Stantec Consulting Services Inc.
3052 Beaumont Circle, Lexington KY 40513

October 12, 2018
File: rpt_012_let_175567307
Revision 0

Tennessee Valley Authority (TVA)
1101 Market Street
Chattanooga, Tennessee 37402

RE: Placement Above the Uppermost Aquifer Demonstration
Bottom Ash Pond
EPA Final Coal Combustion Residuals (CCR) Rule
TVA Cumberland Fossil Plant
Cumberland City, Tennessee

1.0 PURPOSE

As described in 40 CFR § 257.60(a), an owner or operator of an existing CCR surface impoundment is required to demonstrate that the unit is located no less than five feet above the upper limit of the uppermost aquifer. This letter documents Stantec's certification that the Bottom Ash Pond at the TVA Cumberland Fossil Plant (CUF) complies with the location restrictions for aquifer separation in the EPA Final CCR Rule at 40 CFR § 257.60(a)

2.0 SUMMARY OF FINDINGS

The attached demonstration documents that the Bottom Ash Pond meets the requirements set forth in 40 CFR § 257.60(a).

3.0 QUALIFIED PROFESSIONAL ENGINEER CERTIFICATION

I, Stephen H. Bickel, being a Professional Engineer in good standing in the State of Tennessee, do hereby certify, to the best of my knowledge, information, and belief:

1. that the information contained in this certification is prepared in accordance with the accepted practice of engineering;

2. that the information contained herein is accurate as of the date of my signature below; and

3. that the TVA Cumberland Bottom Ash Pond meets the requirements specified in 40 CFR 257.60(a).

Re: **Placement Above the Uppermost Aquifer Demonstration**
Bottom Ash Pond
EPA Final Coal Combustion Residuals (CCR) Rule
TVA Cumberland Fossil Plant
Cumberland City, Tennessee

SIGNATURE _____ DATE 10/12/2018

ADDRESS: Stantec Consulting Services Inc.
10509 Timberwood Circle Suite 100
Louisville, Kentucky 40223

TELEPHONE: (502) 212-5075

ATTACHMENTS: Aquifer Location Demonstration Report

Placement Above the Uppermost Aquifer Demonstration

Bottom Ash Pond
Cumberland Fossil Plant
Stewart County, Tennessee

Prepared for:
Tennessee Valley Authority

Prepared by:
Stantec Consulting Services Inc.
Lexington, Kentucky

October 12, 2018
Revision 0

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1.0 INTRODUCTION

On April 17, 2015, the "Disposal of Coal Combustion Residuals (CCR) from Electric Utilities" (final rule) was published in the Federal Register. Stantec Consulting Services Inc. (Stantec) was tasked by the Tennessee Valley Authority (TVA) to determine whether the requirements for Placement Above the Uppermost Aquifer (UMA) Location Restriction for the Bottom Ash Pond CCR unit (the Unit) at the Cumberland Fossil Plant (CUF) are met as required by the final rule § 257.60.

1.1 OBJECTIVE

As required by §257.60 of the final rule, an owner or operator of new CCR landfills, existing and new CCR surface impoundments, and all lateral expansions of CCR units is required by October 17, 2018 to demonstrate whether the Unit is located no less than five feet above the upper limit of the UMA. Relevant sections of the final rule are cited below to provide context and additional detail regarding the objective (EPA, 2015).

The final rule § 257.53 provides definitions of CCR and CCR surface impoundments.

> *"Coal combustion residuals (CCR) means fly ash, bottom ash, boiler slag, and flue gas desulfurization materials generated from burning coal for the purpose of generating electricity by electric utilities and independent power producers." (257.53)*

> *"CCR surface impoundment means a natural topographic depression, manmade excavation, or diked area, which is designed to hold an accumulation of CCR and liquids, and the unit treats, stores, or disposes of CCR." (257.53)*

The final rule § 257.60 (a) requires that the CCR unit is constructed:

> *"…with a base that is located no less than 1.52 meters (five feet) above the upper limit of the uppermost aquifer, or must demonstrate that there will not be an intermittent, recurring, or sustained hydraulic connection between any portion of the base of the CCR unit and the uppermost aquifer due to normal fluctuations in groundwater elevations (including the seasonal high water table)." (257.60 (a))*

TVA must demonstrate that the requirements of paragraph (a) of section 257.60 are met, and the demonstration must be certified to meet the requirements by a qualified professional engineer (P.E.) (§ 257.60 (b)). The demonstration and certification must be completed no later than October 17, 2018 (§ 257.60 (c)(1)).

1.2 UNIT DESCRIPTION

CUF is a coal-fired, electric-generating plant. The plant is located in Stewart County, Tennessee along the south shore of the Cumberland River, and upstream from Lake Barkley (**Figure 1**).

The Unit is located between the Dry Fly Ash Stack to the west, the plant to the northeast, the Coal Yard Drainage Basin to the east, and the Gypsum Storage Area to the south. The Unit is an enclosed dike structure that was built above existing grades. The Unit was constructed when divider dikes were built to separate this facility from the current Gypsum Storage Area and Dry Ash Stack locations (Stantec, 2011). The Unit overlies the original Ash Disposal Area 1. The Unit is considered an active CCR surface impoundment. It is used to receive sluiced bottom ash from the plant. The settled bottom ash is dredged, removed from the pond, and transported to the Dry Ash Stack (Stantec, 2016).

The Bottom Ash Pond at CUF meets the EPA definition of a CCR surface impoundment because it is a manmade area designed to hold an accumulation of CCR and liquids and is used to treat, store or dispose of CCR.

1.3 GEOLOGY AND HYDROGEOLOGY

CUF is located within Wells Creek Basin, which is the result of a meteor impact that occurred approximately 200 million years ago. Bedrock was uplifted 2,500 feet in the center of the impact, tilting the mostly horizontal limestone and shale strata outward from the central uplift. Over time, the area affected by the meteor crater has been more susceptible to weathering, due to the orientation of the bedding planes and faults, resulting in the Wells Creek Basin. Circular faults surround the basin, with grabens (valleys) and horsts (ridges). The bedrock elevation in the basin ranges from 360 ft-msl to 449 ft-msl, with the highest elevation located on the central hill, which is located approximately 1,800 feet south of the Unit (TVA, 1998).

The Unit overlies eight mapped bedrock formations ranging from the Ordovician Hermitage Formation to the Mississippian Fort Payne Formation. **Figure 3** is a geologic map of the Wells Creek Basin that was adapted from Wilson and Sterns (1968) to indicate the approximate boundaries of CCR units at CUF. This figure includes a detailed geologic map of the Wells Creek Basin and cross-sections for certain areas. This map shows the variability of strikes and dips for the bedrock across the Basin. Most notably, the bedrock formations along the northern side of the Unit strike generally to the east with steeply dipping beds to the south (Cross-section C-C' in Wilson and Sterns, 1968). Major bedrock formations in this area include: the Wayne Group, the Brownsport Group, the Devonian Harriman and Camden Formations, the Devonian Chattanooga Shale, and the Mississippian Fort Payne Formation.

The regional overburden geologic units consist of Quaternary-aged flood plain deposits of the Cumberland River and larger creeks (including Wells Creek) as well as the Late Cretaceous Tuscaloosa Formation (Wilson and Sterns, 1968). Flood plain deposits consist of alluvial lenticular beds of clays and silts grading to coarser grained sands and gravels with depth (TVA, 2010).

Prior to the construction of CUF in 1968, the channel for Wells Creek was located beneath the adjacent Stilling Pond (including Retention Pond). The Creek's channel was relocated and placed along the southwestern edge of the Dry Ash Stack and the Stilling Pond (adjacent to the perimeter dike) during the construction of the plant. The overburden geology at CUF consists of the Quaternary-aged flood plain deposits of the Cumberland River (Wilson and Sterns, 1968) and the former Wells Creek. The flood plain deposits consist of alluvial lenticular beds of clays and silts overlaying coarser-grained sand and gravel (TVA, 2010). These deposits are located within the historic floodplain found below elevation 360 ft-msl. The alluvial deposits within the larger tributaries are highly variable in thickness (Wilson and Sterns, 1968) and are not consistently present beneath the Unit. **Figure 3** includes pre-construction ground surface contours and the approximate extent of alluvial deposits at CUF. Alluvial deposits are not present at higher pre-construction elevations, including within the northern part of the Unit.

At CUF, the alluvium is generally saturated and the coarse-grained alluvial deposits are confined beneath the finer grained alluvial deposits. These coarse-grained alluvial deposits are discontinuous at CUF and pinch out with distance away from the former Wells Creek channel beneath the Stilling Pond.

Hydraulic conductivity data describing geologic deposits at CUF have been characterized by analysis of Shelby tube samples and slug, pumping and packer tests performed at CUF (Law, 1992; Stantec, 2018; Stantec, 2009; Stantec, 2010a; Stantec, 2015; TVA, 1998). Generally, the upper alluvial (clay) deposits tend to have a low permeability and the underlying, thin coarse sand and gravel have a higher permeability. Based on hydraulic conductivity data obtained at CUF, the sand and gravel deposits tend to be more permeable than underlying bedrock as well. Bedrock beneath CUF has varying permeability depending on the formation.

1.4 APPROACH AND METHODS

The following factors have been considered (specifically within the extent of the Unit) to determine whether the Unit meets the requirements for placement above the UMA:

- Identification of the UMA;
- Identification of the upper limit of the UMA;
- Evaluation of the elevation of the top of the UMA;
- Evaluation of the elevation of the bottom of CCR; and
- Comparison of the elevations of the bottom of the CCR and the top of the UMA.

The following methods were used to determine whether the Unit meets the requirements for placement above the UMA:

- Desktop review of historical documents;
- Assessment of compliance with the final rule.

2.0 UPPERMOST AQUIFER (UMA)

2.1 DEFINITION

The EPA Final CCR Rule § 257.53 provides the following definitions of aquifer and uppermost aquifer (UMA):

> *"Aquifer means a geologic formation, group of formations, or portion of a formation capable of yielding usable quantities of groundwater to wells or springs."*
>
> *"Uppermost aquifer means the geologic formation nearest the natural ground surface that is an aquifer, as well as lower aquifers that are hydraulically interconnected with this aquifer within the facility's property boundary. Upper limit is measured at a point nearest to the natural ground surface to which the aquifer rises during the wet season"*

2.2 IDENTIFICATION

Groundwater Monitoring System Certification

The groundwater monitoring system for the UNIT is part of the multiunit which includes the Unit, Gypsum Storage Area, and the Dry Ash Stack. AECOM prepared a letter dated October 16, 2017 (AECOM, 2017) including a qualified professional engineer certification which stated that:

> *"Based upon review of the available information, the groundwater monitoring system at the Multiunit meets the performance standard specified in 40 CFR § 257.91, based on the following criteria…The wells provide samples from the uppermost aquifer (257.91(a) and 257.53)" (AECOM, 2017).*

The groundwater monitoring system referenced in this letter includes seven monitoring wells: 93-2R, 93-3, CUF-201, CUF-202, CUF-209, CUF-211, and CUF-212. The letter indicates that the screened formation for these monitoring wells is Alluvial Deposits. A copy of this certification is available on the TVA Cumberland Coal Combustion Residuals website.

Alluvium UMA

The alluvium beneath CUF may be differentiated between alluvial sands and gravels and alluvial silts and clays. Generally, the shallow alluvium is silt and clay with minor intervals of silty sand. In areas close to the former Wells Creek channel, coarse grained alluvium is generally present beneath the fine-grained alluvium. Where present, this coarse-grained alluvium is the UMA.

Extent of Coarse Grained Alluvium

The location of borings and wells completed near the Unit are shown in **Figure 3**. In general, alluvial sand and gravel was not encountered in borings completed near the Unit. The unconsolidated lithology consisted, predominantly, of clay and silt mixtures with variables amounts (trace to some)

of sand, gravel, and cobbles. Although several coarse-grained intervals were encountered in borings near the Unit (including boulders encountered at D-10A, D-16 and an interval of clayey gravel to gravelly clay at D-13) these intervals appeared to be limited in thickness and extent and were part of a fine-grained matrix.

During construction of the CCR units at CUF, the original Wells Creek channel was diverted to the west of the CCR units. The original channel generally ran along the southwest edge of the Gypsum Storage Area, north through the Dry Ash Stack and northwest through the Stilling Pond/Retention Pond (AECOM, 2017B). The Unit is located to the east of the former channel. The presence of fine grained alluvium and residuum in the vicinity of the Unit is consistent with its location relative to the pre-construction Wells Creek channel.

Bedrock UMA

Based on the fine-grained alluvium beneath the Unit, and the lack of coarse grained alluvium beneath the Unit, the UMA beneath the Unit is within the bedrock. For the purposes of the following evaluation of the location restriction for placement of the Unit above the UMA, the UMA is assumed to be the first bedrock. The first bedrock beneath the Unit is the Stones River Group.

2.3 UPPER LIMIT

According to the final rule, the upper limit of the UMA is measured at a point nearest to the natural ground surface to which the aquifer rises during the wet season. For a confined aquifer the top of the UMA would be defined based on the structure of the top of the aquifer (base of the confining layer). This demonstration conservatively assumed that the UMA is confined and that the top of the UMA is defined based on the structure of the top of the bedrock and not at depth within the bedrock. For the demonstration of placement above the UMA, if bedrock is not encountered within five feet of the bottom of the Unit then the required separation is met.

