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Second Early Action Record of Decision Remedial Alternative Selection for the D-Area Operable Unit (U)

SEMS Number: 63

SRNS-RP-2018-00461

Revision 1

July 2020

SAVANNAH RIVER SITE • AIKEN, SOUTH CAROLINA

DISCLAIMER

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

SECOND EARLY ACTION RECORD OF DECISION REMEDIAL ALTERNATIVE SELECTION (U)

D-Area Operable Unit (U)

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July 2020

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 SECOND EARLY ACTION RECORD OF DECISION

Unit Name and Location

D-Area Operable Unit (DAOU)
Superfund Enterprise Management System (SEMS) Identification Number: OU-SEMS 63
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 DAOU is listed as a Resource Conservation and Recovery Act (RCRA) 3004(u) Solid Waste Management Unit/CERCLA unit in Appendix C of the Federal Facility Agreement (FFA) for the SRS.

The FFA is a legally binding agreement between regulatory agencies (United States Environmental Protection Agency [USEPA]) and South Carolina Department of Health and Environmental Control [SCDHEC]) and regulated entities (USDOE) that establishes the responsibilities and schedules for the comprehensive remediation of SRS. The media associated with this operable unit (OU) are coal, coal-combustion waste (ash) and contaminated soil. Groundwater is not part of the DAOU. Groundwater is being addressed separately under the D-Area Groundwater OU.

Statement of Basis and Purpose

This decision document presents the selected early action (EA) remedy for the 488-1D Ash Basin (including Inlet Basins), 488-2D Ash Basin, 488-4D Ash Landfill and the 489-D Coal Pile Runoff Basin (CPRB) (Southern 75%) subunits of the DAOU, which is located at the SRS near Aiken, South Carolina. The remedy was chosen in accordance with CERCLA, as amended by the Superfund Amendments Reauthorization Act and, to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). This decision is based on the information contained in the Administrative Record File for this site.

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

Assessment of the Site

There has been a release of contaminants found in coal and coal-combustion waste (ash) at the DAOU into the environment. The response action selected in this Second EA Record of Decision (ROD) for the DAOU is necessary to protect the public health or welfare or the environment from actual or threatened releases of hazardous substances into the environment.

The DAOU is comprised of multiple subunits and includes both deactivation and decommissioning facilities and facilities associated with the former operation of the 484-D Powerhouse. Following a series of removal actions, an *Early Action Record of Decision Remedial Alternative Selection for the D-Area Operable Unit* (SRNS 2011) was issued in 2011 that selected land use controls (LUCs) as the final remedial action to prevent unrestricted use for the Bubble Tower Subunit, Moderator Processing Subunit, 489-D CPRB (Northern 25%), D-Area Asbestos Pit (including restrictions against land disturbance), and D-Area Process Sewer Lines as Abandoned inside the area fence.

This Second EA ROD document applies to the following four DAOU subunits: 488-1D Ash Basin (including Inlet Basins), 488-2D Ash Basin, 488-4D Ash Landfill, and the 489-D CPRB (Southern 75%). A range of alternatives were evaluated for each of these subunits through a series of removal action documents that support an accelerated cleanup strategy for the DAOU. These documents include a Removal Site Evaluation Report (RSER) for the time-critical removal action at the 488-2D Ash Basin and a RSER/Engineering Evaluation/Cost Analysis (EE/CA) for each of the non-time critical removal actions at the 488-1D Ash Basin, 488-4D Ash Landfill and the 489-D CPRB (Southern 75%). The removal actions selected include ash removal and installation of a geosynthetic cover system at the 488-1D Ash Basin; ash removal at the 488-2D Ash Basin; installation of a geosynthetic cover system at the 488-4D Ash Landfill; and excavation and disposal of coal residue and contaminated soil at the 489-D CPRB (Southern 75%). The selected removal actions for each subunit were made available for public notice and comment, and Action Memoranda were issued following the comment periods.

Hazardous substances will remain at the 488-1D Ash Basin, 488-2D Ash Basin, 488-4D Ash Landfill subunits of the DAOU at levels that pose a threat to human health and prevent unrestricted land use. The response action selected in this Second EA ROD for 488-1D Ash Basin, 488-2D

Ash Basin, and 488-4D Ash Landfill subunits is LUCs necessary to protect the public health or welfare or the environment from actual or threatened releases of hazardous substances into the environment. There are no problems warranting action at the 489-D CPRB (Southern 75%) and the Inlet Basins portion of the 488-1D Ash Basin subunit, and no LUCs are needed for these subunits.

Description of the Selected Remedy

The current land use for the DAOU is industrial with USDOE maintaining control of the land as long as necessary to keep the selected remedy fully protective of human health and the environment. The selected EA remedy under this Second EA ROD for the DAOU is LUCs to prevent unrestricted use for the 488-1D Ash Basin, 488-2D Ash Basin, and the 488-4D Ash Landfill.

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

- Prevent contact, removal, or excavation of coal and coal-combustion waste that is buried underneath the engineered cover systems as well as protect against disturbance of soil overlaying the caps;
- Prohibit the development and use of property for residential housing, elementary and secondary schools, child care facilities, and playgrounds;
- Maintain the integrity of any current or future remedial or monitoring systems, such as soil covers or groundwater monitoring wells; and
- Prevent construction of inhabitable buildings without an evaluation of indoor air quality to address vapor intrusion.
- Prevent construction of facilities or structures on/above the engineered cover systems.

The EA LUC remedy is the final remedial action for the 488-1D Ash Basin, 488-2D Ash Basin, and the 488-4D Ash Landfill. This remedy effectively balances short-term effectiveness, implementability, and cost criteria, while providing a high level of long-term protection to

hazardous contaminants that will remain at the site above levels that would allow for unrestricted use.

The selected remedial alternative for the 489-D CPRB (Southern 75%) and the Inlet Basins is No Action. In their current state, these subunits pose no unacceptable risk requiring a response action to human health and the environment and support unrestricted land use.

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

Statutory Determinations

The 488-1D Ash Basin, 488-2D Ash Basin, and the 488-4D Ash Landfill subunits of the DAOU pose a threat to human health and the environment. Therefore, Alternative 2, LUCs, has been selected as the remedy for these subunits of the DAOU. As part of the selected remedy, the future land use will be industrial. The selected remedial alternative for the 489-D CPRB (Southern 75%) and the Inlet Basins portion of the 488-1D Ash Basin is No Action. In their current state, these subunits pose no unacceptable risk requiring a response action to human health and the environment and support unrestricted land use.

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, 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 in this OU does not satisfy the statutory preference for treatment as a principal element of the remedy because treatment is unnecessary to achieve the remedial action objectives.

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 ROD with USEPA and SCDHEC review and approval.
- In addition, if the site is ever transferred to non-Federal 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 488-1D Ash Basin, 488-2D Ash Basin and 488-4D Ash Landfill subunits of the DAOU leaves hazardous substances in place that pose a potential future risk and will require land use restrictions for as long as necessary to keep the selected remedy fully protective of human health and the environment. As agreed on March 30, 2000, among the

USDOE, USEPA, and SCDHEC, SRS is implementing a Land Use Control Assurance Plan (LUCAP) to ensure that the LUCs required by numerous remedial decisions at SRS are properly maintained and periodically verified. The unit-specific Second EA Land Use Control Implementation Plan (EA LUCIP) incorporated by reference into this Second 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 Second EA ROD. The Second EA LUCIP, developed as part of this action, will be submitted as required in the FFA for review and approval by USEPA and SCDHEC. Upon final approval, the Second EA LUCIP will be appended to the LUCAP and is considered incorporated by reference into the ROD, establishing LUC implementation and maintenance requirements enforceable under CERCLA. The approved Second EA LUCIP will establish implementation, monitoring, maintenance, reporting, and enforcement requirements for the unit. The Second EA LUCIP will remain in effect until modifications are approved by the USEPA and SCDHEC as needed to be protective of human health and the environment. Second EA LUCIP modification will only occur through another CERCLA document.

Data Certification Checklist

This Second EA ROD provides the following information:

- Constituents of concern (COCs) (Section V);
- Baseline risk represented by the COCs (Section VII);
- Cleanup levels established for the COCs and the basis for the levels (Section VIII);
- Current and reasonably anticipated future land and groundwater use assumptions used in the Baseline Risk Assessment and Second 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); and

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

13 Aug 2020
Date

Jimmy E. McMillian
Assistant Manager for Infrastructure and Environmental Stewardship
U.S. Department of Energy
Savannah River Operations Office

CAROL MONELL Digitally signed by CAROL MONELL
Date: 2020.09.09 13:53:23 -04'00'

Date

Carol J. Monell
Director
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U.S. Environmental Protection Agency – Region 4

8-21-2020
Date

Henry J. Porter
Chief
Bureau of Land and Waste Management
South Carolina Department of Health and Environmental Control

DECISION SUMMARY
REMEDIAL ALTERNATIVE SELECTION (U)

D-Area Operable Unit (U)

SEMS Number: 63

SRNS-RP-2018-00461
Rev. 1
July 2020

Savannah River Site
Aiken, South Carolina

Prepared By:

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Aiken, South Carolina

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TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF APPENDICES

LIST OF ABBREVIATIONS AND ACRONYMS

~	approximate, approximately
>	greater than
ac	acre
AM	Action Memorandum
ARAR	applicable or relevant and appropriate requirement
ARF	Administrative Record File
BRA	Baseline Risk Assessment
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CFR	Code of Federal Regulation
cm	centimeters
CM	contaminant migration
COC	constituent of concern
CPRB	Coal Pile Runoff Basin
CSM	conceptual site model
DAG	D-Area Groundwater
DAOU	D-Area Operable Unit
EA	Early Action
EA SB/PP	Early Action Statement of Basis/Proposed Plan
EA ROD	Early Action Record of Decision
ECs	engineering controls
EE/CA	Engineering Evaluation/Cost Analysis
FFA	Federal Facility Agreement
FSP	Field Sampling Plan
ft	feet
ha	hectare
HQ	hazard quotient
ICs	institutional controls
in.	inches
IOU	Integrator Operable Unit
IWT	Industrial Wastewater Treatment
km	kilometer
km^2	square kilometer
LLC	Limited Liability Company
LUCs	Land Use Controls
LUCAP	Land Use Control Assurance Plan
LUCIP	Land Use Control Implementation Plan
m	meter
m^3	cubic meter
MCL	maximum contaminant level
mg/kg	milligram per kilogram
mg/L	milligram per liter
mi	mile
mi^2	square mile

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

NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NPDES	National Pollution Discharge and Elimination System
NTCRA	non-time critical removal action
O&M	Operations and Maintenance
OU	operable unit
PTSM	principal threat source material
RADP	Removal Action Design Plan
RAO	remedial action objective
RAR	Removal Action Report
RCRA	Resource Conservation and Recovery Act
RFI	RCRA Facility Investigation
RFI/RI	RCRA Facility Investigation/Remedial Investigation
RG	remedial goal
RI	Remedial Investigation
RM	River Marker
ROD	Record of Decision
RSER	Removal Site Evaluation Report
RSL	regional screening level
SAP	Sampling and Analysis Plan
SARA	Superfund Amendments Reauthorization Act
SB/PP	Statement of Basis/Proposed Plan
SCDHEC	South Carolina Department of Health and Environmental Control
SCHWMR	South Carolina Hazardous Waste Management Regulations
SEMS	Superfund Enterprise Management System
SRNS	Savannah River Nuclear Solutions, LLC
SRS	Savannah River Site
TCLP	toxicity characteristic leaching procedure
TCRA	time critical removal action
USDOE	United States Department of Energy
USEPA	United States Environmental Protection Agency
VOC	volatile organic compound
WOF	Waste Oil Facility
WSRC	Washington Savannah River Company, LLC
yd^3	cubic yards

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

Unit Name, Location, and Brief Description

D-Area Operable Unit (DAOU)
Superfund Enterprise Management System (SEMS)
Identification Number: OU-SEMS 63
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 (~) 803 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 ~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 DAOU as a Resource Conservation and Recovery Act (RCRA) Solid Waste Management Unit/CERCLA unit requiring further evaluation.

The DAOU was evaluated through an investigation process that integrates and combines the RCRA corrective action process with the CERCLA remedial process to determine the actual or potential impact to human health and the environment of releases of hazardous substances to the environment. Groundwater is not part of the DAOU. Groundwater is being addressed separately under the D-Area Groundwater (DAG) Operable Unit (OU). Groundwater use will continue to be restricted until the final ROD for the DAG OU is completed.

II. SITE AND OPERABLE UNIT COMPLIANCE HISTORY

SRS Operational and Compliance History

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

Hazardous waste materials handled at SRS are managed under RCRA, a comprehensive law requiring responsible management of hazardous waste. Certain SRS activities require South Carolina Department of Health and Environmental Control (SCDHEC) operating or post-closure permits under RCRA. SRS received a RCRA hazardous waste permit from the SCDHEC, which was most recently renewed on February 11, 2014. 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 (RFI) program with CERCLA requirements to provide for a focused environmental program. In accordance with Section 120 of CERCLA 42 United States Code Section 9620, USDOE has negotiated a FFA (FFA 1993) with United States Environmental Protection Agency (USEPA) and SCDHEC to coordinate remedial activities at SRS into one comprehensive strategy which fulfills these dual regulatory requirements. USDOE functions as the lead agency for remedial activities at SRS, with concurrence by the USEPA - Region 4 and the SCDHEC.

Operable Unit (OU) Operational and Compliance History

SRS produced special nuclear materials for the United States Department of Defense between 1952 and 1988. The reactors that were used to produce the nuclear materials required heavy water as a moderator to control the speed of neutrons in the reactor. The heavy water was produced at D Area on the SRS. D Area also contained the heavy water rework facility to purify the SRS inventory of used reactor moderator.

D Area is located in the southwest quadrant of the SRS, ~915-meters (m) (3,000-feet [ft]) east of the nearest site boundary, the Savannah River (Figure 2). The DAOU is ~85 hectares (ha) (210 acres [ac]) and contains surface units and source areas in D Area that are potentially responsible for contaminating groundwater. Groundwater is not part of the DAOU. Groundwater is currently being addressed separately under the DAG OU.

The DAOU is comprised of multiple subunits and includes both deactivation and decommissioning facilities and facilities associated with the former operation of the 484-D Powerhouse. It consists of three main facility areas: the 484-D Powerhouse, the D-Area Heavy Water Facility (i.e., bubble towers), and the Moderator Processing Facility (Figure 3). The facilities began operation in the early 1950s. The bubble towers were shut down in January 1982, the moderator processing facility remained operational until the late 1990s, and the 484-D Powerhouse (and associated support facilities) was shut down in April 2012.

An *Early Action Record of Decision Remedial Alternative Selection for the D-Area Operable Unit* (SRNS 2011) integrated the outcomes of the completed removal actions and selected the final action (land use controls [LUCs]) to prevent unrestricted use for the Bubble Tower Subunit, Moderator Processing Subunit, 489-D Coal Pile Runoff Basin (CPRB) (Northern 25%), D-Area Asbestos Pit (including restrictions against land disturbance), and D-Area Process Sewer Lines as Abandoned inside the area fence. The 2011 Early Action Record of Decision (EA ROD) documented that there were no problems warranting action for the 904-50G Outfall, electrical transformers, and miscellaneous buildings.

In 2013, the USDOE, USEPA, and SCDHEC agreed to add the 488-1D Ash Basin, 488-2D Ash Basin, and the 488-4D Ash Landfill as subunits of the DAOU. The ash basins were permitted and operated under the SCDHEC Industrial Wastewater Treatment (IWT) regulations (Permit #7295), and the ash landfill was permitted and operated under a Class Two Solid Waste Landfill (Permit #025800-1602). The USDOE, USEPA, and SCDHEC agreed to the submittal of three separate Removal Site Evaluation Report/Engineering Evaluation/Cost Analysis (RSER/EE/CA) documents and Action Memorandums (AMs) to perform the cleanup. The FFA documentation satisfies the substantive technical objectives of the closure plan requirements for these units. The applicable IWT operating permits have been terminated upon approval of the respective Removal Action Reports (RARs). The Solid Waste Landfill permit has been certified closed and will be managed consistent with the post closure phase of the SCDHEC permit as defined in the Applicable or Relevant and Appropriate Requirements (ARARs) until the remedial action specified in this Second EA ROD is implemented.

In 2015, the USEPA, SCDHEC, and USDOE approved deletion of the submittal of the Revision 1 RSER/EE/CA for the 489-D CPRB from the FFA and agreed that only the submittal of the Revised AM and a Removal Action Start milestone were necessary for the remaining portion of the 489-D CPRB (Southern 75%). The 489-D CPRB was permitted under IWT Permit #7295 during operation.

Because of the extensive scope, cost, and duration, these removal actions were divided into two major phases. Phase 1 included the 488-2D Ash Basin and the 488-4D Ash Landfill; Phase 2 included the 488-1D Ash Basin and the 489-D CPRB (Southern 75%) (Figure 4).

