

DECLARATION FOR THE (INTERIM) RECORD OF DECISION

Unit Name and Location

Operable Unit Name (Bldg. No.)

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

Savannah River Site

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

Aiken, South Carolina

United States Department of Energy

The Operable Unit Name (Bldg. No.) Operable Unit (OU) (unit acronym) is listed as a Resource Conservation and Recovery Act (RCRA) 3004(u) Solid Waste Management Unit/Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) unit in Appendix C of the Federal Facility Agreement (FFA) for the Savannah River Site (SRS).

The FFA is a legally binding agreement between regulatory agencies [United States Environmental Protection Agency (USEPA) and South Carolina Department of Health and Environmental Control (SCDHEC)] and regulated entities [United States Department of Energy (USDOE)] that establishes the responsibilities and schedules for the comprehensive remediation of SRS. The media associated with this operable unit are (insert list of media associated with the unit [e.g., surface soil and groundwater]; also list site-specific factors that required consideration during remediation, if any.). (If the groundwater is being addressed in a separate OU, name that OU here.)

If an interim action, include a paragraph that discusses the SRS RCRA permit modification process applicability to the interim action. For example, the following paragraph may be used:

An SRS RCRA permit modification is not required at this time since this is an interim action. However the RCRA permit will be revised to reflect selection of the final remedy using the procedures under 40 Code of Federal Regulation (CFR) Part 270, and South Carolina Hazardous Waste Management Regulations (SCHWMR) R.61-79.264.101; 270.

Statement of Basis and Purpose

This section should contain the factual and legal basis for the selected remedy. Insert the following language:

This decision document presents the selected (insert interim if appropriate) remedy for the unit acronym, in location, which was chosen in accordance with CERCLA, as amended by the Superfund Amendments Reauthorization Act (SARA), and, to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). This decision is based on the Administrative Record File for this site.

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

Assessment of the Site

There has been a release of (insert contaminants) at the unit acronym into the environment. The response action selected in this ROD (or IROD) is necessary to protect the public health or welfare or the environment from actual or threatened releases of hazardous substances into the environment.

Description of the Selected Remedy

The selected remedy for the unit acronym is insert title of the selected remedy.

List the future land use assumed for the OU.

Describe the selected remedy and list the major components of the selected remedy in a bullet fashion, including land use controls and the time to complete construction.

Describe how this operable unit addresses principal and low-level threats at the site (i.e., what is being treated, what is being contained, and what is the rationale for each).

If land use controls are part of the remedy, specify those activities the LUC is designed to protect. Example: The LUC component of the remedy will protect against: 1) disturbance of the soil overlaying the cap, 2) changes in grade that would interfere with storm water runoff from cap, 3) the use of groundwater for any purpose.

Describe the scope and role of this operable unit within the overall site management strategy.

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

[Note: Delete RCRA reference if this is a CERCLA only unit.]

Statutory Determinations

Based on the unit RCRA Facility Investigation/Remedial Investigation with Baseline Risk Assessment (RFI/RI/BRA) report the unit acronym poses a threat to human health and the environment. Therefore, alternative number, and title, has been selected as the remedy for the unit acronym. The future land use of the unit acronym is assumed to be insert industrial or unrestricted land use.

If the five-year review is applicable, use the following language:

Because this remedy will result in hazardous substances, pollutants, or contaminants remaining on-site above levels that allow for unlimited use and unrestricted exposure, a

statutory review will be conducted within five years after initiation of remedial action to ensure that the remedy is, or will be, protective of human health and the environment.

If the five-year review is not applicable, use the following language:

Because this remedy will not result in hazardous substances, pollutants, or contaminants remaining on-site above levels that allow for unlimited use and unrestricted exposure, a five-year review will not be required for this remedial action.

If the selected remedy satisfies the CERCLA 121 preference for treatment as a principal element, use the following language:

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 also satisfies the 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).

If the selected remedy does not satisfy the preference for treatment as a principal element, use the following language:

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), and is cost-effective. The remedy in this OU does not satisfy the statutory preference for treatment as a principal element of the remedy for the following reasons (give reasons).

For an interim action, use the following language:

This interim action is protective of human health and the environment, complies with Federal and State requirements that are legally applicable or relevant and appropriate to the limited-scope remedial action (unless justified by a waiver), and is cost-effective. This action is interim and is not intended to utilize permanent solutions and alternative treatment (or resource recovery) technologies to the maximum extent practicable for this OU. [Note: where treatment is utilized, replace the prior sentence with the following sentence: Although this interim action is not intended to fully address the statutory mandate for permanence and treatment to the maximum extent practicable, this interim action utilizes treatment and thus is in furtherance of that statutory mandate.] Because this action does not constitute the final remedy for the unit acronym, the statutory preference for remedies that employ treatment that reduces toxicity, mobility, or volume as a principal element [Note: Include if treatment is being used: *although partially addressed in this remedy*] will be addressed by the final response action. Subsequent actions are planned to fully address the threats posed by the conditions at this OU.

Because this remedy will result in hazardous substances, pollutants, or contaminants remaining on-site above levels that allow for unlimited use and unrestricted exposure, a statutory review will be conducted to ensure that the remedy continues to provide adequate protection of human health and the environment within five years after commencement of the remedial action. Because this is an IROD, review of this OU and of this remedy will be continuing as USDOE continues to develop remedial alternatives for the unit acronym.

For remedies that invoke an applicable or relevant and appropriate requirement (ARAR) waiver, please be sure to include a statement to that effect. For example, in the case of an action that invokes an MCL waiver, the following statement can be used:

An applicable or relevant and appropriate requirement (ARAR) waiver under §300.430(f)(1)(ii)(C) of the NCP for all groundwater constituents of concern (COCs) has

been invoked because the selected remedy is an interim action measure that will become part of a total remedial action that will ultimately attain ARARs (MCLs).

For remedies that include institutional controls, use the following language:

In the long term, if the property is ever transferred to nonfederal 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. These requirements are also consistent with the intent of the RCRA deed notification requirements at final closure of a RCRA facility if contamination will remain at the unit.

