Savannah River NUCLEAR SOLUTIONS℠

Early Action Record of Decision Remedial Alternative Selection for the Beneficial Use of Select Coal Ash and Coal Fines at the A-Area Ash Pile (788-A), A-Area Coal Pile Runoff Basin (788-3A), F-Area Ash Landfill (288-F), H-Area Ash Basin (288-H), K-Area Ash Basin (188-K), and L-Area Ash Basin (188-L) Operable Units (U)

SEMS Numbers: 61, 62, 88, 90, & 91

SRNS-RP-2026-00742

Revision 0

August 2026

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

RECORD OF DECISION
REMEDIAL ALTERNATIVE SELECTION (U)

Record of Decision Remedial Alternative Selection for the Beneficial Use of Select Coal Ash and Coal Fines at the Area Ash Pile (788-A), A-Area Coal Pile Runoff Basin (788-3A), F-Area Ash Landfill (288-F), H-Area Ash Basin (288-H), K-Area Ash Basin (188-K), and L-Area Ash Basin (188-L) (U)

SEMS Numbers: 61, 62, 88, 90, & 91

SRNS-RP-2026-00742
Revision 0

August 2026

Savannah River Site
Aiken, South Carolina

Prepared by:

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

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DECLARATION FOR THE EARLY ACTION RECORD OF DECISION

Unit Name and Location

A-Area Ash Pile (788-A) and A-Area Coal Pile Runoff Basin (788-3A) (AAP and ACPRB), F-Area Ash Landfill (288-F) (FAL), H-Area Ash Basin (288-H) (HAB), K-Area Ash Basin (188-K) (KAB), and L-Area Ash Basin (188-L) (LAB) Operable Units (OUs)

Superfund Enterprise Management System (SEMS) Identification Number: OU-SEMS 61, 62, 88, 90, & 91

Savannah River Site (SRS)

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

Aiken, South Carolina

United States Department of Energy (USDOE)

The AAP and ACPRB, FAL, HAB, KAB, and LAB OUs, herein referred to as the remaining coal ash and coal fines OUs, are listed as Resource Conservation and Recovery Act (RCRA) 3004(u) Solid Waste Management Units/CERCLA units in Appendix C of the Federal Facility Agreement (FFA) for the SRS.

The FFA is a legally binding agreement between regulatory agencies (United States Environmental Protection Agency [USEPA] and South Carolina Department of Environmental Services [SCDES]) and regulated entities (USDOE) that establishes the responsibilities and schedules for the comprehensive remediation of SRS. The media associated with these OUs are surface ash/soil. Groundwater resources are considered in evaluating contaminant migration (CM) from ash/soil that may impact groundwater above drinking water standards. However, groundwater as a media is being addressed separately as part of area groundwater OUs or through corrective action under the SRS RCRA Permit.

Statement of Basis and Purpose

This decision document, per 40 Code of Federal Regulation (CFR) § 300.430(f)(5)(i), presents the selected remedial action for the remaining coal ash and coal fines OUs located at the SRS near Aiken, South Carolina. This 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 information contained in the Administrative Record File for this site.

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

Assessment of the Site

There has been a release of contaminants at the remaining coal ash and coal fines OUs into the environment. Arsenic and naturally occurring radionuclides (potassium-40 [K-40], radium-226 [Ra-226], uranium-238 [U-238]) are present in surface ash/soils of the AAP and ACPRB OU that may pose a risk to human health receptors. Arsenic and naturally occurring radionuclides (K-40, thorium-232 [Th-232], and U-238) are present in surface ash/soils of the FAL, HAB, KAB, and LAB OUs that may pose a risk to human health receptors. Radionuclides present within the ash occur naturally in coal. However, coal ash is considered a form of Technologically Enhanced Naturally Occurring Radioactive Material, as the elevated activity levels of radionuclides found within the ash units are the result of coal combustion. CM concerns present in the vadose zone of the HAB OU (barium [Ba], uranium 233/34 [U-233/234], uranium-235 [U-235], U-238) and LAB OU (Ba) have the potential to migrate to groundwater and exceed groundwater action levels within 1,000 years. There are no CM problems warranting action identified for the AAP and ACPRB OU, FAL OU, and KAB OU. There are no ecological or principal threat source material (PTSM) problems warranting action identified for the remaining coal ash and coal fines OUs.

The response action selected in this Early Action (EA) Record of Decision (ROD) is necessary to protect the public health or welfare or the environment from actual or threatened releases of hazardous substances into the environment from the remaining coal ash and coal fines OUs.

Description of the Selected Remedy

The selected remedy for the remaining coal ash and coal fines OUs is Land Use Controls (LUCs) with Beneficial Use[1] (Alternative A-2) as defined in 40 CFR 257.53 to prevent exposure of arsenic and naturally occurring radionuclides (K-40, Ra-226, U-238, and Th-232) that are present in

[1] The term “Beneficial Use” was formerly referred to as “Beneficial Reuse” in prior documentation.

surface ash/soils to human receptors (future resident and industrial worker). To address CM concerns present in the vadose zone of the HAB OU (Ba, U-233/234, U-235, U-238) and LAB OU (Ba), groundwater monitoring wells will be installed at both OUs and monitored every 5 years to coincide with five-year remedy reviews. Groundwater beneath the FAL OU will continue to be monitored semi-annually as required under the current Solid Waste Landfill permit until implementation of the final remedy, at which point the frequency shall be determined by the Post-EA ROD documentation.

Phase 1 of Alternative A-2 implements LUCs. LUCs will be in effect until Phase 2 of the remedy is implemented and contaminated media is excavated and removed from the subunits for beneficial use. LUCs include the following:

- Warning signs posted around the perimeter of each of the remaining coal ash and coal fines OUs where the ash/soil is located, including operations and maintenance of the signage.

- Administrative/Worker Access Controls: Includes SRS administrative controls and land use restrictions for onsite workers as implemented under the Site Use/Site Clearance Program and other controls that are in place to ensure worker safety, including work controls/work packages that include worker training, and health and safety requirements, and pre-work briefings.

- Engineering Controls: SRS access controls that limit and inform SRS workers and inadvertent trespassers as described in the current 2023 RCRA 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.

Phase 2 of the alternative implementation will include excavation of coal combustion residuals (CCR) to unrestricted use levels and beneficial use of the CCR as defined in 40 Code of Federal Regulation 257.53. Proven unencapsulated beneficial use alternatives for CCR include use as fill material. Beneficial use receiving facilities include the Saltstone Disposal Units (SDUs) or F-Area and H-Area Tank Farms, where CCR can be used as lower fill material as part of the cover systems.

Removing the contaminated media from the remaining coal ash and coal fines OUs will effectively eliminate risk for the human health receptor and CM scenarios by permanently removing the ash.

This alternative would require five-year remedy reviews unless unrestricted use is achieved following excavation of the CCR for beneficial use (Phase 2).

This remedy was selected because it meets the remedial action objectives (RAOs), provides overall protection of human health and the environment, complies with Applicable or Relevant and Appropriate Requirements (ARARs), and is cost-effective.

The RCRA permit will be revised to reflect selection of the final remedy using the procedures under 40 CFR Part 270, and South Carolina Hazardous Waste Management Regulation (SCHWMR) R.61-79.264.101; 270.

Statutory Determinations

Based on the Focused EA Corrective Measures Study/Feasibility Study (CMS/FS) for the AAP and ACPRB, FAL, HAB, KAB, and LAB OUs (SRNS 2025a) the remaining coal ash and coal fines OUs pose a threat to human health and the environment. Therefore, LUCs with Beneficial Use (Alternative A-2) has been selected as the remedy for the remaining coal ash and coal fines OUs. As part of the selected remedy, during Phase 1 the land use of the remaining coal ash and coal fines OUs will remain restricted/industrial. Following excavation and removal of the CCR in Phase 2, clean closure (i.e., unrestricted land use) will be evaluated for each OU. In the event a clean closure is not possible, closure with CCR left in place will be evaluated by the FFA parties and may be documented in an Explanation of Significant Difference or amendment to the final EA ROD.

In accordance with Section 121(c) of CERCLA and NCP § 300.430(f)(5)(iii)(c), a statutory review will be conducted within five years of initiation of the remedial action, and every five years thereafter until the excavation and beneficial use component (Phase 2) of the remedy is completed and clean closure is achieved, to ensure that the remedy continues to be protective 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), and is cost-effective. The remedy for these OUs does not satisfy the statutory preference for treatment as a principal element of the remedy, and no technologies exist to practically treat the contaminants in the coal ash.

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

In addition, if the property, or any portion thereof, is ever transferred by deed, the U.S. Government will also satisfy the requirements of CERCLA 120(h)(3). The requirements include: a description of the remedial action taken, a covenant, and an access clause. These requirements are also consistent with the intent of the RCRA deed notification requirements at final closure of a RCRA facility if contamination will remain at the unit.

LUCs will be implemented through the following:

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

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

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

The selected remedy for the remaining coal ash and coal fines OUs leaves hazardous substances in place that pose a potential future risk and will require land use restrictions for as long as necessary (i.e., until completion of Phase 2 and clean closure of the OU) to keep the selected remedy fully protective of human health and the environment. As agreed on March 30, 2000, among the USDOE, USEPA, and SCDES, SRS is implementing a Land Use Control Assurance Plan (LUCAP) to ensure that the LUCs required by numerous remedial decisions at SRS are properly maintained and periodically verified. The OU-specific EA Land Use Control Implementation Plan (LUCIP) incorporated by reference into this EA 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 EA ROD. The EA LUCIP, developed as part of this action, will be submitted as required in the FFA for review and approval by USEPA and SCDES. Upon final approval, the EA LUCIP will be appended to the LUCAP and is considered incorporated by reference into the EA ROD, establishing LUC implementation and maintenance requirements enforceable under CERCLA. The EA LUCIP will remain in effect unless and until modifications are approved by the USEPA and SCDES as needed to be protective of human health and the environment. EA LUCIP modification will only occur through another CERCLA document.

Data Certification Checklist

This EA ROD provides the following information:

- Refined constituents of concern (RCOCs) and their respective concentrations (Section V).
- Baseline risk represented by the RCOCs (Section VII).
- Cleanup levels established for the RCOCs and the basis for the levels (Section VIII).

- Current and reasonably anticipated future land and groundwater use assumptions used in the BRA and EA ROD (Section VI).

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

- Estimated capital, operation and maintenance, and total present worth cost; discount rate; and the number of years over which the remedy cost estimates are projected (Section IX).

- Key decision factor(s) that led to selecting the remedy (Section X).

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Date	Karen D. Morrow, Acting Director Office Director for Closure and Project Management Savannah River Operations Office Office of Environmental Management U. S. Department of Energy
Date	Juli E. Blalock, Chief Bureau of Land and Waste Management South Carolina Department of Environmental Services
Date	Hunter Johnson, Division Director Superfund and Emergency Management Division U. S. Environmental Protection Agency - Region 4

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DECISION SUMMARY
REMEDIAL ALTERNATIVE SELECTION (U)

A-Area Ash Pile (788-A), A-Area Coal Pile Runoff Basin (788-3A), F-Area Ash Landfill (288-F), H-Area Ash Basin (288-H), K-Area Ash Basin (188-K), and L-Area Ash Basin (188-L) Operable Units

SEMS Numbers: 61, 62, 88, 90, & 91

SRNS-RP-2026-00742
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August 2026

Savannah River Site
Aiken, South Carolina

Prepared By:

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

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LIST OF ACRONYMS AND ABBREVIATIONS

AAP	A-Area Ash Pile (788-A)
ac	acres
ACPRB	A-Area Coal Pile Runoff Basin (788-3A)
amsl	above mean sea level
ARAR	applicable or relevant and appropriate requirement
Ba	barium
BRA	Baseline Risk Assessment
bgs	below ground surface
CCR	coal combustion residuals
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CM	contaminant migration
CMS	Corrective Measures Study
CFR	Code of Federal Regulation
COC	constituent of concern
COPC	constituents of potential concern
COPEC	constituents of potential ecological concern
CSM	conceptual site model
EA	Early Action
EPC	exposure point concentration
ERA	ecological risk assessment
ESD	explanation of significant difference
ESV	ecological screening values
FAL	F-Area Ash Landfill (288-F)
FFA	Federal Facility Agreement
FS	Feasibility Study
ft	feet
g	gram
ha	hectares
HAB	H-Area Ash Basin (288-H)
HBL	health-based limit
HH	human health
HHRA	human health risk assessment
HI	hazard index
HQ	hazard quotient
IOU	Integrator Operable Unit
K-40	potassium-40
KAB	K-Area Ash Basin (188-K)
kg	kilogram
km/km^2	kilometer/square kilometer
LAB	L-Area Ash Basin (188-L)
LiDAR	light detection and ranging
LLC	Limited Liability Company
LOAEL	Lowest Observed Adverse Effect Level
LUC	Land Use Controls

LIST OF ACRONYMS AND ABBREVIATIONS (*CONTINUED*)

LUCAP	Land Use Control Assurance Plan
LUCIP	Land Use Control Implementation Plan
m/m^3	meter/cubic meter
MCL	maximum contaminant levels
MDC	maximum detected concentration
MDL	minimum detection levels
mg	milligram
mi/mi^2	mile/square miles
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NOAEL	No Observed Adverse Effect Level
OU	operable unit
pCi	picocurie
PRG	preliminary remediation goal, preliminary remedial goal
PTSM	principal threat source material
Ra-226	radium-226
RAO	remedial action objective
RCOC	refined constituents of concern
RCRA	Resource Conservation and Recovery Act
RfC	reference concentration
RfD	reference dose
RFI/RI	RCRA Facility Investigation/Remedial Investigation
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
RSL	regional screening levels
RSV	refinement screening values
SARA	Superfund Amendments Reauthorization Act
SB/PP	Statement of Basis/Proposed Plan
SCDES[2]	South Carolina Department of Environmental Services
SCHWMR	South Carolina Hazardous Waste Management Regulations
SDU	Saltstone Disposal Units
SEMS	Superfund Enterprise Management System
SRNS	Savannah River Nuclear Solutions, LLC
SRS	Savannah River Site
TAL	target analyte list
TCL	target compound list
Th-232	thorium-232
U-233/234	uranium-233/234
U-235	uranium-235
U-238	uranium-238
UCL	upper confidence limit
U.S.C.	United States Code

[2] SCDES was known as the South Carolina Department of Health and Environmental Control prior to July 1, 2024.

LIST OF ACRONYMS AND ABBREVIATIONS (*CONTINUED/END*)

USDOE	United States Department of Energy
USEPA	United States Environmental Protection Agency
WSRC	Westinghouse Savannah River Company, LLC
yd^3	cubic yards
≥,>	greater than or equal to, greater than
<	less than

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

Unit Name, Location, and Brief Description

A-Area Ash Pile (788-A) and A-Area Coal Pile Runoff Basin (788-3A) (AAP and ACPRB), F-Area Ash Landfill (288-F) (FAL), H-Area Ash Basin (288-H) (HAB), K-Area Ash Basin (188-K) (KAB), and L-Area Ash Basin (188-L) (LAB) Operable Units (OUs)
Superfund Enterprise Management System (SEMS) Identification Number: OU-SEMS 61, 62, 88, 90, & 91
Savannah River Site (SRS)
Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) Identification Number: SC1 890 008 989
Aiken, South Carolina
United States Department of Energy (USDOE)

SRS occupies approximately 800 square kilometers (km^2) (310 square miles [mi^2]) of land adjacent to the Savannah River, principally in Aiken and Barnwell counties of South Carolina (Figure 1). SRS is located approximately 40 km (25 mi) southeast of Augusta, Georgia, and 32 km (20 mi) south of Aiken, South Carolina.

The 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 AAP and ACPRB, FAL, HAB, KAB, and LAB OUs, herein referred to as the remaining coal ash and coal fines OUs, as Resource Conservation and Recovery Act (RCRA) Solid Waste Management Units/CERCLA units requiring further evaluation.

The remaining coal ash and coal fines OUs were evaluated through an investigation process that integrates and combines the RCRA corrective action process with the CERCLA remedial process to determine the actual or potential impact to human health and the environment of releases of hazardous substances to the environment.

II. SITE AND OPERABLE UNIT COMPLIANCE HISTORY

SRS Operational and Compliance History

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

Hazardous waste materials handled at SRS are managed under RCRA, 42 United States Code (U.S.C.) § 6901–6992k, a comprehensive law requiring responsible management of hazardous waste. Certain SRS activities require South Carolina Department of Environmental Services (SCDES) operating or post-closure permits under RCRA. SRS received a RCRA hazardous waste permit from the SCDES, which was most recently renewed on October 27, 2025. Module VIII of the Hazardous and Solid Waste Amendments 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. The inclusion created a need to integrate the established RCRA facility investigation program with CERCLA requirements to provide for a focused environmental program. In accordance with Section 120 of CERCLA 42 U.S.C. § 9620(e)(2), USDOE has negotiated a FFA (FFA 1993) with United States Environmental Protection Agency (USEPA) and SCDES 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 SCDES.

Operable Unit Operational and Compliance History

Early infrastructure development of the SRS between 1951 and 1955 included the use of coal-fired powerhouses to generate steam and electricity. These powerhouses were located in each industrial/administrative area of the SRS. As a result of burning coal in boiler operations, coal ash (coal combustion residuals [CCR]) was generated as an industrial waste. The CCR were either sluiced into a nearby ash basin or hauled to an ash pile. Associated coal pile runoff basins were constructed to receive surface water runoff from coal storage areas. Several SRS ash basins, coal pile runoff basins, and one ash pile have been remediated/certified closed in four SRS areas (A, D, P and R). In general, the remaining coal ash and coal fines OUs are located near or within the perimeter of industrial areas. No current or future development of the remaining coal ash and coal fines OUs is planned.

Groundwater is not part of any of the remaining coal ash and coal fines OUs and will be addressed separately as part of area groundwater OUs or through corrective action under the SRS RCRA Permit.

The AAP and ACPRB OU was investigated via the Remedial Investigation/Feasibility Study (RI/FS) process in 2008 and documented in the combined *RCRA Facility Investigation/Remedial Investigation (RFI/RI) Work Plan and RFI/RI Report with Baseline Risk Assessment and Corrective Measures Study/Feasibility Study for the A-Area Ash Pile (788-A), A-Area Coal Pile Runoff Basin (788-3A), and Stormwater Outfall A-013 (NBN) Operable Unit* (SRNS 2012a). A Revision 1.1 Redline Interim Action Statement of Basis/Proposed Plan (SB/PP) (SRNS 2014) was submitted in March 2014 identifying the preferred remedial action for consolidation of AAP into the ACPRB with a soil cover, land use controls (LUCs), and groundwater monitoring. A preliminary design for excavation of the AAP was prepared as part of the Interim Action SB/PP development in 2014. However, finalization and regulatory approval of the Interim Action SB/PP and preparation of a Record of Decision (ROD) were placed on hold due to the uncertainty associated with the proposed USEPA CCR regulations being applied to this OU as applicable or relevant and

appropriate requirements (ARARs). CERCLA section 121(d)(2) and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) at 40 CFR § 300.430(f)(5)(i)(B) require remedial actions to comply with ARARs unless a waiver is justified.

With the exception of the AAP and ACPRB OU, no previous RCRA/CERCLA regulatory actions have been implemented for the remaining coal ash and coal fines OUs considered for beneficial use.[3]

In 2022, the USDOE proposed a wholistic remedial approach to address the remaining coal ash and coal fines OUs at the SRS that includes future beneficial use of the CCR as defined in 40 Code of Federal Regulation (CFR) 257.53 (USDOE 2022). Beneficial use would allow for the CCR to be used as fill material or a concrete additive rather than waste that requires excavation and disposal or containment by an engineered cover system. The proposed strategy for the remaining coal ash and coal fines OUs was to complete the remedial action in two phases with LUCs implemented in Phase 1 followed by excavation of the CCR for beneficial use in Phase 2. The USEPA and SCDES approved the implementation and administrative strategy for the remaining coal ash and coal fines OUs on August 11, 2022, and September 22, 2022, respectively.

AAP and ACPRB OU

The AAP is located in A Area in the northwest portion of SRS within the Upper Three Runs watershed (Figure 1). The AAP was formed from the stockpiling of ash (bottom ash and fly ash) received from the A-Area coal-fired boiler house (784-A) between 1952 and 1978. The AAP boundary encompasses 0.65 hectares (ha) (1.60 acres [ac]) and is located south of the ACPRB. The total area of ash, including ash outside the boundary, is approximately (~)1.03 ha (2.55 ac) (Figure 2). The volume of ash inside and outside the AAP boundary is estimated to be 53,518 cubic meters (m^3) (70,000 cubic yards [yd^3]). The depth of ash is variable with an average depth of ~5 m (17 feet [ft]). Within the AAP, the topography ranges from ~99 to 101 m (325 to 330 ft) above mean sea level (amsl) . The

[3] The term “Beneficial Use” was formerly referred to as “Beneficial Reuse” in prior documentation.

depth to groundwater is ~ 37 m (~120 ft) below ground surface (bgs). During operation of the AAP, the pile was graded, the top leveled, and the north side (stream side) benched.

Surface water in the vicinity of the AAP drains to the north-northeast via overland flow toward the unnamed tributary of Tims Branch, to Tims Branch, and to Upper Three Runs Creek. Over the years, the banks of the unnamed tributary to Tims Branch were significantly scoured, and erosion threatened the stability of the ash pile until sheet piling and other erosion control measures were installed in the early 2000s. Though the erosion control measures appear to be sufficient, an annual slope stability assessment to monitor this area is performed to ensure that there is no immediate threat of collapse of the ash pile and/or migration into the adjacent tributary. Currently, the AAP is heavily vegetated with mature pines, hardwoods, and a dense undergrowth. The heavily vegetated side slopes help to prevent migration and slope failure.

The ACPRB is located in A Area, just north of the AAP, in the northwest portion of SRS within the Upper Three Runs watershed (Figure 1). The basin is an unlined earthen surface impoundment surrounded by earthen berms. It was constructed in 1978 and operated until closure of the boiler house in 2008. Runoff from the coal storage pile was collected/transported in ditches and underground pipes that discharged to the ACPRB. The area of coal fines in the ACPRB covers ~1.06 ha (2.62 ac) (Figure 3). The approximate total volume of coal fines within the basin is ~7,646 m^3 (10,000 yd^3). The average depth of coal fines within the ACPRB is ~0.7 m (2.4 ft). Elevations across the basin range from 105 to 108 m (344 to 355 ft) amsl. The depth to groundwater in this area is ~37 m (~120 ft) bgs. The ACPRB is inactive and receives water only via precipitation. During times of large rain events standing water may be present within the ACPRB.

The AAP and ACPRB OU was investigated via the RI/FS process in 2008. The collected data was of sufficient quality and quantity to conduct a human health risk assessment (HHRA), ecological risk assessment (ERA), contaminant migration (CM) analysis, and principal threat source material (PTSM) evaluation. Results of the characterization efforts are documented in the 2012 combined document (SRNS 2012a) and were used to support

the Focused Early Action (EA) Corrective Measures Study/Feasibility Study (CMS/FS) (SRNS 2025a). In 2020, sampling along transects was conducted to determine the extent of ash outside the boundary of the AAP.

H-, K-, and L-Area Ash Basin

The HAB OU is located in the Fourmile Branch watershed, downgradient of H-Area (Figure 1). The HAB OU received ash via sluice of wet ash slurry from the H-Area powerhouse. The powerhouse operated from 1950 to 1990. All operating systems in the H-Area powerhouse have been shut down. The area of the HAB OU covers ~5.29 ha (13.06 ac) (Figure 4). Additional ash outside of the basin boundary is estimated to have an area of ~7.45 ha (18.40 ac). The total estimated volume of ash inside and outside of the basin is 198,105 m^3 (259,112 yd^3). Elevations across the HAB OU range from 85 to 90 m (278 to 295 ft) amsl. The depth of ash is variable with an average depth of ~3.6 m (12 ft). The land surface slopes toward Fourmile Branch. The depth to groundwater in this area is ~4.6 m (15 ft) bgs. The HAB OU is currently heavily vegetated with mature pines, hardwoods, and dense undergrowth. Wet ash/soils at the southeastern side of the basin are primarily located/associated with ash deposits outside the basin berm where ash deposits align with the location of a historical Carolina bay that a portion of the HAB OU was partially constructed on top of (Figure 4). The basin was constructed in 1952 which predates any wetland or state regulations.

Although the HAB OU is considered inactive since it no longer receives sluiced ash, the HAB OU is permitted as an “as-built” industrial wastewater facility (Permit #18748-IW). HAB OU is currently receiving rainwater runoff from abatement pumps located behind the H-Area powerhouse (284-H) through an above ground pipeline and is considered an active unit in that regard. The pipeline can be re-routed, as necessary, to support future remedial activities at the HAB OU.

The KAB OU is located southwest of the K-Reactor Complex and is in the Pen Branch watershed (Figure 1). The KAB OU received ash from the K-Area coal-fired powerhouse (184-K) via wet sluice. The powerhouse operated from 1951 to 1990. The area of the basin

is ~4.52 ha (11.16 ac) (Figure 5). Additional ash was discovered beyond the basin, covering ~1.54 ha (3.81 ac). The total volume of ash inside and outside of the basin is ~208,362 m^3 (272,527 yd^3). The depth of ash is variable with an average depth of ~4.5 m (15 ft). Elevations across the KAB OU range from 75 to 80 m (246 to 262 ft) amsl with a gentle slope toward Indian Grave Branch. The KAB OU is not located near surface water conveyances that would facilitate surface water movement. The depth to groundwater in this area is ~16 m (53 ft) bgs. The KAB OU has undergone secondary succession since operations at the basin have ceased. The KAB OU is currently heavily vegetated with mature pines, hardwoods with dense undergrowth. No standing water has been observed during multiple field visits to the basin.

Although considered inactive since it no longer receives sluiced ash, the KAB OU is permitted as an "as-built" industrial wastewater facility (Permit #7293). KAB OU currently receives stormwater discharge that can be re-routed, as necessary, to support future remedial activities at the KAB OU.

The LAB OU is located northeast of the L-Reactor Complex, and a small portion of the LAB OU is within the Steel Creek watershed, with the remainder in the Pen Branch watershed (Figure 1). The LAB OU received ash from the L-Area coal-fired powerhouse (184-L) via wet sluice. The powerhouse operated from 1951 to 1968. The area of the basin is ~7.13 ha (17.61 ac) (Figure 6). Additional ash outside of the basin boundary is estimated to have an area of 0.68 ha (1.67 ac). The volume of fly ash and bottom ash is estimated to be ~246,971 m^3 (323,026 yd^3) including ash deposits inside and outside the basin. The depth of ash is variable with an average depth of ~3.3 m (11 ft). Elevations across the LAB OU range from 75 to 80 m (246 to 262 ft) amsl. In general, the surface water from the LAB OU flow toward Pen Branch. The depth to groundwater in this area is estimated to be about 4.9 to 6.1 m (16 to 20 ft) bgs. It is currently heavily vegetated with mature pines, hardwoods, and a dense undergrowth.

Data for the HAB, KAB, and LAB OUs were obtained from sampling that was conducted according to the *Sampling and Analysis Plan for Pre-Characterization of the A-Area Ash*

Pile (788-0A), F-Area Ash Landfill (288-0F), H-Area Ash Basin (288-0H), L-Area Ash Basin (188-0L), K-Area Ash Basin (188-0K), and D Ash Overflow that was developed in 2020 (SRNS 2020).