2.4 STRUCTURE OF THE TOP OF THE UMA

Stantec reviewed boring logs for borings and wells completed in the vicinity of the Unit and identified borings with indications of the elevation of the top of the bedrock (UMA). These boring logs completed by others have been furnished to Stantec by TVA which Stantec has used, as furnished, in preparing this demonstration report. The elevation of the top of the bedrock at each of these borings is shown on **Figure 4**. Review of these data indicates that the top of the bedrock (UMA) is generally lower (below 350 feet msl) to the northeast and to the west of the Unit and higher (above 350 feet msl) beneath the Unit and to the south and southeast of the Unit.

Interpolation of data between data points is an industry standard approach for estimating geologic surfaces utilizing geologic data from borings and wells. The stratigraphy data points identified in **Figure 4** were interpolated to produce a raster representing the elevation of the top of the bedrock surface using a natural neighbor method (ESRI, 2016).

Figure 4 presents the interpolated surface representing the structure of the top of the bedrock. The figure also includes labels for the data points used to produce the surface. Directly beneath the Unit, the interpolated elevation of the top of the bedrock ranges from approximately 337 feet msl to approximately 360 feet msl.

3.0 AFFECTED BOUNDARY (BASE OF CCR UNIT)

To determine if the CCR unit meets the requirement for placement above the UMA, the affected boundary (base elevation of the CCR material) must be identified.

Stantec developed a raster surface representing the estimated affected boundary (**Figure 5**). The surface was created by digitizing pre-construction ground surface contour lines from TVA drawing 10N212-R11 (TVA, 1969; **Appendix B**). The surface was refined by incorporating the elevation of the bottom of CCR material identified in boring logs from wells completed near the Unit. Where the estimated elevation of the affected boundary from boring logs was lower than the elevation of the pre-construction ground surface, the elevation from the boring log was used in development of the affected boundary surface.

Within the extent of the Unit, the surface representing the bottom of the CCR unit ranged from approximately 359 to 380 feet msl. The lowest elevations of the surface were indicated to occur along the northern edge of the Unit.

4.0 SEPARATION

4.1 ISOPACH

The raster representing the top of the UMA (**Section 2.4** and **Figure 3**) was subtracted from the raster representing the base of the CCR unit (**Section 3.0** and **Figure 5**) to estimate the thickness of material between the base of the CCR and top of the UMA. This information was used to produce an isopach map with five-foot contour intervals representing the separation of the base of the CCR unit from the top of the UMA (**Figure 6**). The interpolated separation between the base of the CCR unit and the UMA was greater than five feet throughout the extent of the Unit.

4.2 DISCUSSION

The following factors were considered to determine whether the Unit located at CUF meets the requirements for placement above the UMA. These factors are specific to the extent of the Unit.

- Identification of the UMA.
    - The UMA beneath the Unit is Bedrock (**Section 2.2**).
- Identification of the upper limit of the UMA.
    - The bedrock UMA was conservatively assumed to be confined (**Section 2.3**). The upper limit of the UMA beneath the Unit is consistent with the stratigraphic top of the Bedrock.
- Interpolated elevation of the top of the UMA.
    - The elevation of the top of the UMA ranges from approximately 337 feet msl to approximately 360 feet msl within the extent of the Unit based on interpolation of data from boring logs (**Section 2.4**; **Figure 4**).
- Interpolated elevation of the base of the CCR.
    - The elevation of the bottom of the CCR unit ranges from approximately 359 feet msl to approximately 380 feet msl within the extent of the Unit based on interpretation of pre-construction ground surface contours and review of boring logs (**Section 3; Figure 5**).

- Comparison of the elevations of the base of the CCR unit and the top of the UMA.

    - The interpolated isopach map (**Section 4**; **Figure 6**) representing the thickness of the deposits separating the bottom of the Unit from the top of the UMA indicates that the separation distance between the base of the CCR unit and the UMA is greater than five feet (Section 4.1) throughout the extent of the Unit.

5.0 CONCLUSIONS

Based on this assessment of the UMA and the CCR unit, the requirements of §257.60 of the final rule for placement above the UMA at the CUF Bottom Ash Pond have been met.

6.0 REFERENCES

AECOM. (2017). Groundwater Monitoring System Multiunit TVA Cumberland Fossil Plant Cumberland City, Tennessee.

Environmental Protection Agency (EPA) (2015). Federal Register, Vol. 80, No. 74, Part II. 40 CFR

Parts 257 and 261, Hazardous and Solid Waste Management System; Disposal of Coal Combustion Residuals from Electric Utilities, Final Rule.

Environmental Systems Research Institute, Inc. (ESRI) (2016). How Natural Neighbor works –

ArcMap 10.3. (http://desktop.arcgis.com/en/arcmap/10.3/tools/spatial-analyst-toolbox/how-natural-neighbor-works.htm)

Stantec Consulting Services Inc. (2018). 2017 Annual Groundwater Monitoring and Corrective Action Report, Tennessee Valley Authority, Cumberland Fossil Plant, Bottom Ash Pond, Gypsum Storage Area, and Dry Ash Stack Multi-unit CCR Unit.

Stantec Consulting Services Inc. (2016). History of Construction Cumberland Fossil Plant Bottom Ash Pond Stewart County, Tennessee.

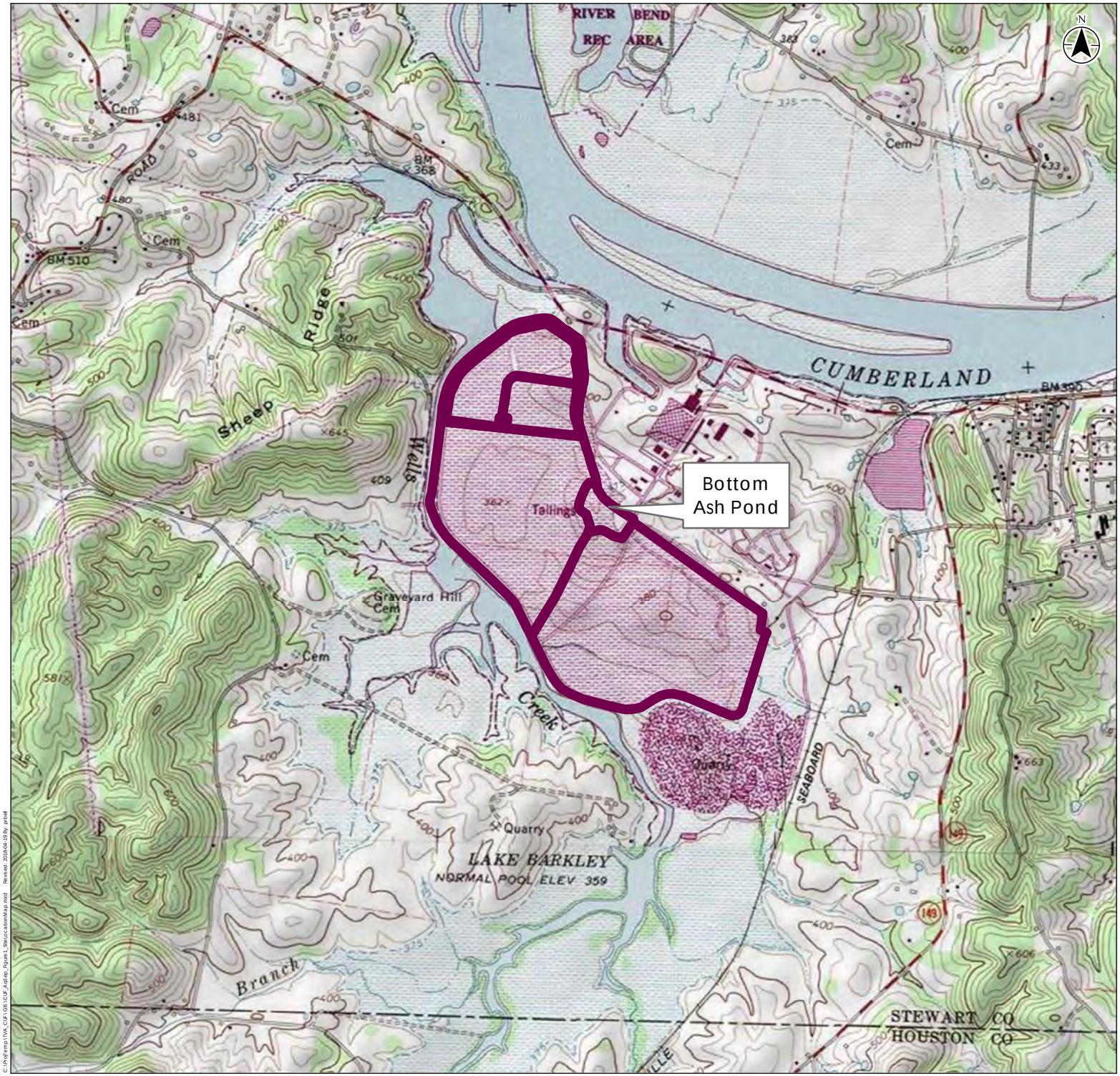
Tennessee Valley Authority. (TVA). (2010). Groundwater Detection Monitoring Plan. Tennessee Valley Authority, Cumberland Fossil Plant, Dry Fly Ash and Gypsum Disposal Areas (IDL 81-102-0086). February 27, 2010.

Tennessee Valley Authority. (TVA) (1998). Cumberland Fossil Plant Groundwater Assessment No. WR98-1-46-110.

Tennessee Valley Authority. (TVA) (1969). Main Plant Ash Disposal Areas Sheet No. 1. 10N212-R11.

Wilson, Jr., C. W. and R. G. Sterns. 1968. Geology of the Wells Creek Structure, Tennessee. Tennessee Division of Geology, Bulletin 68. 1968.

FIGURE 1
SITE LOCATION MAP



Legend

CCR Unit Area (Approximate)

Notes
1. Coordinate System: NAD 1983 StatePlane Kentucky FIPS 1600 Feet
2. Service Layer Credits: Copyright:© 2013 National Geographic Society, i-cubed

0 400
Feet

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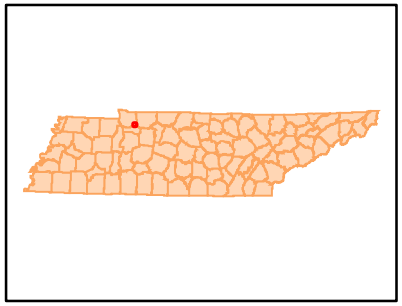

Project Location:
Stewart County, TN

Prepared by PRB on 4/19/2018

Client/Project
Client: Tennessee Valley Authority
Stantec No: 175577013

Figure No.
1

Title
Site Location Map
Cumberland Fossil Plant

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FIGURE 2
SITE MAP

Stantec

Legend

CCR Unit Area (Approximate)

Notes
1. Coordinate System: NAD 1983 StatePlane Kentucky FIPS 1600 Feet
2. Aerial Imagery: Imagery Provided by Tuck Mapping (c. 2017)

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Feet
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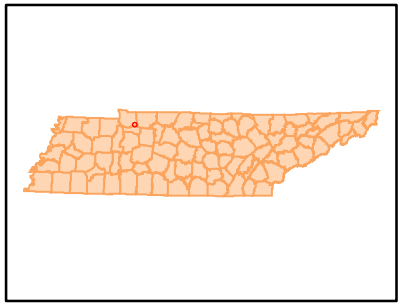

