are no capital construction or system operation and maintenance costs. The No Action alternative is insufficient in protecting human health and environment. This alternative does not include five-year remedy reviews.

Alternative 2: Land Use Controls

Total Present Worth Cost \$418,981

This alternative involves only the use of LUCs to prohibit residential use at the Building Pad Subunit and Parking Area Subunit. LUCs will include institutional controls (i.e., administrative measures) as managed through the SRS Site Use/Site Clearance Program to require authorization before beginning an excavation activity at the site. This authorization is usually in the form of an internal SRS permit. Other administrative measures include property record notices and property record restrictions. LUCs will also include signage at the Gunsite 012 OU to alert on-site workers to the presence of hazardous substances and to prevent unknowing entry and unrestricted use. LUCs meet the threshold and balancing criteria requirements and are the least expensive alternative besides the No Action alternative. As shown in Figure 15, the extent of the LUCs to the Building Pad and Parking Area Subunits where the contamination occurs, and not the entire Gunsite 012 OU (Figure 15).

Alternative 3: Excavation and Removal of Contaminated Soils

Total Present Worth Cost \$1,382,509

This alternative involves the removal of PAH-contaminated soils from within the Building Pad Subunit to a depth of 0.33 m (1 ft) and antimony contaminated soil within the disposal trench at the Parking Area Subunit to a depth of 1.2 m (4 ft) to support unrestricted land use. The area of excavation includes the contaminated soils between the building pads as well as the contaminated soils in the disposal trench. All vegetative growth throughout the Building Pad Subunit excavation area would need to be removed and disposed of appropriately. Excavation within the disposal trench is not planned to increase its overall footprint area. This alternative would be required to meet the residential Remedial Goals (RGs) as presented in Tables 6 and 7 in order to allow unrestricted land use (i.e., no future LUCs).

The resultant volumes of soils that would be removed from the Building Pad Subunit and the Parking Area Subunit are 3,073 m³ and 11 m³ (4,020 yd³ and 14 yd³), respectively. A total of 3,084 m³ (4,034 yd³) would be removed. The proposed excavation areas are shown on Figure 16 and apply to 1.008 ha (2.5 ac) of the Building Pad Subunit plus 0.0009 ha (0.002 ac) of the disposal trench in the Parking Area Subunit rather than the entire OU. The excavated material would be disposed at the Three Rivers Landfill. The excavated area would be filled with clean soil and re-vegetated.

X. COMPARATIVE ANALYSIS OF ALTERNATIVES

The NCP [40 CFR 300.430(e)(9)] requires that potential remedial alternatives undergo detailed analysis using relevant evaluation criteria that will be used by decision makers to select a final remedy. The results of the detailed analysis are then examined to compare alternatives and identify key tradeoffs among alternatives. Potential alternatives that address the Gunsite 012 OU are individually evaluated in detail against the CERCLA requirements. A comparative analysis is then conducted for the corrective measure/remedial alternatives.

The statutory requirements that guide the evaluation of remedial alternatives in a CERCLA Feasibility Study state that a remedial action must:

- Be protective of human health and the environment;
- Attain ARARs or define criteria for invoking a waiver;
- Be cost effective; and
- Use permanent solutions to the maximum extent.

USEPA has established nine evaluation criteria to address these statutory requirements under CERCLA. The criteria fall into the categories of threshold criteria, primary balancing criteria, and modifying criteria. Modifying criteria (i.e., state or support

agency acceptance and community acceptance) will be evaluated after the public comment period on the SB/PP. Evaluation criteria categories and the nine evaluation criteria are listed and explained in the following discussion.

Threshold Criteria

Threshold criteria are requirements that each alternative must achieve to be eligible for selections as a permanent remedy under CERCLA. The threshold criteria are:

- Overall protection of human health and the environment.
- Compliance with ARARs.

Primary Balancing Criteria

Primary balancing criteria are factors that identify key tradeoffs among alternatives. The primary balancing criteria are:

- Long-term effectiveness and permanence.
- Reduction of mobility, toxicity, or volume through treatment.
- Short-term effectiveness.
- Implementability.
- Cost.

Modifying Criteria

Modifying criteria (i.e., state or support agency acceptance; community acceptance) will be considered during remedy selection. The modifying criteria are:

- State or support agency acceptance.
- Community Acceptance.

Comparative Analysis of the Gunsite 012 OU Alternatives

A comparative analysis summary and ranking of the three Gunsite 012 OU alternatives is presented below and summarized in Table 8.

Overall Protection of Human Health and the Environment

With the exception of No Action (Alternative 1), all alternatives are protective of human health and the environment. LUCs (Alternative 2) are protective of human health by restricting exposure to PAHs in soil at the Building Pad subunit and antimony in the disposal trench within the Parking Area subunit. LUCs require no excavation activities that would pose an exposure risk to workers; therefore, with complete adherence to the LUCs, this alternative would be more protective than Excavation and Removal of Contaminated Soil (Alternative 3). Alternative 3 is protective of human health through the removal of contaminated media from the Gunsite 012 OU. However, Alternative 3 will pose a risk to workers due to the earthwork, handling, and transportation involved in the remedy.

Compliance with ARARs

Potential ARARs were presented in the SB/PP for the three alternatives (SRNS 2010a). However, there are no chemical-specific, location-specific, or action-specific ARARs

associated with application of LUCs as the selected remedy; therefore, no ARARs are presented in this ROD.

Long-Term Effectiveness and Permanence

The remedial alternatives are assessed on their ability to maintain reliable protection of human health and the environment after implementation. Alternative 1 (No Action) has no long-term effectiveness or permanence since no action is taken to mitigate the residual risk. Alternative 2 (LUCs) is protective and provides long-term effectiveness and permanence as long as LUCs criteria are met. Alternative 3 meets these criteria by excavation and removal of contaminated soils.

Reduction of Toxicity, Mobility, or Volume through Treatment

The statutory preference is to select a remedial action that employs treatment to reduce the toxicity, mobility, or volume of hazardous substances. The degree to which alternatives employ recycling or treatment is assessed, including how treatment is used to address the principal threats posed by the unit.

None of the alternatives evaluated provided a reduction in the toxicity, mobility, or volume of contaminants through treatment.

Short-Term Effectiveness

Evaluation of alternatives for short-term effectiveness takes into account protection of remedial workers, members of the community, and the environment during implementation of the remedial action and the time required to achieve RAOs/RGs. Schedule estimates are based on projected availability of materials and labor and may have to be updated at the time of remediation.

Short-term effectiveness is not applicable to the No Action alternative since it does not involve any remedial activities. Alternative 2 achieves RAOs in a short period of time

with a low risk to workers and the public. Alternative 3 would also achieve RAOs in a short period of time, but poses a risk to workers because of the earthwork, handling, and transportation involved in the remedies.

Implementability

The remedial alternatives are assessed by considering the difficulty of implementing the alternative, including technical feasibility, constructability, reliability of technology, ease of undertaking additional remedial actions (if required, monitoring considerations, administrative feasibility (regulatory requirements), and availability of services and materials.

Alternative 1 (No Action) involves no implementation. Alternatives 2 and 3 are readily implemented.

Cost

Accuracy of present-worth costs is +50/-30 percent according to USEPA guidance. Detailed cost estimates are derived from current information, including vendor quotes, conventional cost-estimating guides (e.g., Means Site Work Cost Data), and costs associated with similar projects. The cost estimates are included for comparison only and are not intended to forecast actual budgetary expenditures. The actual costs of the project depend on labor and material costs, site conditions, competitive market conditions, final project scope, and implementation schedule at the time that the remedial activities are initiated. In estimating the present-worth costs, a discount rate of 3.9% is used and inflation is assumed to be 0%. Present-worth costs for review of the site remedy every five years are given for each alternative for which residuals remain at the site. Present-worth costs for these items are based on an estimated time frame of operation.

The No Action alternative is the least expensive of all the alternatives (\$0). Alternative 2 (\$418,981) is less expensive than Alternative 3 (\$1,382,509). Detailed costs for each alternative are provide in Tables 9, 10, and 11.

State or Support Agency Acceptance

State acceptance criteria were evaluated based on scoping meetings held between USDOE, USEPA, and SCDHEC and are based on comments received on the final SB/PP. Regulatory approval of the proposed action, Alternative 2 (LUCs), in the SB/PP constitutes acceptance of the selected remedy.

Community Acceptance

The community acceptance of the preferred alternative was assessed by giving the public an opportunity to comment on the remedy selection process. A public comment period began on December 20, 2010 and ended on February 3, 2011. A Responsiveness Summary is provided in Appendix A to address public comments on the SB/PP. No comments were received during the public comment period.

XI. THE SELECTED REMEDY

A remedy of No Action has been selected for the ECODS G-3 (Adjacent to Gunsite 012) (NBN), the Rubble Pile Across from Gunsite 012 (Gun Emplacement Area Subunit), and the Groundwater Subunit associated within the Gunsite 012 OU (NBN). There is no waste to treat, no LUCs are required, and there are no ARARs for these RCRA/CERCLA Units and the associated Subunits. Because there are no problems warranting action at these units, no action will be taken. These units pose no risk to human health or the environment and warrant unrestricted land use.

The selected remedy for the Gunsite 012 Rubble Pile (NBN) which includes the Building Pad and Parking Area Subunits is Alternative 2, LUCs. This remedy was selected because it effectively achieves the RAO for the residential exposure scenario, is easily implementable, is cost effective, and provides the best balance of tradeoffs between the no action and removal with off-site disposal alternatives. Additionally, a remedial alternative for the Gunsite 012 OU to achieve unrestricted land use is not necessary because of its close proximity to other operable units within the LTR watershed,

particularly Pond B. Pond B is currently under evaluation through the IOU program, but is expected to be under LUCs for a significant length of time based on the radiological contamination present in the pond sediments. Based on the proximity of Pond B to the Gunsite 012 OU, future unrestricted use is not anticipated for the area. The area that will be under LUCs for the Gunsite OU is shown in Figure 15. Table 12 shows the types of controls, purposes of control, duration, implementation method, and affected areas.

LUCs for the Gunsite 012 OU include the following:

- Institutional controls (i.e., administrative measures) and use restrictions for on-site workers via the SRS Site Use/Site Clearance Program. Other administrative controls to ensure worker safety include work controls, worker training, and workers briefing of health and safety requirements prior to access being granted.
- Engineering controls including signage located at the Building Pad Subunit and Parking Area Subunit boundaries shown in Figure 15 to prevent unauthorized entry and uses. The date for installation of the signs will be stated in the unit-specific LUCIP referenced in this ROD.
- Access controls to prevent exposure to trespassers, as described in the 2000 RCRA Part B Permit Renewal Application, Volume I, Section F.1, which describes the security procedures and equipment, 24-hour surveillance system, artificial or natural barriers, control entry systems, and warning signs in place at the SRS boundary.

In the long term, if the property, or any portion thereof, is ever transferred from DOE, the U.S. Government and/or DOE will take those actions necessary pursuant to Section 120(h)(1) of CERCLA. Those actions will include in any contract, deed, or other transfer document, notice of the type and quantity of any hazardous substances that were known to have been stored (for more than one year), released, or disposed of on the property.

The notice will also include the time at which the storage, release, or disposal took place to the extent such information is available.

In addition, if the property, or any portion thereof, is ever transferred by deed, the U.S. Government will also satisfy the requirements of CERCLA 120(h)(3). The requirements include: a description of the remedial action taken, a covenant, and an access clause. 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.

LUCs will be implemented through the following:

- The contract, deed, or other transfer document shall also include restrictions precluding residential use of the property. However, the need for these 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 LUCs 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.

In the event of a property lease or interagency agreement, the equivalent restrictions will be implemented as required by CERCLA Section 120(h).

The selected remedy for the Gunsite 012 Rubble Pile leaves hazardous substances in place that pose a potential future risk and will require land use restrictions for an indefinite period of time. As agreed on March 30, 2000, among the USDOE, USEPA, and SCDHEC, SRS is implementing a LUCAP to ensure that the LUCs required by numerous remedial decisions at SRS are properly maintained and periodically verified. The unit-specific LUCIP referenced in this ROD will provide details and specific

measures required to implement and maintain the LUCs selected as part of this remedy. USDOE is responsible for implementing, maintaining, monitoring, reporting upon, and enforcing the LUCs selected. The LUCIP, developed as part of this action, will be submitted concurrently with the Corrective Measures Implementation/Remedial Action Implementation Plan (CMI/RAIP), as required in the FFA for review and approval by USEPA and SCDHEC. Upon final approval, the LUCIP will be appended to the LUCAP and is considered incorporated by reference into the ROD, establishing LUC implementation and maintenance requirements enforceable under CERCLA and the *SRS FFA* (FFA 1993). The approved LUCIP will establish implementation, monitoring, maintenance, reporting, and enforcement requirements for the unit. The LUCIP will remain in effect unless and until modifications are approved as needed to be protective of human health and the environment. The LUCs shall be maintained until the concentration of hazardous substances associated with the unit have been reduced to levels that allow for unlimited exposure and unrestricted use. Approval by EPA and SCDHEC is required for any modification or termination of the LUCs.

