LUCIP for the
P Area Operable Unit (consists of P-Area Ash Basin [Including Outfall P-007], 188-P; P-Area Process Sewer Lines as Abandoned, NBN and Spill on 03/15/79 of 5500 Gallons of Contaminated Water, NBN; P-Area Reactor Area Cask Car Railroad Tracks as Abandoned, NBN; Potential Release from P-Area Disassembly Basin, NBN; Potential Release from P-Area Reactor Cooling Water System, 186/190-P)
Land Use Control Implementation Plan for the
P Area Operable Unit
(SRNS-RP-2010-00619, Rev.1, October 2010)

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United States Department of Energy

Savannah River Site

Land Use Control Implementation Plan (LUCIP) for the P Area Operable Unit (PAOU) (U)

CERCLIS Number: 94

SRNS–RP–2010-00619

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June 2010

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Aiken, South Carolina

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF APPENDICES

LIST OF ACRONYMS AND ABBREVIATIONS

ac	acre
ACP	Area Completion Projects
bgs	below ground surface
BRA	Baseline Risk Assessment
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
Ci	curie
CMS/FS	Corrective Measures Study/Feasibility Study
EARAIP	Early Action Remedial Action Implementation Plan
EAROD	Early Action Record of Decision
EE/CAs	Engineering Evaluation/Cost Analyses
ESD	Explanation of Significant Difference
FFA	Federal Facility Agreement
ft	feet
ha	hectare
HCA	high contamination area
ISD	in situ decommissioning
km	kilometer
km^2	square kilometer
LUC	land use control
LUCIP	Land Use Control Implementation Plan
LUCAP	Land Use Control Assurance Plan
mg/kg	milligram per kilogram
mi	mile
mi^2	square mile
NBN	no building number
NTC	non-time critical
OU	operable unit
PAOU	P Area Operable Unit
PCE	tetrachloroethylene
pCi/g	picocuries per gram
PCR	Post-Construction Report
PSA	potential source area
PSL	process sewer line
RA	remedial action
RCRA	Resource Conservation and Recovery Act
RFI/RI	RCRA Facility Investigation/Remedial Investigation
RG	remedial goal
ROD	Record of Decision
RSER	Removal Site Evaluation Report

LIST OF ACRONYMS AND ABBREVIATIONS *(Continued/End)*

SCDHEC	South Carolina Department of Health and Environmental Control
SRNS	Savannah River Nuclear Solutions, LLC
SRS	Savannah River Site
SVE	soil vapor extraction
TCE	trichloroethylene
USDOE	U.S. Department of Energy
USEPA	U.S. Environmental Protection Agency
WSRC	Washington Savannah River Company LLC (formerly Westinghouse Savannah River Company LLC)

1.0 INTRODUCTION

This Land Use Control Implementation Plan (LUCIP) has been prepared for the P Area Operable Unit (PAOU) at the Savannah River Site (SRS). The PAOU comprises several subunits within P Area and covers approximately 50 ha (126 ac). Groundwater is not considered part of the scope for the PAOU as detailed in the Early Action Record of Decision (EAROD) (SRNS 2008) and the Record of Decision (ROD) (SRNS 2009c). Any groundwater contamination resulting from the PAOU is being addressed as part of the P-Area Reactor Groundwater Operable Unit (OU). The purpose of this LUCIP is to describe how the land use controls (LUCs) selected in the ROD for the PAOU subunits will be implemented and maintained. The LUC objectives have been documented in the PAOU ROD and are listed in Section 3.0.

The selected remedy leaves hazardous substances in place that pose a potential future risk and will require land use restrictions until the concentrations of hazardous substances in the soil and groundwater are at levels that allow for unrestricted use. The hazardous substances left in place could pose a risk if the waste is disturbed. As agreed on March 30, 2000, among the U.S. Department of Energy (USDOE), the U.S. Environmental Protection Agency (USEPA), and South Carolina Department of Health and Environmental Control (SCDHEC), SRS has implemented 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 requirements of that LUCAP also apply to the LUCs that were selected as part of the PAOU remedial action (RA). This document, the PAOU LUCIP, contains the detailed and specific measures required to implement and maintain the LUCs selected as part of this particular remedial decision. The LUCs shall be maintained until the OU is suitable for unlimited exposure and unrestricted use. Approval by USEPA and SCDHEC is required for any modification or termination of the LUCs.

USDOE is responsible for implementing, maintaining, monitoring, reporting, and enforcing the LUCs in accordance with the approved LUCIP. Upon final approval, the LUCIP will be appended to the LUCAP and should be considered incorporated by reference into the PAOU ROD (SRNS 2009c), establishing implementation and maintenance requirements for the LUCs

under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and the SRS Federal Facility Agreement (FFA) (FFA 1993). The LUCIP will remain in effect unless and until modifications are approved by USEPA and SCDHEC as necessary for protection of human health and the environment. This LUCIP will be evaluated for accuracy during the five-year remedy review and any approved LUCIP modification will be appropriately documented for incorporation by reference into the PAOU ROD.

1.1 Format of LUCIP

The format of this LUCIP is consistent with the FFA protocol format approved by the USEPA and SCDHEC in March 2004.

2.0 OVERVIEW OF PAOU REMEDIAL ACTION

2.1 General Description and History of the Unit

SRS occupies approximately 802.8 km^2 (310 mi^2) of land adjacent to the Savannah River, principally in Aiken and Barnwell counties of South Carolina. SRS is located approximately 6.4 km (25 mi) southeast of Augusta, Georgia, and 32.1 km (20 mi) south of Aiken, South Carolina.

The PAOU is located approximately 4 km (2.5 mi) east-southeast of the geographical center of SRS and about 6.4 km (4 mi) west of the nearest site boundary. PAOU is located in an upland area between the Steel Creek and Lower Three Runs watersheds. It has a flat to gently rolling topography with an approximate elevation of 96.0 km (315 ft) above mean sea level (Figure 1).