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

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

The selected remedy for the unit acronym or OU subunit name leaves hazardous substances in place that pose a potential future risk and will require land use restrictions for an indefinite period of time. As agreed on March 30, 2000, among the USDOE, USEPA, and SCDHEC, SRS is implementing a Land Use Control and Assurance Plan

(LUCAP) to ensure that the Land Use Controls (LUCs) required by numerous remedial decisions at SRS are properly maintained and periodically verified. The unit-specific Land Use Control Implementation Plan (LUCIP) incorporated by reference into this ROD will provide details and specific measures required to implement and maintain the LUCs selected as part of this remedy. The USDOE is responsible for implementing, maintaining, monitoring, reporting upon, and enforcing the LUCs selected under this ROD. The LUCIP, developed as part of this action, will be submitted concurrently with the Corrective Measures Implementation (CMI)/Remedial Action Implementation Plan (RAIP), as required in the FFA for review and approval by USEPA and SCDHEC. Upon final approval, the LUCIP will be appended to the LUCAP and is considered incorporated by reference into the ROD, establishing LUC implementation and maintenance requirements enforceable under CERCLA. The approved LUCIP will establish implementation, monitoring, maintenance, reporting, and enforcement requirements for the unit. The LUCIP will remain in effect unless and until modifications are approved as needed to be protective of human health and the environment. LUCIP modification will only occur through another CERCLA document.

Data Certification Checklist

The Declaration should certify that the following information is included in the ROD (or provide a brief explanation for why this information is not included).

This ROD (or IROD) provides the following information: [include section numbers]

- COCs and their respective concentrations
- Baseline risk represented by the COCs
- Cleanup levels established for the COCs and the basis for the levels

- Current and reasonably anticipated future land and groundwater use assumptions used in the Baseline Risk Assessment (BRA) and ROD
- Potential 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
- Key decision factor(s) that led to selecting the remedy (i.e., describe how the selected remedy provides the best balance of tradeoffs with respect to the balancing and modifying criteria)

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

Unit Name, Location, and Brief Description

Operable Unit Name (Bldg. No.)

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

Savannah River Site

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

Aiken, South Carolina

United States Department of Energy (USDOE)

Savannah River Site (SRS) occupies approximately 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 the CERCLA, are currently present in the environment at SRS.

The Federal Facility Agreement (FFA) (FFA 1993) for SRS lists the Operable Unit Name (Bldg. No.) Operable Unit (OU) (unit acronym) as a Resource Conservation and Recovery Act Solid Waste Management Unit/Comprehensive Environmental Response, Compensation and Liability Act (RCRA/CERCLA) unit requiring further evaluation.

Figure 1. Location of the Unit Acronym within the Savannah River Site

The unit acronym was evaluated through an investigation process that integrates and combines the RCRA corrective action process with the CERCLA remedial process to determine the actual or potential impact to human health and the environment of releases of hazardous substances to the environment.

II. SITE AND OPERABLE UNIT COMPLIANCE HISTORY

SRS Operational and Compliance History

The primary mission of SRS has been to produce tritium, plutonium, and other special nuclear materials for our nation's defense programs. Production of nuclear materials for the defense program was discontinued in 1988. SRS has provided nuclear materials for the space program, as well as for medical, industrial, and research efforts up to the present. Chemical and radioactive wastes are 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.

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

On December 21, 1989, SRS was included on the National Priorities List (NPL). The inclusion created a need to integrate the established RCRA facility

investigation (RFI) program with CERCLA requirements to provide for a focused environmental program. In accordance with Section 120 of CERCLA 42 United States Code Section 9620, USDOE has negotiated a FFA (FFA 1993) with United States Environmental Protection Agency (USEPA) and SCDHEC to coordinate remedial activities at SRS into one comprehensive strategy which fulfills these dual regulatory requirements. USDOE functions as the lead agency for remedial activities at SRS, with concurrence by the USEPA - Region 4 and the SCDHEC.

Operable Unit Operational and Compliance History

Provide a brief description of operating history, how the unit received waste that led to the current problems.

Provide an overview of the OU, including the size of the site (e.g., acres).

Provide a description of surface and subsurface features (e.g., number and volume of tanks, lagoons, structures, and drums at the site).

Provide geographical and topographical information (e.g., surface waters, flood plains, wetlands). If groundwater is in the OU, state where drinking water source wells are located.

Include the document submittal and history information. Provide information on any removal and remedial actions conducted under CERCLA or other authorities.

Include maps, (Figure 2) a site plan, or other graphical presentations, as appropriate.

Figure 2. Layout of the Unit Acronym

III. HIGHLIGHTS OF COMMUNITY PARTICIPATION

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

The SRS Public Involvement Plan (USDOE 1994) is designed to facilitate public involvement in the decision-making process for permitting, closure, and the selection of remedial alternatives. The SRS Public Involvement Plan addresses the requirements of RCRA, CERCLA, and the National Environmental Policy Act, 1969 (NEPA). SCHWMR R.61-79.124 and Section 117(a) of CERCLA, as amended, require the advertisement of the draft permit modification and notice of any proposed remedial action and provide the public an opportunity to participate in the selection of the remedial action. The proposed plan document name, a part of the Administrative Record File, highlights key aspects of the investigation and identifies the preferred action for addressing the unit acronym.

The FFA 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	Thomas Cooper Library
Public Reading Room	Government Documents Department
Gregg-Graniteville Library	University of South Carolina
University of South Carolina – Aiken	Columbia, South Carolina 29208
171 University Parkway	(803) 777-4866
Aiken, South Carolina 29801	
(803) 641-3465	

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

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

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

[Note: Insert this paragraph for interim actions: An SRS RCRA permit modification is not required at this time since this is an interim action. However, the RCRA permit will be revised to reflect selection of the final selected remedy using the procedures under 40 CFR Part 270, and SCHWMR R.61-79.264.101; 270.]

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

The SB/PP 45-day (or IAPP 30-day) public comment period began on start date and ended on end date. A Responsiveness Summary, prepared to address any comments received during the public comment period, is provided in Appendix A of the ROD. A Responsiveness Summary will also be available in the final RCRA permit.

If there were any SRS CAB activities or recommendations regarding the operable unit, include a summary in this section.

[Note: Delete RCRA time period and references to RCRA if a CERCLA only unit.]

IV. SCOPE AND ROLE OF THE OPERABLE UNIT

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

The [OU name] is located within the [IOU name]. Upon disposition of all operable units within the [IOU name], a final comprehensive ROD for the IOU will be pursued with additional public involvement.

Describe the scope of the problem(s) that will be addressed by the remedial action(s) for this OU.

The following activities have been or will be performed to support the overall cleanup strategy for the [OU name].

- List past response actions at the OU and authority (e.g., removal, remedial) under which each action has been implemented. If none, so state.
- List response actions proposed in this ROD and authority under which each action will be implemented.
- List future response plans and authority under which each action will be implemented at the OU. (e.g., "If the residual contamination following the soil excavation poses a risk less than 1×10^{-6} to the future resident, an Explanation of Significant Difference will be submitted to eliminate the need for institutional controls.")

- List other remediation activities at the OU that should be discussed (e.g., long-term waste management actions)

For interim RODs, state that the OU response action will be consistent with the final action selected for the site.