488-1D Ash Basin (including Inlet Basins)

The 488-1D Ash Basin was an unlined, earthen containment structure that was built generally on existing grade (ground elevation). Powerhouse ash slurry flowed via an ash sluice line from the 484-D Powerhouse into one of two Inlet Basins identified as Inlet Basin #1 (northern) and Inlet Basin #2 (southern), each ~1.2 ha (3 ac) in size. The bulk of ash settled out of the slurry in the Inlet Basins and the remaining waste water flowed into the

eastern end of the 488-1D Basin (~14 ha [35 ac]). As the waste water level increased in the 488-1D Ash Basin, the waste water flowed through a pipe located at the western end of the basin into the 488-2D Ash Basin for polish settling of any remaining solids. Figure 5 shows the relationship of the wastewater flow between the basins.

When the Inlet Basin(s) were filled to capacity, the dry ash was excavated, trucked and placed into the 488-4D Ash Landfill for final disposal. This operation ended when the 484-D Powerhouse was removed from service in 2012. Following cessation of the 484-D Powerhouse operations, only wash water was received in the Inlet Basins for approximately six months during the 484-D Powerhouse deactivation activities. The area impacted by the presence of ash (including the 2.4-ha [6-ac] Inlet Basins) is ~16 ha (40 ac). Ash historically contains unacceptable levels of contaminants that require remediation to meet cleanup requirements.

The *Removal Site Evaluation Report/Engineering Evaluation/Cost Analysis (RSER/EE/CA) for the D-Area Ash Basin (488-1D)* (SRNS 2016a) identified the objectives of the removal action for the 488-1D Ash Basin, described alternatives that address the potential threats from release of contaminants to the environment, identified ARARs for each alternative presented, and provided a vehicle for public comment. The preferred removal action, Alternative 2 – Ash Consolidation and Geosynthetic Cover System, provided the best balance of tradeoffs among the other alternatives with respect to the evaluation criteria. The AM was submitted on August 17, 2016 (USDOE 2016a) with a Removal Action Start Date of August 25, 2016 (USDOE 2016b).

The National Oil and Hazardous Substances Pollution Contingency Plan (NCP) requires compliance with ARARs during removal actions to the extent practicable considering the exigencies of the situation. The selected removal action complied with all action- and location-specific ARARs identified in Table 1 of the June 2016 RSER/EE/CA for the 488-1D Ash Basin. The action-specific ARARs included South Carolina requirements for managing storm water run-off and fugitive dust emissions during land-disturbing activities; RCRA waste characterization, storage and disposal requirements; and South Carolina

regulations limiting discharges of pollutants to waters of the State. The capping and closure of the 488-1D Ash Basin also complies with State and Federal requirements for closure and post-closure care of South Carolina Class III landfills, including minimum standards for landfill cover design and construction, run-on and run-off controls during and after closure, and post-closure groundwater monitoring. Implementation of the selected alternative also complied with on and off-site waste transportation ARARs, and location-specific ARARs for protection of migratory birds under the Migratory Bird Treaty Act.

The removal action for the 488-1D Ash Basin was conducted in accordance with the *Removal Action Design Plan (RADP) for the 488-1D Ash Basin and 489-D Coal Pile Runoff Basin* (SRNS 2016b). After dewatering and vegetation removal, the ash in the 488-1D Ash Basin was consolidated into the eastern portion of the basin and a new berm installed along the western side interface. A geosynthetic cover was installed over the ash consolidation area ~7.9 ha (19.4 ac). A vegetative layer (sod) was placed over the geosynthetic cover. The cover system is compliant with the SCDHEC Class Three Solid Waste Landfill cover requirements. The western portion of the basin ~6.5 ha (16 ac) is covered with soil and graded to direct storm water away from the basin into an existing ditch at the southwest corner of the 488-1D Ash Basin.

The 488-1D Ash Basin subunit includes the ash sluicing lines. These above ground lines ran from the 484-D Powerhouse to the Inlet Basins at the 488-1D Ash Basin. Removal of these lines included 25.4-centimeters (cm) (10-inch [in.]) cast iron and fiberglass pipe, 20.3 cm (8-in.) carbon steel pipe, and a temporary 15.2-cm (6-in.) polyvinyl chloride pipe. These materials were dispositioned at an approved disposal facility (Three Rivers Landfill). The sluicing lines were removed during Phase 1 construction activities. Documentation is provided in the *Removal Action Report for the 488-2D Ash Basin and 488-4D Ash Landfill* (SRNS 2017a).

Ash was removed from the two Inlet Basins and placed in the 488-1D Ash Basin. The Inlet Basin area was graded to provide sheet flow drainage to an existing ditch located along the east side of the Inlet Basins. The *Removal Action Report for the 488-1D Ash Basin and*

489-D Coal Pile Runoff Basin (SRNS 2019a) documents the construction activities and as-built condition of the 488-1D Ash Basin and Inlet Basins.

The closure activities for the 488-1D Ash Basin required the abandonment of several monitoring wells and piezometers. Federal Energy Regulatory Commission wells/ piezometers installed for monitoring berm stability that were abandoned include DA 4C, DB 5C, DA 7C, DB 6C, DA 11C, DB 10C, DA 12C, DB 13C, DA 14C, and DB 15C. In addition, piezometer P-06, installed as part of early basin closure activities, was abandoned. Two new wells (DCB081 and DCB082) were installed down gradient of the 488-1D Ash Basin geosynthetic cover system. As required by the regulations (R.61-71, Well Standards), all well abandonments and installations were approved by SCDHEC. The USEPA was included on all correspondence concerning the well abandonments and installations. Figure 6 shows both the new and abandoned wells around the 488-1D Ash Basin. Well installation and abandonment records are provided in the *Removal Action Report for the 488-1D Ash Basin and 489-D Coal Pile Runoff Basin* (SRNS 2019a).

Confirmatory sampling was performed in both of the Inlet Basins, western end of the 488-1D Ash Basin, and an area exterior to the 488-4D Ash Landfill in accordance with the *Confirmation Sampling and Analysis Plan* (SAP*) for Coal and/or Ash Removal at the Savannah River Site* (SRNS 2014a), the *Field Sampling Plan for the 488-1D Ash Basin* (SRNS 2015a) and the *Field Sampling Plan (FSP) for the D-Area 488-1D Inlet Basins* (SRNS 2014b). The confirmation sample results were evaluated to demonstrate successful ash removal in the *Human Health and Ecological Evaluation for Confirmation Sampling at the 488-1D Ash Basin and Inlet Basins* (SRNS 2019b). All of the confirmation sample results for the 488-1D Ash Basin and Inlet Basins are presented in that report (SRNS 2019b).

The *Removal Action Report (RAR) for the 488-1D Ash Basin and 489-D Coal Pile Runoff Basin* (SRNS 2019a) documents the construction activities and as-built condition of the 488-1D Ash Basin and Inlet Basins. Figure 7 is an aerial photograph showing the 488-1D

Ash Basin in October 2013 before initiation of the removal action, and Figure 8 is a photograph of the same area in October 2018 after removal action completion.

Completion of the removal action addressed the problems warranting action for human and ecological receptors in surface ash as well as the potential for contaminant migration (CM) to groundwater identified prior to any early action (EA) construction activities.

488-2D Ash Basin

The 488-2D Ash Basin served as the final settling stage for the treatment of the 484-D Powerhouse operation ash contaminated wastewater. This basin received the overflow waste water from the 488-1D Ash Basin and provided final settling of the solids as the water flowed from the western end of the 488-2D Ash Basin to the discharge pipe located at the eastern end of the 488-2D Ash Basin. As the water flowed from west to east, the flow distance, along with the settling velocity of solids, provided sufficient removal of any remaining solids to ensure compliance with the National Pollution Discharge and Elimination System (NPDES) discharge permit at Outfall D-01C. The 488-2D Ash Basin discharged the treated water into the D-Area Discharge Canal at the D-01C Outfall which eventually flowed into Beaver Dam Creek. Figure 5 shows the relationship of the wastewater flow between the basins.

A time-critical *Removal Site Evaluation Report (RSER) for the D-Area Ash Basin (488-2D*) (SRNS 2014c) was submitted to the USEPA and SCDHEC to dewater and remove the bulk ash from the basin that was essential to reduce the risk to human health and the environment and to maintain the DAOU construction and closure schedule. The *Action Memorandum for the Time-Critical Removal Action for the D-Area Ash Basin (488-2D)* (USDOE 2014a) was submitted on October 28, 2014, with a Removal Action Start Date of October 14, 2014 (USDOE 2014b).

The NCP requires compliance with ARARs during removal actions to the extent practicable considering the exigencies of the situation. ARARs associated with implementation of the removal action are identified in Table 2 of the September 2014

RSER for the 488-2D Ash Basin. Key ARARs that were complied with during implementation of the removal action include the South Carolina requirements for managing storm water run-off and fugitive dust emissions during land-disturbing activities; temporary waste storage requirements; and South Carolina regulations limiting discharges of pollutants to waters of the State. The closure of the 488-2D Ash Basin also complies with State and Federal requirements for closure of a permitted waste treatment facility. Implementation of the selected alternative also complied with location-specific ARARs for protection of migratory birds under the Migratory Bird Treaty Act.

The removal action for the 488-2D Ash Basin was conducted in accordance with the *Removal Action Design Plan (RADP) for the 488-4D Ash Landfill and the 488-2D Ash Basin* (SRNS 2015b). After dewatering, the ash and contaminated sediment/soils from the basin bottom and embankment along the entire length of the northern berm were excavated and consolidated in the 488-4D Ash Landfill. Approximately 0.3-m (1-ft) average depth of ash fines and 0.3-m (1-ft) average depth of contaminated sediment/soils were removed from across the 488-2D Ash Basin bottom. Approximately 69,420 cubic meters (m^3) (90,800 cubic yards [yd^3]) of ash from the 488-2D Ash Basin was placed into the 488-4D Ash Landfill; this volume includes an area of ash excavated from the west (outer edge) of the 488-4D Ash Landfill.

Fill was placed in the 488-2D Ash Basin (~6 ha [15 ac]) and was re-graded, sloped appropriately and converted into a storm water detention structure. A detention structure is a permanent storm water management structure whose primary purpose is to temporarily store storm water runoff and release the stored runoff at controlled rates. This detention structure is designed and constructed to serve as a storm water conveyance system as part of the post-closure ARARs specific to the 488-4D Ash Landfill. The RAR for the 488-2D Ash Basin and 488-4D Ash Landfill (SRNS 2017a) documents the construction activities and as-built condition of the 488-2D Ash Basin.

Confirmation samples were collected and evaluated to demonstrate that the ash had been successfully removed in accordance with the *Confirmation Sampling and Analysis Plan*

for Coal and/or Ash Removal at the Savannah River Site (SRNS 2014a) and the *Field Sampling Plan for the 488-2D Ash Basin* (SRNS 2015c). The confirmation sample results were evaluated in the *Human Health and Ecological Evaluation for Confirmation Sampling at the 488-2D Ash Basin* (SRNS 2016c). All of the confirmation sample results for the 488-2D Ash Basin are presented in that report (SRNS 2016c).

The *Removal Action Report for the 488-2D Ash Basin and 488-4D Ash Landfill,* (SRNS 2017a) documents the construction activities and as-built condition of the 488-2D Ash Basin. Figure 7 is an aerial photograph showing the 488-2D Ash Basin in October 2013 before initiation of the removal action, and Figure 8 is a photograph of the same area in October 2018 after removal action completion.

Completion of the removal action addressed the problems warranting action for human and ecological receptors in surface ash that were identified prior to any early action construction activities.

488-4D Ash Landfill

The 488-4D Ash Landfill was an 8.9-ha (22-ac) basin that was initially part of the SRS As-Built Construction Permit #7295 and the associated 1991 SRS permit-to-operate for existing SRS wastewater facilities. Per agreement with SCDHEC, the basin was re-permitted in November 2007 as a Class Two Solid Waste Landfill under Solid Waste Landfill Permit #025800-1602 to accept ash waste for disposal. All storm water drainage was directed into the infiltration basin located within the western end of the landfill which had an overflow channel that directed any contaminated water to the 488-2D Ash Basin for treatment (settling). The water was combined with the 488-1D Ash Basin waste water, treated per the 488-2D Ash Basin IWT permit, and released through NPDES Outfall D-01C.

An ash waste characterization report was approved by SCDHEC in 2004 requiring ash characterization to be completed every six years. In 2009, a one-time approval was granted by SCDHEC to dispose of dredge spoils from the 681-3G (Downstream Water Pump

House for 100 Area) and 681-5G (Water Pump House for 400 Area) into the 488-4D Landfill. In 2010, characterization of the coal ash from the 484-D Powerhouse indicated that arsenic levels would exceed the regulatory threshold for a Class Two Solid Waste Landfill. In 2011, the USDOE, USEPA, and SCDHEC agreed to add the 488-4D Ash Landfill to the FFA to satisfy substantive technical objectives of the Solid Waste Closure Plan requirements for the Class Two Solid Waste Landfill permit. The coal ash was placed in the 488-4D Ash Landfill.

In 2012, coal from the D-Area Coal Storage Area (484-17D) was excavated and placed into the 488-4D Ash Landfill for disposal. This excavated material may have included coal-reject material that contained manganese and arsenic at concentrations exceeding the regulatory threshold for a Class Two Solid Waste Landfill. In May 2013, SCDHEC approved the disposal of non-hazardous solids from the nearby D-Area Surge Basin (483-6D) into the 488-4D Ash Landfill. Characterization of the surge basin solids indicated that manganese, aluminum, and iron exceeded the regulatory threshold for a Class Two Solid Waste Landfill. As a result, SCDHEC reiterated in 2013 their requirement that the 488-4D Landfill be closed with a SCDHEC Class Three Landfill cover.

The *Removal Site Evaluation Report/Engineering Evaluation/Cost Analysis (RSER/ EE/CA) for the D-Area Ash Landfill (488-4D)* (SRNS 2014d) was submitted in June 2014. The RSER/EE/CA identified the objectives of the removal action for the 488-4D Ash Landfill, described alternatives that address the potential threats from release of contaminants to the environment, identified ARARs for each alternative presented, and provided a vehicle for public involvement. The removal action for the 488-4D Ash Landfill was conducted in accordance with the *Removal Action Design Plan (RADP) for the 488-4D Ash Landfill and the 488-2D Ash Basin* (SRNS 2015b). The AM and *Responsiveness Summary for the Non-Time Critical Removal Action for the D-Area Ash Landfill (488-4D)* was submitted on August 11, 2014 (USDOE 2014c). The Removal Action Start Date was September 2, 2014 (USDOE 2014d).

The NCP requires compliance with ARARs during removal actions to the extent practicable considering the exigencies of the situation. The selected removal action complied with all action- and location-specific ARARs identified in Appendix A of the June 2014 RSER/EE/CA for the 488-4D Ash Landfill. The action-specific ARARs included South Carolina requirements for managing storm water run-off and fugitive dust emissions during land-disturbing activities; RCRA waste characterization, storage and disposal requirements; and South Carolina regulations limiting discharges of pollutants to waters of the State. The capping and closure of the 488-4D Ash Landfill also complies with State and Federal requirements for closure and post-closure care of South Carolina Class III landfills, including minimum standards for landfill cover design and construction, run-on and run-off controls during and after closure, and post-closure groundwater monitoring. The selected alternative also complied with on and off-site waste transportation ARARs, and location-specific ARARs for protection of migratory birds under the Migratory Bird Treaty Act.

Under the removal action, excavated ash from the 488-2D Ash Basin was placed in the 488-4D Ash Landfill. The landfill was graded to achieve proper slope elevations and the infiltration basin located at the western end of 488-4D Ash Landfill was dewatered and filled in. Side slopes were graded to obtain proper slopes for drainage and stabilization (where necessary). A geosynthetic cover was applied over the entire 488-4D Ash Landfill (~8.9 ha [22 ac] including the infiltration basin). A vegetative layer (sod) was placed over the geosynthetic cover. The cover system is compliant with the SCDHEC Class Three Solid Waste Landfill cover requirements.

No confirmation samples were required at the 488-4D Ash Landfill because there were no excavation activities associated with the removal action for this subunit.

A total of five (5) wells (DCB 16R, DCB 47C, DCB075, DCB076 and DCB 13R) were abandoned for the construction activities related to the Phase 1 (488-4D Ash Landfill and 488-2D Ash Basin) removal activities. Four replacement wells (DCB077, DCB078, DCB079 and DCB080) were installed around the 488-4D Ash Landfill. As required by

SCDHEC regulations (R.61-71, Well Standards), all well abandonments and installations were approved by SCDHEC. The USEPA was included on all correspondence concerning the well abandonments and installations. Figure 6 shows both new and abandoned wells around the 488-4D Ash Landfill. Well installation and abandonment records are provided in the *Removal Action Report for the 488-2D Ash Basin and 488-4D Ash Landfill* (SRNS 2017a).

The *Removal Action Report for the 488-2D Ash Basin and 488-4D Ash Landfill* (SRNS 2017a) documents the construction activities and as-built condition of the 488-4D Ash Landfill. Figure 7 is an aerial photograph showing the 488-4D Ash Landfill in October 2013 before initiation of the removal action, and Figure 8 is a photograph of the same area in October 2018 after removal action completion.