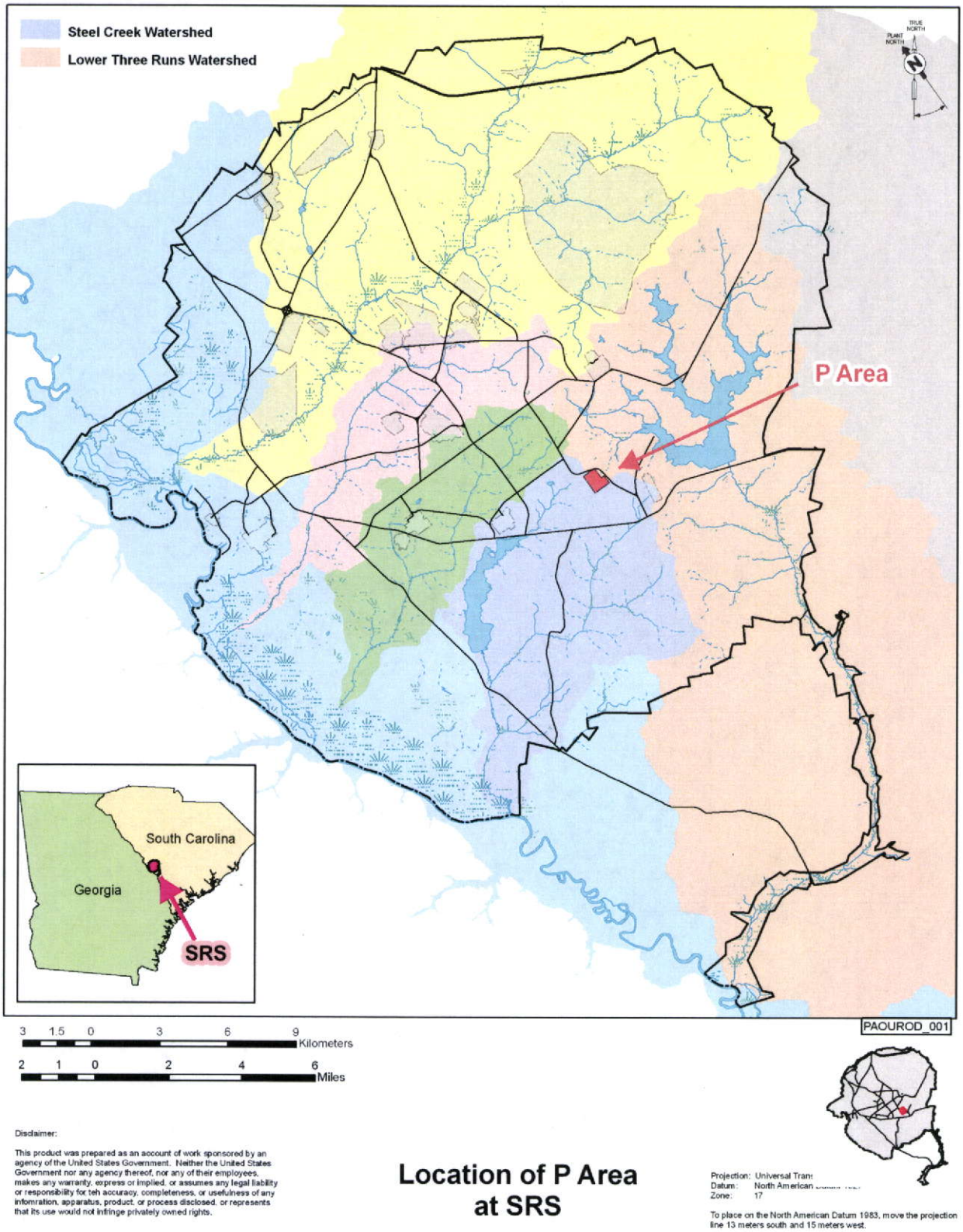

Figure 1. Location of the PAOU within the Savannah River Site

In February 1954, P-Reactor began operations. It was taken off-line for maintenance and safety upgrades in 1987, placed in warm standby in 1988, and placed in shutdown status in 1991. In 1993, P-Reactor was placed in cold shutdown with no capability of restart. The primary sources of radioactive contamination in P Area are activation products, fission products, and tritium, the majority of which were the consequence of P-Reactor operations.

P Area is the third OU at SRS to be addressed under an area-wide remedial strategy. As part of this strategy, Resource Conservation and Recovery Act (RCRA)/CERCLA/Site Evaluation units and deactivation and decommissioning facilities (or remnants) in the former P-Area industrial area were consolidated into a single OU (i.e., the PAOU). The characterization evaluation and analysis of the PAOU were documented in the *RCRA Facility Investigation/Remedial Investigation (RFI/RI) Work Plan, RFI/RI Report with Baseline Risk Assessment (BRA), and Corrective Measures Study/Feasibility Study (CMS/FS) for P Area Operable Unit* (WSRC 2008b).

The PAOU (Figure 2) comprises the following:

- P-Reactor Building (105-P) Complex and its Ancillary Structures including Engine House (108-1P), Engine House (108-2P) with Standby Pumphouse 191-P
- Disposition of Water in the P-Reactor Disassembly Basin (no building number [NBN]
- Potential Release from the P-Area Reactor Cooling Water System (186/190-P)
- Potential Release from the P-Area Disassembly Basin (105-P)
- Process Sewer Lines (PSLs) As Abandoned (NBN); including the Spill on 03/15/79 of 5,000 gallons of Contaminated Water; and various components of the PSLs, including Process Water Storage Tank (106-P), Process Water Storage Basin (109-P); Cooling Water Effluent Sump (107-P/107-1P); outfalls; manholes, miscellaneous weirs and boxes; sumps, etc.
- P-Area Reactor Area Cask Car Railroad Tracks as Abandoned (NBN)
- All Railroad Tracks within the P-Area Fence

- High Contamination Area (HCA) associated with the P-Area Cask Car Railroad Tracks
- P-Area Ash Basin (including Outfall P-007) (188-P)
- Slab Associated with Containment Tank within Emergency Cooling Water Retention Basin (904-86G)
- Slab Associated with Pipe Fabrication Shop Building (717-9P)
- Slab Associated with Radiological Zone Storage Building (710-P)
- Slab and Sumps Associated with No. 2&5 Basin Deionizers Pad (105-1P)
- Potential Source Area (PSA) 1 – Emergency Cooling Water Retention Basin (904-86G)
- PSA 2 – Area around the Cooling Water Effluent Sump (107-P/107-1P)
- PSA 3A – Area near the Northern end of the Reactor Building (105-P)
- PSA 3B – Area West of the Administrative/ Maintenance Slab
- PSA 4 – Area East of the Reactor Building (105-P)
- PSA 5 – Two Localized Areas in the Southwestern Part of P Area
- Outfall P02

Regulatory decisions were previously made on select PAOU subunits. These decisions included early RAs documented in the EAROD (SRNS 2008) and an Explanation of Significant Difference (ESD) to the EAROD (SRNS 2009e) and Non-Time Critical (NTC) RAs documented in the three Removal Site Evaluation Reports (RSER)/Engineering Evaluation/Cost Analyses (EE/CAs) (SRNS 2009a and b, USDOE 2009). The subunits not selected for an early RA or an NTC removal action were presented in the RCRA Facility Investigation (RFI)/Remedial Investigation (RI) with Baseline Risk Assessment (BRA) and Corrective Measures Study (CMS)/Feasibility Study (FS) report (WSRC 2008). Figure 3 and Table 1 present this information for each of the subunits.