F-Area Ash Landfill

The FAL OU is located in the Upper Three Runs watershed between F and H Areas (Figure 1). The FAL OU became operational in 1954 and received ash from the operation of the A-, F-, and H-Area powerhouses. The interior area of the FAL OU is ~2.84 ha (7.01 ac) (Figure 7). There is an estimated 4.64 ha (11.47 ac) of ash observed outside of the FAL OU boundary. The total volume of ash inside and outside of the FAL OU is ~163,201 m^3 (213,459 yd^3). The depth of ash is variable with an average depth of ~9.8 m (32.0 ft). Surface elevations across the FAL OU range from 85 to 95 m (278 to 311 ft) amsl. Surface water in the area drains to the north-northwest toward Upper Three Runs Creek along surface gradients and intermittent stream channels. The FAL OU is surrounded by a relatively congested industrial area and has engineered storm water controls in place. Depth to groundwater is ~ 21 to 24 m (70 to 80 ft) bgs. The FAL OU is surrounded by an earthen dike wall and has an overflow conduit that is located within the sedimentation basin, also inside the earthen dike. The FAL OU has an O&M Plan for regular maintenance and is maintained by mowing to prevent woody plants from becoming established.

The FAL OU is an active Class II Landfill (SCDES Solid Waste Landfill Permit #025800-1601). SCDES clarified in a May 2022 meeting with the Core Team that the 288-F Class II Ash Landfill will remain a permitted operating landfill until beneficial use is initiated (SRNS 2022). Currently, a groundwater monitoring program exists for the FAL OU and will continue to be monitored semi-annually in accordance with its Solid Waste permit. No metals and/or radionuclides related to 288-F landfill have been reported at levels above the permitted thresholds within the groundwater beneath the OU.

For the FAL OU, sampling results were documented in the *Waste Characterization Report for Savannah River Site Ash Outside 288-F Landfill* (SRNS 2012b).

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 U.S.C. § 9613(k)(2)(B) and 9617(a). These requirements include establishment of an Administrative Record File (ARF) that documents the investigation and selection of the remedial alternative for addressing the remaining coal ash and coal fines OUs soils. The Administrative Record File must be established at or near the facility at issue.

The SRS FFA Community Involvement Plan (SRNS 2011) is designed to facilitate public involvement in the decision-making process for permitting, closure, and the selection of remedial alternatives. The plan addresses the requirements of RCRA, CERCLA, and the National Environmental Policy Act, 1969. 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 *Early Action Statement of Basis/Proposed Plan for the Beneficial Use of Select Coal Ash and Coal Fines at the A-Area Ash Pile (788-A), A-Area Coal Pile Runoff Basin (788-3A), F-Area Ash Landfill (288-F), H-Area Ash Basin (288-H), K-Area Ash Basin (188-K), and L-Area Ash Basin (188-L) Operable Units (U)* (SRNS 2025b), a part of the ARF, highlights key aspects of the investigation and identifies the preferred action for addressing the remaining coal ash and coal fines OUs.

The FFA ARF, which contains 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
471 University Parkway
Aiken, South Carolina 29801
(803) 641-3465

Thomas Cooper Library
Government Information and Maps Department
University of South Carolina
1322 Greene Street
Columbia, South Carolina 29208
(803) 777-4841

The FFA ARF is available electronically at the following address:

https://public.srs.gov/missions-and-programs/environmental-stewardship/arf-irf-index/

The RCRA Administrative Record File for SCDES is available for review by the public at the following location:

The South Carolina Department of
Environmental Services
Bureau of Land and Waste
Management
2600 Bull Street
Columbia, South Carolina 29201
(803) 898-2000

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 Augusta Chronicle*, *The People-Sentinel*, and *The State* newspapers. The public comment period was also announced on local radio stations. A presentation to the SRS Citizens Advisory Board was held on September 22, 2026.

The EA SB/PP 45-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 EA ROD. A Responsiveness Summary will also be available with the final RCRA permit renewal.

IV. SCOPE AND ROLE OF THE OPERABLE UNIT

Due to the complexity and size of multiple waste units in different areas, the SRS is divided into watersheds for the purpose of managing a comprehensive cleanup strategy. The SRS is segregated into six watersheds: Upper Three Runs, Lower Three Runs, Fourmile Branch, Steel Creek, Pen Branch, and the Savannah River. In addition, the SRS also identifies six Integrator Operable Units (IOUs) which are the surface water bodies and associated wetlands that correspond to the six respective watersheds. Waste units within a watershed may be evaluated and remediated individually or grouped with other waste units and

evaluated as part of a larger Area OU. Upon disposition of all the waste units within a watershed, a final comprehensive ROD for the corresponding IOU (i.e., surface water and associated wetlands) will be pursued with additional public involvement. The AAP and ACPRB OU and the FAL OU are located within the Upper Three Runs watershed (Figure 1). The HAB OU is located in the Fourmile branch watershed (Figure 1). The KAB OU is located in the Pen Branch watershed (Figure 1). A small portion of the LAB OU is within the Steel Creek watershed, with the remainder in the Pen Branch watershed (Figure 1).

Remedial decisions have been completed for other ash waste units at the SRS prior to the investigation of the remaining coal ash and coal fines OUs. Concentrations of ash-related constituents have been found to be consistent among similar characterized ash waste units, allowing for a streamlined remedial approach to addressing ash waste units at the SRS.

In 2022, the USDOE proposed a wholistic remedial approach to address several of the remaining coal ash and coal fines OUs at the SRS that includes future excavation and beneficial use of the CCR (Phase 2) following the implementation of LUCs (Phase 1). The USEPA and SCDES approved the implementation and administrative strategy for the remaining coal ash and coal fines OUs on August 11, and September 22, 2022, respectively.

A release of hazardous substances into the environment has occurred at the remaining coal ash and coal fines OUs. The response action selected in this EA ROD is necessary to protect the public health or welfare or the environment from actual or threatened releases of hazardous substances into the environment.

V. OPERABLE UNIT CHARACTERISTICS

This section presents the objective framework for the media assessment, an overview of the characterization activities, and the results of the media assessment for the remaining coal ash and coal fines OUs.

Conceptual Site Model for the Remaining Coal Ash and Coal Fines OUs

The conceptual site model (CSM) is an objective framework for assessing data pertinent to the investigation. The CSM identifies and evaluates suspected sources of contamination, contaminant release mechanisms, potentially affected media (secondary sources of contamination), potential exposure pathways, and potential human and ecological receptors.

Exposure pathways describe the course a chemical or physical agent takes from the source to the exposed receptor. The following five (5) components make up an exposure pathway:

1. Source (facility operations, spill, etc.)
2. Exposure medium (soil, sediment, surface water, etc.)
3. Exposure point (soil surface, sediment surface, etc.)
4. Exposure route (ingestion, dermal contact, inhalation, external radiation, etc.)
5. Receptor (resident, worker, wildlife, etc.)

If any of these elements are missing, the pathway is incomplete and is not considered further in the quantitative risk assessment. A pathway is complete when all five components are present to permit potential exposure of a receptor to a source of contamination. Exposure analysis is conceptually important in terms of identifying all potentially complete exposure routes, understanding the nature and extent (as well as fate and transport) of contamination, and developing preliminary remedial alternatives. In a complete pathway, exposure occurs at exposure points that may represent only a small portion of the entire exposure route. If there is no exposure point, then there is no exposure, and the pathway is considered incomplete.

For the coal ash and coal fines OUs evaluated, all are located in areas that contain environmental media to which a receptor may be exposed, that allows for a complete exposure pathway.

The most likely receptor scenarios include the human receptor scenarios (hypothetical residential and industrial worker). The primary exposure pathways for evaluation relative

to human receptors include exposure to surface ash/soil (0 to 0.3 m [0 to 1 ft]) via incidental ingestion, dermal contact, inhalation of windblown dust, inhalation of volatile constituents, and external exposure from radionuclides.

From an ecological risk perspective, the habitats for the remaining coal ash and coal fines OUs primarily supports terrestrial receptors (i.e., earthworm, American robin, mountain cottontail, gray fox). The media of concern are the surficial ash/soil 0 to 0.3 m (0 to 1 ft).

Figure 8 shows a generic CSM for the remaining coal ash and coal fines OUs that illustrates how the primary exposure routes of concern will be broken/rendered incomplete upon implementation of the selected remedy. The USDOE expects the Selected Remedy to satisfy the statutory requirements in CERCLA Section 121(b) to: 1) be protective of human health and the environment, 2) comply with ARARs, and 3) be cost effective.

Media Assessment

The overall investigative approach that was implemented for the AAP and ACPRB OU is documented in the 2012 combined document (SRNS 2012a). The investigative approach implemented for the FAL OU, HAB OU, KAB OU, and LAB OU is documented in the 2020 Sampling and Analysis Plan (SRNS 2020).

Unit Investigation (Ash/Soil)

Characterization of the AAP and ACPRB OU was conducted primarily in 2009 and is documented in the 2012 combined document (SRNS 2012a). Characterization of the AAP, FAL OU, HAB OU, KAB OU, and LAB OU was conducted in 2020 and documented in the Focused EA CMS/FS (SRNS 2025a).

In 2020, for units with known/suspected appreciable ash outside the unit boundary (AAP, FAL, HAB, KAB, and LAB), transects were established for the purpose of estimating the extent of ash based on visual observation. The transect sampling was conducted by taking step-outs along the transects radiating from the edge of the ash unit boundary where ash was either known to exist or was suspected. The transect sampling was based on ash/soil

borings taken along the transects advanced vertically up to a maximum depth of 30.5 centimeters (12 inches). Additional boring locations followed, as needed, with 3-m (10-ft) step-outs. Longer transects included 30-m (100-ft) step-out intervals. The sampling was described in the 2020 Sampling and Analysis Plan (SRNS 2020).

Depths of ash were estimated from unit records, if available, and current LiDAR data compared to historic topography data. The depth estimates support the volume estimates provided in this EA ROD.

AAP & ACPRB OU

The AAP and ACPRB OU was investigated via the RI/FS process in 2008 (SRNS 2012a).

The investigation characterization of the AAP was conducted in 2009 and included ash and soil samples from five borehole locations. In general, ash samples were collected from 0 to 0.3 m (0 to 1 ft), 0.3 to 1.2 m (1 to 4 ft), and 2.4 to 3.0 m (8 to 10 ft) below ash surface and directly above the ash/soil contact. The soil intervals (native material below the ash) were collected at varying intervals. The total depth of each boring ranged from 10 to 12 m (33 to 40 ft) bgs. In total 21 ash and 18 soil samples were collected from the AAP.

Characterization of the ACPRB was conducted in 2009 and included sampling of sediment/coal fines, soil, surface water, and groundwater. Four locations within the basin were sampled at six depth intervals (0 to 0.3 m [0 to 1ft], 0.3 to 1.2 m [1 to 4ft], 1.8 to 2.4 [6 to 8 ft], 3.0 to 3.7 m [10 to 12 ft], 4.3 to 4.9 m [14 to 16 ft], 5.5 to 6.1 m [18 to 20 ft] bgs) for a total depth of 6.1 m (20 ft) bgs. In addition, soil was collected from one sample location adjacent to the basin at four depth intervals (0 to 0.3 m [0 to 1 ft], 0.3 to 1.2 m [1 to 4 ft], 1.8 to 2.4 [6 to 8 ft], 3.0 to 3.7 m [10 to 12 ft] bgs) to a total depth of 3.7 m (12 ft) bgs. In total, 29 sediment/coal fines/soil samples were collected. Surface water and sediment associated with the ACPRB at one time provided a potential aquatic/semi-aquatic habitat, however that marginal aquatic/semi-aquatic habitat has undergone secondary succession and is now a forested ecosystem with no aquatic/semi-aquatic habitat.

Ash/soil samples from both units were analyzed for pH, alkalinity, target compound list (TCL) constituents, target analyte list (TAL) inorganics, sulfate, phosphate, gross alpha, non-volatile beta, gamma spectroscopy, alpha spectroscopy, radium-226, and radium-228.

HAB, LAB, & KAB OUs

Data for the HAB, KAB, and LAB OUs were obtained from sampling that was conducted according to the 2020 Sampling and Analysis Plan (SRNS 2020).

As part of the ash consolidation strategy development, three ash/soil samples were collected from the HAB, KAB, and LAB OUs in 2020. Samples were collected in each basin from the 0 to 0.3 m (0 to 1 ft) surface interval and analyzed for constituents with the potential to occur in the ash units, (e.g., TAL/TCL, gross alpha, nonvolatile beta, and radionuclides).

As agreed to by the Core Team (USEPA, SCDES, and USDOE) at the November 2, 2023, Scoping Meeting for the Focused EA CMS/FS, the data from the HAB, KAB, and LAB OUs was combined into one dataset for data processing. Table 1 demonstrates that concentrations of arsenic and naturally occurring radionuclides for the HAB, KAB, and LAB OUs are consistent with other ash waste unit risk evaluations that have been previously performed, including OUs that have completed a formal BRA process such as the AAP and ACPRB OU.

FAL OU

For the FAL OU, a total of eight samples were collected and analyzed for Toxic Characteristic Leaching Procedure metals and total metals in 2012 (SRNS 2012b).

Elevated arsenic levels were consistent with other ash containing units. Radionuclide results were not available but are expected to be consistent with naturally occurring radionuclides present at similar ash basins (i.e., HAB, KAB, and LAB OUs). Based on the arsenic results and similarity with the other ash OUs, the Core Team agreed with the use of analogous site data from the HAB, KAB, and LAB OUs combined into one dataset for

use at the FAL OU. Risk levels and conclusions from the HAB, KAB and LAB OU evaluation were therefore applied to the FAL OU.

Media Assessment Results

A comprehensive approach was implemented to address potential impacts to the human health and the environment at the remaining coal ash and coal fines OUs. The characterization data were used to perform a HHRA, ERA, CM analysis, and PTSM evaluation for the remaining coal ash and coal fines OUs (SRNS 2025a). Table 2 summarizes the results of these evaluations and identifies refined constituents of concern (RCOCs) for the OU. RCOCs are constituents of concern (COCs) that were retained following a weight-of-evidence evaluation and require remedial action. This process involves identifying and selecting COCs which have a reasonable likelihood of being released, are consistent with the CSM, and pose an adverse hazard or risk to human health or the environment. These constituents are subsequently designated as RCOCs.

All remaining coal ash and coal fines OUs present a problem warranting remedial action. The results by OU are summarized below.

AAP & ACPRB OU

At the AAP, arsenic and naturally occurring radionuclides (potassium-40 [K-40], radium-226 [Ra-226], and uranium-238 [U-238]) present in surface ash/soil interval (0 to 0.3 m [0 to 1 ft]) pose an unacceptable risk to human health (HH).

At the ACPRB, arsenic present in surface ash/soil interval (0 to 0.3 m [0 to 1 ft]) poses an unacceptable risk to HH.

FAL, HAB, KAB, and LAB OUs

At the FAL, HAB, KAB, and LAB OUs, arsenic and naturally occurring radionuclides (K-40, thorium-232 [Th-232], U-238) present in surface ash/soil interval (0 to 0.3 m [0 to 1 ft]) pose an unacceptable risk to HH.

Barium (Ba), uranium-233/234 (U-233/234), uranium-235 (U-235), and U-238 present in the vadose zone of the HAB OU have the potential to migrate to groundwater and exceed drinking water standards within 1,000 years.

Barium present in the vadose zone of the LAB OU has the potential to migrate to groundwater and exceed drinking water standards within 1,000 years.

Site Specific Factors

No site-specific factors requiring special consideration that might affect the remedial action for the remaining coal ash and coal fines OUs are present at the site.

VI. CURRENT AND POTENTIAL FUTURE SITE AND RESOURCE USES

Land Uses

According to the Savannah River Site Future Use Project Report (USDOE 1996), residential uses of SRS land should be prohibited. The *Land Use Control Assurance Plan for the Savannah River Site* (WSRC 1999) designates the remaining coal ash and coal fines OUs as being near or within the perimeter of industrial areas. The future land use is reasonably anticipated to be restricted/industrial with DOE maintaining control of the land.

Groundwater is not part of the any of the remaining coal ash and coal fines OUs and is addressed separately as part of the corresponding groundwater OUs.

VII. SUMMARY OF OPERABLE UNIT RISKS

Baseline Risk Assessment

As a component of the RFI/RI process, BRAs were performed to evaluate risks associated with the remaining coal ash and coal fines OUs. A 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 BRAs include HHRA, ERA, PTSM evaluations, and CM analyses. This section of the EA

ROD summarizes the results of the BRAs for the remaining coal ash and coal fines OUs (SRNS 2012a, SRNS 2025a).

Summary of Human Health Risk Assessment

In general, the remaining coal ash and coal fines OUs are located near or within the perimeter of industrial areas. No current or projected future development of the remaining coal ash and coal fines OUs is planned, nor is the current land use expected to change. Nevertheless, to support the risk management decision-making, both the residential (unrestricted) and industrial land use scenarios were evaluated. A description of each is presented below.

The *future resident* receptor scenario evaluates long-term risks to individuals assumed to have unrestricted use of the area. This scenario considers residents (children and adults) that hypothetically live on the subunits and are exposed chronically, both indoors and outdoors, to subunit contaminants. The standard exposure assumptions used for the AAP and ACPRB OU assessment were 30 years, 350 days per year, and 24 hours per day. The standard exposure assumptions used for the HAB, LAB, KAB, and FAL OUs assessment were 26 years, 350 days per year, and 24 hours per day.

The *future industrial worker* scenario is a standard USEPA exposure scenario which addresses long-term risks to workers who are exposed to subunit contaminants within an industrial setting. The standard exposure assumptions are 25 years, 250 days per year, and 8 hours per day. This receptor is referred to as “composite worker” by USEPA and is analogous to the term “industrial worker” used herein. The future industrial worker scenario considers an adult who hypothetically works on-unit in an outdoor setting for the majority of time.

Exposure routes associated with soil include incidental ingestion, inhalation of particulates and vapors, dermal absorption, and external exposure to radiation. The 0 to 0.3 m (0 to 1 ft) surface interval was evaluated for both the residential and industrial worker scenarios in the HHRA.

USEPA publishes regional screening levels (RSLs) for non-radiological constituents and preliminary remediation goals (PRGs) for radiological constituents that are risk-based concentrations (or activity concentrations) that can be used to evaluate potentially contaminated waste sites. RSLs and PRGs combine current USEPA toxicity values with standard exposure factors that represent reasonable maximum exposure conditions to estimate contaminant concentrations in exposure media that the agency considers protective of humans over a lifetime. The concentrations are based on direct exposure pathways for which generally accepted methods, models, and assumptions have been developed for specific land use conditions.

The *USEPA Regional Screening Levels* website (USEPA 2010a, USEPA 2024a) was the source of RSLs used in the assessments. The generic table used for the AAP and ACPRB OU HHRA located on the USEPA RSL website was published in November 2010 and used all default parameters for both the residential and industrial worker scenarios. The website was accessed in December 2010. The website was accessed in June 2024 for the table used in the HAB, KAB, LAB, and FAL OUs.

The *Preliminary Remediation Goals for Superfund* website (USEPA 2010b, USEPA 2024b) was the source of the PRGs used in this assessment. The website was accessed in October 2010 for the AAP and ACPRB OU and in June 2024 for the HAB, KAB, LAB, and FAL OUs. The PRGs for a residential scenario were obtained by using the website calculator function to derive site-specific PRGs. These site-specific PRG values were calculated by using all default parameters as standard input assumptions with the exception of the fruit and vegetable consumption pathways. The PRGs for an industrial worker scenario were obtained from the generic table which assumed all default parameters.

The first step of the formal HHRA for soil was data screening to identify human health constituents of potential concern (COPCs). The maximum detected soil concentration from the 0 to 0.3 m (0 to 1 ft) sample depth interval for each constituent was compared to a residential RSL or PRG screening value and SRS background concentration, if appropriate (i.e., for naturally occurring constituents only). Constituents that exceeded the soil

screening criteria were identified as COPCs and were carried forward to the quantitative risk evaluation.

The next step in the HHRA for the remaining coal ash and coal fines OUs is to calculate risk or hazard for the resident and industrial worker.

For carcinogens, the risk estimates for constituents are calculated using the following equation:

$$Cancer\ risk\ estimate = \left(\frac{[EPC]}{[RSL\ or\ PRG]}\right) \times 1E\text{-}06$$

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

For noncarcinogens, hazard quotients (or HQs) are calculated individually for each nonradiological constituent using the following equation:

$$Noncancer\ hazard\ quotient\ (HQ) = \frac{[EPC]}{[RSL]}$$

Individual constituent HQs are summed to provide the total hazard index (HI). If the total HI is less than (<) 1, then no COCs are identified. If the total HI is greater than or equal to (≥) 1, then the constituents are segregated based on relevant target organ or system toxicity, and the grouped constituent HQs are summed. Constituents are identified as COCs if the constituent organ/system HQ is > 0.1 and the total organ HI is > 1.

A recommendation of whether a HH COC should be carried forward for further remedial evaluation was based on a thorough analysis of each constituent in an uncertainty discussion. This process involves identifying and selecting COCs which have a reasonable likelihood of being released, are consistent with the CSM, and pose an adverse hazard or risk to human health or the environment. COCs that were not eliminated in the refinement process based on a weight-of-evidence evaluation were identified as HH RCOCs.

HH RCOCs were identified for the remaining coal ash and coal fines OUs (surface ash/soil). Table 3 lists the RCOCs and their EPCs for each subunit. Table 4 provides a summary of the cancer toxicity data, and Table 5 provides a summary of the noncancer toxicity data. Tables 6, 7, and 8 provide the cancer and noncancer calculated risk levels for the future resident and industrial worker.

Results from the AAP assessment identified one metal (arsenic) and three radionuclides (K-40, Ra-226, and U-238) as HH RCOCs in the 0 to 0.3 m (0 to 1 ft) surface ash/soil interval for the future resident and industrial worker scenarios. Ra-226 is a daughter product of the U-238 decay series and will be managed under the cleanup level established for the entire decay series.

- Residential scenario, 0 to 0.3 m (0 to 1 ft) surface ash/soil interval: HH RCOCs include arsenic (risk = 5.4E-05), K-40 (risk = 1.3E-04), Ra-226 (risk = 1.8E-04), and U-238 (risk = 2.8E-06); the total cumulative risk (TCR) is 3.7E-04.
- Industrial worker scenario, 0 to 0.3 m (0 to 1 ft) surface ash/soil interval: HH RCOCs include arsenic (risk = 1.3E-05), K-40 (risk = 7.3E-04), Ra-226 (risk = 1.0E-04), and U-238 (risk = 1.4E-06); the TCR is 1.9E-04.

Results from the ACPRB assessment identified one metal (arsenic) as a HH RCOC in the 0 to 0.3 m (0 to 1 ft) surface ash/soil interval.

- Residential scenario, 0 to 0.3 m (0 to 1 ft) surface ash/soil interval: HH RCOCs include arsenic (risk = 9.4E-05).
- Industrial worker scenario, 0 to 0.3 m (0 to 1 ft) surface ash/soil interval: HH RCOCs include arsenic (risk = 2.3E-05).

Results from the FAL, HAB, KAB, and LAB OUs HHRA identified one metal (arsenic) and three radionuclides (K-40, Th-232, and U-238) as HH RCOCs for the 0 to 0.3 m (0 to 1 ft) surface ash/soil interval as follows:

- Residential scenario, 0 to 0.3 m (0 to 1 ft) surface ash/soil interval: HH RCOCs include arsenic (risk = 5.6E-05, HQ = 1.1), K-40 (risk = 7.8E-05), Th-232 (risk = 3.5E-04), and U-238 (risk = 4.4E-04); the HI is 2.0 and the TCR is 9.8E-04.
- Industrial worker scenario, 0 to 0.3 m (0 to 1 ft) surface ash/soil interval: HH RCOCs include arsenic (risk = 1.3E-05), K-40 (risk = 5.1E-05), Th-232 (risk = 2.2E-04), and U-238 (risk = 2.8E-04); the TCR is 5.7E-04.

Summary of Ecological Risk Assessment

Ecological risk is associated with the potential for harmful effects to ecosystems resulting from exposure to an environmental stressor. A stressor is any physical, chemical, or biological entity that can induce an adverse response. Stressors may adversely affect specific natural resources or entire ecosystems, including plants and animals, as well as the environment with which they interact.

Ecological threshold levels are medium- and receptor-specific values that can be used to evaluate (i.e., screen) soil, sediment, and surface water data from potentially contaminated sites. The thresholds are derived from several sources and are used to evaluate No Observed Adverse Effect Level (NOAEL) and Lowest Observed Adverse Effect Level (LOAEL) for wildlife receptors. The ecological screening values (ESVs) in the initial screening-level effects evaluation are based on NOAEL thresholds. For constituents that exceed ESVs and background screening, refinement screening values (RSVs) are used for the refinement-level risk calculation. The RSVs are based on LOAEL thresholds appropriate for refinement of soil, sediment, and surface water constituents.

The threshold values used for the ESV and RSV assessments were derived from two sources: 1) the USEPA Region 4 Ecological Risk Assessment Supplement Guidance March 2018 Update (USEPA 2018); and 2) the Los Alamos National Laboratory ECORISK Database Tool (LANL 2022).

The ERA consisted of steps designed to provide a scientifically based and defensible assessment of exposure and hazard assessment for ecological receptors that will support a

risk management decision regarding site remediation. The ERA included a screening-level ecological effects evaluation in which constituent concentrations in media were compared to relevant ecological screening levels; constituents that exceeded ESVs or that had no ESV were considered constituents of potential ecological concern (COPECs). COPECs that result from the screening-level evaluation are carried forward to a refinement-level risk (hazard) calculation in which refinement-level HQs are calculated for each COPEC. The refinement-level screening is based on LOAEL thresholds and the 95% UCL on the mean. Analytes that failed the refinement-level screening were considered COPCs. Uncertainties associated with the screening thresholds, background concentrations, nature and extent of contamination, receptor-specific area use factors, age of data, or contaminants that result from the screening and refinement processes were discussed in an uncertainty evaluation. The uncertainty discussion concluded with a determination of whether the constituent should or should not be considered a RCOC.

In general, the remaining coal ash and coal fines OUs are located in upland areas and are represented by mature forested habitats, primarily pine dominated with hardwoods, shrub-scrub species, vines, and various herbaceous species. The habitats primarily support terrestrial receptors with the media of concern being ash/soil.

Surface soils and sediments (0 to 0.3 m [0 to 1 ft]) from the HAB, KAB, LAB, and FAL OUs were evaluated (soil, terrestrial receptors) in the ERA. No RCOCs were identified.

Surface (0 to 0.3 m [0 to 1 ft]) and subsurface (0.3 to 1.2 m [1 to 4 ft]) ash/soils were evaluated for the AAP (SRNS 2012a). No ecological RCOCs were identified. Sediment/coal fines media (0 to 0.3 m [0 to 1 ft]) and surface water were evaluated for the ACPRB. Based on current environmental conditions, which includes little evidence of aquatic habitat due to secondary succession, there are no ecological RCOCs for the ACPRB (SRNS 2025a).

Site-specific ecological/biological studies have been conducted on various ash units at the SRS, primarily associated with ash depositional areas in sensitive environments such as

Carolina bays (i.e., Wetland Area at Dunbarton Bay) or within floodplain habitat (i.e., D-Area Ash Basin Wetlands). These recolonized/recovered areas appear healthy and diverse as compared to similar uncontaminated areas, and it is reasonable to conclude that from an ecological perspective, the remaining coal ash and coal fines OUs offer similar habitat to surrounding areas and have become integrated within the natural landscape over time.

The ecological assessment for the remaining coal ash and coal fines OUs indicates that the data are adequate to conclude that ecological risks are negligible, and additional information is not needed to make a remedial decision recommendation for the protection of ecological receptors. No RCOCs were identified that require a remedial action.

