009628

United States Department of Energy

Savannah River Site

Record of Decision, Remedial Alternative Selection for the R-Area Bingham Pump Outage Pits (643-8G, 643-9G, 643-10G) and R-Area Unknown Pits #1, #2, #3 (RUNK-1, -2, -3) (U)

WSRC-RP-2001-4129

Rev. 1.1

October 2002

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

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

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

RECORD OF DECISION
REMEDIAL ALTERNATIVE SELECTION (U)

R-Area Bingham Pump Outage Pits (643-8G, 643-9G, 643-10G) and R-Area Unknown Pits #1, #2, #3 (RUNK-1, -2, -3)

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Aiken, South Carolina

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Aiken, South Carolina

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DECLARATION FOR THE RECORD OF DECISION

Unit Name and Location

R-Area Bingham Pump Outage Pits (643-8G, 643-9G, 643-10G) and R-Area Unknown Pits #1, #2, #3 (RUNK-1, -2, -3) Operable Unit

Comprehensive Environmental Response, Compensation and Liability Information System (CERCLIS) Identification Number: OU-38

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

Savannah River Site

Aiken, South Carolina

United States Department of Energy

The R-Area Bingham Pump Outage Pits (643-8G, 643-9G, 643-10G) and R-Area Unknown Pits #1, #2, #3 (RUNK-1, -2, -3) (R BPOPs and RUNKs) Operable Unit (OU) is listed as a CERCLA unit in Appendix C of the Federal Facility Agreement (FFA) for the Savannah River Site (SRS). The media associated with this OU are buried debris and associated contaminated soil.

Statement of Basis and Purpose

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

The State of South Carolina Department of Health and Environmental Control (SCDHEC) and the United States Environmental Protection Agency (USEPA) concur with the selected remedy.

Assessment of the Site

At the R BPOPs and RUNKs OU, there has been a release of hazardous substances into the environment. 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, pollutants or contaminants into the environment.

Description of the Selected Remedy

The R BPOPs and RUNKs OU future land use will be industrial usage. Unrestricted land use is inappropriate due to the proximity of the R BPOPs and RUNKs to the heavy industrial (nuclear) area and the presence of buried debris at the unit. The remedial action objective for the R BPOPs and RUNKs OU is to prevent exposure of future industrial workers to hazardous substances at concentrations that exceed remedial goals (RGs).

The selected remedy for the R BPOPs and RUNKs is Alternative 2: Institutional Controls. There is no principal threat source material at this OU.

The selected remedy entails the following:

- Site maintenance: Site maintenance will consist of inspections of the OU and maintenance of drainage features to minimize the formation of large gullies. Minor earthwork will be performed as needed to repair any erosion damage that may occur. Site maintenance will also include mowing.

- Access controls: Access controls will include security measures such as posting and maintenance of warning signs. Signs will be posted around the OU with a legend warning of the hazard. They will be posted at appropriate locations in sufficient numbers to be seen from any approach. Administrative controls (land use restrictions) will be implemented to restrict human exposure to contaminants remaining at the unit.

- CERCLA ROD reviews: The ROD will be reviewed every five years to ensure that the selected remedy is still protective of human health and the environment.

Because there are no design or construction activities associated with the selected remedy, the time to complete construction is 3 to 6 months.

The groundwater is not included in the scope of this ROD, but is addressed in the R-Area Groundwater OU.

The R BPOPs and RUNKs OU, in addition to many other OUs, is within the Lower Three Runs watershed. Under the overall site management strategy, all source control and groundwater OUs within this watershed will be evaluated to determine their impacts, if any, on the associated streams and wetlands. SRS will manage all OUs to mitigate impact to the watershed. Upon disposition of all OUs, a final comprehensive ROD for the watershed will be pursued. The response action for this OU will not adversely impact the response actions of other OUs at SRS.

Statutory Determinations

Based on the unit Remedial Investigation Report with Baseline Risk Assessment (RI/BRA), soil in the R BPOPs and RUNKs poses a threat to human health. Therefore, Alternative 2 (Institutional Controls) has been selected as the remedy for the R BPOPs and RUNKs OU.

Section 300.430(f)(2) of the NCP requires that a five-year remedy review of the ROD be performed if hazardous substances, pollutants, or contaminants above levels that allow for unlimited use and unrestricted exposure remain in the OU. The three parties - SCDHEC, USEPA, and the United States Department of Energy (USDOE) - have determined that a five-year review of the ROD for the R BPOPs and RUNKs OU will be performed to ensure that the remedy continues to provide adequate protection of human health and the environment.

The selected remedy is protective of human health and the environment, complies with Federal and State requirements that are legally applicable or relevant and appropriate to the remedial action (unless justified by a waiver), is cost-effective, and utilizes permanent solutions and

alternative treatment (or resource recovery) technologies to the maximum extent practicable. This remedy does not satisfy the CERCLA Section 121(b) statutory preference for treatment as a principal element of the remedy (i.e., reduce the toxicity, mobility, or volume of materials comprising principal threats through treatment) because treatment technologies were not as practical and cost-effective as the selected remedy since (1) the long-term threat is low, and (2) there is no principal threat source material at the OU, hence no bias to treat or remove the contaminated media.

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

In the long-term, if the property is ever transferred to non-federal ownership, the US Government will take those actions necessary pursuant to Section 120(h) of CERCLA. Those actions will include a deed notification disclosing former waste management and disposal activities as well as remedial actions taken on the site. The contract for sale and the deed will contain the notification required by CERCLA Section 120(h). The deed notification shall, in perpetuity, notify any potential purchaser that the property has been used for the management and disposal of waste.

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

In addition, if the site is ever transferred to nonfederal ownership, a survey plat of the OU will be prepared, certified by a professional land surveyor, and recorded with the appropriate county recording agency.

The selected remedy leaves hazardous substances in place that pose a potential future risk and will require land use restrictions for an indefinite period of time. As negotiated with USEPA, and in accordance with USEPA Region IV Policy (Johnston 1998), SRS has developed a LUCAP (WSRC 1999a) to ensure that land use restrictions are maintained and periodically verified. The unit-specific LUCIP referenced in this ROD will provide detail and specific measures required for the land use controls selected as part of this remedy. USDOE is responsible for implementing, maintaining, monitoring, reporting upon, and enforcing the land use control selected under this ROD. The LUCIP developed as part of this action will be submitted with the post-ROD documentation, 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 until modified 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 provides the following information:

- Refined constituents of concern (RCOCs) and their respective concentrations
- Baseline risk represented by the RCOCs
- Cleanup levels established for the RCOCs and the basis for the levels
- Current and future land and groundwater use assumptions used in the BRA and ROD

- Land and groundwater use that will be available at the site as a result of the selected remedy

- 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

- Decision factor(s) that led to selecting the remedy (i.e., describes how the selected remedy provides the best balance of tradeoffs with respect to the balancing and modifying criteria)

- How source materials are addressed (there is no principal threat source material at this unit)

12/18/02
Date

Jeffrey M. Allison
Acting Manager
U. S. Department of Energy, Owner and Co-Operator, Savannah River Operations Office

4/23/03
~~4/23/04~~
Date

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

Date

See additional signature page
R. Lewis Shaw
Deputy Commissioner
Environmental Quality Control
South Carolina Department of Health and Environmental Control

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12/18/02
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4/21/03
Date

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

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DECISION SUMMARY
REMEDIAL ALTERNATIVE SELECTION (U)

R-Area Bingham Pump Outage Pits (643-8G, 643-9G, 643-10G) and R-Area Unknown Pits #1, #2, #3 (RUNK-1, -2, -3)

WSRC-RP-2001-4129
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Savannah River Operations Office
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LIST OF ACRONYMS AND ABBREVIATIONS

ARAR	applicable or relevant and appropriate requirement
BRA	Baseline Risk Assessment
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CERCLIS	Comprehensive Environmental Response, Compensation and Liability Information System
CFR	Code of Federal Regulations
CM RCOC	contaminant migration refined constituent of concern
CSM	conceptual site model
FFA	Federal Facility Agreement
FS	feasibility study
GPR	ground penetrating radar
IOU	integrator operable unit
LLC	Limited Liability Company
LUC	Land Use Controls
LUCAP	Land Use Controls Assurance Plan
LUCIP	Land Use Controls Implementation Plan
MCL	maximum contaminant level
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NPL	National Priorities List
O&M	operations and maintenance
OU	operable unit
PAH	polycyclic aromatic hydrocarbon
pCi/g	picoCuries per gram
PP	Proposed Plan
ppmV	parts per million by volume
PTSM	principal threat source material
RAO	remedial action objective
RBC	risk-based concentration
R BPOPs	R-Area Bingham Pump Outage Pits (643-8G, 643-9G, 643-10G)
RCOC	refined constituent of concern
RCRA	Resource Conservation and Recovery Act
RG	remedial goal
RGO	remedial goal option
RI	Remedial Investigation
ROD	Record of Decision
RUNKs	R-Area Unknown Pits #1, #2, #3 (RUNK-1, -2, -3)
SARA	Superfund Amendments Reauthorization Act
SCDHEC	South Carolina Department of Health and Environmental Control
SRS	Savannah River Site
TBC	to-be-considered

LIST OF ACRONYMS AND ABBREVIATIONS (CONTINUED)

ug/kg	micrograms per kilogram
USDOE	United States Department of Energy
USEPA	United States Environmental Protection Agency
WSRC	Westinghouse Savannah River Company

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

Unit Name, Location, and Brief Description

R-Area Bingham Pump Outage Pits (643-8G, 643-9G, 643-10G) and R-Area Unknown Pits #1, #2, #3 Operable Unit

Comprehensive Environmental Response, Compensation and Liability Information System (CERCLIS) Identification Number: OU-38

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

Savannah River Site

Aiken, South Carolina

United States Department of Energy (USDOE)

Savannah River Site (SRS) occupies approximately 310 square miles of land adjacent to the Savannah River, principally in Aiken and Barnwell counties of South Carolina (Figure 1). SRS is located approximately 25 miles southeast of Augusta, Georgia, and 20 miles 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 CERCLA, are currently present in the environment at SRS.

The Federal Facility Agreement (FFA) (FFA 1993) for SRS lists the R-Area Bingham Pump Outage Pits (643-8G, 643-9G, 643-10G) and R-Area Unknown Pits #1, #2, #3 (RUNK-1, -2, -3) (R BPOPs and RUNKs) Operable Unit (OU) as CERCLA unit requiring further evaluation. The R BPOPs and RUNKs OU required further evaluation using the CERCLA Remedial Investigation (RI) process to determine the actual or potential impact to human health and the environment of releases of hazardous substances, pollutants or contaminants to the environment.