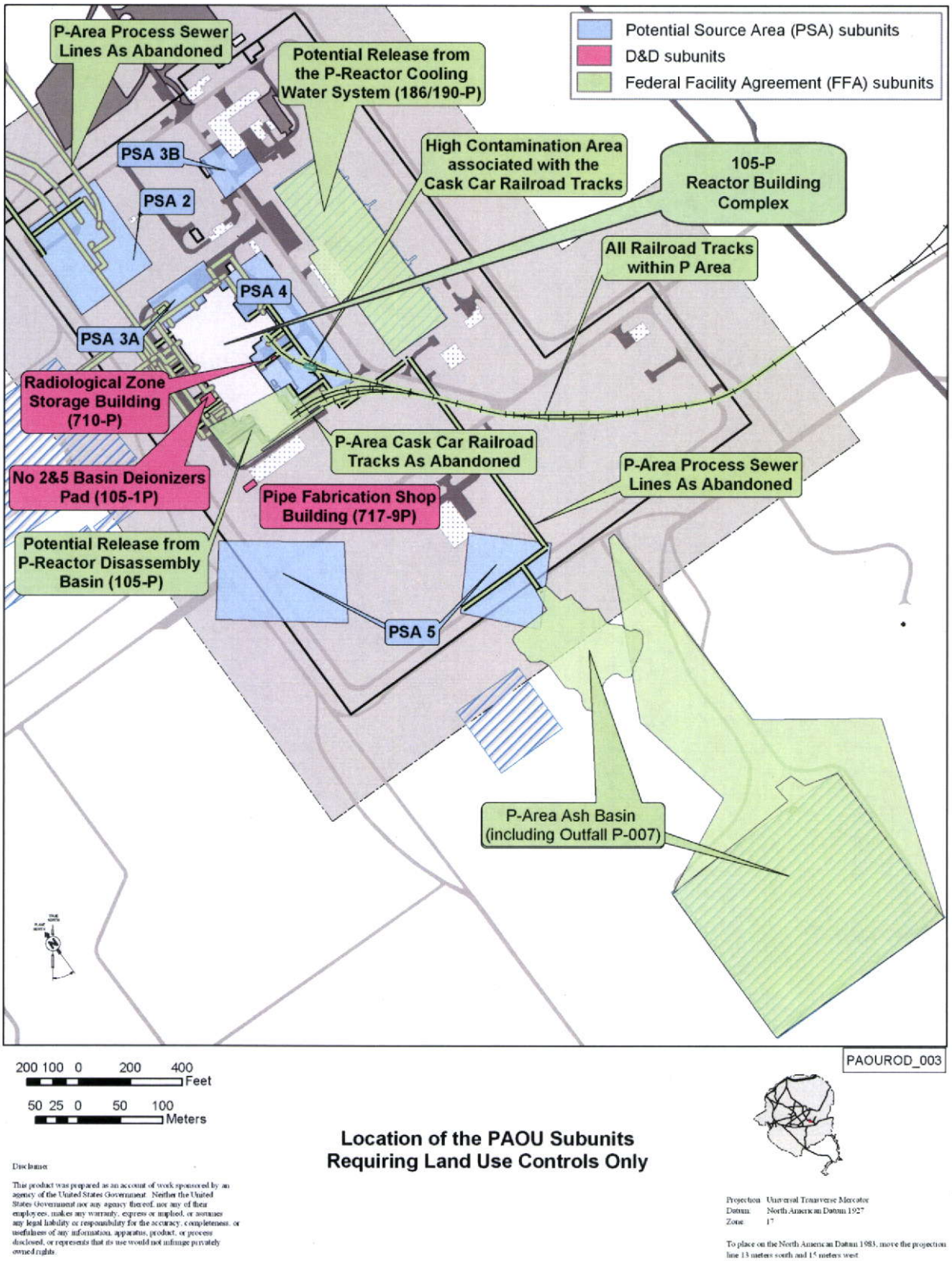

Figure 2. Layout of the P Area Operable Unit

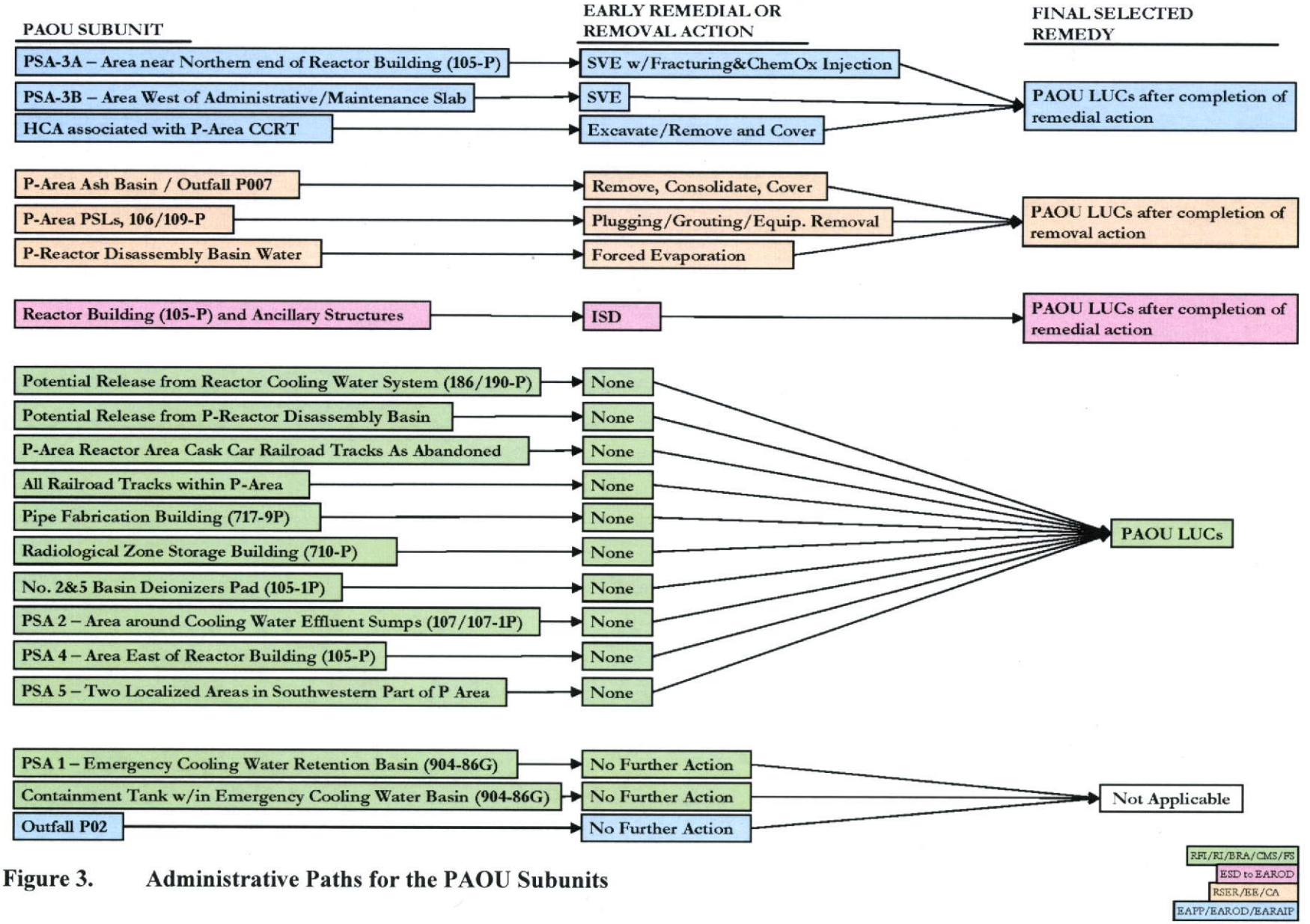

Figure 3. Administrative Paths for the PAOU Subunits

Table 1. List and Status of Subunits at the PAOU

		Subunit	Early Action or Removal Action	Reference Document	Final Selected Remedy
Federal Facility Agreement Subunits		Potential Release from Reactor Cooling Water System (186/190-P)	None	RFI/RI/BRA/CMS/FS	Manage with PAOU Land Use Controls (LUCs)
		Potential Release from P-Reactor Disassembly Basin (105-P)	None	RFI/RI/BRA/CMS/FS	Manage with PAOU LUCs
	P-Area Process Sewer Lines	Process Sewer Lines As Abaondoned (no building number [NBN]); including the spill on 03/15/79 of 500 gallons of contaminated water	Alternative P-2: Isolation Plugging of P-Reactor Building (105-P) PSLs and Drainage System; Grouting of Manholes, Diversion Boxes, and Process Tanks; Select Removal of Process Equipment External to the P-Reactor Building (105-P); Sealing/Plugging of Outfalls; LUCs	RSER/EE/CA - P-Area PSLs	Manage with PAOU LUCs
	P-Area Process Sewer Lines	Process Water Storage Tank (106-P)			
	P-Area Process Sewer Lines	Process Water Storage Basin (109-P)			
	P-Area Cask Car Railroad Tracks	P-Area Reactor Area Cask Car Railroad Tracks As Abandoned (NBN)	None	RFI/RI/BRA/CMS/FS	Manage with PAOU LUCs
	P-Area Cask Car Railroad Tracks	All railroad tracks within the P Area fence	None	RFI/RI/BRA/CMS/FS	Manage with PAOU LUCs
	P-Area Cask Car Railroad Tracks	High Contamination Area near the 105-P	Alternative AC-2: Alternative Excavation and Removal; Confirmatory Sampling	EAROD	Manage with PAOU LUCs
	P-Reactor Building (105-P) Complex	P-Reactor Building (105-P)	Alternative R-2A: In-Situ Decommissioning	ESD	Manage with PAOU LUCs
	P-Reactor Building (105-P) Complex	Engine House (108-1P)			
	P-Reactor Building (105-P) Complex	Enging House (108-2P) with Standby Pumphouse (191-P)			
		P-Area Ash Basin (Including Outfall P-007) (188-P)	Alternative P-3: Removal and Disposal of Cesium-137; Consolidation as Needed; Soil Cover; LUCs	RSER/EE/CA - P-Area Ash Basin (Including Outfall P-007)	Manage with PAOU LUCs
		Containment Tank within Emergency Cooling Water Retention Basin (904-86G)	None	RFI/RI/BRA/CMS/FS	No Futher Action
		Pipe Fabrication Shop Building (717-9P)	None	RFI/RI/BRA/CMS/FS	Manage with PAOU LUCs
		Radiological Zone Storage Building (710-P)	None	RFI/RI/BRA/CMS/FS	Manage with PAOU LUCs
		No. 2 & 5 Basin Deionizers Pad (105-1P)	None	RFI/RI/BRA/CMS/FS	Manage with PAOU LUCs
Potential Source Area Subunits		PSA-1 - Emergency Cooling Water Retention Basin (904-86G)	None	RFI/RI/BRA/CMS/FS	No Further Action
		PSA-2 - Area around the Cooling Water Effluent Sumps (107/107-1P)	None	RFI/RI/BRA/CMS/FS	Manage with PAOU LUCs
	PSA 3	PSA-3A - Area near the northern end of the Reactor Building (105-P)	Alternative AV-3: Soil Vapor Extraction [SVE] with Fracturing and Chemical Oxidation Injection)	EAROD	Manage with PAOU LUCs
	PSA 3	PSA-3B - West of the Administrative/Maintenance slab	Alternative AV-2: SVE		
		PSA-4 - Area east of the Reactor Building (105-P)	None	RFI/RI/BRA/CMS/FS	Manage with PAOU LUCs
		PSA-5 - Two localized areas in the southwestern part of P Area	None	RFI/RI/BRA/CMS/FS	Manage with PAOU LUCs
Other		P02 Outfall	No Further Action	EARAIP	No Further Action
		Disposition of Water in the P-Reactor Disassembly Basin	Alternative 3: Forced Evaporation	RSER/EE/CA & Action Memos - Disposition of Water in the P-Reactor Disassembly Basin	Manage with PAOU LUCs