USDOE has recommended that residential use of SRS land be controlled; therefore, future residential use and potential residential water usage will be restricted to ensure long-term protectiveness. LUCs will restrict the Gunsite 012 OU to future industrial use and will prohibit residential use of the area. Unauthorized excavation will also be prohibited and the waste unit will remain undisturbed. LUCs selected as part of this action will be maintained for as long as they are necessary and termination of any LUCs will be subject to CERCLA requirements for documenting changes in remedial actions.

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

- Prevent unrestricted use of the Building Pad Subunit and the Parking Area Subunit;

- Prohibit the development and use of property for residential housing, elementary and secondary schools, child care facilities and playgrounds.

Cost Estimate for the Selected Remedy

The information in the cost estimate shown in Table 10 is based on the best available information regarding the anticipated scope of the remedial alternative. Changes in the cost elements are likely to occur as a result of new information and data collected during the engineering design of the remedial alternative. Major changes may be documented in the form of a memorandum in the Administrative Record File, an Explanation of Significant Difference (ESD), or a ROD amendment. This is an order-of-magnitude engineering cost estimate that is expected to be within +50 to -30 percent of the actual project cost.

Estimated Outcomes of Selected Remedy

LUCs will be maintained by DOE as long as soil levels exceed the clean up levels for unrestricted use. They will be maintained for protection of human health and the environment at the Gunsite 012 OU by restricting land disturbance activities and by restricting land use to industrial use only.

Waste Disposal and Transport

Because LUCs is the selected remedy, there will be no waste streams generated during the remedial action.

XII. STATUTORY DETERMINATIONS

Based on the Gunsite 012 OU characterization data and risk evaluation results, the Gunsite 012 OU poses a risk to human health and the environment. Therefore, Alternative 2 – LUCs, has been selected as the remedy for the Gunsite 012 OU. As part of the selected remedy, the future land use of the Gunsite 012 OU will be industrial.

This alternative was selected because it is protective of human health and the environment by preventing exposure to soil contamination. It provides the best balance of tradeoffs between alternatives because it offers adequate protection at a minimal cost. The selected remedy is protective of human health and the environment, is easily implementable, is cost-effective, and provides the best balance of tradeoffs between the no action and removal and off-site disposal alternatives. The remedy does not satisfy the preference for treatment as a principal element of the remedy since the remedy does not reduce toxicity, mobility, or volume of materials through treatment.

In accordance with Section 121(c) of CERCLA and NCP §300.430(f)(5)(iii)(c), a statutory review will be conducted within 5 years of initiation of the remedial action, and every 5 years thereafter, to ensure that the remedy continues to be protective of human health and the environment.

XIII. EXPLANATION OF SIGNIFICANT CHANGES

The remedy selected in this ROD does not contain any significant changes from the preferred alternative presented in the SB/PP (SRNS 2010a).

Since this ROD submittal period is overlapping with the SB/PP public comment period, any comments received during the 45-day public comment period will be included in the revised ROD.

XIV. RESPONSIVENESS SUMMARY

The 45-day public comment period for the SB/PP for the Gunsite 012 OU began on December 20, 2010 and ended on February 3, 2011. The Responsiveness Summary is included as Appendix A of this document.

XV. POST-ROD DOCUMENT SCHEDULE AND DESCRIPTION

A detailed schedule for the post-ROD activities is provided in Figure 17.

XVI. REFERENCES

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

SRNS, 2009a. *Removal Site Evaluation Report / Engineering Evaluation / Cost Analysis (RSER/EE/CA) for Asphalt Floor Tile Piles at Gunsite 012 Operable Unit (U)*, SRNS-RP-2009-01026, Rev 1, December, 2009

SRNS 2009b. *Periodic Report 3 for the Lower Three Runs Integrator Operable Unit*, SRNS-RP-2009-00763, Rev.1, Savannah River Nuclear Solutions, LLC, Savannah River Site, Aiken, SC

SRNS, 2010a. *Statement of Basis/Proposed Plan for the Gunsite 012 Operable Unit (NBN) (U)*, SRNS-RP-2010-00502, Savannah River Nuclear Solutions, Savannah River Site, Aiken, SC

SRNS, 2010b. *RCRA Facility Investigation / Remedial Investigation (RFI/RI) Report with Baseline Risk Assessment (BRA) and Corrective Measures Study / Feasibility Study (CMS/FS) for the Gunsite 012 (U)*, SRNS-RP-2009-00978, Revision 1.2, Savannah River Nuclear Solutions, Savannah River Site, Aiken, SC

USDOE, 1996. *SRS Future Use Project Report, Stakeholder Preferred Recommendations for SRS Land Use Facilities*, United States Department of Energy, Savannah River Operations Office, Aiken, SC

USEPA, 1991. *Role of the Baseline Risk Assessment in Superfund Remedy Selection Decisions*, OSWER Directive 9355.0-30, U.S. Environmental Protection Agency, Washington, SC

USEPA 2009. *Regional Screening Levels Table*, United States Environmental Protection Agency, dated April 2009 http://www.epa.gov/reg3hwmd/risk/human/rb_concentration_table/index.htm.

WSRC, 1998. *Site Evaluation Report for the Gunsite 012 Rubble Pile (Rubble Pile Across From Gunsite 012)*; WSRC-RP-98-4057, Washington Savannah River Company, Savannah River Site, Aiken, SC

WSRC, 2008. *RCRA Facility Investigation/Remedial Investigation (RFI/RJ) Work Plan for the Gunsite 012 Operable Unit (OU)*, WSRC-RP-2007-4052, Revision 0, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

WSRC, 1999. *Land Use Control Assurance Plan for the Savannah River Site*, Revision 1.1, WSRC-RP-98-4125, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

WSRC, 2006. *Savannah River Site Federal Facility Agreement Community Involvement Plan (U)*, WSRC-RP-96-120, Savannah River Operations Site, Aiken, SC