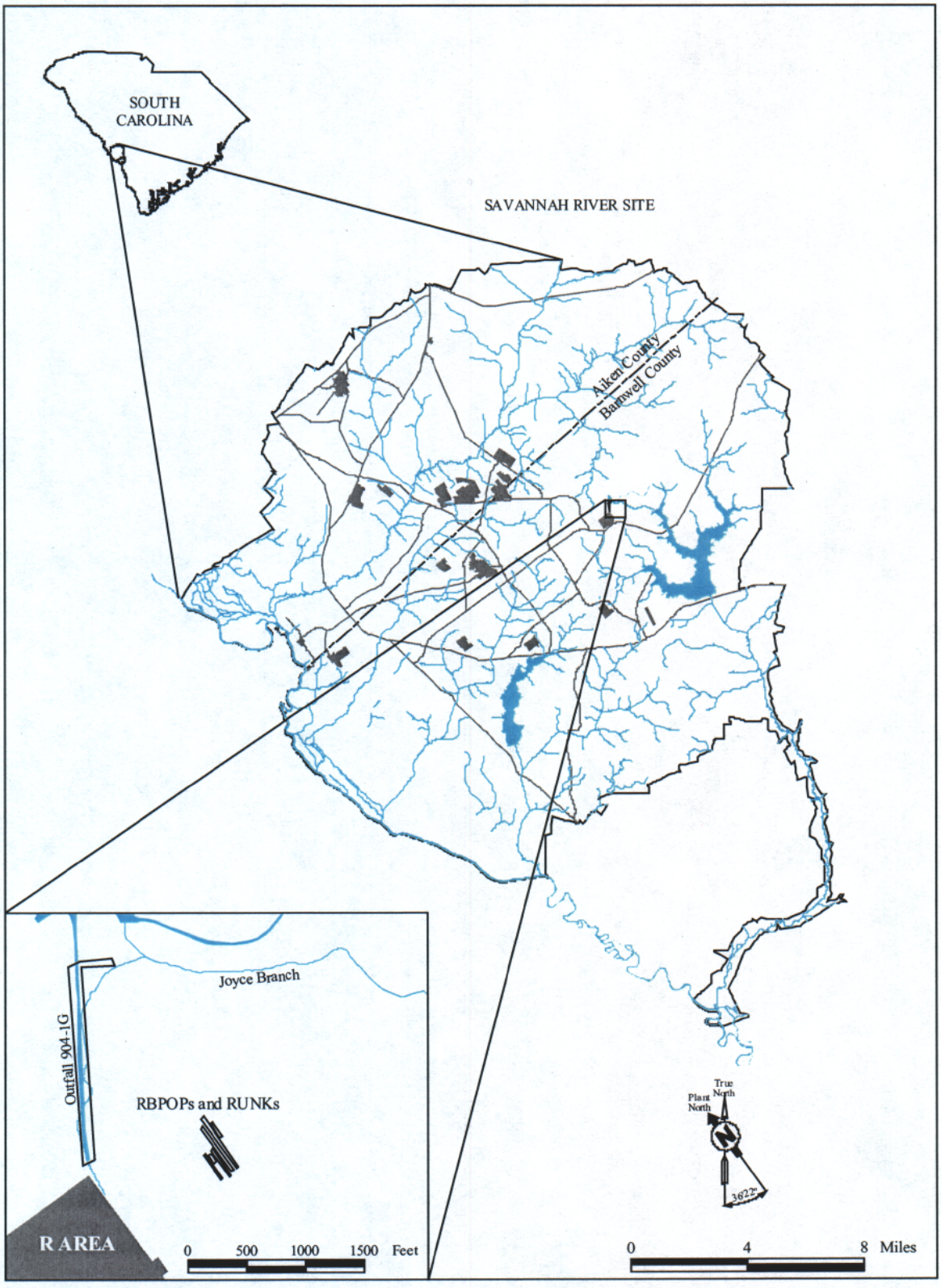


Figure 1. Location of the R BPOPs and RUNKs OU at SRS

II. SITE AND OPERABLE UNIT COMPLIANCE HISTORY

SRS Operational and Compliance History

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

On December 21, 1989, SRS was included on the National Priorities List (NPL). In accordance with Section 120 of CERCLA, 42 U.S.C.A. § 9620, USDOE has negotiated a FFA (FFA 1993) with the United States Environmental Protection Agency (USEPA) and the South Carolina Department of Health and Environmental Control (SCDHEC). The FFA is a legally-binding agreement between regulatory agencies (USEPA and SCDHEC) and regulated entities (USDOE) that sets the standards and schedules for the comprehensive remediation of the SRS. USDOE functions as the lead agency for remedial activities at SRS, with concurrence by the USEPA - Region IV and the SCDHEC.

Operable Unit Operational and Compliance History

The R BPOPs and RUNKs OU consists of six pits including three known pits called R BPOPs (643-8G, 643-9G, and 643-10G) and three pits with unknown or incomplete histories called RUNKs (RUNK-1, RUNK-2, and RUNK-3). Pits 643-8G and 643-9G are approximately 250 ft long, 16 ft and 20 ft wide respectively, and up to 13 ft deep. Pit 643-10G is approximately 522 ft long, 19 ft wide, and 14 ft deep. RUNK-1 and RUNK-3 are approximately 105 ft and 135 ft long respectively, 25 ft wide, and up to 8 ft deep. RUNK-2 is approximately 445 ft long, 30 ft wide, and up to 12 ft deep. The sum of the

areas for each pit is 0.9 acres; the area of a polygon around all the pits, which includes the areas between the pits, is 1.75 acres. The OU is located on the northeast side of R Area at the SRS (Figure 1).

The land surface at R BPOPs and RUNKs OU is gently sloping and covered by grassy vegetation. Dense vegetation and trees are located around the unit. The habitats at the OU generally do not meet the needs of most threatened, endangered, or sensitive species. No unique or sensitive ecosystems have been identified. A ground-level photograph is provided as Figure 2.

The OU has been assessed through characterization and a series of documents written by USDOE and approved by the regulatory agencies (SCDHEC and USEPA). These documents include a Work Plan (WSRC 1999b), RI Report with Baseline Risk Assessment (BRA) (WSRC 2000), and a Proposed Plan (PP) (WSRC 2001). A feasibility study (FS) was not prepared because USDOE, SCDHEC, and USEPA agreed that the problem warranting action and the scope of the problem was well-defined and that the list of likely response actions was short enough to proceed directly from the RI/BRA to the PP. The types of assessments typically done in an FS were included in Appendix A of the PP.

History of the R BPOPs and RUNKs

Historical aerial photographs indicate RUNK-2 predates the R BPOPs and was in existence as early as 1953. Construction debris has been verified in RUNK-2 based upon a magnetic survey, ground penetrating radar (GPR) surveys, and soil sampling in the pit. A historical photograph indicates that liquid wastes were also introduced into the pit but no containerized liquids were discovered during characterization. Historical photographs indicate that RUNK-2 was closed in 1956.

The R BPOPs were constructed during 1957 and 1958 when major modifications were made to primary and secondary SRS reactor cooling water systems. The outages of the

Figure 2. Ground-Level Photograph of R BPOPs and RUNKs

All six pits of the OU are located in the center of the open grassy area behind the signs. The pits were backfilled to grade in the late 1950s and are not evident at the surface.

cooling water systems that occurred as a result of these modifications became known as Bingham Pump Outages. Wastes generated during these outages were segregated based on levels of radioactivity. Higher activity waste was sent to the SRS Burial Ground Complex in E-Area while lower activity waste was buried in the R BPOPs. Waste disposed in the R BPOPs consisted of miscellaneous construction materials such as pipes, cables, ladders, concrete, and miscellaneous hardware. The R BPOPs were closed in the late 1950s by backfilling with approximately 4 ft of cover soil.

RUNK-1 and RUNK-3 were discovered in 1993 during a GPR survey of the area. The survey indicated that these areas had been previously disturbed, but their history is unknown. Magnetic surveys of these RUNKs indicated they do not contain metallic debris, and furthermore, no metallic or non-metallic debris was encountered during soil sampling. Due to the lack of any identified debris, it is possible that no debris was ever placed in these two RUNKs.

III. HIGHLIGHTS OF COMMUNITY PARTICIPATION

CERCLA requires the public to be given an opportunity to review and comment on the proposed remedial alternative. Public participation requirements are listed in Sections 113 and 117 of CERCLA, 42 U.S.C.A. §§ 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 R BPOPs and RUNKs OU. The Administrative Record File must be established at or near the facility at issue. The SRS Public Involvement Plan (USDOE 1994) is designed to facilitate public involvement in the decision-making process for permitting, closure, and the selection of remedial alternatives. The SRS Public Involvement Plan addresses the requirements of CERCLA and the National Environmental Policy Act, 1969. Section 117(a) of CERCLA, as amended, requires the notice of any proposed remedial action and provide the public an opportunity to participate in the selection of the remedial action. The *Proposed Plan for the R-Area Bingham Pump Outage Pits (643-8G, 643-9G, 643-10G) and R-Area Unknown Pits #1, #2, #3 (RUNK-1, -2, -3)* (WSRC 2001), a part of the Administrative

Record File, highlights key aspects of the investigation and identifies the preferred action for addressing the R BPOPs and RUNKs OU.

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

US 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 South Carolina Department of Health and Environmental Control
Bureau of Land and Waste Management
8901 Farrow Road
Columbia, South Carolina 29203
(803) 896-4000

Lower Savannah District
Environmental Quality Control Office
206 Beaufort Street, Northeast
Aiken, South Carolina 29801
(803) 641-7670

The public was notified of the public comment period through mailings of the *SRS Environmental Bulletin*, a newsletter sent to citizens in South Carolina and Georgia, and through notices in the *Aiken Standard*, the *Allendale Citizen Leader*, the *Augusta Chronicle*, the *Barnwell People-Sentinel*, and *The State* newspapers. The public comment period was also announced on local radio stations.

The PP 30-day public comment period began on April 18, 2002, and ended on May 17, 2002. No comments were received during the public comment period.

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

CERCLA Programs at SRS

CERCLA units (including the R BPOPs and RUNKs OU) at SRS are subject to a multi-stage RI process to meet the requirements of CERCLA as outlined in the FFA (FFA 1993). The CERCLA process is summarized below:

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

The steps of this process are iterative in nature and include decision points which require concurrence between USDOE as owner/manager, USEPA and SCDHEC as regulatory oversight agencies, and the public (see Figure 3).

Operable Unit Remedial Strategy

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

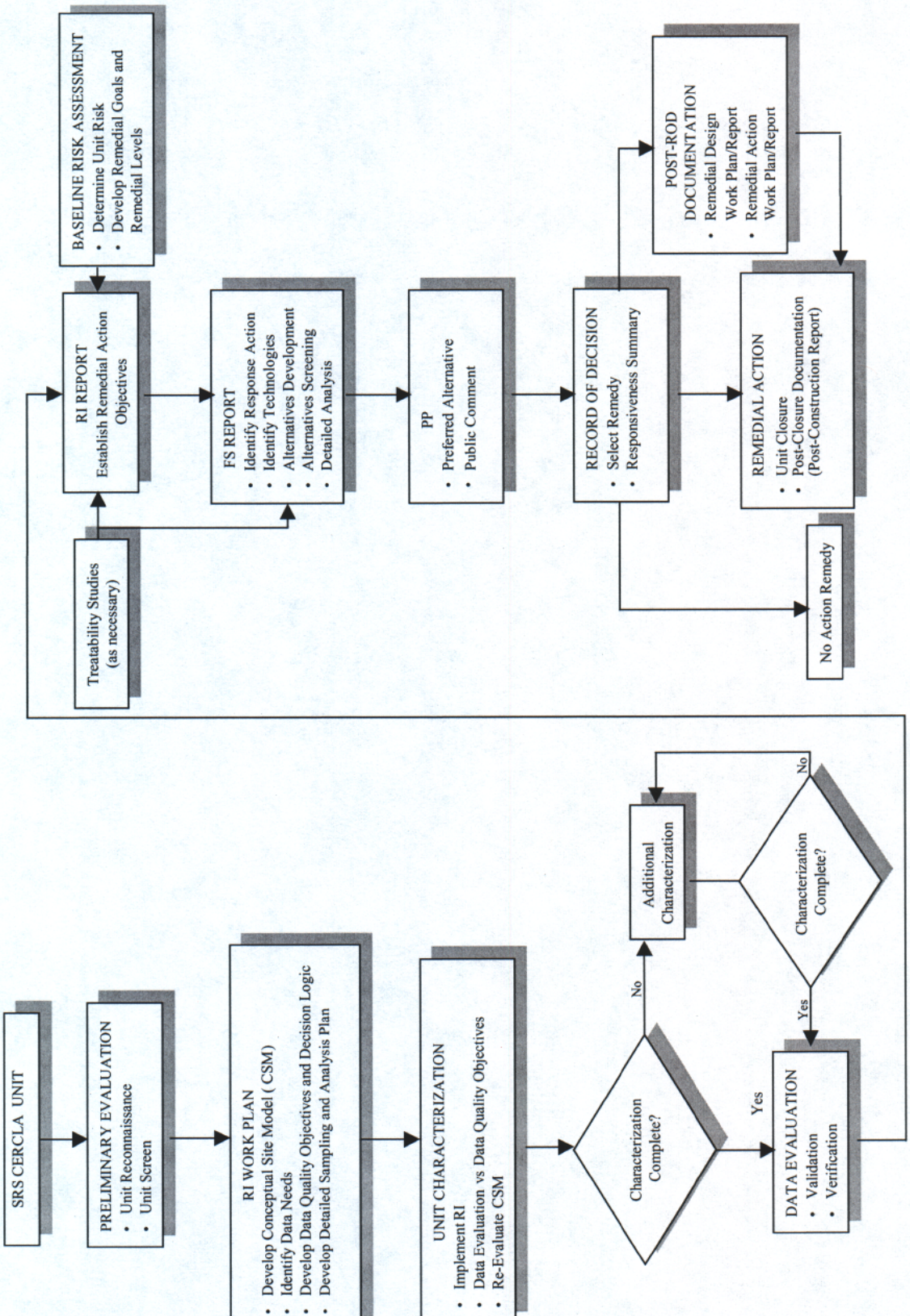


Figure 3. CERCLA Logic and Documentation

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

The scope of the problem to be addressed by this final action is contamination in soil and on buried debris at R BPOPs and RUNKs. Groundwater is being addressed separately in association with the R Area Groundwater OU. The R BPOPs and RUNKs OU is within the Lower Three Runs watershed in the Lower Three Runs integrator operable unit (IOU). In addition to the R BPOPs and RUNKs OU, there are many other OUs within this watershed. Under the overall site management strategy, all source control and groundwater OUs within this watershed will be evaluated to determine their impacts, if any, on the associated streams and wetlands. SRS will manage all OUs to mitigate impact to the watershed. Upon disposition of all OUs, a final comprehensive Record of Decision (ROD) for the watershed comprising the Lower Three Runs IOU will be pursued with additional public involvement.

