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# Removal Action Report for the 484-17D Coal Storage Area (U)

**SEMS Number: 63**

**SRNS-RP-2022-00071**

**Revision 1**

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# DISCLAIMER



**Printed in the United States of America**

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

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## LIST OF ABBREVIATIONS AND ACRONYMS

| | |
|---|---|
| ~ | approximate, approximately |
| > | greater than |
| < | less than |
| ac | acre |
| ACP | Area Completion Projects |
| AIP | abandoned in place |
| BMP | Best Management Practices |
| CA | cost analysis |
| CCE | calcium carbonate equivalent |
| cm | centimeter |
| CMS | Corrective Measures Study |
| CPRB | Coal Pile Runoff Basin |
| DAG | D-Area Groundwater |
| DAOU | D-Area Operable Unit |
| DCSA | D-Area Coal Storage Area |
| EC&ACP | Environmental Compliance & Area Completion Projects |
| EE | Engineering Evaluation |
| FFA | Federal Facility Agreement |
| ft | feet |
| FS | Feasibility Study |
| FSP | Field Sampling Plan |
| GPS | global positioning system |
| ha | hectare |
| in. | inch, inches |
| km | kilometer |
| $km^2$ | square kilometer |
| LLC | limited liability company |
| m | meter |
| Mg | Megagrams |
| mi | mile |
| $mi^2$ | square mile |
| NTC | non-time critical |
| OU | Operable Unit |
| PMCS | Project Management & Construction Service |
| RA | removal action |
| RAO | removal action objectives |
| RAR | Removal Action Report |
| ROD | Record of Decision |

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

| | |
|---|---|
| RSER | Removal Site Evaluation Report |
| RSER/EE/CA | Removal Site Evaluation Report/Engineering Evaluation/Cost Analysis |
| SCDHEC | South Carolina Department of Health and Environmental Control |
| SEMS | Superfund Enterprise Management System |
| SOW | Statement of Work |
| SRNS | Savannah River Nuclear Solutions, LLC |
| SRS | Savannah River Site |
| STR | Subcontract Technical Representative |
| SWPPP | Stormwater Pollution Prevention Plan |
| tn | ton |
| USDOE | U.S. Department of Energy |
| USEPA | U.S. Environmental Protection Agency |

# 1.0 GENERAL DESCRIPTION

## 1.1 Purpose and Scope

This Removal Action Report (RAR) documents the completion of field implementation of the non-time critical (NTC) removal action (RA) at the 484-17D D-Area Coal Storage Area (DCSA). The DCSA is associated with the 484-D Powerhouse and is listed in the Federal Facility Agreement (FFA) Appendix K.1 as a Deactivation and Decommissioning facility to be decommissioned (FFA 1993). An NTC RA was needed because rainwater infiltration through the 484-17D DCSA acidic vadose zone created an acidic leachate that contributes to low pH and metal plumes in groundwater. An NTC RA to return the pH in the 484-17D DCSA vadose zone soils to more natural conditions may minimize future impact to groundwater. The D-Area Groundwater (DAG) Operable Unit (OU) will address the remedial action for groundwater. A Record of Decision (ROD) for the D-Area OU (DAOU) will select the final remedial action for the 484-17D DCSA for the (DAOU, scheduled for submittal in 2046.

The *Removal Site Evaluation Report/Engineering Evaluation/Cost Analysis (RSER/EE/CA) for the 484-17D Coal Storage Area* (SRNS 2019) established the RA, along with the applicable or relevant and appropriate requirements. This RAR summarizes activities performed to implement the selected RA requirements the RSER/EE/CA defines. There are no groundwater monitoring requirements associated with this RA.

The scope of this report includes the following items:

- A brief description of the 484-17D DCSA background, including early-action requirements and objectives;
- A chronology of completed events related to the RA of the 484-17D DCSA;
- A summary of construction/removal activities performed;
- Deviations from the original design/requirements;
- Sampling results – both pre- and post-RA;
- Final inspection and verification of construction/removal completion;
- Figures including field photographs;
- As-built drawings;

- Forecasts of postconstruction activities (e.g., operation and maintenance); and
- Project costs.

### *1.1.1 Document Format*

This RAR was prepared in accordance with the requirements for submittal of regulatory documents identified in the FFA (FFA 1993) between the U.S. Department of Energy (USDOE), U.S. Environmental Protection Agency (USEPA), and South Carolina Department of Health and Environmental Control (SCDHEC). The format of this RAR was based on the postconstruction report protocol format found in the *Environmental Compliance and Area Completion Projects* (ACP) *Regulatory Document Handbook* (SRNS 2012) approved by USEPA and SCDHEC as applicable to the RAR.

## 1.2 General Description and History of the Unit

The Savannah River Site (SRS) occupies 801.5 square kilometers ($km^2$) (309.4 square miles [$mi^2$]) of land adjacent to the Savannah River, principally in Aiken and Barnwell counties in South Carolina. SRS is approximately (~) 40.2-kilometers (km) (25-miles [mi]) southeast of Augusta, Georgia, and 32.1-km (20-mi) south of Aiken, South Carolina (Figure 1). D Area is in the southwest quadrant of the SRS, ~914-meters (m) (3,000-feet [ft]) east of the Savannah River, which is the nearest site boundary (Figure 2).

The D-Area Powerhouse (484-D) was built in 1953 and removed from service in 2012 after 59 years of operation. The facility burned ~145,149.6 megagrams (Mg [160,000 tons {tn}]) of coal per year. The 484-17D DCSA (Figure 3) was the storage area for coal before its use in the 484-D Powerhouse. In 2013, the coal was removed from the northern 4.0 hectare (ha [10 acres {ac}]) of the 484-17D DCSA (Figure 4).

Low pH conditions (pH <4) from ~60 years of coal storage have impacted the vadose zone beneath the 484-17D DCSA, creating a source of acidity from surface soils to groundwater (Figure 5). In addition, a 15.2- to 20.3-centimeters (cm [6- to 8-inch (in.}]) layer of coal fragments below topsoil and sod in the southern 2.02 ha (5 ac) of the 484-17D DCSA (Figure 4 and Photo 11) represents a possible further source of acidity. The remaining northern 4.05 ha (10 ac) had no vegetative cover,

and decades of coal storage and large construction equipment use had compacted the soil. The low-pH plume in the groundwater arising from these sources and the dense vadose zone soils were expected to last for decades under natural groundwater conditions. The low-pH groundwater discharges into the D-Area Discharge Canal, which later converges with Beaver Dam Creek and flows through the Savannah River floodplain to the Savannah River. If the pH of the upper portion of the affected vadose zone can be raised to less acidic (pH >5), conditions and the additional source of acidity from coal fragments can be effectively neutralized, improving the surface water conditions in the D-Area Discharge Canal.

## 1.3 Removal Action Objectives

### *1.3.1 Removal Action Objectives 484-17D DCSA*

Per the *Removal Site Evaluation Report / Engineering Evaluation /Cost Analysis (RSER/EE/CA) for the D-Area Coal Storage Area (484-17D)* (SRNS 2019), the removal action objective (RAO) for the 484-17D DCSA subunit is as follows:

The RAO to protect human health and the environment is to increase the pH in the 484-17D DCSA vadose zone soils to more natural background conditions (approximate pH of 5.5) to minimize future impacts to groundwater.

## 1.4 Selected Removal Actions

### *1.4.1 Selected Removal Action 484-17D DCSA*

Per the *Removal Site Evaluation Report / Engineering Evaluation /Cost Analysis (RSER/EE/CA) for the D-Area Coal Storage Area (484-17D)* (SRNS 2019), the selected RA for the DCSA subunit is as follows:

The selected NTC RA is Alternative 2 - Addition of Soil Neutralization Amendments (6.1 ha [15 ac]), which reduces the acidity in the upper portion of the vadose zone and subsequently reduces the amount of acidic leachate to groundwater. Addressing the acidic vadose zone soils will eventually improve groundwater conditions. Soil neutralization can be achieved by mixing neutralization amendments (lime/calcium carbonate) into the vadose zone soils at the 484-17D

DCSA to raise the pH of the vadose zone soils to natural background levels (approximate pH of 5.5). This RA is specific for the 484-17D DCSA vadose zone soils and complements a treatability study for the treatment of acidic groundwater and surface water in the vicinity of the 484-17D DCSA and the 489-D Coal Pile Runoff Basin (CPRB) (SRNS 2018a).

### 1.5 Chronology of Events

Table 1 provides the Chronology of Events.

## 2.0 CONSTRUCTION ACTIVITIES

### 2.1 Removal Action Summary

This project treated the upper layer of the vadose zone using soil neutralization amendments. SRS construction, Project Management & Construction Services (PMCS), ripped up a 4.8 ha (12-ac) portion of the 6.1 ha (15-ac) DCSA surface soils to a minimum depth of 1.2 m (4 ft) and mixed in a lime calcium carbonate neutralization amendment (i.e., Hi-Cal AgLime) into this 1.2-m (4-ft) zone. A total of 1182.1 Mg (1,303 tn) of Hi-Cal AgLime was purchased, allowing for an average of 97.9 Mg (108 tn) applied per acre, although this value does not include amendment losses during transport, storage, and handling. The amendments were of sufficient quantity to raise the pH level of the 484-17D DCSA vadose zone soils from a pH <4 to the target pH of 5.5 or higher .

Placing a 5.1-cm (2-in.) thick minimum #4 limestone gravel cover stabilized all the disturbed areas. The estimated mass used to cover the coal yard is 2871.2 Mg (3,165 tn). The gravel is intended to increase rainwater infiltration into the uncompacted coal yard soils, which results in an increased flow of basic water into the acidified soils beneath the cover layer. In addition, this flow is intended to assist in a more rapid dissolution of the soil amendments, quickening reaction time within the vadose zone column.

### 2.2 Construction Team

Savannah River Nuclear Solutions, LLC (SRNS) provided project management, oversight, confirmation sampling, worker protection, and regulatory integration. During the construction

phase of the project, SRNS Environmental Compliance & Area Completion Projects (EC&ACP) Engineering provided Title 3 (Construction) support. PMCS, the prime contractor for implementing the RA at the 484-17D DCSA, was responsible for all remaining construction activities to include contract management, erosion and sediment control measures, stormwater controls, ripping the soils, applying soil amendments, final stabilization, restoring an access road, submittals, etc.

All work described in this section of the RAR was performed in accordance with the design drawings in the RSER/EE/CA (SRNS 2019) and Statement of Work (SOW) (SRNS 2020a), and manufacturer's recommendations. Deviations are discussed in Section 3 "Deviations from Original Design."

## 2.3 Equipment

Table 2 identifies the general equipment types and activities used during construction and equipment or vehicles used for mixing in soil neutralization amendments.

## 2.4 Removal Action Activities

### *2.4.1 Mobilization*

Before mobilizing, the contractor project team had preconstruction meetings with SRNS on March 5, 2020, and March 9, 2020. The team provided a detailed schedule and discussed each task. Meeting topics included operational requirements, review of safety requirements, and site preconstruction requirements necessary to start work.

Project personnel began mobilizing upon approval of required preconstruction submittals. The construction management team prepared the submittal and managed equipment mobilization during this time frame. Craft personnel mobilized once the Notice to Proceed was received. Three laydown/storage areas were designated for the project to allow for equipment maintenance, material storage, etc.

Upon arrival, all equipment delivered to the site was inspected for cleanliness, operability, and compliance with the Occupational Safety and Health Administration standards. Delivery and

service vehicles, tools, and equipment entering the site were subject to the same inspection requirements. All equipment delivered to the site was required to have up-to-date maintenance logs and to be functioning properly.

### *2.4.2 Project Surveying*

PMCS and SRNS provided survey control points prior to the start of work. Control point or benchmark/monument positions (x, y, and z coordinates) maintained vertical and horizontal limits throughout the life of the project. Control points and survey monuments were protected during construction. In high-traffic areas, guard posts with reflective paint striping demarcated benchmarks.

The contractor used a global positioning system (GPS) to perform the site construction layout. The GPS used Digital Terrain Models and electronic background maps to ensure continuous control of all excavation grades, limits of excavation and backfill soil placement, and minimize the possibility of induced error by limiting the number of field calculations needed to conduct layout operations.

A land surveyor set additional project control monuments where needed. This included performing initial pre-excavation topographic surveys, bottom of excavation topographic surveys, cover material topographic surveys, stormwater system as-built surveys, and spot-checking construction layout staking. All as-built survey data was submitted to SRNS EC&ACP Engineering.