Summary of the Fate and Transport Analysis

A fate and transport analysis was performed to identify CM COCs. A constituent was identified as a CM COC if leachability modeling predicted the constituent will leach to groundwater and exceed maximum contaminant levels (MCL) (or RSLs/PRGs in the absence of a MCL) within 1,000 years.

Vadose zone CM simulations were modeled using VZCOMML© (V.4.0)[4]. Inputs were based on the best available data from previous soil boring activities as well as recent soil core descriptions. Tier I screening was conducted on each OU (and on the AAP and ACPRB subunits separately) modeling the most conservative assumptions including maximum constituent concentrations at the maximum sample depth (i.e., shortest travel time distance in the vadose zone to water table). Tier I constituents predicted to potentially impact groundwater at concentrations exceeding action levels were assessed further, following a less conservative set of assumptions for the Tier II analysis, assessing the impact to groundwater at concentrations exceeding action levels within the evaluation timeframe of 1,000 years. There were no CM RCOCs identified for the AAP, ACPRB, KAB OU or the FAL OU.

[4] Vadose Zone Contaminant Migration Multi-Layered Model (VZCOMML©) Version 4.0, Copyright TXu 1-663-361, 2009, Savannah River Nuclear Services, LLC.

The CM analysis identified CM RCOCs in the vadose zone for the HAB OU (Ba, U-233/234, U-235, U-238) and the LAB OU (Ba), with the potential to migrate to groundwater and exceed groundwater action levels within 1,000 years. Table 9 summarizes the Tier I and Tier II Screening Results. The mean travel times calculated for the HAB OU CM RCOCs were 402 years for Ba and 845 years for the uranium radioisotopes (U-233/234, U-235, U-238). The mean travel time calculated for Ba at the LAB OU was 638 years. CM cleanup levels for identified CM RCOCs were determined using the highest Tier II soil screening level calculated for each OU.

Discussion of Principal Threat Source Material

Source materials are those materials that include or contain hazardous substances, pollutants, or contaminants that act as a reservoir for migration of contamination to groundwater, surface water, or air that acts as a source for direct exposure (USEPA 1991). PTSM are defined as those source materials that have a high toxicity or mobility and cannot be reliably contained or present a significant risk to human health or the environment. No threshold level of toxicity/risk has been established to define “principal threat.” However, treatment or removal alternatives should be considered for source materials when the cumulative risk for the future industrial worker exceeds 1E-03 for carcinogens or a HI of 10 for noncarcinogens. The identification of PTSM based on mobility is evaluated under the CM analysis. In order to determine whether contaminants in soil or sediment at the remaining coal ash and coal fines OUs may be considered PTSM, a quantitative assessment evaluating the toxicity of the source material was performed.

The USEPA default industrial worker was the receptor scenario evaluated under the PTSM evaluation for the remaining coal ash and coal fines OUs. Data used for the HAB, KAB, LAB, and FAL OUs PTSM evaluation included soil results from all depths intervals, as appropriate, from the consolidated 2020 samples.

In the preliminary screen, the maximum detected concentration for every constituent from the soil media from each of the remaining coal ash and coal fines OUs was determined and

used as the EPC. HQs for noncarcinogens and risk estimates for carcinogens were calculated using industrial worker RSLs/PRGs as risk-based threshold levels.

Results of the PTSM evaluation for soil at the AAP indicate that the HI is 1.60E+00 and the cumulative risk is 3.53E-05. Results of the PTSM evaluation for soil at the ACPRB indicate that the HI is 2.00E+00 and the cumulative risk is 1.42E-04. No PTSM RCOCs were identified for the AAP and ACPRB OU. Results of the PTSM evaluation for soil at the FAL, HAB, KAB, and LAB OUs indicate that the HI is 2.83E-01 and the cumulative risk is 8.07E-04. No PTSM RCOCs were identified for the FAL, HAB, KAB and LAB OUs.

In summary, no PTSM RCOCs were identified for the surface ash/soil media at any of the remaining coal ash and coal fines OUs.

Conclusions

In summary, analysis of all data and weight-of-evidence indicates that problems warranting action exist for human health receptors (future resident and industrial worker) from exposure to the surface ash/soil media. Unacceptable risks were identified for human health receptors for the AAP and APRB OU for arsenic and naturally occurring radionuclide (K-40, Ra-226, U-238) contamination in surface ash/soils. Unacceptable risks were identified for human health receptors for the FAL, HAB, KAB, and LAB OUs for arsenic and naturally occurring radionuclide (K-40, Th-232, and U-238) contamination in surface ash/soils. In addition, CM concerns present in the vadose zone of the HAB OU (Ba, U-233/234, U-235, U-238) and LAB OU (Ba) have the potential to migrate to groundwater and exceed groundwater action levels within 1,000 years.

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

VIII. REMEDIAL ACTION OBJECTIVES AND REMEDIAL GOALS

This section discusses the remedial action objectives (RAOs) and cleanup levels for the remaining coal ash and coal fines OUs to protect human health and the environment and mitigate the effects of contamination.

Remedial Action Objectives

RAOs are media- or OU-specific objectives for protecting human health and the environment. RAOs usually specify potential receptors and exposure pathways and are identified during project scoping once the CSM is understood. RAOs describe what the remediation must accomplish and are used as a framework for developing remedial alternatives. The RAOs are based on the nature and extent of contamination, threatened resources, and the potential for human and environmental exposure. The following RAOs are identified for the remaining coal ash and coal fines OUs and are protective of the future resident and industrial worker:

- For all remaining coal ash and coal fines OUs, the RAO is to prevent human exposure to contaminants present in the surface ash/soil that present a risk to the future resident and industrial worker greater than 1E-06 risk threshold or background levels.
- For the HAB OU and LAB OU, the RAO is to protect groundwater resources from migration of contaminants in unit ash/soil that would impact the groundwater above drinking water standards.

Cleanup Levels

PRGs serve to provide a range of cleanup goals for each COC and are typically identified along with the RAOs. Following public comment and approval of the SB/PP, the PRGs for the selected remedy are documented as final cleanup levels in the EA ROD. Cleanup levels were previously referred to as remedial goals in earlier SRS documentation.

Cleanup levels can be qualitative statements or numerical values often expressed as concentrations in soil and groundwater, or actions (installation of engineered barriers, placement of caps and covers, etc.) that achieve the RAO. These cleanup levels are either

concentration levels that correspond to a specific risk or hazard or are based on ARARs. Final cleanup levels will be monitored to determine when the remedial action is complete.

PRGs and final cleanup levels for receptors and media of concern are presented in Table 10. Cleanup levels were calculated for the future industrial and onsite worker, and future resident (unrestricted) receptor, corresponding to a target cancer risk of 1×10^{-6}. The most restrictive PRG or background concentration for each RCOC is selected as the final cleanup level in each medium.

Applicable or Relevant and Appropriate Requirements

Section 121(d) of CERCLA, as amended by the Superfund Amendments Reauthorization Act (SARA), requires that remedial actions for cleanup of hazardous substances must comply with requirements and standards set forth under federal and state environmental laws and regulations that are applicable or relevant and appropriate (i.e., ARARs). ARARs are Federal and more stringent, promulgated State environmental or facility siting requirements in a law or regulation that a selected remedy must attain, which vary from site to site. SARA requires that the remedial action for a site meet all ARARs unless a waiver is invoked.

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

proposed standards that are not legally binding but provide useful approaches or recommendations. Such information is required to-be-considered when cleanup levels are developed.

Key ARARs associated with each alternative are discussed in more detail in the Description of Alternatives section. The complete list of ARARs for the selected remedy are presented in Table 11.

IX. DESCRIPTION OF ALTERNATIVES

This section presents and summarizes the remedial alternatives for the final remedy for the remaining coal ash and coal fines OUs. The Focused EA CMS/FS for the remaining coal ash and coal fines OUs (SRNS 2025a) included the identification and screening of technologies, development and screening of alternatives, and a detailed analysis of remedial alternatives. The range of alternatives includes options that (1) restrict exposure to contaminated media; (2) reduce exposure to contaminated media; and (3) eliminate exposure to contaminated media. Remedial alternatives were developed for each subunit as described below. Three remedial alternatives were evaluated (Alternatives A-1 through A-3) and retained for detailed analysis in the Focused EA CMS/FS (SRNS 2025a) and are described below.

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

Alternative A-1: No Action

The No Action alternative is required by the NCP to serve as a baseline for comparison with other remedial alternatives. Under this alternative, no effort would be made to control access, limit exposure, or reduce toxicity, mobility, or volume of RCOCs at the remaining coal ash and coal fines OUs. This alternative would leave the remaining coal ash and coal fines OUs in their current condition with no additional controls. This alternative does not include five-year remedy reviews.

Summary of Costs

Capital Cost:.....$0
Operation and Maintenance (O&M):.....$0
Total Present-Worth Cost: $0

Alternative A-2: LUCs with Beneficial Use

Alternative A-2 would be implemented in a two-phase approach. Phase 1 would implement LUCs for each of the remaining coal ash and coal fines OUs to limit access to the area and prevent direct exposure to contaminated media. LUCs have been implemented successfully within SRS and are fully employed in all areas of the site to limit access at the site boundary and on-site facilities. Specific LUCs to be used in the remedy at the remaining coal ash and coal fines OUs include warning/no trespassing signs, the SRS Site Use/Site Clearance Program, the RCRA Permit Renewal Application, Volume I, Section F.1, and deed restrictions when the property is transferred outside federal ownership. LUC boundaries are provided in Figures 9 through 13.

Due to the CM concerns at the HAB and LAB OUs, groundwater monitoring wells would be installed/identified at these two OUs and would be monitored every five years to coincide with the five-year remedy reviews. Groundwater beneath the FAL OU would continue to be monitored semi-annually as required under the current Solid Waste Landfill permit until implementation of the final remedy. LUCs with groundwater monitoring for the HAB, LAB, and FAL OUs will remain in place until the coal ash (CCR) is excavated and transported to its beneficial use location (Phase 2).

Phase 2 of the alternative includes excavation of the CCR and its beneficial use. Excavation would be applied to the full volumes of CCR within and outside of the unit boundaries. Following completion of the excavation activities, confirmation sampling will be performed. After sampling indicates cleanup levels have been achieved, the ash units will be restored (i.e., contouring the site after removal of the contaminated media and revegetating).

Proven unencapsulated beneficial use alternatives for CCR include use as fill material. SRS will have a need for large quantities of fill material for the closures of waste storage facilities such as the Saltstone Disposal Units (SDUs) or F-Area and H-Area Tank Farms. CCR can be used as lower fill material as part of the cover systems at these receiving facilities. Specifically at the SDUs, an estimated 3.1 million m^3 (4.0 million yd^3) of backfill material will be needed to be placed beneath the class III cover system. The total volume of ash within the remaining coal ash and coal fines OUs is approximately 840,000 m^3 (1.1 million yd^3). Therefore, all of the ash could potentially be beneficially used as part of the SDU closure. The approximate time frame for use as part of this phase of the alternative is 12 years (i.e. SDU remedial action start is projected for 2038). Another beneficial use alternative includes using the CCR as an additive or replacement for cement in concrete mixes, improving the durability and strength of concrete products. Any action selected during Phase 2 will be compliant with 40 CFR 257.

This alternative would require five-year remedy reviews until the excavation and beneficial use component (Phase 2) of the remedy is completed. Following completion of Phase 2 and clean closure, this alternative would not require LUCs or five-year remedy reviews.

Summary of Costs

Capital Cost: $23,089,898
O&M: $16,518,056
Total Present-Worth Cost: $39,607,954

Alternative A-3: Class III Covers with LUCs

Alternative A-3 would include the use of a cover system and LUCs to prevent direct exposure to contaminated media. A Class III cover system would be constructed over the ash basins as a final action, with the exception of AAP. The ash from AAP would be excavated and hauled to the ACPRB to be placed under a cover system. In preparation for the installation of a Class III cover system, Alternative A-3 would include clearing vegetation and trees, grubbing tree stumps, stockpiling at site perimeter, constructing access roads and, where applicable, draining the basins and drying the ash. Ash located outside of the OUs would be consolidated as appropriate under the cover system.

Containment would be applied to the full area of the unit boundary of FAL OU, ~7.48 ha (18.48 ac). To minimize the cover areas, the ash would be consolidated to one side of each ash basin. Containment would apply to the consolidated areas of ~6.35 ha (15.70 ac) for HAB OU, ~3.04 ha (7.50 ac) for KAB OU, and ~3.88 ha (9.60 ac) for LAB OU. The area where the ash was removed would be evaluated for clean closure.

Specific LUCs to be used in the remedy include warning/no trespassing signs, the SRS Site Use/Site Clearance Program, the RCRA Permit Renewal Application, Volume I, Section F.1, and deed restrictions when the property is transferred outside federal ownership. LUC boundaries are provided in Figures 9 through 13. This alternative would also include installing four groundwater monitoring wells, one upgradient and three downgradient, at all OUs with the exception of the FAL OU. Groundwater beneath the FAL OU would continue to be monitored semi-annually as required under the current Solid Waste Landfill permit. Groundwater monitoring is required at all OUs as part of closure requirements under the CCR regulations for landfills/impoundments and will coincide with the five-year remedy reviews.

This alternative would require five-year remedy reviews and maintenance of the cover.

Summary of Costs

Capital Cost: $48,165,265
O&M: $11,499,505
Total Present-Worth Cost: $59,664,770

X. COMPARATIVE ANALYSIS OF ALTERNATIVES

The NCP (40 CFR § 300.430(e)(9)) requires that potential remedial alternatives undergo detailed analysis using relevant evaluation criteria that will be used to select a final remedy. USEPA has established nine evaluation criteria to address the statutory requirements under CERCLA. The criteria fall into categories of threshold criteria, primary balancing criteria and modifying criteria. The nine CERCLA evaluation criteria are detailed in Table 12.

The potential remedial alternatives have been evaluated against the threshold and primary balancing criteria. Provided below is a summary of the comparison of the alternatives

against the CERCLA evaluation criteria. Key advantages and disadvantages for each alternative relative to one another and in relation to the two threshold criteria and five primary balancing criteria are discussed below and summarized in Table 13.

Overall Protection of Human Health and the Environment

Alternative A-1 would not be protective of human health as no controls or remedial action would be taken to prevent exposure. Alternative A-2 limits human exposure to contaminated ash/soil through the implementation of LUCs in Phase 1. After the ash is excavated for beneficial use (Phase 2), the remaining coal ash and coal fines OUs are expected to be clean closed. The potential for clean closure will be evaluated following excavation activities in Phase 2. The completion of Phase 2 will ensure that unacceptable exposure or leaching of the ash does not occur by breaking the exposure pathway. Alternative A-3 breaks the exposure pathway to contaminated media and limits contaminant migration to groundwater through the use of an engineered cover system in addition to the use of LUCs. Alternatives A-2 and A-3 would not result in any natural resource injury. Protection to ecological receptors is not applicable for Alternatives A-1, A-2, and A-3 since contaminants are not at levels that pose a threat to the environment.

Compliance with ARARs

There are no chemical-specific ARARs for any of the alternatives. Location-specific ARARs associated with the excavation or consolidation of the ash/soil in any wetland area are considered for Alternatives A-2 and A-3. These alternatives achieve the location-specific ARARs by avoiding, minimizing, or mitigating the destruction, loss, or degradation of wetlands. Excavation within any wetland area may require restoration upon completion of the excavation to comply with the applicable ARARs in 10 CFR 1022 and the Clean Water Act Section 404(b)(1) guidelines (Table 11). Action-specific ARARs associated with Alternatives A-2 and A-3 are achieved by employing best management practices to minimize erosion of ash/soil and management of storm water runoff and developing a storm water management plan. Action-specific ARARs such as 40 CFR 257.102(d) and R61-107.19 part V (CCR regulations), as applicable, shall also be achieved

under the implementation of Alternative A-3. In addition, the characterization, disposal, and transportation of ash generated from Alternative A-2 would be handled in accordance with Federal and State regulations 40 CFR 262.11(a)-(d) and SCDES 61-107.5(C)(1). Coal ash and coal pile runoff are excluded as hazardous waste per 40 CFR 261.4(b)(4)(i) and (ii). Installation of monitoring wells will be in accordance with R.61-71H.

Short-Term Effectiveness

Alternative A-1 is not effective in the short-term since exposure is not prevented and therefore, ranked lowest of all the alternatives. Both Alternatives A-2 and A-3 pose minimal risk to the industrial worker during implementation. However, Alternative A-3 was ranked higher due to a shorter time frame to implement.

Long-Term Effectiveness and Permanence

Alternative A-1 is not effective in the long-term since exposure is not prevented and therefore ranked the lowest. Alternative A-2 is ranked slightly higher than A-3. Alternative A-2 relies on LUCs to prevent exposure in the near term, but excavation and beneficial use will eliminate exposure in the long term. Alternative A-3 can be implemented sooner but relies on long-term cover maintenance and LUCs to prevent exposure, as the CCR will remain in place.

Reduction of Toxicity, Mobility, or Volume through Treatment

None of the alternatives employ any treatment to reduce the toxicity, mobility, or volume of the contaminated media. The statutory preference for treatment as a principal element of the remedy is not applicable, as the contaminants present in the CCR have no reasonable way to be treated. As such, all alternatives are given an equally low ranking.

Implementability

No implementation is required of Alternative A-1; therefore, this alternative was ranked highest. Alternative A-2 was ranked slightly lower than Alternative A-1 because Alternative A-2 requires administrative and engineering controls, with phase 2 construction (CCR excavation) activities. Alternative A-3 was ranked the same as

Alternative A-2 because both soils/waste excavation and cover systems have been successfully implemented at SRS.

Cost

The total present-worth cost for each of the alternatives is provided below:

Alternative A-1 No Action: $0
Alternative A-2 LUCs with Beneficial Use: $39,607,954
Alternative A-3 Class III Cover with LUCs: $59,664,770

XI. THE SELECTED REMEDY

Detailed Description of the Selected Remedy

For the remaining coal ash and coal fines OUs, Alternative A-2, Land Use Controls with Beneficial Use is the selected remedy because it is effective in preventing exposure to arsenic and naturally occurring radionuclides present in surface ash/soils that will present an unacceptable risk to the hypothetical future resident and future industrial worker. This alternative would be implemented in a two-phase approach. Phase 1 would implement LUCs for each of the remaining coal ash and coal fines OUs. Phase 2 of the implementation includes excavation of the ash and its beneficial use. Alternative A-2 will achieve the RAOs provided LUCs remain in place until completion of Phase 2.

Description of Phase 1

The following LUC objectives are necessary to ensure protectiveness of Alternative A-2:

- Prevent unauthorized contact, removal, or excavation of contaminated ash/soil within the OUs.
- Prohibit the development and use of property for residential housing, elementary and secondary schools, childcare facilities and playgrounds.
- Maintain the integrity of any current or future groundwater monitoring system.

LUCs are a proven remedy for many other waste units at SRS. The LUC remedy consists of using engineering and administrative controls to prevent/restrict access to the future

resident and industrial worker from the contaminated media within the remaining coal ash and coal fines OUs. LUCs would be applied to the entire area of ash and coal fines within and outside of the unit boundaries. The estimated area for LUCs includes ~1.03 ha (2.55 ac) for AAP, ~1.06 ha (2.62 ac) for ACPRB, ~7.48 ha (18.48 ac) for FAL OU, ~12.73 ha (31.46 ac) for HAB OU, ~6.06 ha (14.97 ac) for KAB OU, and ~7.80 ha (19.28 ac) for LAB OU. LUC boundaries are provided in Figures 9 through 13. Specific LUCs to be used in the remedy at the remaining coal ash and coal fines OUs include warning/no trespassing signs, the SRS Site Use/Site Clearance Program, the RCRA Permit Renewal Application, Volume I, Section F.1, and deed restrictions when the property is transferred outside federal ownership. Periodic (annual) inspections will be required and periodic maintenance (e.g., sign repair) will be performed to ensure that the LUCs remain protective. LUCs will be maintained and five-year remedy reviews will be required until the excavation and beneficial use component (Phase 2) of the remedy is completed and each OU is clean closed.

Due to the CM concerns at the HAB and LAB OUs, groundwater monitoring wells would be installed/identified at these two OUs and would be monitored every five years to coincide with the five-year remedy reviews. Groundwater monitoring would include four groundwater monitoring wells at each OU, one upgradient and three downgradient. Groundwater beneath the FAL OU would continue to be monitored semi-annually as required under the current Solid Waste Landfill permit until implementation of the final remedy. The AAP and ACPRB OU and the KAB OU have no CM risk and would not require a groundwater monitoring component under Alternative A-2. Additionally, the AAP is currently monitored (i.e., inclinometers, LIDAR surveys) annually for slope stability due to its proximity to the unnamed tributary of Tims Branch. This monitoring will continue until the ash is removed. LUCs with groundwater monitoring for HAB, LAB, and FAL OUs will remain in place until excavation and beneficial use (Phase 2) is completed and each OU is clean closed.

As required in the installation-wide Land Use Control Assurance Plan (LUCAP), and in accordance with the approved *Environmental Compliance and Area Completion Projects*

Regulatory Document Handbook (SRNS 2023), an EA Land Use Control Implementation Plan (LUCIP) will be prepared by the USDOE that describes the implementation and maintenance actions for the remedial action, including periodic inspections. If other specific LUCs are found to be effective during preparation of the EA LUCIP, they can, in general, be added to the EA LUCIP without further revision of this EA ROD, unless the objective of the LUCs is found to be different than the LUC objectives stated in The Selected Remedy section. Periodic inspections will be performed to ensure warning signs are in place and no unauthorized encroachment onto the controlled area is occurring. Signs will be replaced and/or repaired as needed, and records for site use/site control permits will be maintained within the SRS infrastructure. The USDOE is responsible for implementing, maintaining, monitoring, reporting upon, and enforcing the LUCs. The EA LUCIP will remain in effect unless and until modifications are approved by the USEPA and SCDES as needed to be protective of human health and the environment.

LUCs selected to meet the RAOs for the remaining coal ash and coal fines OUs are presented in Table 14 and include the following:

- Signage will be located at the remaining coal ash and coal fines OUs LUC boundaries to alert on-site workers to the presence of hazardous substances and to prevent unauthorized entry and unrestricted uses.
- The SRS Site Use/Site Clearance Program, which requires review of any proposed work on-site if on or in proximity to waste units. Other administrative controls to ensure worker safety include work controls, worker training, and worker briefings of health and safety requirements.
- SRS access controls to prevent exposure to trespassers, as described in the current 2023 RCRA Permit Renewal Application, Volume I, Section F.1, which describes the security procedures and equipment, 24-hour surveillance system, artificial or natural barriers, control entry systems, and warning signs in place at the SRS boundary.

In the long term, if the property, or any portion thereof, is ever transferred from DOE, the U.S. Government and/or DOE will take those actions necessary pursuant to Section 120(h)(1) of CERCLA. Those actions will include in any contract, deed, or other transfer

document, notice of the type and quantity of any hazardous substances that were known to have been stored (for more than one year), released, or disposed of on the property. The notice will also include the time at which the storage, release, or disposal took place to the extent such information is available.

In addition, if the property, or any portion thereof, is ever transferred by deed, the U.S. Government will also satisfy the requirements of CERCLA 120(h)(3). The requirements include: a description of the remedial action taken, a covenant, and an access clause. These requirements are also consistent with the intent of the RCRA deed notification requirements at final closure of a RCRA facility if contamination will remain at the OU.

The LUCs will be implemented through the following:

- The contract, deed, or other transfer document shall also include restrictions precluding residential use of the property. However, the need for these restrictions may be reevaluated at the time of transfer in the event that exposure assumptions differ and/or the residual contamination no longer poses an unacceptable risk under residential use. Any reevaluation of the LUCs will be done through an amended EA ROD with USEPA and SCDES review and approval.
- In addition, if the site is ever transferred to nonfederal ownership, a survey plat of the OU will be prepared, certified by a professional land surveyor, and recorded with the appropriate county recording agency.

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

The selected remedy for the remaining coal ash and coal fines OUs leaves hazardous substances in place that pose a potential future risk and will require land use restrictions for as long as necessary (until completion of Phase 2 and clean closure) to keep the selected remedy fully protective of human health and the environment.

As agreed on March 30, 2000, among USDOE, USEPA, and SCDES, SRS is implementing a LUCAP (WSRC 1999) to ensure that the LUCs required by numerous remedial decisions

at SRS are properly maintained and periodically verified. The OU-specific EA LUCIP referenced in this EA 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 EA ROD. The EA LUCIP, developed as part of this action, will be submitted as required in the FFA for review and approval by USEPA and SCDES. Upon final approval, the EA LUCIP will be appended to the LUCAP and is considered incorporated by reference into the EA ROD, establishing LUC implementation and maintenance requirements enforceable under CERCLA and the *SRS Federal Facility Agreement*. The approved EA LUCIP will establish implementation, monitoring, maintenance, reporting, and enforcement requirements for the unit. The EA LUCIP will remain in effect unless and until modifications are approved as needed to be protective of human health and the environment. The LUCs shall be maintained until the concentration of hazardous substances associated with the unit have been reduced to levels that allow for unlimited exposure and unrestricted use. Approval by EPA and SCDES is required for any modification or termination of the OU-specific LUCs.

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

Description of Phase 2

Phase 2 of the implementation involves excavation of the coal ash (CCR) with the goal to achieve unrestricted use levels while providing beneficial use of the CCR. Phase 2 physically removes the contamination via excavation and placement in a storage facility or other beneficial use alternative to eliminate or limit potential human receptor exposure

pathways. This phase includes releasing any standing water from the OUs that have the potential to hold water, clearing and grubbing each of the vegetated areas within the OUs, constructing a stormwater management system, the removal and beneficial use of the CCR, confirmation sampling, and site restoration.

Excavation would be applied to the full volumes of CCR within and outside of the unit boundaries (~53,519 m^3 [70,000 yd^3] for AAP, ~7,646 m^3 [10,000 yd^3] for ACPRB, ~163,201 m^3 [213,459 yd^3] for FAL OU, ~198,105 m^3 [259,112 yd^3] for HAB OU, ~208,362 m^3 [272,527 yd^3] for KAB OU, and ~246,971 m^3 [323,026 yd^3] for LAB OU). Excavation activities would include the use of standard commercial equipment (i.e., excavator, dump truck, bulldozer). To complete the excavation, stormwater will be managed by releasing water through a stormwater best management practice sediment control feature (i.e., check dams, silt fences, etc.) to eliminate sediment migration. Excavation of CCR to allow for unrestricted use is the goal. Following completion of the excavation activities, confirmation sampling will be performed to ensure unrestricted use cleanup levels are achieved, after which the ash units will be restored (i.e., contoured for proper drainage and revegetated as necessary).

Proven unencapsulated beneficial use alternatives for CCR include use as fill material. SRS will have a need for large quantities of fill material for the closures of waste storage facilities such as the SDUs or F-Area and H-Area Tank Farms. CCR can be used as lower fill material as part of the cover systems at these receiving facilities. Regulatory acceptance of unencapsulated uses of fly ash requires demonstration that there will be no unacceptable releases of contaminants to the environment, and the ash has acceptable geotechnical characteristics. Preliminary analysis indicates that the CCR would be acceptable as lower fill material. Additional testing of the proposed fill material (chemical [i.e., SPLT] and geotechnical) will be needed to support design, accommodating CCR use as part of the cover systems. Prior to use as lower backfill any organic material will need to be removed from the ash. This is the most likely/preferred option as the SDU closure will require an estimated 3.1 million m^3 (4.0 million yd^3) of backfill material to be placed beneath the class III cover system. The total volume of ash within the remaining coal ash and coal fines OUs

is approximately 840,000 m^3 (1.1 million yd^3). Therefore, all of the ash could potentially be beneficially used as part of the SDU closure. The approximate time frame for use as part of this phase of the alternative is 12 years (i.e. SDU remedial action start is projected for 2038). Another beneficial use alternative includes using the CCR as an additive or replacement for cement in concrete mixes, improving the durability and strength of concrete products. These beneficial use options will ensure that unacceptable exposure or leaching of the ash does not occur. Any action selected during Phase 2 will be compliant with 40 CFR 257.