The response action for this OU will not impact the response actions of other OUs at SRS.

V. OPERABLE UNIT CHARACTERISTICS

Conceptual Site Model for the R BPOPs and RUNKs OU

To better understand the risks posed against current and future receptors, a conceptual site model (CSM) of the unit was developed. The CSM illustrates the sources of contamination, potential exposure pathways, and exposure media relevant to the unit. The CSM is provided as Figure 4. A detailed explanation of the CSM is provided in Chapter 2 of the RI/BRA (WSRC 2000).

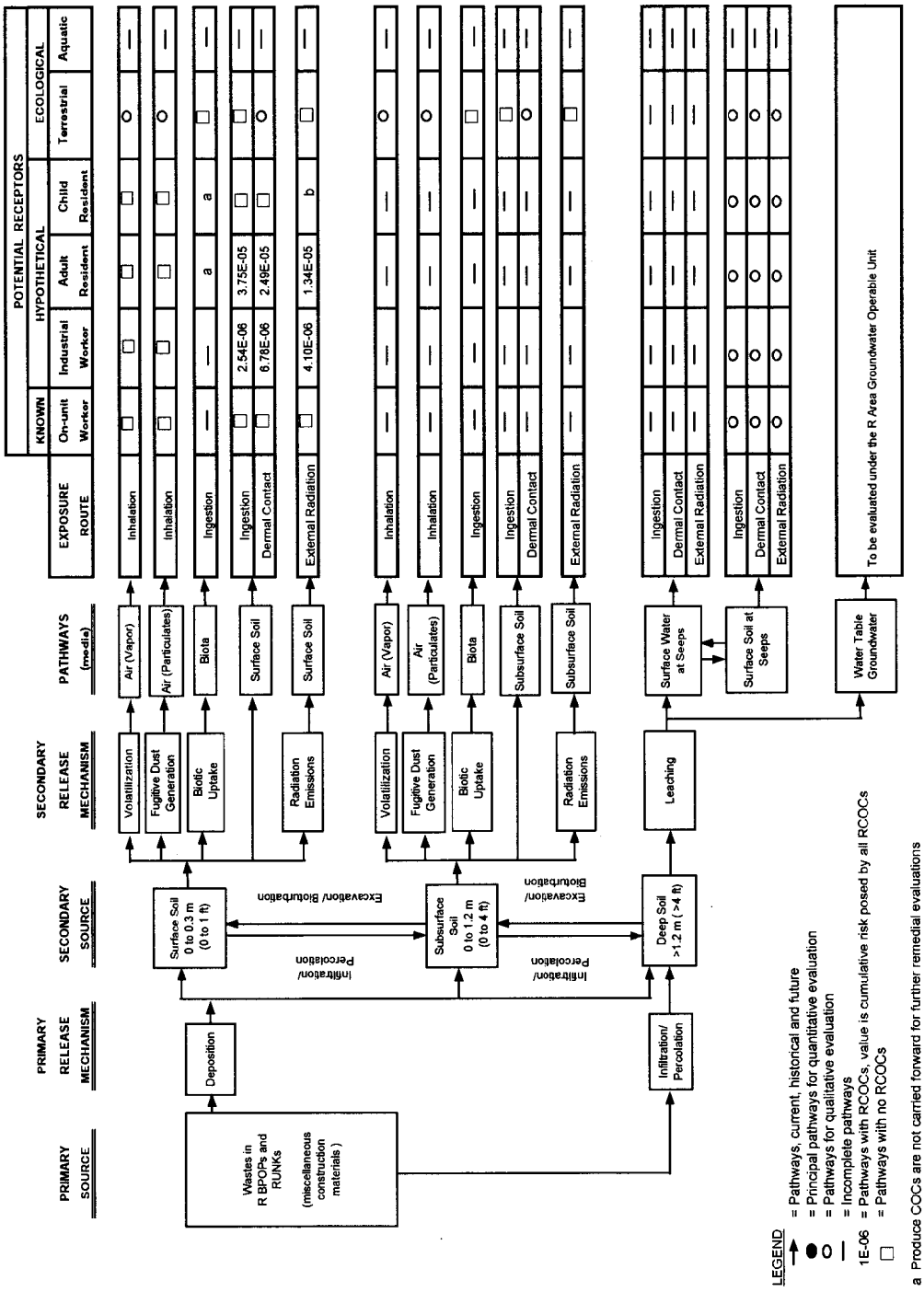


Figure 4. CSM for the R BPOPs and RUNKs OU

Media Assessment

The RI/BRA (WSRC 2000) contains detailed information and analytical data for the media assessment. This document is available in the Administrative Record File (see Section III). The investigations are summarized below. Table 1 is a summary of the environmental activities performed at the unit.

Soil Investigation

Characterization of R BPOPs and RUNKs was performed through a series of sampling events. Generally, the sampling locations of each successive event were selected based on review of data previously collected with the intent of targeting the areas exhibiting the highest levels of contamination.

Investigation of R BPOPs and RUNKs began in 1987 with a radiological survey of vegetation. Although no quantitative data were provided in the resulting Environmental Information Document (Pekkala et al. 1987), it is noted that radiation levels were elevated above background but "very low". In November 1991, surface soil samples were screened for beta/gamma and alpha radioactivity, but no activity was detected above background.

In 1992 a soil-gas survey was conducted on the R BPOPs. Sample results indicated low levels of light hydrocarbons which were attributed to decaying organic matter. Additionally, tetrachloroethene was detected in pits 643-8G and 643-10G. Maximum concentrations were 0.046 parts per million by volume (ppmV) and 0.005 ppmV respectively. O-Xylene was also detected at pit 643-10G at 0.81 ppmV.

In 1993, a GPR survey was conducted to delineate the vertical boundaries of the pits. This survey was followed in 1995 by a magnetic survey which located metallic debris in the R BPOPs and RUNK-2.

Table 1. CERCLA Activities Performed at the R BPOPs and RUNKs

Investigation Dates	Media Investigated	Description
c. 1987	Vegetation	Radiation survey of vegetation
November 1991	Soil, Air	Radiation survey of surface soil and air
1992	Soil	Soil gas survey (7 sites in 643-8G, 8 sites in 643-9G, 12 sites in 643-10G)
September 1993	Soil, Debris	GPR survey (57 transects)
June, August 1994	Biota	Threatened, Endangered & Sensitive (TES) Species Survey
1995	Soil, Debris	Magnetic survey
June 26 through August 19, 1996	Soil	Phase I (pre-work plan) characterization: Background soil samples (boring R-12) Intra-pit soil samples (borings R-13 through R-27) CPT lithologic logs (R/CPT-1 through R/CPT-5)
February 24 through July 2, 1997	Soil, Groundwater	Phase II characterization: Background soil samples (borings R-48 and R-49) Perimeter soil samples (borings R-50 and R-52 through R-56) Intra-pit samples (borings R-57 through R-64) Installation and sampling of monitoring wells (RBP-1D, -2D, and -3D)
March 23 through April 30, 1998	Groundwater	Groundwater I: CPT groundwater sampling (CPT-6r, -7, -8, -10, -11, -12, -13, -15, -16, -17, -19) CPT lithologic logs (CPT-20 through –25) Installation of temporary piezometers (RBP-4D, -5D, and –6D) (abandoned 4/24/98)
October 1 through November 2, 1998	Groundwater	Groundwater II: Installation of temporary piezometers (RBP-8D, -9D, and –10D) (abandoned 12/10/98) Installation and sampling of monitoring well (RBP-7D) CPT groundwater sampling (CPT-26 through -33, -35, -40 through 44, -49, and -50) CPT lithologic logs (CPT-45, -46, -47, and –51)
October 1998	Soil	Seep soil samples (E-SEEP-01 and W-SEEP-01)
June 1 through June 8, 1999	Groundwater, Soil	Groundwater III: CPT groundwater sampling (CPT-53, -55, -59, -61, -63, -65, -67, -69, -71, -89, -91, -93, -95, -97, -99, -101, -103, -105, -107, -109) CPT lithologic logs (CPT-52, -54, -56, -58, -60, -62, -64, -66, -68, -70, -88, -90, -92, -94, -96, -98, -100, -102, -104, -106, -108) CPT soil gas sampling (CPT-74 through –83)

Contingent CPT stations CPT-72, -73, -84, -85, -86, -87 were cancelled.

Phase I pre-Work Plan characterization activities began in the summer of 1996. Intra-pit soil samples (samples collected from borings advanced through the pits), background soil samples, and cone penetrometer technology data were collected from June 26 through August 19, 1996.

Phase II sampling, designed to augment data from Phase I, included additional intra-pit soil samples, perimeter samples (samples collected from borings advanced around the edges of the pits), background samples, and installation and sampling of monitoring wells.

Groundwater Investigation

Characterization of groundwater was performed through a series of sampling events. Generally, the sampling locations of each successive event were selected based on review of data previously collected with the intent of targeting the areas exhibiting the highest levels of contamination.

To refine information about groundwater flow and to determine the nature and extent of any contamination in the water table aquifer, three phases of groundwater sampling occurred in 1998 and 1999.

Media Assessment Results

The sampling data were evaluated in the RI/BRA to identify RCOCs (constituents warranting remedial action). RCOCs were identified using the SRS protocols for data processing, human health and ecological risk assessment, and contaminant migration modeling. Table 2 lists the types of contaminants and risks at the unit. The key findings of the RI/BRA are discussed below.

Table 2. Summary of Risks and Hazards: Surface Soil at R BPOPs and RUNKs

Known On-Unit Worker
No RCOCs

Future On-Unit Industrial Worker				
RCOC	**Ingestion**	**Inhalation**	**Dermal/External**	**Total of All Exposure Routes**
Benzo(a)pyrene	2.54×10^{-6}	----	5.24×10^{-6}	7.78×10^{-6}
Dibenzo(a,h)anthracene	----	----	1.54×10^{-6}	1.54×10^{-6}
Cesium-137	----	----	1.94×10^{-6}	1.94×10^{-6}
Cobalt-60	----	----	2.17×10^{-6}	2.17×10^{-6}
			Total Cumulative Risk	1.34×10^{-5}

Hypothetical On-Unit Resident Adult				
RCOC	**Ingestion**	**Inhalation**	**Dermal/External**	**Total of All Exposure Routes**
Benzo(a)anthracene	3.51×10^{-6}	----	2.41×10^{-6}	5.92×10^{-6}
Benzo(a)pyrene	2.27×10^{-5}	----	1.56×10^{-5}	3.84×10^{-5}
Benzo(b)fluoranthene	3.22×10^{-6}	----	2.21×10^{-6}	5.44×10^{-6}
Dibenzo(a,h)anthracene	6.70×10^{-6}	----	4.60×10^{-6}	1.13×10^{-5}
Indeno(1,2,3-c,d)pyrene	1.30×10^{-6}	----	----	1.30×10^{-6}
Cesium-137	----	----	6.35×10^{-6}	6.35×10^{-6}
Cobalt-60	----	----	7.10×10^{-6}	7.10×10^{-6}
			Total Cumulative Risk	7.58×10^{-5}

---- = not a RCOC for this pathway.
There are no ecological RCOCs or CM RCOCs for the R BPOPs and RUNKs OU.
A risk of 1×10^{-6} means there is a risk of one additional incident of cancer per one million people.