### *2.4.3 Stormwater Pollution Prevention and Erosion Control*

All work was performed in accordance with SRNS's Comprehensive Stormwater Pollution Prevention Plan for the 484-17D DCSA (SRNS 2020b). On March 9, 2020, all SRNS subcontractors whose work at the project site involved activities that may impact stormwater discharges or controls were required to attend a preconstruction meeting to discuss, review, and sign on to the Stormwater Pollution Prevention Plan (SWPPP) before beginning land-disturbing activities.

Erosion control measures (i.e., silt fences and check dams) were constructed and maintained to prevent releases during the project. To further reduce possible sediment transport and minimize erosion, the 484-17D DCSA was worked 0.40 ha (1 ac) at a time. The primary objectives of the stormwater/erosion controls used for this project were to:

- Prevent the spread of coal fines and/or sediments during remediation,
- Maintain stormwater run-on/run-off within the project site boundaries,
- Provide stormwater/erosion control inspection and reporting, and
- Identify locations and methods of construction of stormwater/erosion control measures and maintenance.

The work site was inspected and evaluated weekly or after rain events of 1.3-cm (0.5-in.) and greater during field operations to determine whether additional stormwater/erosion control measures were necessary. EC&ACP Engineering performed the SWPPP (SRNS 2020b) inspections.

The silt fencing was removed after project completion. The check dams were left in place.

### *2.4.4 Initial Land Disturbance*

The initial erosion control measures were installed before the start of any excavation or other soil-disturbing activities. All stormwater/erosion control features were installed in the locations identified in the design drawings (SRNS 2020b) documents. Initial land disturbance activities included the following:

- Installing construction entrance(s),
- Providing check dams, and
- Clearing and grubbing to allow installation of silt fence.

Front-end loaders and graders were used to build construction entrances to the site. Entrances were established where vehicles access the construction site's gravel or dirt roads from paved roads. Construction entrances were installed per design requirements in the SOW (SRNS 2020a) to prevent vehicles from tracking of coal fines/sediment when entering hard surface roads.

All areas requiring silt fences were grubbed only to the extent necessary to install the fencing. Throughout construction, the contractor used a range of erosion control Best Management Practices (BMPs) to stabilize nonvegetated areas. Erosion control BMPs included a combination of run-off berms, check dams, straw waddles, silt fence, etc., to prevent transporting coal fines/sediment off the project site.

### *2.4.5 Clearing and Grubbing*

The gravel road that covered portions of the northern 4.0-ha (10-ac) section of the 484-17D DCSA was removed before ripping and mixing and was stockpiled for future use.

There were two abandoned-in-place (AIP) stormwater pipes (a 10.2-cm [4-in.] pipe and 20.3-cm [8-in.] pipe) identified in the pre-job interference report (Table 3). These pipes were encountered after site work began and subsequently removed and disposed of off-site at Three Rivers Landfill.

### *2.4.6 Soil Neutralization*

The lime calcium carbonate product provided for the project was Hi-Cal AgLime sourced from Wake Stone (Myrtle Beach, South Carolina). Hi-Cal AgLime has a moisture content of 8.4% and a calcium carbonate equivalent (CCE) of at least 90%, although the supplier's testing results provided revealed CCE ranging from 97.39% to 103.25%. The amendment application rate was calculated to be 72.6 Mg ac (80 tn/acres), resulting in a total requirement of 872.7 Mg (962 tn) for the total 4.9 ha (12.02 ac). However, this application rate was difficult to achieve in the field as it would require estimating fractions of a truck load (or acreage). To simplify, an application rate of 81.6 to 90.7 Mg/ac (90- to 100 tn/ac) was used instead, which equates to three truckloads (13.6 to 15.4 Mg [15-17 tn] per load) per 0.2 ha (0.5 ac).

A total of 1,182.1 Mg (1,303 tn) of Hi-Cal AgLime was purchased, resulting in an average application of 97.9 Mg/ac (108 tn/ac), although this value does not include amendment losses during transport, storage, and handling.

Large construction equipment (bulldozers, excavators, graders, soil processors, and dump trucks) broke up the compacted soils to ensure a thorough mixing of the soil neutralization amendments.

The goal soil pH of the RSER/EE/CA (SRNS 2019) and SOW (SRNS 2020a) was ~pH 5.5. The original process for amendment application and mixing was as follows:

1) The compacted soils are partially decompacted with a bulldozer equipped with ripping attachment (Photo 2);
2) The amendment is spread over the defined area with a front loader (three truckloads per 0.2 ha [0.50 ac], Photo 3);
3) An excavator removes and mixes 1.2 m (4 ft) of soil with the spread amendment and places both into a dump truck (Photo 4);
4) The soil and amendment are dumped on another area and spread/mixed with a bulldozer/grader (Photo 5);
5) The soil and amendment are processed (mixed and pulverized) with a processer (Photo 5);
6) The soil and amendment are picked up and mixed (blades on a rotor) with a grader pan;
7) The soil and amendment are replaced back at original location;
8) The location is graded.

Soil pH samples were taken in May 2020 during mixing (Table 5) to determine:

- If a sufficient amount of amendment was applied to the area, and
- The mixing efficacy at various steps.

Samples taken after step 4 had an average pH 5.12 +/- 0.09. Samples after step 5 had an average pH of 5.52 +/- 0.48. Finally, samples were taken after step 6 but without the use of the processor (skipped step 5). These samples had an average pH of 5.75 +/- 0.18. Note that this later set of samples was from the same soils as those sampled for step 4 and had the same amount of applied amendment.

Soil pH sampling revealed that sufficient amendment was being applied to the soil. Further, the soil pH would be expected to rise more over time as more amendment is dissolved after being exposed to rainwater infiltration. Mixing efficacy was slightly better using the pan grader. Using the processor (step 5), which was laborious, and the rate-limiting step were deemed unnecessary.

Finally, early equipment problems and resultant delays led to further mixing using the excavator and bulldozer in lieu of the pan (step 6). The final process used throughout the 484-17D DCSA was as follows:

1) The compacted soils were partially decompacted with a bulldozer equipped with ripping attachment;
2) The amendment was spread over the defined area with a front loader (three truckloads per 0.2 ha [0.50 ac]);
3) An excavator removed and mixed 4 ft of soil with the spread amendment and placed both into a dump truck;
4) The soil and amendment were dumped on another area and spread/mixed with a bulldozer/grader;
5) The soil and amendment were further mixed with a bulldozer and picked up with a front loader;
6) The soil and amendment were replaced back at original location;
7) The location was graded.

Dust control was provided during lime addition/mixing as described in the Work Plan.

### *2.4.7 Grading*

After work neutralizing the soil (i.e., desired soil pH achieved) was completed, the 484-17D DCSA was graded to provide positive uniform sheet flow drainage (maximum slope of 2%) toward the perimeter drainage ditches. Finish-grade elevations are at or greater than existing grades as required to meet drainage requirements. The gravel road across the northern portion of the 484-17D DCSA was returned to its preconstruction configuration (Photo 10).

### *2.4.8 Final Stabilization*

All disturbed areas were stabilized with a 5.1-cm (2-in.) thick minimum #4 limestone gravel cover placed within 14 days of completing the final grading. The estimated mass of #4 limestone gravel required to cover the coal yard was 2871.2 Mg (3,165 tn) for a 5.1-cm (2-in.) thick cover and 4,222 Mg (4,654 tn) for a 7.6-cm (3-in.)-thick cover. A bulldozer and grader were used to place the limestone cover (Photo 6). A total of 4,020.4 Mg (4,431.76 tn) of limestone was placed on the coal yard for an average coverage of 5.1- to 7.6-cm (2- to 3-in.) by weight (Photo 7). The gravel will increase rainwater infiltration into the uncompacted coal yard soils, resulting in an increased flow of more basic rainwater into the acidified soils beneath the treated layer. This flow will also assist in the more rapid dissolution of the soil amendments, quickening reaction time within the vadose zone column.

### *2.4.9 Compaction Prevention*

Future vehicle access to the coal yard was discouraged to prevent the coal yard soils recompacting following project completion. The original gravel road (granite crusher run) through the coal yard was reinstalled to provide designated vehicle access (Photo 8). A barricade made of posts and chains (Photo 9) was installed along the road to keep traffic off the limestone gravel cover. These measures will help minimize soil compaction, which maintains increased infiltration into the coal yard soils, potentially decreasing stormwater runoff.

### *2.4.10 Sampling of the Coal Yard Soils*

The coal yard soils were first sampled for the RSER/EE/CA in June 2018. A total of 54 samples were collected before the RA per the sampling plan provided in Appendix A. Figure 6 shows the eight soil boring locations within the 484-17D DCSA. The pH of all soil samples was measured both in the field and the laboratory. Both pH results displayed an overall acidification of the 484-17D DCSA vadose zone soils (Table 4 and Figure 7). Normal pH levels in native soils are generally above 5.0. Most of the sampled locations and depths at the 484-17D DCSA had pH levels between 3 and 4.5, indicating coal leachate has affected the entire 6 ha (15 ac) of vadose zone soils. These results are similar to the pH levels seen in the groundwater and surface water

downgradient of the 484-17D DCSA and 489-D CPRB, indicating that the acidified vadose zone soil poses a contaminant migration concern to groundwater.

The coal yard soils were sampled a second time following the completion of the coal yard mixing and placement of the gravel cover in December 2020. Samples of surface soil under the gravel cover (0- to 5.1-cm [0- to 2 in.] depth) were taken throughout the coal yard, including a location under the road where amendment was applied but no cover was placed (Photos 8 and 11). A sample was also taken outside the scope of the work but within the limits of a coal yard. The pH of standing water near the crusher house was also measured (Table 6 and Figure 10).

The average soil pH was 7.65 +/- 0.26 (Table 6). This soil pH is markedly higher than those measured during process refinement sampling (Table 5). The increase in pH is likely from a combination of the dissolution/mixing of amendment with rainwater, the gravel dust/fines that act as additional amendment, and gravel dissolving into rainwater.

The soil pH under the road (pH 6.76) provides a measure of soils uninfluenced by the gravel cover, while the location outside the scope near the crusher house (pH 3.95) represents an untreated area. The pooled water near the crusher house (pH 7.48) indicates the pH of rainwater that has interacted with gravel cover and infiltrates into the subsurface. The increase in soil pH will reduce metal contaminant migration risk to groundwater.

A third sampling of the coal yard soils was performed per the Post-RA Sampling Plan (Appendix A) in May 2022 to confirm the pH of the vadose zone soils was successfully raised to natural background levels (approximate pH of 5.5) (Figure 8 and Table 7). By comparing Figure 8 (postremedial action) with Figure 7 (pre-RA) and Figure 9 (2018 and 2022 averages), it can be concluded that the NTC RA did significantly raise the pH of the preamended vadose zone soils. The sampling results support the DAG OU Corrective Measures Study/Feasibility Study (CMS/FS) and the final remedial action for DAOU, as necessary. The DAG OU CMF/FS is currently scheduled for March 10, 2026.

The subcontractor used a rotosonic rig or Geoprobe rig to drill eight shallow borings to a depth of 4.3 m (14 ft) for soil sampling in the 484-17D DCSA. Figure 6 shows the eight soil boring locations within the 484-17D DCSA. Figure 8 shows the pH measurement at these eight locations

to a depth of 4.3 m (14 ft). SRS personnel measured the field pH of the soil. The borings were grouted to the surface upon completion.

No additional sampling is planned as part of this NTC RA as it is not the final action for the 484-17D DCSA. The DAOU Final ROD will specify the final remedial action for the 484-17D DCSA, which may include additional sampling.

### 2.5 Demobilization

At the end of construction, PMCS removed temporary erosion controls, excess materials, along with personnel from the site. All equipment and materials were cleaned per SRNS cleaning and decontamination specifications established in the Work Plan. Following decontamination, equipment was disassembled and removed from SRS. All trash was removed at the end of the project.

All documentation, including but not limited to, daily inspection records, field notes, as-built surveys/drawings, was submitted to SRNS as required.

## 3.0 DEVIATIONS FROM ORIGINAL DESIGN

The area of soil amendment addition was reduced from 6-ha (15-ac) to 4.8-ha (12-ac) (Figure 10) to provide step outs from interferences (i.e., powerhouse infrastructure) and to leave intact previously installed stormwater controls utilized in the project's SWPPP.