V. OPERABLE UNIT CHARACTERISTICS

Provide operable unit characteristics including maps, figures, and photos as appropriate to depict the nature and extent of contamination. For an interim action, this section should focus on the description of those site or operable unit characteristics to be addressed by the interim remedy.

[Note: Describe by subunit, when appropriate.]

Conceptual Site Model (CSM) for the Unit Acronym

Identify primary and secondary sources of contamination and release mechanisms, contaminated media, migration pathways, exposure pathways, and potential receptors (insert the latest revision of the CSM, Figure 3).

Figure 3. Conceptual Site Model for the Unit Acronym

Media Assessment

Briefly describe the media assessment.

[Note: The following subheadings (soil investigation and groundwater investigation) are included as typical media for the OU. Additional subheadings should be added for any affected media at the OU.]

Soil Investigation

Briefly describe the soil investigation.

Groundwater Investigation

Briefly describe the groundwater investigation.

Media Assessment Results

Summarize the results of the investigation.

Insert the Schematic Cross Section (Figure 4) of the **unit acronym** from the Scoping Summary.

Describe types of contamination by affected media (e.g., soils, vadose zone, groundwater) and by discrete unit (if appropriate) [e.g., Pit Soils, Sewer Line Soils, Groundwater, etc.]

- Identify whether RCRA listed or characteristic hazardous wastes are at the unit
- Quantity/volume of waste that needs to be addressed
- Concentrations of contaminants of concern (COCs) in each medium
- Types and characteristics of COCs (e.g., toxic, mobile, carcinogenic, noncarcinogenic)

Figure 4. Schematic Cross Section of the Unit Acronym

Identify principal and low-level threat wastes at the site (e.g., location of mobile/high toxicity source materials and non-mobile/low toxicity source material) [Note: Per USEPA guidance, some wastes can not be classified as either principal or low-level threats.]

[Note: The following subheadings (soil and groundwater) are included as typical media for the OU. Additional subheadings should be added for any affected media at the OU.]

Soil

Summarize the soil assessment results.

Groundwater

Summarize the groundwater assessment results.

Site Specific Factors

Identify any other site-specific factors that may affect response actions at the site. If there are none, use “No site-specific factors requiring special consideration that might affect the remedial action for the unit acronym are present at the site.”

Contaminant Transport Analysis

Describe location of contamination and known or potential routes of off-site migration including:

- Likelihood for migration of COCs
- Population and environmental areas that could be affected, if exposed
- Lateral and vertical extent of contamination
- Current and potential surface and subsurface pathways of migration

For sites with groundwater contamination, describe the following, if appropriate

- Aquifer(s) affected or threatened by site contamination, types of geologic materials, approximate depths, whether aquifer is confined or unconfined
- Groundwater flow directions within each aquifer and between aquifers and groundwater discharge locations (e.g., surface waters, wetlands, other aquifers)
- Confirmed or suspected presence and locations of non-aqueous phase liquids (NAPLs)
- If groundwater transport models were used to define fate and transport of COCs, identify the model used and assumptions
- Surface and subsurface features (e.g., number and volume of tanks, lagoons, structures, drums at the site)
- Interconnection between surface contamination (e.g., soils, surface water/sediments) and groundwater contamination

VI. CURRENT AND POTENTIAL FUTURE SITE AND RESOURCE USES

Land Uses

Describe current on-site land uses.

Describe current adjacent/surrounding land uses.

Describe reasonably anticipated future land uses and bases for future use assumptions. This requires a specific statement describing the future land use assumed for the OU used to evaluate the remedial actions. Sample language, change use and reference numbers as appropriate: The unit acronym OU is located in an area that has been recommended for future industrial (non-nuclear) use by the SRS Citizens Advisory Board (CAB). According to the Savannah River Site Future Use Project Report (USDOE 1996), residential uses of SRS land should be prohibited. The Savannah River Site Federal Facility Agreement Implementation Plan (WSRC 1996) designates the LAHS OU as being within an industrial use with buffer.

Groundwater Uses/Surface Water Uses

Describe current ground/surface water uses on the site and in its vicinity.

Describe potential beneficial ground/surface water uses (e.g., potential drinking water, irrigation, recreational) and bases for future use assumptions.

If beneficial use is potential drinking water source, identify the appropriate time frame of projected future drinking water uses (e.g., groundwater aquifer not currently used as a drinking water source, but expected to be utilized in 30-50 years).

Describe the location of the anticipated use in relation to location and anticipated migration of contamination.

VII. SUMMARY OF OPERABLE UNIT RISKS

Baseline Risk Assessment

Summarize briefly the baseline risk assessment process utilizing text and table formats (see example tables and sample language provided). Also, provide an illustration depicting the risk and final COCs for affected pathways. This section should focus on the information that is driving the need for the specific response action described in the ROD. It is not necessarily a summary of the entire baseline risk assessment.

As a component of the RFI/Remedial Investigation (RI) process, a baseline risk assessment (BRA) was performed to evaluate risks associated with the unit acronym. The BRA estimates what risks the site poses if no action were taken. It provides the bases for taking action and identifies the contaminants and exposure pathways that need to be addressed by the remedial action. The BRA includes

human health and ecological risk assessments. This section of the ROD summarizes the results of the BRA for this OU.

[Note: Describe risks by subunit, when appropriate.]

Summary of Human Health Risk Assessment

Identification of COCs (Table 1) (from RAGS Part D Standard Table 3.1)

- COCs in each medium
- Minimum/maximum detects and frequency
- Data quality
- Exposure point concentration for each COC (95% UCL)

Exposure Assessment (from RAGS Part D Standard Table 1)

- Use CSM as a reference to determine exposure scenarios and pathways
- Potentially exposed populations in current/future scenarios
- Sensitive sub-populations
- Routes of exposure

Toxicity Assessment (from RAGS Part D Standard Tables 5 and 6)

- Carcinogenic/non-carcinogenic toxicity data used to calculate risk of each COC
- Source of toxicity information
- Primary target organs/health effects non-carcinogenic COCs (Tables 2 and 3)