Completion of the removal action addressed the problems warranting action for human and ecological receptors in surface ash as well as the potential for CM to groundwater identified prior to any early action construction activities.

489-D CPRB (Southern 75%)

The 489-D CPRB is located in the southern portion of the DAOU and is ~5.7 ha (14 ac) in size. During operation of the 484-D Powerhouse, runoff storm water from the 484-17D Coal Storage Area was collected through a network of drainage ditches and flowed to the 489-D CPRB via storm sewers for settling. The *RCRA Facility Investigation/Remedial Investigation (RFI/RI) Work Plan and RFI/RI Report with Baseline Risk Assessment for the D-Area Operable Unit* (SRNS 2009) concluded that arsenic in 489-D CPRB sediment posed an unacceptable risk for future industrial workers, and arsenic and 2-methylnapthalene posed a risk for ecological receptors. In addition, metals and low pH presented an ecological risk for aquatic receptors in surface water. On December 21, 2009, an AM was issued to document the preferred removal action for the 489-D CPRB to include consolidation of contaminated sediments, placement of a soil cover, and LUCs (USDOE 2009). Because the 484-D Powerhouse would still be active when the removal action began in April 2011, a revised AM was issued on August 26, 2010, to segment the

489-D CPRB into a northern and southern section (USDOE 2010). The Northern 25% section of the 489-D CPRB was addressed by the removal action, and the Southern 75% section remained active during 484-D Powerhouse operations. As documented in the August 2010 Revised AM, the second phase for remediation of the Southern 75% section would be implemented after the operations of the 484-D Powerhouse ceased, and storm water runoff was no longer received from the active 484-17D Coal Storage Area. In 2013, the storm water sewer line was diverted to prevent storm water runoff originating from the 484-17D Coal Storage Area from entering the Southern 75% section of the 489-D CPRB.

The *Revision 3 AM for the Non-Time Critical Removal Action for the D-Area CPRB (489-D)*, dated August 11, 2015, identified the removal action of excavation and disposal with unrestricted land use for the Southern 75% section (USDOE 2015a), and a Removal Action Start Date of September 10, 2015, was achieved (USDOE 2015b).

The NCP requires compliance with ARARs during removal actions to the extent practicable considering the exigencies of the situation. Table 1 of the Revision 3 AM identifies all ARARs related to the removal action at the 489-D CPRB (Southern 75%). The action-specific ARARs included South Carolina requirements for managing storm water run-off and fugitive dust emissions during land-disturbing activities; RCRA waste characterization, storage and disposal requirements; and South Carolina regulations limiting discharges of pollutants to waters of the State. Implementation of the selected alternative also complied with on and off-site waste transportation ARARs, and location-specific ARARs for protection of migratory birds under the Migratory Bird Treaty Act as well as threatened and endangered wildlife under the Endangered Species Act.

The removal action for the Southern 75% of the 489-D CPRB was completed in accordance with the *Removal Action Design Plan (RADP) for the 488-1D Ash Basin and 489-D Coal Pile Runoff Basin* (SRNS 2016b). After dewatering, ~17,620 m^3 (23,050 yd^3) of coal fines and contaminated sediments from the basin were excavated, transferred and consolidated within the eastern end of the 488-1D Ash Basin. The material was toxicity characteristic

leaching procedure (TCLP) sampled prior to transporting the material to the 488-1D Ash Basin. No sample results of the coal fines exceeded the TCLP limits.

Confirmation sampling to verify that the coal fines were successfully removed was conducted in accordance with the *Confirmation Sampling and Analysis Plan (SAP) for Coal and/or Ash Removal at the Savannah River Site* (SRNS 2014a) and the *Field Sampling Plan (FSP) for the 489-D Coal Pile Runoff Basin* (SRNS 2015d). The *Human Health and Ecological Evaluation for Confirmation Sampling at the 489-D Coal Pile Runoff Basin* (SRNS 2017b) evaluated a total of 23 confirmation sample results to demonstrate that the coal had been successfully removed from the basin and the remaining soils are below human health and ecological risk-based threshold levels. All of the confirmation sample results for the 489-D CPRB (Southern 75%) are presented in that report (SRNS 2017b).

Once the coal fine removal was confirmed, clean soil was placed in the basin and the area was contoured and re-graded as described in the RADP (SRNS 2016b). The remediated basin is defined as a storm water retention structure in the end-state condition. (A retention structure is a permanent structure whose primary purpose is to permanently store a given volume of storm water runoff; release of the given volume is by infiltration and/or evaporation). The *Removal Action Report (RAR) for the 488-1D Ash Basin and 489-D Coal Pile Runoff Basin* documents the construction activities and as-built condition of the Southern 75% of the 489-D CPRB (SRNS 2019a). Figure 7 is an aerial photograph showing the 489-D CPRB in October 2013 before initiation of the removal action, and Figure 8 is a photograph of the same area in October 2018 after removal action completion.

Completion of the removal action addressed both the surface sediment and surface water problems warranting action for human and ecological receptors that were identified prior to any early action construction activities.

A *Corrected Revision 1 Focused Corrective Measures Study/Feasibility Study Letter in Support of the D-Area Operable Unit* was submitted in October 2019 (USDOE 2019). The letter provides information regarding the evaluation of remedial alternatives for the

subunits of the DAOU that are within the scope of this Second EA ROD for the DAOU. The alternative evaluation supports the USDOE, USEPA, and SCDHEC agreement on the preferred remedy for the 488-1D Ash Basin, 488-2D Ash Basin, 488-4D Ash Landfill, and 489-D CPRB (Southern 75%) identified in the *Early Action Statement of Basis for the D-Area Operable Unit* (SRNS 2019c). The remedy selected in this Second EA ROD does not contain any significant changes from the preferred alternative presented in the EA Statement of Basis/Proposed Plan (SB/PP).

III. HIGHLIGHTS OF COMMUNITY PARTICIPATION

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

The SRS FFA Community Involvement Plan (WSRC 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 D-Area Operable Unit* (SRNS 2019c), a part of the ARF, highlights key aspects of the investigation and identifies the preferred action for addressing the DAOU.

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

US Department of Energy
Public Reading Room
Gregg-Graniteville Library
University of South Carolina – Aiken
471 University Parkway
Aiken, South Carolina 29803
(803) 641-3504

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

The RCRA ARF for SCDHEC is available for review by the public at the following locations:

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

The South Carolina Department of Health and Environmental Control
Aiken Environmental Affairs Office
206 Beaufort Street, Northeast
Aiken, South Carolina 29801
(803) 642-1637

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

The EASB/PP 45-day public comment period began on March 10, 2020, and ended on April 23, 2020. A Responsiveness Summary, prepared to address any comments received during the public comment period, is provided in Appendix A of this ROD. A Responsiveness Summary will also be available with the final RCRA permit.

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 DAOU is located within the Savannah River and Floodplain Swamp watershed (Figure 2).

In 2003, a new completion strategy for environmental restoration at SRS was developed to accelerate cleanup completion. A key component of the plan is to implement an area-by-area remediation strategy. Through the sequencing of environmental restoration and decommissioning activities, environmental cleanup can be completed for entire areas of the SRS. The USDOE, USEPA, and SCDHEC have agreed that using the Area OU strategy to manage surface units at the DAOU was appropriate and the waste units and facilities in the area were consolidated to form a single area OU.

Completion of the DAOU is being implemented through a series of removal actions and early final actions to accommodate response implementation commensurate with changing missions and evolving budgets. An EA ROD (SRNS 2011) was approved in August 2011 to document final remedial decisions for portions of the DAOU. The future missions of the 484-D Powerhouse and ancillary facilities were still being developed at that time and issuance of a final ROD for all remaining portions of the DAOU was not achievable by the (previously) approved FFA ROD issuance date in 2016. For this reason, the USDOE, USEPA and SCDHEC agreed to issue a Second EA ROD by November 2020 to document the final remedial actions for the remaining portions of the DAOU with the exception of the 484-D Powerhouse and ancillary facilities. The final action ROD issuance date for completion of the DAOU is scheduled for January 2046 and is based on the remedial decisions for the remaining DAOU subunits and completion of deactivation and decommissioning in D Area. The administrative paths for all D-Area components are identified in Table 1.

V. OPERABLE UNIT CHARACTERISTICS

Coal-fired facilities were in operation on the SRS since the early 1950s into the early 2010s, and there are multiple coal and/or ash piles and basins across the Site, as well as some areas of coal-combustion waste spills/overflow. Environmental characterization studies, risk assessments, and remediations have been performed for many of these areas at the SRS. Acceptable cleanup and closure of these sites requires knowledge of the contamination levels, and SRS possesses significant process and historical information regarding the coal and/or ash media associated with operation of these facilities.

There had not been any prior CERCLA documentation specific to the 488-1D Ash Basin, 488-2D Ash Basin and 488-4D Ash Landfill subunits before submittal of the removal action documents (SRNS 2016a, SRNS 2014c, SRNS 2014d, respectively) for each subunit. However, previous remedial investigations (RIs) and baseline risk assessments (BRAs) performed by SRS yield consistent conclusions for coal and/or ash contaminated media which typically contain toxic metals, such as arsenic, and naturally-occurring radionuclides. These historical results were used to presumptively identify the problems warranting action at these subunits. Based on this historical information, the USDOE, USEPA, and SCDHEC concluded that the 488-1D Ash Basin, 488-2D Ash Basin and the 488-4D Ash Landfill contained unacceptable levels of contaminants, (including arsenic and naturally-occurring radionuclides) that require remediation to meet CERCLA cleanup requirements.

The removal actions for three of the DAOU subunits (488-1D Ash Basin, 488-2D Ash Basin and 489-D CPRB) involved excavation of ash or coal media. Confirmation sampling was performed at the completion of the excavation/removal activities as an additional line of evidence to support visual inspection of coal and /or ash removal and to confirm that coal/ash related constituents do not remain in sediment/soil. The *Confirmation Sampling and Analysis Plan for Coal and/or Ash Removal at the Savannah River Site* (SRNS 2014a) outlined the project data quality objectives and human health risk-based threshold levels for the historical constituents of concern at SRS as well as potential constituents of concern (COCs) that may be associated with coal ash media from the draft document *Human and*

Ecological Risk Assessment of Coal Combustion Wastes (USEPA 2010). The historical COCs at SRS included arsenic, potassium-40, radium-226, radium-228, thorium-228, uranium-235 and uranium-238. In addition to arsenic, the potential COCs included aluminum, antimony, barium, beryllium, boron, cadmium, chromium, hexavalent chromium, cobalt, copper, iron, lead, magnesium, manganese, mercury, molybdenum, nickel, selenium, silver, strontium, thallium, vanadium and zinc (USEPA 2010). Human health risk based threshold levels for an unrestricted land use scenario (i.e., residential) were developed for each of these 30 (total) constituents (24 metals and 6 radionuclides). The residual concentrations of all 30 analytes were evaluated using the cleanup levels documented in the *Confirmation Sampling and Analysis Plan for Coal and/or Ash Removal at the Savannah River Site* for unrestricted land use (SRNS 2014a). Ecological risk based thresholds were also developed and are presented in each technical evaluation document (SRNS 2016c, SRNS 2017b and SRNS 2019b).

Characterization/confirmation sampling information is summarized below.

Inlet Basins Ash Sampling

The 2010 ash characterization of the D-Area Powerhouse ash collected from the 488-1D Inlet Basins indicated that arsenic levels exceeded the regulatory threshold for a Class Two Solid Waste Landfill. The data indicates arsenic TCLP values of 0.11, 0.12 and 0.13 milligram per liter (mg/L) were detected and exceeded the ten times (10X) maximum contaminant level (MCL) threshold value (the South Carolina regulatory threshold for Class Two Landfills). No other constituents exceeded the 10X MCL threshold. No constituents exceed the RCRA thresholds for toxicity characteristic hazardous waste. Excerpts from the Waste Characterization Report are provided in the RSER/EE/CA for the 488-1D Ash Basin (SRNS 2016a).

488-1D and 488-2D Ash Basin Sampling

Additional characterization of the 488-1D and 488-2D Ash Basins was performed in 2012. No constituents had a TCLP value that exceeded the 10X MCL threshold at the 488-1D Basin, but arsenic (concentrations = 0.112 and 0.106 mg/L) exceeded the 10X MCL

threshold at the 488-2D Ash Basin. In addition, a total metals analysis was performed for the RCRA metals at both basins. Arsenic (maximum concentration = 64.3 mg/kg) was the only constituent that exceeded the SRS maximum background concentration (in both the 488-1D and 488-2D Ash Basins). No constituents exceed the RCRA thresholds for toxicity characteristic hazardous waste. This information is provided in the RSER/EE/CA for the 488-1D Ash Basin (SRNS 2016a).

488-1D Ash Basin and Inlet Basin Surface Water Sampling

In December 2015, two surface water samples from the Inlet Basins (one sample per basin) and two surface water samples from the 488-1D Ash Basin were collected. A portion of each of these samples was filtered in the field in an effort to evaluate potential issues related to turbidity. The samples were analyzed for target analyte list inorganics and target compound list volatile organic compounds (VOCs), semi-VOCs and pesticides/ polychlorinated biphenyls. Only the metal constituents were detected in the surface water samples. The concentrations of beryllium (0.010 mg/L) and cadmium (0.0129 mg/L) exceed the MCL in Inlet Basin #1. Cobalt (0.337 mg/L) and manganese (7.08 mg/L) also exceed the tapwater regional screening level (RSL) in this basin. There are no MCL/RSL exceedances from Inlet Basin #2 or for either of the surface water samples from the 488-1D Ash Basin. This information is provided in the RSER/EE/CA for the 488-1D Ash Basin (SRNS 2016a).

488-2D Ash Basin Surface Water Sampling

In May 2014, two surface water samples were obtained from the 488-2D Ash Basin. The samples were analyzed for target analyte list inorganics and target compound list VOCs, semi-VOCs and pesticides/polychlorinated biphenyls. Only the metal constituents were detected in the surface water samples. A comparison of the maximum detected results to MCLs/ RSLs is provided in the RSER for the 488-2D Ash Basin (SRNS 2014c). None of the maximum detected concentrations exceeded the MCL/RSL threshold levels.

488-4D Ash Landfill

In 2009, a one-time approval was granted by SCDHEC to dispose of dredge spoils from the 681-3G (Downstream Water Pump House for 100 Area) and 681-5G (Water Pump House for 400 Area) into the 488-4D Landfill. Savannah River sediment data from locations upstream (River Marker [RM] 160 and RM 157.2) of these intakes were included as part of the 2008 approval request package. It was concluded that the radiological levels at the upstream sample locations were insignificant and representative of background levels. All data are readily available in the SRS Environmental Report for 2007 (WSRC 2008).

The 2010 ash characterization of the D-Area Powerhouse ash indicated that arsenic levels exceeded the regulatory threshold for a Class Two Solid Waste Landfill. In 2013, approval was granted by SCDHEC to dispose of material from the D-Area Coal Storage Area (484-17D) and D-Area Surge Basin (483-6D) into the 488-4D Ash Landfill. Coal from the D-Area Coal Storage Area (484-17D) likely contained coal reject material. Characterization of this material indicated manganese in the coal/coal reject material from the D-Area Coal Storage Area (484-17D) exceeded the regulatory threshold for a Class Two Solid Waste Landfill. The D-Area Surge Basin (483-6D) characterization indicates that manganese, aluminum and iron exceed the regulatory threshold for a Class Two Solid Waste Landfill. The waste material from these locations was placed in the 488-4D Ash Landfill.

Excerpts from the Waste Characterization Reports, including the results of the TCLP analysis for the D-Area Powerhouse, D-Area Coal Storage Area (484-17D), and the D-Area Surge Basin (483-6D) are provided in the RSER/EE/CA for the 488-4D Ash Landfill (SRNS 2014d).

Ash Located Exterior to the 488-4D Ash Landfill Sampling

Two samples were collected from ash located exterior to the east end of the 488-4D Ash Landfill in December 2015. Results of the TCLP analysis are presented in the RSER/EE/CA for the 488-1D Ash Basin (SRNS 2016a). Detected constituents included

arsenic, barium, boron, cadmium, chromium, selenium and thallium. No constituents exceed the RCRA thresholds for toxicity characteristic hazardous waste. This material was placed into the eastern portion of the 488-1D Ash Basin with a geosynthetic cover.

489-D CPRB Sampling (Coal Residue and Surface Water)

The *RCRA Facility Investigation/Remedial Investigation (RFI/RI) Work Plan and RFI/RI Report with Baseline Risk Assessment for the D-Area Operable Unit* (SRNS 2009) concluded that the 489-D CPRB sediment posed an arsenic risk for future industrial workers and arsenic and 2-methylnaphthalene posed a risk for ecological receptors (sediment dwelling organisms). Arsenic was detected at concentrations ranging from 2.02 to 158 milligram per kilogram (mg/kg) with an average of 22.6 mg/kg. 2-Methylnaphthalene was detected at concentrations ranging from non-detect to 2.4 mg/kg with an average of 0.68 mg/kg. Sample results from locations that correspond to the 75% southern section of the 489-D CPRB that were placed in the eastern portion of the 488-1D Ash Basin (under the geosynthetic cover system) are presented in RSER/EE/CA for the 488-1D Ash Basin (SRNS 2016a).