The design specified in RSER/EE/CA called for a vegetative cover, consisting of a 7.6-cm (3-in.) layer of topsoil, lime fertilizer in the topsoil to support growth, and a three- to four-week commitment of establishing a vegetative cover as the final stabilization over the entire 6.1 ha (15-ac) DCSA. However, the project team identified using limestone gravel as a final stabilization method to draw on fewer resources while also being less expensive. Gravel is an Environmental Protection Agency-approved final stabilization method. The design replaces the vegetative cover with large limestone aggregate/gravel (4A or 57 stone) as the final stabilization. Limestone is a lower cost alternative with the following benefits:

- The stone will increase rainwater infiltration into the uncompacted coal yard soils (whereas vegetation would increase evapotranspiration), resulting in an increased flow of more basic rainwater into the acidified soils beneath the treated layer. This will also assist in the more rapid dissolution of the soil amendments, quickening reaction time within the vadose zone column.
- Limestone, which is predominantly calcium carbonate, will slowly break down over time, leaching carbonates and calcium into the system. These ions will raise the pH of underlying soils, eventually reducing the source of acidity to groundwater. (Calcium will exchange with surface bound protons and carbonate will buffer the system.) The increased pH will also decrease the mobility of coal-originated radionuclides and heavy metals.
- Gravel is a BMP for final stabilization in the closeout of a SWPPP. Gravel could be installed with the same equipment used to grade the coal yard, eliminating a demobilization of equipment as well as the need for a 7.6-cm (3-in.) layer of topsoil, lime fertilizer in the topsoil to support growth, and a three- to four-week commitment of establishing a vegetative cover.

These changes were communicated to the Core Team via email, and all concurred in favor of the design changes via email.

## 4.0 VERIFICATION SURVEYING, PERFORMANCE STANDARDS, AND CONSTRUCTION QUALITY CONTROL

To ensure the "Performance Requirements and Standards" were achieved, the Project Team personnel comprising SRNS EC&ACP Engineering, Project Management, Safety, and Subcontract Technical Representatives (STRs) performed routine monitoring/surveillance, as required by the approved construction procedures. EC&ACP Engineering performed various functions including routine field oversight, verification of sampling results, sampling data management, and evaluation and acceptance of the analytical results.

Final acceptance was EC&ACP concurrence that the soil neutralization and final area preparation meets (or closely meets at the discretion of EC&ACP) the specifications in C-CG-D-00073, C-CG-D-00074, and C-CG-D-00075, latest revisions. A quality assurance project plan was not

required for this project as PMCS performed the work using approved site implementation procedures and work instructions. Dedicated SRNS STRs were assigned to follow all work throughout the construction/removal process.

## 5.0 VERIFICATION OF CONSTRUCTION COMPLETION AND FINAL INSPECTION

### 5.1 Verification of Construction Completion

EC&ACP reviewed the services and documents PMCS provided. EC&ACP accepted services and documents based on an objective review of the material against criteria and conditions described in the procurement documents.

### 5.2 Final Inspection

USDOE and SRNS had a final walk down inspection on January 14, 2021, to observe and discuss the status and completion of the RA construction activities for the 484-17D DCSA. The personnel present observed and discussed the construction activities within the 484-17D DCSA.

Based on this review and walk down, USDOE and SRNS personnel agreed that there were no deficiencies observed with the completed field activities for the RAs associated with 484-17D DCSA.

A 484-17D DCSA Notice of Termination walkdown was held on February 4, 2021, with Josh Yon and the Professional Engineer for the SWPPP.

## 6.0 AS-BUILT DOCUMENTATION

### 6.1 As-Built Drawings

A Field Summary Report (SRNS 2021) documented the activities performed for the RA. Appendix E "As-Built Drawings" includes the documentation for the project:

- Topographical As-built of 484-17D DCSA Northern Portion

- Topographical As-built of 484-17D DCSA Southern Portion

## 7.0 POST CONSTRUCTION ACTIVITIES

The NTC RA for the 484-17D DCSA is complete. The final remedial decision for the 484-17D DCSA will be selected in the ROD for the DAOU scheduled for submittal in 2046. The ROD will address the remedial decision for all DAOU subunits. The DAG OU addresses the final remedial action.

The 484-17D DCSA requires no maintenance. However, SRS procedures will control activities associated with the treatability study (SRNS 2018a) to prevent or minimize disturbance to the gravel layer, the drainage systems, and unacceptable erosion.

Current groundwater monitoring and reporting under the DAG OU will continue and will document the effectiveness of the soil neutralization and gravel cover. Additional soil pH sampling may occur when the final DAOU investigation/actions take place.

## 8.0 PROJECT COSTS

The estimated cost in the RSER/EE/CA for the 484-17D DCSA includes construction costs associated with removing gravel in the northern 4-ha (10-ac) section, ripping of the dense soils in 6-ha (15-ac), applying neutralization amendments in 6-ha (15-ac), final grading and construction of surface water drainages back to the 489-D CPRB, vegetative cover, one-time follow-up soil pH sampling, and costs to reflect maintenance of the vegetative cover. As discussed in Section 3, the final design reduced the area to be neutralized to 4.8 ha (12 ac), and a limestone aggregate/gravel cover replaced the vegetative cover as the final stabilization of 484-17D DCSA.

As identified in the RSER/EE/CA for the 484-17D DCSA, the total estimated capital cost (including direct and indirect) for the 484-17D DCSA is $2,536,801 (SRNS 2019).

The RA at 484-17D DCSA incurred a total project capital cost of $3,166,253, ~25% over the estimated cost. The increase was due to the use specialty construction equipment to implement the RA. Equipment availability was extremely limited in March 2020. Therefore, PMCS decided

to reserve the equipment when it became available to avoid delaying the projected field start date and EC&ACP regulatory milestone. Subsequently, the USDOE issued a Stop Work Order across SRS due an increase of cases of COVID-19, resulting in a delay in project schedule and increase in equipment and overall project costs.

See Table 8 for a Project Cost Comparison of estimated versus actual costs for 484-17D DCSA.

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## 9.0 REFERENCES

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USDOE, 2020. *DOE Submittal for the Removal Action Start of the D-Area Coal Storage Area (484-17D)*, SEMS Number: 63, May 7, 2020, United States Department of Energy, Savannah River Operations, Aiken SC

USDOE, 2021. *DOE Submittal for the Completion Status of the D-Area Coal Storage Area (484-17D)*, SEMS Number: 63, February 3, 2021, United States Department of Energy, Savannah River Operations, Aiken SC