This alternative would require five-year remedy reviews unless unrestricted use is achieved during excavation of the contaminated media for beneficial use (Phase 2). Alternative A-2 would achieve the RAO and meet ARARs (Table 11) and is determined to be protective of human health and the environment.

In the event a clean closure is not possible, closure with CCR left in place will be evaluated by the FFA parties and may be documented in an Explanation of Significant Difference (ESD) or amendment to the final EA ROD to include the modified final remedial decision.

Cost Estimate for the Selected Remedy

The estimated costs for Alternative A-2, LUCs with Beneficial Use is $39,607,954. A detailed, activity-based breakdown of the estimated costs associated with implementing and maintaining the selected remedy is presented in Tables 15 through 20 and summarized below:

Item	Total Estimated Cost
Capital Cost:	$23,089,898
O&M:	$16,518,056
Total Present-Worth Cost:	$39,607,954

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 ARF, an ESD to this EA ROD, 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.

Given that the specific use option has not been determined, it is unclear what the costs (if any) would be for transportation of the ash for use. Therefore, SRS has included only the costs for the excavation of the ash from the unit in the remedial alternative cost for LUCs with beneficial use. Any costs associated with transportation of the CCR to the receiving facility or location for beneficial use that would be incurred by Area Completion Projects will be documented in the Post Construction Report/Remedial Action Completion Report following remedy implementation.

Additionally, the most likely/preferred beneficial use option is lower fill material as part of the cover systems for the SDUs. SDU closure will require an estimated 3.1 million m^3 (4.0 million yd^3) of backfill material to be placed beneath the class III cover system. The total volume of ash within the remaining coal ash and coal fines OUs is approximately 840,000 m^3 (1.1 million yd^3). The required fill material (soil) would otherwise have to be sourced and transported to complete SDU closure. The beneficial use of ash in the SDUs represents a cost savings for USDOE that was not included in the cost estimate or comparative analysis of alternatives.

Estimated Outcomes of Selected Remedy

Based on the information currently available, the USDOE, USEPA, and SCDES believe that Alternative A-2, LUCs with Beneficial Use provides the best balance of tradeoffs among the alternatives with respect to the evaluation criteria.

Alternative A-2 addresses the risk to human receptors by limiting access and restricting land disturbance activities, thereby eliminating the potential exposure to arsenic and naturally occurring radionuclides in surface ash/soil until beneficial use can be initiated. Excavation for beneficial use has the highest potential for worker exposure during dewatering, staging, and transportation of excavated ash/soil, however, this alternative

would effectively eliminate risk for the HH receptor and CM scenarios by permanently removing the contaminated media. Alternative A-2 achieves the RAOs and has been determined to be protective of human health and the environment. The land use at remaining coal ash and coal fines OUs will remain industrial/restricted. Following excavation and removal of the CCR in Phase 2, clean closure (i.e., unrestricted land use) will be evaluated for each OU.

For the remaining coal ash and coal fines OUs, periodic (annual) inspections will be required and periodic maintenance (e.g., sign repair) will be performed to ensure that the LUCs remain protective until completion of beneficial use (Phase 2). Five-year remedy reviews will be required for all OUs until the excavation and beneficial use component (Phase 2) of the remedy is completed.

Waste Disposal and Transport

There will be no waste streams generated during Phase 1, LUCs, of the remedial action.

The CCR waste generated as part of Phase 2, excavation and beneficial use, of the selected alternative will be transported to the final beneficial use facility. Dewatering, staging, and removal of excavated sediment/soils/ash at the unit, and any debris encountered, will be managed through a site-specific Waste Management Plan as CERCLA waste. In addition to the ash, the waste anticipated to be generated includes job control waste, personal protective equipment, and miscellaneous items which will be disposed of at an approved waste disposal facility.

XII. STATUTORY DETERMINATIONS

Based on the approved Focused EA CMS/FS (SRNS 2025a), the remaining coal ash and coal fines OUs pose a threat to human health at the remaining coal ash and coal fines OUs. Therefore, Alternative A-2, LUCs with Beneficial Use has been selected as the remedy for the remaining coal ash and coal fines OUs. As part of the selected remedy, during Phase 1 the land use of the remaining coal ash and coal fines OUs will remain industrial until beneficial use. Following excavation and removal of the coal ash and coal fines for

beneficial use in Phase 2, clean closure (i.e., unrestricted land use) will be evaluated for each OU. In the event a clean closure is not possible, closure with CCR left in place will be evaluated by the FFA parties and may be documented in an ESD or amendment to the final EA ROD.

In accordance with Section 121(c) of CERCLA and NCP § 300.430(f)(5)(iii)(c), a statutory review will be conducted within 5 years of initiation of the remedial action, and every five years thereafter until the excavation and beneficial use component (Phase 2) of the remedy is completed, to ensure that the remedy continues to be protective 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, and is cost effective. Treatment is not a principal element of the remedy for the coal ash and coal fines OUs because LUCs with beneficial use provide protection of human health and the environment while providing the best balance of tradeoffs regarding treatment with respect to implementability, long-term effectiveness, and permanence at a reasonable cost.

XIII. EXPLANATION OF SIGNIFICANT CHANGES

"The remedy/remedies selected in this EA ROD do not contain any significant changes from the preferred alternative(s) presented in the EA SB/PP. No comments were received during the public comment period" or "Comments received during the public comment period did not materially alter the selected remedy."

XIV. RESPONSIVENESS SUMMARY

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

XV. POST-ROD DOCUMENT SCHEDULE AND DESCRIPTION

A summary of the key deliverables and submittal dates for the remaining coal ash and coal fines OUs is summarized below.

Submit Revision 0 EA Record of Decision	August 11, 2026
Submit Revision 0 EA Land Use Control Implementation Plan	February 3, 2027
Issuance of the EA Record of Decision	April 24, 2027
Remedial Action Start	February 23, 2028

XVI. REFERENCES

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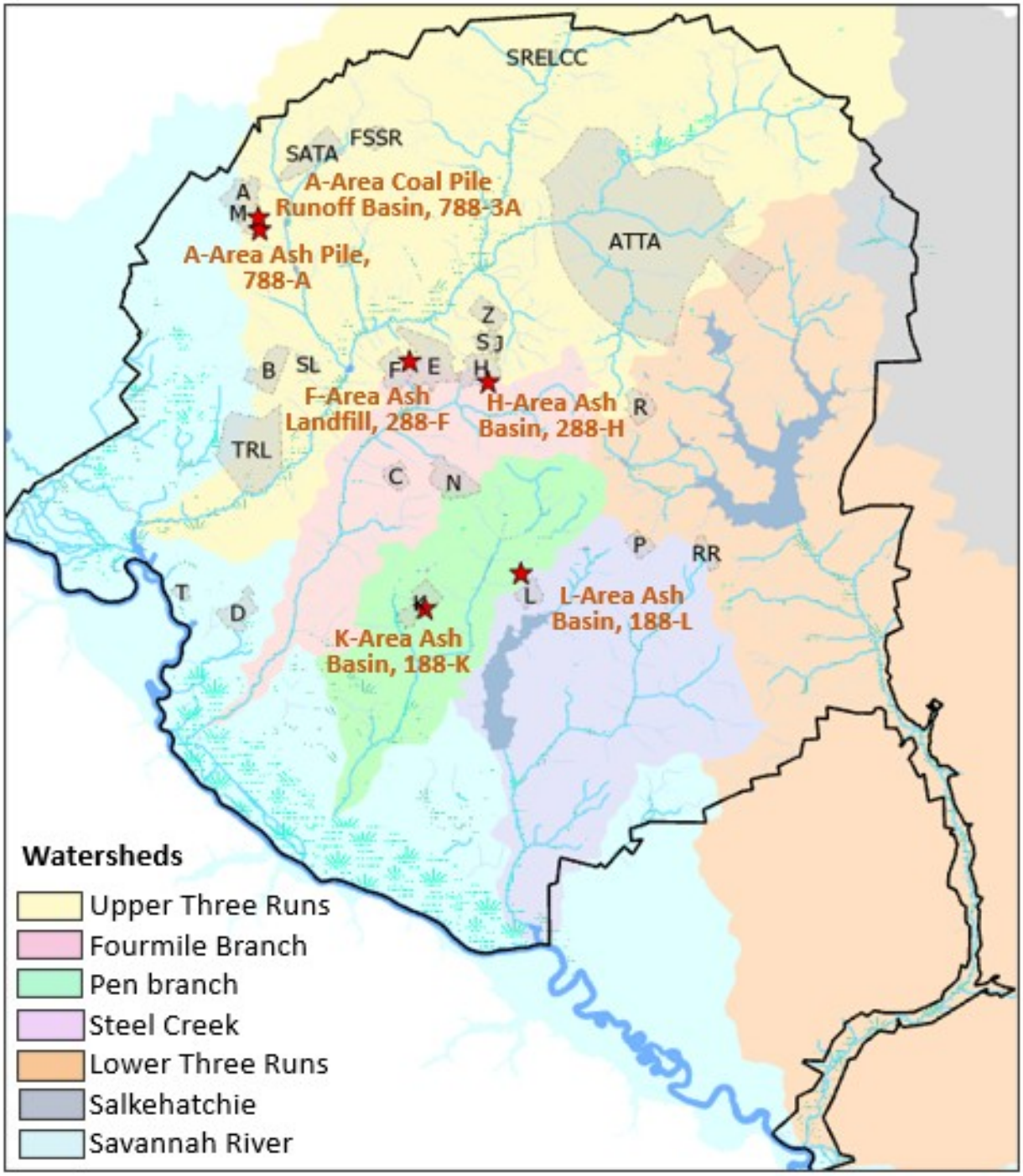