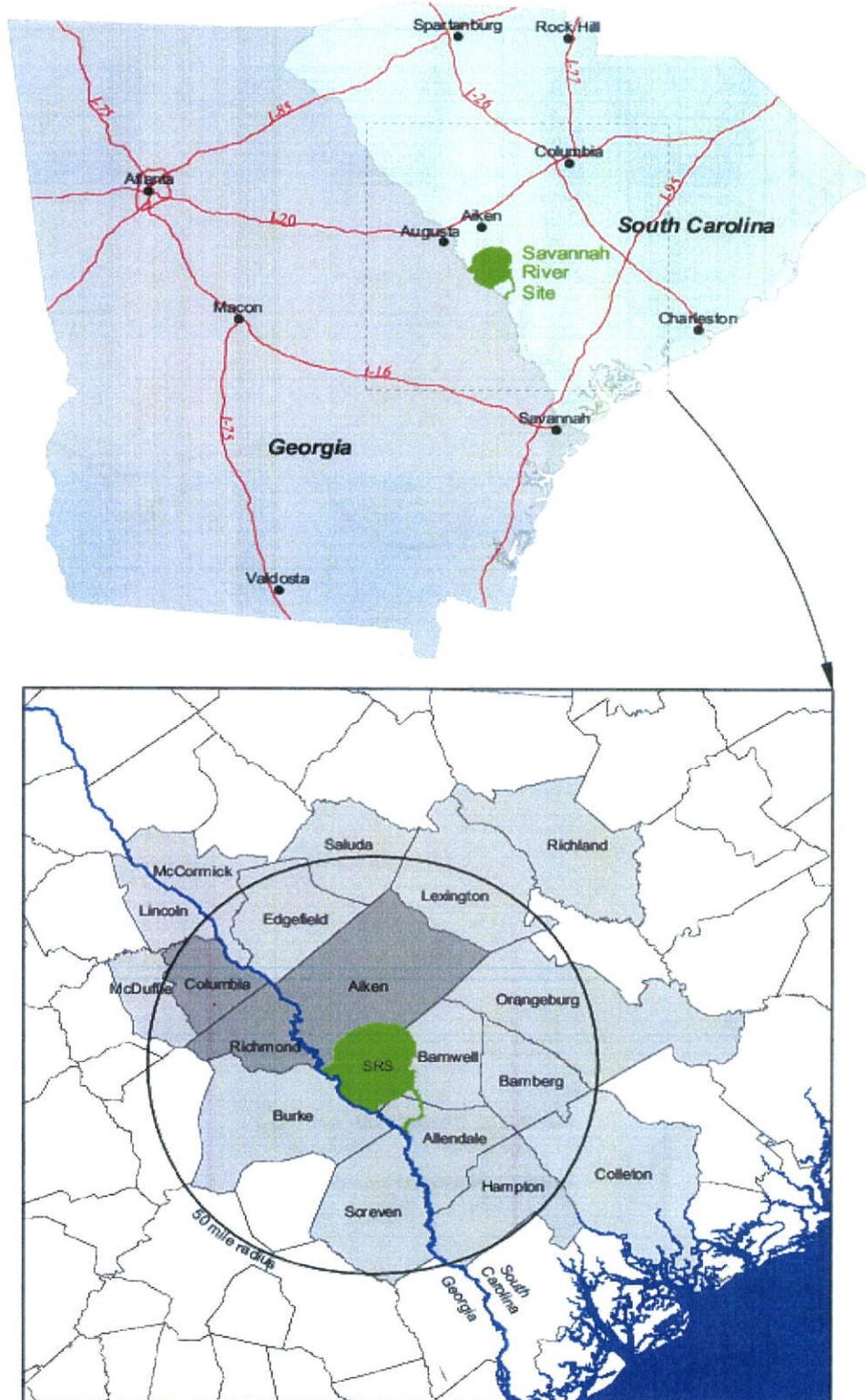


FIGURE 1. Location of the Savannah River Site

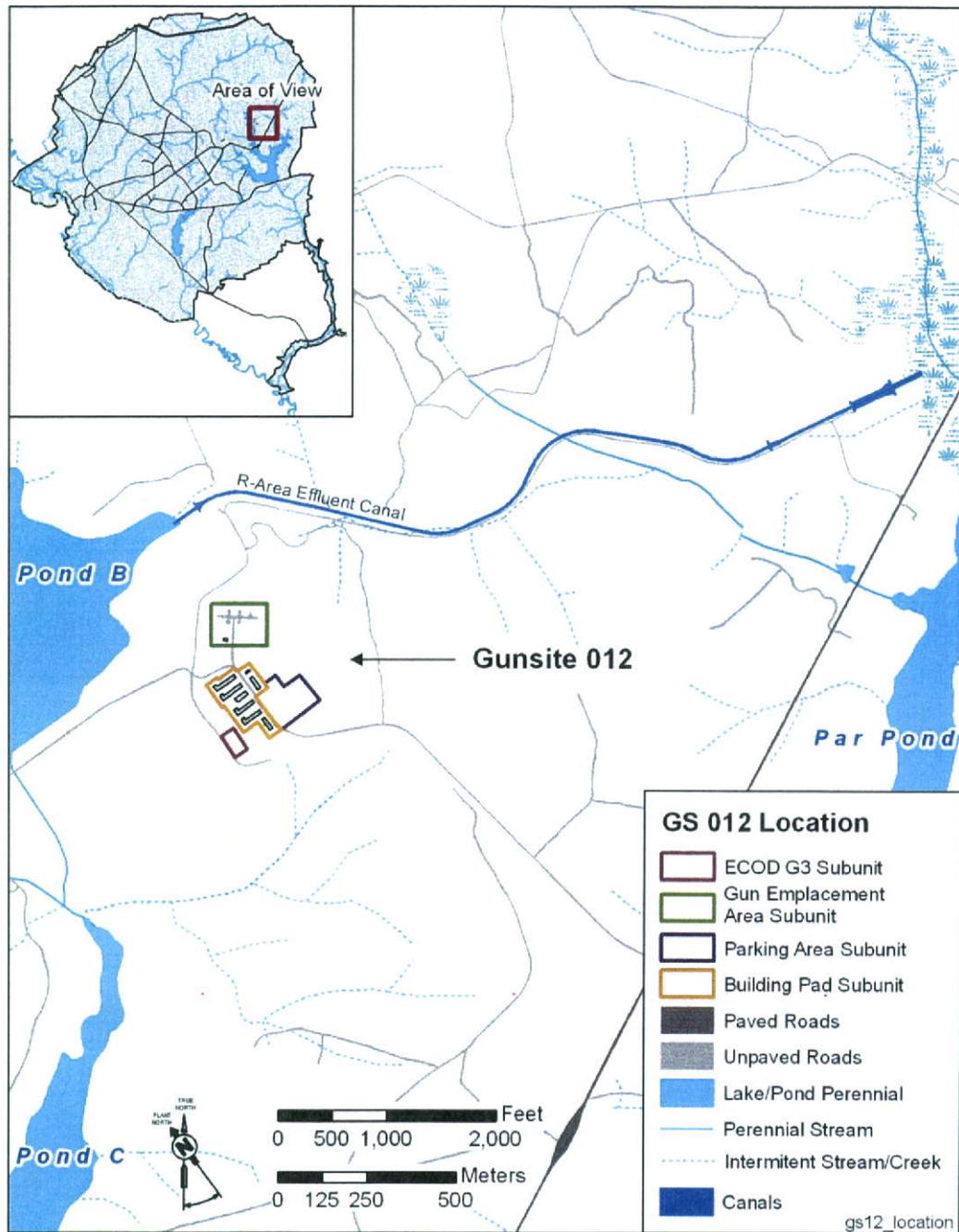


FIGURE 2. Location of the Gunsite 012 OU within the Savannah River Site

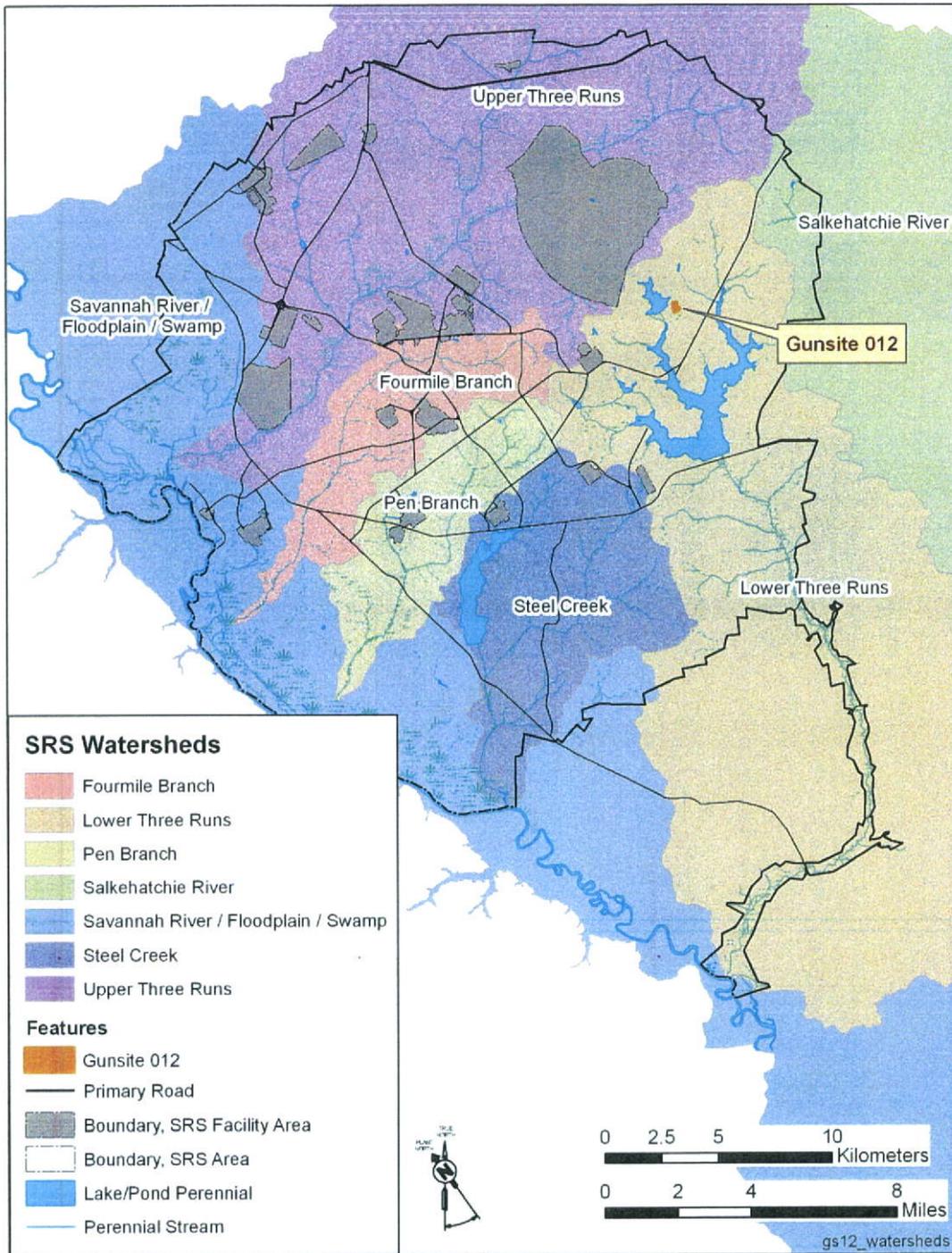


FIGURE 3. Layout of the Gunsite 012 OU within the Lower Three Runs Watershed

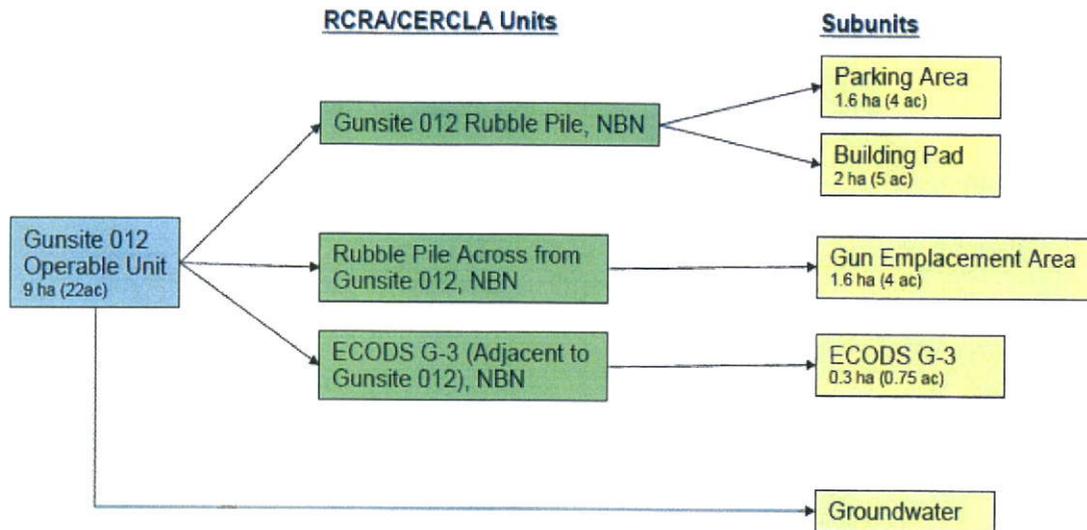


FIGURE 4. RCRA/CERCLA Units of the Gunsite 012 OU

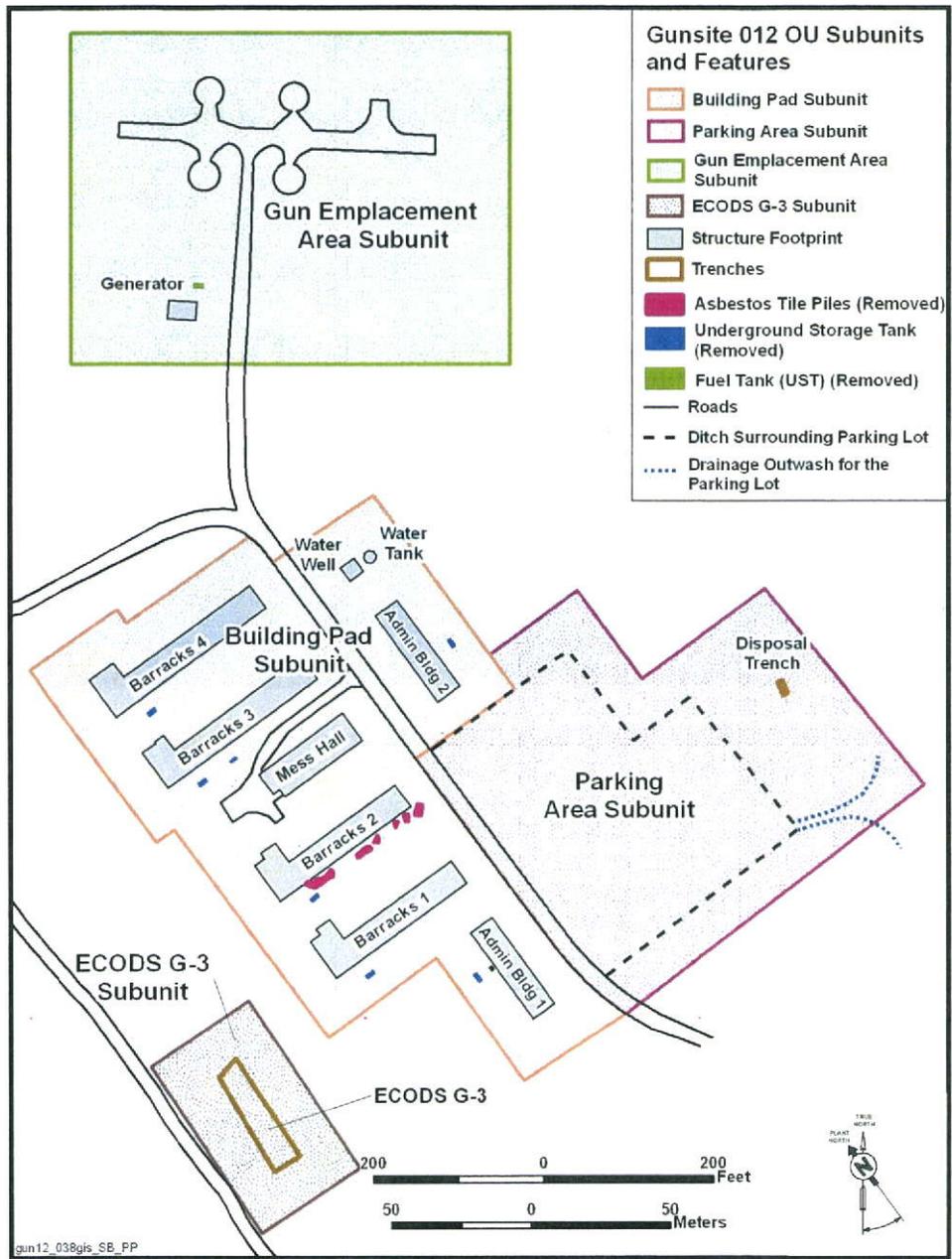


FIGURE 5. Gunsite 012 OU Subunits and Features

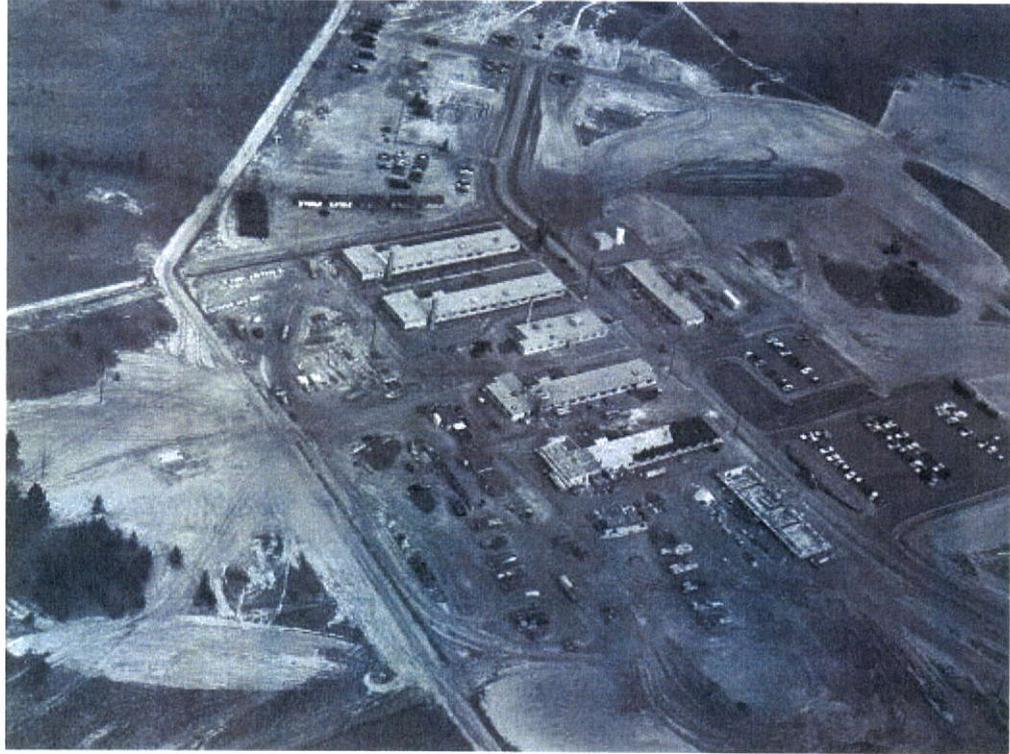


FIGURE 6. Aerial Photograph of Gunsite 012 During Operation

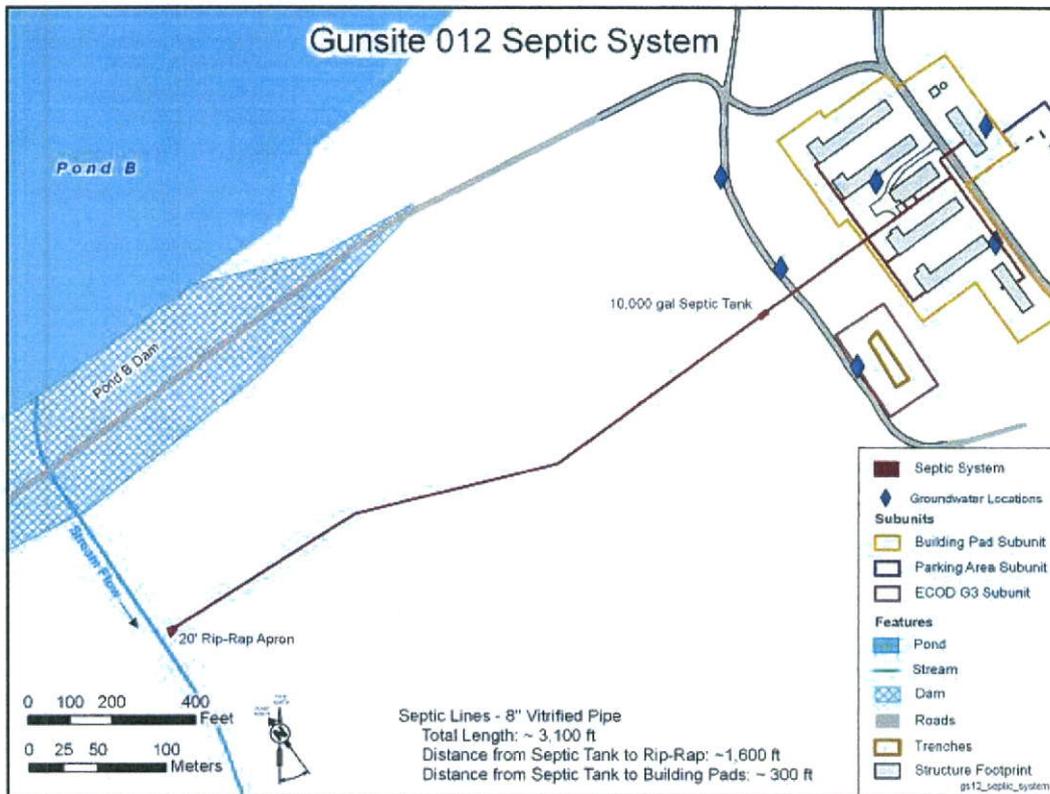