- Early Action Record of Decision (EAROD) or Early Action Remedial Action Implementation Plan (EARAIP)
- Explanation of Significant Difference for the Revision 1.1 Early Action Record of Decision for the P-Area Operale Unit (ESD)
- RCRA Facility Investigation / Remedial Investigation with Baseline Risk Assessment and Corrective Measure Study / Feasibility Study (RFI/RI/BRA/CMS/FS)
- Removal Site Evalution Reports / Engineering Evaluation / Cost Assessments (RSER/EE/CA)

Based on the results of the RFI/RI/BRA/CMS/FS, two areas within the PAOU require No Further Action since it has been determined that they pose no impact to human health or the environment based on an unrestricted land use scenario. They include the Slab Associated with Containment Tank within the Emergency Cooling Water Retention Basin (904-86G) and the PSA 1 - Emergency Cooling Water Retention Basin (904-86G). In addition, Outfall P02 has also been determined to require No Further Action as documented in the Early Action Remedial Action Implementation Plan (EARAIP) (SRNS 2009d). These areas are located outside of the P-Area fence line. The remaining subunits, located within the P-Area fence line, require LUCs to prevent unrestricted land use (Figure 4) and are the focus of this LUCIP.

The P Area at SRS is located in an area of historically heavy industrial (nuclear) land use, as identified in the LUCAP (WSRC 1999). Remedial action objectives and likely response actions were developed consistent with future industrial non-residential land use. LUCs will restrict use because of the contamination that will be left behind at the PAOU. Appropriate LUCs against unrestricted and/or residential use will be part of all RAs for the PAOU. As detailed herein, the entire area outlined as the PAOU LUC boundary depicted on Figure 4 will be limited to industrial use, and further restrictions will be placed on certain portions of this area.

Figure 4. Land Use Control Boundary for the P Area Operable Unit

Nature and Extent of Contamination

The characterization evaluation and analysis of each of the subunits requiring LUCs in the PAOU are documented in the *RCRA Facility Investigation/Remedial Investigation (RFI/RI) Work Plan, RFI/RI Report with Baseline Risk Assessment (BRA), and Corrective Measures Study/Feasibility Study (CMS/FS) for P Area Operable Unit* (WSRC 2008b). The subunits that required early actions are discussed briefly below.

P-Reactor Building (105-P) Complex is located centrally within P Area. The building is sub-divided into three components, which include the reactor vessel, the disassembly basin, and the remainder of the reactor building, which includes the engine houses and system components. The reactor vessel contains approximately 211,000 Ci of radionuclide inventory, primarily activation products in the stainless steel and aluminum. The disassembly basin will contain approximately 9,600 Ci of radionuclide inventory after evaporation of the disassembly basin water is completed. The remainder of 105-P is estimated to contain 14,200 Ci of radionuclide inventory, including fission products such as cesium-137 and tritium. Hazardous material is also present in the subunit. Lead and polychlorinated biphenyls constitute the majority of the hazardous inventory.

P-Area Process Sewer Lines (PSLs) are located throughout the PAOU. The PSLs consist of 4.7 km (2.9 mi) of underground lines of various sizes and configuration throughout P Area. Radiological contamination (such as cesium-137 and cobalt-60) may be fixed within the pore spaces of the concrete or trapped in the rust and scale in these lines above principal threat source material thresholds. Any structures outside the Reactor Building Complex (105-P) that came in contact with the P-Area PSLs are also assumed to be contaminated with cobalt-60 and cesium-137. Review of piping drawings and extensive field walkdowns have resulted in the identification of associated underground structures, manholes, and other miscellaneous weirs and boxes that encompass the P-Area PSLs subunit.

The High Contamination Area associated with the Cask Car Railroad Tracks subunit is located southeast of the P-Reactor Building (105-P) Complex. Soils, railroad ties, and rail bed material in the HCA were contaminated with cesium-137 (+D) and cobalt-60 as a result of railroad cask car leakage. The HCA is less than 0.04 ha (0.1 acres) in area.

The P Ash Basin and the **P-007 Outfall** are located south of the P-Reactor Building (105-P) Complex. The P Ash Basin received coal ash from the P Area Powerhouse. Ash covers approximately 97,124 m^2/9.7 ha (116,160 yd^2/24 ac); this includes the basin, the ash placed around the basin perimeter, and the ash released from the basin to the south. The thickness of the ash exterior to the basin varies from less than 0.3 m (1 ft) to greater than 3 m (10 ft). The P-007 Outfall is included with the P Ash Basin because of the presence of ash around the outfall area. The P-007 Outfall received material from process line discharges that originated from the P-Area Disassembly Basin. These discharges are the source of the cesium-137 (+D) and cobalt-60 contamination found at the outfall. The total area contaminated within the P-007 Outfall area (including ash) is approximately 28,328 m^2/2.8 ha (33,880 yd^2/7 ac) in size.

PSA-3A is located north of the reactor building. It is approximately 0.40 ha (1 ac) in area. It is primarily contaminated with trichloroethylene (TCE). The highest concentrations of TCE exist at a depth of 13.7 m (45 ft) below ground surface (bgs), near the water table. This subunit is linked to TCE contamination in the groundwater, indicating that it is an active zone of groundwater contamination.

PSA-3B exists in an area to the west of the administrative/maintenance slab (704-P) and is primarily contaminated with tetrachloroethylene (PCE). It is approximately 0.028 ha (0.7 acres) in area. The highest concentrations of PCE are at a depth of 7.3 m (24 ft) bgs. This subunit is linked to PCE contamination in the groundwater, indicating that it is an active zone of groundwater contamination.