Soil

The unit investigation confirmed that miscellaneous debris remains buried in the unit. Soil contaminants identified as RCOCs include polycyclic aromatic hydrocarbon (PAHs) (benzo[a]anthracene, benzo[a]pyrene, benzo[b]fluoranthene, dibenzo[a,h]anthracene, and indeno[1,2,3-c,d]pyrene) and radionuclides (cobalt-60 and cesium-137). These contaminants are primarily in the R BPOPs (643-8G, 643-9G, and 643-10G) and RUNK-2. Cleanup goals (discussed in Section VIII) are not exceeded in RUNK-1 or RUNK-3. Soils around the perimeter of the unit are generally uncontaminated.

The amount of unit-related contamination in the perimeter soils, if any, is minimal and not readily discernible from ambient background levels. Figure 5 illustrates the extent of contamination. There are no Resource Conservation and Recovery Act (RCRA) listed or characteristic wastes at the unit. The combined volume of the 6 pits, from land surface to the base of the pits, is 14,000 cubic yards.

There is no principal threat source material (PTSM) (highly-mobile or highly-toxic source materials that require a bias toward treatment alternatives) at the R BPOPs and RUNKs OU. The contamination is largely isolated by backfill with its exposure limited by land use restrictions; the waste is categorized as a low-level threat.

Groundwater

A tetrachloroethene plume in groundwater appears to have originated as a result of leaching from RUNK-2, and it has intermingled with trichloroethene and tritium plumes from unrelated upgradient sources in R Area. The source of the tetrachloroethene in RUNK-2 is now depleted and is no longer contributing to the plume. USDOE, USEPA, and SCDHEC have agreed that groundwater at the OU will be evaluated separately in association with the R Area Groundwater OU.

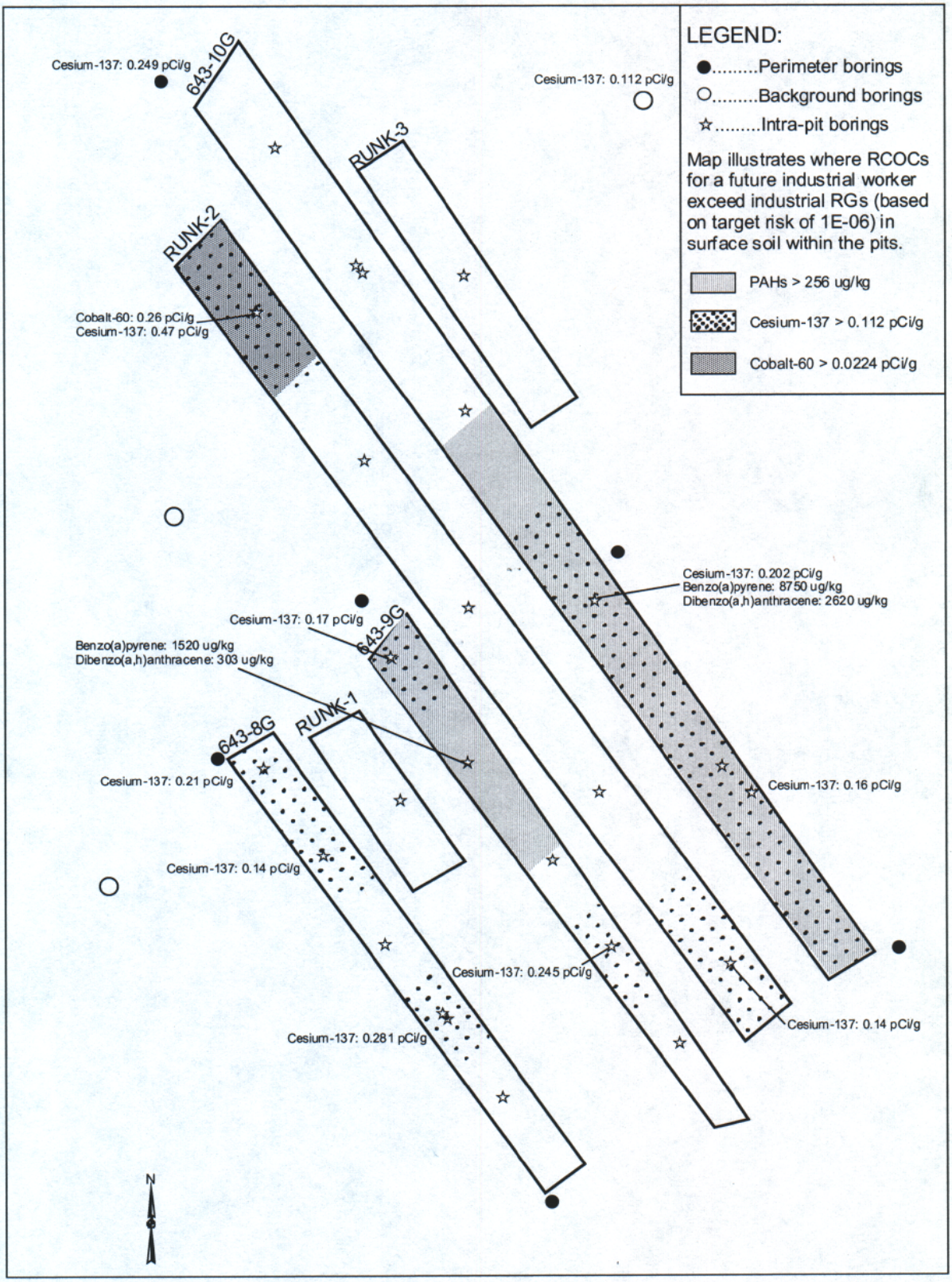


Figure 5. Industrial RCOCs in Surface Soil at R BPOPs and RUNKs OU

Site Specific Factors

There are no site-specific factors that may affect the response action at the OU. There are no areas of archaeological or historical importance in the vicinity of the OU.

Contaminant Transport Analysis

Contaminant fate and transport modeling using the SESOIL computer model was performed to determine if any constituents in soil will leach through the vadose zone and impact groundwater quality (WSRC 2000). The modeling indicated that there are no contaminant migration (CM) RCOCs. This means no constituents are predicted to exceed the Safe Drinking Water Act maximum contaminant levels (MCLs) or risk-based concentrations (RBCs) in groundwater within 1,000 years. Leaching of contaminants in soil does not present a contaminant migration (leachability) threat to groundwater quality.

VI. CURRENT AND POTENTIAL FUTURE SITE AND RESOURCE USES

Land Uses

The OU is located in the interior of SRS approximately 4.6 miles from the nearest SRS boundary (Figure 1). SRS is a secured government facility with no residents. General public access to SRS is prohibited, with access limited by security personnel and fences. SRS Site Use and Site Clearance Programs prevent exposure of SRS employees to contaminants in soil at depth by restricting invasive and permanent installation activities at the unit. The Site Use Program coordinates use of all lands and waters on the SRS. No use of land (i.e., excavation or any other land use) can be undertaken without prior approval documented by a Site Use Permit. The Site Clearance Program coordinates the modification or addition of features or facilities on SRS development maps (i.e., plot plans of facilities/utilities). Approval of the intended land use must be obtained before issuance of a Site Clearance Permit. The Site Use and Site Clearance processes are applicable to all activities and personnel at SRS and are controlled within the SRS

Quality Assurance Program. These programs, in addition to health and safety requirements in place and maintained at SRS, strictly control any work proposed at a waste unit and prevent unacceptable exposure.

The OU is located close to, but outside of, the perimeter fence and industrial buffer zone of R-Area, one of several inactive nuclear reactor areas at SRS. The OU is approximately 900 ft from the reactor area perimeter fence.

In the *Savannah River Site Future Use Project Report* (USDOE 1996), the USDOE has taken steps to prohibit residential use of SRS, including land in the vicinity of the R-Reactor Area, through its plan for current and future use of the SRS. Therefore, future residential use of the area is not anticipated.

The proximity of the R BPOPs and RUNKs to the heavy industrial (nuclear) area and the presence of buried debris at the unit make the OU unsuitable for residential use. The USDOE, USEPA, and SCDHEC agree that industrial land use restrictions are appropriate for the R BPOPs and RUNKs OU area. Industrial land use restrictions will include land use controls to ensure protection against unrestricted (residential) uses. Unrestricted (residential) use of this area is not anticipated. The future land use of the R BPOPs and RUNKs OU is anticipated to be the same as the current land use (industrial use and control by the federal government).

Groundwater Uses/Surface Water Uses

Groundwater at the OU is not currently being used for human consumption or any other purpose. It is unlikely that drinking water wells will be installed in the future in the potentially affected area because (1) the potentially affected area is small, (2) residential use of the area is unlikely due to the proximity of the OU to the heavy industrial zone of R Area, and (3) water table wells in this area do not produce much water.

There are no significant sources of surface water near the OU. Surface water is not used for irrigation, consumption, or other uses.

USDOE controls drilling and surface water use through SRS Site Use and Site Clearance Programs; therefore, as long as USDOE maintains control of SRS, neither surface water nor groundwater will be used as a potential drinking water source or for irrigation.

Future residential use of groundwater or surface water at the OU is not anticipated.

VII. SUMMARY OF OPERABLE UNIT RISKS

As a component of the RI process, a BRA (WSRC 2000) was performed to evaluate risks associated with the R BPOPs and RUNKs OU. The BRA included human health and ecological risk assessments. A summary of risks and hazards is presented in Table 2.

The R BPOPs and RUNKs OU is undeveloped and there are no drinking water wells currently located in the surrounding area. SRS workers occasionally visit the site to perform routine activities such as inspections, periodic maintenance, and environmental sampling. Based on this land use, the risk assessments in the BRA evaluated a current exposure scenario of an on-unit worker exposed to soil at the unit. For future land use, two receptors were evaluated, the future industrial worker and the hypothetical resident. Given that the future land use is expected to be similar to current conditions, the resident scenario is a conservative exposure scenario.

There are no human health RCOCs under current conditions (the current industrial worker scenario). A current industrial worker is an SRS employee who works at or in the vicinity of the OU under current land use conditions. This receptor may be a researcher, environmental sampler, an employee who mows the unit, or other person who comes to the area on an infrequent or occasional basis. The fact that there are no RCOCs for this scenario indicates that the unit does not pose an unacceptable risk (greater than one additional incident of cancer per one million people, or 1×10^{-6}) to a worker who comes to the area on an infrequent basis.

It is anticipated that future conditions at the OU will be similar to current conditions. Although development is unlikely and the future use of the land is not likely to change from

current use, a future on-unit industrial exposure scenario was evaluated in the RI/BRA. The future on-unit industrial exposure scenario addressed long-term risks to workers who are exposed to unit-related constituents while working within an industrial setting. The future on-unit industrial worker is an adult who works in an outdoor industrial setting that is in direct proximity to the contaminated media for the majority of his time while at his workplace. Under this scenario, human health risk calculations indicate benzo(a)pyrene, dibenzo(a,h)anthracene, cobalt-60, and cesium-137 in surface soil would pose an unacceptable risk to a future industrial worker (carcinogenic risks of up to 5.24×10^{-6} for a given pathway for a future industrial worker exceed the benchmark level of 1×10^{-6}).