FIGURE 7. Septic System at Gunsite 012

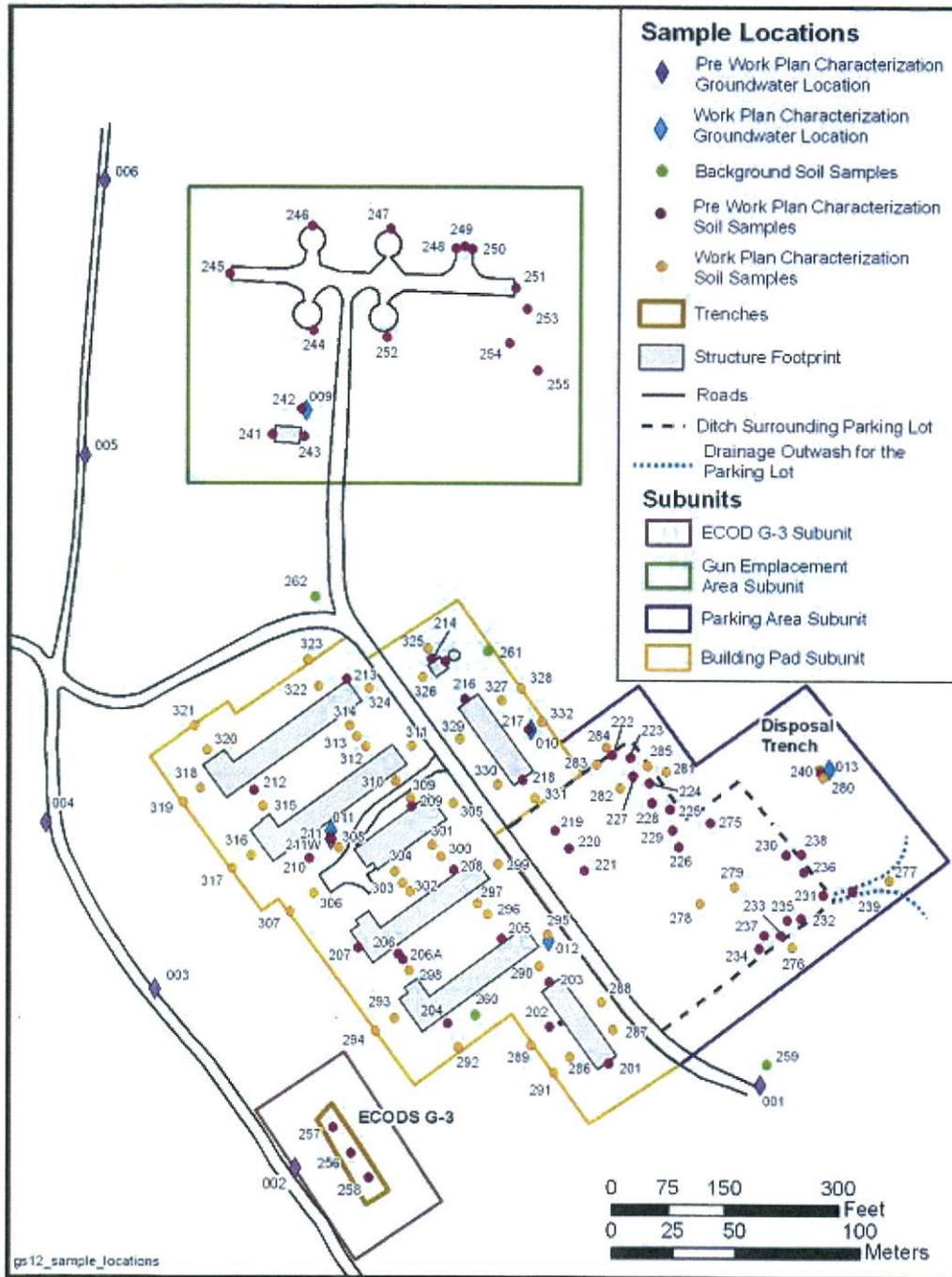


FIGURE 8. Pre-Work Plan and Work Plan Characterization Sample Locations

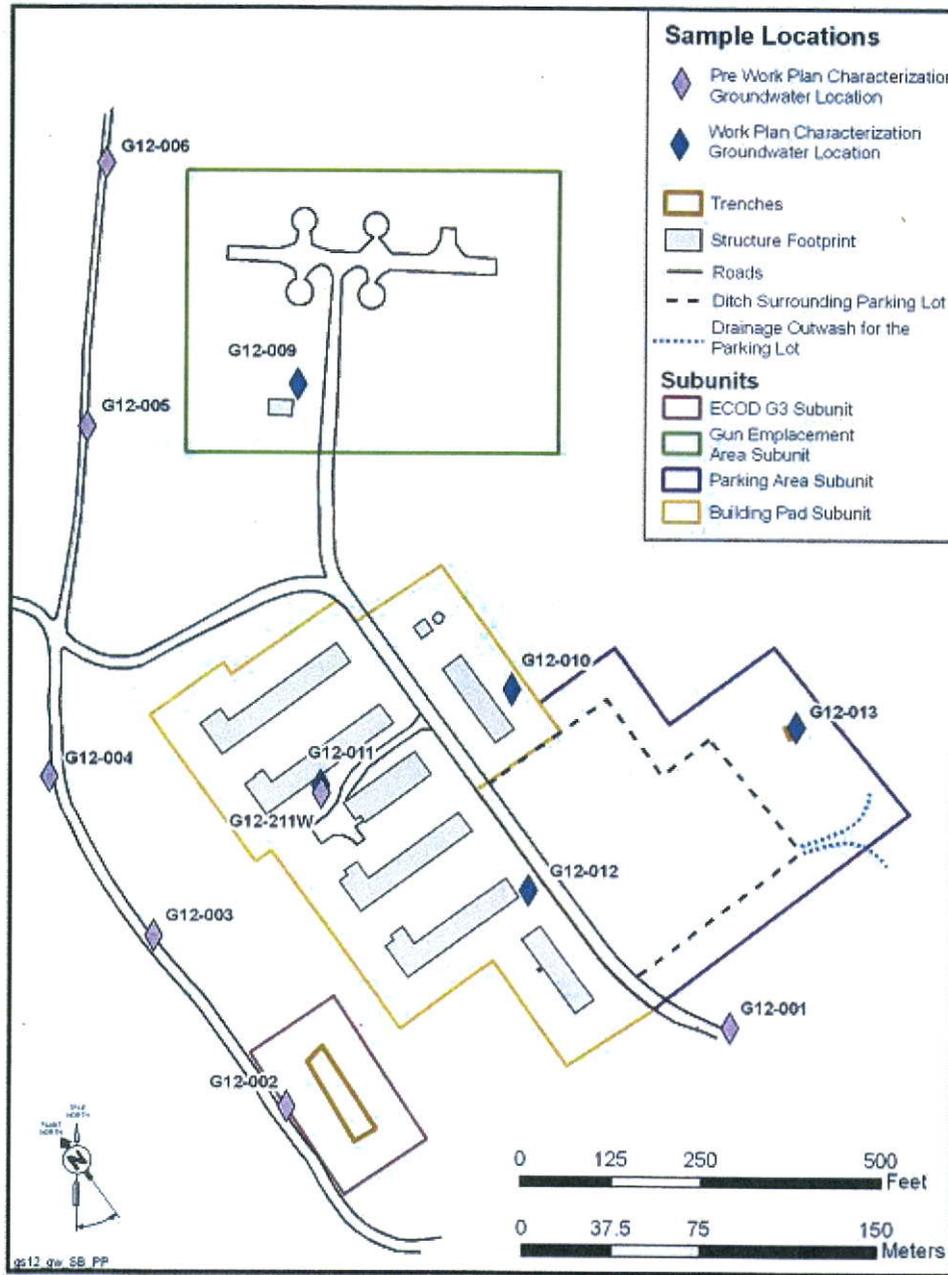
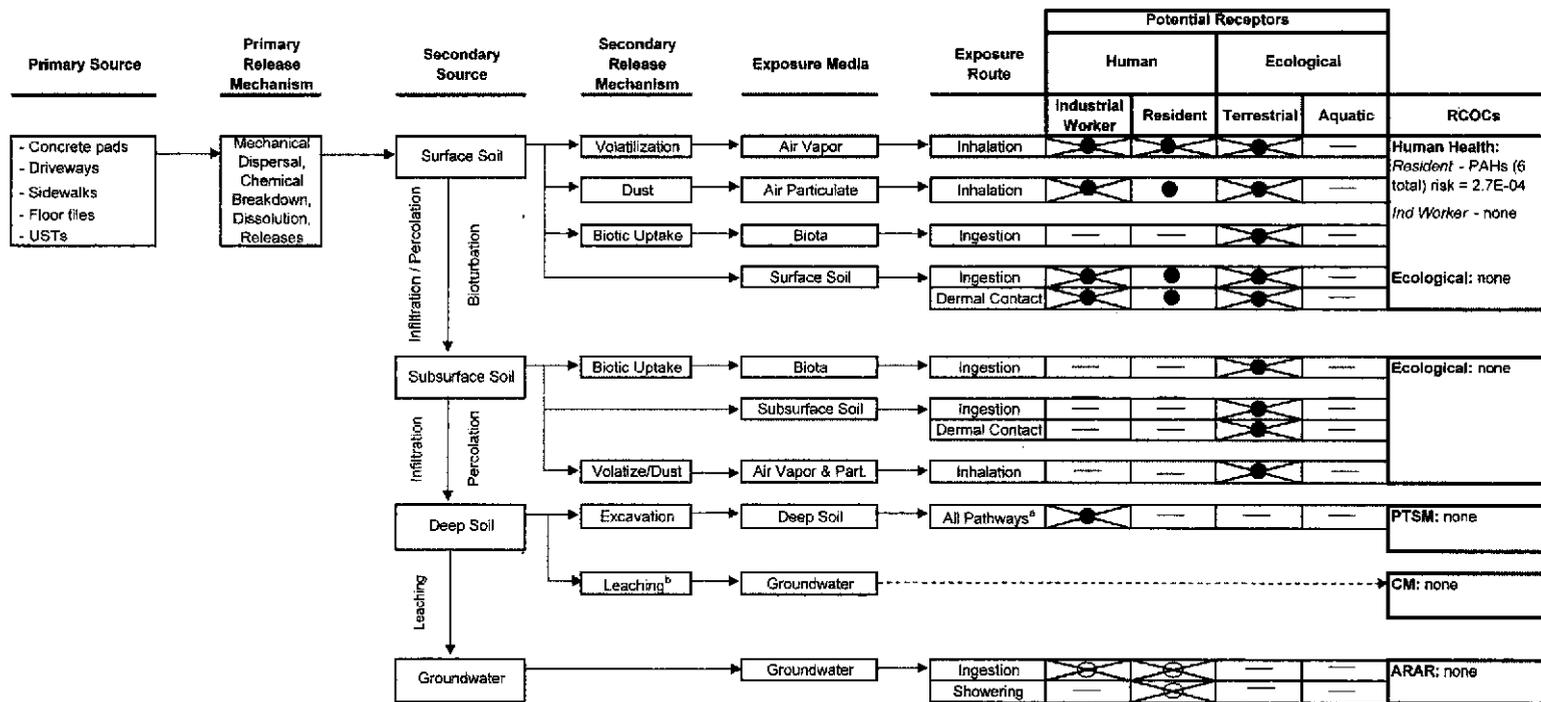


FIGURE 10. Groundwater Sample Location



a - All pathways represents ingestion, inhalation and dermal contact exposure for the principal threat source material (PTSM) evaluation for toxicity.
b - Leaching represents the potential of a contaminant in soil to migrate to groundwater above MCLs/RSLS per the contaminant migration (CM) analysis and does not represent a human or ecological exposure route.

