

# Scoping Summary for the Stormwater Outfall A-013 (NBN) Operable Unit (U)

## PROPOSED PLAN

SEMS Number: 62

SRNS-RP-2020-00122

April 2020 Final

**DISCLAIMER**

**This document was prepared in conjunction with work accomplished under Contract No. DE-AC09-08SR22470 with the U.S. Department of Energy.**

**This work was prepared under an agreement with and funded by the U.S. Government. Neither the U.S. Government or its employees, nor any of its contractors, subcontractors or their employees, makes any express or implied: 1.) warranty or assumes any legal liability for the accuracy, completeness, or for the use or results of such use of any information, product, or process disclosed; or 2.) representation that such use or results of such use would not infringe privately owned rights; or 3.) endorsement or recommendation of any specifically identified commercial product, process, or service. Any views and opinions of authors expressed in this work do not necessarily state or reflect those of the United States Government, or its contractors, or subcontractors.**

**Printed in the United States of America**

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

**TABLE OF CONTENTS**

<u>Section</u>	<u>Page</u>
LIST OF FIGURES .....	iii
LIST OF TABLES .....	iii
LIST OF ATTACHMENTS .....	iii
1.0 PROJECT PHASE AND DOCUMENT STATUS .....	1
2.0 OPERABLE UNIT HISTORY AND BACKGROUND .....	4
3.0 LAND USE .....	5
4.0 STORMWATER OUTFALL A-013 OPERABLE UNIT .....	5
5.0 OPERABLE UNIT STRATEGY .....	8

**LIST OF FIGURES**

<u>Figure</u>	<u>Page</u>
Figure 1. Stormwater Outfall A-013 Location in Relation to AAP (788-A) and CPRB (788-3A) within A-Area.....	10
Figure 2. Photo of Stormwater Outfall A-013 (2010).....	11
Figure 3. Phase 1 and Phase 2 Sample Locations at Stormwater Outfall A-013.....	12

**LIST OF TABLES**

<u>Table</u>	<u>Page</u>
Table 1. Record of Core Team Agreements for Stormwater Outfall A-013 .....	13

**LIST OF ATTACHMENTS**

<u>Attachment</u>	<u>Page</u>
Attachment 1 Stormwater Outfall A-013 Operable Unit Risk Evaluation.....	Att1-1

**This page was intentionally left blank.**

## 1.0 PROJECT PHASE AND DOCUMENT STATUS

This scoping summary supports the development of a Proposed Plan (PP) for the Stormwater Outfall A-013 (NBN) Operable Unit (OU). The Revision 0 PP is due for submittal on June 22, 2020.

The Stormwater Outfall A-013 was formerly a subunit of the A-Area Ash Pile (788-A), A-Area Coal Pile Runoff Basin (788-3A), and Stormwater Outfall A-013 (AAP/CPRB) OU. During the June 2012 scoping meeting for the Statement of Basis/Proposed Plan (SB/PP), the Core Team (i.e., representatives from United States Department of Energy [USDOE], US Environmental Protection Agency [USEPA], and South Carolina Department of Health and Environmental Control [SCDHEC]) agreed that there were no problems warranting action for the Stormwater Outfall A-013 subunit. Subsequent to this agreement, the USDOE decided to pursue a comprehensive evaluation for disposition of the remaining coal ash waste units at the Savannah River Site (SRS), including the AAP/CPRB. In addition, the Stormwater Outfall A-013 did not receive any discharge or runoff from the AAP/CPRB, but was only included as a subunit due to geographic proximity. For this reason, the AAP (788-A) and CPRB (788-3A) subunits were decoupled from the Stormwater Outfall A-013 subunit, and the milestones associated with the AAP/CPRB OU delayed in order for the USDOE to evaluate and discuss ash disposal options with the Core Team. The Stormwater Outfall A-013 subunit was officially placed on a separate administrative pathway as a single OU in the Federal Facility Agreement (FFA) (Appendix E) in January 2020.

The *Scoping Summary for the A-Area Ash Pile (788-A), A-Area Coal Pile Runoff Basin (788-3A) and Stormwater Outfall A-013 (NBN) Operable* (ERD-EN-2009-0042) was used in previous Core Team meetings to scope the AAP/CPRB OU and document Core Team agreements. Core Team agreements that related specifically to the Stormwater Outfall A-013 were extracted from the AAP/CPRB OU scoping summary and placed in Record of Core Team Agreements (Table 1) in this scoping summary. The following is a brief synopsis of the evolution of the project.

Pre-Work Plan scoping of the AAP/CPRB OU (including the Stormwater Outfall A-013 subunit) was conducted in May 2009, and a Post-Work Plan characterization scoping meeting was conducted in August 2010. A combined Problem Identification/Corrective Measures Study (CMS)/Feasibility Study (FS) scoping meeting was conducted in February 2011 to finalize the problem statements and identify likely response actions in support of development of the Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI)/Remedial Investigation (RI)/Baseline Risk Assessment (BRA) with CMS/FS. The *RCRA Facility Investigation/Remedial Investigation (RFI/RI) Work Plan and RFI/RI Report with Baseline Risk Assessment and Corrective Measures Study/Feasibility Study for the A-Area Ash Pile (788-A), A-Area Coal Pile Runoff Basin (788-3A), and Stormwater Outfall A-013 (NBN) Operable Unit (U)* (SRNS-RP-2010-01457, Revision 1) was approved in June 2012 and the certified clean copy was submitted to USEPA and SCDHEC in July 2012.

The SB/PP scoping meeting for AAP/CPRB OU (including the Stormwater Outfall A-013 subunit) was held in June 2012. The scoping meeting supported Core Team agreements on the preferred final action alternatives and development of the SB/PP. The *Statement of Basis/Proposed Plan for the A-Area Ash Pile (788-A), A-Area Coal Pile Runoff Basin (788-3A), and Stormwater Outfall A-013 (NBN) Operable Unit (U)* (SRNS-RP-2012-00307, Revision 0) was submitted in September 2012.