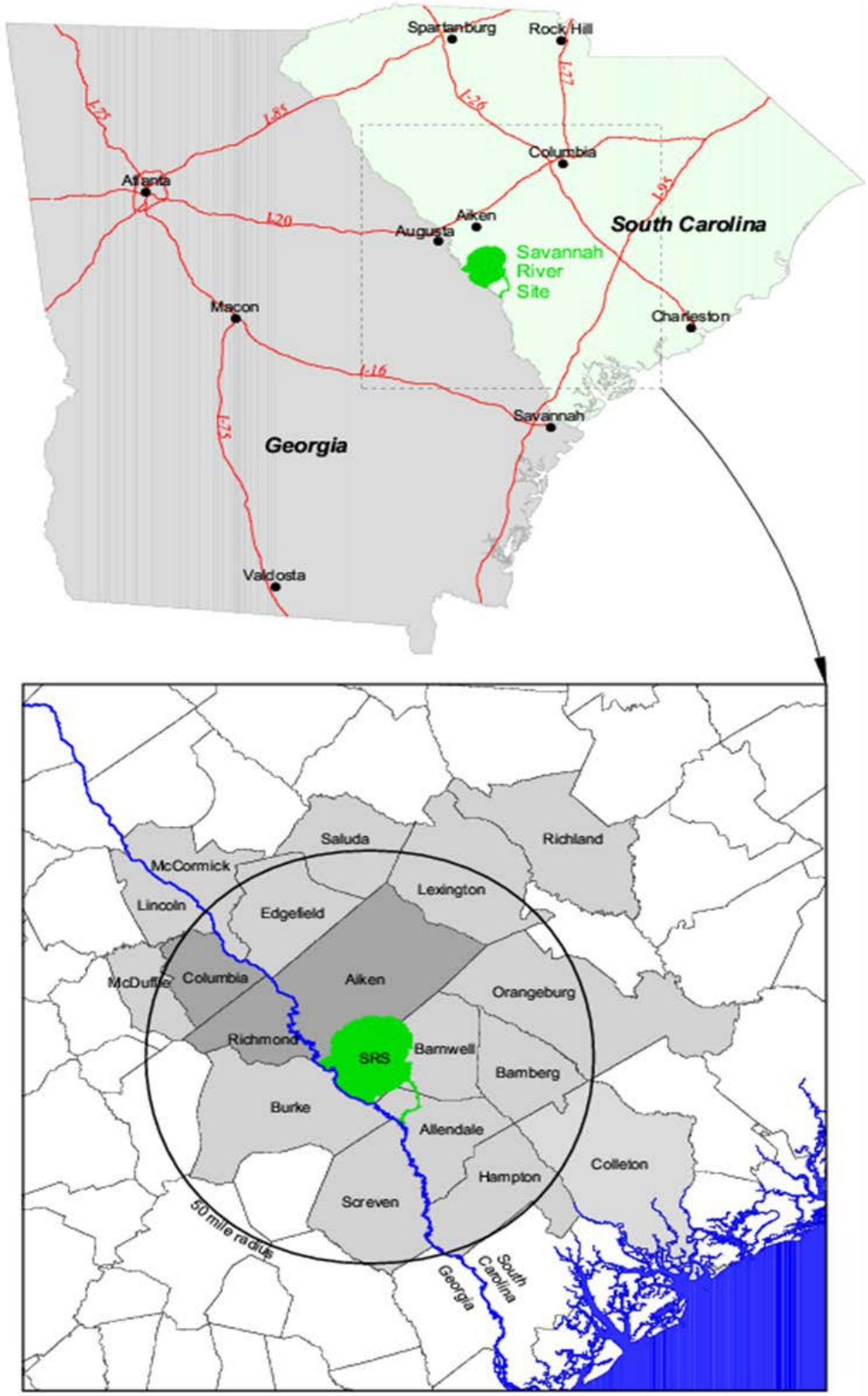


**Figure 1. Location of the Savannah River Site**

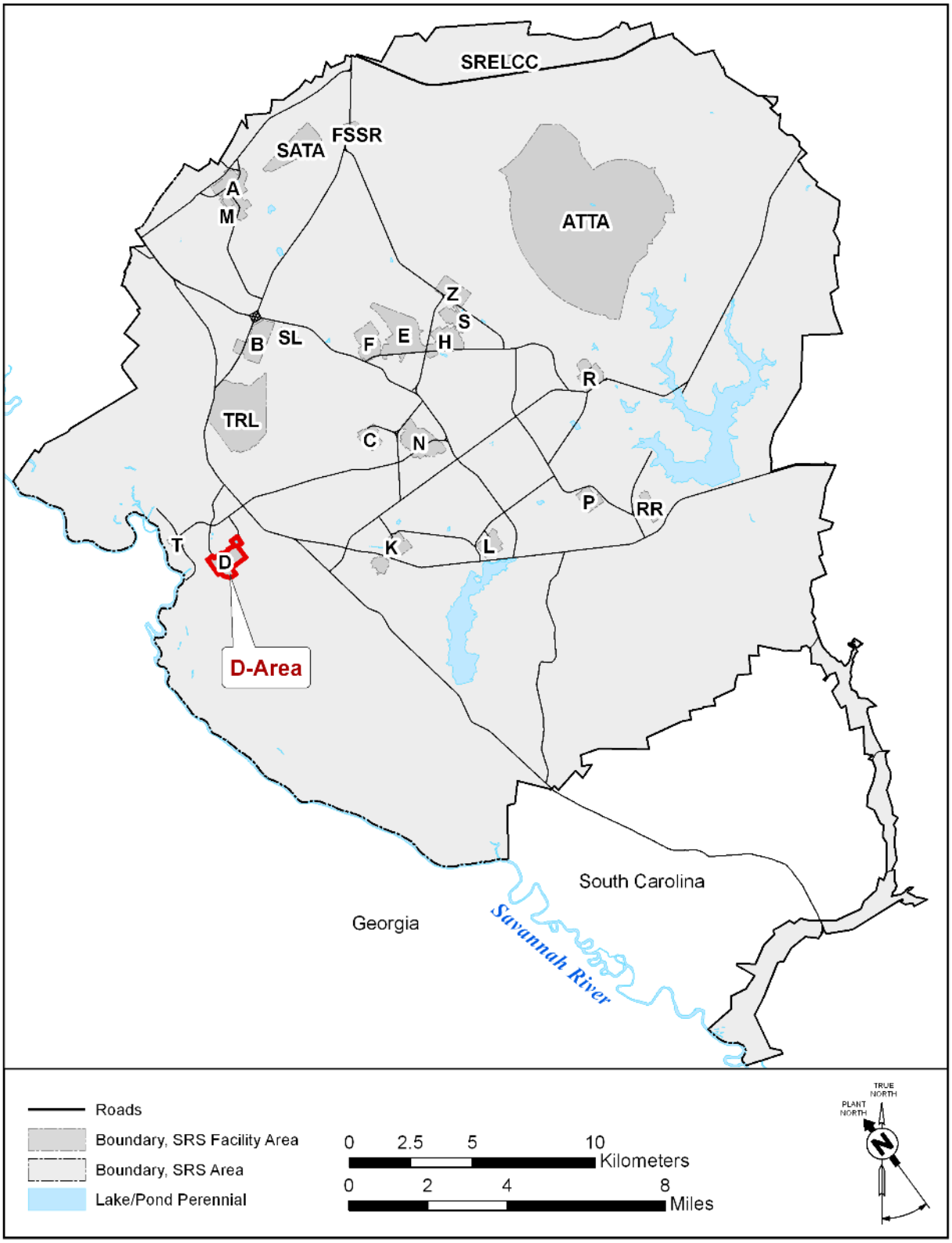


**Figure 2. Location of D-Area Operable Unit at the Savannah River Site**

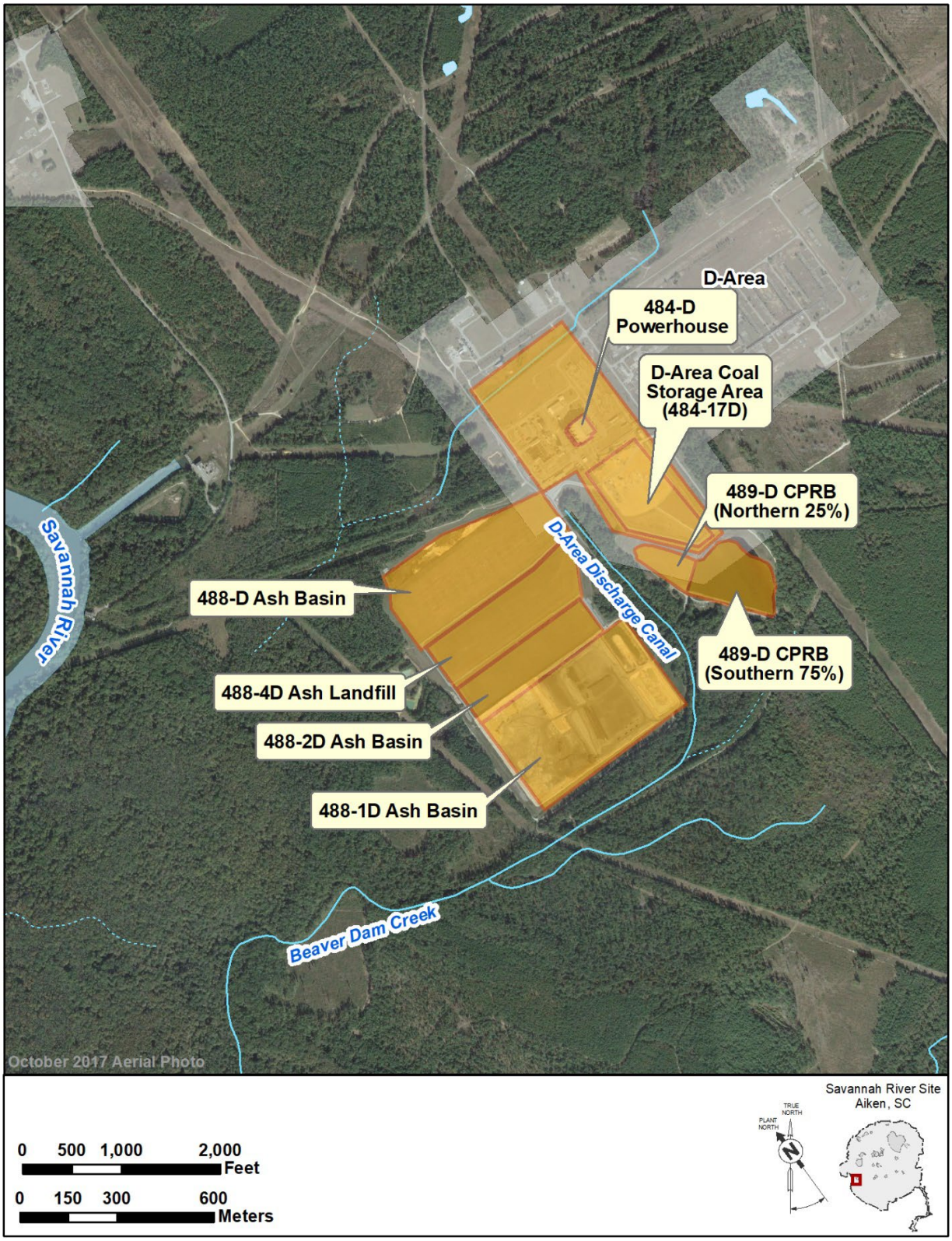


**Figure 3. Location of 484-17D D-Area Coal Storage Area within the DAOU**

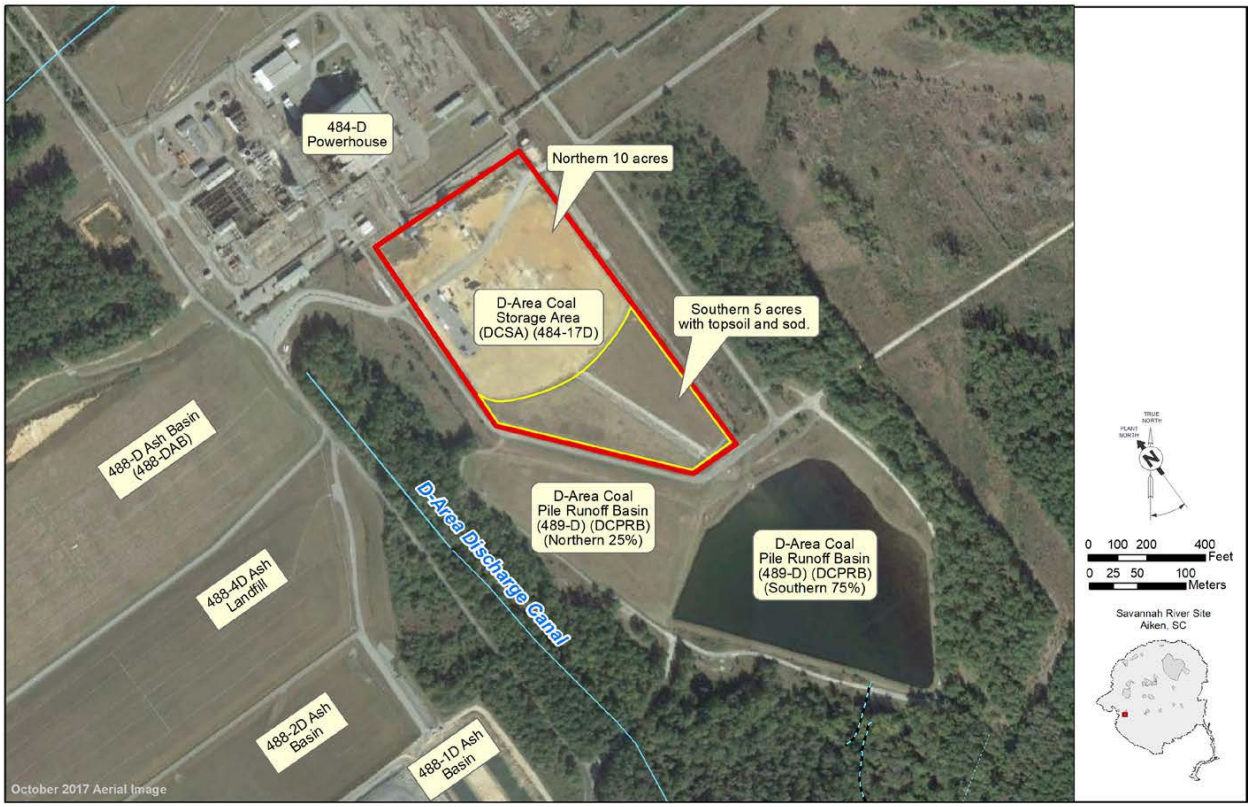