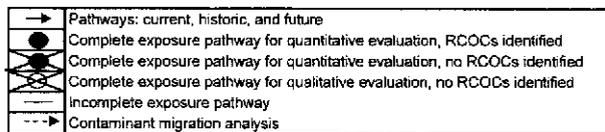
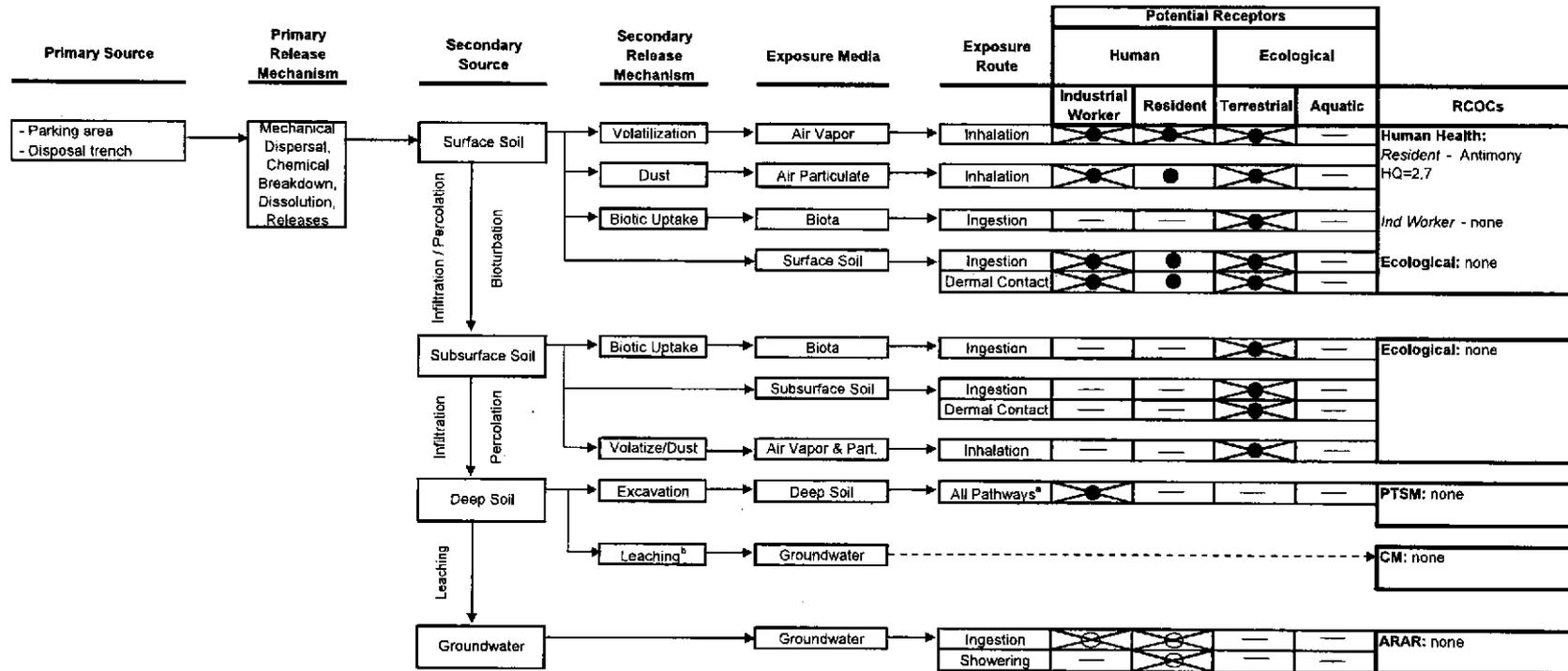


FIGURE 11. Conceptual Site Model for the Building Pad Subunit



a - All pathways represents ingestion, inhalation and dermal contact exposure for the principal threat source material (PTSM) evaluation for toxicity.
b - Leaching represents the potential of a contaminant in soil to migrate to groundwater above MCLs/RSLs per the contaminant migration (CM) analysis and does not represent a human or ecological exposure route.

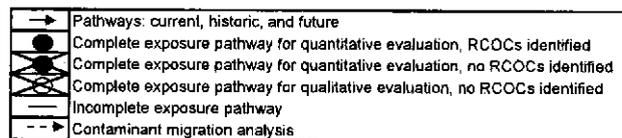
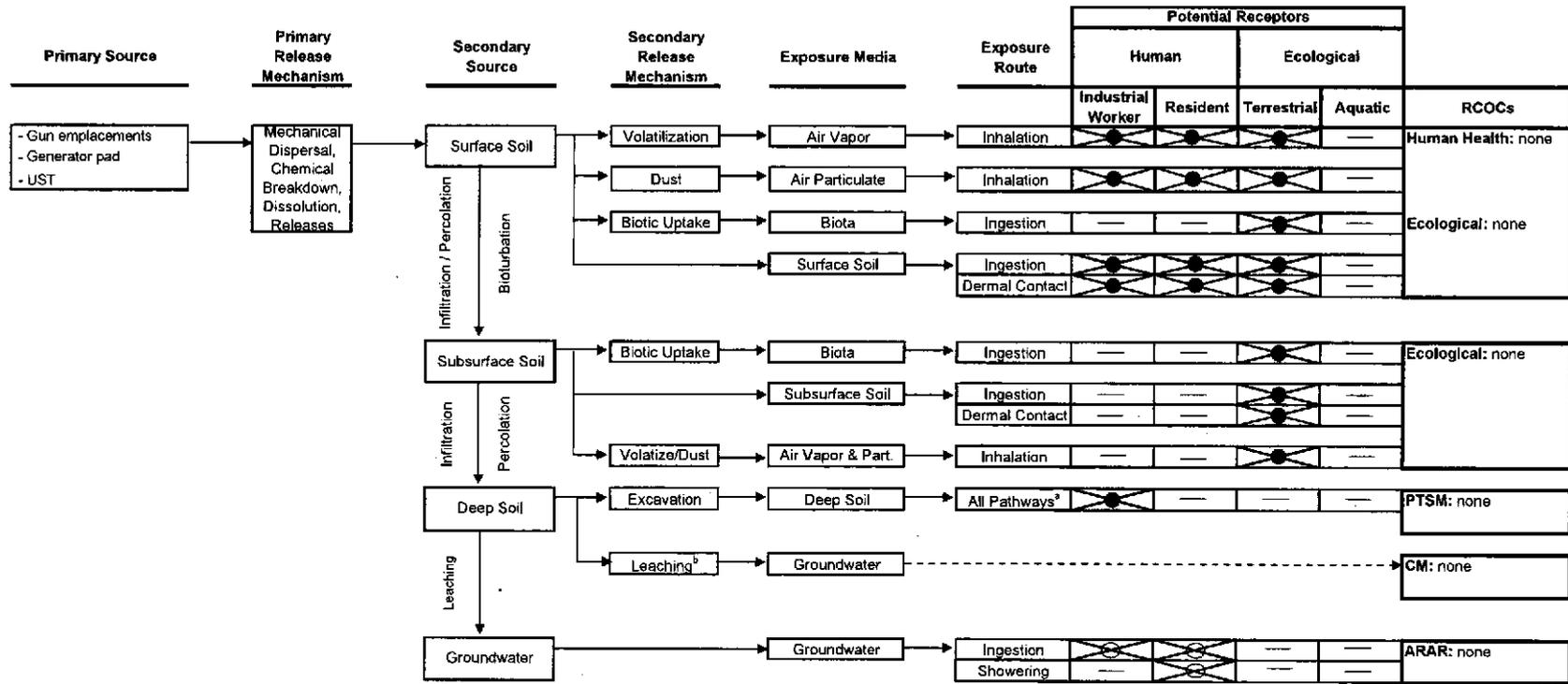


FIGURE 12. Conceptual Site Model for the Parking Area Subunit



a - All pathways represents ingestion, inhalation and dermal contact exposure for the principal threat source material (PTSM) evaluation for toxicity.

b - Leaching represents the potential of a contaminant in soil to migrate to groundwater above MCLs/RLs per the contaminant migration (CM) analysis and does not represent a human or ecological exposure.

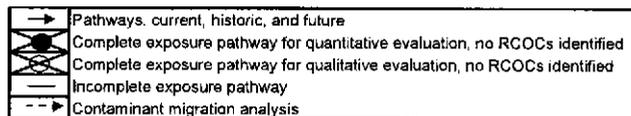
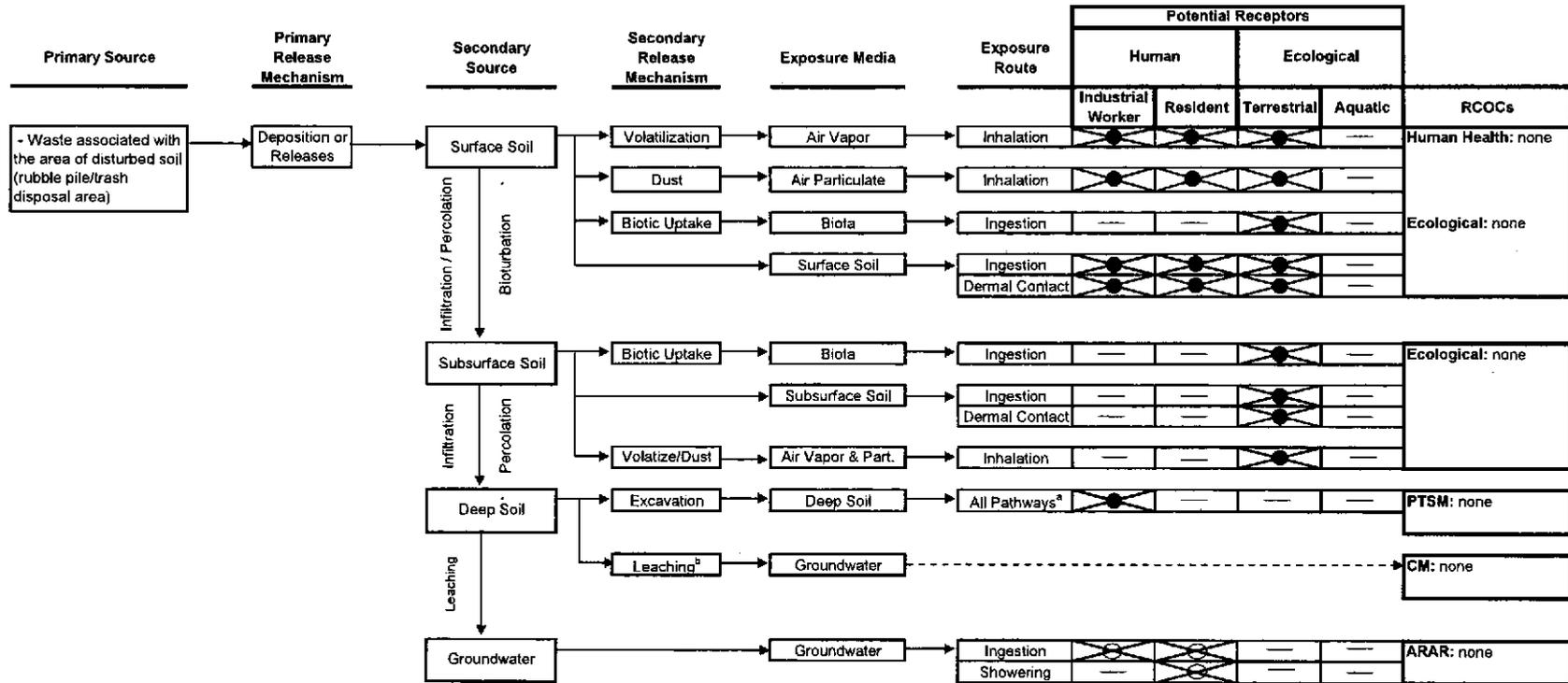


FIGURE 13. Conceptual Site Model for the Gun Emplacement Area Subunit



a - All pathways represents ingestion, inhalation and dermal contact exposure for the principal threat source material (PTSM) evaluation for toxicity.

b - Leaching represents the potential of a contaminant in soil to migrate to groundwater above MCLs/RSLs per the contaminant migration (CM) analysis and does not represent a human or ecological exposure.