The RFI/RI/BRA also concluded that surface water was impacted with aluminum (maximum = 70.5 mg/L), cobalt (maximum = 0.4 mg/L), copper (maximum = 0.495 mg/L), iron (maximum = 152 mg/L), manganese (maximum = 5.0 mg/L) and zinc (maximum = 1.66 mg/L) at concentrations that posed a risk to aquatic organisms. In addition, the low pH conditions posed a risk to aquatic organisms, mammals and birds.

A portion of the 489-D CPRB was sampled in 2000 for TCLP analysis as part of a maintenance action. This information is provided in the RSER/EE/CA for the 488-1D Ash Basin (SRNS 2016a). Barium (0.096 mg/L), chromium (0.0111 mg/L), and silver (0.0084 mg/L) were the only constituents detected; none of these exceeded the RCRA thresholds for toxicity characteristic hazardous waste.

In November 2016, soil/coal fines were staged for TCLP sampling prior to placement in 488-1D Ash Basin. Material from each of the staged piles was composited into three separate samples and submitted to the laboratory for TCLP analysis. Only one constituent,

barium, was detected. The maximum detected concentration of 0.159 mg/L is below the regulatory threshold of 100 mg/L for toxicity characteristic hazardous waste. These sample results confirm the process knowledge determination that material from the 489-D CPRB is not a RCRA hazardous waste. The TCLP results from the 489-D CPRB are presented in the *Removal Action Report for the 488-1D Ash Basin and 489-D Coal Pile Runoff Basin* (SRNS 2019a).

488-1D Ash Basin and Inlet Basins Confirmation Sampling (Soil)

The confirmation sample results were evaluated to demonstrate successful ash removal and documented in the *Human Health and Ecological Evaluation for Confirmation Sampling at the 488-1D Ash Basin and Inlet Basins* (SRNS 2019b).

The *Field Sampling Plan for the 488-1D Ash Basin* (SRNS 2015a) identified a total of 19 confirmation sampling locations in the western end (16 within the basin and 3 from the basin berm) of the 488-1D Ash Basin. The samples were collected from September 2017 through January 2018. Also, two confirmation samples on the east side of the 488-4D Ash Landfill were collected in December 2016 and are included in the 488-1D Ash Basin confirmation sample dataset. Each of these samples were analyzed for 24 metals and six radionuclides. The residual concentrations of all analytes, except hexavalent chromium, met the pre-established cleanup levels documented in the *Confirmation Sampling and Analysis Plan for Coal and/or Ash Removal at the Savannah River Site* for unrestricted land use (SRNS 2014a). The concentration of hexavalent chromium (maximum = 1.94 mg/kg) does not exceed the threshold level for an industrial use scenario (RSL = 6.3 mg/kg). The residential threshold for hexavalent chromium is 0.29 mg/kg.

The *Field Sampling Plan for the 488-1D Inlet Basins* (SRNS 2014b) identified a total of eight sample locations (four per Inlet Basin) for confirmation sampling. The residual concentrations of all analytes met the pre-established cleanup levels documented in the *Confirmation Sampling and Analysis Plan for Coal and/or Ash Removal at the Savannah River Site* for unrestricted land use.

488-2D Ash Basin Confirmation Sampling (Soil)

The confirmation sampling data for the 488-2D Ash Basin are presented in the *Human Health and Ecological Evaluation for Confirmation Sampling at the 488-2D Ash Basin* (SRNS 2016c). Fifteen confirmation samples were collected between July 2015 and September 2015 as outlined in the *Field Sampling Plan for the 488-2D Ash Basin* (SRNS 2015c). In addition, an area of ash located on the west side of the 488-4D Ash Landfill was sampled (after ash removal) and the results included in the confirmation sampling dataset for the formal evaluation. The technical evaluation concluded that the basin soil results were indeterminate with regard to meeting the acceptance criteria for unrestricted land use because the residential threshold level for hexavalent chromium (RSL = 0.29 mg/kg) is at (or very near) the method detection limit and there is a potential for analytical interferences resulting in false positives at these trace levels. Consequently, statistical hypothesis testing results and residual risks varied, depending on the analytical method used. The concentration of hexavalent chromium (maximum = 3.78 mg/kg) does not exceed the threshold level for an industrial use scenario (RSL = 6.3 mg/kg).

489-D CPRB (Southern 75%) Confirmation Sampling (Sediment)

The confirmation sampling data used in this evaluation are provided in the *Human Health and Ecological Evaluation for Confirmation Sampling at the 489-D Coal Pile Runoff Basin* (SRNS 2017b). A total of 11 samples as outlined in the *Field Sampling Plan for the 489-D Coal Pile Runoff Basin* (SRNS 2015d) were collected between September 2016 and November 2016. In addition to the 11 confirmation sampling locations collected per the FSP, 12 samples were collected in November 2016 at locations where soil/coal fines were previously staged for TCLP sampling prior to placement in the 488-1D Ash Basin. Therefore, a total of 23 confirmation sample results were evaluated to demonstrate that the coal has been successfully removed from the 489-D CPRB and the remaining soils are below human health and ecological risk-based threshold levels. In addition to the 24 metals and six radionuclide analytes, one organic compound, (2-methylnaphthalene) was included in the analytical suite because it was identified as a refined COC in sediment media in the RFI/RI/BRA (SRNS 2009). The technical evaluation concluded that the residual

concentrations of these analytes met the pre-established cleanup levels documented in the *Confirmation Sampling and Analysis Plan for Coal and/or Ash Removal at the Savannah River Site* for unrestricted land use (SRNS 2014a).

Conceptual Site Model (CSM)

A generic CSM after completion of early removal actions for the 488-1D Ash Basin, 488-2D Ash Basin, 488-4D Ash Landfill and the 489-CPRB is presented in Figure 9.

Site-Specific Factors

No site-specific factors requiring special consideration that might affect the remedial action are present at the site.

VI. CURRENT AND POTENTIAL FUTURE SITE AND RESOURCE USES

Land Uses

According to the SRS Future Use Project Report (USDOE 1996), residential uses of SRS land should be prohibited. The Land Use Control Assurance Plan (LUCAP) for the SRS (WSRC 1999) designates the DAOU as being within an industrial area. The future land use is reasonably anticipated to remain industrial with USDOE maintaining control of the land.

The remedial decision for the 484-D Powerhouse building and ancillary facilities is not included in the DAOU EA ROD (SRNS 2011) or this Second EA ROD, and LUCs are not in place for these operating facilities. Any LUCs required for the 484-D Powerhouse building and associated facilities will be addressed by the appropriate remedial decision after operational closure of the Powerhouse building is complete.

Groundwater Uses/Surface Water Uses

Groundwater is not part of the DAOU. Groundwater is being addressed separately under the DAG OU.

VII. SUMMARY OF OPERABLE UNIT RISKS

Baseline Risk Assessment

The results of RFI/RI/BRAs previously conducted at similar waste units at SRS were used to presumptively identify the problems warranting action at the 488-1D Ash Basin, 488-2D Ash Basin, and the 488-4D Ash Landfill subunits. Based on this historical information, it was concluded that arsenic and naturally-occurring radionuclides in ash media pose an unacceptable risk to human and/or ecological receptors.

As a component of the RFI/RI process, a BRA was performed to evaluate risks associated with the 489-D CPRB. The BRA estimates what risks the site poses if no action were taken. It provides the bases for taking action and identifies the contaminants and exposure pathways that need to be addressed by the remedial action. The BRA includes human health and ecological risk assessments.

Completion of the various removal actions associated with each subunit addressed the problems warranting action for human and ecological receptors that were identified prior to any construction activities. Post-removal action (i.e., current) conditions for these DAOU subunits are summarized below.

488-1D Ash Basin (including Inlet Basins)

Summary of Human Health Risk Assessment

Prior to implementation of the non-time critical removal action (NTCRA), arsenic and coal-related radionuclides were identified as historic COCs in SRS surface ash that may pose a risk to human receptors (future industrial worker risk greater than (>) 1E-06).

Completion of the removal action (i.e., excavate ash and contaminated sediment from the western section of the 488-1D Ash Basin and the Inlet Basins and placement of a geosynthetic cover system in the eastern section of the 488-1D Basin) addressed the surface ash problems warranting action for human receptors that were identified prior to any construction activities. Coal-related contaminants beneath the geosynthetic cover (eastern

end) poses a risk to human receptors (future industrial worker risk >1E-06) if direct exposure were to occur.

In addition, coal-related constituents remain in soil in the western end of the basin that pose a risk to human receptors (hypothetical future resident risk >1E-06). The *Human Health and Ecological Evaluation for Confirmation Sampling at the 488-1D Ash Basin and Inlet Basins* (SRNS 2019b) concluded that the residual concentrations of all analytes, except hexavalent chromium, met the pre-established cleanup levels for unrestricted land use. All of the confirmation sample results are presented in that report (SRNS 2019b). The maximum concentration of hexavalent chromium (1.94 mg/kg) did not exceed the threshold level for an industrial use scenario (6.3 mg/kg). The residential threshold for hexavalent chromium is 0.29 mg/kg. The report recommended that LUCs to prevent unrestricted use (i.e., residential) be implemented at the 488-1D Ash Basin and Area East of the 488-4D Ash Landfill. For the Inlet Basins portion of the 488-1D Ash Basin subunit, the residual concentrations of all analytes met the cleanup levels for unrestricted land use.

Summary of Ecological Risk Assessment

Prior to implementation of the NTCRA, arsenic was identified as a historic COC in SRS surface ash that may pose a risk to ecological receptors (hazard quotient [HQ] >1).

Completion of the removal action addressed the surface ash problems warranting action for ecological receptors that were identified prior to any construction activities. Coal-related contaminants beneath the geosynthetic cover (eastern end) poses a risk to ecological receptors (HQ >1) if direct exposure were to occur.

The *Human Health and Ecological Evaluation for Confirmation Sampling at the 488-1D Ash Basin and Inlet Basins* (SRNS 2019b) concluded that the residual concentrations of the remaining soils in the western portion of the 488-1D Ash Basin and the Inlet Basins did not pose an unacceptable risk to ecological receptors.

Summary of the Fate and Transport Analysis

Prior to completion of the NTCRA, there was a potential for migration of contaminants to groundwater above groundwater protection standards due to the uncertainty in groundwater elevation and flow path changes over time.

Completion of the removal action addressed the potential CM problems warranting action that were identified prior to any construction activities. Coal-related contaminants beneath the engineered cover system pose a potential for migration of contaminants to groundwater above protection standards if leaching of the source material were to occur.

Discussion of Principal Threat Source Material

No principal threat source material (PTSM) was identified at the 488-1D Ash Basin (including Inlet Basins).

Risk Assessment Summary

Coal-related contaminants beneath the engineered cover system (eastern end) pose a risk to human receptors (future industrial worker risk >1E-06) and ecological receptors (HQ >1) if direct exposure were to occur. In addition, coal-related contaminants beneath the engineered cover system pose a potential for migration of contaminants to groundwater above protection standards if leaching of the source material were to occur.

Following the removal action, coal-related constituents remain in soil in the western end of the basin that would pose a risk to human receptors (hypothetical future resident risk >1E-06). The western end of the basin does not pose an unacceptable risk to ecological receptors.

There are no human health, ecological or CM problems warranting action following the NTCRA at the Inlet Basins. The Inlet Basins meet the criteria for unrestricted land use.

488-2D Ash Basin

Summary of Human Health Risk Assessment

Prior to implementation of the time-critical removal action (TCRA), arsenic and coal-related radionuclides were identified as historic COCs in SRS surface ash that may pose a risk to human receptors (future industrial worker risk >1E-06).

Completion of the removal action (i.e., excavation of ash and contaminated sediment) addressed the surface sediment problems warranting action for human receptors that were identified prior to any construction activities. Confirmation sample results were evaluated to demonstrate that the ash has been successfully removed in the *Human Health and Ecological Evaluation for Confirmation Sampling at the 488-2D Ash Basin* (SRNS 2016c) report. All of the confirmation sample results are presented in that report (SRNS 2016c). The report identified uncertainties regarding the evaluation of hexavalent chromium in basin soil concentrations. The results were indeterminate with regards to meeting acceptance criteria for unrestricted (residential) land use because the residential threshold level for hexavalent chromium (0.29 mg/kg) is at (or very near) the method detection limit and there is a potential for analytical interferences resulting in false positives at these trace levels. Consequently, statistical hypothesis testing results and residual risks varied, depending on the analytical method used. The concentration of hexavalent chromium (maximum = 3.78 mg/kg) does not exceed the threshold level for an industrial use scenario (6.3 mg/kg). Therefore, the report recommended that LUCs would need to be implemented to prevent unrestricted land use. Coal-related contaminants may remain in basin soils that pose a risk to human receptors (hypothetical future resident risk >1E-06).

Summary of Ecological Risk Assessment

Prior to implementation of the TCRA, arsenic was identified as a historic COC in SRS surface ash that may pose a risk to ecological receptors (HQ >1).

Completion of the removal action (i.e., excavation of ash and contaminated sediment) addressed the surface ash problem warranting action for ecological receptors that were

identified prior to any construction activities. The *Human Health and Ecological Evaluation for Confirmation Sampling at the 488-2D Ash Basin* (SRNS 2016c) concluded that the remaining soils did not pose an unacceptable risk to ecological receptors. There are no problems warranting action from an ecological risk perspective.

Summary of the Fate and Transport Analysis

There were no CM problems warranting action identified prior to the TCRA.

Completion of the removal action further prevents migration of potential mobile contaminants to groundwater that could exceed groundwater protection standards.

Discussion of PTSM

No PTSM was identified at the 488-2D Ash Basin.

Risk Assessment Summary

Although there were no exceedances of coal-related constituents in basin soils that would pose a risk for the future industrial worker, uncertainties regarding the evaluation of hexavalent chromium were inconclusive to support unrestricted land use for the hypothetical future resident. This uncertainty impacts the final remedial action for the 488-2D Ash Basin. To manage this uncertainty, LUCs will be applied to the 488-2D Ash Basin subunit to prevent unrestricted land use.

488-4D Ash Landfill

Summary of Human Health Risk Assessment

Prior to implementation of the NTCRA, arsenic and coal-related radionuclides were identified as historic COCs in SRS surface ash that may pose a risk to human receptors (future industrial worker risk >1E-06).

Completion of the removal action (i.e., placement of a geosynthetic cover system) addressed the surface ash problem warranting action for human receptors that were identified prior to any construction activities. Currently, there is waste consisting primarily

of coal and coal-combustion ash beneath the engineered cover system that poses a risk to human receptors (future industrial worker risk >1E-06) if direct exposure were to occur.

Summary of Ecological Risk Assessment

Prior to implementation of the NTCRA, arsenic was identified as a historical COC in SRS surface ash that may pose a risk to ecological receptors (HQ >1).

Completion of the removal action (i.e., placement of a geosynthetic cover system) addressed the surface ash problems warranting action for ecological receptors that were identified prior to any construction activities. Currently, there is waste consisting primarily of coal and coal-combustion ash beneath the engineered cover system that poses a risk to ecological receptors (HQ >1) if direct exposure were to occur.

Summary of the Fate and Transport Analysis

Prior to completion of the NTCRA, there was a potential for migration of contaminants to groundwater for constituents (aluminum, arsenic, iron and manganese) that exceed the regulatory thresholds for a Class Two Solid Waste Landfill.

Completion of the removal action (i.e., placement of a geosynthetic cover system) addressed the potential CM problem warranting action identified prior to any construction activities. Waste beneath the engineered cover system poses a potential for migration of contaminants to groundwater above protection standards if leaching of the source material were to occur.

Discussion of PTSM

No PTSM was identified at the 488-4D Ash Landfill.

Risk Assessment Summary

Waste consisting primarily of coal and coal-combustion ash beneath the engineered cover system poses a risk to human receptors (future industrial worker risk >1E-06) and ecological receptors (HQ >1) if direct exposure were to occur. In addition, waste beneath

the engineered cover system poses a potential for migration of contaminants to groundwater above protection standards if leaching of the source material were to occur.

489-D CPRB (Southern 75%)

Summary of Human Health Risk Assessment

Prior to implementation of the NTCRA, arsenic was identified as a human health COC in surface sediment at concentrations that pose an unacceptable exposure risk to a hypothetical future resident (risk = 5.0E-05).

Completion of the removal action (i.e., excavation of coal fines and contaminated sediment) addressed the surface sediment problems warranting action for human receptors that were identified prior to any construction activities. The *Human Health and Ecological Evaluation for Confirmation Sampling at the 489-D Coal Pile Runoff Basin* (SRNS 2017b) concluded that residual concentrations of coal-related constituents met the pre-established cleanup levels for unrestricted land use. All of the confirmation sample results are presented in that report (SRNS 2017b). There are no human health problems warranting action.