The *RCRA Facility Investigation/Remedial Investigation (RFI/RI) Work Plan, RFI/RI Report with Baseline Risk Assessment (BRA), and Corrective Measures Study/Feasibility Study (CMS/FS) for P Area Operable Unit* (WSRC 2008b) provides the characterization data and

interpretation of the nature and extent of contamination for the remaining 10 subunits that are included within the LUC boundary. These subunits were evaluated based on the use by a future industrial receptor. No problems warranting action were identified. However, LUCs are required to prevent unrestricted use.

The selected remedy for the PAOU leaves radioactive and hazardous substances that pose a potential future risk in place. Land use restrictions will be required until the concentrations of radioactive and hazardous substances in the soil are at levels that allow for unrestricted use and exposure.

2.2 Remedial Actions Selected

Early RA and removal action decisions were previously made on those PAOU subunits discussed in Section 2.2. These decisions included early RAs documented in the EAROD (SRNS 2008) and in an Explanation of Significant Difference (ESD) to the EAROD (SRNS 2009e) as well as NTC removal actions documented in the three Removal Site Evaluation Reports (RSER)/Engineering Evaluation/Cost Analyses (EE/CAs) (SRNS 2009a and 2009b, USDOE 2009). These actions will require long-term maintenance as part of this final action LUCIP to ensure that the remedy remains protective. The early actions are presented below.

- Soil vapor extraction (SVE) enhanced with soil fracturing and chemical oxidation at PSA-3A;
- SVE at PSA-3B;
- Excavation and disposal of contaminated media at the HCA at the Cask Car Railroad Tracks;
- Soil removal at the P-007 Outfall along with a soil cover over the P Ash Basin and the P-007 Outfall;
- Isolation/plugging of Reactor Building (105-P) Complex PSLs; grouting of associated underground structures, manholes, weirs and boxes; select removal of process equipment external to the Reactor Building (105-P) Complex; sealing/plugging of outfalls; and

- In situ Decommissioning (ISD) of the P-Reactor Building (105-P) Complex. ISD of the P-Reactor Building (105-P) Complex entails the following:
  - Leave the Process, the Purification, the Assembly Areas of the P-Reactor Building (105-P) Complex and the Actuator Tower in place.
  - Evaporate the P-Reactor Disassembly Basin water.
  - Demolish the above-grade structure of the Disassembly Area to grade-level.
  - Grout the contents of the disassembly basin to stabilize the contaminants.
  - Remove the stack above the plus 16.8-m (55-ft) elevations.
  - Construct a new partial roof over the shield door slots to prevent rainwater ingress.
  - Grout the Reactor Vessel in place with a constructed concrete cover, sloped to allow water runoff in the event of future rainwater ingress.
  - Leave the Process Room, an above-grade structure, in its current state.
  - Place a sloped concrete cover over the grouted disassembly basin.
  - Grout all vacant spaces from the 0-m (0-ft) level (grade) down to the minus 15.1-m (49.5-ft) level in place (to the extent practical).
  - Grout the Purification Area cells and the below-grade area of Purification in place.

Following successful completion of the early actions, residual hazardous substances will remain at the PAOU. The selected final remedy for the PAOU, as established in the PAOU ROD (SRNS 2009c), includes LUCs. These LUCs are also for the entire PAOU, including the subunits designated in Table 1 that were not included in the early RAs or removal actions decisions but are located within the P-Area fence line.

LUCs will include administrative controls (i.e., institutional controls) and engineering controls. LUCs will consist of property record notices and restrictions, Site Use/Site Clearance Program restrictions, and physical access controls. Sewer connections to all manholes and underground

tanks within the PAOU will be grouted, and warning signs will be posted at the LUC boundary as depicted in Figure 4. LUCs will also include site maintenance (site inspections, general housekeeping, repair of erosion damage and other routine maintenance as needed).

The post-RA conceptual site model (Figure 5) demonstrates that the exposure pathways to an industrial worker are incomplete following implementation of the RA. According to the *Savannah River Site Future Use Project Report* (USDOE 1996), residential use of SRS land is prohibited.

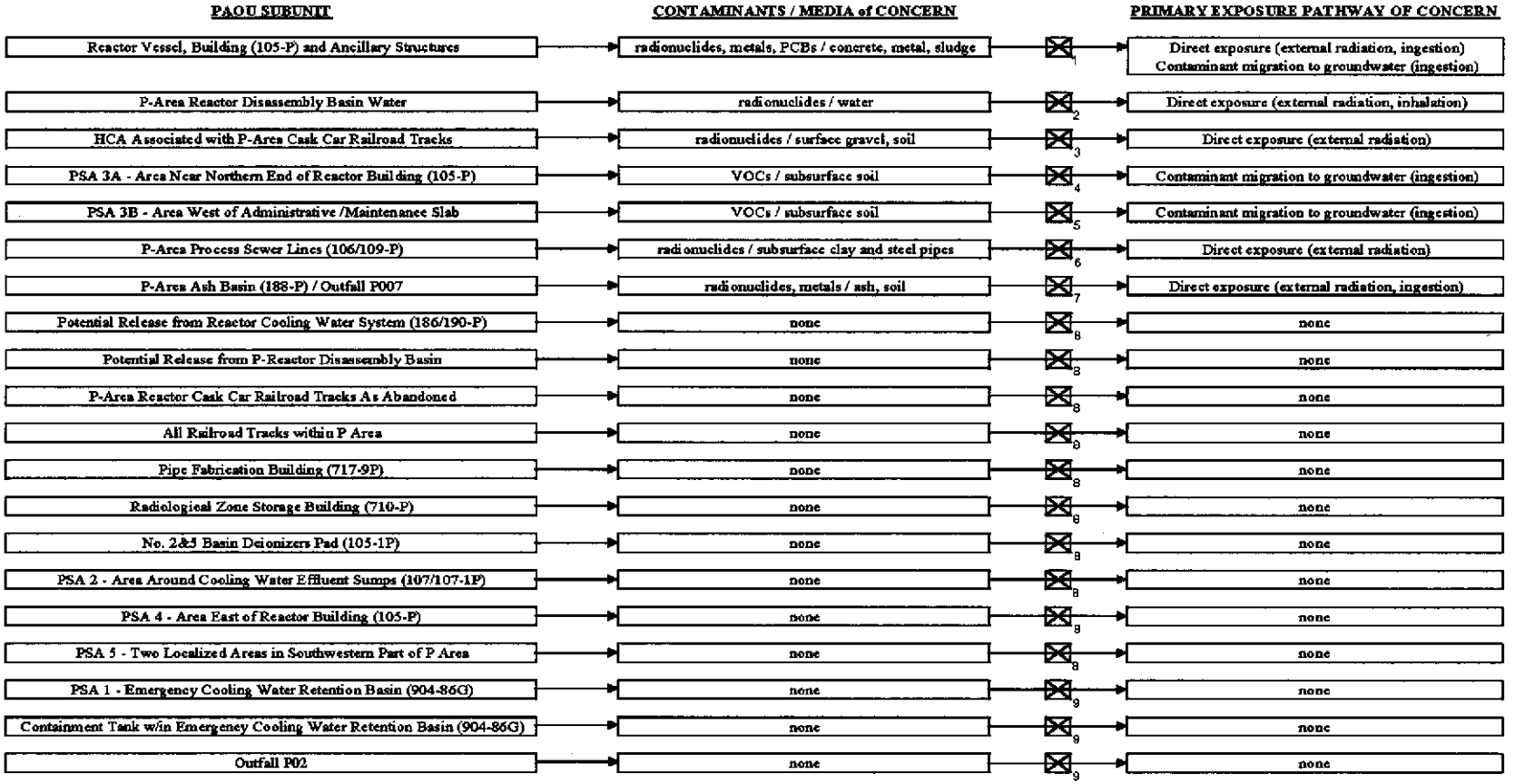

Figure 5. Conceptual Site Model for the P Area Operable Unit Final Action

3.0 LAND-USE CONTROL OBJECTIVES

The following PAOU LUC objectives have been developed to ensure the protectiveness of the remedy described above:

- Restrict worker access and prevent unauthorized contact, removal or excavation of contaminated media
- Prevent access to the 105-P Reactor Building Complex
- Prevent access through manholes and pipelines
- Prohibit the development and use of property for residential housing, elementary schools, childcare facilities and playgrounds
- Maintain the integrity of any current or future remedial or monitoring systems such as SVE systems or groundwater monitoring wells
- Prevent access to or use of the groundwater until cleanup levels are met
- Prevent construction of inhabitable buildings without an evaluation of indoor air quality to address vapor intrusion

Current access controls and deed notification needed to maintain the future land use are described in the following sections of this LUCIP.