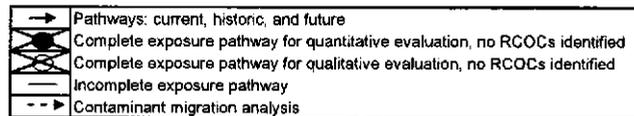


FIGURE 14. Conceptual Site Model for the ECODS-G3 Subunit

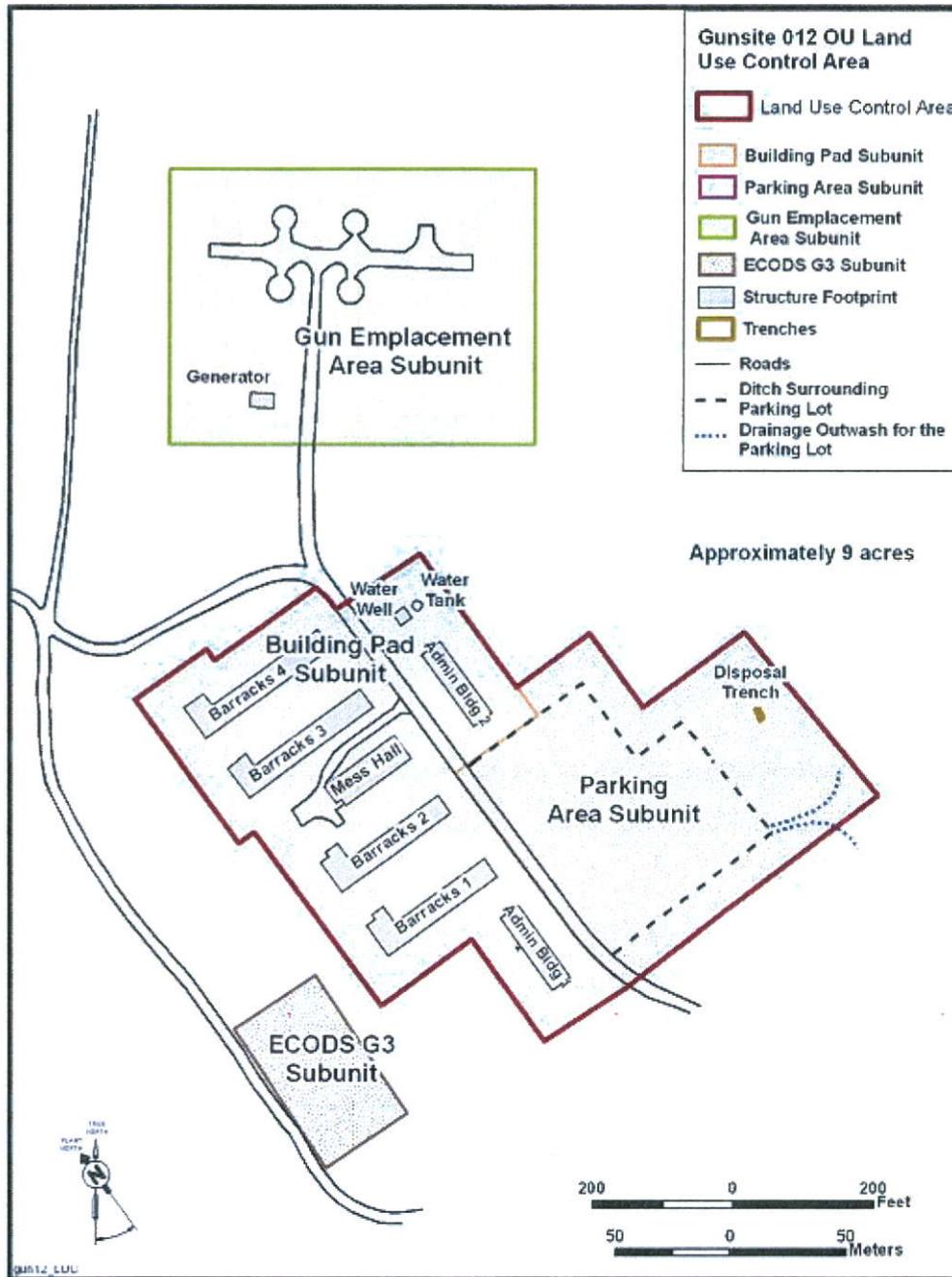


FIGURE 15. Area of Land Use Control for Alternative 2 – Land Use Controls

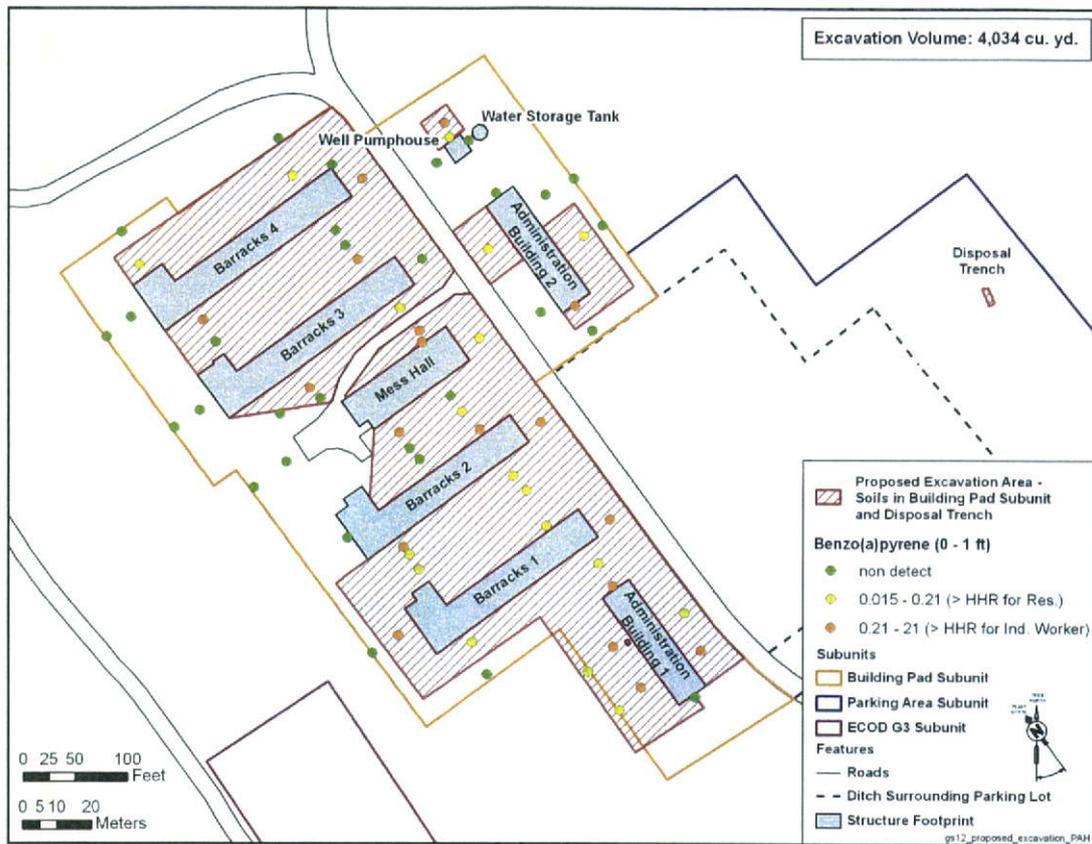


FIGURE 16. Soil Removal Area for Alternative 3 – Excavation and Removal of Contaminated Soils

**ROD for the Gunsite 012 (NBN) (U)
Savannah River Site
March 2011**

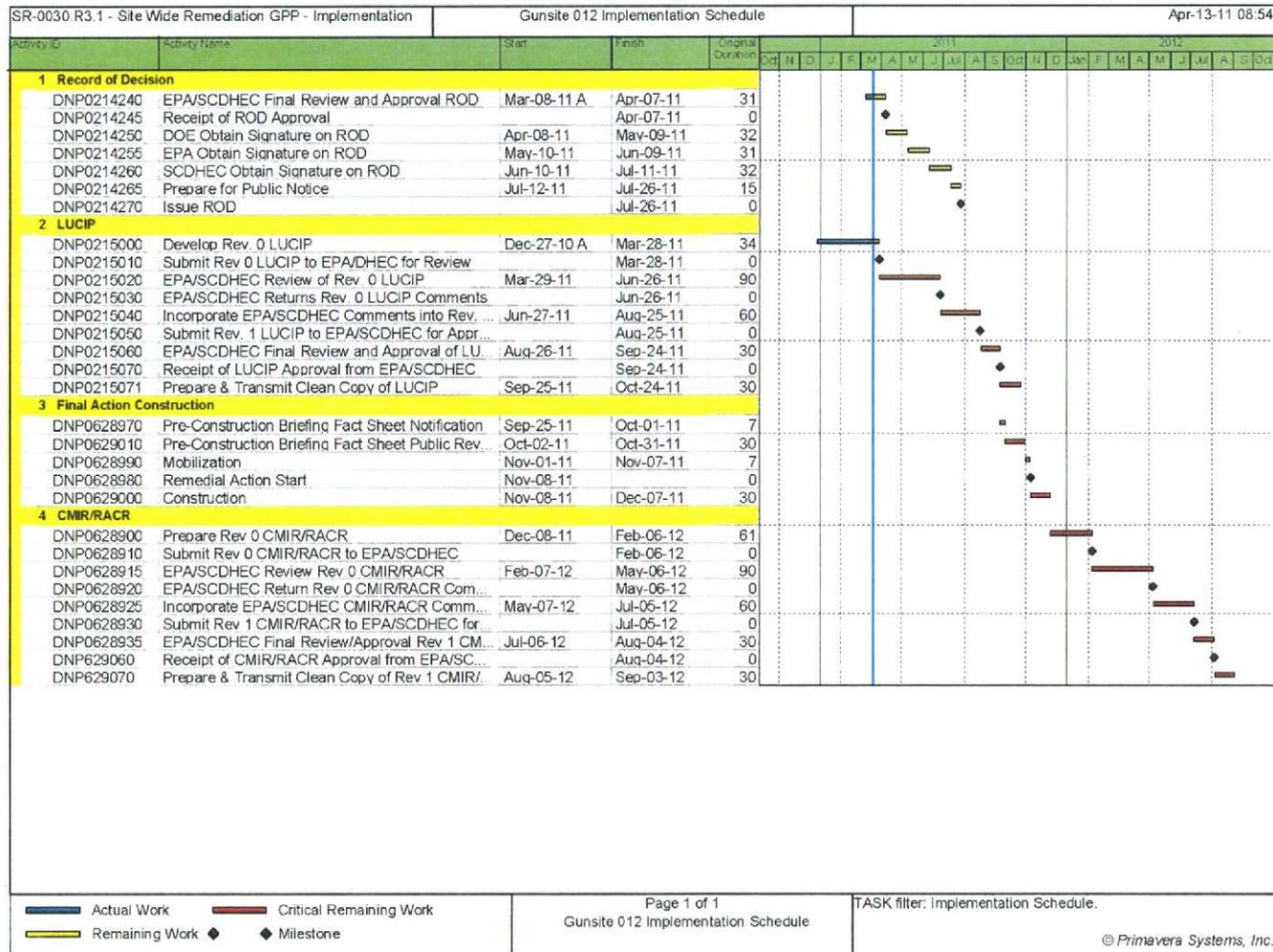


FIGURE 17. Implementation Schedule

TABLE 1. Summary of Refined Constituents of Concern and Medium-Specific Exposure Point Concentrations

| Scenario Timeframe: Current/Future | | | | | | | | |
|---|------------------------|------------------------|-----|-------|------------------------|---|------------------------------------|----------------------------------|
| Medium: Surface Soil (0-1 ft) | | | | | | | | |
| Exposure Medium: Gunsite 012 Operable Unit | | | | | | | | |
| Exposure Route | Constituent of Concern | Concentration Detected | | Units | Frequency of Detection | Exposure Point Concentration ¹ | Exposure Point Concentration Units | Statistical Measure ² |
| | | Min | Max | | | | | |
| Building Pad subunit Soil Onsite -direct contact | Benzo(a)anthracene | ND | 26 | mg/kg | 37/66 | 3.33 | mg/kg | 95% UCL |
| | Benzo(a)pyrene | ND | 21 | mg/kg | 36/66 | 2.71 | mg/kg | 95% UCL |
| | Benzo(b)fluoranthene | ND | 27 | mg/kg | 38/66 | 3.39 | mg/kg | 95% UCL |
| | Benzo(k)fluoranthene | ND | 18 | mg/kg | 37/66 | 2.34 | mg/kg | 95% UCL |
| | Dibenz[ah]anthracene | ND | 3.9 | mg/kg | 18/66 | 0.53 | mg/kg | 95% UCL |
| | Indeno[1,2,3-cd]pyrene | ND | 11 | mg/kg | 34/66 | 1.49 | mg/kg | 95% UCL |
| Parking Area subunit Soil Onsite -direct contact | Antimony | ND | 128 | mg/kg | 10/19 | 83.8 | mg/kg | 95% UCL |
| <p>Key</p> <p>mg/kg = milligrams per kilogram</p> <p>ND - not detected</p> <p>1 - Exposure Point Concentration (EPC) = the lesser of the maximum detected concentration and the 95% UCL</p> <p>2 - 95% UCL = 95% upper confidence limit of the mean concentration</p> | | | | | | | | |