As documented in the responses to regulatory comments on the Revision 0 SB/PP for the AAP/CPRB OU, the USDOE decided to revisit the preferred remedy discussion because of outstanding issues that needed to be examined which impacted schedule commitments. In a Core Team conference call held on August 15, 2012, the USDOE stated its intent to pursue a different final remedy for the AAP and CPRB subunits than that scoped in June 2012. The USDOE proposed to resubmit the document as an Interim Action Statement of Basis/Proposed Plan (IASB/PP) until those uncertainties could be more thoroughly addressed and resolved. More specifically, the USDOE proposed consolidation of the AAP material into the CPRB and classifying the disposal area as a Class 2 Landfill. A meeting was held with SCDHEC's Division of Solid Waste and Mining on August 23, 2012, to discuss the required waste characterization and

other design/technical issues needed to meet the requirements of a Class 2 Landfill as described in R.61-107.19 (SWM: Solid Waste Landfills and Structural Fill). It was acknowledged that the technical requirements for design and construction would be based on the outcome of testing required by R.61-107.19 and likely have a large bearing on the final remedy for the AAP and CPRB subunits. Per those discussions, two new alternatives were presented in the Revision 1 IASB/PP document for the AAP and CPRB subunits, with *Alternative A-8 Consolidate AAP Material at CPRB and Apply Soil Cover With LUCs and Effectiveness Groundwater Monitoring* as the preferred interim remedial alternative.

The *Interim Action Statement of Basis/Proposed Plan for the A-Area Ash Pile (788-A), A-Area Coal Pile Runoff Basin (788-3A), and Stormwater Outfall A-013 (NBN) Operable Unit (U)* (SRNS-RP-2012-00307, Revision 1) was submitted in November 2013. SCDHEC provided comments on this document in January 2014 (USEPA did not provide comments on the Revision 1 during the comment period), and a Revision 1.1 redlined document was submitted in March 2014 to address those concerns.

USEPA provided comments on the Revision 1.1 redline IASB/PP in a letter dated April 21, 2014, and SCDHEC approved the document as submitted on April 23, 2014. On May 22, 2014, the USDOE submitted a thirty-day extension notification for submittal of the Revision 1.2 IASB/PP, which extended the submittal date from May 23, 2014 to June 22, 2014. On June 16, 2014, the USDOE submitted an extension request for submittal of the Revision 1.2 IASB/PP from June 22, 2014, to June 22, 2016. The SCDHEC and USEPA approved the extension request on June 18, 2014, and June 20, 2014, respectively. On November 17, 2014, the USDOE submitted the FFA Revision 0 Appendix E for FY2015, which proposed to extend the Revision 1.2 IASB/PP submittal date from June 22, 2016 to June 22, 2020, to allow the D-Area Ash Basins (488-1D and 488-2D), D-Area Ash Landfill (488-4D), and D-Area Coal Pile Runoff Basin (489-D) project to remain on schedule. Subsequent AAP/CPRB OU milestones were also proposed for extension. After incorporation of the responses to the regulatory comments, the FFA Revision 1 Appendix E for FY2015 was approved in March 2015; and the AAP/CPRB OU submittal dates were revised accordingly.

As previously discussed, FFA Appendix E was revised in January 2020 to separate the Stormwater Outfall A-013 from the AAP/CPRB OU. Because the Stormwater Outfall A-013 is a Comprehensive Environmental Response, Compensation, and Liability Act only unit, only a PP document is required. Submittal of the Revision 0 PP for the Stormwater Outfall A-013 OU is due on June 22, 2020, consistent with the Appendix E milestone date previously established for the AAP/CPRB OU IASB/PP.

## 2.0 OPERABLE UNIT HISTORY AND BACKGROUND

SRS encompasses 803 square kilometers ( $\text{km}^2$  [310 square miles $\{\text{mi}^2\}$ ]) of South Carolina coastal plain uplands along the Savannah River in Aiken, Barnwell, and Allendale counties. SRS was constructed during the early 1950s to produce the basic materials used in the fabrication of nuclear weapons, primarily tritium and plutonium-239, in support of U.S. defense programs. A Area is located in the northwest portion of SRS. Stormwater Outfall A-013 is located in the southern portion of A Area (Figure 1); the AAP and CPRB are also shown on the figure for reference.

Stormwater Outfall A-013 drains a small area along a section of abandoned railroad track on the southern end of A Area. A shallow open ditch, approximately (~) 122-meters (m [400-feet {ft}]) long, follows the railroad track and feeds into a drainpipe and to the outfall. There is a drop-in elevation of ~5 m (15 ft) from the inlet drain to the outfall. The outfall and drainage ditch are normally dry; the only flow through the drainage is stormwater during periodic rain events. A photograph of the outfall in 2010 is shown in Figure 2. Potential past releases to this outfall include runoff from the former 716-A Motor Shop and adjacent parking areas located north/northwest of the drainage ditch and outfall and the Motor Shop Seepage Basin located north of the outfall pipe. The Motor Shop Seepage Basin did not require remedial action and was closed under a 1998 No Action Record of Decision (ROD).

### 3.0 LAND USE

The Stormwater Outfall A-013 OU is located in an area currently designated for industrial use. No current or projected future development of A Area is planned. Although an industrial land use scenario is selected as the most appropriate BRA exposure scenario for the protection of human health (HH) and the environment, both unrestricted and industrial land use scenarios were evaluated in the BRA to support risk management decision making. The Stormwater Outfall A-013 OU was also evaluated for ecological impacts. There is no current or projected future use of the groundwater as a drinking water source. Groundwater is not part of the Stormwater Outfall A-013 OU and is addressed under the M-Area Hazardous Waste Management Facility RCRA Permit.