Project Location:
Stewart County, TN

Prepared by PRB on 5/31/2018

Client/Project
Client: Tennessee Valley Authority
Stantec No: 175577013

Figure No.
2

Title
Site Map
Cumberland Fossil Plant

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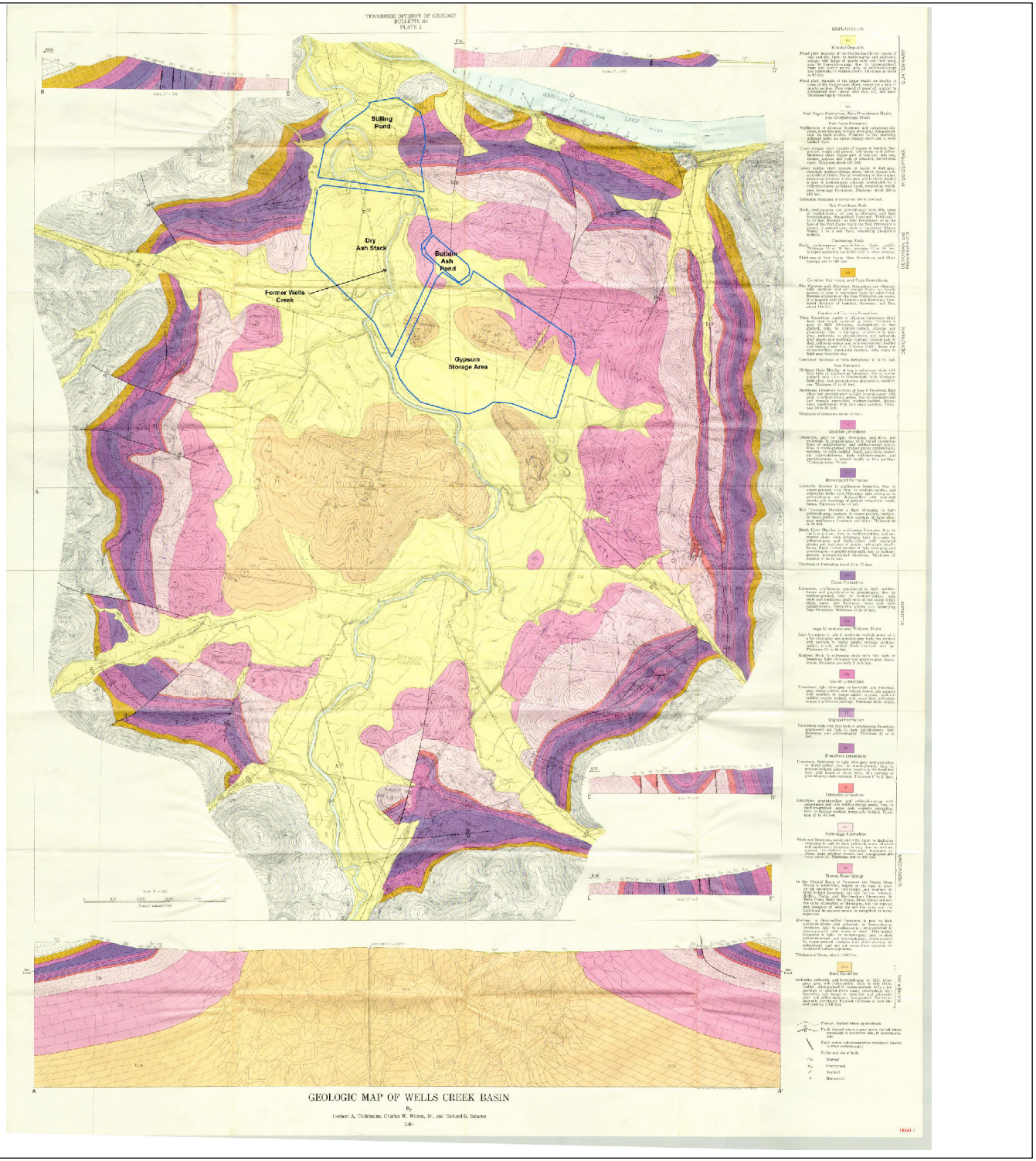
FIGURE 3
GEOLOGIC MAP OF WELLS CREEK BASIN (WILSON AND STERNS, 1968)



Legend

Notes
1. Adapted from Wilson and Sterns, 1968

Project Location:
Stewart County, TN

Prepared by PRB on 9/25/2018

Client/Project
Client: Tennessee Valley Authority
Stantec No: 175577013

Figure No.
3

Title
Geologic Map of Wells Creek Basin (Wilson and Sterns, 1968)

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FIGURE 4
INTERPOLATED TOP OF BEDROCK

Disclaimer: Stantec assumes no responsibility for data supplied in electronic format. The recipient accepts full responsibility for verifying the accuracy and completeness of the data. The recipient releases Stantec, its officers, employees, consultants and agents, from any and all claims arising in any way from the content or provision of the data.

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Legend

- Top of Bedrock Elevation From Boring or Well Used In Interpolation
- Other Boring or Well
- Top of Bedrock (C.I. = 5 feet)
- CCR Unit Area (Approximate)

Notes
1. Coordinate System: NAD 1983 StatePlane Kentucky FIPS 1600 Feet
2. Aerial Imagery: Imagery Provided by Tuck Mapping (c. 2017)
3. Top of bedrodck surface based on interpolation of data points shown.

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Feet
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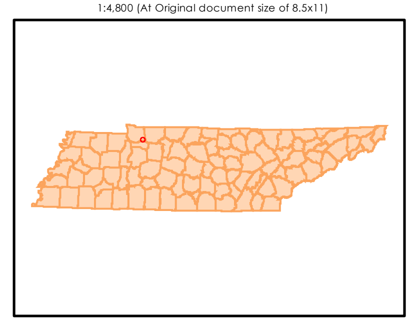


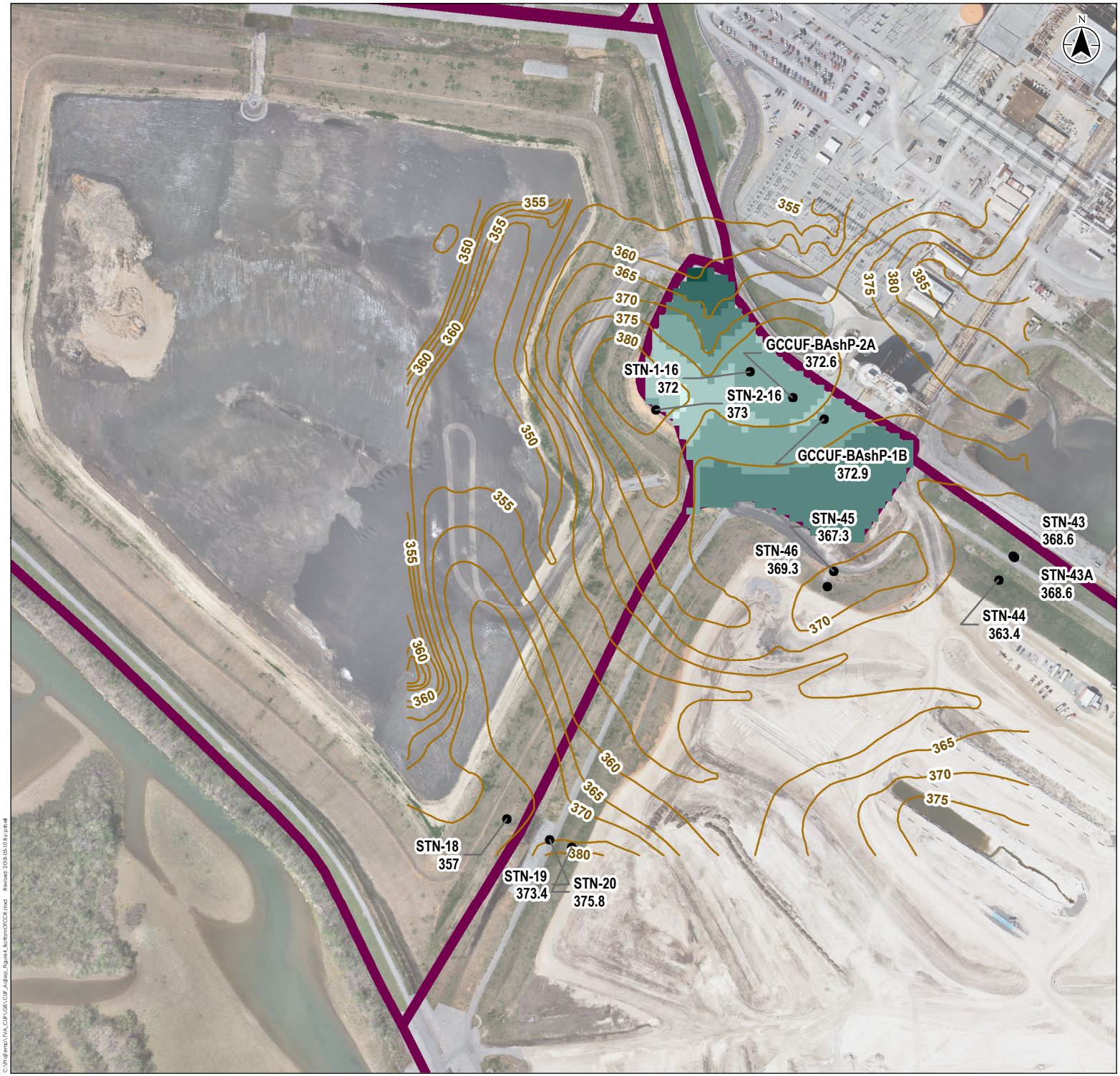
Project Location:
Stewart County, TN
Prepared by PRB on 5/10/2018

Client/Project
Client: Tennessee Valley Authority
Stantec No: 175577013

Figure No.
4

Title
Interpolated Top of Bedrock
Cumberland Fossil Plant

FIGURE 5
AFFECTED BOUNDARY
(BASE OF CCR UNIT)



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Legend

- Native Soil Elevation From Boring or Well
- Pre-Construction Ground Surface (ft. msl)
- CCR Unit Area (Approximate)

Estimated Base of CCR

ft. msl

- 355 - 360
- 360 - 365
- 365 - 370
- 370 - 375
- 375- 380
- 380 - 385

Notes

1. Coordinate System: NAD 1983 StatePlane Kentucky FIPS 1600 Feet
2. Aerial Imagery: Imagery Provided by Tuck Mapping (c. 2017)
3. Pre-construction ground surface based on TVA drawing 10N212-R11
4. Base of CCR surface based on TVA drawing 10N212-R11, refined by incorporating native soil elevations from boring logs where applicable.

0 400

Feet

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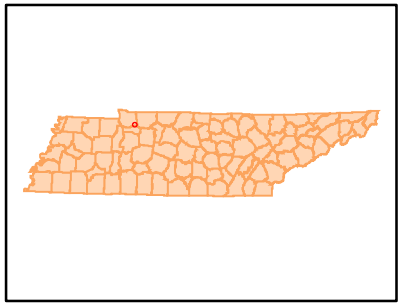

Project Location:
Stewart County, TN

Prepared by PRB on 5/10/2018

Client/Project
Client: Tennessee Valley Authority
Stantec No: 175577013

Figure No.
5

Title
Affected Boundary (Base of CCR Unit) Cumberland Fossil Plant

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FIGURE 6
ISOPACH MAP OF AQUIFER SEPARATION

Legend

- Isopach Thickness of Separation (Bottom of CCR - Top of Bedrock) (C.I. = 5 ft.)
- CCR Unit Area (Approximate)

Notes
1. Coordinate System: NAD 1983 StatePlane Kentucky FIPS 1600 Feet
2. Aerial Imagery: Imagery Provided by Tuck Mapping (c. 2017)

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Feet
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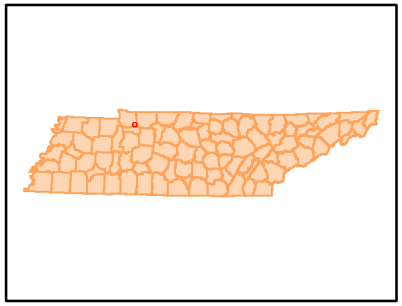

Project Location:
Stewart County, TN

Prepared by PRB on 5/10/2018

Client/Project
Client: Tennessee Valley Authority
Stantec No: 175577013

Figure No.
6

Title
Isopach Map of Aquifer Separation Cumberland Fossil Plant

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ATTACHMENT A
BORING AND WELL LOGS

DEPTH (FT.)	DESCRIPTION	ELEVATION (FT.)
0.0	BOTTOM ASH, CINDERS AND SLAG	387.4
3.0	FLY ASH BOTTOM ASH MIXTURE VERY SOFT GRAY SILT WITH SOME CINDERS AND SLAG UNDISTURBED SAMPLE RETREIVED FROM 15.0 TO 17.0 FEET	382.4
		377.4
		372.4
17.0	ALLUVIAL - VERY SOFT TO FIRM BROWN AND TAN SILTY CLAY SET 4-INCH PVC CASING TO 19.0 FEET	367.4
		362.4
28.0	ALLUVIAL - FIRM GRAY SILTY CLAY	357.4
34.0	RESIDUAL - FIRM TO STIFF BROWN SILTY CLAY	352.4

● PENETRATION - BLOWS/FOOT

0 10 20 30 40 60 80 100

REMARKS:

INSTALLED TWO INCH DIAMETER PVC TYPE III PIEZOMETER, STABILIZED GROUNDWATER MEASURED AT 8.85 FEET ON MAY 1, 1992.