Summary of Ecological Risk Assessment

Prior to implementation of the NTCRA, arsenic (HQ = 2.8) and 2-methylnaphthalene (HQ = 9.7) were identified as COCs to benthic organisms; and surface water was impacted with aluminum (HQ = 791), beryllium (HQ = 45), cobalt (HQ = 17), copper (HQ = 13), iron (HQ = 127), manganese (HQ = 41) and zinc (HQ = 5) at concentrations exceeding an HQ of one that posed a risk to aquatic organisms. In addition, the low pH conditions posed a risk to aquatic organisms, mammals and birds.

Completion of the removal action (i.e., water removal and excavation of coal fines and contaminated sediment) addressed both the surface sediment and surface water problems warranting action for ecological receptors that were identified prior to any construction activities. The *Human Health and Ecological Evaluation for Confirmation Sampling at*

the 489-D Coal Pile Runoff Basin (SRNS 2017b) concluded that the remaining soils did not pose an unacceptable risk to ecological receptors.

Summary of the Fate and Transport Analysis

There were no CM COCs identified prior to the NTCRA. Completion of the removal action (i.e., excavation of coal fines and contaminated sediment) further prevents migration of potential mobile contaminants to groundwater that could exceed groundwater protection standards.

Discussion of PTSM

No PTSM was identified at the 489-D CPRB.

Risk Assessment Summary

There are no human health, ecological or CM problems warranting action following the NTCRA. The 489-D CPRB (Southern 75%) meets the criteria for unrestricted land use.

Conclusions

488-1D Ash Basin (including Inlet Basins)

Coal-related contaminants beneath the engineered cover system (eastern end) pose a risk to human receptors (future industrial worker risk >1E-06) and ecological receptors (HQ >1) if direct exposure were to occur. In addition, coal-related contaminants beneath the engineered cover system pose a potential for migration of contaminants to groundwater above protection standards if leaching of the source material were to occur.

Following the removal action, coal-related constituents remain in soil in the western end of the basin that would pose a risk to human receptors (hypothetical future resident risk >1E-06). The western end of the basin does not pose an unacceptable risk to ecological receptors.

There are no human health, ecological or CM problems warranting action following the NTCRA at the Inlet Basins. The Inlet Basins meet the criteria for unrestricted land use.

488-2D Ash Basin

Although there were no exceedances of coal-related constituents in basin soils that would pose a risk for the future industrial worker, uncertainties regarding the evaluation of hexavalent chromium were inconclusive to support unrestricted land use for the hypothetical future resident. Therefore, LUCs will be applied to the 488-2D Ash Basin subunit to prevent unrestricted land use.

488-4D Ash Landfill

Waste consisting primarily of coal and coal-combustion ash beneath the engineered cover system poses a risk to human receptors (future industrial worker risk >1E-06) and ecological receptors (HQ >1) if direct exposure were to occur. In addition, waste beneath the engineered cover system poses a potential for migration of contaminants to groundwater above protection standards if leaching of the source material were to occur.

489-D CPRB

There are no human health, ecological or CM problems warranting action following the NTCRA. The 489-D CPRB (Southern 75%) meets the criteria for unrestricted land use.

VIII. REMEDIAL ACTION OBJECTIVES AND REMEDIAL GOALS

Remedial Action Objectives (RAOs)

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 DAOU after completion of removal actions. No RAOs are identified

for the Inlet Basins or the 489-D CPRB (Southern 75%) because the residual concentrations of all analytes met the cleanup levels for unrestricted land use.

488-1D Ash Basin

- Maintain the engineered cover system (eastern end) to eliminate or control all routes of exposure to contaminants beneath the cover exceeding 1E-06 risk to future industrial workers and exceeding HQ >1 to ecological receptors and/or presenting a CM concern.

- Protect hypothetical future residents from exposure to residual contamination in soil in the western end of the basin exceeding 1E-06 risk.

488-2D Ash Basin

- Protect hypothetical future residents from exposure to residual contamination in basin soils exceeding 1E-06 risk.

488-4D Ash Landfill

- Maintain the engineered cover system to eliminate or control all routes of exposure to contaminants beneath the cover exceeding 1E-06 risk to future industrial workers and exceeding a HQ >1 to ecological receptors.

- Maintain the engineered cover system to prevent migration of contaminants to groundwater that could exceed groundwater protection standards.

Remedial Goals (RGs)

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

Human health risk-based threshold levels and the associated acceptance criteria for determining if cleanup levels have been met are presented in the *Confirmation Sampling*

and Analysis Plan (SAP) for Coal and/or Ash Removal at the Savannah River Site (SRS) (SRNS 2014a). An evaluation of the confirmation sample results relative to human health and ecological threshold levels (cleanup levels) are presented in each of the individual subunit reports (SRNS 2016c, SRNS 2017b and SRNS 2019b).

Applicable or Relevant and Appropriate Requirements

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

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

Three categories of ARARs are identified to clarify how to identify and comply with environmental requirements. They include action-specific, location-specific, and chemical-specific requirements:

- Action-specific ARARs control or restrict the design, performance, and other aspects of implementation of specific remedial activities;
- Location-specific ARARs reflect the physiographic and environmental characteristics of the unit or the immediate area, and may restrict or preclude remedial actions depending on the location or the characteristics of the unit;
- Chemical-specific ARARs are media-specific concentration limits promulgated under Federal or State law.

A summary of the ARARs for the selected remedy is presented in Table 2.

IX. DESCRIPTION OF ALTERNATIVES

This section presents the remedial alternatives that apply to post-removal action conditions at the DAOU. In accordance with the NCP, it is desirable, when practical, to offer a range of diverse alternatives to compare during the detailed analyses. The range of alternatives includes an option that involves little or no treatment yet provides protection to human health and the environment by preventing or controlling exposure through LUCs. Due to the focused effort in this Second EA ROD, two alternatives including No Action and LUCs were developed for the 488-1D Ash Basin, 488-2D Ash Basin and 488-4D Ash Landfill to address contamination in the surface and subsurface. No action will be implemented for the 489-D CPRB (Southern 75%) and the Inlet Basins portion of the 488-1D Ash Basin subunit because there are no problems warranting action.

Alternative 1. No Action

The No Action alternative is required by the NCP to serve as a baseline for comparison to other alternatives. Under this alternative, no efforts would be made to control access, limit exposure, or reduce contaminant toxicity, mobility, or volume. This alternative would

leave the DAOU subunits in their current condition with no additional controls. This alternative is not effective in achieving the RAOs, and there are no capital construction or system operation and maintenance costs. The No Action alternative is not sufficient in meeting neither the threshold criteria of protection of human health and environment nor compliance with ARARs. This alternative does not include five-year remedy reviews.

Summary of Costs

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

Alternative 2. Land Use Controls

LUCs (i.e., engineering controls [ECs] and institutional controls [ICs]) will be implemented for the 488-1D Ash Basin, 488-2D Ash Basin, and 488-4D Ash Landfill subunits of the DAOU to limit access (e.g., land use and disturbance activities) in the area. ECs (i.e., warning signs) and ICs (i.e., excavation permit restrictions and deed restrictions) will be used to restrict access to or activities that can be performed at the impacted areas. Site maintenance (site inspections, mowing, general housekeeping, repair of erosion damage, and other routine maintenance as needed) would be required to maintain the cover systems at the 488-1D Ash Basin and 488-4D Ash Landfill.

Groundwater monitoring will be performed to evaluate the long-term effectiveness of the cover systems and the results will be documented in the *Groundwater Monitoring Report for the D-Area Groundwater Operable Unit* (which is a full report issued in the even years), and the *D-Area Groundwater Operable Unit Letter Report* (which is an abbreviated report issued in the odd years). The groundwater sampling and monitoring requirements (including final remedial decisions) will be addressed by the DAG OU; therefore, costs associated with groundwater monitoring and reporting are not included in the estimate for Alternative 2. Any remedial groundwater actions, including land use restrictions, will be selected in the remedial assessment for DAG OU.

LUCs meet the threshold and balancing criteria requirements. Because this alternative results in hazardous substances, pollutants, or contaminants remaining on-site above levels that allow for unrestricted use, five-year remedy reviews would be performed to ensure that the remedy is and will continue to be protective of human health and the environment. Estimated costs for the 488-1D Ash Basin, 488-2D Ash Basin, and 488-4D Ash Landfill subunits include the capital cost, O&M cost, and present worth cost (Table 3).

Summary of Costs

Capital Cost:	$47,520
O&M:	$9,846,699
Total Present-Worth Cost:	$9,894,219

X. COMPARATIVE ANALYSIS OF ALTERNATIVES

This section summarizes the evaluation of alternatives that apply to post-removal action conditions. Note that a range of alternatives were evaluated for each of these subunits through a series of removal action documents that support an accelerated cleanup strategy for the DAOU.

The NCP [40 Code of Federal Regulations {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 evaluation criteria are described in Table 4.

- Overall protection of human health and the environment
- Compliance with ARARs
- Long-term effectiveness and permanence
- Reduction of toxicity, mobility, or volume through treatment
- Short-term effectiveness
- Implementability
- Cost
- State acceptance
- Community acceptance

Comparative Analysis of Alternatives

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 5.

Overall Protection of Human Health and the Environment

Alternative 1 (No Action) is not protective of human health and the environment. Alternative 2 (LUCs) is protective of human health and the environment and addresses the buried coal-related contamination and residual contamination at the DAOU subunits with land use restrictions.

Compliance with ARARs

Chemical-Specific ARARs. There are no chemical-specific ARARs.

Action-Specific ARARs. There are no action-specific ARARs applicable to Alternative 1 (No Action). Alternative 2 (LUCs) would be effective in complying with the action specific ARARs pertaining to the relevant and appropriate closure and monitoring of landfills (i.e., 488-1D Ash Basin and 488-4D Ash Landfill).

Location-Specific ARARs. There are no location-specific ARARs.

Short-Term Effectiveness

Alternative 2 (LUCs) achieves RAOs whereas short-term effectiveness is not applicable to Alternative 1 (No Action) since it does not involve any remedial activities. LUCs are effective in the short-term because the time needed to implement the remedy is minimal and the LUCs will prevent/limit exposure.

Long-Term Effectiveness and Permanence

Alternative 2 (LUCs) is effective in the long term and protects human health. This alternative is effective in reducing exposure to contaminated media by limiting access. LUCs will eliminate the exposure pathway and will remain in place until the contaminated media is below levels that allow unrestricted use. Alternative 1 (No Action) has no long-term effectiveness or permanence since no action is taken to mitigate the residual risk.

Reduction of Toxicity, Mobility, or Volume through Treatment

None of the alternatives reduce toxicity, mobility, or volume through treatment.

Implementability

Alternative 2 is readily implementable by installation of warning signs and site inspections at SRS. Alternative 1 (No Action) involves no implementation.

Cost

Alternative 1 (No Action) is the least expensive alternative of the two alternatives for the DAOU ($0). Alternative 2 (LUCs) is a more costly alternative at $9,894,219.

State or Support Agency Acceptance

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

Community Acceptance

The community acceptance of the preferred alternative was assessed by giving the public an opportunity to comment on the remedy selection process. A public comment period was held between March 10, 2020, and April 23, 2020. Public comments concerning the proposed remedy are incorporated in the Responsiveness Summary in Appendix A of this Second EA ROD.

XI. THE SELECTED REMEDY

Table 6 presents a Comparative Ranking of DAOU Final Action Alternatives. The selected remedy for the 488-1D Ash Basin, 488-2D Ash Basin and 488-4D Ash Landfill is Alternative 2 – LUCs. This alternative was selected because it effectively protects against unrestricted use (hypothetical future residential exposure). No action for the 489-D CPRB (Southern 75%) and the Inlet Basins is required.

Detailed Description of the Selected Remedy

The selected remedial action for the 488-1D Ash Basin, 488-2D Ash Basin and 488-4D Ash Landfill subunits of the DAOU is Alternative 2 – LUCs. The early removal actions reduced the human health and ecological risk by eliminating the exposure pathway and minimizing the potential of contaminants to migrate to groundwater. Alternative – 2 will achieve the following LUC objectives:

- Prevent contact, removal, or excavation of coal and coal-combustion waste that is buried underneath the engineered cover systems as well as protect against disturbance of soil overlaying the caps;
- Prohibit the development and use of property for residential housing, elementary and secondary schools, child care facilities and playgrounds;
- Maintain the integrity of any current or future remedial or monitoring system, such as soil covers or groundwater monitoring wells; and
- Prevent construction of inhabitable buildings without an evaluation of indoor air quality to address vapor intrusion.
- Prevent construction of facilities or structures on/above the engineered cover systems.

LUCs for the DAOU are presented in Table 7 and include the following:

- Signage will be located at the 488-1D Ash Basin, 488-2D Ash Basin and 488-4D Ash Landfill subunit boundaries to alert on-site workers to the presence of hazardous substances and to prevent unauthorized entry and unrestricted uses. The date for

installation of the signs will be stated in the unit-specific Land Use Control Implementation Plan (LUCIP) referenced in this ROD. The approximate area of LUCs are shown in Figure 10.

- ICs (i.e., administrative measures) and use restrictions for on-site workers via the Site Use/Site Clearance Program. 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 2013 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 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.

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 ROD with USEPA and SCDHEC review and approval.

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

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

The selected remedy for the 488-1D Ash Basin, 488-2D Ash Basin and 488-4D Ash Landfill subunits of the DAOU leaves hazardous substances in place that pose a potential future risk and will require land use restrictions for as long as waste remains in place at levels above those allowing unrestricted use to keep the selected remedy fully protective of human health and the environment. As agreed on March 30, 2000, among the USDOE, USEPA, and SCDHEC, SRS is implementing a LUCAP (WSRC 1999) to ensure that the LUCs required by numerous remedial decisions at SRS are properly maintained and periodically verified. The unit-specific Second EA LUCIP referenced in this Second 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 Second EA ROD. The Second EA LUCIP, developed as part of this action, will be submitted as required in the FFA for review and approval by USEPA and SCDHEC. Upon final approval, the Second EA LUCIP will be appended to the LUCAP and is considered incorporated by reference into the ROD, establishing LUC implementation and maintenance requirements enforceable under CERCLA and the *SRS Federal Facility*

Agreement. The approved Second EA LUCIP will establish implementation, monitoring, maintenance, reporting, and enforcement requirements for the unit. The Second 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 USEPA and SCDHEC 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 DAOU 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.

Cost Estimate for the Selected Remedy

A detailed, activity-based breakdown of the estimated costs associated with implementing and maintaining the selected remedy is presented in Table 3. A summary of the costs is provided below:

Summary of Costs

Capital Cost:	$47,520
O&M:	$9,846,699
Total Present-Worth Cost:	$9,894,219

The information in the 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 Explanation of Significant Difference, or a

ROD amendment. This is an order-of-magnitude engineering cost estimate that is expected to be within +50 to –30 percent of the actual project cost.

Estimated Outcomes of Selected Remedy

LUCs will be maintained for protection of human health and the environment at the DAOU by restricting land disturbance activities and restricting land use to industrial use only. Although groundwater is not included as part of this OU, the use of groundwater will continue to be restricted until the final ROD for the DAG OU is completed.

Waste Disposal and Transport

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

XII. STATUTORY DETERMINATIONS

The 488-1D Ash Basin, 488-2D Ash Basin, and the 488-4D Ash Landfill subunits of the DAOU pose a threat to human health and the environment. Therefore, Alternative – 2, LUCs, has been selected as the remedy for the 488-1D Ash Basin, 488-2D Ash Basin, and the 488-4D Ash Landfill subunits. As part of the selected remedy, the future land use will be industrial. The selected remedial alternative for the 489-D CPRB (Southern 75%) and the Inlet Basins portion of the 488-1D Ash Basin is No Action. In their current state, these subunits pose no unacceptable risk requiring a response action to human health and the environment and support unrestricted land use.

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, 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. This remedy does not satisfy the statutory preference for treatment as a principal element of the remedy because treatment is unnecessary to achieve RAOs.

XIII. EXPLANATION OF SIGNIFICANT CHANGES

The remedy selected in this Second EA ROD does 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.

XIV. RESPONSIVENESS SUMMARY

The Responsiveness Summary is included as Appendix A of this document. No comments were received during the public comment period.