**Figure 4. Layout of D-Area Coal Storage Area (484-17D)**

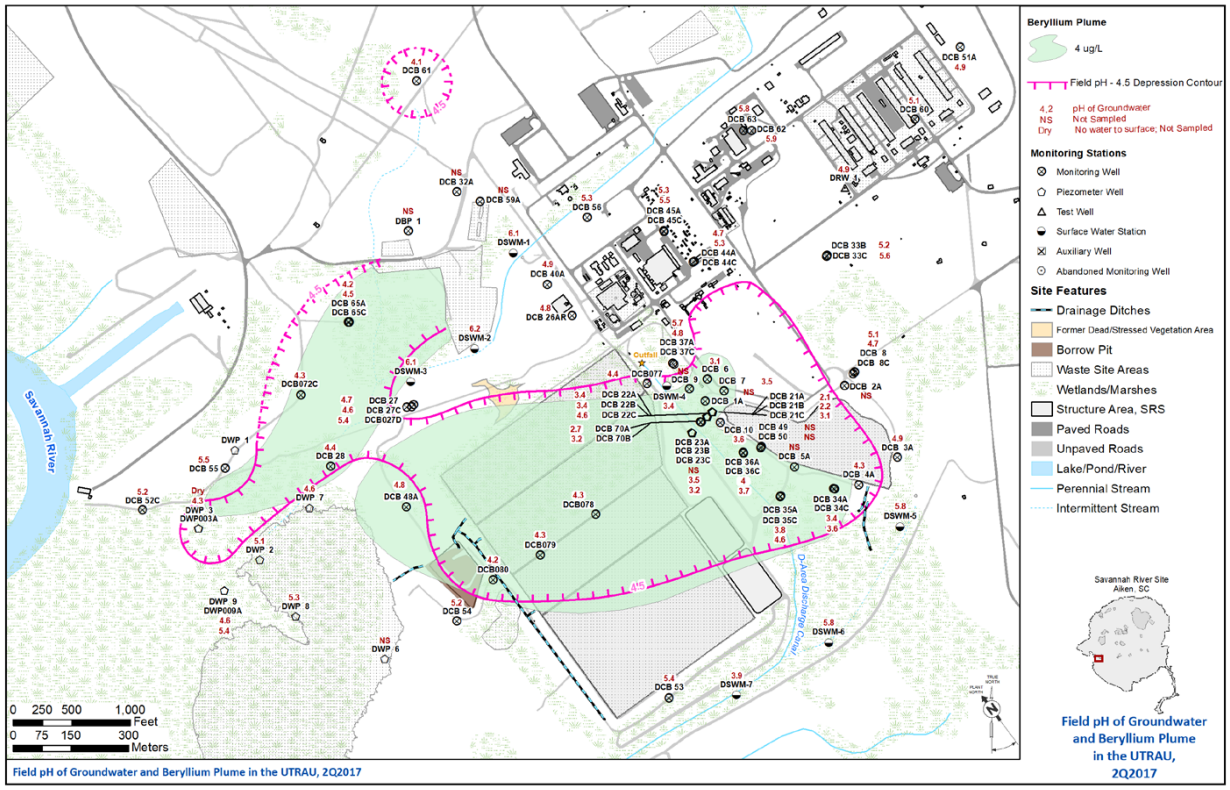


**Figure 5. Field pH of Groundwater and Beryllium Plume in D Area, 2Q2017**

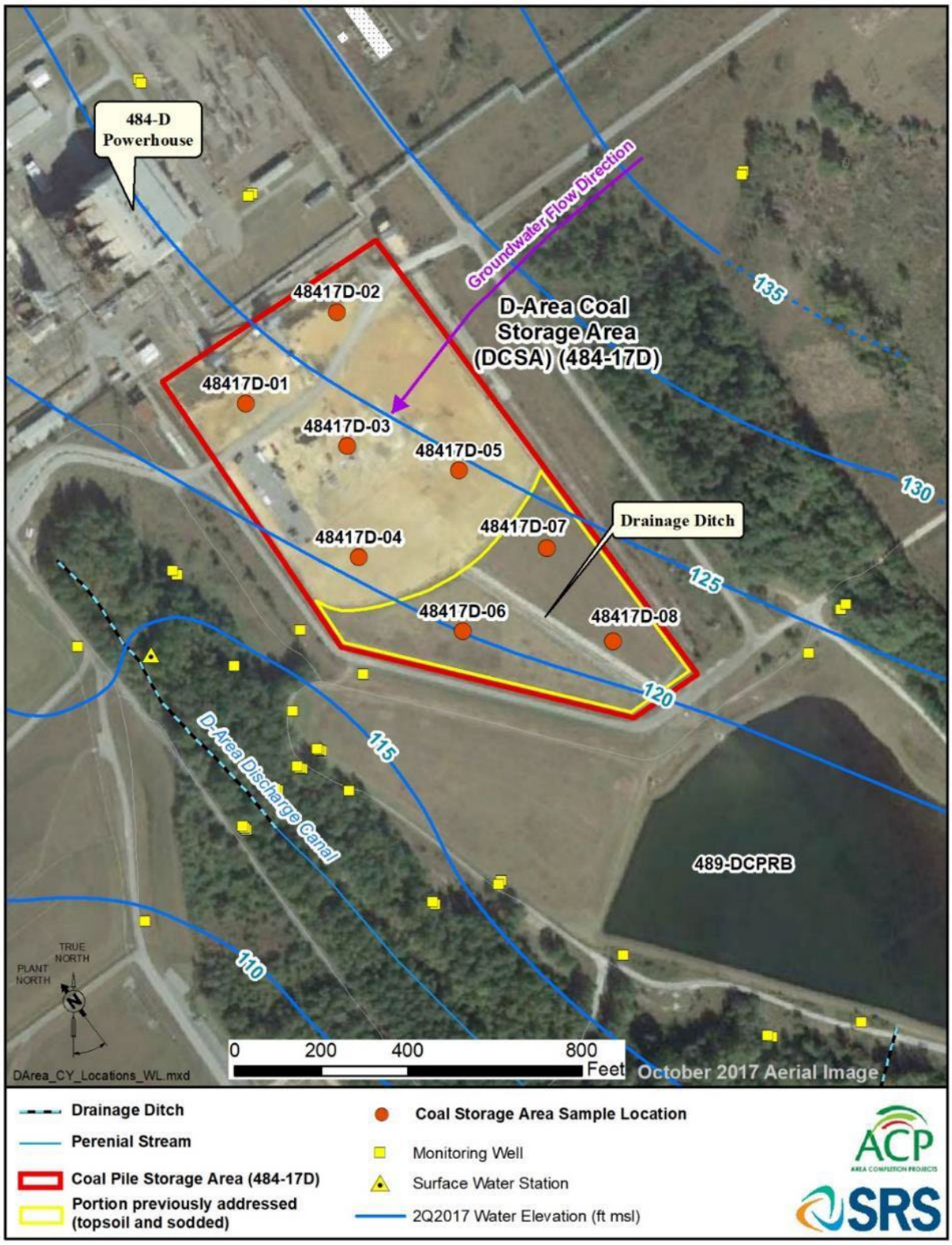


**Figure 6. June 2018 and May 2022 Soil Sampling Locations within the 484-17D DCSA**

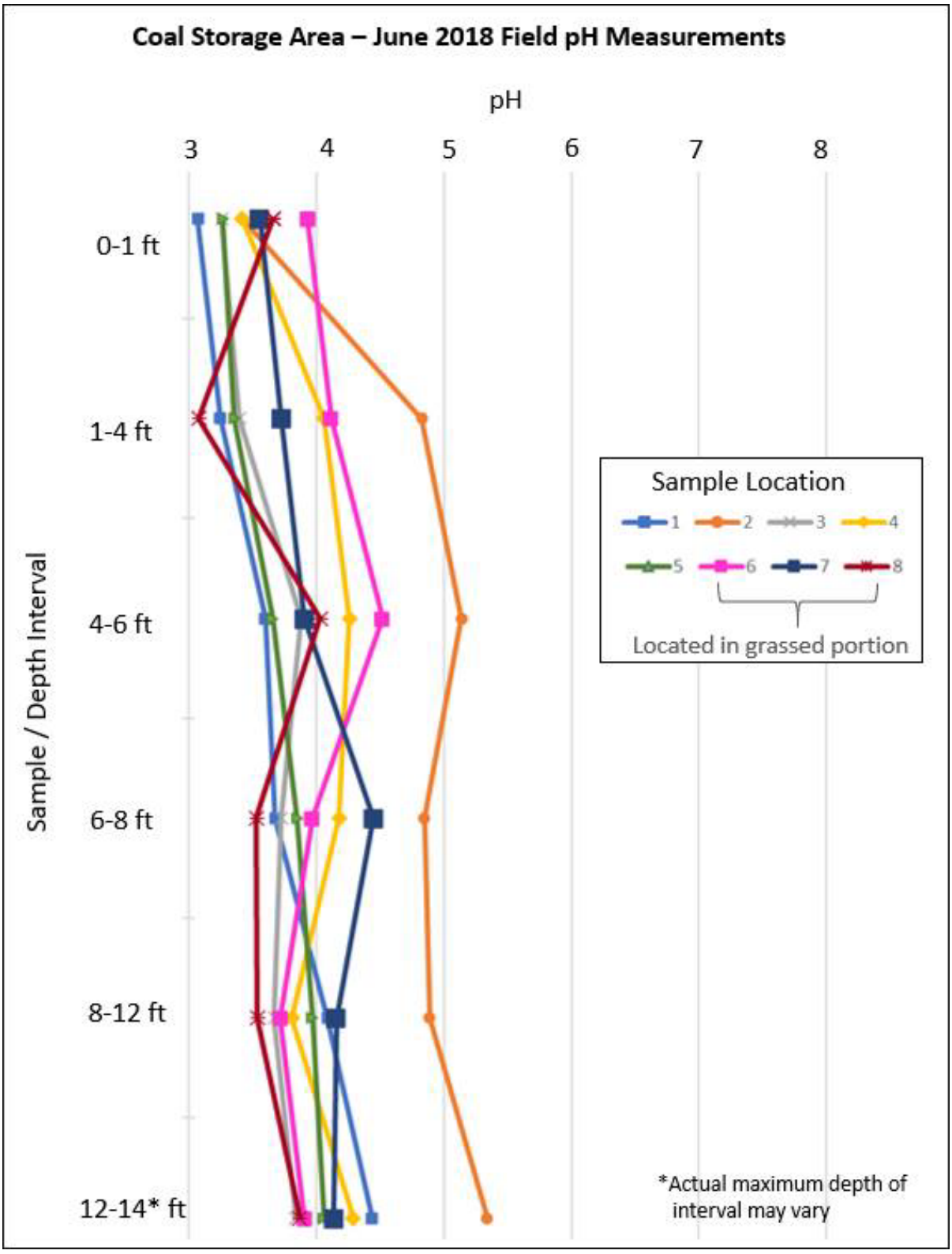


**Figure 7. June 2018 484-17D DCSA Soil Sampling pH Field Measurements**

For sample locations – See Figure 6.