SOIL TEST BORING RECORD

BORING NUMBER	B-105A
DATE DRILLED	April 15, 1992
PROJECT NUMBER	57401442.04
PROJECT	TVA - CUMBERLAND
PAGE 1 OF 2	

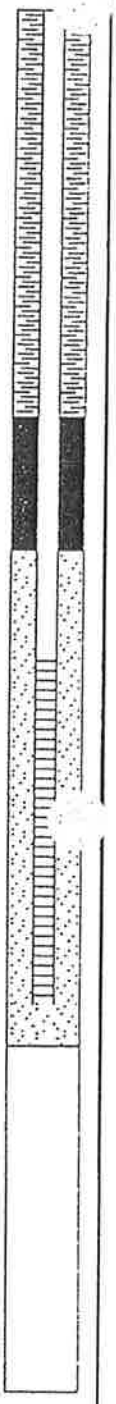
SEE KEY SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVATIONS USED ABOVE

LAW ENGINEERING

DEPTH (FT.)	DESCRIPTION	ELEVATION (FT.)
	RESIDUAL - FIRM TO STIFF BROWN SILTY CLAY	
		342.4
		337.4
		332.4
		327.4
62.0	RESIDUAL - FIRM TAN AND ORANGE BROWN SILTY CLAY WITH CHERT FRAGMENTS	
		322.4
70.0	BORING TERMINATED AT 70.0 FEET	317.4
		312.4

● PENETRATION - BLOWS/FOOT

0 10 20 30 40 60 80 100



REMARKS:

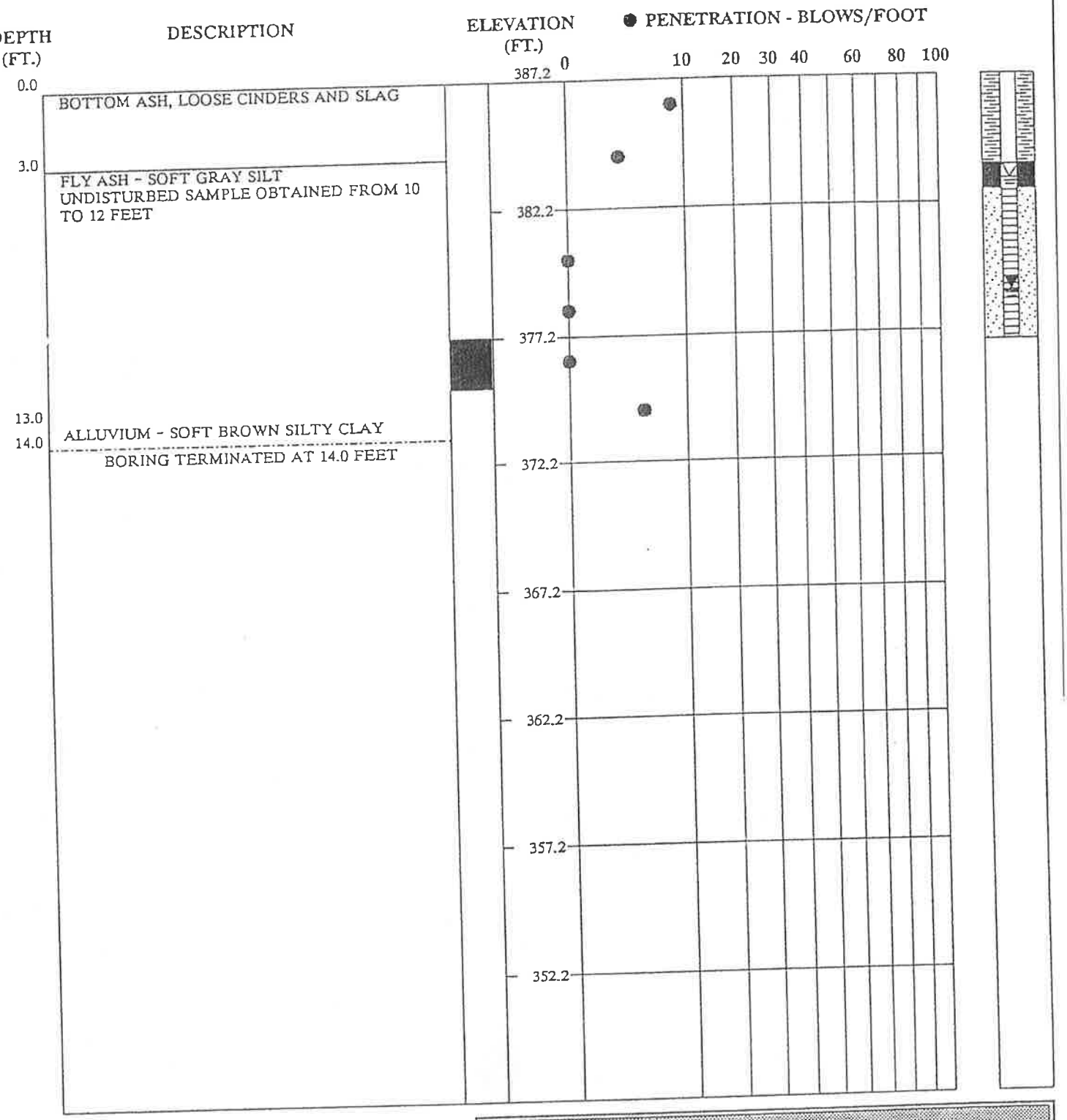
INSTALLED TWO INCH DIAMETER PVC TYPE III PIEZOMETER, STABILIZED GROUNDWATER MEASURED AT 8.85 FEET ON MAY 1, 1992.

SOIL TEST BORING RECORD

BORING NUMBER	B-105A
DATE DRILLED	April 15, 1992
PROJECT NUMBER	57401442.04
PROJECT	TVA - CUMBERLAND
PAGE 2 OF 2	

SEE KEY SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVATIONS USED ABOVE

LAW ENGINEERING



REMARKS:

INSTALLED TWO INCH DIAMETER PVC TYPE II PIEZOMETER, STABILIZED GROUNDWATER MEASURED AT 8.50 FEET ON MAY 1, 1992.

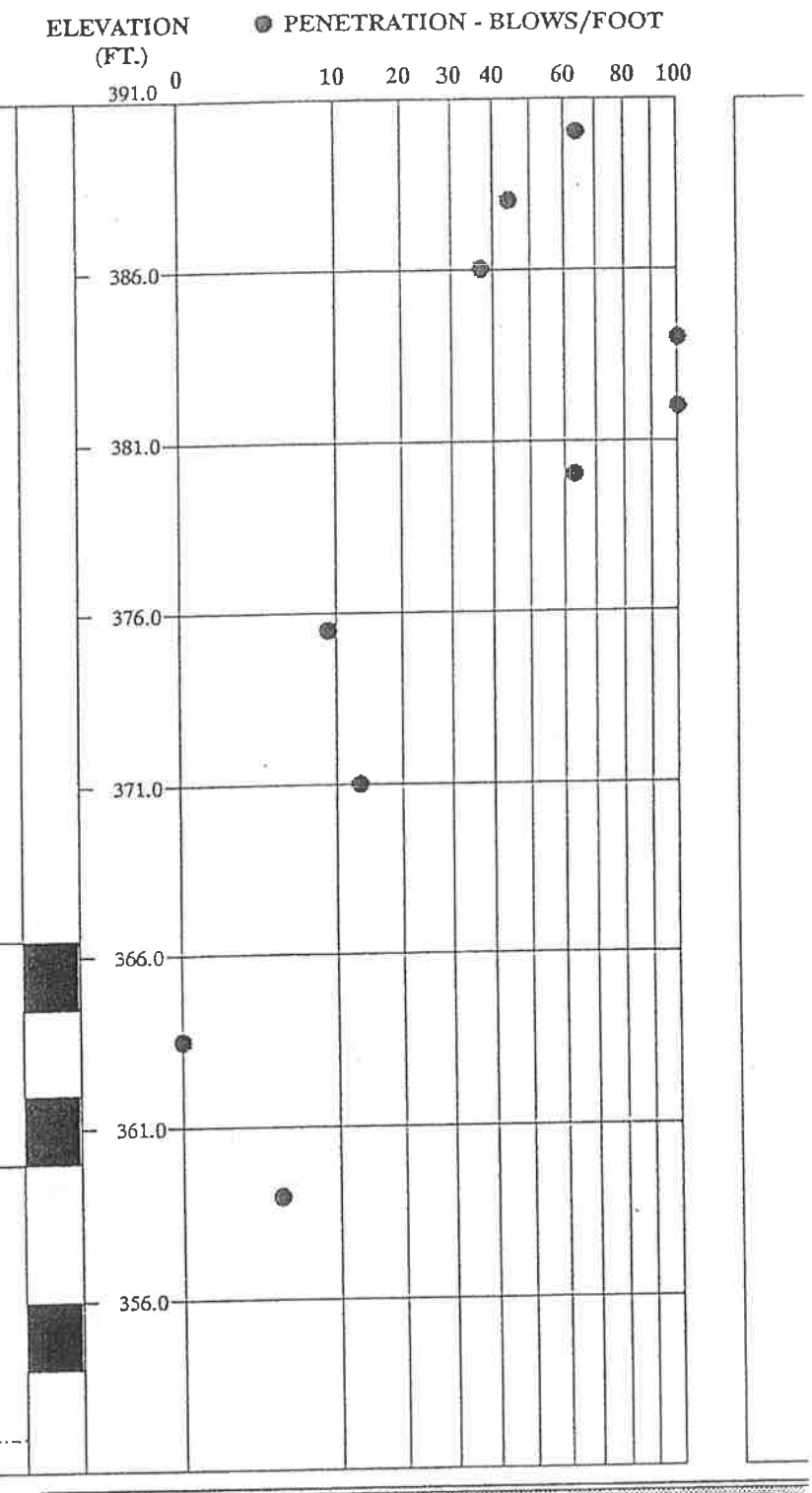
SEE KEY SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVATIONS USED ABOVE

SOIL TEST BORING RECORD

BORING NUMBER	B-105B
DATE DRILLED	April 16, 1992
PROJECT NUMBER	57401442.04
PROJECT	TVA - CUMBERLAND
PAGE 1 OF 1	

LAW ENGINEERING

DEPTH (FT.)	DESCRIPTION	ELEVATION (FT.)
0.0	BOTTOM ASH DENSE TO VERY DENSE CINDERS AND SLAG UNDISTURBED SAMPLES RETREIVED FROM 29.0-31.0, AND 35.0 TO 37.0 FEET UNDISTURBED SAMPLE ATTEMPTED FROM 25.0-26.5 FEET (NO RECOVERY)	391.0
24.5	FLY ASH, SOFT GRAY SILT	366.0
31.0	ALLUVIAL - SOFT TAN AND GRAY SLIGHTLY SANDY SILTY CLAY WITH SOME ORGANICS AND GRAVEL	361.0
39.0	BORING TERMINATED AT 39.0 FEET	356.0



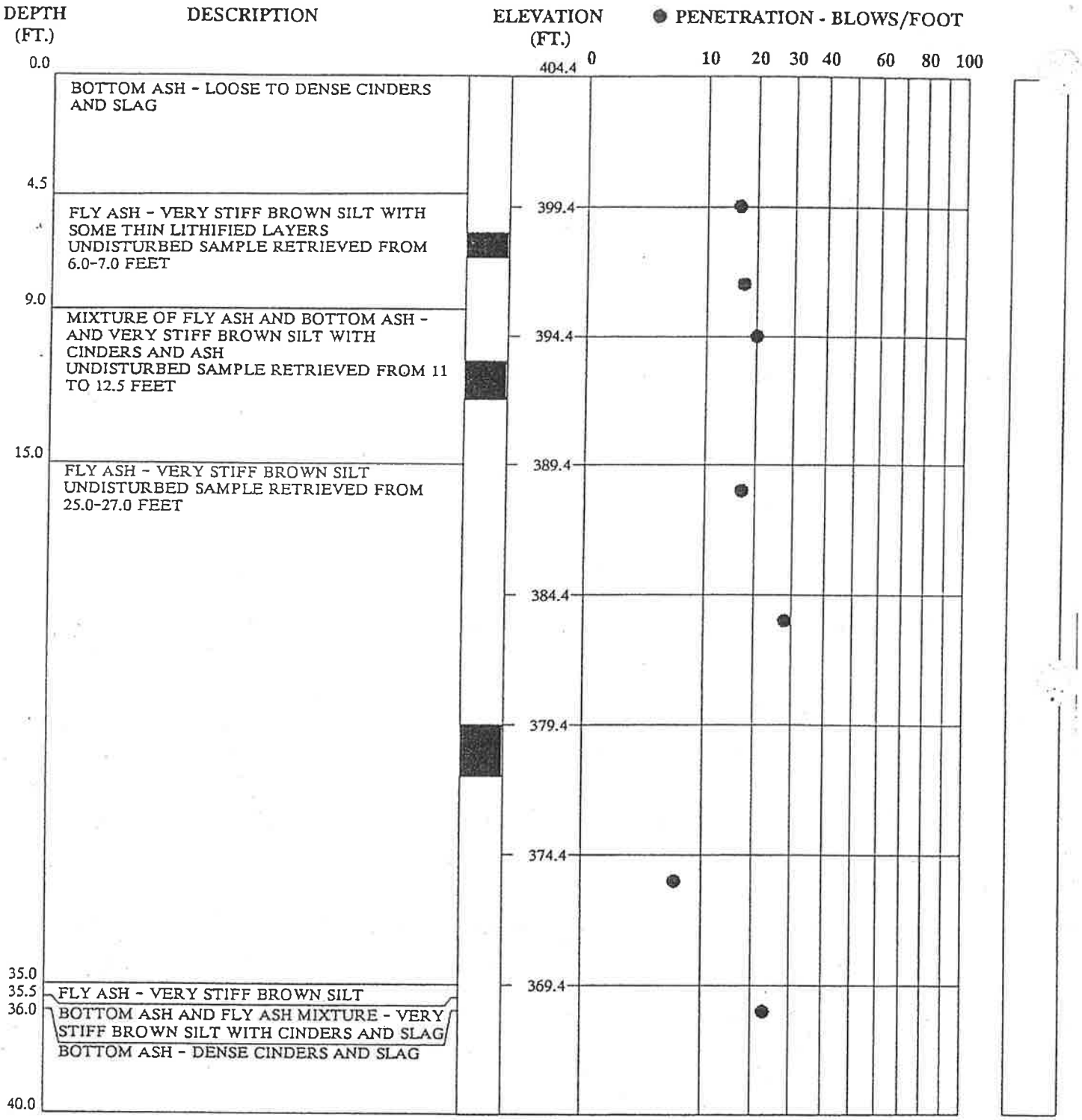
REMARKS:
PIEZOMETER WAS NOT INSTALLED.