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

Scenario Timeframe: Current								
Medium: Soil								
Exposure Medium: Soil								
Exposure Route	Constituent of Concern	Concentration Detected		Units	Frequency of Detection	Exposure Point Concentration	Exposure Point Concentration Units	Statistical Measure
		Min	Max					
Soil Onsite	Benzo(a) pyrene	100	430	ppm	20/24	300	ppm	95% UCL
- Direct	4,4'-DDT	20	350	ppm	8/24	350	ppm	MAX
Contact	Dieldrin	15	60	ppm	15/24	40	ppm	95% UCL
Key								
ppm: parts per million								
95% UCL: 95% Upper Confidence Limit								
MAX: maximum concentration								
Sample Language Describing Summary of Constituents of Concern and Medium-Specific Exposure Point Concentrations								
<p>The table presents the constituents of concern (COCs) and exposure point concentration (EPC) for each of the COCs detected in soil (i.e., the concentration that will be used to estimate the exposure and risk from each COC in the soil). The table includes the range of concentrations detected for each COC, as well as the frequency of detection (i.e., the number of times the chemical was detected in the samples collected at the site), the EPC, and how the EPC was derived. The table indicates that benzo(a)pyrene is the most frequently detected COC in soil at the site. The 95% UCL on the arithmetic mean was used as the EPC for benzo(a)pyrene and dieldrin. However, due to the limited amount of sample data available for 4,4'-DDT, the maximum concentration was used as the default EPC.</p> <p>NOTE: In a ROD, this table would be expanded to include all exposure points that have significant routes of exposure for the soil. Additional versions of this table format would be presented to include other media (e.g., groundwater) or other exposure media (e.g., dust) with significant routes of exposure.</p>								

Table 2. Cancer Toxicity Data Summary

Pathway: Ingestion, Dermal						
Constituent of Concern	Oral Cancer Slope Factor	Dermal Cancer Slope Factor	Slope Factor Units	Weight of Evidence/ Cancer Guideline Description	Source	Date (Year)
Benzo(a)pyrene	7.3	7.3	(mg/kg)/day	B2	IRIS	1998
4,4'-DDT	0.34	0.34	(mg/kg)/day	B2	IRIS	1998
Dieldrin	16	16	(mg/kg)/day	B2	IRIS	1998
TCE	0.011	0.011	(mg/kg)/day	B2	IRIS	1998
Pathway: Inhalation						
Constituent of Concern	Unit Risk	Units	Inhalation Cancer Slope Factor	Units	Weight of Evidence/ Cancer Guideline Description	Date (Year)
Benzo(a)pyrene	---	NA	---		B2	1998
4,4'-DDT	9.7×10^{-5}	NA	---		B2	1998
Dieldrin	4.6×10^{-3}	NA	---		B2	1998
TCE	---	NA	---		B2	1998
Pathway: External (Radiation) ¹						
Constituent of Concern	Cancer Slope or Conversion Factor	Exposure Route	Units	Weight of Evidence/ Cancer Guideline Description	Source	Date (Year)
---	---	---	---	---	---	---
---	---	---	---	---	---	---
Key	EPA Group			A-	Human carcinogen	
---	No information available			B1-	Probable human carcinogen – indicates that limited human data are available	
IRIS:	Integrated Risk Information System, USEPA			B2-	Probable human carcinogen – indicates sufficient evidence in animals and inadequate or no evidence in humans	
NA:	Not Applicable			C-	Possible human carcinogen	
1-	This pathway would be used in the event that one of the contaminants of concern was a radionuclide. If there are no radionuclides associated with a particular site, then this column can be deleted.			D-	Not classifiable as a human carcinogen	
				E-	Evidence of noncarcinogenicity	
Sample Language Describing Summary of Toxicity Assessment						
<p>This table provides carcinogenic risk information that is relevant to the COCs in both soil and groundwater. At this time, slope factors are not available for the dermal route of exposure. Thus, the dermal slope factors used in the assessment have been extrapolated from oral values. An adjustment factor is sometimes applied, and is dependent upon how well the chemical is absorbed via the oral route. Adjustments are particularly important for chemicals with less than 50% absorption via the ingestion route. However, adjustment is not necessary for the chemicals evaluated at this site. Therefore, the same values presented above were used as the dermal carcinogenic slope factors for these contaminants.</p> <p>Two of the COCs are also considered carcinogenic via the inhalation route. Dieldrin and 4,4'-DDT have inhalation unit risk factors of 4.6×10^{-3} and 9.7×10^{-5}, respectively (Source: IRIS, USEPA 1998). TCE (found in the groundwater) and benzo(a)pyrene lack sufficient toxicity information via the inhalation route to support the development of specific inhalation carcinogenic toxicity criteria.</p>						

Table 3. Non-Cancer Toxicity Data Summary

Pathway: Ingestion, Dermal									
Constituent of Concern	Chronic/ Subchronic	Oral RfD Value	Oral RfD Units	Dermal RfD	Dermal RfD Units	Primary Target Organ	Combined Uncertainty/ Modifying Factors	Sources of RfD: Target Organ	Dates of RfD: Target Organ (M/D/Y)
Benzo(a) pyrene	---	---	---	---	---	---	---	---	---
4,4'-DDT	Chronic	5.0 x 10 ⁴	mg/kg day	5.0 x 10 ⁴	mg/kg day	Liver	---	IRIS	1998
Dieldrin	Chronic	5.0 x 10 ⁴	mg/kg day	5.0 x 10 ⁴	mg/kg day	Liver	---	IRIS	1998
TCE	---	---	---	---	---	---	---	---	---
Pathway: Inhalation									
Constituent of Concern	Chronic/ Subchronic	Inhalation RfC	Inhalation RfC Units	Inhalation RfD	Inhalation RfD Units	Primary Target Organ	Combined Uncertainty/ Modifying Factors	Sources of RfC:RfD : Target Organ	Dates (M/D/Y)
Benzo(a) pyrene	---	---	---	---	---	---	---	---	---
4,4'-DDT	---	---	---	---	---	---	---	---	---
Dieldrin	---	---	---	---	---	---	---	---	---
TCE	---	---	---	---	---	---	---	---	---
Key									
<p>---: no information available IRIS: Integrated Risk Information System, USEPA RfDs: reference dose RfC: reference concentration</p>									
Sample Language Describing Summary of Toxicity Assessment									
<p>This table provides noncarcinogenic risk information that is relevant to the COCs in both soil and groundwater. Two of the COCs have toxicity data indicating their potential for adverse noncarcinogenic health effects in humans. The chronic toxicity data available for both 4,4'-DDT and dieldrin for oral exposures, have been used to develop oral reference doses (RfDs). The oral RfDs for 4,4'-DDT and dieldrin are 5.0 x 10⁻⁴ mg/kg/day, and 5.0 x 10⁻⁴ mg/kg/day, respectively (Source: IRIS, USEPA 1998). The available toxicity data, from both chronic and subchronic animal studies, indicate that both dieldrin and 4,4'-DDT primarily affect the liver. Reference doses are not available for benzo(a)pyrene or TCE, neither are dermal RfDs or inhalation RfCs for any of the contaminants. As was the case for the carcinogenic data, dermal RfDs can be extrapolated from the oral RfDs applying and adjustment factor as appropriate. However, for dieldrin and 4,4'-DDT no adjustment is necessary, and the oral RfDs discussed were used as the dermal RfDs for these contaminants. At this time, inhalation reference concentrations are not available for any of the COCs.</p>									