### 4.0 STORMWATER OUTFALL A-013 OPERABLE UNIT

#### *Characterization Summary*

Characterization of the Stormwater Outfall A-013 consisted of two (2) phases of sampling. The initial phase of soil sampling was conducted in January 2010 along a conveyance leading to and including Stormwater Outfall A-013. This phase of sampling included four (4) sample locations (A013-01 through A013-04) (Figure 3). Samples were collected from the 0- to 0.3-m (0- to 1-ft) and 0.3- to 1.2-m (1- to 4-ft) below ground surface (bgs) intervals at each location for a total of eight (8) soil samples. Samples for each interval were analyzed for target compound list (TCL) volatile organic compounds, TCL semi-volatile organic compounds, TCL pesticides/polychlorinated biphenyls, target analyte list inorganics, mercury, cyanide, gross alpha, non-volatile beta, and gamma pulse height analysis. One sample also was analyzed for alpha spectroscopy (uranium and thorium isotopes).

Following review of the initial sampling results, soil samples were collected in April and May 2011 from three additional soil sampling stations (A013-05 through A013-07) to confirm elevated polycyclic aromatic hydrocarbon (PAH) detections (primarily benzo(a)pyrene),

that were present in samples near, and potentially impacted by, an access road (Figure 3). During this second phase of sampling, soil samples were collected from the 0- to 0.3-m (0- to 1-ft) bgs interval at the three locations and analyzed for PAHs only. The Phase 2 data and all of the supporting information for Stormwater Outfall A-013 are provided in the *RCRA Facility Investigation/Remedial Investigation (RFI/RI) Work Plan and RFI/RI Report with Baseline Risk Assessment and Corrective Measures Study/Feasibility Study for the A-Area Ash Pile (788-A), A-Area Coal Pile Runoff Basin (788-3A), and Stormwater Outfall A-013 (NBN) Operable Unit (U)* (SRNS-RP-2010-01457, Revision 1, July 2012).

#### *Risk Assessment Summary*

The initial human health risk assessment (HHRA) for the Stormwater Outfall A-013 published in the RFI/RI/BRA/CMS/FS included the Phase I soil sampling results (locations A013-01 through A013-04) and identified five PAHs as refined constituents of concern (RCOCs) for the residential scenario with a total cumulative risk of  $1.9E-04$  (SRNS-RP-2010-01457, Revision 1, July 2012). The primary risk driver was benzo(a)pyrene (risk =  $1.3E-04$ ). There were no HH RCOCs identified for the industrial worker scenario. The initial HHRA was based on the maximum PAH concentration at sample location A013-04 which is located near the access road. Elevated PAH concentrations are not uncommon near roadways due to asphalt road materials, vehicle exhaust, motor oil, etc. The data from the Phase 2 sampling event (A013-05 through A013-07) were evaluated for nature and extent and included in an appendix to the Revision 1 RFI/RI/BRA/CMS/FS but were not used to recalculate the HHRA.

The USDOE, USEPA and SCDHEC reached agreement at the June 2012 SB/PP scoping meeting that the data from sample locations near the access road were not related to Stormwater Outfall A-013 activities and the HHRA for PAHs presented in the RFI/RI/BRA/CMS/FS was biased high. For this reason, the HHRA was revised for the Revision 0 SB/PP to include only data from the sample locations determined to be directly related to the outfall (i.e., A-013-01 through A013-03). Samples A013-04 thru A013-07 were not included in this re-evaluation due to their proximity to the road. The residential risk estimate for benzo(a)anthracene (risk =

3.1E-07), benzo(a)pyrene (risk = 3.3E-06), benzo(b)fluoranthene (risk = 1.0E-06), dibenz(a,h)anthracene (no risk, all samples were non-detect) and indeno(1,2,3-cd)pyrene (risk = 3.2E-07) were determined to not be significant enough to warrant any remedial action for the Stormwater Outfall A-013. No constituents had a risk greater than 1E-06 for the industrial worker scenario. Based on this re-evaluation, there are no HH RCOCs and there are no problems warranting action at Stormwater Outfall A-013 that would require remedial action. This decision was documented in the Record of Core Team Agreements Table in the scoping summary document. Per those agreements, the *Re-Evaluation of the Problem Warranting Action at Stormwater Outfall A-013* was presented as an appendix in the Revision 0 SB/PP for the AAP/CPRB OU (SRNS-RP-2012-00307, Revision 0, September 2012) and the Revision 1 (SRNS-RP-2012-00307, Revision 1, November 2013) and Revision 1.1 (SRNS-RP-2012-00307, Revision 1.1, March 2014) versions of the IASB/PP.

The HHRA based on sample locations A013-01 through A013-03 will be included as an appendix to the Revision 0 PP for the Stormwater Outfall A-013 OU but updated to evaluate against the current USEPA regional screening levels (RSLs) for the PAHs. The updated Stormwater Outfall A-013 Operable Unit Risk Evaluation is included for information purposes as Attachment 1 to this Scoping Summary document.

An important development that further justifies the No Action preferred remedial action for Stormwater Outfall A-013 is that in June 2017, the USEPA RSLs for the PAHs were updated based on a new toxicological profile. The RSLs increased by an order of magnitude for both the residential and industrial worker scenarios as identified in the table below. The RSLs for these constituents have not changed since the 2017 update (i.e., 2017 RSLs are the same as the current November 2019 RSLs). The result is that the maximum detected concentration of the PAH constituents are less than the residential RSL (i.e., risk less than 1E-06) as shown in Attachment 1.