XV. POST-ROD DOCUMENT SCHEDULE AND DESCRIPTION

A summary of the key deliverables and submittal dates for the DAOU is summarized below:

- Submit Rev. 0, Second EA ROD — February 18, 2020
- Issuance of Second EA ROD — November 10, 2020
- Submit Rev. 0, Second EA LUCIP — November 30, 2020
- Remedial Action Start — September 30, 2021
- Submit Second Post Construction Report — May 9, 2022

XVI. REFERENCES

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

SRNS, 2009. *RCRA Facility Investigation /Remedial Investigation (RFI/RI) Work Plan and RFI/RI Report with Baseline Risk Assessment for the D-Area Operable Unit (U),* Revision 1.1, WSRC-RP-2007-4079, Savannah River Nuclear Solutions, LLC, Savannah River Site, Aiken, SC (April)

SRNS, 2011. *Early Action Record of Decision Remedial Alternative Selection for the D Area Operable Unit (DAOU (U),* Revision 1.2, SRNS-RP-2010-00162, Savannah River Nuclear Solutions, LLC, Savannah River Site, Aiken, SC (July)

SRNS, 2014a. *Confirmation Sampling and Analysis Plan for Coal and/or Ash Removal at the Savannah River Site (U),* Revision 1.1, SRNS-RP-2013-00332, Savannah River Nuclear Solutions, LLC, Savannah River Site, Aiken, SC (July)

SRNS, 2014b. *Field Sampling Plan for the 488-1D Inlet Basins (U),* Revision 1.1, SRNS-RP-2013-00342, Savannah River Nuclear Solutions, LLC, Savannah River Site, Aiken, SC (July)

SRNS, 2014c. *Removal Site Evaluation Report (RSER) for the D-Area Ash Basin (488-2D) (U),* Revision 1, SRNS-RP-2013-00825, Savannah River Nuclear Solutions, LLC, Savannah River Site, Aiken, SC (September)

SRNS, 2014d. *Removal Site Evaluation Report/Engineering Evaluation/Cost Analysis (RSER/EE/CA) for the D-Area Ash Landfill (488-4D) (U),* Revision 1, SRNS-RP-2014-00001, Savannah River Nuclear Solutions, LLC, Savannah River Site, Aiken, SC (June)

SRNS, 2015a. *Field Sampling Plan for the 488-1D Ash Basin (U),* Revision 1, SRNS-RP-2015-00096, Savannah River Nuclear Solutions, LLC, Savannah River Site, Aiken, SC (December)

SRNS, 2015b. *Removal Action Design Plan (RADP) for the 488-4D Ash Landfill and 488-2D Ash Basin (U),* Revision 1.1, SRNS-RP-2014-00459, Savannah River Nuclear Solutions, LLC, Savannah River Site, Aiken, SC (March)

SRNS, 2015c. *Field Sampling Plan for the 488-2D Ash Basin (U),* Revision 1, SRNS-RP-2014-00442, Savannah River Nuclear Solutions, LLC, Savannah River Site, Aiken, SC (January)

SRNS, 2015d. *Field Sampling Plan for the 489-D Coal Pile Runoff Basin (U),* Revision 1, SRNS-RP-2014-01048, Savannah River Nuclear Solutions, LLC, Savannah River Site, Aiken, SC (May)

SRNS, 2016a. *Removal Site Evaluation Report/Engineering Evaluation/Cost Analysis (RSER/EE/CA) for the D-Area Ash Basin (488-1D) (U),* Revision 1, SRNS-RP-2015-00490, Savannah River Nuclear Solutions, LLC, Savannah River Site, Aiken, SC (June)

SRNS, 2016b. *Removal Action Design Plan (RADP) for the 488-1D Ash Basin and 489-D Coal Pile Runoff Basin (U),* Revision 1, SRNS-RP-2015-00196, Savannah River Nuclear Solutions, LLC, Savannah River Site, Aiken, SC (May)

SRNS, 2016c. *Human Health and Ecological Evaluation for Confirmation Sampling at the 488-2D Ash Basin (U),* Revision 1, ERD-EN-2015-0053, Savannah River Nuclear Solutions, LLC, Savannah River Site, Aiken, SC (October)

SRNS, 2017a. *Removal Action Report for the 488-2D Ash Basin and 488-4D Ash Landfill (U),* Revision 1, SRNS-RP-2017-00057, Savannah River Nuclear Solutions, LLC, Savannah River Site, Aiken, SC (October)

SRNS, 2017b. *Human Health and Ecological Evaluation for Confirmation Sampling at the 489-D Coal Pile Runoff Basin (U),* Revision 1, ERD-EN-2017-0027, Savannah River Nuclear Solutions, LLC, Savannah River Site, Aiken, SC (October)

SRNS, 2019a. *Removal Action Report for the 488-1D Ash Basin and 489-D Coal Pile Runoff Basin (U),* Revision 1, SRNS-RP-2018-01091, Savannah River Nuclear Solutions, LLC, Savannah River Site, Aiken, SC (October)

SRNS, 2019b. *Human Health and Ecological Evaluation for Confirmation Sampling at the 488-1D Ash Basin and Inlet Basins (U*), Revision 1, ERD-EN-2018-0007, Savannah River Nuclear Solutions, LLC, Savannah River Site, Aiken SC (May)

SRNS, 2019c. *Early Action Statement of Basis/Proposed Plan for the D-Area Operable Unit (U)*, Revision 1, SRNS-RP-2017-00723, Savannah River Nuclear Solutions, LLC, Savannah River Site, Aiken SC (December)

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

USDOE, 2009. *Action Memorandum and Responsiveness Summary for the Non-Time Critical Removal Action for the 489-D Coal Pile Runoff Basin, D-006 Outfall, and 489-10 Waste Oil Facility at the D-Area Operable Unit*, CERCLIS Number: 63, ARF #16516, 12/21/09, United States Department of Energy, Savannah River Operations Office, Aiken, SC

USDOE, 2010. *Revised Action Memorandum for the Non-Time Critical Removal Action for the 489-D Coal Pile Runoff Basin, D-006 Outfall, and 489-10 Waste Oil Facility at the D-Area Operable Unit*, CERCLIS Number: 63, ACP-10-255, 08/26/10, United States Department of Energy, Savannah River Operations Office, Aiken, SC

USDOE, 2014a. *Action Memorandum for the Time Critical Removal Action for the D-Area Ash Basin (488-2D)*, CERCLIS Number: 63, IACD-15-101, 10/28/14, United States Department of Energy, Savannah River Operations Office, Aiken, SC

USDOE, 2014b. *Notification of the Removal Action Start Date D-Area Ash Basin (488-2D)*, CERCLIS Number: 63, IACD-15-102, 10/28/14, United States Department of Energy, Savannah River Operations Office, Aiken, SC

USDOE, 2014c. *Action Memorandum and Responsiveness Summary for the Non-Time Critical Removal Action for the D-Area Ash Landfill (488-4D)*, CERCLIS Number: 63, ACP-14-181, 08/11/14, United States Department of Energy, Savannah River Operations Office, Aiken, SC

USDOE, 2014d. *Notification of the Removal Action Start Date for the D-Area Ash Landfill (488-4D)*, CERCLIS Number: 63, IACD-14-189, 09/09/14, United States Department of Energy, Savannah River Operations Office, Aiken, SC

USDOE, 2015a. *Revision 3 Action Memorandum for the Non-Time Critical Removal Action for the D-Area Coal Pile Runoff Basin (489-D),* CERCLIS Number: 63, IACD-15-168, 08/11/15, United States Department of Energy, Savannah River Operations Office, Aiken, SC

USDOE, 2015b. *Notification of the Removal Action Start Date for the D-Area Coal Pile Runoff Basin (489-D),* CERCLIS Number: 63, IACD-15-102, 09/15/15, United States Department of Energy, Savannah River Operations Office, Aiken, SC

USDOE, 2016a. *Action Memorandum and Responsiveness Summary for the Non-Time Critical Removal Action for the D-Area Ash Basin (488-1D),* CERCLIS Number: 63, IACD-16-160, 08/17/16, United States Department of Energy, Savannah River Operations Office, Aiken, SC

USDOE, 2016b. *Notification of the Removal Action Start Date D-Area Ash Basin (488-1D),* CERCLIS Number: 63, IACD-16-167, 09/19/16, United States Department of Energy, Savannah River Operations Office, Aiken, SC

USDOE, 2019. *Corrected Revision 1 Focused Corrective Measures Study/Feasibility Study (CMS/FS) Letter in Support of the D-Area Operable Unit (DAOU),* SEMS Number:63, IACD-20-102, 10/10/19, United States Department of Energy, Savannah River Operations Office, Aiken, SC

USEPA, 2010. *Human and Ecological Risk Assessment of Coal Combustion Wastes*. Draft, Regulation Identification Number 2050-AR81, United States Environmental Protection Agency, Office of Solid Waste and Emergency Response, Office of Resource Conservation and Recovery

WSRC, 1999. *Land Use Control Assurance Plan for the Savannah River Site,* WSRC-RP-98-4125, Revision 1.1, August 1999, latest update, Savannah River Nuclear Solutions, LLC, Savannah River Site, Aiken, SC

WSRC, 2008. *Savannah River Site Environmental Report for 2007,* WSRC-STI-2008-00057, Washington Savannah River Company, LLC, Savannah River Site, Aiken SC

WSRC, 2011. *Savannah River Site Federal Facility Agreement Community Involvement Plan (U),* Revision 7, WSRC-RP-96-120, Savannah River Nuclear Solutions, LLC, Savannah River Site, Aiken, SC (February)

