# INITIAL STRUCTURE STABILITY ASSESSMENT AND SAFETY FACTOR ASSESSMENT
JEFFERIES GENERATING STATION
ASH POND A
MONCKS CORNER, SOUTH CAROLINA

by
Haley & Aldrich, Inc.
Greenville, South Carolina

for
Santee Cooper
Moncks Corner, South Carolina

File No. 0132892-103-100-07
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File No. 0132892-103-100-07

Santee Cooper
1 Riverwood Drive
Moncks Corner, South Carolina 29461

Attention: Brian Holmes, P.E.
Manager, Waste Management

Subject: Initial Structural Stability Assessment and Safety Factor Assessment
Jefferies Generating Station
Ash Pond A
Moncks Corner, South Carolina

Dear Mr. Holmes:

Enclosed please find our report on the coal combustion residuals (CCR) *Initial Structural Stability Assessment and Safety Factor Assessment* for Ash Pond A located at the Jefferies Generating Station in Moncks Corner, South Carolina.

This work was performed by Haley & Aldrich, Inc. on behalf of Santee Cooper in accordance with the United States Environmental Protection Agency's *Hazardous and Solid Waste Management System; Disposal of Coal Combustion Residuals from Electric Utilities*, Title 40 Code of Federal Regulations (40 CFR) Parts 257 and 261 (Final CCR Rule), in particular 40 CFR § 257.73(d) and § 257.73(e).

The scope of our work consisted of the following:

- obtain and review readily available reports;
- visit the site to inspect the CCR surface impoundment;
- determine the critical cross section(s) based upon slope geometry, anticipated loadings on the dikes, proximity to critical downstream features, available subsurface geotechnical data, and historical performance of the dikes;
- develop representative geotechnical strength parameters at the critical cross section(s) from available geotechnical subsurface data;
- evaluate the structural stability of the impounding embankment(s);
- evaluate the impacts of sudden drawdown of surrounding waters on the impounding embankment(s) using the limit equilibrium software Slide2 Modeler (Rocscience, 2025);
- determine the seismic soil classification and risk category in accordance with the guidance outlined in American Society of Civil Engineers ASCE 7-22;

- develop the representative seismic coefficient for a 2 percent chance probability of exceedance in 50 years (i.e., 2,475 return period) using the recommended Hynes-Griffin (1984) ratio of critical acceleration to peak bedrock acceleration;
- determine the susceptibility to liquefaction of the dike and foundation materials;
- calculate the factors of safety for the following loading conditions: (a) long-term maximum storage pool, (b) maximum surcharge pool, (c) seismic, and (d) post-liquefaction (if susceptible) loading conditions using Slide2 Modeler;
- identify deficiencies if calculated factors of safety do not meet the requirements of 40 CFR § 257.73(d) and/or § 257.73(e); and
- Provide general recommendations for corrective measures.

Thank you for inviting us to complete these assessments and please feel free to contact us if you wish to discuss the contents of the report.

Sincerely yours,
**HALEY & ALDRICH, INC.**

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https://haleyaldrich.sharepoint.com/sites/SanteeCooper2/Shared Documents/0132892.Santee Cooper CCR Consulting Service/0_Jefferies Generating Station/Deliverables/2025_1028_StructuralStabilityandSafetyFactor/2025-1202_Initial Structural Stability_F.docx

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# 1. General

## 1.1 AUTHORITY

Haley & Aldrich, Inc. (Haley & Aldrich) was contracted by Santee Cooper to perform the *Initial Structural Stability Assessment* (SSA) *and Safety Factor Assessment* (SFA) for the Ash Pond A coal combustion residuals (CCR) surface legacy impoundment located at Jefferies Generating Station (JGS) in Moncks Corner, South Carolina. This work was completed in accordance with the United States Environmental Protection Agency's (EPA's) *Hazardous and Solid Waste Management System: Disposal of Coal Combustion Residuals from Electric Utilities; Legacy CCR Surface Impoundments*, Title 40 Code of Federal Regulations (40 CFR) Part 257 (CCR Rule), specifically 40 CFR §257.73(d) and §257.73(e).

## 1.2 PURPOSE OF STRUCTURAL STABILITY ASSESSMENT

The purpose of this report pursuant to the CCR Rule 40 CFR § 257.73(d) was to document whether the design, construction, operation, and maintenance of Ash Pond A are consistent with recognized and generally accepted engineering practices.

The scope of our work consisted of the following: 1) obtain and review readily available reports, investigations, plans and data pertaining to the Ash Pond A surface impoundment; 2) visit the site to observe Ash Pond A; 3) evaluate whether the design, construction, operation, and maintenance of Ash Pond A are consistent with recognized and generally accepted engineering practices; and 4) prepare and submit this report presenting the results of our evaluation, including recommendations.

## 1.3 PURPOSE OF SAFETY FACTOR ASSESSMENT

The purpose of this report was to evaluate the subsurface soil and water conditions at the site and to perform the initial SFA in accordance with 40 CFR § 257.73(e)(1) of the CCR Rule. To achieve the objective discussed above, the scope of work undertaken for this assessment included the tasks listed below.

- Reviewing readily available reports, investigations, plans and data pertaining to Ash Pond A.
- Evaluating liquefaction susceptibility of materials used to construct the impoundment embankments and underlying foundation soils.
- Performing static and pseudo-static (seismic) stability analyses for rotational failure surfaces using limit equilibrium methods.

## 1.4 ELEVATION DATUM AND HORIZONTAL CONTROL

The elevations referenced in this report are in feet and are based on the National Geodetic Vertical Datum of 1929 unless otherwise noted. The horizontal control is the South Carolina State Plane Coordinate System (North American Datum of 1983) datum unless otherwise noted.

# 2. Description of Impoundment

The JGS is located on the southeast side of Lake Moultrie in Berkeley County, in Moncks Corner, South Carolina. As shown on Figure 1, Ash Pond A lies in oblong northwesterly to southeasterly fashion and borders the Tailrace Canal of the Cooper River along the southwest side of the pond. JGS and Ash Pond A are owned and operated by Santee Cooper

A summary of relevant information associated with Ash Pond A is provided below. Additional details can be found in the *History of Construction* and *Hazard Potential Classification Reports* prepared by Haley & Aldrich (2025a and 2025b, respectively) under separate cover.

## 2.1 HISTORY OF ASH POND A

Ash Pond A is the sole CCR legacy surface impoundment at JGS in Moncks Corner, South Carolina. Ash Pond A is an unlined impoundment constructed in 1970 on approximately 136-acres to the southeast of JGS. Throughout its active life, the ash pond received sluiced CCR, consisting predominately of fly ash, bottom ash, and possibly boiler slag. Ash Pond A has not received CCR or CCR wastewater since the coal-fired units were retired in 2012. Currently, Ash Pond A is permitted as an industrial wastewater impoundment to serve primarily as a settling basin prior to wastewater entering the Decant Pond (formally known as Ash Pond B).

## 2.2 EMBANKMENTS

The northwestern border of Ash Pond A was constructed by excavation from natural grade down to the bottom of the pond and is bounded by an access road and railroad owned and operated by JGS and CSX Transportation, respectively. Along the southwest side, Ash Pond A is bounded by a “spoil dike” separating it from the Tailrace Canal. To the southeast, a separator berm (also known as “cross dike”) separates Ash Pond A from the Decant Pond. CCR was not sluiced to the Decant Pond that was used for polishing and pH adjustments.

From September 2015 to September 2016, eastern stormwater channels and the northeastern dike of Ash Pond A were constructed to re-route stormwater flow around the pond to Ash Pond B (Santee Cooper, 2016). CCR was removed from the outermost extents of the pond and was placed within the redefined boundaries of Ash Pond A (Haley & Aldrich, 2025a) to both reduce the CCR footprint and amount of stormwater run-on into Ash Pond A. Beyond the northeastern dike, the ground surface gradually slopes up to elevations greater than that of the ash pond.

## 2.3 COAL COMBUSTION RESIDUALS

Ash Pond A is in the late stages of closure-by-removal (excavation) of CCR and a layer of underlying soil in accordance with the South Carolina Department of Environmental Services (SCDES)-approved state closure plan (SCDHEC, 2015). Excavation activities will continue until all visible CCR is removed along with a layer of underlying soil. Overall closure activities are expected to be completed by December 2030 in accordance with the SCDES-approved closure plan (Geosyntec, 2016). As of 2025, Santee Cooper estimated approximately 800,000 cubic yards, or 33 percent, of the maximum estimated 2,402,000 cubic yards of CCR remained in the northern corner of Ash Pond A.

## 2.4 IMPOUNDED SURFACE WATER

Since the coal-fired units were retired in 2012, Ash Pond A hasn't received CCR nor CCR wastewater. Active dewatering via gravity flow "rim ditching" throughout Ash Pond A is used to support the excavation of the CCR in Ash Pond A. The rim ditches direct contact water to a sump where it is then pumped into the Decant Pond.

While Ash Pond A is largely in a dry, decanted state, a 100-year 24-hour storm event is estimated to raise the surface water up to elevation (El.) 14.75 feet in the southern 19 acres of Ash Pond A.

## 2.5 SURROUNDING WATERS

As previously stated, the "spoils dike" separates Ash Pond A from the Tailrace Canal of the Cooper River. The water elevation in the canal is subject to tidal influence and can range between El. -3.0 and El. +5.0 feet. The water level in the Tailrace Canal is expected to rise to El. 14.00 feet during a 100-year 24-hour storm event.

# 3. Review of Existing Subsurface Data

The assessments performed herein are based upon subsurface data obtained by other consultants and by Santee Cooper. Attachment 1 contains a *Soil Data and Interpreted Parameters* memorandum prepared by Haley & Aldrich that summarizes the historical data.

## 3.1 HISTORICAL EXPLORATION PROGREAM

A brief summary of the explorations is provided below and details of relevant explorations are presented in Attachment 1. Note that the term "relevant" explorations refers to explorations from previous investigations by others that were directly used in our structural stability and safety factor assessments; the full list of explorations performed during these events is outlined in Attachment 1. The test boring logs and laboratory test results associated with these investigations are included in Attachment 1.

- Two test borings, B-102 and B-104, were drilled by Soil Consultants, Inc. at the direction of WorleyParsons in February 2011 to November 8, 2011, as part of an ash pond site assessment.
- One test boring, JAP-2, was performed by Santee Cooper in November 2024.
- Three test borings, JAP-4, JAP-5PZ, and JAP-6, were performed by Santee Cooper in March 2025.

## 3.2 GEOLOGY

JGS is located within the Santee River Valley of the Lower Coastal Plain physiographic unit of South Carolina (SCDOT, 2022); the Lower Coastal Plain features low-lying swamps and wetlands containing fluvial and alluvial sands, silts and clays. JGS was constructed atop these fluvial/alluvial deposits (here forth referred to as "Alluvium") with varying amounts of fill (sands and clays). Underlying the Alluvium are the Cooper Marl (fat clay) and Santee Limestone (bedrock) Formations (WorleyParsons, 2011).

## 3.3 SUBSURFACE CONDITIONS

Descriptions of the soil conditions encountered at the explorations referenced above during the historical subsurface exploration programs conducted at the site are provided below in order of increasing depth below ground surface. Actual soil conditions between boring locations may differ from these typical descriptions. Refer to the test boring logs in Attachment 1 for specific descriptions of soil samples obtained from the historical borings.

From the borings, six distinct soil layers above the bedrock were encountered:

- "Spoils Dike" Upper Fill: very loose to loose sands and very soft to medium stiff lean and fat clays.
- "Spoils Dike" Middle Fill: medium dense to very dense sands.
- "Spoils Dike" Lower Fill: soft to hard fat clays.
- Separator Berm Fill (separator berm): soft to medium stiff sandy lean clays.
- Organics: soft organics mixed with stiff clay fill.

- Alluvium: very loose to loose sands and soft to medium stiff lean and fat clays.
- Marl (Cooper Marl Formation): very hard fat clays.

Three of the historical borings extended into the Alluvium and two extended into the Cooper Marl Formation. None of the recent or historical explorations extended into the Santee Limestone Formation. Boring logs and descriptions of the materials encountered are presented in Attachment 1.

# 4. Structural Stability Assessment

In accordance with 40 CFR § 257.73(d), the owner or operator of a CCR surface impoundment must conduct initial and periodic structural stability assessments to determine whether the design, construction, operation, and maintenance of the CCR unit is consistent with recognized and generally accepted engineering practices.

Haley & Aldrich reviewed the information provided to us and visited the site to observe Ash Pond A. Based on our review of available information and observations during our site visit, we have conducted the Structural Stability in accordance with 40 CFR § 257.73(d) as further described in the sections below.

## 4.1 REVIEW OF EXISTING INFORMATION

For this assessment, Haley & Aldrich reviewed multiple sources of information including:

- *Dam Assessment Report* prepared by Dewberry & Davis (2011) for EPA and the South Carolina Office of Resource Conservation and Recovery;
- geotechnical exploration logs and laboratory data presented in the *Ash Pond Site Assessment* prepared by WorleyParsons (2011);
- geotechnical exploration logs and laboratory data prepared by Santee Cooper in 2024 and 2025;
- topographic plans and aerial photographs;
- correspondence with JGS site personnel and Santee Cooper; and
- variety of other information in addition to verbal information provided by Santee Cooper during our assessment.

## 4.2 SITE VISITS AND FIELD OBSERVATIONS

On March 25, 2025, Haley & Aldrich visited JGS to observe conditions at Ash Pond A, and to meet with Santee Cooper personnel to discuss operations and maintenance of the impoundment. Prior to the site visit, Haley & Aldrich reviewed previous site assessment reports including the above-*referenced Ash Pond Site Assessment* by WorleyParsons (2011), the *Dam Assessment Report* by Dewberry & Davis (2011), and previous inspection reports referenced above and listed in Appendix A. At the time of our site visit, Ash Pond A was actively being excavated and water levels within the pond and in the Tailrace Canal were at the normal levels.

## 4.3 STRUCTURAL STABILITY ASSESSEMENT

Based on our review of available information and observations during our site visit, we have concluded the following in accordance with 40 CFR § 257.73(d):

### 4.3.1 Foundations and Abutments

*40 CFR § 257.73(d)(1)(i): Stable foundations and abutments*

Based on our review of available subsurface information, design/construction records, investigation reports, impoundment inspection reports and observations during our March 25, 2025, site visit, Ash Pond A was observed to have stable foundations. The Ash Pond A embankments have not exhibited signs of excessive settlement, instability or other signs of inadequate foundation support.

#### *4.3.1.1 Liquefaction Susceptibility of Embankment and Underlying Foundation Soils*

40 CFR § 257.73(e)(1)(iv) of the CCR Rule states "*For dikes constructed of soils that have susceptibility to liquefaction, the calculated liquefaction factor of safety must equal or exceed 1.20.*" While the "spoils dike" and separator berm fill materials are not susceptible to liquefaction, the underlying alluvial sands that support the "spoils dike" and separator berm are susceptible to liquefaction below the water table and do not meet the minimum required factor of safety against liquefaction of 1.20 for the model earthquake magnitude of 7.3 (USGS, 2025) and the peak ground acceleration of 0.69g (American Society of Civil Engineers, 2022). This is further discussed in Section 5.

### 4.3.2 Slope Protection

> *40 CFR § 257.73(d)(1)(ii): Adequate slope protection to protect against surface erosion, wave action, and adverse effects of sudden drawdown.*

Excavation of Ash Pond A is ongoing and as such vegetation and CCRs have been removed from the interior slopes of the "spoils dike" and separator berm in Ash Pond A. Interior slopes were not protected but were observed to be in good condition.

#### *4.3.2.1 "Spoils Dike"*

Given that the anticipated 100-year flood level within the pond is at El. 14.75 and the majority of the pond's bottom along the "spoils dike" is above this elevation, the interior slopes of the "spoils dike" were determined to be stable against wave action and sudden drawdown from surface water within the pond.

The exterior slope of the "spoils dike" is covered with dense vegetation (trees, bushes, and grasses) extending down to the high level of the Tailrace Canal. This vegetation acts as a natural form of slope protection and the exterior slopes were observed to be stable against surface erosion and wave action.

#### *4.3.2.2 Separator Berm*

The separator berm is subject to wave action and rapid drawdown conditions during a 100-year 24-hour storm. To evaluate the structural impacts of rapid drawdown, Haley & Aldrich used the slope stability analysis program Slide2 Modeler (RocScience, 2025). Haley & Aldrich used Spencer's Method of Slices (1967), the Autorefine Noncircular Cuckoo search method, and the Effective Stress Bbar Method (Morgenstern, 1963) to evaluate the impacts of Rapid Drawdown. The analysis focused on the internal stability of the separator berm since failure of the slopes would be the more likely event to cause a "discharge of pond contents" into the Decant Pond. The geometry of the separator berm was developed per the following assumptions:

- Crest is at El. 16.4 feet (ground surface elevation surveyed at JAP-2).

- Lowest excavated toe is at El. 6.8 feet in Ash Pond A (lowest elevation documented at the toe of the separator berm as shown in original construction drawings from Lockwood Greene Engineers [1968]).
- The slopes are modeled at a 3H:1V grade (cross dike grades as shown in the Conceptual Closure Plan by Geosyntec Consultants).
- Crest width is 10 feet (historical references vary between 6 feet and 12 feet wide).
- Initial water level in Ash Pond A is El.14.75 feet (100-year flood level in Ash Pond A).
- Final drawdown level in Ash Pond A is the ground surface at the bottom of Ash Pond A

The geotechnical shear strength properties used in the stability model are shown in Table 1.

The required minimum factor of safety for a rapid drawdown analysis is 1.10 as outlined in Table 3-1 of the United States Army Corps of Engineers Engineering Manual 1110-2-1902 for Slope Stability (2003) and on the condition of sudden drawdown as outlined in Table 1 of the Federal Energy Regulatory Commission Engineering Guidelines for the Evaluation of Hydropower Projects: Chapter 4: Embankment Dams (2006). A factor of safety of 1.10 applies to a drawdown level during a maximum flood level at which this scenario was modeled (see Note 5 of Table 3-1 in EM 1110-2-1902).

The results of the rapid drawdown analysis indicate that the interior slope of the separator berm does not meet a minimum target factor of safety of 1.1. However, the proposed configuration per the *Conceptual Closure Plan* in which the bottom of Ash Pond A is filled up to approximate El. 13 does meet the minimum target factor of safety. The results of the rapid drawdown analyses of the existing and proposed conditions are presented in Appendix A.

The Decant Pond has not been dewatered and the slope into the Decant Pond is covered in short grass. This vegetation acts as a natural form of slope protection, and this slope was observed to be stable against surface erosion and wave action.

### 4.3.3 Compaction of Dikes

> *40 CFR § 257.73(d)(1)(iii): Dikes mechanically compacted to a density sufficient to withstand the range of loading conditions in the CCR unit.*

Few records of the original construction of Ash Pond A are available and are discussed in the Initial *History of Construction Report* prepared by Haley & Aldrich (2025a).

While compaction records of the dikes and foundation soils are not available, the historical explorations described in Section 3.3 along the “spoils dike” indicate that the embankment was constructed of sand and clay fills on top of sand and clay Alluvium. Based upon Standard Penetration Test N-values recorded at the explorations, the upper layers of the fill were placed loosely while the lower layers of fill appear to have been mechanically compacted. The separator berm was constructed at a later date and was constructed of sandy lean clay.

During our March 25, 2025, site visit, we observed no evidence of slope instability or other signs of inadequate compaction of the embankment fill. In addition, based on the information reviewed for this

SSA, there has been no historical evidence of slope instability or other signs of inadequate embankment compaction.

### 4.3.4 Vegetated Slopes

> *40 CFR §257.73(d)(1)(iv): Vegetated slopes of dikes and surrounding areas not to exceed a height of six inches above the slope of the dike, except for slopes which have an alternate form or forms of slope protection.*

At the time of our March 25, 2025, site visit, the vegetation on the exterior slopes of the "spoils dike" exceeded 6 to 12 inches in height; this vegetation includes trees and bushes with large root balls that serve as slope protection. The vegetation on the interior slopes of Ash Pond A had been removed during CCR excavation activities. At the time of Haley & Aldrich's site visit the closest CCR remaining in Ash Pond A was more than an estimated 250 feet from the "spoils dike".

### 4.3.5 Spillway Erosion Protection

> *40 CFR §257.73(d)(1)(v)(A): Spillway Erosion Protection – All spillways must be either: (1) Of non-erodible construction and designed to carry sustained flows; or (2) Earth- or grass-lined and designed to carry short-term, infrequent flows at non-erosive velocities where sustained flows are not expected.*

The separator berm between Ash Pond A and the Decant Pond is the lowest point along the boundary of Ash Pond A (at approximate El. 15) and currently serves as the spillway to the Decant Pond. Adequate vegetation was observed on the slopes of the separator berm during the March 25, 2025, site visit and historical explorations provided in Attachment 1 show the separator berm was constructed of clay materials. The separator berm is constructed adequately to carry short-term, infrequent flows at non-erosive velocities where sustained flows are not expected.

### 4.3.6 Spillway Capacity

> *40 CFR § 257.73(d)(1)(v)(B): Spillway Capacity – The combined capacity of all spillways must adequately manage flow during and following the peak discharge from a: (1) Probable maximum flood (PMF) for a high hazard potential CCR surface impoundment; or (2) 1000-year flood for a significant hazard potential CCR surface impoundment; or (3) 100-year flood for a low hazard potential CCR surface impoundment.*

The *Initial Hazard Potential Classification* prepared by Haley & Aldrich (2025) classified Ash Pond A as a "Low Hazard Potential". The spillway capacity is adequate since it is taller in elevation than the flood elevation for a 100-year 24-hours storm event (El. 14.75).

### 4.3.7 Hydraulic Structures

> *40 CFR §257.73(d)(1)(vi): Hydraulic structures underlying the base of the CCR unit or passing through the dike of the CCR unit that maintain structural integrity and are free of significant deterioration, deformation, distortion, bedding deficiencies, sedimentation, and debris which may negatively affect the operation of the hydraulic structure.*

#### *4.3.7.1 Outfall Control Structure*

Ash Pond A was constructed to discharge directly to the Decant Pond through an outfall control structure within Ash Pond A that gravity feeds through a culvert at the southeast corner into the Decant Pond. To maintain Ash Pond A at a largely dewatered state not possible solely with the outfall structure and gravity drainage, a portable e Godwin Dri Prime CD150M Pump with a diesel engine is used to pump the ponded water level down below the structure elevation. The pump is routinely operated by JGS personnel and it is used to transfer Ash Pond A wastewater through the control structure and culvert into the Decant Pond.

At the time of the March 25, 2025, site visit, Ash Pond A was relatively dry and the control structure and the pump were observed to be in good condition.

#### *4.3.7.2 20-Inch Diameter Water Force Main*

In the spring of 2025, after the Haley & Aldrich site visit, a 20-inch diameter water force main (ductile iron pipe with a polyethylene encasement) was discovered by Santee Cooper during excavation of ash along the northwest boundary of Ash Pond A. This force main is owned and operated by Berkeley County Water & Sewer Authority (BCW&SA) and was previously unknown to Santee Cooper. The force main was bedded directly in the ash approximately 10 feet from the CSX Transportation right-of-way. The risks associated with the presence of this force main include instability of the pipe and joints during ash excavation, corrosion of the pipe and/or joints after long-term contact with the ash and resulting potential for a break in the force main causing potential damages to the northwest slope, CSX Transportation railway, and ash excavation face, and disruption of services to downstream BCW&SA customers.

### 4.3.8 Adjacent Water Bodies

> *40 CFR § 257.73(d)(1)(vii): For CCR units with downstream slopes which can be inundated by the pool of an adjacent water body, such as a river, stream or lake, downstream slopes that maintain structural stability during low pool of the adjacent water body or sudden drawdown of the adjacent water body.*

To evaluate the structural impacts of rapid drawdown to the exterior slopes of the "spoils dike" and the separator berm, Haley & Aldrich used the slope stability analysis program Slide2 Modeler Spencer's Method of Slices (1967), the Autorefine Noncircular Cuckoo search method, and the Effective Stress Bbar Method (Morgenstern, 1963). Four cross sections were assessed: Cross Sections 1, 2, and 3 along the "spoils dike" and Cross Section 4 along the separator berm as shown on Figure 2.

#### *4.3.8.1 "Spoils Dike"*

The initial water table and Tailrace Canal level were set to El. 14.00 (100-year flood level in the Tailrace Canal) and the drawdown water table was evaluated from El. 14.00 to the ground surface to both the high (El. 5) and low (El. -3) tides anticipated in the Tailrace Canal and the typical water table (El. 7) anticipated in the "spoils dike". The geotechnical shear strength properties used in the stability model are shown in Table 1.

Cross Section 1 yielded the lowest factors of safety for the high and low tide drawdown conditions and is considered the critical section along the "spoils dike" for the rapid drawdown condition. The results of rapid drawdown analyses on the critical cross section (Cross Section 1) are presented in Table 2 and Appendix A. The calculated factors of safety of 1.28 and 1.20 meet the required factor of safety of 1.10 (USACE, 2003) for the high and low tide drawdown conditions respectively.

##### *4.3.8.2 Separator Berm*

The initial water level in the Decant Pond was set to El.14.75 (100-year flood level in Ash Pond B) and the drawdown water table was evaluated from El. 14.75 to the typical water elevation in the Decant Pond (El. 13). The geotechnical shear strength properties used in the stability model are shown in Table 1.

As shown in Table 2 and Appendix A, the separator berm (Cross Section 4) meets the required factor of safety of 1.10 (USACE, 2003) for an event that would cause a "discharge of pond contents" into the Decant Pond.

### 4.3.9 Structural Stability Deficiencies

> *40 CFR §257.73*(d)(2): *Identify any structural stability deficiencies associated with the CCR unit in addition to recommending corrective measures.*

#### *4.3.9.1 Separator Berm*

As discussed in Section 4.3.2.2, the separator berm does not meet the required factor of safety for the internal drawdown of Ash Pond A for the existing condition of the ash having been excavated from the toe of the berm. We recommend continuing with the closure activities and filling the toe to approximately El. 13 feet per the *Conceptual Closure Plan* (Geosyntec, 2016) to meet the required factor of safety.

#### *4.3.9.2 20-Inch Diameter Water Force Main*

The presence of the 20-inch diameter water force main (previously unknown to Santee Cooper) presents challenges during excavation of the ash and closure activities. It is recommended that Santee Cooper coordinate with BCW&SA to develop a plan to facilitate the closure activities and mitigate disruption of services to downstream BCW&SA customers.

#### *4.3.9.3 Safety Factor Assessment*

As mentioned in Section 4.3.1 and further discussed in Section 5, the results of the SFA indicate that the "spoils dike" and the separator berm does not meet the minimum requirements as outlined in the CCR Rule 40 CFR § 257.73(e)(1), specifically with respect to foundations consisting of liquefiable materials. Recommendations as a result of the SFA are further discussed in Section 5.10.

#### *4.3.9.4 Other Recommendations*

In addition, we recommend the following maintenance actions:

- Install erosion control or slope protections along the interior slope of the “spoils dike”.
- Maintain height of vegetation on the interior slopes of Ash Pond A in accordance with 40 CFR § 257.73(d)(1)(iv).
- Update the Operating and Management Plan to reflect recent modifications to the eastern stormwater channels and the northeastern dike of Ash Pond A.
- Update the Operating and Management Plan upon completion of the modifications to the splitter dike as shown in the *Conceptual Closure Plan* (Geosyntec, 2016).

# 5. Safety Factor Assessment

As required by 40 CFR § 257.73(e)(1) of the CCR Rule, the initial SFA is performed for a CCR unit to determine calculated factors of safety for each CCR unit relative to the minimum prescribed safety factors for the critical cross section of the embankment. The minimum required safety factors are defined as follows:

- The calculated static factor of safety under the long-term, maximum storage pool loading conditions must equal or exceed 1.50.
- The calculated static factor of safety under the maximum surcharge pool loading condition must equal or exceed 1.40.
- The calculated seismic factor of safety must equal or exceed 1.00.
- For dikes constructed of soils that have susceptibility to liquefaction, the calculated post-liquefaction factor of safety must equal or exceed 1.20.

## 5.1 METHODOLOGY

Stability analyses have been performed in general conformance with the principles and methodologies described in the U.S. Army Corps of Engineers (USACE) Slope Stability Manual (USACE, 2003). Conventional static and seismic stability analyses of the impoundment embankments were performed for non-circular rotational failures using limit equilibrium methods. Limit equilibrium methods compare driving forces, moments, and stresses which cause instability of the mass of the embankment to those which resist that instability. Haley & Aldrich used the slope stability analysis program Slide2 Modeler (RocScience, 2025). Haley & Aldrich used Spencer's Method of Slices (1967) and the Autorefine Noncircular Cuckoo search method to evaluate the impacts of the four loading scenarios described above. The analysis focused on the external stability of the "spoils dike" since failure of the external slopes would be the more likely event to cause a "discharge of pond contents".

## 5.2 SUBSURFACE PROPERTIES

The subsurface properties are shown in Table 1 and are further discussed in Attachment 1.

## 5.3 CRITICAL CROSS SECTION

The critical section for Ash Pond A is Cross Section 1 shown on Figure 2, which runs perpendicular to the "spoils dike" slope at approximate Station 5+50. This section is the same as analyzed for rapid drawdown discussed in Section 5.8. Three other sections, Cross Sections 2 and 3, along the "spoils dike" slope and Cross Section 4 along the separator berm located as shown on Figure 2 were also assessed and consistently yielded higher factors of safety. This SFA only presents results of analyses performed for Cross Section 1 that consistently yielded the lowest factors of safety for all of the evaluated conditions.

## 5.4 GROUNDWATER CONDITIONS

Groundwater elevations historically ranged from El. 16.8 to deeper than El. -19.8. A groundwater level El. 7 feet was used in stability models along the "spoils dike" since the more recent borings indicated that the embankment has been dewatered since the CCR was removed along the embankment. For Cross Section 4, the water table is assumed to drawdown within the separator berm from the typical surface water elevation in the Decant Pond (El. 13) to the excavated toe in Ash Pond A (El. 6.8).

## 5.5 CCR STORAGE VOLUMES

Given that Ash Pond A is currently being excavated, the pond conditions were modeled with the existing grades provided by Santee Cooper on January 8, 2025. CCR had been removed from within a minimum of 150 feet from the "spoils dike" and the separator berm at the time the survey provided by Santee Cooper was performed.

## 5.6 LONG-TERM MAXIMUM STORAGE POOL CONDITION

Since the CCR has been excavated from against both the "spoils dike" and the separator berm and the ash pond is currently being closed by excavation, the maximum storage pool was modeled assuming existing conditions without the CCR or contact waters. The stability analyses assume long term (also known as "drained" or "effective") strength parameters and use the Mohr-Coulomb strength model for each of the strata.

As shown in Table 3 and in Appendix B, the calculated factor of safety meets the required minimum factor of safety of 1.50 for the long-term maximum storage pool condition.

## 5.7 MAXIMUM SURCHARGE POOL CONDITION

The 100-year flood level (El. 14.75) is below the toe of Cross Sections 1, 2, and 3 along the "spoils dike". At these sections, the "maximum surcharge pool" was modeled as a water table at El. 14.75 feet within Ash Pond A drawing down to the typical water table (El. 7) under the embankment then drawing to the high (El. 5) or low tide (El. -3) levels in the Tailrace Canal. Additionally, a 250 pounds per square feet (psf) vehicular loading was added to the crest of the "spoils dike".

At Cross Section 4, the "maximum surcharge pool" was modeled as a surface and water table at El. 14.75 feet in Ash Pond A drawing down to the typical surface water level (El. 13) in the Decant Pond. A 250 psf vehicular loading was added to the crest of the separator berm.

The stability analyses assume: (a) short term (also known as "undrained" or "total") strength parameters and undrained strength models for fine-grained materials below the water table; (b) and long-term strength parameters and Mohr-Coulomb strength models for materials above the water table and for coarse-grained materials below the water table.

As shown in Table 3 and in Appendix B, the calculated factor of safety meets the required minimum factor of safety of 1.40 for the maximum surcharge pool condition.

## 5.8 SEISMIC LOADING CONDITION

The seismic safety factor is defined as the factor of safety determined under earthquake conditions using the peak ground acceleration for a seismic event with a 2 percent probability of exceedance in 50 years (2,475-year return period). In accordance with ASCE 7 (2022), the site is classified as a seismic Site Class E (see Attachment 1). A horizontal ground motion of 0.345 g was applied to the models. This ground motion was developed from the peak free field acceleration (0.69 g) with a 50 percent reduction factor (Hynes-Griffin and Franklin, 1984).

As shown in Table 1, a 20 percent strength reduction was applied to the subsurface parameters for "spoils dike" and the separator berm. The seismic stability analyses assume (a) short term (also known as "undrained" or "total") strength parameters and undrained strength models for fine-grained materials below the water table, and (b) and long term strength parameters and Mohr-Coulomb strength models for materials above the water table and for coarse-grained materials below the water table.

As shown in Table 3 and in Appendix B, the lowest calculated factor of safety is 0.52 for the seismic loading condition; therefore, the embankments do not meet the requirement for the seismic loading condition.

## 5.9 LIQUEFACTION ANALYSIS AND POST-LIQUEFACTION LOADING CONDITION

Haley & Aldrich performed a liquefaction analysis on each of the historical borings along the "spoils dike" and the separator berm as part of this initial SFA as shown in Appendix C. The peak free-field acceleration (0.69 g) was used as the maximum ground acceleration associated with the modal earthquake magnitude of 7.3 per the 2018 United States National Seismic Hazard Model for the Conterminous US (USGS, 2025). Liquefiable materials were defined as coarse grained materials below the water table; the water tables used in the analyses were the water tables observed in the borings at the time of drilling.

### *5.9.1.1 Liquefaction Susceptibility of Embankment Fill and Underlying Foundation Soils*

As mentioned in Section 4.3.1.1, while the "spoils dike" and separator berm fill materials are not susceptible to liquefaction, the underlying foundation soils (sandy Alluvium) supporting the embankment fills are susceptible to liquefaction and do not meet the minimum required factor of safety against liquefaction of 1.20. Haley & Aldrich recommends including the sandy Alluvium in liquefaction susceptibility assessments.

As shown in Appendix C, the saturated alluvial sands underlying the embankments do not meet the required factor of safety of 1.20 against liquefaction. Thicknesses of the liquefiable alluvial sands range from 2.5 to 10 feet, though the boring (JAP-6) that indicated 10 feet of liquefiable material was terminated before the bottom of the alluvial sand layer was encountered.

### *5.9.1.2 Post-Liquefaction Slope Stability Analysis*

A post-liquefaction slope stability analysis was performed on each of the cross sections with the assumption that the Alluvium under the water table (El. -6 to El. 7) is liquefiable. Since only Standard Penetration Test N-Value data are available, the relationship by Olsen and Stark (2010) was used to estimate a liquefied vertical stress ratio of 0.05 assuming the lowest average N-Value of 2.5 as observed in the borings. The other materials in the model assume (a) short term (also known as "undrained" or "total") strength parameters and undrained strength models for fine-grained materials below the water table, and (b) and long term strength parameters and Mohr-Coulomb strength models for materials above the water table and for coarse-grained materials below the water table.

As shown in Table 3 and in Appendix B, the calculated factor of safety at the critical cross section (Cross Section 1) is 0.29 for the post-liquefaction loading condition. While the embankment fill materials are not susceptible to liquefaction, it is our professional opinion that the foundation soils underlying the embankment do not meet the intent of the CCR Rule and will contribute to the instability of the "spoils dike" and the separator berm following a 2,475 year return period seismic event.

#### *5.9.1.3 Liquefaction Susceptibility of CCRs*

Liquefaction and subsequent flow of CCR materials to a failure of the "spoils dike" or separator berm after a 2,475 year return period seismic event is unlikely to occur since the CCR materials are being actively dewatered via "rim ditching" and are no longer saturated.

## 5.10 CONCLUSIONS AND RECOMMENDATIONS

The analyses associated with the SFA have been performed in accordance with the requirement of Section 40 CFR § 257.73(d) and (e) of the CCR Rule. A summary of our conclusions as they relate to the rule requirements is provided below.

- *40 CFR § 257.73(e)(1)(i) – The calculated static factor of safety under the long-term, maximum storage pool loading conditions must equal or exceed 1.50.*

  As shown in Table 3 and Appendix B, the static safety factors for the long-term (drained) maximum storage pool condition are above the minimum required value for the critical section analyzed. Accordingly, this requirement has been met.
- *40 CFR § 257.73(e)(1)(ii) – The calculated static factor of safety under the maximum surcharge pool loading condition must equal or exceed 1.40.*

  As shown in Table 3 and Appendix B, the static safety factors for the maximum surcharge pool loading condition (undrained) are above the minimum required value for the critical section analyzed. Accordingly, this requirement has been met.
- *40 CFR § 257.73(e)(1)(iii) – The calculated seismic factor of safety must equal or exceed 1.00.*

  As shown in Table 3 and Appendix B, the calculated seismic safety factor is below the minimum required value for the critical section analyzed. Accordingly, this requirement has not been met.
- *40 CFR § 257.73(e)(1)(iv) – For dikes constructed of soils that have susceptibility to liquefaction, the calculated liquefaction factor of safety must equal or exceed 1.20.*

While the embankment fill materials are not susceptible to liquefaction, the results of the subsurface investigations and liquefaction triggering evaluation indicate that the Alluvial materials underlying the "spoils dike" and the separator berm are susceptible to liquefaction. Furthermore, the post-liquefaction calculated factor of safety is below the minimum required value for the critical section analyzed. Accordingly, it is our opinion that the intent of the CCR Rule has not been met.

Given that Ash Pond A is currently being excavated and the nearest ash to the "spoils dike" at the time of our site visit on March 25, 2025, was more than 150 feet away, "discharge of pond contents" is unlikely to occur. We recommend continuing with the pond closure activities in accordance with the

*Conceptual Closure Plan* (Geosyntec, 2016) with an understanding of the stability risks associated with "spoils dike".

At this time, a future land use of Ash Pond A designating the "spoils dike" or separator berm as structural components has not been made; therefore, a remediation is not necessary at this time. However, if the either the "spoils dike" or separator berm is to serve as a structural component in the future, we recommend designing a remedy to mitigate the seismic stability and liquefaction concerns identified.

## 6. Structural Stability Assessment Certification

This SSA for the Ash Pond A at the JGS was prepared by Haley & Adrich. This Certification/Statement of Professional Opinion is based on and limited to information that Haley & Aldrich has relied on from Santee Cooper and others, but not independently verified, as well as the site visit and analyses performed by Haley & Aldrich.

I certify that the *Initial Structural Stability Assessment* for Ash Pond A at the Jefferies Generating Station was conducted in accordance with the requirements of 40 CFR § 257.73(d) of the EPA's CCR Rule.

As used herein, the word "certification" shall mean an expression of the Engineer's professional opinion to the best of his or her information, knowledge, and belief, and does not constitute a warranty or guarantee by the Engineer.

Signed: Nicholas Davis

Certifying Engineer

| | |
|---|---|
| Print Name: | Nicholas Davis |
| South Carolina License No.: | 34880 |
| Title: | Technical Expert |
| Company: | Haley & Aldrich, Inc. |

No. 34880
Nicholas Davis
12/2/2025

# 7. Safety Factor Assessment Certification

This SFA for the Ash Pond A at the JGS was prepared by Haley & Adrich. This Certification/Statement of Professional Opinion is based on and limited to information that Haley & Aldrich has relied on from Santee Cooper and others, but not independently verified, as well as the site visit and analyses performed by Haley & Aldrich.

I certify that the *Initial Safety Factor Assessment* for Ash Pond A at the Jefferies Generating Station was conducted in accordance with the requirements of 40 CFR § 257.73(e)(1)(i) through (iv) of the EPA's CCR Rule.

As used herein, the word "certification" shall mean an expression of the Engineer's professional opinion to the best of his or her information, knowledge, and belief, and does not constitute a warranty or guarantee by the Engineer.

Signed: Nicholas Davis
Certifying Engineer

| | |
|---|---|
| Print Name: | Nicholas Davis |
| South Carolina License No.: | 34880 |
| Title: | Technical Expert |
| Company: | Haley & Aldrich, Inc. |

No. 34880
NICHOLAS DAVIS
12/2/2025

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# TABLES

# TABLE 1
## SUMMARY OF GEOTECHNICAL STRENGTH PROPERTIES
JEFFERIES GENERATING STATION - ASH POND A
MONCKS CORNER, SOUTH CAROLINA

| Stratum | Bottom El. (ft-MSL) | Unit Weight (pcf) | Angle of Internal Friction, ϕ' (deg) (Note 1) | | Cohesion, c' (psf) (Note 2) | | Undrained Shear Strength, Su (psf) (Note 3) | | Vertical Stress Ratio, VSR (Note 5) |
|---|---|---|---|---|---|---|---|---|---|
| | | | Static | Seismic (Note 4) | Static | Seismic (Note 4) | Static | Seismic (Note 4) | |
| Spoils Dike Upper Fill | 30 | 115 | 31 | 24.8 | 350 | 280 | - | - | - |
| Spoils Dike Middle Fill | 20 | 120 | 34 | 27.2 | 50 | 40 | - | - | - |
| Spoils Dike Lower Fill | 9 | 110 | 32 | 25.6 | 350 | 280 | 1500 | 1200 | - |
| Separator Berm Fill | 4 | 115 | 30 | 24 | 50 | 40 | 450 | 360 | - |
| Organics | 7 | 85 | 27 | 21.6 | 0 | 0 | 200 | 160 | - |
| Alluvium | -6 | 105 | 29 | 23.2 | 0 | 0 | Note 5 | | 0.05 |
| Cooper Marl | < -35 | 125 | 35 | 28 | 0 | 0 | 5000 | 4000 | - |

Notes:

1. *ϕ' is the symbol for the Effective Angle of Internal Friction, also known as "Friction Angle", obtained form SPT data.*
2. *c' is the symbol for effective cohesion. Cohesion is only applied to materials above the water table.*
3. *Su is the symbol for undrained shear strength. It is recommdended that undrained shear strengths are only applied to fine-grained materials below the water table. When modeling the undrained Factor of Safety, the Su is modeled using the Undrained failure criterion.*
4. *A twenty percent (20%) reduction in material strength was conservatively incorporated in the seismic analysis to represent the approximate threshold between large and small strains induced by cyclic loading (Duncan, 2014).*
5. *Layers identified as liquefiable were modeled using a vertical stress ratio of 0.05 based on the lowest average corrected blowcount of 2.5 bpf. (Olsen and Stark, 2010).*

$$Su_{(LIQ)} / \sigma'v_0 = 0.03 + 0.0075 * N_{(1,60)} \pm 0.03$$

6. *Alluvium shall be modeled as a course-grained (i.e. sand) material without an undrained cohesive strength.*

# TABLE 2
## SUMMARY OF STRUCTURAL STABILITY ASSESSMENT
JEFFERIES GENERATION STATION - ASH POND A
MONCKS CORNER, SOUTH CAROLINA

| Cross Section | CCR Rule Section | Scenario [2] | Stress Condition [3,4,5,6] | Final Drawdown El. [6] | Initial Surface Water and Groundwater El. | Target Factor of Safety | Calculated Factor of Safety | Meets Target Factor of Safety? |
|---|---|---|---|---|---|---|---|---|
| 4 | §257.73(d)(1)(ii) | Rapid Drawdown in Ash Pond A to Existing Toe (El. 6.8) | Effective Stress using Bbar (100-year flood elevation in Ash Pond A) | 6.8 | 14.75 | 1.1 | 0.84 | No |
| 4 | | Rapid Drawdown in Ash Pond A to Proposed Toe (El. 12.9) | | El. 12.9 | 14.75 | | 1.53 | Yes |
| 1 | §257.73(d)(1)(vii) | Rapid Drawdown of Tailrace Canal to High Tide Level (El. 5) | Effective Stress using Bbar (100-year flood elevation in Tailrace Canal) | 5.0 | 14.0 | | 1.28 | Yes |
| 1 | | Rapid Drawdown of Tailrace Canal to Low Tide Level (El. -3) | | -3.0 | | | 1.20 | Yes |
| 4 | | Rapid Drawdown in Decant Pond to Typical Water Level (El. 13) | Effective Stress using Bbar (100-year flood elevation in Ash Pond B) | 13.0 | 14.8 | | 1.25 | Yes |

*Notes:*

1. *Cross Section 1 consistentely yielded the lowest factors of safety for each scenario and the results are presented in this table and in Appendices A and B.*
2. *The slope stability scenarios for the initial structural stability and safety factor assessments were performed in accordance with 40 CFR §*
3. *The stress condition, or failure criterion, is the stress/strength model used to determine the factor of safety.*
4. *Data required to do the typical Rapid Drawdown Assessment (USACE 1990) was not available, therefore the Morgenstern Method (1963) is recommended. The Morgenstern method uses the Mohr-Coulomb relationship to establish the undrained shear strength developed at the time of drawdown. The effective stress failure criterion, also known as "drained" or "long-term" assumes excess pore pressures are given sufficient time to dissipate. Materials shall be modeled with Mohr-Coulomb shear strength parameters.*
5. *For rapid drawdown conditions, the undrained behavior is calculated using Skempton's pore pressure parameter, Bbar (Morgenstern 1963). Bbar is assumed to be 1.0 for a fully saturated condition at the time of drawdown.*
6. *Rapid drawdown analyses were performed for both typical high (El. 5) and low (El. -3) tidal conditions as the drawdown level.*

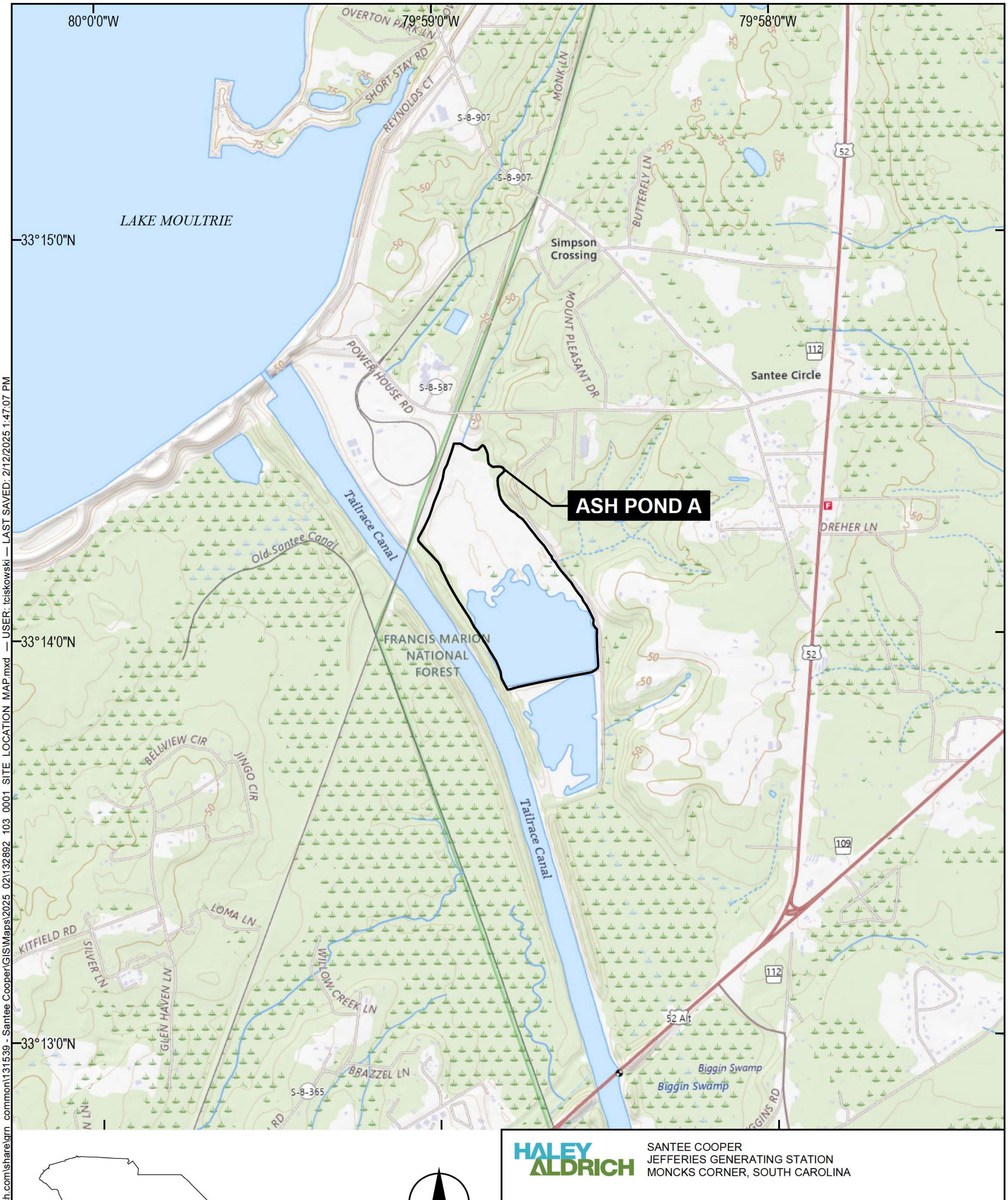
# TABLE 3
## SUMMARY OF SAFETY FACTOR ASSESSMENT
JEFFERIES GENERATION STATION - ASH POND A
MONCKS CORNER, SOUTH CAROLINA

| Scenario [2] | Stress Condition [3,4,5] | Typical River El. | Typical Groundwater El. | Critical Cross Section | Target Factor of Safety | Calculated Factor of Safety | Meets Target Factor of Safety? |
|---|---|---|---|---|---|---|---|
| Long Term Maximum Storage | Effective Stress (Mohr Coulomb) | 5.0 | 7.0 | 1 | 1.5 | 1.66 | Yes |
| Maximum Surcharge Pool | Total Stress (100-year flood elevation in the pond) | 5.0 | 14.8 | 1 | 1.4 | 1.65 | Yes |
| Seismic | Total Stress with $S_{ah}$ = 0.345 (PGA for 2% in 50 year Return Period) | 5.0 | 7.0 | 1 | 1 | 0.52 | No |
| Post-Liquefaction | Total Stress (Alluvium below water table has post-liquefaction VSR =0.05 ) | 5.0 | 7.0 | 1 | 1.2 | 0.29 | No |

*Notes:*

1. *Cross Section 1 consistentely yielded the lowest factors of safety for each scenario and the results are presented in this table and in Appendices A and B.*
2. *The slope stability scenarios for the initial structural stability and safety factor assessments were performed in accordance with 40 CFR § 257.73(d) and § 257.73(e), respectively.*
3. *The stress condition, or failure criterion, is the stress/strength model used to determine the factor of safety.*
4. *The effective stress failure criterion, also known as "drained" or "long-term" assumes excess pore pressures are given sufficient time to dissipate. Materials shall be modeled with Mohr-Coulomb shear strength parameters.*
5. *The total stress failure criterion, also known as "undrained" or "short-term" assumes excess pore pressures do not have time to dissipate. Under total stress conditions fine grained materials shall be modeled with undrained shear strengths and coarse grained materials shall be modeled with Mohr-Coulomb shear strength parameters.*

# FIGURES



MAP SOURCE: UNITED STATES GEOLOGICAL SURVEY
SITE COORDINATES: 33°14'07"N 79°58'48"W

HALEY ALDRICH

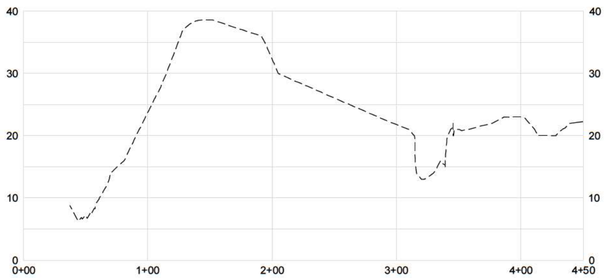
SANTEE COOPER
JEFFERIES GENERATING STATION
MONCKS CORNER, SOUTH CAROLINA

## SITE LOCATION MAP

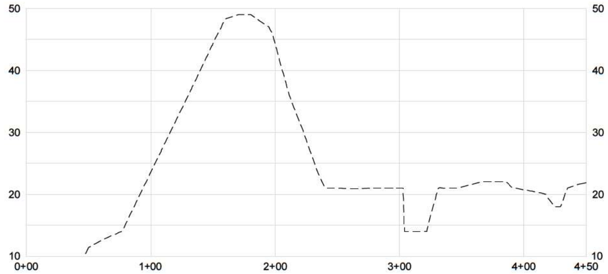
APPROXIMATE SCALE 1 IN = 2,000 FT
DECEMBER 2025

FIGURE 1

GIS FILE PATH: \\haleyaldrich.com\share\grn common\131539 - Santee Cooper\GIS\Maps\2025 02\132892 103 0001 SITE LOCATION MAP.mxd — USER: tciskowski — LAST SAVED: 2/12/2025 1:47:07 PM



**CROSS-SECTION 1**



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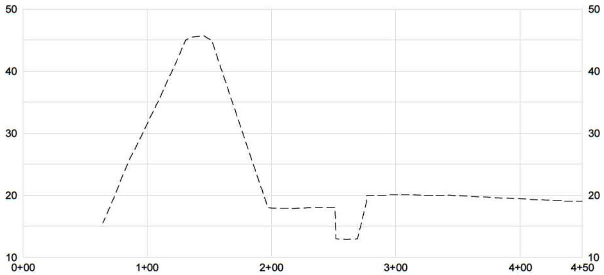

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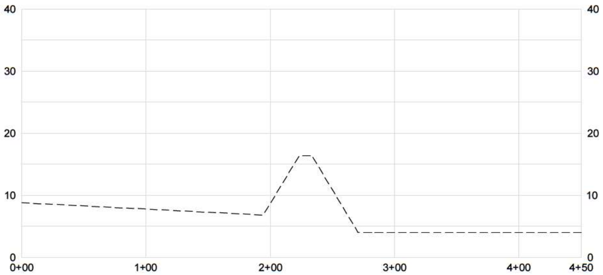


**CROSS-SECTION 4**

## NOTES

1. THE SPOILS DIKE SEPARATES ASH POND A AND ASH POND B FROM THE TAILRACE CANAL.
2. THE PORTION OF THE SPOILS DIKE STARTS AT STATION 0+00 AND ENDS APPROXIMATELY AT STA. 26+30.
3. TOPOGRAPHY SHOWN FOR CROSS SECTIONS 1, 2, AND 3 WAS PROVIDED BY SANTEE COOPER ON 8 JANUARY 2025.
4. THE EXISTING GEOMETRY FOR CROSS SECTION 4 WAS ESTIMATED FROM THE HISTORICAL DRAWINGS AND THE BORING SURVEY ELEVATIONS.

HORIZ. 0 100
VERT. 0 20
SCALE IN FEET

HALEY ALDRICH

SANTEE COOPER
JEFFERIES GENERATING STATION
MONCK'S CORNER, SOUTH CAROLINA

STRUCTURAL STABILITY AND SAFETY
FACTOR ASSESSMENT
CROSS-SECTIONS

SCALE: AS SHOWN
DECEMBER 2025

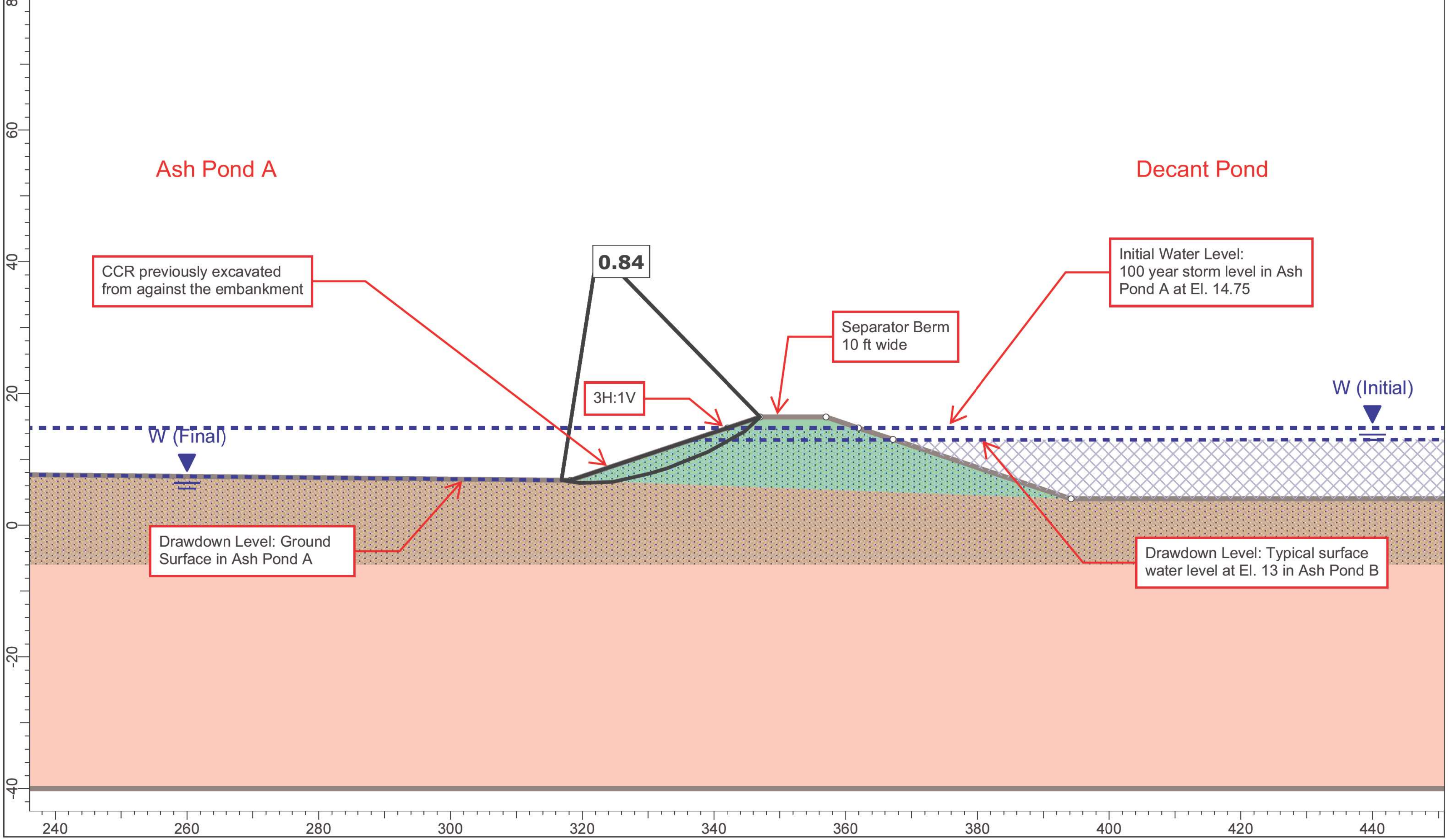
FIGURE 2

VARI, KATALIN Printed: 11/11/2025 4:20 PM Layout: XS
\\HALEYALDRICH.COM\SHARE\GRN_COMMON\131539 - SANTEE COOPER\CAD\JEFFERIES\FIGURES\132892-103_QUICK XS.DWG

# APPENDIX A
## Structural Stability Assessment

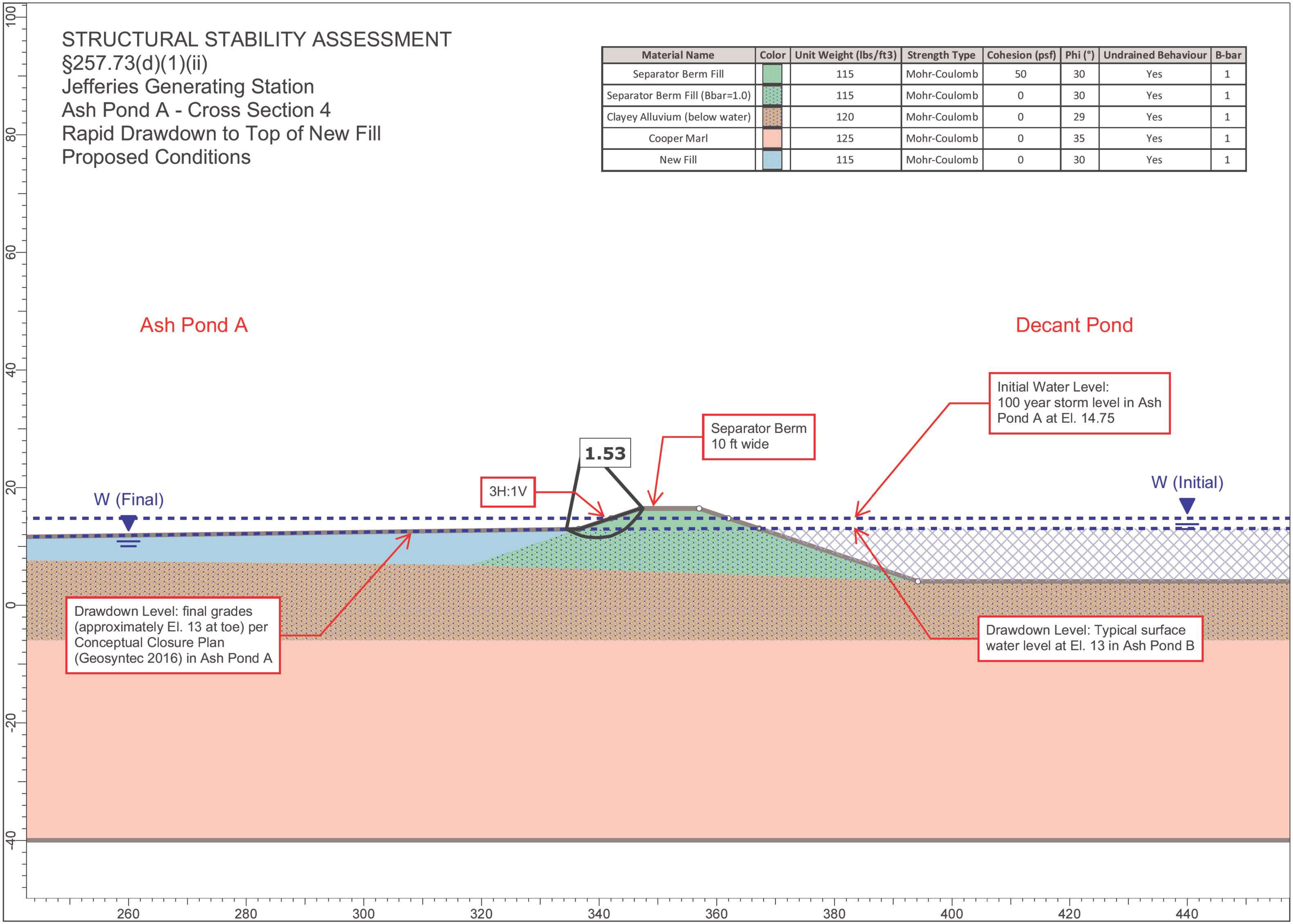
# STRUCTURAL STABILITY ASSESSMENT
§257.73(d)(1)(ii)
Jefferies Generating Station
Ash Pond A - Cross Section 4
Rapid Drawdown to Bottom of Excavation
Existing Conditions

| Material Name | Color | Unit Weight (lbs/ft3) | Strength Type | Cohesion (psf) | Phi (°) | Undrained Behaviour | B-bar |
|---|---|---|---|---|---|---|---|
| Separator Berm Fill | 🟩 | 115 | Mohr-Coulomb | 50 | 30 | Yes | 1 |
| Separator Berm Fill (Bbar=1.0) | 🟩 | 115 | Mohr-Coulomb | 0 | 30 | Yes | 1 |
| Clayey Alluvium (below water) | 🟫 | 120 | Mohr-Coulomb | 0 | 29 | Yes | 1 |
| Cooper Marl | 🟧 | 125 | Mohr-Coulomb | 0 | 35 | Yes | 1 |



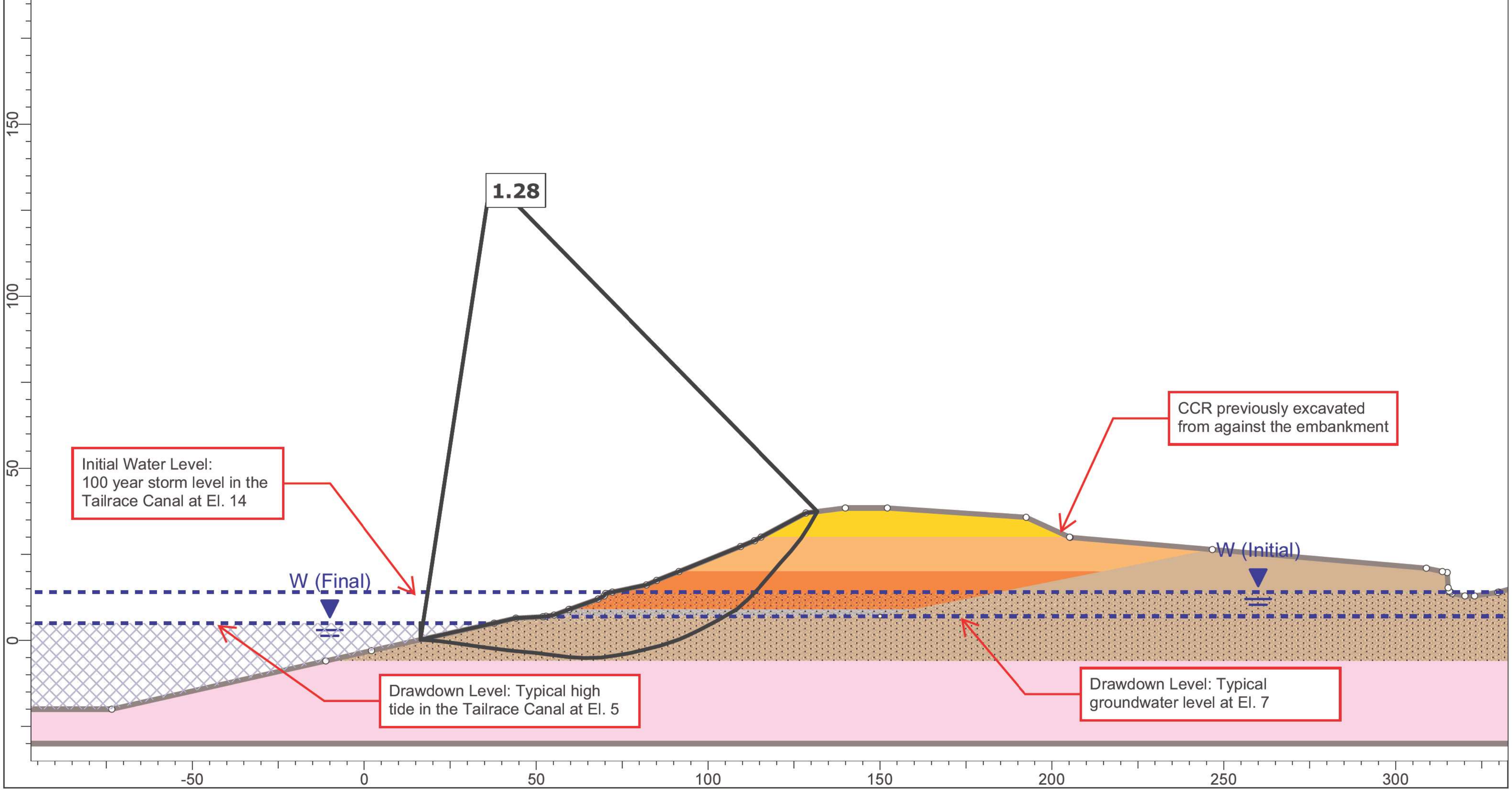
# STRUCTURAL STABILITY ASSESSMENT
§257.73(d)(1)(ii)
Jefferies Generating Station
Ash Pond A - Cross Section 4
Rapid Drawdown to Top of New Fill
Proposed Conditions

| Material Name | Color | Unit Weight (lbs/ft3) | Strength Type | Cohesion (psf) | Phi (°) | Undrained Behaviour | B-bar |
|---|---|---|---|---|---|---|---|
| Separator Berm Fill | 🟩 | 115 | Mohr-Coulomb | 50 | 30 | Yes | 1 |
| Separator Berm Fill (Bbar=1.0) | ▨ | 115 | Mohr-Coulomb | 0 | 30 | Yes | 1 |
| Clayey Alluvium (below water) | ▨ | 120 | Mohr-Coulomb | 0 | 29 | Yes | 1 |
| Cooper Marl | 🟥 | 125 | Mohr-Coulomb | 0 | 35 | Yes | 1 |
| New Fill | 🟦 | 115 | Mohr-Coulomb | 0 | 30 | Yes | 1 |



# STRUCTURAL STABILITY ASSESSMENT
§257.73(d)(1)(vii)
Jefferies Generating Station
Ash Pond A - Cross Section 1
Rapid Drawdown to El. 5 (high tide)

| Material Name | Color | Unit Weight (lbs/ft3) | Strength Type | Cohesion (psf) | Phi (°) | Water Surface | Undrained Behaviour | B-bar |
|---|---|---|---|---|---|---|---|---|
| Upper Fill | 🟨 | 115 | Mohr-Coulomb | 350 | 31 | Water Table | No | |
| Middle Fill | 🟧 | 120 | Mohr-Coulomb | 50 | 34 | Water Table | No | |
| Lower Fill | 🟧 | 110 | Mohr-Coulomb | 350 | 32 | Water Table | No | |
| Lower Fill (below water) | ▨ | 110 | Mohr-Coulomb | 0 | 32 | Water Table | Yes | 1 |
| Organics (below water) | ▨ | 85 | Mohr-Coulomb | 0 | 27 | Water Table | Yes | 1 |
| Sandy Alluvium | 🟫 | 105 | Mohr-Coulomb | 0 | 29 | Water Table | No | |
| Sandy Alluvium (below water) | ▨ | 105 | Mohr-Coulomb | 0 | 29 | Water Table | Yes | 1 |
| Cooper Marl | 🟪 | 125 | Mohr-Coulomb | 0 | 35 | Water Table | Yes | 1 |