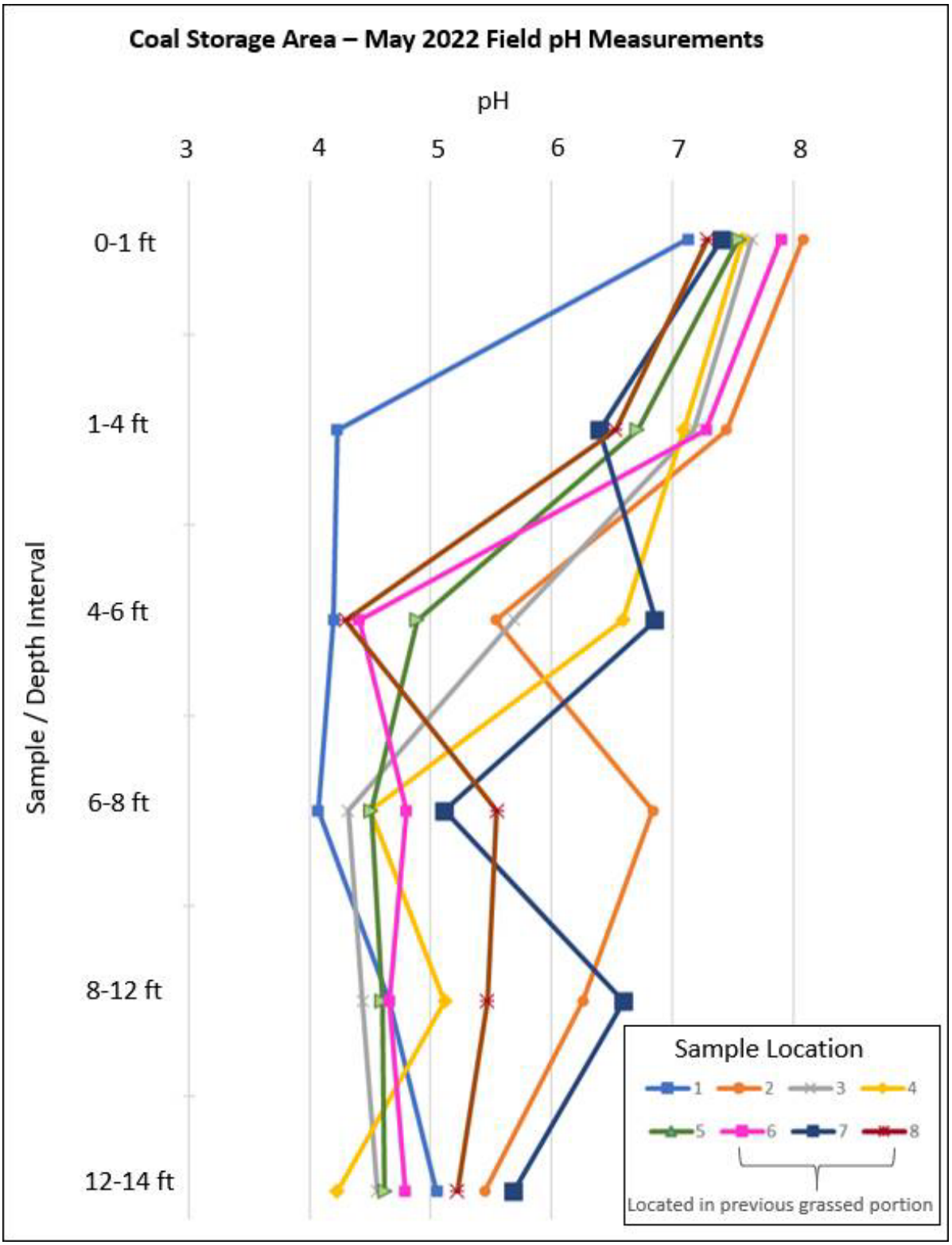


**Figure 8. May 2022 484-17D DCSA Soil Sampling pH Field Measurements**
For sample locations – See Figure 6.

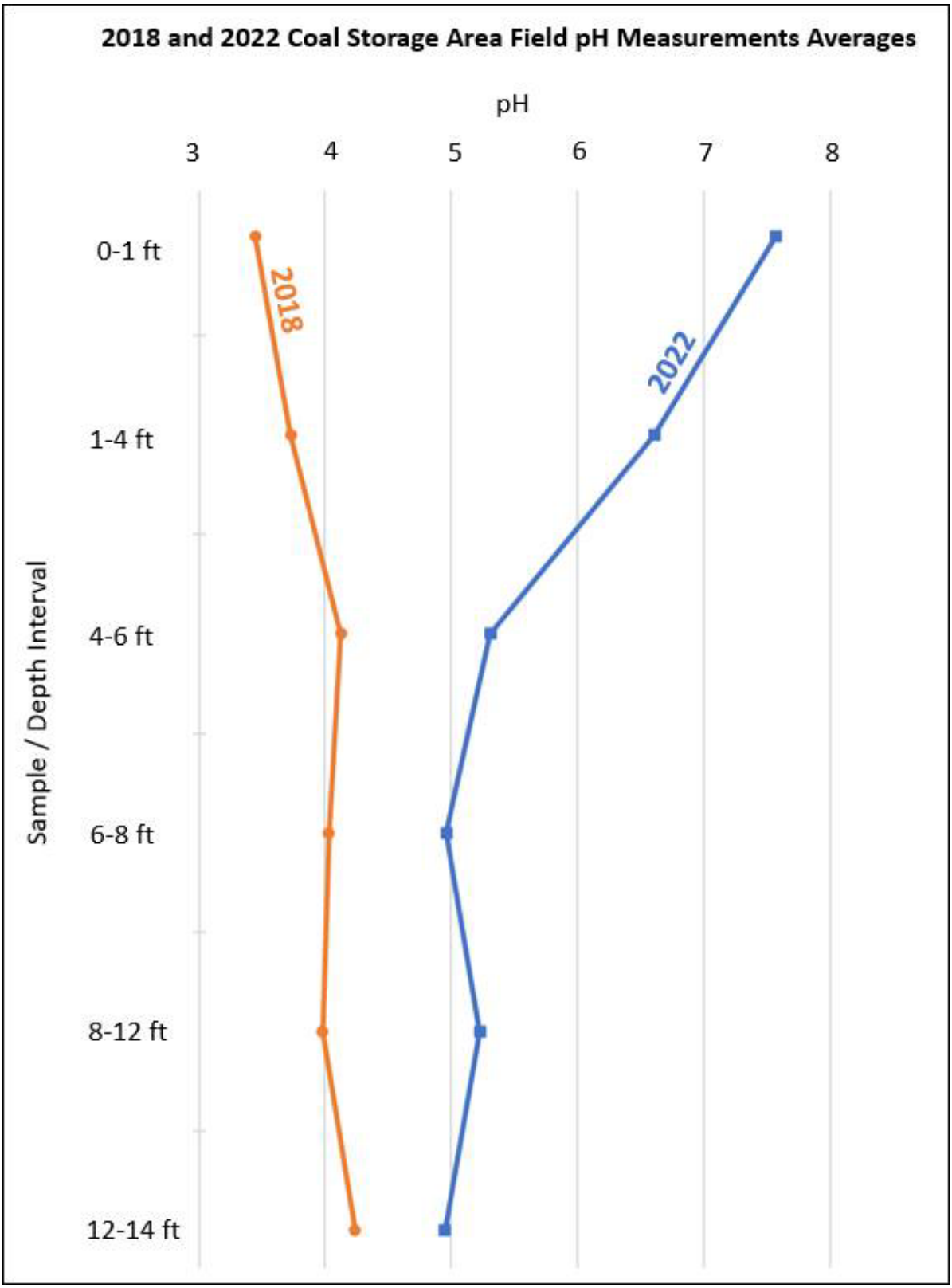


**Figure 9. 2018 and 2022 484-17D DCSA Field pH Measurements Averages**

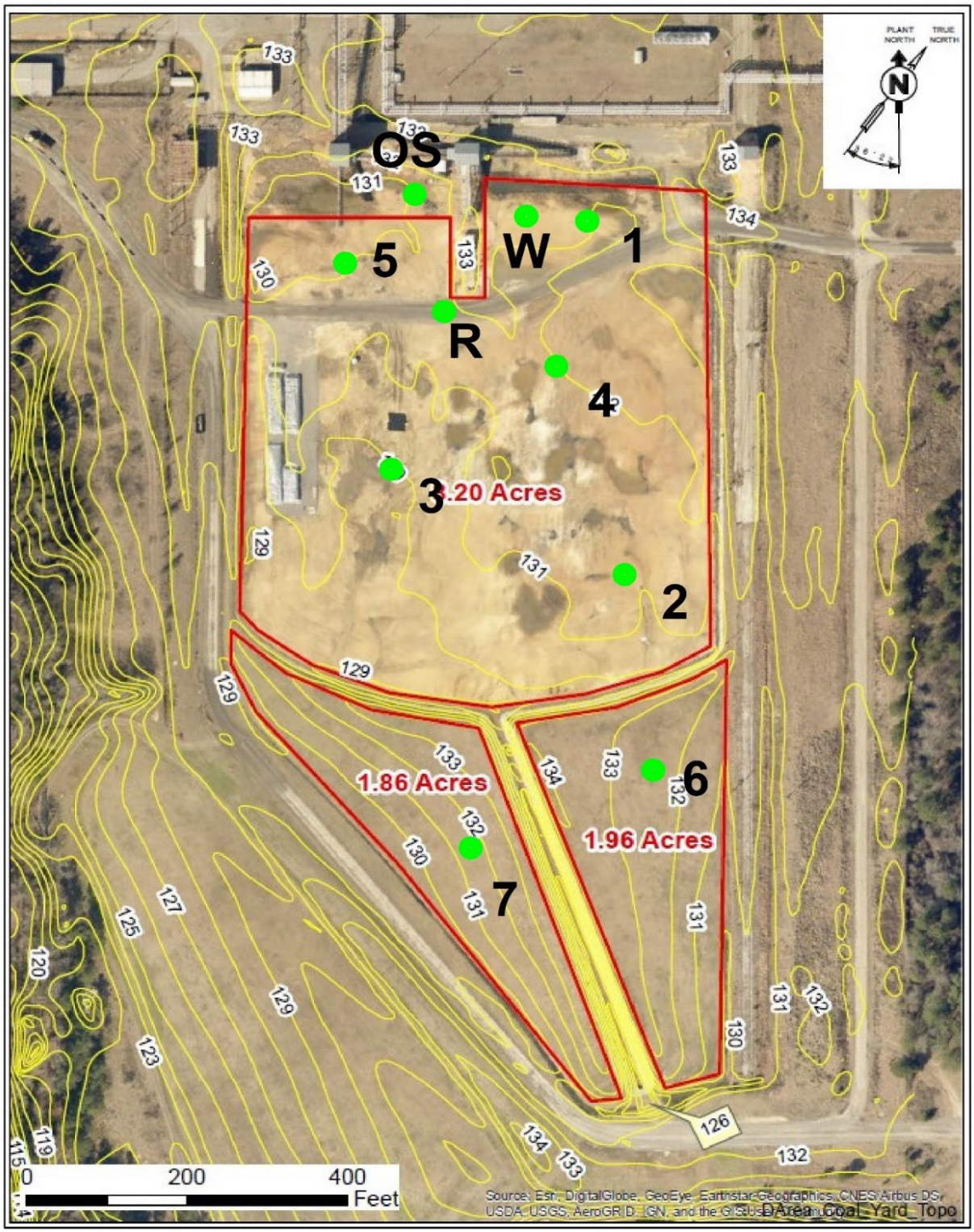


**Figure 10. May 2020 and December 2020 Soil pH Sampling Locations**

Key: OS = outside scope, R = roadway, W = standing water, Red line = 484-17D DCSA area of soil amendment addition, Yellow line - topographical contours.

## Table 1. Chronology of Events

| Description of Activity | Date |
|---|---|
| Sampling of the coal yard soils performed for the RSER/EE/CA. | June 2018 |
| Core Team agreed to the RAOs and RAs to be evaluated in the RSER/EE/CA. | August 2018 |
| USDOE Submittal of the RSER/EE/CA Revision 1 | June 6, 2019 |
| SCDHEC Conditional Approval of draft Action Memorandum and Responsiveness Summary for the Non-Time Critical Removal Action for the D-Area Coal Storage Area (484-l7D) | July 2, 2019 |
| USDOE Submittal of the Action Memorandum and Responsiveness Summary for the Non-Time Critical Removal Action for the D-Area Coal Storage Area (484-l7D) (USDOE 2019) – See Appendix B | July 24, 2019 |
| USEPA Concurrence of Removal Action Memorandum and Responsiveness Summary for the Non-Time Critical Removal Action for the D-Area Coal Storage Area (484-l7D) | August 15, 2019 |
| Pre-Job Briefing | March 5, 2020 |
| SWPPP walkdown for DCSA (484-l7D) | March 9, 2020 |
| Removal Action start for DCSA (484-l7D) | May 5, 2020 |
| USDOE Submittal of the Notification of the Removal Action Start of the D-Area Coal Storage Area (484-17D) (USDOE 2020) – See Appendix C | May 7, 2020 |
| Soil pH Process Efficacy Sampling During Amendment Addition | May 13&14, 2020 |
| Mechanical Completion of the 484-17D DCSA | November 24, 2020 |
| Soil pH Sampling After Amendment Addition | December 2, 2020 |
| FAI-51 Walkdown of the 484-17D DCSA | December 3, 2020 |
| Physical Completion of the 484-17D DCSA | December 15, 2020 |
| Second FAI-51 Walkdown of the 484-17D DCSA | January 14, 2021 |
| USDOE Submittal of Notification of the Completion of Construction Activities for the Non-Time Critical Removal Action for the D-Area Coal Storage Area (484-17D) (USDOE 2021) – See Appendix D | February 3, 2021 |
| Soil pH sampling post-RA. | May 2022 |

**Table 2. Equipment Types and Activities**

| General Equipment Type | Type Activity |
|---|---|
| D-6 and D-8 Dozers (Options Low Ground Pressure [LGP], global positioning system [GPS]) | Decompacting coal yard soils (Photos 2, 5 and 6) |
| Excavator 300 and 400 series (Options GPS, Long reach) | Processing coal yard soils with amendment (Photos 3, 4 and 5) |
| Tandem Axle Dump Trucks | Processing coal yard soils with amendment (Photo 5) |
| Processor | Processing coal yard soils with amendment (Photo 5) |
| Road Scrapers | Processing coal yard soils with amendment |
| Motor Grader | Processing coal yard soils with amendment (Photos 5 and 6) |
| Pickup trucks | General site operations. |

**Table 3. Summary Table of Demolished Items**

| Location | Material | Function | Disposal Route |
|---|---|---|---|
| Northwest portion of DCSA | 4” AIP pipe | Stormwater collection | Three Rivers Landfill |
| Northwest portion of DCSA | 8” AIP pipe | Stormwater collection | Three Rivers Landfill |

**Table 4. June 2018 Soil Sample Field pH and Lab pH Measurements**

| | Location | 1 | | 2 | | 3 | | 4 | | 5 | | 6 | | 7 | | 8 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sample/ Depth | | Field | Lab | Field | Lab | Field | Lab | Field | Lab | Field | Lab | Field | Lab | Field | Lab | Field | Lab |
| Topsoil | | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 6.43 | -- | 5.34 | -- | -- | -- |
| Coal | | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 3.93[1] | -- | -- | -- | 3.25 | -- |
| 0-1 | | 3.07 | 3.28 | 3.42 | 3.72 | 3.26 | 3.27 | 3.42 | 3.55 | 3.27 | 3.31 | 3.93 | 4.23 | 3.56 | 3.68 | 3.66 | 4.10 |
| 1-4 | | 3.25 | 3.32 | 4.83 | 4.74 | 3.40 | 3.73 | 4.06 | 3.97 | 3.36 | 3.40 | 4.12 | 4.45 | 3.73 | 3.82 | 3.08 | 3.40 |
| 4-6 | | 3.60 | 3.66 | 5.14 | 5.03 | 3.88 | 3.74 | 4.26 | 4.19 | 3.66 | 3.64 | 4.52 | 4.67 | 3.91 | 4.02 | 4.03 | 4.07 |
| 6-8 | | 3.68 | 3.80 | 4.85 | 5.34 | 3.73 | 3.67 | 4.18 | 4.26 | 3.85 | 3.74 | 3.97 | 4.16 | 4.45 | 4.67 | 3.53 | 4.19 |
| 8-12 | | 4.09 | 4.36 | 4.89 | 5.11 | 3.67 | 3.64 | 3.81 | 4.07 | 3.97 | 3.96 | 3.73 | 3.98 | 4.16 | 4.38 | 3.54 | 4.02 |
| 12-14* | | 4.44 | 4.58 | 5.34 | 5.51 | 3.84 | 3.92 | 4.29 | 4.18 | 4.06 | 4.11 | 3.91 | 4.04 | 4.14 | 4.50 | 3.87 | 4.11 |
| * Actual maximum depth of interval may vary | | | | | | | | | | | | | | | | | |

[1] Coal was mixed with the 0-1 ft sample and a field pH measurement was taken after homogenization. Actual pH measurement using just the coal may be slightly lower than the soil mixture (as was seen at location 8).

For sample locations – See Figure 6.

**Table 5. May 2020 Soil pH Sampling Results for Process Efficacy**

| Sample # | With Bulldozer Only | Processor Mixed | With Pan |
|---|---|---|---|
| 1 | 5.00 | 5.14 | 5.97 |
| 2 | 5.17 | 5.80 | 5.77 |
| 3 | 5.20 | 6.04 | 5.52 |
| 4 | | 4.67 | |
| 5 | | 5.94 | |
| | | | |
| Average | 5.12 | 5.52 | 5.75 |
| Standard Dev. | 0.09 | 0.53 | 0.18 |

For sample locations – See Figure 10.

**Table 6. December 2020 Soil pH Sampling Results at Project Completion**

| Sample # | pH |
|---|---|
| 1 | 7.72 |
| 2 | 7.76 |
| 3 | 7.82 |
| 4 | 7.62 |
| 5 | 7.60 |
| 6 | 7.06 |
| 7 | 7.94 |
| Average | 7.65 |
| Standard Dev. | 0.26 |
| | |
| R - Under Roadway | 6.76 |
| OS - Outside Scope | 3.95 |
| W - Standing Water | 7.48 |

For sample locations – See Figure 10.

**Table 7. May 2022 RAR Final Soil pH Sampling Results**

| | Location | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Sample/Depth | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | Average |
| 0-1 | 7.13 | 8.08 | 7.66 | 7.58 | 7.55 | 7.9 | 7.41 | 7.29 | 7.58 |
| 1-4 | 4.23 | 7.45 | 7.18 | 7.09 | 6.71 | 7.28 | 6.4 | 6.53 | 6.61 |
| 4-6 | 4.2 | 5.54 | 5.69 | 6.59 | 4.89 | 4.41 | 6.86 | 4.3 | 5.31 |
| 6-8 | 4.07 | 6.84 | 4.32 | 4.5 | 4.51 | 4.8 | 5.12 | 5.55 | 4.96 |
| 8-12 | 4.66 | 6.26 | 4.44 | 5.12 | 4.6 | 4.66 | 6.6 | 5.47 | 5.23 |
| 12-14 | 5.05 | 5.45 | 4.56 | 4.23 | 4.62 | 4.79 | 5.69 | 5.22 | 4.95 |

For sample locations – See Figure 6.