<b>benzo(a)anthracene</b>	<b>benzo(a)pyrene</b>	<b>benzo(b)fluoranthene</b>	<b>dibenz(a,h)anthracene</b>	<b>indeno(1,2,3-cd)pyrene</b>
<i>May 2012 RSLs</i> Resident = 0.15 mg/kg Ind Worker = 2.1 mg/kg	<i>May 2012 RSLs</i> Resident = 0.015 mg/kg Ind Worker = 0.21 mg/kg	<i>May 2012 RSLs</i> Resident = 0.15 mg/kg Ind Worker = 2.1 mg/kg	<i>May 2012 RSLs</i> Resident = 0.015 mg/kg Ind Worker = 0.21 mg/kg	<i>May 2012 RSLs</i> Resident = 0.15 mg/kg Ind Worker = 2.1 mg/kg
<i>June 2017 RSLs</i> Resident = 1.1 mg/kg Ind Worker = 21 mg/kg	<i>June 2017 RSLs</i> Resident = 0.11 mg/kg Ind Worker = 2.1 mg/kg	<i>June 2017 RSLs</i> Resident = 1.1 mg/kg Ind Worker = 21 mg/kg	<i>June 2017 RSLs</i> Resident = 0.11 mg/kg Ind Worker = 2.1mg/kg	<i>June 2017 RSLs</i> Resident = 1.1 mg/kg Ind Worker = 21 mg/kg

There are no HH or ecological risk, principal threat source material, or contaminant migration to groundwater problems that require remedial action at the Stormwater Outfall A-013 OU. Land use controls (LUCs) are not required. The results of the evaluation support No Action as the likely response action.

<b>Problem(s) Warranting Action</b>	<b>Remedial Action Objectives</b>	<b>Scope of Problem(s)</b>	<b>Likely Response Actions</b>
None	None	None	No Action
<b>Uncertainties</b>			
None			

## 5.0 OPERABLE UNIT STRATEGY

Appendix E of the FFA was revised in January 2020 to separate the Stormwater Outfall A-013 from the AAP/CPRB OU. A Revision 0 PP for the Stormwater Outfall A-013 OU documenting No Action as the preferred and only response action will be submitted to the regulatory agencies by June 22, 2020.

The updated Risk Evaluation using sample locations A013-01 through A013-03 and November 2019 RSL values will be included as an appendix to the Stormwater Outfall A-013 OU Revision 0 PP. The Stormwater Outfall A-013 OU project schedule is presented below and is consistent with the Appendix E milestone dates previously established for the AAP/CPRB OU.

<b>Milestone</b>	<b>Date</b>
PP Submittal (Revision 0)	June 22, 2020
No Action ROD Submittal (Revision 0)	March 9, 2021
No Action ROD Issuance	November 29, 2021

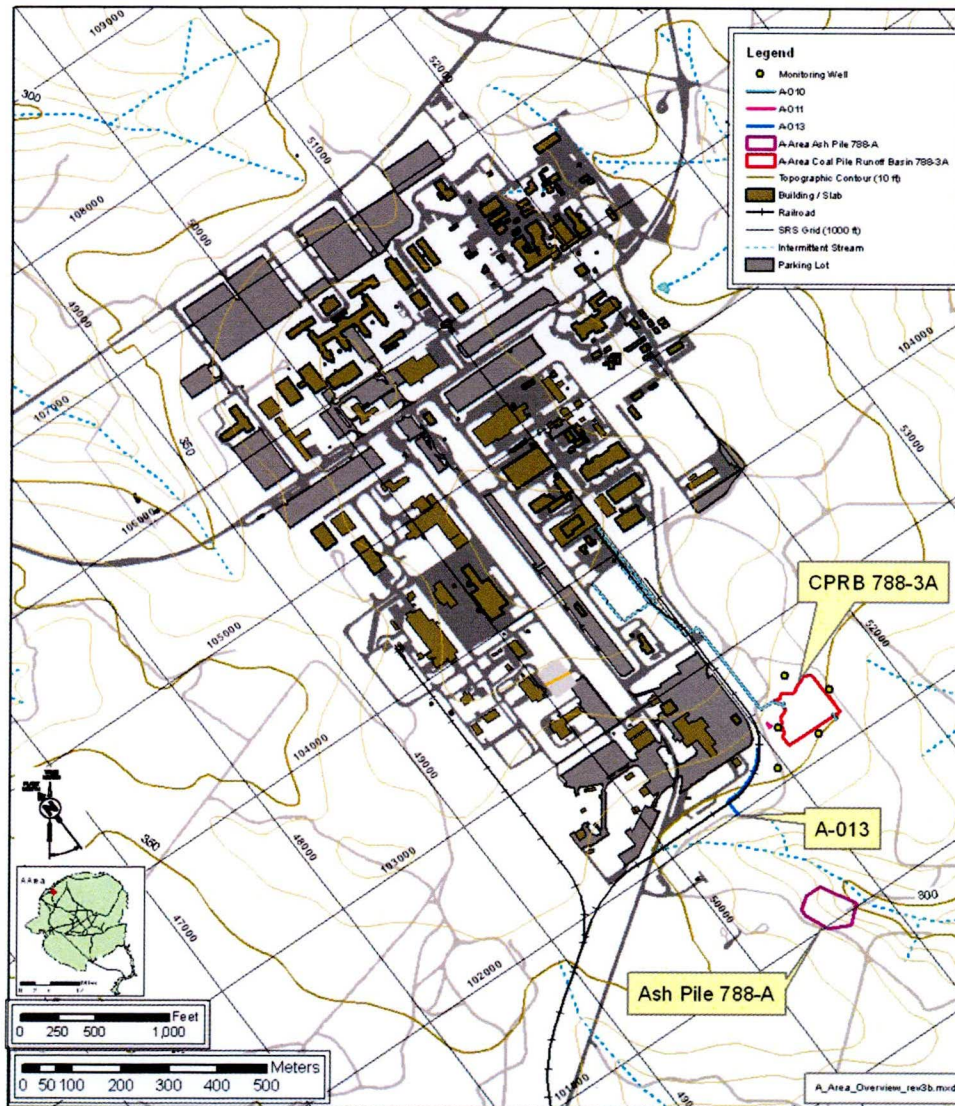


Figure 1. Stormwater Outfall A-013 Location in Relation to AAP (788-A) and CPRB (788-3A) within A-Area