Initial Water Level:
100 year storm level in the Tailrace Canal at El. 14

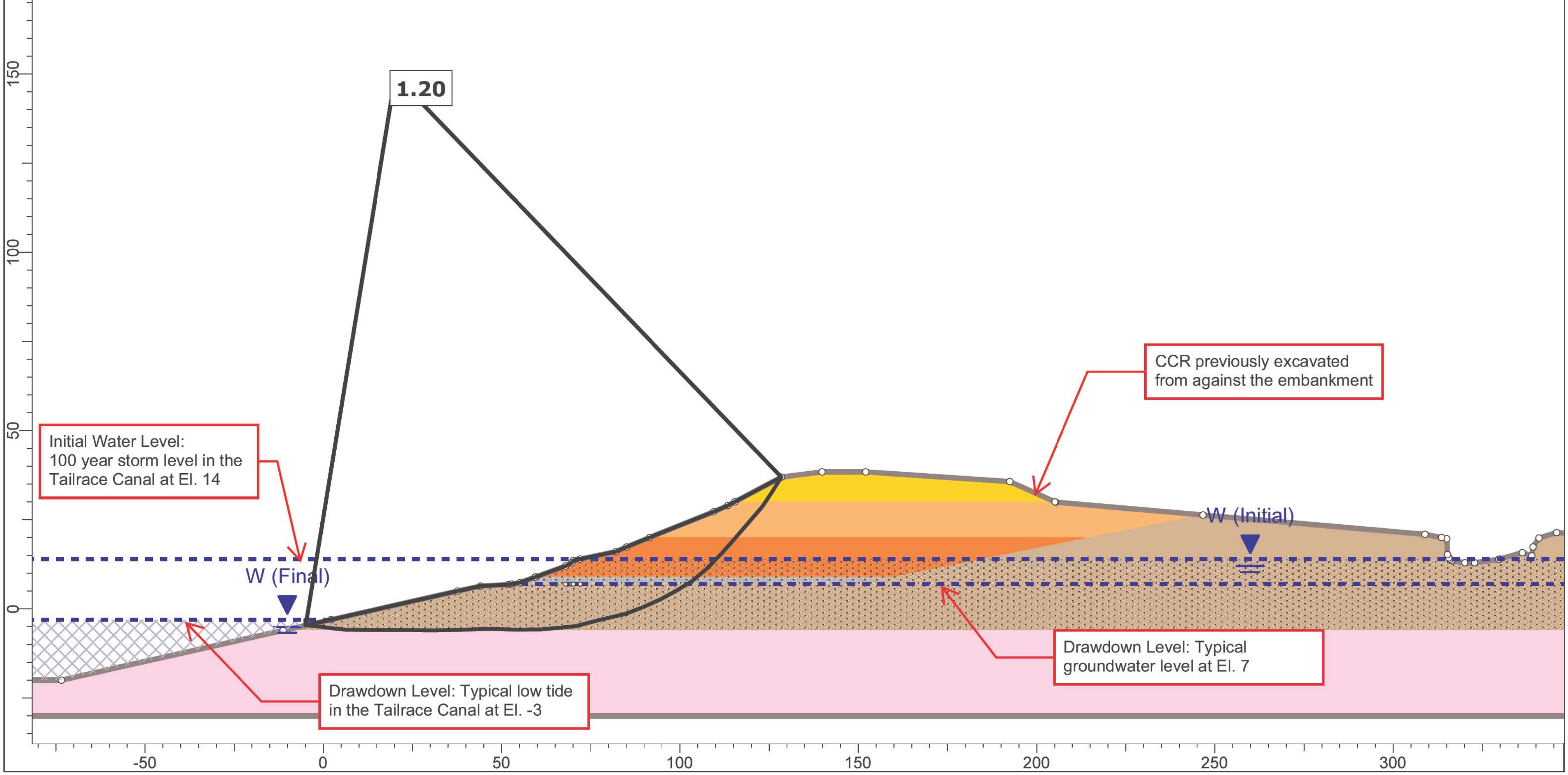
Drawdown Level: Typical high tide in the Tailrace Canal at El. 5

CCR previously excavated from against the embankment

Drawdown Level: Typical groundwater level at El. 7

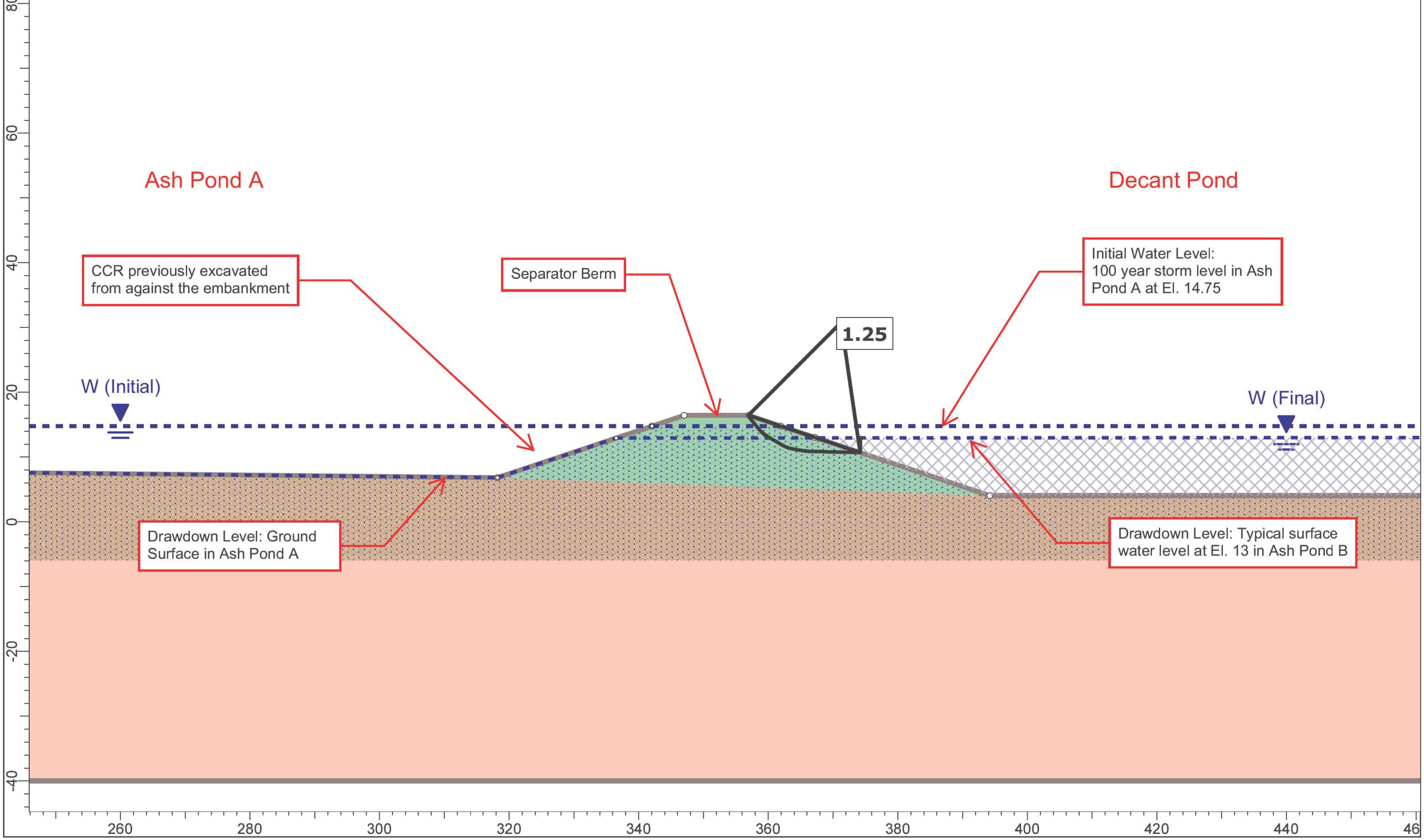
# STRUCTURAL STABILITY ASSESSMENT
§257.73(d)(1)(vii)
Jefferies Generating Station
Ash Pond A - Cross Section 1
Rapid Drawdown to El. -3 (low tide)

| Material Name | Color | Unit Weight (lbs/ft3) | Strength Type | Cohesion (psf) | Phi (°) | Undrained Behaviour | B-bar |
|---|---|---|---|---|---|---|---|
| Upper Fill | 🟨 | 115 | Mohr-Coulomb | 350 | 31 | No | |
| Middle Fill | 🟧 | 120 | Mohr-Coulomb | 50 | 34 | No | |
| Lower Fill | 🟧 | 110 | Mohr-Coulomb | 350 | 32 | No | |
| Lower Fill (below water) | ▨ | 110 | Mohr-Coulomb | 0 | 32 | Yes | 1 |
| Organics (below water) | ▨ | 85 | Mohr-Coulomb | 0 | 27 | Yes | 1 |
| Sandy Alluvium | 🟫 | 105 | Mohr-Coulomb | 0 | 29 | No | |
| Sandy Alluvium (below water) | ▨ | 105 | Mohr-Coulomb | 0 | 29 | Yes | 1 |
| Cooper Marl | 🟪 | 125 | Mohr-Coulomb | 0 | 35 | Yes | 1 |



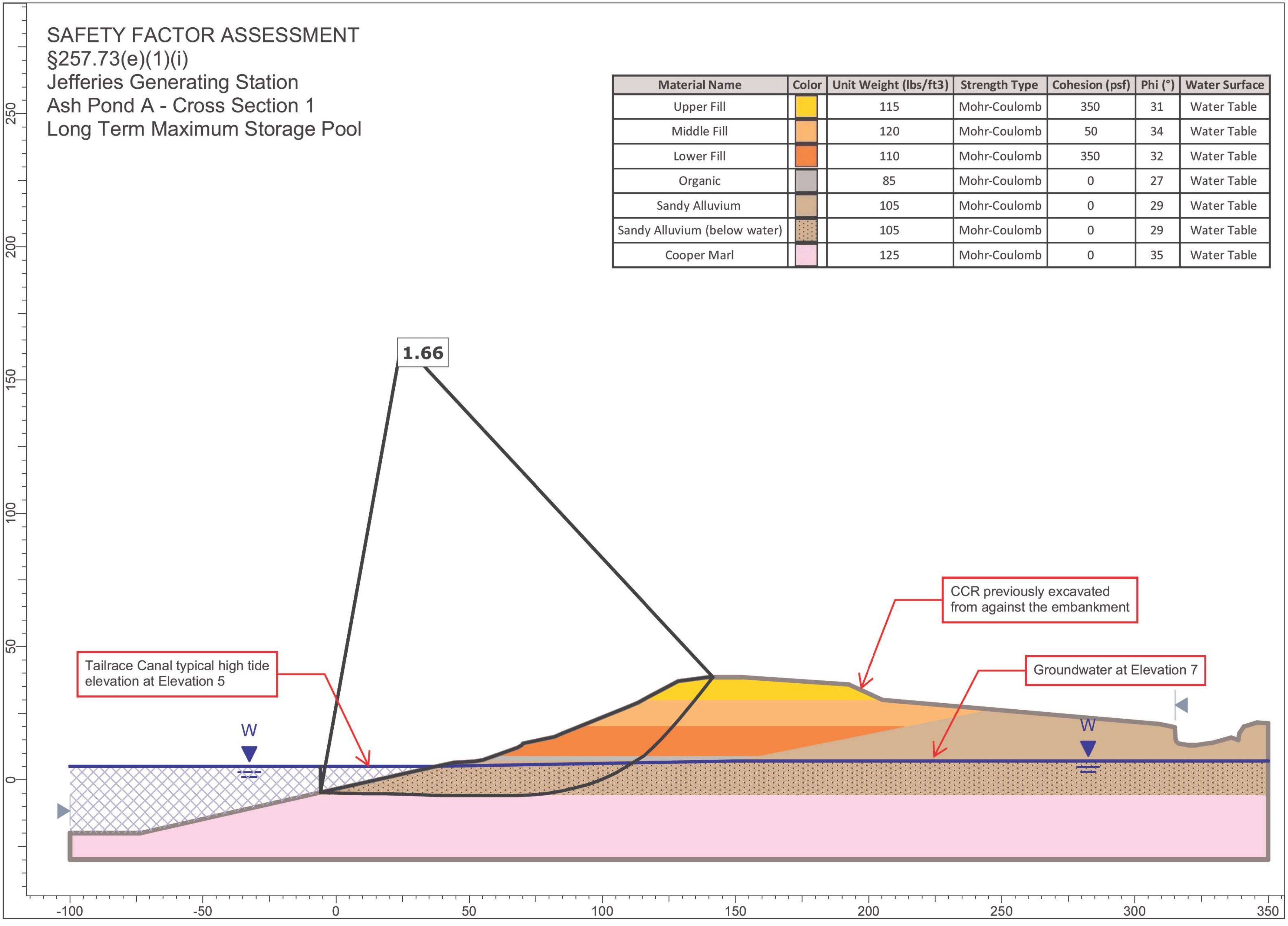
STRUCTURAL STABILITY ASSESSMENT
§257.73(d)(1)(vii)
Jefferies Generating Station
Ash Pond A - Cross Section 4
Rapid Drawdown to Bottom of Excavation

| Material Name | Color | Unit Weight (lbs/ft3) | Strength Type | Cohesion (psf) | Phi (°) | Undrained Behaviour | B-bar |
|---|---|---|---|---|---|---|---|
| Separator Berm Fill | 🟩 | 115 | Mohr-Coulomb | 50 | 30 | Yes | 1 |
| Separator Berm Fill (Bbar=1.0) | 🟩 | 115 | Mohr-Coulomb | 0 | 30 | Yes | 1 |
| Clayey Alluvium (below water) | 🟫 | 120 | Mohr-Coulomb | 0 | 29 | Yes | 1 |
| Cooper Marl | 🟧 | 125 | Mohr-Coulomb | 0 | 35 | Yes | 1 |



# APPENDIX B
# Safety Factor Assessment

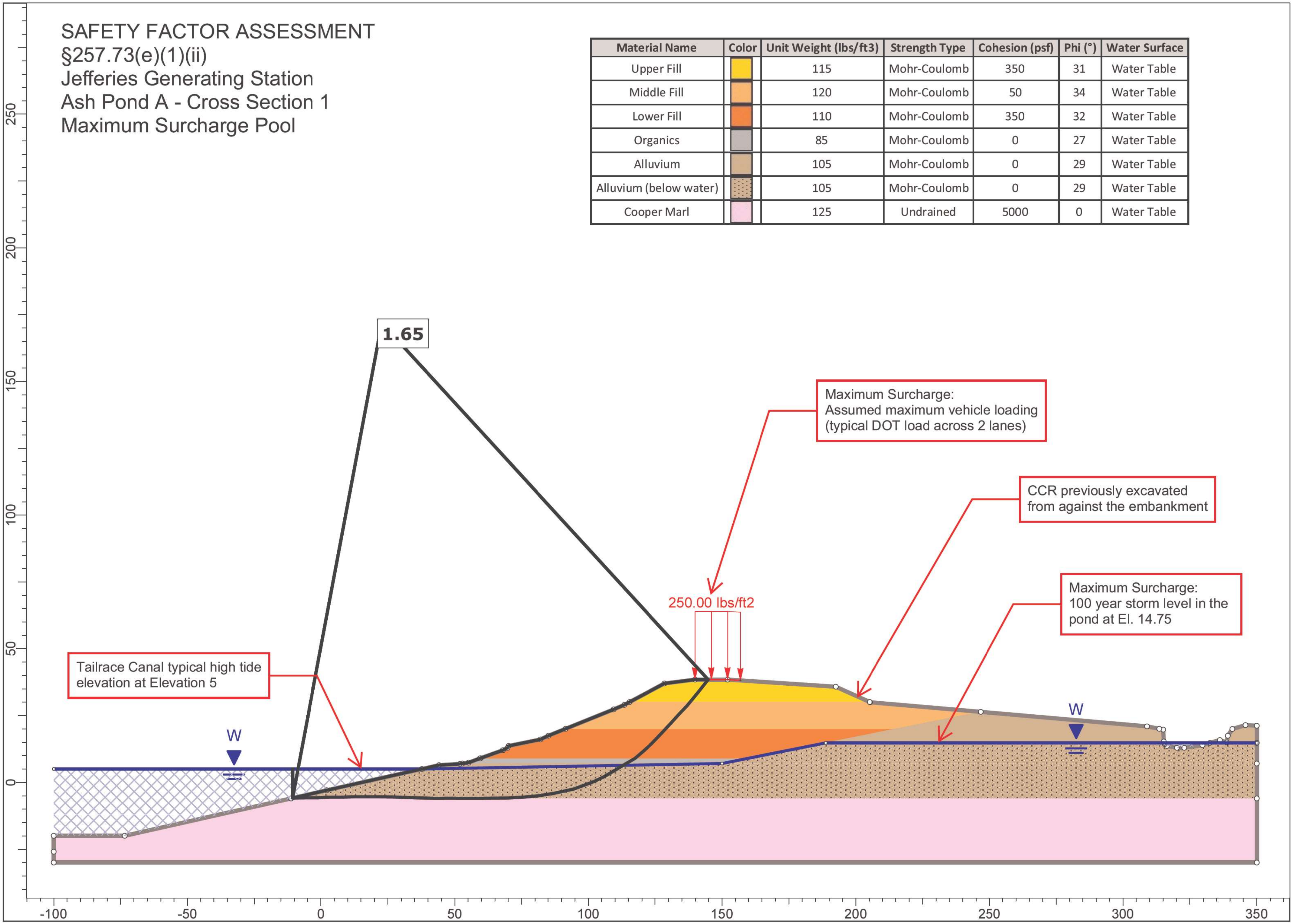
# SAFETY FACTOR ASSESSMENT
§257.73(e)(1)(i)
Jefferies Generating Station
Ash Pond A - Cross Section 1
Long Term Maximum Storage Pool



| Material Name | Color | Unit Weight (lbs/ft3) | Strength Type | Cohesion (psf) | Phi (°) | Water Surface |
|---|---|---|---|---|---|---|
| Upper Fill | 🟨 | 115 | Mohr-Coulomb | 350 | 31 | Water Table |
| Middle Fill | 🟧 | 120 | Mohr-Coulomb | 50 | 34 | Water Table |
| Lower Fill | 🟧 | 110 | Mohr-Coulomb | 350 | 32 | Water Table |
| Organic | ⬜ | 85 | Mohr-Coulomb | 0 | 27 | Water Table |
| Sandy Alluvium | 🟫 | 105 | Mohr-Coulomb | 0 | 29 | Water Table |
| Sandy Alluvium (below water) | ▨ | 105 | Mohr-Coulomb | 0 | 29 | Water Table |
| Cooper Marl | 🟪 | 125 | Mohr-Coulomb | 0 | 35 | Water Table |

# SAFETY FACTOR ASSESSMENT
§257.73(e)(1)(ii)
Jefferies Generating Station
Ash Pond A - Cross Section 1
Maximum Surcharge Pool

| Material Name | Color | Unit Weight (lbs/ft3) | Strength Type | Cohesion (psf) | Phi (°) | Water Surface |
|---|---|---|---|---|---|---|
| Upper Fill | 🟨 | 115 | Mohr-Coulomb | 350 | 31 | Water Table |
| Middle Fill | 🟧 | 120 | Mohr-Coulomb | 50 | 34 | Water Table |
| Lower Fill | 🟧 | 110 | Mohr-Coulomb | 350 | 32 | Water Table |
| Organics | ⬜ | 85 | Mohr-Coulomb | 0 | 27 | Water Table |
| Alluvium | 🟫 | 105 | Mohr-Coulomb | 0 | 29 | Water Table |
| Alluvium (below water) | ▨ | 105 | Mohr-Coulomb | 0 | 29 | Water Table |
| Cooper Marl | 🟪 | 125 | Undrained | 5000 | 0 | Water Table |



Maximum Surcharge:
Assumed maximum vehicle loading
(typical DOT load across 2 lanes)

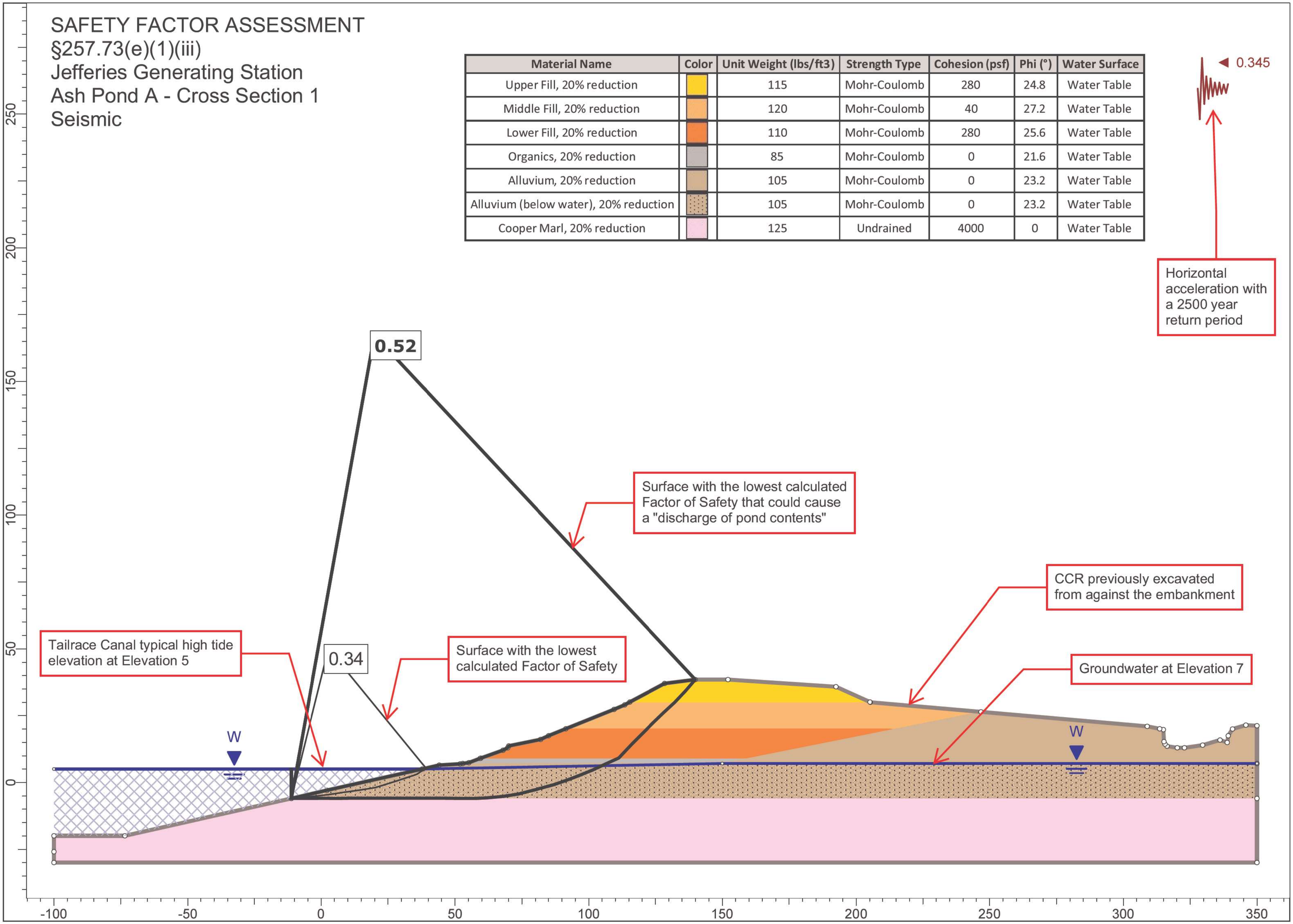
CCR previously excavated
from against the embankment

Maximum Surcharge:
100 year storm level in the
pond at El. 14.75

Tailrace Canal typical high tide
elevation at Elevation 5

# SAFETY FACTOR ASSESSMENT
§257.73(e)(1)(iii)
Jefferies Generating Station
Ash Pond A - Cross Section 1
Seismic

| Material Name | Color | Unit Weight (lbs/ft3) | Strength Type | Cohesion (psf) | Phi (°) | Water Surface |
|---|---|---|---|---|---|---|
| Upper Fill, 20% reduction | 🟨 | 115 | Mohr-Coulomb | 280 | 24.8 | Water Table |
| Middle Fill, 20% reduction | 🟧 | 120 | Mohr-Coulomb | 40 | 27.2 | Water Table |
| Lower Fill, 20% reduction | 🟧 | 110 | Mohr-Coulomb | 280 | 25.6 | Water Table |
| Organics, 20% reduction | ⬜ | 85 | Mohr-Coulomb | 0 | 21.6 | Water Table |
| Alluvium, 20% reduction | 🟫 | 105 | Mohr-Coulomb | 0 | 23.2 | Water Table |
| Alluvium (below water), 20% reduction | ▨ | 105 | Mohr-Coulomb | 0 | 23.2 | Water Table |
| Cooper Marl, 20% reduction | 🟪 | 125 | Undrained | 4000 | 0 | Water Table |



Horizontal acceleration with a 2500 year return period

Surface with the lowest calculated Factor of Safety that could cause a "discharge of pond contents"

CCR previously excavated from against the embankment

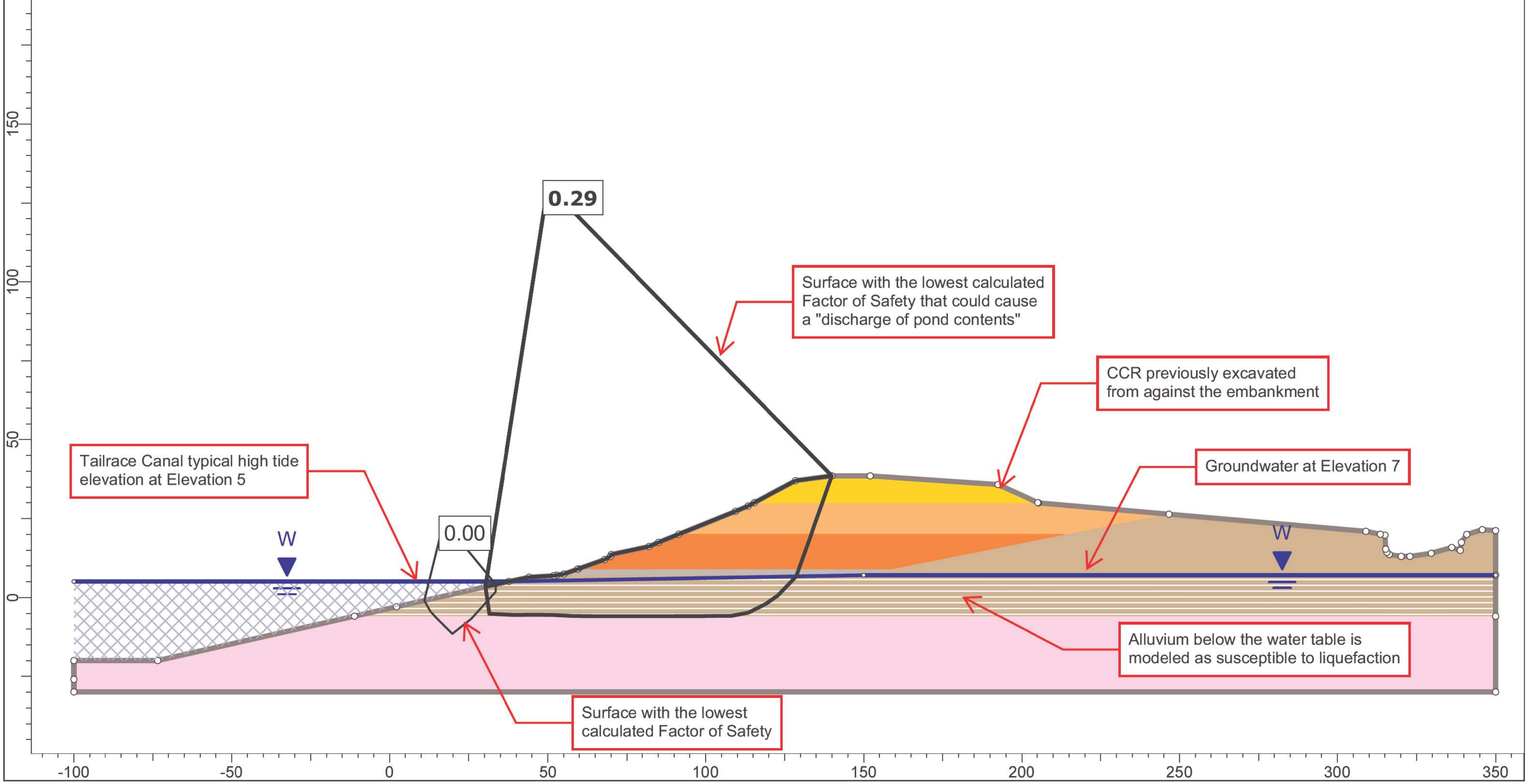
Tailrace Canal typical high tide elevation at Elevation 5

Surface with the lowest calculated Factor of Safety

Groundwater at Elevation 7

# SAFETY FACTOR ASSESSMENT
§257.73(e)(1)(iv)
Jefferies Generating Station
Ash Pond A - Cross Section 1
Post-Liquefaction

| Material Name | Color | Unit Weight (lbs/ft3) | Strength Type | Cohesion (psf) | Phi (°) | Vertical Stress Ratio | Water Surface |
|---|---|---|---|---|---|---|---|
| Upper Fill | 🟨 | 115 | Mohr-Coulomb | 350 | 31 |  | Water Table |
| Middle Fill | 🟧 | 120 | Mohr-Coulomb | 50 | 34 |  | Water Table |
| Lower Fill | 🟧 | 110 | Mohr-Coulomb | 350 | 32 |  | Water Table |
| Organics | ◼ | 85 | Mohr-Coulomb | 0 | 27 |  | Water Table |
| Alluvium | 🟫 | 105 | Mohr-Coulomb | 0 | 29 |  | Water Table |
| Alluvium (liquefied) | ▤ | 105 | Vertical Stress Ratio |  |  | 0.05 | Water Table |
| Cooper Marl | 🟪 | 125 | Undrained | 5000 | 0 |  | Water Table |



Surface with the lowest calculated Factor of Safety that could cause a "discharge of pond contents"

CCR previously excavated from against the embankment

Tailrace Canal typical high tide elevation at Elevation 5

Groundwater at Elevation 7

Alluvium below the water table is modeled as susceptible to liquefaction

Surface with the lowest calculated Factor of Safety

# APPENDIX C
# Liquefaction Analysis

**APPENDIX C.1**
**LIQUEFACTION ANALYSIS - B-102**
JEFFERIES GENERATING STATION - ASH POND A
MONCKS CORNER, SOUTH CAROLINA

## Liquefaction analysis using SPT blow counts for relatively shallow, level-ground sites

Reference: "Soil Liquefaction During Earthquakes" by I.M. Idriss and R.W. Boulanger, Earthquake Engineering Research Institute MNO-12, 2008

IMPORTANT: Set excel to iterate at least 100 times as CN and CS contain circular references to (N1)60

| | | | | |
|---|---|---|---|---|
| Boring No. | B-102 | | | |
| Project No. | 0132892-0 | Reset | Iteration: | 60390 |
| Project Name: | Jefferies Generating Station | | | |

| **Input Parameters** | | |
|---|---|---|
| Depth to water table (Enter soil layer at water table depth) = | 4 | ft |
| unit weight of water = | 62.4 | pcf |
| rod length from hammer to ground = | 7.5 | ft |
| ground surface elevation = | 20.82 | ft |
| **Split spoon with room for liners used without liners?**** | FALSE | (true / false) |
| Borehole Diameter (4", 6", 8") = | 4 | (inches) |
| Atmospheric Pressure = | 2116 | (psf) |
| Measured Energy Ratio of SPT Hammer = | 60 | (percent) |

| **Earthquake Event Parameters** | Event 1 | Event 2 | Event IBC | Vertical Settlement | |
|---|---|---|---|---|---|
| Earthquake Moment Magnitude | 7.3 | 7.3 | 7.3 | 0.44 | Inches |
| Maximum Ground Acceleration (a_max / g) | 0.2 | 0.45 | 0.68 | 3.42 | Inches |
| Magnitude Scaling Factor (MSF) | 1.05 | 1.05 | 1.05 | 3.42 | Inches |

| | | | | | blow | | | | | effective | Check | energy | borehole | rod | sampling | | Fines | clean | Clean | Normalized CSR | | | | | | FS=(CRR,M=7.5,σ'=1 atm)/(CSR,M=7.5,σ'=1 atm) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | total unit | count | Fines | | | | stress | CN | ratio | diameter | length | method | | Adjustment | sand | Sand | Event 1 | Event 2 | Event IBC | | | | Event 1 | Event 2 | Event IBC | |
| Stratigraphy | Sample | depth | ΔH | weight | $N_m$ | Content | Liquefiable? | $\sigma'_{v0}$ | $\sigma_{v0}$ | $C_N$ | $C_N$ | $C_E$ | $C_B$ | $C_R$ | $C_S$** | $(N_1)_{60}$ | $\Delta(N_1)_{60}$ | $(N_1)_{60CS}$ | CRR | CSR | CSR | CSR | Kα | $C_\sigma$ | Kσ | F.O.S. | F.O.S. | F.O.S. | elev |
| | - | (ft) | (feet) | (pcf) | - | % | True/False | (psf) | (psf) | - | Liao | - | - | - | - | - | | - | norm | a =0.2 | a =0.45 | a =0.68 | - | - | - | M = 7.3 | M = 7.3 | M = 7.3 | (ft) |
| | na | | 0 | | | | | 0 | 0 | #DIV/0! | #DIV/0! | 1.00 | 1 | 0.75 | 1.00 | #DIV/0! | 0.0 | #DIV/0! | #DIV/0! | #DIV/0! | #DIV/0! | #DIV/0! | 1 | #DIV/0! | #DIV/0! | #DIV/0! | #DIV/0! | #DIV/0! | 20.82 |
| Alluvial Sand | S-3 | 15 | 15 | 105 | 14 | 30 | 1 | 889 | 1575 | 1.47 | 1.54 | 1.00 | 1 | 0.95 | 1.00 | 20 | 5.4 | 25 | 0.29 | 0.19 | 0.43 | 0.65 | 1 | 0.13 | 1.10 | 1.51 | **0.67** | **0.44** | 5.82 |
| Alluvial Sand | S-4 | 17.5 | 2.5 | 105 | 74 | 30 | 1 | 995 | 1838 | 1.22 | **1.46** | 1.00 | 1 | 0.95 | 1.00 | 86 | 5.4 | 91 | 4.00 | 0.20 | 0.44 | 0.67 | 1 | 0.30 | 1.10 | 20.33 | 9.03 | 5.98 | 3.32 |
| Alluvial Clay | S-5 | 20 | 2.5 | 105 | 2 | 80 | 0 | 1102 | 2100 | 1.53 | 1.39 | 1.00 | 1 | 0.95 | 1.00 | 3 | 5.5 | 8 | 0.11 | 0.21 | 0.48 | 0.72 | 1 | 0.07 | 1.04 | 0.51 | 0.23 | 0.15 | 0.82 |
| Marl | S-6 | 25 | 5 | 120 | 43 | 90 | 0 | 1390 | 2700 | 1.12 | **1.23** | 1.00 | 1 | 0.95 | 1.00 | 46 | 5.5 | 51 | 4.00 | 0.20 | 0.45 | 0.68 | 1 | 0.30 | 1.10 | 19.99 | 8.88 | 5.88 | -4.18 |
| Marl | S-7 | 30 | 5 | 120 | 45 | 90 | 0 | 1678 | 3300 | 1.06 | 1.12 | 1.00 | 1 | 1 | 1.00 | 48 | 5.5 | 53 | 4.00 | 0.20 | 0.46 | 0.69 | 1 | 0.30 | 1.07 | 19.69 | 8.75 | 5.79 | -9.18 |
| Marl | S-8 | 35 | 5 | 120 | 42 | 90 | 0 | 1966 | 3900 | 1.02 | 1.04 | 1.00 | 1 | 1 | 1.00 | 43 | 5.5 | 48 | 4.00 | 0.21 | 0.47 | 0.71 | 1 | 0.30 | 1.02 | 19.17 | 8.52 | 5.64 | -14.18 |

## Liquefaction analysis using SPT blow counts for relatively shallow, level-ground sites

Reference: "Soil Liquefaction During Earthquakes" by I.M. Idriss and R.W. Boulanger, Earthquake Engineering Research Institute MNO-12, 2008

IMPORTANT: Set excel to iterate at least 100 times as CN and CS contain circular references to (N1)60

Boring No. B-104
Project No. 0132892-0
Project Name: Jefferies Generating Station

Reset

Iteration: 60386

**Input Parameters**

Depth to water table (Enter soil layer at water table depth) = 4.5 ft
unit weight of water = 62.4 pcf
rod length from hammer to ground = 7.5 ft
ground surface elevation = 16.85 ft
**Split spoon with room for liners used without liners?**** FALSE (true / false)
Borehole Diameter (4", 6", 8") = 4 (inches)
Atmospheric Pressure = 2116 (psf)
Measured Energy Ratio of SPT Hammer = 60 (percent)

| **Earthquake Event Parameters** | Event 1 | Event 2 | Event IBC | Vertical Settlement | |
|---|---|---|---|---|---|
| Earthquake Moment Magnitude | 7.3 | 7.3 | 7.3 | 1.83 | Inches |
| Maximum Ground Acceleration (a_max / g) | 0.2 | 0.45 | 0.68 | 2.78 | Inches |
| Magnitude Scaling Factor (MSF) | 1.05 | 1.05 | 1.05 | 2.84 | Inches |

| | | | | | blow | | | | | effective | Check | energy | borehole | rod | sampling | | Fines | clean | Clean | Normalized CSR | | | | | | FS=(CRR,M=7.5,σ'=1 atm)/(CSR,M=7.5,σ'=1 atm) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | total unit | count | Fines | | | | stress | CN | ratio | diameter | length | method | | Adjustment | sand | Sand | Event 1 | Event 2 | Event IBC | | | | Event 1 | Event 2 | Event IBC | |
| Stratigraphy | Sample | depth | ΔH | weight | $N_m$ | Content | Liquefiable? | $\sigma'_{v0}$ | $\sigma_{v0}$ | $C_N$ | $C_N$ | $C_E$ | $C_B$ | $C_R$ | $C_S$** | $(N_1)_{60}$ | $\Delta(N_1)_{60}$ | $(N_1)_{60cs}$ | CRR | CSR | CSR | CSR | Kα | $C_\sigma$ | Kσ | F.O.S. | F.O.S. | F.O.S. | elev |
| | - | (ft) | (feet) | (pcf) | - | % | True/False | (psf) | (psf) | - | Liao | - | - | - | - | - | | - | norm | a =0.2 | a =0.45 | a =0.68 | - | - | - | M = 7.3 | M = 7.3 | M = 7.3 | (ft) |
| | na | | 0 | | | | | 0 | 0 | #DIV/0! | #DIV/0! | 1.00 | 1 | 0.75 | 1.00 | #DIV/0! | 0.0 | #DIV/0! | #DIV/0! | #DIV/0! | #DIV/0! | #DIV/0! | 1 | #DIV/0! | #DIV/0! | #DIV/0! | #DIV/0! | #DIV/0! | 16.85 |
| Fill Medium Dense Sand | S-1 | 0.1 | 0.1 | 120 | 11 | 30 | 0 | 12 | 12 | 1.70 | 1.70 | 1.00 | 1 | 0.75 | 1.00 | 14 | 5.4 | 19 | 0.20 | 0.11 | 0.25 | 0.38 | 1 | 0.11 | 1.10 | 1.76 | 0.78 | 0.52 | 16.75 |
| Fill Clay | S-2 | 2.5 | 2.4 | 110 | 11 | 80 | 0 | 276 | 276 | 1.70 | 1.70 | 1.00 | 1 | 0.75 | 1.00 | 14 | 5.5 | 20 | 0.20 | 0.11 | 0.25 | 0.38 | 1 | 0.11 | 1.10 | 1.79 | 0.80 | 0.53 | 14.35 |
| Fill Clay | S-3 | 5 | 2.5 | 110 | 12 | 80 | 0 | 520 | 551 | 1.70 | 1.70 | 1.00 | 1 | 0.8 | 1.00 | 16 | 5.5 | 22 | 0.23 | 0.12 | 0.27 | 0.40 | 1 | 0.12 | 1.10 | 1.96 | 0.87 | 0.58 | 11.85 |
| Fill Clay | S-4 | 7.5 | 2.5 | 110 | 9 | 80 | 0 | 639 | 826 | 1.70 | 1.70 | 1.00 | 1 | 0.85 | 1.00 | 13 | 5.5 | 19 | 0.19 | 0.14 | 0.32 | 0.49 | 1 | 0.10 | 1.10 | 1.32 | 0.59 | 0.39 | 9.35 |
| Alluvial Clay | S-5 | 10 | 2.5 | 105 | 5 | 80 | 0 | 745 | 1089 | 1.70 | 1.68 | 1.00 | 1 | 0.85 | 1.00 | 7 | 5.5 | 13 | 0.14 | 0.16 | 0.36 | 0.55 | 1 | 0.08 | 1.09 | 0.85 | 0.38 | 0.25 | 6.85 |
| Alluvial Sand | S-6 | 13.5 | 3.5 | 105 | 10 | 30 | 1 | 894 | 1456 | 1.53 | 1.54 | 1.00 | 1 | 0.95 | 1.00 | 15 | 5.4 | 20 | 0.20 | 0.18 | 0.40 | 0.60 | 1 | 0.11 | 1.09 | **1.15** | **0.51** | **0.34** | 3.35 |
| Alluvial Sand | S-7 | 15 | 1.5 | 105 | 15 | 30 | 1 | 958 | 1614 | 1.42 | 1.49 | 1.00 | 1 | 0.95 | 1.00 | 20 | 5.4 | 26 | 0.30 | 0.18 | 0.41 | 0.62 | 1 | 0.13 | 1.10 | 1.67 | **0.74** | **0.49** | 1.85 |
| Alluvial Sand | S-8 | 17.5 | 2.5 | 105 | 0 | 30 | 1 | 1065 | 1876 | 1.70 | 1.41 | 1.00 | 1 | 0.95 | 1.00 | 0 | 5.4 | 5 | 0.09 | 0.20 | 0.45 | 0.68 | 1 | 0.05 | 1.04 | **0.44** | **0.20** | **0.13** | -0.65 |
| Alluvial Clay | S-9 | 20 | 2.5 | 105 | 0 | 80 | 0 | 1171 | 2139 | 1.59 | 1.34 | 1.00 | 1 | 0.95 | 1.00 | 0 | 5.5 | 6 | 0.09 | 0.21 | 0.46 | 0.70 | 1 | 0.05 | 1.03 | 0.44 | 0.19 | 0.13 | -3.15 |
| Alluvial Clay | S-10 | 25 | 5 | 120 | 20 | 80 | 0 | 1459 | 2739 | 1.17 | 1.20 | 1.00 | 1 | 0.95 | 1.00 | 22 | 5.5 | 28 | 0.37 | 0.20 | 0.45 | 0.69 | 1 | 0.15 | 1.05 | 1.86 | 0.82 | 0.55 | -8.15 |

**APPENDIX C.3**
**LIQUEFACTION ANALYSIS - JAP-2**
JEFFERIES GENERATING STATION - ASH POND A
MONCKS CORNER, SOUTH CAROLINA

## Liquefaction analysis using SPT blow counts for relatively shallow, level-ground sites

Reference: "Soil Liquefaction During Earthquakes" by I.M. Idriss and R.W. Boulanger, Earthquake Engineering Research Institute MNO-12, 2008

IMPORTANT: Set excel to iterate at least 100 times as CN and CS contain circular references to (N1)60

| | | | | |
|---|---|---|---|---|
| Boring No. | JAP-2 | | | |
| Project No. | 0132892-0 | Reset | Iteration: | 60476 |
| Project Name: | Jefferies Generating Station | | | |

**Input Parameters**

| | | |
|---|---|---|
| Depth to water table (Enter soil layer at water table depth) = | 9 | ft |
| unit weight of water = | 62.4 | pcf |
| rod length from hammer to ground = | 7.5 | ft |
| ground surface elevation = | 16.4 | ft |
| **Split spoon with room for liners used without liners?**** | FALSE | (true / false) |
| Borehole Diameter (4", 6", 8") = | 4 | (inches) |
| Atmospheric Pressure = | 2116 | (psf) |
| Measured Energy Ratio of SPT Hammer = | 60 | (percent) |

**Earthquake Event Parameters**

| | Event 1 | Event 2 | Event IBC | Vertical Settlement | |
|---|---|---|---|---|---|
| Earthquake Moment Magnitude | 7.3 | 7.3 | 7.3 | 0.00 | Inches |
| Maximum Ground Acceleration (a_max / g) | 0.2 | 0.45 | 0.68 | 0.00 | Inches |
| Magnitude Scaling Factor (MSF) | 1.05 | 1.05 | 1.05 | 0.00 | Inches |

| | | | | total unit | blow count | Fines | | | | effective stress | Check CN | energy ratio | borehole diameter | rod length | sampling method | | Fines Adjustment | clean sand | Clean Sand | Normalized CSR Event 1 | Event 2 | Event IBC | | | | FS=(CRR,M=7.5,σ'=1 atm)/(CSR,M=7.5,σ'=1 atm) Event 1 | Event 2 | Event IBC | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Stratigraphy | Sample | depth | ΔH | weight | $N_m$ | Content | Liquefiable? | $\sigma'_{v0}$ | $\sigma_{v0}$ | $C_N$ | $C_N$ | $C_E$ | $C_B$ | $C_R$ | $C_S$** | $(N_1)_{60}$ | $\Delta(N_1)_{60}$ | $(N_1)_{60CS}$ | CRR | CSR | CSR | CSR | Kα | $C_\sigma$ | Kσ | F.O.S. | F.O.S. | F.O.S. | elev |
| | - | (ft) | (feet) | (pcf) | - | % | True/False | (psf) | (psf) | - | Liao | - | - | - | - | - | | - | norm | a =0.2 | a =0.45 | a =0.68 | - | - | - | M = 7.3 | M = 7.3 | M = 7.3 | (ft) |
| | na | | 0 | | | | | 0 | 0 | #DIV/0! | #DIV/0! | 1.00 | 1 | 0.75 | 1.00 | #DIV/0! | 0.0 | #DIV/0! | #DIV/0! | #DIV/0! | #DIV/0! | #DIV/0! | 1 | #DIV/0! | #DIV/0! | #DIV/0! | #DIV/0! | #DIV/0! | 16.4 |
| Fill Clay | S-1 | 6 | 6 | 115 | 3 | 30 | 0 | 690 | 690 | 1.70 | 1.70 | 1.00 | 1 | 0.85 | 1.00 | 9 | 5.4 | 14 | 0.15 | 0.11 | 0.25 | 0.38 | 1 | 0.09 | 1.10 | 1.33 | 0.59 | 0.39 | 10.4 |
| Fill Clay | S-2 | 8 | 2 | 115 | 4 | 30 | 0 | 920 | 920 | 1.70 | 1.52 | 1.00 | 1 | 0.85 | 1.00 | 13 | 5.4 | 18 | 0.18 | 0.11 | 0.25 | 0.38 | 1 | 0.10 | 1.10 | 1.65 | 0.73 | 0.48 | 8.4 |
| Fill Clay | S-3 | 10 | 2 | 115 | 7 | 30 | 0 | 1088 | 1150 | 1.70 | 1.39 | 1.00 | 1 | 0.85 | 1.00 | 12 | 5.4 | 18 | 0.18 | 0.11 | 0.25 | 0.38 | 1 | 0.10 | 1.10 | 1.61 | 0.72 | 0.47 | 6.4 |
| Alluvial Sand | S-4 | 12 | 2 | 105 | 6 | 30 | 1 | 1173 | 1360 | 1.59 | 1.34 | 1.00 | 1 | 0.85 | 1.00 | 23 | 5.4 | 28 | 0.40 | 0.11 | 0.25 | 0.38 | 1 | 0.15 | 1.10 | 3.60 | 1.60 | **1.06** | 4.4 |
| Alluvial Sand | S-5 | 14 | 2 | 105 | 30 | 30 | 1 | 1258 | 1570 | 1.38 | 1.30 | 1.00 | 1 | 0.95 | 1.00 | 11 | 5.4 | 16 | 0.16 | 0.11 | 0.26 | 0.39 | 1 | 0.09 | 1.06 | 1.44 | **0.64** | **0.42** | 2.4 |
| Alluvial Clay | S-6 | 16 | 2 | 105 | 55 | 60 | 0 | 1343 | 1780 | 1.25 | 1.26 | 1.00 | 1 | 0.95 | 1.00 | 12 | 5.6 | 17 | 0.17 | 0.11 | 0.26 | 0.39 | 1 | 0.10 | 1.04 | 1.52 | 0.67 | 0.45 | 0.4 |
| Alluvial Clay | S-7 | 18 | 2 | 105 | 18 | 60 | 0 | 1428 | 1990 | 1.17 | 1.22 | 1.00 | 1 | 0.95 | 1.00 | 8 | 5.6 | 13 | 0.14 | 0.12 | 0.26 | 0.40 | 1 | 0.08 | 1.02 | 1.21 | 0.54 | 0.36 | -1.6 |
| Marl | S-8 | 22 | 4 | 120 | 13 | 90 | 0 | 1659 | 2470 | 1.07 | 1.13 | 1.00 | 1 | 0.95 | 1.00 | 17 | 5.5 | 23 | 0.25 | 0.12 | 0.26 | 0.39 | 1 | 0.12 | 1.02 | 2.12 | 0.94 | 0.62 | -5.6 |

**APPENDIX C.4**
**LIQUEFACTION ANALYSIS - JAP-4**
JEFFERIES GENERATING STATION - ASH POND A
MONCKS CORNER, SOUTH CAROLINA

## Liquefaction analysis using SPT blow counts for relatively shallow, level-ground sites

Reference: "Soil Liquefaction During Earthquakes" by I.M. Idriss and R.W. Boulanger, Earthquake Engineering Research Institute MNO-12, 2008

IMPORTANT: Set excel to iterate at least 100 times as CN and CS contain circular references to (N1)60

| | | | | |
|---|---|---|---|---|
| Boring No. | JAP-4 | | | |
| Project No. | 0132892-0 | Reset | Iteration: | 60376 |
| Project Name: | Jefferies Generating Station | | | |

**Input Parameters**

| | | |
|---|---|---|
| Depth to water table (Enter soil layer at water table depth) = | 32 | ft |
| unit weight of water = | 62.4 | pcf |
| rod length from hammer to ground = | 7.5 | ft |
| ground surface elevation = | 39.07 | ft |
| **Split spoon with room for liners used without liners?**** | FALSE | (true / false) |
| Borehole Diameter (4", 6", 8") = | 4 | (inches) |
| Atmospheric Pressure = | 2116 | (psf) |
| Measured Energy Ratio of SPT Hammer = | 60 | (percent) |

**Earthquake Event Parameters**

| | Event 1 | Event 2 | Event IBC | Vertical Settlement | |
|---|---|---|---|---|---|
| Earthquake Moment Magnitude | 7.3 | 7.3 | 7.3 | 3.16 | Inches |
| Maximum Ground Acceleration (a_max / g) | 0.2 | 0.45 | 0.68 | 3.16 | Inches |
| Magnitude Scaling Factor (MSF) | 1.05 | 1.05 | 1.05 | 3.16 | Inches |

| Stratigraphy | Sample | depth | ΔH | total unit weight | blow count $N_m$ | Fines Content | Liquefiable? | $\sigma'_{v0}$ | $\sigma_{v0}$ | effective stress $C_N$ | Check CN $C_N$ | energy ratio $C_E$ | borehole diameter $C_B$ | rod length $C_R$ | sampling method $C_S$** | $(N_1)_{60}$ | Fines Adjustment $\Delta(N_1)_{60}$ | clean sand $(N_1)_{60cs}$ | Clean Sand CRR | Normalized CSR Event 1 CSR | Event 2 CSR | Event IBC CSR | Kα | $C_\sigma$ | Kσ | FS=(CRR,M=7.5,σ'=1 atm)/(CSR,M=7.5,σ'=1 atm) Event 1 F.O.S. | Event 2 F.O.S. | Event IBC F.O.S. | elev |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | - | (ft) | (feet) | (pcf) | - | % | True/False | (psf) | (psf) | - | Liao | - | - | - | - | - | | - | norm | a =0.2 | a =0.45 | a =0.68 | - | - | - | M = 7.3 | M = 7.3 | M = 7.3 | (ft) |
| | na | | 0 | | | | | 0 | 0 | #DIV/0! | #DIV/0! | 1.00 | 1 | 0.75 | 1.00 | #DIV/0! | 0.0 | #DIV/0! | #DIV/0! | #DIV/0! | #DIV/0! | #DIV/0! | 1 | #DIV/0! | #DIV/0! | #DIV/0! | #DIV/0! | #DIV/0! | 39.07 |
| Fill Loose Sand | S-1 | 0.5 | 0.5 | 115 | 7 | 30 | 0 | 58 | 58 | 1.70 | 1.70 | 1.00 | 1 | 0.75 | 1.00 | 9 | 5.4 | 14 | 0.15 | 0.11 | 0.25 | 0.38 | 1 | 0.09 | 1.10 | 1.33 | 0.59 | 0.39 | 38.57 |
| Fill Loose Sand | S-2 | 2 | 1.5 | 115 | 10 | 30 | 0 | 230 | 230 | 1.70 | 1.70 | 1.00 | 1 | 0.75 | 1.00 | 13 | 5.4 | 18 | 0.18 | 0.11 | 0.25 | 0.38 | 1 | 0.10 | 1.10 | 1.65 | 0.73 | 0.48 | 37.07 |
| Fill Loose Sand | S-3 | 4 | 2 | 115 | 9 | 30 | 0 | 460 | 460 | 1.70 | 1.70 | 1.00 | 1 | 0.8 | 1.00 | 12 | 5.4 | 18 | 0.18 | 0.11 | 0.25 | 0.38 | 1 | 0.10 | 1.10 | 1.61 | 0.72 | 0.47 | 35.07 |
| Fill Loose Sand | S-4 | 6 | 2 | 115 | 17 | 30 | 0 | 690 | 690 | 1.59 | **1.70** | 1.00 | 1 | 0.85 | 1.00 | 23 | 5.4 | 28 | 0.40 | 0.11 | 0.25 | 0.38 | 1 | 0.15 | 1.10 | 3.60 | 1.60 | 1.06 | 33.07 |
| Fill Loose Sand | S-5 | 10 | 4 | 115 | 9 | 30 | 0 | 1150 | 1150 | 1.38 | 1.36 | 1.00 | 1 | 0.85 | 1.00 | 11 | 5.4 | 16 | 0.16 | 0.11 | 0.26 | 0.39 | 1 | 0.09 | 1.06 | 1.44 | 0.64 | 0.42 | 29.07 |
| Fill Loose Sand | S-6 | 12 | 2 | 115 | 11 | 30 | 0 | 1380 | 1380 | 1.25 | 1.24 | 1.00 | 1 | 0.85 | 1.00 | 12 | 5.4 | 17 | 0.17 | 0.11 | 0.26 | 0.39 | 1 | 0.10 | 1.04 | 1.52 | 0.67 | 0.45 | 27.07 |
| Fill Loose Sand | S-7 | 14 | 2 | 115 | 7 | 30 | 0 | 1610 | 1610 | 1.17 | 1.15 | 1.00 | 1 | 0.95 | 1.00 | 8 | 5.4 | 13 | 0.14 | 0.12 | 0.26 | 0.40 | 1 | 0.08 | 1.02 | 1.21 | 0.54 | 0.36 | 25.07 |
| Fill Clay | S-8 | 16 | 2 | 110 | 17 | 80 | 0 | 1830 | 1830 | 1.07 | 1.08 | 1.00 | 1 | 0.95 | 1.00 | 17 | 5.5 | 23 | 0.25 | 0.12 | 0.26 | 0.39 | 1 | 0.12 | 1.02 | 2.12 | 0.94 | 0.62 | 23.07 |
| Fill Clay | S-9 | 18 | 2 | 110 | 14 | 80 | 0 | 2050 | 2050 | 1.02 | 1.02 | 1.00 | 1 | 0.95 | 1.00 | 14 | 5.5 | 19 | 0.19 | 0.12 | 0.26 | 0.40 | 1 | 0.10 | 1.00 | 1.67 | 0.74 | 0.49 | 21.07 |
| Fill Clay | S-10 | 20 | 2 | 110 | 11 | 80 | 0 | 2270 | 2270 | 0.96 | 0.97 | 1.00 | 1 | 0.95 | 1.00 | 10 | 5.5 | 16 | 0.16 | 0.12 | 0.26 | 0.40 | 1 | 0.09 | 0.99 | 1.38 | 0.61 | 0.41 | 19.07 |
| Fill Clay | S-12 | 22 | 2 | 110 | 13 | 80 | 0 | 2490 | 2490 | 0.92 | 0.92 | 1.00 | 1 | 0.95 | 1.00 | 11 | 5.5 | 17 | 0.17 | 0.12 | 0.26 | 0.40 | 1 | 0.10 | 0.98 | 1.48 | 0.66 | 0.44 | 17.07 |
| Fill Clay | S-13 | 24 | 2 | 110 | 10 | 80 | 0 | 2710 | 2710 | 0.87 | 0.88 | 1.00 | 1 | 0.95 | 1.00 | 8 | 5.5 | 14 | 0.15 | 0.12 | 0.26 | 0.40 | 1 | 0.09 | 0.98 | 1.26 | 0.56 | 0.37 | 15.07 |
| Fill Clay | S-14 | 26 | 2 | 110 | 32 | 80 | 0 | 2930 | 2930 | 0.89 | 0.85 | 1.00 | 1 | 1 | 1.00 | 28 | 5.5 | 34 | 0.89 | 0.12 | 0.27 | 0.41 | 1 | 0.19 | 0.94 | 7.38 | 3.28 | 2.17 | 13.07 |
| Organics | S-15 | 30 | 4 | 85 | 2 | 80 | 0 | 3270 | 3270 | 0.74 | 0.80 | 1.00 | 1 | 1 | 1.00 | 1 | 5.5 | 7 | 0.10 | 0.11 | 0.26 | 0.39 | 1 | 0.06 | 0.97 | 0.87 | 0.38 | 0.25 | 9.07 |
| Alluvial Sand | S-16 | 32 | 2 | 105 | 2 | 40 | 1 | 3480 | 3480 | 0.71 | 0.78 | 1.00 | 1 | 1 | 1.00 | 1 | 5.6 | 7 | 0.10 | 0.11 | 0.25 | 0.38 | 1 | 0.06 | 0.97 | **0.87** | **0.39** | **0.26** | 7.07 |
| Alluvial Sand | S-17 | 34 | 2 | 105 | 2 | 40 | 1 | 3565 | 3690 | 0.70 | 0.77 | 1.00 | 1 | 1 | 1.00 | 1 | 5.6 | 7 | 0.10 | 0.12 | 0.26 | 0.39 | 1 | 0.06 | 0.97 | **0.85** | **0.38** | **0.25** | 5.07 |
| Alluvial Sand | S-18 | 36 | 2 | 105 | 4 | 40 | 1 | 3650 | 3900 | 0.70 | 0.76 | 1.00 | 1 | 1 | 1.00 | 3 | 5.6 | 8 | 0.11 | 0.12 | 0.27 | 0.40 | 1 | 0.07 | 0.96 | **0.90** | **0.40** | **0.27** | 3.07 |

**APPENDIX C.5**
**LIQUEFACTION ANALYSIS - JAP-5PZ**
JEFFERIES GENERATING STATION - ASH POND A
MONCKS CORNER, SOUTH CAROLINA

## Liquefaction analysis using SPT blow counts for relatively shallow, level-ground sites

Reference: "Soil Liquefaction During Earthquakes" by I.M. Idriss and R.W. Boulanger, Earthquake Engineering Research Institute MNO-12, 2008

IMPORTANT: Set excel to iterate at least 100 times as CN and CS contain circular references to (N1)60

| | | | | |
|---|---|---|---|---|
| Boring No. | JAP-5PZ | | | |
| Project No. | 0132892-0 | Reset | Iteration: | 60374 |
| Project Name: | Jefferies Generating Station | | | |

**Input Parameters**

| | | |
|---|---|---|
| Depth to water table (Enter soil layer at water table depth) = | 53.9 | ft |
| unit weight of water = | 62.4 | pcf |
| rod length from hammer to ground = | 7.5 | ft |
| ground surface elevation = | 42.2 | ft |
| **Split spoon with room for liners used without liners?**** | FALSE | (true / false) |
| Borehole Diameter (4", 6", 8") = | 4 | (inches) |
| Atmospheric Pressure = | 2116 | (psf) |
| Measured Energy Ratio of SPT Hammer = | 60 | (percent) |

**Earthquake Event Parameters**

| | Event 1 | Event 2 | Event IBC | Vertical Settlement | |
|---|---|---|---|---|---|
| Earthquake Moment Magnitude | 7.3 | 7.3 | 7.3 | 0.07 | Inches |
| Maximum Ground Acceleration (a_max / g) | 0.2 | 0.45 | 0.68 | 1.23 | Inches |
| Magnitude Scaling Factor (MSF) | 1.05 | 1.05 | 1.05 | 1.23 | Inches |

| | | | | | blow | | | | | effective | Check | energy | borehole | rod | sampling | | Fines | clean | Clean | Normalized CSR | | | | | | FS=(CRR,M=7.5,σ'=1 atm)/(CSR,M=7.5,σ'=1 atm) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | total unit | count | Fines | | | | stress | CN | ratio | diameter | length | method | | Adjustment | sand | Sand | Event 1 | Event 2 | Event IBC | | | | Event 1 | Event 2 | Event IBC | |
| Stratigraphy | Sample | depth | ΔH | weight | $N_m$ | Content | Liquefiable? | $\sigma'_{v0}$ | $\sigma_{v0}$ | $C_N$ | $C_N$ | $C_E$ | $C_B$ | $C_R$ | $C_S$** | $(N_1)_{60}$ | $\Delta(N_1)_{60}$ | $(N_1)_{60CS}$ | CRR | CSR | CSR | CSR | Kα | $C_\sigma$ | Kσ | F.O.S. | F.O.S. | F.O.S. | elev |
| | - | (ft) | (feet) | (pcf) | - | % | True/False | (psf) | (psf) | - | Liao | - | - | - | - | - | | - | norm | a =0.2 | a =0.45 | a =0.68 | - | - | - | M = 7.3 | M = 7.3 | M = 7.3 | (ft) |
| | na | | 0 | | | | | 0 | 0 | #DIV/0! | #DIV/0! | 1.00 | 1 | 0.75 | 1.00 | #DIV/0! | 0.0 | #DIV/0! | #DIV/0! | #DIV/0! | #DIV/0! | #DIV/0! | 1 | #DIV/0! | #DIV/0! | #DIV/0! | #DIV/0! | #DIV/0! | 42.2 |
| Fill Loose Sand | S-1 | 0.5 | 0.5 | 115 | 9 | 30 | 0 | 58 | 58 | 1.70 | 1.70 | 1.00 | 1 | 0.75 | 1.00 | 11 | 5.4 | 17 | 0.17 | 0.11 | 0.25 | 0.38 | 1 | 0.10 | 1.10 | 1.53 | 0.68 | 0.45 | 41.7 |
| Fill Loose Sand | S-2 | 2 | 1.5 | 115 | 14 | 30 | 0 | 230 | 230 | 1.70 | 1.70 | 1.00 | 1 | 0.75 | 1.00 | 18 | 5.4 | 23 | 0.25 | 0.11 | 0.25 | 0.38 | 1 | 0.12 | 1.10 | 2.25 | 1.00 | 0.66 | 40.2 |
| Fill Loose Sand | S-3 | 8 | 6 | 115 | 8 | 30 | 0 | 920 | 920 | 1.56 | 1.52 | 1.00 | 1 | 0.85 | 1.00 | 11 | 5.4 | 16 | 0.16 | 0.11 | 0.25 | 0.38 | 1 | 0.09 | 1.08 | 1.46 | 0.65 | 0.43 | 34.2 |
| Fill Loose Sand | S-4 | 10 | 2 | 115 | 7 | 30 | 0 | 1150 | 1150 | 1.41 | 1.36 | 1.00 | 1 | 0.85 | 1.00 | 8 | 5.4 | 14 | 0.15 | 0.11 | 0.26 | 0.39 | 1 | 0.09 | 1.05 | 1.27 | 0.57 | 0.37 | 32.2 |
| Fill Loose Sand | S-5 | 12 | 2 | 115 | 9 | 30 | 0 | 1380 | 1380 | 1.26 | 1.24 | 1.00 | 1 | 0.85 | 1.00 | 10 | 5.4 | 15 | 0.16 | 0.12 | 0.26 | 0.39 | 1 | 0.09 | 1.04 | 1.36 | 0.60 | 0.40 | 30.2 |
| Fill Medium Dense Sand | S-6 | 14 | 2 | 120 | 14 | 30 | 0 | 1620 | 1620 | 1.14 | 1.14 | 1.00 | 1 | 0.95 | 1.00 | 15 | 5.4 | 21 | 0.21 | 0.12 | 0.26 | 0.39 | 1 | 0.11 | 1.03 | 1.84 | 0.82 | 0.54 | 28.2 |
| Fill Medium Dense Sand | S-7 | 16 | 2 | 120 | 30 | 30 | 0 | 1860 | 1860 | 1.05 | 1.07 | 1.00 | 1 | 0.95 | 1.00 | 30 | 5.4 | 35 | 1.16 | 0.11 | 0.26 | 0.39 | 1 | 0.20 | 1.03 | 10.13 | 4.50 | 2.98 | 26.2 |
| Fill Medium Dense Sand | S-8 | 18 | 2 | 120 | 14 | 30 | 0 | 2100 | 2100 | 1.00 | 1.00 | 1.00 | 1 | 0.95 | 1.00 | 13 | 5.4 | 19 | 0.19 | 0.12 | 0.26 | 0.40 | 1 | 0.10 | 1.00 | 1.64 | 0.73 | 0.48 | 24.2 |
| Fill Clay | S-9 | 20 | 2 | 110 | 19 | 90 | 0 | 2320 | 2320 | 0.96 | 0.96 | 1.00 | 1 | 0.95 | 1.00 | 17 | 5.5 | 23 | 0.25 | 0.12 | 0.26 | 0.40 | 1 | 0.12 | 0.99 | 2.10 | 0.93 | 0.62 | 22.2 |
| Fill Clay | S-10 | 22 | 2 | 110 | 11 | 90 | 0 | 2540 | 2540 | 0.90 | 0.91 | 1.00 | 1 | 0.95 | 1.00 | 9 | 5.5 | 15 | 0.16 | 0.12 | 0.26 | 0.40 | 1 | 0.09 | 0.98 | 1.33 | 0.59 | 0.39 | 20.2 |
| Fill Clay | S-12 | 24 | 2 | 110 | 13 | 90 | 0 | 2760 | 2760 | 0.87 | 0.88 | 1.00 | 1 | 0.95 | 1.00 | 11 | 5.5 | 16 | 0.17 | 0.12 | 0.26 | 0.40 | 1 | 0.09 | 0.97 | 1.43 | 0.64 | 0.42 | 18.2 |
| Fill Clay | S-13 | 26 | 2 | 110 | 14 | 90 | 0 | 2980 | 2980 | 0.84 | 0.84 | 1.00 | 1 | 1 | 1.00 | 12 | 5.5 | 17 | 0.18 | 0.12 | 0.26 | 0.40 | 1 | 0.10 | 0.97 | 1.51 | 0.67 | 0.44 | 16.2 |
| Fill Clay | S-14 | 28 | 2 | 110 | 13 | 90 | 0 | 3200 | 3200 | 0.80 | 0.81 | 1.00 | 1 | 1 | 1.00 | 10 | 5.5 | 16 | 0.16 | 0.12 | 0.26 | 0.39 | 1 | 0.09 | 0.96 | 1.41 | 0.63 | 0.42 | 14.2 |
| Fill Clay | S-15 | 30 | 2 | 110 | 10 | 90 | 0 | 3420 | 3420 | 0.76 | 0.79 | 1.00 | 1 | 1 | 1.00 | 8 | 5.5 | 13 | 0.14 | 0.12 | 0.26 | 0.39 | 1 | 0.08 | 0.96 | 1.22 | 0.54 | 0.36 | 12.2 |
| Fill Clay | S-16 | 32 | 2 | 110 | 13 | 90 | 0 | 3640 | 3640 | 0.74 | 0.76 | 1.00 | 1 | 1 | 1.00 | 10 | 5.5 | 15 | 0.16 | 0.11 | 0.26 | 0.39 | 1 | 0.09 | 0.95 | 1.37 | 0.61 | 0.40 | 10.2 |
| Fill Clay | S-17 | 34 | 2 | 110 | 13 | 90 | 0 | 3860 | 3860 | 0.72 | 0.74 | 1.00 | 1 | 1 | 1.00 | 9 | 5.5 | 15 | 0.15 | 0.11 | 0.26 | 0.39 | 1 | 0.09 | 0.95 | 1.36 | 0.60 | 0.40 | 8.2 |
| Alluvial Clay | S-18 | 36 | 2 | 105 | 16 | 90 | 0 | 4070 | 4070 | 0.71 | 0.72 | 1.00 | 1 | 1 | 1.00 | 11 | 5.5 | 17 | 0.17 | 0.11 | 0.26 | 0.39 | 1 | 0.10 | 0.94 | 1.51 | 0.67 | 0.44 | 6.2 |
| Alluvial Clay | S-19 | 38 | 2 | 105 | 25 | 90 | 0 | 4280 | 4280 | 0.72 | 0.70 | 1.00 | 1 | 1 | 1.00 | 18 | 5.5 | 24 | 0.26 | 0.12 | 0.26 | 0.39 | 1 | 0.12 | 0.91 | 2.25 | 1.00 | 0.66 | 4.2 |
| Alluvial Clay | S-20 | 40 | 2 | 105 | 23 | 90 | 0 | 4490 | 4490 | 0.70 | 0.69 | 1.00 | 1 | 1 | 1.00 | 16 | 5.5 | 22 | 0.23 | 0.11 | 0.26 | 0.39 | 1 | 0.12 | 0.91 | 1.98 | 0.88 | 0.58 | 2.2 |
| Alluvial Clay | S-21 | 42 | 2 | 105 | 18 | 90 | 0 | 4700 | 4700 | 0.66 | 0.67 | 1.00 | 1 | 1 | 1.00 | 12 | 5.5 | 17 | 0.18 | 0.11 | 0.25 | 0.38 | 1 | 0.10 | 0.92 | 1.59 | 0.71 | 0.47 | 0.2 |
| Alluvial Clay | S-22 | 44 | 2 | 105 | 28 | 90 | 0 | 4910 | 4910 | 0.69 | 0.66 | 1.00 | 1 | 1 | 1.00 | 19 | 5.5 | 25 | 0.28 | 0.11 | 0.26 | 0.39 | 1 | 0.13 | 0.89 | 2.48 | 1.10 | 0.73 | -1.8 |
| Alluvial Sand | S-23 | 46 | 2 | 105 | 32 | 30 | 0 | 5120 | 5120 | 0.69 | 0.64 | 1.00 | 1 | 1 | 1.00 | 22 | 5.4 | 27 | 0.36 | 0.12 | 0.26 | 0.39 | 1 | 0.14 | 0.87 | 3.11 | 1.38 | 0.92 | -3.8 |
| Alluvial Sand | S-24 | 48 | 2 | 105 | 21 | 30 | 0 | 5330 | 5330 | 0.63 | 0.63 | 1.00 | 1 | 1 | 1.00 | 13 | 5.4 | 19 | 0.19 | 0.11 | 0.25 | 0.37 | 1 | 0.10 | 0.90 | 1.72 | 0.76 | 0.51 | -5.8 |
| Alluvial Sand | S-25 | 50 | 2 | 105 | 7 | 30 | 0 | 5540 | 5540 | 0.54 | 0.62 | 1.00 | 1 | 1 | 1.00 | 4 | 5.4 | 9 | 0.11 | 0.11 | 0.24 | 0.36 | 1 | 0.07 | 0.93 | 1.06 | 0.47 | 0.31 | -7.8 |
| Alluvial Sand | S-26 | 52 | 2 | 105 | 15 | 30 | 0 | 5750 | 5750 | 0.57 | 0.61 | 1.00 | 1 | 1 | 1.00 | 9 | 5.4 | 14 | 0.15 | 0.11 | 0.24 | 0.36 | 1 | 0.09 | 0.91 | 1.38 | 0.62 | 0.41 | -9.8 |
| Alluvial Sand | S-27 | 54 | 2 | 105 | 64 | 30 | 1 | 5954 | 5960 | 0.76 | 0.60 | 1.00 | 1 | 1 | 1.00 | 49 | 5.4 | 54 | 4.00 | 0.14 | 0.31 | 0.47 | 1 | 0.30 | 0.69 | 28.72 | 12.76 | 8.45 | -11.8 |
| Alluvial Sand | S-28 | 56 | 2 | 105 | 22 | 30 | 1 | 6039 | 6170 | 0.59 | 0.59 | 1.00 | 1 | 1 | 1.00 | 13 | 5.4 | 18 | 0.19 | 0.11 | 0.24 | 0.37 | 1 | 0.10 | 0.89 | 1.72 | **0.76** | **0.51** | -13.8 |
| Alluvial Sand | S-29 | 58 | 2 | 105 | 20 | 30 | 1 | 6124 | 6380 | 0.57 | 0.59 | 1.00 | 1 | 1 | 1.00 | 11 | 5.4 | 17 | 0.17 | 0.11 | 0.24 | 0.37 | 1 | 0.10 | 0.90 | 1.58 | **0.70** | **0.47** | -15.8 |