Figure 1. Location of the Savannah River Site

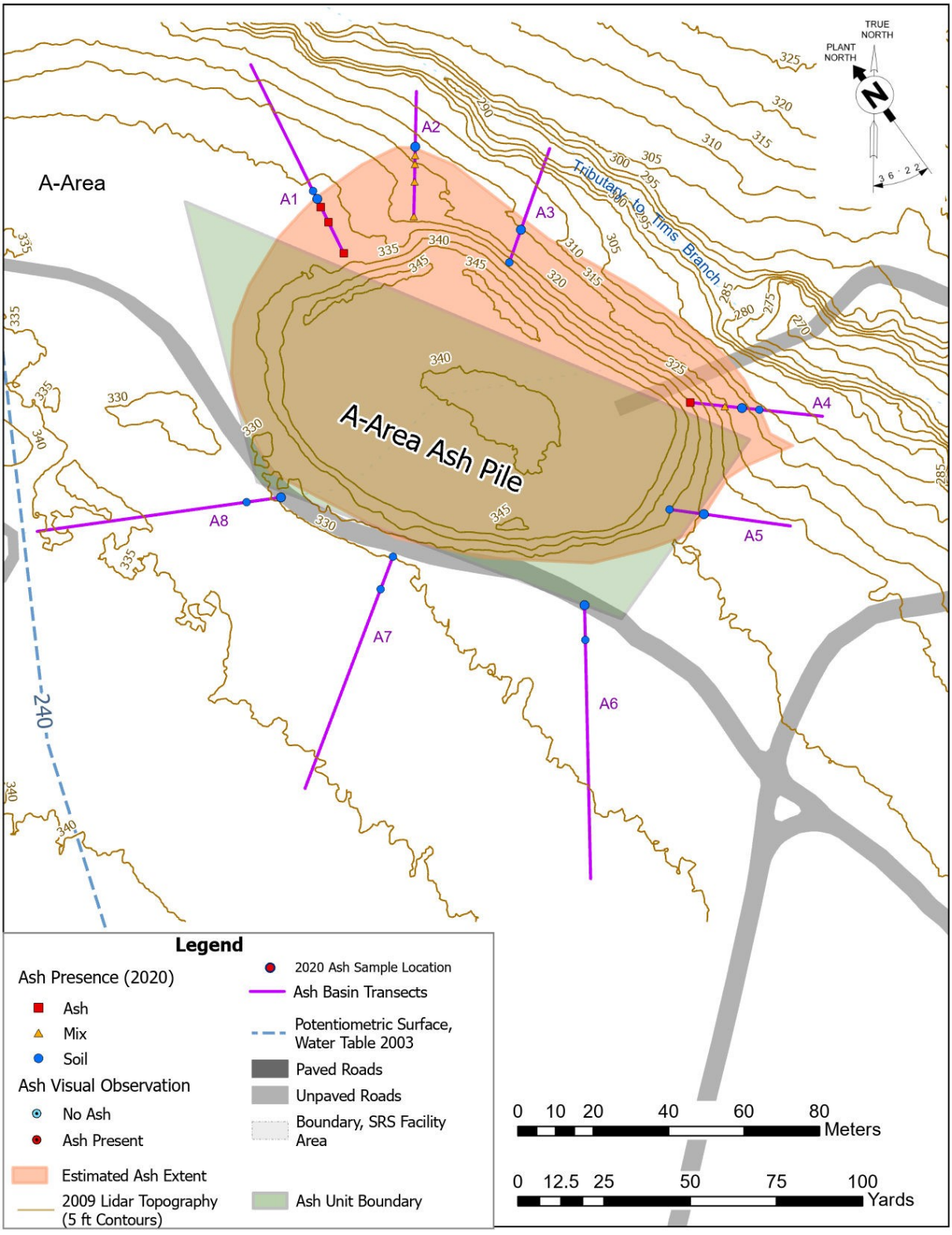


Figure 2. A-Area Ash Pile Topography and Ash Observation Transects

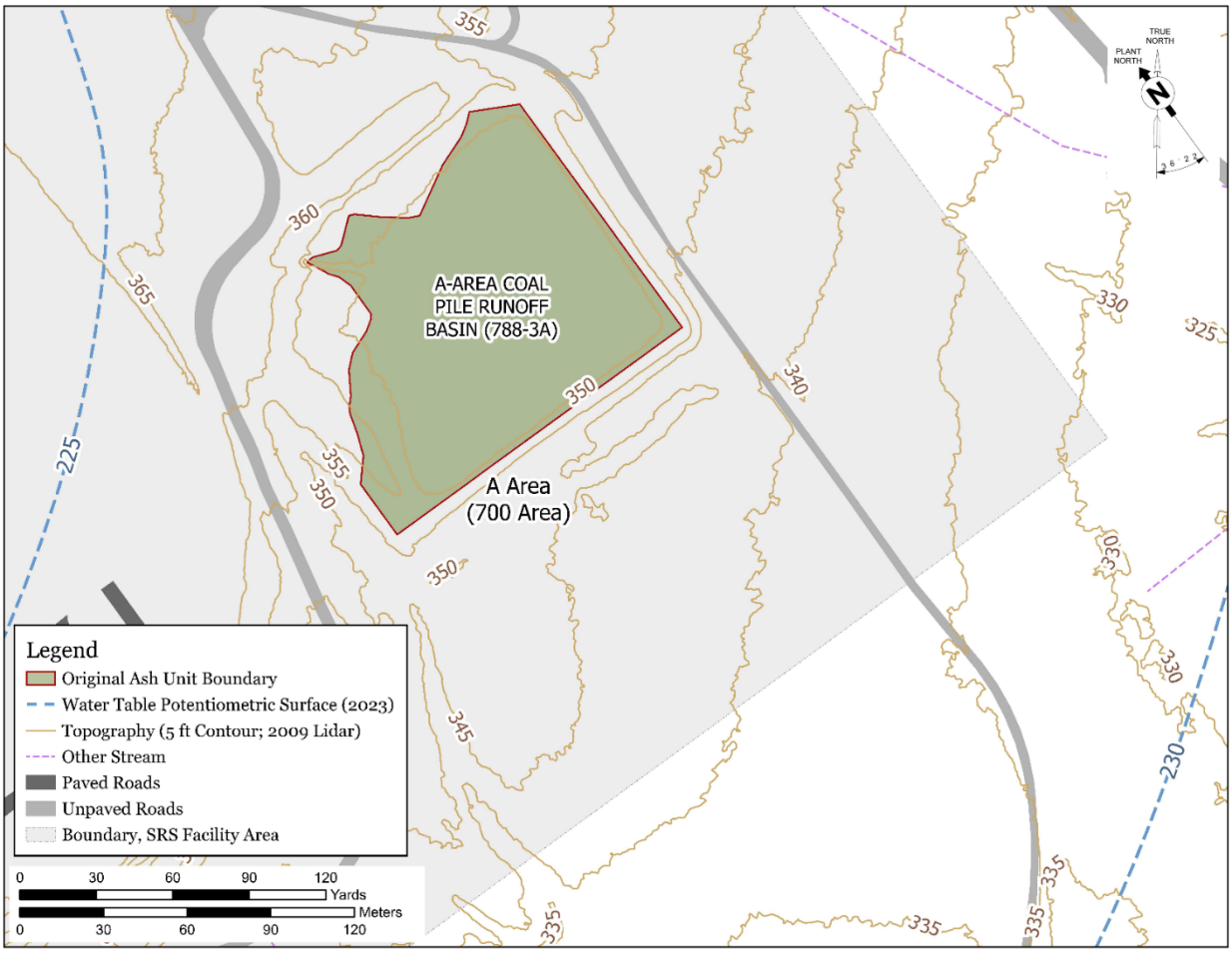


Figure 3. A-Area Coal Pile Runoff Basin Topography

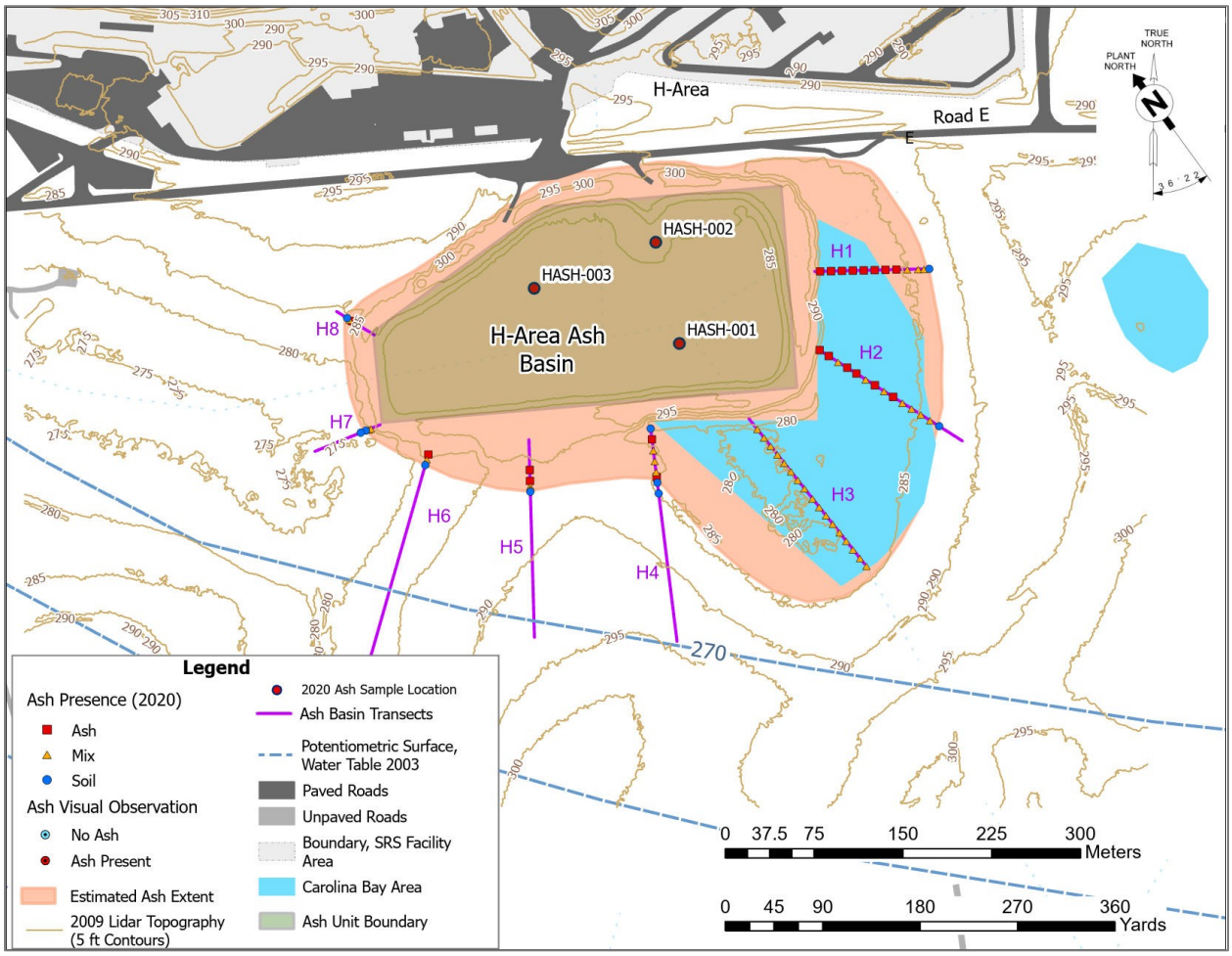


Figure 4. H-Area Ash Basin OU Topography and Ash Observation Transects

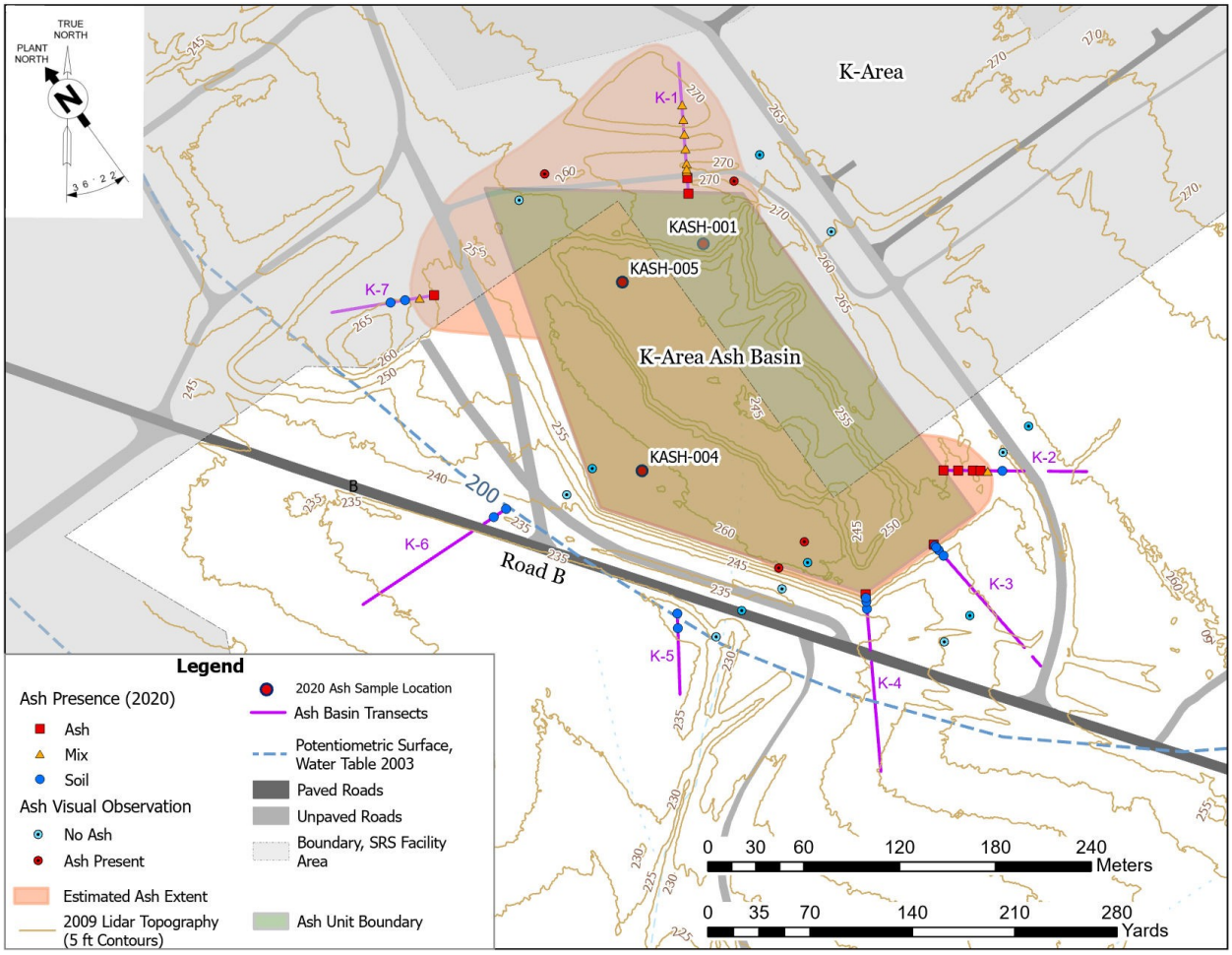


Figure 5. K-Area Ash Basin OU Topography and Ash Observation Transects

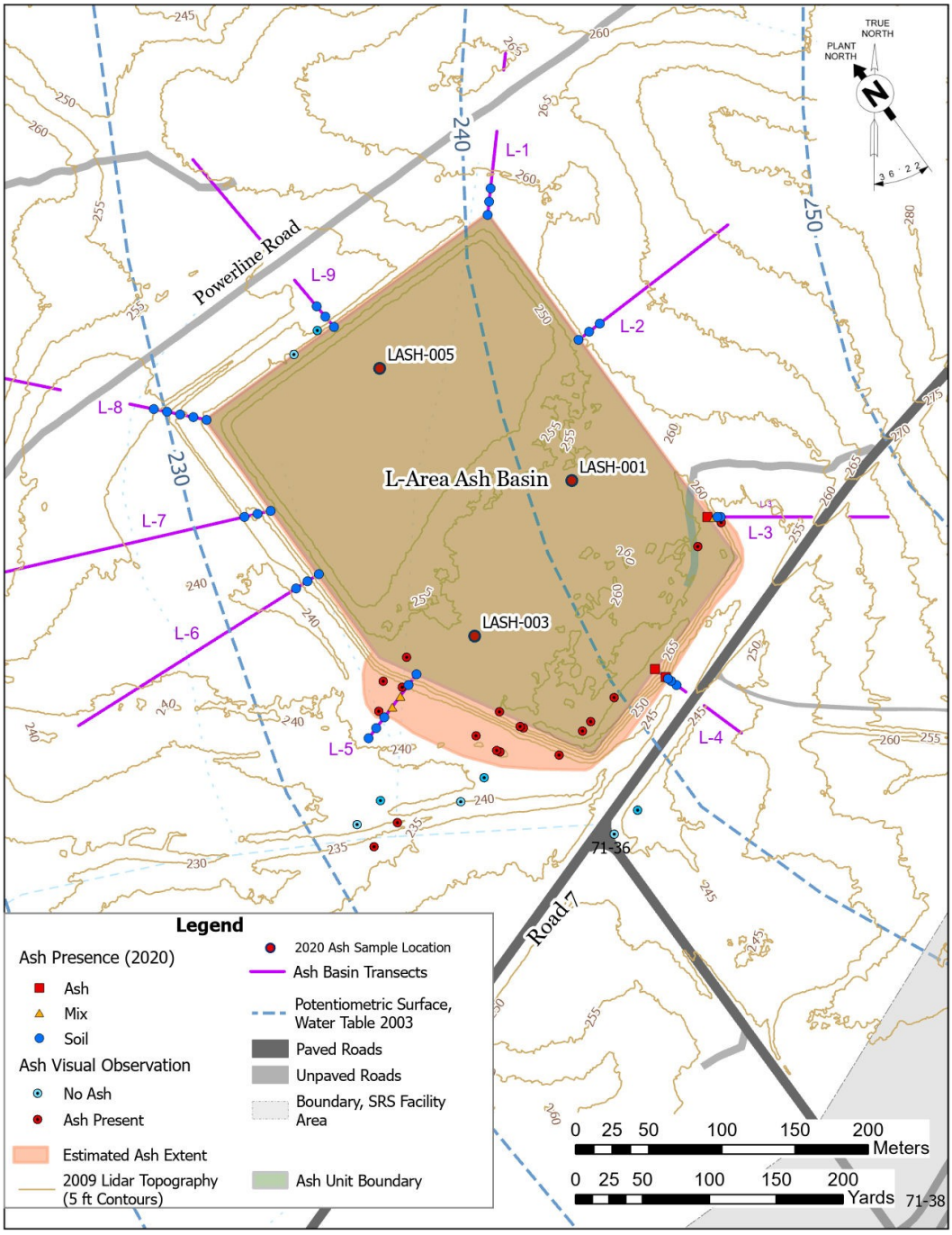


Figure 6. L-Area Ash Basin OU Topography and Ash Observation Transects

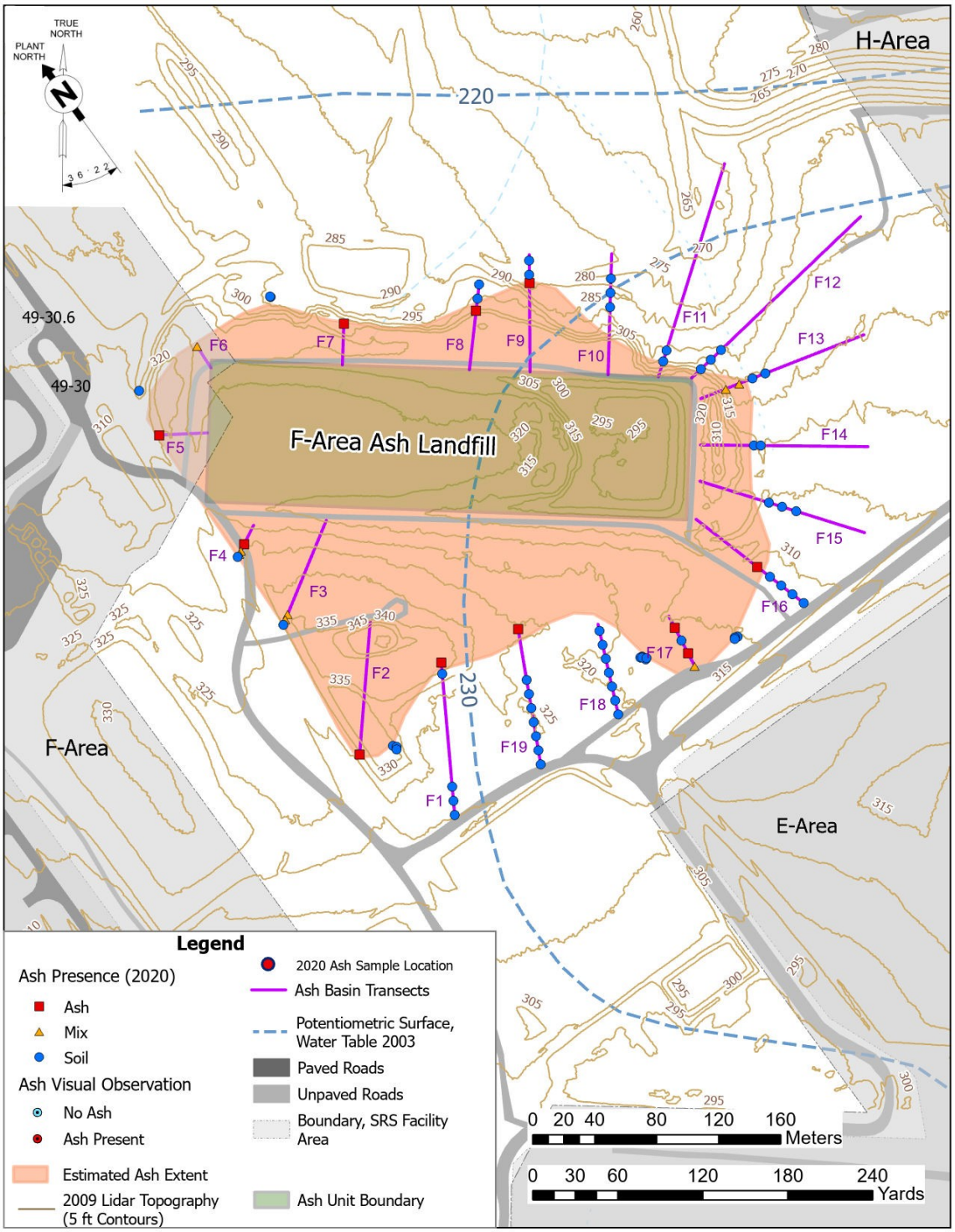


Figure 7. F-Area Ash Landfill OU Topography and Ash Observation Transects

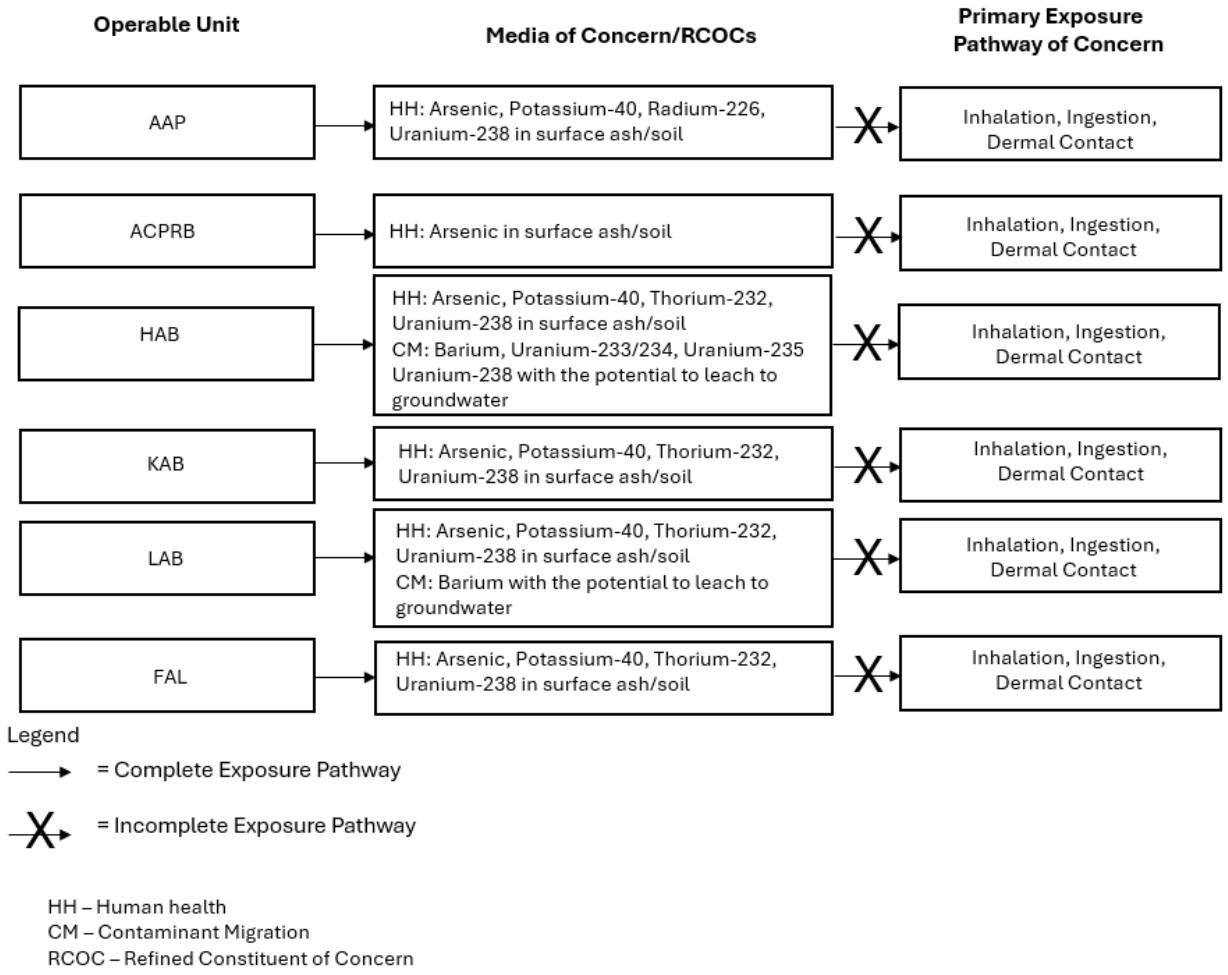


Figure 8. Conceptual Site Model Following Implementation of the Selected Remedy (Alternative A-2, LUCs with Beneficial Use) for the Remaining Coal Ash and Coal Fines OUs

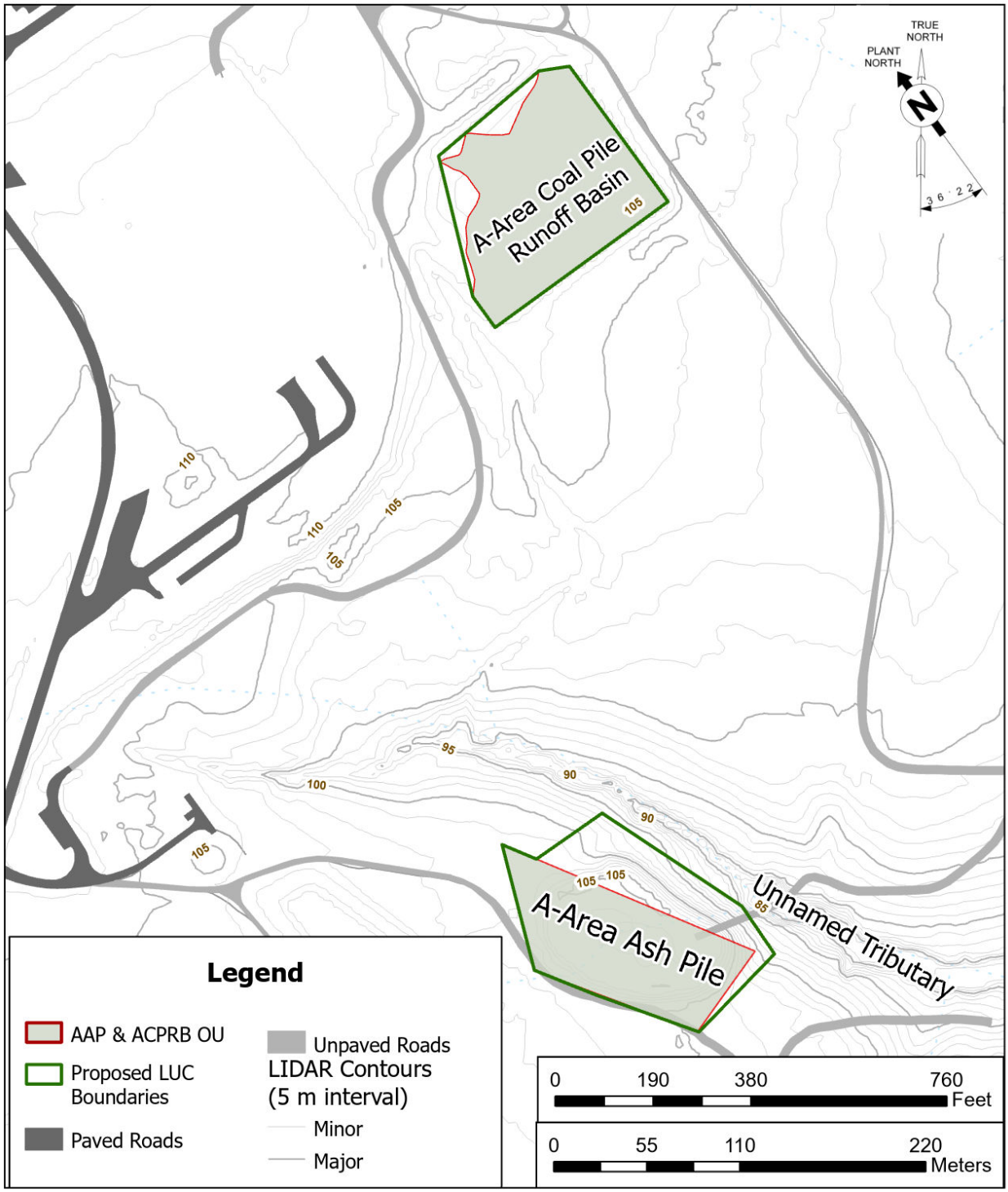


Figure 9. LUC Boundaries for the AAP and ACPRB OU

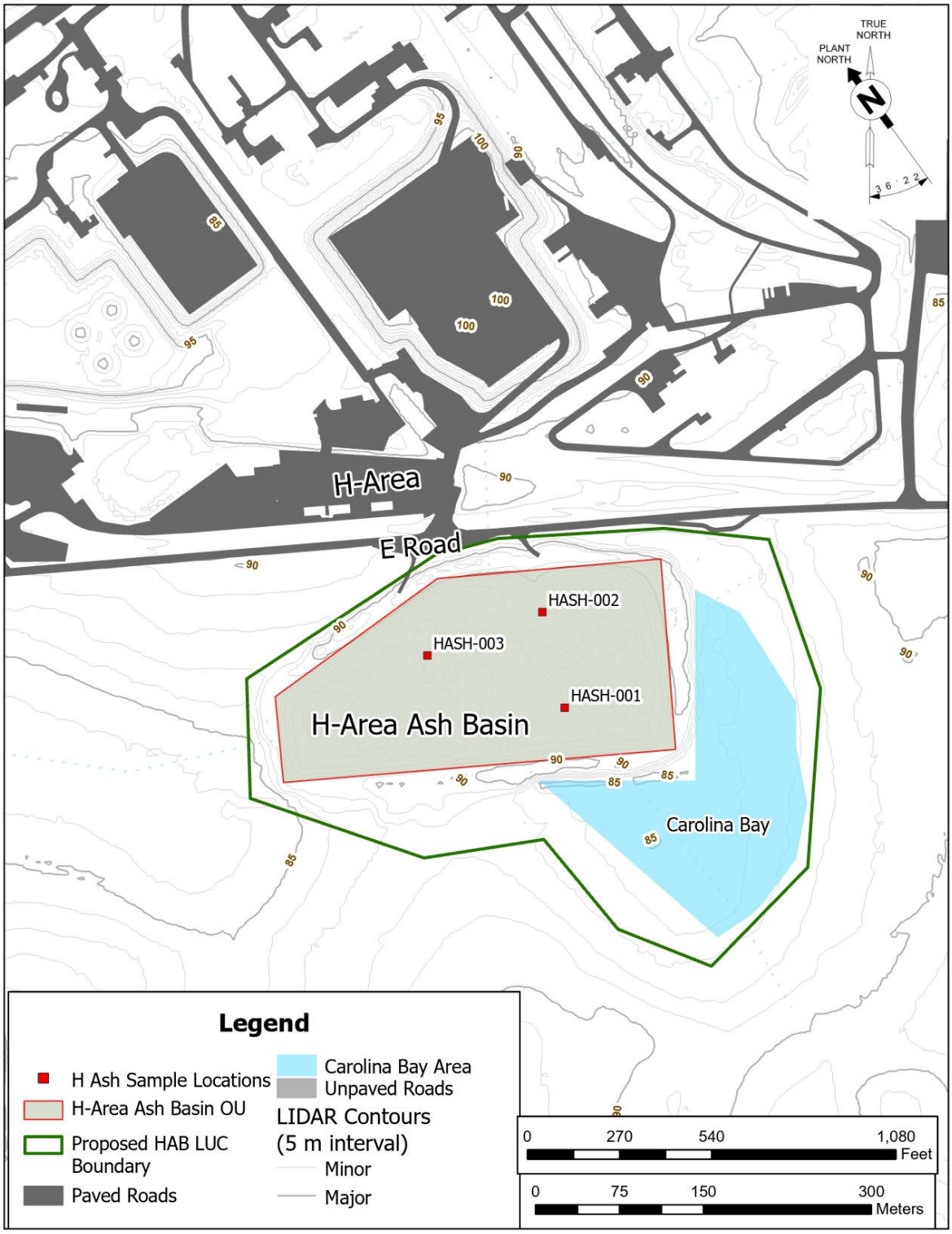


Figure 10. LUC Boundaries for the HAB OU

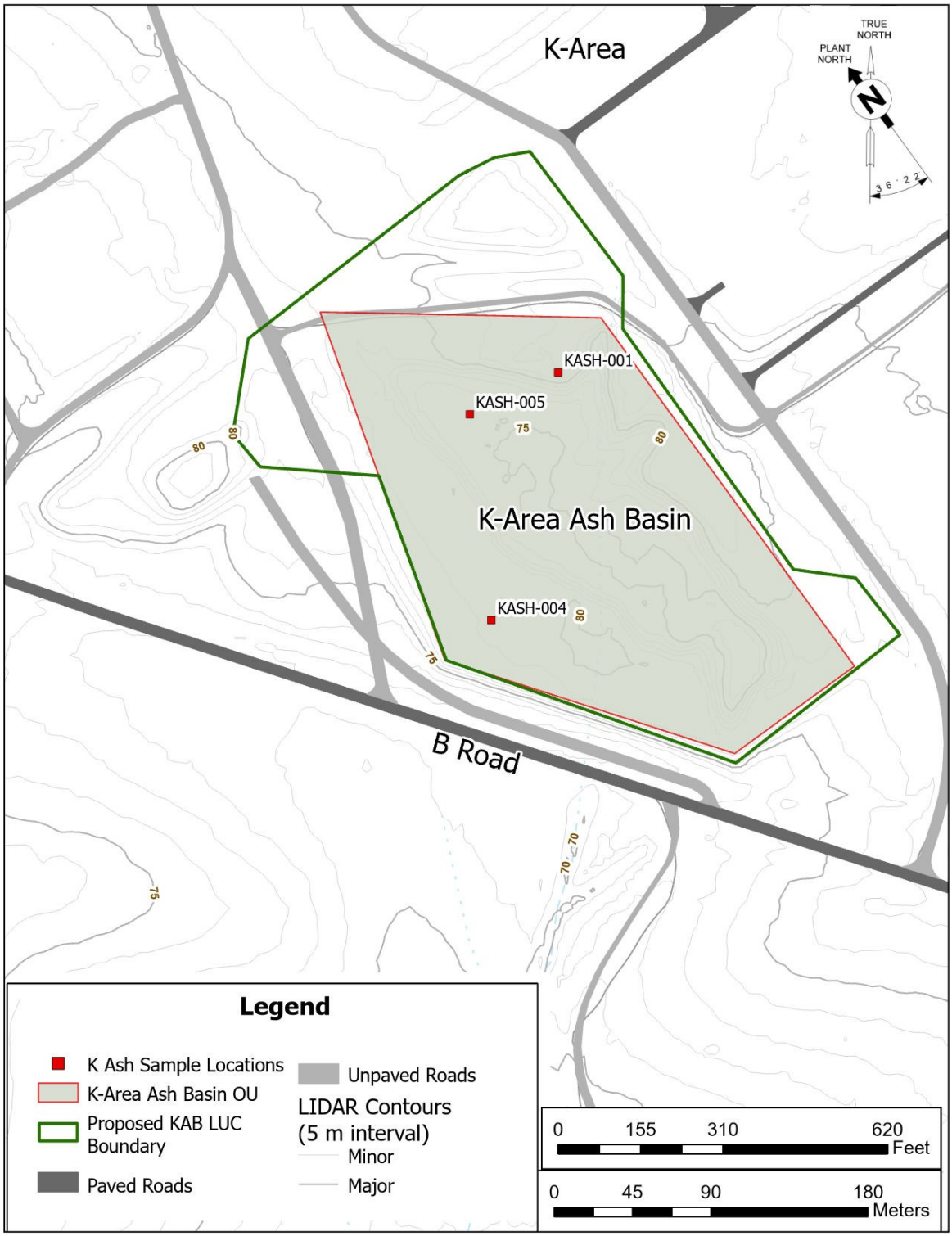


Figure 11. LUC Boundaries for the KAB OU

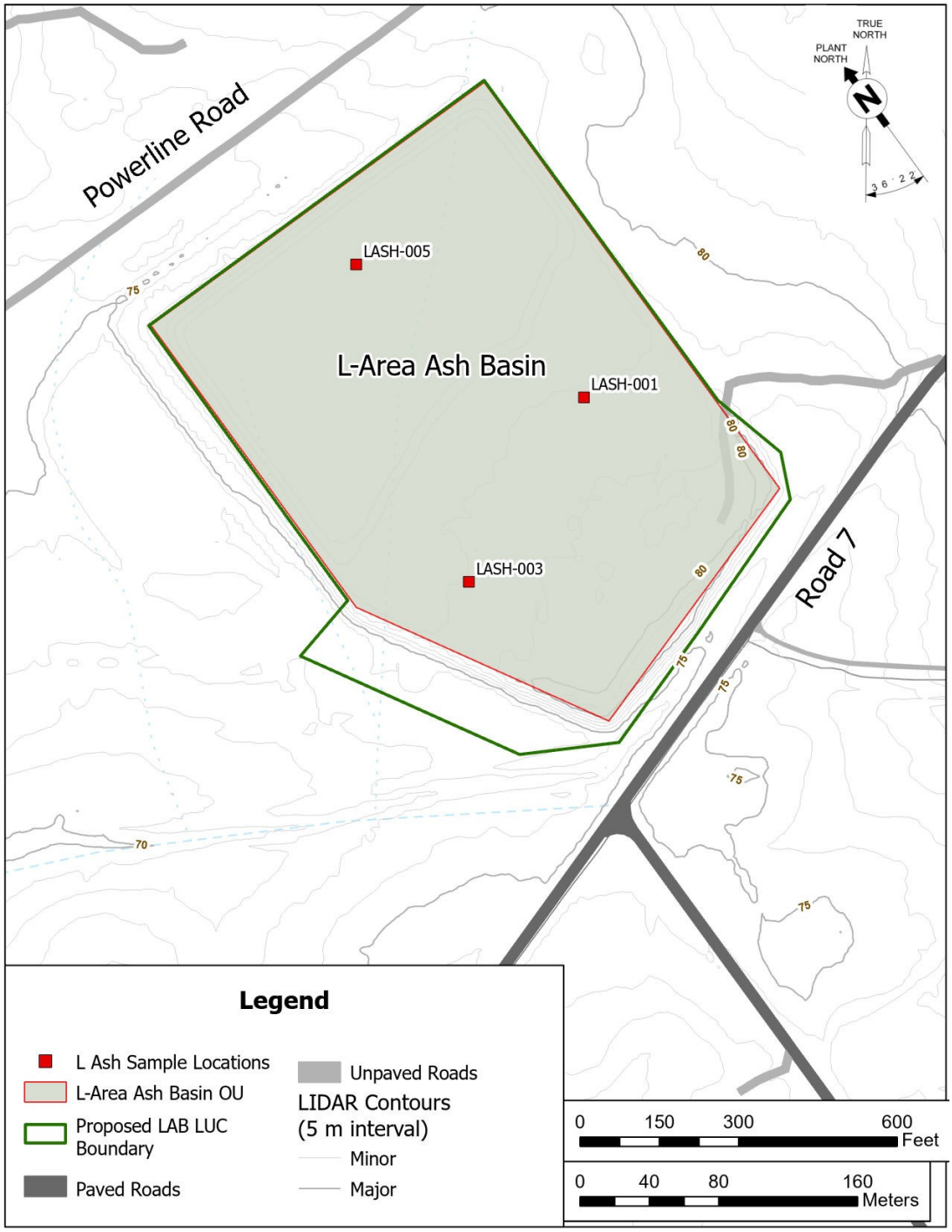


Figure 12. LUC Boundaries for the LAB OU

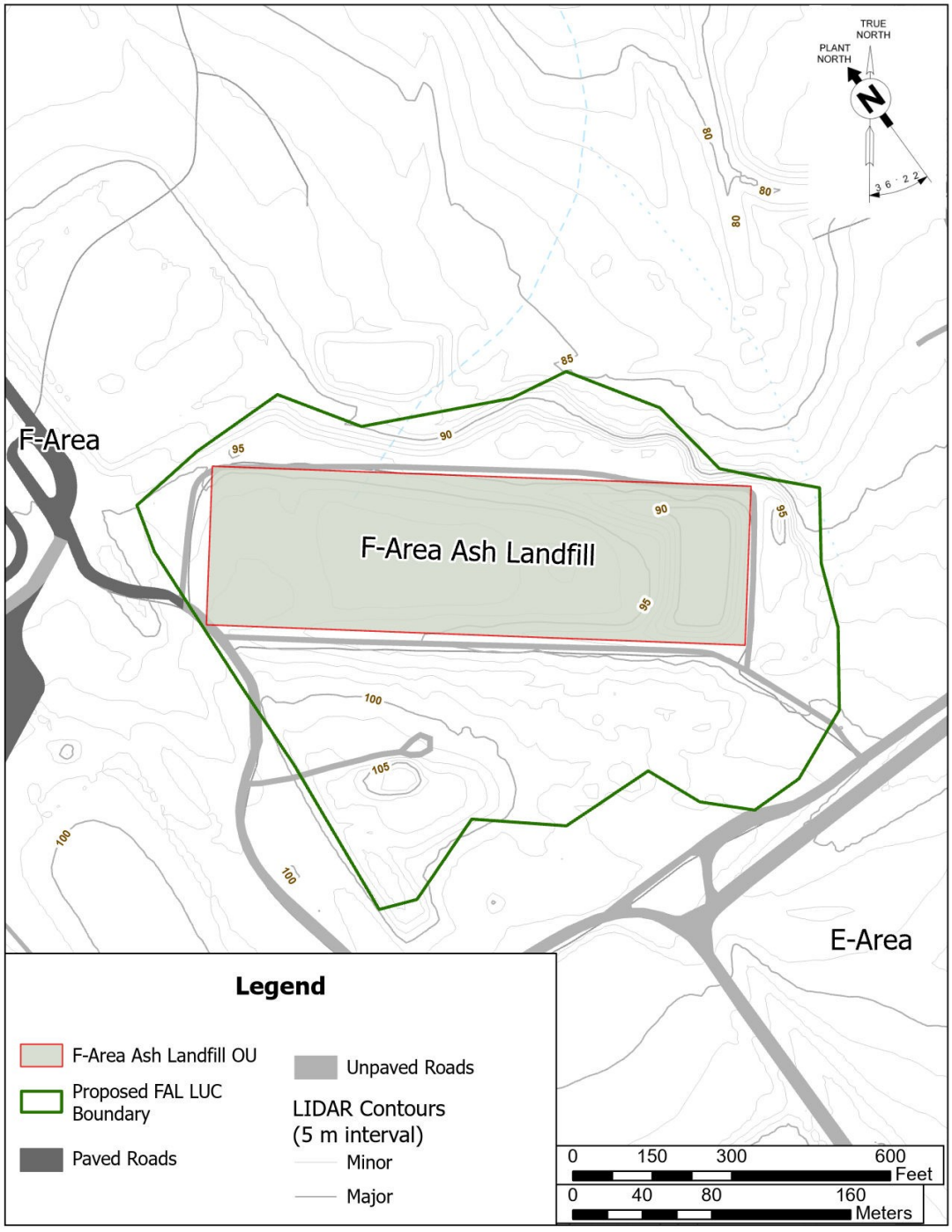


Figure 13. LUC Boundaries for the FAL OU

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Table 1. Waste Unit Comparison of Arsenic Concentrations and Naturally Occurring Radionuclide Activities