4.0 IMPLEMENTATION OF LAND-USE CONTROLS

This section describes the LUCs selected in the ROD to achieve the objectives stated in Section 3.0. A summary of the types of controls is provided in Table 2. USDOE is responsible for implementing, maintaining, reporting on, and enforcing the PAOU LUCs. The LUCIP will become enforceable and will be implemented when approved by USEPA and SCDHEC following the completion of the RA prescribed by the PAOU ROD and ESD. USDOE shall notify USEPA and SCDHEC 60 days in advance of any proposed land use changes that are inconsistent with LUC objectives or the selected remedy.

Table 2. PAOU Land Use Controls

Type of Control	Purpose of Control	Duration	Implementation	Affected Areas[a]
1. Property Record Notices[b]	Provide notice to anyone searching records about the existence and location of contaminated areas.	Until the concentrations 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.	PAOU 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 concentrations 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	PAOU 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 concentrations 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	PAOU 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 PAOU where remedy components cannot be disturbed and where levels requiring land use and groundwater restrictions.
5. Physical Access Controls[f] (e.g., fences, gates, portals)	Control and restrict access to workers and the public to prevent unauthorized access	Until the concentrations 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.

Table 2. PAOU Land Use Controls *(Continued/End)*

Type of Control	Purpose of Control	Duration	Implementation	Affected Areas
6. Warning Signs[g]	Provide notice or warning to prevent unauthorized uses	Until the concentrations of hazardous substances associated with the unit have been reduced to levels that allow for unlimited exposure and unrestricted use	Signage maintained by USDOE	Warning signs will be posted in accordance with applicable site procedures and will be placed in appropriate areas of the PAOU.
7. Security Surveillance Measures	Control and monitor access by workers/public	Until the concentrations of hazardous substances associated with the unit have been reduced to levels that allow for unlimited exposure and unrestricted use	Established and maintained by USDOE Necessity of patrols evaluated upon completion of remedial actions	Security and surveillance measures are in place at the SRS boundary in accordance with RCRA-permit requirements.

[a]Affected areas – Specific locations identified in the SRS LUCIP or subsequent post-ROD documents.
[b]Property Record Notices – Refers to any non-enforceable, purely informational document recorded along with the original property acquisition records of USDOE and its predecessor agencies that alerts anyone searching property records to important information about residual contamination or waste disposal areas in the property.
[c]Property Record Restrictions – Includes conditions and/or covenants that restrict or prohibit certain uses of real property and are recoded along with original property acquisition records of USDOE and its predecessor agencies.
[d]Other 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.
[e]Site 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 of contaminated soil or groundwater, will not disturb the affected areas without the appropriate precautions and safeguards.
[f]Physical Access Controls – Physical barriers or restrictions to entry.
[g]Signs – Posted command, warning or direction.

The PAOU will be maintained as an industrial use area by implementation of the property record notices (Section 4.1) and restrictions (Section 4.2), and the use of a certified LUC survey plat (Section 4.3). Figure 4 illustrates approximate PAOU land use boundary requirements. As previously noted, groundwater LUCs are excluded herein and instead will be managed by the P Area Groundwater OU decision document and LUCIP.

The Site Use Program (Section 4.4) will be implemented to prevent onsite worker exposure to contamination left in place at the PAOU. Other existing measures (i.e., Site Clearance Program, worker training, health and safety requirements, work controls) will also be used to ensure worker safety at the PAOU. Physical access controls (Section 4.5) are implemented at the SRS boundary to control and restrict public and trespasser access to the PAOU, and to prevent unauthorized entry into the Reactor Building Complex.

Signs at the PAOU will be maintained to alert onsite workers to the presence of hazardous substances. The signs will also convey the restrictions of unauthorized personnel. Access control warning signs will be placed and maintained around the PAOU to prevent unknowing entry and unrestricted use.

4.1 Property Record Notices

In the long term, if the property is ever transferred to non-federal ownership, the United States Government will take those actions necessary pursuant to Section 120(h) of CERCLA. Those actions will include a deed notification disclosing former waste management and disposal activities as well as RAs taken on the site. The contract for sale and the deed will contain the notification required by CERCLA Section 120(h).

The deed notification shall notify any potential purchaser that the property has been used for the management and disposal of waste. These requirements are also consistent with the intent of RCRA deed notification requirements at final closure of a RCRA facility if contamination will remain at the unit.

4.2 Property Record Restrictions

The deed shall also include deed restrictions precluding residential use of the property and/or any other property record restrictions necessary to achieve the LUC objectives. The deed shall expressly prohibit activities inconsistent with the RGs and objectives in the PAOU ROD upon any and all transfers. USDOE shall provide a copy of the executed deeds to the regulatory agencies as soon as practicable after the transfer of fee title, but no later than 30 days. However, the need for these deed restrictions may be re-evaluated 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 re-evaluation of the need for the deed restrictions will be done through an amended ROD.

USDOE shall provide USEPA and SCDHEC six-months notice prior to transfer or sale to ensure that USEPA and SCDHEC can be involved in discussions to ensure that appropriate provisions are included in the transfer terms or conveyance documents to maintain effective LUCs. If it is not possible for the facility to notify USEPA and SCDHEC at least six months prior to any transfer or sale, then the facility will notify USEPA and SCDHEC as soon as possible but no later than 60 days prior to the transfer or sale of any property subject to LUCs. In addition to the land transfer notice and discussion provisions above, USDOE further agrees to provide USEPA and SCDHEC with similar notice within the same time frames as to federal transfer of property. USDOE shall provide a copy of the executed deed or transfer assembly to USEPA and SCDHEC.

4.3 Other Public Notices

The LUCIP identifies the proposed area under land use restrictions in Figure 4 for the PAOU and the final survey plat (when available) located in Appendix A. After construction completion, a final survey plat will be prepared to document the as-built arrangement and area subject to LUCs. The drawing will present a polygon of the PAOU subject to LUCs, including the benchmarks, the location of warning signs, access control points, and other information for LUCs. This post-construction survey plat will be certified by a professional land surveyor and

will be submitted to USEPA and SCDHEC concurrently with the Post-Construction Report (PCR). In addition, if the site is ever transferred to non-federal ownership, a professional land surveyor-certified survey plat of the OU will be prepared at or near the time of conveyance to support the LUCIP-required restrictive covenants on land use and will be recorded with the appropriate county recording agency.

4.4 Site Use Program

Under DOE Order 430.1A, *Life Cycle Management* (USDOE 1998), SRS is required to implement an asset management program for the use, maintenance, and disposal of physical assets, including real estate. SRS complies with this order through its Site Use Program, which is conducted in accordance with SRS Manual 1D, *Site Infrastructure and Services Manual*, Procedure 3.02, "Site Real Property Configuration Control" (SRS 2006). All employees, contractors, and visitors at SRS are required to adhere to the Site Use Program. No use of land (i.e., excavation or any other land use) shall be undertaken without prior approval documented by a Site Use Permit. Also, in accordance with SRS Manual 1D, Procedure 3.02, all work at SRS that adds to or modifies features or facilities portrayed on SRS development maps (i.e., plot plans of facilities/utilities at SRS) will be authorized by a Site Clearance Permit before any activities are conducted. All Site Clearance Requests will be reviewed to verify that either an approved Site Use Permit has been obtained or that the request is sanctioned by an existing Site Use Permit. All land use requirements applicable for the OU will be provided to the Site Use Program for use in determining issuance of Site Clearance Permits. In addition, the Site Use Permit must be amended when the geographic configuration or buffer zone used to establish the permit boundary changes or there is a change to the permitted land use.