Although residential development of the OU is unlikely, a hypothetical residential exposure scenario was evaluated for comparative purposes. The hypothetical on-unit resident exposure scenario evaluates long-term risks to individuals having unrestricted use of the unit. It assumes that residents live on-unit and are chronically exposed (both indoors and outdoors) to unit-related constituents. If future land use is unrestricted, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, dibenzo(a,h)anthracene, indeno(1,2,3-c,d)pyrene, cobalt-60, and cesium-137 would pose an unacceptable risk to a hypothetical on-unit resident adult (carcinogenic risks of up to 2.27×10^{-5} for a given pathway for a hypothetical on-unit resident exceed the benchmark level of 1×10^{-6}).

The ecological risk assessment in the RI/BRA evaluated whether contaminants at the OU would have an adverse impact on potential ecological receptors. No ecological RCOCs were identified, indicating that the unit does not pose a risk to biota.

Contaminant fate and transport analyses in the RI/BRA indicated that there are no CM RCOCs. This means no constituents are predicted to exceed the Safe Drinking Water Act MCLs or RBCs in groundwater within 1,000 years. Leaching of contaminants in soil does not present a contaminant migration (leachability) threat to groundwater quality.

At R BPOPs and RUNKs OU, miscellaneous contaminated construction debris remains buried at depth in the unit.

The assessments in the RI/BRA conclude that no PTSM is present at the OU. However, soil at R BPOPs and RUNKs OU poses risks to human health. Hence, actual or threatened releases of hazardous substances, pollutants or contaminants from the OU, if not addressed by the selected alternative or another active measure, would 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 used as the framework for developing remedial alternatives and are formulated to achieve the overall goal of protecting human health and the environment. RAOs are based on the nature and extent of contamination, threatened resources, potential for human and environmental exposure, and the anticipated future land use (industrial for the R BPOPs and RUNKs OU).

The RAO for the R BPOPs and RUNKs OU is to prevent exposure of future industrial workers to benzo(a)pyrene, dibenzo(a,h)anthracene, cesium-137, and cobalt-60 at concentrations that exceed remedial goals (RGs).

In the RI/BRA, remedial goal options (RGOs) were calculated for each RCOC. RGOs are concentration goals for individual chemicals for specific medium and land use combinations. They are designed to provide conservative, long-term targets for the selection and analysis of remedial alternatives.

Human health RGOs were calculated for various land use/receptor scenarios including future industrial workers and hypothetical on-unit residents. Table 3 presents RGOs.

There were no ecological RGOs or CM RGOs calculated because no ecological RCOCs or CM RCOCs were identified for soil at R BPOPs and RUNKs OU.

Final RGs are selected from the RGOs to be protective of both human health and the environment, as well as to comply with federal and state applicable or relevant and

Table 3. Remedial Goals

RCOC	Type of RCOC	Units	Frequency of Detection		Maximum Detection		RGOs		Background Benchmarks		RGs	
			Surface Soil (0-1 ft)	All Depths	Surface Soil (0-1 ft)	All Depths	Industrial 1×10^{-6}	Residential 1×10^{-6}	Unit-Specific Max. Bkgd. (all depths)	Unit-Specific 2X Avg. Bkgd. (all depths)	Value	Basis
Benzo(a)anthracene	HH_{res}	ug/kg	2/13	8/115	13,800	29,100	NA	519	ND	NA	NA	Not a RCOC for anticipated future land use
Benzo(a)pyrene	$HH_{ind,res}$	ug/kg	2/13	12/115	8,750	17,000	256	51.9	3.27	11.1	256	Carcinogenic RGO for target risk of 1×10^{-6} for the future industrial worker
Benzo(b)fluoranthene	HH_{res}	ug/kg	2/13	12/115	12,100	25,600	NA	519	6.2	10.8	NA	Not a RCOC for anticipated future land use
Dibenzo(a,h)anthracene	$HH_{ind,res}$	ug/kg	2/13	6/115	2,620	4,520	256	51.9	ND	NA	256	Carcinogenic RGO for target risk of 1×10^{-6} for the future industrial worker
Indeno(1,2,3-c,d)pyrene	HH_{res}	ug/kg	2/13	11/115	5,060	14,000	NA	519	3.06	8.38	NA	Not a RCOC for anticipated future land use
Cesium-137	$HH_{ind,res}$	pCi/g	15/22	68/186	0.47	537	0.105	0.0319	0.112	0.0492	0.112	Greater of industrial 1×10^{-6} RGO or unit-specific max. background
Cobalt-60	$HH_{ind,res}$	pCi/g	2/22	12/186	0.26	3.61	0.0224	0.00685	ND	NA	0.0224	Carcinogenic RGO for target risk of 1×10^{-6} for the future industrial worker

$HH_{ind,res}$ = Human Health COC for the industrial worker, resident
NA = not applicable – not a RCOC for industrial exposure scenario
ND = not detected
Due to radioactive decay, cesium-137 levels in surface soil will drop below RG in 63 years.
Due to radioactive decay, cobalt-60 levels in surface soil will drop below RG in 19 years.

appropriate requirements (ARARs). Table 4 is a list of ARARs for the R BPOPs and RUNKs. To be protective of both human health and the environment, the RG is selected as the lower of the most restrictive human health RGO for the expected future land use (future industrial).

Because of the generally conservative assumptions used in the RGO calculations, it is possible for a risk-based RG to be less than what occurs naturally in unimpacted ambient background conditions. This RG would not be technically possible to achieve. To avoid this, the RGs are compared to background benchmarks. Table 3 presents two benchmarks: the maximum result in the unit-specific background soil and the unit-specific 2X average background concentration. Comparison of the risk-based RGOs to these background benchmarks indicates that the calculated cesium-137 RGO for the future industrial worker is less than the background levels and therefore is not achievable. The clean-up goal for cesium-137 is consequently set to background (unit-specific maximum background, see Table 3).

IX. DESCRIPTION OF ALTERNATIVES

Throughout the RI process, USDOE, SCDHEC, and USEPA have evaluated a range of possible response actions for the R BPOPs and RUNKs. The information regarding the development and evaluation of remedial alternatives and their cost estimates is presented in Appendices A and B of the PP.

Three alternatives are identified for R BPOPs and RUNKs OU. The alternatives are: (1) No Action, (2) Institutional Controls, and (3) Soil Cover with Institutional Controls. The alternatives evaluated are briefly summarized in the following paragraphs.

Table 4. ARARs and TBC Criteria for the R BPOPs and RUNKs

Citation(s)	Status	Requirement Summary	Reason for Inclusion	Remedial Alternatives Considered
Chemical-Specific				
SC R.61-107.11, Part IV, Subtitle G. Solid Waste Management: Construction, Demolition and Land-Clearing Debris Landfills, Long-Term Landfills, Closure	Applicable	Identifies regulations for closure of a debris landfill. Section 1 identifies that the closure cover must meet specifications including a two-foot-thick cover, a 1-4% slope to provide drainage, and at least a 75% vegetative ground cover. Section 6a requires a survey plat be performed and filed. Section 6b requires a deed notation.	Applicable because non-hazardous construction debris placed in landfill disposal.	No Action Institutional Controls Soil Cover
40 CFR 264, Part G, Section 116. SC R.61-79.264.116 Standards for Owners and Operators of Hazardous Waste Treatment, Storage and Disposal, Closure and Post-Closure, Survey Plat	Relevant & Appropriate	Mandates a survey plat indicating the location and dimensions of the waste unit. The plat must be certified by a land surveyor and filed with the local zoning authority restricting disturbance of the disposal unit.	Not Applicable because debris is not hazardous waste. Relevant & Appropriate because contamination will be left in place.	No Action Institutional Controls Soil Cover
42 U.S.C.A. 201, Sections 2011-2259 Atomic Energy Act	Applicable	The AEA makes the federal government responsible for regulatory control of the production, possession, and use of three types of radioactive material: source, special nuclear, and byproducts. DOE is required to maintain control over these materials.	Applicable because pit debris is byproduct material.	No Action Institutional Controls Soil Cover
10 CFR 835 Occupational Radiation Protection	Relevant and Appropriate	Establishes radiation protection standards, limits, and program requirements for protecting individuals from ionizing radiation resulting from the conduct of DOE activities. Establishes monitoring requirements, posting and labeling requirements. 10 CFR 835.1001 mandates as-low-as-reasonably-achievable (ALARA) principles.	Radioactive contamination is present in surface soil and at depth.	No Action Institutional Controls Soil Cover
Action-Specific				
40 CFR 50.6 National Primary and Secondary Ambient Air Quality Standards	Applicable	The concentration of particulate matter (PM_{10}) in ambient air shall not exceed 50 ug/m^3 (annual arithmetic mean) or 150 ug/m^3 (24-hour average concentration).	Dust suppression would likely be required to minimize dust emissions during construction/ remedial action.	Soil Cover
SC R.61-62.6 Fugitive Dust	Applicable	Fugitive particulate material shall be controlled.	Construction/remedial action may be required for dust suppression.	Soil Cover
SC R.72-300 Standards for Stormwater Management and Sediment Reduction	Applicable	Stormwater management and sediment control plan for land disturbances.	Construction/remedial action may require an erosion control plan.	Soil Cover
Location-Specific				
None.	--	--	--	--

TBC = to-be-considered

Alternative 1: No Action

Total Present Worth Cost: $65,234

Construction Time to Complete: 0 years

No Action would consist of no remedial activities at the R BPOPs and RUNKs. Institutional controls would not be implemented. The No Action alternative is required by 40 Code of Federal Regulations (CFR) 300.430(e)(6) of the National Oil and Hazardous Substances Contingency Plan (NCP) to serve as a baseline for comparison with other remedial alternatives. The No Action alternative would not be protective of human health or the environment. The key ARARs for this alternative are the Atomic Energy Act and 10 CFR 835 (occupational radiation protection standards). No Action would not comply with the Atomic Energy Act because USDOE would not maintain control over the wastes. No Action would not comply with 10 CFR 835 because the posting requirements would not be met. There would be no reduction of risk, and potential exposure pathways posing unacceptable risks would remain. The ROD would be reviewed every five years, as needed, to determine whether the remedy is meeting RAOs. If this alternative were selected, the expected outcome would be that soil contamination would remain at the surface above industrial risk-based standards. R BPOPs and RUNKs would not be available for industrial or residential land use.

Alternative 2: Institutional Controls

Total Present Worth Cost: $185,313

Construction Time to Complete: 3-6 months (time required to install signs and implement procedures)

Under this alternative, institutional controls would be implemented. Institutional controls would consist of site maintenance (inspections, repair of any erosion damage, and

mowing) and access controls (posting and maintenance of warning signs, and SRS Site Use and Site Clearance Programs). Institutional controls would prevent residential use of the area and prevent unauthorized excavation. The ROD would be reviewed every five years, as needed, to determine whether the remedy is meeting RAOs. The key ARARs for this alternative are the Atomic Energy Act and 10 CFR 835 (occupational radiation protection standards). Institutional controls would comply with these ARARs because USDOE would maintain control over the wastes and posting requirements would be met.

The expected outcome of this alternative is that land use controls would prevent potential human receptors (future industrial workers and future residents) from exposure to human health RCOCs. The OU would be available for industrial land use with land use restrictions.

Alternative 3: Soil Cover with Institutional Controls

Total Present Worth Cost: $1,517,593

Construction Time to Complete: 12-18 months (time required to design and install cover, install signs, and implement procedures)

Under this alternative, a soil cover would be emplaced over the pits to provide a barrier isolating the RCOCs in surface soil from potential human contact. Institutional controls, consisting of site maintenance (inspections, repair of any erosion damage, and mowing) and access controls (posting and maintenance of warning signs, SRS Site Use and Site Clearance Programs) would also be implemented to prevent residential use of the area and prevent unauthorized excavation. The ROD would be reviewed every five years, as needed, to determine whether the remedy is meeting RAOs. The key ARARs for this alternative are the Atomic Energy Act and 10 CFR 835 (occupational radiation protection standards). The institutional controls component of this alternative would comply with these ARARs because USDOE would maintain control over the wastes and posting requirements would be met.