Risk Characterization

Include the following for all current/future land use scenarios that present unacceptable risks:

- Carcinogenic risks for each COC by medium and pathway
- Combine carcinogenic risks for total exposure to COCs in medium and pathway
- HQ for each COC in each medium for each pathway
- HI for combined non-carcinogenic effects
- Combined carcinogenic and HIs for paths to which individuals could be exposed
- Qualitative descriptions of risks
- Explanation of quantitative risk versus qualitative
- Table summary (Tables 4 and 5) (RAGS Part D Table 10)

Include Significant Sources of Uncertainty:

- Uncertainty due to number of samples
- Uncertainty due to fate and transport models
- Uncertainty due to default exposure assumptions
- Uncertainty due to available toxicity data (Tables 4 and 5)

Table 4. Risk Characterization Summary - Carcinogens

Scenario Timeframe:		Current						
Receptor Population:		Resident						
Receptor Age:		Child						
Medium	Exposure Medium	Exposure Route	Constituent of Concern	Carcinogenic Risk				
				Ingestion	Inhalation	Dermal	External (Radiation) ¹	Exposure Routes Total
Soil	Soil	Soil Onsite-Direct Contact	Benzo(a)pyrene	1.2 x 10 ⁻²	N/A	3.3 x 10 ⁻⁶	---	1.2 x 10 ⁻²
		Soil Onsite-Direct Contact	4,4'-DDT	6.5 x 10 ⁻⁴	N/A	4.5 x 10 ⁻⁷	---	6.5 x 10 ⁻⁴
		Soil Onsite-Direct Contact	Dieldrin	3.5 x 10 ⁻³	N/A	4.8 x 10 ⁻⁶	---	3.5 x 10 ⁻³
	Dust	Soil Onsite-Inhalation of Soil as Dust	Benzo(a)pyrene	N/A	---	N/A	---	
		Soil Onsite-Inhalation of Soil as Dust	4,4'-DDT	N/A	9.7 x 10 ⁻⁴	N/A	---	9.7 x 10 ⁻⁴
		Soil Onsite-Inhalation of Soil as Dust	Dieldrin	N/A	8.5 x 10 ⁻³	N/A	---	8.5 x 10 ⁻³
Soil Risk Total =								2.6 x 10 ⁻²
Ground-water	Ground-water	Aquifer X-Tap Water	TCE	2.5 x 10 ⁻³	---	1.4 x 10 ⁻⁷	---	2.5 x 10 ⁻³
Groundwater Risk Total =								2.5 x 10 ⁻³
Total Risk =								2.9 x 10 ⁻²
Key								
---: Toxicity criteria are not available to quantitatively address this route of exposure.								
N/A: Route of exposure is not applicable to this medium.								
1--- This column would be used in the event that one of the contaminants of concern was a radionuclide. If there are no radionuclides associated with a particular site, then this column can be deleted.								
Sample Language Describing Risk Characterization								
<p>Table 4 provides risk estimates for the significant routes of exposure. These risk estimates are based on a reasonable maximum exposure and were developed by taking into account various conservative assumptions about the frequency and duration of a child's exposure to soil and groundwater, as well as the toxicity of the COCs (benzo(a)pyrene, 4,4'-DDT, dieldrin, and TCE). The total risk from direct exposure to contaminated soil and groundwater at this site to a current child resident is estimated to be 2.85 x 10⁻². The COCs contributing most to this risk level are benzo(a)pyrene and dieldrin in soil and TCE in groundwater. This risk level indicates that if no cleanup action is taken, an individual would have an increased probability of 3 in 100 of developing cancer as a result of site-related exposure to the COCs.</p>								
<p>NOTE: Additional versions of this table format would be presented to include other receptors with significant exposure (scenario timeframe, receptor population, receptor age).</p>								

Table 5. Risk Characterization Summary – Non-Carcinogens

Scenario Timeframe:		Current						
Receptor Population:		Resident						
Receptor Age:		Child						
Medium	Exposure Medium	Exposure Route	Constituent of Concern	Primary Target Organ	Non-Carcinogenic Hazard Quotient			
					Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil	Soil	Soil Onsite-Direct Contact	Benzo(a)pyrene	Liver	---	N/A	---	---
		Soil Onsite-Direct Contact	4,4'-DDT	Liver	3.8	N/A	1.5x10 ⁻²	3.9
		Soil Onsite-Direct Contact	Dieldrin	Liver	4.4	N/A	2.7x10 ⁻⁴	4.4
Soil Hazard Index Total =								8.3
Ground-water	Ground-water	Aquifer X-Tap Water	TCE	---	---	---	---	---
Groundwater Hazard Index Total =								---
Receptor Hazard Index =								8.3
Liver Hazard Index =								8.3
Key								
---: Toxicity criteria are not available to quantitatively address this route of exposure.								
N/A: Route of exposure is not applicable to this medium.								
Sample Language Describing Risk Characterization								
<p>Table 5 provides hazard quotients (HQs) for each route of exposure and the hazard index (HI)(sum of hazard quotients) for all routes of exposure. The Risk Assessment Guidance (RAGS) for Superfund states that, generally, a HI greater than 1 indicates the potential for adverse noncancer effects. The estimated HI of 8.3 indicates that the potential for adverse noncancer effects could occur from exposure to contaminated soil containing 4,4'-DDT, dieldrin and benzo(a)pyrene. The noncancer risk from exposure to contaminated groundwater could not be evaluated due to the lack of noncarcinogenic toxicity criteria for TCE.</p> <p>NOTE: Additional versions of this table format would be presented to include other receptors with significant exposure (scenario timeframe (e.g., chronic versus subchronic exposures), receptor population, receptor age)</p>								

The following sample language may be included in this section.

For carcinogens, risks are generally expressed as the incremental probability of an individual developing cancer over a lifetime as a result of exposure to the carcinogen. Excess lifetime cancer risk is calculated from the following equation:

$$\text{Risk} = \text{CDI} \times \text{SF}$$

where: risk = a unitless probability (e.g., 2×10^{-5}) of an individual developing cancer

CDI = chronic daily intake averaged over 70 years (mg/kg-day)

SF = slope factor, expressed as (mg/kg-day)⁻¹.