TABLE 2. Cancer Toxicity Data Summary

Building Pad Subunit

| Pathway: Ingestion, Dermal | | | | | | | |
|---|---------------------------------------|---|--------------------------------|-------|---|---------------------|-------------------------|
| Constituent of Concern | Oral Cancer Slope Factor ¹ | Dermal Cancer Slope Factor ² | Slope Factor Units | | Weight of Evidence/ Cancer Guideline Description ³ | Source ⁴ | Date ⁴ (M/Y) |
| Benzo(a)anthracene | 7.3E-01 | --- | (mg/kg-day) ¹ | | B2 | IRIS/RSL | 04/09 |
| Benzo(a)pyrene | 7.3E+00 | --- | (mg/kg-day) ¹ | | B2 | IRIS/RSL | 04/09 |
| Benzo(b)fluoranthene | 7.3E-01 | --- | (mg/kg-day) ¹ | | B2 | IRIS/RSL | 04/09 |
| Benzo(k)fluoranthene | 7.3E-02 | --- | (mg/kg-day) ¹ | | B2 | IRIS/RSL | 04/09 |
| Dibenz[ah]anthracene | 7.3E+00 | --- | (mg/kg-day) ¹ | | B2 | IRIS/RSL | 04/09 |
| Indeno[1,2,3-cd]pyrene | 7.3E-01 | --- | (mg/kg-day) ¹ | | B2 | IRIS/RSL | 04/09 |
| Pathway: Inhalation | | | | | | | |
| Constituent of Concern | Unit Risk ⁵ | Units | Inhalation Cancer Slope Factor | Units | Weight of Evidence/ Cancer Guideline Description ³ | Source ⁶ | Date ⁶ (M/Y) |
| Benzo(a)anthracene | 1.1E-04 | (ug/m ³) ⁻¹ | --- | --- | B2 | Cal EPA/RSL | 04/09 |
| Benzo(a)pyrene | 1.1E-03 | (ug/m ³) ⁻¹ | --- | --- | B2 | Cal EPA/RSL | 04/09 |
| Benzo(b)fluoranthene | 1.1E-04 | (ug/m ³) ⁻¹ | --- | --- | B2 | Cal EPA/RSL | 04/09 |
| Benzo(k)fluoranthene | 1.1E-04 | (ug/m ³) ⁻¹ | --- | --- | B2 | Cal EPA/RSL | 04/09 |
| Dibenz[ah]anthracene | 1.2E-03 | (ug/m ³) ⁻¹ | --- | --- | B2 | Cal EPA/RSL | 04/09 |
| Indeno[1,2,3-cd]pyrene | 1.1E-04 | (ug/m ³) ⁻¹ | --- | --- | B2 | Cal EPA/RSL | 04/09 |
| Key | | | | | | | |
| --- No information available | | | | | | | |
| mg/kg: milligrams per kilogram | | | | | | | |
| ug/m ³ : micrograms per cubic meter | | | | | | | |
| IRIS: Integrated Risk Information System, USEPA | | | | | | | |
| RSL: Regional Screening Level Table, USEPA (www.epa.gov/reg3hwmd/rb-concentration_table) | | | | | | | |
| Cal EPA: California Environmental Protection Agency | | | | | | | |
| 1 - Oral cancer slope factor from IRIS as documented in the <i>USEPA Regional Screening Levels Table</i> dated April 2009. | | | | | | | |
| 2 - Dermal cancer slope factor obtained by using the oral cancer slope factor and applying a gastro-intestinal absorption factor. | | | | | | | |
| 3 - Weight of Evidence B2 = Probable human carcinogen – indicates sufficient evidence in animals and inadequate or no evidence in humans. | | | | | | | |
| 4 - Primary source of information is IRIS as documented in the <i>USEPA Regional Screening Levels Table</i> dated April 2009. | | | | | | | |
| 5 - Inhalation unit risk from Cal EPA as documented in the <i>USEPA Regional Screening Levels Table</i> dated April 2009. | | | | | | | |
| 6 - Primary source of information is Cal EPA as documented in the <i>USEPA Regional Screening Levels Table</i> dated April 2009. | | | | | | | |

TABLE 3. Non-Cancer Toxicity Data Summary

Parking Area Subunit

| Pathway: Ingestion, Dermal | | | | | | | | | |
|---|------------------------|-----------------------------|----------------------|-------------------------|----------------------|----------------------|--|---|--------------------------|
| Constituent of Concern | Chronic/ Subchronic | Oral RfD Value ¹ | Oral RfD Units | Dermal RfD ² | Dermal RfD Units | Primary Target Organ | Combined Uncertainty/ Modifying Factors | Sources of RfD: Target Organ ³ | Dates (M/Y) ³ |
| Antimony | Chronic | 4.0E-04 | (mg/kg-day) | --- | --- | blood | 1000 | IRIS/RSL | 04/09 |
| Pathway: Inhalation | | | | | | | | | |
| Constituent of Concern | Chronic/ Subchronic | Inhalation RfC ³ | Inhalation RfC Units | Inhalation RfD | Inhalation RfD Units | Primary Target Organ | Combined Uncertainty/ Modifying Factors | Sources of RfC:RfD: Target Organ ³ | Dates (M/Y) ³ |
| Antimony | --- | --- | --- | --- | --- | --- | --- | IRIS/RSL | 04/09 |
| <p>Key --- No information available mg/kg: milligram per kilogram IRIS: Integrated Risk Information System, USEPA RSL: Regional Screening Level Table, USEPA (www.epa.gov/reg3hwmd/rb-concentration_table) RfD: Reference Dose RfC: Reference Concentration</p> <p>1 - Oral RfD from IRIS as documented in the <i>USEPA Regional Screening Levels Table</i> dated April 2009. 2 - Dermal RfD obtained by using oral RfD and applying a gastro-intestinal absorption factor. 3 - Primary source of information is IRIS as documented in the <i>USEPA Regional Screening Levels Table</i> dated April 2009.</p> | | | | | | | | | |

TABLE 4. Risk Characterization Summary – Carcinogens

Building Pad Subunit

| Scenario Timeframe: | | Future | | | | | | | |
|--|-----------------------|---------------------------------------|------------------------|-------------------|------------|--------|----------------------|---------|-----------------------|
| Receptor Population: | | Resident | | | | | | | |
| Receptor Age: | | Adult/Child | | | | | | | |
| Medium | Exposure Medium | Exposure Route | Constituent of Concern | Carcinogenic Risk | | | | | Exposure Routes Total |
| | | | | Ingestion | Inhalation | Dermal | External (Radiation) | | |
| <i>Building Pad subunit</i> | Surface Soil (0-1 ft) | Ingestion, Inhalation, Dermal Contact | Benzo(a)anthracene | NC | NC | NC | NA | 2.2E-05 | |
| | | | Benzo(a)pyrene | NC | NC | NC | NA | 1.8E-04 | |
| | | | Benzo(b)fluoranthene | NC | NC | NC | NA | 2.3E-05 | |
| | | | Benzo(k)fluoranthene | NC | NC | NC | NA | 1.6E-06 | |
| | | | Dibenz[ah]anthracene | NC | NC | NC | NA | 3.5E-05 | |
| | | | Indeno[1,2,3-cd]pyrene | NC | NC | NC | NA | 9.9E-06 | |
| Total Cumulative Risk = | | | | | | | | 2.7E-04 | |
| <p>Key NA = Not applicable. NC = Not calculated. Risk was not calculated separately for each exposure pathway. The regional screening level (RSL) value that was used to calculate risk is a risk-based concentration that is derived from standardized equations which combine all of the exposure pathways and assumptions with USEPA toxicity data. Use of the RSL provides an exposure routes total risk estimate for each constituent. Residential RSLs for soil media obtained from generic Regional Screening Levels table website (April 2009) using default exposure assumptions (www.epa.gov/reg3hwmd/rb-concentration_table).</p> | | | | | | | | | |

TABLE 5. Risk Characterization Summary – Non-Carcinogens

Parking Area Subunit

| Scenario Timeframe: | | Future | | | | | | |
|--|-----------------------|---------------------------------------|------------------------|----------------------|----------------------------------|------------|--------|-----------------------|
| Receptor Population: | | Resident | | | | | | |
| Receptor Age: | | Adult/Child | | | | | | |
| Medium | Exposure Medium | Exposure Route | Constituent of Concern | Primary Target Organ | Non-Carcinogenic Hazard Quotient | | | |
| | | | | | Ingestion | Inhalation | Dermal | Exposure Routes Total |
| <i>Parking Area subunit</i> | Surface Soil (0-1 ft) | Ingestion, Inhalation, Direct Contact | Antimony | blood | NC | NC | NC | 2.7 |
| Soil Hazard Index Total = | | | | | | | | 2.7 |
| <p>Key NC = Not calculated. Risk was not calculated separately for each exposure pathway. The regional screening level (RSL) value that was used to calculate risk is a risk-based concentration that is derived from standardized equations which combine all of the exposure pathways and assumptions with USEPA toxicity data. Use of the RSL provides an exposure routes total hazard quotient for each constituent. Residential RSLs for soil media obtained from generic Regional Screening Levels table website (April 2009) using default exposure assumptions (www.epa.gov/reg3hwmd/rb-concentration_table).</p> | | | | | | | | |

TABLE 6. Building Pad Subunit Remedial Goals for HH RCOCs

| RCOC | Units | Future Resident Carcinogens (Soil Media) | Future Industrial Worker Carcinogens (Soil Media) |
|-----------------------|-------|---|---|
| | | 1.0E-06 | |
| Benzo-(a)anthracene | mg/kg | 0.15 | NA |
| Benzo(a)pyrene | mg/kg | 0.015 | NA |
| Benzo(b)fluoranthene | mg/kg | 0.15 | NA |
| Benzo(k)fluoranthene | mg/kg | 1.5 | NA |
| Dibenz[ah]anthracene | mg/kg | 0.015 | NA |
| Indeno[1,2,-cd]pyrene | mg/kg | 0.15 | NA |

TABLE 7. Parking Area Subunit Remedial Goals for HH RCOCs

| RCOC | Units | Future Resident Non-Carcinogens (Soil Media) | Future Industrial Worker Non- Carcinogens (Soil Media) |
|----------|-------|---|---|
| | | HQ = 1 | |
| Antimony | mg/kg | 31 | NA |

TABLE 8. Comparative Analysis of Alternatives for the Gunsite 012 OU

| Response Action | Overall Protection of Human Health and the Environment | Compliance with RAOs | Long-Term Effectiveness and Permanence | Reduction of Toxicity, Mobility, or Volume Through Treatment | Short-Term Effectiveness | Implementability | Cost | Overall Ranking (range 1-25) |
|--|---|-----------------------------|---|---|---------------------------------|-------------------------|-------------|-------------------------------------|
| A1 - No Action | No | NA | 1 | 1 | 1 | 5 | 5 | 13 |
| A2 - Land Use Controls | Yes | Yes | 2 | 1 | 3 | 5 | 5 | 16 |
| A3 - Excavation and Removal of Contaminated Soil | Yes | Yes | 4 | 4 | 2 | 3 | 2 | 15 |

Note: Numeric range 1 through 5, where 1 = worst and 5 = best
 Overall Numeric range 5 through 25, where 5 = worst and 25 = best