**Figure 2. Photo of Stormwater Outfall A-013 (2010)**

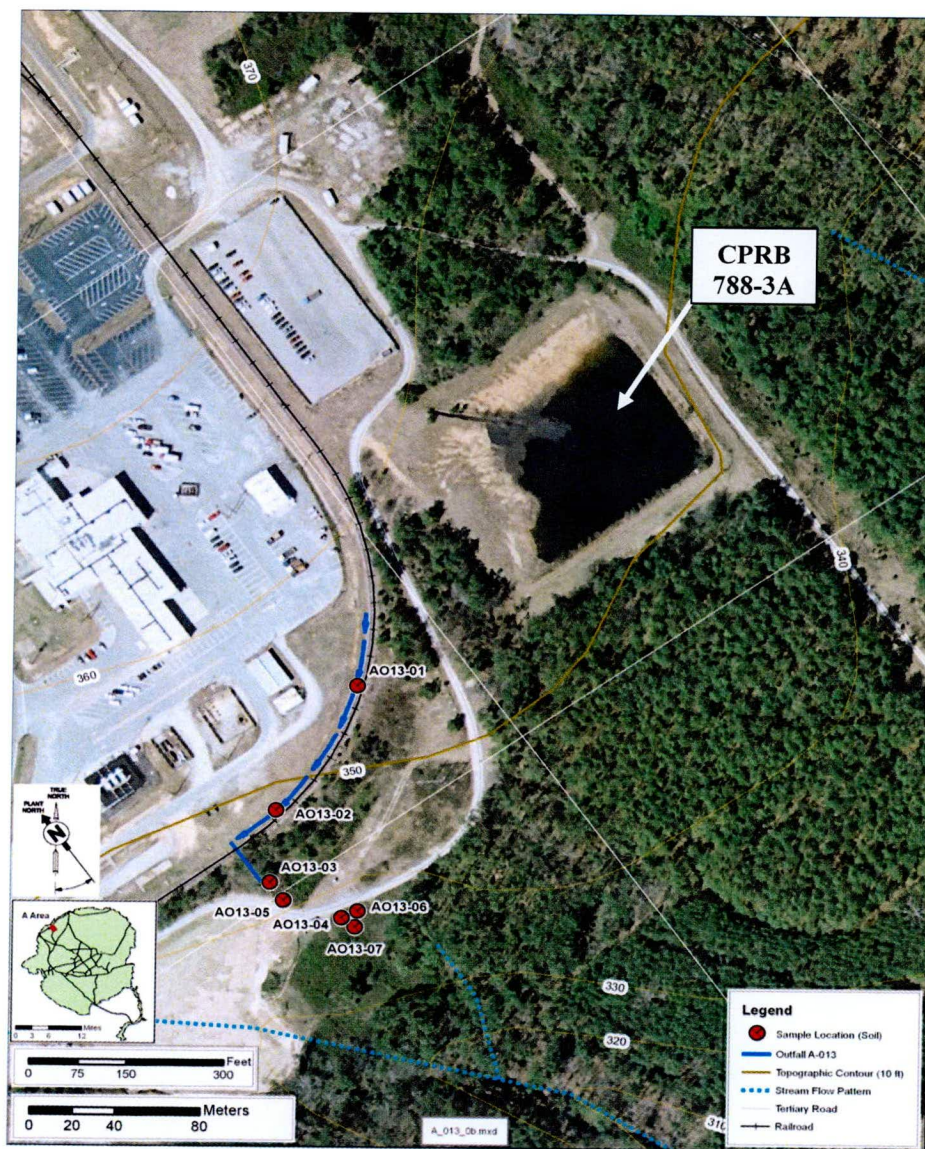


Figure 3. Phase 1 and Phase 2 Sample Locations at Stormwater Outfall A-013

**Table 1. Record of Core Team Agreements for Stormwater Outfall A-013**

<b>RECORD OF CORE TEAM AGREEMENTS DOCUMENTED IN PREVIOUS SCOPING SUMMARY DOCUMENT</b>	
<b>Date</b>	<b>Description of Agreement</b>
05/28/09 <sup>1</sup>	Agree to Characterization Plan
08/25/10 <sup>1</sup>	Core Team agreed that the sampling plan for Outfall A-013 was adequately executed.
02/23/11 <sup>1</sup>	Core Team agreed to obtain three additional samples at the A-013 Outfall for determining extent of PAH contamination.
06/27/12 <sup>1</sup>	Core Team agreed that the additional samples east of the road at A-013 Outfall are not related to the outfall. The data from these samples will be reevaluated in the A Area OU.
06/27/12 <sup>1</sup>	Core Team agreed that there was No Problem Warranting Action at the A-013 Outfall. No Action is the final decision for this subunit. The SB/PP will document this decision and include the revised risk assessment excluding data east of the road.
4/27/20	During scoping of the stand-alone Proposed Plan for the A-013 Operable Unit, the Core Team reaffirmed that there is no problem warranting action and thus no need for an evaluation of remedial alternatives.

<sup>1</sup> – Scoping Summary for the A-Area Ash Pile (788-A), Area Coal Pile Runoff Basin (788-3A), and Stormwater Outfall A-013 (NBN) Operable Unit (U), ERD-EN-2009-0042

**This page was intentionally left blank.**

**ATTACHMENT 1**

**Stormwater Outfall A-013 Operable Unit  
Risk Evaluation**

**This page was intentionally left blank.**

### **Introduction/Purpose**

The RCRA Facility Investigation/Remedial Investigation (RFI/RI) Work Plan and RFI/Report with Baseline Risk Assessment and Corrective Measure Study/Feasibility Study for the A-Area Ash Pile (788-A), A-Area Coal Pile Runoff Basin (788-3A), and Stormwater Outfall A-013 (NBN) Operable Unit (SRNS 2012) identified polycyclic aromatic hydrocarbons (PAHs) as a problem warranting action for the residential scenario at the Stormwater Outfall A-013 subunit pending further discussion with the U.S. Department of Energy (USDOE), U.S. Environmental Protection Agency (USEPA), and South Carolina Department of Health and Environmental Control (SCDHEC). (For the purposes of this discussion, this report will be referred to as the “Combined Document.”) The USDOE, USEPA, and SCDHEC subsequently met on June 27, 2012, to scope the AAP/CPRB OU Statement of Basis/Proposed Plan and more thoroughly consider the nature and extent of contamination of the PAH constituents based on a second phase of soil sampling from three additional locations. The three additional Phase 2 sampling locations and one location from the Phase 1 sampling event were collected near an access road. The Core Team recognized that asphalt is a known source of PAH contamination and agreed that the elevated PAH concentrations in samples obtained near the access road are not likely related to Stormwater Outfall A-013. Based on this information, the USDOE, USEPA, and SCDHEC concluded that there are no problems warranting action at the Stormwater Outfall A-013 subunit.