SRS is responsible for updating, maintaining, and reviewing site maps, including FFA (FFA 1993) OU identifications. If a Site Clearance Request potentially impacts an FFA OU, the Site Clearance Request Form is sent to the appropriate FFA OU reviewer for approval. The roles and responsibilities of each individual are detailed in SRS Manual 1D, *Site Infrastructure and Services Manual*, Procedure 3.02, "Site Real Property Configuration Control." Before a Site Clearance Permit is issued, verification of USDOE approval for intended land use must be

obtained. The site use and site clearance processes are applicable to all activities and personnel on site (including subcontractors). USDOE will notify USEPA and SCDHEC in advance of any change to any internal procedure, including the Site Use Program, which would affect implementing or maintaining the LUCs. The processes are controlled within the SRS Quality Assurance Program in accordance with SRS 1Q Manual, *Quality Assurance* (SRS 2010). The SRS Quality Assurance Program governs all SRS activities.

SRS identifies all buildings and facilities on maps used in the Site Use Program. This waste unit is identified on these maps as a CERCLA facility. The PAOU LUC boundaries are shown in Figure 4.

Any work proposed in these areas will be strictly controlled, and workers will be trained and briefed about health and safety requirements if work is deemed necessary for maintenance. No change in land use at the PAOU shall be undertaken without USEPA and SCDHEC approval. Proposed excavation activities within the PAOU LUC boundary must be approved by the PAOU facility custodian. Approval by USEPA and SCDHEC is required for any modification or termination of the LUCs and implementation actions, and USDOE must obtain prior approval from USEPA and SCDHEC before taking any anticipated action that may disrupt the effectiveness of the LUCs or alter or negate the need for LUCs.

4.5 Physical Access Controls

Site-specific physical access controls are required at the PAOU. Specifically, manholes and the sewer connections to those manholes will be grouted per the RSER/EE/CA (SRNS 2009a). In addition, the entry doors will be sealed so access to the Reactor Building Complex will be prevented. SRS-wide physical access controls are provided at the SRS boundary as mentioned in Table 2, item 5.

4.6 Warning Signs

To prevent unknowing entry and to ensure that unrestricted use of the waste unit does not occur while the unit is under ownership of the government, access control warning signs will be posted

at the unit as shown in Appendix B. The signs shall be legible for a distance of at least 7.6 m (25 ft). Custodial responsibilities for maintenance and inspection of the PAOU will be maintained by the SRS Post-Closure Maintenance Group. Warning signs will be installed as part of the PAOU construction. The signs will be placed at a maximum distance of 100 m (328 ft) apart. Closer spacing will be used as needed (at roads that enter the area, corners, etc.). The final placement of the signage will be documented in the PCR.

4.7 Other Access Controls and Security/Surveillance Measures

While under the ownership of USDOE, access control at the SRS boundary will be in compliance with the current RCRA Part B Permit Renewal Application section describing the 24-hour surveillance system (R.61-79.264.14(b)(1)), artificial or natural barriers (R.61-79.264.14(b)(2)(I)), control entry systems (R.61-79.264.14(b)(2)(ii)), and access control warning signs (R.61-79.264.14(c)).

4.8 Field Inspection and Maintenance for Land Use Controls

After remediation of the PAOU, inspection, monitoring, and maintenance activities will be required as part of the RA. The PAOU will be inspected annually per the example Field Inspection Checklist (Appendix C) and will include:

- The roof structure of the 105-P Reactor Building Complex to ensure that it is functioning properly. Herbicides will be applied to the 105-P Reactor Building Complex roof structure as necessary to prevent the growth of woody vegetation on the roof structure.

- The doors into the 105-P Reactor Building Complex to ensure that they remain sealed.

- The disassembly basin cover to ensure that excessive deterioration has not occurred and that no woody vegetation is growing on the cover.

- The P Ash Basin cover to verify that significant erosion has not occurred (60.9 cm [2 ft] thickness maintained), to ensure that no woody vegetation is growing on the cover, and to ensure that no burrowing or mounding animals are present.

- The PAOU to ensure that are no unauthorized excavations, digging, or construction activities within the LUC boundaries have occurred.

- Posted signs.

Additional inspections may be necessary in the event of unusual weather or any other condition warranting inspection. Inspection records will be kept in the operations record file for future access.

Groundwater monitoring will be conducted to ensure that the ISD remedy is performing as expected and that no contaminant migration constituents of concern have impacted groundwater. Soil-gas monitoring and soil sampling will also be conducted to verify the effectiveness of the SVE actions at PSA-3A and PSA-3B. The details of these monitoring efforts are described in the PAOU Effectiveness Monitoring Plan (SRNS 2010).

Maintenance (including site inspections, general housekeeping, and repair of erosion damage) will be performed as needed at PAOU. Annual inspections will ensure that access control signs are in place. Maintenance activities will be documented and maintained in files subject to USEPA and SCDHEC review and audit. A copy of the completed inspection form is maintained in the SRS Document Control Center. 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.

The waste unit inspectors are to be trained in Hazardous Waste Operations and Emergency Response, RCRA Well Inspections (ACP-specific training), RCRA Waste Unit Inspections, Radiological Worker Training, etc., as applicable for the specific inspection. They will also be trained based on the individual requirements of the regulatory approved closure documents for each waste unit.

Any activity that is inconsistent with the LUC objectives or use restrictions, or any other action that may interfere with the effectiveness of the LUCs will be addressed by the USDOE as soon as practicable, but in no case will the process be initiated later than 10 days after the USDOE becomes aware of the breach. The USDOE will notify USEPA and SCDHEC as soon as practicable but no later than 10 days after discovery of any activity that is inconsistent with the LUC objectives or use restrictions, or any other action that may interfere with the effectiveness of the LUCs. The USDOE will notify USEPA and SCDHEC regarding how the USDOE has addressed or will address the breach within 10 days of sending USEPA and SCDHEC notification of the breach. The FFA Annual Progress Report, submitted to the regulatory agencies by USDOE, will provide the status of the LUCs and describe how any LUC deficiencies or inconsistent uses have been addressed. In the event of property transfer or lease, the Annual Report will cite findings on the following: whether the use restrictions and controls referenced above were communicated in the deed(s) or lease restrictions; whether property use conforms with the deed or lease restrictions and controls; and whether the owners and state/local agencies have been notified regarding the deed or lease restrictions and controls. The FFA Annual Progress Report(s) will be used in the preparation of the Five-Year Remedy Review Report.

This unit-specific LUCIP, including the checklist (Appendix C), will be appended to the SRS LUCAP upon final regulatory approval. After completion of the PCR, the preliminary checklist in the LUCAP will be replaced with the final approved checklist.