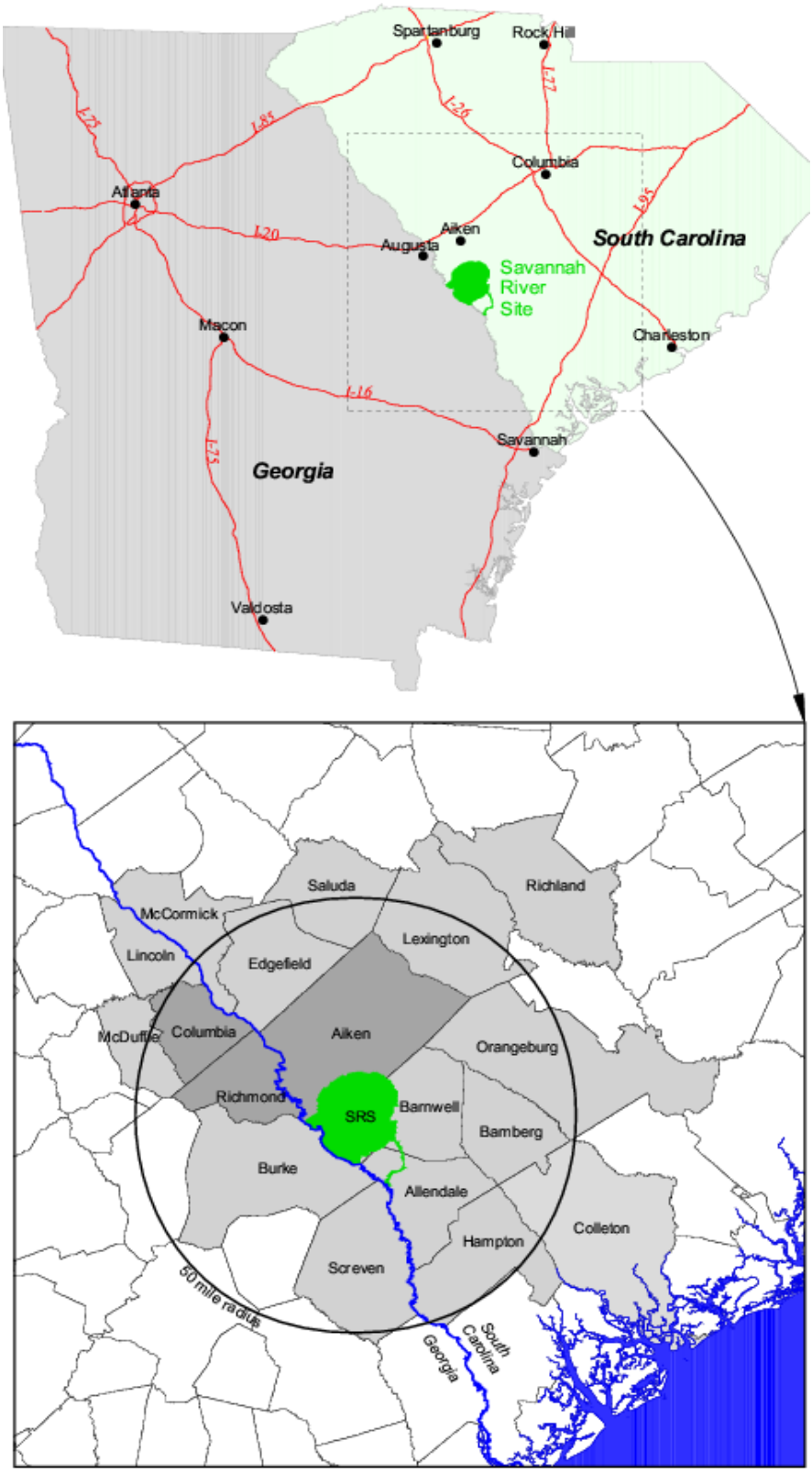


Figure 1. Geographic Proximity of the Savannah River Site

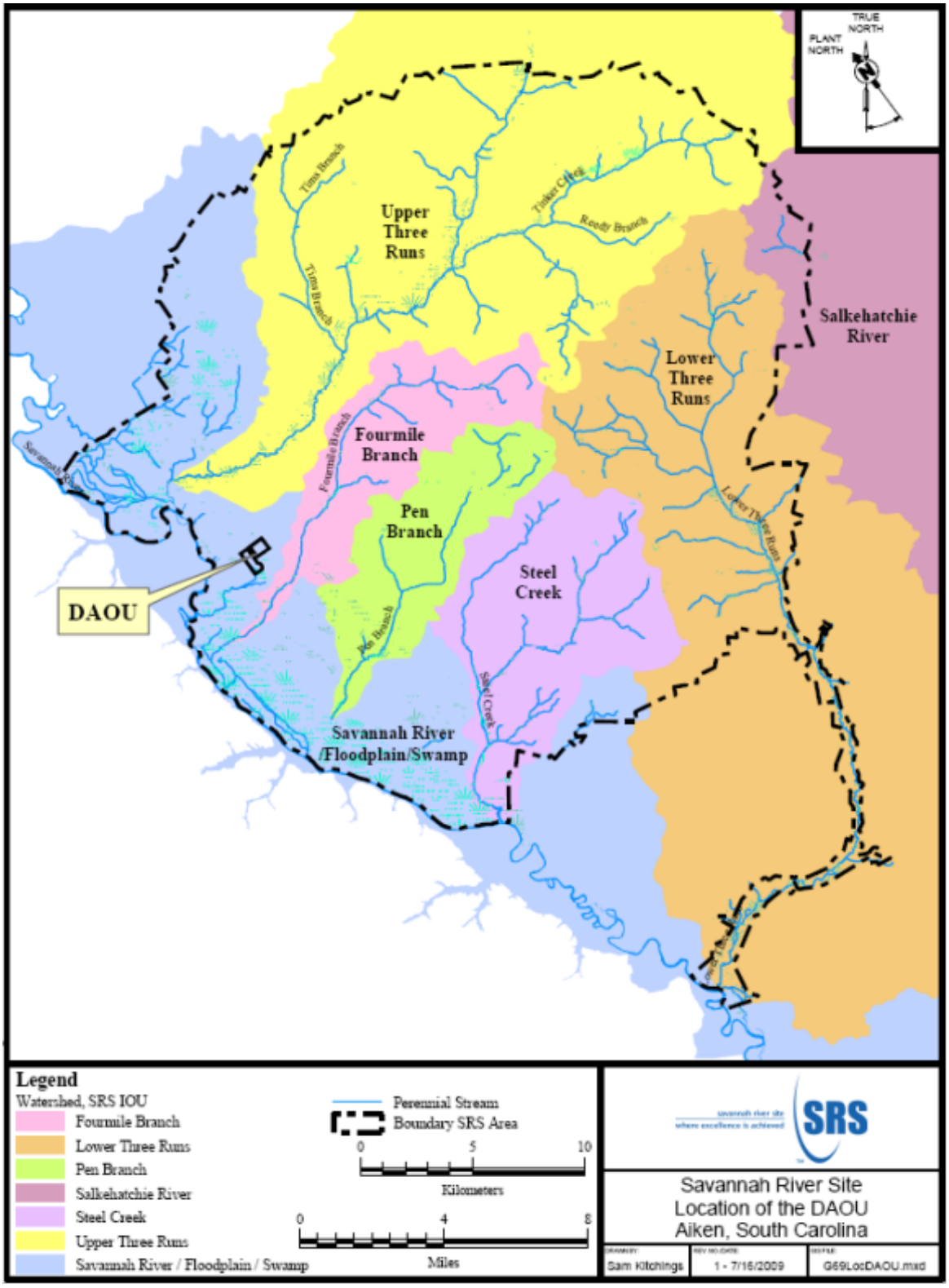


Figure 2. Location of the DAOU within the Savannah River Site

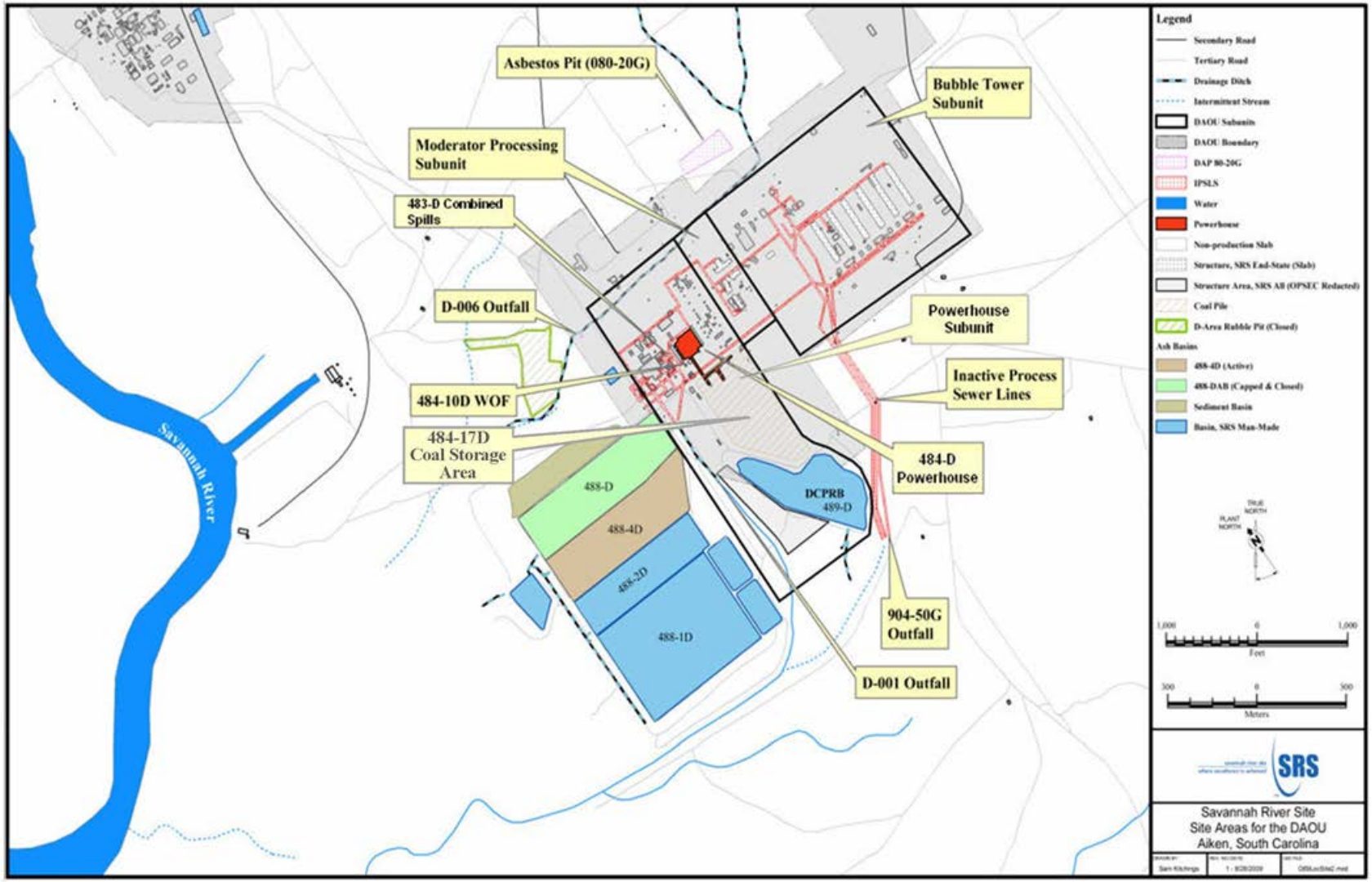


Figure 3. Layout of the DAOU

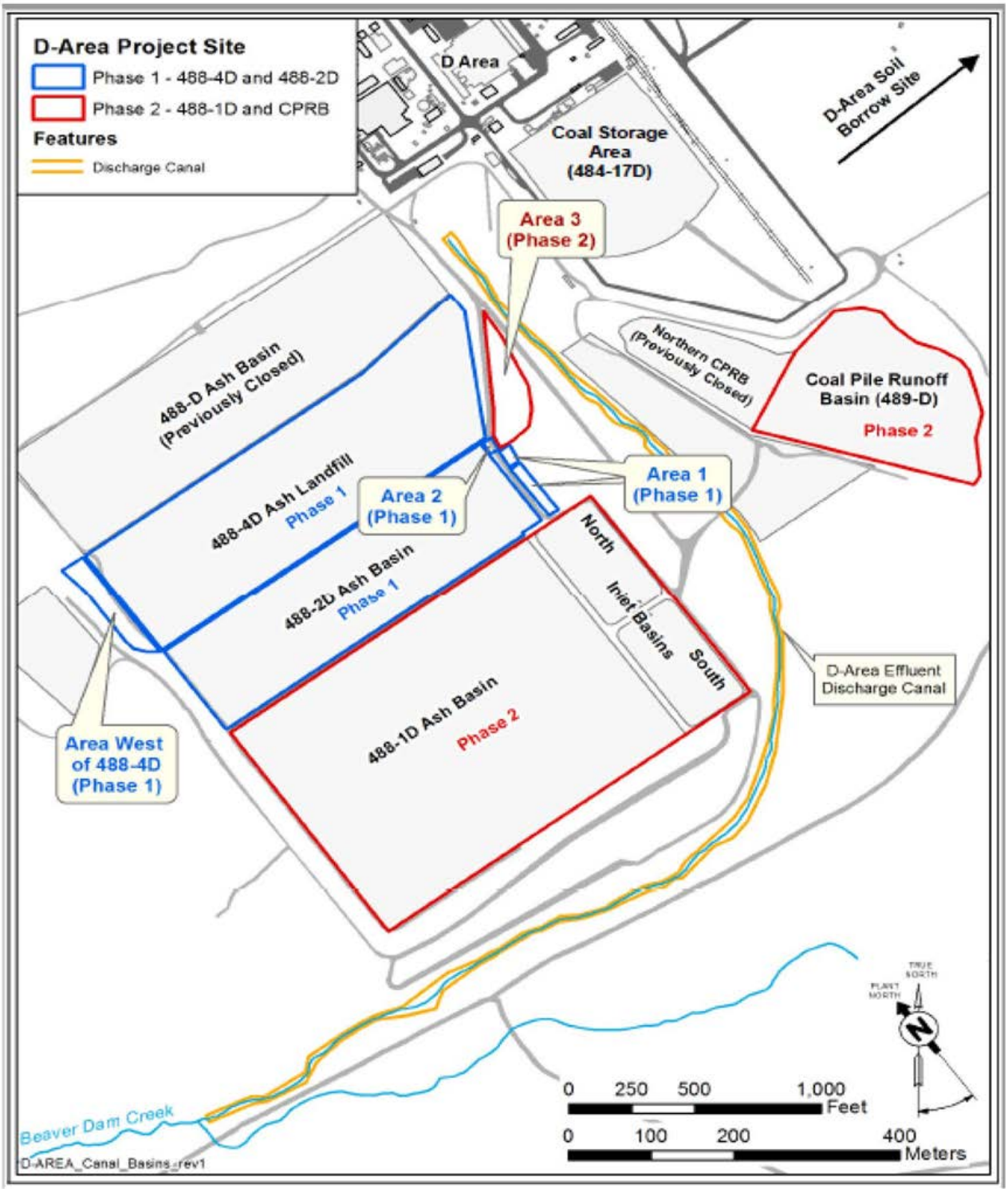


Figure 4. D-Area Project Site, Phase 1 and Phase 2

Figure 5. D-Area Ash Basins Waste Water Flow Pattern During Operations

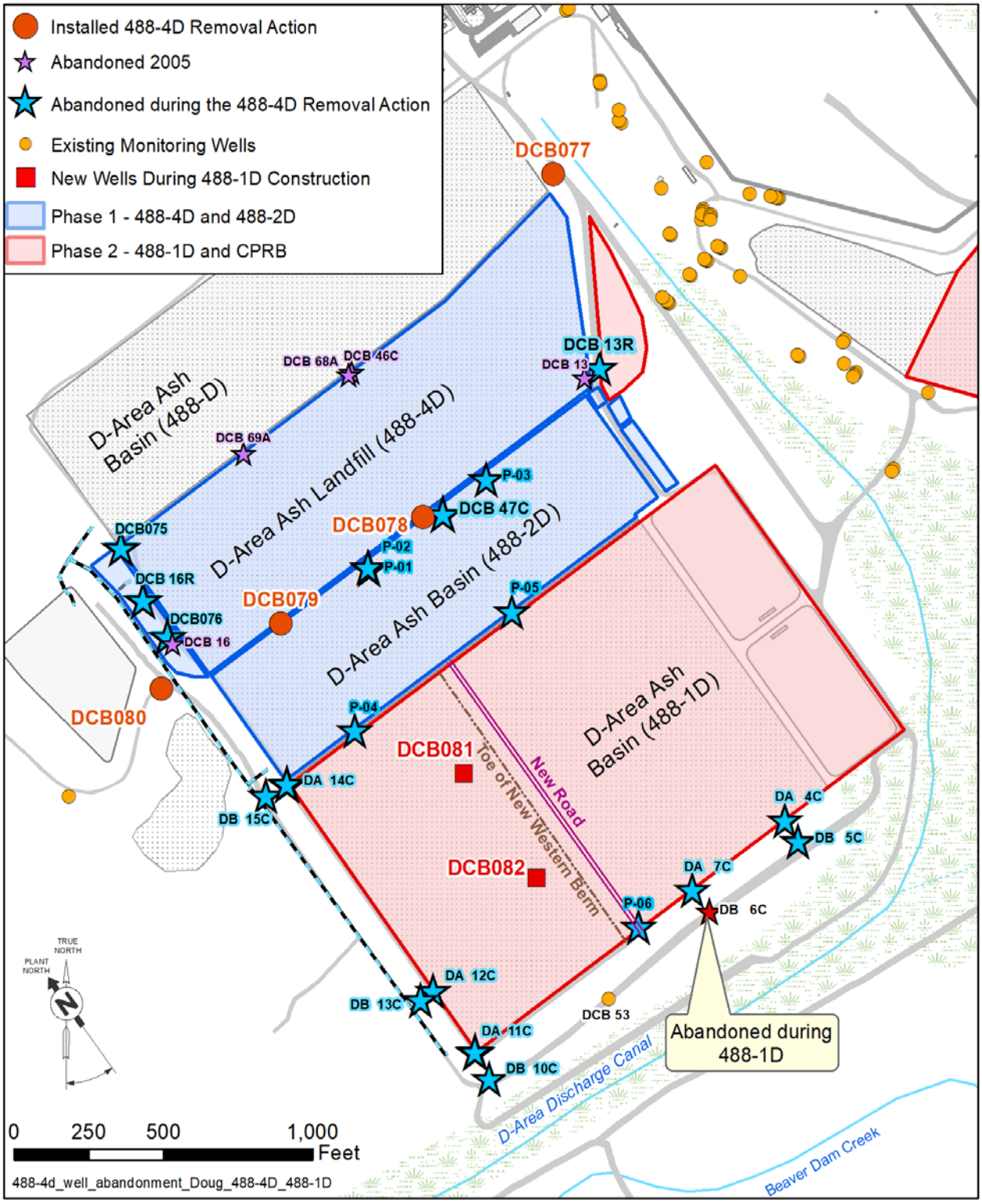


Figure 6. Well Field Modifications

Figure 7. D-Area Project in October 2013 (Before Project Initiation)

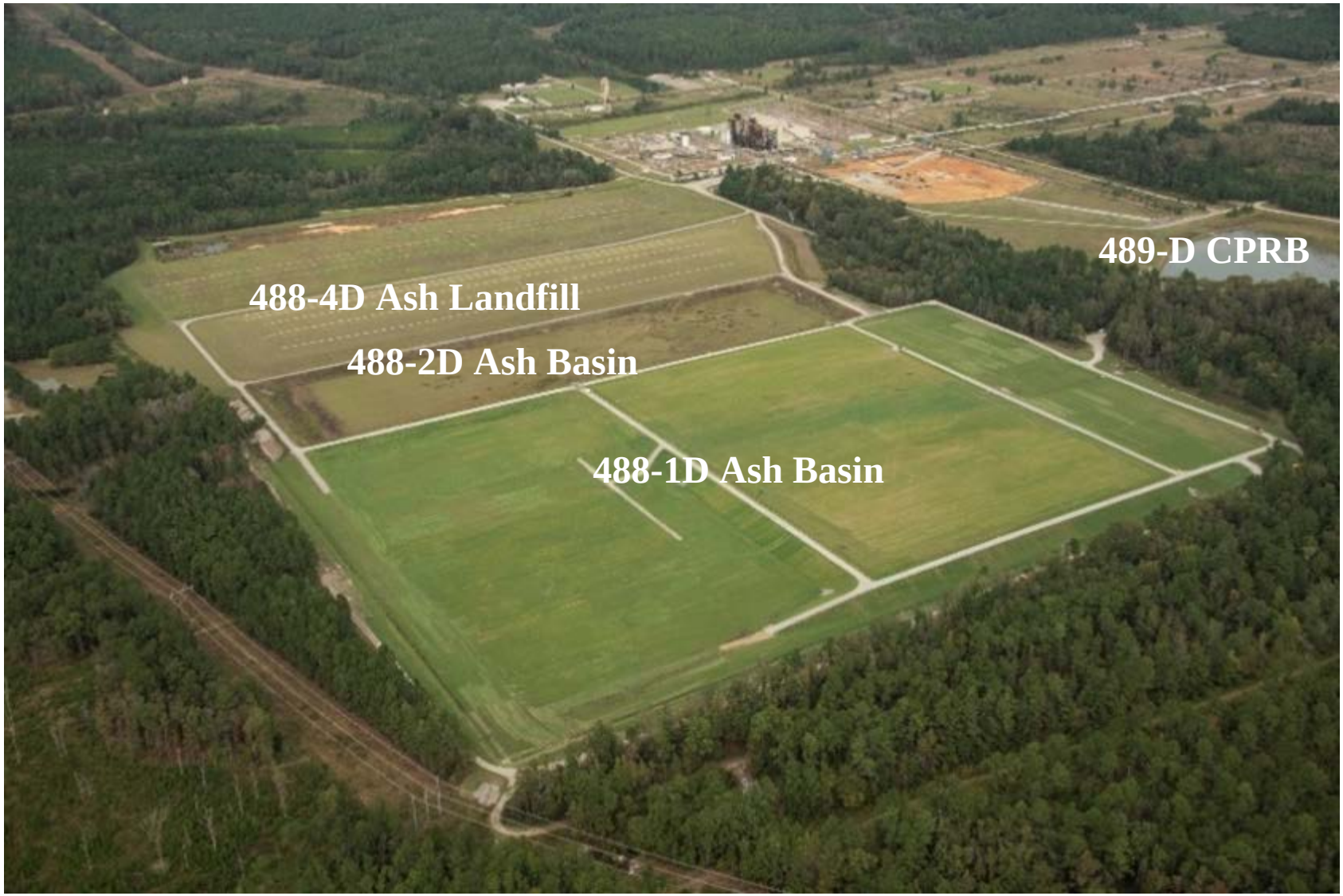
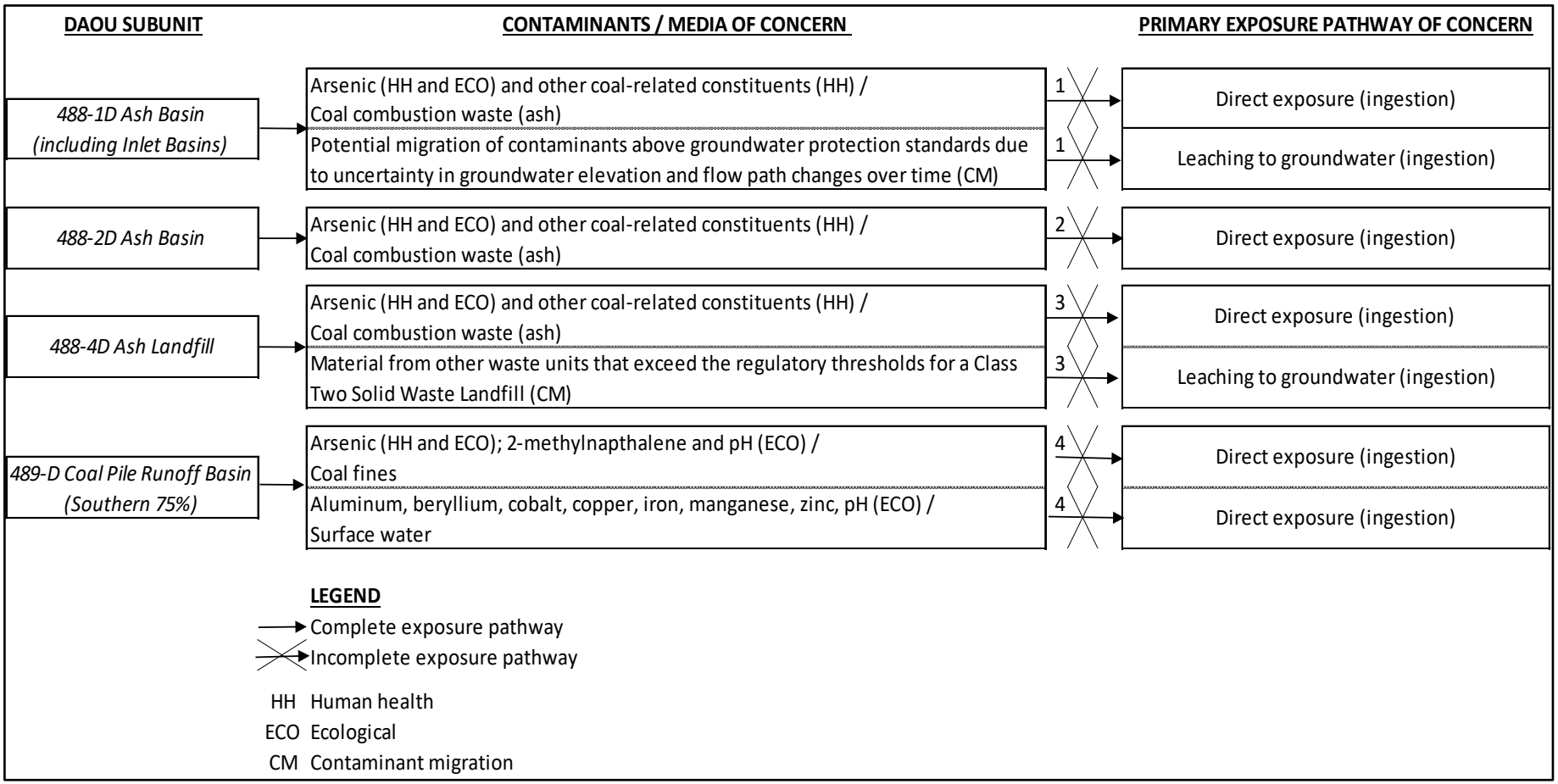