SOIL TEST BORING RECORD

BORING NUMBER	B-107
DATE DRILLED	April 21, 1992
PROJECT NUMBER	57401442.04
PROJECT	TVA - CUMBERLAND
PAGE 1 OF 1	

SEE KEY SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVATIONS USED ABOVE

LAW ENGINEERING



REMARKS:
PIEZOMETER WAS NOT INSTALLED.

SOIL TEST BORING RECORD

BORING NUMBER	B-112
DATE DRILLED	April 22, 1992
PROJECT NUMBER	57401442.04
PROJECT	TVA - CUMBERLAND
PAGE 1 OF 2	

SEE KEY SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVATIONS USED ABOVE

LAW ENGINEERING

DEPTH (FT.)	DESCRIPTION	ELEVATION (FT.)
	RESIDUAL - STIFF BROWN SLIGHTLY SANDY CLAY UNDISTURBED SAMPLE RETRIEVED FORM 40.0-42.0 FEET	359.4
47.0	BORING TERMINATED AT 47.0 FEET	354.4 349.4 344.4 339.4 334.4 329.4

● PENETRATION - BLOWS/FOOT

0 10 20 30 40 60 80 100

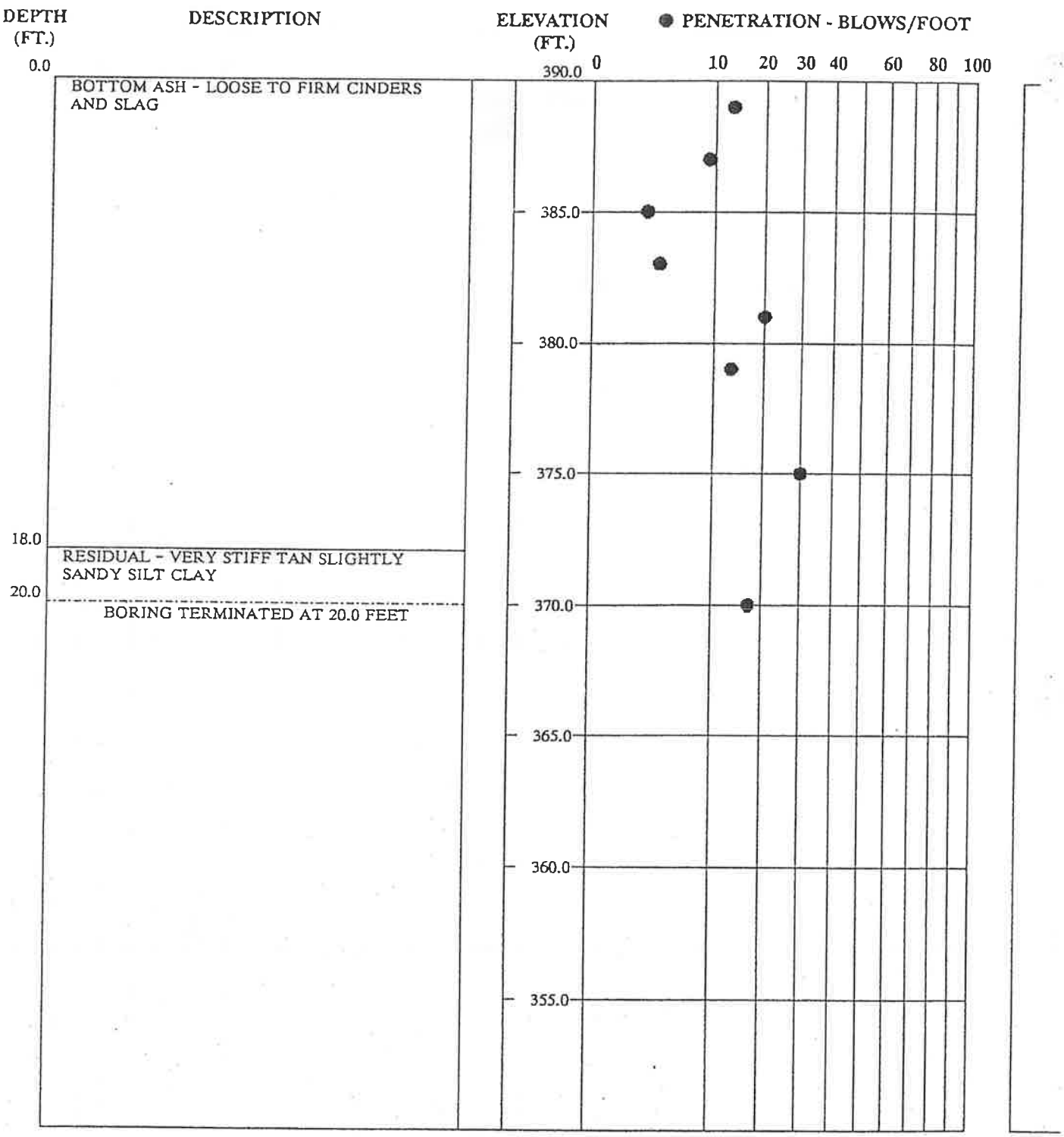
REMARKS:
PIEZOMETER WAS NOT INSTALLED.

SOIL TEST BORING RECORD

BORING NUMBER	B-112
DATE DRILLED	April 22, 1992
PROJECT NUMBER	57401442.04
PROJECT	TVA - CUMBERLAND
PAGE 2 OF 2	

SEE KEY SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVATIONS USED ABOVE

LAW ENGINEERING



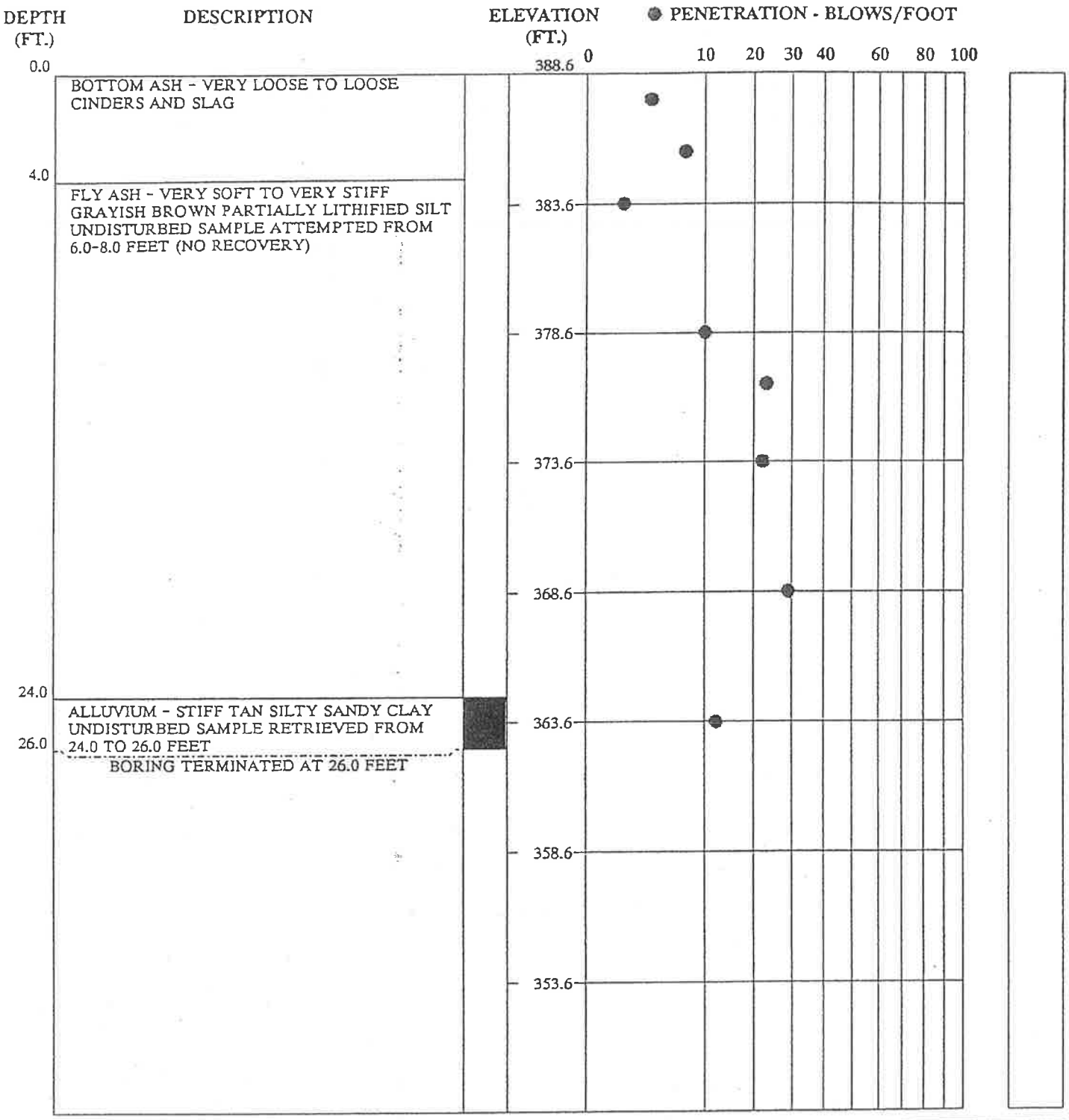
REMARKS:

SEE KEY SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVATIONS USED ABOVE

SOIL TEST BORING RECORD

BORING NUMBER	B-113
DATE DRILLED	April 23, 1992
PROJECT NUMBER	57401442.04
PROJECT	TVA - CUMBERLAND
PAGE 1 OF 1	

LAW ENGINEERING



REMARKS:

SEE KEY SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVATIONS USED ABOVE

SOIL TEST BORING RECORD

BORING NUMBER	B-115
DATE DRILLED	April 23, 1992
PROJECT NUMBER	57401442.04
PROJECT	TVA - CUMBERLAND
PAGE 1 OF 1	

LAW ENGINEERING

JOB No.: 6314.009	PROJECT: DACP	BORING No.: D-7A
CLIENT: CUMBERLAND STEAM PLANT	START: 03-25-93	SPOON SIZE: 2" OD, 2' LONG
LOCATION: CUMBERLAND CITY, TENN.	END: 03-26-93	CORE SIZE: NX
CONTRACTOR: PSI INC.	ELEVATION: 383.0 FT.	G.W. DEPTH/EL.: 2.5/380.5 FT
DRILL RIG: CME, MODEL M-75	N. COOR.: 8,535.7 FT.	G.W. DATE: 03-29-93
GEOLOGIST: R.D. BECKER	E. COOR.: 10,247.5 FT.	

ELEV. (FT.)	DEPTH	SAMPLE TYPE	SAMPLE No.	PENETRATION RESIST. BLOWS/6 in.	N	TSF	RECOVERY (%) R	RQD	VOID	COLUMN SYMBOL	SOIL/ROCK DESCRIPTION SAMPLE	SEQUENCE
		S-SP	1	1/12"-7-16	8/18"		10"				Brown silty CLAY FILL, some pebbles, plastic, moist, 16 blows/6" due to rock fragment	Brown and reddish brown stiff to very stiff GRAVELLY SILTY CLAY FILL (Compacted Structural Fill)
	5.00	S-SP	2	5-10-7-14	17		12"				Brown silty CLAY FILL and GRAVEL FILL, dry to moist	
	10.00	S-SP	3	3-3-5-6	8		14"				Top: Reddish brown gravelly silty CLAY FILL, moist, soft Bott: Gray peaty material	11.5
		S-SP	4	2-1-2-4	3		16"				Gray organic clayey SILT with silt and sandy silt interbeds	Gray soft organic CLAYEY SILT (Lacustrine Deposit)
	15.00	S-SP	5	5-5-4-6	9		8"				Brown and gray gravelly silty CLAY to clayey SILT, trace to some pebbles and dark br. pigments	14.0
	20.00	S-SP	6	5-10-10-12	20		19"				Brown and gray gravelly silty CLAY with rounded cobbles (0.5"), moist to dry	Brown and gray stiff to very stiff SILTY CLAY to CLAYEY SILT, with trace to some pebbles (Colluvial Deposit)
	25.00											23.5

NOTES: Borehole was drilled in soil and weathered rock by plugged hollow-stem augers (3-1/4" ID, 6-1/2" D. flights) which were advanced through and between the sampled intervals, whereas rock was cored.