**APPENDIX C.6**
**LIQUEFACTION ANALYSIS - JAP-6**
JEFFERIES GENERATING STATION - ASH POND A
MONCKS CORNER, SOUTH CAROLINA

## Liquefaction analysis using SPT blow counts for relatively shallow, level-ground sites

Reference: "Soil Liquefaction During Earthquakes" by I.M. Idriss and R.W. Boulanger, Earthquake Engineering Research Institute MNO-12, 2008

IMPORTANT: Set excel to iterate at least 100 times as CN and CS contain circular references to (N1)60

Boring No. JAP-6
Project No. 0132892-0
Project Name: Jefferies Generating Station

Reset

Iteration: 60382

**Input Parameters**
Depth to water table (Enter soil layer at water table depth) = 4 ft
unit weight of water = 62.4 pcf
rod length from hammer to ground = 7.5 ft
ground surface elevation = 43.33 ft
**Split spoon with room for liners used without liners?**** FALSE (true / false)
Borehole Diameter (4", 6", 8") = 4 (inches)
Atmospheric Pressure = 2116 (psf)
Measured Energy Ratio of SPT Hammer = 60 (percent)

**Earthquake Event Parameters**

| | Event 1 | Event 2 | Event IBC | Vertical Settlement | |
|---|---|---|---|---|---|
| Earthquake Moment Magnitude | 7.3 | 7.3 | 7.3 | 2.72 | Inches |
| Maximum Ground Acceleration (a_max / g) | 0.2 | 0.45 | 0.68 | 3.07 | Inches |
| Magnitude Scaling Factor (MSF) | 1.05 | 1.05 | 1.05 | 3.16 | Inches |

| | | | | | blow | | | | | effective | Check | energy | borehole | rod | sampling | | Fines | clean | Clean | Normalized CSR | | | | | | | | FS=(CRR,M=7.5,σ'=1 atm)/(CSR,M=7.5,σ'=1 atm) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | total unit | count | Fines | | | | stress | CN | ratio | diameter | length | method | | Adjustment | sand | Sand | Event 1 | Event 2 | Event IBC | | | | Event 1 | Event 2 | Event IBC | |
| Stratigraphy | Sample | depth | ΔH | weight | $N_m$ | Content | Liquefiable? | $\sigma'_{v0}$ | $\sigma_{v0}$ | $C_N$ | $C_N$ | $C_E$ | $C_B$ | $C_R$ | $C_S$** | $(N_1)_{60}$ | $\Delta(N_1)_{60}$ | $(N_1)_{60cs}$ | CRR | CSR | CSR | CSR | $K_\alpha$ | $C_\sigma$ | $K_\sigma$ | F.O.S. | F.O.S. | F.O.S. | elev |
| | - | (ft) | (feet) | (pcf) | - | % | True/False | (psf) | (psf) | - | Liao | - | - | - | - | - | | - | norm | a =0.2 | a =0.45 | a =0.68 | - | - | - | M = 7.3 | M = 7.3 | M = 7.3 | (ft) |
| | na | | 0 | | | | | 0 | 0 | #DIV/0! | #DIV/0! | 1.00 | 1 | 0.75 | 1.00 | #DIV/0! | 0.0 | #DIV/0! | #DIV/0! | #DIV/0! | #DIV/0! | #DIV/0! | 1 | #DIV/0! | #DIV/0! | #DIV/0! | #DIV/0! | #DIV/0! | 43.33 |
| Fill Loose Sand | S-1 | 0.5 | 0.5 | 115 | 16 | 30 | 0 | 58 | 58 | 1.70 | 1.70 | 1.00 | 1 | 0.75 | 1.00 | 20 | 5.4 | 26 | 0.31 | 0.11 | 0.25 | 0.38 | 1 | 0.14 | 1.10 | 2.74 | 1.22 | 0.81 | 42.83 |
| Fill Loose Sand | S-2 | 2 | 1.5 | 115 | 13 | 30 | 0 | 230 | 230 | 1.70 | 1.70 | 1.00 | 1 | 0.75 | 1.00 | 17 | 5.4 | 22 | 0.23 | 0.11 | 0.25 | 0.38 | 1 | 0.12 | 1.10 | 2.07 | 0.92 | 0.61 | 41.33 |
| Fill Loose Sand | S-3 | 4 | 2 | 115 | 8 | 30 | 0 | 460 | 460 | 1.70 | 1.70 | 1.00 | 1 | 0.8 | 1.00 | 11 | 5.4 | 16 | 0.17 | 0.11 | 0.25 | 0.38 | 1 | 0.10 | 1.10 | 1.49 | 0.66 | 0.44 | 39.33 |
| Fill Medium Dense Sand | S-4 | 6 | 2 | 120 | 16 | 30 | 0 | 575 | 700 | 1.70 | 1.70 | 1.00 | 1 | 0.85 | 1.00 | 23 | 5.4 | 28 | 0.40 | 0.14 | 0.30 | 0.46 | 1 | 0.15 | 1.10 | 2.99 | 1.33 | 0.88 | 37.33 |
| Fill Medium Dense Sand | S-5 | 8 | 2 | 120 | 14 | 30 | 0 | 690 | 940 | 1.64 | 1.70 | 1.00 | 1 | 0.85 | 1.00 | 20 | 5.4 | 25 | 0.29 | 0.15 | 0.34 | 0.51 | 1 | 0.13 | 1.10 | 1.92 | 0.85 | 0.56 | 35.33 |
| Fill Medium Dense Sand | S-6 | 10 | 2 | 120 | 23 | 30 | 0 | 806 | 1180 | 1.44 | **1.62** | 1.00 | 1 | 0.85 | 1.00 | 28 | 5.4 | 33 | 0.83 | 0.16 | 0.36 | 0.55 | 1 | 0.19 | 1.10 | 5.15 | 2.29 | 1.52 | 33.33 |
| Fill Medium Dense Sand | S-7 | 12 | 2 | 120 | 17 | 30 | 0 | 921 | 1420 | 1.44 | 1.52 | 1.00 | 1 | 0.85 | 1.00 | 21 | 5.4 | 26 | 0.32 | 0.17 | 0.38 | 0.57 | 1 | 0.14 | 1.10 | 1.90 | 0.84 | 0.56 | 31.33 |
| Fill Medium Dense Sand | S-8 | 14 | 2 | 120 | 20 | 30 | 0 | 1036 | 1660 | 1.33 | **1.43** | 1.00 | 1 | 0.95 | 1.00 | 25 | 5.4 | 31 | 0.53 | 0.17 | 0.39 | 0.59 | 1 | 0.16 | 1.10 | 3.04 | 1.35 | 0.89 | 29.33 |
| Fill Medium Dense Sand | S-9 | 16 | 2 | 120 | 26 | 30 | 0 | 1151 | 1900 | 1.24 | **1.36** | 1.00 | 1 | 0.95 | 1.00 | 31 | 5.4 | 36 | 1.40 | 0.18 | 0.40 | 0.60 | 1 | 0.21 | 1.10 | 7.94 | 3.53 | 2.33 | 27.33 |
| Fill Medium Dense Sand | S-10 | 18 | 2 | 120 | 16 | 30 | 0 | 1266 | 2140 | 1.26 | 1.29 | 1.00 | 1 | 0.95 | 1.00 | 19 | 5.4 | 24 | 0.28 | 0.19 | 0.42 | 0.63 | 1 | 0.13 | 1.07 | 1.50 | 0.67 | 0.44 | 25.33 |
| Fill Medium Dense Sand | S-12 | 20 | 2 | 120 | 22 | 30 | 0 | 1382 | 2380 | 1.19 | 1.24 | 1.00 | 1 | 0.95 | 1.00 | 25 | 5.4 | 30 | 0.50 | 0.19 | 0.42 | 0.64 | 1 | 0.16 | 1.07 | 2.65 | 1.18 | 0.78 | 23.33 |
| Fill Medium Dense Sand | S-13 | 22 | 2 | 120 | 18 | 30 | 0 | 1497 | 2620 | 1.17 | 1.19 | 1.00 | 1 | 0.95 | 1.00 | 20 | 5.4 | 25 | 0.30 | 0.19 | 0.43 | 0.65 | 1 | 0.13 | 1.05 | 1.54 | 0.69 | 0.45 | 21.33 |
| Fill Medium Dense Sand | S-14 | 24 | 2 | 120 | 21 | 30 | 0 | 1612 | 2860 | 1.12 | 1.15 | 1.00 | 1 | 0.95 | 1.00 | 22 | 5.4 | 28 | 0.37 | 0.19 | 0.44 | 0.66 | 1 | 0.15 | 1.04 | 1.92 | 0.85 | 0.56 | 19.33 |
| Fill Medium Dense Sand | S-15 | 26 | 2 | 120 | 20 | 30 | 0 | 1727 | 3100 | 1.09 | 1.11 | 1.00 | 1 | 1 | 1.00 | 22 | 5.4 | 27 | 0.35 | 0.20 | 0.44 | 0.67 | 1 | 0.14 | 1.03 | 1.79 | 0.80 | 0.53 | 17.33 |
| Fill Clay | S-16 | 28 | 2 | 110 | 10 | 80 | 0 | 1822 | 3320 | 1.08 | 1.08 | 1.00 | 1 | 1 | 1.00 | 11 | 5.5 | 16 | 0.17 | 0.20 | 0.45 | 0.68 | 1 | 0.10 | 1.01 | 0.84 | 0.37 | 0.25 | 15.33 |
| Fill Clay | S-17 | 30 | 2 | 110 | 8 | 80 | 0 | 1918 | 3540 | 1.06 | 1.05 | 1.00 | 1 | 1 | 1.00 | 8 | 5.5 | 14 | 0.15 | 0.20 | 0.45 | 0.69 | 1 | 0.09 | 1.01 | 0.73 | 0.33 | 0.22 | 13.33 |
| Fill Clay | S-18 | 32 | 2 | 110 | 12 | 80 | 0 | 2013 | 3760 | 1.03 | 1.03 | 1.00 | 1 | 1 | 1.00 | 12 | 5.5 | 18 | 0.18 | 0.20 | 0.46 | 0.69 | 1 | 0.10 | 1.01 | 0.90 | 0.40 | 0.26 | 11.33 |
| Fill Clay | S-19 | 34 | 2 | 110 | 7 | 80 | 0 | 2108 | 3980 | 1.00 | 1.00 | 1.00 | 1 | 1 | 1.00 | 7 | 5.5 | 13 | 0.14 | 0.20 | 0.46 | 0.69 | 1 | 0.08 | 1.00 | 0.67 | 0.30 | 0.20 | 9.33 |
| Fill Clay | S-20 | 36 | 2 | 110 | 15 | 80 | 0 | 2203 | 4200 | 0.98 | 0.98 | 1.00 | 1 | 1 | 1.00 | 15 | 5.5 | 20 | 0.21 | 0.20 | 0.46 | 0.70 | 1 | 0.11 | 1.00 | 1.02 | 0.45 | 0.30 | 7.33 |
| Alluvial Clay | S-21 | 38 | 2 | 105 | 45 | 80 | 0 | 2288 | 4410 | 0.98 | 0.96 | 1.00 | 1 | 1 | 1.00 | 44 | 5.5 | 50 | 4.00 | 0.21 | 0.47 | 0.71 | 1 | 0.30 | 0.98 | 19.18 | 8.52 | 5.64 | 5.33 |
| Alluvial Sand | S-22 | 40 | 2 | 105 | 29 | 30 | 1 | 2374 | 4620 | 0.96 | 0.94 | 1.00 | 1 | 1 | 1.00 | 28 | 5.4 | 33 | 0.78 | 0.21 | 0.47 | 0.71 | 1 | 0.18 | 0.98 | 3.73 | 1.66 | **1.10** | 3.33 |
| Alluvial Sand | S-23 | 42 | 2 | 105 | 16 | 30 | 1 | 2459 | 4830 | 0.93 | 0.93 | 1.00 | 1 | 1 | 1.00 | 15 | 5.4 | 20 | 0.21 | 0.21 | 0.46 | 0.70 | 1 | 0.11 | 0.98 | **1.01** | **0.45** | **0.30** | 1.33 |
| Alluvial Sand | S-24 | 44 | 2 | 105 | 4 | 30 | 1 | 2544 | 5040 | 0.89 | 0.91 | 1.00 | 1 | 1 | 1.00 | 4 | 5.4 | 9 | 0.11 | 0.20 | 0.46 | 0.70 | 1 | 0.07 | 0.99 | **0.54** | **0.24** | **0.16** | -0.67 |
| Alluvial Sand | S-25 | 46 | 2 | 105 | 6 | 30 | 1 | 2629 | 5250 | 0.88 | 0.90 | 1.00 | 1 | 1 | 1.00 | 5 | 5.4 | 11 | 0.12 | 0.20 | 0.46 | 0.70 | 1 | 0.08 | 0.98 | **0.60** | **0.27** | **0.18** | -2.67 |
| Alluvial Sand | S-26 | 48 | 2 | 105 | 12 | 30 | 1 | 2714 | 5460 | 0.88 | 0.88 | 1.00 | 1 | 1 | 1.00 | 11 | 5.4 | 16 | 0.16 | 0.21 | 0.46 | 0.70 | 1 | 0.09 | 0.98 | **0.80** | **0.35** | **0.23** | -4.67 |

# ATTACHMENT 1

## Geotechnical Soil Data and Interpreted Parameters

HALEY & ALDRICH, INC.
400 Augusta Street
Suite 100
Greenville, SC 29601
864.214.8750

**MEMORANDUM**

November 14, 2025
File No. 0132892

| | |
|---|---|
| TO: | Kim Van Patten<br>Buyer III, Santee Cooper Procurement<br>Brian Holmes, P.E.<br>Manager, Waste Management |
| FROM: | Haley & Aldrich, Inc.<br>Alejandra Larrea Brown<br>Assistant Project Manager<br>Katherine Coco, P.E.<br>Senior Technical Specialist, Geotechnical Engineer |
| SUBJECT: | Geotechnical Soil Data and Interpreted Parameters<br>Jefferies Generating Station<br>Ash Pond A<br>Moncks Corner, South Carolina |

Haley & Aldrich, Inc. prepared this memorandum to summarize available geotechnical soil data and develop shear strength parameters for Ash Pond A at the Jefferies Generating Station (JGS) located in Moncks Corner, South Carolina.

## Purpose

The data and interpretations contained in this memorandum support the analyses associated with the Structural Stability Assessment (SSA) and Safety Factor Assessment (SFA) performed in accordance with Title 40 Code of Federal Regulations § 257.73(d) and § 257.73(e) of the Coal Combustion Residuals (CCR) Rule (USEPA, 2015) and the Legacy Rule updates (USEPA, 2024).

The risk of the release of ash directly into local waterways due to an embankment failure is the greatest along the “spoils dike” (southwestern embankment). This memorandum focuses on the southwestern embankment and the separator berm (also known as “cross dike”) between Ash Pond A and the Decant Pond (formally called “Ash Pond B”) while also briefly describing the site as a whole.

## Site History and Description

### HISTORY

Ash Pond A is the sole CCR legacy surface impoundment at the JGS in Moncks Corner, South Carolina as shown on Figure 1. JGS previously consisted of four, 398-megawatt, generating units owned and operated by Santee Cooper. The two coal-fired units were retired on December 31, 2012, and the oil-fired units were retired on October 1, 2015.

Ash Pond A was constructed without a liner in 1970 on approximately 136 acres to the southeast of JGS. Throughout its active life, the ash pond received sluiced CCR, consisting predominately of fly ash, bottom ash, and boiler slag. Ash Pond A has not received CCR or CCR wastewater since the coal-fired units were retired in 2012. Currently, Ash Pond A is permitted to serve primarily as a settling basin prior to the wastewater entering the Decant Pond.

### DESCRIPTION OF IMPOUNDMENT

As shown on Figure 1, Ash Pond A lies in oblong northwesterly to southeasterly fashion and borders the Tailrace Canal of the Cooper River along the southwest side of the pond.

### Embankments

The northwestern border of Ash Pond A was constructed by excavation from natural grade down to the bottom of the pond and is bounded by an access road and a railroad owned and operated by JGS and CSX Transportation, respectively. Along the southwest side, Ash Pond A is bounded by a “spoils dike” separating it from the Tailrace Canal. To the southeast, the separator berm separates Ash Pond A from the Decant Pond (used for polishing and pH adjustments to which CCR was never sluiced).

From September 2015 to September 2016, eastern stormwater channels and the northeastern dike of Ash Pond A were constructed to re-route stormwater flow around the ash pond to the Decant Pond (Santee Cooper, 2016). CCR was removed from the outermost extents of the pond and was placed within the redefined boundaries of Ash Pond A to both reduce the CCR footprint and amount of stormwater run-on into Ash Pond A (Haley & Aldrich, 2025). Beyond the northeastern dike, the ground surface gradually slopes up to elevations higher than the ash pond.

### Coal Combustion Residuals

Ash Pond A is in the late stages of closure-by-removal (excavation) of CCR and a layer of underlying soil in accordance with the South Carolina Department of Environmental Services (SCDES)-approved state closure plan (SCDHEC, 2015). Excavation activities will continue until all visible CCR is removed. Overall closure activities shall be completed by December 2030 in accordance with the SCDES-approved closure plan (Geosyntec, 2016). As of 2025, Santee Cooper estimated approximately 800,000 cubic yards, or 33 percent, of the maximum estimated 2,402,000 cubic yards of CCR remained in the northern corner of Ash Pond A.

### Impounded Surface Water

Since the coal-fired units were retired in 2012, Ash Pond A hasn’t received CCR wastewater. Active dewatering via “rim ditching” throughout Ash Pond A is used to support excavation of CCR from the pond. The rim ditches direct contact water to a sump where it is then pumped into the Decant Pond.

While Ash Pond A is largely in a dry state, a 100-year 24-hour storm event is estimated to raise the surface water up to elevation 14.75 feet in the southern 19 acres of Ash Pond A.

### SURROUNDING WATERS

As previously stated, the “spoils dike” separates Ash Pond A from the Tailrace Canal of the Cooper River. The water elevation in the canal is subject to tidal influence and can range between elevation -3.0 feet and elevation +5.0 feet. The water level in the Tailrace Canal is estimated to rise to elevation 14.00 during a 100-year 24-hour storm event.

## Subsurface Investigations

### FIELD EXPLORATIONS

To date, 28 borings have been drilled at or near the site. These explorations are further described in the sections below and 20 borings with known locations are summarized in Table 1. Logs for eight borings are not available at this time, and data from those borings is not included in Table 1.

### WorleyParsons

In February 2011, Soil Consultants, Inc. of Charleston, South Carolina performed six mud rotary standard penetration test borings within Ash Pond A. This investigation was directed by WorleyParsons to obtain data to help determine closure options and evaluate subsurface consistency (WorleyParsons, 2011). Four of the borings were located in or around Ash Pond A:

- B-101: at the northern corner of Ash Pond A within the historical limits of the ash.
- B-102: at the western corner of Ash Pond A within the historical limits of the ash.
- B-103: along the northeastern dike of Ash Pond A.
- B-104: at the southern corner of Ash Pond A at the junction of the southwestern embankment and the separator dike between Ash Pond A and the Decant Pond.

The report prepared by WorleyParsons is presented in Attachment 1. It is recommended that the borings performed near or on the “spoils dike” (i.e., B-102 below the ash and B-104) be used to develop estimated shear strength parameters.

### Santee Cooper

Santee Cooper performed two phases of well installation and geotechnical investigations at JGS as shown on Figure 2.

In November 2024, four monitoring wells were installed and seven borings were drilled using a hollow stem auger drill with standard split-spoon sampling:

- Monitoring Well JBW-1: approximately 1,800 feet northwest of the north corner of Ash Pond A.
- Monitoring Well JBW-2: approximately 500 feet northeast of the northeastern dike of Ash Pond A.
- Monitoring Well JAP-2: on the separator berm between Ash Pond A and the Decant Pond.
- Monitoring Well JAP-3: along the northeastern dike of Ash Pond A.
- Borings JRL-1 through JRL-7: south of the historical CCR management unit immediately west of the northwest boundary

In March 2025, three monitoring wells, JAP-4, JAP-5PZ, and JAP-6, were installed along the “spoils dike” and were used to develop estimated soil properties for the embankment along with B-102 and B-104 noted above.

The logs for the JAP-series and JBW-series borings are included in Appendix A and are presented as provided by Santee Cooper. The JRL-series boring logs were not available at the time this memorandum was prepared and based upon the location, they are not necessary for the SSA or SFA tasks for which this memorandum was prepared.

### Other Historical Explorations

The report by WorleyParsons cites eight soil borings performed during 1980 and 1982 approximately 3,000 feet northwest of Ash Pond A in the vicinity of the lock between Lake Moultrie and the Tailrace Canal. A brief description of the subsurface is provided in the WorleyParsons report; however, the logs were not made available at the time this memorandum was written. Due to the distance from Ash Pond A, they are not necessary for the SSA or SFA tasks for which this memorandum was prepared.

## Recommendations for Development of Parameters

### LABORATORY TEST DATA

Both WorleyParsons and Santee Cooper submitted samples to a geotechnical laboratory for index and compressive strength testing. The results of testing on samples submitted from B-102 (below the ash), B-104, JAP-4, JAP-5PZ, and JAP-6 are presented in Table 2.

### WorleyParsons

Under the direction of WorleyParsons, Soil Consultants, Inc. collected 75 split spoon samples for moisture content testing (ASTM D2216), four split spoon samples for mechanical grain size analysis (ASTM D422), and 20 split spoon samples for Atterberg Limit testing (ASTM D4318).

Additionally, four thin-walled Shelby tubes were collected. Three of the four tubes were submitted for mechanical grain size analysis (ASTM D422) and the four tubes were submitted for Atterberg Limit testing (ASTM D4318). Three of the Shelby tube samples were also tested for unconfined compressive strength (ASTM D2166).

The full results of all laboratory tests are presented in Appendix B. The results of the relevant laboratory tests from B-102 and B-104 are presented in Table 2 as these borings are near or on the “spoils dike”.

### Santee Cooper

Santee Cooper submitted four thin-walled Shelby tubes to Certerra Insight Group for laboratory testing. Each of the tubes was submitted for mechanical grain size analysis (ASTM D422). Two tubes were submitted for Atterberg Limit testing (ASTM D4318). Two tube samples were submitted for Unconsolidated Undrained Triaxial Compression Testing (ASTM D2850). Two tube samples were submitted for Direct Shear Testing (ASTM D3080). The results of these laboratory tests are presented in Appendix B.

## Subsurface Conditions and Recommended Geotechnical Parameters

From the borings, seven distinct soil layers above the bedrock were encountered:

- Spoils Dike Upper Fill: very loose to loose sands and very soft to medium stiff lean and fat clays.
- Spoils Dike Middle Fill: medium dense to very dense sands.
- Spoils Dike Lower Fill: soft to hard fat clays.
- Separator Berm Fill: soft to medium stiff sandy lean clays.
- Organics: soft organics mixed with stiff clay fill.
- Alluvium: very loose to loose sands and soft to medium stiff lean and fat clays.
- Marl (Cooper Marl Formation): very hard fat clays.

Table 3 provides the elevations and thicknesses of the strata as encountered in the borings along the “spoils dike”. Fill layers varied in thickness across the borings along the Ash Pond A “spoils dike” and the organics layer only appeared in between the Lower Fill and the Alluvium in one of these borings (JAP-4). The separator berm fill was only encountered in boring JAP-2 located on the separator berm. Ash is not included in the listed strata since the remaining ash is in the northern corner of Ash Pond A.

Appendix C presents the data analyses used to develop the geotechnical shear strength parameters. The analyses compare the correlated field data to the laboratory data and present the recommended parameters to be used in the Structural Stability and Safety Factor Assessments. Table 4 presents the estimated thicknesses and recommended geotechnical parameters to be used in stability analyses for the SSA and the SFA. The estimated thicknesses are intended to present an average stratification.

From the historical explorations, recorded groundwater elevations historically ranged from elevation +16.8 to deeper than elevation -19.8. A groundwater elevation of 7 feet is recommended for use in stability models as the more recent borings indicated that the embankment has been dewatered since the CCR was removed along the “spoils dike” and separator berm.

## Seismic Ground Motions, Design Criteria, and Liquefaction Potential

In accordance with ASCE 7 (2022), the seismic soil design criteria are as follows (see Appendix D):

- Site Class = E
- $PGA_M$ = 0.69 g for a return period of 2,475 years
- $S_s$ = 1.76 g
- $S_1$ = 0.42 g

Sands under the water table may be susceptible to liquefaction during a design earthquake (M = 7.3 and ground motion = 0.69 g) and a liquefaction susceptibility analysis of the fill and underlying foundation soils is recommended.

For seismic (pseudo-static) slope stability analyses, a horizontal ground motion of 0.345 g is recommended using the 50 percent reduction factor as recommended by Hynes-Griffin and Franklin (1984). Additionally, a 20 percent strength reduction factor is recommended for the seismic slope stability analyses as shown in Table 4.

## References

1. American Society of Civil Engineers (2022). ASCE/SEI 7-22: *Minimum Design Loads and Associated Criteria for Buildings and Other Structures*.
2. Geosyntec Consultants, 2016. *Conceptual Closure Plan – Ash Pond A and Ash Pond B – Jefferies Station.* November.
3. Haley & Aldrich, Inc., 2025. *History of Construction – Ash Pond A; Jefferies Generating Station*. March.
4. Hynes-Griffin, Mary E. and Franklin, Arley G., 1984. *Rationalizing the Seismic Coefficient Method. Prepared for the United States Army Corps of Engineers*. July.
5. Olson, S. M., and Stark, T. D., 2010*. Liquefied strength ratio from liquefaction flow failure case histories. Canadian Geotechnical Journal*. 39, pp. 629-647
6. Santee Cooper, 2016. *Santee Cooper/Jefferies/Ash Pond Stormwater Diversion – Construction Permit No. 19913-IW Modified September 23, 2015*. September 1.

7. South Carolina Department of Health and Environmental Control (SCHEC), 2015. *Partial Approval to Place into Operation.* July 28.

8. United States Environmental Protection Agency, 2015. *CCR Final Rule, 40 CFR §257 Hazardous and Solid Waste Management System: Disposal of Coal Combustion Residuals from Electric Utilities; Final Rule*. April.

9. United States Environmental Protection Agency, 2024. *CCR Final Rule, 40 CFR §257 Hazardous and Solid Waste Management System: Disposal of Coal Combustion Residuals from Electric Utilities; Legacy CCR Surface Impoundments.* May.

10. WorleyParsons, 2011. *Jefferies Generating Station: Ash Pond Site Assessment – Initial Hydrologic and Geotechnical Studies.* June.

Enclosures:

Table 1 – Summary of Exploration Locations
Table 2 – Summary of Relevant Laboratory Data
Table 3 – Summary of Encountered Subsurface Strata
Table 4 – Interpreted Soil Parameters
Figure 1 – Site Location Map
Figure 2 – Well and Boring Location Plan (2024-2025 Santee Cooper Program)
Appendix A – Boring Logs – Ash Pond A
Appendix B– Laboratory Data Reports
Appendix C – Correlated and Interpreted Shear Strength Data
Appendix D – Seismic Site Class and Design Data
Attachment 1 – WorleyParsons 2011 Ash Pond Site Assessment

https://haleyaldrich.sharepoint.com/sites/SanteeCooper2/Shared Documents/0132892.Santee Cooper CCR Consulting Service/0_Jefferies Generating Station/Geotech/05_Data Report/2025-1114-JGS Ash Pond A - Geotechnical Soil Data and Interpretation Report_DF.docx

# TABLES

**TABLE 1**

**SUMMARY OF EXPLORATION LOCATIONS**

JEFFERIES GENERATING STATION
ASH POND A
MONCKS CORNER, SOUTH CAROLINA

| Boring ID | Date Performed | Northing[1] | Easting[1] | Latitude | Longitude | G.S. Elevation[2] | Highest W.T. (ft bgs) |
|---|---|---|---|---|---|---|---|
| ***Soil Consultants, Inc.*** [3] | | | | | | | |
| B-101 | Feb 2011 | 513794.66 | 2311543.18 | 33.241270 | -79.980898 | 29.56 | 5.0 |
| B-102 | Feb 2011 | 512389.92 | 2310568.12 | 33.237435 | -79.984133 | 20.82 | 4.0 |
| B-103 | Feb 2011 | 512154.04 | 2312582.63 | 33.236732 | -79.977551 | 22.73 | 10.0 |
| B-104 | Feb 2011 | 510117.61 | 2311871.06 | 33.231154 | -79.979945 | 16.85 | 4.5 |
| B-105 | Feb 2011 | 509711.12 | 2313297.96 | 33.229998 | -79.975291 | 17.9 | 5.0 |
| B-106 | Feb 2011 | 508468.45 | 2312880.88 | 33.226594 | -79.976695 | 18.23 | 8.0 |
| ***Santee Cooper*** [4] | | | | | | | |
| JRL-1 | Nov 2024 | 513,028.1 | 2,310,508.9 | 33.239191 | -79.984306 | 22.8 | N.R. |
| JRL-2 | Nov 2024 | 513,089.7 | 2,310,327.2 | 33.239365 | -79.984898 | 23.1 | N.R. |
| JRL-3 | Nov 2024 | 513,190.7 | 2,310,149.4 | 33.239647 | -79.985477 | 22.3 | N.R. |
| JRL-4 | Nov 2024 | 513,186.6 | 2,310,455.9 | 33.239628 | -79.984474 | 24.7 | N.R. |
| JRL-5 | Nov 2024 | 513,106.9 | 2,310,441.2 | 33.239409 | -79.984525 | 25.3 | N.R. |
| JRL-6 | Nov 2024 | 512,960.6 | 2,310,486.9 | 33.239006 | -79.984380 | 23.8 | N.R. |
| JRL-7 | Nov 2024 | 513,086.2 | 2,310,205.1 | 33.239358 | -79.985298 | 23.2 | N.R. |
| JBW-1 | Nov 2024 | 514,973.9 | 2,309,656.6 | 33.244562 | -79.987031 | 25.2 | 19.5 |
| JBW-2 | Nov 2024 | 513,065.6 | 2,312,646.1 | 33.239236 | -79.977315 | 55.6 | N.R. |
| JAP-2 | Nov 2024 | 510,274.9 | 2,312,599.3 | 33.231567 | -79.977558 | 16.4 | 9.0 |
| JAP-3 | Nov 2024 | 511,263.4 | 2,313,223.9 | 33.234266 | -79.975483 | 15.7 | 24.0 |
| JAP-4 | March 2025 | 511,841.6 | 2,310,703.4 | 33.235924 | -79.983708 | 39.1 | 7.07 |
| JAP-5 | March 2025 | 511,244.8 | 2,311,105.2 | 33.234273 | -79.982413 | 42.2 | -11.7 |
| JAP-6 | March 2025 | 510,664.7 | 2,311,504.8 | 33.232668 | -79.981125 | 43.3 | 3.33 |

***Abbreviations***

*G.S. = ground surface*
*ft bgs = below ground surface*
*N.R. = not recorded*
*W.T. = water table*

***Notes:***

*1. The state plane coordinate system is South Carolina (SC-3900) with units of US feet referenced horizontally to the North American Datum of 1983.*

*2. The vertical reference is North American Vertical Datum of 1988.*

*3. The data presented here was taken from the "Ash Pond Site Assessment" by WorleyParsons (2011).*

*4. The data presented here was provided by Santee Cooper.*

*5. The 2011 report by Worley Parsons references eight soil borings performed during 1980 and 1982 approximately 3,000 feet northwest of Ash Pond A, but the logs were not made available at the time this memorandum was written.*

**TABLE 2**
**SUMMARY OF RELEVANT LABORATORY DATA**
JEFFERIES GENERATING STATION
ASH POND A
MONCKS CORNER, SOUTH CAROLINA

| | | | | | | | Atterberg Limits | | | | | | | | Direct Shear | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Boring ID and Sample Number | Sample Type | Depth (ft bgs) | Strata | Material Description | MC (%) | Fines Content | LL (%) | PL (%) | PI (%) | USCS[1] | Specific Gravity | Dry Density (pcf) | UC Triaxial (psf, [psi]) | UU Triaxial (psf, [psi]) | ϕ' (°) | c' (psf, [psi]) |
| B-102 S-3 | SS | 15-16.5 | Alluvium | Sand with Silt | 18.8 | - | - | - | - | SP-SM | - | - | - | - | - | - |
| B-102 S-4 | SS | 17.5-19 | Alluvium | Sand with Silt | 17.1 | See Note 2 | - | - | - | SP-SM | - | - | - | - | - | - |
| B-102 S-5 | SS | 20-21.5 | Alluvium | Clay with Sand | 52.6 | - | 83 | 20 | 63 | CH | - | - | - | - | - | - |
| B-102 S-6 | SS | 25-26.5 | Cooper Marl | Silty Clay with Sand | 27.0 | - | - | - | - | CH | - | - | - | - | - | - |
| B-102 S-7 | SS | 30-31.5 | Cooper Marl | Silty Clay with Sand | 37.2 | See Note 2 | - | - | - | CH | - | - | - | - | - | - |
| B-102 S-8 | SS | 35-36.5 | Cooper Marl | Silty Clay with Sand | 37.9 | - | 81 | 21 | 60 | CH | - | - | - | - | - | - |
| B-104 S-2 | SS | 2.5-4 | Lower Fill | Sand with Silt | 37.7 | - | - | - | - | SP-SM | - | - | - | - | - | - |
| B-104 S-3 | SS | 5-6.5 | Lower Fill | Silty Clay with Sand | 30.5 | - | 51 | 28 | 23 | CH | - | - | - | - | - | - |
| B-104 S-4 | SS | 7.5-9 | Lower Fill | Silty Clay with Sand | 32.9 | - | - | - | - | CH | - | - | - | - | - | - |
| B-104 S-5 | SS | 10-11.5 | Alluvium | Sandy Clay | 37.4 | - | 40 | 18 | 22 | CL | - | - | - | - | - | - |
| B-104 S-8 | SS | 17.5-19 | Alluvium | Clay with Sand | 75.0 | - | 72 | 22 | 50 | CH | - | - | - | - | - | - |
| B-104 S-9 | SS | 20-21.5 | Alluvium | Clay with Sand | 65.2 | - | - | - | - | CH | - | - | - | - | - | - |
| B-104 S-10 | SS | 25-26.5 | Cooper Marl | Silty Clay with Sand | 34.0 | - | - | - | - | CH | - | - | - | - | - | - |
| B-104 S-11 | SS | 30-31.5 | Cooper Marl | Silty Clay with Sand | 23.7 | - | 42 | 26 | 16 | CH | - | - | - | - | - | - |
| B-104 S-12 | SS | 35-36.5 | Cooper Marl | Silty Clay with Sand | 31.1 | - | - | - | - | CH | - | - | - | - | - | - |
| B-104 S-13 | SS | 40-41.5 | Cooper Marl | Silty Clay with Sand | 37.7 | - | - | - | - | CH | - | - | - | - | - | - |
| B-104 S-14 | SS | 45-46.5 | Cooper Marl | Silty Clay with Sand | 41.1 | - | - | - | - | CH | - | - | - | - | - | - |
| B-104 S-15 | SS | 50-51.5 | Cooper Marl | Silty Clay with Sand | 41.7 | - | - | - | - | CH | - | - | - | - | - | - |
| B-104 UD -2 | ST | 22-24 | Alluvium | Clayey Sand | 24.9 | 23.32 | 45 | 15 | 30 | SC | 2.63 | 102.27 | 238 [1.65] | - | - | - |
| JAP-2 #1[3] | ST | 20-21.7 | Lower Fill | Sandy Silt | 27.2 | 64.4 | NP | NP | NP | ML | - | 113.6[4] | - | 5,850 [40.6][6] | 32.0 | 360 [2.5] |
| JAP-4 #1 | ST | 8-10 | Upper Fill | Sandy Lean Clay | 22.6 | 56.5 | 35 | 17 | 18 | CL | - | 118.1[5] | - | 3,420 [23.78][6] | - | - |
| JAP-4 #2 | ST | 8-10 | Upper Fill | Silty Sand | - | 28.2 | NP | NP | NP | SM | - | - | - | - | - | - |
| JAP-5PZ #1 | ST | 5-7 | Upper Fill | Sandy Lean Clay | - | 60.2 | 35 | 15 | 20 | CL | - | - | - | - | - | - |
| JAP-5PZ #2 | ST | 5-7 | Upper Fill | Silty Sand | 15.3 | 20.1 | NP | NP | NP | SM | - | - | - | - | 31.0 | 360 [2.5] |
| JAP-5 | ST | 60-62 | Cooper Marl | Brown Sandy Clay | - | 80.1 | - | - | - | CH | - | - | - | - | - | - |

***Abbreviations***
*SS = split spoon sample*
*ST = Shelby tube sample*
*MC = moisture content*
*LL = liquid limit*
*PL = plastic limit*
*PI = plasticity index*
*USCS = Unified Soil Classification System*
*UC = unconfined compressive strength test*
*UU = unconsolidated undrained compressive strength test*
*φ' = effective friction angle*
*c' = effective cohesion*
*SP-SM = poorly graded silty sand*
*CH = fat clay*
*CL = lean clay*
*SC = clayey sand*
*ML = inelastic silt*
*SM = silty sand*
*ft bgs = feet below ground surface*
*% = percent*
*pcf = pounds per cubic foot*
*psf = pounds per square foot*
*psi = pounds per square inch*
*° = degrees*

***Notes:***
1. *Soils not submitted for grain size analysis and/or index testing were classified based on visual observation.*
2. *Mechanical grain size analysis performed after No. 200 wash on sample.*
3. *The Shelby tube from JAP-2 was included in this table for information on the underlying alluvium*
4. *The laboratory reported the sample as having a dry unit weight of 13.6 pcf, however it is believed that this is a typographical error based on the dry densities of the samples for the associated direct shear test (112.7 pcf to 114.5 pcf).*
5. *The laboratory reported the sample as having a dry unit weight of 18.1 pcf, however it is believed that this is a typographical error and the estimated density is as shown.*
6. *The laboratory reported the principal stress difference at 15% strain rather than the peak deviator stress. This test reflects the peak deviator stress as visually estimated from the laboratory graph.*

**TABLE 3**
**SUMMARY OF ENCOUNTERED SUBSURFACE STRATA**
JEFFERIES GENERATING STATION
ASH POND A
MONCKS CORNER, SOUTH CAROLINA

| | | Highest W.T. | | Spoils Dike Upper Fill | | Spoils Dike Middle Fill | | Spoils Dike Lower Fill | | Separator Berm | | Organics | | Alluvium | | Cooper Marl | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Boring ID** | **G.S. Elevation** | **Depth (ft bgs)** | **Elevation** | **Bottom El.** | **Thickness (ft)** | **Bottom El.** | **Thickness (ft)** | **Bottom El.** | **Thickness (ft)** | **Bottom El.** | **Thickness (ft)** | **Bottom El.** | **Thickness (ft)** | **Bottom El.** | **Thickness (ft)** | **Bottom El.** | **Thickness (ft)** |
| B-102 | 20.82 | 4.0 | 16.8 | Not Encountered | | Not Encountered | | Not Encountered | | Not Encountered | | Not Encountered | | -2.18 | 10 | < -15.68 ft | > 13.5 |
| B-104 | 16.85 | 4.5 | 12.4 | Not Encountered | | 14.9 | 2.0 | 7.35 | 7.5 | Not Encountered | | Not Encountered | | -6.65 | 14 | < -34.65 ft | > 28 |
| JAP-2 | 16.4 | 9.0 | 7.4 | Not Encountered | | Not Encountered | | Not Encountered | | 3.4 | 13 | Not Encountered | | -6.6 | 10 | < -7.6 | > 1 |
| JAP-4 | 39.1 | 32.0 | 7.1 | 23.1 | 16.0 | Not Encountered | | 9.1 | 14.0 | Not Encountered | | 7.1 | 2.0 | 1.1 | 6.0 | Not Encountered | |
| JAP-5PZ | 42.2 | > 62.0 | < -19.8 | 28.2 | 14.0 | 22.2 | 6.0 | -5.8 | 28.0 | Not Encountered | | Not Encountered | | -12.8 | 7.0 | < -17.8 | > 5 |
| JAP-6 | 43.3 | 40.0 | 3.3 | 37.3 | 6.0 | 15.3 | 22.0 | 3.3 | 12.0 | Not Encountered | | Not Encountered | | -6.7 | 10.0 | Not Encountered | |

***Abbreviations:***
*G.S. = ground surface*
*ft bgs = feet below ground surface*
*El. = elevation*
*ft = feet*

***Notes:***
1. *B-102 and B-104 were performed by Soil Consultants, Inc. under the direction of WorleyParsons in February 2011. The borings are provided in Attachment 1.*
2. *JAP-2 was performed by Santee Cooper in November 2025. The boring log is presented in Appendix A as provided by Santee Cooper.*
3. *JAP-4, JAP-5PZ, and JAP-6 were performed by Santee Cooper in March 2025. The borings are presented in Appendix A as provided by Santee Cooper.*
4. *Water tables shown were either taken as documented in the logs or from soil or drilling descriptions such as "saturated" or "spoon is wet". Groundwater was not encountered in JAP-5PZ.*
5. *Bedrock was not encountered in these borings.*

**TABLE 4**

**INTERPRETED SOIL PARAMETERS**

JEFFERIES GENERATING STATION
ASH POND A
MONCKS CORNER, SOUTH CAROLINA

| Stratum | Bottom El. (ft msl) | Unit Weight (pcf) | Angle of Internal Friction, φ' (deg) [1] | | | | Cohesion, c' (psf) [2] | | | Undrained Shear Strength, Su (psf) [3] | | | | Vertical Stress Ratio [9] | Bbar [10] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Recommended | | | Recommended [7] | | | | Recommended | | | |
| | | | from SPT [4] | from Laboratory [5] | Static | Seismic [6] | from Laboratory [5] | Static | Seismic | from SPT [8] | from Laboratory [5] | Static | Seismic | | |
| Spoils Dike Upper Fill | 30 | 115 | 32 | 31 | 31 | 24.8 | 360 | 350 | 280 | - | - | - | - | - | 1 |
| Spoils Dike Middle Fill | 20 | 120 | 34 | - | 34 | 27.2 | - | 50 | 40 | - | - | - | - | - | 1 |
| Spoils Dike Lower Fill | 9 | 110 | 32 | 32 | 32 | 25.6 | 360 | 350 | 280 | 1500 | 5,850 | 1500 | 1200 | - | 1 |
| Separator Berm Fill | 4 | 115 | 30 | - | 30 | 24 | - | 50[11] | 40 | 450 | - | 450 | 360 | - | 1 |
| Organics | 7 | 85 | 27 | - | 27 | 21.6 | - | 0 | 0 | 200 | - | 200 | 160 | - | 1 |
| Alluvium | -6 | 105 | 29 | - | 29 | 23.2 | - | 0 | 0 | 200 | 238 | see Note 11 | | 0.05 | 1 |
| Cooper Marl | < -35 | 125 | 35 | - | 35 | 28 | - | 0 | 0 | 5000 | - | 5000 | 4000 | - | 1 |

***Abbreviations:***

*El. = elevation*
*ft msl = feet mean sea level*
*deg = degree*
*psf = pounds per square feet*
*pcf = pound per cubic foot*
*SPT = Standardized Penetration Test*

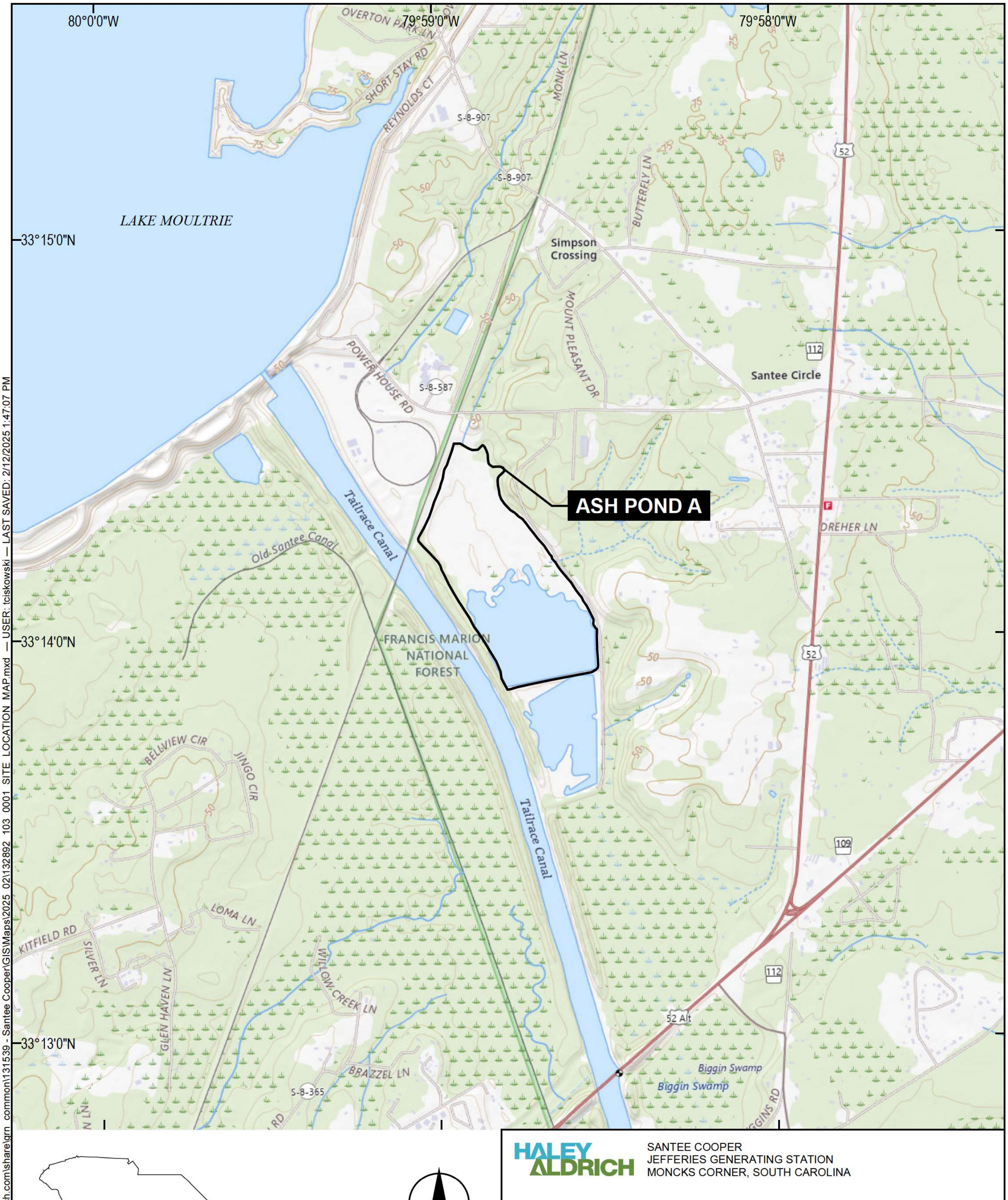
***Notes:***

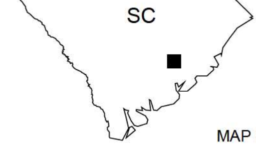
*1. φ' is the symbol for the Effective Angle of Internal Friction, also known as "Friction Angle", obtained form SPT data.*
*2. c' is the symbol for effective cohesion.*
*3. Su is the symbol for undrained shear strength. It is recommended that undrained shear strengths are only applied to fine-grained materials below the water table. When modeling the undrained Factor of Safety, the Su is modeled using the Undrained failure criterion.*
*4. Friction Angle as obtained form SPT data.*
*5. Value obtained from laboratory data.*
*6. A twenty percent (20%) reduction in material strength was conservatively incorporated in the seismic analysis to represent the approximate threshold between large and small strains induced by cyclic loading (Duncan, 2014).*
*7. Cohesion is only recommended for materials above the water table, below the water table, the cohesion is assumed to be 0 psf.*
*8. Undrained shear strengths were correlated from SPT blowcounts only for fine-grained materials.*
*9. Layers identified as liquefiable were modeled using a vertical stress ratio of 0.05 based on the lowest average corrected N-value of 2.5 bpf.*

$$Su_{(LIQ)} / \sigma'v_0 = 0.03 + 0.0075 * N_{(1,60)} \pm 0.03 \qquad \text{(Olson and Stark, 2002)}$$

*10. $B_{bar}$ is the symbol for "Skempton's Pore Pressure Coefficient" which is (simplified) the ratio of the change of pore pressure to the change in stress.*
*11. A minor cohesion for separator berm fill above the water table was assumed due to the clay description in the logs.*

# FIGURES





N

MAP SOURCE: UNITED STATES GEOLOGICAL SURVEY
SITE COORDINATES: 33°14'07"N 79°58'48"W

HALEY ALDRICH

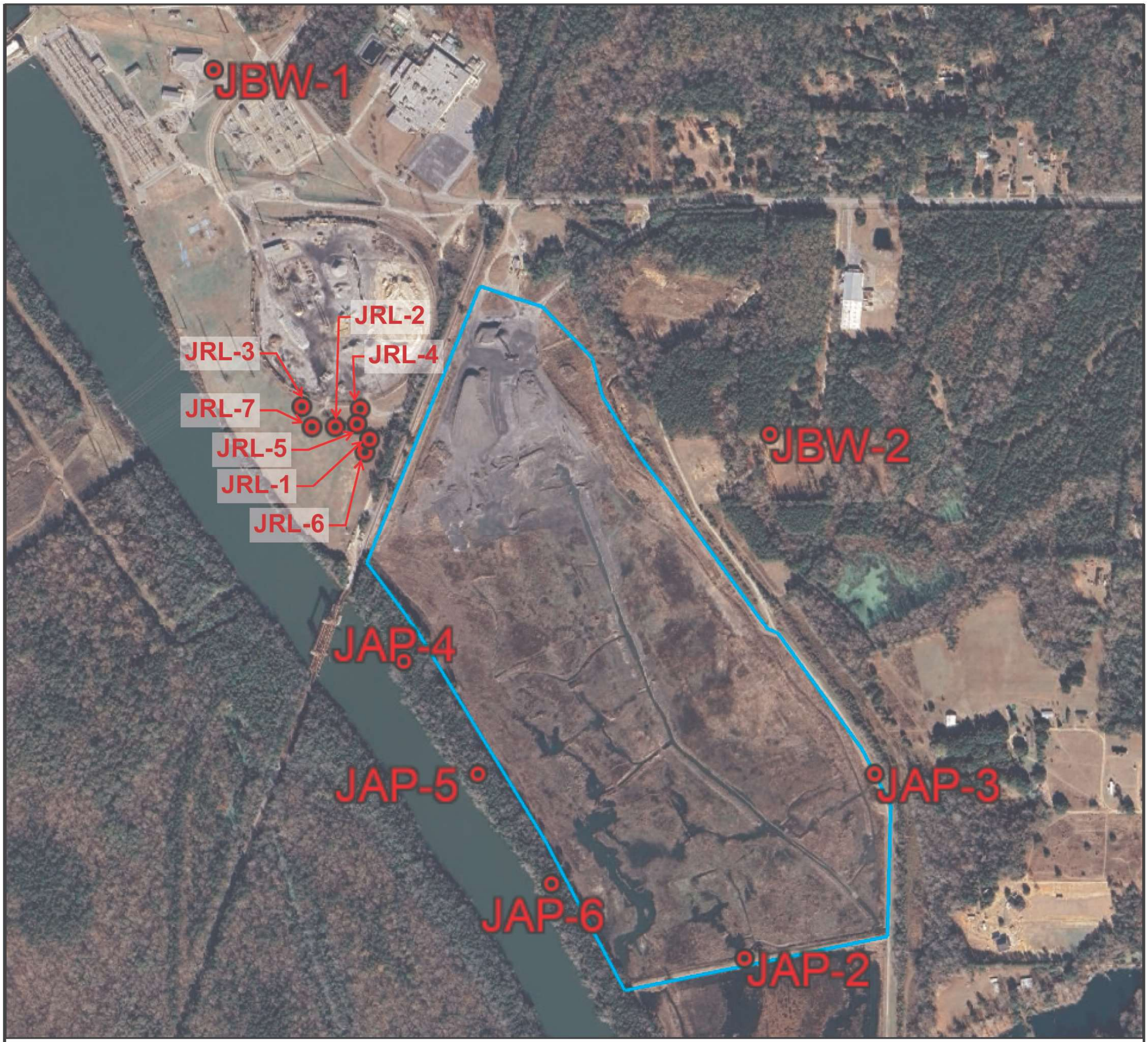
SANTEE COOPER
JEFFERIES GENERATING STATION
MONCKS CORNER, SOUTH CAROLINA

## SITE LOCATION MAP

APPROXIMATE SCALE: 1IN = 2,000 FT
NOVEMBER 2025

FIGURE 1

GIS FILE PATH: \\haleyaldrich.com\share\grn common\131539 - Santee Cooper\GIS\Maps\2025 02\132892 103 0001 SITE LOCATION MAP.mxd — USER: tciskowski — LAST SAVED: 2/12/2025 1:47:07 PM



LEGEND

● BORING/PIEZOMETER

NOTES:

1. Phase 1 and 2 borings and wells were performed by Santee Cooper in November 2024 and March 2025, respectively.

2. Boring and location data as shown was provided by Santee Cooper.

HALEY ALDRICH

SANTEE COOPER
JEFFERIES GENERATING STATION
MONCKS CORNER, SOUTH CAROLINA

WELL AND BORING LOCATION PLAN
(2024-2025 SANTEE COOPER PROGRAM)

NOVEMBER 2025

FIGURE 2

# APPENDIX A

## Boring Logs – Ash Pond A

| | | | |
|---|---|---|---|
| **Boring ID:** | **JBW-1** | **Logged by:** | M. Goings (Santee Cooper) |
| **Date:** | Not Recorded | **Site:** | Jeffries Generation Station Pond A |
| **Type:** | HAS | | |
| **Coordinate** | N83SP SC ft | **Northing** | 514,973.85 |
| **GS El. (ft)** | 25.24' | **Easting** | 2,309,656.59 |

**Depth to Water Table at time of Drilling** 19.5

**Depth to Water Table at time of Well Installation** Not Recorded

| Depth ft bls | Blow counts | Description | Comments |
|---|---|---|---|
| 0-6 | NA | | Since up near the warehouse and possible chance of utilities, hand auger before starting to split spoon soil sampling. However, hit "refusal" in first 2 attempts. Seemed to be at least chunks of concrete, so had station personnel come out to confirm that there was not any structures. Appears to just be pieces of rock and concrete dumped in this area, maybe to level it out. Practically had to dig out to get to 6 ft bls to start drilling. |
| 6-8 | 2/3/5/11 | **Clay,** Grayish green (10 GY 5/2) with Dark yellowish oragne 910 YR 6/6) "spots". Very Fat Clay. Dry. Last 0.4 ft is very fine sand to silty **Clay**. Yellowish gray (5 Y 7/2) . Moist. | |
| 8-10 | 5/5/5/5 | **Clay** with very fine to fine sand and silt. Grayish orange (10 YR 7/4). Crumbles. Moist. | |
| 10-12 | 2/3/4/5 | **Clay** as above. Mottled moderate olive brown (5 Y 4/4) and Light olive brown (5 Y 5/6). Micas. Crumbly. Moist. | Driller said water at 10 ft bls. |
| 12-14 | 3/4/6/7 | **Clay,** as above. Greenish brown colors, but does have some darker spots/laminae. | |
| 14-16 | 5/6/8/10 | **Clay,** as above. | |
| 16-18 | 8/15/14/26 | Clayey, silty fine to medium **Sand.** Same mottled colors as above. Moist. | |
| 18-20 | 6/6/10/8 | **Sand,** as above. Saturated at the bottom 0.5 ft. | |
| 20-22 | 8/11/8/50/2 | **Sand,** as above. Less clay, not as plastic. Saturated. | |
| 22-24 | 19/12/11/16 | **Sand,** as above. Top 6 inches is somewhat cemented. | |
| 24-26 | '6/5/6/8 | **Sand**, as above. Tottally saturated. | |
| | | At 24.8 ft, **Clay.** No visible silt or sand (except in tiny laminae), Waxy appearance. Light olive gray (5 Y 5/2) to Grayish Olive (10 Y 4/2). | Soaking wet. Drillers took at 30 minute lunch, and dept to water 13 ft bls. |

**Total Depth drilled depth at 25 ' bls**

**Well Specifications (11/20/24)**

**Screen from 15 to 25 ' bls**
**Sand from 10 to 25 ' bls**
**Bentonite Chips from 8 to 10 ' bls**
**Portland Cement from 0 to 8 ' bls**
**Above ground surface completion with protective bollards.**

**Boring ID:** **JBW-2**
**Date:** Not Recorded
**Type:** HAS
**Coordinate** N83SP SC ft
**GS El. (ft)** 55.6

**Logged by:** M. Goings (Santee Cooper)
**Site:** Jeffries Generation Station Pond A
**Northing** 513,065.6
**Easting** 2,312,646.1
**Depth to Water Table at time of Drilling** Not Recorded
**Depth to Water Table at time of Well Installation** Not Recorded

| Depth ft bls | Blow counts | Description | Comments |
|---|---|---|---|
| 0-6 | NA | Fine to medium **Sand** with little silt. Light brown (5 YR 5/6). Loose. Dry. | Hand Auger down to 6 ft bls to start drilling and split spoon soil sampling. |
| 6-8 | 5/9/8/9 | **Sand**, as above. | |
| | | 6.7-8' silty, fine sandy **Clay.** Grayish orange pink (5 YR 7/2) with some mottled Moderate reddish brown (10 R 4/6). Dry. | |
| 8-10 | 4/4/8/8 | Only 1.5 ft recovery. **Clay**, as above, but graded with little silt and almost no sand. Fatter clay. Dense. Dry. | |
| 10-12 | 4/7/13/20 | **Clay**, as above. Still mottled color. Very dense. Dry. | |
| 12-14 | 6/9/7/6 | Only 1.5 ft recovery. Top 0.3 ft is **Clay,** as above. Then **Sand**, fine to very coarse with some rounded pebbles, some silt and very little clay. Mottled Moderate reddish brown (10 R 4/6), Dark yellowish orange (10 YR 6/6), and Grayish orange (10 YR 7/4). Definitely moist. | Driller said hit water at 13 ft bls. |
| 14-16 | 3/6/4/4 | Top 1.2 ft is **Sand**, as above. Then start to get **Clay** lenses (Yellowish gray (5 Y 7/2)) in the **Sand**. | |
| | | 15.2-16' **Clay** with some silt in stringers**.** Yellowish gray (5 Y 7/2). Fat. Dense. | |
| 16-18 | 2/2/4/5 | 16-17.2'---mottled clayey, silty **Sand,** as above at 12.3 ft. Some larger, pebble sized grains. Some clay in lenses, as well as matrix. | |
| | | 17.2-17.5'-- **Clay,** Light olive gray (5 Y 5/2) with some stringers of Light olive brown (5 Y 5/6) and Dark yellowish brown (10 YR 4/2). Dense. Breaks at silty lenses/stringers. | |
| | | 17.5-18'-- **Clay** with silt and fine to medium sand in matrix. Grayish olive (10 Y 4/2). Micas. A few large, anglular pieces of quartz. Then grades back to **Clay** at 17.2 ft with some lenses of silt and very fine **Sand**. | This seems to be the "transition zone". |
| 18-20 | 2/7/11/15 | Top 0.5 ft is **Clay**, as above. No pebbles or pieces of quartz, but some lenses or stringers of silt and sand. | |
| | | 18.5 to 20'-- **Clay dense** with enough silt to make it crumbly vs plastc. Light olive brown (5 Y 5/6). Almost powdery when rubbed between fingers. | |
| 20-22 | 6/13/27/40 | Brown **Clay**, as above. | |
| 22-24 | 7/11/20/41 | Brown **Clay**, as above. | |

**Total Depth drilled depth at 24 ' bls**

**Well Specifications (11/20/24)**

**Screen from 14 to 24 ' bls**
**Sand from 9 to 24 ' bls**
**Bentonite Chips from 7 to 9 ' bls**
**Portland Cement from 0 to 7 ' bls**
**Above ground surface completion with protective bollards.**

| | | | |
|---|---|---|---|
| **Boring ID:** | **JAP-2** | **Logged by:** | M. Goings (Santee Cooper) |
| **Date:** | Not Recorded | **Site:** | Jeffries Generation Station Pond A |
| **Type:** | HAS | | |
| **Coordinate** | N83SP SC ft | **Northing** | 510,274.9 |
| **GS El. (ft)** | 16.4 | **Easting** | 2,312,599.3 |

**Depth to Water Table at time of Drilling** 9.0

**Depth to Water Table at time of Well Installation** Not Recorded

| Depth ft bls | Blow counts | Description | Comments |
|---|---|---|---|
| 0-6 | NA | | Since no chance of utilities on the dike, drill down to 6 ft bls to start split spoon soil sampling. |
| 6-8 | 3/2/1/2 | **Clay,** probably fill. Tree roots and organic material in it. Some fine sand and silt, in matrix. Moderate yellowish brown (10 YR 5/4). Plastic. Moist. | |
| 8-10 | 1/1/3/3 | Only 1.5 ft recovery---Fat **Clay,** very plastic, no silt or sand. Dark color, Olive gray (5 Y 3/2) to Dusky yellow brown (10 YR 2/2). | |
| 10-12 | 3/3/4/4 | **Clay** with some silt and very fine sand in stringers, but Fat **Clay**, plastic, mottled Light olive gray (5 Y 5/2) and Dark yellowing orange (10 YR 6/6). | |
| 12-14 | 4/3/3/7 | **Clay,** as above, but at 13.4 ft, approximately 3 inch lense of medium **Sand** with silt and clay. Olive gray (5 Y 3/2). Then back to **Clay**, and back to another 3 inch lense of a better medium to coarse **Sand** with some silt and little clay in matrix. And back to a tan colored **Clay** with some silt and sand. Dusky yellow (5 Y 6/4) to Light olive brown (5 Y 5/6). | |
| 14-16 | 5/11/19/27 | Olive gray (5 Y 3/2) **Sand**, as above, in first half foot. Then back to tan **Clay, as above,** with silt and very fine sand in matrix. | Split spoon is wet. |
| 16-18 | 10/16/39/27 | Tan, silty **Clay,** as above. Friable, not as plastic. Just crumbles. | |
| 18-20 | 3/6/12/15 | Top 1 ft is tan **Clay**, as above, with some shell pieces. Then grades to more dense and plastic with less very fine sand, but some silt. | Split spoon is wet. |
| 20-21.7 | NA | **Shelby Tube** | Lifted the rig up when attempted to push this Shelby Tube. Crushed the end of the tube, but sealed up as best we could. |
| 22-24 | 5/6/7/8 | **Clay**, as above. Top foot is silty and very fine sandy with some shell fragments, but the bottom is silty **Clay** with no sand. | Soupy, sloppy "cuttings" coming up out of the hole. Definitely in water. After drilling to 24 ft, let hole site while drillers went to lunch and tagged depth to water at 9 ft bls. |

**Total Depth drilled depth at 24 ' bls**

**Well Specifications (11/19/24)**

**Screen from 14 to 24 ' bls**
**Sand from 9 to 24 ' bls**
**Bentonite Chips from 7 to 9 ' bls**
**Portland Cement from 0 to 7 ' bls**
**At surface completion/manhole since in the middle of the dike.**

**Boring ID:** **JAP-3**
**Date:** Not Recorded
**Type:** HAS
**Coordinate** N83SP SC ft
**GS El. (ft)** 15.7

**Logged by:** M. Goings (Santee Cooper)
**Site:** Jeffries Generation Station Pond A
**Northing** 511,263.4
**Easting** 2,313,223.9
**Depth to Water Table at time of Drilling** 24.0
**Depth to Water Table at time of Well Installation** Not Recorded

| Depth ft bls | Blow counts | Description | Comments |
|---|---|---|---|
| 0-6 | NA | | Hand Auger down to 6 ft bls to start drilling and split spoon soil sampling. |
| 6-8 | 5/5/8/10 | Fat **Clay** with fine to medium sandy, silty stringers. Mottled yellowish gray (5 Y 7/2) and moderate yellowish brown (10 YR 5/4). Micas. Dry. | |
| 8-10 | 4/4/4/7 | 8-9.5' **Clay,** silty very pale orange (10 YR 8/2. Dry, almost powdery. | |
| | | 9.5-10' silty, very fine sandy **Clay.** Moderate brown (5 YR 4/4). Moist. Crumbles. | |
| 10-12 | 2/2/6/10 | Silty, very fine sandy **Clay**. Light olive (10 R 4/6) with some yellowish gray (10 Y 5/4). Dry. Still crumbles. | |
| 12-14 | 6/28/39/34 | Silty, very fine **Sand** with some clay. Light olive brown (15 Y 5/6). Dry. Not as consolidated. | |
| 14-16 | 6/9/10/20 | **Clay** with some silt and very fine sand in matrix. Light olive gray (5 Y 5/2). Moist. | |
| 16-18 | 8/14/30/39 | **Clay,** as above. | Difference in blow counts could be because they had to work on the hammer. |
| 18-20 | 4/8/11/29 | **Clay**, as above. Maybe more clay/less silt and sand. Mica. More Moist. | |
| 20-22 | 3/12/14/39 | **Clay**, as above at 16 to 18 ft. Still moist, but crumbles, more friable. | |
| 22-24 | 4/7/10/15 | **Clay**, as above has graded more silt, very fine sand and mica. Still Light olive gray (5 Y 5/2). Dense. Well consolidated. Some darker mineral "spots" and possible fossils/shells. | |
| 24-26 | 9/11/24/34 | **Clay,** as above. | |
| 26-28.3 | NA | **Shelby Tube** | Broke bolt off so tried to fish it out of the hole. Ended up tripping everything out of the hole because the tube was wedged in the HAS. Was able to push and twist it out so it could be sealed properly. Let hole site overnight. |
| 28-30 | 17/27/27/23 | **Clay**, but less consolidated, less clay. Moist. Color still Light olive gray (5 Y 5/2) to Grayish olive (10 Y 4/2). | Approximately 0.3 ft of water in the borehole so continue soil sampling. |
| 30-32 | 5/9/12/24 | Very fine **Sand** with silt and clay in matrix. | Definitely wet at 31 ft bls and coming up wet out of the HSA. |
| 32-34 | 3/7/11/14 | Fine **Sand** with silt and some clay in stringers. | Even the split spoon is dripping water. |
| 34-36 | WOH/19/14/36 | **Sand,** as above. | |
| 36-38 | 6/50/25/19 | **Clay**, with some silt and fine to very fine sand. Still Light olive gray (5 Y 5/2). Last half foot (37.5 to 38 ft bls) is a Very dDense, Fat Clay with no silt or sand. | |

**Total Depth drilled depth at 38 ' bls**

**Well Specifications (11/19/24)**

**Screen from 28 to 38 ' bls**
**Sand from 26 to 38 ' bls**
**Bentonite Chips from 24 to 26 ' bls**
**Portland Cement from 0 to 26 ' bls**
**Above ground surface completion with protective bollards.**

**Boring ID:** **JAP-4**
**Date:** Not Recorded
**Type:** HSA
**Coordinate** N83SP SC ft
**GS El. (ft)** 39.07

**Logged by:** M. Goings (Santee Cooper)
**Site:** Jeffries Generation Station Pond A
**Northing** 511,841.58
**Easting** 2,310,703.41
**Depth to Water Table at time of Drilling** 32
**Depth to Water Table at time of Well Installation** Not Recorded

| Depth ft bls | Blow counts | Description | Comments |
|---|---|---|---|
| 0-2 | 3/3/4/6 | Top 6 inches is organic material. | Continuous Split Spoon from ground surface. |
| | | 0.5 ft.--**Sand**, very fine, silty, clayey. Pale yellowish brown (10 YR 6/2) to moderate yellowish brown (10 YR 5/4). White flecks. Consolidated, but friable. Disentigrates when touching. Dry to moist. | |
| 2-4 | 6/5/5/7 | **Sand**, as above. | |
| 4-6 | 2/4/5/7 | **Sand**, as above. | |
| 6-8 | 6/8/9/9 | **Sand**, as above. | |
| 8-10 | Shelby Tube | | Shelby Tube from 8 to 10 ft. Actually only got 23 inches because so hard. The rig was "standing up". Can still see the brown "bluff" material at the bottom of the tube. |
| 10-12 | 1/3/6/9 | Same **Sand**, as above, but do have white (N9) to pinkish gray (5 YR 8/1) cemented area from 11-11.2 bgs (put in a jar). | |
| 12-14 | 2/4/7/9 | Same **Sand,** as above/ Another 2 inch section of the white at 13.5 ft, but not cemented. Starting to see some mottling of colors. Dark yellowish orange (10 YR 6/6) and very pale orange (10 YR 8/2) added. | |
| 14-16 | 2/3/4/8 | **Sand,** as above. | |
| 16-18 | 5/9/8/14 | A transition zone. Starting to see more **Clay** come in at 16.8 ft. Lenses of Pale olive (10 Y 6/2) and more light olive gray (5 Y 5/2) at 17.5 ft. | |
| 18-20 | 3/5/9/10 | Still alternating/transition zone. Silty, clayey fine **Sand,** from above with plastic **Clay** lenses (approximately 2 inches) of Pale Olive (10 Y 6/2) and Pale yellowish brown (10 YR 6/2). | |
| 20-22 | 1/6/5/6 | As above, transitioning, but at 21 ft, mainly the Pale olive **Clay**, waxy in appearance (put a sample in a jar). | |
| 22-24 | 2/6/7/7 | **Clay**, as above is grading to more silty, very fine sandy **Clay** with more light olive gray (5 Y 5/6) to Moderate olive brown (5 Y 4/4) versus the light pale olive (10 Y 6/2). Consolidated. Moist. | |
| 24-26 | 2/3/7/6 | More silty, very fine sandy **Clay** (or clayey, silty very fine **Sand**). Consolidated. Moist (but rods are not wet) to 25.5 ft. Then the light pale olive (10 Y 6/2) is back in 2 inch lenses. | |
| 26-28 | 3/8/24/50 | Top 4 inches is as above. Then Clay with some silt and very fine sand in some stringers, but otherwise, uniform and plastic. Then at 27 ft there is pale olive (10 Y 6/2) **Clay**, and at 27.1 ft, some **bark and wood** (a tree) (10 inches of wood/tree preserved). 28 to 29.3 ft--Pale olive **Clay** and then another tree. | (10 inches of wood/tree preserved) |
| 28-30 | Not recorded | Top ft is silty, sandy **Clay**. Moderate brown (5 YR 4/4) but bands of color. Consolidated. Then grades back to **Sand,** as above at 28 ft. with stringers of the light olive gray clay. Loose and dray. | |
| 30-32 | 5/1/1/1 | 4.5 inches of the mottled green and tan **Clay** from above (Light olive gray (5 Y 5/2) and Moderate yellowish brown (10 YR 5.4)). With some roots and organic material in it. Then 4 inches of "bark" or decaying organic material, and then wood. | |
| 32-34 | 0/0/2/2 | **Sand**. Starts out fine with some silt in matrix. Light brown gray (5 YR 6/1) to brownish gray (5 YR 4/1). Saturated to flowing. Then at 33 ft, more large to coarse sand with very little silt (if any). Then at 33.5 f, back to the finer sand again. | |
| 34-36 | 1/1/1/8 | Alternating **Sand**, as above. Fine Sand for the first foot. Then back to the coarser Sand with some very coarse to pebbles. Then at 35.75 ft, back to finer Sand and some bark at the end of the shoe. | |
| 36-38 | 2/2/2/2 | Same fine **Sand**, as above to 36.5 ft. Saturated. Then sticky, plastic **Clay** with little to no silt or sand. Dense. | Drilled out to 50 ft bls, planning to set screen from 40 to 50 ft, but difficulty reaching that so set from 39 to 49 ft. |

**Total Depth drilled depth at 38 ' bls**

**Well Specifications (3/13/25)**

**Screen from 33 to 38 ' bls**
**Sand from 30 to 38 ' bls**
**Bentonite Chips from 28 to 30 ' bls**
**Portland Cement from 0 to 28 ' bls**
**Above ground surface completion with protective bollards.**

Note: took a LOT of sand, probably due to void form 31 to 32 ft.