Figure 8. D-Area Project in October 2018 (After Project Completion)



1. Ash Consolidation and Geosynthetic Cover System per RSER/EE/CA (SRNS 2016a); 488-1D Ash Basin - LUCs required after completion of early removal action to prevent land disturbance activities and unrestricted land use. Inlet Basins - No LUCs required, meets the criteria for unrestricted land use.
2. Ash Removal per RSER (SRNS 2014c); LUCs required after completion of early removal action to prevent unrestricted land use.
3. Geosynthetic Cover System per RSER/EE/CA (SRNS 2014d); LUCs required after completion of early removal action to prevent land disturbance activities and unrestricted land use.
4. Excavation and Disposal per Revision 3 Action Memorandum for the Non-Time Critical Removal Action for the D-Area Coal Pile Runoff Basin (489-D) (USDOE 2015a); No LUCs required, meets the criteria for unrestricted land use

Figure 9. Generic Conceptual Site Model After Completion of Early Removal Actions

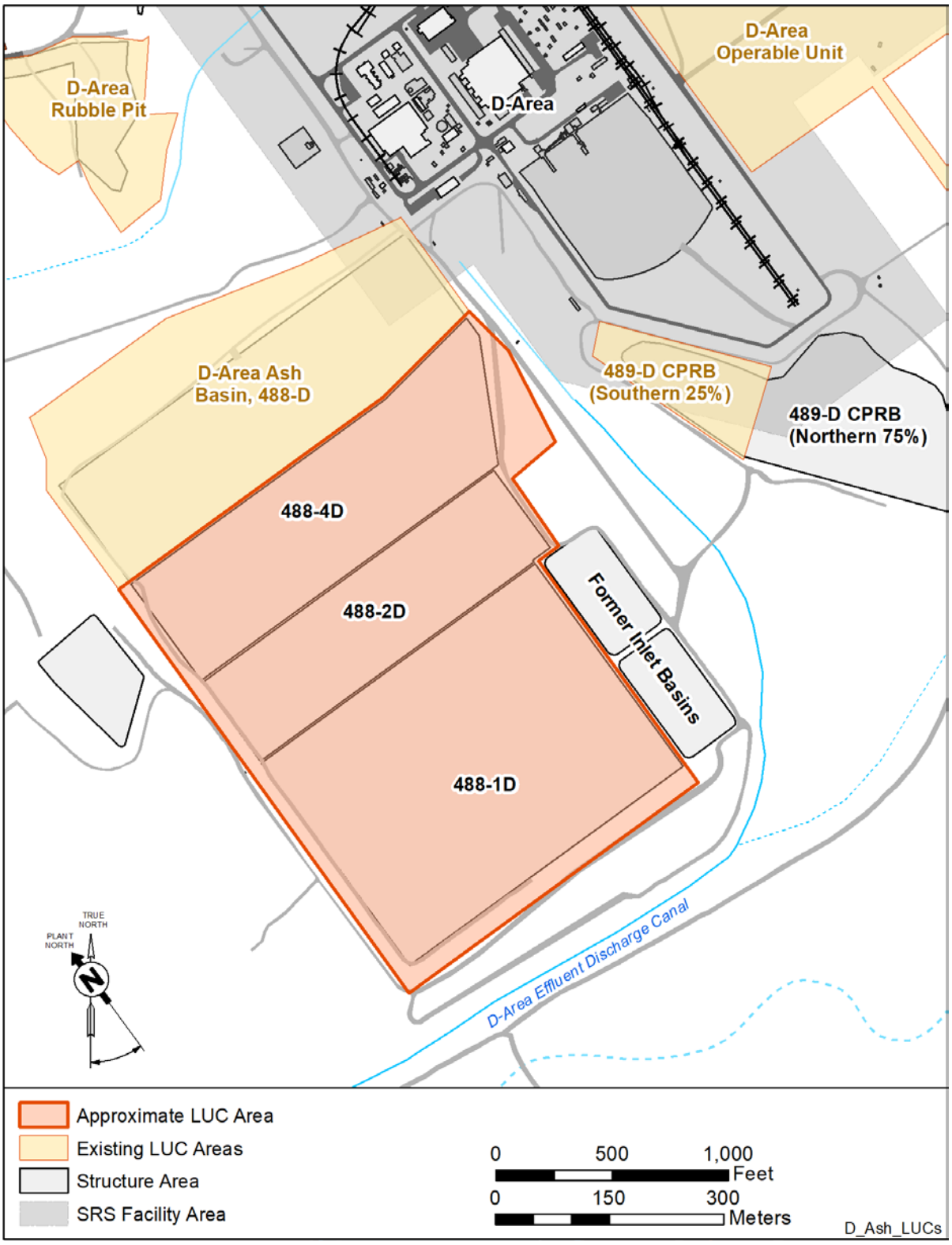


Figure 10. Approximate Area of LUCs

Table 1. Summary of Administrative Paths for DAOU Subunits

Subunit/Area	ADMINISTRATIVE PATH					
	EA ROD[1] *(approved)*	**Second[2] EA ROD**	**Final ROD**	**IOU**	**DAG OU**	**Remedial Decision**
Ash Basin (488-1D) (including Inlet Basins)		X				LUCs; No Action for the Inlet Basins portion
Ash Basin (488-2D)		X				LUCs
Ash Landfill (488-4D)		X				LUCs
Powerhouse Subunit	X		X			
489-D CPRB - southern 75%		X				No Action
489-D CPRB - northern 25%	X					LUCs
484-D Powerhouse Building			X			
484-10D Waste Oil Facility [WOF] Building			X			
484-10D WOF Environmental Media			X			
Ash Sluice Lines			X			
D-Area Coal Storage Area (484-17D)[3]			X			
483-D Combined Spills			X			
Moderator Processing Subunit	X					LUCs
Bubble Tower Subunit	X					LUCs
Miscellaneous Units						
D-006 Outfall (Petroleum Release Site)				X		
904-50G Outfall	X					No Action
D-Area Asbestos Pit (80-20G)	X					LUCs
DIPSLs	X					LUCs
Electrical Transformers	X					No Action
Miscellaneous Buildings	X					No Action
D-Area Rubble Pit (431-2D)						LUCs (DEXOU ROD 2004)
D-Area Oil Seepage Basin						GW Monitoring/LUCs (DAOSB ROD 1998)
Ash Basin (488-D)						Geosynthetic Cover/GW Monitoring/LUCs (DEXOU ROD 2004)
D-Area Groundwater					X	
Ash Area Adjacent to and Easterly of D-Area Ash Basins 488-1D and 488-2D				X		

1. EA ROD for DAOU, SRNS-RP-2010-00162, Rev 1.1, June 2011.
2. Second EA ROD for DAOU, subunits highlighted in yellow are the subject of this document.
3. D-Area Coal Storage Area (484-17D) also referred to as D-Area Coal Pile in SRS documentation.

Table 2. ARARs for the Selected Remedial Alternative for the DAOU

Action	Requirements	Prerequisite	Citation
Onsite Closure/Capping of the 488-1D Ash Basin and the 488-4D Ash Landfill			
Run-on/Run-off control Systems for Landfill Cover	The final cover system shall be designed and constructed to have a storm water conveyance system for the landfill cap designed to ensure that the hydraulic head at any point does not exceed one foot for a 24-hour period as the result of a 24-hour, 25-year storm event on all areas that have received final cover.	Closure of solid waste disposal facility (SC Class III landfill) – **applicable**	SCDHEC R. 61-107.19 Part V Subpart F 258.60(a)(4)
Post-Closure of 488-1D Ash Basin and the 488-4D Ash Landfill			
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) – **488-1D: relevant and appropriate** **488-4D: applicable**	40 CFR 258.61(a)(1),(3) SC R.61-107.19 Part V Subpart F 258.61(a)
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 D-Area Groundwater 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 SCDHEC and USEPA approval of a modification to the monitoring period.	Post-closure care of solid waste disposal facility (SC Class III landfill) – **488-1D: relevant and appropriate** **488-4D: applicable**	SC R.61-107.19 Part V Subpart F 258.61(a)(3) 40 CFR 258.61(b)(2) SC R.61-107.19 Part V Subpart F 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) – **488-1D: relevant and appropriate** **488-4D: applicable**	SC R.61-107.19 Part V Subpart F 258.61(c)(3)

Table 3. Summary of Present Value Costs for Alternative 2, Land Use Controls

Alternative 2 Early Final Action Land Use Controls D Area OU (488-1D, 2D and 4D) Savannah River Site				
Item	**Quantity**	**Units**	**Unit Cost**	**Total Cost**
Direct Capital Costs				
Land Use Controls				
Posting of Warning Signs	10	ea.	$100	$1,000
Land Use Control Implementation Plan	1	ea.	$7,500	$7,500
Deed Restrictions	1	ea.	$7,500	$7,500
Subtotal - Direct Capital Cost				$16,000 *
Mobilization/Demobilization	25%	of subtotal direct capital		$4,000 *
Site Preparation/Site Restoration	25%	of subtotal direct capital		$4,000 *
Total Direct Capital Cost		(sum of * items)		**$24,000**
Indirect Capital Costs				
Engineering & Design	18%	of direct capital		$4,320
Project/Construction Management	25%	of direct capital		$6,000
Health & Safety	5%	of direct capital		$1,200
Overhead	30%	of direct capital		$7,200
Contingency	20%	of direct capital		$4,800
Total Indirect Capital Cost				**$23,520**
Total Estimated Capital Cost				**$47,520**
Direct O&M Costs	0.7%	discount rate for costs >30 years duration[1]		
Annual Costs (Existing System during Early Action ROD Design & Const.)	1	years O&M		*Year 2020*
Access Controls	1	ea.	$750	$750
Subtotal - Annual Costs				$750
Present Worth Annual Costs (-0.5% Discount Rate)				$754
Annual Costs (Land Use Controls)	200	years O&M		*Years 2021 - 2221*
Access Controls	1	ea.	$750	$750
Annual Inspections / Reporting (2 per year)	2	ea.	$5,000	$10,000
Annual Mowing and Vegetation / Debris Removal (2 per year)	2	ea.	$7,500	$15,000
Annual Maintenance / Repairs (1 per year) Allowance	1	ea.	$10,000	$10,000
Subtotal - Annual Costs				$35,750
Present Worth Annual Costs (0.7% Discount Rate)				$3,814,875
Five Year Costs	41			
Remedy Review	1	ea.	$20,000	$20,000
Subtotal: Five-Year O&M Costs				$20,000
Present Worth Five-Year Costs				$428,638
Total Present Worth Direct O&M Cost				**$4,244,267**
Indirect O&M Costs				
Project/Admin Management	50%	of direct O&M		$2,122,133
Health & Safety	37%	of direct O&M		$1,570,379
Overhead	30%	of direct O&M		$1,273,280
Contingency	15%	of direct O&M		$636,640
Total Present Worth Indirect O&M Cost				**$5,602,432**
Total Estimated Present Worth O&M Cost				**$9,846,699**
TOTAL ESTIMATED COST				**$9,894,219**

Table 4. 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 ICs, ECs, 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 SCDHEC 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 5. Comparison of Alternatives Against the CERCLA Evaluation Criteria

Criterion	Alternative 1	Alternative 2
	No Action	Land Use Controls
Overall Protection of Human Health and the Environment		
Protection of Human Health	Not Protective	Protective
Protection of the Environment	Not Protective	Protective
Compliance with ARARs		
Chemical-Specific	Not Applicable	Not Applicable
Action-Specific	Not Applicable	Applicable to long-term maintenance of cover systems
Location-Specific	Not Applicable	Not Applicable
Long-Term Effectiveness and Permanence		
Magnitude of Residual Risks	Risks remain unchanged, not protective	Risks are reduced to acceptable levels by controlling exposure.
Adequacy of Controls	Not Adequate	Adequate
Permanence	Not Permanent	Permanent
Reduction of Toxicity, Mobility, or Volume Through Treatment		
Treatment Process	None	None
Degree of Expected Reduction in Toxicity, Mobility, or Volume	None	No reduction through treatment
Short-Term Effectiveness		
Risk to Remedial Workers	Not applicable; no remedial action involved.	None
Risk to Community	Not applicable; no remedial action involved.	None
Risks to Environment	Not applicable; no remedial action involved.	None
Estimated Time Frame to Achieve RAOs or concentration-based RGs	Does not achieve RAOs/RGs	1 month
Implementability		
Availability of Materials, Equipment, and Skilled Labor	Not Applicable	Straightforward; no specialized materials, equipment, and labor required
Ability to Construct and Operate the Remedial Technology	Not Applicable	Not Applicable
Ability to Obtain Permits/Approvals from Agencies	Not Applicable	Readily implemented
Ease of Undertaking Additional Actions	Compatible	Compatible
Time to Implement	Readily implementable	1 month

Table 5. Comparison of Alternatives Against the CERCLA Evaluation Criteria *(Continued/End)*

Criterion	Alternative 1	Alternative 2
	No Action	**Land Use Controls**
Cost		
Total Present-Worth Costs	$0	$9,894,219
State Support/Agency Acceptance	Not acceptable	Both USEPA and SCDHEC support the preferred remedy
Community Acceptance	Not acceptable	Acceptable

Table 6. Comparative Ranking of DAOU Final Action Alternatives

Alternative	Overall Protection of Human Health and the Environment	Compliance with ARARs	Long-Term Effectiveness and Permanence	Reduction of Toxicity, Mobility, or Volume Through Treatment	Short-Term Effectiveness	Implementability	Cost	Overall Ranking (Range 1 - 20)
1 - No Action	NA	NA	1	NA	1	5	$0	7
2 - Land Use Controls	4	Yes	5	NA	5	5	$9,894,219	19

Note: Numeric range 1 - 5, where 1 = worst and 5 = best

Table 7. Land Use Controls for the DAOU

Type of Control	Purpose of Control	Duration	Implementation	Affected Areas[a]
1. Property Record Notices[b]	Provide notice to anyone searching records about the existence and location of contaminated areas.	Until the concentration of hazardous substances associated with the unit have been reduced to levels that allow for unlimited exposure and unrestricted use.	Notice recorded by 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.	DAOU areas identified in this ROD where hazardous substances are left in place at levels requiring land use and/or groundwater restrictions.
2. Property record restrictions[c]: A. Land Use B. Groundwater	Restrict use of property by imposing limitations. Prohibit the use of groundwater.	Until the concentration of hazardous substances associated with the unit have been reduced to levels that allow for unlimited exposure and unrestricted use.	Drafted and implemented by USDOE upon any transfer of affected areas. Recorded by USDOE in accordance with state law at County Register of Deeds office.	DAOU areas identified in this ROD where hazardous substances are left in place at levels requiring land use and/or groundwater restrictions.
3. Other Notices[d]	Provide notice to city &/or county about the existence and location of waste disposal and residual contamination areas for zoning/planning purposes.	Until the concentration of hazardous substances associated with the unit have been reduced to levels that allow for unlimited exposure and unrestricted use.	Notice recorded by 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.	DAOU areas identified in this ROD where hazardous substances are left in place at levels requiring land use and/or groundwater restrictions.
4. Site Use Program[e]	Provide notice to worker/developer (i.e., permit requestor) on extent of contamination and prohibit or limit excavation/penetration activity.	As long as property remains under USDOE control.	Implemented by USDOE and site contractors. Initiated by permit request.	DAOU areas and remediation systems identified in this ROD where hazardous substances are left in place at levels requiring land use and / or groundwater restrictions.
5. Physical Access Controls[f] (e.g., fences, gates, portals)	Control and restrict access to workers and the public to prevent unauthorized 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.

Table 7. Land Use Controls for the DAOU *(Continued/End)*

Type of Control	Purpose of Control	Duration	Implementation	Affected Areas[a]
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 DAOU.
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 DAOU areas identified in this ROD, as necessary.

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

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

APPENDIX A

RESPONSIVENESS SUMMARY

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Responsiveness Summary

The 45-day public comment period for the *Early Action Statement of Basis/Proposed Plan for the D-Area Operable Unit* began on March 10, 2020, and ended on April 23, 2020.

Public Comments

No comments were received during the public comment period.

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