JOB No.: 6314.009	PROJECT: DACP	BORING No.: D-7A
CLIENT: CUMBERLAND STEAM PLANT	START: 03-25-93	SPOON SIZE: 2" OD, 2' LONG
LOCATION: CUMBERLAND CITY, TENN.	END: 03-26-93	CORE SIZE: NX
CONTRACTOR: PSI INC.	ELEVATION: 383.0 FT.	G.W. DEPTH/EL.: 2.5/380.5 FT
DRILL RIG: CME, MODEL M-75	N. COOR.: 8,535.7 FT.	G.W. DATE: 03-29-93
GEOLOGIST: R.D. BECKER	E. COOR.: 10,247.5 FT.	

ELEV. (FT.)	DEPTH	SAMPLE TYPE	SAMPLE No.	PENETRATION RESIST. BLOWS/6 in.	N	TSF	RECOVERY (%) R	RQD	VOID	COLUMN SYMBOL	SOIL/ROCK DESCRIPTION: SAMPLE	SOIL/ROCK DESCRIPTION: SEQUENCE
		S-SP	7	7-5-7-9	12		20"				Brown silty CLAY, plastic, trace pebbles, some dark br. pigments	Brown stiff SILTY CLAY, trace of pebbles (Colluvial Deposit)
30.00		S-SP	8	6-5-5-6	10		18"				Brown silty CLAY, trace pebbles, becoming silty sandy CLAY, trace pebbles	31.0
35.00		S-SP	9	4-4-5-6	9		6"				Brown plastic silty CLAY, no pebbles, with sand laminae	Brown stiff SILTY SANDY CLAY, (Colluvial/Alluvial Deposits)
40.00		S-SP	10	23-23-7-6	30		8"				Brown plastic silty CLAY, with rock fragments causing high blow count	38.5 Brown stiff SILTY CLAY with rock fragments (Residual Soil)
45.00				50/2" AUGER REFUSAL								45.0 T.O.R.
				AUGERED TO 48.5'								Gray vertically bedded fresh and sound CALCILUTITE (Bedrock)
50.00			Run 1				63" 95%	40" 60%				

NOTES: Borehole was drilled in soil and weathered rock by plugged hollow-stem augers (3-1/4" ID, 6-1/2" D. flights) which were advanced through and between the sampled intervals, whereas rock was cored.

JOB No.: 6314.009	PROJECT: DACP	BORING No.: D-7A
CLIENT: CUMBERLAND STEAM PLANT	START: 03-25-93	SPOON SIZE: 2" OD, 2' LONG
LOCATION: CUMBERLAND CITY, TENN.	END: 03-26-93	CORE SIZE: NX
CONTRACTOR: PSI INC.	ELEVATION: 383.0 FT.	G.W. DEPTH/EL.: 2.5/380.5 FT
DRILL RIG: CME, MODEL M-75	N. COOR.: 8,535.7 FT.	G.W. DATE: 03-29-93
GEOLOGIST: R.D. BECKER	E. COOR.: 10,247.5 FT.	

ELEV (FT.)	DEPTH	SAMPLE TYPE	SAMPLE No.	PENETRATION RESIST BLOWS/6 in.	N	TSF	RECOVERY (%) R	RQD	VOID	COLUMN SYMBOL	SOIL/ROCK DESCRIPTION SAMPLE	SEQUENCE
			Run 1				63" 95%	40" 60%			Light gray microcrystalline LIMESTONE, hard, unweathered, with vertical bedding	
	55.00		Run 2				114" 100%	99" 87%			(As above)	Gray vertically bedded fresh and sound CALCILUTITE (Bedrock)
	60.00											63.5 End of Boring
	65.00											
	70.00											
	75.00											

NOTES: Borehole was drilled in soil and weathered rock by plugged hollow-stem augers (3-1/4" ID, 6-1/2" D. flights) which were advanced through and between the sampled intervals, whereas rock was cored.

JOB No.: 6314.009	PROJECT: DACP	BORING No.: D-9
CLIENT: CUMBERLAND STEAM PLANT	START: 03-24-93	SPOON SIZE: 2" OD, 2' LONG
LOCATION: CUMBERLAND CITY, TENN.	END: 03-25-93	CORE SIZE: NX
CONTRACTOR: PSI INC.	ELEVATION: 385.4 FT.	G.W. DEPTH/EL.: 3.5/381.9 FT
DRILL RIG: CME, MODEL M-75	N. COOR.: 8,484.0 FT.	G.W. DATE:
GEOL: R.D. BECKER/N.S. DRAKULICH	E. COOR.: 10,275.0 FT.	

ELEV. (FT.)	DEPTH	SAMPLE TYPE	SAMPLE No.	PENETRATION RESIST. BLOWS/6 in.	N	TSF	RECOVERY (%) R	RQD	VOID	COLUMN SYMBOL	SOIL/ROCK DESCRIPTION SAMPLE	SEQUENCE
		S-SP	1	1-2-2-3	4		13"				Brown to reddish brown sandy silty CLAY FILL	
		S-SP	2	4-6-7-9	13		13"				Brown and grayish brown silty CLAY FILL, trace pebbles	
5.00		S-SP	3	4-12-12-17	24		14.5"				Brown, grayish brown, and reddish brown silty CLAY FILL, some pebbles	Brown, reddish brown, and grayish brown soft to very stiff SILTY CLAY TO CLAYEY SILT FILL, trace to some pebbles (Compacted Structural Fill)
		S-SP	4	12-13-13-12	26		15"				Brown clayey SILT FILL, trace to some pebbles	
		S-SP	5	50/6"	50/6"		6"				Brown silty CLAY FILL with bould at the bottom	
10.00		S-SP	6	4-7-5-5	12		9"				Brown and reddish brown silty CLAY FILL, some sand and pebbles	
												13.5
15.00		S-SP	7	1-1-3-4	4		24"				Uniform brownish gray organic clayey SILT, moist; water entering hole	Brownish gray organic soft CLAYEY SILT (Lacustrine Deposit)
												18.5
20.00		S-SP	8	8-11-6-6	17		0				No recovery	Brown stiff to very stiff SILTY CLAY, some sand and pebbles (Colluvial Deposit)
		S-SP	9	4-4-6-8	10		6"				Brown plastic silty CLAY, no pebbles, trace black pigments	
25.00												24.5

NOTES: Borehole was drilled in soil by plugged hollow-stem augers (3-1/4" ID, 6-1/2" D. flights) which were advanced through and between the sampled intervals, whereas rock was cored.

JOB No.: 6314.009	PROJECT: DACP	BORING No.: D-9
CLIENT: CUMBERLAND STEAM PLANT	START: 03-24-93	SPOON SIZE: 2" OD, 2' LONG
LOCATION: CUMBERLAND CITY, TENN.	END: 03-25-93	CORE SIZE: NX
CONTRACTOR: PSI INC.	ELEVATION: 385.4 FT.	G.W. DEPTH/EL.: 3.5/381.9 FT
DRILL RIG: CME, MODEL M-75	N. COOR.: 8,484.0 FT.	G.W. DATE:
GEOL: R.D. BECKER/N.S. DRAKULICH	E. COOR.: 10,275.0 FT.	

ELEV (FT.)	DEPTH	SAMPLE TYPE	SAMPLE No.	PENETRATION RESIST. BLOWS/6 in.	N	TSF	RECOVERY (%) R	RQD	VOID	COLUMN SYMBOL	SOIL/ROCK DESCRIPTION SAMPLE	SEQUENCE
		S-SP	10	3-5-7-8	12		19"				Brown plastic silty CLAY, no pebbles, trace black pigments	Brown and brown & gray, stiff SILTY CLAY, trace or no pebbles (Colluvial Deposit)
	30.00	S-SP	11	3-3-9-11	12		13"				Brown and gray plastic silty CLAY, laminated, trace pebbles, moist	33.5
	35.00	S-SP	12	5-2-2-3	4		24"				Brown and yellow brown silty CLAY with black pigments, trace pebbles, plastic, wet, soft	Brown and yellow brown, very soft to soft SILTY CLAY, assumably mixed with SANDY SILTY CLAY (Colluvial/Alluvial Deposits)
	40.00	S-SP	13	1/12"-1/12"	1		4"				Brown silty CLAY, very soft, plastic	
	45.00										Rods dropped down all the way to 46.0'	46.0
		S-SP	14	16-2-2-3	4		8"				Gray silty CLAY, very soft, with decomposed rock fragments	Gray very soft to soft SILTY CLAY with boulders and smaller rock fragments (Residual Soil)
				AUGER REFUSAL AT 48.5'								
			Run 1				100%	100%			BOULDER	
	50.00											

NOTES: Borehole was drilled in soil by plugged hollow-stem augers (3-1/4" ID, 6-1/2" D. flights) which were advanced through and between the sampled intervals, whereas rock was cored.

JOB No.: 6314.009	PROJECT: DACP	BORING No.: D-9
CLIENT: CUMBERLAND STEAM PLANT	START: 03-24-93	SPOON SIZE: 2" OD, 2' LONG
LOCATION: CUMBERLAND CITY, TENN.	END: 03-25-93	CORE SIZE: NX
CONTRACTOR: PSI INC.	ELEVATION: 385.4 FT.	G.W. DEPTH/EL.: 3.5/381.9 FT
DRILL RIG: CME, MODEL M-75	N. COOR.: 8,484.0 FT.	G.W. DATE:
GEOL: R.D. BECKER/N.S. DRAKULICH	E. COOR.: 10,275.0 FT.	

ELEV (FT.)	DEPTH	SAMPLE TYPE	SAMPLE No.	PENETRATION RESIST. BLOWS/6 in.	N	TSF	RECOVERY (%) R	RQD	VOID	COLUMN SYMBOL	SOIL/ROCK DESCRIPTION SAMPLE	SEQUENCE
				AUGERED THROUGH SOILS								Gray very soft to soft SILTY CLAY with boulders and smaller rock fragments (Residual Soil)
				AUGER REFUSAL AT 53.0'								53.0 T.O.R.
55.00			Run 2				5.4' 83%	3.4' 52%			Brown to light gray, thin-bedded, micro-crystalline LIMESTONE, vertically to sub-vertically bedded, hard to very hard, unweathered, water stained horizontally to 20 fractures at 53.5', 57.0', 58.0', & 64.5'	
60.00			Run 3				9.5' 98%	8.2' 85%			(See above)	Brown to light gray fresh and sound CALCILLUTITE, subvertically bedded (Bedrock)
65.00												69.2 End of Boring
70.00												
75.00												

NOTES: Borehole was drilled in soil by plugged hollow-stem augers (3-1/4" ID, 6-1/2" D. flights) which were advanced through and between the sampled intervals, whereas rock was cored.

JOB No.: 6314.009	PROJECT: DACP	BORING No.: D-10A
CLIENT: CUMBERLAND STEAM PLANT	START: 03-29-93	SPOON SIZE: 2" OD, 2' LONG
LOCATION: CUMBERLAND CITY, TENN.	END: 03-30-93	CORE SIZE: NX
CONTRACTOR: PSI INC.	ELEVATION: 382.5 FT.	G.W. DEPTH/EL.: 2.0/380.5 FT
DRILL RIG: CME, MODEL M-75	N. COOR.: 8,533.1 FT.	G.W. DATE: 03-29-93
GEOLOGIST: N.S. DRAKULICH	E. COOR.: 10,349.0 FT.	

ELEV (FT.)	DEPTH	SAMPLE TYPE	SAMPLE No.	PENETRATION RESIST BLOWS/6 in.	N	TSF	RECOVERY (%) R	RQD	VOID	COLUMN SYMBOL	SOIL/ROCK DESCRIPTION SAMPLE	SEQUENCE
	5.00											Brown soft to very stiff SILTY CLAY FILL with some pebbles and SANDY CLAY FILL (Structural Fill)
	10.00			AUGERED TO 10.0'								
		S-SP	1	1-3-1-8 WATER ENTERING HOLE	4		8"				Top 4": Brown silty CLAY FILL, some pebbles, trace rock fragments Bott 4": Brown gravelly sandy silty CLAY FILL, dry	
		S-SP	2	5-7-9-7	16		0"				No recovery due to a pebble stuck in the shoe	
	15.00											14.5
		S-SP	3	1-1-1-1	2		11"				Top 0.5": Dark gray soft organic silty CLAY-clayey SILT Bott 10.5": Brownish gray very soft, saturated silty CLAY-clayey SILT	Dark gray and brownish gray soft & saturated CLAYEY SILT to SILTY CLAY (Lacustrine Deposit)
	20.00											18.5
		S-SP	4	8-10-12-12	22		22"				Light gray & brown clayey SILT with black pigments; pebble stuck in the shoe, but silt is stiff anyway	Gray & brown, brown, and reddish brown stiff to very stiff CLAYEY SILT with trace to some pebbles and GRAVELLY CLAYEY SILT (Colluvial Deposit)
	25.00											

NOTES: Borehole was drilled in soil by plugged hollow-stem augers (3-1/4" ID, 6-1/2" D. flights) which were advanced through and between the sampled intervals, whereas rock was cored.

JOB No.: 6314.009	PROJECT: DACP	BORING No.: D-10A
CLIENT: CUMBERLAND STEAM PLANT	START: 03-29-93	SPOON SIZE: 2" OD, 2' LONG
LOCATION: CUMBERLAND CITY, TENN.	END: 03-30-93	CORE SIZE: NX
CONTRACTOR: PSI INC.	ELEVATION: 382.5 FT.	G.W. DEPTH/EL.: 2.0/380.5 FT
DRILL RIG: CME, MODEL M-75	N. COOR.: 8,533.1 FT.	G.W. DATE: 03-29-93
GEOLOGIST: N.S. DRAKULICH	E. COOR.: 10,349.0 FT.	