HH COC	*Units*	*SRS Bkgd*	*PAB*	*RAB*	*DCPRB*	*WADB*	*AAP*	*ACPRB*	***HAB***	***KAB***	***LAB***	***FAL***
Arsenic	mg/kg	22.9	59.7	28.7	158	33.6	51.6	44.7	**76.5**	**32.3**	**19.1**	**36.3**
Potassium-40	pCi/g	8.53	13.8	16.9	NA	16.4	23.9	NA	**11.3**	**12.5**	**10.8**	**na**
Radium-228 (+D)	pCi/g	6.75	4.07	NA	NA	NA	NA	NA	**4.15**	**2.91**	**2.63**	**na**
Thorium-228 (+D)	pCi/g	4.17	3.94	NA	NA	NA	NA	NA	**4.27**	**3.94**	**3.18**	**na**
Uranium-238 (+D)	pCi/g	1.9	5.29	8.32	NA	2.51	2.68	NA	**3.59**	**3.7**	**5.82**	**na**
Radium-226 (+D)	pCi/g	1.74	5.4	8.08	NA	2.38	3.33	NA	**4.04**	**4.12**	**8.63**	**na**
Uranium-235 (+D)	pCi/g	0.17	NA	0.506	NA	NA	NA	NA	**ND**	**ND**	**0.561**	**na**

RSL/PRG = USEPA Regional Screening Level / Preliminary Remediation Goal set at risk = 1E-06
SRS Bkgd = *Background Soils Statistical Summary Report for Savannah River Site*, Appendix B-2 (max detect, all depths)
PAB = P-Area Ash Basin (188-P)
RAB = R-Area Ash Basin (188-R)
DCPRB = D-Area Coal Pile Runoff Basin (489-D)
WADB = Wetland Area at Dunbarton Bay (NBN)
AAP = A-Area Ash Pile (788-A)
ACPRB = A-Area Coal Pile Runoff Basin (788-3A)
HAB = H-Area Ash Basin (288-H)
KAB = K-Area Ash Basin (188-K
LAB = L-Area Ash Basin (188-L)
FAL = F-Area Ash Landfill (288-F)
na = not analyzed
NA = not applicable
ND = not detected
+D = plus daughter isotopes

Table 2. Summary of the RCOCs for the Remaining Coal Ash and Coal Fines OUs

Subunit	RCOCs					
			HHRA			
	ARAR	CM [1]	Residential	Industrial	ERA	PTSM
AAP	Ash / Soil **None**	Ash / Soil **None**	Ash / Soil *Arsenic =5.4E-05* *Potassium-40 = 1.3E-04* *Radium-226 [2] = 1.8E-04* *Uranium-238 = 2.8-06* **TCR = 3.7E-04**	Ash / Soil *Arsenic = 1.3E-05* *Potassium-40 = 7.3E-04* *Radium-226 [2] =1.0E-04* *Uranium-238 = 1.4E-06* **TCR = 1.9E-04**	Ash / Soil **None**	Ash / Soil **None**
ACPRB	Ash / Soil **None**	Ash / Soil **None**	Ash / Soil *Arsenic = 9.4E-05* **TCR = 9.4E-05**	Ash / Soil *Arsenic =2.3E-05* **TCR = 2.3E-05**	Ash / Soil **None**	Ash / Soil **None**
FAL	Ash / Soil **None**	Ash / Soil **None**	Ash / Soil *Arsenic = 5.6E-05; HQ = 1.1* *Potassium-40 = 7.8E-05* *Thorium-232 = 3.5E-04* *Uranium-238 = 4.4E-04* **HI = 2.0** **TCR = 9.8E-04**	Ash / Soil *Arsenic = 1.3E-05* *Potassium-40 = 5.1E-05* *Thorium-232 = 2.2E-04* *Uranium-238 = 2.8E-04* **TCR = 5.7E-04**	Ash / Soil **None**	Ash / Soil **None**

Table 2. Summary of the RCOCs for the Remaining Coal Ash and Coal Fines OUs *(continued)*

HAB	Ash / Soil **None**	Ash / Soil ***Barium*** *= 5.64E+03 ug/L (402 years)* ***Uranium-233/234*** *= 5.04E+01 pCi/L (845 years)* ***Uranium-235 =*** *4.05E+00 pCi/L (845 years)* ***Uranium-238*** *= 5.01E+01 (845 years)*	Ash / Soil *Arsenic = 5.6E-05; HQ = 1.1* *Potassium-40 = 7.8E-05* *Thorium-232 = 3.5E-04* *Uranium-238 = 4.4E-04* **HI = 2.0** **TCR = 9.8E-04**	Ash / Soil *Arsenic = 1.3E-05* *Potassium-40 = 5.1E-05* *Thorium-232 = 2.2E-04* *Uranium-238 = 2.8E-04* **TCR = 5.7E-04**	Ash / Soil **None**	Ash / Soil **None**
KAB	Ash / Soil **None**	Ash / Soil **None**	Ash / Soil *Arsenic = 5.6E-05; HQ = 1.1* *Potassium-40 = 7.8E-05* *Thorium-232 = 3.5E-04* *Uranium-238 = 4.4E-04* **HI = 2.0** **TCR = 9.8E-04**	Ash / Soil *Arsenic = 1.3E-05* *Potassium-40 = 5.1E-05* *Thorium-232 = 2.2E-04* *Uranium-238 = 2.8E-04* **TCR = 5.7E-04**	Ash / Soil **None**	Ash / Soil **None**

Table 2. Summary of the RCOCs for the Remaining Coal Ash and Coal Fines OUs *(continued/end)*

LAB	Ash / Soil **None**	Ash / Soil *Barium = 4.80E+03 ug/L (638 years)*	Ash / Soil *Arsenic = 5.6E-05; HQ = 1.1* *Potassium-40 = 7.8E-05* *Thorium-232 = 3.5E-04* *Uranium-238 = 4.4E-04* **HI = 2.0** **TCR = 9.8E-04**	Ash / Soil *Arsenic = 1.3E-05* *Potassium-40 = 5.1E-05* *Thorium-232 = 2.2E-04* *Uranium-238 = 2.8E-04* **TCR = 5.7E-04**	Ash / Soil **None**	Ash / Soil **None**

1) Contaminant Migration RCOCs present the predicted groundwater concentration and the mean travel time to groundwater impact.
2) Radium-226 risk will be managed under the cleanup level established for the entire decay series. Radium-226 is a daughter product of the uranium-238 decay series.

AAP = A-Area Ash Pile (788-A)
ACPRB = A-Area Coal Pile Runoff Basin (788-3A)
ARAR = applicable or relevant and appropriate requirement
CM = contaminant migration
ERA = ecological risk assessment
FAL = F-Area Ash Landfill
HAB = H-Area Ash Basin (288-H)
HHRA = human health risk assessment
KAB = K-Area Ash Basin (188-K)
LAB = L-Area Ash Basin (188-L)
PTSM = principal threat source material
RCOCs = refined constituents of concern
TCR = total cumulative risk

Table 3. Summary of Refined Constituents of Concern and Medium-Specific Exposure Point Concentrations

Scenario Timeframe: Current/Future (AAP)
Medium: AAP
Exposure Medium: Soil (0-1 ft)

Exposure Route	Constituent of Concern	Concentration Detected		Units	Frequency of Detection	Exposure Point Concentration	Exposure Point Concentration Units	Statistical Measure
		Min	Max					
Soil Onsite – Direct Contact	Arsenic	9.63	20.9	mg/kg	5/5	20.9	mg/kg	Max
	Potassium-40	9.6	20.3	pCi/g	5/5	19.3	pCi/g	95% UCL
	Radium-226	1.03	2.36	pCi/g	5/5	2.32	pCi/g	95% UCL
	Uranium-238	1.28	2.19	pCi/g	5/5	2.01	pCi/g	95% UCL

Scenario Timeframe: Current/Future
Medium: ACPRB
Exposure Medium: Soil (0-1 ft)

Exposure Route	Constituent of Concern	Concentration Detected		Units	Frequency of Detection	Exposure Point Concentration	Exposure Point Concentration Units	Statistical Measure
		Min	Max					
Soil Onsite – Direct Contact	Arsenic	7.18	44.7	mg/kg	5/5	36.6	mg/kg	95% UCL

Scenario Timeframe: Current/Future
Medium: HAB, KAB, LAB, (FAL)
Exposure Medium: Soil (0-1 ft)

Exposure Route	Constituent of Concern	Concentration Detected		Units	Frequency of Detection	Exposure Point Concentration	Exposure Point Concentration Units	Statistical Measure
		Min	Max					
Soil Onsite – Direct Contact	Arsenic	12.1	76.5	mg/kg	9/9	37.61	mg/kg	95% UCL
	Potassium-40	2.3	12.5	pCi/g	9/9	11.16	pCi/g	95% UCL
	Thorium-232	2.11	8.02	pCi/g	9/9	3.42	pCi/g	95% UCL
	Uranium-238	1.42	5.82	pCi/g	9/9	5.54	pCi/g	95% UCL

Key
Min = minimum detected concentration
Max = maximum detected concentration
ND = non-detect
mg/kg = milligrams per kilogram
pCi/g = picocuries per gram
95% UCL = 95% upper confidence limit of the mean concentration

Table 4. 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 (Mo/Yr)**
Arsenic	1.5E+00[1,2]	---	$(mg/kg\text{-}day)^{-1}$	A	USEPA RSL website	Dec. 2010 June 2024
Potassium-40	6.18E-11 (a)[1] 1.51E-11(b)[1] 5.85E-11 (a)[2] 1.51E-11 (b)[2]	---	risk/pCi	A	USEPA PRG website	Oct. 2010 June 2024
Radium-226	7.30E-10(a)[1] 2.95E-10(b)[1]	---	risk/pCi	A	USEPA PRG website	Oct. 2010
Uranium-238	2.10E-10 (a)[1] 4.66E-11(b)[1] 1.34E-10 (a)[2] 4.66E-11 (b)[2]	---	risk/pCi	A	USEPA PRG website	Oct. 2010 June 2024
Thorium-232	1.84E-10 (a)[2] 8.47E-11 (b)[2]	---	risk/pCi	A	USEPA PRG website	June 2024

Pathway: Inhalation							
Constituent of Concern	**Unit Risk**	**Units**	**Inhalation Cancer Slope Factor**	**Units**	**Weight of Evidence/ Cancer Guideline Description**	**Source**	**Date (Mo/Yr)**
Arsenic	4.3E-03[1,2]	$(ug/m^3)^{-1}$	---	---	A	USEPA RSL website	Dec. 2010 June 2024
Potassium-40	---	---	1.03E-11[1] 2.22E-10[2]	risk/pCi	A	USEPA PRG website	Oct. 2010 June 2024
Radium-226	---	---	1.16E-08[1]	risk/pCi	A	USEPA PRG website	Oct. 2010
Uranium-238	---	---	9.35E-09[1] 2.36E-08[2]	risk/pCi	A	USEPA PRG website	Oct. 2010 June 2024
Thorium-232	---	---	4.33E-08[2]	risk/pCi	A	USEPA PRG website	June 2024

Table 4. Cancer Toxicity Data Summary (*continued/end*)

Pathway: External (Radiation)						
Constituent of Concern	**Cancer Slope or Conversion Factor**	**Exposure Route**	**Units**	**Weight of Evidence/ Cancer Guideline Description**	**Source**	**Date (Mo/Yr)**
Potassium-40	7.98E-07[1] 7.99E-07[2]	External exposure	risk/year per pCi/g	A	USEPA PRG website	Oct. 2010 June 2024
Radium-226	8.49E-06[1]	External exposure	risk/year per pCi/g	A	USEPA PRG website	Oct. 2010
Uranium-238	1.14E-07[1] 1.24E-10[2]	External exposure	risk/year per pCi/g	A	USEPA PRG website	Oct. 2010 June 2024
Thorium-232	3.58E-10[2]	External exposure	risk/year per pCi/g	A	USEPA PRG website	June 2024

1- Data from USEPA, accessed in 2010.
2- Data from USEPA, accessed in 2024.

Key
--- = no information available
A = human carcinogen
mg/kg = milligram per kilogram
ug/m^3 = micrograms per cubic meter
pCi = picocurie
risk/pCi = risk per picocurie
risk/year per pCi/g = risk/year per picocurie per gram

(a) = resident (child + adult) slope factor
(b) = industrial worker (adult) slope factor

USEPA, 2010. *Regional Screening Levels* website, United States Environmental Protection Agency (November) https://www.epa.gov/risk/regional-screening-levels-rsls. Website accessed December 2010.

USEPA, 2010. *Preliminary Remedial Goals for Radionuclides* website, United States Environmental Protection Agency https://epa-prgs.ornl.radionuclides. Website accessed October 2010.

USEPA, 2024. *Preliminary Remedial Goals for Radionuclides* website, United States Environmental Protection Agency https://epa-prgs.ornl.radionuclides. Website accessed June 2024.

USEPA, 2024. *Regional Screening Levels* website, United States Environmental Protection Agency https://www.epa.gov/risk/regional-screening-levels-rsls. Website accessed June 2024.

Table 5. Non-Cancer Toxicity Data Summary

Pathway: Ingestion, Dermal									
Refined 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**
ARSENIC	Chronic	3.00E-04	mg/kg-day	1.00E+00	unitless (GIABS)	Dermal	---	USEPA RSL website	2024
Pathway: Inhalation									
Refined 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**	**Datesof RfC/RfD Target Organ**
ARSENIC	Chronic	1.50E-05	mg/m3	---	---	Dermal	---	USEPA RSL website	2024

Key
---: no information available
RfDs: reference dose
RfC: reference concentration
GIABS = gastrointestinal tract absorption for the calculation of dermal toxicity values (unitless).

USEPA, 2024. *Regional Screening Levels* website, United States Environmental Protection Agency https://www.epa.gov/risk/regional-screening-levels-rsls. Website accessed June 2024.

Table 6. Risk Characterization Summary – Carcinogens (Residential)

Scenario Timeframe: Future **Receptor Population:** Future Resident **Receptor Age:** Adult/Child								
				Carcinogenic Risk				
Medium	**Exposure Medium**	**Exposure Route**	**Refined Constituent of Concern**	**Ingestion**	**Inhalation**	**Dermal**	**External (Radiation)**	**Exposure Routes Total**
AAP	Ash/Soil	Ingestion, Inhalation, Dermal Contact	Arsenic	NC	NC	NC	NA	5.4E-05
	Ash/Soil	Ingestion, Inhalation, External Radiation	Potassium-40	NC	NC	NA	NC	1.3E-04
	Ash/Soil	Ingestion, Inhalation, External Radiation	Radium-226	NC	NC	NA	NC	1.8E-04
	Ash/Soil	Ingestion, Inhalation, External Radiation	Uranium-238	NC	NC	NA	NC	2.8E-06
ACPRB	Ash/Soil	Ingestion, Inhalation, Dermal Contact	Arsenic	NC	NC	NC	NA	9.4E-05
FAL, HAB, KAB, LAB	Ash/Soil	Ingestion, Inhalation, Dermal Contact	Arsenic	NC	NC	NC	NA	5.6E-05
	Ash/Soil	Ingestion, Inhalation, External Radiation	Potassium-40	NC	NC	NA	NC	7.8E-05
	Ash/Soil	Ingestion, Inhalation, External Radiation	Thorium-232	NC	NC	NA	NC	3.5E-04
	Ash/Soil	Ingestion, Inhalation, External Radiation	Uranium-238	NC	NC	NA	NC	4.4E-04

NA = not applicable.

NC = not calculated. Risk was not calculated separately for each exposure pathway. The USEPA regional screening levels (RSLs) for nonradionuclides and preliminary remediation goals (PRGs) for radionuclides that were used to calculate risk are risk-based concentrations that are derived from standardized equations which combine all of the exposure pathways and assumptions with USEPA toxicity data. Use of the RSL/PRG provides an exposure routes total risk estimate for each constituent.

USEPA, 2010. *Regional Screening Levels* website, United States Environmental Protection Agency (November) https://www.epa.gov/risk/regional-screening-levels-rsls. Website accessed December 2010.

USEPA, 2010. *Preliminary Remedial Goals for Radionuclides* website, United States Environmental Protection Agency https://epa-prgs.ornl.radionuclides. Website accessed October 2010.

USEPA, 2024. *Preliminary Remedial Goals for Radionuclides* website, United States Environmental Protection Agency https://epa-prgs.ornl.radionuclides. Website accessed June 2024.

USEPA, 2024. *Regional Screening Levels* website, United States Environmental Protection Agency https://www.epa.gov/risk/regional-screening-levels-rsls. Website accessed June 2024.

Table 7. Risk Characterization Summary – Carcinogens (Industrial)

Scenario Timeframe:	Future							
Receptor Population:	Industrial Worker							
Receptor Age:	Adult							
				Carcinogenic Risk				
Medium	**Exposure Medium**	**Exposure Route**	**Refined Constituent of Concern**	**Ingestion**	**Inhalation**	**Dermal**	**External (Radiation)**	**Exposure Routes Total**
AAP	Ash/Soil	Ingestion, Inhalation, Dermal Contact	Arsenic	NC	NC	NC	NA	1.3E-05
	Ash/Soil	Ingestion, Inhalation, External Radiation	Potassium-40	NC	NC	NA	NC	7.3E-04
	Ash/Soil	Ingestion, Inhalation, External Radiation	Radium-226	NC	NC	NA	NC	1.0E-04
	Ash/Soil	Ingestion, Inhalation, External Radiation	Uranium-238	NC	NC	NA	NC	1.4E-06
ACPRB	Ash/Soil	Ingestion, Inhalation, Dermal Contact	Arsenic	NC	NC	NC	NA	2.3E-05
FAL, HAB, KAB, LAB	Ash/Soil	Ingestion, Inhalation, Dermal Contact	Arsenic	NC	NC	NC	NA	1.3E-05
	Ash/Soil	Ingestion, Inhalation, External Radiation	Potassium-40	NC	NC	NA	NC	5.1E-05
	Ash/Soil	Ingestion, Inhalation, External Radiation	Thorium-232	NC	NC	NA	NC	2.2E-04
	Ash/Soil	Ingestion, Inhalation, External Radiation	Uranium-238	NC	NC	NA	NC	2.8E-04

NA = not applicable.

NC = not calculated. Risk was not calculated separately for each exposure pathway. The USEPA regional screening levels (RSLs) for nonradionuclides and preliminary remediation goals (PRGs) for radionuclides that were used to calculate risk are risk-based concentrations that are derived from standardized equations which combine all of the exposure pathways and assumptions with USEPA toxicity data. Use of the RSL/PRG provides an exposure routes total risk estimate for each constituent.

USEPA, 2010. *Regional Screening Levels* website, United States Environmental Protection Agency (November) https://www.epa.gov/risk/regional-screening-levels-rsls. Website accessed December 2010.

USEPA, 2010. *Preliminary Remedial Goals for Radionuclides* website, United States Environmental Protection Agency https://epa-prgs.ornl.radionuclides. Website accessed October 2010.

USEPA, 2024. *Preliminary Remedial Goals for Radionuclides* website, United States Environmental Protection Agency https://epa-prgs.ornl.radionuclides. Website accessed June 2024.

USEPA, 2024. *Regional Screening Levels* website, United States Environmental Protection Agency https://www.epa.gov/risk/regional-screening-levels-rsls. Website accessed June 2024.

Table 8. Risk Characterization Summary – Non-Carcinogens (Residential)

Scenario Timeframe: Future **Receptor Population:** Resident **Receptor Age:** Child/Adult								
					Non-Carcinogenic Hazard Quotient			
Medium	**Exposure Medium**	**Exposure Route**	**Refined Constituent of Concern**	**Primary Target Organ**	**Ingestion**	**Inhalation**	**Dermal**	**Exposure Routes Total**
HAB, KAB, LAB, FAL OUs	Ash/Soil (0 to 0.3 m [0 to 1 ft])	Soil Onsite-Direct Contact	ARSENIC	Dermal	NC	NC	NC	1.08E+00
Soil Hazard Index Total =								**1.99E+00[1]**

Key

NC = not calculated. Hazards were not calculated separately for each exposure pathway. The USEPA regional screening levels (RSLs) for nonradionuclides that were used to calculate the HQs are risk-based concentrations that are derived from standardized equations which combine all of the exposure pathways and assumptions with USEPA toxicity data. Use of the RSL provides an exposure routes total risk estimate for each constituent.

1 – The total Hazard Index (HI) is calculated based off the summed COPC Hazard Quotients (HQ) (aluminum, arsenic, chromium, cobalt, iron, manganese, and vanadium). Arsenic was the only non-carcinogenic constituent identified as a COC and RCOC.

USEPA, 2024. *Regional Screening Levels* website, United States Environmental Protection Agency https://www.epa.gov/risk/regional-screening-levels-rsls. Website accessed June 2024.

Table 9. Summary Table of Tier I and Tier II Screening Results

OU Subunit	# of Tier I CM COPCs	Tier I CM COPCs	Tier II CM COCs	CM RCOCs
HAB OU	17	Benzo(a)anthracene, Naphthalene, Aluminum, Arsenic, Barium, Beryllium, Cobalt, Iron, Manganese, Nickel, Potassium-40, Radium-226, Thorium-230, Thorium-232, Uranium-233/234, Uranium-235, Uranium-238	Barium, Nickel, Uranium-233/234, Uranium-235, Uranium-238	Barium, Uranium-233/234, Uranium-235 Uranium-238
KAB OU	16	Benzo(a)anthracene, Naphthalene, Arsenic, Barium, Beryllium, Cobalt, Iron, Manganese, Nickel, Potassium-40, Radium-226, Thorium-230, Thorium-232, Uranium-233/234, Uranium-235, Uranium-238	None	None
LAB OU	16	Benzo(a)anthracene, Naphthalene, Arsenic, Barium, Beryllium, Cobalt, Iron, Manganese, Nickel, Potassium-40, Radium-226, Thorium-230, Thorium-232, Uranium-233/234, Uranium-235, Uranium-238	Barium, Nickel	Barium
FAL OU	17	Benzo(a)anthracene, Naphthalene, Aluminum, Arsenic, Barium, Beryllium, Cobalt, Iron, Manganese, Nickel, Potassium-40, Radium-226, Thorium-230, Thorium-232, Uranium-233/234, Uranium-235, Uranium-238	None	None

Table 10. Summary of the Final Cleanup Levels for the Remaining Coal Ash and Coal Fines Operable Units

MEDIA	RCOC[1,11]	UNITS	ARAR [2]	HHRA Future Resident[3] (1.00E-06)	HHRA Industrial Worker[4] (1.00E-06)	PTSM [5]	ERA[6]	CM[7]	Most Restrictive PRG[8]	SRS Background 95th %tile[9]	Final Cleanup Level [10]
AAP (ash)	Arsenic	mg/kg	-	0.68	3.0	-	-	-	0.68	*8.2*	8.2
	Potassium-40	pCi/g	-	0.144	0.219	-	-	-	0.144	*3.3*	3.3
	Uranium-238	pCi/g	-	0.0125	0.020	-	-	-	0.0125	*1.22*	1.22
ACPRB (sediment/ coal fines)	Arsenic	mg/kg	-	0.68	3.0	-	-	-	0.68	*8.3*	8.3
ACPRB (surface water)	None	-	-	-	-	-	-	-	-	-	-
FAL, HAB, KAB, LAB (ash)	Arsenic	mg/kg	-	0.68	3.00	-	-	-	0.68	*8.2*	8.2
	Potassium-40	pCi/g	-	0.144	0.219	-	-	-	0.144	*3.3*	3.3
	Thorium-232	pCi/g	-	0.00985	0.0153	-	-	-	0.001	*1.94*	1.94
	Uranium-238	pCi/g	-	0.0125	0.020	-	-	-	0.125	*1.22*	1.22
HAB	Barium	mg/ kg	-	-	-	-	-	*64.1*	64.1	75.3	64.1
	Uranium-233/234	pCi/g	-	-	-	-	-	0.67	0.67	*1.20*	1.20
	Uranium-235	pCi/g	-	-	-	-	-	0.03	0.03	*0.11*	0.11
	Uranium-238	pCi/g	-	-	-	-	-	0.67	0.67	*1.22*	1.22
LAB	Barium	mg/ kg	-	-	-	-	-	*75.3*	75.3	49.9	75.3

1 - RCOC = refined constituent of concern
2 - ARAR = applicable or relevant and appropriate requirement.
3 - HHRA = human health risk assessment. PRGs calculated for the future resident at a target risk of 1E-06.
4 - HHRA = human health risk assessment. PRGs calculated for the future industrial worker at a target risk of 1E-06.
5 - PTSM = principal threat source material evaluation. No RCOCs identified.
6 - ERA = ecological risk assessment. No RCOCs identified.
7 - CM = contaminant migration analysis.
8 - Most Restrictive PRG = the lesser of the ARAR, HHRA, PTSM, ERA and CM PRGs.
9 - SRS 95th %tile = ninety-fifth percentile from the SRS Background Soils Statistical Summary Report, Appendix B-2 (all depths), dated October 2006.
10 - Final Cleanup Level = the most restrictive risk-based PRG if it is greater than background concentrations. If the most restrictive risk-based PRG is less than SRS background concentrations, then the PRG defaults to the background value. Sources of the PRGs in this column are italicized in the table.
11 - Radium-226 risk will be managed under the cleanup level established for the entire decay series. Radium-226 is a daughter product of the uranium-238 decay series.