The expected outcome of this alternative is that human health RCOCs in surface soil would be isolated under the soil cover, and land use controls would prevent exposure to contaminants at depth. The OU would be available for industrial land use with land use restrictions.

X. COMPARATIVE ANALYSIS OF ALTERNATIVES

Description of the Nine Evaluation Criteria

Each of the remedial alternatives is evaluated against the nine criteria established by the NCP, 40 CFR 300. The criteria are derived from the statutory requirements of CERCLA Section 121. The criteria provide the basis for evaluating the alternatives and selecting a remedy. The nine criteria are:

Threshold criteria:

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

Balancing criteria:

3. Long-term effectiveness and permanence
4. Reduction of toxicity, mobility, or volume through treatment
5. Short-term effectiveness
6. Implementability
7. Cost

Modifying criteria:

8. State acceptance
9. Community acceptance

Table 5 presents a summary of this evaluation. The evaluation is briefly summarized below. Cost estimates are provided in Tables 6, 7, and 8. Industrial land use is assumed as

Table 5. Comparative Analysis of Alternatives – R BPOPs and RUNKs OU

EVALUATION CRITERIA	Alternative 1 No Action	Alternative 2 Institutional Controls	Alternative 3 Soil Cover with Institutional Controls
Overall Protection of Human Health and the Environment			
Human Health	Not Protective. Human health RCOCs remaining at unit would pose an unacceptable risk to future industrial workers and hypothetical future residents.	Protective. Institutional controls would protect against unrestricted land use (e.g., unauthorized excavation) and would provide access controls to prevent unacceptable exposure of future industrial workers to RCOCs.	Protective. Institutional controls would protect against unrestricted land use (e.g., unauthorized excavation) and would provide access controls to prevent unacceptable exposure of future industrial workers to RCOCs.
Environment	Not Protective. Although there are no ecological RCOCs under current conditions, future excavation could bring contaminants to the surface and pose an unacceptable risk to ecological receptors.	Protective. Periodic inspections and maintenance included in institutional controls will control erosion of soils and the spread of contamination.	Protective. Periodic inspections and maintenance included in institutional controls will control erosion of soils and the spread of contamination.
Compliance with ARARs			
Chemical-Specific	Does not comply.	Complies.	Complies.
Action-Specific	None.	None.	Complies.
Location-Specific	None.	None.	None.
Long-Term Effectiveness and Permanence			
Magnitude of Residual Risks	High.	Low. Institutional controls would prevent unacceptable exposure.	Low. Institutional controls would prevent unacceptable exposure. Soil cover does not significantly reduce residual risks because the action would be redundant to institutional controls. Institutional controls provide adequate risk reduction, and a soil cover would only be effective as long as maintenance (erosion control) associated with institutional controls is implemented.
Permanence	NA. Does not meet RAOs, and there are no remedy components.	High. Land use controls are considered permanent.	High. Land use controls are considered permanent. Soil cover does not add significantly greater permanence. Permanence of soil cover dependant on permanence of maintenance (erosion control) associated with institutional controls.

Table 5. Comparative Analysis of Alternatives – R BPOPs and RUNKs OU (Continued)

EVALUATION CRITERIA	Alternative 1 No Action	Alternative 2 Institutional Controls	Alternative 3 Soil Cover with Institutional Controls
Reduction in Toxicity, Mobility, or Volume Through Treatment			
Degree of Expected Reduction in Toxicity	None through treatment, but reduction occurs through natural processes.	None through treatment, but reduction occurs through natural processes.	None through treatment, but reduction occurs through natural processes.
Degree of Expected Reduction in Mobility	None through treatment, but reduction occurs through natural processes.	None through treatment, but reduction occurs through natural processes.	None through treatment, but reduction occurs through natural processes. Because the RI/BRA determined that there is no leachability threat warranting action, the soil cover would not be specifically designed to reduce infiltration. However, the soil cover would reduce infiltration.
Degree of Expected Reduction in Volume	None through treatment, but reduction occurs through natural processes.	None through treatment, but reduction occurs through natural processes.	None through treatment, but reduction occurs through natural processes.
Short-Term Effectiveness			
Risk to Workers	No risk because unit does not pose an exposure threat to current workers and there are no construction activities that would result in worker exposure.	No risk because unit does not pose an exposure threat to current workers and there are no construction activities that would result in worker exposure.	No risk because unit does not pose an exposure threat to current workers. Minor safety risk associated with construction activities (heavy equipment use).
Risk to Community	No exposure concerns; unit is located several miles from the nearest SRS boundary.	No exposure concerns; unit is located several miles from the nearest SRS boundary.	No exposure concerns; unit is located several miles from the nearest SRS boundary. No increase in off-SRS traffic.
Time until Protection is Achieved	Protection not achieved.	3-6 months after ROD is approved (time required to install signs and implement procedures).	12-18 months after ROD is approved (time required to design and install cover, signs and implement procedures).
Implementability			
Availability of Materials, Equipment, Contractors	No materials, equipment, or contractors required.	Materials such as signs easily obtained.	Materials and equipment are easily obtained. Qualified contractors readily available.
Administrative Feasibility/Regulatory Requirements	None.	Implementable.	Implementable.

Table 5. Comparative Analysis of Alternatives – R BPOPs and RUNKs OU (Continued)

EVALUATION CRITERIA	Alternative 1 No Action	Alternative 2 Institutional Controls	Alternative 3 Soil Cover with Institutional Controls
Technical Feasibility	Implementable. There are no remedy components to implement.	Implementable.	Implementable.
Monitoring Considerations	None.	Periodic inspection for erosion and unauthorized access will be required. Periodic erosion repair.	Periodic inspection for erosion and unauthorized access will be required. Periodic erosion repair.
Cost			
Total Present Worth Cost	Five-Year Review Requirement: $65,234 Total = $65,234	Institutional Controls: $120,079 Five-Year Review Requirement: $65,234 Total = $185,313	Soil Cover $1,332,280 Institutional Controls: $120,079 Five-Year Review Requirement: $65,234 Total = $1,517,593

Table 6. Cost Estimate for Five-Year Review Requirement (CERCLA ROD Reviews)

DESCRIPTION		QUANTITY	UNITS	UNIT COST	TOTAL COST
Direct Capital Costs					$0
Total Direct Capital Costs					$0
Indirect Capital Costs					
Engineering and design					$0
Project/construction management					$0
Health and safety					$0
Overhead & markups					$0
Contingency					$0
Total Indirect Capital Costs					$0
TOTAL CAPITAL COSTS					$0
O&M Costs					
ROD Reviews (every five years for 65 years)		6	ea	$15,000	
Discount Rate (i)	0.039				
O&M Present Worth					$65,234
TOTAL O&M COSTS					$65,234
TOTAL PRESENT WORTH COST					$65,234

O&M Present Worth = Sum [1/(1+i)^n_a] x periodic cost] where n_a are the years at which the periodic cost is incurred (5, 10, 15…65 yrs)

Table 7. Cost Estimate for Institutional Controls

DESCRIPTION		QUANTITY	UNITS	UNIT COST	TOTAL COST
Direct Capital Costs					
Miscellaneous Control Items					
Documentation		1	ea	$10,000	$10,000
Access Restrictions					
Furnish and Install Signs		10	ea	$1,100	$11,000
Total Direct Capital Costs					$21,000
Indirect Capital Costs					
Engineering and design (10% of total direct capital cost)					$2,100
Project/construction management (25% of total direct capital cost)					$5,250
Health and safety					$0
Overhead & markups (30% of total direct capital cost)					$6,300
Contingency (15% of total direct capital cost)					$3,150
Total Indirect Capital Costs					$16,800
TOTAL CAPITAL COSTS					$37,800
O&M Costs					
Inspection		1	/yr	$1,000	$1,000
Maintain Signs		1	ls/yr	$500	$500
Mowing		2	/yr	$250	$500
Repairs (erosion control, reseeding, etc.)		1	ac/yr	$1,500	$1,500
Subtotal Annual O&M Costs					$3,500
Discount Rate (i)	0.039				
Number of Years (n)	65				
Present Worth Factor = {[(1+i)^n]-1} / {i[(1+i)^n]}	23.508				
O&M Present Worth (Annual O&M x PWF)					$82,279
TOTAL O&M COSTS					$82,279
TOTAL PRESENT WORTH COST					$120,079

ls = lump sum

Table 8. Cost Estimate for Soil Cover

DESCRIPTION	QUANTITY	UNITS	UNIT COST	TOTAL COST
Direct Capital Costs				
Construction of Soil Cover				
Mobilization	1	ls	$37,000	$37,000
Site Survey	4	ac	$2,650	$10,600
General Sitework (clear and grub, grading, access controls)	1	ls	$75,000	$75,000
Sandy Soil Layer (borrow, delivery, installation)	4,000	cu. yd	$27.50	$110,000
Topsoil (purchase, delivery, installation)	1,300	cu. yd	$25.00	$32,500
Site Restoration (Fine Grading and Seeding)	20,000	sq. ft	$1.40	$28,000
Demobilization	1	ls	$27,000	$27,000
Post Construction	1	ls	$75,000	$75,000
Total Direct Capital Costs				$395,100
Indirect Capital Costs				
Engineering and design (55% of total direct capital cost)				$217,305
Project/construction management (20% of total direct capital cost)				$79,020
Health and safety (10% of total direct capital cost)				$39,510
Overhead & markups (30% of total direct capital cost)				$118,530
Contingency (20% of total direct capital cost)				$79,020
Total Indirect Capital Costs				$533,385
TOTAL CAPITAL COSTS				$928,485
O&M Costs				
Soil Cover repairs (10% of initial cost every 5 yrs for 65 yrs)	6	ea	$92,849	
Discount Rate (i) 0.039				
O&M Present Worth				$403,795
TOTAL O&M COSTS				$403,795
TOTAL PRESENT WORTH COST				$1,332,280

O&M Present Worth = Sum $[1/(1+i)^{n_a}]$ x periodic cost] where n_a are the years at which the periodic cost is incurred (5, 10, 15…65 yrs)

ls = lump sum

the future land use when stating that a remedy is protective and when evaluating remedial alternatives against the nine criteria.

Overall Protection of Human Health and the Environment: Institutional Controls (Alternative 2) and Soil Cover with Institutional Controls (Alternative 3) are protective because they would prevent unacceptable exposure scenarios. They would prevent unrestricted (residential) land use and would provide controls to prevent unacceptable exposure of future industrial workers to RCOCs. No Action (Alternative 1) is not protective because human health RCOCs would remain at the unit in surface soil and would pose an unacceptable risk to future industrial workers and hypothetical residents. Although there are no ecological RCOCs under current conditions and no leachability threat, if excavation were to occur, contaminants brought to the surface could pose an unacceptable risk to ecological receptors.

Compliance with ARARs: Alternatives 2 and 3 would meet all ARARs, but No Action would not. All alternatives would comply with SC R.61-107.11 Part IV Subtitle G Section 1 because the closure requirements for a debris landfill were met when the debris was covered with backfill in the late 1950s. There is already at least 2 ft of soil over the debris; the pits are on the top of a hill, so there is adequate drainage; and there is an adequate grassy vegetative cover. All three alternatives also comply with Sections 6a and 6b of that regulation, as well as SC R.61-79.264.116, because, in the unlikely event that the land is ever transferred to non-federal ownership, the U.S. Government would perform a survey and would be required by CERCLA Section 120(h) to (1) include a notice in the contract for sale, (2) include a notice in the deed, (3) include a covenant in the deed, and (4) include provisions for access in the deed. No Action would not comply with the Atomic Energy Act because USDOE would not maintain control over the wastes. No Action would not comply with 10 CFR 835 because the posting requirements would not be met. Standard construction procedures to control dust and stormwater runoff would allow action-specific ARARs associated with the soil cover to be met.