The purpose of this appendix is to revise the human health risk estimates presented in the Combined Document using only the samples that are directly associated with the Stormwater A-013 Outfall as agreed to at the June 27, 2012 scoping meeting to demonstrate that there are no problems warranting action at the Stormwater A-013 Outfall. The November 2019 regional screening levels (RSLs) were used in the risk estimates.

### **Characterization Background**

The following is a summary of the characterization efforts at the Stormwater Outfall A-013 subunit. Additional details are provided in the Combined Document (SRNS 2012).

Sampling of Stormwater Outfall A-013 was conducted in two phases. Phase 1 soil samples were collected from four stations along Outfall A-013 (A013-01 through A013-04). Phase 2 soil samples were collected from three additional soil sampling stations (A013-05 through A013-07) (Figure A1).

Phase 1 consisted of sampling at four locations (A013-01 through A013-04) along Stormwater Outfall A-013 during January 2010. The following is a summary of the data collected during the Phase 1 sampling.

- Two soil sample stations along the drainage ditch upstream of Outfall A-013: A013-01 and A013-02
- One soil sample station at Outfall A-013: A013-03
- One soil sample station downstream of the Outfall A-013 pipe and south of the access road: A013-04
- Depth intervals: 0- to 0.3-m (0- to 1-ft) and 0.3- to 1.2-m (1- to 4-ft) below ground surface (bgs)
- Laboratory analyses: target compound list (TCL) volatile organic compounds, TCL semi-volatile organic compounds, TCL pesticides/polychlorinated biphenyls, target analyte list inorganics, mercury, cyanide, gross alpha, non-volatile beta, and gamma pulse height analysis

Following review of the Phase 1 sampling results, soil samples were collected from three additional sample locations (A013-05 through A013-07) in April and May 2011 to confirm elevated PAH detections in sample station A013-04 (Figure A1). The following is a summary of the data collected during the Phase 2 sampling.

- One soil sample station below the Outfall A-013 pipe near the access road: A013-05
- One soil sample station adjacent to Phase 1 sample location A013-04 (i.e., south of the gravel access road): A013-06
- One soil sample station downgradient of Phase 1 sample location A013-04 (i.e., south of the gravel access road): A013-07
- Depth interval: 0- to 0.3-m (0- to 1-ft) bgs
- Laboratory analyses: PAHs

In general, the soil from the Phase 1 sample locations (A013-01 through A013-04) is a fine- to medium-grained sand in the upper 0.15 m (0.5 ft) that overlies clay or silty clay. There were no coal fines, ash, or asphalt observed in these samples. During the Phase 2 sampling, weathered asphalt was observed to be mixed in with the soil at locations south of the gravel access road.

The human health risk assessment (HHRA) identified five refined constituents of concern (RCOCs) in surface soil (0- to 0.3-m [0- to 1-ft] bgs) (SRNS 2012) using the Phase 1 sampling results (locations A013-01 through A013-04). The five RCOCs were benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, dibenzo(a,h)anthracene, and indeno(1,2,3-cd)pyrene. A summary of the detections in surface soil for the Phase 1 samples is provided below. During the Phase 1 sampling, the location of the maximum detection for the five RCOCs was A013-04 in the surface soil (0- to 0.3-m [0- to 1-ft] bgs) interval.

<b>Constituent</b>	<b>Frequency of Detects</b>	<b>Range of Concentrations (mg/kg)</b>
Benzo(a)anthracene	2/4	non-detect to 1.7
Benzo(a)pyrene	3/4	non-detect to 1.87
Benzo(b)fluoranthene	3/4	non-detect to 2.96
Dibenzo(a,h)anthracene	1/4	non-detect to 0.303
Indeno(1,2,3-cd)pyrene	3/4	non-detect to 0.908

The Phase 2 samples were collected to verify the results of the Phase 1 sampling. A summary of the detections in surface soil for the Phase 2 samples is provided below.

<b>Constituent</b>	<b>Frequency of Detects</b>	<b>Range of Concentrations (mg/kg)</b>
Benzo(a)anthracene	3/3	0.236 to 0.823
Benzo(a)pyrene	3/3	0.234 to 0.876
Benzo(b)fluoranthene	3/3	0.354 to 1.4
Dibenzo(a,h)anthracene	3/3	0.0375 to 0.146
Indeno(1,2,3-cd)pyrene	3/3	0.132 to 0.467

The Phase 2 sampling results confirmed that the majority of the elevated detections are located south of the access road at locations A013-04, A013-06, and A013-07.

During the Phase 2 sampling, weathered asphalt fragments were observed in the soil south of the access road. Asphalt is a known potential source of PAH contamination. Because no asphalt was observed in samples from Outfall A-013 (A013-01 through A013-03), and because the asphalt and elevated PAH concentrations are located near the access road, it is believed that the elevated PAHs detected at locations A013-04, A013-05, A013-06, and A013-07 are not related to Stormwater Outfall A-013.

**Evaluation of the Human Health Risk Assessment and Problems Warranting Action**

The HHRA presented in the Combined Document was based on the four samples from the Phase 1 sampling event (A013-01 through A013-04). Because only four samples were taken initially, a calculation of the 95% upper confidence limit (UCL) was not possible. Therefore, the maximum detected concentrations (from sample A013-04) were used for the risk estimate. The following conclusions were presented in the Combined Document HHRA (SRNS 2012). The initial risk estimates were calculated using November 2010 RSLs.