**Boring ID:** **JAP-5PZ**
**Date:** Not Recorded
**Type:** HSA
**Coordinate** N83SP SC ft
**GS El. (ft)** 42.2

**Logged by:** M. Goings (Santee Cooper)
**Site:** Jeffries Generation Station Pond A
**Northing** 511,244.77
**Easting** 2,311,105.24
**Depth to Water Table at time of Drilling** Not encountered
**Depth to Water Table at time of Well Installation** 53.9

| Depth ft bls | Blow counts | Description | Comments |
|---|---|---|---|
| 0-2 | 1/4/5/6 | **Sand,** very fine, silty clay. Pale yellowish brown (10 YR 6/2) and moderate yellowish brown (10 YR 5/4). Consolidated, but friable. Powdery. Dry. Hard Drilling. | Continuous Split Spoon from ground surface. Hard Drilling |
| 2-4 | 6/6/8/8 | **Sand**, as above. | Drill down to 5 ft to attempt shelby tube. |
| 5-7 | Shelby Tube | | Shelby Tube from 5-7 ft. Sealed and secured for analysis. |
| 8-10 | 2/3/5/6 | Same **Sand,** as above to 8.6 ft---less clay, not as consolidated. Silty, very fine **Sand.** Powdery. Dry. Looks brownish when comparing to color chart, but "cuttings" or powder coming up has a greenish tint. | Drill down to 8 ft to continue split spoon. Loose in the split spoon. |
| 10-12 | 2/2/5/6 | **Sand**, as above. | |
| 12-14 | 4/4/5/7 | Same **Sand,** as above. Does have some more consolidated lenses in the splitspoon. | |
| 14-16 | 3/6/8/7 | **Sand**, as above. | |
| 16-18 | 10/16/14/13 | **Sand**, as above. | |
| 18-20 | 2/6/8/11 | **Sand**, as above. | |
| 20-22 | 3/6/13/19 | Same, as above. But transitioning to more **Clay**/cohesive. Very fine to fine sand with some larger grains and silt. Mottled colors--Pale yellowish brown (10 YR 6/2), light brown (5 YR 5/6) and dark yellowish orange (10 YR 4/2). Micas. Not as dry. | |
| 22-24 | 3/4/7/11 | **Clay**, as above. Micas. | |
| 24-26 | 2/5/8/10 | **Clay**, as above, more sandy. Less consolidated. Same colors. | |
| 26-28 | 6/6/8/8 | **Clay** with some silt and fine to medium sand in occasional stringers. Yellowish orange (5 Y 7/2) to pale yellowish brown (10 YR 6/2) to pale brown (5 YR 5/2). Micas. Some shells. | |
| 28-30 | 5/6/7/9 | **Clay**, as above. | |
| 30-32 | 2/5/5/7 | **Clay**, as above. | |
| 32-34 | 8/5/8/5 | Not 100% recovery, but at 32.5 ft--end of **Clay** from above. 1 inch of **Sand**, fine to coarse. Mottled moderate brown (5 YR 4/4), pale yellowish brown (10 YR 6/2) and moderate reddish brown (10 R 4/6). Then 1 inch of light sand, fine to very coarse with some pebbles. No silt or clay. Dusky brown (5 YR 2/2). Then Dusky brown (5 YR 2/2) **Clay** and moderate reddish brown (5 YR 4/4) stringers. Dense. Moist. | |
| 34-36 | 3/6/7/6 | **Clay**. Grayish olive (10 Y 4/2) to Olive gray (5 Y 3/2). Dense with some lenses of large quartz grains. Organic material (roots) and shells. | |
| 36-38 | 5/7/9/6 | **Clay**, as above at 34 ft. | |
| | | At 37.3 ft, **Sand**. Coarse with little silt and clay (for color). Olive gray (5 Y 3/2). Grades to fine to medium (3 inches). | |
| 38-40 | 6/12/13/16 | Back to **Clay**. Light olive gray (5 Y 5/2) to moderate olive gray (5 Y 4/4). Dense and well consolidated. Some silt and very fine sand doesn't impact the clay features. Mica and some dark spots. | |
| 40-42 | 5/5/18/22 | **Clay**, as above. | |
| 42-44 | 8/8/10/17 | **Clay**, as above. | |
| 44-46 | 8/10/18/9 | **Clay**, as above. | |
| 46-48 | 8/10/22/35 | **Clay**, as above. Maybe some more silt and fine sand. | |
| 48-50 | 7/8/13/27 | Clayey, silty **Sand**, very fine. Same colors. Moist. | |
| 50-52 | 0/0/7/15 | **Sand**, as above. | Although moist, still no water on the rods. |
| 52-54 | 0/6/9/16 | **Sand**, as above. | |
| 54-56 | 7/44/20/16 | **Sand**, as above until 55 ft. **Clay.** Waxy. Little to no silt or sand. Light olive gray (5 Y 5/2). Micas. | |
| 56-58 | 5/8/14/50/5 | **Clay**. As above. Waxy. No silt or sand. | |
| 58-60 | '4/8/12/19 | **Clay**, as above. | |
| 60-62 | Shelby Tube | | Shelby Tube from 60-62 ft, but crumbled. Still sealed up. Drilled out to 62 ft and left 45 ft of augers in the hole. Hoping water will come in. Checked on 3/12/25 at 0730, and WL was 53.9 ft bgs. |

**Total Depth drilled depth at 60 ' bls**

**Well Specifications (3/13/25)**

**Screen from 50 to 55 ' bls**
**Sand from 47 to 55 ' bls**
**Bentonite Chips from 45 to 47 ' bls**
**Portland Cement from 0 to 45 ' bls**
**Above ground surface completion with protective bollards.**

**Boring ID:** JAP-6

**Logged by:** M. Goings (Santee Cooper)

**Date:** Not Recorded

**Site:** Jeffries Generation Station Pond A

**Type:** HSA

**Coordinate** N83SP SC ft

**Northing** 510664.7

**GS El. (ft)** 43.33

**Easting** 2,311,504.80

**Depth to Water Table at time of Drilling** 40

**Depth to Water Table at time of Well Installation** Not Recorded

| Depth ft bls | Blow counts | Description | Comments |
|---|---|---|---|
| 0-2 | 6/7/9/9 | **Sand,** fine, silty, no clay. Pale yellowish brown (10 YR 6/2) and moderate yellowish brown (10 YR 5/4). Consolidated, but friable when mashed. Dry. | Continuous Split Spoon from ground surface. |
| 2-4 | 5/6/7/4 | **Sand**, as above. | |
| 4-6 | 4/3/5/6 | **Sand**, as above. | |
| 6-8 | 6/6/10/6 | **Sand**, as above. | |
| 8-10 | 3/6/8/12 | **Sand**, as above. | Getting "harder". Steam coming off the augers when they pull them up. |
| 10-12 | 16/14/9/10 | 10 to 10.5 ft--Same, as above. | |
| | | approximately 10.5 to 11 ft., fine to very fine **Sand**. hard, very pale orange (10 YR 8/2) to pale yellowish brown (10 YR 6/2). Almost cemented. Broke into pebble-sized pieces.. | |
| | | at 11 ft, **Sand**, less "cemented" or dry as before at 10.5 ft. Some clay with silt. Mottled pale yellowish brown (10 YR 6/2), light brown (5 YR 5/6), dark yellowish brown (10 YR 4/2). | |
| 12-14 | 5/8/9/10 | Same **Sand,** as above at 11 ft. | |
| 14-16 | 7/10/10/10 | **Sand,** as above. Some "cemented" lenses. | |
| 16-18 | 9/9/17/23 | **Sand**, fine to very fine, silty, dry. Pale yellowish brown (10 YR 6/2) to moderate yellowish brown (10 YR 5/4). Still just crumbles when you apply pressure. Like powder. | |
| 18-20 | 3/7/9/10 | **Sand**, as above. | |
| 20-22 | 8/11/11/11 | **Sand**, as above. | |
| 22-24 | 1/7/11/17 | **Sand**, as above. | |
| 24-26 | 7/11/10/18 | **Sand**, as above, maybe a little more mottling and mica. | |
| 26-28 | 11/9/11/10 | **Sand**, as above, to approximately 27 ft. Then 3 inches of **Clay**, light olive gray (5 Y 5/2). Dense. Then **Sand**, fine to medium with silt and clay from above. Mottled dark yellowish orange (10 YR 6/6), light brown (5 YR 5/6) and light olive gray (5 Y 5/2), micas, moist. | |
| 28-30 | 4/4/6/8 | Top ft is silty, sandy **Clay**. Moderate brown (5 YR 4/4) but bands of color. Consolidated. Then grades back to **Sand,** as above at 28 ft. with stringers of the light olive gray clay. Loose and dray. | |
| 30-32 | 3/3/5/9 | **Clay** with fine sand and silt stringers. Mottled pale brown (5 YR 5/2), pale yellowish brown (10 YR 6/2), moderate brown (5 YR 4/4), and light olive gray (5 Y 5/2). Consolidated, but breaks apart with stringers. | |
| 32-34 | 6/6/6/3 | **Clay**, as above. More "green". | |
| 34-36 | 2/3/4/7 | **Clay**, as above. More "green". | |
| | | At 34.2-35 ft, color change to dark olive gray (5 Y 4/1) medium sandy, silty **Clay**, in matrix. Consolidated. Micas. Moist. | |
| | | At 35 ft, **Clay**, light olive gray (5 Y 6/1) less silt and fine to medium sand. Plastic. Waxy. Moist. | |
| 36-38 | 1/7/8/14 | More of the dark, greenish **Clay**, as above. Light olive gray (5 Y 6/1) to Olive gray (5 Y 4/1) | |
| 38-40 | 13/19/26/28 | Top 6 inches **Clay**, as above. Then **Sand**, medium ot coarse. 1 to 2 inch bands of color (Yellowish gray (5 Y 7/2), vary pale orange (10 YR 8/2) and grayish orange pin (10 R 8/2)). Looks "white" and "gray". | No water in the hole after lunch. |
| 40-42 | 3/11/18/22 | **Sand**, as above, maybe coarser. Almost no silt or clay. Less "banding" of colors, Very pale orange (10 YR 8/2) to grayish orange pink (5 YR 7/2). Saturated. | |
| 42-44 | 6/8/8/10 | **Sand**, as above. Coarse. Micas and white specs. Moist. | |
| 44-46 | 1/2/2/3 | **Sand**, as above. Saturated. | |
| 46-48 | 4/2/4/6 | **Sand**, as above. Only 50% recovery. | |
| 48-50 | 7/5/7/8 | **Sand**, as above. Last 1 inch is getting darker and more clay. | Drilled out to 50 ft bls, planning to set screen from 40 to 50 ft, but difficulty reaching that so set from 39 to 49 ft. |

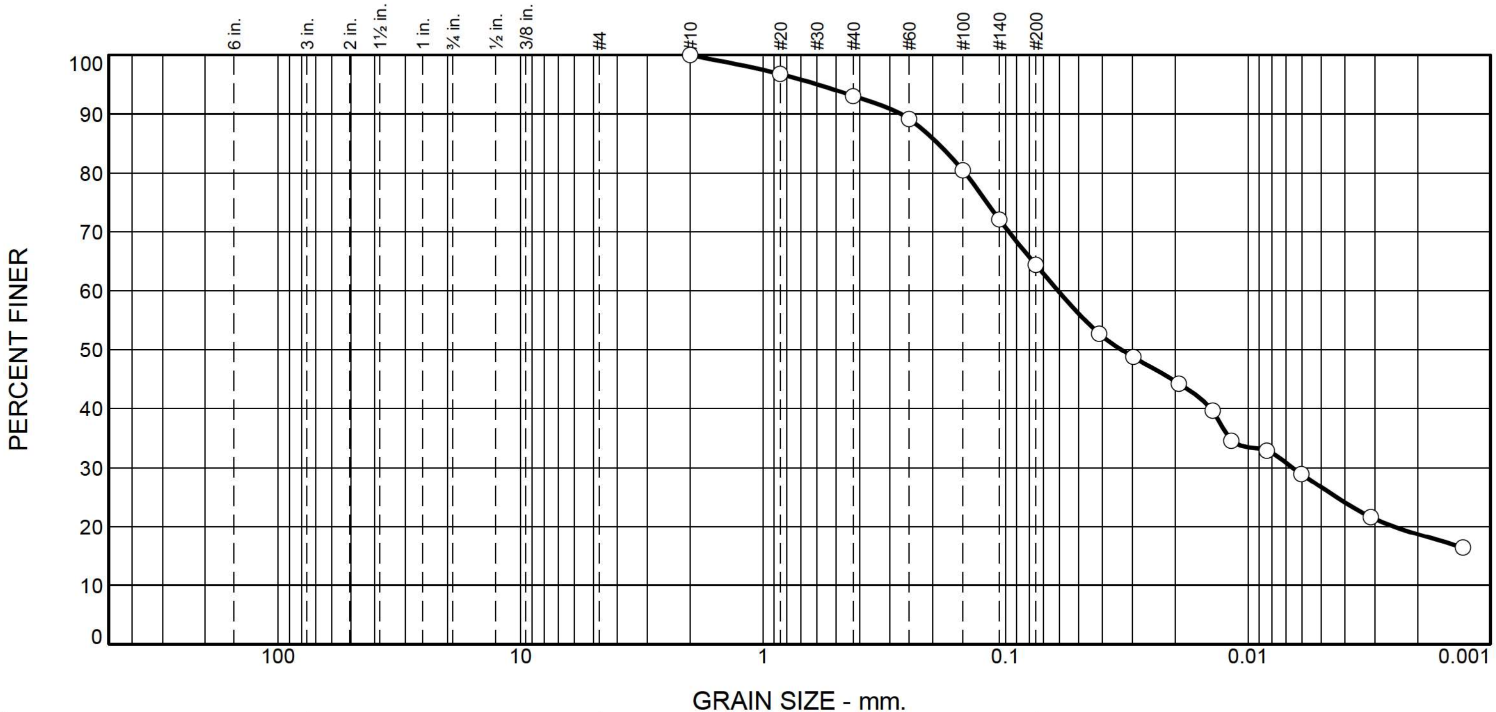
**Total Depth drilled depth at 50 ' bls**

**Well Specifications (3/11/25)**

**Screen from 39 to 49 ' bls**
**Sand from 37 to 49 ' bls**
**Bentonite Chips from 35 to 37 ' bls**
**Portland Cement from 0 to 35 ' bls**
**Above ground surface completion with protective bollards.**

# APPENDIX B
## Laboratory Data Reports

# Particle Size Distribution Report



<table>
<tr><th rowspan="2">% +3"</th><th colspan="2">% Gravel</th><th colspan="3">% Sand</th><th colspan="2">% Fines</th></tr>
<tr><th>Coarse</th><th>Fine</th><th>Coarse</th><th>Medium</th><th>Fine</th><th>Silt</th><th>Clay</th></tr>
<tr><td>0.0</td><td>0.0</td><td>0.0</td><td>0.0</td><td>7.0</td><td>28.6</td><td>45.8</td><td>18.6</td></tr>
</table>

**Test Results (ASTM D6913 & D1140, ASTM**

| Sieve Size or Diam. (mm.) | Finer (%) | Spec.* (%) | Out of Spec. (%) |
|---|---|---|---|
| #10 | 100.0 | | |
| #20 | 96.8 | | |
| #40 | 93.0 | | |
| #60 | 89.1 | | |
| #100 | 80.4 | | |
| #140 | 72.1 | | |
| #200 | 64.4 | | |
| 0.0411 mm. | 52.7 | | |
| 0.0297 mm. | 48.7 | | |
| 0.0193 mm. | 44.2 | | |
| 0.0140 mm. | 39.7 | | |
| 0.0117 mm. | 34.5 | | |
| 0.0084 mm. | 32.8 | | |
| 0.0060 mm. | 28.9 | | |
| 0.0031 mm. | 21.6 | | |
| 0.0013 mm. | 16.3 | | |

* (no specification provided)

## Material Description

Sandy Silt

## Atterberg (ASTM D4318)

**PL=** NP **LL=** NP **PI=** NP

## Coefficients

**$D_{90}$=** 0.2714 **$D_{85}$=** 0.1903

**$D_{60}$=** 0.0608 **$D_{50}$=** 0.0333

**$D_{30}$=** 0.0066 **$D_{15}$=**

**$D_{10}$=**

**$C_u$=** **$C_c$=**

## Sieve Test (ASTM D6913 & D1140)

**Test Date:** 4.18.25 **Technician:** T. Hyodo

**Test Notes**

## Hydrometer Test (ASTM D7928)

**Test Date:** 4.16.25 **Technician:** M. Moore

**Test Notes**

## USCS (ASTM D2487)

ML

**Date Sampled:** 3.11.25
**Date Received:** 3.25.25
**Checked By:** M. Moore
**Title:** Lab Manager

**Source of Sample:** Jeffries Generating Station **Depth:** 19.0-24.0'
**Sample Number:** JAP-2

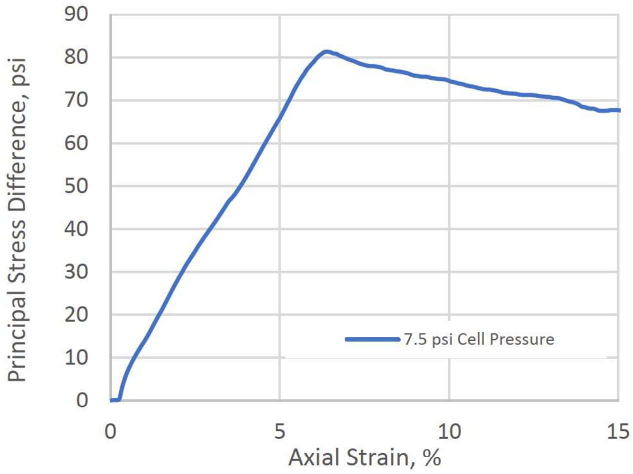
CERTERRA
INSIGHT GROUP

**Client:** Santee Cooper
**Project:** Santee Cooper Testing Services
**Project No:** 24-0052 **Figure**

# Isotropically Unonsolidated
# Undrained Triaxial Compression Test

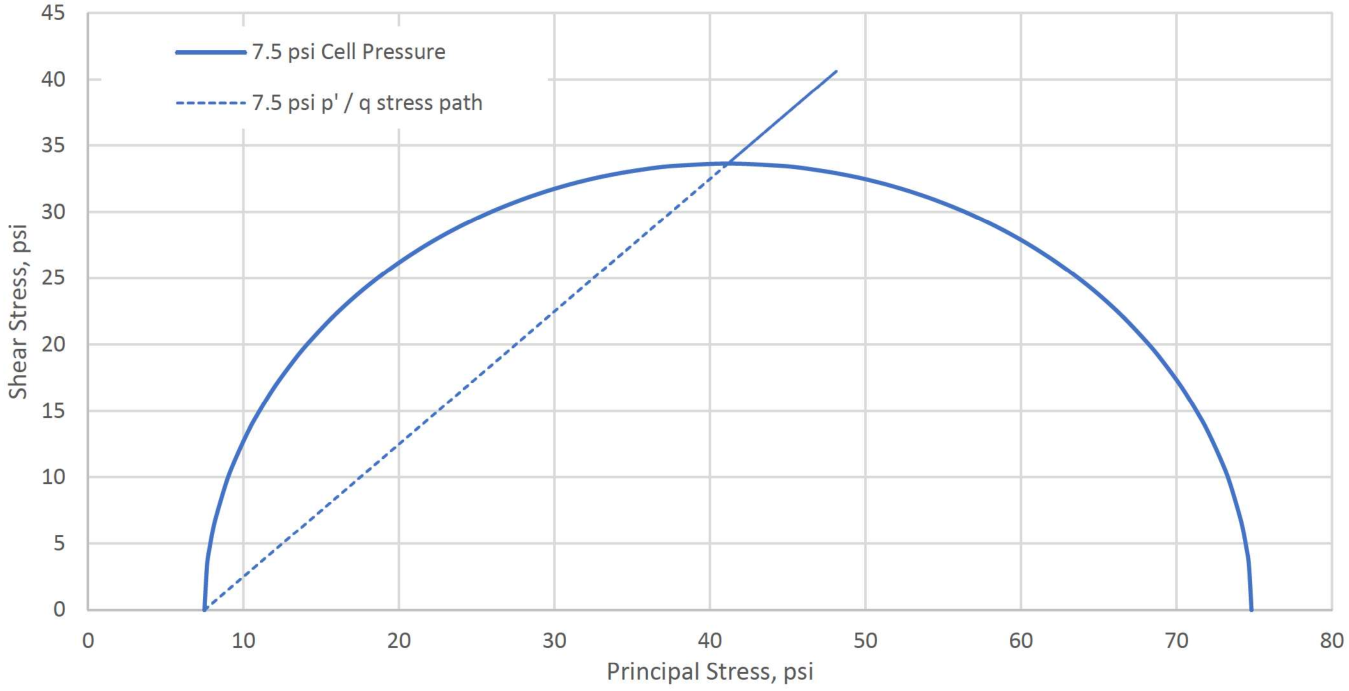
Project Name: Jeffries Generating Station LL: NP
Project Number: 24-0052 Santee Cooper PI: NP
Sample ID: JAP-2 (19.0-24.0') % -200: 64.4%
Description: Sandy Silt (ML)
Sample Type: Undisturbed Assumed SG: 2.65
Saturation Method: Wet Strain Rate: 0.05
Failure Criterion: Max Deviator Stress or 15% Strain

| Specimen | 1 |
|---|---|
| Initial Dry Unit Weight, pcf | 13.6 |
| Initial Void Ratio | 11.18 |
| Initial Water Content, % | 27.2% |
| Initial Saturation, % | 43.3% |
| Initial Height, in | 5.86 |
| Initial Diameter, in | 2.85 |
| Parameter B | N/A |
| Total Back Pressure, psi | 0.0 |
| Effective Consolidation Stress, psi | 7.5 |
| **Conditions at Failure** | |
| Axail Strain, % | 15.4 |
| Principal Stress Difference, psi | 67.3 |
| Effective Minor Principal Stress, psi | 7.5 |
| Effective Major Principal Stress, psi | 74.8 |
| Parameter Āf ($\Delta u / [\sigma_1 - \sigma_3]$) | 0.00 |



Specimen at Failure

Remarks:



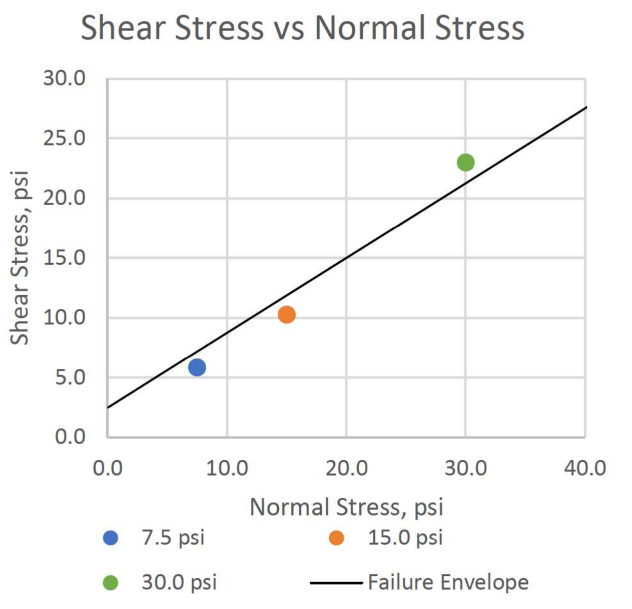
**Shear Strength at Failure = 40.7 psi**

# Direct Shear Test - ASTM D3080

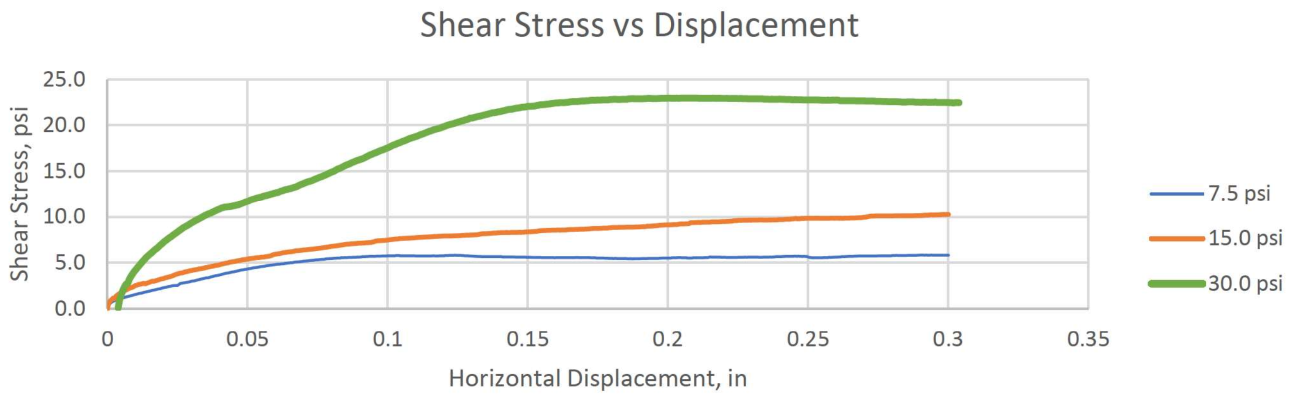
| | | | |
|---|---|---|---|
| Project Name: | Jeffries Generating Station | LL: | NP |
| Project Number: | 24-0052 Santee Cooper | PL: | NP |
| Sample ID: | JAP-2 (19.0-24.0') | PI: | NP |
| Sample Type: | Undisturbed | -200: | 64.4% |
| Description: | Sandy Silt | | |
| Strain Rate: | 0.010 in/min | | |
| Specific Gravity: | 2.65 Assumed | | |

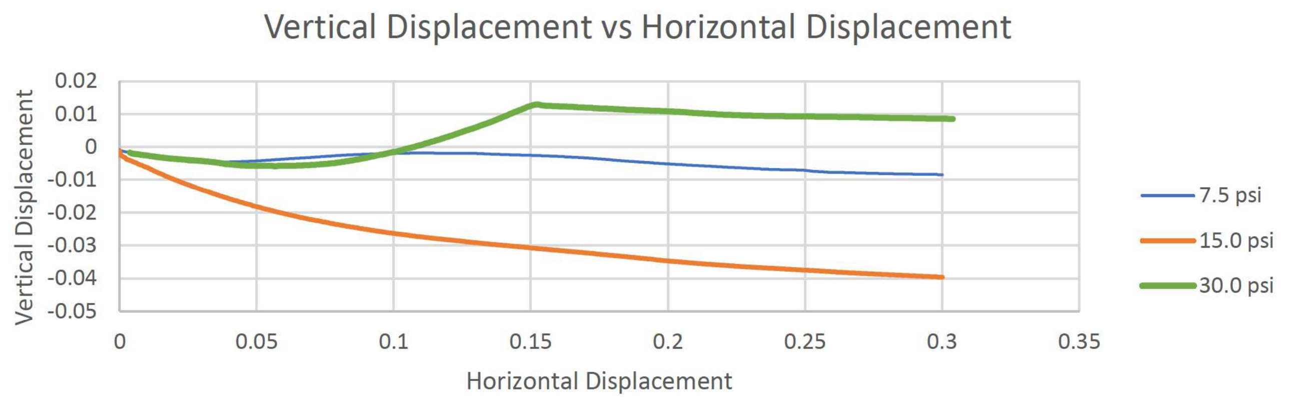
| Specimen | 1 | 2 | 3 |
|---|---|---|---|
| Normal Stress, psi | 7.5 | 15.0 | 30.0 |
| Initial Wet Density, pcf | 112.7 | 114.5 | 113.5 |
| Initial Dry Density, pcf | 88.6 | 90.1 | 89.3 |
| Initial Void Ratio | 0.87 | 0.84 | 0.85 |
| Initial Water Content, % | 27.2% | 27.2% | 27.2% |
| Initial Saturation, % | 83.1% | 86.1% | 84.5% |
| Initial Mass, g | 145.2 | 147.6 | 146.3 |
| Initial Height, in | 1.00 | 1.00 | 1.00 |
| Initial Diameter, in | 2.50 | 2.50 | 2.50 |

Remarks: Undisturbed sample

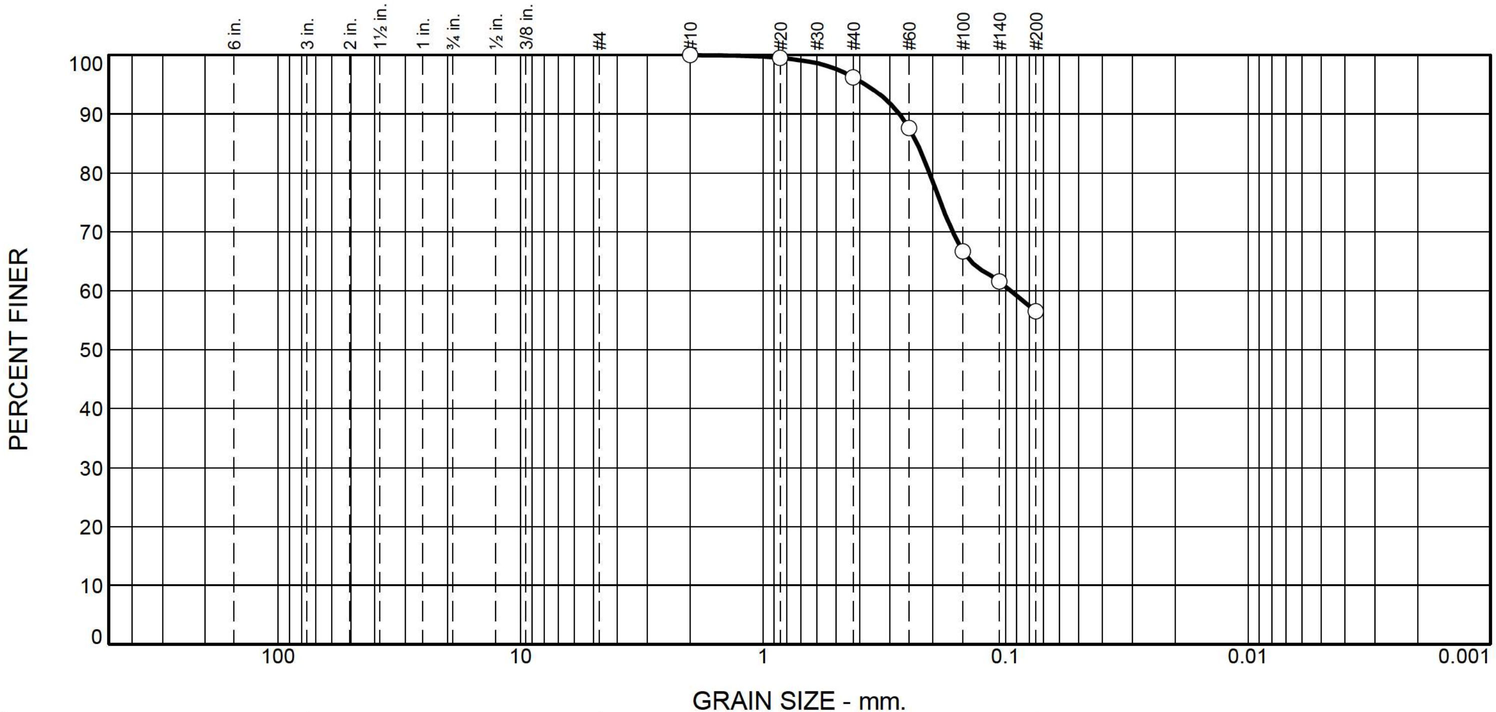


**ϕ' = 32.0 °** **c' = 2.5 psi**





# Particle Size Distribution Report



| % +3" | % Gravel |  | % Sand |  |  | % Fines |  |
|---|---|---|---|---|---|---|---|
|  | Coarse | Fine | Coarse | Medium | Fine | Silt | Clay |
| 0.0 | 0.0 | 0.0 | 0.0 | 3.8 | 39.7 | 56.5 |  |

**Test Results (ASTM D6913 & D1140)**

| Sieve Size or Diam. (mm.) | Finer (%) | Spec.* (%) | Out of Spec. (%) |
|---|---|---|---|
| #10 | 100.0 |  |  |
| #20 | 99.5 |  |  |
| #40 | 96.2 |  |  |
| #60 | 87.6 |  |  |
| #100 | 66.7 |  |  |
| #140 | 61.5 |  |  |
| #200 | 56.5 |  |  |

* (no specification provided)

## Material Description

Sandy Lean Clay

## Atterberg (ASTM D4318)

**PL=** 17 **LL=** 35 **PI=** 18

## Coefficients

**$D_{90}$=** 0.2748 **$D_{85}$=** 0.2315
**$D_{60}$=** 0.0954 **$D_{50}$=**
**$D_{30}$=** **$D_{15}$=**
**$D_{10}$=**
**$C_u$=** **$C_c$=**

## Sieve Test (ASTM D6913 & D1140)

**Test Date:** 4.14.25 **Technician:** T. Hyodo

**Test Notes**

Grain size data on portion for UU Triaxial testing

## Hydrometer Test

**Test Date:** ______ **Technician:** ______

**Test Notes**

## USCS (ASTM D2487)

CL

**Date Sampled:** 3.11.25
**Date Received:** 3.25.25
**Checked By:** M. Moore
**Title:** Lab Manager

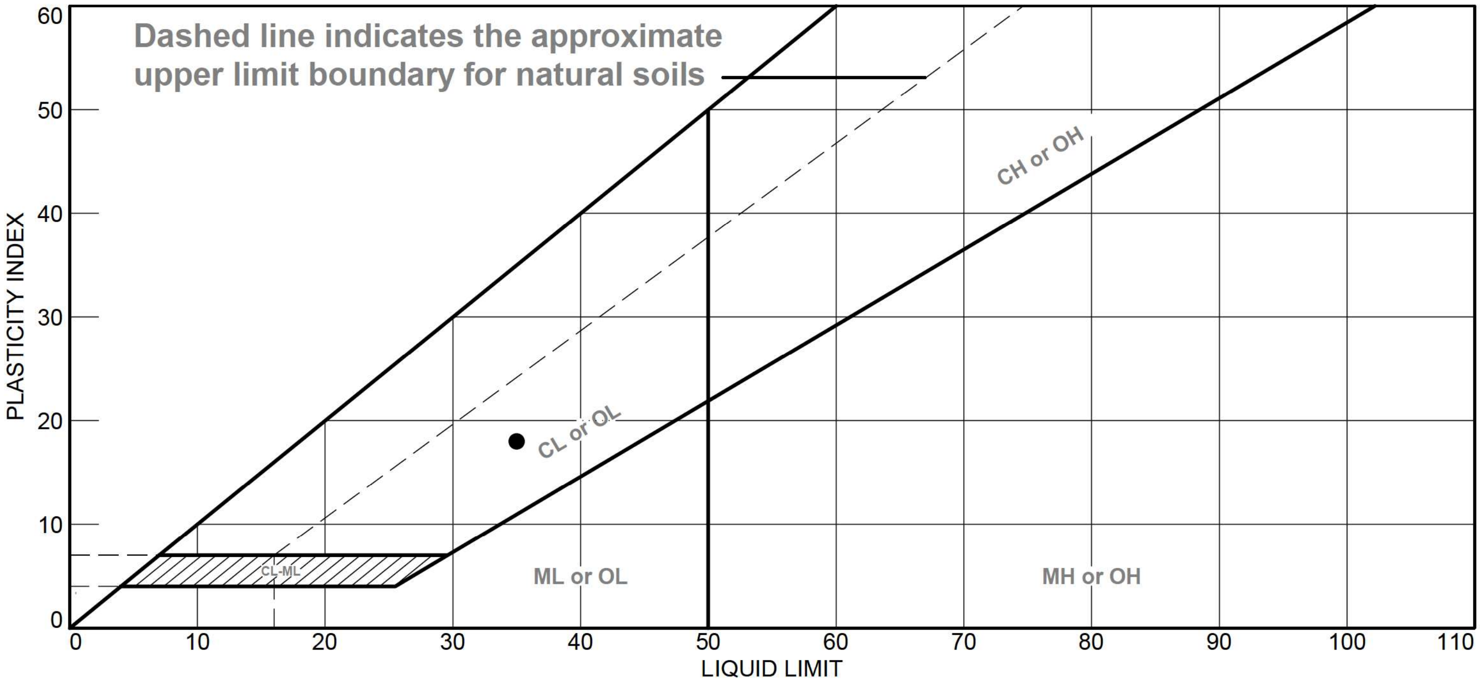
**Source of Sample:** Jeffries Generating Station **Depth:** 8.0-10.0'
**Sample Number:** JAP-4 #1

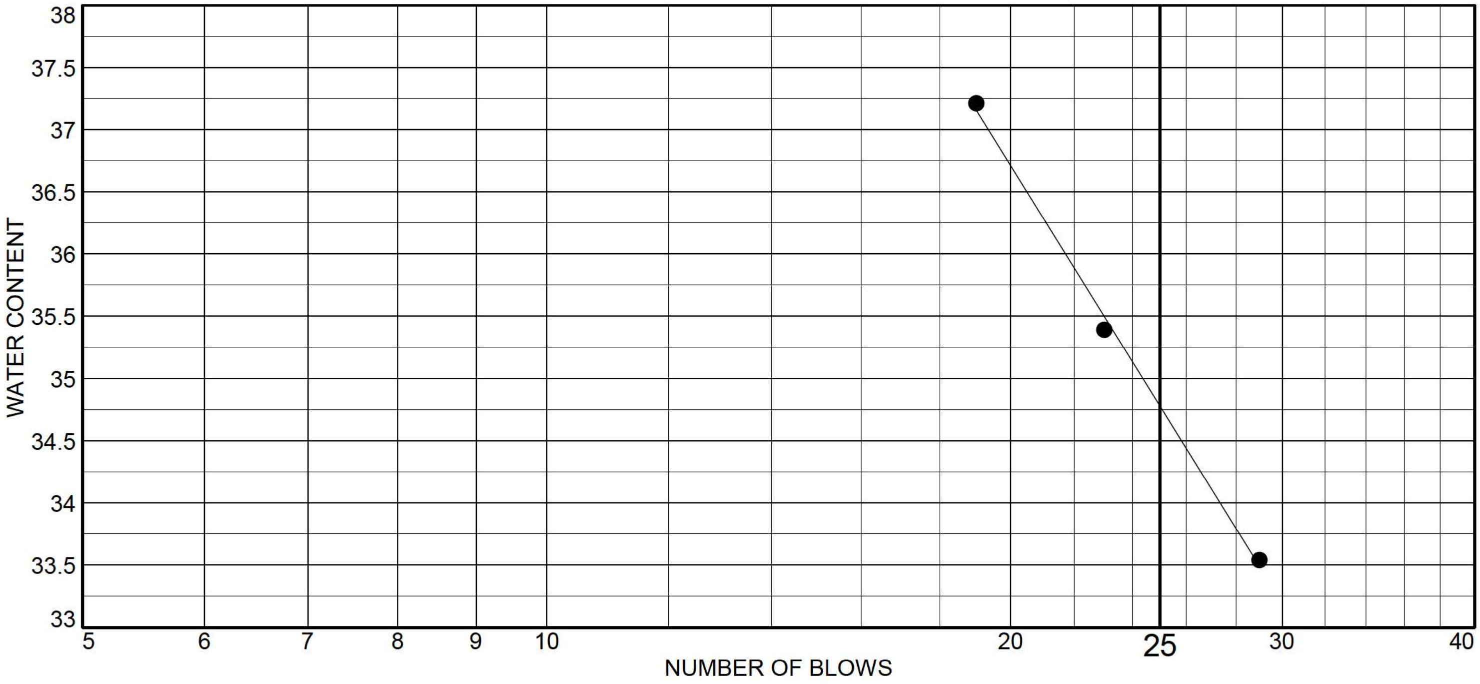
CERTERRA INSIGHT GROUP

**Client:** Santee Cooper
**Project:** Santee Cooper Testing Services

**Project No:** 24-0052 **Figure**

# LIQUID AND PLASTIC LIMITS TEST REPORT





| | MATERIAL DESCRIPTION | LL | PL | PI | %<#40 | %<#200 | USCS |
|---|---|---|---|---|---|---|---|
| ● | Sandy Lean Clay | 35 | 17 | 18 | 96.2 | 56.5 | CL |

**Project No.** 24-0052 **Client:** Santee Cooper

**Project:** Santee Cooper Testing Services

**Source of Sample:** Jeffries Generating Station **Depth:** 8.0-10.0'
**Sample Number:** JAP-4 #1

**Remarks:**

CERTERRA
INSIGHT GROUP

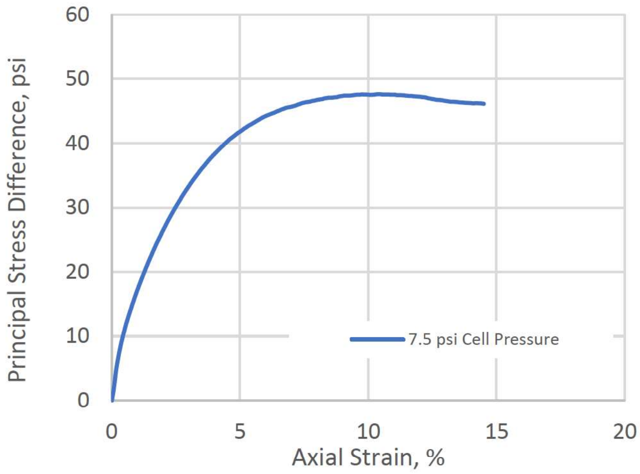
**Figure**

# Isotropically Unonsolidated
# Undrained Triaxial Compression Test

**INSIGHT GROUP**

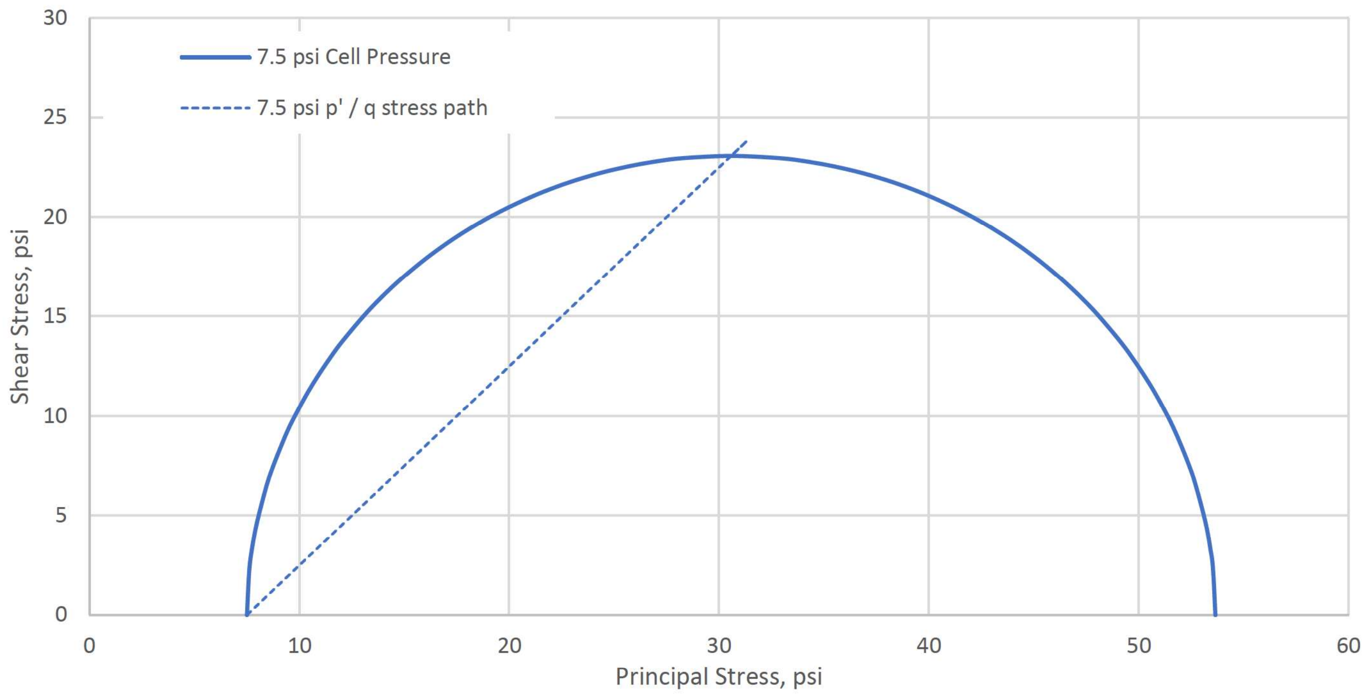
| | | | |
|---|---|---|---|
| Project Name: Jeffries Generating Station | | LL: | 35 |
| Project Number: 24-0052 Santee Cooper | | PI: | 18 |
| Sample ID: JAP-4 (8.0-10.0') | | % -200: | 56.5% |
| Description: Sandy Lean Clay (CL) | | | |
| Sample Type: | Undisturbed | Assumed SG: | 2.65 |
| Saturation Method: Wet | | Strain Rate: | 0.05 |
| Failure Criterion: Max Deviator Stress or 15% Strain | | | |

| Specimen | 1 |
|---|---|
| Initial Dry Unit Weight, pcf | 18.1 |
| Initial Void Ratio | 8.14 |
| Initial Water Content, % | 22.6% |
| Initial Saturation, % | 41.9% |
| Initial Height, in | 6.21 |
| Initial Diameter, in | 2.85 |
| Parameter B | N/A |
| Total Back Pressure, psi | 0.0 |
| Effective Consolidation Stress, psi | 7.5 |
| **Conditions at Failure** | |
| Axail Strain, % | 14.5 |
| Principal Stress Difference, psi | 46.1 |
| Effective Minor Principal Stress, psi | 7.5 |
| Effective Major Principal Stress, psi | 53.6 |
| Parameter Āf ($\Delta u / [\sigma_1 - \sigma_3]$) | 0.00 |



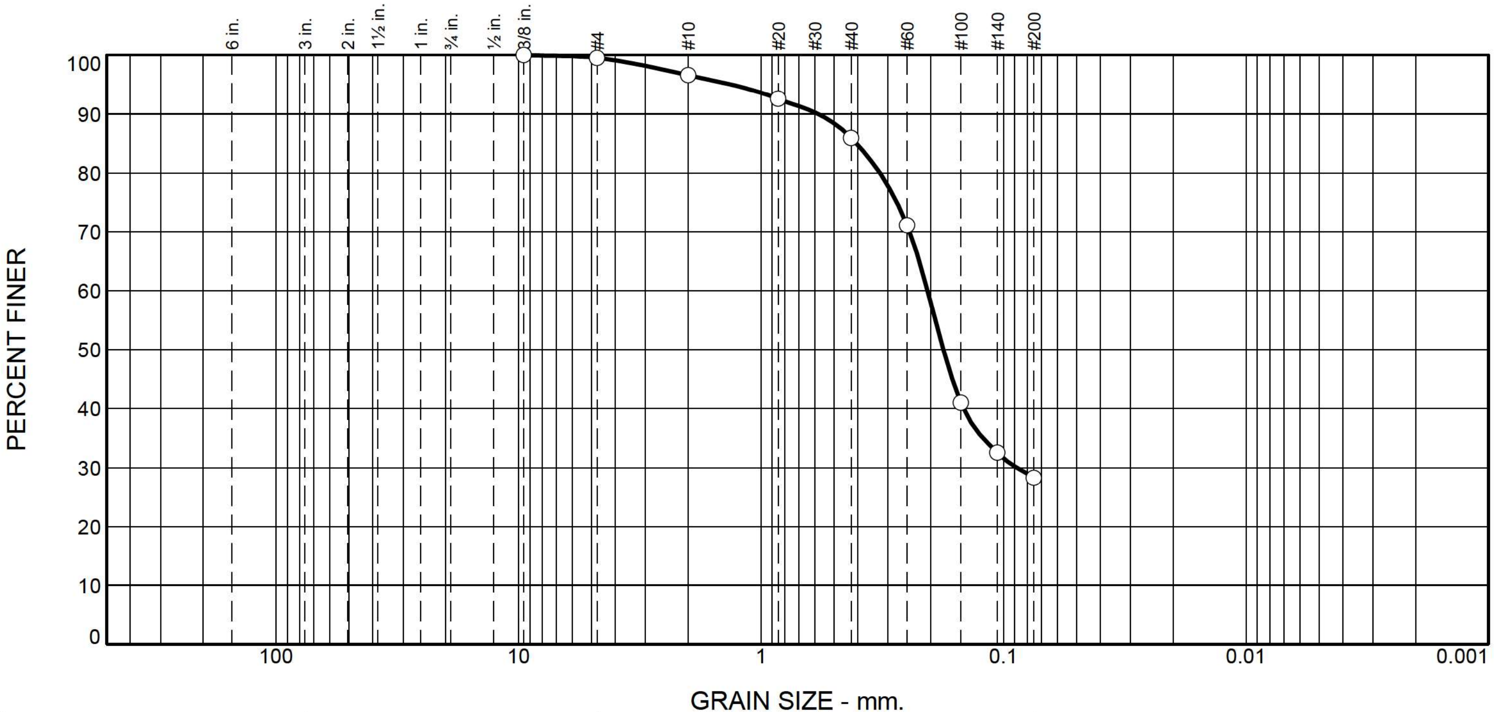
Specimen at Failure

Remarks:



**Shear Strength at Failure = 23.8 psi**

# Particle Size Distribution Report



| % +3" | % Gravel | | % Sand | | | % Fines | |
|---|---|---|---|---|---|---|---|
| | Coarse | Fine | Coarse | Medium | Fine | Silt | Clay |
| 0.0 | 0.0 | 0.5 | 2.9 | 10.7 | 57.7 | 28.2 | |

**Test Results (ASTM D6913 & D1140)**

| Sieve Size or Diam. (mm.) | Finer (%) | Spec.* (%) | Out of Spec. (%) |
|---|---|---|---|
| 0.375" | 100.0 | | |
| #4 | 99.5 | | |
| #10 | 96.6 | | |
| #20 | 92.6 | | |
| #40 | 85.9 | | |
| #60 | 71.1 | | |
| #100 | 41.0 | | |
| #140 | 32.5 | | |
| #200 | 28.2 | | |

* (no specification provided)

## Material Description

Silty Sand

## Atterberg (ASTM D4318)

**PL=** NP **LL=** NP **PI=** NP

## Coefficients

$D_{90}$= 0.5830 $D_{85}$= 0.4048
$D_{60}$= 0.2058 $D_{50}$= 0.1770
$D_{30}$= 0.0883 $D_{15}$=
$D_{10}$=
$C_u$= $C_c$=

## Sieve Test (ASTM D6913 & D1140)

**Test Date:** 4.18.25 **Technician:** T. Hyodo

**Test Notes**

Grain size data on the sandy portion of the tube sample.

## Hydrometer Test

**Test Date:** ____________ **Technician:** ____________

**Test Notes**

## USCS (ASTM D2487)

SM

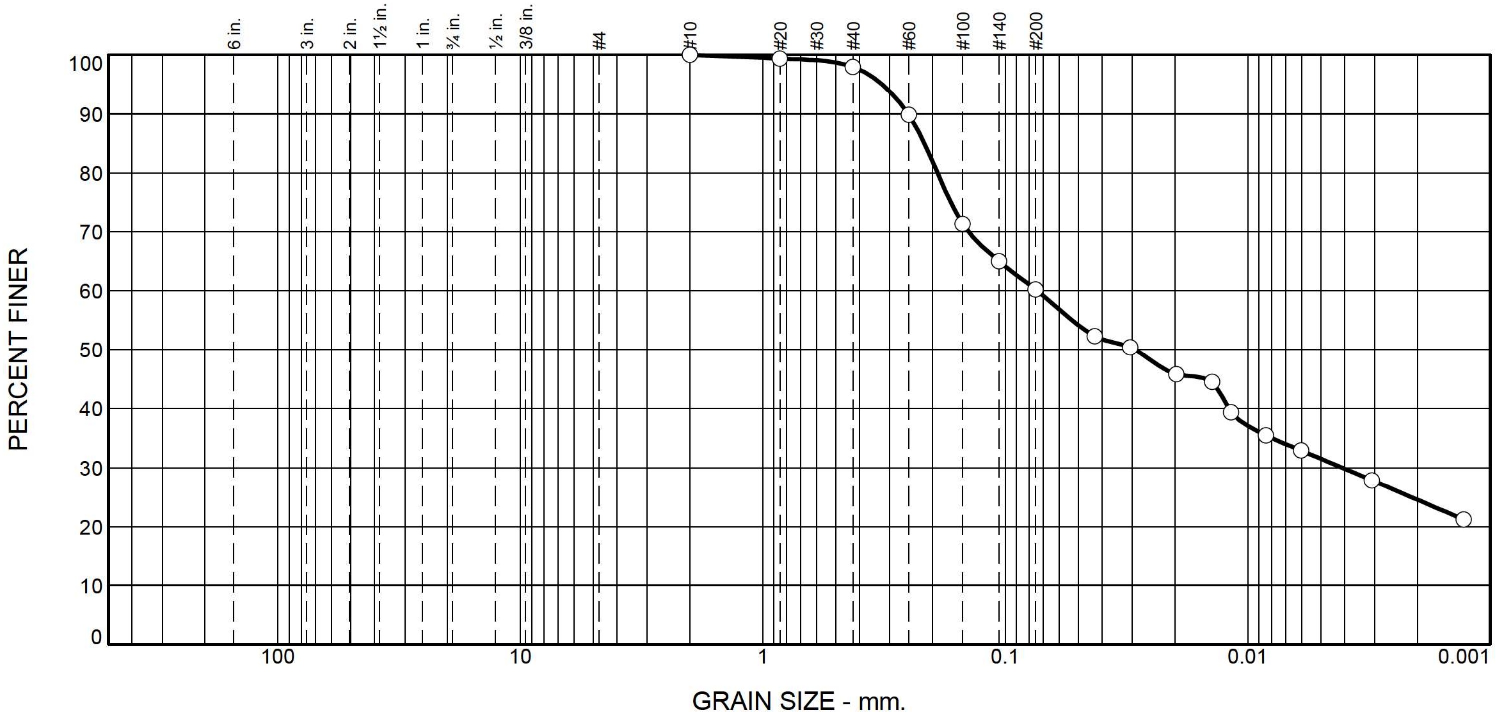
**Date Sampled:** 3.11.25
**Date Received:** 3.25.25
**Checked By:** M. Moore
**Title:** Lab Manager

**Source of Sample:** Jeffries Generating Station **Depth:** 8.0-10.0'
**Sample Number:** JAP-4 #2

CERTERRA
INSIGHT GROUP

**Client:** Santee Cooper
**Project:** Santee Cooper Testing Services
**Project No:** 24-0052 **Figure**

# Particle Size Distribution Report



| % +3" | % Gravel |  | % Sand |  |  | % Fines |  |
|---|---|---|---|---|---|---|---|
|  | Coarse | Fine | Coarse | Medium | Fine | Silt | Clay |
| 0.0 | 0.0 | 0.0 | 0.0 | 2.1 | 37.7 | 35.6 | 24.6 |

**Test Results (ASTM D6913 & D1140, ASTM**

| Sieve Size or Diam. (mm.) | Finer (%) | Spec.* (%) | Out of Spec. (%) |
|---|---|---|---|
| #10 | 100.0 |  |  |
| #20 | 99.4 |  |  |
| #40 | 97.9 |  |  |
| #60 | 89.8 |  |  |
| #100 | 71.3 |  |  |
| #140 | 65.0 |  |  |
| #200 | 60.2 |  |  |
| 0.0427 mm. | 52.3 |  |  |
| 0.0305 mm. | 50.4 |  |  |
| 0.0197 mm. | 45.8 |  |  |
| 0.0140 mm. | 44.5 |  |  |
| 0.0117 mm. | 39.4 |  |  |
| 0.0084 mm. | 35.5 |  |  |
| 0.0060 mm. | 32.9 |  |  |
| 0.0031 mm. | 27.8 |  |  |
| 0.0013 mm. | 21.2 |  |  |

* (no specification provided)

**Material Description**

Sandy Lean Clay

**Sieve Test (ASTM D6913 & D1140)**

**Test Date:** 4.18.25 **Technician:** T. Hyodo

**Test Notes**

Grain size data on the portion of the tube sample used for Direct Shear testing.

**Hydrometer Test (ASTM D7928)**

**Test Date:** 4.16.25 **Technician:** M. Moore

**Test Notes**

**Atterberg (ASTM D4318)**

**PL=** 15 **LL=** 35 **PI=** 20

**Coefficients**

$D_{90}$= 0.2519 $D_{85}$= 0.2158

$D_{60}$= 0.0740 $D_{50}$= 0.0293

$D_{30}$= 0.0041 $D_{15}$=

$D_{10}$=

$C_u$= $C_c$=

**USCS (ASTM D2487)**

CL

**Date Sampled:** 3.12.25

**Date Received:** 3.25.25

**Checked By:** M. Moore

**Title:** Lab Manager

**Source of Sample:** Jeffries Generating Station **Depth:** 5.0-7.0'

**Sample Number:** JAP-5 #1

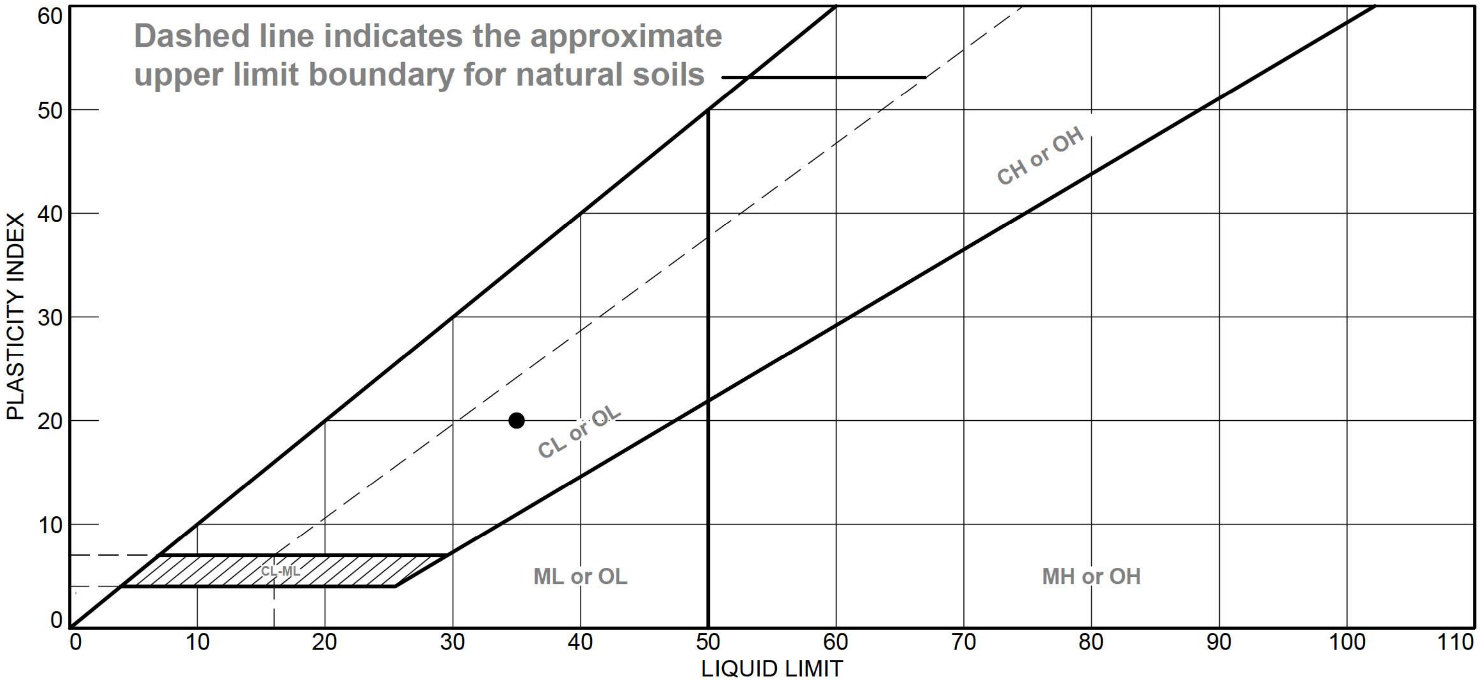
CERTERRA
INSIGHT GROUP

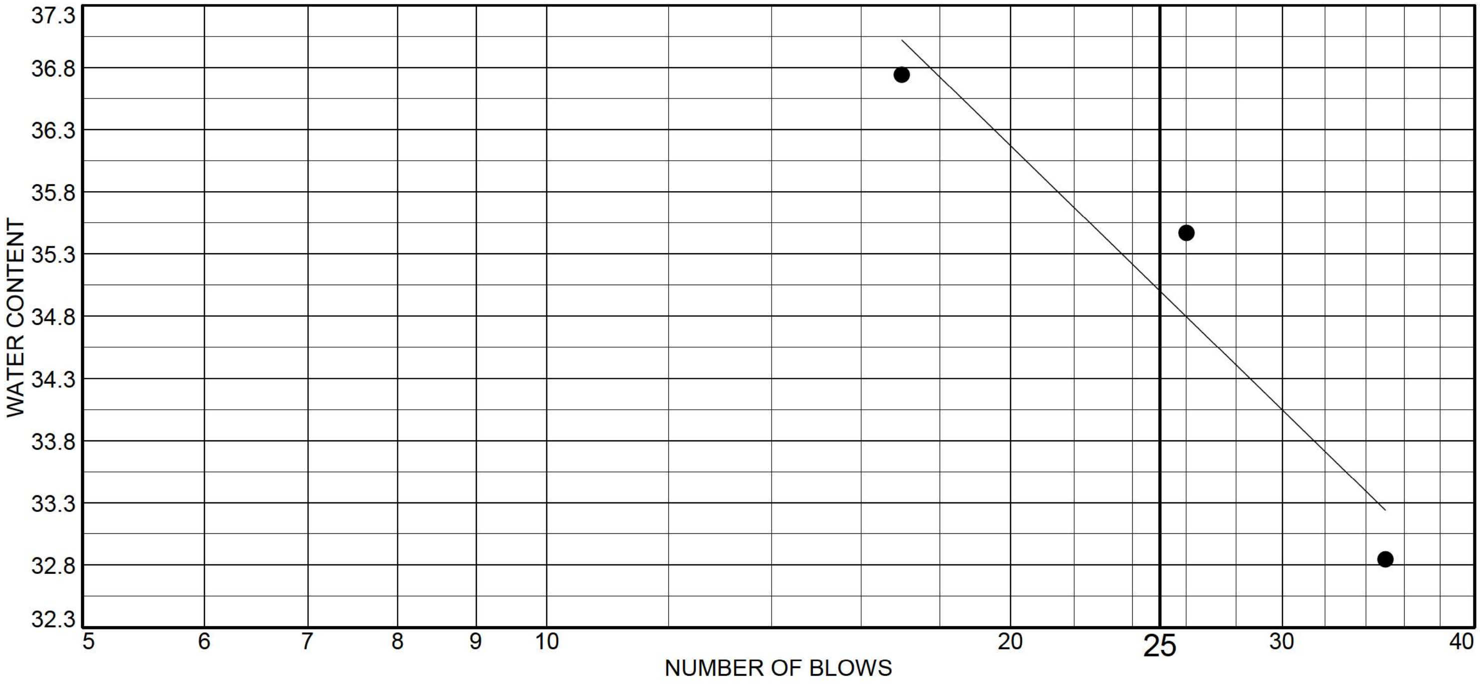
**Client:** Santee Cooper

**Project:** Santee Cooper Testing Services

**Project No:** 24-0052 **Figure**

# LIQUID AND PLASTIC LIMITS TEST REPORT





| | MATERIAL DESCRIPTION | LL | PL | PI | %<#40 | %<#200 | USCS |
|---|---|---|---|---|---|---|---|
| ● | Sandy Lean Clay | 35 | 15 | 20 | 97.9 | 60.2 | CL |

**Project No.** 24-0052 **Client:** Santee Cooper

**Project:** Santee Cooper Testing Services

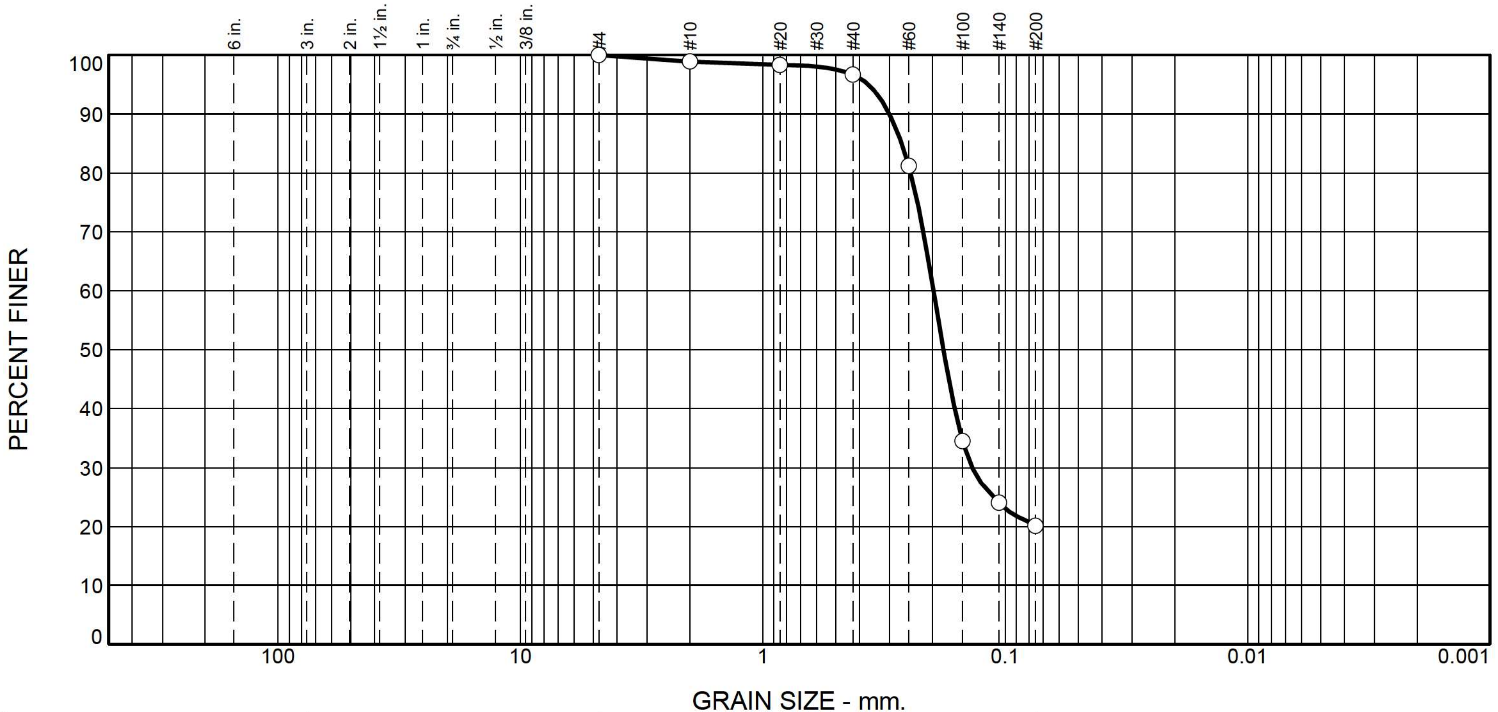
**Source of Sample:** Jeffries Generating Station **Depth:** 5.0-7.0'
**Sample Number:** JAP-5 #1

CERTERRA
INSIGHT GROUP

**Remarks:**

**Figure**

# Particle Size Distribution Report



| % +3" | % Gravel | | % Sand | | | % Fines | |
|---|---|---|---|---|---|---|---|
| | Coarse | Fine | Coarse | Medium | Fine | Silt | Clay |
| 0.0 | 0.0 | 0.0 | 1.1 | 2.2 | 76.6 | 20.1 | |

**Test Results (ASTM D6913 & D1140)**

| Sieve Size or Diam. (mm.) | Finer (%) | Spec.* (%) | Out of Spec. (%) |
|---|---|---|---|
| #4 | 100.0 | | |
| #10 | 98.9 | | |
| #20 | 98.3 | | |
| #40 | 96.7 | | |
| #60 | 81.2 | | |
| #100 | 34.5 | | |
| #140 | 24.0 | | |
| #200 | 20.1 | | |

* (no specification provided)

## Material Description

Silty Sand

## Sieve Test (ASTM D6913 & D1140)

**Test Date:** 4.18.25 **Technician:** T. Hyodo

**Test Notes**

Grin size data on the sandy portion of the tube sample.