These risks are probabilities that usually are expressed in scientific notation (e.g., 1×10^{-6}). An excess lifetime cancer risk of 1×10^{-6} indicates that an individual experiencing the reasonable maximum exposure estimate has a 1 in 1,000,000 chance of developing cancer as a result of site-related exposure. This is referred to as an “excess lifetime cancer risk” because it would be in addition to the risks of cancer individuals face from other causes such as smoking or exposure to too much sun. The chance of an individual developing cancer from all other causes has been estimated to be as high as one in three. USEPA’s generally acceptable risk range for site-related exposures is 10^{-4} to 10^{-6} .

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

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

The HQ is calculated as follows:

$$\text{Non-cancer HQ} = \text{CDI/RfD}$$

where: CDI = Chronic daily intake

RfD = reference dose

CDI and RfD are expressed in the same units and represent the same exposure period (i.e., chronic, subchronic, or short-term).

Summary of Ecological Risk Assessment

Identification of COCs

- Summary of toxicity data used to evaluate constituents of potential concern (COPCs) plus background concentrations for each chemical
- COPCs in each medium
- Range of detected concentrations and frequency of detects for each COPC in each medium
- Mean and maximum concentrations of COPCs
- Ecological HQ and COC flag (yes or no) for each COPC
- Data quality (data usability section of ecological risk assessment)

Exposure Assessment

- Description of ecological setting (habitat maps, sensitive areas, etc.)
- Key species exposed; threatened, endangered species (Table 6)
- Exposure pathways for receptors plus exposure point concentrations

- Monitoring/modeling data and assumptions used for exposure point concentrations
- Summary of field studies conducted

Table 6. Ecological Exposure Pathways of Concern

Exposure Medium	Sensitive Environment Flag (Y or N)	Receptor	Endangered/Threatened Species Flag (Y or N)	Exposure Routes	Assessment Endpoints	Measurement Endpoints
Sediment	N	Benthic organisms	N	Ingestion, respiration, and direct contact with chemicals in sediment	Benthic invertebrate community species diversity and abundance	<ul style="list-style-type: none"> • Toxicity of soil to <i>Hyallela</i> • Species diversity index
Surface Water	N	Fish	N	Ingestion, respiration, and direct contact with chemicals in surface water	Maintenance of an abundant and productive game fish population	<ul style="list-style-type: none"> • Toxicity of surface water to <i>Pimephales promelas</i> • Species diversity index
Soil	N	Terrestrial invertebrates	N	Ingestion and direct contact with chemicals in wetland soils	Survival of terrestrial invertebrate community	<ul style="list-style-type: none"> • Toxicity of sediments to <i>Lumbricus terrestris</i>
		Terrestrial plants	Y	Uptake of chemicals via root systems	Maintenance/enhancement of native wetland vegetation	<ul style="list-style-type: none"> • Species diversity index • Survival of seedlings
Surface Water (Vernal pools)	Y	Aquatic invertebrates	N	Ingestion, respiration, and direct contact with chemicals in surface water	Maintenance of a balanced, indigenous aquatic invertebrate community	<ul style="list-style-type: none"> • Species diversity index

Ecological Effects Assessment

- Summary of toxicity tests/field studies used to evaluate adverse ecological effects
- Description of the assessment and measurement endpoints

Ecological Risk Characterization

- Summary of environmental risks associated with a relevant media, the basis of these risks, how risks were determined, and COC concentrations expected to be protective of ecological receptors. (Table 7)

Table 7. COC Concentrations Expected to Provide Adequate Protection of Ecological Receptors

Habitat Type/ Name	Exposure Medium	COC	Protective Level ¹	Units	Basics	Assessment/Measurement Endpoint (protocol)
Small Freshwater Stream/ West Branch Maple Creek	Sediment	Arsenic	6	mg/kg	Toxicity Reference Value (TRV) protocol	Benthic invertebrate community species diversity and abundance
		Lead	15	mg/kg	Significant difference in Benthic Diversity Index between the site and the reference site.	
		Total PCBs	0.03-0.05	mg/kg	TRV	
	Surface Water	Aluminum	123	ug/l	TRV	Maintenance of an abundant and productive game fish population
		Arsenic	208	ug/l	TRV	
		Total PCBs	0.1	ug/l	Bioaccumulation factor (BAF) protocol	
Notes						
¹ . A range of levels may be provided.						

Summary of the Fate and Transport Analysis

Summarize the results of the fate and transport analysis with emphasis on where remedial action is required.

Discussion of Principal Threat Source Material (PTSM)

Discuss whether the OU does/does not contain PTSM and its location.

Risk Assessment Summary

This section may be organized by subunit, when applicable.

Conclusions

This section may be organized by subunit, when applicable. State basis for remedial action, which is generally warranted if one or more of the following conditions is met: (1) the cumulative excess carcinogenic risk to an individual exceeds the acceptable risk for the current or future land use; (2) the non-carcinogenic hazard index is greater than one for either current or future land use; (3) site-specific contaminants cause adverse environmental impacts; or (4) chemical-specific standards or other measures that define acceptable risk levels are exceeded.

VIII. REMEDIAL ACTION OBJECTIVES AND REMEDIAL GOALS

Present a clear statement of the specific remedial action objectives (RAOs) for the operable unit or site (e.g., treatment of contaminated soils above health-based action levels, restoration of groundwater plume to drinking water standards, and containment of dense non-aqueous phase liquid (DNAPL) source areas).

Discuss the basis and rationale for RAOs (e.g., current and reasonably anticipated future land use and potential beneficial groundwater use).

[Note: RAOs should be specific at this point and indicate the remedial levels to achieve (can refer to table). An example is: Protect future workers from contact with soil containing levels of B(a)P in excess of 200 $\mu\text{g}/\text{kg}$.]

Include an RAO to ensure that the future land use for which remedial goals are developed is maintained (e.g., "Prevent residential and/or agricultural land use").

Explain how the RAOs address risks identified in the risk assessment (e.g., how will the risks driving the need for action be addressed by the response action).

Based upon the appropriate human health and ecological COCs, provide the remedial goals (RGs) for the operable unit (use tables and illustrations as appropriate).

Identify key ARARs for all the options in a table format. The table can be included as an appendix to the ROD.

IX. DESCRIPTION OF ALTERNATIVES

The objective of this section is to provide a brief understanding of the remedial alternatives developed for the site.

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

Up front, provide the following information for each alternative:

- Estimated Present Value Cost
- Construction Time to Complete

Present worth (PW) costs should include a statement listing the basis for those costs. The discount rate (2.1% for 1 to 3 years, 2.8% for 4 to 5 years, 3.0% for 6 to 7 years, 3.1% for 8 to 10 years, and 3.9% for 11 years or longer) and the length of time used for O&M costs must be stated. Use the actual expected length of time in the calculations. If the costs are expected to continue beyond 30 years, without a definite end point, use 500 years. Use the same time period for each alternative to discuss PW costs. For alternatives that are complete (no O&M

required) earlier than others, show that there are no costs for the years after completion.