Table 11. Potential ARARs for the Preferred Remedial Alternative for the Remaining Coal Ash and Coal Fines OUs

Action	Requirements	Prerequisites	Citation
Action-Specific ARARs			
General Construction Standards — All Land-disturbing Activities (i.e., excavation, clearing, grading, etc.)			
Managing storm water run-off from land-disturbing activities	Must comply with the substantive requirements for stormwater management and sediment control of *NPDES General Permit No. SCR100000.*	Large and small construction activities (as defined in R.61-9) of more than 1 acre of land – **applicable**	SC R.61-9.122.26(c) NPDES General Permit No. SCR100000
	The requirements of R.72-305 and R.72-307 will apply.	For land disturbing activities disturbing more than five (5) acres – **applicable**	SC R.72-305.B.(3)
	The stormwater management and sediment control plan shall contain at a minimum the information provided in the following subsections:	Activities involving more than two (2) acres and less than five (5) acres of actual land disturbance which are not part of a larger common plan of development or sale – **applicable**	SC R.72-307 I. – *South Carolina Storm Water Management and Sediment Reduction Regulations*
	A plan for temporary and permanent vegetative and structural erosion and sediment control measures which specify the erosion and sediment control measures to be used during all phases of the land disturbing activity and a description of their proposed operation.		SC R.72-307 I.(3)(d)
	Provisions for stormwater runoff control during the land disturbing activity and during the life of the facility meeting the following requirements: Post-development peak discharge rates shall not exceed pre-development discharge rates for the 2- and 10-year frequency 24-hour duration storm event. Implementing agencies may utilize a less frequent storm event (e.g. 25-year, 24-hour) to address existing or future stormwater quantity or quality problems. Discharge velocities shall be reduced to provide a non- erosive velocity flow from a structure, channel, or other control measure or the velocity of the 10-year, 24-hour storm runoff in the receiving waterway prior to the land disturbing activity, whichever is greater.		SC R.72-307 I.(3)(e)
Managing fugitive dust emissions from land disturbing activities	Emissions of fugitive particulate matter shall be controlled in such a manner and to the degree that it does not create an undesirable level of air pollution. Volatile organic compounds shall not be used for dust control purposes. Oil treatment is also prohibited.	Activities that will generate fugitive particulate matter (Statewide) – **applicable**	SC R.61-62.6 Section III(a)- *Control of Fugitive Particulate Matter Statewide* SC R.61-62.6 Section III(d)

Table 11. Potential ARARs for the Preferred Remedial Alternative for the Remaining Coal Ash and Coal Fines OUs *(continued)*

Action	Requirements	Prerequisites	Citation
Action-Specific ARARs *(continued)*			
Waste Characterization and Storage — (e.g., wastewaters, excavated ash, coal fines, contaminated soils/sediments, vegetation, debris)			
Characterization of *solid* waste	Determination for each solid waste must be made at the point of waste generation, before any dilution, mixing, or other alteration of the waste occurs, and at any time in the course of its management that it has, or may have, changed its properties as a result of exposure to the environment or other factors that may change the properties of the waste such that the RCRA classification of the waste may change.: Must determine whether the solid waste is excluded from regulation under 40 CFR 261.4.	Generation of solid waste as defined in 40 CFR 261.2 – **applicable**	40 CFR 262.11(a) and (b) SC R.61-79 262.11*(a) and (b)*
	Must determine if waste is listed as hazardous waste under 40 CFR Part 261.	Generation of solid waste which is not excluded under 40 CFR 261.4(a) – **applicable**	40 CFR 262.11(c) SC R.61-79 262.11*(c)*
	Must determine whether the waste is (characteristic waste) identified in subpart C of 40 CFR Part 261 by either: Testing the waste according to the methods set forth in subpart C of 40 CFR part 261, or according to an equivalent method approved by the Administrator under 40 CFR 260.21; or Applying knowledge of the hazard characteristic of the waste in light of the materials or the processes used.	Generation of solid waste which is not excluded under 40 CFR 261.4(a) – **applicable**	40 CFR 262.11(d) SC R.61-79 262.11*(d)*
	Must refer to Parts 261, 262, 264, 265, 266, 268, and 273 of Chapter 40 for possible exclusions or restrictions pertaining to management of the specific waste.	Generation of solid waste which is determined to be *hazardous* waste – **applicable**	40 CFR 262.11(e) SC R.61-79 262.11*(e)*
Determinations for management of *hazardous* waste [1]	Must determine each EPA Hazardous Waste Number (waste code) applicable to the waste in order to determine the applicable treatment standards under 40 CFR 268 *et seq*. *Note:* This determination may be made concurrently with the hazardous waste determination required in Sec. 262.11 of this chapter.	Generation of hazardous waste for storage, treatment or disposal – **applicable**	40 CFR 268.9(a) SC R.61-79 268.9*(a)*
	Must determine the underlying hazardous constituents [as defined in 40 CFR 268.2(i)] in the characteristic waste.	Generation of RCRA characteristic hazardous waste (and is not D001 non- wastewaters treated by CMBST, RORGS, or POLYM of Section 268.42 Table 1) for storage, treatment, or disposal – **applicable**	40 CFR 268.9(a) SC R.61-79 268.9*(a)*

Table 11. Potential ARARs for the Preferred Remedial Alternative for the Remaining Coal Ash and Coal Fines OUs *(continued)*

Action	Requirements	Prerequisites	Citation
Action-Specific ARARs *(continued)*			
Waste Characterization and Storage — (e.g., wastewaters, excavated ash, coal fines, contaminated soils/sediments, vegetation, debris) *(cont'd)*			
	Must determine if the hazardous waste meets the treatment standards in 40 CFR 268.40, 268.45, or 268.49 by testing in accordance with prescribed methods or use of generator knowledge of waste. *Note: This determination can be made concurrently with the hazardous waste determination required in 40 CFR 262.11.*	Generation of hazardous waste for storage, treatment or disposal – **applicable**	40 CFR 268.7(a) SC R.61-79 268.7*(a)* (1)
Temporary Storage of Solid Waste	Shall be conducted in a manner to: Inhibit the harborage of flies, rodents, and other vectors; Prevent conditions for transmission of diseases to man or animals; Prevent blowing debris and particulates so as not to be injurious to human health and the environment; Prevent water pollution and prevent the escape of solid waste or leachate to waters of the State; and Minimize objectionable odors, dust, unsightliness, and aesthetically objectionable conditions, and prevent the accumulation of materials in an untidy and unsafe manner so as to become a fire and safety hazard.	Generation of solid waste for temporary storage prior to processing, disposal of that waste – **relevant and appropriate**	SC R.61-107.5(C)(1)
Dewatering of Ash Basin (If Necessary – no basins currently hold water)			
Discharge to Surface Water	Any discharge into waters of the State must be permitted by the Department and receive a degree of treatment and/or control which shall produce an effluent which is consistent with the Act, the Clean Water Act (P.L. 92-500, 95-217, 97-117, 100-4), this regulation, and related regulations. *Note: Under CERCLA Section 121(e) permits are not required for on-site response actions. Instead, SRS must meet any applicable effluent limits in its existing NPDES discharge permit or other substantive requirements, including the numeric water quality criteria for the protection and maintenance of the appropriate class of surface waters as adopted in SC R.61-68 and listed in Sections E, G, and the appendix therein.*	Discharge of pollutants (including toxic substances) into waters of the State of South Carolina – **applicable**	SC R.61-68E.4.a SC R.61-68 E.14
	Site-specific permit effluent limitations and alternate criteria less stringent than those derived in accordance with the requirements in SC R.61-68 E.14.c. may be derived where it is demonstrated that such limits and criteria shall maintain the existing and classified uses.		SC R.61-68 E.14.c.(7)

Table 11. Potential ARARs for the Preferred Remedial Alternative for the Remaining Coal Ash and Coal Fines OUs *(continued)*

Action	Requirements	Prerequisites	Citation
Action-Specific ARARs *(continued)*			
Dewatering of Ash Basin (If Necessary – no basins currently hold water) *(cont'd)*			
	Discharge of garbage, cinders, ashes, oils, sludges, or other refuse is not allowed.	Quality Standards for Waters of the State of South Carolina (classified as FW as provided in SC R.61-68G.10) – **applicable**	SC R.61-68G.10.a
	Treated wastes, toxic wastes, deleterious substances in sufficient amounts to make the waters unsafe or unsuitable for primary contact recreation or to impair the waters for any other best usage are not allowed.		SC R.61-68G.10.b
	Discharge of toxic pollutants is not allowed except as prescribed in Section E of SC R.61-68.		SC R.61-68G.10.c
	Stormwater, and other nonpoint source runoff is allowed if water quality necessary for existing and classified uses shall be maintained and protected consistent with anti-degradation rules.		SC R.61-68G.10.d
	Dissolved oxygen – daily average not less than 5.0 mg/L with a low of 4.0 mg/L		SC R.61-68G.10.e
	pH between 6.0 and 8.5		SC R.61-68G.10.g
Monitoring Well Installation, Operation, and Abandonment			
Installation or Abandonment of Permanent and Temporary Monitoring Wells	All monitoring wells shall be drilled, constructed, maintained, operated, and/or abandoned to ensure that underground sources of drinking water are not contaminated.	Construction of permanent and temporary monitoring wells (including non-standard installation, as defined in R.61-71B(2)) – **relevant and appropriate** *(NOTE: "Applicable" for 288-F only since it is a SCDES permitted landfill.)*	SC R.61-71H.1(b)

Table 11. Potential ARARs for the Preferred Remedial Alternative for the Remaining Coal Ash and Coal Fines OUs *(continued)*

Action	Requirements	Prerequisites	Citation
Action-Specific ARARs *(continued)*			
[2]On-Site Closure/Capping of CCR Unit			
Closure of CCR Unit	Closure of a CCR unit must be completed either by leaving the CCR in place and installing a final cover system or through removal of the CCR and decontamination of the CCR unit,	Closure of CCR Unit– **relevant and appropriate** *(NOTE: "Applicable" for 288-F only since it is a SCDES permitted landfill.)*	40 CFR 257.102 (a) SC R.61-107.19 Part V
Closure by Removal of CCR	Closure by removal is complete when CCR has been removed; any areas affected by releases from the CCR unit have been removed or decontaminated; and groundwater monitoring concentrations of the constituents listed in appendix IV to this part do not exceed groundwater protection standards established pursuant to § 257.95(h).	Closure of CCR unit by removal of CCR – relevant and appropriate	40 CFR 257.102(c) SC R.61-107.19 Part V
Performance Standard when leaving CCR in place	(1) The owner or operator of a CCR unit must ensure that, at a minimum, the CCR unit is closed in a manner that will: (i) Control, minimize or eliminate, to the maximum extent feasible, post-closure infiltration of liquids into the waste and releases of CCR, leachate, or contaminated run-off to the ground or surface waters or to the atmosphere; (ii) Preclude the probability of future impoundment of water, sediment, or slurry; (iii) Include measures that provide for major slope stability to prevent the sloughing or movement of the final cover system during the closure and post-closure care period; (iv) Minimize the need for further maintenance of the CCR unit	Closure of CCR disposal facility– **relevant and appropriate** (NOTE: "Applicable" for 288-F only since it is a SCDES permitted landfill.)	40 CFR 257.102(d)(1) SC R.61-107.19 Part V
	(2) Drainage and stabilization of CCR units. The owner or operator of any CCR unit must meet the requirements of paragraphs (d)(2)(i) and (ii) of this section prior to installing the final cover system required under paragraph (d)(3) of this section. (i) Free liquids must be eliminated by removing liquid wastes or solidifying the remaining wastes and waste residues. (ii) Remaining wastes must be stabilized sufficient to support the final cover system.	Closure of CCR disposal facility– **relevant and appropriate** (NOTE: "Applicable" for 288-F only since it is a SCDES permitted landfill.)	40 CFR 257.102(d)(2) SC R.61-107.19 Part V

Table 11. Potential ARARs for the Preferred Remedial Alternative for the Remaining Coal Ash and Coal Fines OUs *(continued)*

Action	Requirements	Prerequisites	Citation
Action-Specific ARARs *(continued)*			
[2]On-Site Closure/Capping of CCR Unit *(cont'd)*			
Performance Standard when leaving CCR in place	(3) Final cover system. If a CCR unit is closed by leaving CCR in place, the owner or operator must install a final cover system that is designed to minimize infiltration and erosion, and at a minimum, meets the requirements of paragraph (d)(3)(i) of this section (i) The final cover system must be designed and constructed to meet the criteria in paragraphs (d)(3)(i)(A) through (D) of this section. The design of the final cover system must be included in the written closure plan required by paragraph (b) of this section. (A) The permeability of the final cover system must be less than or equal to the permeability of any bottom liner system or natural subsoils present, or a permeability no greater than 1 × 10−5 cm/sec, whichever is less. (B) The infiltration of liquids through the closed CCR unit must be minimized by the use of an infiltration layer that contains a minimum of 18 inches of earthen material. (C) The erosion of the final cover system must be minimized by the use of an erosion layer that contains a minimum of six inches of earthen material that is capable of sustaining native plant growth. (D) The disruption of the integrity of the final cover system must be minimized through a design that accommodates settling and subsidence.	Closure of CCR disposal facility– **relevant and appropriate** (NOTE: "Applicable" for 288-F only since it is a SCDES permitted landfill.)	40 CFR 257.102(d) (3) SC R.61-107.19 Part V Subpart F 258.60 (a)

Table 11. Potential ARARs for the Preferred Remedial Alternative for the Remaining Coal Ash and Coal Fines OUs *(continued)*

Action	Requirements	Prerequisites	Citation
Action-Specific ARARs *(continued)*			
Groundwater Monitoring Systems			
Performance Standard when leaving CCR in place	(a) The owner or operator of a CCR unit must install a groundwater monitoring system that consists of a sufficient number of wells, installed at appropriate locations and depths, to yield groundwater samples from the uppermost aquifer that: (1) Accurately represent the quality of background groundwater that has not been affected by leakage from a CCR unit. A determination of background quality may include sampling of wells that are not hydraulically upgradient of the CCR management area where: (i) Hydrogeologic conditions do not allow the owner or operator of the CCR unit to determine what wells are hydraulically upgradient; or (ii) Sampling at other wells will provide an indication of background groundwater quality that is as representative or more representative than that provided by the upgradient wells; and (2) Accurately represent the quality of groundwater passing the waste boundary of the CCR unit. The downgradient monitoring system must be installed at the waste boundary that ensures detection of groundwater contamination in the uppermost aquifer. All potential contaminant pathways must be monitored.	Groundwater monitoring requirements for CCR left in place. **relevant and appropriate**	40 CFR 257.91 (a)
	(b) the number, spacing, and depths of monitoring systems shall be determined based upon site-specific technical information that must include thorough characterization of: (1) Aquifer thickness, groundwater flow rate, groundwater flow direction including seasonal and temporal fluctuations in groundwater flow; and (2) Saturated and unsaturated geologic units and fill materials overlying the uppermost aquifer, materials comprising the uppermost aquifer, and materials comprising the confining unit defining the lower boundary of the uppermost aquifer, including, but not limited to, thicknesses, stratigraphy, lithology, hydraulic conductivities, porosities and effective porosities.	Groundwater monitoring requirements for CCR left in place. **relevant and appropriate**	40 CFR 257.91 (b)

Table 11. Potential ARARs for the Preferred Remedial Alternative for the Remaining Coal Ash and Coal Fines OUs *(continued)*

Action	Requirements	Prerequisite	Citation
Action-Specific ARARs *(continued)*			
Groundwater Monitoring Systems *(cont'd)*			
	(c)The groundwater monitoring system must include the minimum number of monitoring wells necessary to meet the performance standards specified in paragraph (a) of this section, based on the site-specific information specified in paragraph (b) of this section. The groundwater monitoring system must contain: (1) A minimum of one upgradient and three downgradient monitoring wells; and (2) Additional monitoring wells as necessary to accurately represent the quality of background groundwater that has not been affected by leakage from the CCR unit and the quality of groundwater passing the waste boundary of the CCR unit.	Groundwater monitoring requirements for CCR left in place. **relevant and appropriate**	40 CFR 257.91 (c)
	(e) Monitoring wells must be cased in a manner that maintains the integrity of the monitoring well borehole. This casing must be screened or perforated and packed with gravel or sand, where necessary, to enable collection of groundwater samples. The annular space (i.e., the space between the borehole and well casing) above the sampling depth must be sealed to prevent contamination of samples and the groundwater.	Groundwater monitoring requirements for CCR left in place. **relevant and appropriate**	40 CFR 257.91 (e)
[2]***Post-Closure of Ash Basins***			
Post-Closure Care Requirements	Following closure, owner/operator must conduct post-closure care for a minimum of 30 years, except as provided in paragraph b. below, and consistent of at least the following: Maintain the integrity and effectiveness of any final cover, including making repairs to the cover as necessary to correct the effects of settlement, subsidence, erosion, or other events, and preventing run-on and run-off from eroding or otherwise damaging the final cover.	Post-closure care of solid waste disposal facility (SC Class III landfill) – **relevant and appropriate** (NOTE: "Applicable" for 288-F only since it is a SCDES permitted landfill.)	SC R.61-107.19 Part V Subpart F 258.61(a) 40 CFR 258.61(a)(1)

Table 11. Potential ARARs for the Preferred Remedial Alternative for the Remaining Coal Ash and Coal Fines OUs *(continued)*

Action	Requirements	Prerequisite	Citation
Action-Specific ARARs *(continued)*			
[2]***Post-Closure of Ash Basins*** *(cont'd)*			
Post-Closure Groundwater Monitoring	Monitoring the groundwater in accordance with the requirements of subpart E of this Part and maintaining the groundwater monitoring system. *Note:* USDOE will conduct post-closure groundwater monitoring and reporting under the respective Operable Unit to document the effectiveness of the cover system. The length of the post-closure care period may be decreased if the permittee can provide technical rationale that the decreased post-closure care period is sufficient to protect human health and the environment. *Note:* USDOE as part of the CERCLA remedy review process (including Five-Year Review under Section 121(c)), must seek SCDES and USEPA approval of a modification to the monitoring period.	Post-closure care of solid waste disposal facility (SC Class III landfill) – **relevant and appropriate** (NOTE: "Applicable" for 288-F only since it is a SCDES permitted landfill.)	SC R.61-107.19 Part V Subpart F 258.61(a)(3) 40 CFR 258.61(a)(3) SC R.61-107.19 Part V Subpart F 258.61(b)(2) 40 CFR 258.61(b)(2)
Post-closure use of Property	Post-closure use of the property shall not disturb the integrity of the final cover, liner(s), or any other components of the containment system, or the function of the monitoring systems unless necessary to comply with the requirements in this Part. *Note:* USDOE is responsible for ensuring LUCs (as part of the CERCLA remedy) to prevent unauthorized activities including disturbance of landfill cover integrity. LUCs will be implemented as part of the final remedial action for the DAOU.	Post-closure care of solid waste disposal facility (SC Class III landfill) – **relevant and appropriate** (NOTE: "Applicable" for 288-F only since it is a SCDES permitted landfill.)	SC R.61-107.19 Part V Subpart F 258.61(c)(3) 40 CFR 258.61(c)(3)
Deed restrictions, recordkeeping, and notifications	Following closure of a CCR unit, the owner or operator must record a notation on the deed to the property, or some other instrument that is normally examined during title search. The owner or operator of the CCR unit must comply with the closure recordkeeping requirements specified in § 257.105(i), the closure notification requirements specified in § 257.106(i), and the closure internet requirements specified in § 257.107(i).	Completion of closure activities – **relevant and appropriate**	40 CFR 257.102(i) 40 CFR 257.102(j)

Table 11. Potential ARARs for the Preferred Remedial Alternative for the Remaining Coal Ash and Coal Fines OUs *(continued)*

Action	Requirements	Prerequisite	Citation
Action-Specific ARARs *(continued)*			
Transportation of Wastes			
Transportation of Samples (i.e. Solid Waste, Soils and Wastewaters)	A sample of solid waste or a sample of water, soil, or air, which is collected for the sole purpose of testing to determine its characteristics or composition, is not subject to any requirements of this part or parts 262 through 268 or part 270 or part 124 of this chapter or to the notification requirements of section 3010 of RCRA, when:: the sample is being transported to a laboratory for the purpose of testing; or the sample is being transported back to the sample collector after testing. the sample is being stored by sample collector before transport to a lab for testing.	Samples of solid waste or a sample of water, soil for purpose of conducting testing to determine its characteristics or composition – **applicable**	40 CFR 261.4(d)(1)(i)-(iii) SC R.61-79 261.4*(d)* (1) (i)-(iii)
	In order to qualify for the exemption in 40 CFR 261.4 (d)(1)(i) and (ii), a sample collector shipping samples to a laboratory must: Comply with U.S. DOT, U.S. Postal Service, or any other applicable shipping requirements. Assure that the information provided in (1) through (5) of this section accompanies the sample. Package the sample so that it does not leak, spill, or vaporize from its packaging.		40 CFR 261.4(d)(2)(i)and (ii) SC R.61-79 261.4*(d)* (2)(i)(A) and (B)
Managing Fugitive Dust Emissions from Land-Disturbing Activities	Emissions of fugitive particulate matter shall be controlled in such a manner and to the degree that it does not create an undesirable level of air pollution. Volatile organic compounds shall not be used for dust control purposes. Oil treatment is also prohibited.	Activities that will generate fugitive particulate matter (Statewide) – a**pplicable**	SCDES R. 61-62.6 Section III(a)- Control of Fugitive Particulate Matter Statewide SCDES R. 61-62.6 Section III(d)
Location-Specific ARARs			
Presence of wetlands as defined in 10 *CFR* 1022.4	Avoid, to the extent possible, the long- and short-term adverse effects associated with destruction, occupancy, and modification of wetlands and floodplains.	DOE actions that involve potential impacts to, or take place within, wetlands – **applicable.**	10 *CFR* 1022.3(a)
	Take action, to extent practicable, to minimize destruction, loss, or degradation of wetlands and to preserve and enhance the natural and beneficial values of wetlands.		10 *CFR* 1022.3(a)(7) and (8)

Table 11. Potential ARARs for the Preferred Remedial Alternative for the Remaining Coal Ash and Coal Fines OUs *(continued)*

Action	Requirements	Prerequisites	Citation
Location-Specific ARARs *(continued)*			
	Undertake a careful evaluation of the potential effects of any new construction in wetlands. Identify, evaluate, and as appropriate, implement alternative actions that may avoid or mitigate adverse impacts on wetlands.		10 *CFR* 1022.3(b) and (d)
	If no practicable alternative to locating or conducting the action in the wetland is available, then before taking action, design or modify the action in order to minimize potential harm to or within the wetland, consistent with the policies set forth in E.O. 11990.		10 CFR 1022.14(a)
Location encompassing *aquatic ecosystem* as defined in 40 CFR 230.3(b)	No discharge of dredged or fill material into an aquatic ecosystem is permitted if there is a practicable alternative that would have less adverse impact. No discharge of dredged or fill material shall be permitted unless appropriate and practicable steps in accordance with 40 CFR 230.70 *et seq.* have been taken that will minimize potential adverse impacts of the discharge on the aquatic ecosystem.	Action that involves the discharge of dredged or fill material into waters of the United States, including jurisdictional wetlands – **applicable.**	40 *CFR* 230.10(a) and (c) 40 *CFR* 230.10(d) Clean Water Act Section 404(b)(1) Guidelines 40 CFR 230
Compensatory Mitigation for Losses of Aquatic Resources	Compensatory mitigation for unavoidable impacts may be required to ensure that an activity requiring a section 404 permit complies with the Section 404(b)(1) Guidelines.		40 *CFR* 230.91 Clean Water Act Section 404(b)(1) Guidelines 40 CFR 230
	Must comply with the substantive requirements of the Nationwide Permit 38, General Conditions, as appropriate, any regional or case-specific conditions recommended by the Corps District Engineer, after consultation. *Note: Despite that consultation may be considered an administrative requirement, it should be performed to ensure activities are in compliance with substantive provisions of the permit.*	On-site CERCLA action conducted by Federal agency that involves discharge of dredged or fill material into *waters of the United States*, including jurisdictional wetlands – **relevant and appropriate**.	Nationwide Permit (38) – Cleanup of Hazardous and Toxic Waste 33 *CFR* 323.3(b)
Presence of wetlands	Requires Federal agencies to evaluate action to minimize the destruction, loss or degradation of wetlands and to preserve and enhance beneficial values of wetlands.	Actions that involve potential impacts to, or take place within, wetlands –**applicable**	Executive Order 11990 – *Protection of Wetlands* - Section 1.(a)

Table 11. Potential ARARs for the Preferred Remedial Alternative for the Remaining Coal Ash and Coal Fines OUs *(continued/end)*

Action	Requirements	Prerequisites	Citation
Location-Specific ARARs *(continued)*			
Presence of archeological or cultural artifacts	No person may excavate, remove, damage, or otherwise alter or deface, or attempt to excavate, remove, damage, or otherwise alter or deface any archaeological resource located on public lands unless such activity is pursuant to a permit issued under §7.8 or exempted by § 7.5(b) of this part. *Note: Prior to removal activities existing Site Use process requires approval by the Savannah River Archaeological Research Program. The SRARP is a division of the South Carolina Institute of Archaeology and Anthropology (SCIAA) at the University of South Carolina. The SRARP manages the archaeological and other historic resources for the U.S. Department of Energy.*	Excavation and/or removal of archaeological resources from public lands – **applicable**.	43 *CFR* Part 7 – implementing the Archaeological Resources Protection Act of 1979.
Presence of migratory birds and their habitats	No person may take, possess, import, export, transport, sell, purchaser, barter or offer for sale, purchase or barter, any migratory bird, or the parts, nests, or eggs of such bird except as may be permitted under the terms of a valid permit.	If action is likely to impact migratory birds – **applicable**.	16 *USC* 703-704 – Migratory Bird Treaty Act

1 - The requirements from 40 CFR Part 268 contained in this table will be triggered if any generated wastes, including coal ash, coal fines, soil, sediments, and/or groundwater are characterized as RCRA hazardous wastes.
2- Only applies in the event one or more OU cannot be clean closed, requiring closure of the OU with CCR left in place.

Alt – Alternative
ARAR – applicable or relevant and appropriate requirement
CFR – Code of Federal Regulation
CMBST – Combustion
CCR – Coal Combustion Residuals
CWA – Clean Water Act of 1972
DEACT – deactivation
DOT – U.S. Department of Transportation
EPA – U.S. Environmental Protection Agency
LDR – Land Disposal Restrictions
NPDES – National Pollutant Discharge Elimination System
POLYM – polymerization
RCRA – Resource Conservation and Recovery Act of 1976
RORGS – recovery of organics
SCDES – South Carolina Department of Environmental Services
TCLP – Toxicity Characteristics Leaching Procedure
UHC – underlying hazardous constituents
UTS – Universal Treatment Standard
WWTU – Waste Water Treatment Unit

Table 12. Description of CERCLA Evaluation Criteria

Threshold Criteria:
• *Overall Protectiveness of Human Health and the Environment* determines whether an alternative eliminates, reduces, or controls threats to public health and the environment through institutional controls, engineering controls, or treatment. • *Compliance with ARARs* evaluates whether the alternative meets Federal and State environmental statutes, regulations, and other requirements that pertain to the site. ARARs may be waived under certain circumstances. ARARs are divided into chemical-specific, location-specific, and action-specific criteria.
Primary Balancing Criteria:
• *Long-Term Effectiveness and Permanence* considers the ability of an alternative to maintain protection of human health and the environment over time. It evaluates magnitude of residual risk and adequacy of reliability of controls. • *Reduction of Toxicity, Mobility, or Volume of Contaminants through Treatment* evaluates an alternative's use of treatment to reduce the harmful effects of principal contaminants, their ability to move in the environment, and the amount of contamination present. • *Short-Term Effectiveness* considers the length of time needed to implement an alternative and the risks the alternative poses to workers, residents, and the environment during implementation. • *Implementability* considers the technical and administrative feasibility of implementing the alternative, including factors such as the relative availability of goods and services. • *Cost* includes estimated capital and annual operations and maintenance costs, as well as present worth cost. Present worth cost is the total cost of an alternative over time in terms of today's dollar value. Cost estimates are expected to be accurate within a range of +50 to -30 percent.
Modifying Criteria:
• *State Support/Agency Acceptance* considers whether USEPA and SCDES agree with the analyses and recommendations by the USDOE. Approval of the Record of Decision constitutes approval of the selected alternative by the regulatory agencies. • *Community Acceptance* considers whether the local community agrees with the Preferred Alternative. Comments received on the Statement of Basis/Proposed Plan during the public comment period are an important indicator of community acceptance. Comments from the public are considered in the final remedy selection in the Record of Decision.

Table 13. Comparison of Alternatives against the CERCLA Evaluation Criteria

Criteria	Alternative A-1 No Action	Alternative A-2 LUCs with Beneficial Use	Alternative A-3 Class III Cover with LUCs
Threshold Criteria			
Overall protection of human health and the environment			
Protection of Human Health	Not protective	Meets the requirement by limiting exposure to the contaminated media through the use of administrative and engineering controls.	Meets the requirement by placement of a soil cover to eliminate the direct exposure pathways.
Protection of the Environment	Not protective	Optimally protective of environment because the ash sites are restored to pre-ash conditions.	Protective of environment because the ash sites are isolated from ash.
Compliance with ARARs			
Chemical-specific	Not applicable	Not applicable	Not applicable
Action-specific	Not applicable	Meets the requirement by limiting exposure to the contaminated media through the use of administrative and engineering controls.	Meets the requirement by placement of a soil cover to eliminate the direct exposure pathways.
Location-specific	Not applicable	Meets the requirement by limiting exposure to the contaminated media through the use of administrative and engineering controls.	Meets the requirement by placement of a soil cover to eliminate the direct exposure pathways.