## Table 8. Project Cost Comparison

| Project Cost Comparison for 484-17D DCSA | | | | | |
|---|---|---|---|---|---|
| **Cost** | **484-17D Estimated Capital Cost 2019 RSER/EE/CA** | **484-17D Estimated O&M Cost 2019 RSER/EE/CA** | **484-17D Actual Capital Cost** | **484-17D Actual O&M Cost** | **Delta Cost** |
| | *($)* | *($)* | *($)* | *($)* | *(%)* |
| Construction Activities | $308,934 | | $578,259 | | |
| Material (Lime) | $201,000 | | $339,306 | | |
| Equipment | $753,098 | | $815,471 | | |
| Performance Margin | $37,891 | | $0 | | |
| Direct | $1,300,923 | $215,275 | $1,733,036 | N/A | |
| Engineering & Design, Health & Safety | $260,185 | | $591,482 | | |
| Project/Construction Management | $ 325,231 | | $841,735 | | |
| Overhead | $ 390,277 | | $0 | | |
| Contingency | $260,185 | | $0 | | |
| Indirect | $1,235,878 | $1,189,396 | $1,433,217 | N/A | |
| **Total** | **$2,536,801** | **$1,404,671** | **$3,166,253** | **N/A** | **25%** |

- Direct actual capital cost: Construction activities are broken down to the lowest level possible due to cost processing constraints.
- Indirect actual capital cost: Engineering and design is combined with H&S due to cost processing constraints.


**Photo 1. Historical Photo of D Area (1982)**

**Photo 2. Bulldozer with Ripper Attachment Decompacting Coal Yard Soils**

**Photo 3. Amendment Spread over Decompacted Soils**

**Photo 4. Excavator Removing Four Feet of Soil and Amendment**

**Photo 5. Equipment Types Used**
(From left to right: excavator, processor, dump truck, grader, and bulldozer work to mix amendment)

**Photo 6. Placement of Limestone Gravel Stabilization**

**Photo 7. Finished Limestone Gravel Cover**

**Photo 8.** **Stabilized Coal Yard with Gravel Vehicle Access Road**
(Pictured from above.)

**Photo 9.** **Plastic Chain and Post Barricade**
(Used to discourage vehicle access to limestone gravel cover.)

**Photo 10. 484-17D DCSA Northern Portion**

**Photo 11. 484-17D DCSA Southern Portion**

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# APPENDIX A

## SAMPLING PLANS FOR THE D-AREA COAL STORAGE AREA (484-17D))

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# Pre-RA Sampling Plan for the 484-17D DCSA

The neutralization effort is aimed to increase the pH of the vadose zone soils to average SRS background levels of ~5.5. The neutralization amendments should affect the pH of the treated vadose zone soils relatively quickly (less than 1.5 years). This amount of time will allow infiltration of rainwater to aid in the dispersing and reactivity of the calcium carbonate within the vadose zone. The sampling is intended to check the pH levels of the vadose zone soils and any additional effect below the amended zone. Samples will be collected from the eight locations identified in the June 2018 sampling effort at six depth intervals down to 14 feet (4.3 meters) below ground surface (Figure A-1). A total of 10% of the samples will include duplicates or quality assurance/quality control. The sampling results will support the DAG OU Corrective Measures Study/Feasibility Study (CMS/FS) and the final remedial action for DAOU, as necessary. The DAG OU CM/FS is currently scheduled for July 20, 2021.

Since the pH measurements from the June 2018 sampling effort showed excellent correlation between the field pH measurements and the lab analyzed pH measurements, only field pH measurements are proposed to be collected. Consistent with the June 2018 sampling event, the soil samples will be used to create soil slurries and measured for pH in the field following USEPA (https://www.epa.gov/sites/production/files/2015-12/documents/9045d.pdf, accessed 9/20/2018) and the USDA Soil Survey Field and Laboratory Methods Manual, Report No. 51 guidance (https://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb1244466.pdf, accessed on 9/20/2018, section 4.3.1.1.1.3, page 232).

Under the *Treatability Study Work Plan for Groundwater Injection and Discharge Canal Treatment at the D-Area Groundwater* (SRNS 018b), potable groundwater from nearby production wells in D-Area will be injected in the upper water table upgradient of the 484-17D DCSA and the 489-D CPRB to raise the water table ~5 feet (1.5 meters) to create a hydraulic head and displace the low pH groundwater. The injected groundwater will also serve as a buffering treatment agent to raise the groundwater pH levels. It is anticipated that the lower depth intervals of the 484-17D DCSA vadose zone will become saturated. SRS will submit a Program Plan prior to collecting saturated soil samples from the 484-17D DCSA.

**54 total composite soil *samples (includes* 10% Quality Assurance/Quality Control – 6 duplicates)**

| 8 Locations (Figure A-1) | 6 Depth Intervals |
|---|---|
| 48417D-01 | 0-1’ |
| 48417D-02 | 1-4’ |
| 48417D-03 | 4-6’ |
| 48417D-04 | 6-8’ |
| 48417D-05 | 8-12’ |
| 48417D-06 | 12-14’ |
| 48417D-07 | |
| 48417D-08 | |

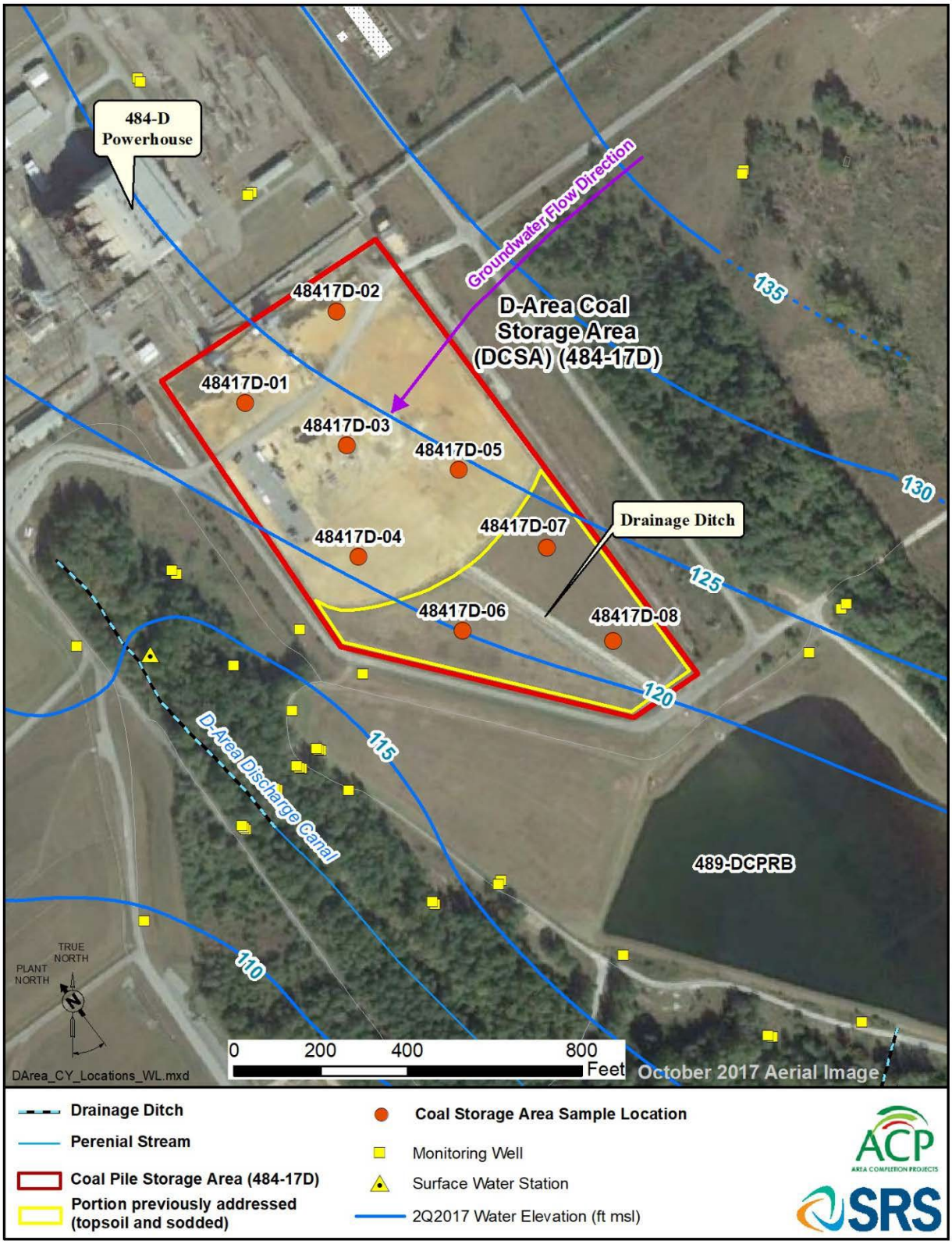


**Figure A-1. Soil Sampling Locations at the 484-17D DCSA**

# Post-RA Sampling Plan for the 484-17D DCSA

## 1.0 SCOPE

The FY22 D-Area sampling consists of two subtasks in support of the D-Area Groundwater Operable Unit (DAG OU) Work Plan Characterization, and the shallow soil investigations within the D-Area Coal Storage Area (DCSA), respectively. The subtasks include: 1) drilling a total of six (6) locations (two soil borings, four monitoring wells) for the DAG OU; and 2) drilling eight (8) soil borings for the 484-17D DCSA. Further details are provided below.

**Subtask 2): D-Area Coal Storage Area**

The SRS Environmental Monitoring (EM) group are to collect soil samples at eight (8) of the borings/wells as listed in Table A-1. No PFAS samples are being collected within the 484-17D DCSA. Figures A-1 and A-2 shows the eight (8) locations of the borings within the 484-17D DCSA (48417D-## locations).

Three (3) depth intervals are to be sampled at each location (0 to 0.3 m, 0.3 to 1.2 m, and 2.4 to 3.0 m [0 to 1 ft, 1 to 4 ft, and 8 to 10 ft]) or at the direction of technical oversight or SRNS technical leads. Field pH measurements of the soil will be measured by SRNS technical project leads.

All samples will be taken to the Burma Road shipping facility.

**Table A-1. Subtask 2): 484-17D DCSA Borings Details**

| Station ID | Type | Estimated Total Drilled Depth (ft) | Samples (#) – Sampler | Aquifer |
|---|---|---|---|---|
| 48417D-01 | Boring | 14 | Field pH (6) – SRS Technical; TAL, TCL, Gross Alpha, NVB (3) – SRS EM | Vadose Zone |
| 48417D-02 | Boring | 14 | Field pH (6) – SRS Technical; TAL, TCL, Gross Alpha, NVB (3) – SRS EM | Vadose Zone |
| 48417D-03 | Boring | 14 | Field pH (6) – SRS Technical; TAL, TCL, Gross Alpha, NVB (3) – SRS EM | Vadose Zone |
| 48417D-04 | Boring | 14 | Field pH (6) – SRS Technical; TAL, TCL, Gross Alpha, NVB (3) – SRS EM | Vadose Zone |
| 48417D-05 | Boring | 14 | Field pH (6) – SRS Technical; TAL, TCL, Gross Alpha, NVB (3) – SRS EM | Vadose Zone |
| 48417D-06 | Boring | 14 | Field pH (6) – SRS Technical; TAL, TCL, Gross Alpha, NVB (3) – SRS EM | Vadose Zone |
| 48417D-07 | Boring | 14 | Field pH (6) – SRS Technical; TAL, TCL, Gross Alpha, NVB (3) – SRS EM | Vadose Zone |
| 48417D-08 | Boring | 14 | Field pH (6) – SRS Technical; TAL, TCL, Gross Alpha, NVB (3) – SRS EM | Vadose Zone |
| | | **Total:** | **Field pH (48), Full Suite (24)** | |


**Figure A-2. Locations of the 2022 D-Area Borings for 484-17D DCSA**

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# APPENDIX B

## USDOE SUBMITTAL OF THE ACTION MEMORANDUM AND RESPONSIVENESS SUMMARY FOR THE NON-TIME CRITICAL REMOVAL ACTION FOR THE D-AREA COAL STORAGE AREA (484-17D) (USDOE 2019)