Describe the remedy and provide a bulleted list of the major components of each alternative, as they logically occur in the remediation process. Describe common elements and distinguishing features unique to each response action. Examples of these include:

- Treatment technologies and the materials they will address (e.g., principal threat) Note: Regulators do consider monitored natural attenuation as meeting the preference for treatment. Also, natural radioactive decay qualifies, but time must be short.
- Containment components of remedy (e.g., engineering controls, cap, hydraulic barriers) and the materials they will address (e.g., low-level threat source materials, treatment residuals)
- Land Use Controls and Institutional Controls (Identify entity responsible for implementing, monitoring, reporting, and a reference to the LUCIP form implementation details, including monitoring frequency)
- Operations and Maintenance (O & M) activities required to maintain the integrity of the remedy (e.g., cap maintenance)
- Monitoring requirements
- Key ARARs associated with each alternative
- Long-term reliability of remedy (potential for remedy failure/replacement costs)
- Quantity of untreated waste and treatment residuals to be disposed off-site or managed on-site in a containment system and degree of hazard remaining in such waste
- Available land uses upon achieving remediation goals. Note: Timeframe to achieve goals (e.g., commercial or light industrial use available in 3 years when cleanup levels are achieved)
- Available groundwater uses upon achieving remediation goals. Note timeframe to achieve goals (e.g., restricted use for industrial purposes in Technical Impracticability (TI) waiver zone, drinking water use in non-TI zone achieving cleanup levels in 100 years). Also include a statement on current groundwater uses.
- Other impacts or benefits associated with each alternative

For an interim action, this section should describe the limited alternatives (including the No Action alternative) that were considered for the interim action (generally three or fewer). Only those requirements that are ARARs for the limited-scope interim action should be incorporated into the description of alternatives.

X. COMPARATIVE ANALYSIS OF ALTERNATIVES

Briefly compare the relative performance of each alternative against the others with respect to the nine evaluation criteria (summarize in a table if appropriate):

[Note: The discussion for each criterion should be in decreasing order of the alternative's ability to satisfy the respective criterion.]

- Overall protection of human health and the environment (specify “industrial” or “residential” to qualify the protectiveness statements.)
- Compliance with ARARs
- Long-term effectiveness and permanence
- Reduction of toxicity, mobility, or volume through treatment
- Short-term effectiveness
- Implementability
- Cost
- State acceptance

- Community acceptance

For an interim action, this section should be presented in light of the limited scope of the action. Evaluation criteria not relevant to evaluation of interim actions need not be addressed in detail. Rather, their irrelevance to the decision should be noted briefly.

[Note: A summary table may be added, in addition to the discussion in the text to clarify.]

XI. THE SELECTED REMEDY

Detailed Description of the Selected Remedy

Expand on the description of the Selected Remedy from that which was provided in the Description of Alternatives section.

Include a clear, concise, thorough explanation of the logic behind selecting the alternative. This should discuss the major distinguishing features over each of the other alternatives.

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

If a selected alternative is and/or includes Institutional Controls, the following words should be inserted after the paragraph that states the selected alternative is Institutional Controls. Also include Table 8, which should show the Type of Control, Purposes of Control, Duration, Implementation (including when it will be implemented) and Affected Areas.

Table 8. Land Use Controls for the [Operable Unit Name (XXXX)]

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

^aAffected areas – Specific locations identified in the SRS LUCIP or subsequent post-ROD documents.

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

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

^dOther 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-DOE property.

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

^fPhysical Access Controls – Physical barriers or restrictions to entry.

^gSigns – Posted command, warning or direction.

Institutional controls will be implemented by:

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

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

For remedies that include institutional controls, include the following language:

In the long term, if the property is ever transferred to nonfederal 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. These requirements are also consistent with the intent of the RCRA deed notification requirements at final closure of a RCRA facility if contamination will remain at the unit.

The deed shall also include deed restrictions precluding residential use of the property. The deed shall contain provisions to ensure that appropriate land use controls remain with the affected area upon any and all transfers. However, the need for these deed restrictions may be reevaluated at the time of transfer in the

event that exposure assumptions differ 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 for the unit acronym or OU subunit name leaves hazardous substances in place that pose a potential future risk and will require land use restrictions for an indefinite period of time. As agreed on March 30, 2000, among the USDOE, USEPA, and SCDHEC, SRS is implementing a Land Use Control and Assurance Plan (LUCAP) to ensure that the Land Use Controls (LUCs) required by numerous remedial decisions at SRS are properly maintained and periodically verified. The unit-specific LUCIP referenced in this ROD will provide details and specific measures required to implement and maintain the LUCs selected as part of this remedy. The USDOE is responsible for implementing, maintaining, monitoring, reporting upon, and enforcing the LUCs selected under this ROD. The LUCIP, developed as part of this action, will be submitted concurrently with the CMI/RAIP, as required in the FFA for review and approval by USEPA and SCDHEC. Upon final approval, the LUCIP will be appended to the LUCAP and is considered incorporated by reference into the ROD, establishing LUC implementation and maintenance requirements enforceable under CERCLA and the *SRS Federal Facility Agreement*. The approved LUCIP will establish implementation, monitoring, maintenance, reporting, and enforcement requirements for the unit. The LUCIP will remain in effect unless and until modifications are approved as needed to be protective of human health and the environment. The deed shall contain provisions to ensure

that appropriate land use controls remain with the affected area upon any and all transfers. The LUCs shall be maintained until the concentration of hazardous substances associated with the unit have been reduced to levels that allow for unlimited exposure and unrestricted use. Approval by EPA and DHEC is required for any modification or termination of the ICs.

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

The LUC objectives necessary to ensure the protectiveness of the selected remedy are [include the following list as appropriate]

- prevent contact, removal, or excavation of [list media or components for specific waste unit, e.g. contaminated soil and pipelines, buried waste, etc.]
- preclude residential use of the area; and
- prevent unauthorized access to contaminated groundwater in the area.

Cost Estimate for the Selected Remedy

Present a detailed, activity-based breakdown of the estimated costs associated with implementing and maintaining the remedy (include estimated capital, O &

M, and present worth costs, and the number of years to completion of the remedy. All alternatives will have the same time period for the purpose of calculating remedy cost estimates).

Standard language from guidance for Cost Estimate Disclaimer: The information in this cost estimate summary table is based on the best available information regarding the anticipated scope of the remedial alternative. Changes in the cost elements are likely to occur as a result of new information and data collected during the engineering design of the remedial alternative. Major changes may be documented in the form of a memorandum in the Administrative Record File, an ESD, or a ROD amendment. This is an order-of-magnitude engineering cost estimate that is expected to be within +50 to -30 percent of the actual project cost.