ELEV (FT.)	DEPTH	SAMPLE TYPE	SAMPLE No.	PENETRATION RESIST. BLOWS/6 in.	N	TSF	RECOVERY (%) R	RQD	VOID	COLUMN SYMBOL	SOIL/ROCK DESCRIPTION SAMPLE	SEQUENCE
	30.00											Gray & brown, brown, and reddish brown stiff to very stiff CLAYEY SILT with trace to some pebbles and GRAVELLY CLAYEY SILT (Colluvial Deposit)
		S-SP	5	7-8-8-18	16		10"					
	35.00											36.5
				During augering, boulders encountered from 36.5' to 38.5'							36.5' to 38.5' boulders	Brownish gray CLAYEY SILT with boulders (Residual Soil)
	40.00	S-SP	6	50/1"	50/1"		1"				Brownish gray clayey SILT to silty CLAY	40.5 T.O.R.
	45.00		Run 1					114" 100%	112" 98%		Dark gray partially laminated CALCILUTITE with high-angle to vertical bedding and slightly weathered (brown) at top 3"; ten pieces over 4", one of which is 2' long	Dark gray, fresh and sound vertically bedded CALCILUTITE (Bedrock)
	50.00											50.0 End of Boring

NOTES: Borehole was drilled in soil by plugged hollow-stem augers (3-1/4" ID, 6-1/2" D. flights) which were advanced through and between the sampled intervals, whereas rock was cored.

JOB No.: 6314.009	PROJECT: DACP	BORING No.: D-12
CLIENT: CUMBERLAND STEAM PLANT	START: 03-23-93	SPOON SIZE: 2" OD, 2' LONG
LOCATION: CUMBERLAND CITY, TENN.	END: 03-24-93	CORE SIZE: NX
CONTRACTOR: PSI INC.	ELEVATION: 384.7 FT.	G.W. DEPTH/EL.: 4.0/380.7 FT
DRILL RIG: CME, MODEL M-75	N. COOR.: 8,484.0 FT.	G.W. DATE: 03-29-93
GEOLOGIST: N.S. DRAKULICH	E. COOR.: 10,325.0 FT.	

ELEV (FT.)	DEPTH	SAMPLE TYPE	SAMPLE No.	PENETRATION RESIST BLOWS/6 in.	N	TSF	RECOVERY (%) R	RQD	VOID	COLUMN SYMBOL	SOIL/ROCK DESCRIPTION SAMPLE	SEQUENCE
		S-SP	1	2-3-5-6	8		17"				Top 5": Reddish br. silty CLAY FILL, some pebbles Bott 12": Red lateritic gravelly silty CLAY FILL	
		S-SP	2	4-6-10-11	16		15"				Top 5": Red silty CLAY FILL, as above Bott 10": Brown harder silty CLAY-clayey SILT, trace pebbles	
5.00		S-SP	3	8-14-14-13	28		15"				Brown clayey SILT FILL, occasional to some pebbles	Brown, reddish brown, and brownish gray medium stiff to hard SILTY CLAY to CLAYEY SILT, trace to some pebbles, to GRAVELLY SILTY CLAY to CLAYEY SILT (Structural Fill)
		S-SP	4	13-14-25-13	39		14"				Dark brownish green & green clayey SILT FILL, partially sandy, occasional to some pebbles, trace roots	
		S-SP	5	5-5-8-14	13		14"				Brown silty CLAY FILL, trace to some angular pebbles & black pigments	
10.00		S-SP	6	3-4-8-5	12		15"				Brown & reddish brown gravelly silty CLAY FILL	
				WATER ENTERING HOLE								13.5
15.00		S-SP	7	1-2-4-4	6		22"				Dark gray organic SILT changing into clayey SILT, and silty CLAY, no pebbles	Dark gray interbedded soft to medium stiff organic SILT, CLAYEY SILT, and SILTY CLAY (Lacustrine Deposit)
												18.5
20.00		S-SP	8	5-7-8-12	15		21"				Light brownish gray silty CLAY-clayey SILT, trace pebbles with dark brown pigments and pockets	Light brownish gray stiff SILTY CLAY to CLAYEY SILT, with trace pebbles (Colluvial Deposit)
												23.5
25.00												Brown & gray stiff plastic SILTY CLAY, trace or no pebbles (Colluvial Deposit)

NOTES: Borehole was drilled in soil by plugged hollow-stem augers (3-1/4" ID, 6-1/2" D. flights) which were advanced through and between the sampled intervals, whereas rock was cored.

JOB No.: 6314.009	PROJECT: DACP	BORING No.: D-12
CLIENT: CUMBERLAND STEAM PLANT	START: 03-23-93	SPOON SIZE: 2" OD, 2' LONG
LOCATION: CUMBERLAND CITY, TENN.	END: 03-24-93	CORE SIZE: NX
CONTRACTOR: PSI INC.	ELEVATION: 384.7 FT.	G.W. DEPTH/EL.: 4.0/380.7 FT
DRILL RIG: CME, MODEL M-75	N. COOR.: 8,484.0 FT.	G.W. DATE: 03-29-93
GEOLOGIST: N.S. DRAKULICH	E. COOR.: 10,325.0 FT.	

ELEV (FT.)	DEPTH	SAMPLE TYPE	SAMPLE No.	PENETRATION RESIST BLOWS/6 in.	N	TSF	RECOVERY (%) R	RQD	VOID	COLUMN SYMBOL	SOIL/ROCK DESCRIPTION SAMPLE	SEQUENCE
		S-SP	9	3-5-7-9	12		17"				Brown & gray plastic silty CLAY, trace or no pebbles	Brown & gray stiff plastic SILTY CLAY, trace or no pebbles (Colluvial Deposit)
												28.5
	30.00	S-SP	10	7-7-9-10	16		24"				Brown & gray plastic silty CLAY trace pebbles, occasional black pigments and pockets	
	35.00	S-SP	11	6-7-8-12	15		24"				Brown plastic silty CLAY, trace pebbles, some black pigments and pockets	Brown and brown & gray stiff SILTY CLAY, trace pebbles (Colluvial Deposit)
	40.00	S-SP	12	4-5-7-9	12		23"				Brown plastic silty CLAY, some black pigments	
				AUGER HIGH RESISTANCE AT 43.0' AND REFUSAL				42.5'				42.5
			Run 1				6" 50%	0 0%			Boulder	
	45.00	S-SP	13	3-2-3-6	5		24"				Brown plastic, soft silty CLAY, trace pebbles	Brown medium stiff SILTY CLAY, trace to some pebbles and rock fragments (Residual Soil)
	50.00											

NOTES: Borehole was drilled in soil by plugged hollow-stem augers (3-1/4" ID, 6-1/2" D. flights) which were advanced through and between the sampled intervals, whereas rock was cored.

JOB No.: 6314.009	PROJECT: DACP	BORING No.: D-12
CLIENT: CUMBERLAND STEAM PLANT	START: 03-23-93	SPOON SIZE: 2" OD, 2' LONG
LOCATION: CUMBERLAND CITY, TENN.	END: 03-24-93	CORE SIZE: NX
CONTRACTOR: PSI INC.	ELEVATION: 384.7 FT.	G.W. DEPTH/EL.: 4.0/380.7 FT
DRILL RIG: CME, MODEL M-75	N. COOR.: 8,484.0 FT.	G.W. DATE: 03-29-93
GEOLOGIST: N.S. DRAKULICH	E. COOR.: 10,325.0 FT.	

ELEV (FT.)	DEPTH	SAMPLE TYPE	SAMPLE No.	PENETRATION RESIST. BLOWS/6 in.	N	TSF	RECOVERY (%) R	RQD	VOID	COLUMN SYMBOL	SOIL/ROCK DESCRIPTION SAMPLE	SEQUENCE
		S-SP	14	8-50/6"	58		12"				Brown plastic, very stiff and saturated silty CLAY to gravelly silty CLAY with fragments of rock	51.0 T.O.R.
				AUGER REFUSAL								
55.00			Run 2				79" 94%	67" 80%			Gray and dark gray laminated CALCILUTITE, vertically bedded, with a 2-1/16" thick calcite vein along a sub-horizontal joint. Top 2' partially weathered; seven pieces over 4"	
60.00			Run 3				96" 100%	91" 95%			As above, with 11 pieces over 4"	Gray and dark gray, fresh and sound vertically bedded, laminated CALCILUTITE (Bedrock)
65.00												66.5 End of Boring
70.00												
75.00												

NOTES: Borehole was drilled in soil by plugged hollow-stem augers (3-1/4" ID, 6-1/2" D. flights) which were advanced through and between the sampled intervals, whereas rock was cored.

JOB No.: 6314.009	PROJECT: DACP	BORING No.: D-13
CLIENT: CUMBERLAND STEAM PLANT	START: 03-16-93	SPOON SIZE: 2" OD, 2' LONG
LOCATION: CUMBERLAND CITY, TENN.	END: 03-17-93	CORE SIZE: NX
CONTRACTOR: PSI INC.	ELEVATION: 389.2 FT.	G.W. DEPTH/EL.: 8.5/380.7 FT
DRILL RIG: CME, MODEL M-75	N. COOR.:	G.W. DATE: 03-17-93
GEOLOGIST: N.S. DRAKULICH	E. COOR.:	

ELEV (FT.)	DEPTH	SAMPLE TYPE	SAMPLE No.	PENETRATION RESIST. BLOWS/6 in.	N	RECOVERY (%) TSF	R	RQD	VOID	COLUMN SYMBOL	SOIL/ROCK DESCRIPTION SAMPLE	SEQUENCE
		S-SP	1	10-18-15-14	33		19"				Black & dark brown Bottom ASH, sand-and-gravel size	Black & dark brown dense BOTTOM ASH (Dike Access Road Material)
		S-SP	2	19-20-14-16	34		20"				(As above)	
	5.00	S-SP	3	8-8-8-10	16		15"				Top 5": AA Bott 10": Red lateritic silty CLAY FILL with rock fragments	4.5 Red and brown to brownish gray stiff to hard GRAVELLY SILTY CLAY FILL (Structural Fill)
		S-SP	4	14-14-45-16	64		10"				Brown to brownish gray gravelly silty CLAY FILL	
		S-SP	5	11-7-6-6	13		13"				Top 5": Red gravelly silty CLAY FILL. Mid 4": AA Bott 4": Crushed Stone	9.5
	10.00	S-SP	6	4-4-3-5	7		10"				Gray saturated CRUSHED STONE, silty sandy gravel	Gray loose CRUSHED STONE (Structural Fill)
												13.5
	15.00	S-SP	7	1-2-2-3	4		6"				Top 2": Red gravelly silty CLAY FILL Bott 4": Brown soft silty CLAY FILL	Red and brown soft GRAVELLY SILTY CLAY and SILTY CLAY FILL (Random Fill)
	20.00	S-SP	8	3-9-11-9	20		14"				Top 4": Br. gravelly silty CLAY FILL Bott 10": Gray SILT with trace of black organic matter, clay, sand, and roots	20.5 Gray very stiff SILT (Lacustrine Deposit)
												23.5
	25.00											

NOTES: Borehole was drilled in soil by plugged hollow-stem augers (3-1/4" ID, 6-1/2" D. flights) which were advanced through and between the sampled intervals, whereas rock was cored.

JOB No.: 6314.009	PROJECT: DACP	BORING No.: D-13
CLIENT: CUMBERLAND STEAM PLANT	START: 03-16-93	SPOON SIZE: 2" OD, 2' LONG
LOCATION: CUMBERLAND CITY, TENN.	END: 03-17-93	CORE SIZE: NX
CONTRACTOR: PSI INC.	ELEVATION: 389.2 FT.	G.W. DEPTH/EL.: 8.5/380.7 FT
DRILL RIG: CME, MODEL M-75	N. COOR.:	G.W. DATE: 03-17-93
GEOLOGIST: N.S. DRAKULICH	E. COOR.:	

ELEV (FT.)	DEPTH	SAMPLE TYPE	SAMPLE No.	PENETRATION RESIST BLOWS/6 in.	N	TSF	RECOVERY (%) R	RQD	VOID	COLUMN SYMBOL	SOIL/ROCK DESCRIPTION SAMPLE	SEQUENCE
		S-SP	9	5-15-8-6	23		19"				Top 13": Reddish brown clayey GRAVEL to gravelly CLAY Bott 6": Reddish brown silty CLAY, trace to some pebbles	Reddish brown very stiff SILTY CLAY, trace to some pebbles, to GRAVELLY SILTY CLAY (Colluvial Deposit)
												28.5
	30.00	S-SP	10	6-9-12-15	21		10"				Brown and brown & gray hard plastic silty CLAY	
	35.00	S-SP	11	4-6-8-8	14		19"				Br., reddish br, and brown & gray silty CLAY, trace pebbles, some black pigments	Brown, reddish brown, and brown & gray, stiff to very stiff SILTY CLAY, trace pebbles (Residual Soil)
	40.00	S-SP	12*	1-1-1-1*	2		3"				Brown hard silty CLAY	41.5
												T.O.R.
			Run 1				25" 83%	25" 83%			Gray CALCILUTITE, four pieces exceeding 4"	
	45.00		Run 2				25" 83%	25" 83%			As above, six pieces exceeding 4"	Gray fresh and sound CALCILUTITE (Bedrock)
												48.75 End of Boring
	50.00											

NOTES: *Auger refusal at 41.5', but augers forced to 42.0' since the spoon went to 42.0, probably into a crevice (note low blowcount by "hard" clay)

JOB No.: 6314.009	PROJECT: DACP	BORING No.: D-14
CLIENT: CUMBERLAND STEAM PLANT	START: 03-16-93	SPOON SIZE: 2" OD, 2' LONG
LOCATION: CUMBERLAND CITY, TENN.	END: 03-16-93	CORE SIZE: NX
CONTRACTOR: PSI INC.	ELEVATION: 383.5 FT.	G.W. DEPTH/EL.: 3.0/380.5 FT
DRILL RIG: CME, MODEL M-75	N. COOR.: 8,572.1 FT.	G.W. DATE: 03-18-93
GEOLOGIST: N.S. DRAKULICH	E. COOR.: 10,569.1 FT.	