5.0 REFERENCES

FFA, 1993. *Federal Facility Agreement for the Savannah River Site*, (Effective Date: August 16, 1993)

SRNS, 2008. *Early Action Record of Decision Remedial Alternative Selection for the P Area Operable Unit (U),* WSRC-RP-2008-4037, Savannah River Nuclear Solutions, LLC, Savannah River Site, Aiken, SC

SRNS, 2009a. *Removal Site Evaluation Report / Engineering Evaluation / Cost Analysis (RSER/EE/CA) for the P-Area Process Sewer Lines as Abandoned (NBN) Subunit for the P Area Operable Unit (U),* SRNS-RP-2009-01046, Savannah River Nuclear Solutions, LLC, Savannah River Site, Aiken, SC

SRNS, 2009b. *Removal Site Evaluation Report / Engineering Evaluation / Cost Analysis (RSER/EE/CA)) for the P-Area Ash Basin (Including Outfall P-007) (188-P) and the R-Area Ash Basin (188-R)(U),* SRNS-RP-2009-01064, Savannah River Nuclear Solutions, LLC, Savannah River Site, Aiken, SC

SRNS, 2009c. *Record of Decision Remedial Alternative Selection for the P-Area Operable Unit (U),* SRNS-RP-2009-01368, Savannah River Nuclear Solutions LLC, Savannah River Site, Aiken, SC

SRNS, 2009d. *Early Action Remedial Action Implementation Plan (EARAIP) for the P Area Operable Unit (PAOU) (U),* WSRC-RP-2008-4072, Savannah River Nuclear Solutions, LLC, Savannah River Site, Aiken, SC

SRNS, 2009e. *Explanation of Significant Difference to the Revision 1.1 Early Action Record of Decision for the P-Area Operable Unit (PAOU) (U),* SRNS-RP-2009-00704, Savannah River Nuclear Solutions, LLC, Savannah River Site, Aiken, SC

SRNS, 2010. P-Area Operable Unit Effectiveness Monitoring Plan, SRNS-RP-2010-00894, Savannah River Nuclear Solutions, Savannah River Site, Aiken, SC

SRS, 2006. SRS Procedure Manual 1D, *Site Infrastructure and Services Manual (U)*, Procedure 3.02, "Site Real Property Configuration Control," Savannah River Site, Aiken, SC

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USDOE, 1996. *Savannah River Site Future Use Project Report, Stakeholder Recommendations for SRS Land and Facilities,* U.S. Department of Energy Savannah River Operations Office

USDOE, 1998. DOE Order 430.1A, *Life Cycle Management* (approved October 14, 1998)

USDOE, 2009. *Submittal of the Revision 3 Action Memorandum for the Non-Time Critical Removal (NTCR) Action for Disposition of Water in the 105-P Disassembly Basin,* U.S. Department of Energy, Savannah River Operations Office, Savannah River Site, Aiken, SC

WSRC, 1999. *Land Use Control Assurance Plan (LUCAP) for the Savannah River Site (SRS),* WSRC-RP-98-4125, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

WSRC, 2008. *RCRA Facility Investigation/Remedial Investigation (RFI/RI) Report with Baseline Risk Assessment, and Corrective Measures Study/Feasibility Study (CMS/FS) for the P Area Operable Unit (U),* WSRC-RP-2007-4032, Washington Savannah River Company LLC, Savannah River Site, Aiken, SC

APPENDIX A – AS-BUILT DRAWINGS

(Drawings to be provided with the submission of the PAOU PCR.)

APPENDIX B –

TYPCIAL ACCESS CONTROL WARNING SIGN

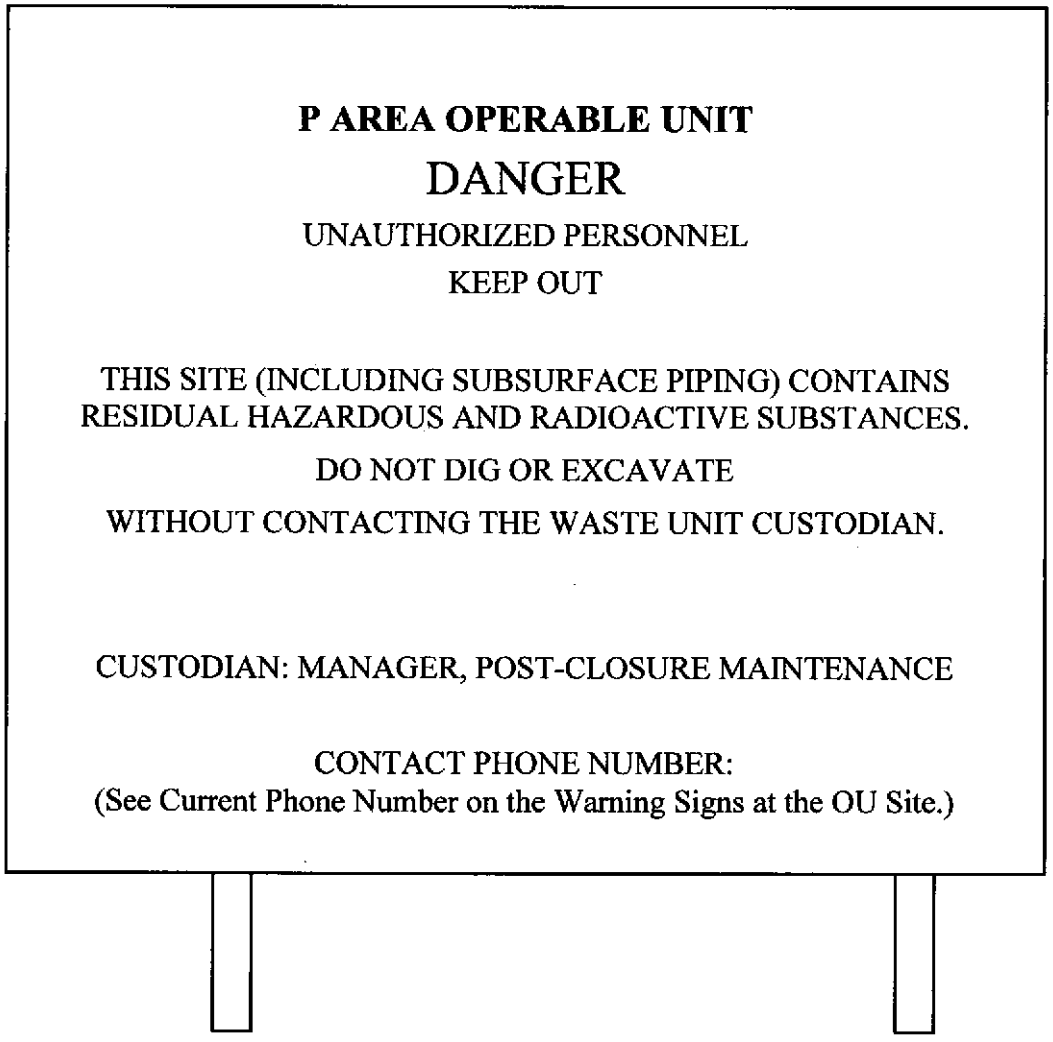

Figure B-1. Typical Access Control Warning Sign

APPENDIX C –

PAOU FIELD INSPECTION CHECKLIST

FIELD INSPECTION CHECKLIST

☐ SCHEDULED ☐ UNSCHEDULED

A= Satisfactory X= Unsatisfactory (Explanation required)	A or X	Observation of Corrective Action Taken
1. Verify that roads are accessible.		
2. Verify that the waste unit signs are in acceptable condition, have the correct information, and are legible from a distance of 25 feet (ft).		
3. Verify that roof structure of 105-P Reactor Building Complex is free of woody vegetation.		
4. Verify that doors to 105-P Reactor Building Complex are sealed.		
5. Verify that excessive deterioration of the disassembly basin cover has not occurred and that the disassembly basin cover is free of woody vegetation.		
6. Verify that no woody vegetation is growing on the P Ash Basin soil cover. Remove or identify as needed.		
7. Verify that the P Ash Basin soil cover has no signs of unacceptable erosion (subsidence).		
8. Verify that signs of burrowing or mounding animals are not present at the P Ash Basin soil cover.		
9. Verify that there are no unauthorized excavations, digging, or construction activities within the LUC boundaries at PAOU.		

Inspected by:		
(Print Name)	(Signature)	(Date)

Post-Closure Manager:		
(Print Name)	(Signature)	(Date)

CAUTION: The inspector shall notify the Post-Closure Manager and Environmental Compliance Authority **IMMEDIATELY** if there has been a breach or compromise of the land use controls of this waste unit. The notification shall be in accordance with SRS post-closure inspection procedures.