TABLE 9. Alternative A-1 — No Action

| | | Alternative 1 No Action Gunsite 012 Savannah River Site | | | |
|---|----------|--|-----------|--|--|
| Item | Quantity | Units | Unit Cost | Total Cost | |
| Direct Capital Costs | | | | | |
| No Action | | | | | |
| | | | | Subtotal - Direct Capital Cost | |
| | | | | \$0 | |
| | | | | Mobilization/Demobilization | |
| | | | | 10% of subtotal direct capital | |
| | | | | \$0 | |
| | | | | Site Preparation/Site Restoration | |
| | | | | 10% of subtotal direct capital | |
| | | | | \$0 | |
| | | | | Total Direct Capital Cost | |
| | | | | (sum of * items) | |
| | | | | \$0 | |
| Indirect Capital Costs | | | | | |
| Engineering & Design | | | | 15% of direct capital | |
| | | | | \$0 | |
| Project/Construction Management | | | | 25% of direct capital | |
| | | | | \$0 | |
| Health & Safety | | | | 5% of direct capital | |
| | | | | \$0 | |
| Overhead | | | | 30% of direct capital | |
| | | | | \$0 | |
| Contingency | | | | 20% of direct capital | |
| | | | | \$0 | |
| | | | | Total Indirect Capital Cost | |
| | | | | \$0 | |
| | | | | Total Estimated Capital Cost | |
| | | | | \$0 | |
| Direct O&M Costs | | | | | |
| Annual Costs (Existing System during Post-ROD Design & Const) | | | | 3.9% discount rate for costs > 30 years duration | |
| | | | | 30 year O&M period | |
| | | | | Years 2010 - 2040 | |
| | | | | Subtotal - Annual Costs | |
| | | | | \$0 | |
| | | | | Present Worth Annual Costs | |
| | | | | \$0 | |
| Five Year Costs | | | | | |
| Remedy Review | 0 | ea | \$15,000 | \$0 | |
| | | | | \$0 | |
| | | | | Subtotal - Five Year O&M Costs | |
| | | | | \$0 | |
| | | | | Present Worth Five Year Costs | |
| | | | | \$0 | |
| | | | | Total Present Worth Direct O&M Cost | |
| | | | | \$0 | |
| Indirect O&M Costs | | | | | |
| Project/Admin Management | | | | 0% of direct O&M | |
| | | | | \$0 | |
| Health & Safety | | | | 0% of direct O&M | |
| | | | | \$0 | |
| Overhead | | | | 30% of direct O&M | |
| | | | | \$0 | |
| Contingency | | | | 15% of direct O&M | |
| | | | | \$0 | |
| | | | | Total Present Worth Indirect O&M Cost | |
| | | | | \$0 | |
| | | | | Total Estimated Present Worth O&M Cost | |
| | | | | \$0 | |
| | | | | TOTAL ESTIMATED COST | |
| | | | | \$0 | |

There are no O&M or 5-year review costs for the No Action alternative, as per EPA-540-R-98-031 guidance.

TABLE 10. Alternative A-2 —Land Use Controls

| Alternative 2 Land Use Controls Gunsite 012 Savannah River Site | | | | |
|---|-----------------------|--------------|------------------|---|
| <u>Item</u> | <u>Quantity</u> | <u>Units</u> | <u>Unit Cost</u> | <u>Total Cost</u> |
| <u>Direct Capital Costs</u> | | | | |
| Institutional Controls | | | | |
| Posting of Warning Signs | 10 | ea | \$50 | \$500 |
| Land Use Control Implementation Plan | 1 | ea | \$5,000 | \$5,000 |
| Deed Restrictions | 1 | ea | \$5,000 | \$5,000 |
| Subtotal - Direct Capital Cost | | | | \$10,500 |
| Mobilization/Demobilization | | | | 25% of subtotal direct capital \$2,625 |
| Site Preparation/Site Restoration | | | | 25% of subtotal direct capital \$2,625 |
| Total Direct Capital Cost | | | | \$(sum of * items) \$15,750 |
| <u>Indirect Capital Costs</u> | | | | |
| Engineering & Design | 18% of direct capital | | | \$2,835 |
| Project/Construction Management | 25% of direct capital | | | \$3,938 |
| Health & Safety | 5% of direct capital | | | \$788 |
| Overhead | 30% of direct capital | | | \$4,725 |
| Contingency | 20% of direct capital | | | \$3,150 |
| Total Indirect Capital Cost | | | | \$15,435 |
| Total Estimated Capital Cost | | | | \$31,185 |
| <u>Direct O&M Costs</u> | | | | |
| Annual Costs 3.9% discount rate for costs > 30 years duration¹ | | | | |
| 30 years O&M Years 2010 - 2040 | | | | |
| Access Controls | 1 | ea | \$500 | \$500 |
| Annual Inspections / Maintenance | 1 | ea | \$2,000 | \$2,000 |
| Subtotal - Annual Costs | | | | \$2,500 |
| Present Worth Annual Costs (3.9% Discount Rate) | | | | \$43,760 |
| Five Year Costs | | | | |
| Remedy Review | 6 | | | |
| | 1 | ea | \$15,000 | \$15,000 |
| Subtotal - Five Year O&M Costs | | | | \$15,000 |
| Present Worth Five Year Costs | | | | \$48,572 |
| Total Present Worth Direct O&M Cost | | | | \$92,332 |
| <u>Indirect O&M Costs</u> | | | | |
| Project/Admin Management | 250% of direct O&M | | | \$230,831 |
| Health & Safety | 25% of direct O&M | | | \$23,083 |
| Overhead | 30% of direct O&M | | | \$27,700 |
| Contingency | 15% of direct O&M | | | \$13,850 |
| Total Present Worth Indirect O&M Cost | | | | \$295,464 |
| Total Estimated Present Worth O&M Cost | | | | \$387,796 |
| TOTAL ESTIMATED COST | | | | \$418,981 |

1. Interest rate for costs with duration < 30 years (i.e., before 2034) is based on WSRC's 16 April 2002 Technical Memorandum.

TABLE 11. Alternative A-3 — Excavation and Removal of Contaminated Soil

| Alternative 3 Excavation and Removal of Contaminated Soil Gunsite 012 Savannah River Site | | | | |
|--|-----------------------|----------------------------|-------------------|--------------------|
| <u>Item</u> | <u>Quantity</u> | <u>Units</u> | <u>Unit Cost</u> | <u>Total Cost</u> |
| Direct Capital Costs | | | | |
| Removal and Offsite Disposal | | | | |
| Site Surveys | 4 | days | \$1,750 | \$7,000 |
| Excavate / Load Soil | 4034 | cy | \$25 | \$100,850 |
| Haul Soil to Three Rivers Landfill | 5244.2 | cy | \$10 | \$52,442 |
| Sanitary Waste Disposal (Soil) | 7079.67 | tn | \$25 | \$176,992 |
| Confirmation TAL/TCL Soil Sampling | 4 | ea | \$2,525 | \$10,100 |
| Backfill / Compaction | 4840.8 | cy | \$31 | \$150,065 |
| Subtotal - Direct Capital Cost | | | | \$497,449 |
| Mobilization/Demobilization | 22% | of subtotal direct capital | | \$109,439 |
| Site Preparation/Site Restoration | 22% | of subtotal direct capital | | \$109,439 |
| Total Direct Capital Cost | | (sum of * items) | | \$716,326 |
| Indirect Capital Costs | | | | |
| Engineering & Design | 14% of direct capital | | | \$100,286 |
| Project/Construction Management | 25% of direct capital | | | \$179,081 |
| Health & Safety | 4% of direct capital | | | \$28,653 |
| Overhead | 30% of direct capital | | | \$214,898 |
| Contingency | 20% of direct capital | | | \$143,265 |
| Total Indirect Capital Cost | | | | \$666,183 |
| Total Estimated Capital Cost | | | | \$1,382,509 |
| Direct O&M Costs | | | | |
| 3.9% discount rate for costs > 30 years duration ¹ | | | | |
| Annual Costs | 0 years O&M | | Years 2010 - 2040 | |
| Access Controls | 0 | ea | \$500 | \$0 |
| Annual Inspections / Maintenance | 0 | ea | \$2,000 | \$0 |
| Subtotal - Annual Costs | | | | \$0 |
| Present Worth Annual Costs (3.9% Discount Rate) | | | | \$0 |
| Five Year Costs | 0 | | | |
| Remedy Review | 0 | ea | \$15,000 | \$0 |
| Subtotal - Five Year O&M Costs | | | | \$0 |
| Present Worth Five Year Costs | | | | \$0 |
| Total Present Worth Direct O&M Cost | | | | \$0 |
| Indirect O&M Costs | | | | |
| Project/Admin Management | 0% of direct O&M | | | \$0 |
| Health & Safety | 0% of direct O&M | | | \$0 |
| Overhead | 30% of direct O&M | | | \$0 |
| Contingency | 15% of direct O&M | | | \$0 |
| Total Present Worth Indirect O&M Cost | | | | \$0 |
| Total Estimated Present Worth O&M Cost | | | | \$0 |
| TOTAL ESTIMATED COST | | | | \$1,382,509 |

1. Interest rate for costs with duration < 30 years (i.e., before 2034) is based on WSRC's 16 April 2002 Technical Memorandum.

ROD for the Gunsite 012 (NBN) (U)
Savannah River Site
March 2011

SRNS-RP-2010-01232

Rev. 1

Page 68 of 69

Table 12. Land Use Controls for the Gunsite 012 OU

| Type of Control | Purpose of Control | Duration | Implementation | Affected Areas ³ |
|---|--|--|--|---|
| 1. Property Record Notices ^b | Provide notice to anyone searching records about the existence and location of contaminated areas. | Until the concentration of hazardous substances associated with the unit have been reduced to levels that allow for unlimited exposure and unrestricted use. | Notice recorded by USDOE in accordance with state laws at County Register of Deeds office if the property or any portion thereof is ever transferred to non-federal ownership. | GS012 OU where hazardous substances are left in place at levels requiring land use restrictions. |
| 2. Property record restrictions ^c : A. Land Use B. Groundwater | Restrict use of property by imposing limitations Prohibit the use of groundwater. | Until the concentration of hazardous substances associated with the unit have been reduced to levels that allow for unlimited exposure and unrestricted use. | Drafted and implemented by USDOE upon any transfer of affected areas. Recorded by USDOE in accordance with state law at County Register of Deeds office. | GS012 where hazardous substances are left in place at levels requiring land use restrictions. |
| 3. Other Notices ^d | Provide notice to city &/or county about the existence and location of waste disposal and residual contamination areas for zoning/planning purposes. | Until the concentration of hazardous substances associated with the unit have been reduced to levels that allow for unlimited exposure and unrestricted use. | Notice recorded by USDOE in accordance with state laws at County Register of Deeds office if the property or any portion thereof is ever transferred to non-federal ownership. | GS012 where hazardous substances are left in place at levels requiring land use restrictions. |
| 4. Site Use Program ^e | Provide notice to worker/developer (i.e., permit requestor) on extent of contamination and prohibit or limit excavation/penetration activity. | As long as property remains under USDOE control | Implemented by USDOE and site contractors Initiated by permit request | Subunits at GS012 OU where hazardous substances are left in place at levels requiring land use restrictions. |
| 5. Physical Access Controls ^f (e.g., fences, gates, portals) | Control and restrict access to workers and the public to prevent unauthorized access. | Until the concentration of hazardous substances associated with the unit have been reduced to levels that allow for unlimited exposure and unrestricted use. | Controls maintained by USDOE. | Security is provided at site boundaries in accordance with SRS procedures. |
| 6. Warning Signs ^g | Provide notice or warning to prevent unauthorized uses. | Until the concentration of hazardous substances associated with the unit have been reduced to levels that allow for unlimited exposure and unrestricted use. | Signage maintained by USDOE. | Warning signs will be posted in accordance with applicable site procedures and placed in appropriate areas of the GS012 OU. |
| 7. Security Surveillance Measures | Control and monitor access by workers/public. | Until the concentration of hazardous substances associated with the unit have been reduced to levels that allow for unlimited exposure and unrestricted use. | Established and maintained by USDOE Necessity of patrols evaluated upon completion of remedial actions or property transfer. | Security and surveillance measures are in place at SRS boundary in accordance with RCRA permit requirements. |

ROD for the Gunsite 012 (NBN) (U)
Savannah River Site
March 2011

SRNS-RP-2010-01232

Rev. 1

Page 69 of 69

¹Affected areas – Specific locations identified in the OU-specific LUCIP or subsequent post-ROD documents.

²Property Record Notices – Refers to any non-enforceable, purely informational document recorded along with the original property acquisition records of USDOE and its predecessor agencies that alerts anyone searching property records to important information about residual contamination; waste disposal areas in the property.

³Property Record Restrictions – Includes conditions and/or covenants that restrict or prohibit certain uses of real property and are recorded along with original property acquisition records of USDOE and its predecessor agencies.

⁴Other Notices – Includes information on the location of waste disposal areas and residual contamination depicted on as survey plat, which is provided to a zoning authority (i.e., city planning commission) for consideration in appropriate zoning decisions for non-USDOE property.

⁵Site Use Program – Refers to the internal USDOE/USDOE contractor administrative program(s) that requires the permit requestor to obtain authorization, usually in the form of a permit, before beginning any excavation/penetration activity (e.g., well drilling) for the purpose of ensuring that the proposed activity will not affect underground utilities/structures, or in the case contaminated soil or groundwater, will not disturb the affected areas without the appropriate precautions and safeguards.

⁶Physical Access Controls – Physical barriers or restrictions to entry.

⁷Signs – Posted command, warning or direction.

Appendix A

Responsiveness Summary

The 45-day public comment period for the Statement of Basis/Proposed Plan for the Gunsite 012 Operable Unit (NBN) began on December 20, 2010 and ended on February 3, 2011.

Public Comments

No comments were received from the public during the 45-day public comment period.