Long-term Effectiveness and Permanence: Institutional Controls and Soil Cover with Institutional Controls offer greater long-term effectiveness compared to No Action. Whereas the residual risk associated with No Action would be the same as current conditions, Institutional Controls and Soil Cover with Institutional Controls would provide controls to prevent unacceptable exposure scenarios. An assessment of permanence for No Action is not applicable because RAOs are not met and there are no remedy components. Institutional Controls are generally considered permanent. Although there is some uncertainty with the ability to maintain institutional controls in the very long term, this uncertainty is mitigated by the fact that the types of contaminants at this OU are not persistent in the environment in the long term. PAHs attenuate through natural processes such as biodegradation and volatilization, while cesium-137 and cobalt-60 have short half-lives (30 and 5.2 years, respectively) and attenuate through radioactive decay.

A soil cover would not provide significantly greater long-term effectiveness and permanence compared to institutional controls alone because institutional controls provide adequate protection and a soil cover would only be effective as long as institutional controls (including cover maintenance) are being implemented. In the unlikely event that institutional controls are relinquished, maintenance of the soil cover would also cease and erosion of the soil cover could re-expose contaminated soil.

Reduction of Toxicity, Mobility, or Volume: None of the alternatives offer reduction in toxicity, mobility, or volume through treatment; however, over time, PAHs attenuate through natural processes such as biodegradation and volatilization, while cesium-137 and cobalt-60 have short half-lives (30 and 5.2 years, respectively) and attenuate through radioactive decay. Due to radioactive decay, cesium-137 levels in surface soil will drop below its RG in 63 years, and cobalt-60 levels in surface soil will drop below its RG in 19 years.

Short-term Effectiveness: Institutional Controls and Soil Cover with Institutional Controls offer greater short-term effectiveness compared to No Action. This is because

Institutional Controls and Soil Cover with Institutional Controls both immediately prevent humans from direct contact with contaminated soil through access restrictions. A soil cover with institutional controls would not provide additional short-term effectiveness compared to institutional controls alone because institutional controls would sufficiently prevent unacceptable exposure. Isolation of RCOCs under a soil cover to prevent unacceptable exposure would be redundant. None of the alternatives would pose an exposure risk to the remediation workers or the community. No Action does not achieve RAOs and is therefore not effective.

Implementability: All alternatives are implementable. No Action does not involve any action; therefore, it is readily implementable. Institutional Controls and Soil Cover with Institutional Controls pose no implementability restrictions.

Cost: No Action is the least expensive. Soil Cover with Institutional Controls is the most expensive.

State Acceptance: Approval of the ROD by SCDHEC and USEPA constitutes acceptance of the selected alternative.

Community Acceptance: The PP provided for community involvement through a document review process and a public comment period. Public input is documented in the Responsiveness Summary, Section XIV of this ROD.

XI. THE SELECTED REMEDY

Detailed Description of the Selected Remedy

Based upon the characterization data and risk assessments in the RI/BRA (WSRC 2000), the RAOs, and the evaluation of alternatives, the selected remedy for the R BPOPs and RUNKs OU is Alternative 2: Institutional Controls. USDOE, USEPA, and SCDHEC have agreed that groundwater at the OU will be evaluated separately in association with the R Area Groundwater OU. Figure 6 is a schematic illustration of the selected remedy.

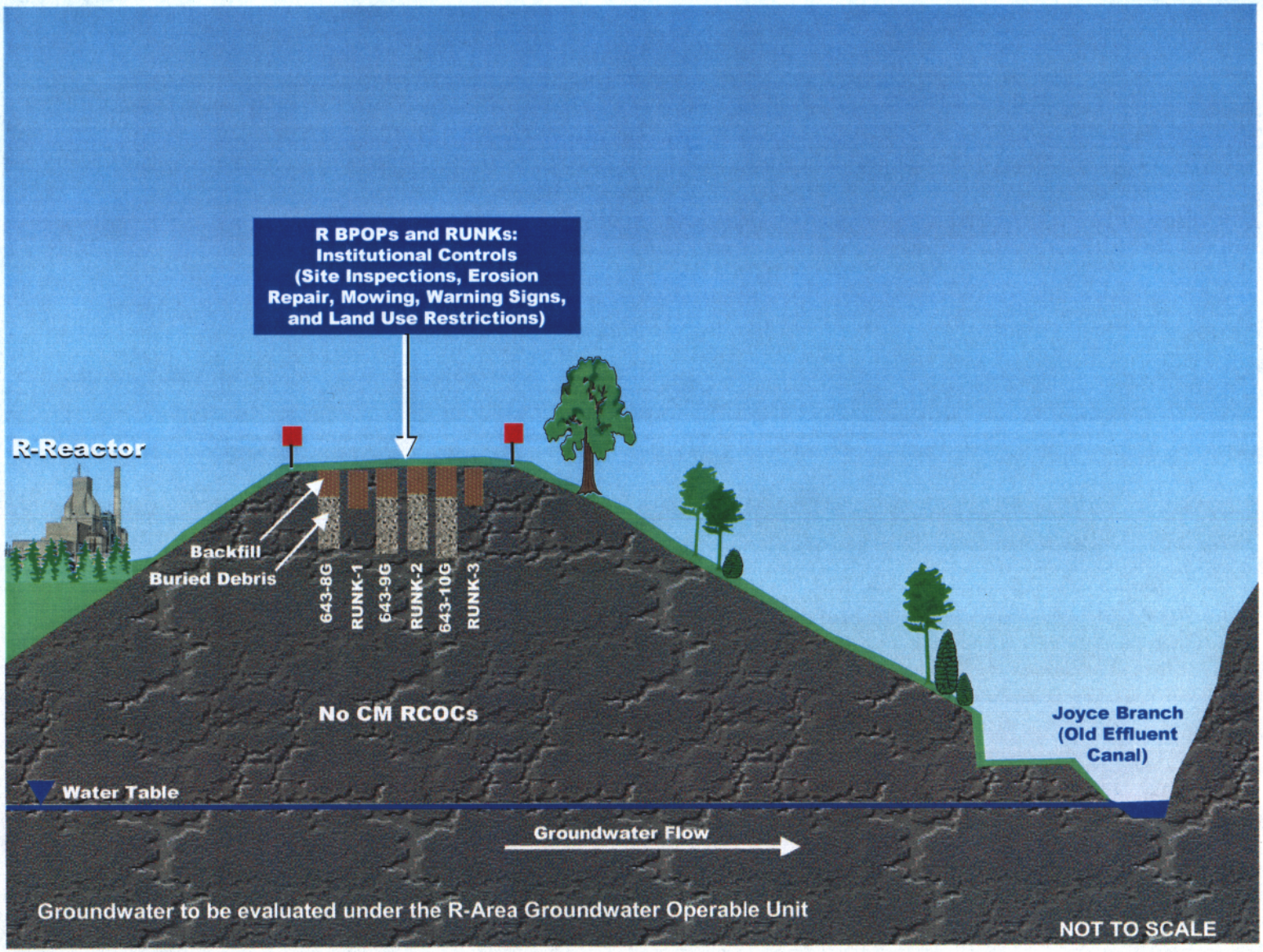


Figure 6. Schematic Illustration of the Selected Remedy

Alternative 2 (Institutional Controls) was selected because it provides overall protectiveness of human health and the environment, complies with ARARs, and provides the best balance of tradeoffs among the other alternatives with respect to the balancing and modifying evaluation criteria. Alternative 1 (No Action) failed to meet the threshold criteria of overall protectiveness of human health and the environment and compliance with ARARs. Alternative 3 (Soil Cover with Institutional Controls) was not selected because it is more expensive than the selected remedy, without providing additional risk reduction that would make the unit available for other land uses.

The selected remedy will meet the RAO as follows:

Prevent exposure of future industrial workers to benzo(a)pyrene, dibenzo(a,h)anthracene, cesium-137, and cobalt-60 at concentrations that exceed RGs: Institutional controls will include land use restrictions which will prevent industrial development of the unit, thus preventing the future industrial worker exposure scenario. Land use controls will also prevent unauthorized excavation and exposure to contaminated debris that remains buried at depth in the unit.

Institutional Controls will consist of site maintenance and access controls. Site maintenance will consist of inspections of the OU and maintenance of existing drainage features to minimize the formation of large gullies. Minor earthwork will be performed as needed to repair any erosion damage that may occur. No grading or construction of new drainage features is anticipated to be needed. Site maintenance will also include mowing. Site maintenance will ensure that site conditions for which the remedial action has been implemented do not change; site maintenance will be performed on a frequency to be determined in the Land Use Controls Implementation Plan (LUCIP). Administrative controls (land use restrictions) will be implemented to restrict human exposure to contaminants remaining at the unit. Access controls will include security measures such as posting and maintenance of warning signs. To prevent unknowing entry and to ensure that unrestricted use of the waste unit does not occur while under ownership of the

government, identification signs will be posted at the waste unit roadway access points. The signs will be posted at each entrance to the restricted portion of the unit and at other appropriate locations in sufficient numbers to be seen from any approach. The signs will be legible from a distance of at least 25 ft. The signs will read:

> "Danger – Unauthorized Personnel Keep Out. This waste unit was used to manage waste materials/hazardous substances (radioactively contaminated construction material). Do not dig or excavate. Do not enter without contacting the waste site custodian."
>
> Custodian: Manager, Post-Closure

The selected remedy leaves hazardous substances in place that pose a potential future risk and will require land use restrictions for an indefinite period of time. Per the USEPA – Region IV Land Use Controls (LUCs) Policy, a LUC Assurance Plan (LUCAP) for SRS has been developed and approved by the regulators (WSRC 1999a). In addition, a LUCIP for the R BPOPs and RUNKs OU will be developed and submitted to the regulators for their approval with the post-ROD documentation. The LUCIP will detail how SRS will implement, maintain, and monitor the land use control elements of the OU selected alternative to ensure that the remedy remains protective of human health and the environment. The institutional controls will include (1) providing access controls for on-site workers via the Site Use Program, Site Clearance Program, work control, worker training, worker briefing of health and safety requirements, and identification signs posted at the waste unit access points, (2) notifying the USEPA and SCDHEC in advance of any changes in use or disturbance of waste, and (3) providing access controls against trespassers as described in the LUCIP to include security procedures and equipment, 24-hour surveillance system, artificial or natural barriers, control entry systems, and warning signs in place at the SRS boundary. The Site Use Program coordinates use of all lands and waters on the SRS. No use of land (i.e., excavation or any other land use) can be undertaken without prior approval documented by a Site Use Permit. The Site Clearance Program coordinates the modification or addition of features or facilities on SRS development maps (i.e., plot plans of facilities/utilities). Approval of the intended land

use must be obtained before issuance of a Site Clearance Permit. The Site Use and Site Clearance processes are applicable to all activities and personnel at SRS and are controlled within the SRS Quality Assurance Program. These programs, in addition to health and safety requirements in place and maintained at SRS, strictly control any work proposed at a waste unit and prevent unacceptable exposure.

As negotiated with USEPA, and in accordance with USEPA Region IV Policy (Johnston 1998), SRS has developed a LUCAP (WSRC 1999a) to ensure that land use restrictions are maintained and periodically verified. The unit-specific LUCIP referenced in this ROD will provide detail and specific measures required for the land use controls selected as part of this remedy. USDOE is responsible for implementing, maintaining, monitoring, reporting upon, and enforcing the land use control selected under this ROD. The LUCIP developed as part of this action will be submitted with the post-ROD documentation, 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 until modified as needed to be protective of human health and the environment. LUCIP modification will only occur through another CERCLA document.

In the long-term, if the property is ever transferred to non-federal ownership, the US Government will take those actions necessary pursuant to Section 120(h) of CERCLA. Those actions will include a deed notification disclosing former waste management and disposal activities as well as remedial actions taken on the site. The contract for sale and the deed will contain the notification required by CERCLA Section 120(h). The deed notification shall, in perpetuity, notify any potential purchaser that the property has been used for the management and disposal of waste.

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

In addition, if the site is ever transferred to nonfederal ownership, a survey plat of the OU will be prepared, certified by a professional land surveyor, and recorded with the appropriate county recording agency.

The ROD will be reviewed every five years to determine whether the remedy is meeting RAOs.