## Hydrometer Test

**Test Date:** ______ **Technician:** ______

**Test Notes**

## Atterberg (ASTM D4318)

**PL=** NP **LL=** NP **PI=** NP

## Coefficients

$D_{90}$= 0.3010 $D_{85}$= 0.2678
$D_{60}$= 0.1976 $D_{50}$= 0.1798
$D_{30}$= 0.1368 $D_{15}$=
$D_{10}$=
$C_u$= $C_c$=

## USCS (ASTM D2487)

SM

**Date Sampled:** 3.12.25
**Date Received:** 3.25.25
**Checked By:** M. Moore
**Title:** Lab Manager

**Source of Sample:** Jeffries Generating Station **Depth:** 5.0-7.0'
**Sample Number:** JAP-5 #2

CERTERRA
INSIGHT GROUP

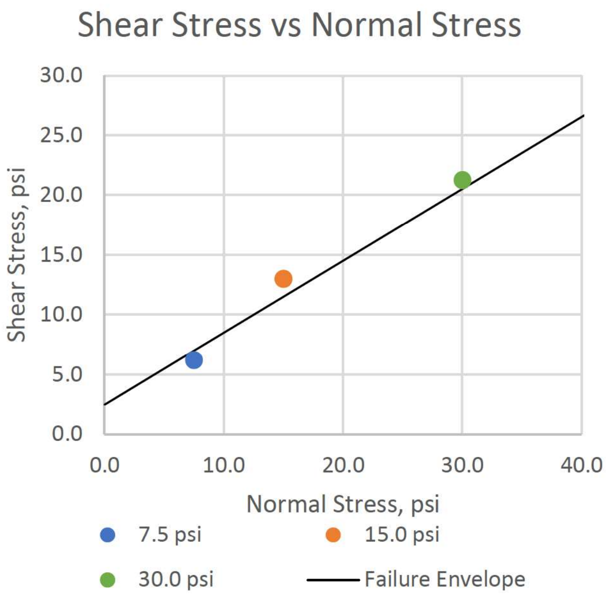
**Client:** Santee Cooper
**Project:** Santee Cooper Testing Services

**Project No:** 24-0052 **Figure**

# Direct Shear Test - ASTM D3080

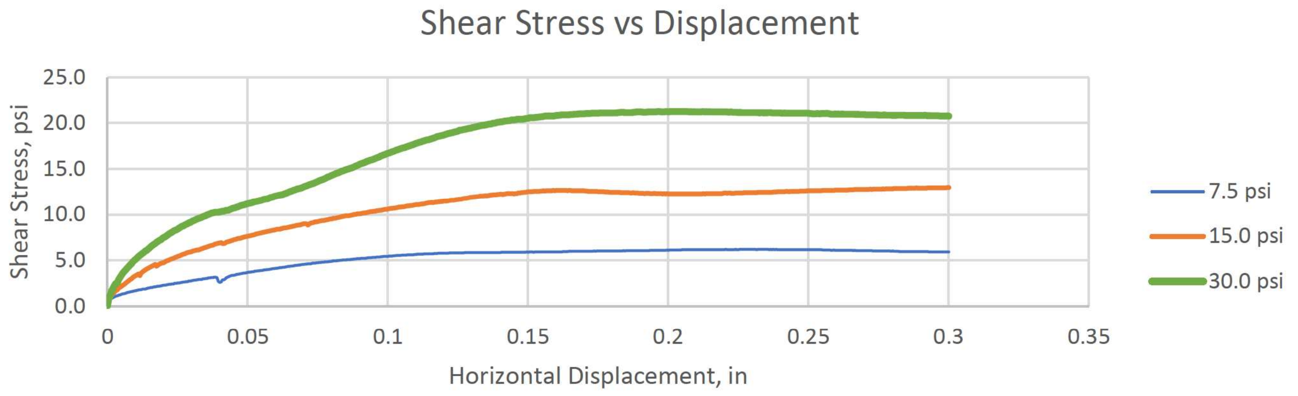
Project Name: Jeffries Generating Station | LL: 35
Project Number: 24-0052 Santee Cooper | PL: 15
Sample ID: JAP-5 (5.0-7.0') | PI: 20
Sample Type: Undisturbed | -200: 60.2%
Description: Sandy Silt
Strain Rate: 0.010 in/min
Specific Gravity: 2.65 Assumed

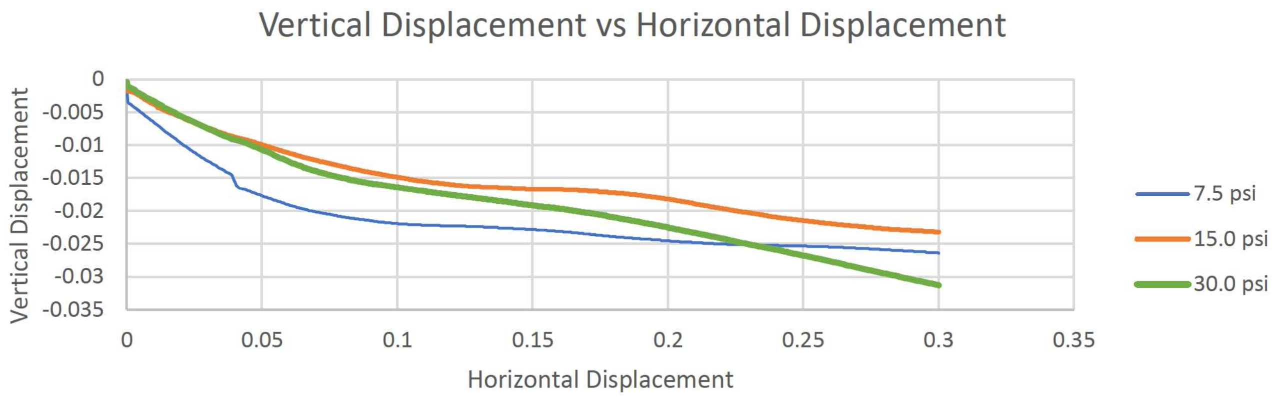
| Specimen | 1 | 2 | 3 |
|---|---|---|---|
| Normal Stress, psi | 7.5 | 15.0 | 30.0 |
| Initial Wet Density, pcf | 108.5 | 113.1 | 115.4 |
| Initial Dry Density, pcf | 94.1 | 98.0 | 100.1 |
| Initial Void Ratio | 0.76 | 0.69 | 0.65 |
| Initial Water Content, % | 15.3% | 15.3% | 15.3% |
| Initial Saturation, % | 53.6% | 59.1% | 62.2% |
| Initial Mass, g | 139.8 | 145.7 | 148.7 |
| Initial Height, in | 1.00 | 1.00 | 1.00 |
| Initial Diameter, in | 2.50 | 2.50 | 2.50 |



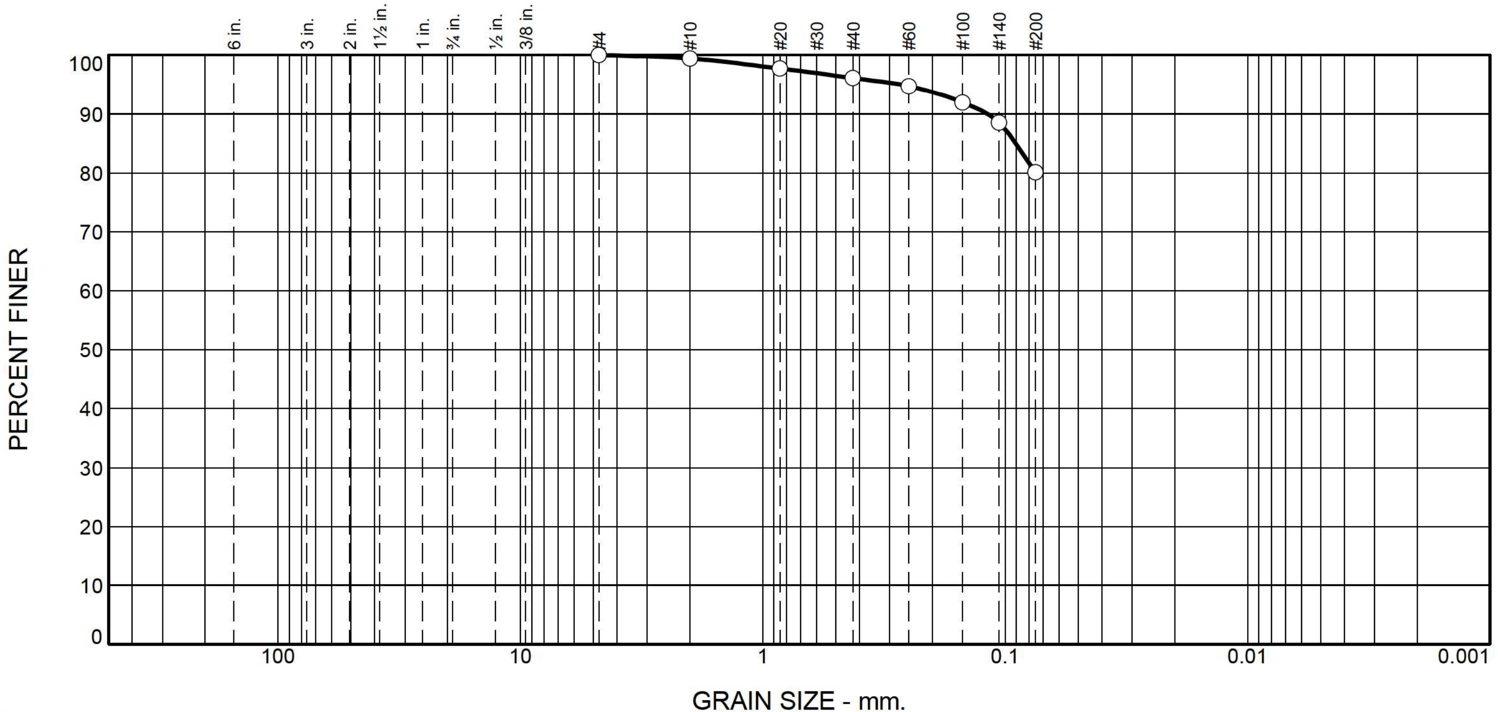
Remarks: Undisturbed sample

**ϕ' = 31.0 °** **c' = 2.5 psi**





# Particle Size Distribution Report



| % +3" | % Gravel |  | % Sand |  |  | % Fines |  |
|---|---|---|---|---|---|---|---|
|  | Coarse | Fine | Coarse | Medium | Fine | Silt | Clay |
| 0.0 | 0.0 | 0.0 | 0.6 | 3.3 | 16.0 | 80.1 |  |

**Test Results (ASTM D6913 & D1140)**

| Sieve Size or Diam. (mm.) | Finer (%) | Spec.* (%) | Out of Spec. (%) |
|---|---|---|---|
| #4 | 100.0 |  |  |
| #10 | 99.4 |  |  |
| #20 | 97.7 |  |  |
| #40 | 96.1 |  |  |
| #60 | 94.7 |  |  |
| #100 | 91.9 |  |  |
| #140 | 88.5 |  |  |
| #200 | 80.1 |  |  |

* (no specification provided)

## Material Description

Brown Sandy Clay

## Atterberg (ASTM D4318)

**PL=** **LL=** **PI=**

## Coefficients

**$D_{90}$=** 0.1182 **$D_{85}$=** 0.0905
**$D_{60}$=** **$D_{50}$=**
**$D_{30}$=** **$D_{15}$=**
**$D_{10}$=**
**$C_u$=** **$C_c$=**

## Sieve Test (ASTM D6913 & D1140)

**Test Date:** 4.18.25 **Technician:** T. Hyodo

**Test Notes**

## Hydrometer Test

**Test Date:** ____________ **Technician:** ____________

**Test Notes**

## USCS (ASTM D2487)

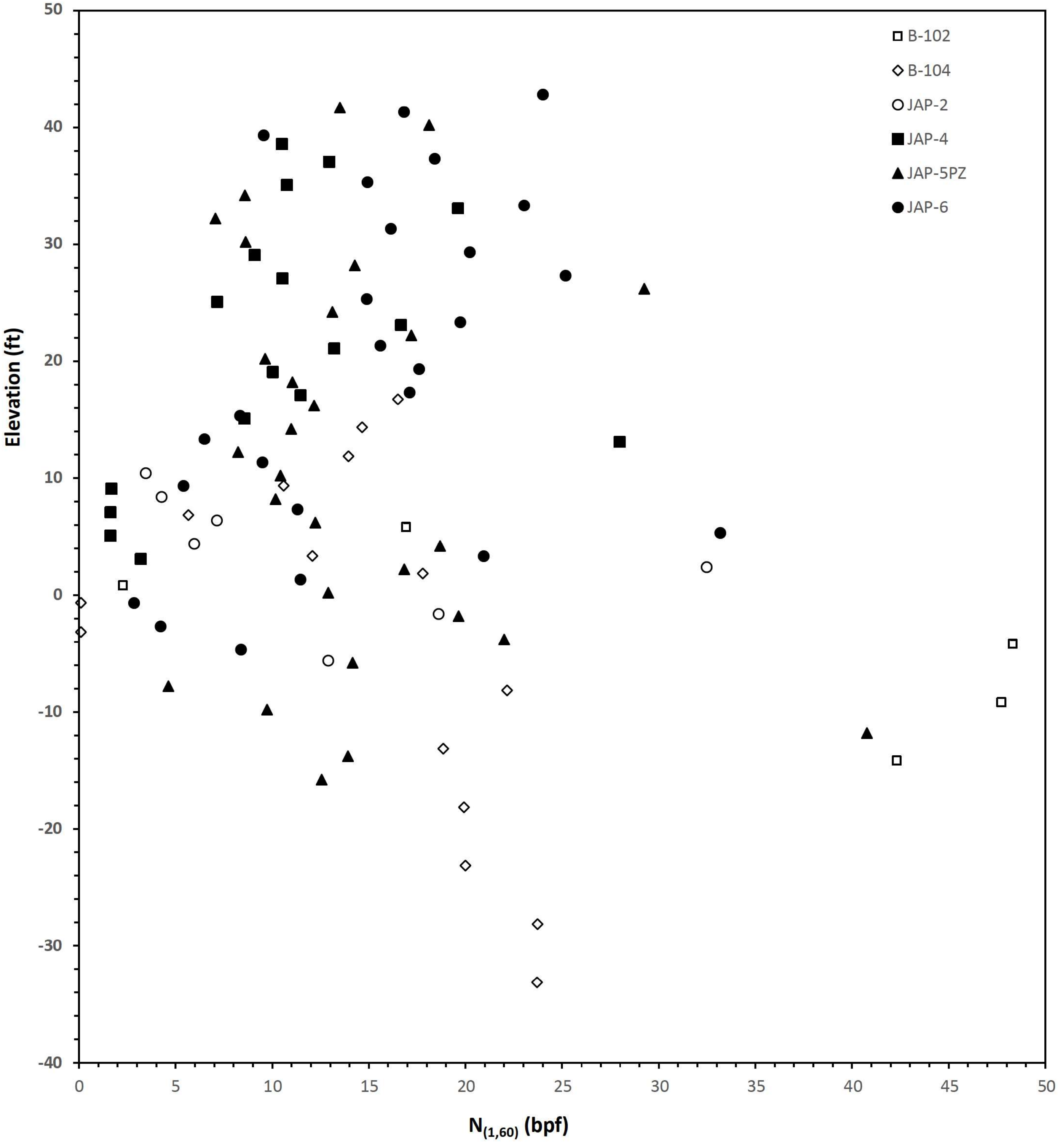
**Date Sampled:** 3.12.25
**Date Received:** 3.25.25
**Checked By:** M. Moore
**Title:** Lab Manager

**Source of Sample:** Jeffries Generating Station **Depth:** 60.0-62.0'
**Sample Number:** JAP-5

CERTERRA
INSIGHT GROUP

**Client:** Santee Cooper
**Project:** Santee Cooper Testing Services
**Project No:** 24-0052 **Figure**

# APPENDIX C
# Correlated and Interpreted Shear Strength Data



*Notes:*

1. *Blow Count data were taken from borings B-102, B-104, JAP-2, JAP-4, JAP-5PZ, and JAP-6.*
2. *Blow counts were corrected for overburden (Cn), energy (Ce), rod length (Cr), borehole diameter (Cb), and liner (Cl).*

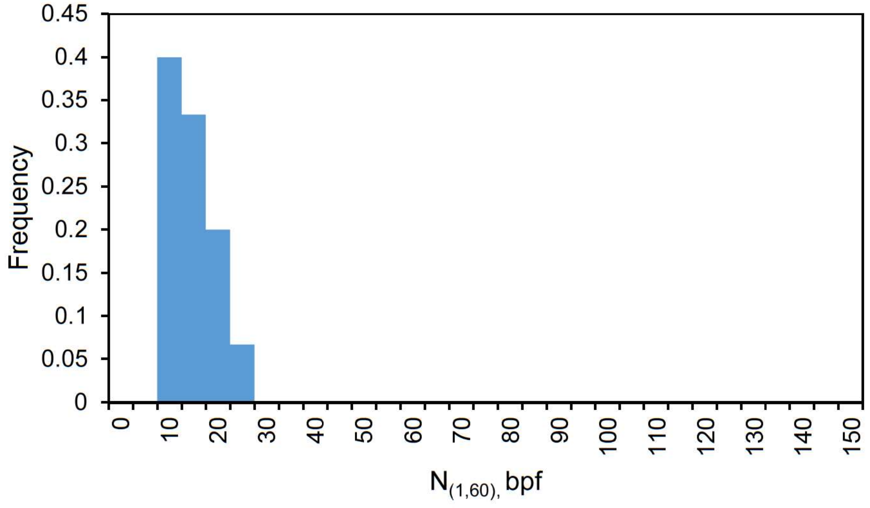
HALEY ALDRICH

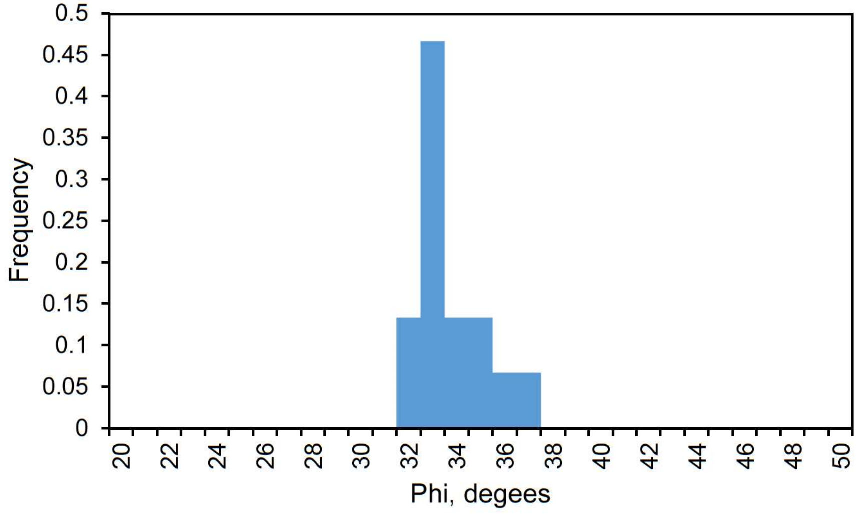
SANTEE COOPER
JEFFERIES GENERATING STATION - ASH POND A
MONCKS CORNER, SOUTH CAROLINA

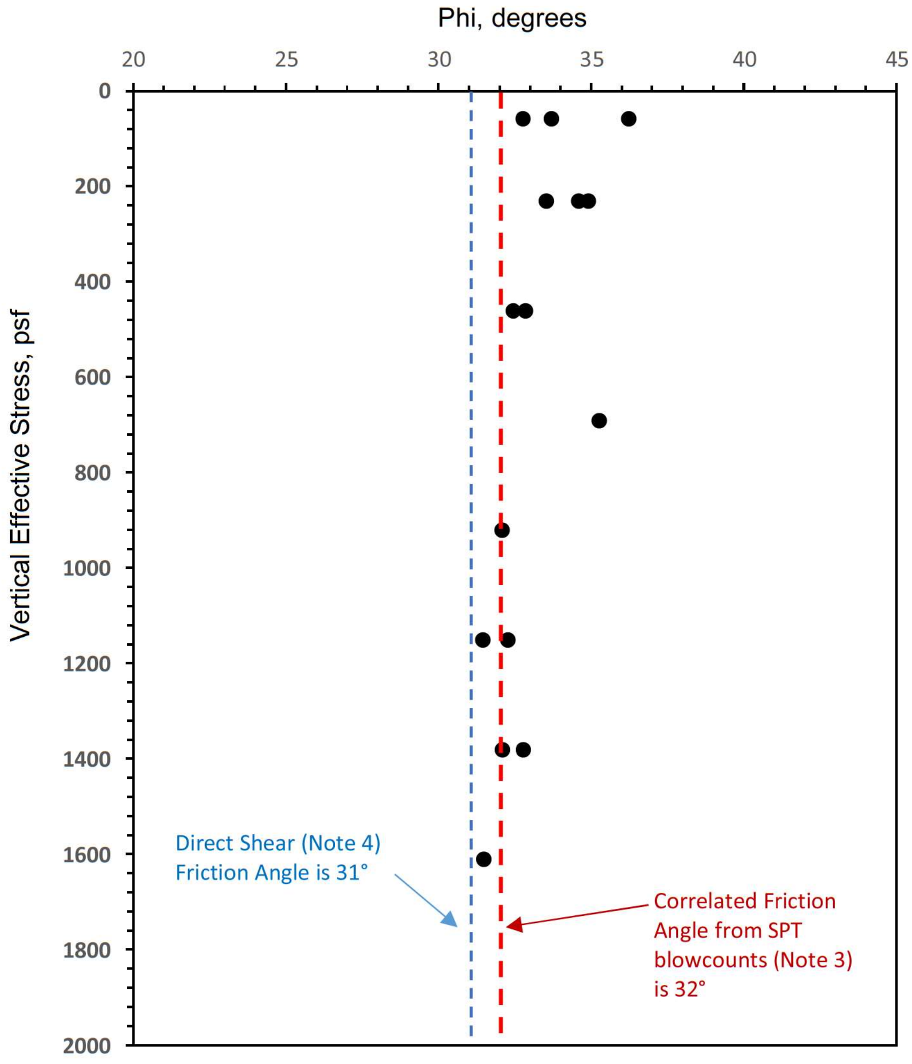
**$N_{(1,60)}$ Vs. Elevation**
**Correlated & Interpreted Data**

November 2025

**Figure C.1**







*Notes:*

1. *Blow Count data were taken from borings B-104, JAP-4, JAP-5PZ, and JAP-6. Data is limited to the strata identified (Upper Fill).*
2. *Blow counts were corrected for overburden (Cn), energy (Ce), rod length (Cr), borehole diameter (Cb), and liner (Cl).*
3. *The angle of internal friction (phi) was estimated using the Bowles (1977) correlation:*

   $$23.5 \text{ degrees} \leq 26 \text{ degrees} + 5.5*\log(N1,60) + 0.11*N1,60 \leq 45 \text{ degrees}$$
4. *Direct Shear Testing on JAP-5PZ #2 yielded an angle of internal friction of 31 degrees and a cohesion of 360 psf.*

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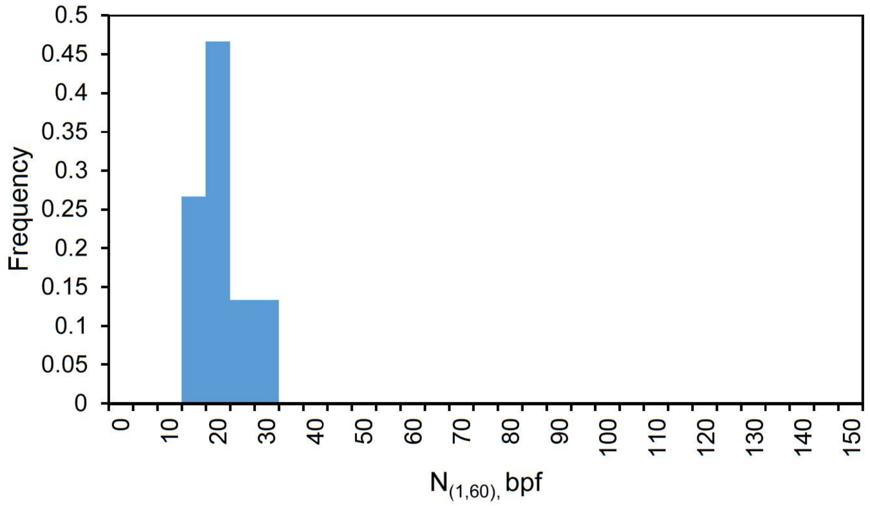
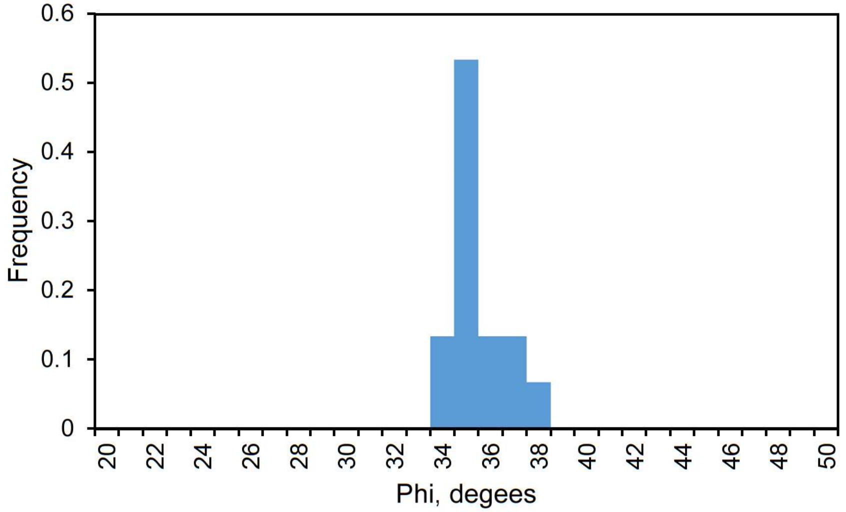
JEFFERIES GENERATING STATION - ASH POND A
MONCKS CORNER, SOUTH CAROLINA

**Upper Fill (Loose Sand)**
**Correlated & Interpreted Data**

November 2025

**Figure C.2**

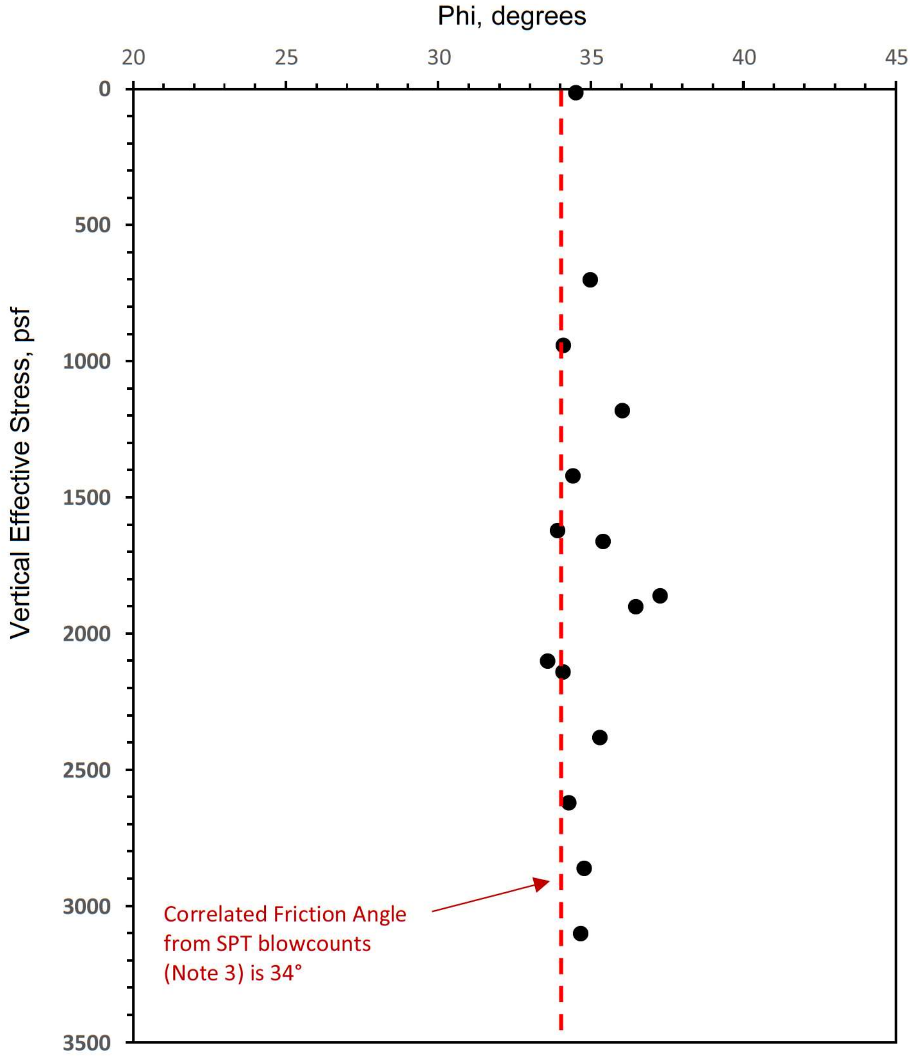




*Notes:*

1. *Blow Count data were taken from borings B-104, JAP-4, JAP-5PZ, and JAP-6. Data is limited to the strata identified (Middle Fill).*
2. *Blow counts were corrected for overburden (Cn), energy (Ce), rod length (Cr), borehole diameter (Cb), and liner (Cl).*
3. *The angle of internal friction (phi) was estimated using the Bowles (1977) correlation:*

   *23.5 degrees ≤ 26 degrees + 5.5*log(N1,60) + 0.11*N1,60 ≤ 45 degrees*



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JEFFERIES GENERATING STATION - ASH POND A
MONCKS CORNER, SOUTH CAROLINA

## Middle Fill (Med. Dense/Dense Sand) Correlated & Interpreted Data

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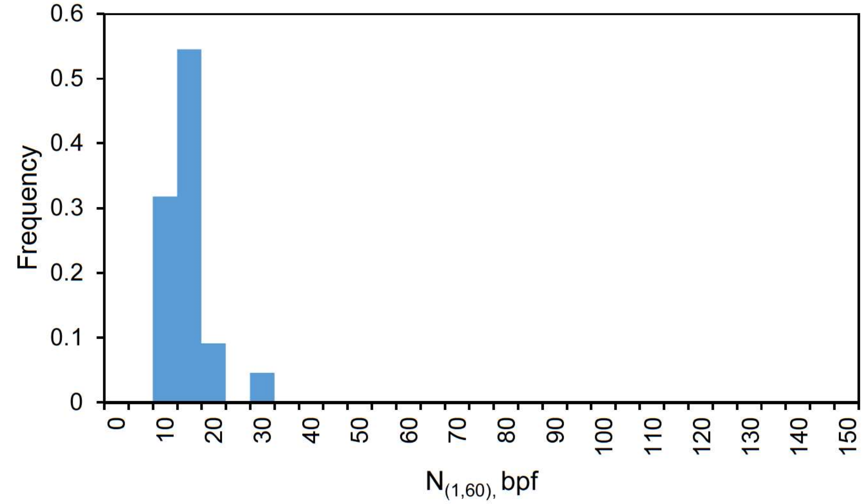
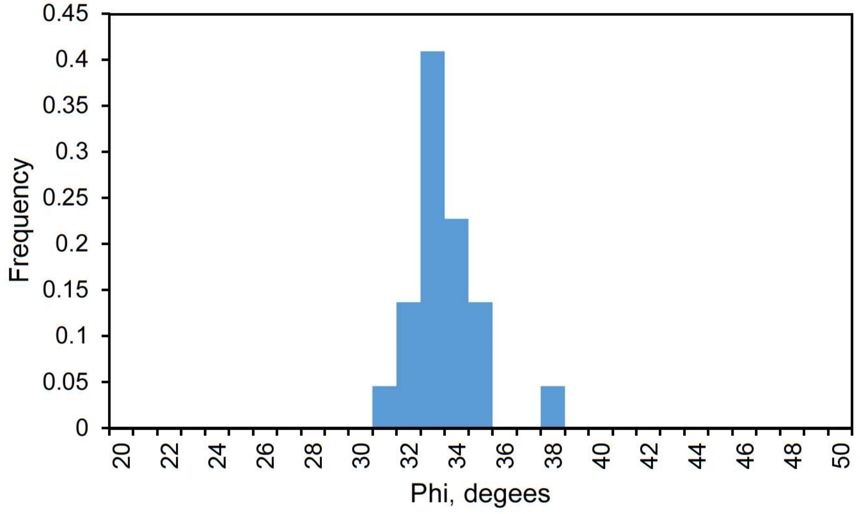
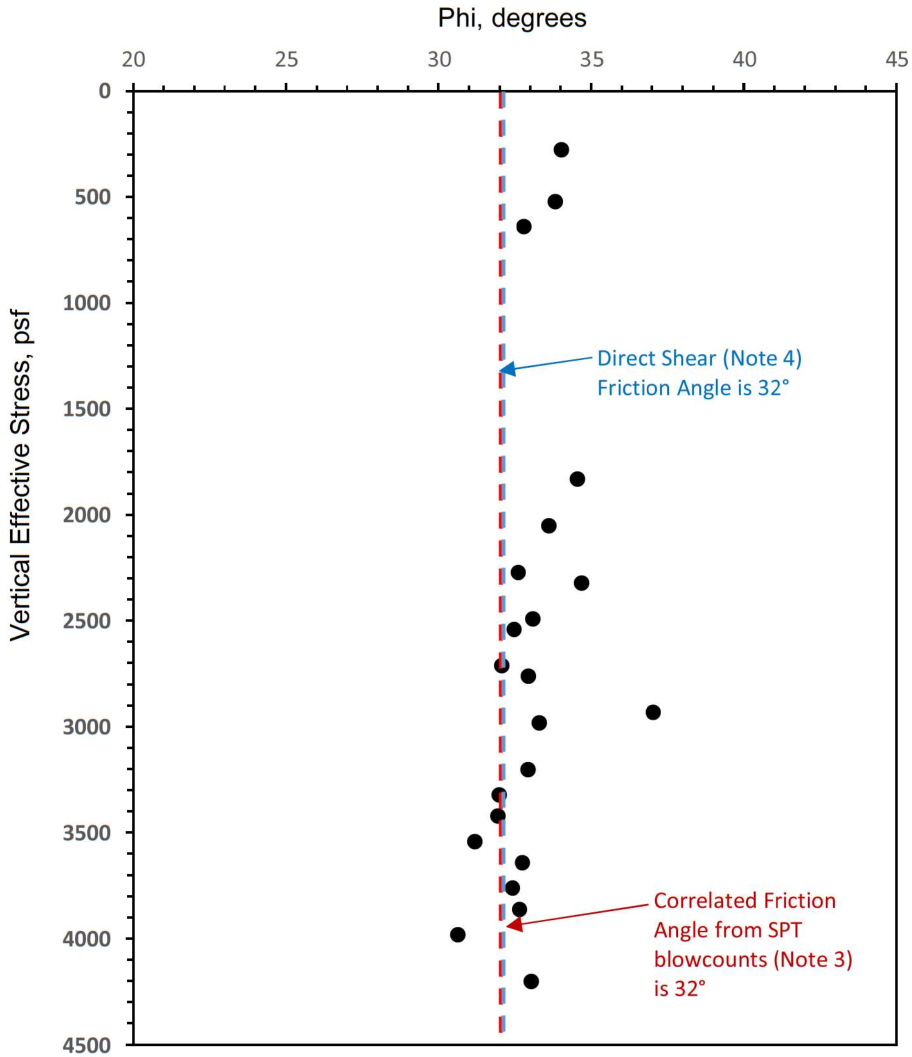
**Figure C.3**







*Notes:*

1. *Blow Count data were taken from borings B-104, JAP-4, JAP-5PZ, and JAP-6. Data is limited to the strata identified (Lower Fill).*
2. *Blow counts were corrected for overburden (Cn), energy (Ce), rod length (Cr), borehole diameter (Cb), and liner (Cl).*
3. *The angle of internal friction (phi) was estimated using the Bowles (1977) correlation:*

$$23.5 \text{ degrees} \le 26 \text{ degrees} + 5.5*\log(N1,60) + 0.11*N1,60 \le 45 \text{ degrees}$$

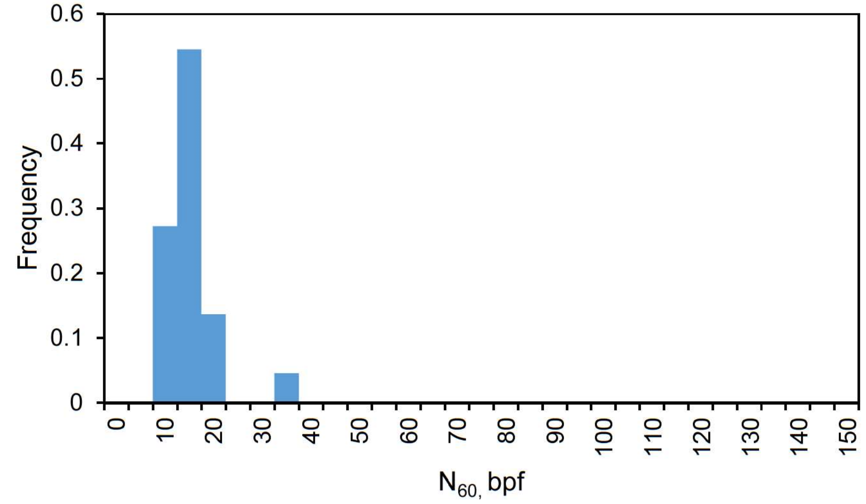
HALEY ALDRICH

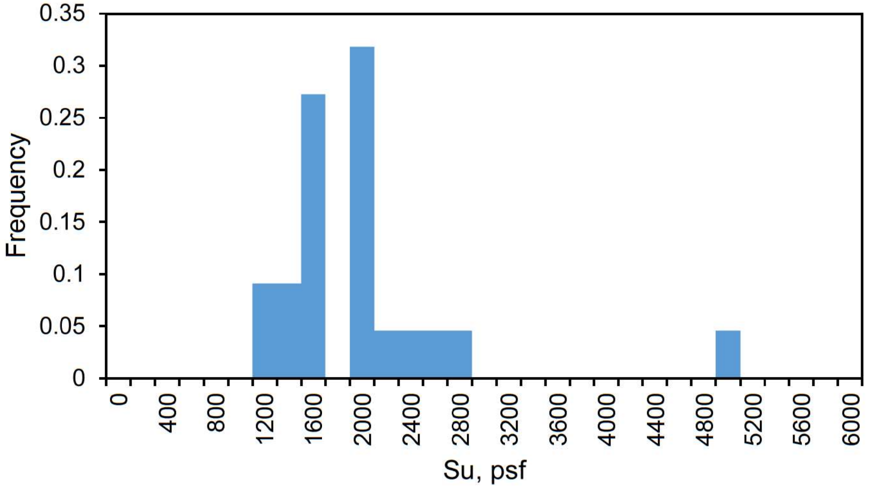
SANTEE COOPER
JEFFERIES GENERATING STATION - ASH POND A
MONCKS CORNER, SOUTH CAROLINA

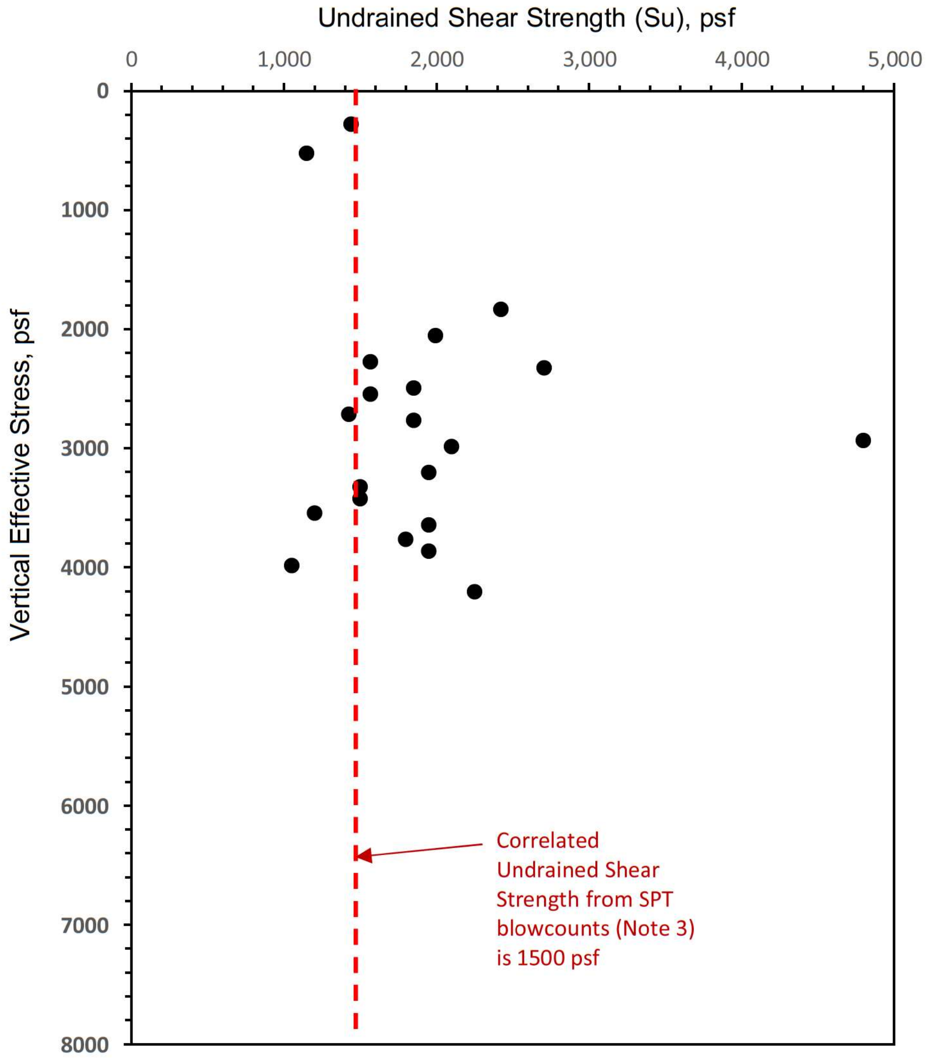
**Lower Fill (Sandy Silty Clay)**
**Correlated & Interpreted Data**

November 2025

**Figure C.4**







Correlated
Undrained Shear
Strength from SPT
blowcounts (Note 3)
is 1500 psf

*Notes:*

1. *Blow Count data were taken from borings B-104, JAP-4, JAP-5PZ, and JAP-6. Data is limited to the strata identified (Lower Fill).*
2. *Blow counts were corrected for energy (Ce), rod length (Cr), borehole diameter (Cb), and liner (Cl).*
3. *The Undrained Shear Strength (Su) was estimated using the Sowers (1979) correlation:*

   *150 psf *N60 < Su ≤ 5,000 psf for CL (assumed recompacted clay)*

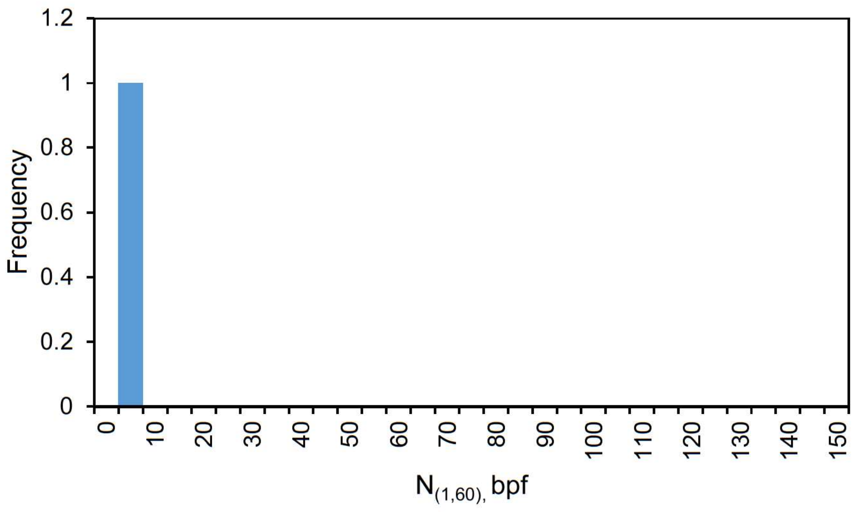
HALEY ALDRICH

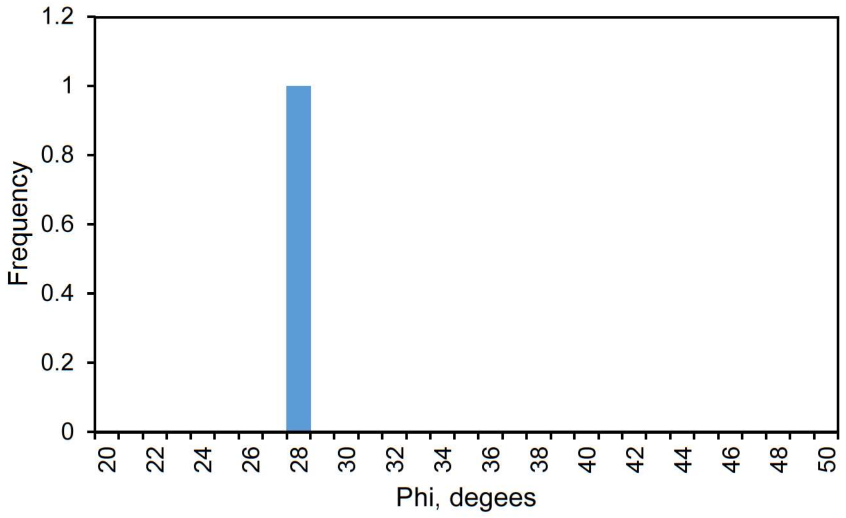
SANTEE COOPER
JEFFERIES GENERATING STATION - ASH POND A
MONCKS CORNER, SOUTH CAROLINA

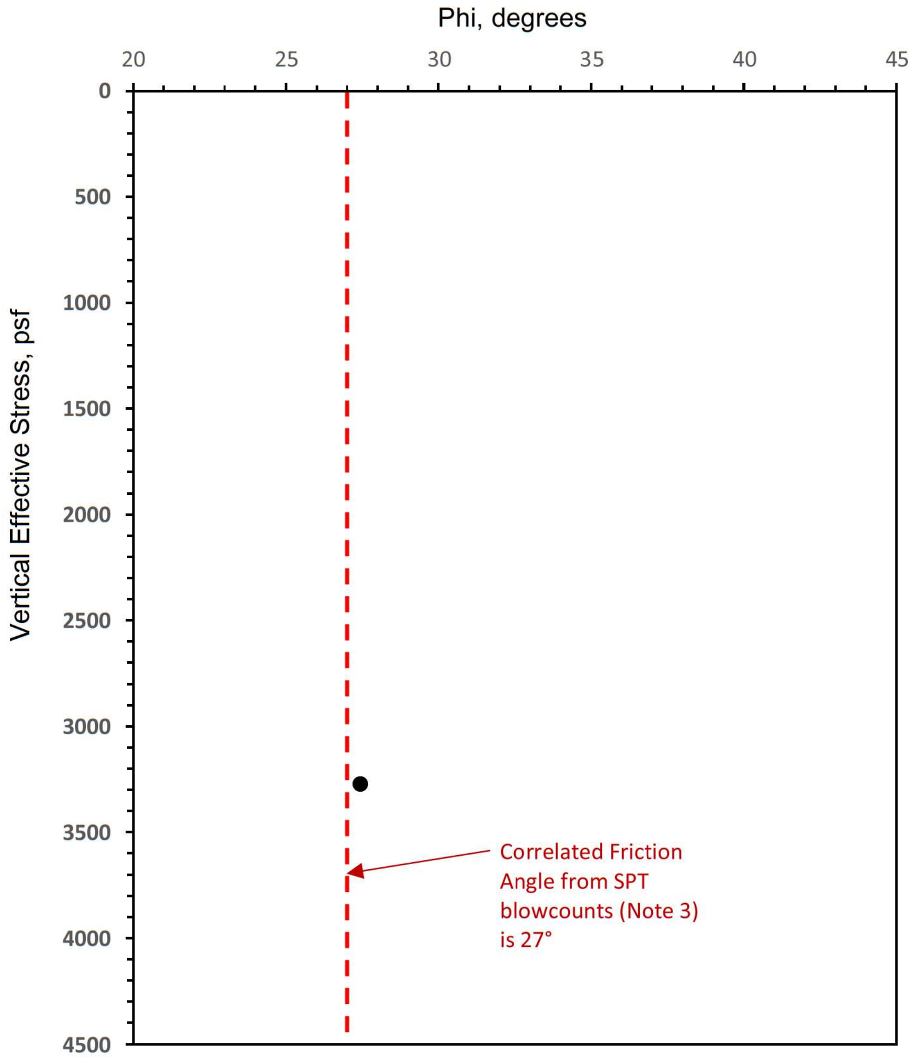
**Lower Fill (Sandy Silty Clay)**
**Correlated & Interpreted Data**

November 2025

**Figure C.5**







Correlated Friction Angle from SPT blowcounts (Note 3) is 27°

*Notes:*

1. *Blow Count data were taken from borings B-102, B-104, JAP-2, JAP-4, JAP-5PZ, and JAP-6. Data is limited to the strata identified (Organics).*
2. *Blow counts were corrected for overburden (Cn), energy (Ce), rod length (Cr), borehole diameter (Cb), and liner (Cl).*
3. *The angle of internal friction (phi) was estimated using the Bowles (1977) correlation:*

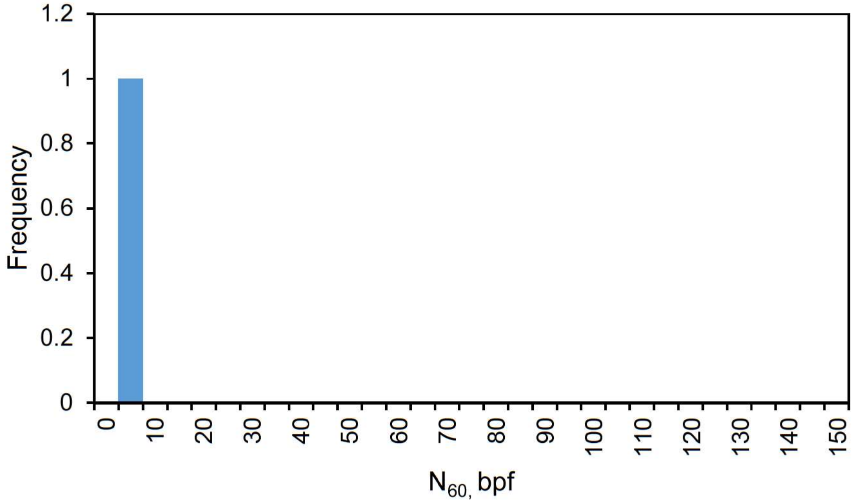
$$23.5 \text{ degrees} \leq 26 \text{ degrees} + 5.5*\log(N1,60) + 0.11*N1,60 \leq 45 \text{ degrees}$$

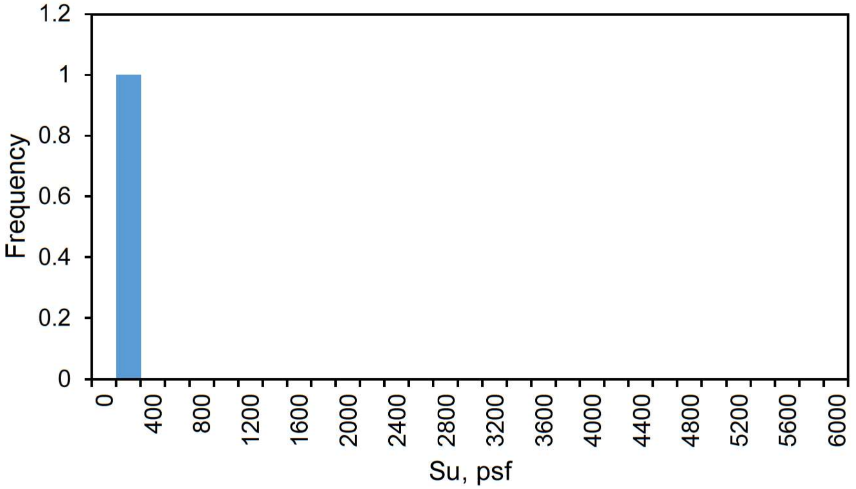
SANTEE COOPER
JEFFERIES GENERATING STATION - ASH POND A
MONCKS CORNER, SOUTH CAROLINA

## Organics (Clay with Organics) Correlated & Interpreted Data

November 2025

**Figure C.6**

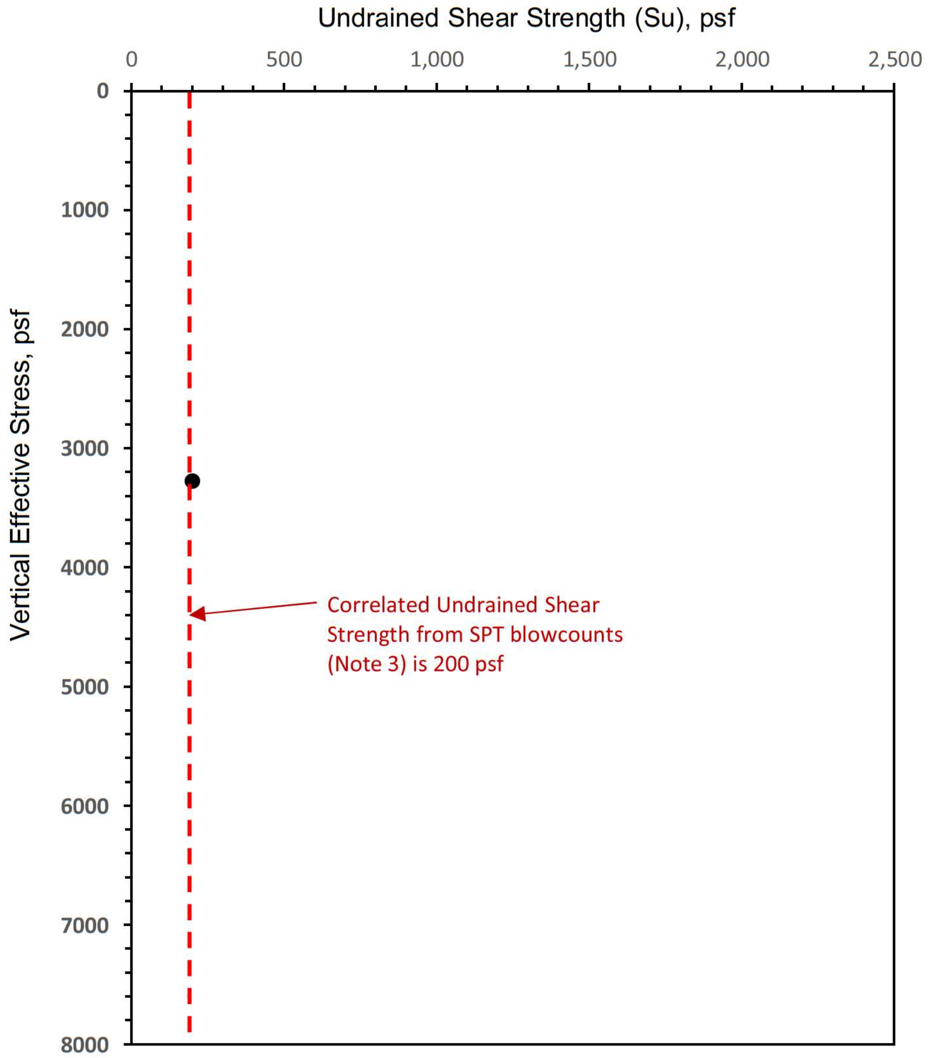




*Notes:*

1. *Blow Count data were taken from borings B-102, B-104, JAP-2, JAP-4, JAP-5PZ, and JAP-6. Data is limited to the strata identified (Organics).*
2. *Blow counts were corrected for energy (Ce), rod length (Cr), borehole diameter (Cb), and liner (Cl).*
3. *The Undrained Shear Strength (Su) was estimated using the Sowers (1979) correlation:*

*100 psf *N60 < Su ≤ 2,500 psf for OL (organics and clay with organics)*



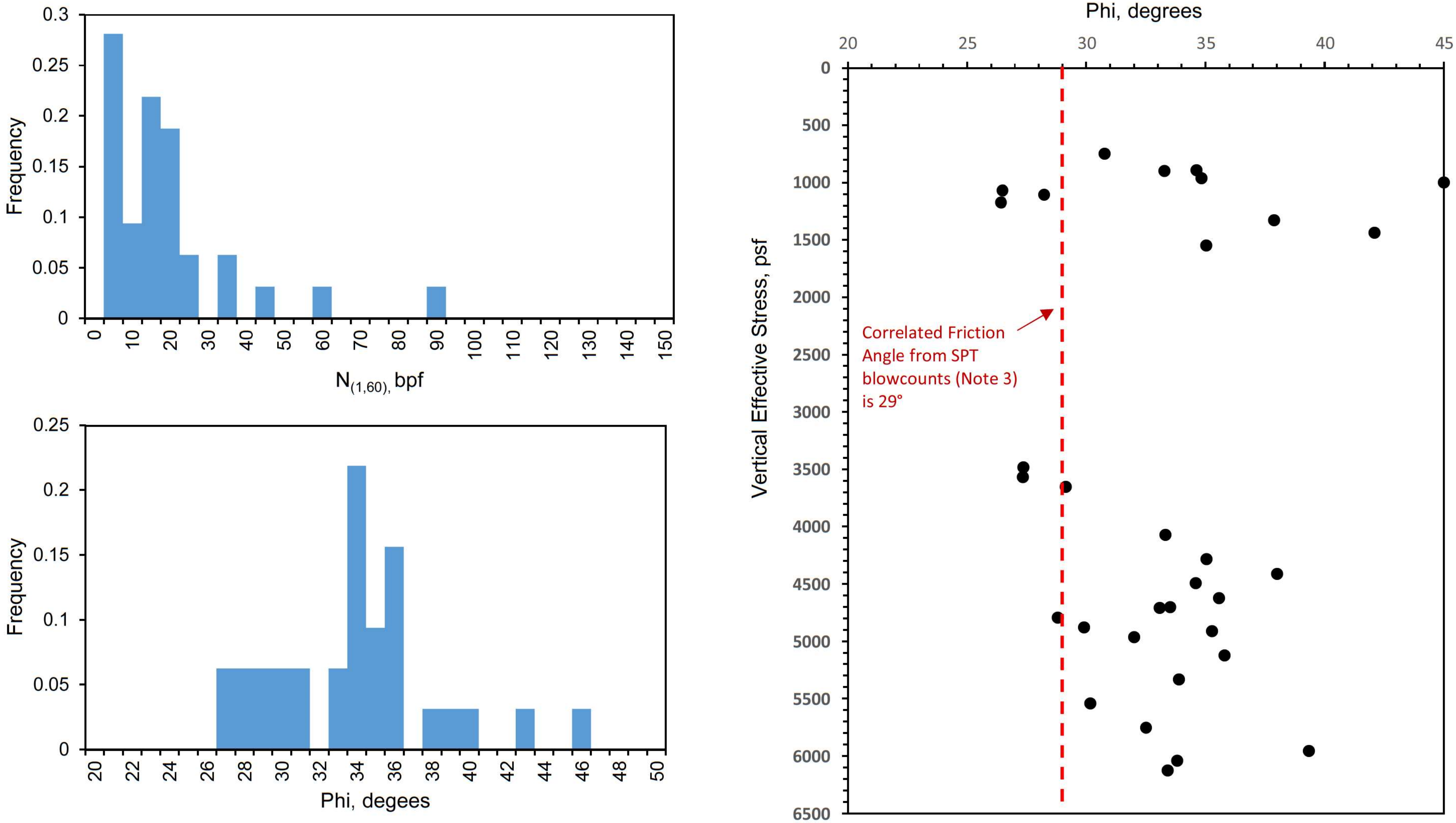
Correlated Undrained Shear Strength from SPT blowcounts (Note 3) is 200 psf

SANTEE COOPER
JEFFERIES GENERATING STATION - ASH POND A
MONCKS CORNER, SOUTH CAROLINA

**Organics (Clay with Organics)**
**Correlated & Interpreted Data**

November 2025

**Figure C.7**



Correlated Friction Angle from SPT blowcounts (Note 3) is 29°

*Notes:*

1. *Blow Count data were taken from borings B-102, B-104, JAP-2, JAP-4, JAP-5PZ, and JAP-6. Data is limited to the strata identified (Alluvium).*
2. *Blow counts were corrected for overburden (Cn), energy (Ce), rod length (Cr), borehole diameter (Cb), and liner (Cl).*
3. *The angle of internal friction (phi) was estimated using the Bowles (1977) correlation:*

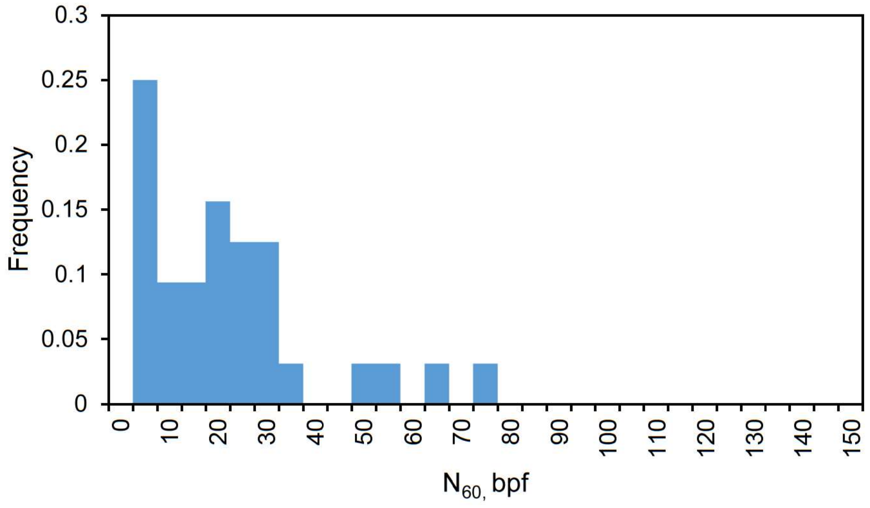
   *23.5 degrees ≤ 26 degrees + 5.5*log(N1,60) + 0.11*N1,60 ≤ 45 degrees*
4. *Direct Shear Testing on JAP-5PZ #2 yielded an angle of internal friction of 31 degrees and a cohesion of 360 psf.*

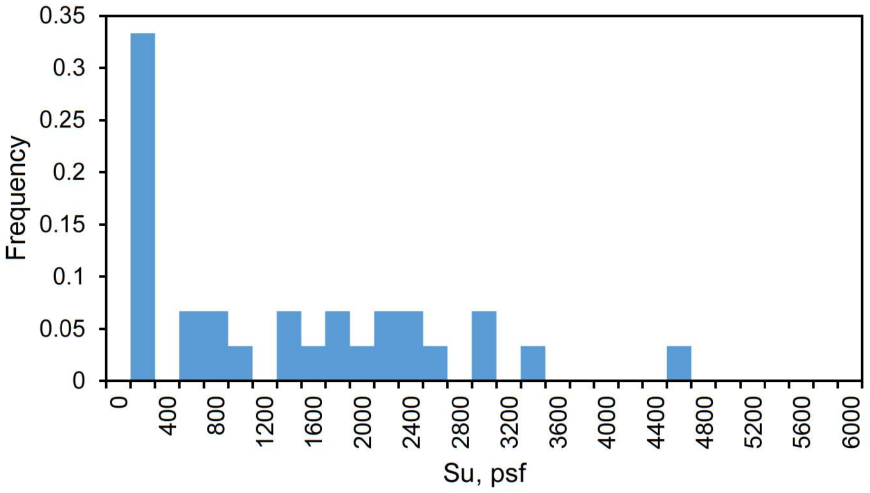
SANTEE COOPER
JEFFERIES GENERATING STATION - ASH POND A
MONCKS CORNER, SOUTH CAROLINA

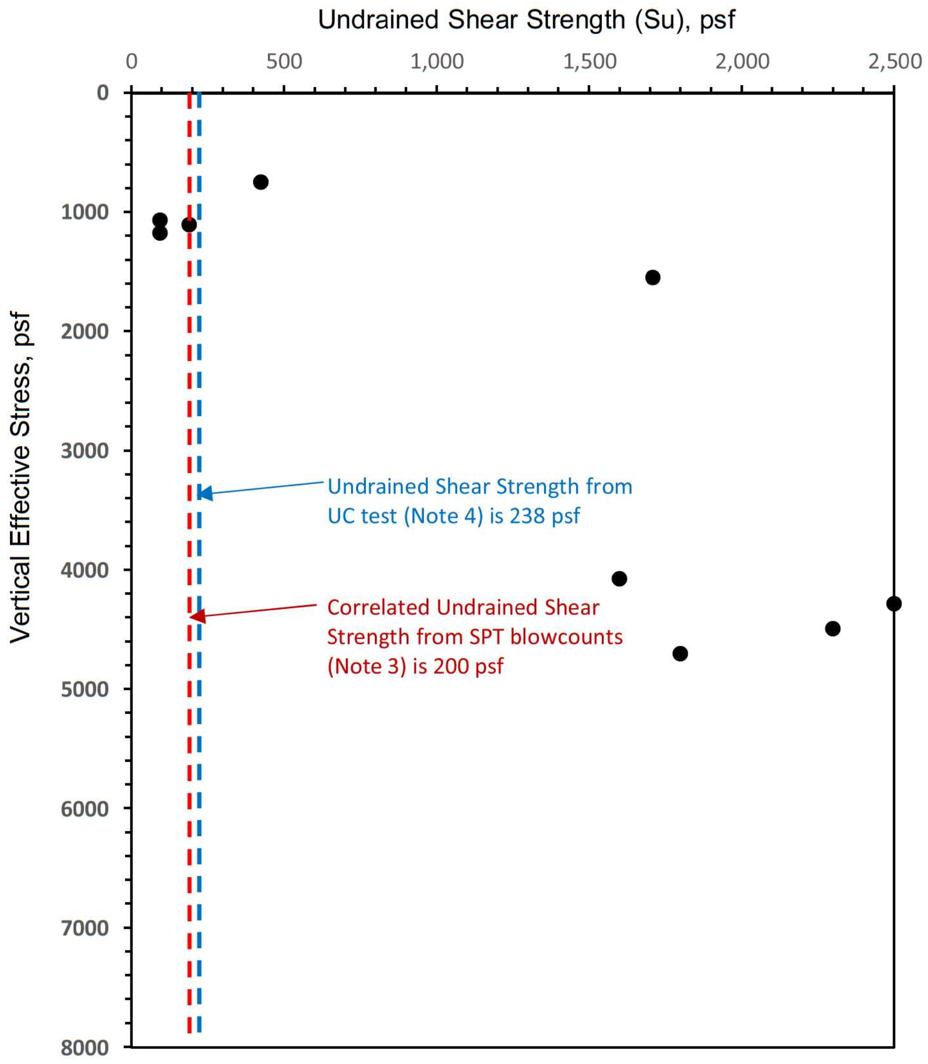
**Alluvium (Sand with Clay)**
**Correlated & Interpreted Data**

November 2025

**Figure C.8**







Undrained Shear Strength from UC test (Note 4) is 238 psf

Correlated Undrained Shear Strength from SPT blowcounts (Note 3) is 200 psf

*Notes:*

1. *Blow Count data were taken from borings B-102, B-104, JAP-2, JAP-4, JAP-5PZ, and JAP-6. Data is limited to the strata identified (Alluvium).*
2. *Blow counts were corrected for energy (Ce), rod length (Cr), borehole diameter (Cb), and liner (Cl).*
3. *The Undrained Shear Strength (Su) was estimated using the Sowers (1979) correlation:*
   *100 psf *N60 < Su ≤ 2,500 psf for Alluvium (sandy lean clay, clayey sand, silts)*
4. *Unconfined Compressive Strength Test on B-104 UD-2 yielded undrained shear strength of 238 psf. It is recommend that the alluvium be modeled as a cohesionless material (i.e. sand).*