For the residential scenario, 0- to 0.3 m (0- to 1-ft) soil interval, human health RCOCs included benzo(a)anthracene (risk = 1.1E-05), benzo(a)pyrene (risk = 1.3E-04), benzo(b)fluoranthene (risk = 2.0E-05), dibenzo(a,h)anthracene (risk = 2.0E-05), and indeno(1,2,3-cd)pyrene (risk = 6.1E-06). The total cumulative risk was 1.9E-04 (based on sample A013-04).

For the industrial worker scenario, 0- to 0.3 m (0- to 1-ft) soil interval, there were no human health RCOCs identified.

The data from the Phase 2 sampling event were evaluated for nature and extent but were not used to recalculate the risk for the Combined Document. At the June 27, 2012, scoping meeting for the AAP/CPRB OU Statement of Basis/Proposed Plan, the Core Team agreed that the samples on the south side of the road (A013-04 through A013-07) that have elevated PAH concentrations are not related to the Stormwater Outfall A013 subunit. In general, PAHs are ubiquitous environmental pollutants that can be found in substances such as vehicle exhaust, asphalt road materials, motor oil, and coal tar pitch.

In January 2020, the Stormwater Outfall A-013 subunit was officially placed on a separate administrative pathway as a single OU in the FFA (Appendix E), the risk estimate was revised in this exercise to use only Phase 1 samples directly related to Stormwater Outfall A-013 (A013-01, -02, -03). Samples A013-04 through A013-07 were not included in this re-evaluation due to their proximity to the road. The maximum detected concentrations from samples A013-01 through A013-03 were used in the revised risk estimate. Table A1 shows the revised risk calculations for the residential scenario, and Table A2 shows the revised risk calculations for the industrial worker scenario. The November 2019 RSLs were used to calculate risk. The data used in the risk evaluation is provided in Table A3 and the data from the locations near the access road that were not used in the evaluation are provided in Table A4.

There are no constituents with a risk greater than 1E-06 for either the residential or the industrial worker scenarios.

*Conclusion:* Based on this revised risk estimate that used only the samples that are directly related to the Stormwater Outfall A-013 as well as the most current RSL thresholds (November 2019), there are no problems warranting action from a human health risk perspective at the Stormwater Outfall A013 OU. Accordingly, there are no remedial action objectives or remedial goal objectives associated with the Stormwater Outfall A013 OU.

No constituents were recommended for further remedial evaluation as ecological RCOCs in surface (0- to 0.3-m [0- to 1-ft]) or subsurface soils (0.3- to 1.2-m [1- to 4-ft]) in the Combined Document (SRNS 2012). For comparison purposes, the lowest observed adverse effects level (LOAEL)-based ecological thresholds that were used in the ecological risk assessment (ERA) were compared to the most current Los Alamos National Laboratory (LANL) LOAEL-based screening limits for soil media for a subset of the PAH constituents (LANL 2017). The table below shows that the current ecological screening values are approximately 1- 4 orders of magnitude greater than the values used in the Combined Document. Note that the Combined Document identified considerable uncertainty in the PAH toxicity reference values used in the risk calculations. This additional information supports the original conclusions of the ERA that there are no problems warranting action from an ecological risk perspective.

PAH	LOAEL-Based Threshold (2012)	LOAEL-Based Screening Value (2017)
Benzo(a)anthracene	0.929 mg/kg	7.3 mg/kg
Benzo(a)pyrene	0.118 mg/kg	190 mg/kg
Benzo(b)fluoranthene	0.0165 mg/kg	180 mg/kg
Dibenz(a,h)anthracene	0.458 mg/kg	140 mg/kg
Indeno(1,2,3-cd)pyrene	0.118 mg/kg	710 mg/kg

**References**

LANL, 2017. EcoRisk Database, Release 4.1, Los Alamos National Laboratory, Los Alamos, NM, accessed 02/19/2020

SRNS, 2012. *RCRA Facility Investigation/Remedial Investigation (RFI/RI) Work Plan and RFI/RI Report with Baseline Risk Assessment and Corrective Measures Study/Feasibility Study for the A-Area Ash Pile (788-A), A-Area Coal Pile Runoff Basin (788-3A), and Stormwater Outfall A-013 (NBN) Operable Unit (U)*, Rev.1, SRNS-RP-2010-01457, Savannah River Nuclear Solutions, LLC, Savannah River Site, Aiken SC



Figure A1. Phase 1 and Phase 2 Sample Locations at Stormwater Outfall A-013

Table A1. Human Health Risk Calculation for the Stormwater Outfall A-013 Residential Scenario

Analyte <sup>1</sup>	Exposure Point Concentration <sup>2</sup>	Residential RSL <sup>3</sup>	Residential Hazard Estimate <sup>4</sup>	Residential Risk Estimate <sup>5</sup>	COC? <sup>6</sup>
<b>Organics (mg/kg)</b>					
Benzo(a)anthracene	4.69E-02	1.1E+00	----	4.26E-08	no
Benzo(a)pyrene	4.93E-02	1.1E-01	----	4.48E-07	no
Benzo(b)fluoranthene	1.56E-01	1.1E+00	----	1.42E-07	no
Dibenz(a,h)anthracene	ND	1.1E-01	----	NA	no
Indeno(1,2,3-cd)pyrene	4.77E-02	1.1E+00	----	4.34E-08	no
<b>Carcinogenic PAH Risk =</b>				<b>6.96E-07</b>	

1 - Analytes from Combined Document (SRNS 2012) that were identified as RCOCs for the residential scenario.

2 - EPC = Reasonable maximum exposure (RME) exposure point concentration (EPC) is the lesser of the maximum detected concentration and the 95% upper confidence limit (UCL) on the mean. For this waste unit, a 95% UCL calculation could not be made on 3 samples. Therefore, the EPC is the maximum detected concentration.