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ARF-022270

**Department of Energy**
Savannah River Operations Office
P.O. Box A
Aiken, South Carolina 29802

JUL 24 2019

Ms. Susan B. Fulmer, P. G., Manager
Federal Remediation Section
Division of Site Assessment, Remediation and Revitalization
Bureau of Land and Waste Management
South Carolina Department of Health and Environmental Control
2600 Bull Street
Columbia, South Carolina 29201

Mr. Jon Richards
Acting Savannah River Site Remedial Project Manager
Superfund Division
U. S. Environmental Protection Agency, Region 4
61 Forsyth Street, SW
Atlanta, Georgia 30303

Dear Ms. Fulmer and Mr. Richards:

SUBJECT: Action Memorandum and Responsiveness Summary for the Non-Time Critical Removal Action for the D-Area Coal Storage Area (484-17D), SEMS Number: 63

Pursuant to the National Oil and Hazardous Substances Pollution Contingency Plan [40 CFR Section 300.415(b)(2)(iv)] that states removal actions shall be considered when "*High levels of hazardous substances or pollutants or contaminants in soils largely at or near the surface that might migrate.*", the U.S. Department of Energy (DOE) prepared a Removal Site Evaluation Report/Engineering Evaluation/Cost Analysis (RSER/EE/CA) for the D-Area Coal Storage Area (484-17D) (SRNS-RP-2018-00813, Revision 1, May 2019) SEMS Number: 63. The regulatory review of the Revision 0 RSER/EE/CA occurred from November 29, 2018 to March 4, 2019. The Savannah River Site (SRS) received comments from the South Carolina Department of Health and Environmental Control (SCDHEC) on January 25, 2019 and the U.S. Environmental Protection Agency (EPA) on March 4, 2019. The SRS' responses to the EPA's and SCDHEC's comments were incorporated into the Revision 1 RSER/EE/CA, which was made available for public review and comment from June 13, 2019 to July 13, 2019. As documented in the enclosed Responsiveness Summary, no comments were received during the public comment period. The Action Memorandum and Responsiveness Summary will be made part of the Administrative Record. In addition, a notice will be filed in the Environmental Bulletin within two (2) weeks of submittal of the Action Memorandum and Responsiveness Summary to the Administrative Record File/Information Repository File

The D-Area Coal Storage Area (484-17D) is located within the D-Area Operable Unit (DAOU) at the SRS. DAOU is located within the southwest quadrant of SRS approximately 3,000-feet east of the nearest site boundary, the Savannah River. The DAOU contains surface units and source areas in D Area that potentially pose a threat to human health and the environment. The D-Area Coal Storage Area is approximately fifteen acres in size and supported the D-Area Powerhouse (484-D) as a temporary storage area for coal prior to use at 484-D. The D-Area Powerhouse was built in 1953 and shut down in 2012 after 59 years of operation. The facility burned approximately 160,000 tons of coal per year during this period.

Ms. Susan Fulmer
Mr. Jon Richards 2 JUL 24 2019

The justification to perform a removal action is to reduce the acidity in the upper portion of the vadose zone and subsequently reduce the amount of acidic leachate to groundwater. The removal action objective to protect human health and the environment is to increase the pH in the D-Area Coal Storage Area vadose zone soils to more natural conditions resulting in the minimization of future impacts to groundwater.

The preferred removal action for the D-Area Coal Storage Area is Alternative 2, Addition of Soil Neutralization Amendments, which meets the effectiveness, implementation, cost, and acceptance criteria. Alternative 2 will mix in soil neutralization amendments such as lime or calcium carbonate material to a targeted depth of 4 feet below ground surface across the entire 15 acres of the D-Area Coal Storage Area, including the 6 to 8 inches layer of coal fragments. The addition of soil neutralization amendments to raise the pH of the vadose zone soils will reduce the acidic leachate that contributes to low pH and metals plumes in groundwater. This alternative will employ treatment by the addition of soil amendments and meets the criteria to reduce toxicity by raising the pH of the leachate prior to discharge to groundwater. Through treatment of the vadose zone soils and reduction in acidic leachate, groundwater pH is expected to return to more natural background levels over time. Reducing the leaching of metals and returning the groundwater to an approximate pH of 5.5 (background condition) over time is more protective of human health and the environment as compared to no action.

Removal activities are scheduled to commence April 30, 2020. Upon conclusion of the removal action, a Removal Action Report that summarizes the work will be prepared and submitted to document the completion of the removal action.

Questions from you or your staff may be directed to me at (803) 952-8365.

Sincerely,

Brian T. Hennessey
SRS Remedial Project Manager
Area Completion Project

IACD-19-174

Enclosure:
Responsiveness Summary for the Non-Time Critical Removal Action for the for the D-Area Ash Basin (488-1D) SEMS Number: 63

# APPENDIX C

## USDOE SUBMITTAL OF THE NOTIFICATION OF THE REMOVAL ACTION START OF THE D-AREA COAL STORAGE AREA (484-17D) (USDOE 2020)

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ARF-022687

**Department of Energy**
Savannah River Operations Office
P.O. Box A
Aiken, South Carolina 29802

MAY - 7 2020

Ms. Susan B. Fulmer, P.G., Manager
Federal Remediation Section
Division of Site Assessment, Remediation and Revitalization
Bureau of Land and Waste Management
South Carolina Department of Health and Environmental Control
2600 Bull Street
Columbia, South Carolina 29201

Mr. Jon Richards
Savannah River Site Remedial Project Manager
Superfund Division
U. S. Environmental Protection Agency, Region 4
61 Forsyth Street, SW
Atlanta, Georgia 30303

Dear Ms. Fulmer and Mr. Richards:

SUBJECT: Notification of the Removal Action Start of the D-Area Coal Storage Area (484-17D) (U)
SEMS Number: 63

The U.S. Department of Energy (DOE) is notifying the South Carolina Department of Health and Environmental Control (SCDHEC) and the U.S. Environmental Protection Agency (EPA) that the Removal Action Start for the D-Area Coal Storage Area (484-17D) was met on May 5, 2020 ahead of the milestone date of August 28, 2020. The removal action start date was met with installation of the stormwater pollution prevention controls along the perimeter of the excavation area.

Questions from you or your staff may be directed to me at (803) 952-8365, or the DOE Federal Project Director, Karen Adams, at (803) 952-7871.

Sincerely,

BRIAN HENNESSEY

Digitally signed by BRIAN HENNESSEY
Date: 2020.05.07 07:47:01 -04'00'

Brian T. Hennessey
SRS Remedial Project Manager
Infrastructure and Area Completion Division

IACD-20-152

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# APPENDIX D

## USDOE SUBMITTAL OF THE NOTIFICATION OF THE COMPLETION OF CONSTRUCTION ACTIVITIES FOR THE NON-TIME CRITICAL REMOVAL ACTION FOR THE D-AREA COAL STORAGE AREA (484-17D)

## (USDOE 2021)

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Department of Energy
Savannah River Operations Office
P.O. Box A
Aiken, South Carolina 29802

ARF-023065

FEB -3 2021

Ms. Susan B. Fulmer, P. G., Manager
Federal Remediation Section
Division of Site Assessment, Remediation and Revitalization
Bureau of Land and Waste Management
South Carolina Department of Health and Environmental Control
2600 Bull Street
Columbia, South Carolina 29201

Mr. Jon Richards
Savannah River Site Remedial Project Manager
Superfund Division
U. S. Environmental Protection Agency, Region 4
61 Forsyth Street, SW
Atlanta, Georgia 30303

Dear Ms. Fulmer and Mr. Richards:

SUBJECT: Notification of the Completion of Construction Activities for the Non-Time Critical Removal Action for the D-Area Coal Storage Area (484-17D) SEMS Number: 63

The U. S. Department of Energy is submitting this letter to document the completion of the construction activities associated with the D-Area Coal Storage Area (484-17D) non-time critical removal action defined in the *Removal Site Evaluation Report/Engineering Evaluation/Cost Analysis (RSER/EE/CA) for the D-Area Coal Storage Area (484-17D) (U)* (SRNS-RP-2018-00813, Revision 1, June 2019) and the subsequent Action Memorandum (IACD-19-174, dated July 24, 2019). The construction activities for this removal action were completed on December 15, 2020. The removal action report is scheduled to be submitted by July 3, 2022 to include the follow-up monitoring data to evaluate the result of the action as described in the RSER/EE/CA implementation schedule. The effort and time that the South Carolina Department of Health and Environmental Control and the U. S. Environmental Protection Agency have provided on this operable unit are greatly appreciated.

Questions from you or your staff may be directed to me at (803) 952-8365.

Sincerely,

Brian T. Hennessey
Digitally signed by Brian T. Hennessey
Date: 2021.02.02 11:18:57 -05'00'

Brian T. Hennessey
SRS Remedial Project Manager
Infrastructure and Area Completion Division

IACD-21-122

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# APPENDIX E

## AS-BUILT DRAWINGS FOR THE D-AREA COAL STORAGE AREA (484-17D)

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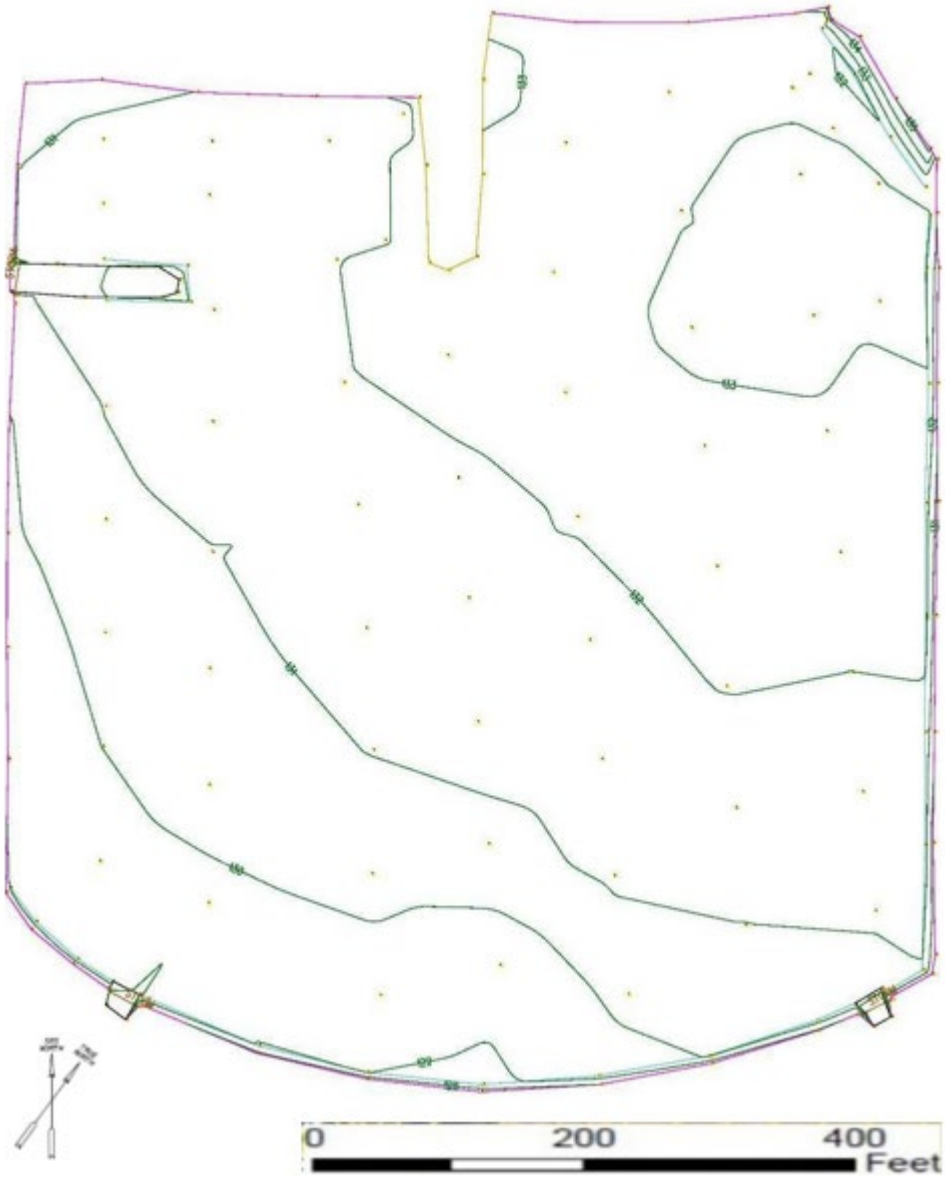
**APPENDIX E-1.**
**072720 Topographical As-built Drawing of 484-17D DCSA Northern Portion**
September 15, 2020



**APPENDIX E-2.**
**093520 Topographical As-built Drawing of 484-17D DCSA Southern Portion**
October 1, 2020