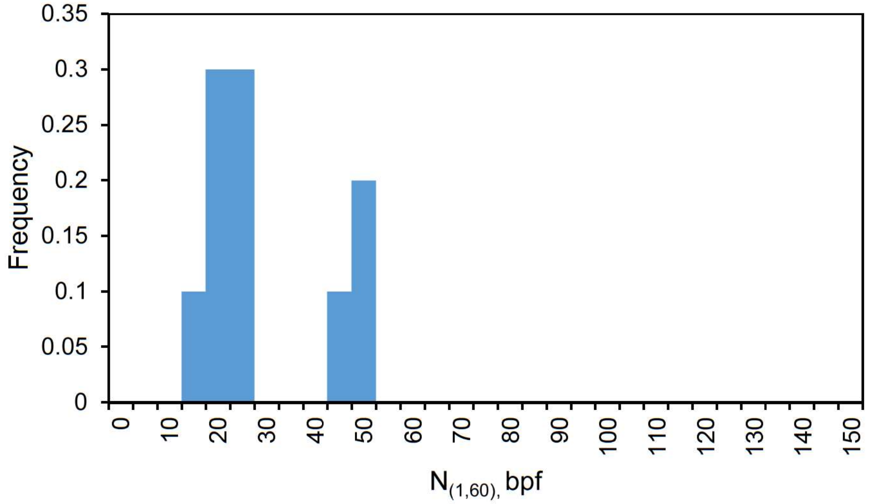
HALEY ALDRICH

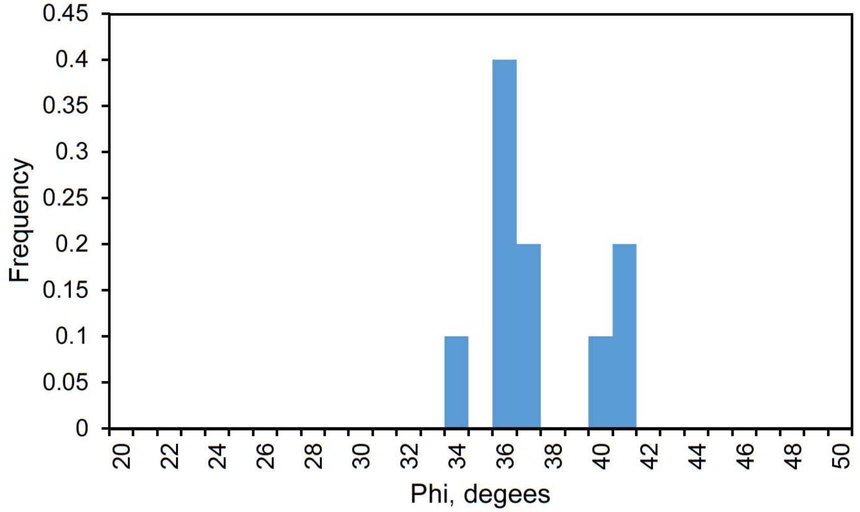
SANTEE COOPER
JEFFERIES GENERATING STATION - ASH POND A
MONCKS CORNER, SOUTH CAROLINA

**Alluvium (Sand with Clay)**
**Correlated & Interpreted Data**

November 2025

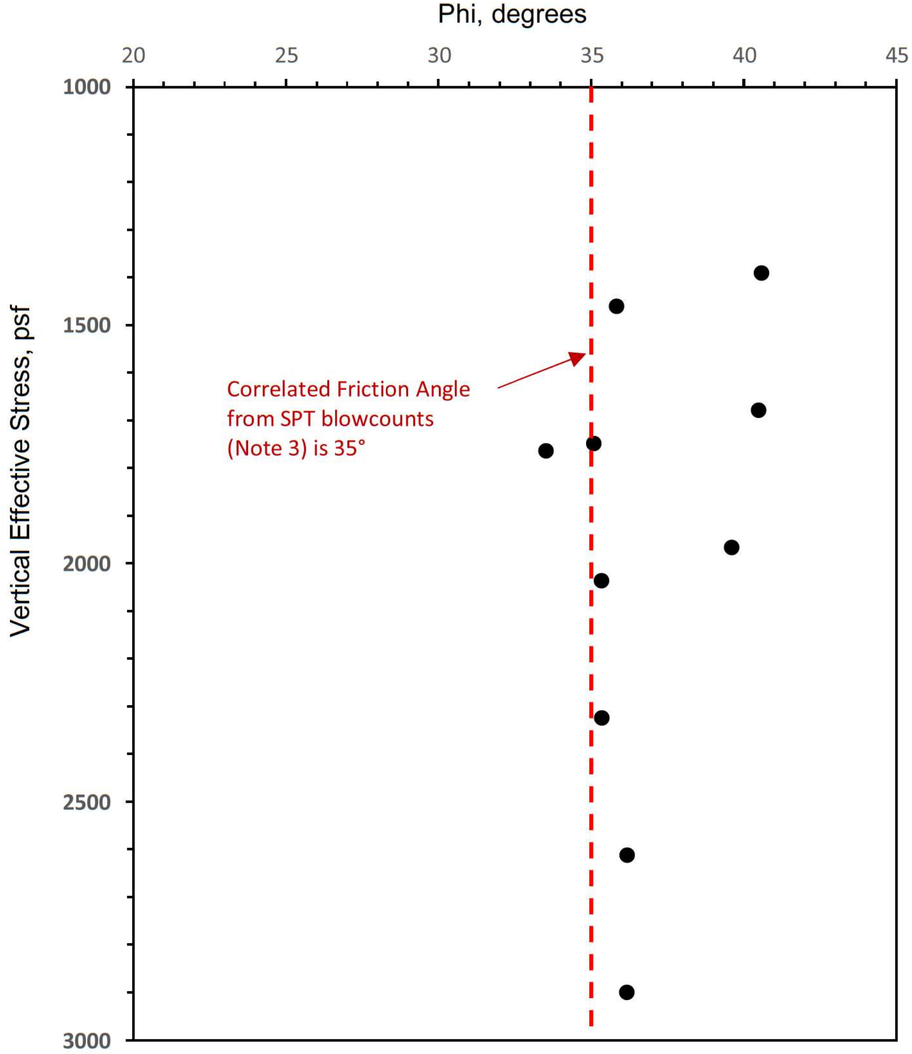
**Figure C.9**





*Notes:*

1. *Blow Count data were taken from borings B-102, B-104, JAP-2, JAP-4, JAP-5PZ, and JAP-6. Data is limited to the strata identified (Marl).*
2. *Blow counts were corrected for overburden (Cn), energy (Ce), rod length (Cr), borehole diameter (Cb), and liner (Cl).*
3. *The angle of internal friction (phi) was estimated using the Bowles (1977) correlation:*
   *23.5 degrees ≤ 26 degrees + 5.5*log(N1,60) + 0.11*N1,60 ≤ 45 degrees*



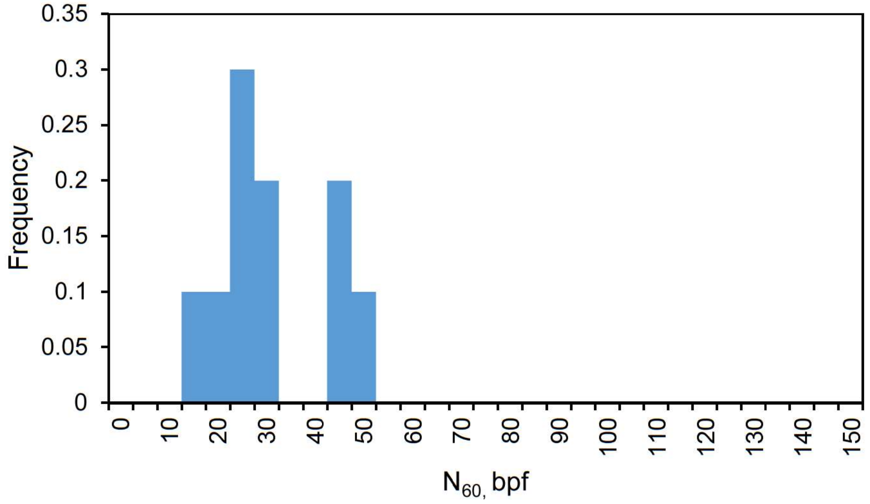
HALEY ALDRICH

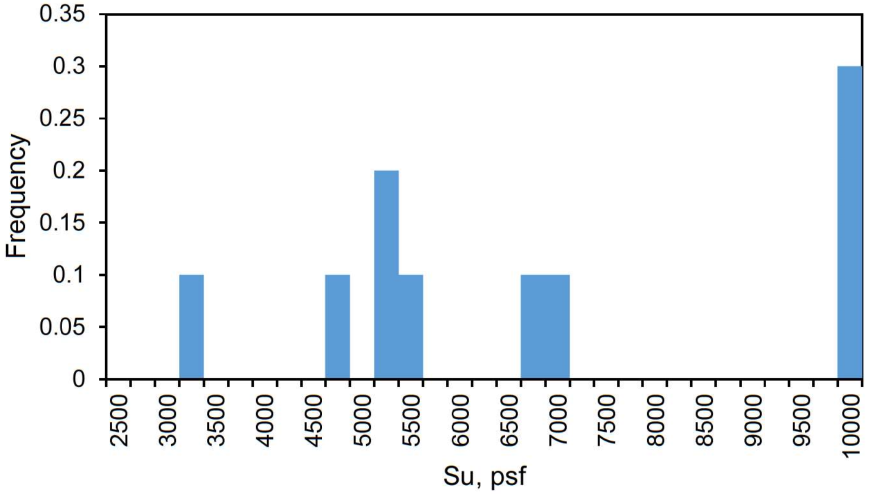
SANTEE COOPER
JEFFERIES GENERATING STATION - ASH POND A
MONCKS CORNER, SOUTH CAROLINA

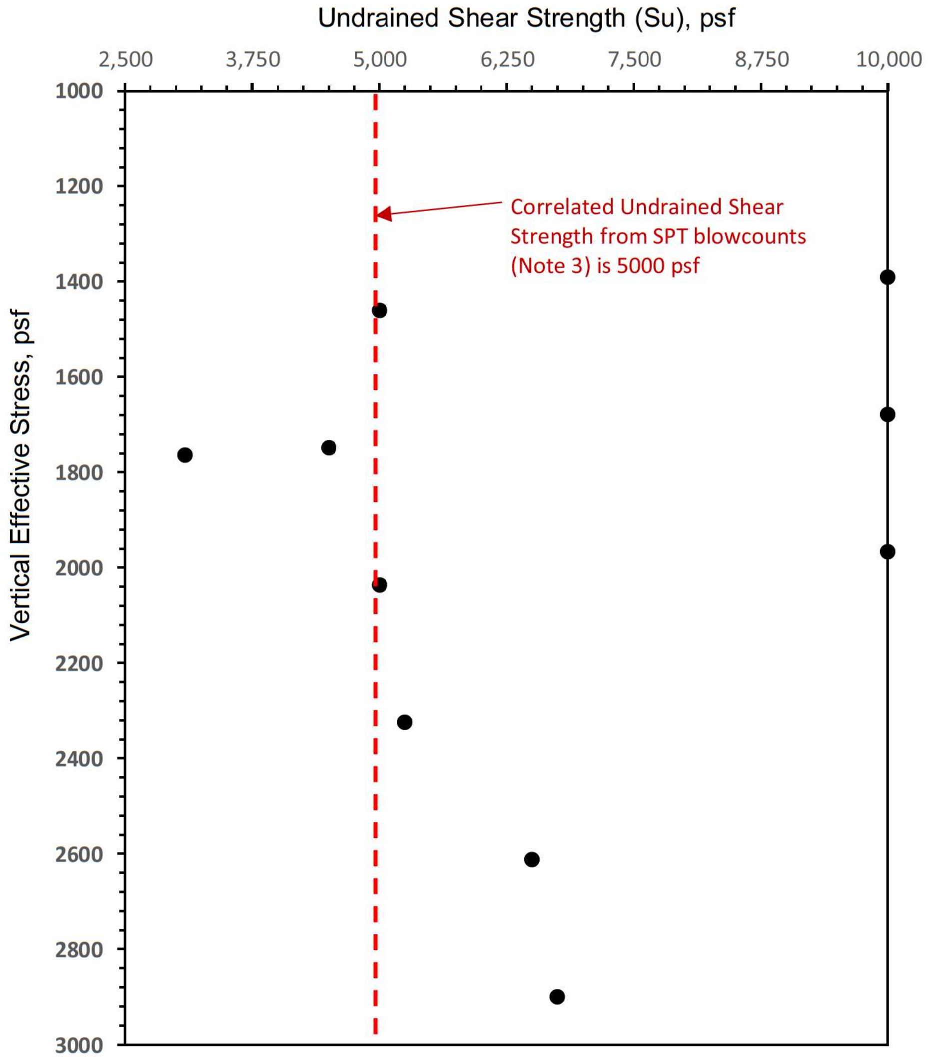
**Cooper Marl (Fat clay)**
**Correlated & Interpreted Data**

November 2025

**Figure C.10**







*Notes:*

1. *Blow Count data were taken from borings B-102, B-104, JAP-2, JAP-4, JAP-5PZ, and JAP-6. Data is limited to the strata identified (Marl).*
2. *Blow counts were corrected for energy (Ce), rod length (Cr), borehole diameter (Cb), and liner (Cl).*
3. *The Undrained Shear Strength (Su) was estimated using the Sowers (1979) correlation:*
   *250 psf *N60 < Su ≤ 10,000 psf for the Marl (fat clay)*

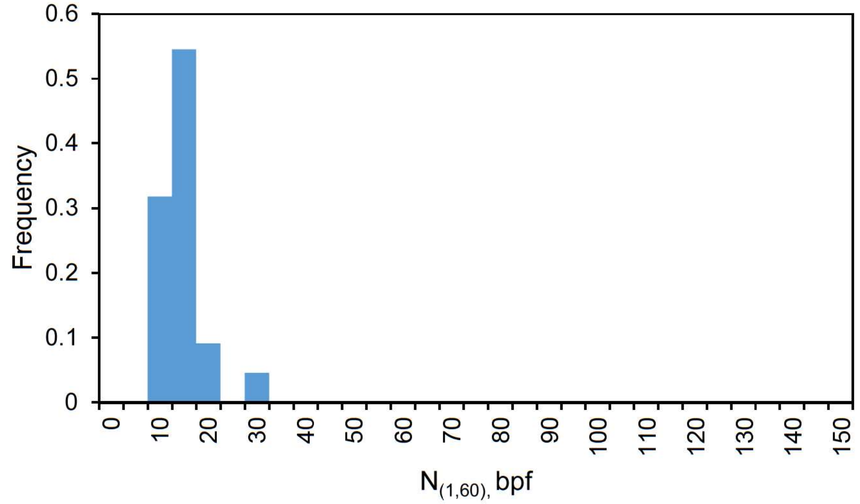
HALEY ALDRICH

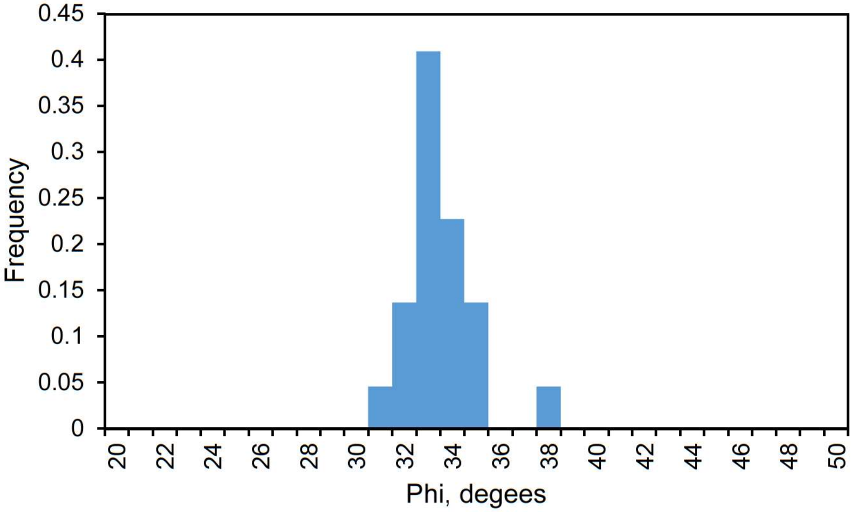
SANTEE COOPER
JEFFERIES GENERATING STATION - ASH POND A
MONCKS CORNER, SOUTH CAROLINA

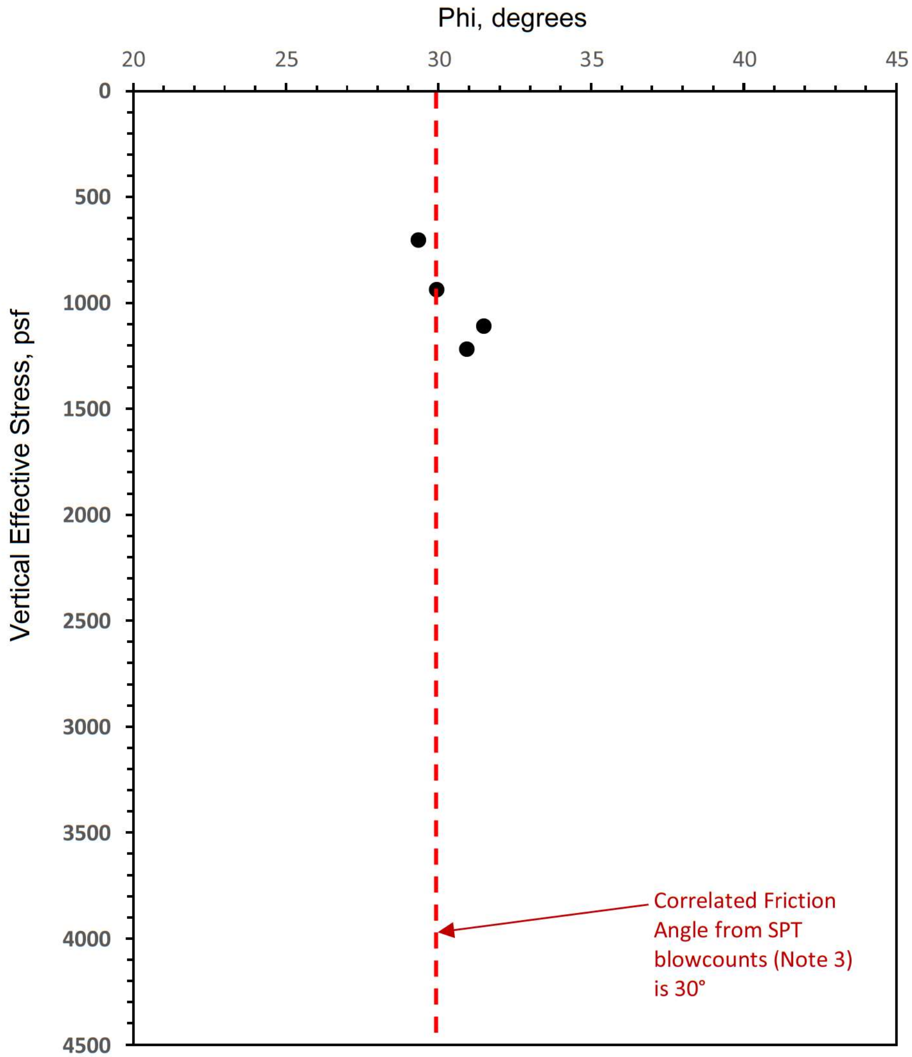
**Cooper Marl (Fat clay)**
**Correlated & Interpreted Data**

November 2025

**Figure C.11**







Correlated Friction Angle from SPT blowcounts (Note 3) is 30°

*Notes:*

1. *Blow Count data were taken from boring JAP-2. Data is limited to the strata identified (Separator Berm Fill).*
2. *Blow counts were corrected for overburden (Cn), energy (Ce), rod length (Cr), borehole diameter (Cb), and liner (Cl).*
3. *The angle of internal friction (phi) was estimated using the Bowles (1977) correlation:*

   *23.5 degrees ≤ 26 degrees + 5.5*log(N1,60) + 0.11*N1,60 ≤ 45 degrees*

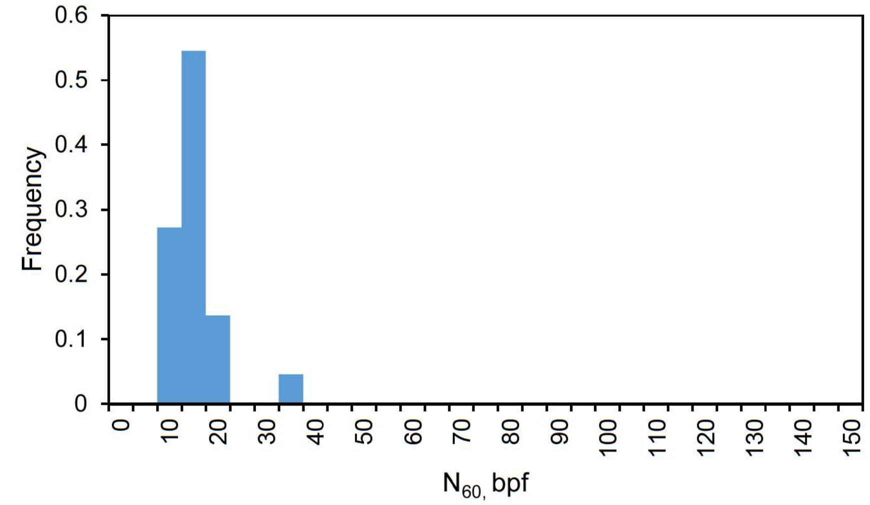
HALEY ALDRICH

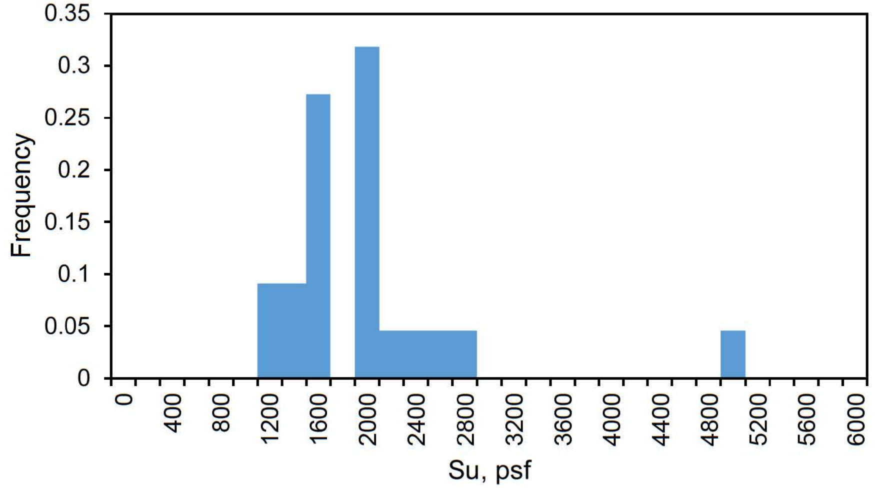
SANTEE COOPER
JEFFERIES GENERATING STATION - ASH POND A
MONCKS CORNER, SOUTH CAROLINA

**Separator Berm Fill (Sandy Silty Clay)**
**Correlated & Interpreted Data**

November 2025

**Figure C.12**

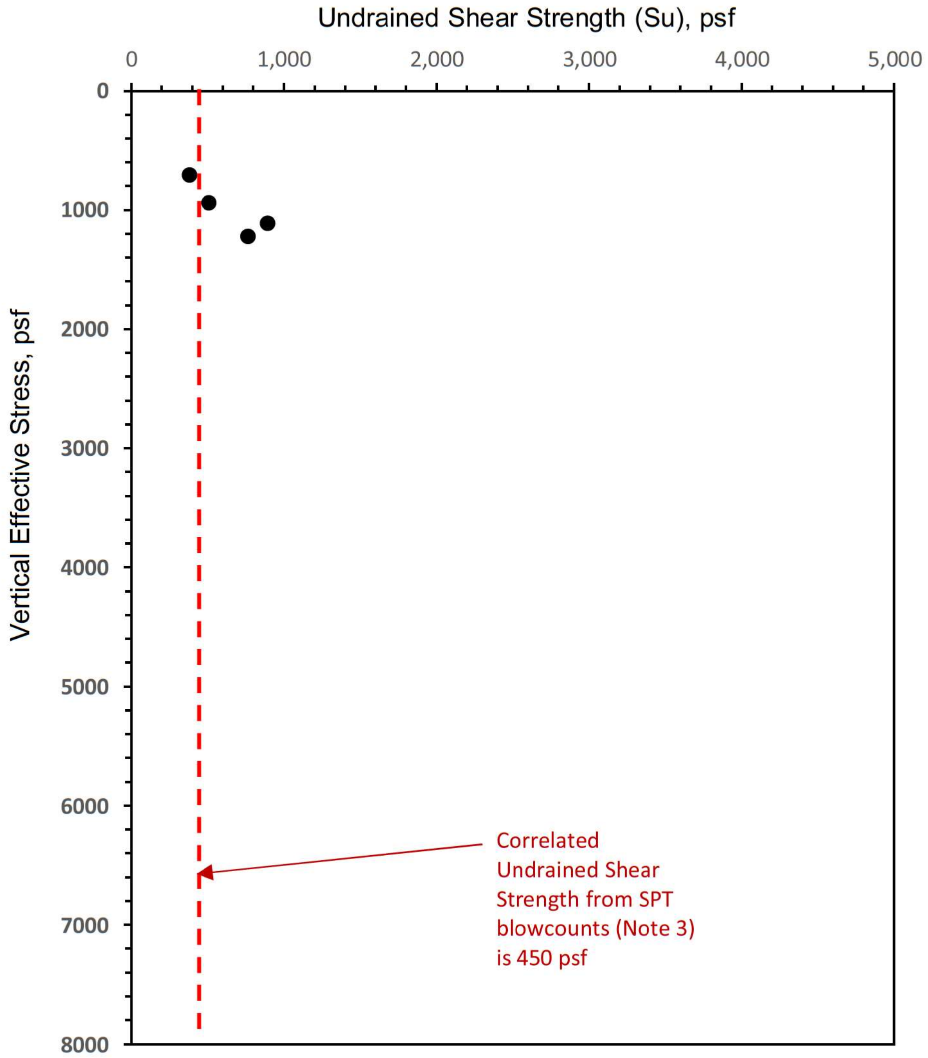




*Notes:*

1. *Blow Count data were taken from boring JAP-2. Data is limited to the strata identified (Separator Berm Fill).*
2. *Blow counts were corrected for energy (Ce), rod length (Cr), borehole diameter (Cb), and liner (Cl).*
3. *The Undrained Shear Strength (Su) was estimated using the Sowers (1979) correlation:*

   *150 psf *N60 < Su ≤ 5,000 psf for CL (assumed recompacted clay)*



SANTEE COOPER
JEFFERIES GENERATING STATION - ASH POND A
MONCKS CORNER, SOUTH CAROLINA

**Separator Berm Fill (Sandy Silty Clay)**
**Correlated & Interpreted Data**

November 2025

**Figure C.13**

# APPENDIX D
## Seismic Site Class and Design Data

HALEY ALDRICH

**CALCULATIONS**

File No.: 0132892-103
Sheet: 2
Date: 2-Sep-25
Computed by: ALB
Checked by: KGC

Client: Santee Cooper
Project: Jeffries Generation Station Pond A
Subject: Site class beased on SPT values

**CALCULATIONS - METHOD B**

**Exploration ID:** JAP-6
**Ground Surface El.:** 20.82

| Sample Number | Depth (ft) | Elevation (ft) | Description | d (ft) | SPT N (blows/ft) | d/N |
|---|---|---|---|---|---|---|
| S-01 | 15 | 5.82 | SM | 2.5 | 14 | 0.179 |
| S-02 | 17.5 | 3.32 | SM | 2.5 | 74 | 0.034 |
| S-03 | 20 | 0.82 | SM | 5.0 | 2 | 2.500 |
| S-04 | 25 | -4.18 | SM | 5.0 | 43 | 0.116 |
| S-05 | 30 | -9.18 | SM | 5.0 | 45 | 0.111 |
| S-06 | 35 | -14.18 | SM | 5.0 | 42 | 0.119 |
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| | | | Totals = | 25.0 | | 3.059 |

N-bar (blows/ft) = 8.2
Site Class = E

## CALCULATIONS - METHOD B

**Exploration ID:** JAP-6
**Ground Surface El.:** 43.33

| Sample Number | Depth (ft) | Elevation (ft) | Description | d (ft) | SPT N (blows/ft) | d/N |
|---|---|---|---|---|---|---|
| S-01 | 0.1 | 43.23 | SP-SM | 1.5 | 11 | 0.136 |
| S-02 | 2.5 | 40.83 | CH | 2.5 | 11 | 0.227 |
| S-03 | 5 | 38.33 | CH | 2.5 | 12 | 0.208 |
| S-04 | 7.5 | 35.83 | CH | 2.5 | 9 | 0.278 |
| S-05 | 10 | 33.33 | CL | 2.5 | 5 | 0.500 |
| S-06 | 13.5 | 29.83 | SP-MS | 2.5 | 10 | 0.250 |
| S-07 | 15 | 28.33 | SP | 2.5 | 15 | 0.167 |
| S-08 | 17.5 | 25.83 | CH | 2.5 | 1 | 2.500 |
| S-09 | 20 | 23.33 | CH | 2.5 | 1 | 2.500 |
| S-10 | 25 | 18.33 | CH | 5.0 | 20 | 0.250 |
| S-11 | 30 | 13.33 | CH | 5.0 | 18 | 0.278 |
| S-12 | 35 | 8.33 | CH | 5.0 | 20 | 0.250 |
| S-13 | 40 | 3.33 | CH | 5.0 | 21 | 0.238 |
| S-14 | 45 | -1.67 | CH | 5.0 | 26 | 0.192 |
| S-15 | 50 | -6.67 | CH | 5.0 | 27 | 0.185 |
| | | | Totals = | 51.5 | | 8.160 |

N-bar (blows/ft) = 6.3
Site Class = E

**CALCULATIONS - METHOD B**

**Exploration ID:** JAP-4
**Ground Surface El.:** 39.07

| Sample Number | Depth (ft) | Elevation (ft) | Description | d (ft) | SPT N (blows/ft) | d/N |
|---|---|---|---|---|---|---|
| S-01 | 0.5 | 38.57 | SM | 1.5 | 7 | 0.214 |
| S-02 | 2 | 37.07 | SM | 2.0 | 10 | 0.200 |
| S-03 | 4 | 35.07 | SM | 2.0 | 9 | 0.222 |
| S-04 | 6 | 33.07 | SM | 4.0 | 17 | 0.235 |
| S-05 | 10 | 29.07 | SM | 2.0 | 9 | 0.222 |
| S-06 | 12 | 27.07 | SM | 2.0 | 11 | 0.182 |
| S-07 | 14 | 25.07 | SM | 2.0 | 7 | 0.286 |
| S-08 | 16 | 23.07 | CL | 2.0 | 17 | 0.118 |
| S-09 | 18 | 21.07 | CL | 2.0 | 14 | 0.143 |
| S-10 | 20 | 19.07 | CL | 2.0 | 11 | 0.182 |
| S-11 | 22 | 17.07 | CL | 2.0 | 13 | 0.154 |
| S-12 | 24 | 15.07 | CL | 2.0 | 10 | 0.200 |
| S-13 | 26 | 13.07 | CL | 4.0 | 32 | 0.125 |
| S-14 | 30 | 9.07 | OL | 2.0 | 2 | 1.000 |
| S-15 | 32 | 7.07 | SP | 2.0 | 2 | 1.000 |
| S-16 | 34 | 5.07 | SP | 2.0 | 2 | 1.000 |
| S-17 | 36 | 3.07 | SP | 2.0 | 4 | 0.500 |
| | | | Totals = | 37.5 | | 5.983 |

N-bar (blows/ft) = 6.3
Site Class = E

| | | | |
|---|---|---|---|
| Client: | Santee Cooper | File No.: | 0132892-103 |
| | | Sheet: | 2 |
| | | Date: | 2-Sep-25 |
| Project: | Jeffries Generation Station Pond A | Computed by: | ALB |
| Subject: | Site class beased on SPT values | Checked by: | KGC |

**CALCULATIONS - METHOD B**

**Exploration ID:** JAP-5PZ
**Ground Surface El.:** 42.2

| Sample Number | Depth (ft) | Elevation (ft) | Description | d (ft) | SPT N (blows/ft) | d/N |
|---|---|---|---|---|---|---|
| S-01 | 0.5 | 41.7 | SM | 1.5 | 9 | 0.167 |
| S-02 | 2 | 40.2 | SM | 6.0 | 14 | 0.429 |
| S-03 | 8 | 34.2 | SM | 2.0 | 8 | 0.250 |
| S-04 | 10 | 32.2 | SM | 2.0 | 7 | 0.286 |
| S-05 | 12 | 30.2 | SM | 2.0 | 9 | 0.222 |
| S-06 | 14 | 28.2 | SM | 2.0 | 14 | 0.143 |
| S-07 | 16 | 26.2 | SM | 2.0 | 30 | 0.067 |
| S-08 | 18 | 24.2 | SM | 2.0 | 14 | 0.143 |
| S-09 | 20 | 22.2 | CL | 2.0 | 19 | 0.105 |
| S-10 | 22 | 20.2 | CL | 2.0 | 11 | 0.182 |
| S-11 | 24 | 18.2 | CL | 2.0 | 13 | 0.154 |
| S-12 | 26 | 16.2 | CL | 2.0 | 14 | 0.143 |
| S-13 | 28 | 14.2 | CL | 2.0 | 13 | 0.154 |
| S-14 | 30 | 12.2 | CL | 2.0 | 10 | 0.200 |
| S-15 | 32 | 10.2 | CL | 2.0 | 13 | 0.154 |
| S-16 | 34 | 8.2 | CL | 2.0 | 13 | 0.154 |
| S-17 | 36 | 6.2 | CL | 2.0 | 16 | 0.125 |
| S-18 | 38 | 4.2 | CL | 2.0 | 25 | 0.080 |
| S-19 | 40 | 2.2 | CL | 2.0 | 23 | 0.087 |
| S-20 | 42 | 0.2 | CL | 2.0 | 18 | 0.111 |
| S-21 | 44 | -1.8 | CL | 2.0 | 28 | 0.071 |
| S-22 | 46 | -3.8 | SM | 2.0 | 32 | 0.063 |
| S-23 | 48 | -5.8 | SM | 2.0 | 21 | 0.095 |
| S-24 | 50 | -7.8 | SM | 2.0 | 7 | 0.286 |
| S-25 | 52 | -9.8 | SM | 2.0 | 15 | 0.133 |
| S-26 | 54 | -11.8 | SM | 2.0 | 64 | 0.031 |
| S-27 | 56 | -13.8 | SM | 2.0 | 22 | 0.091 |
| S-28 | 58 | -15.8 | SM | 2.0 | 20 | 0.100 |
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| | | | | | | |
| | | | Totals = | 59.5 | | 4.224 |

N-bar (blows/ft) = 14.1
Site Class = E

**CALCULATIONS**

|  |  |  |  |
|---|---|---|---|
|  |  | File No.: | 0132892-103 |
|  |  | Sheet: | 2 |
| Client: | Santee Cooper | Date: | 2-Sep-25 |
| Project: | Jeffries Generation Station Pond A | Computed by: | ALB |
| Subject: | Site class beased on SPT values | Checked by: | KGC |

**CALCULATIONS - METHOD B**

**Exploration ID:** JAP-6
**Ground Surface El.:** 43.33

| Sample Number | Depth (ft) | Elevation (ft) | Description | d (ft) | SPT N (blows/ft) | d/N |
|---|---|---|---|---|---|---|
| S-01 | 0.5 | 42.83 | SM | 1.5 | 16 | 0.094 |
| S-02 | 2 | 41.33 | SM | 2.0 | 13 | 0.154 |
| S-03 | 4 | 39.33 | SM | 2.0 | 8 | 0.250 |
| S-04 | 6 | 37.33 | SM | 2.0 | 16 | 0.125 |
| S-05 | 8 | 35.33 | SM | 2.0 | 14 | 0.143 |
| S-06 | 10 | 33.33 | SM | 2.0 | 23 | 0.087 |
| S-07 | 12 | 31.33 | SM | 2.0 | 17 | 0.118 |
| S-08 | 14 | 29.33 | SM | 2.0 | 20 | 0.100 |
| S-09 | 16 | 27.33 | SM | 2.0 | 26 | 0.077 |
| S-10 | 18 | 25.33 | SM | 2.0 | 16 | 0.125 |
| S-11 | 20 | 23.33 | SM | 2.0 | 22 | 0.091 |
| S-12 | 22 | 21.33 | SM | 2.0 | 18 | 0.111 |
| S-13 | 24 | 19.33 | SM | 2.0 | 21 | 0.095 |
| S-14 | 26 | 17.33 | SM | 2.0 | 20 | 0.100 |
| S-15 | 28 | 15.33 | CL | 2.0 | 10 | 0.200 |
| S-16 | 30 | 13.33 | CL | 2.0 | 8 | 0.250 |
| S-17 | 32 | 11.33 | CL | 2.0 | 12 | 0.167 |
| S-18 | 34 | 9.33 | CL | 2.0 | 7 | 0.286 |
| S-19 | 36 | 7.33 | CL | 2.0 | 15 | 0.133 |
| S-20 | 38 | 5.33 | CL | 2.0 | 45 | 0.044 |
| S-21 | 40 | 3.33 | SP | 2.0 | 29 | 0.069 |
| S-22 | 42 | 1.33 | SP | 2.0 | 16 | 0.125 |
| S-23 | 44 | -0.67 | SP | 2.0 | 4 | 0.500 |
| S-24 | 46 | -2.67 | SP | 2.0 | 6 | 0.333 |
| S-25 | 48 | -4.67 | SP | 2.0 | 12 | 0.167 |
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|  |  |  | Totals = | 49.5 |  | 3.943 |

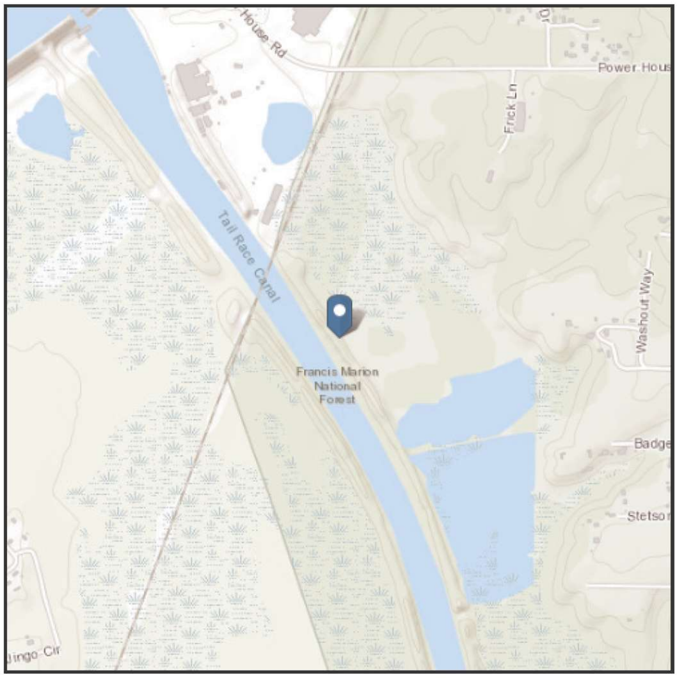
N-bar (blows/ft) = 12.6
Site Class = E

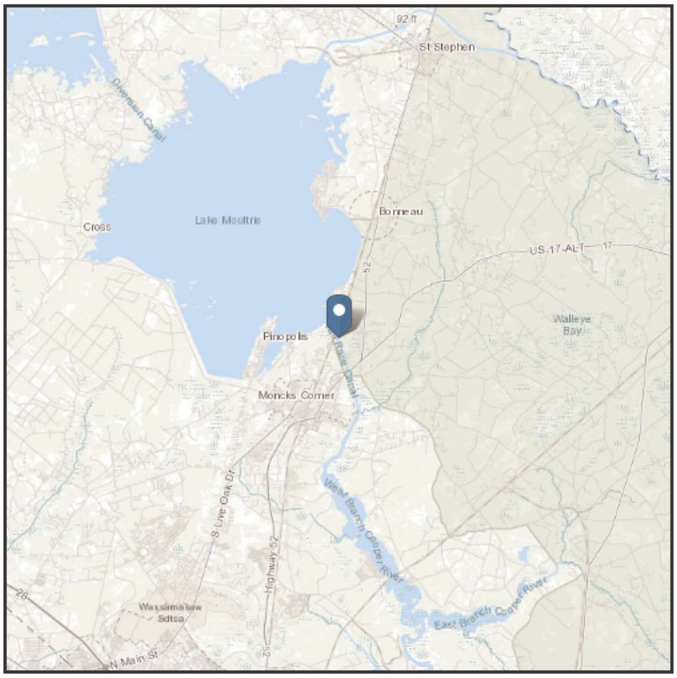
# ASCE Hazards Report

**Address:**
No Address at This Location

**Standard:** ASCE/SEI 7-22
**Risk Category:** II
**Soil Class:** E - Soft Clay Soil

**Latitude:** 33.234582
**Longitude:** -79.982357
**Elevation:** 17.84605517737296 ft (NAVD 88)





# Seismic

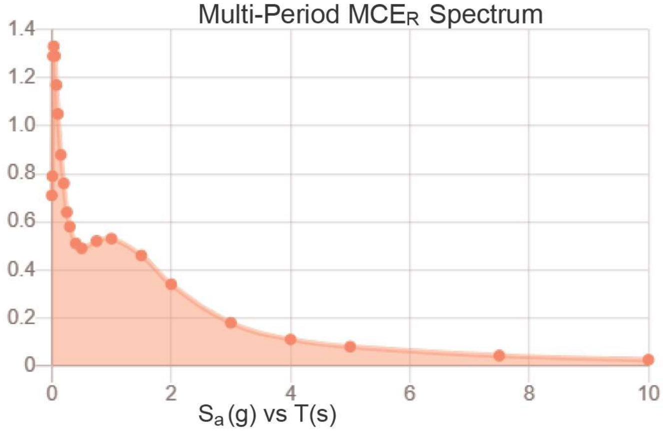
**Site Soil Class:** E - Soft Clay Soil

**Results:**

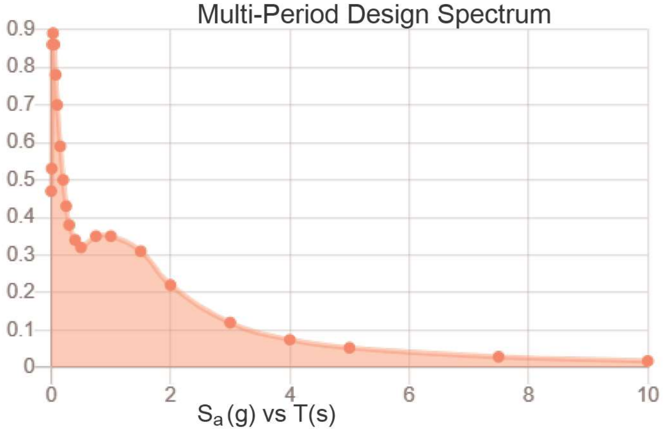
| | | | |
|---|---|---|---|
| $PGA_M$ : | 0.69 | $T_L$ : | 8 |
| $S_{MS}$ : | 0.68 | $S_S$ : | 1.76 |
| $S_{M1}$ : | 0.62 | $S_1$ : | 0.42 |
| $S_{DS}$ : | 0.45 | $V_{S30}$ : | 150 |
| $S_{D1}$ : | 0.41 | | |

**Seismic Design Category: D**

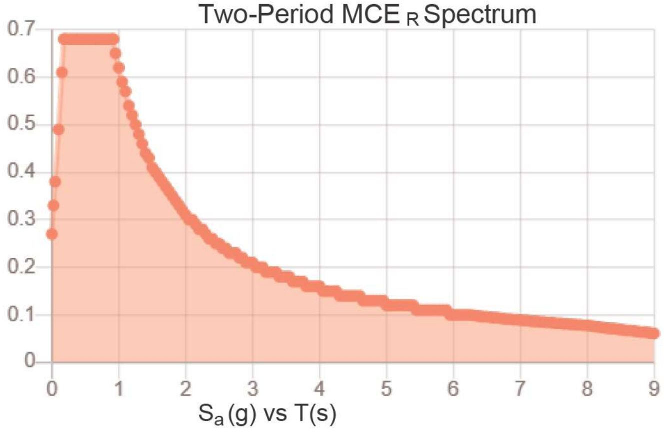
Multi-Period $MCE_R$ Spectrum



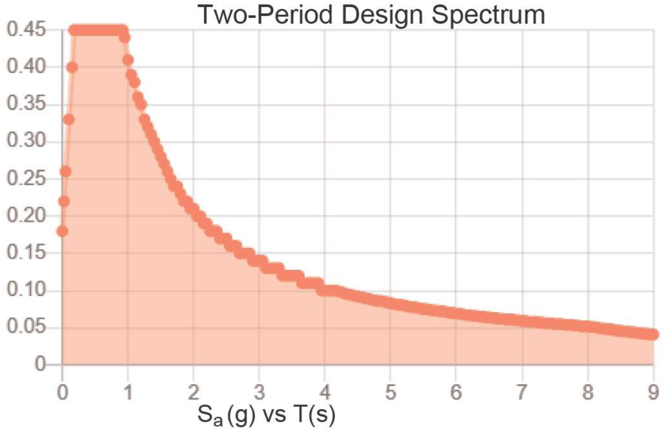
Multi-Period Design Spectrum



Two-Period $MCE_R$ Spectrum



Two-Period Design Spectrum



$MCE_R$ Vertical Response Spectrum

Vertical ground motion data has not yet been made available by USGS.

Design Vertical Response Spectrum

Vertical ground motion data has not yet been made available by USGS.

**Data Accessed:** **Fri Aug 22 2025**

**Date Source:**

**USGS Seismic Design Maps based on ASCE/SEI 7-22 and ASCE/SEI 7-22 Table 1.5-2. Additional data for site-specific ground motion procedures in accordance with ASCE/SEI 7-22 Ch. 21 are available from USGS.**

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# ATTACHMENT 1
# WorleyParsons 2011 Ash Pond Site Assessment

WorleyParsons
resources & energy

EcoNomics™

**SANTEE COOPER**

# Jefferies Generating Station

## Ash Pond Site Assessment - Initial Hydrologic and Geotechnical Studies

108008-01330 – JEFF-0-LI-AP-0001

1 June 2011

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Eastern Operations

**SANTEE COOPER**
**JEFFERIES GENERATING STATION**
**ASH POND SITE ASSESSMENT - INITIAL HYDROLOGIC AND GEOTECHNICAL STUDIES**

## SYNOPSIS

This report documents the initial results of a site assessment performed for Santee Cooper's Jefferies Generating Station. The scope of the site assessment included initial characterizations of the existing hydrologic and subsurface geotechnical conditions within the vicinity of the ash pond areas.

**PROJECT 108008-01330 - JEFFERIES GENERATING STATION**

| REV | DESCRIPTION | ORIG | REVIEW | WORLEY-PARSONS APPROVAL | DATE | CLIENT APPROVAL | DATE |
|---|---|---|---|---|---|---|---|
| A | Issued for Review | F Wood | E Leiby | R Martin | 1-Jun-11 | N/A | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |

# CONTENTS

## Appendices

# 1. SUMMARY

The purpose of this site assessment is to provide an initial characterization of the existing hydrologic and subsurface geotechnical conditions within the vicinity of the ash ponds at Jefferies Generating Station.

The scope of the hydrologic study included review of available information, field reconnaissance, and delineation of an apparent offsite area draining into the ash ponds. Detailed site survey was not available for this study. This study confirmed the existence of an offsite area equal to approximately 305 acres draining into Pond A. Upper-bound peak flows into the pond for several design storm events were determined.

The scope of the geotechnical study included performing six soil borings and laboratory testing on selected soil samples. The existence of a relatively thick soil deposit of low-permeability Cooper Marl underlying both ponds was confirmed. The top of the marl deposit appears higher along the east edge of the ponds and lower along the tailrace canal to the west. Santee Limestone was not encountered by any of the six borings.

Further hydrologic study is recommended to ensure the ponds can pass the appropriate design storm event, including flows from offsite. In the near term, this should include the requirements for maintaining the channel within Pond A to ensure it can convey the appropriate design storm event without backing up and overtopping the dike. Provisions to safely divert offsite stormwater flow around the ponds will need to be incorporated into any long-term closure plan.

No further geotechnical work is planned at this time, however additional field and laboratory testing will be required as part of any future closure design process.

# 2. INTRODUCTION

This report documents the results of an initial site assessment performed on the ash ponds at Jefferies Generating Station in response to a letter from South Carolina Department of Health and Environmental Control (SCDHEC) to Santee Cooper dated October 28, 2010. This site assessment was conducted in general accordance with a work plan submitted by Santee Cooper to DHEC, dated January 26, 2011.

The primary objectives of this site assessment were data collection and characterization of the existing hydrologic and subsurface conditions within the vicinity of the ash ponds. The results are intended to help facilitate the planning and evaluation of current operational alternatives as well as future closure options as the ponds begin to approach the latter portion of their service life.

# 3. DISCUSSION

This discussion is separated into two sections. Section 3.1 summarizes the hydrologic study and Section 3.2 summarizes the results of the geotechnical investigation.

## 3.1 Initial Hydrologic Study

### 3.1.1 Objective

The main objective of the hydrologic assessment was to characterize the stormwater flow in the general vicinity of the ash ponds using available site records, site reconnaissance, and available United States Geological Survey (USGS) topographic maps.

### 3.1.2 Existing Available Data

Documentation of the original design and construction of the ash ponds is limited. Two drawings were made available for this study. The first was a plan drawing showing drainage improvements presumably made in 1982. The second contained a plan, sections, and details for the perimeter pond dike and outfall structure. The plan drawing seemed to indicate that stormwater from an area north and east of the ash ponds appeared to flow into Pond A, but there was no indication of the size of the drainage area.

### 3.1.3 Results

Site reconnaissance confirmed that offsite stormwater flows into Pond A. The contributory drainage area was delineated using USGS maps and then walked down for visual confirmation. The drainage area was determined to be approximately 305 acres. Refer to Figure 3.1.1 on the following page.

The majority of the offsite stormwater flow enters Pond A through a 48-inch reinforced concrete pipe (RCP) under Power House Road. It then follows a well-defined channel excavated into the ash just inside the east perimeter of the pond. This channel also intercepts additional run-on from elevated areas east of Pond A. The majority of this channel appears well-maintained, however it appears to lose definition after it passes the start of the pond dike, prior to reaching the open water and outlet structure in the south-eastern extent of Pond A. It appears to be connected to the open water by shallow swales through the ash. Topographic survey of the ash within the pond is not available at this time.

Stormwater from the remaining areas east of the ash ponds is intercepted by a separate ditch along the exterior base of the perimeter dike, where it bypasses the ponds and flows directly into the tailrace canal through the drainage structure located southwest of Pond B.

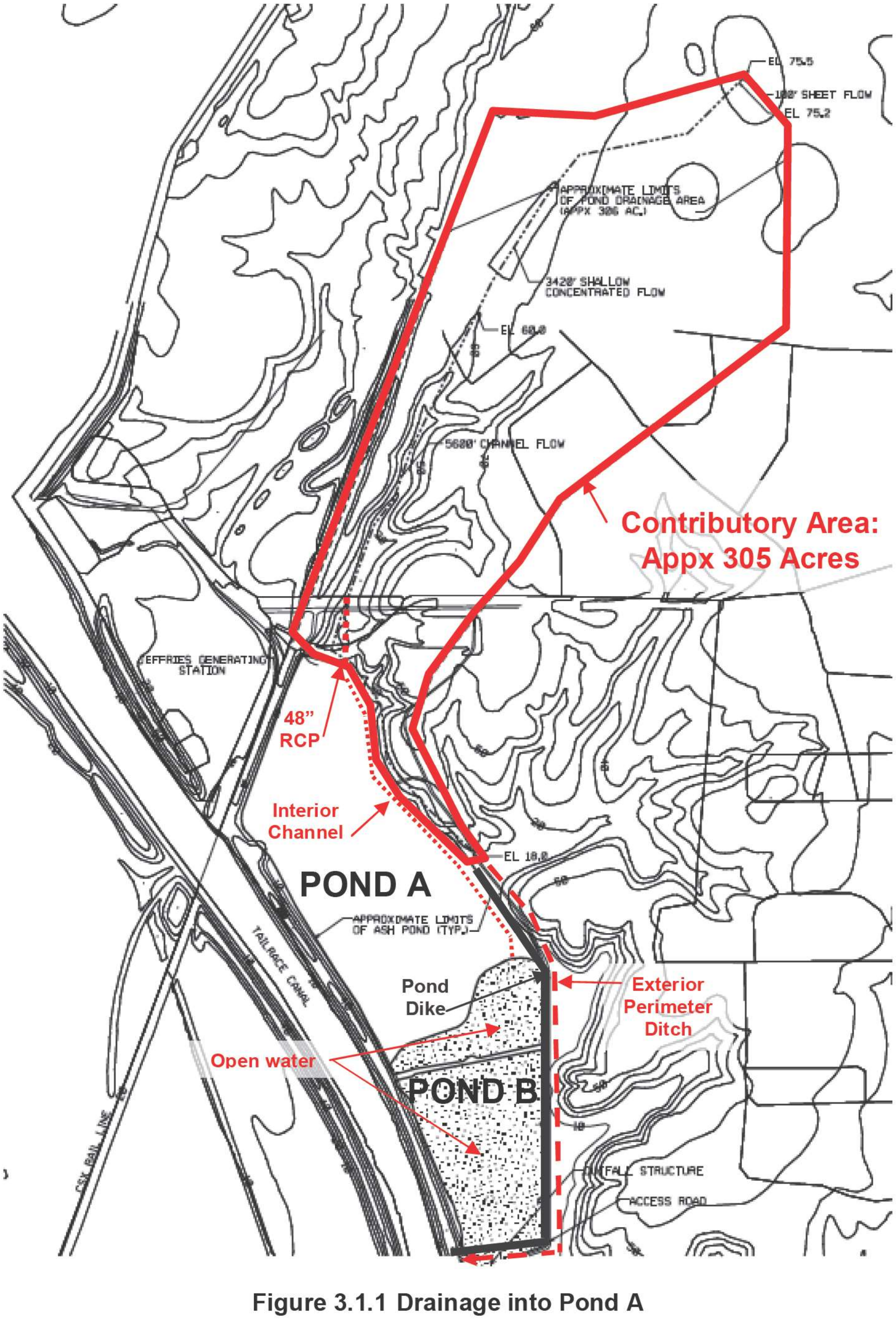


Figure 3.1.1 Drainage into Pond A

Upon consideration of available aerial imagery, USGS topographic maps, soil survey data, and local precipitation data, the TR-55 method was used to calculate preliminary theoretical peak flows from the offsite area for various 24-hour storm events. The results are summarized in Table 3.1.1 below:

**Table 3.1.1 Summary of Peak Runoffs**

| 24-hour Storm Event | Peak Runoff (cfs) |
|---|---|
| 2-yr | 70 |
| 25-yr | 321 |
| 50-yr | 421 |
| 100-yr | 533 |

It is likely that the above peak flows into Pond A are attenuated to lesser values by the 48-inch RCP under Power House Road. The degree to which this may occur is unknown at this time due to the lack of survey information.

There is no record of any storm event overtopping the dike throughout the 40-year history of the ponds. However, it is possible that the current channel configuration within the pond has existed only recently as Pond A has continued to fill with ash. In the near term, an additional study is recommended in order to document the degree to which Ash Pond A can safely store and/or pass the runoff resulting from the appropriate design storm event. The study should ensure that the flow through any channel or swale constructed within the Pond A ash is not restricted to the point that it could be diverted over the top of the east perimeter dike before reaching the open water. Limited additional field survey will be required for this analysis.

As part of any long term pond closure plan, provisions should be included to segregate and divert the flow from this offsite area around the perimeter of the pond.

## 3.2 Initial Geotechnical Investigation

### 3.2.1 Objective

The main objective of this investigation was to obtain sufficient field and laboratory data to:

1) characterize the soil conditions in the vicinity of the ash ponds to help evaluate the feasibility of any near-term operational alternatives or long-term closure options
2) evaluate the consistency of the soil profile across the ash ponds
3) assist with the planning of any future more comprehensive geotechnical or hydrogeologic investigations that may be required

The general nature and consistency of the existing subsurface conditions is the focus of this report.

### 3.2.2 Existing Available Data

Subsurface data made available prior to the current investigation included eight soil borings performed during 1980 and 1982. The tests were conducted in the vicinity of the lock between the tailrace canal and Lake Moultrie, approximately 3000 feet northwest of Ash Pond A. In general, these tests indicated approximately 15 feet of loose sands, silts, and clays overlying about 10 feet of Cooper Marl (Average top of marl was approximately Elevation 0 NGVD 29). Underlying the Cooper Marl was Santee Limestone to an undetermined depth (no tests extended completely through the limestone).

### 3.2.3 Field Test Results

The current investigation included six standard penetration test (SPT) soil borings, designated B-101 through B-106, performed during late February, 2011 by Soil Consultants, Inc. (SCI). Borings B-101 and B-102 were performed within Ash Pond A, while borings B-103 through B-106 were performed along the embankments surrounding Ash Ponds A and B. Figure 3.2.1 on the following page indicates the soil boring locations.

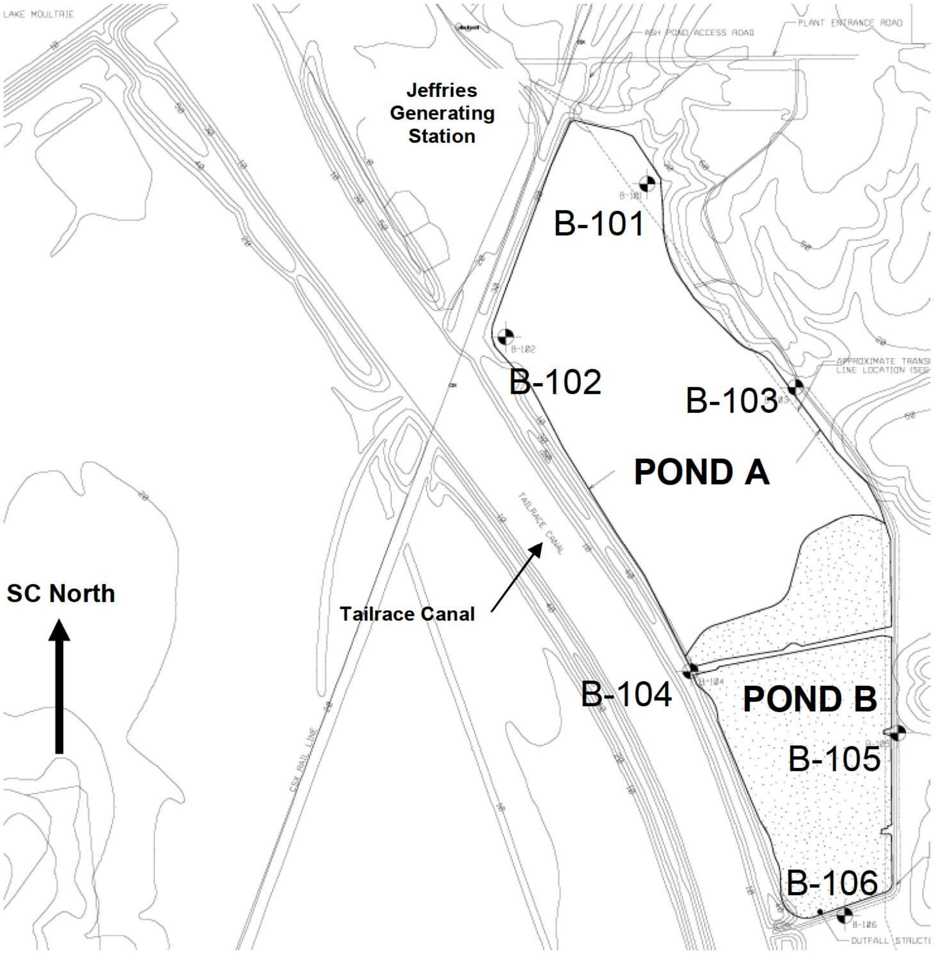


**Figure 3.2.1 Field Test Location Plan**

Prior to performing these six borings it was anticipated that a similar soil profile would be encountered in the ash pond areas, namely surficial sands, silts, and clays overlying a relatively thin stratum of Cooper Marl, followed by Santee Limestone to a greater depth. Therefore it was determined that all borings would extend completely through the marl in order to assess the degree to which its thickness varied over the ash pond areas and most importantly whether or not there was any indication of a possible discontinuity in the formation. Two of those borings were intended to extend through the limestone to provide an initial assessment of its general thickness and consistency.

In actuality, the Cooper Marl thickness was found to be significantly greater in the pond areas, and Santee Limestone was not encountered in any of the six borings. Only boring B-101 appeared to extend completely through the marl, as it terminated upon refusal in a dark gray siltstone after penetrating over 27 feet of marl. Furthermore, the top of the Cooper Marl was encountered at a shallower depth along the east side of Pond A. Table 3.2.1, below, summarizes the depth and thickness of each formation encountered:

**Table 3.2.1 Summary of Soil Borings**

| Boring # | Location | Grade Elevation (NAVD88) | Fill Elevation (NAVD88) | Top of Natural Soil Elevation (NAVD88) | Cooper Marl Elevation (NAVD88) |
|---|---|---|---|---|---|
| B-101 | Pond A | 29.6 | 29.6 to 21.5 (ash) | 21.5 to 6.5 | 6.5 to -21 |
| B-102 | Pond A | 20.8 | 20.8 to 8 (ash) | 8 to -2 | -2 to -15.5+ |
| B-103 | Beginning of Dike | 22.7 | NA | 22.7 to 16 | 16 to -29+ |
| B-104 | Canal Dike | 16.9 | 16.9 to 7.5 (dike) | 7.5 to -6.5 | -6.5 to -35+ |
| B-105 | Pond B Dike | 17.9 | 17.9 to 8.5 (dike) | 8.5 to 1 | 1 to -33.5+ |
| B-106 | Pond B Dike | 18.2 | 18.2 to 11 (dike) | 11 to -1.5 | -1.5 to -33+ |

Notes:

1.) Add 0.99 feet to convert NAVD88 to NGVD29
2.) "+" indicates that Cooper Marl extended below termination depth of boring

It should be noted that the two soil borings performed within Ash Pond A were cased below the ash, and all soil borings (and companion sampling holes) were grouted.

Additional detail regarding the general nature and consistency of each soil stratum encountered is presented in section 3.2.5.

### 3.2.4 Laboratory Test Results

During March and April of 2011, SCI also conducted laboratory index and strength testing on samples obtained from these borings (and two adjacent companion holes). All detailed field and laboratory test results, as well as testing procedures, are contained in the SCI data report, which is included as Appendix 1 to this report. Laboratory test results are summarized in Table 3.2.2 on the following page.

**Table 3.2.2 Summary of Test Results**

| **Dike Fill Soils** | | **SPT N (corr)** | **WC (%)** | **PL** | **LL** | **PI** | **% < #200** |
|---|---|---|---|---|---|---|---|
| Medium to stiff inorganic clay, sand, and marl dike fill materials | No. of Tests | 11 | 9 | 3 | 3 | 3 | 0 |
| | Minimum Value | 5 | 16 | 13 | 31 | 15 | - |
| | **Average Value** | **11** | **24** | **19** | **40** | **21** | - |
| | Maximum Value | 22 | 38 | 28 | 51 | 26 | - |
| **Near-Surface Soils** | | **SPT N (corr)** | **WC (%)** | **PL** | **LL** | **PI** | **% < #200** |
| Very loose to very dense gray fine to medium sands with varying amounts of silt | No. of Tests | 11 | 10 | 2 | 2 | 2 | 5 |
| | Minimum Value | 2 | 16 | 15 | 44 | 29 | 5 |
| | **Average Value** | **23** | **23** | **15** | **45** | **30** | **16** |
| | Maximum Value | 100 | 39 | 15 | 45 | 30 | 39 |
| Medium to stiff tan and brown inorganic clays with varying amounts of sand and silt | No. of Tests | 4 | 4 | 2 | 2 | 2 | 0 |
| | Minimum Value | 5 | 17 | 16 | 36 | 20 | - |
| | **Average Value** | **11** | **24** | **19** | **61** | **42** | - |
| | Maximum Value | 14 | 34 | 21 | 85 | 64 | - |
| Very soft to stiff gray inorganic clay with varying amounts of sand | No. of Tests | 9 | 9 | 7 | 7 | 7 | 0 |
| | Minimum Value | 1 | 14 | 13 | 29 | 12 | - |
| | **Average Value** | **5** | **45** | **19** | **52** | **33** | - |
| | Maximum Value | 14 | 75 | 25 | 83 | 63 | - |
| **Cooper Marl** | | **SPT N (corr)** | **WC (%)** | **PL** | **LL** | **PI** | **% < #200** |
| Stiff to hard brownish-green calcareous clays, silts, and sands | No. of Tests | 41 | 43 | 8 | 8 | 8 | 2 |
| | Minimum Value | 12 | 17 | 18 | 31 | 6 | 19 |
| | **Average Value** | **42** | **32** | **24** | **52** | **28** | **30** |
| | Maximum Value | 100 | 42 | 29 | 81 | 60 | 40 |

In addition to the natural moisture content (ASTM D2216), Atterberg limits (ASTM D4318), and gradation test (ASTM D422) results presented on the previous page, limited testing also was performed on relatively undisturbed samples in order to assess the specific gravity (3), permeability (1), unit weight (4), and unconfined compressive strength (3).

Specific gravity testing was performed in general accordance with ASTM D854. Two of these tests were performed on the gray clayey fine to medium/course sands. Both indicated a specific gravity of 2.63. The third test was performed on the Cooper Marl and indicated a value of 2.74.

Permeability testing was performed in general accordance with ASTM D5084. Undisturbed sampling with a Shelby tube can be increasingly difficult above SPT N values of 15. Test data available prior to the current study suggested that the Cooper Marl would allow for undisturbed sampling in most (but not all) locations. The current investigation therefore intended to obtain one undisturbed sample of Cooper Marl at each boring location for the purpose of permeability testing in order to assess the degree to which the formation would serve as a barrier to the vertical migration of groundwater (depending on its thickness). However, as shown in Table 3.2.2 the Cooper Marl underlying the ash ponds consistently had SPT N values well in excess of 15 and was therefore very difficult to sample with a Shelby tube. Only one successful relatively undisturbed sample of marl was obtained for permeability testing, which indicated a value of $1.28 \times 10^{-6}$ cm/sec. It should be noted that despite its relatively low permeability, the marl specimen tested was actually classified as a clayey fine to coarse sand with silt (40% passing #200 sieve), as opposed to silty clay with sand or sandy clay with silt as is more frequently the case with Cooper Marl. Therefore, it is reasonable to assume that the marl underlying the ponds in general would exhibit an even lower permeability.

The moist unit weight was calculated for two samples of the gray clayey fine to medium/coarse sands (average 130 pcf), one sample of Cooper Marl (122 pcf), and one sample of the inorganic clay dike fill (135 pcf).

Unconfined compressive strength testing of cohesive soil was performed in general accordance with ASTM D2166. Two of the test results are not considered reliable due to the large fraction of coarse material in the samples. The third test was performed on a sample of dike fill consisting of brownish-gray sandy inorganic clay with silt. The undrained shear strength of this specimen was 612 psf.

### 3.2.5 Nature and Consistency of Natural Soil Profile

The soil profile in the vicinity of the Jefferies Generating Station ash ponds consists of varying amounts of sands and clays overlying Cooper Marl. Borings located within the ponds encountered ash fill at the surface, while borings located on the pond dikes encountered mostly clayey fill overlying the natural soils.

The near-surface soils encountered can be separated into three general categories:

1) *Loose to very dense gray fine to medium sands with varying amounts of silt.* These sands were generally classified as sands with silt or clay or clayey sands, and were generally interbedded throughout the soil profile. The average corrected SPT N value was 23, however it should be noted that some of the deposits were very loose, while others were dense to very dense. The average percent passing the #200 sieve was 16%.
2) *Medium to stiff tan and brown inorganic clays with varying amounts of sand and silt.* These clays were classified as either low or high-plasticity clays, and were generally encountered near the surface or directly below the fill. The average corrected SPT N value was 11, and water contents generally were closer to the plastic limit.
3) *Very soft to stiff gray inorganic clay with varying amounts of sand.* These clays were classified as either low or high-plasticity clays, and were generally encountered either directly below the fill (Borings B-101 and B-104), or deeper near Elevation 0 just above the Cooper Marl. In general the deeper gray inorganic clay was softer. The average corrected SPT N value was 5, and water contents in some cases approached the liquid limit.

The Cooper Marl was found to underlie the ponds at each boring location. The marl generally consisted of *very stiff to hard brownish-green calcareous silty clay with sand*, though occasionally was found to consist more as a silty or clayey-sand. On average the marl was encountered at approximately Elevation -3 along the tailrace canal and Elevation 8 east of the ash ponds, suggesting an overall slope of approximately half a percent in the direction of the canal. The average corrected SPT N value was 42, which is reflective of the very stiff, hard, and dense nature of the formation. Due to the greater thickness of marl detected in the pond area, the majority of soil borings did not penetrate through it. The borings encountered an average of 30 feet of marl prior to termination. It is reasonable to conclude that a relatively thick and consistent stratum of Cooper Marl appears to underlie the ash pond areas.

The dike fill materials generally consisted of medium-stiff clays, either low plasticity brownish-gray inorganic clay with silt or high plasticity brownish green marl, and extended down Elevation 6.5 to 11 depending on location. The average corrected SPT N value was 11, and water contents generally were closer to the plastic limit.

# 4. CONCLUSIONS

The hydrologic study confirmed the existence of a drainage area of 305 acres draining into Pond A. The stormwater runoff entering Pond A from this drainage area may be significant during large storm events. The adequacy of the drainage channel within Pond A that conveys this stormwater should be verified.

The geotechnical study confirmed the existence of a relatively thick deposit of low-permeability Cooper Marl underlying both ponds. The top of the marl appears higher along the east edge of the ponds and lower along the tailrace canal to the west. Santee Limestone was not encountered by any of the six borings.

## 5. RECOMMENDATIONS

Although there is no record of any storm event overtopping the dike throughout the 40-year history of the ponds, further study is recommended in the short term to ensure the ponds can pass the appropriate design storm event. At minimum this should include the requirements for maintaining the channel within Pond A to ensure it can convey the appropriate design storm event to the open water without overtopping the dike. This study also should include documentation that the pond outlet structures can safely pass the design storm while maintaining minimum freeboard. In the long term, provisions should be included to segregate and divert the flow from this offsite area safely around the perimeter of the pond as part of any closure plan.

No further geotechnical work is recommended at this time, however the number of tests performed as part of this study is limited and additional testing will be required as part of any future closure design.