3 - Nonradiological RSLs are residential soil values from the generic USEPA Regional Screening Levels (RSLs) Table, dated November 2019.

4 - Residential Hazard Estimate = EPC / RSL

5 - Residential Risk Estimate = (EPC / RSL) x 1E-06

6 - Constituent identified as COC if the individual cancer risk  $\geq 1E-06$ .

ND = non-detect; NA not applicable

Table A2. Human Health Risk Calculation for the Stormwater Outfall A-013 Industrial Worker Scenario

Analyte <sup>1</sup>	Exposure Point Concentration <sup>2</sup>	Industrial RSL <sup>3</sup>	Industrial Hazard Estimate <sup>4</sup>	Industrial Risk Estimate <sup>5</sup>	COC? <sup>6</sup>
<b>Organics (mg/kg)</b>					
Benzo(a)anthracene	4.69E-02	2.1E+01	----	2.23E-09	no
Benzo(a)pyrene	4.93E-02	2.1E+00	----	2.35E-08	no
Benzo(b)fluoranthene	1.56E-01	2.1E+01	----	7.43E-09	no
Dibenz(a,h)anthracene	ND	2.1E+00	----	NA	no
Indeno(1,2,3-cd)pyrene	4.77E-02	2.1E+01	----	2.27E-09	no
<b>Carcinogenic PAH Risk =</b>				<b>3.54E-08</b>	

1 - Analytes from Combined Document (SRNS 2012) that were identified as RCOCs for the residential scenario.

2 - EPC = Reasonable maximum exposure (RME) exposure point concentration (EPC) is the lesser of the maximum detected concentration and the 95% upper confidence limit (UCL) on the mean. For this waste unit, a 95% UCL calculation could not be made on 3 samples. Therefore, the EPC is the maximum detected concentration.

3 - Nonradiological RSLs are industrial worker soil values from the generic USEPA Regional Screening Levels (RSLs) Table, dated November 2019.

4 - Residential Hazard Estimate = EPC / RSL

5 - Residential Risk Estimate = (EPC / RSL) x 1E-06

6 - Constituent identified as COC if the individual cancer risk  $\geq 1E-06$ .

ND = non-detect; NA not applicable

Table A3. PAH Data Used in Revised Risk Calculation

Station	Analyte	MDL	PQL	Qual	Result	Units
A013-01	Benzo(a)anthracene	11.5	38.5	U	41.4	µg/kg
A013-02	Benzo(a)anthracene	11.9	39.6		<b>46.9</b>	µg/kg
A013-03	Benzo(a)anthracene	11.4	38.2	U	38.2	µg/kg
A013-01	Benzo(a)pyrene	11.5	38.5		47.9	µg/kg
A013-02	Benzo(a)pyrene	11.9	39.6		<b>49.3</b>	µg/kg
A013-03	Benzo(a)pyrene	11.4	38.2	U	38.2	µg/kg
A013-01	Benzo(b)fluoranthene	11.5	38.5		<b>156</b>	µg/kg
A013-02	Benzo(b)fluoranthene	11.9	39.6		150	µg/kg
A013-03	Benzo(b)fluoranthene	11.4	38.2	U	38.2	µg/kg
A013-01	Dibenz(a,h)anthracene	11.5	38.5	U	38.5	µg/kg
A013-02	Dibenz(a,h)anthracene	11.9	39.6	U	<b>39.6</b>	µg/kg
A013-03	Dibenz(a,h)anthracene	11.4	38.2	U	38.2	µg/kg
A013-01	Indeno(1,2,3-cd)pyrene	11.5	38.5		<b>47.7</b>	µg/kg
A013-02	Indeno(1,2,3-cd)pyrene	11.9	39.6		42.4	µg/kg
A013-03	Indeno(1,2,3-cd)pyrene	11.4	38.2	U	38.2	µg/kg

Table A4. PAH Data from Locations Near Access Road

Station <sup>1</sup>	Analyte	MDL	PQL	Qual	Result	Units
A013-04	Benzo(a)anthracene	12	39.9		1,700	µg/kg
A013-05	Benzo(a)anthracene	11	36.8		236	µg/kg
A013-06	Benzo(a)anthracene	11.2	37.2		823	µg/kg
A013-07	Benzo(a)anthracene	10.8	36.2		778	µg/kg
A013-04	Benzo(a)pyrene	12	39.9		1,870	µg/kg
A013-05	Benzo(a)pyrene	11	36.8		234	µg/kg
A013-06	Benzo(a)pyrene	11.2	37.2		876	µg/kg
A013-07	Benzo(a)pyrene	10.8	36.2		798	µg/kg
A013-04	Benzo(b)fluoranthene	12	39.9		2,960	µg/kg
A013-05	Benzo(b)fluoranthene	11	36.8		354	µg/kg
A013-06	Benzo(b)fluoranthene	11.2	37.2		1,400	µg/kg
A013-07	Benzo(b)fluoranthene	10.8	36.2		1,210	µg/kg
A013-04	Dibenz(a,h)anthracene	12	39.9		303	µg/kg
A013-05	Dibenz(a,h)anthracene	11	36.8		37.5	µg/kg
A013-06	Dibenz(a,h)anthracene	11.2	37.2		146	µg/kg
A013-07	Dibenz(a,h)anthracene	10.8	36.2		127	µg/kg
A013-04	Indeno(1,2,3-cd)pyrene	12	39.9		908	µg/kg
A013-05	Indeno(1,2,3-cd)pyrene	11	36.8		132	µg/kg
A013-06	Indeno(1,2,3-cd)pyrene	11.2	37.2		467	µg/kg
A013-07	Indeno(1,2,3-cd)pyrene	10.8	36.2		465	µg/kg

1 – Locations A-013-04 through A-013-07 were not used in the revised risk evaluation due to their proximity to the access road.