The remedy may change as a result of the remedial design or construction processes. Changes to the remedy described in the ROD will be documented in the Administrative Record File utilizing a memo, an Explanation of Significant Difference, or a ROD Amendment.

Cost Estimate for the Selected Remedy

The present worth costs for this remedy are as follows:

Capital Cost: $37,800

Operations and Maintenance (O&M) Cost: $147,513

Total Present Worth Cost: $185,313

These costs include the cost of implementation of Institutional Controls ($120,079) and the five-year CERCLA ROD review requirement ($65,234). Cost estimates were generated using a 3.9% discount (interest) rate and a 65-year time period. For five-year CERCLA ROD reviews and institutional controls, the 65-year time period was used for

cost estimating purposes; however, there is no time limit on the five-year CERCLA ROD review requirement or institutional controls. For more details on cost estimates, refer to Tables 6 and 7. Because the USDOE owns the waste unit and is responsible for the contamination, the USDOE will be the source of the cleanup monies.

Estimated Outcomes of Selected Remedy

The expected condition after the selected remedy is implemented is that land use restrictions will prevent industrial or residential development of the unit, thus preventing the future industrial worker and residential exposure scenarios. Land use controls will also prevent unauthorized excavation and exposure to contaminated debris that will remain buried at depth in the unit.

The time to achieve RAOs is approximately 3-6 months. The future land use is expected to remain similar to current conditions (undeveloped with land use restrictions).

Alternative 2 (Institutional Controls) is considered the best remedy to mitigate unit risks; however, there are always uncertainties. The primary uncertainty with the selected remedy is the ability to maintain institutional controls for the very long term. This uncertainty is small because the types of contaminants at this OU are not persistent in the environment in the long term. PAHs attenuate through natural processes such as biodegradation and volatilization while cesium-137 and cobalt-60 have short half-lives (30 and 5.2 years, respectively) and attenuate through radioactive decay. Due to radioactive decay, cesium-137 levels in surface soil will drop below its RG in 63 years. Due to radioactive decay, cobalt-60 levels in surface soil will drop below its RG in 19 years. The selected remedy may be changed if the RGs are not being met.

Waste Management

No wastes are expected to be generated during the implementation of the selected remedy. Contamination at the OU is limited to soil and debris, which will be left in place at the unit. Based upon process history and soil sampling results, the vegetation is not considered contaminated. If any wastes are generated, they will be managed and dispositioned in accordance with an SRS Environmental Restoration Division waste management plan.

XII. STATUTORY DETERMINATIONS

Based on the unit RI/BRA report, the R BPOPs and RUNKs OU poses a threat to human health. Therefore, Alternative 2 (Institutional Controls) has been selected as the remedy for the R BPOPs and RUNKs OU.

There is no PTSM at the R BPOPs and RUNKs OU. The contamination that is present is categorized as a low-level threat.

Based on information currently available, USDOE, USEPA, and SCDHEC believe the selected alternative provides the best balance of tradeoffs among the other alternatives with respect to the evaluation criteria. USDOE, USEPA, and SCDHEC expect the selected alternative to satisfy the statutory requirements in CERCLA Section 121(b) to: (1) be protective of human health and the environment, (2) comply with ARARs, (3) be cost-effective, (4) utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable, and (5) satisfy the preference for treatment as a principal element (treatment/removal technologies were considered for this OU, but given the relatively low long-term threat {40 CFR 300.430[a][iii][B]}, were not as practical and cost-effective as the selected remedy).

Section 300.430(f)(2) of the NCP requires that a 5-year remedy review of the ROD be performed if hazardous substances, pollutants, or contaminants above levels that allow

for unlimited use and unrestricted exposure remain in the OU. The three parties, SCDHEC, USEPA, and USDOE, have determined that a 5-year review of the ROD for the R BPOPs and RUNKs OU will be performed to ensure that the remedy continues to provide adequate protection of human health and the environment.

XIII. EXPLANATION OF SIGNIFICANT CHANGES

No comments on the PP were received during the public comment period, consequently, there were no significant changes made to the ROD based on public comments.

XIV. RESPONSIVENESS SUMMARY

The 30-day public comment period for the PP for the R BPOPs and RUNKs OU began on April 18, 2002, and ended on May 17, 2002. No comments were received from the public.

XV. POST-ROD DOCUMENT SCHEDULE AND DESCRIPTION

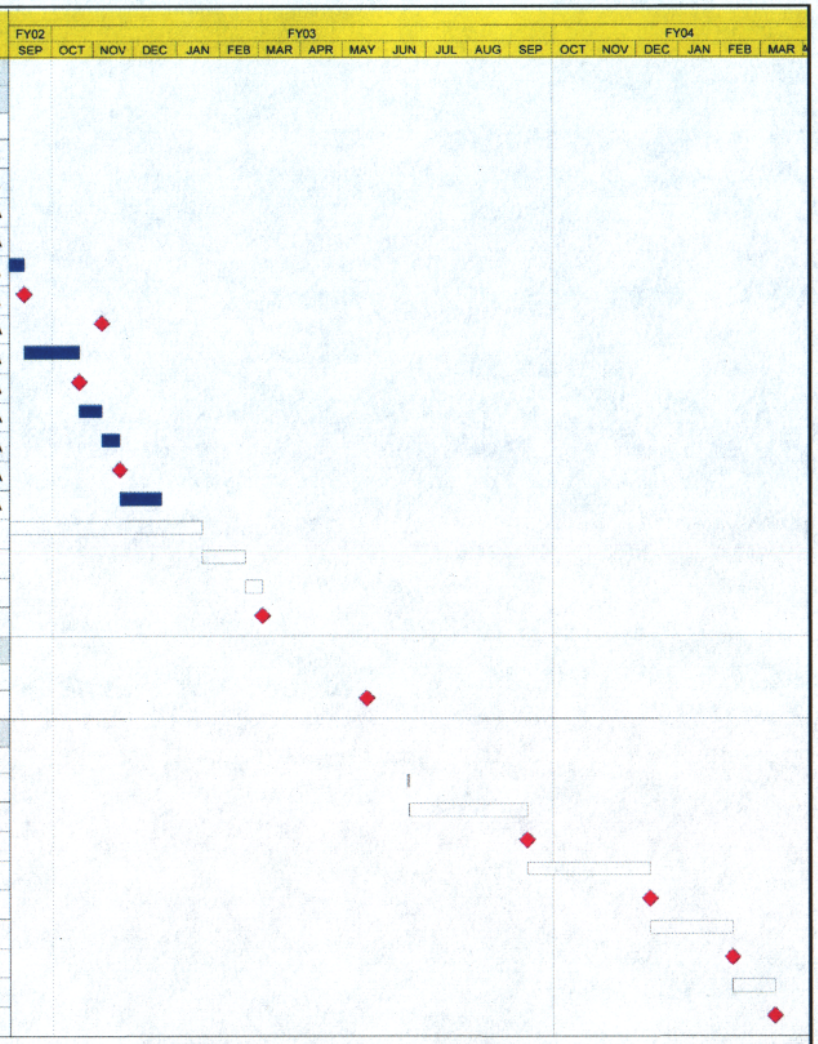
Table 9 is an implementation schedule for the R BPOPs and RUNKs OU showing the post-ROD document submittals and the remedial action start date.

Major milestones are as follows:

- The remedial action start date is anticipated to be May 19, 2003.
- Construction is anticipated to be completed in June 2003.
- SRS will submit a post-construction report (Final Remediation Report) approximately 60 days after construction is complete (i.e., after completion of a post-construction walkdown and acceptance by the USDOE, USEPA, and SCDHEC).
- Regulatory approval of the Final Remediation Report is expected in March 2004.

Table 9. Implementation Schedule

Activity Description	Early Start	Early Finish
CA 1216 BINGHAM PUMP OUTAGE PITS		
LCS 14 - STATEMENT OF BASIS/PROPOSED PLAN & ROD		
DEVELOP ROD	08MAR02A	17JUN02A
SUBMIT REV. 0 ROD		17JUN02A
EPA/SCDHEC REVIEW OF REV.0 ROD	18JUN02A	12AUG02A
EPA/SCDHEC RETURNS REV.0 COMMENTS FOR ROD		12AUG02A
SRS INCORPORATES EPA/SCDHEC COMMENTS REV.0 ROD	13AUG02A	11SEP02A
SRS SUBMITTAL OF REV. 1 ROD		11SEP02A
SRS SUBMITTAL OF REV. 1.1 ROD		06NOV02A
EPA/SCDHEC REVIEW OF REV.1 ROD	12SEP02A	21OCT02A
EPA/SCDHEC RETURNS REV.1 COMMENTS FOR ROD		21OCT02A
SRS INCORPORATES EPA/SCDHEC COMMENTS REV.1 ROD	22OCT02A	06NOV02A
EPA/SCDHEC FINAL REVIEW AND APPROVAL REV.1.1 ROD	07NOV02A	19NOV02A
RECEIPT OF REV. 1.1 ROD APPROVAL		19NOV02A
DOE OBTAIN SIGNATURE ON REV. 1.1 ROD	20NOV02A	19DEC02A
EPA OBTAIN SIGNATURE ON REV. 1.1 ROD	20DEC02A	18JAN03
SCDHEC OBTAIN SIGNATURE ON REV. 1.1 ROD	19JAN03	17FEB03
PREPARE FOR PUBLIC NOTICE REV. 1.1 ROD	18FEB03	03MAR03
ISSUE REV. 1.1 ROD		03MAR03
LCS 16 - REMEDIAL ACTION IMPLEMENTATION		
REMEDIAL ACTION (RA) START DATE R-AREA	19MAY03*	
LCS 17 - POST CONSTRUCTION ACTIVITIES		
FINAL REGULATORY WALKDOWN	17JUN03	17JUN03
DEVELOP FINAL REMEDIATION REPORT (FRR)	18JUN03	11SEP03
SUBMITTAL OF REV. 0 FRR		11SEP03
REGULATORY REVIEW REV.0 FRR	12SEP03	10DEC03
REGULATORS RETURN COMMENTS FRR		10DEC03
INCORPORATE REGULATOR COMMENTS FRR	11DEC03	08FEB04
SUBMITTAL OF REV. 1 FRR		08FEB04
REGULATORY FINAL REVIEW & APPROVAL FRR	09FEB04	09MAR04
RECEIPT OF REGULATORY APPROVAL FOR THE FRR		09MAR04



Start Date 01OCT92
Finish Date 08NOV27
Data Date 01MAY99
Run Date 09JAN03 13:41

Early Bar
Progress Bar
Critical Activity

IMPL - BEPC
Sheet 1 of 1

Environmental Restoration
CA 1216 BINGHAM PUMP OUTAGE IHM
RCRA/CERCLA Implementation Sch.

Date	Revision	Checked	Approved
10OCT02	Rev.1 Extend signed ROD 104 days		

XVI. REFERENCES

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WSRC, 1999a. *Land Use Control Assurance Plan for the Savannah River Site*, WSRC-RP-98-4125, Rev. 1.1, Westinghouse Savannah River Company, Savannah River Site, Aiken, South Carolina (August).

WSRC, 1999b. *L-, P- and R-Area Bingham Pump Outage Pits Addendum to the RI Work Plan for the K-Area Bingham Pump Outage Pit (U),* WSRC-RP-96-00173, Rev. 1.5, Westinghouse Savannah River Company, Savannah River Site, Aiken, South Carolina (June).

WSRC, 2000. *Remedial Investigation Report with Baseline Risk Assessment for the R-Area Bingham Pump Outage Pits and the R-Area Unknowns (U),* WSRC-RP-98-4106, Rev. 1, Westinghouse Savannah River Company, Savannah River Site, Aiken, South Carolina (December).

WSRC, 2001. *Proposed Plan for the R-Area Bingham Pump Outage Pits (643-8G, 643-9G, 643-10G) and R-Area Unknown Pits #1, #2, #3 (RUNK-1, -2, -3) (U),* WSRC-RP-2001-4128, Rev. 0, Westinghouse Savannah River Company, Savannah River Site, Aiken, South Carolina (December).