# Appendix 1 - SCI Geotechnical Data Report

SCI
Construction Materials
Non Destructive
Geotechnical
Environmental

**SOIL CONSULTANTS, INC.**
**ENGINEERS & GEOLOGISTS**
*Since 1951*
P.O. Drawer 698 • Charleston, South Carolina 29402 • 843/723-4539 • Fax 843/723-3648

April 28, 2011

Santee Cooper
One Riverwood Drive
Post Office Box 2946101
Moncks Corner, South Carolina 29461-2901

Attention: Mr. John Fondren

Reference: Jeffries Generating Station Ash Pond
Moncks Corner, South Carolina

SCI Project 11023

Dear Mr. Fondren:

On February 23 through February 25, 2011, we performed six soil borings, designated B-101 through B-106, in locations and to depths as directed. Borings B-101 and B-102 were performed within an existing ash pond, and Borings B-103 through B-106 were performed on the dikes surrounding the ash pond. The boring locations were selected by Santee Cooper and were staked in the field cooperatively by you and our representative prior to drilling activities. As directed by Mr. Fletcher Wood of WorleyParsons Group, Inc., a consultant for this project, the borings were advanced to depths ranging from approximately 30 to 50 feet below the existing ground surface. The borings were performed using truck and adverse terrain vehicle (ATV)-mounted drilling equipment with split-spoon sampling and Standard Penetration Testing (SPT) performed at selected intervals. After completion of the borings, each boring was grouted to the ground surface with bentonite grout, as requested. Approximate boring locations are shown on the attached Boring Location Plan.

In Borings B-101 and B-102, the depths to the groundwater table were measured as late as possible on the date that the borings were drilled to allow drilling fluids to dissipate and the groundwater level to stabilize somewhat prior to grouting the boreholes. In Borings B-103 through B-106, the depths to the groundwater table were measured approximately 3 days after completion of the drilling and sampling prior to grouting the boreholes. The groundwater table was encountered at depths ranging from approximately 4 to 10 feet below the existing ground surface. It must be noted, fluctuations in the level of the groundwater table may occur due to variations in ground elevation, rainfall, drainage, types of soil encountered, temperature, and other factors not evident at the time measurements were made.

Field exploratory procedures (split-spoon samples with SPT tests) are explained on the enclosed Plates No. 1, 2, and 3, and the classification of the soils encountered under the Unified

Soil Classification System is explained on Plate No. 4. Soil samples from this exploration will be retained for a period of three months from the date of this correspondence. Unless other arrangements are made, they will be disposed of following this period.

Portions of the soil samples obtained from the split-spoon sampler during the field exploration were placed in sample containers and transported to our laboratory for testing. Laboratory testing included 75 Determination of Moisture Content of Soils (ASTM D2216) tests, 24 Atterberg Limits (ASTM D 4318) tests, 3 Particle Size Analysis of Soils (ASTM D422) tests without Hydrometer Analysis, 4 Particle Size Analysis of Soils (ASTM D422) tests with Hydrometer Analysis, and 3 Specific Gravity of Soil Solids by Water Pycnometer (ASTM D854) tests. These tests were performed to confirm visual classifications of soils performed by the geotechnical engineer and aid in the evaluation of subsurface soil conditions. The results of the index property laboratory testing are attached.

In addition to split-spoon samples, four thin-walled tube "undisturbed" samples of the subsurface soils were obtained during the field exploration using Shelby Tubes. Following completion of the field exploration, the thin-walled tube samples were transported to our laboratory. In addition to the index property tests discussed above, three Unconfined Compressive Strength of Cohesive Soil (ASTM D2166) tests and one Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter (ASTM D5084) test were performed on these undisturbed samples. These tests were performed to investigate the shear strength of the clayey soils encountered above the Cooper Marl and to investigate the hydraulic conductivity of the Cooper Marl soil stratum underlying the existing ash pond.

Unconfined compressive strength testing indicated unconfined compressive strengths ranging from 477 to 1223 pounds per square foot (psf). The hydraulic conductivity testing of the Cooper Marl indicated a hydraulic conductivity of $1.28 \times 10^{-6}$ centimeters per second. Detailed results of the unconfined compressive strength testing and hydraulic conductivity testing are also attached.

Thank you for allowing us to be of service to you on this project, and we look forward to working with you in the future.

Sincerely,

SOIL CONSULTANTS, INC.

A. Talbot Henderson III

A. Talbot Henderson, III, E.I.T.
Geotechnical Professional

Ronald R. Austin, P.E.
Vice President, Engineering

No. 17284
RONALD R. AUSTIN

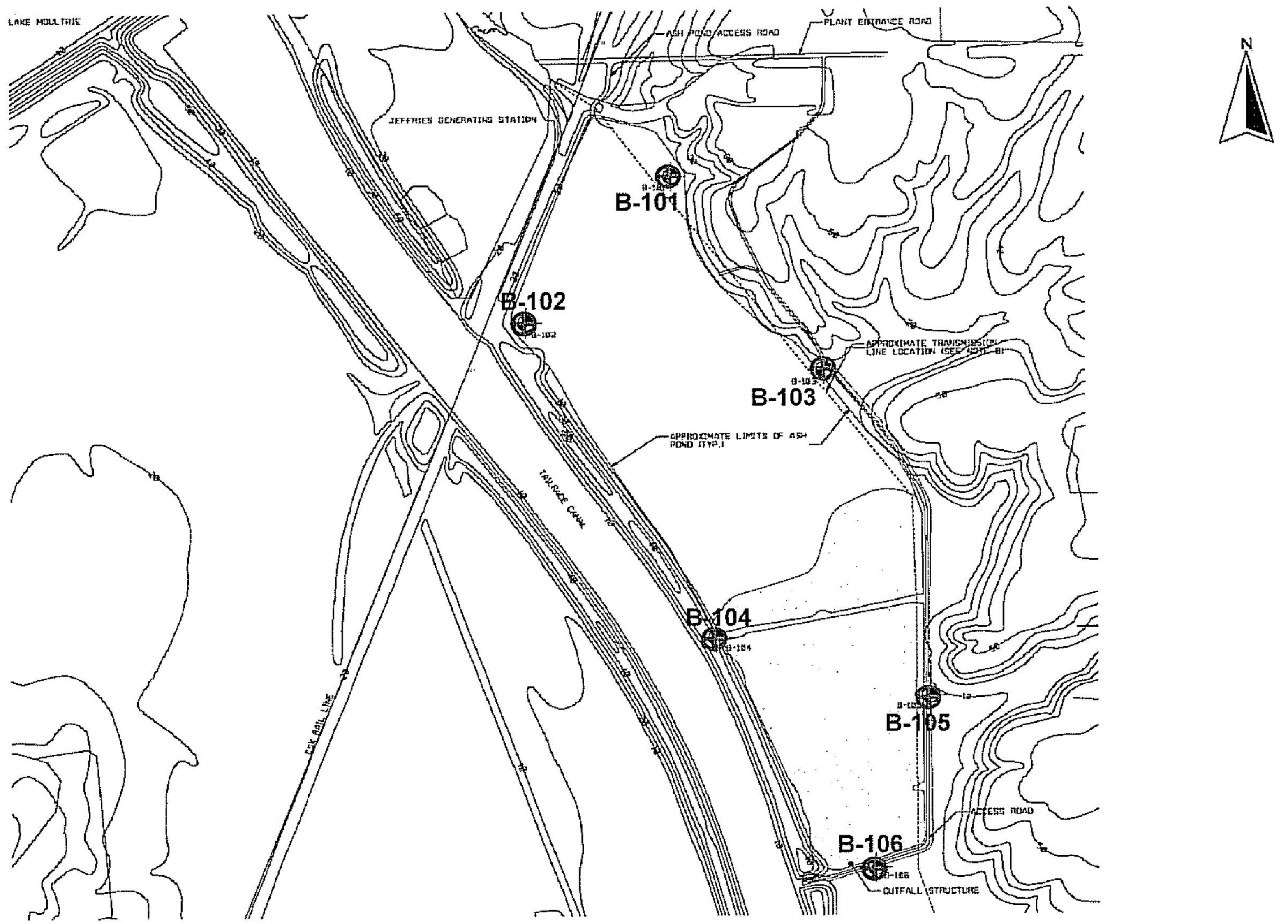
Date 4/28/11

ath

mc: Mr. Fletcher Wood, WorleyParsons Group, Inc

Enclosures

Soil Consultants, Inc.
No. C00124



**LEGEND**

⊕ Soil Test Boring Location (B)

Reference: Site plan obtained from client and adapted by Soil Consultants, Inc. Boring locations are approximate.

## BORING LOCATION PLAN

Santee Cooper - Jeffries Generating Station
Existing Ash Pond
Moncks Corner, South Carolina

**SOIL CONSULTANTS, INC.**
ENGINEERS AND GEOLOGISTS
*SINCE 1951*

| | | | |
|---|---|---|---|
| **SCALE:** | Not to Scale | **PROJECT NO.:** | 11023 |
| **DRAWN BY:** | ATH | **DATE:** | April 18, 2011 |
| **CHECKED BY:** | RRA | **FIGURE NO.:** | 1 |

**SCI**
Construction Materials
Non Destructive
Geotechnical
Environmental

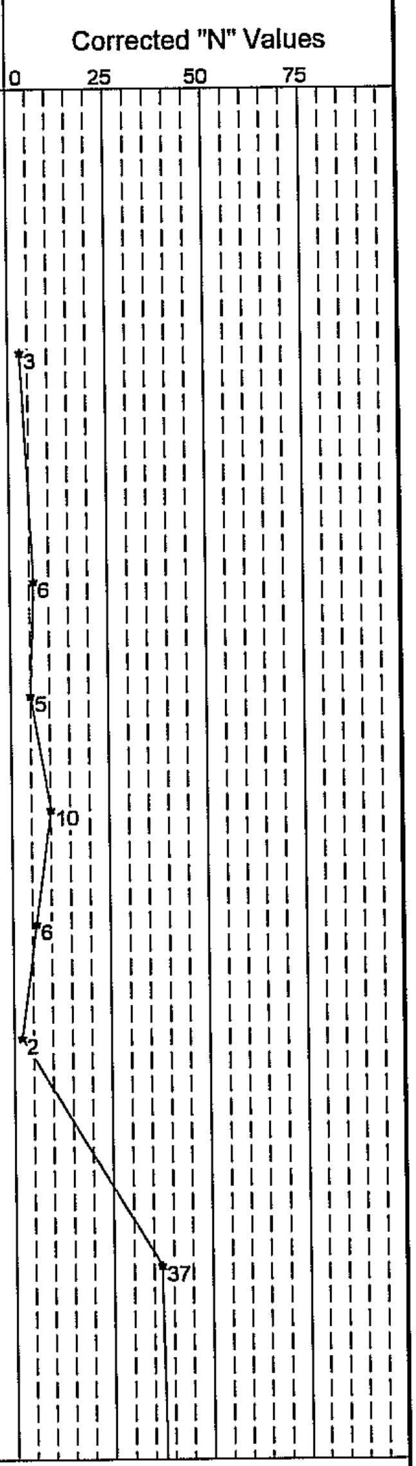
# LOG OF BORING B-101

**Project: SANTEE COOPER - JEFFRIES GENERATING STATION ASH POND, MONCKS CORNER, SOUTH CAROLINA**

**Location:** NORTHING: 513794.66 EASTING: 2311543.18 **SCI No.: 11023**

**Datum:** NAVD88 **Elevation:** 29.56 **Date:** 2/23/2011 **GWT (ft):** 5

| Strata | Sample | Elev. (feet) | Depth (feet) | Visual Description (Unified Soil Classification System) | Actual Blows/6" |
|---|---|---|---|---|---|
| ▩ | 1 | 25 | 5 ▼ | ASH (FILL MATERIAL) | 1-1-1 |
| ░▨ | 2 | 20 | 10 | LOOSE GRAY FINE TO MEDIUM SAND WITH WOOD, ROOT, AND CLAY (SP-SC) | 1-1-2 |
| ▨ | 3 | 15 | | MEDIUM GRAY INORGANIC CLAY WITH SAND (CH) | 2-2-2 |
| ▨ | 4 | | 15 | STIFF GRAY SANDY INORGANIC CLAY (CL) | 2-2-6 |
| ░ | 5 | 10 | | LOOSE GRAY FINE TO MEDIUM SAND WITH SILT (SP-SM) | 1-2-1 |
| ░ | 6 | | 20 | VERY LOOSE GRAY FINE TO MEDIUM SAND WITH SILT (SP-SM) | 2/18"-- |
| ▨ | 7 | 5<br>0 | 25<br>30 | HARD BROWNISH-GREEN CALCAREOUS SILTY CLAY WITH SAND (CH - LOCALLY CALLED MARL) | 6-11-15 |



Remarks: BORING LOCATIONS AND DEPTHS AS DIRECTED BY CLIENT.
SHOVEL SAMPLE TAKEN ADJACENT TO BORING INDICATED VARYING ROOT CONTENT TO A DEPTH OF 5 INCHES.
BORING GROUTED WITH BENTONITE TO GROUND SURFACE ON 2/23/11.
PLOTTED "N" VALUES ARE CORRECTED TO $N_{60}$ VALUES FOR CLAYS AND $(N_1)_{60}$ VALUES FOR SANDS.
BORING PERFORMED USING MUD-ROTARY. HOLLOW STEM AUGER INITIALLY USED TO BORE THROUGH ASH.

Testing and Sampling in accordance with ASTM D 1586-08a

**SCI**
Construction Materials
Non Destructive
Geotechnical
Environmental

# LOG OF BORING B-101

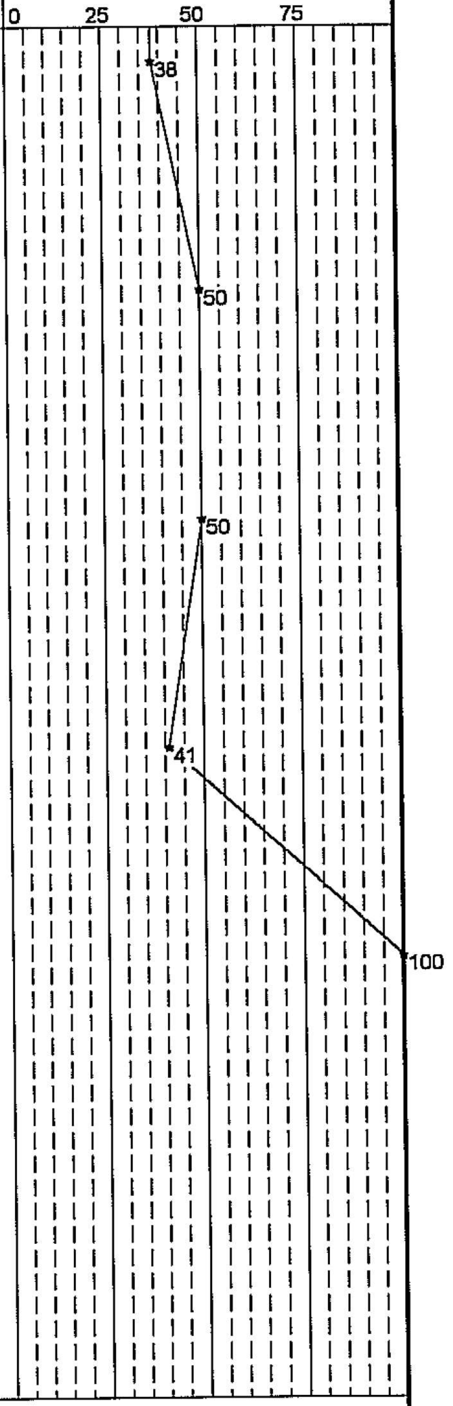
## Project: SANTEE COOPER - JEFFRIES GENERATING STATION ASH POND, MONCKS CORNER, SOUTH CAROLINA

**Location:** NORTHING: 513794.66 EASTING: 2311543.18 **SCI No.:** **11023**

**Datum:** NAVD88 **Elevation:** 29.56 **Date:** 2/23/2011 **GWT (ft):** 5

| Strata | Sample | Elev. (feet) | Depth | Visual Description (Unified Soil Classification System) | Actual Blows/6" |
|---|---|---|---|---|---|
| | 8 | | | HARD BROWNISH-GREEN CALCAREOUS SILTY CLAY WITH SAND (CH - LOCALLY CALLED MARL) | 7-10-15 |
| | | -5 | 35 | | |
| | 9 | | | HARD BROWNISH-GREEN CALCAREOUS SILTY CLAY WITH SAND (CH - LOCALLY CALLED MARL) | 10-15-18 |
| | | -10 | 40 | | |
| | 10 | | | HARD BROWNISH-GREEN CALCAREOUS SILTY CLAY WITH SAND (CH - LOCALLY CALLED MARL) | 8-13-20 |
| | | -15 | 45 | | |
| | 11 | | | HARD BROWNISH-GREEN CALCAREOUS SILTY CLAY WITH SAND (CH - LOCALLY CALLED MARL) | 8-12-15 |
| | | -20 | 50 | | |
| | 12 | | | HARD BROWNISH-GREEN CALCAREOUS SILTY CLAY WITH SAND (CH - LOCALLY CALLED MARL) BORING TERMINATED UPON REFUSAL IN DARK GRAY SILTSTONE | 10-50/2"- |
| | | | | *BORING B-101 TERMINATED AT A DEPTH OF 50.67 FEET* | |
| | | -25 | 55 | | |
| | | -30 | 60 | | |

Corrected "N" Values



Remarks: BORING LOCATIONS AND DEPTHS AS DIRECTED BY CLIENT.
SHOVEL SAMPLE TAKEN ADJACENT TO BORING INDICATED VARYING ROOT CONTENT TO A DEPTH OF 5 INCHES.
BORING GROUTED WITH BENTONITE TO GROUND SURFACE ON 2/23/11.
PLOTTED "N" VALUES ARE CORRECTED TO $N_{60}$ VALUES FOR CLAYS AND $(N_1)_{60}$ VALUES FOR SANDS.
BORING PERFORMED USING MUD-ROTARY. HOLLOW STEM AUGER INITIALLY USED TO BORE THROUGH ASH.

Testing and Sampling in accordance with ASTM D 1586-08a

PRIMARY 2 CORR N 11023 LOGS.GPJ PRIMARY.GDT 04/27/11

**SOIL CONSULTANTS, INC.**
Engineers & Geologists
*Since 1951*

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*www.soilconsultantsinc.com*

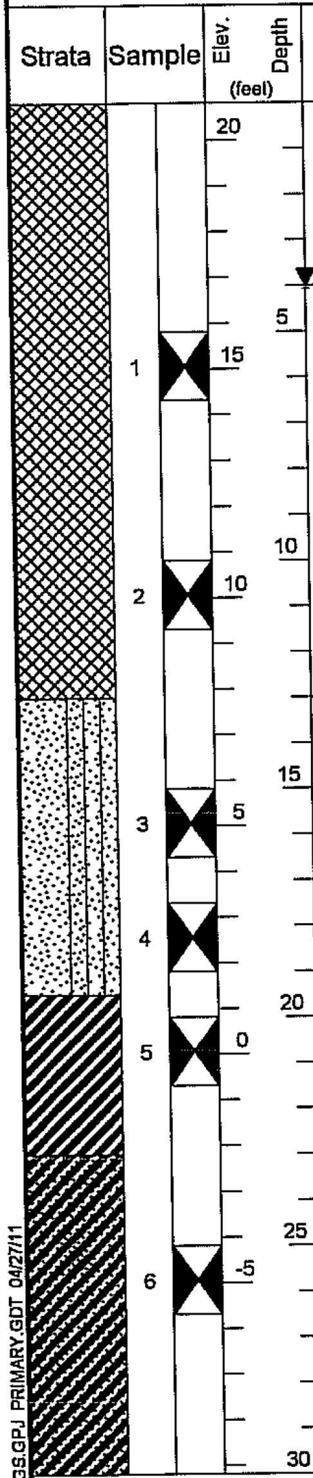
**SCI**
Construction Materials
Non Destructive
Geotechnical
Environmental

# LOG OF BORING B-102

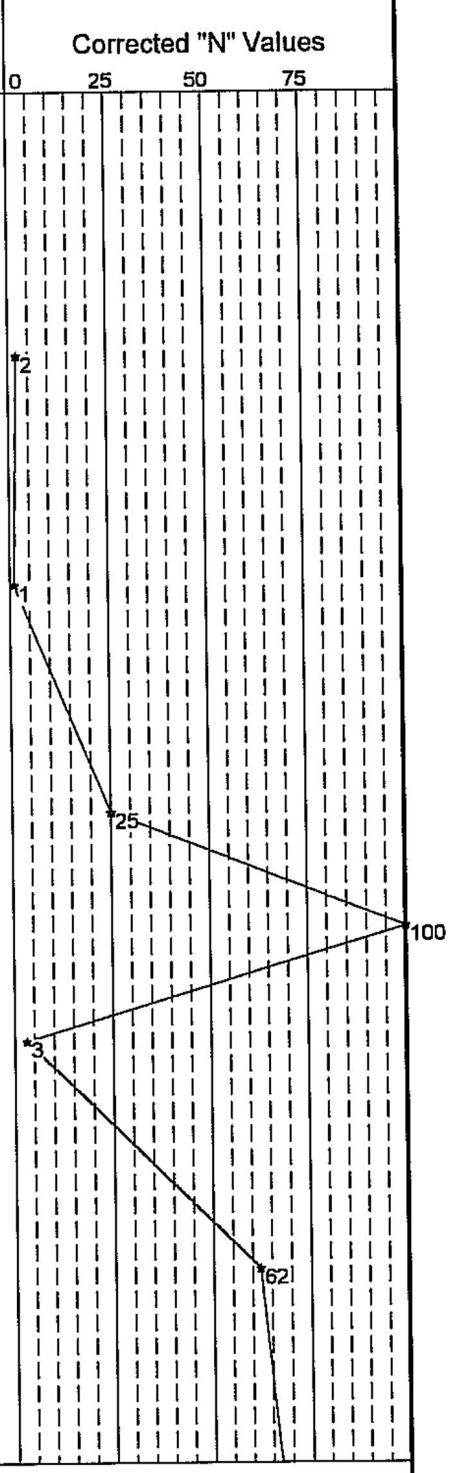
**Project: SANTEE COOPER - JEFFRIES GENERATING STATION ASH POND, MONCKS CORNER, SOUTH CAROLINA**

**Location:** NORTHING: 512389.92 EASTING: 2310568.12 **SCI No.: 11023**

**Datum:** NAVD88 **Elevation:** 20.82 **Date:** 2/24/2011 **GWT (ft):** 4



| Sample | Visual Description (Unified Soil Classification System) | Actual Blows/6" | Corrected "N" Values |
|---|---|---|---|
| 1 | ASH (FILL MATERIAL) | 2-1-1 | 2 |
| 2 | ASH (FILL MATERIAL) | 1/18"– | 1 |
| 3 | MEDIUM DENSE GRAY FINE TO MEDIUM SAND WITH SILT (SP-SM) | 1-4-10 | 25 |
| 4 | VERY DENSE GRAY FINE TO MEDIUM SAND WITH SILT (SP-SM) | 30-34-40 | 100 |
| 5 | SOFT GRAY INORGANIC CLAY WITH SAND (CH) | 1-1-1 | 3 |
| 6 | HARD BROWNISH-GREEN CALCAREOUS SILTY CLAY WITH SAND (CH - LOCALLY CALLED MARL) | 30-25-18 | 62 |



**Remarks:** BORING LOCATIONS AND DEPTHS AS DIRECTED BY CLIENT.
SHOVEL SAMPLE TAKEN ADJACENT TO BORING INDICATED VARYING ROOT CONTENT TO A DEPTH OF 6 INCHES.
BORING GROUTED WITH BENTONITE TO GROUND SURFACE ON 2/24/11.
PLOTTED "N" VALUES ARE CORRECTED TO $N_{60}$ VALUES FOR CLAYS AND $(N_1)_{60}$ VALUES FOR SANDS.
BORING PERFORMED USING MUD-ROTARY. HOLLOW STEM AUGER INITIALLY USED TO BORE THROUGH ASH.

Testing and Sampling in accordance with ASTM D 1586-08a

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# LOG OF BORING B-102

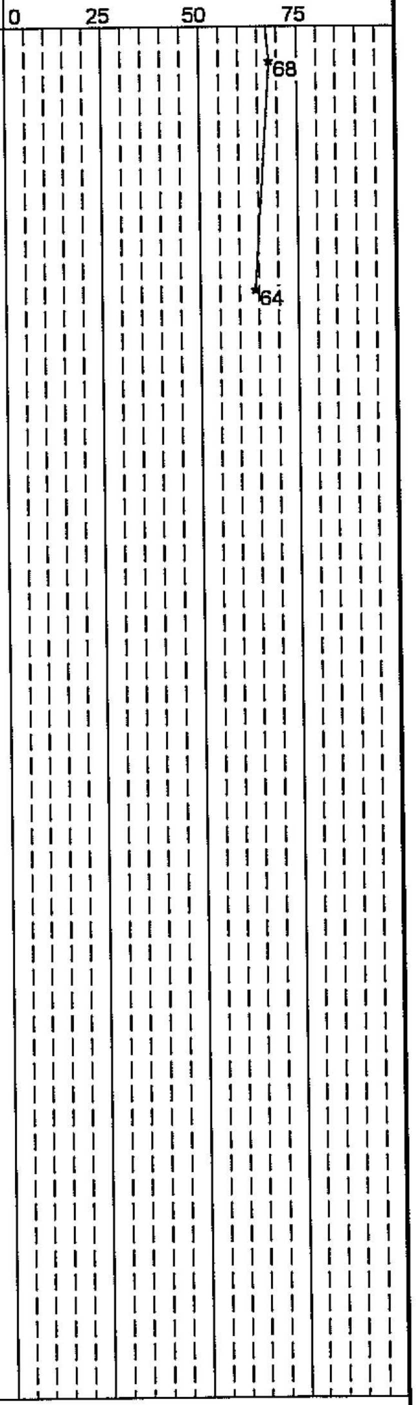
**SCI**
Construction Materials
Non Destructive
Geotechnical
Environmental

**Project: SANTEE COOPER - JEFFRIES GENERATING STATION ASH POND, MONCKS CORNER, SOUTH CAROLINA**

**Location:** NORTHING: 512389.92 EASTING: 2310568.12 **SCI No.: 11023**

**Datum:** NAVD88 **Elevation: 20.82** **Date:** 2/24/2011 **GWT (ft):** 4

| Strata | Sample | Elev. (feet) | Depth (feet) | Visual Description (Unified Soil Classification System) | Actual Blows/6" | Corrected "N" Values |
|---|---|---|---|---|---|---|
| ▨ | 7 | -10 | | HARD BROWNISH-GREEN CALCAREOUS SILTY CLAY WITH SAND (CH - LOCALLY CALLED MARL) | 7-15-30 | 68 |
| | | | 35 | | | |
| ▨ | 8 | -15 | | HARD BROWNISH-GREEN CALCAREOUS SILTY CLAY WITH SAND (CH - LOCALLY CALLED MARL) | 30-24-18 | 64 |
| | | | | *BORING B-102 TERMINATED AT A DEPTH OF 36.5 FEET* | | |
| | | | 40 | | | |
| | | -20 | | | | |
| | | | 45 | | | |
| | | -25 | | | | |
| | | | 50 | | | |
| | | -30 | | | | |
| | | | 55 | | | |
| | | -35 | | | | |
| | | | 60 | | | |



**Remarks:** BORING LOCATIONS AND DEPTHS AS DIRECTED BY CLIENT.
SHOVEL SAMPLE TAKEN ADJACENT TO BORING INDICATED VARYING ROOT CONTENT TO A DEPTH OF 6 INCHES.
BORING GROUTED WITH BENTONITE TO GROUND SURFACE ON 2/24/11.
PLOTTED "N" VALUES ARE CORRECTED TO $N_{60}$ VALUES FOR CLAYS AND $(N_1)_{60}$ VALUES FOR SANDS.
BORING PERFORMED USING MUD-ROTARY. HOLLOW STEM AUGER INITIALLY USED TO BORE THROUGH ASH.

Testing and Sampling in accordance with ASTM D 1586-08a

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**SCI**
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Environmental

# LOG OF BORING B-103

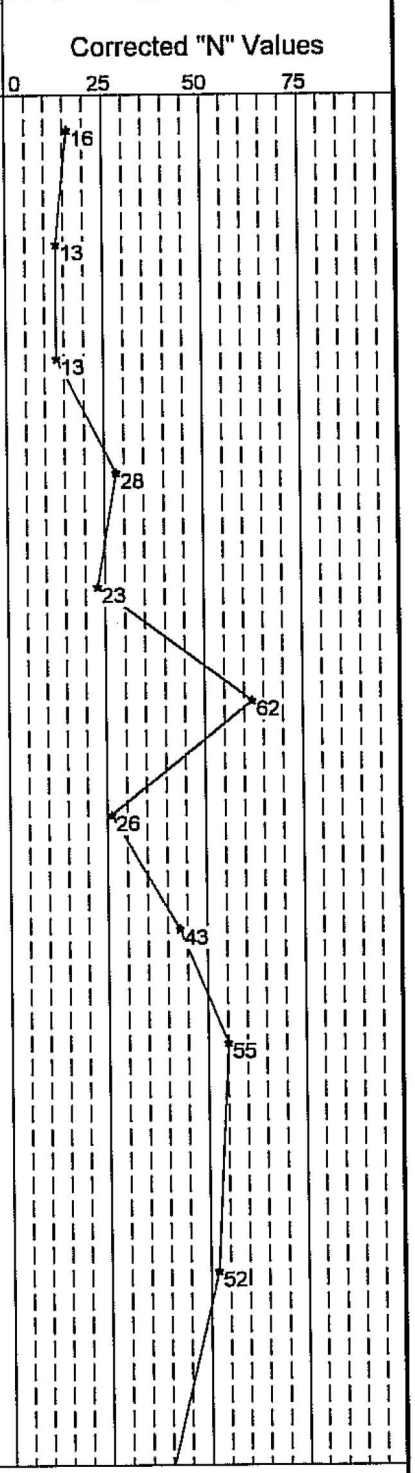
**Project:** **SANTEE COOPER - JEFFRIES GENERATING STATION ASH POND, MONCKS CORNER, SOUTH CAROLINA**

**Location:** NORTHING: 512154.04 EASTING: 2312582.63 **SCI No.:** **11023**

**Datum:** NAVD88 **Elevation:** 22.73 **Date:** 2/25/2011 **GWT (ft):** 10

| Sample | Visual Description (Unified Soil Classification System) | Actual Blows/6" | Corrected "N" Values |
|---|---|---|---|
| 1 | MEDIUM DENSE BROWN FINE TO MEDIUM SAND WITH SILT (SP-SM) | 3-4-4 | 16 |
| 2 | STIFF TAN INORGANIC CLAY WITH SAND (CH) | 6-6-5 | 13 |
| 3 | STIFF TAN INORGANIC CLAY WITH SAND (CH) | 5-5-6 | 13 |
| 4 | VERY STIFF BROWNISH-GREEN CALCAREOUS SILTY CLAY WITH SAND (CH - LOCALLY CALLED MARL) | 5-13-10 | 28 |
| 5 | VERY STIFF BROWNISH-GREEN CALCAREOUS SILTY CLAY WITH SAND (CH - LOCALLY CALLED MARL) | 7-8-10 | 23 |
| 6 | HARD BROWNISH-GREEN CALCAREOUS SILTY CLAY WITH SAND (CH - LOCALLY CALLED MARL) | 18-23-25 | 62 |
| 7 | VERY STIFF BROWNISH-GREEN CALCAREOUS SILTY CLAY WITH SAND (CH - LOCALLY CALLED MARL) | 5-10-10 | 26 |
| 8 | HARD BROWNISH-GREEN CALCAREOUS SILTY CLAY WITH SAND (CH - LOCALLY CALLED MARL) | 8-10-20 | 43 |
| 9 | HARD BROWNISH-GREEN CALCAREOUS SANDY CLAY WITH SILT (CL - LOCALLY CALLED MARL) | 8-15-23 | 55 |
| 10 | HARD BROWNISH-GREEN CALCAREOUS SILTY CLAY WITH SAND (CH - LOCALLY CALLED MARL) | 10-17-19 | 52 |

Elev. / Depth (feet): Elev. 20, 15, 10, 5, 0, -5; Depth 5, 10, 15, 20, 25, 30



**Remarks:** BORING LOCATIONS AND DEPTHS AS DIRECTED BY CLIENT.
SHOVEL SAMPLE TAKEN ADJACENT TO BORING INDICATED LITTLE TO NO ROOT CONTENT.
BORING GROUTED WITH BENTONITE TO GROUND SURFACE ON 2/28/11.
PLOTTED "N" VALUES ARE CORRECTED TO $N_{60}$ VALUES FOR CLAYS AND $(N_1)_{60}$ VALUES FOR SANDS.
BORING PERFORMED USING MUD-ROTARY.

Testing and Sampling in accordance with ASTM D 1586-08a

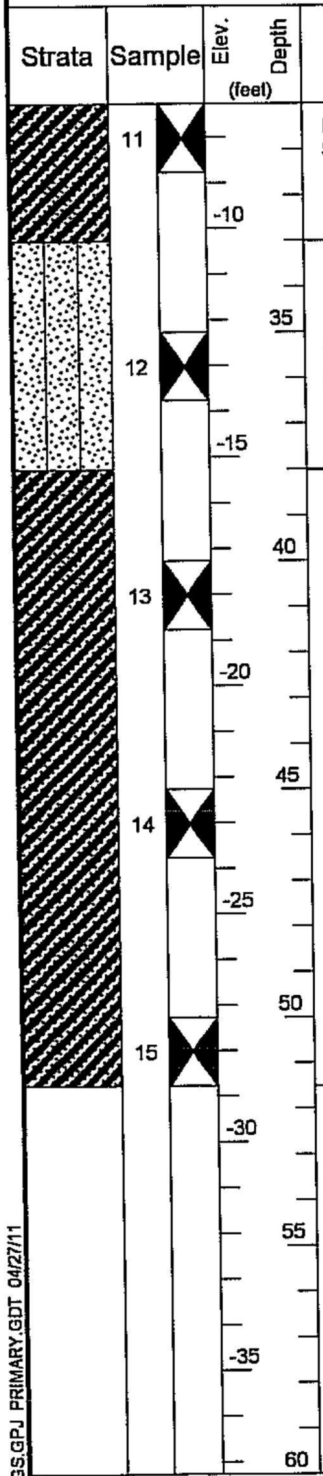
**Construction Materials**
**Non Destructive**
**Geotechnical**
**Environmental**

# LOG OF BORING B-103

**Project:** **SANTEE COOPER - JEFFRIES GENERATING STATION ASH POND, MONCKS CORNER, SOUTH CAROLINA**

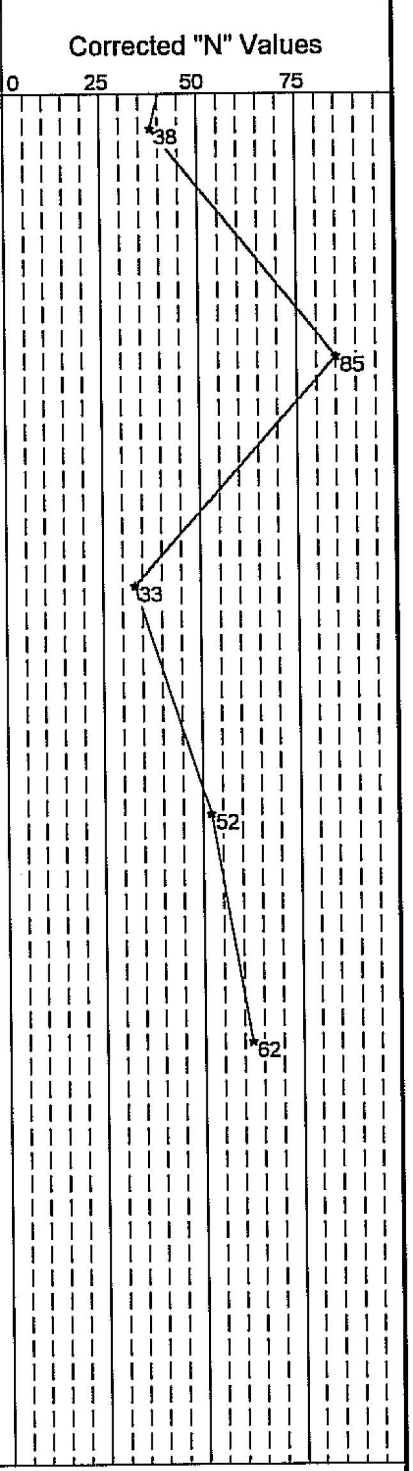
**Location:** NORTHING: 512154.04 EASTING: 2312582.63 **SCI No.:** **11023**

**Datum:** NAVD88 **Elevation:** 22.73 **Date:** 2/25/2011 **GWT (ft):** 10



| Sample | Visual Description (Unified Soil Classification System) | Actual Blows/6" |
|---|---|---|
| 11 | HARD BROWNISH-GREEN CALCAREOUS SILTY CLAY WITH SAND (CH - LOCALLY CALLED MARL) | 8-10-15 |
| 12 | VERY DENSE BROWNISH-GREEN CALCAREOUS FINE SILTY SAND WITH CLAY (SM - LOCALLY CALLED MARL) | 10-15-40 |
| 13 | HARD BROWNISH-GREEN CALCAREOUS SILTY CLAY WITH SAND (CH - LOCALLY CALLED MARL) | 8-10-12 |
| 14 | HARD BROWNISH-GREEN CALCAREOUS SILTY CLAY WITH SAND (CH - LOCALLY CALLED MARL) | 10-15-19 |
| 15 | HARD BROWNISH-GREEN CALCAREOUS SILTY CLAY WITH SAND (CH - LOCALLY CALLED MARL) | 10-18-23 |

*BORING B-103 TERMINATED AT A DEPTH OF 51.5 FEET*



Remarks: BORING LOCATIONS AND DEPTHS AS DIRECTED BY CLIENT.
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BORING GROUTED WITH BENTONITE TO GROUND SURFACE ON 2/28/11.
PLOTTED "N" VALUES ARE CORRECTED TO $N_{60}$ VALUES FOR CLAYS AND $(N_1)_{60}$ VALUES FOR SANDS.
BORING PERFORMED USING MUD-ROTARY.

Testing and Sampling in accordance with ASTM D 1586-08a

**SCI**
Construction Materials
Non Destructive
Geotechnical
Environmental

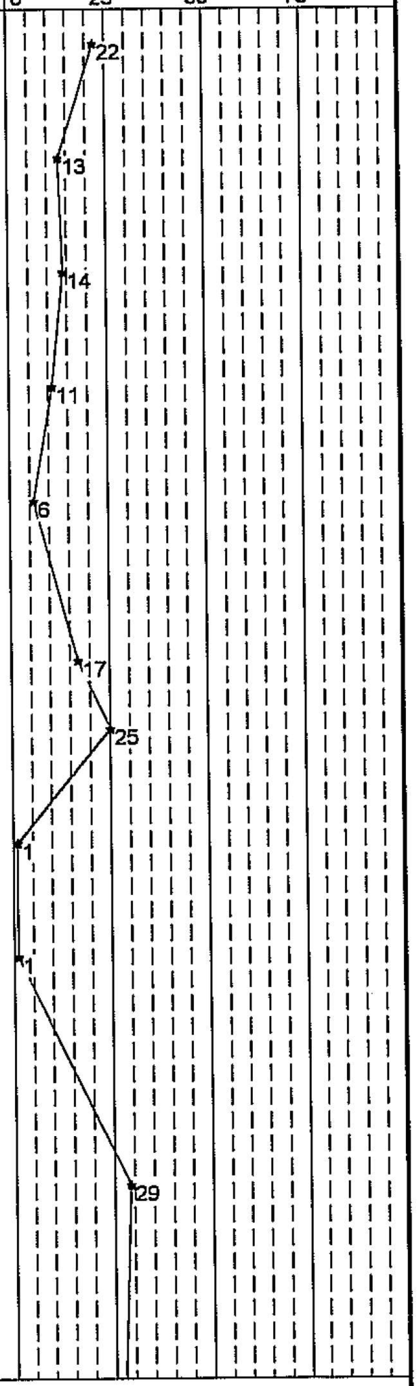
# LOG OF BORING B-104

**Project: SANTEE COOPER - JEFFRIES GENERATING STATION ASH POND, MONCKS CORNER, SOUTH CAROLINA**

**Location:** NORTHING: 510117.61 EASTING: 2311871.06 **SCI No.: 11023**

**Datum:** NAVD88 **Elevation:** 16.85 **Date:** 2/24/2011 **GWT (ft):** 4.5

| Strata | Sample | Elev. (feet) | Depth | Visual Description (Unified Soil Classification System) | Actual Blows/6" | Corrected "N" Values |
|---|---|---|---|---|---|---|
| | 1 | 15 | | MEDIUM DENSE BROWN FINE TO MEDIUM SAND WITH SILT (SP-SM) (POSSIBLE FILL MATERIAL) | 4-5-6 | 22 |
| | 2 | | 5 | STIFF BROWNISH-GREEN CALCAREOUS SILTY CLAY WITH SAND (CH - LOCALLY CALLED MARL) (POSSIBLE FILL MATERIAL) | 4-4-7 | 13 |
| | 3 | 10 | | STIFF BROWNISH-GREEN CALCAREOUS SILTY CLAY WITH SAND (CH - LOCALLY CALLED MARL) (POSSIBLE FILL MATERIAL) | 2-5-7 | 14 |
| | 4 | | 10 | STIFF BROWNISH-GREEN CALCAREOUS SILTY CLAY WITH SAND (CH - LOCALLY CALLED MARL) (POSSIBLE FILL MATERIAL) | 3-4-5 | 11 |
| | 5 | 5 | | MEDIUM GRAY SANDY INORGANIC CLAY (CL) | 3-2-3 | 6 |
| | UD-1 | | | SHELBY TUBE 3" X 30", PUSHED 24", NO RECOVERY | – | |
| | 6 | | 15 | MEDIUM DENSE GRAY FINE TO MEDIUM SAND WITH SILT (SP-SM) | 3-4-6 | 17 |
| | 7 | 0 | | MEDIUM DENSE GRAY FINE TO MEDIUM SAND (SP) | 4-7-8 | 25 |
| | 8 | | 20 | VERY SOFT GRAY INORGANIC CLAY WITH SAND (CH) | 1/18"– | 1 |
| | 9 | -5 | | VERY SOFT GRAY INORGANIC CLAY WITH SAND (CH) | 1/18"– | 1 |
| | UD-2 | | | SHELBY TUBE 3" X 30", PUSHED 24", RECOVERY 24" GRAY CLAYEY FINE TO COARSE SAND (SC) | – | |
| | 10 | -10 | 25 | VERY STIFF BROWNISH-GREEN CALCAREOUS SILTY CLAY WITH SAND (CH - LOCALLY CALLED MARL) | 6-10-10 | 29 |
| | | | 30 | | | |



Remarks: BORING LOCATIONS AND DEPTHS AS DIRECTED BY CLIENT.
SHOVEL SAMPLE TAKEN ADJACENT TO BORING INDICATED LITTLE TO NO ROOT CONTENT.
BORING GROUTED WITH BENTONITE TO GROUND SURFACE ON 2/28/11.
PLOTTED "N" VALUES ARE CORRECTED TO $N_{60}$ VALUES FOR CLAYS AND $(N_1)_{60}$ VALUES FOR SANDS.
BORING PERFORMED USING MUD-ROTARY.

Testing and Sampling in accordance with ASTM D 1586-08a

**SCI**
Construction Materials
Non Destructive
Geotechnical
Environmental

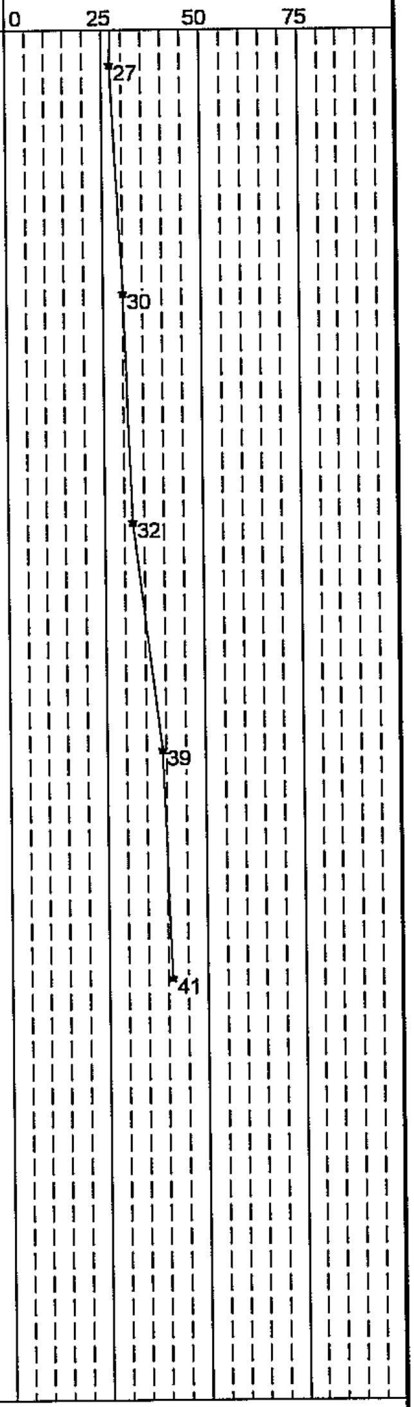
# LOG OF BORING B-104

**Project:** **SANTEE COOPER - JEFFRIES GENERATING STATION ASH POND, MONCKS CORNER, SOUTH CAROLINA**

**Location:** NORTHING: 510117.61 EASTING: 2311871.06 **SCI No.:** **11023**

**Datum:** NAVD88 **Elevation:** 16.85 **Date:** 2/24/2011 **GWT (ft):** 4.5

| Strata | Sample | Elev. (feet) | Depth (feet) | Visual Description (Unified Soil Classification System) | Actual Blows/6" | Corrected "N" Values |
|---|---|---|---|---|---|---|
|  | 11 | -15 |  | VERY STIFF BROWNISH-GREEN CALCAREOUS SANDY CLAY WITH SILT (CL - LOCALLY CALLED MARL) | 5-4-14 | 27 |
|  |  |  | 35 |  |  |  |
|  | 12 | -20 |  | VERY STIFF BROWNISH-GREEN CALCAREOUS SILTY CLAY WITH SAND (CH - LOCALLY CALLED MARL) | 6-10-10 | 30 |
|  |  |  | 40 |  |  |  |
|  | 13 | -25 |  | HARD BROWNISH-GREEN CALCAREOUS SILTY CLAY WITH SAND (CH - LOCALLY CALLED MARL) | 7-11-10 | 32 |
|  |  |  | 45 |  |  |  |
|  | 14 | -30 |  | HARD BROWNISH-GREEN CALCAREOUS SILTY CLAY WITH SAND (CH - LOCALLY CALLED MARL) | 6-12-14 | 39 |
|  |  |  | 50 |  |  |  |
|  | 15 | -35 |  | HARD BROWNISH-GREEN CALCAREOUS SILTY CLAY WITH SAND (CH - LOCALLY CALLED MARL) | 6-12-15 | 41 |
|  |  |  |  | *BORING B-104 TERMINATED AT A DEPTH OF 51.5 FEET* |  |  |
|  |  |  | 55 |  |  |  |
|  |  | -40 |  |  |  |  |
|  |  |  | 60 |  |  |  |



Remarks: BORING LOCATIONS AND DEPTHS AS DIRECTED BY CLIENT.
SHOVEL SAMPLE TAKEN ADJACENT TO BORING INDICATED LITTLE TO NO ROOT CONTENT.
BORING GROUTED WITH BENTONITE TO GROUND SURFACE ON 2/28/11.
PLOTTED "N" VALUES ARE CORRECTED TO $N_{60}$ VALUES FOR CLAYS AND $(N_1)_{60}$ VALUES FOR SANDS.
BORING PERFORMED USING MUD-ROTARY.

Testing and Sampling in accordance with ASTM D 1586-08a

**SCI** Construction Materials | Non Destructive | Geotechnical | Environmental

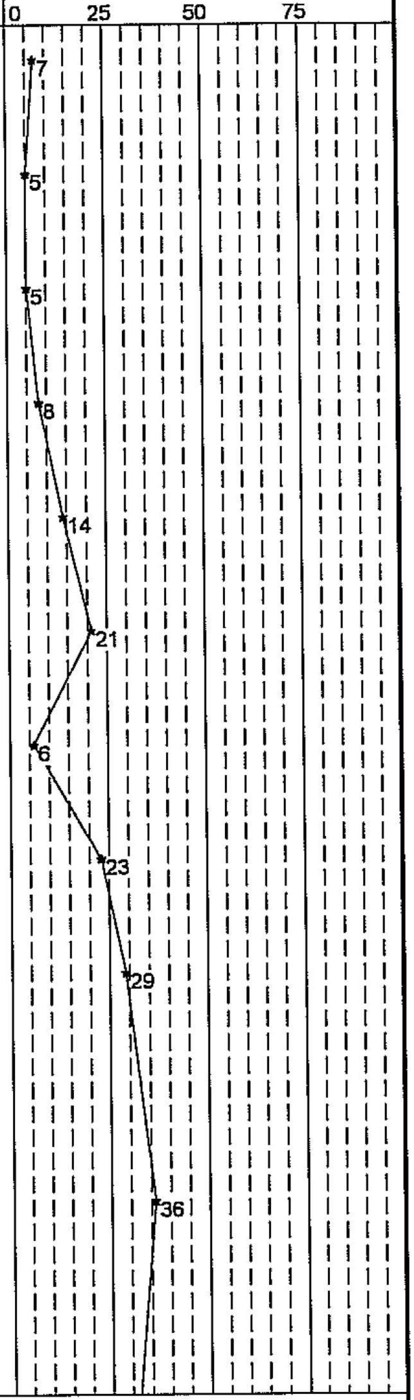
# LOG OF BORING B-105

**Project:** **SANTEE COOPER - JEFFRIES GENERATING STATION ASH POND, MONCKS CORNER, SOUTH CAROLINA**

**Location:** NORTHING: 509711.12 EASTING: 2313297.96 **SCI No.:** **11023**

**Datum:** NAVD88 **Elevation:** 17.9 **Date:** 2/25/2011 **GWT (ft):** 5

| Strata | Sample | Elev. (feet) | Depth (feet) | Visual Description (Unified Soil Classification System) | Actual Blows/6" |
|---|---|---|---|---|---|
| | 1 | | | MEDIUM BROWNISH-GREEN CALCAREOUS SILTY CLAY WITH SAND (CH - LOCALLY CALLED MARL) (POSSIBLE FILL MATERIAL) | 6-4-3 |
| | 2 | 15 | | MEDIUM BROWNISH-GRAY SANDY INORGANIC CLAY WITH SILT (CL) (POSSIBLE FILL MATERIAL) | 2-2-3 |
| | 3 | | 5 ▼ | MEDIUM BROWNISH-GRAY SANDY INORGANIC CLAY WITH SILT (CL) (POSSIBLE FILL MATERIAL) | 2-2-3 |
| | 4 | 10 | | MEDIUM BROWNISH-GRAY SANDY INORGANIC CLAY WITH SILT (CL) (POSSIBLE FILL MATERIAL) | 2-4-3 |
| | 5 | | 10 | STIFF BROWN SANDY INORGANIC CLAY (CL) | 3-4-8 |
| | 6 | 5 | | MEDIUM DENSE GRAY FINE TO MEDIUM SAND WITH CLAY (SP-SC) | 3-4-10 |
| | 7 | | 15 | MEDIUM GRAY SANDY INORGANIC CLAY (CL) | 5-2-3 |
| | 8 | 0 | | VERY STIFF BROWNISH-GREEN CALCAREOUS SILTY CLAY WITH SAND (CH - LOCALLY CALLED MARL) | 6-8-10 |
| | 9 | | 20 | VERY STIFF BROWNISH-GREEN CALCAREOUS SILTY CLAY WITH SAND (CH - LOCALLY CALLED MARL) | 6-10-13 |
| | UD-2 | -5 | | SHELBY TUBE 3" X 30", PUSHED 24", RECOVERY 24" BROWNISH-GREEN CALCAREOUS CLAYEY FINE TO COARSE SAND WITH SILT (SC - LOCALLY CALLED MARL) | – |
| | 10 | | 25 | HARD BROWNISH-GREEN CALCAREOUS SILTY CLAY WITH SAND (CH - LOCALLY CALLED MARL) | 9-11-17 |
| | | -10 | 30 | | |



Remarks: BORING LOCATIONS AND DEPTHS AS DIRECTED BY CLIENT.
SHOVEL SAMPLE TAKEN ADJACENT TO BORING INDICATED LITTLE TO NO ROOT CONTENT.
BOREHOLE GROUTED WITH BENTONITE TO GROUND SURFACE ON 2/28/11.
PLOTTED "N" VALUES ARE CORRECTED TO $N_{60}$ VALUES FOR CLAYS AND $(N_1)_{60}$ VALUES FOR SANDS.
BORING PERFORMED USING MUD-ROTARY.

Testing and Sampling in accordance with ASTM D 1586-08a

**SCI**
Construction Materials
Non Destructive
Geotechnical
Environmental

# LOG OF BORING B-105

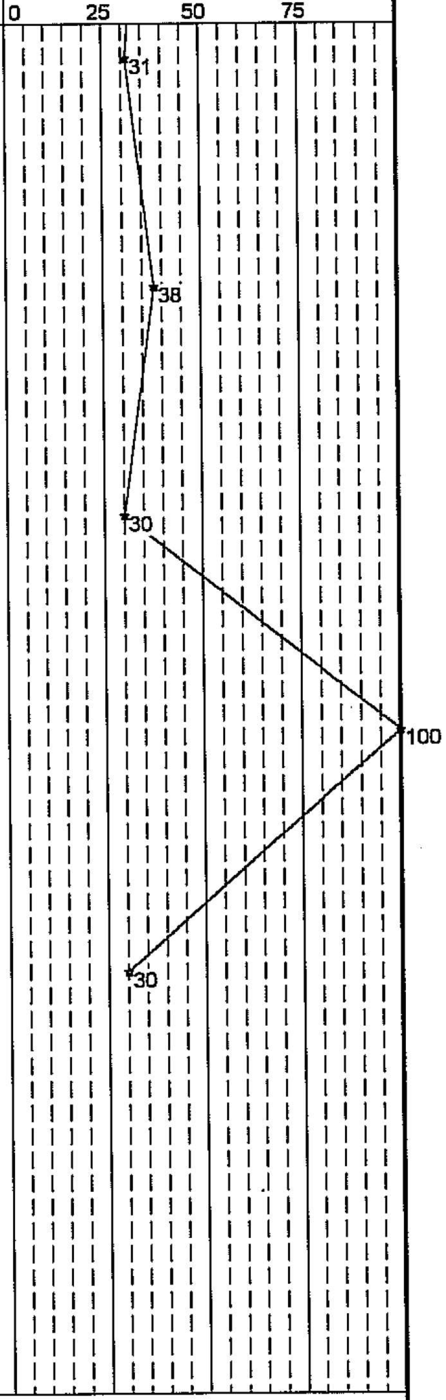
**Project:** **SANTEE COOPER - JEFFRIES GENERATING STATION ASH POND, MONCKS CORNER, SOUTH CAROLINA**

**Location:** NORTHING: 509711.12 EASTING: 2313297.96 **SCI No.:** **11023**

**Datum:** NAVD88 **Elevation:** 17.9 **Date:** 2/25/2011 **GWT (ft):** 5

| Strata | Sample | Elev. (feet) | Depth | Visual Description (Unified Soil Classification System) | Actual Blows/6" |
|---|---|---|---|---|---|
| | 11 | | | HARD BROWNISH-GREEN CALCAREOUS SILTY CLAY WITH SAND (CH - LOCALLY CALLED MARL) | 8-10-13 |
| | | -15 | | | |
| | | | 35 | | |
| | 12 | | | HARD BROWNISH-GREEN CALCAREOUS SILTY CLAY WITH SAND (CH - LOCALLY CALLED MARL) | 12-13-15 |
| | | -20 | | | |
| | | | 40 | | |
| | 13 | | | VERY STIFF BROWNISH-GREEN CALCAREOUS SILTY CLAY WITH SAND (CH - LOCALLY CALLED MARL) | 11-10-12 |
| | | -25 | | | |
| | | | 45 | | |
| | 14 | | | VERY DENSE BROWNISH-GREEN CALCAREOUS FINE SAND WITH SILT (SP-SM - LOCALLY CALLED MARL) | 11-60/5"- |
| | | -30 | | | |
| | | | 50 | | |
| | 15 | | | VERY STIFF BROWNISH-GREEN CALCAREOUS SILTY CLAY WITH SAND (CH - LOCALLY CALLED MARL) | 9-9-13 |
| | | | | *BORING B-105 TERMINATED AT A DEPTH OF 51.5 FEET* | |
| | | -35 | | | |
| | | | 55 | | |
| | | -40 | | | |
| | | | 60 | | |

Corrected "N" Values



Remarks: BORING LOCATIONS AND DEPTHS AS DIRECTED BY CLIENT.
SHOVEL SAMPLE TAKEN ADJACENT TO BORING INDICATED LITTLE TO NO ROOT CONTENT.
BOREHOLE GROUTED WITH BENTONITE TO GROUND SURFACE ON 2/28/11.
PLOTTED "N" VALUES ARE CORRECTED TO $N_{60}$ VALUES FOR CLAYS AND $(N_1)_{60}$ VALUES FOR SANDS.
BORING PERFORMED USING MUD-ROTARY.

Testing and Sampling in accordance with ASTM D 1586-08a

**SCI**
Construction Materials
Non Destructive
Geotechnical
Environmental

# LOG OF BORING B-105A

**Project: SANTEE COOPER - JEFFRIES GENERATING STATION ASH POND, MONCKS CORNER, SOUTH CAROLINA**

**Location:** NORTHING: 509711.12 EASTING: 2313297.96 **SCI No.: 11023**

**Datum:** NAVD88 **Elevation:** 17.9 **Date:** 2/25/2011 **GWT (ft):**

| Strata | Sample | Elev. (feet) | Depth | Visual Description (Unified Soil Classification System) | Actual Blows/6" | Corrected "N" Values 0 25 50 75 |
|---|---|---|---|---|---|---|
| ▩ | | 15 | 5 | VARIOUS SOILS | – | |
| ▨ | UD-1 ■ | | | SHELBY TUBE 3" X 30", PUSHED 24", RECOVERY 24"<br>BROWNISH-GRAY SANDY INORGANIC CLAY WITH SILT (CL) (POSSIBLE FILL MATERIAL) | – | |
| | | 10<br>5<br>0<br>-5<br>-10 | 10<br>15<br>20<br>25<br>30 | *BORING B-105A TERMINATED AT A DEPTH OF 7 FEET* | | |

Remarks: BORING LOCATIONS AND DEPTHS AS DIRECTED BY CLIENT.
COMPANION HOLE ADJACENT TO BORING B-105.
BOREHOLE GROUTED WITH BENTONITE TO GROUND SURFACE ON 2/28/11.
PLOTTED "N" VALUES ARE CORRECTED TO $N_{60}$ VALUES FOR CLAYS AND $(N_1)_{60}$ VALUES FOR SANDS.
BORING PERFORMED USING MUD-ROTARY.

Testing and Sampling
in accordance with
ASTM D 1586-08a

**SCI**
Construction Materials
Non Destructive
Geotechnical
Environmental

# LOG OF BORING B-106

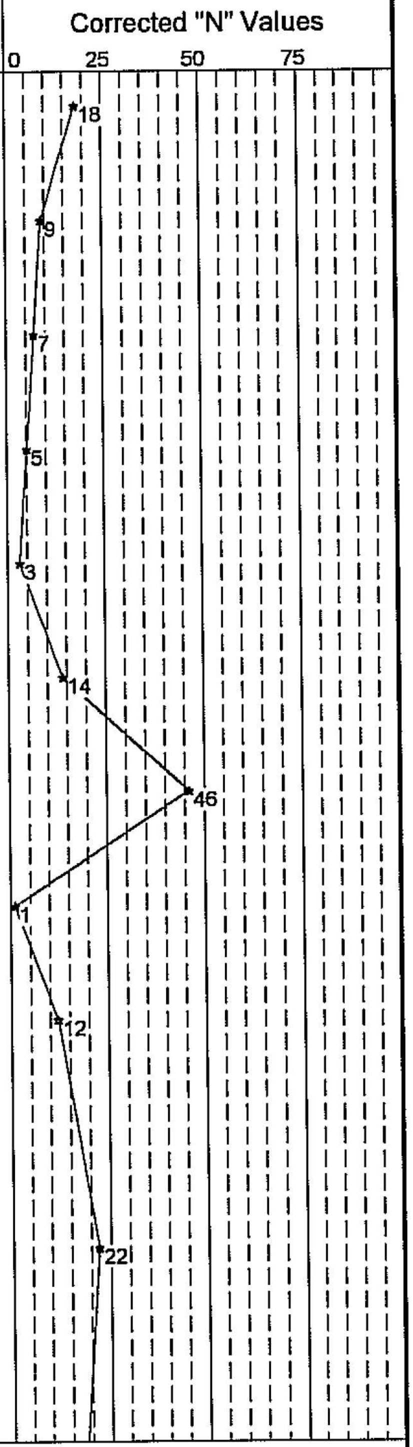
**Project:** **SANTEE COOPER - JEFFRIES GENERATING STATION**
**ASH POND, MONCKS CORNER, SOUTH CAROLINA**

**Location:** NORTHING: 508468.45 EASTING: 2312880.88 **SCI No.:** **11023**

**Datum:** NAVD88 **Elevation:** 18.23 **Date:** 2/25/2011 **GWT (ft):** 8

| Sample | Visual Description (Unified Soil Classification System) | Actual Blows/6" | Corrected "N" Values |
|---|---|---|---|
| 1 | MEDIUM DENSE TAN FINE SAND WITH SILT AND SHELL (SP-SM) (POSSIBLE FILL MATERIAL) | 8-5-5 | 18 |
| 2 | STIFF BROWNISH-GREEN CALCAREOUS SANDY CLAY WITH SILT (CL - LOCALLY CALLED MARL) (POSSIBLE FILL MATERIAL) | 2-4-5 | 9 |
| 3 | MEDIUM BROWNISH-GREEN CALCAREOUS SILTY CLAY WITH SAND (CH - LOCALLY CALLED MARL) (POSSIBLE FILL MATERIAL) | 3-4-3 | 7 |
| 4 | MEDIUM TAN INORGANIC CLAY WITH SAND (CH) | 1-2-3 | 5 |
| 5 | VERY LOOSE GRAY CLAYEY FINE TO MEDIUM SAND (SC) | 1-1-2 | 3 |
| 6 | STIFF GRAY SANDY INORGANIC CLAY (CL) | 5-4-8 | 14 |
| 7 | DENSE GRAY FINE TO MEDIUM SAND WITH SILT (SP-SM) | 14-18-14 | 46 |
| 8 | VERY SOFT GRAY INORGANIC CLAY WITH SAND (CH) | 1/18"-- | 1 |
| 9 | STIFF BROWNISH-GREEN CALCAREOUS SILTY CLAY WITH SAND (CH - LOCALLY CALLED MARL) | 3-4-5 | 12 |
| 10 | VERY STIFF BROWNISH-GREEN CALCAREOUS CLAYEY SILT WITH SAND (ML - LOCALLY CALLED MARL) | 5-7-10 | 22 |

Elev. (feet): 15, 10, 5, 0, -5, -10
Depth: 5, 10, 15, 20, 25, 30



**Remarks:** BORING LOCATIONS AND DEPTHS AS DIRECTED BY CLIENT.
SHOVEL SAMPLE TAKEN ADJACENT TO BORING INDICATED LITTLE TO NO ROOT CONTENT.
BOREHOLE GROUTED WITH BENTONITE TO GROUND SURFACE ON 2/28/11.
PLOTTED "N" VALUES ARE CORRECTED TO $N_{60}$ VALUES FOR CLAYS AND $(N_1)_{60}$ VALUES FOR SANDS.
BORING PERFORMED USING MUD-ROTARY.

Testing and Sampling in accordance with ASTM D 1586-08a

**SCI**
Construction Materials
Non Destructive
Geotechnical
Environmental

# LOG OF BORING B-106

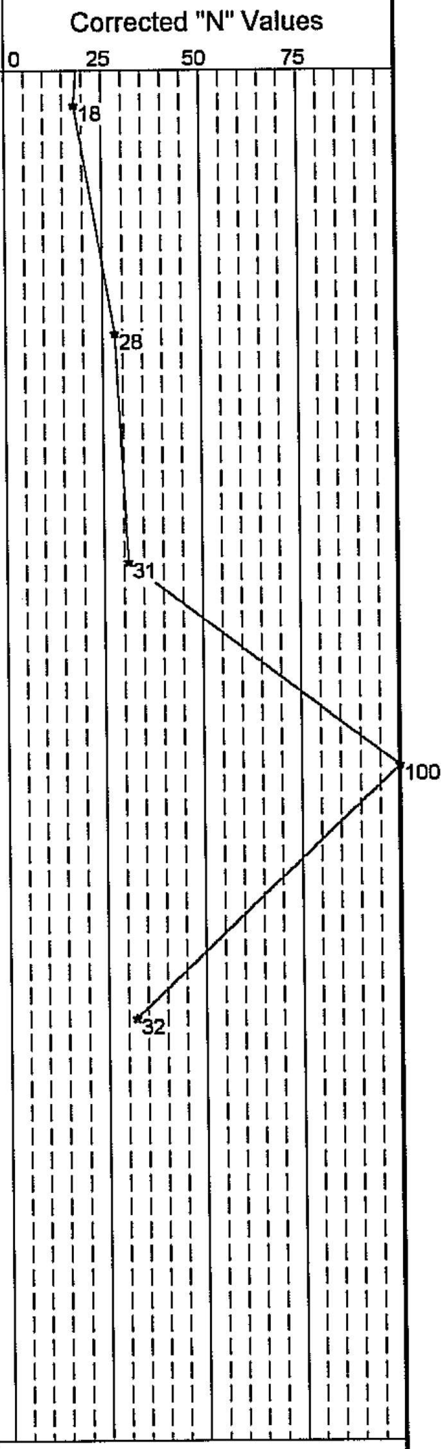
**Project:** **SANTEE COOPER - JEFFRIES GENERATING STATION ASH POND, MONCKS CORNER, SOUTH CAROLINA**

**Location:** NORTHING: 508468.45 EASTING: 2312880.88 **SCI No.:** **11023**

**Datum:** NAVD88 **Elevation:** 18.23 **Date:** 2/25/2011 **GWT (ft):** 8

| Strata | Sample | Elev. (feet) | Depth | Visual Description (Unified Soil Classification System) | Actual Blows/6" |
|---|---|---|---|---|---|
| ▨ | 11 | | | VERY STIFF BROWNISH-GREEN CALCAREOUS SILTY CLAY WITH SAND (CH - LOCALLY CALLED MARL) | 7-9-4 |
| ▨ | 12 | | | VERY STIFF BROWNISH-GREEN CALCAREOUS SILTY CLAY WITH SAND (CH - LOCALLY CALLED MARL) | 7-10-11 |
| ▨ | 13 | | | HARD BROWNISH-GREEN CALCAREOUS SILTY CLAY WITH SAND (CH - LOCALLY CALLED MARL) | 9-10-13 |
| ▨ | 14 | | | HARD BROWNISH-GREEN CALCAREOUS SILTY CLAY WITH SAND (CH - LOCALLY CALLED MARL) | 60/5"-- |
| ▨ | 15 | | | HARD BROWNISH-GREEN CALCAREOUS SILTY CLAY WITH SAND (CH - LOCALLY CALLED MARL) | 9-12-12 |

*BORING B-106 TERMINATED AT A DEPTH OF 51.5 FEET*



Remarks: BORING LOCATIONS AND DEPTHS AS DIRECTED BY CLIENT.
SHOVEL SAMPLE TAKEN ADJACENT TO BORING INDICATED LITTLE TO NO ROOT CONTENT.
BOREHOLE GROUTED WITH BENTONITE TO GROUND SURFACE ON 2/28/11.
PLOTTED "N" VALUES ARE CORRECTED TO $N_{60}$ VALUES FOR CLAYS AND $(N_1)_{60}$ VALUES FOR SANDS.
BORING PERFORMED USING MUD-ROTARY.

Testing and Sampling
in accordance with
ASTM D 1586-08a

**SCI**
Construction Materials
Non Destructive
Geotechnical
Environmental

# LOG OF BORING B-106A

**Project:** **SANTEE COOPER - JEFFRIES GENERATING STATION ASH POND, MONCKS CORNER, SOUTH CAROLINA**

**Location:** NORTHING: 508468.45 EASTING: 2312880.88 **SCI No.:** **11023**

**Datum:** NAVD88 **Elevation:** 18.23 **Date:** 2/25/2011 **GWT (ft):**

| Strata | Sample | Elev. (feet) | Depth (feet) | Visual Description (Unified Soil Classification System) | Actual Blows/6" | Corrected "N" Values 0 25 50 75 |
|---|---|---|---|---|---|---|
| ▩ | | | | VARIOUS SOILS | -- | |
| ▩ | | 15 | | | | |
| ▩ | | | 5 | | | |
| ▩ | | 10 | | | | |
| ▩ | | | 10 | | | |
| ▨ | UD-1 ■ | | | SHELBY TUBE 3" X 30", PUSHED 24", RECOVERY 24"<br>GRAY CLAYEY FINE TO MEDIUM SAND (SC) | – | |
| | | | | *BORING B-106A TERMINATED AT A DEPTH OF 12 FEET* | | |
| | | 5 | | | | |
| | | | 15 | | | |
| | | 0 | | | | |
| | | | 20 | | | |
| | | -5 | | | | |
| | | | 25 | | | |
| | | -10 | | | | |
| | | | 30 | | | |

Remarks:
BORING LOCATIONS AND DEPTHS AS DIRECTED BY CLIENT.
COMPANION HOLE ADJACENT TO BORING B-106.
BOREHOLE GROUTED WITH BENTONITE TO GROUND SURFACE ON 2/28/11.
PLOTTED "N" VALUES ARE CORRECTED TO $N_{60}$ VALUES FOR CLAYS AND $(N_1)_{60}$ VALUES FOR SANDS.
BORING PERFORMED USING MUD-ROTARY.

Testing and Sampling
in accordance with
ASTM D 1586-08a

# Field Exploratory Procedures

Soil Boring

A soil boring is simply the process of advancing a hole in the ground by some means and obtaining samples of soil at stated intervals or at changes of stratum. In the usual procedure involving the Standard Penetration Test (SPT), the hole is advanced by augering or by use of rotary drills with various types of bits cutting the soil. The hole is cleaned with flight augers or with water being pumped to remove the cuttings.