Table 13. Comparison of Alternatives against the CERCLA Evaluation Criteria *(continued)*

Criteria	Alternative A-1 No Action	Alternative A-2 LUCs with Beneficial Use	Alternative A-3 Class III Cover with LUCs
Primary Balancing Criteria			
Long-term effectiveness and permanence			
Magnitude of Residual Risks	Residual human health risk remains above $1x10^{-6}$ or SRS background concentrations	Residual human health risk less than $1x10^{-6}$ or SRS background concentrations; 5-year remedy reviews and LUCs required until beneficial use.	Residual human health risk less than $1x10^{-6}$ or SRS background concentrations; 5-year remedy reviews and LUCs required until risks decrease to allow for unlimited use and unrestricted exposure.
Adequacy of Controls	Not adequate	Controls are adequate as long as they are maintained.	Controls are adequate as long as they are maintained.
Permanence	Not permanent	LUCs are permanent until beneficial use as long as controls are maintained.	Cover system and LUCs are permanent as long as it is maintained
Reduction of toxicity, mobility, or volume through treatment			
Treatment Process	No treatment	No treatment	No treatment
Degree of Expected Reduction in Toxicity, Mobility, or Volume	None	None	None
Short-term effectiveness			
Risk to Remedial Workers	Not applicable; no remedial action involved.	Minimal; Health and Safety Plan will be implemented to protect remedial workers	Minimal; Health and Safety Plan will be implemented to protect remedial workers
Risk to Community	Not applicable; no remedial action involved.	None	None
Risk to Environment	Not applicable; no remedial action involved.	None	None
Estimated Time Frame to Achieve RAOs or RGs	Not applicable; no remedial action involved.	12+ years	18 months

Table 13. Comparison of Alternatives against the CERCLA Evaluation Criteria *(continued/end)*

Criteria	Alternative A-1 No Action	Alternative A-2 LUCs with Beneficial Use	Alternative A-3 Class III Cover with LUCs
Primary Balancing Criteria (continued)			
Implementability			
Availability of materials, equipment, and skilled labor	No implementation	Readily implemented	Readily implemented
Ability to construct and operate remedial technology	Not Applicable	Proven technology at SRS	Proven technology at SRS
Ability to obtain permits/approvals from Agencies	Not Applicable	Prior history with similar permits/approvals at SRS	Prior history with similar permits/approvals at SRS
Ease of undertaking additional actions	Compatible	Compatible	Compatible
Cost			
Total Present-Worth Costs	$0	$39,607,954	$59,664,770

Table 14. Land Use Controls for the Remaining Coal Ash and Coal Fines OUs

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

Table 14. Land Use Controls for the Remaining Coal Ash and Coal Fines OUs (*continued/end*)

Type of Control	Purpose of Control	Duration	Implementation	Affected Areas[a]
7. Security Surveillance Measures	Control and monitor access by workers/public.	Until the concentration of hazardous substances associated with the unit have been reduced to levels that allow for unlimited exposure and unrestricted use.	Established and maintained by USDOE Necessity of patrols evaluated upon completion of remedial actions or property transfer.	Patrol of waste management areas identified in this ROD, as necessary.

[a]Affected areas – Specific locations identified in the OU-specific EA LUCIP or subsequent post-EA ROD documents.
[b]Property Record Notices – Refers to any non-enforceable, purely informational document recorded along with the original property acquisition records of USDOE and its predecessor agencies that alerts anyone searching property records to important information about residual contamination; waste disposal areas in the property.
[c]Property Record Restrictions – Includes conditions and/or covenants that restrict or prohibit certain uses of real property and are recorded along with original property acquisition records of USDOE and its predecessor agencies.
[d]Other Notices – Includes information on the location of waste disposal areas and residual contamination depicted on as survey plat, which is provided to a zoning authority (i.e., city planning commission) for consideration in appropriate zoning decisions for non-USDOE property.
[e]Site Use Program – Refers to the internal USDOE/USDOE contractor administrative program(s) that requires the permit requestor to obtain authorization, usually in the form of a permit, before beginning any excavation/penetration activity (e.g., well drilling) for the purpose of ensuring that the proposed activity will not affect underground utilities/structures, or in the case contaminated soil or groundwater, will not disturb the affected areas without the appropriate precautions and safeguards.
[f]Physical Access Controls – Physical barriers or restrictions to entry.
[g]Signs – Posted command, warning or direction.

Table 15. Alternative A-2: Land Use Controls and Beneficial Use Cost Estimate (AAP)

Institutional Controls Estimate
Alternatives A-2
Land Use Controls w/Beneficial Use*

Item	Quantity	Units	Unit Cost	Total Cost
Direct Capital Costs				
A-ASH				
Monitoring Wells				
Install monitoring wells to 120ft , core from surface to TD	0	ea	$20,324	$0
Technical Oversight	0	ls	$37,932	$0
Institutional Controls				
Install inclinometers	1	ea	$12,000	$12,000
Posting of Warning Signs	4	ea	$500	$2,000
Land Use Control Implementation Plan	1	ea	$5,000	$5,000
Deed Restrictions	1	ea	$5,000	$5,000
Off-Unit Disposal				
Excavate & Load Sediment / Coal Ash for Hauling	70,000	yd3	$3.59	$251,300
Confirmation Sampling / Analysis	15	ea	$1,000	$15,000
Stormwater Management	1,333	lf	$25	$33,325
Site Restoration				
Contour Basin After Sediment / Coal Removal	2.55	ac	$1,700	$4,335
Common Backfill (4 Inches)	1,645	yd3	$13	$21,385
Topsoil (4 Inches)	1,645	yd3	$35	$57,575
Fertilizer, Lime, Seed & Mulch	14,810	yd2	$0.75	$11,108
Backfill Sampling / Analysis	4	ea	$1,200	$4,800
Subtotal - Direct Capital Cost				$422,828
Mobilization/Demobilization	9%	of subtotal direct capital		$38,054
Site Preparation/Site Restoration	9%	of subtotal direct capital		$38,054
Total Direct Capital Cost				**$498,936**
Indirect Capital Costs				
Engineering & Design	14%	of direct capital		$69,851
Project/Construction Management	25%	of direct capital		$124,734
Health & Safety	6%	of direct capital		$29,936
Overhead	30%	of direct capital + indirect capital		$217,037
Contingency	26%	of direct capital + indirect capital		$188,099
Total Indirect Capital Cost				**$629,658**
Total Estimated Capital Cost				**$1,128,594**
Direct O&M Costs	2.2%	3 Year Discount Rate1		
Annual Costs (Existing System during Post-ROD Design & Const)	2	years O&M		*Years 2027-2028*
Access Controls	1	ea	$500	$500
Maintenance	1	ea	$3,442	$3,442
Subtotal - Annual Costs				$3,942
Present Value Cost				**$7,631**
	2.5%	30 Year Discount Rate1		
Annual Costs	30	years O&M		*Years 2029-2058*
Access Controls	1	ea	$500	$500
Annual Inspection/Maintenance	1	ea	$3,442	$3,442
Slope Stability Monitoring	1	ea	$12,000	$12,000
Subtotal - 30 Year Annual Costs				$15,942

Table 15. Alternative A-2: Land Use Controls and Beneficial Use Cost Estimate (AAP) *(continued/end)*

	Present Value Cost			**$333,670**
Five Year Costs		6		
Remedy Review		1 ea	$15,000	$15,000
Groundwater Monitoring - 4 wells		0 ea	$7,000	$0
Subtotal - Five Year O&M Costs				$15,000
	Present Value Cost			**$87,602**
	Total Present Value Direct O&M Cost			**$428,903**
Indirect O&M Costs				
Project/Admin Management		146% of direct O&M		$626,199
Health & Safety		19% of direct O&M		$81,492
Overhead		30% of direct O&M + indirect O&M		$128,671
Contingency		20% of direct O&M + indirect O&M		$83,636
	Total Present Worth Indirect O&M Cost			$919,997
	Total Estimated Present Worth O&M Cost			**$1,348,900**
	TOTAL ESTIMATED COST			**$2,477,495**

[1] *Interest rates for costs with 3-year and 30-year durations are based on SRNS Technical Memorandum ERTEC-2017-00002.*

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Table 16. Alternative A-2: Land Use Controls and Beneficial Use Cost Estimate (ACPRB)

Institutional Controls Estimate
Alternatives AC-2
Land Use Controls w/Beneficial Use*

Item	Quantity	Units	Unit Cost	Total Cost
Direct Capital Costs				
A-CPRB				
Monitoring Wells				
Drill/core rotosonic soil borings to 120 ft	0	ea	$20,324	$0
Technical Oversight	0	ls	$37,932	$0
Institutional Controls				
Posting of Warning Signs	4	ea	$500	$2,000
Land Use Control Implementation Plan	1	ea	$5,000	$5,000
Deed Restrictions	1	ea	$5,000	$5,000
Off-Unit Disposal				
Excavate & Load Sediment / Coal Ash for Hauling	10,000	yd3	$3.59	$35,900
Confirmation Sampling / Analysis	15	ea	$1,000	$15,000
Stormwater Management	1,351	lf	$25	$33,775
Site Restoration				
Contour Basin After Sediment / Coal Removal	2.62	ac	$1,700	$4,454
Common Backfill (4 Inches)	1,690	yd3	$13	$21,970
Topsoil (4 Inches)	1,690	yd3	$35	$59,150
Fertilizer, Lime, Seed & Mulch	15,216	yd2	$0.75	$11,412
Backfill Sampling / Analysis	4	ea	$1,200	$4,800
Subtotal - Direct Capital Cost				$198,461
Mobilization/Demobilization	9%	of subtotal direct capital		$17,861
Site Preparation/Site Restoration	9%	of subtotal direct capital		$17,861
Total Direct Capital Cost				**$234,184**
Indirect Capital Costs				
Engineering & Design	14%	of direct capital		$32,786
Project/Construction Management	25%	of direct capital		$58,546
Health & Safety	6%	of direct capital		$14,051
Overhead	30%	of direct capital + indirect capital		$101,870
Contingency	26%	of direct capital + indirect capital		$88,287
Total Indirect Capital Cost				**$295,540**
Total Estimated Capital Cost				**$529,724**

Table 16. Alternative A-2: Land Use Controls and Beneficial Use Cost Estimate (ACPRB) (*continued/end*)

Direct O&M Costs		2.2%	3 Year Discount Rate1		
Annual Costs (Existing System during Post-ROD Design & Const)		2	years O&M		*Years 2027-2028*
Access Controls		1	ea	$500	$500
Maintenance		1	ea	$3,506	$3,506
	Subtotal - Annual Costs				$4,006
	Present Value Cost				**$7,754**
		2.5%	30 Year Discount Rate1		
Annual Costs		30	years O&M		*Years 2029-2058*
Access Controls		1	ea	$500	$500
Annual Inspection/Maintenance		1	ea	$3,506	$3,506
	Subtotal - 30 Year Annual Costs				$4,006
	Present Value Cost				**$83,838**
Five Year Costs		6			
Remedy Review		1	ea	$15,000	$15,000
Groundwater Monitoring - 4 wells		0	ea	$7,000	$0
Subtotal - Five Year O&M Costs					$15,000
	Present Value Cost				**$59,729**
	Total Present Value Direct O&M Cost				**$151,321**
Indirect O&M Costs					
Project/Admin Management		146%	of direct O&M		$220,929
Health & Safety		19%	of direct O&M		$28,751
Overhead		30%	of direct O&M + indirect O&M		$45,396
Contingency		20%	of direct O&M + indirect O&M		$29,508
	Total Present Worth Indirect O&M Cost				$324,584
	Total Estimated Present Worth O&M Cost				**$475,905**
	TOTAL ESTIMATED COST				

[1] *Interest rates for costs with 3-year and 30-year durations are based on SRNS Technical Memorandum ERTEC-2017-00002.*
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Table 17. Alternative A-2: Land Use Controls and Beneficial Use Cost Estimate (FAL)

Institutional Controls Estimate
Alternatives F-2
Land Use Controls w/Beneficial Use*

Item	Quantity	Units	Unit Cost	Total Cost
Direct Capital Costs				
F-ASH				
Institutional Controls				
Posting of Warning Signs	11	ea	$500	$5,500
Land Use Control Implementation Plan	1	ea	$5,000	$5,000
Deed Restrictions	1	ea	$5,000	$5,000
Off-Unit Disposal				
Excavate & Load Sediment / Coal Ash for Hauling	205,703	yd3	$3.59	$766,318
Confirmation Sampling / Analysis	110	ea	$1,000	$110,000
Stormwater Management	3,588	lf	$25	$89,700
Site Restoration				
Contour After Sediment / Coal Removal	18.48	ac	$1,700	$31,416
Common Backfill (4 Inches)	11,925	yd3	$13	$155,025
Topsoil (4 Inches)	11,925	yd3	$35	$417,375
Fertilizer, Lime, Seed & Mulch	107,331	yd2	$0.75	$80,498
Backfill Sampling / Analysis	24	ea	$1,200	$28,800
Subtotal - Direct Capital Cost				$1,694,632
Mobilization/Demobilization	9%	of subtotal direct capital		$152,517
Site Preparation/Site Restoration	9%	of subtotal direct capital		$152,517
Total Direct Capital Cost				**$1,999,666**
Indirect Capital Costs				
Engineering & Design	14%	of direct capital		$279,953
Project/Construction Management	25%	of direct capital		$499,916
Health & Safety	6%	of direct capital		$119,980
Overhead	30%	of direct capital + indirect capital		$869,855
Contingency	26%	of direct capital + indirect capital		$753,874
Total Indirect Capital Cost				**$2,523,578**
Total Estimated Capital Cost				**$4,523,244**

Table 17. Alternative A-2: Land Use Controls and Beneficial Use Cost Estimate (FAL) *(continued/end)*

Direct O&M Costs		2.2%	3 Year Discount Rate[1]		
Annual Costs (Existing System during Post-ROD Design & Const)		2	years O&M		*Years 2027-2028*
Access Controls		1	ea	$500	$500
Maintenance		12	ea	$9,361	$112,328
Groundwater Monitoring - 4 wells		2	ea	$7,000	$14,000
	Subtotal - Annual Costs				$126,828
	Present Value Cost				**$245,524**
		2.5%	30 Year Discount Rate[1]		
Annual Costs		30	years O&M		*Years 2029-2058*
Access Controls		1	ea	$500	$500
Monthly Inspections/Maintenance		12	ea	$9,361	$112,328
Groundwater Monitoring - 4 wells		2	ea	$7,000	$14,000
	Subtotal - 30 Year Annual Costs				$126,828
	Present Value Cost				**$2,654,544**
Five Year Costs		6			
Remedy Review		1	ea	$15,000	$15,000
Subtotal - Five Year O&M Costs					$15,000
	Present Value Cost				**$59,729**
	Total Present Value Direct O&M Cost				**$2,959,797**
Indirect O&M Costs					
Project/Admin Management		146%	of direct O&M		$4,321,303
Health & Safety		19%	of direct O&M		$562,361
Overhead		30%	of direct O&M + indirect O&M		$887,939
Contingency		20%	of direct O&M + indirect O&M		$577,160
	Total Present Worth Indirect O&M Cost				$6,348,764
	Total Estimated Present Worth O&M Cost				**$9,308,560**
	TOTAL ESTIMATED COST				**$13,831,805**

[1] *Interest rates for costs with 3-year and 30-year durations are based on SRNS Technical Memorandum ERTEC-2017-00002.*
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Table 18. Alternative A-2: Land Use Controls and Beneficial Use Cost Estimate (HAB)

Institutional Controls Estimate
Alternatives H-2
Land Use Controls w/Beneficial Use*

Item	Quantity	Units	Unit Cost	Total Cost
Direct Capital Costs				
H-ASH				
Monitoring Wells				
Drill/core rotosonic soil borings to 50 ft	4	ea	$17,277	$69,110
Technical Oversight	1	ea	$33,532	$33,532
Institutional Controls				
Posting of Warning Signs	15	ea	$500	$7,500
Land Use Control Implementation Plan	1	ea	$5,000	$5,000
Deed Restrictions	1	ea	$5,000	$5,000
Off-Unit Disposal				
Excavate & Load Sediment / Coal Ash for Hauling	259,112	yd3	$3.59	$930,212
Confirmation Sampling / Analysis	188	ea	$1,000	$188,000
Stormwater Management	4,682	lf	$25	$117,050
Site Restoration				
Contour Basin After Sediment / Coal Removal	31.46	ac	$1,700	$53,482
Common Backfill (4 Inches)	20,302	yd3	$13	$263,926
Topsoil (4 Inches)	20,302	yd3	$35	$710,570
Fertilizer, Lime, Seed & Mulch	182,719	yd2	$0.75	$137,039
Backfill Sampling / Analysis	41	ea	$1,200	$49,200
Subtotal - Direct Capital Cost				$2,466,979
Mobilization/Demobilization	9%	of subtotal direct capital		$222,028
Site Preparation/Site Restoration	9%	of subtotal direct capital		$222,028
Total Direct Capital Cost				**$2,911,036**
Indirect Capital Costs				
Engineering & Design	14%	of direct capital		$407,545
Project/Construction Management	25%	of direct capital		$727,759
Health & Safety	6%	of direct capital		$174,662
Overhead	30%	of direct capital + indirect capital		$1,266,300
Contingency	26%	of direct capital + indirect capital		$1,097,460
Total Indirect Capital Cost				**$3,673,727**
Total Estimated Capital Cost				**$6,584,763**

Table 18. Alternative A-2: Land Use Controls and Beneficial Use Cost Estimate (HAB) *(continued/end)*

Direct O&M Costs		2.2%	3 Year Discount Rate[1]		
Annual Costs (Existing System during Post-ROD Design & Const)		2	years O&M		*Years 2027-2028*
Access Controls		1	ea	$500	$500
Maintenance		1	ea	$12,941	$29,721
	Subtotal - Annual Costs				$30,221
	Present Value Cost				**$58,505**
		2.5%	30 Year Discount Rate[1]		
Annual Costs		30	years O&M		*Years 2029-2058*
Access Controls		1	ea	$500	$500
Annual Inspection/Maintenance		1	ea	$12,941	$29,721
	Subtotal - 30 Year Annual Costs				$30,221
	Present Value Cost				**$632,537**
Five Year Costs		6			
Remedy Review		1	ea	$15,000	$15,000
Groundwater Monitoring - 4 wells		1	ea	$7,000	$7,000
Subtotal - Five Year O&M Costs					$15,000
	Present Value Cost				**$87,602**
	Total Present Value Direct O&M Cost				**$778,644**
Indirect O&M Costs					
Project/Admin Management		146%	of direct O&M		$1,136,821
Health & Safety		19%	of direct O&M		$147,942
Overhead		30%	of direct O&M + indirect O&M		$233,593
Contingency		20%	of direct O&M + indirect O&M		$151,836
	Total Present Worth Indirect O&M Cost				$1,670,192
	Total Estimated Present Worth O&M Cost				**$2,448,836**
	TOTAL ESTIMATED COST				**$9,033,599**

[1] Interest rates for costs with 3-year and 30-year durations are based on SRNS Technical Memorandum ERTEC-2017-00002.
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Table 19. Alternative A-2: Land Use Controls and Beneficial Use Cost Estimate (KAB)

Institutional Controls Estimate
Alternatives K-2
Land Use Controls w/Beneficial Use*

Item	Quantity	Units	Unit Cost	Total Cost
Direct Capital Costs				
K-ASH				
Monitoring Wells				
Drill/core rotosonic soil borings to 50 ft	0	ea	$17,277	$0
Technical Oversight	0	ea	$33,532	$0
Institutional Controls				
Posting of Warning Signs	10	ea	$500	$5,000
Land Use Control Implementation Plan	1	ea	$5,000	$5,000
Deed Restrictions	1	ea	$5,000	$5,000
Off-Unit Disposal				
Excavate & Load Sediment / Coal Ash for Hauling	272,527	yd3	$3.59	$978,372
Confirmation Sampling / Analysis	89	ea	$1,000	$89,000
Stormwater Management	3,230	lf	$25	$80,750
Site Restoration				
Contour Basin After Sediment / Coal Removal	14.97	ac	$1,700	$25,449
Common Backfill (4 Inches)	9,660	yd3	$13	$125,580
Topsoil (4 Inches)	9,660	yd3	$35	$338,100
Fertilizer, Lime, Seed & Mulch	86,945	yd2	$0.75	$65,209
Backfill Sampling / Analysis	20	ea	$1,200	$24,000
Subtotal - Direct Capital Cost				$1,741,460
Mobilization/Demobilization	9%	of subtotal direct capital		$156,731
Site Preparation/Site Restoration	9%	of subtotal direct capital		$1156,731
Total Direct Capital Cost				**$2,054,922**
Indirect Capital Costs				
Engineering & Design	14%	of direct capital		$287,689
Project/Construction Management	25%	of direct capital		$513,731
Health & Safety	6%	of direct capital		$123,295
Overhead	30%	of direct capital + indirect capital		$893,891
Contingency	26%	of direct capital + indirect capital		$774,706
Total Indirect Capital Cost				**$2,593,312**
Total Estimated Capital Cost				**$4,648,235**

Table 19. Alternative A-2: Land Use Controls and Beneficial Use Cost Estimate (KAB) *(continued/end)*

Direct O&M Costs		2.2%	3 Year Discount Rate[1]		
Annual Costs (Existing System during Post-ROD Design & Const)		2	years O&M		*Years 2027-2028*
Access Controls		1	ea	$500	$500
Maintenance		1	ea	$14,732	$14,732
	Subtotal - Annual Costs				$15,232
	Present Value Cost				**$22,782**
		2.5%	30 Year Discount Rate[1]		
Annual Costs		30	years O&M		*Years 2029-2058*
Access Controls		1	ea	$500	$500
Annual Inspection/Maintenance		1	ea	$14,732	$14,732
	Subtotal - 30 Year Annual Costs				$15,232
	Present Value Cost				**$318,805**
Five Year Costs		6			
Remedy Review		1	ea	$15,000	$15,000
Groundwater Monitoring - 4 wells		0	ea	$7,000	$0
Subtotal - Five Year O&M Costs					$15,000
	Present Value Cost				**$59,729**
	Total Present Value Direct O&M Cost				**$408,020**
Indirect O&M Costs					
Project/Admin Management		146%	of direct O&M		$595,710
Health & Safety		19%	of direct O&M		$77,524
Overhead		30%	of direct O&M + indirect O&M		$122,406
Contingency		20%	of direct O&M + indirect O&M		$79,564
	Total Present Worth Indirect O&M Cost				$875,203
	Total Estimated Present Worth O&M Cost				**$1,283,224**
	TOTAL ESTIMATED COST				**$5,931,458**

[1] *Interest rates for costs with 3-year and 30-year durations are based on SRNS Technical Memorandum ERTEC-2017-00002.*

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Table 20. Alternative A-2: Land Use Controls and Beneficial Use Cost Estimate (LAB)

Institutional Controls Estimate
Alternatives L-2
Land Use Controls w/Beneficial Use*

Item	Quantity	Units	Unit Cost	Total Cost
Direct Capital Costs				
L-ASH				
Monitoring Wells				
Drill/core rotosonic soil borings to 50 ft	4	ea	$17,277	$69,110
Technical Oversight	1	ea	$33,532	$33,532
Institutional Controls				
Posting of Warning Signs	12	ea	$500	$6,000
Land Use Control Implementation Plan	1	ea	$5,000	$5,000
Deed Restrictions	1	ea	$5,000	$5,000
Off-Unit Disposal				
Excavate & Load Sediment / Coal Ash for Hauling	323,026	yd3	$3.59	$1,159,663
Confirmation Sampling / Analysis	115	ea	$1,000	$115,000
Stormwater Management	3,665	lf	$25	$91,625
Site Restoration				
Contour Basin After Sediment / Coal Removal	19.28	ac	$1,700	$32,776
Common Backfill (4 Inches)	12,442	yd3	$13	$161,746
Topsoil (4 Inches)	12,442	yd3	$35	$435,470
Fertilizer, Lime, Seed & Mulch	111,978	yd2	$0.75	$83,984
Backfill Sampling / Analysis	25	ea	$1,200	$30,000
Subtotal - Direct Capital Cost				$2,126,264
Mobilization/Demobilization	9%	of subtotal direct capital		$191,364
Site Preparation/Site Restoration	9%	of subtotal direct capital		$191,364
Total Direct Capital Cost				**$2,508,991**
Indirect Capital Costs				
Engineering & Design	14%	of direct capital		$351,259
Project/Construction Management	25%	of direct capital		$627,248
Health & Safety	6%	of direct capital		$150,539
Overhead	30%	of direct capital + indirect capital		$1,091,411
Contingency	26%	of direct capital + indirect capital		$945,890
Total Indirect Capital Cost				**$3,166,347**
Total Estimated Capital Cost				**$5,675,338**

Table 20. Alternative A-2: Land Use Controls and Beneficial Use Cost Estimate (LAB) (*continued/end*)

Direct O&M Costs		2.2%	3 Year Discount Rate[1]		
Annual Costs (Existing System during Post-ROD Design & Const)		2	years O&M		*Years 2027-2028*
Access Controls		1	ea	$500	$500
Maintenance		1	ea	$18,650	$18,650
	Subtotal - Annual Costs				$19,150
	Present Value Cost				**$37,071**
		2.5%	30 Year Discount Rate[1]		
Annual Costs		30	years O&M		*Years 2029-2058*
Access Controls		1	ea	$500	$500
Annual Inspection/Maintenance		1	ea	$18,650	$18,650
	Subtotal - 30 Year Annual Costs				$19,150
	Present Value Cost				**$400,805**
Five Year Costs		6			
Remedy Review		1	ea	$15,000	$15,000
Groundwater Monitoring - 4 wells		1	ea	$7,000	$7,000
Subtotal - Five Year O&M Costs					$15,000
	Present Value Cost				**$87,602**
	Total Present Value Direct O&M Cost				**$525,479**
Indirect O&M Costs					
Project/Admin Management		146%	of direct O&M		$767,199
Health & Safety		19%	of direct O&M		$99,841
Overhead		30%	of direct O&M + indirect O&M		$157,644
Contingency		20%	of direct O&M + indirect O&M		$102,468
	Total Present Worth Indirect O&M Cost				$1,127,152
	Total Estimated Present Worth O&M Cost				**$1,652,630**
	TOTAL ESTIMATED COST				**$7,327,969**

[1] *Interest rates for costs with 3-year and 30-year durations are based on SRNS Technical Memorandum ERTEC-2017-00002.*
Real Interest Rates for OMB Circular No. A-94 (12/28/23)
Treasury Notes and Bonds of Specified Maturities

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APPENDIX A

RESPONSIVENESS SUMMARY

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Responsiveness Summary

The 45-day (or 30-day) public comment period for the *Statement of Basis/Proposed Plan for the Select Coal Ash and Coal Fines at the A-Area Ash Pile (788-A) and A-Area Coal Pile Runoff Basin (788-3A), F-Area Ash Landfill (288-F), H-Area Ash Basin (288-H), K-Area Ash Basin (188-K), and L-Area Ash Basin (188-L) Operable Units (U)* began on start date and ended on end date.

Public Comments

Any comments received during the public comment period will be addressed in Revision 1 of the EA ROD.

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