Estimated Outcomes of Selected Remedy

Brief description based on elements relevant to the unit.

Available land use(s) upon achieving remediation goals. Note timeframe to achieve goals (e.g., commercial or light industrial use available in 3 years when cleanup levels are achieved).

Available groundwater use(s) upon achieving remediation goals. Note timeframe to achieve goals (e.g., restricted use for industrial purposes in TI waiver zone, drinking water use in non-TI zone upon achieving cleanup levels in 100 years).

Final cleanup levels for each media (i.e., contaminant specific remediation goals), basis for cleanup levels, and risk at cleanup levels (if appropriate).

Anticipated environmental and ecological benefits (e.g., restoration of sensitive ecosystems, protection of endangered species, protection of wildlife populations, wetlands restoration).

Waste Disposal and Transport

Include the following language to discuss waste management procedures.

- All unused environmental samples may be returned to the waste site, within the Area of Contamination. This only includes samples that have had no preservatives added.
- Decontamination solutions and rinsates from cleaning items intended for reuse or recycle (e.g., field sampling tools, equipment, or personal protective equipment) may be discharged to the ground surface at an area which will not runoff or cause erosion. This method for handling decontamination solutions does not require an engineering evaluation to determine a waste disposal strategy. Decontamination wash and rinse solutions typically include laboratory grade soap and deionized water, and laboratory grade isopropyl alcohol for residual organic compound stripping and tool drying. Any residual isopropyl alcohol must be containerized and combined with the soapy wash water before the solution is discharged to the ground surface, to avoid discharging an ignitable hazardous solution.
- Environmental sampling boreholes may be abandoned by backfilling with native soil. This is regardless of the level of contamination. The soil will be placed in the borehole in the reverse order as removed, to maintain the original stratigraphy.

If the OU has been identified in previous documents as being a RCRA listed waste site, include the following bullet also:

- Environmental media that contains RCRA listed waste is subject to applicable RCRA requirements until determined to no longer contain hazardous waste.
-

Environmental media and/or secondary waste will be determined to no longer contain listed hazardous waste by direct comparison to the Health Based Levels (HBLs) for soil and groundwater. The HBLs for soil are based on the lower of (1) the USEPA Region 9 Preliminary Remediation Goals (PRGs) for the residential exposure scenario or (2) the RCRA toxicity characteristic level (due to the 20-fold dilution factor inherent in the TCLP analysis of solids, the RCRA TCLP values are multiplied by 20). Due to the analytical method limitations, groundwater (as defined by South Carolina Regulation 61-68) HBLs are based on the higher of (1) MCLs, or (2) USEPA RCRA (SW-846) analytical minimum detection levels (MDLs).

XII. STATUTORY DETERMINATIONS

See the Statutory Determination section of the Declaration for text options; these sections should coincide.

Based on the unit RFI/RI/BRA report, the unit acronym poses a threat to human health and the environment. Therefore, Alternative selected alternative number and title has been selected as the remedy for the unit acronym.

Include a statement indicating whether the unit does/does not contain PTSM.

Explain how the remedy satisfies the requirements of Section 121 of CERCLA:

- Protection of human health and the environment
 - Compliance with key ARARs or justify a waiver (summarize in a table if appropriate)
 - Cost-effectiveness
-

- Utilization of permanent solutions and alternative treatment (resource recovery) technologies to the maximum extent practicable (i.e., explain why the Selected Remedy represents the best options).
- Preference for treatment as a principal element (or justify not meeting this preference). Excavation does not meet the standard for treatment.
- Explain five-year remedy review requirements for the Selected Remedy.
- Include the following language for remedial actions requiring a 5-year remedy review:

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

For an interim action, this section should address only those ARARs specific for this action (e.g., residual management during implementation). The discussion under “utilization of permanent solutions and treatment to the maximum extent practicable” should indicate that the interim action is not designed or expected to be final, but that the selected remedy represents the best balance of trade-offs among the alternatives with respect to pertinent criteria, given the limited scope of the action. The discussion under the “preference of treatment” section should note that the preference will be addressed in the final decision document for the site or final operable unit, although treatment components “that support the preference” should be noted.

XIII. EXPLANATION OF SIGNIFICANT CHANGES

If there are no significant changes in the selected remedy from the preferred alternative identified in the proposed plan, then insert the following text.

“The remedy/remedies selected in this ROD do not contain any significant changes from the preferred alternative(s) presented in the SB/PP (or PP or IAPP as applicable). No comments were received during the public comment period”.

If there are significant changes in the selected remedy from the preferred alternative identified in the proposed plan, then:

- Discuss the preferred alternative originally presented in the proposed plan.
- Describe the significant changes in the selected remedy.
- Explain the rationale for the changes and how they could have been reasonably anticipated based on the information presented in the proposed plan.

XIV. RESPONSIVENESS SUMMARY

The Responsiveness Summary serves the dual purposes of (1) presenting stakeholder concerns about the site and preferences regarding the remedial alternatives, and (2) explaining how those concerns were addressed and how the preferences were factored into the remedy selection process. This discussion should cross-reference sections of the Decision Summary that demonstrate how issues raised by the community have been addressed. SRS CAB recommendations or comments made during the public comment period should be summarized and responded to in the Responsiveness Summary.

This section should include the following statement:

The Responsiveness Summary is included as Appendix A of this document.

XV. POST-ROD DOCUMENT SCHEDULE AND DESCRIPTION

Identify by bullets the major post-ROD submittals and attach a schedule.

For a final ROD, this section should include explicit statements telling the reader when cleanup will start in the field and when cleanup is scheduled for completion.

For an IROD, this section should include explicit statements telling the reader when cleanup will start in the field, when cleanup is scheduled for completion, any needed statements about a final Corrective Measures Study/Feasibility Study to arrive at a proposed final remedy for the site, a statement identifying the timing of the public comment period for the final Statement of Basis/Proposed Plan and when the final ROD is scheduled for approval.

XVI. REFERENCES

Provide additional references that are listed in the ROD (or IROD). (Those listed below are referenced in the generic ROD language and should be retained).

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

USDOE 1994. *Public Involvement, A Plan for the Savannah River Site*, Savannah River Operations Office, Aiken SC

APPENDIX A - RESPONSIVENESS SUMMARY

Additional appendices can be added as needed.

**APPENDIX A -
RESPONSIVENESS SUMMARY**

Responsiveness Summary

The 45-day (or 30-day) public comment period for the Statement of Basis/Proposed Plan (or Proposed Plan) for the unit name (bldg. no) began on start date and ended on end date.

Public Comments

If no comments were received from the public, please state so.