When a sample is desired, a split-spoon sampler of 2-inch outside diameter and $1^{3}/_{8}$-inch inside diameter is lowered to the bottom of the hole, seated a distance of 6 inches, and driven an additional 1 foot into the soil with a standard weight (140 pounds) dropping a standard distance (30 inches). The number of blows required to drive the spoon the final foot is called the "N" value. As specified by the American Society for Testing and Materials, ASTM Designation D1586-08a, the number of blows of the standard weight required to seat the sampler as well as the number of blows required to drive the sampler the final foot (in two 6-inch increments) is recorded on the boring log. Tables showing an approximate correlation between soil strength and "N" value are shown on Plate 3.

Usually, the zone most heavily stressed by the average foundation is within the top 10-20 feet of soil. Therefore, in all borings, we perform the SPT at ground surface and at 2½-foot intervals to a depth of 20 feet, and at 5-foot intervals thereafter to the depth of the boring. After each SPT has been made, the split-spoon sampler is brought to the surface and a visual description of the soil found in the sampler is recorded on the boring log. Each sample is then placed in a container to be returned to the laboratory for verification of the field classification. A minimum of 24 hours after completion of each boring, the depth of the groundwater table (GWT) below the ground surface is measured. In the case of cohesionless soil, the position of the GWT is most critical, since a high water table decreases bearing capacity and increases settlement potential.

After the soil has been returned to the laboratory, its visual description is verified and the soil is graded in accordance with the Unified Soil Classification System (USCS). A brief description of the USCS and the different classes of soil are discussed on Plate 4.

**SOIL CONSULTANTS, INC**
ENGINEERS AND GEOLOGISTS
*Since 1951*
CHARLESTON, S.C. MYRTLE BEACH, S.C.

TITLE
SANTEE COOPER - JEFFRIES GENERATING STATION
ASH POND
MONCKS CORNER, SOUTH CAROLINA

**PLATE 1**

| DATE | PROJECT NO. | INITIALS |
|---|---|---|
| April 18, 2011 | 11023 | ATH |

# Field Exploratory Procedures

Undisturbed Sampling

Soil borings utilizing the split-spoon sample method are obviously *disturbed samples*, and thus some of the characteristics of the soil have been changed. These samples are commonly used for identification by means visually inspecting the soil as well as a number of laboratory tests that can be performed to further define the classification. Grain-size analysis, liquid and plastic limit determination, and specific gravity of the soil, for instance, can be performed on disturbed samples since the results of these tests will be the same regardless of the methods used to obtain the sample.

For determining other properties of soils, such as strength, compressibility, and permeability, it is necessary to collect samples such that the characteristics of the sample are the same as they were when the soil existed in the ground. These samples are referred to as *undisturbed samples.* It must be understood that a sample can never be completely undisturbed, as it is impossible to maintain the exact same conditions the soil was initially exposed to after the sample is collected. By exercising extreme care, however, the amount of disturbance and the corresponding change in characteristics can be minimized.

Relatively undisturbed samples are usually obtained using a *Shelby Tube*, which is a thin-walled, (16-gauge) seamless steel tube of 2 to 3-inch outer diameter. With this method, the tube is pushed into the soil using hydraulic pressure, thereby trapping the (undisturbed) sample inside the tube, and then removed with the tube and sample intact. The ends of the tube are then sealed to prevent moisture loss, and the sample is carefully transported to the laboratory. Any undisturbed samples obtained in the field are noted on the boring logs at the depths they were obtained.

# Standard Penetration Tests and Soil Characteristics

The "standard" penetration resistance can be used as an indication of the density of granular soils (sands and gravels) and the apparent strength of cohesive soils (silts and clays).

## RELATIVE DENSITY OF GRANULAR SOILS

| *Number of SPT Blows or "N" Value* | *Relative Density* |
|---|---|
| 0 - 4 | Very Loose |
| 5 – 10 | Loose |
| 11 – 30 | Medium Dense |
| 31 – 50 | Dense |
| Over 50 | Very Dense |

## CONSISTENCY OF COHESIVE SOILS

| *Number of SPT Blows or "N" Value* | *Consistency* |
|---|---|
| 0 - 2 | Very Soft |
| 3 – 4 | Soft |
| 5 – 8 | Medium (firm) |
| 9 – 15 | Stiff |
| 16 – 30 | Very Stiff |
| Over 30 | Hard |

While individual test boring records are considered representative of subsurface conditions at the respective boring locations on the dates the borings were performed, it is not warranted that they are representative of subsurface conditions at other locations and times.

THE ABOVE TABLES ARE BASED ON INFORMATION PRESENTED IN *SOIL MECHANICS IN ENGINEERING PRACTICE* BY DR. KARL TERZAGHI AND DR. RALPH B. PECK.

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*Since 1951*
CHARLESTON, S.C. MYRTLE BEACH, S.C.

TITLE
SANTEE COOPER - JEFFRIES GENERATING STATION
ASH POND
MONCKS CORNER, SOUTH CAROLINA

**PLATE 3**

| DATE | PROJECT NO. | INITIALS |
|---|---|---|
| April 18, 2011 | 11023 | ATH |

# Unified Soil Classification System

The Unified Soil Classification System (USCS) is the most widely used method for classifying soils according to their properties and characteristics. Essentially, there are two broad categories:

- ***Coarse-grained soils*** – soils that are gravelly and sandy in nature with less than 50% of the soil particles capable of passing through a standard No. 200 sieve (mesh openings measuring approximately 0.075 mm). The individual group symbols start with prefixes of either *G* (gravel or gravelly soil) or *S* (sand or sandy soil).
- ***Fine-grained soils*** – soils with more than 50% passing through a No. 200 sieve. The groups start with prefixes of *M* (inorganic silt), *C* (inorganic clay), *O* (organic silts and clays), and *Pt* (peat, muck and other highly organic soils).

Other symbols used are *W* (well-graded), *P* (poorly graded), *L* (low plasticity) and *H* (high plasticity). Some common individual groups are as follows:

| ***Group Symbols*** | ***Soil Types*** |
|---|---|
| GW | Well-graded gravels or gravel sand mixtures, little or no fines |
| GP | Poorly graded gravels or gravel-sand mixtures, little or no fines |
| GM | Silty gravel, gravel-sand-silt mixtures |
| GC | Clayey gravels, gravel-sand-clay mixtures |
| SW | Well-graded or gravelly sands, little or no fines |
| SP | Poorly graded sands or gravelly sands, little or no fines |
| SM | Silty sands, sand-silt mixtures |
| SC | Clayey sands, sand-clay mixtures |
| ML | Inorganic silts and very fine sands, rock flour, silty or clayey fine sands, clayey silts with slight plasticity |
| CL | Inorganic clays of low to medium plasticity, gravelly clays, silty clays, lean clays |
| OL | Organic silts and organic silt-clays of low plasticity |
| MH | Inorganic silts, micaceous or diatomaceous fine, sandy or silty soils, elastic silts |
| CH | Inorganic clays of medium to high plasticity, fat clays |
| OH | Organic clays of medium to high plasticity, organic silts |
| Pt | Peat and other highly organic soils |

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|---|---|---|---|
| **PLATE 4** | DATE<br>April 18, 2011 | PROJECT NO.<br>11023 | INITIALS<br>ATH |

| Materials Testing Report | **Soil Consultants, Inc.**<br>P.O. Drawer 698, Charleston, S.C. 29402 | Tabulated Data Sheet |
|---|---|---|
| **Client:** Santee Cooper | | **Date:** 03/17/11 |
| **Project:** Jeffries Ash Pond | | **SCI No.:** 11023 |

## *Moisture Content (ASTM D2216)*

| Sample Number | Sample Location | Moisture Content (%) |
|---|---|---|
| 1.) | B-101 S-2 | 38.6 |
| 2.) | B-101 S-3 | 74.0 |
| 3.) | B-101 S-4 | 17.2 |
| 4.) | B-101 S-6 | 19.6 |
| 5.) | B-101 S-7 | 31.3 |
| 6.) | B-101 S-8 | 26.9 |
| 7.) | B-101 S-9 | 27.5 |
| 8.) | B-101 S-10 | 35.7 |
| 9.) | B-101 S-11 | 39.7 |
| 10.) | B-101 S-12 | 21.2 |
| 11.) | B-102 S-3 | 18.8 |
| 12.) | B-102 S-4 | 17.1 |
| 13.) | B-102 S-5 | 52.6 |
| 14.) | B-102 S-6 | 27.0 |
| 15.) | B-102 S-7 | 37.2 |
| 16.) | B-102 S-8 | 37.9 |
| 17.) | B-103 S-1 | 17.0 |
| 18.) | B-103 S-2 | 25.5 |
| 19.) | B-103 S-3 | 33.7 |
| 20.) | B-103 S-4 | 36.5 |
| 21.) | B-103 S-5 | 37.9 |
| 22.) | B-103 S-6 | 26.2 |
| 23.) | B-103 S-7 | 31.4 |
| 24.) | B-103 S-8 | 31.8 |
| 25.) | B-103 S-9 | 30.1 |
| 26.) | B-103 S-10 | 26.7 |
| 27.) | B-103 S-11 | 29.6 |
| 28.) | B-103 S-12 | 23.3 |
| 29.) | B-103 S-13 | 38.0 |
| 30.) | B-103 S-14 | 37.9 |
| 31.) | B-103 S-15 | 30.3 |
| 32.) | B-104 S-2 | 37.7 |
| 33.) | B-104 S-3 | 30.5 |
| 34.) | B-104 S-4 | 32.9 |
| 35.) | B-104 S-5 | 37.4 |
| 36.) | B-104 S-8 | 75.0 |
| 37.) | B-104 S-9 | 65.2 |
| 38.) | B-104 S-10 | 34.0 |
| 39.) | B-104 S-11 | 23.7 |
| 40.) | B-104 S-12 | 31.1 |
| 41.) | B-104 S-13 | 37.7 |
| 42.) | B-104 S-14 | 41.1 |
| 43.) | B-104 S-15 | 41.7 |
| 44.) | B-105 S-1 | 16.0 |
| 45.) | B-105 S-2 | 34.8 |
| 46.) | B-105 S-4 | 18.9 |
| 47.) | B-105 S-5 | 17.3 |
| 48.) | B-105 S-6 | 15.6 |
| 49.) | B-105 S-7 | 21.3 |
| 50.) | B-105 S-8 | 37.0 |
| 51.) | B-105 S-9 | 36.0 |
| 52.) | B-105 S-10 | 33.4 |
| 53.) | B-105 S-11 | 32.4 |
| 54.) | B-105 S-12 | 26.4 |
| 55.) | B-105 S-13 | 27.3 |
| 56.) | B-105 S-14 | 21.9 |
| 57.) | B-105 S-15 | 39.8 |
| 58.) | B-106 S-2 | 15.6 |
| 59.) | B-106 S-3 | 17.0 |
| 60.) | B-106 S-4 | 20.5 |
| 61.) | B-106 S-5 | 21.1 |
| 62.) | B-106 S-6 | 14.3 |
| 63.) | B-106 S-7 | 17.4 |
| 64.) | B-106 S-8 | 46.9 |
| 65.) | B-106 S-9 | 41.2 |
| 66.) | B-106 S-10 | 35.4 |
| 67.) | B-106 S-11 | 33.7 |
| 68.) | B-106 S-12 | 31.9 |
| 69.) | B-106 S-13 | 25.0 |
| 70.) | B-106 S-14 | 16.9 |
| 71.) | B-106 S-15 | 38.2 |
| 72.) | B-104 UD-2 | 33.1 |
| 73.) | B-105 UD-1 | 16.1 |
| 74.) | B-105 UD-2 | 38.1 |
| 75.) | B-106 UD-1 | 27.2 |

Respectfully Submitted:

Soil Consultants, Inc.

| | | |
|---|---|---|
| **Materials Testing Report** | **Soil Consultants, Inc.**<br>P.O. Drawer 698, Charleston, S.C. 29402 | **Atterberg Limits ASTM D4318** |
| Client: Santee Cooper | | Date: 04/13/11 |
| Project: Jeffries Ash Pond | | SCI No. 11023 |

## Results of Atterberg Limits (ASTM D4318)

| Sample ID | ASTM D4318 Atterberg Limits | | | Unified Soil Classification |
|---|---|---|---|---|
| | Liquid Limit | Plastic Limit | Plasticity Index | |
| B-101 S-4 | 41 | 13 | 28 | CL* |
| B-101 S-7 | 59 | 29 | 30 | CH* |
| B-101 S-12 | 55 | 18 | 37 | CH* |
| B-102 S-5 | 83 | 20 | 63 | CH* |
| B-102 S-8 | 81 | 21 | 60 | CH* |
| B-103 S-2 | 85 | 21 | 64 | CH* |
| B-103 S-4 | 62 | 23 | 39 | CH* |
| B-103 S-9 | 44 | 25 | 19 | CL* |
| B-103 S-12 | -- | NP | NP | SM |
| B-104 S-3 | 51 | 28 | 23 | CH* |
| B-104 S-5 | 40 | 18 | 22 | CL* |
| B-104 S-8 | 72 | 22 | 50 | CH* |
| B-104 S-11 | 42 | 26 | 16 | CL* |
| B-104 UD-2 | 45 | 15 | 30 | SC |
| B-105 S-5 | 36 | 16 | 20 | CL* |
| B-105 S-7 | 44 | 25 | 19 | CL* |
| B-105 S-14 | -- | NP | NP | SP-SM* |
| B-105 UD-1 | 39 | 13 | 26 | CL* |
| B-105 UD-2 | 31 | 25 | 6 | SC |
| B-106 S-2 | 31 | 16 | 15 | CL* |
| B-106 S-6 | 29 | 17 | 12 | CL* |
| B-106 S-8 | 53 | 15 | 38 | CH* |
| B-106 S-10 | 43 | 28 | 15 | ML* |
| B-106 UD-1 | 44 | 15 | 29 | SC |

* The soil classification is partly based on visual observations since grain-size analyses were not performed for this sample.

Respectfully Submitted:

Soil Consultants, Inc.

| Materials Testing Report | Soil Consultants, Inc.<br>P.O. Drawer 698, Charleston, S.C. | Tabulated Dry Sieve Data Sheet |
|---|---|---|

**Client:** Santee Cooper

**Date:** 04/13/11

**Project:** Jeffries Ash Pond

**SCI No.:** 11023

**Sample ID:** B-103 S-12

**Sample Description:** Olive silty sand

## DRY SIEVE ANALYSIS (ASTM D422/AASHTO T-88)

*% Passing*

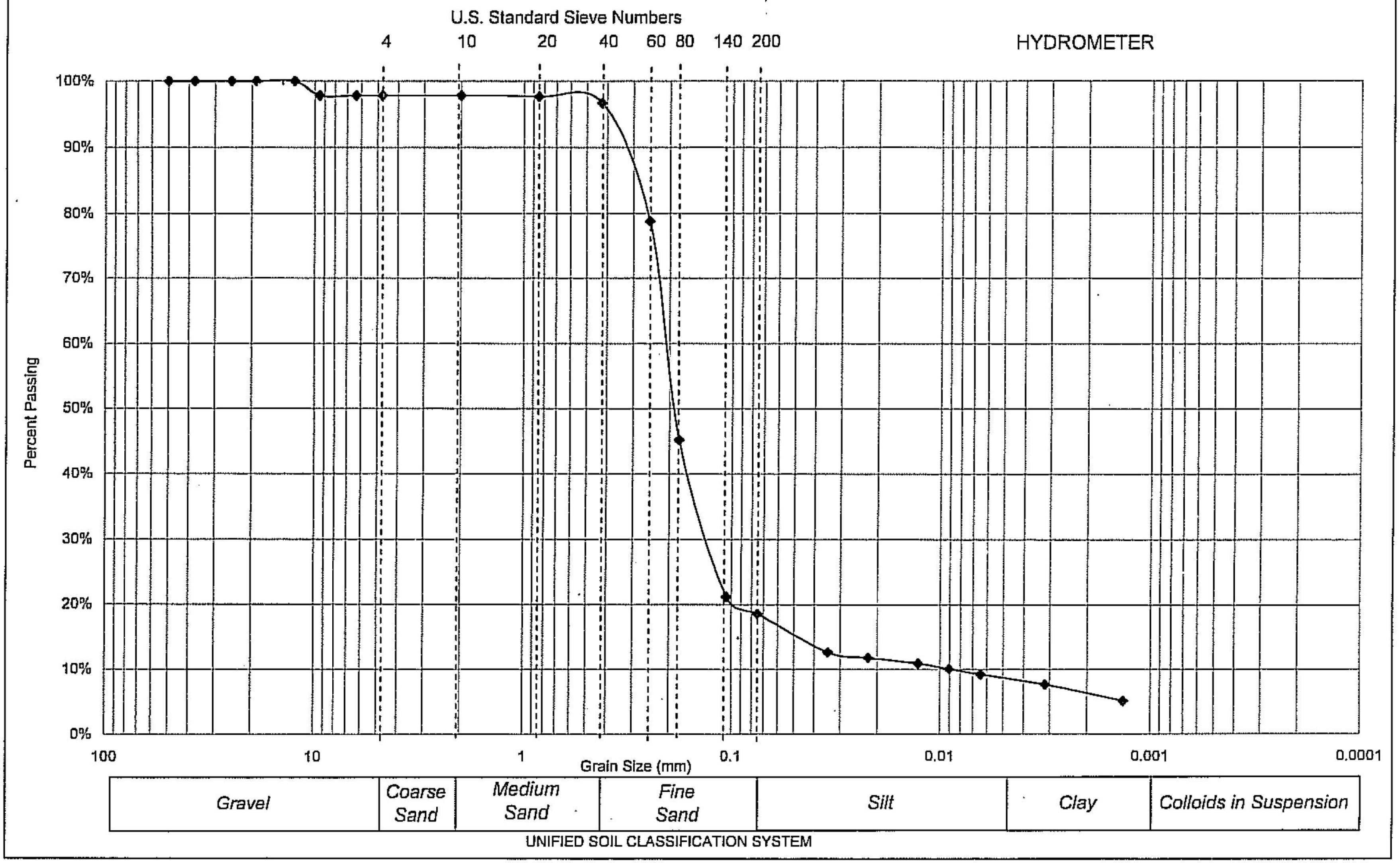
| ***Sieve Size*** | ***Particle Size*** | ***% Passing*** |
|---|---|---|
| 1 1/2-in. | 37.5-mm | 100.0% |
| 1-in. | 25-mm | 100.0% |
| 3/4-in. | 19-mm | 100.0% |
| 1/2-in. | 12.5-mm | 100.0% |
| 3/8-in. | 9.5-mm | 100.0% |
| 1/4-in. | 6.35-mm | 97.8% |
| No. 4 | 4.75-mm | 97.8% |
| No. 10 | 2-mm | 97.8% |
| No. 20 | 0.85-mm | 97.6% |
| No. 40 | 0.42-mm | 96.7% |
| No. 60 | 0.25-mm | 78.8% |
| No. 80 | 0.18-mm | 45.3% |
| No. 140 | 0.106-mm | 21.2% |
| No. 200 | 0.075-mm | 18.6% |

Respectfully Submitted:

SOIL CONSULTANTS, INC

| | | |
|---|---|---|
| Materials Testing Report | SOIL CONSULTANTS, INC.<br>P.O. Drawer 698, Charleston, S.C. 29402 | Grain Size Distribution Diagram<br>Hydrometer Analysis-ASTM D422/AASHTO T-88 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Project:** | Jeffries Ash Pond | | | **SCI No:** | 11023 | **Date:** | 04/13/11 |
| **Client:** | Santee Cooper | | **Shape:**<br>Angular | **Hardness:**<br>soft | | **G$_s$:**<br>2.65 Assumed | |
| **Sample ID:** | B-103 S-12 | **Sample Description:** | Olive silty sand | | | | |



| | |
|---|---|
| % Sand: | 81.38% |
| % Silt: | 9.41% |
| % Clay: | 9.21% |

Respectfully Submitted:

| Materials Testing Report | Soil Consultants, Inc.<br>P.O. Drawer 698, Charleston, S.C. | Tabulated Dry Sieve Data Sheet |
|---|---|---|

**Client:** Santee Cooper

**Date:** 04/13/11

**Project:** Jeffries Ash Pond

**SCI No.:** 11023

**Sample ID:** B-104 UD-2

**Sample Description:** Gray clayey sand with silt

## DRY SIEVE ANALYSIS (ASTM D422/AASHTO T-88)

## *% Passing*

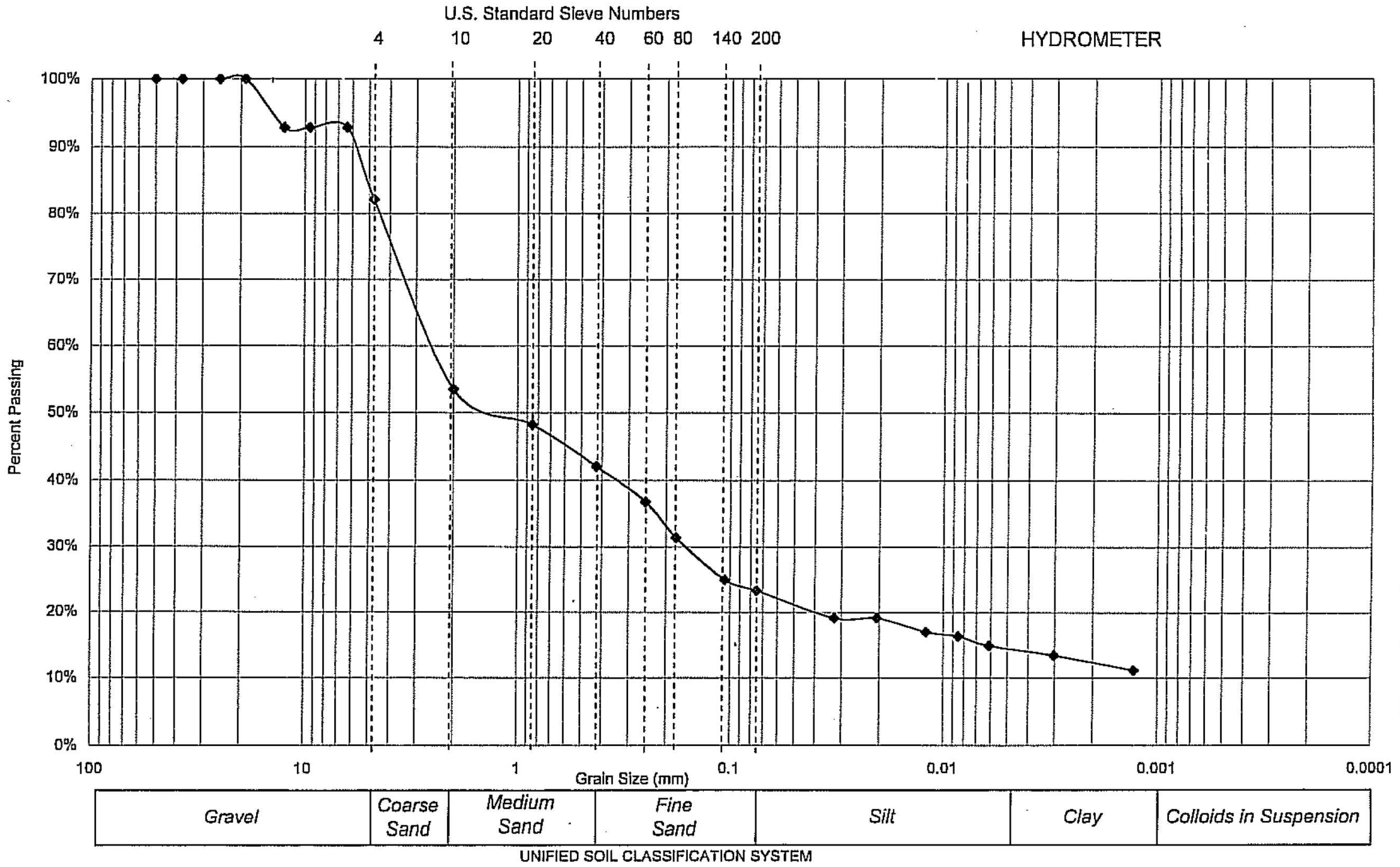
| *Sieve Size* | *Particle Size* | *% Passing* |
|---|---|---|
| 1 1/2-in. | 37.5-mm | 100.0% |
| 1-in. | 25-mm | 100.0% |
| 3/4-in. | 19-mm | 100.0% |
| 1/2-in. | 12.5-mm | 100.0% |
| 3/8-in. | 9.5-mm | 92.9% |
| 1/4-in. | 6.35-mm | 92.9% |
| No. 4 | 4.75-mm | 82.1% |
| No. 10 | 2-mm | 53.5% |
| No. 20 | 0.85-mm | 48.3% |
| No. 40 | 0.42-mm | 42.1% |
| No. 60 | 0.25-mm | 36.8% |
| No. 80 | 0.18-mm | 31.5% |
| No. 140 | 0.106-mm | 25.0% |
| No. 200 | 0.075-mm | 23.3% |

Respectfully Submitted:

SOIL CONSULTANTS, INC

| | | |
|---|---|---|
| Materials Testing Report | SOIL CONSULTANTS, INC.<br>P.O. Drawer 698, Charleston, S.C. 29402 | Grain Size Distribution Diagram<br>Hydrometer Analysis-ASTM D422/AASHTO T-88 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Project:** | Jeffries Ash Pond | | | **SCI No:** 11023 | **Date:** | 04/13/11 |
| **Client:** | Santee Cooper | | **Shape:**<br>Angular | **Hardness:**<br>soft | **$G_s$:**<br>2.63 | |
| **Sample ID:** | B-104 UD-2 | **Sample Description:** | Gray clayey sand with silt | | | |



| | |
|---|---|
| % Sand: | 76.68% |
| % Silt: | 8.42% |
| % Clay: | 14.90% |

Respectfully Submitted:

| | | |
|---|---|---|
| **Materials Testing Report** | Soil Consultants, Inc.<br>P.O. Drawer 698, Charleston, S.C. | **Tabulated Dry Sieve Data Sheet** |

**Client:** Santee Cooper

**Date:** 04/13/11

**Project:** Jeffries Ash Pond

**SCI No.:** 11023

**Sample ID:** B-105 UD-2

**Sample Description:** Olive clayey sand with silt

## DRY SIEVE ANALYSIS (ASTM D422/AASHTO T-88)

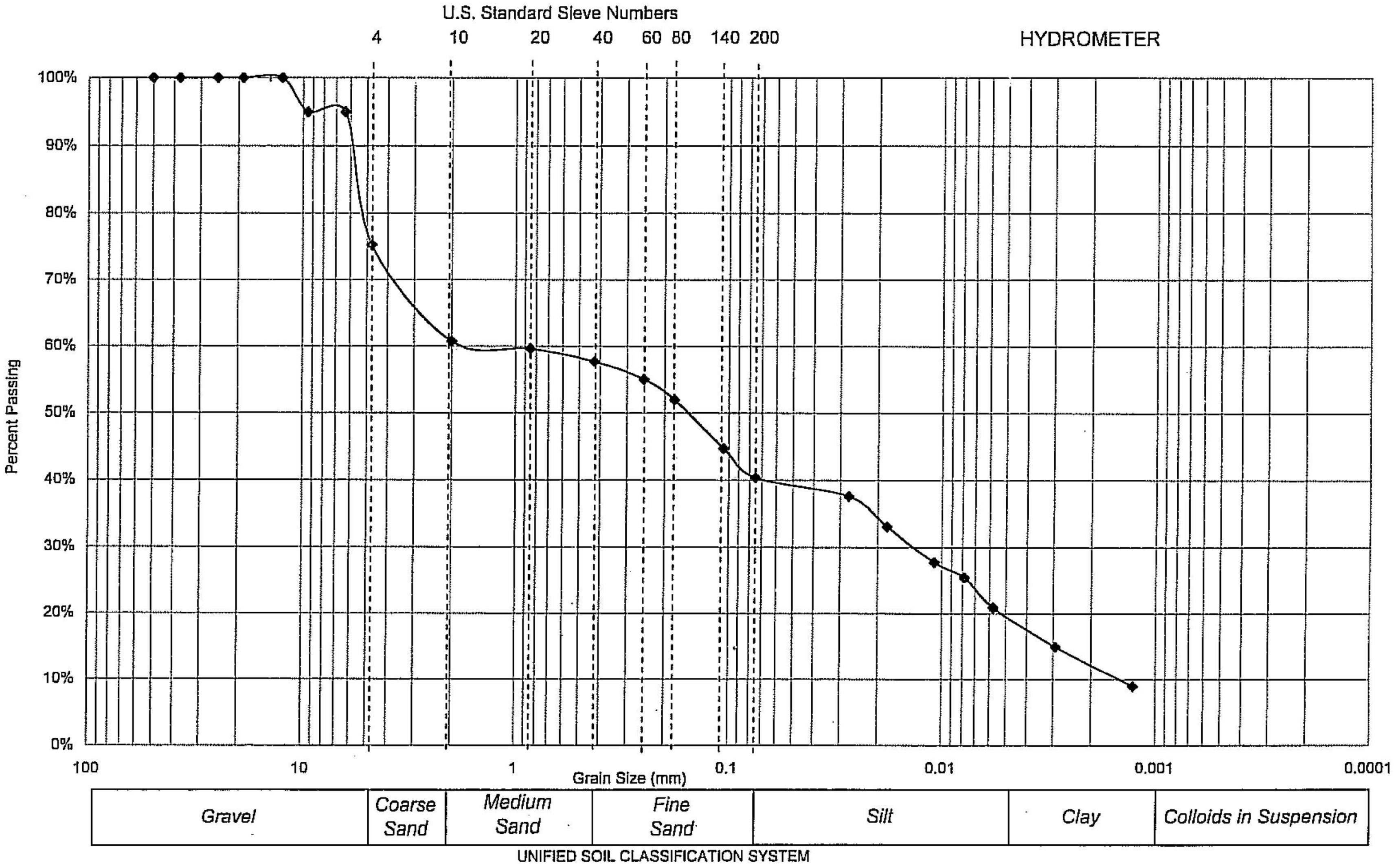
## *% Passing*

| ***Sieve Size*** | ***Particle Size*** | ***% Passing*** |
|---|---|---|
| 1 1/2-in. | 37.5-mm | 100.0% |
| 1-in. | 25-mm | 100.0% |
| 3/4-in. | 19-mm | 100.0% |
| 1/2-in. | 12.5-mm | 100.0% |
| 3/8-in. | 9.5-mm | 100.0% |
| 1/4-in. | 6.35-mm | 95.0% |
| No. 4 | 4.75-mm | 75.2% |
| No. 10 | 2-mm | 60.7% |
| No. 20 | 0.85-mm | 59.6% |
| No. 40 | 0.42-mm | 57.7% |
| No. 60 | 0.25-mm | 55.0% |
| No. 80 | 0.18-mm | 52.0% |
| No. 140 | 0.106-mm | 44.7% |
| No. 200 | 0.075-mm | 40.4% |

Respectfully Submitted:

SOIL CONSULTANTS, INC

| | | | | | |
|---|---|---|---|---|---|
| Materials Testing Report | SOIL CONSULTANTS, INC.<br>P.O. Drawer 698, Charleston, S.C. 29402 | | | Grain Size Distribution Diagram<br>Hydrometer Analysis-ASTM D422/AASHTO T-88 | |
| **Project:** | Jeffries Ash Pond | **SCI No:** | 11023 | **Date:** | 04/13/11 |
| **Client:** | Santee Cooper | **Shape:**<br>Angular | **Hardness:**<br>soft | **$G_s$:**<br>2.74 | |
| **Sample ID:** | B-105 UD-2 | **Sample Description:** | Olive clayey sand with silt | | |



| | |
|---|---|
| % Sand: | 59.63% |
| % Silt: | 19.47% |
| % Clay: | 20.90% |

Respectfully Submitted:

**Materials Testing Report**

Soil Consultants, Inc.
P.O. Drawer 698, Charleston, S.C.

**Tabulated Dry Sieve Data Sheet**

**Client:** Santee Cooper

**Date:** 04/13/11

**Project:** Jeffries Ash Pond

**SCI No.:** 11023

**Sample ID:** B-106 UD-1

**Sample Description:** Gray clayey sand

# DRY SIEVE ANALYSIS (ASTM D422/AASHTO T-88)

## *% Passing*

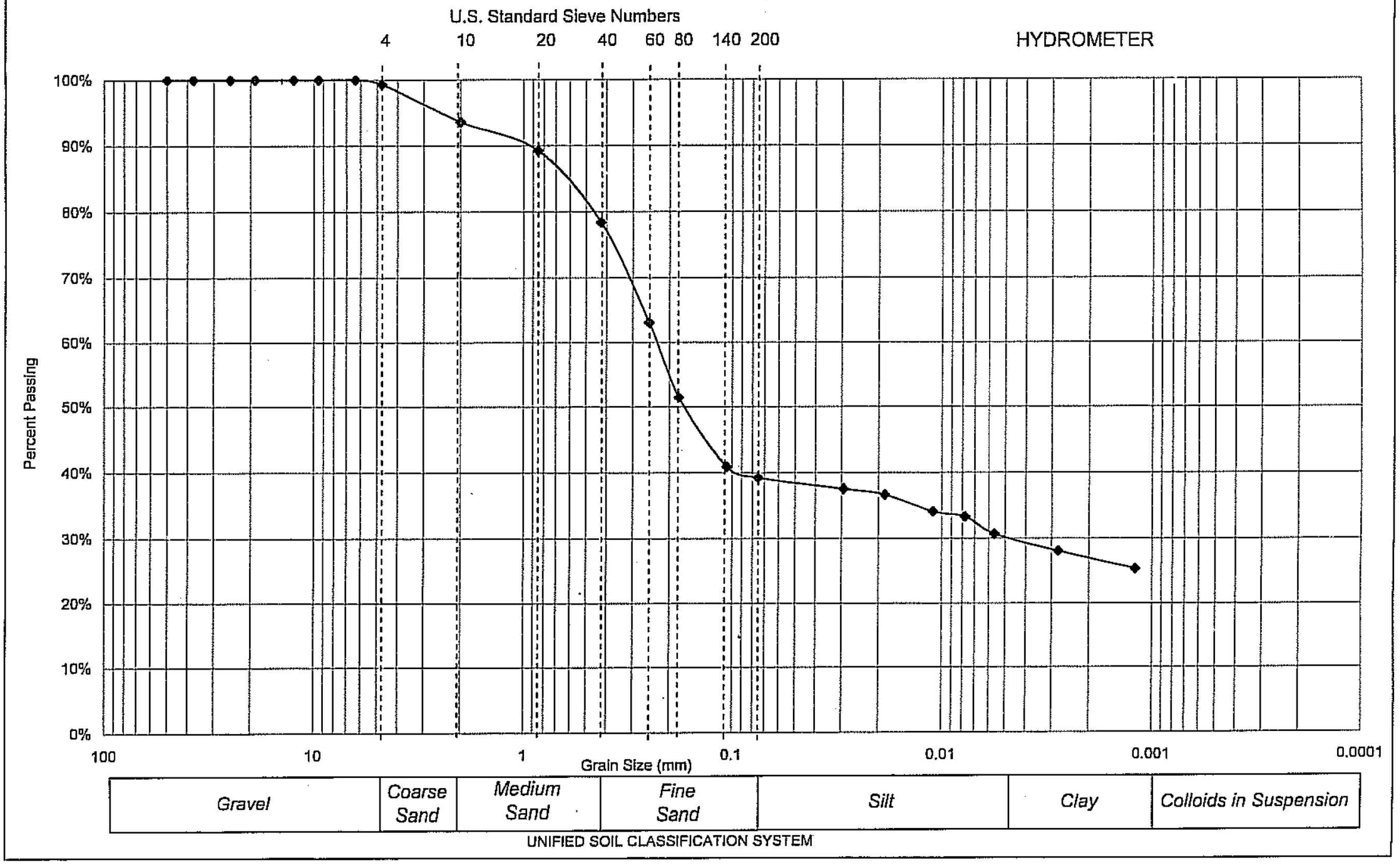
| ***Sieve Size*** | ***Particle Size*** | ***% Passing*** |
|---|---|---|
| 1 1/2-in. | 37.5-mm | 100.0% |
| 1-in. | 25-mm | 100.0% |
| 3/4-in. | 19-mm | 100.0% |
| 1/2-in. | 12.5-mm | 100.0% |
| 3/8-in. | 9.5-mm | 100.0% |
| 1/4-in. | 6.35-mm | 100.0% |
| No. 4 | 4.75-mm | 99.3% |
| No. 10 | 2-mm | 93.6% |
| No. 20 | 0.85-mm | 89.2% |
| No. 40 | 0.42-mm | 78.4% |
| No. 60 | 0.25-mm | 63.1% |
| No. 80 | 0.18-mm | 51.5% |
| No. 140 | 0.106-mm | 40.9% |
| No. 200 | 0.075-mm | 39.2% |

Respectfully Submitted:

SOIL CONSULTANTS, INC

| | | |
|---|---|---|
| Materials Testing Report | SOIL CONSULTANTS, INC.<br>P.O. Drawer 698, Charleston, S.C. 29402 | Grain Size Distribution Diagram<br>Hydrometer Analysis-ASTM D422/AASHTO T-88 |

| | | | | | |
|---|---|---|---|---|---|
| **Project:** | Jeffries Ash Pond | **SCI No:** 11023 | | **Date:** | 04/13/11 |
| **Client:** | Santee Cooper | **Shape:**<br>Angular | **Hardness:**<br>soft | **G$_s$:**<br>2.63 | |
| **Sample ID:** | B-106 UD-1 | **Sample Description:** | Gray clayey sand | | |



| | |
|---|---|
| % Sand: | 60.81% |
| % Silt: | 8.50% |
| % Clay: | 30.70% |

Respectfully Submitted:

| | | |
|---|---|---|
| **Materials Testing Report** | Soil Consultants, Inc.<br>P.O. Drawer 698, Charleston, S.C. | **Tabulated Dry Sieve Data Sheet** |

**Client:** Santee Cooper

**Date:** 03/29/11

**Project and State:** Jeffries Ash Pond

**SCI No.:** 11023

**Sample ID:** B-102 S-4

**Sample Description:** Brown fine sand

## DRY SIEVE ANALYSIS (ASTM D 422 w/o Hydrometer)

## *% Passing*

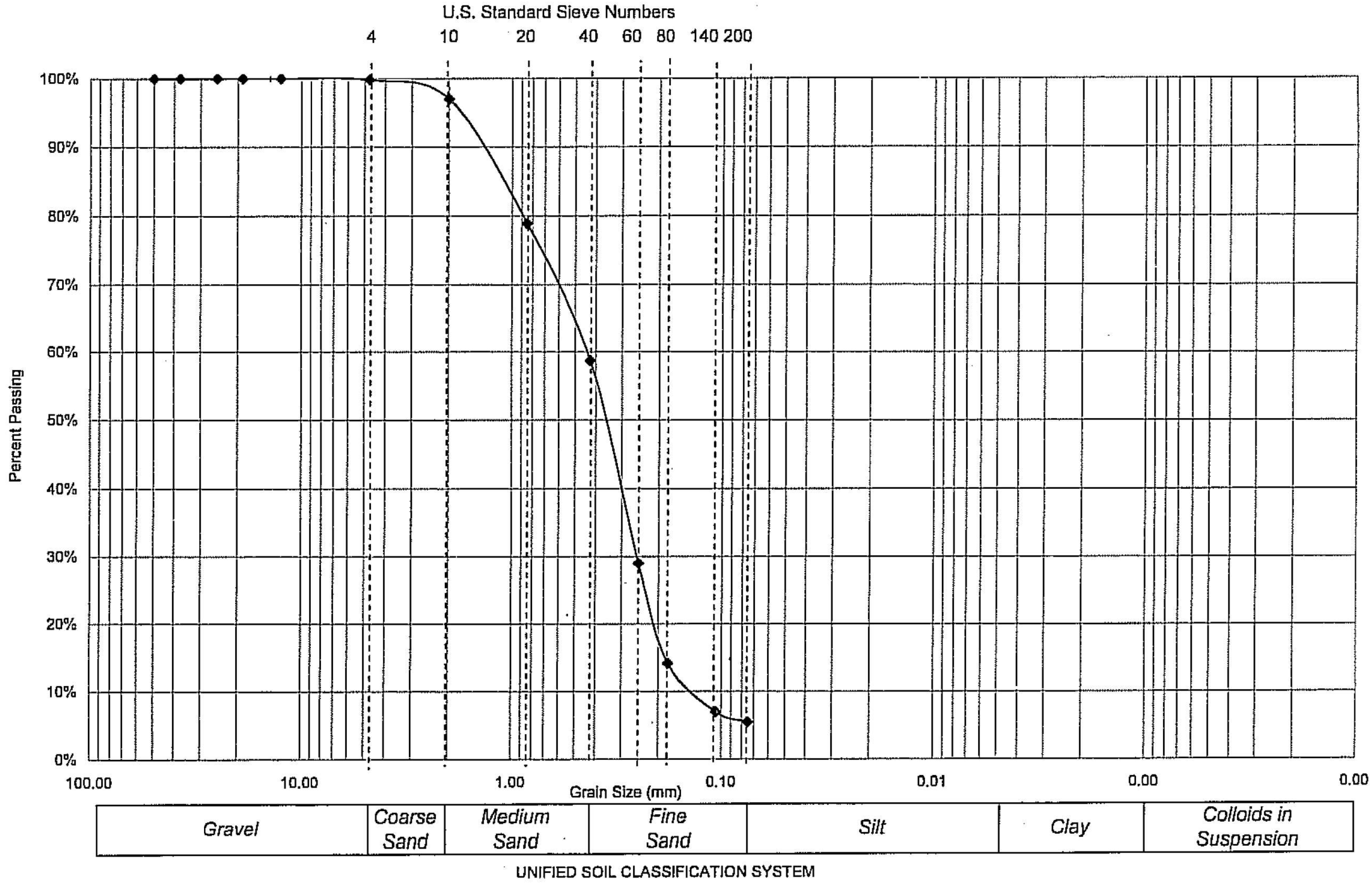
| *Sieve Size* | *Particle Size* | *% Passing* |
|---|---|---|
| 2-in. | 50-mm | 100.0% |
| 1 1/2-in. | 37.5-mm | 100.0% |
| 1-in. | 25-mm | 100.0% |
| 3/4-in. | 19-mm | 100.0% |
| 1/2-in. | 12.5-mm | 100.0% |
| 3/8-in. | 9.5-mm | 100.0% |
| No. 4 | 4.75-mm | 99.8% |
| No. 10 | 2-mm | 97.0% |
| No. 20 | 0.85-mm | 79.0% |
| No. 40 | 0.42-mm | 58.7% |
| No. 60 | 0.25-mm | 29.0% |
| No. 80 | 0.18-mm | 14.1% |
| No. 140 | 0.106-mm | 7.0% |
| No. 200 | 0.075-mm | 5.5% |
| Wash No. 200, % Passing: | | 5.0 |

As requested, a Wash 200 (ASTM D1140) was conducted prior to the Dry Sieve Analysis.

Respectfully Submitted:

SOIL CONSULTANTS, INC

| | | |
|---|---|---|
| Materials Testing Report | SOIL CONSULTANTS, INC.<br>P.O. Drawer 698, Charleston, S.C. 29402 | Grain Size Distribution Diagram<br>Dry Sieve Analysis - ASTM D 422 w/o Hydrometer |
| **Client:** Santee Cooper | | **SCI No.** 11023 |
| **Project and State:** Jeffries Ash Pond | | **Date:** 03/29/11 |
| **Sample ID:** B-102 S-4 | **Sample Description:** Brown fine sand | |



As requested, a Wash 200 (ASTM D1140) was conducted prior to the Dry Sieve Analysis.

Respectfully Submitted:

| **Materials Testing Report** | Soil Consultants, Inc.<br>P.O. Drawer 698, Charleston, S.C. | **Tabulated Dry Sieve Data Sheet** |
|---|---|---|

**Client:** Santee Cooper

**Date:** 03/29/11

**Project and State:** Jeffries Ash Pond

**SCI No.:** 11023

**Sample ID:** B-104 S-7

**Sample Description:** Brown fine sand

## DRY SIEVE ANALYSIS (ASTM D 422 w/o Hydrometer)

## *% Passing*

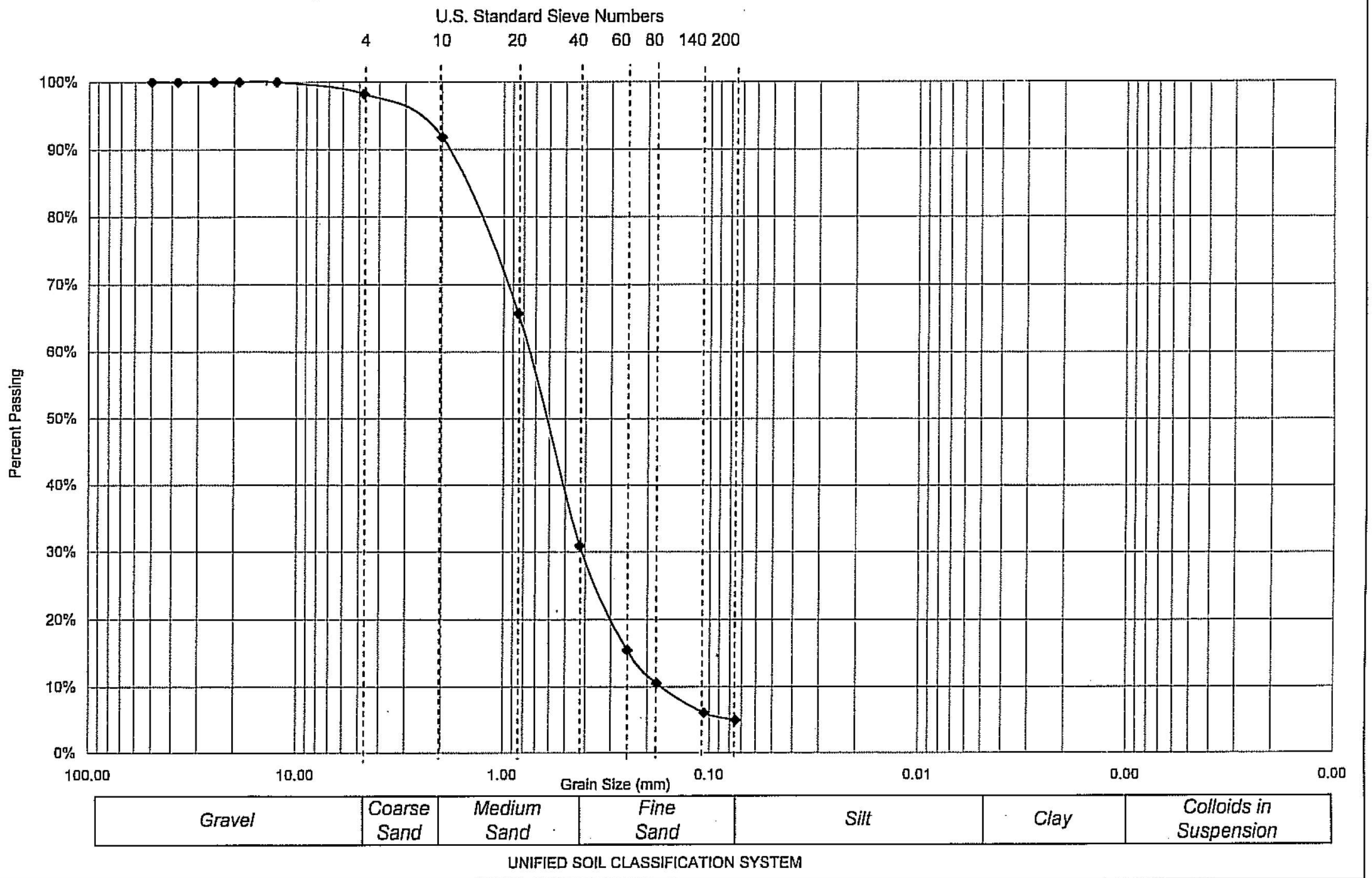
| *Sieve Size* | *Particle Size* | *% Passing* |
|---|---|---|
| 2-in. | 50-mm | 100.0% |
| 1 1/2-in. | 37.5-mm | 100.0% |
| 1-in. | 25-mm | 100.0% |
| 3/4-in. | 19-mm | 100.0% |
| 1/2-in. | 12.5-mm | 100.0% |
| 3/8-in. | 9.5-mm | 100.0% |
| No. 4 | 4.75-mm | 98.2% |
| No. 10 | 2-mm | 91.8% |
| No. 20 | 0.85-mm | 65.7% |
| No. 40 | 0.42-mm | 30.9% |
| No. 60 | 0.25-mm | 15.4% |
| No. 80 | 0.18-mm | 10.5% |
| No. 140 | 0.106-mm | 6.1% |
| No. 200 | 0.075-mm | 4.9% |
| Wash No. 200, % Passing: | | 4.6 |

As requested, a Wash 200 (ASTM D1140) was conducted prior to the Dry Sieve Analysis.

Respectfully Submitted:

SOIL CONSULTANTS, INC

| | | |
|---|---|---|
| Materials Testing Report | SOIL CONSULTANTS, INC.<br>P.O. Drawer 698, Charleston, S.C. 29402 | Grain Size Distribution Diagram<br>Dry Sieve Analysis - ASTM D 422 w/o Hydrometer |
| **Client:** Santee Cooper | | **SCI No.** 11023 |
| **Project and State:** Jeffries Ash Pond | | **Date:** 03/29/11 |
| **Sample ID:** B-104 S-7 | **Sample Description:** Brown fine sand | |



As requested, a Wash 200 (ASTM D1140) was conducted prior to the Dry Sieve Analysis.

Respectfully Submitted:

| | | |
|---|---|---|
| **Materials Testing Report** | Soil Consultants, Inc.<br>P.O. Drawer 698, Charleston, S.C. | **Tabulated Dry Sieve Data Sheet** |

**Client:** Santee Cooper

**Date:** 03/29/11

**Project and State:** Jeffries Ash Pond

**SCI No.:** 11023

**Sample ID:** B-106 S-7

**Sample Description:** Brown fine sand

## DRY SIEVE ANALYSIS (ASTM D 422 w/o Hydrometer)

## *% Passing*

| *Sieve Size* | *Particle Size* | *% Passing* |
|---|---|---|
| 2-in. | 50-mm | 100.0% |
| 1 1/2-in. | 37.5-mm | 100.0% |
| 1-in. | 25-mm | 100.0% |
| 3/4-in. | 19-mm | 100.0% |
| 1/2-in. | 12.5-mm | 100.0% |
| 3/8-in. | 9.5-mm | 100.0% |
| No. 4 | 4.75-mm | 100.0% |
| No. 10 | 2-mm | 99.3% |
| No. 20 | 0.85-mm | 85.8% |
| No. 40 | 0.42-mm | 59.6% |
| No. 60 | 0.25-mm | 34.8% |
| No. 80 | 0.18-mm | 23.8% |
| No. 140 | 0.106-mm | 10.9% |
| No. 200 | 0.075-mm | 7.7% |
| Wash No. 200, % Passing: | | 7.1 |

As requested, a Wash 200 (ASTM D1140) was conducted prior to the Dry Sieve Analysis.

Respectfully Submitted:

SOIL CONSULTANTS, INC

**Materials Testing Report**

## SOIL CONSULTANTS, INC.

P.O. Drawer 698, Charleston, S.C. 29402

## Grain Size Distribution Diagram

Dry Sieve Analysis - ASTM D 422 w/o Hydrometer

**Client:** Santee Cooper

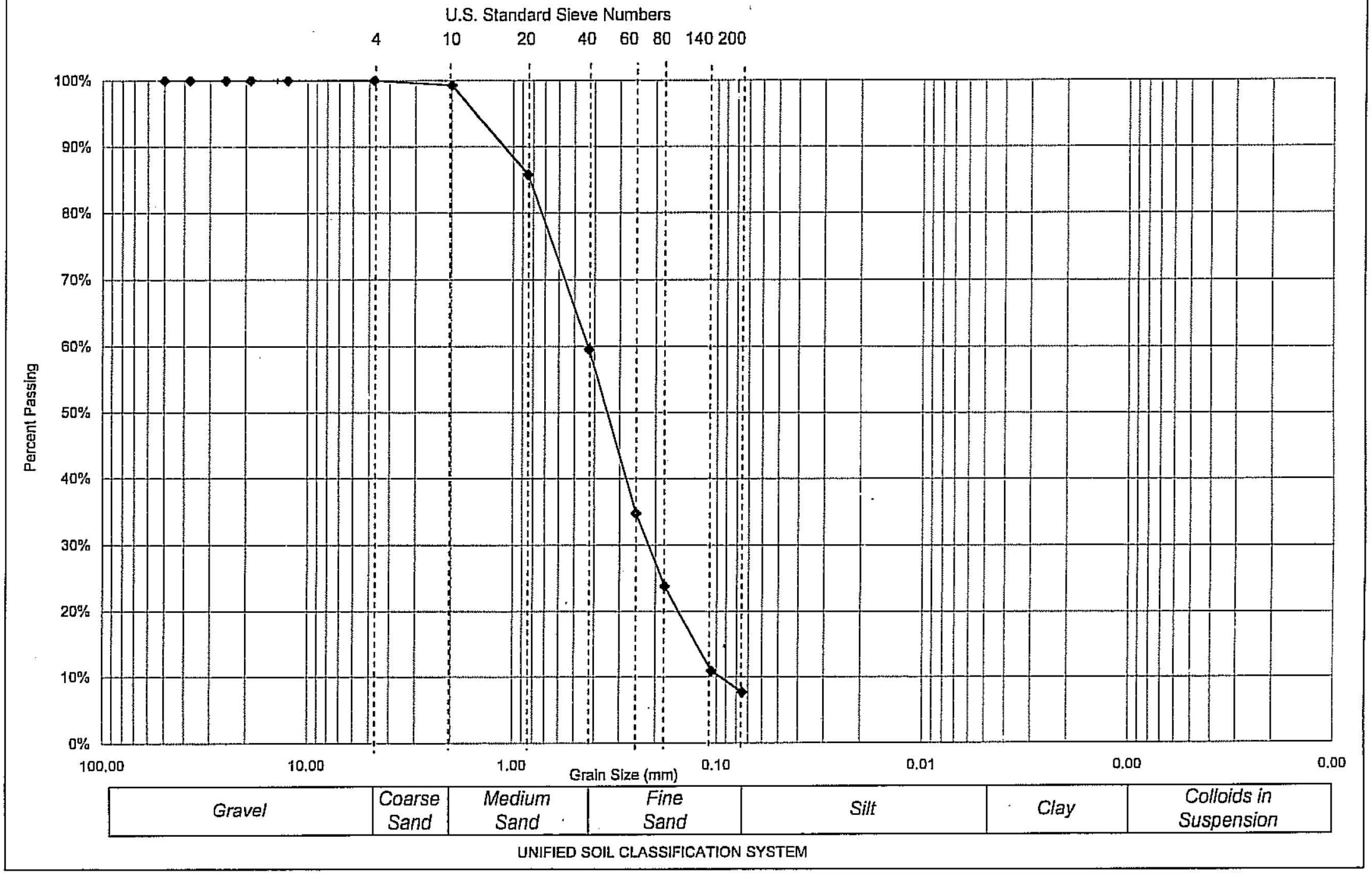
**SCI No.** 11023

**Project and State:** Jeffries Ash Pond

**Date:** 03/29/11

**Sample ID:** B-106 S-7

**Sample Description:** Brown fine sand



As requested, a Wash 200 (ASTM D1140) was conducted prior to the Dry Sieve Analysis.

Respectfully Submitted:

| Materials Testing Report | **Soil Consultants, Inc.**<br>P.O. Drawer 698, Charleston, S.C. 29402 | Tabulated Data Sheet |
|---|---|---|
| Client: Santee Cooper | | Date: 04/13/11 |
| Project: Jeffries Ash Pond | | SCI Project No.: 11023 |

# Specific Gravity (ASTM D854)

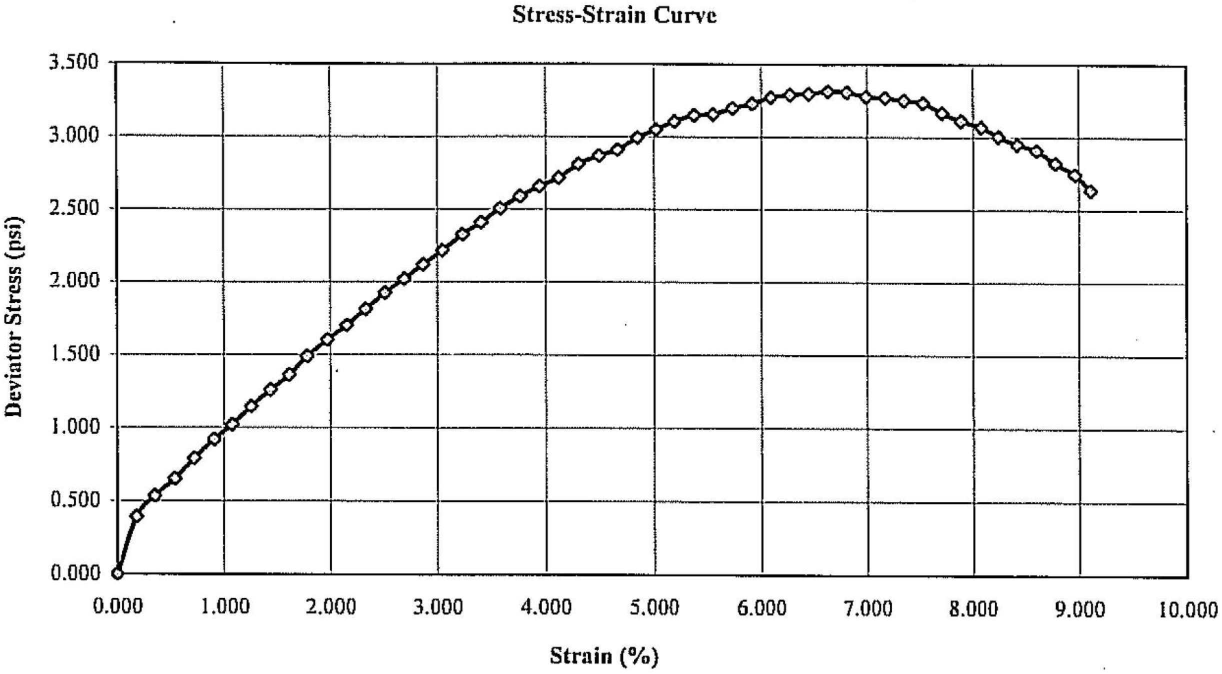
| Sample ID | Specific Gravity |
|---|---|
| B-104 UD-2 | 2.63 |
| B-105 UD-2 | 2.74 |
| B-106 UD-1 | 2.63 |

Respectfully Submitted:

Soil Consultants, Inc.

# Soil Consultants, Inc.

## Unconfined Compression Test Report (ASTM D2166)



| Specimen Information | |
|---|---|
| Water Content (%) | 24.89 |
| Dry Density (pcf) | 102.27 |
| Saturation (%) | 106.80 |
| Void Ratio | 0.62 |
| Diameter (in) | 2.80 |
| Height (in) | 5.60 |

| Test Data | |
|---|---|
| Maximum Deviator Stress (psi) | 3.315 |
| Axial Strain at Failure (%) | 1.432 |
| Rate of Strain (in/min) | 0.056 |
| Date Tested | 03-24-11 |
| Tester | K.Bialas |

| | |
|---|---|
| **Sample Description** | Gray clayey sand |
| **Sample ID** | B-104 UD-2 |

| Test Variables | |
|---|---|
| Specific Gravity: | 2.63 |
| Liquid Limit: | 45 |
| Plastic Limit: | 15 |

Specimen After Failure

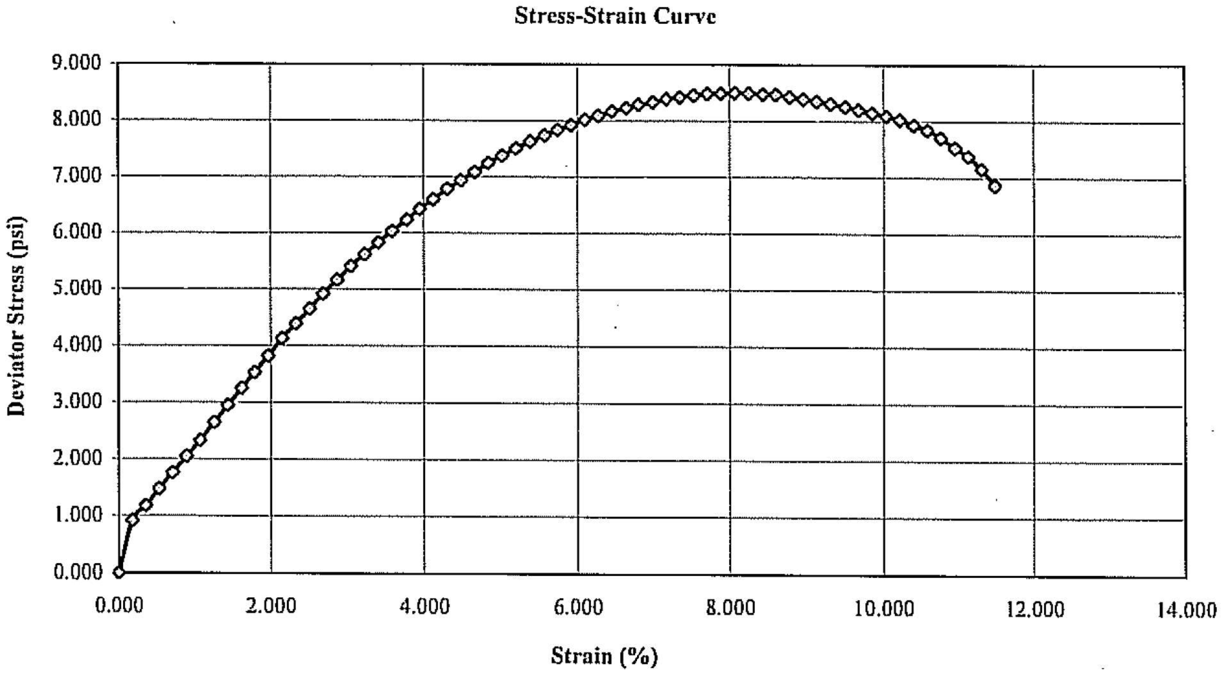
| | |
|---|---|
| **Project Name:** | Jeffries Ash Pond |
| **Project Number:** | 11023 |
| **Client:** | Santee Cooper |
| **Remarks:** | |

Respectfully Submitted:

K. Bialas

SOIL CONSULTANTS, INC.

# Soil Consultants, Inc.
## Unconfined Compression Test Report (ASTM D2166)



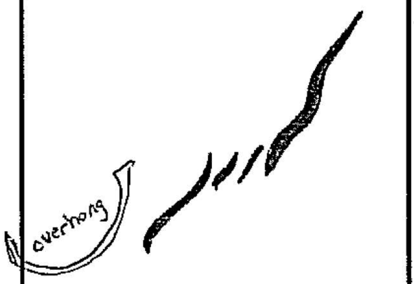
| Specimen Information | |
|---|---|
| **Water Content (%)** | 17.03 |
| **Dry Density (pcf)** | 114.90 |
| **Saturation (%)** | 102.49 |
| **Void Ratio** | 0.44 |
| **Diameter (in)** | 2.80 |
| **Height (in)** | 5.60 |

| Test Data | |
|---|---|
| **Maximum Deviator Stress (psi)** | 8.496 |
| **Axial Strain at Failure (%)** | 3.670 |
| **Rate of Strain (in/min)** | 0.056 |
| **Date Tested** | 03-24-11 |
| **Tester** | K.Bialas |

| | |
|---|---|
| **Sample Description** | Brownish gray sandy clay |
| **Sample ID** | B-105 UD-1 |

| Test Variables | |
|---|---|
| **Specific Gravity:** | 2.65 (Assumed) |
| **Liquid Limit:** | 39 |
| **Plastic Limit:** | 13 |

Specimen After Failure



| | |
|---|---|
| **Project Name:** | Jeffries Ash Pond |
| **Project Number:** | 11023 |
| **Client:** | Santee Cooper |
| **Remarks:** | |

Respectfully Submitted:

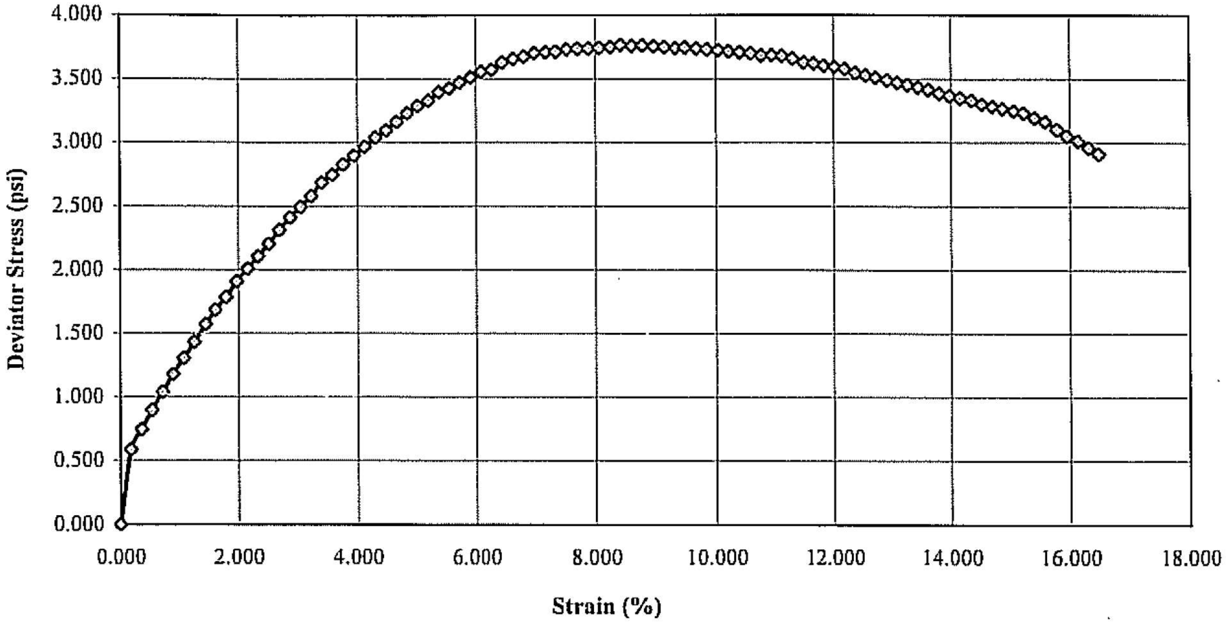
K Bialas

SOIL CONSULTANTS, INC.

# Soil Consultants, Inc.

## Unconfined Compression Test Report (ASTM D2166)

Stress-Strain Curve



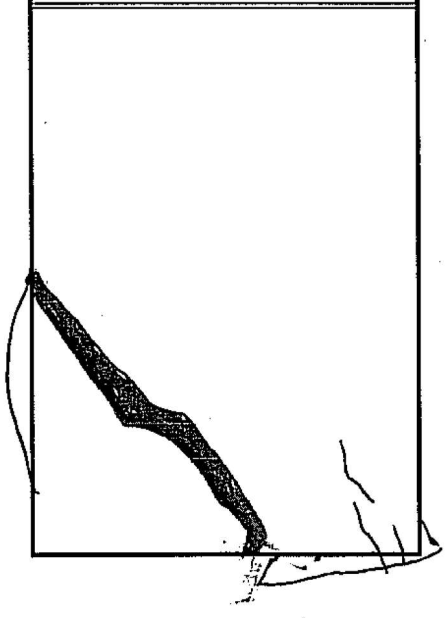
| Specimen Information | |
|---|---|
| **Water Content (%)** | 20.60 |
| **Dry Density (pcf)** | 109.30 |
| **Saturation (%)** | 106.31 |
| **Void Ratio** | 0.51 |
| **Diameter (in)** | 2.80 |
| **Height (in)** | 5.60 |

| Test Data | |
|---|---|
| **Maximum Deviator Stress (psi)** | 3.766 |
| **Axial Strain at Failure (%)** | 1.627 |
| **Rate of Strain (in/min)** | 0.056 |
| **Date Tested** | 03-28-11 |
| **Tester** | K.Bialas |

| | |
|---|---|
| **Sample Description** | Gray mottled clayey sand |
| **Sample ID** | B-106 UD-1 |

| Test Variables | |
|---|---|
| **Specific Gravity:** | 2.63 |
| **Liquid Limit:** | 44 |
| **Plastic Limit:** | 15 |

Specimen After Failure



| | |
|---|---|
| **Project Name:** | Jeffries Ash Pond |
| **Project Number:** | 11023 |
| **Client:** | Santee Cooper |
| **Remarks:** | |

Respectfully Submitted:

SOIL CONSULTANTS, INC.

| **Materials Testing Report** | Soil Consultants, Inc.<br>P.O. Drawer 698, Charleston, S.C. 29402 | **Tabulated Data Sheet - ASTM D5084** |
|---|---|---|

| | | | |
|---|---|---|---|
| **Client:** | Santee Cooper | **Date:** | 03/29/11 |
| **Project and State:** | Jeffries Ash Pond | **SCI No.:** | 11023 |
| **Sample ID:** | B-105 UD-2 | **Sample Description:** | Cooper Marl |

## INITIAL CONDITIONS

| | |
|---|---|
| Sample Length, cm | 14.22 |
| Sample Diameter, cm | 7.11 |
| Moisture Content, % | 17.8 |
| Unit Wet Weight, pcf | 122.2 |
| Unit Dry Weight, pcf | 103.7 |
| Specific Gravity | 2.74 |
| Porosity % | 39.3% |
| Saturation, % | 75.3 |

## FINAL CONDITIONS

| | |
|---|---|
| Sample Length, cm | 14.27 |
| Sample Diameter, cm | 7.23 |
| Moisture Content, % | 33.4 |
| Unit Wet Weight, pcf | 117.9 |
| Unit Dry Weight, pcf | 88.4 |
| Saturation, % | 97.9 |

## TEST CONDITIONS

| | |
|---|---|
| Permeant | Potable Water |
| Cell Pressure, psi | 44 |
| Back Pressure, psi | 42-40 |
| B-value | 95 |
| Average Gradient | 9.86 |
| Hydraulic Conductivity, cm/sec @ 20 deg. C | 1.279E-06 |

Respectfully Submitted:

SOIL CONSULTANTS, INC.