ELEV (FT.)	DEPTH	SAMPLE TYPE	SAMPLE No.	PENETRATION RESIST BLOWS/6 in.	N	TSF	RECOVERY (%) R	RQD	VOID	COLUMN SYMBOL	SOIL/ROCK DESCRIPTION SAMPLE	SEQUENCE
		S-SP	1	2-2-3-3	5		12"				Intercalated black coal and reddish brown silty CLAY FILL	Reddish brown and dark brown medium stiff to stiff SILTY CLAY-GRAVELLY SILTY CLAY FILL, with coal seams (Spoil Pile)
		S-SP	2	2-4-5-4	9		11.5"				Top 1": As above Bott 10.5": Dark brown to black gravelly silty CLAY FILL with black coal pockets	
5.00		S-SP	3	3-6-9-10	15		16"				Top 3": Same as sample 1 Mid 1.5": Gray saturated SILT FILL Bott 11.5": Grayish brown silty CLAY FILL, some pebbles	5.0 Grayish brown stiff to hard SILTY CLAY FILL, some pebbles (Structural Fill)
		S-SP	4	5-5-33-12	38		6"				Gray CRUSHED STONE	7.0
		S-SP	5	7-10-7-6	17		9"				Top 4": Same as sample 1 Bott 5": Saturated gray CRUSHED STONE	Gray CRUSHED STONE (Structural Fill)
10.00		S-SP	6	3-3-4-5 Tube pushed; silty clay & sand	7		0"				No recovery	12.0
				No boulders below 11.5'; smooth augering through clay								Brown, reddish brown, and grayish brown soft SILTY CLAY FILL, trace to some pebbles (Random Fill)
15.00		S-SP	7	2-1-2-2	3		6"				Top 3": Reddish brown plastic SILTY CLAY FILL Bott 3": Brown and grayish brown silty CLAY FILL, some pebbles	
												18.5
20.00		S-SP	8	4-6-6-8	12		24"				Brown, grayish brown and reddish brown silty CLAY, trace pebbles	Brown, reddish brown grayish brown stiff SILTY CLAY with trace pebbles (Colluvial Deposit)
25.00												

NOTES: Borehole was drilled in soil by plugged hollow-stem augers (3-1/4" ID, 6-1/2" D. flights) which were advanced through and between the sampled intervals, whereas rock was cored.

JOB No.: 6314.009	PROJECT: DACP	BORING No.: D-14
CLIENT: CUMBERLAND STEAM PLANT	START: 03-16-93	SPOON SIZE: 2" OD, 2' LONG
LOCATION: CUMBERLAND CITY, TENN.	END: 03-16-93	CORE SIZE: NX
CONTRACTOR: PSI INC.	ELEVATION: 383.5 FT.	G.W. DEPTH/EL.: 3.0/380.5 FT
DRILL RIG: CME, MODEL M-75	N. COOR.: 8,572.1 FT.	G.W. DATE: 03-18-93
GEOLOGIST: N.S. DRAKULICH	E. COOR.: 10,569.1 FT.	

ELEV (FT.)	DEPTH	SAMPLE TYPE	SAMPLE No.	PENETRATION RESIST. BLOWS/6 in.	N	TSF	RECOVERY (%) R	RQD	VOID	COLUMN SYMBOL	SOIL/ROCK DESCRIPTION SAMPLE	SEQUENCE
												25.5 (See sheet 1)
		S-SP	9	4-14-24-14	38		13"				Top 5": Br. & reddish brown silty CLAY, trace pebbles Bott 8": Light br. silty CLAY to clayey SILT with shale fragments	
			Run 1*				12" 66%	11" 61%			BOULDER- gray calcilutite	
	30.00		Run 2*				30" 45%	12" 18%			BOULDERS of calcilutite and brown silty CLAY	Light brown very stiff to hard SILTY CLAY to CLAYEY SILT with pebble-size rock fragments and boulders (Residual Soil) 34.0 T.O.R.
	35.00		Run 3				36" 85%	14" 33%			Gray CALCILUTITE, with 3 pieces exceeding 4" and many small fragments	Gray fresh and sound to fractured CALCILUTITE (Bedrock) 37.75 End of Boring
	40.00											
	20.00											
	25.00											

NOTES: Borehole was drilled in soil by plugged hollow-stem augers (3-1/4" ID, 6-1/2" D. flights) which were advanced through and between the sampled intervals, whereas rock was cored.

* Core barrel advancement was intermittently slow (in rock boulders) and rapid (in soil)

JOB No.: 6314.009	PROJECT: DACP	BORING No.: D-15
CLIENT: CUMBERLAND STEAM PLANT	START: 03-17-93	SPOON SIZE: 2" OD, 2' LONG
LOCATION: CUMBERLAND CITY, TENN.	END: 03-17-93	CORE SIZE: NX
CONTRACTOR: PSI INC.	ELEVATION: 390.1 FT.	G.W. DEPTH/EL.: 10.0/380.1 FT
DRILL RIG: CME, MODEL M-75	N. COOR.: 8,498.2 FT.	G.W. DATE: 03-18-93
GEOLOGIST: N.S. DRAKULICH	E. COOR.: 10,493.5 FT.	

ELEV (FT.)	DEPTH	SAMPLE TYPE	SAMPLE No.	PENETRATION RESIST BLOWS/6 in.	N	TSF	RECOVERY (%) R	RQD	VOID	COLUMN SYMBOL	SOIL/ROCK DESCRIPTION SAMPLE	SEQUENCE
		S-SP	1	5-8-8-8	16		18"				Bottom ASH	Black medium dense BOTTOM ASH, sandy gravel size (Dike Access Road Material)
		S-SP	2	10-10-12-10	22		15"				Bottom ASH	
	5.00	S-SP	3	4-3-4-7	7		15"				Top 3": As above Bott 12": Red & brown sandy gravelly CLAY FILL	4.5
		S-SP	4	8-8-9-11	17		12"				As above, to clayey GRAVEL FILL	Red, brown, and dark gray medium stiff to very stiff GRAVELLY SILTY CLAY FILL to SILTY CLAY FILL, some sand and pebbles (Structural Fill)
		S-SP	5	2-4-5-7	9		14"				Top 8": Red gravelly CLAY FILL with slag lenses Bott 6": Dark gray gravelly silty CLAY FILL	
	10.00	S-SP	6	6-8-8-9	16		12"				Top 3": Red & br. silty CLAY FILL, some sand and pebbles Mid 1": Saturated bottom ash Bott 8": Dark gray silty CLAY FILL, some sand and pebbles	
	15.00	S-SP	7	8-9-6-11	15		11"				Top 6": Red gravelly sandy CLAY FILL with slag Bott 5": Saturated CRUSHED STONE	16.0
												Gray medium dense CRUSHED STONE (Random Fill)
												18.5
	20.00	S-ST	1	NA	NA		0				Assumed: Lacustrine clayey silt NO RECOVERY	Gray soft organic CLAYEY SILT (Lacustrine Deposit)
		S-SP	8	1-9-15	24		0				NO RECOVERY	21.0
	25.00											Brown and grayish brown stiff to very stiff SILTY CLAY with trace to some pebbles (Colluvial Deposit)

NOTES: Borehole was drilled in soil by plugged hollow-stem augers (3-1/4" ID, 6-1/2" D. flights) which were advanced through and between the sampled intervals, whereas rock was cored.

JOB No.: 6314.009	PROJECT: DACP	BORING No.: D-15
CLIENT: CUMBERLAND STEAM PLANT	START: 03-17-93	SPOON SIZE: 2" OD, 2' LONG
LOCATION: CUMBERLAND CITY, TENN.	END: 03-17-93	CORE SIZE: NX
CONTRACTOR: PSI INC.	ELEVATION: 390.1 FT.	G.W. DEPTH/EL.: 10.0/380.1 FT
DRILL RIG: CME, MODEL M-75	N. COOR.: 8,498.2 FT.	G.W. DATE: 03-18-93
GEOLOGIST: N.S. DRAKULICH	E. COOR.: 10,493.5 FT.	

ELEV. (FT.)	DEPTH	SAMPLE TYPE	SAMPLE No.	PENETRATION RESIST. BLOWS/6 in.	N	TSF	RECOVERY (%) R	RQD	VOID	COLUMN SYMBOL	SOIL/ROCK DESCRIPTION SAMPLE	SEQUENCE
		S-ST	2	NA	NA		24"				Bottom: Brown & grayish brown silty CLAY with black pigments	
												Brown and grayish brown stiff to very stiff SILTY CLAY with trace to some pebbles (Colluvial Deposit)
30.00		S-SP	9	4-4-6-50/6"	10		13"				Brown to grayish brown silty CLAY, trace pebbles	31.5
				AUGER REFUSAL AT 31.5'								
			Run 1				8" 19%	6" 14%			Boulder from 31.5' to 32.2' (calcilutite), the rest is brown silty CLAY	Brown stiff SILTY CLAY with boulders (Residual Soil)
35.00		S-SP	10	3-5-5-13	10		22"				Brown silty CLAY	
				AUGER REFUSAL AT 37.5'								37.5 T.O.R.
											Lost circulation below 38.5'	
40.00			Run 2				78" 100%	38" 48%			Gray CALCILUTITE with subhorizontal bedding; 8 pieces are longer than 4"	Gray fresh and sound subhorizontally bedded CALCILUTITE (Bedrock)
												44.0 End of Boring
45.00												
50.00												

NOTES: Borehole was drilled in soil by plugged hollow-stem augers (3-1/4" ID, 6-1/2" D. flights) which were advanced through and between the sampled intervals, whereas rock was cored.

JOB No.: 6314.009	PROJECT: DACP	BORING No.: D-16
CLIENT: CUMBERLAND STEAM PLANT	START: 03-31-93	SPOON SIZE: 2" OD, 2' LONG
LOCATION: CUMBERLAND CITY, TENN.	END: 03-31-93	CORE SIZE: NX
CONTRACTOR: PSI INC.	ELEVATION: 381.3 FT.	G.W. DEPTH/EL.: 1.0/380.3 FT
DRILL RIG: CME, MODEL M-75	N. COOR.: 8,571.5 FT.	G.W. DATE: 04-01-93
GEOLOGIST: N.S. DRAKULICH	E. COOR.: 10,304.9 FT.	

ELEV. (FT.)	DEPTH	SAMPLE TYPE	SAMPLE No.	PENETRATION RESIST. BLOWS/6 in.	N	TSF	RECOVERY (%) R	RQD	VOID	COLUMN SYMBOL	SOIL/ROCK DESCRIPTION SAMPLE	SEQUENCE
		S-SP	1	11-6-3-10	9		12"				Brown silty CLAY FILL, some pebbles, to gravelly silty CLAY, dry	
		S-SP	2	12-12-13-18	25		4"				Brown gravelly silty CLAY FILL to clayey GRAVEL, dry	Brown and reddish brown stiff to very stiff SILTY CLAY to GRAVELLY SILTY CLAY FILL (Structural Fill)
5.00		S-SP	3	3-8-6-9	14		12"				Brown silty CLAY FILL, some pebbles, dry	
		S-SP	4	5-8-24-13	32		19.5"				Brown & reddish br. silty CLAY FILL, plastic, some sand pockets & pebbles, moist	
		S-SP	5	5-2-2-3 Tube resampled	4		0 12"				Top 9": Reddish br. silty CLAY FILL, plastic, moist Bott 3": Dark gray organic clayey SILT with roots	9.0
10.00		S-ST	1	NA	NA		24"				Gray to brownish gray silty CLAY-clayey SILT, no pebbles	Dark gray very soft to soft organic CLAYEY SILT with clayey sand iterbeds (Lacustrine Deposit)
		S-SP	6	1-1-1-1	2		24"				Top 10": Gray soft clayey organic SILT, trace sand and pebbles Bott 14": Gr. saturated sandy CLAY-clayey SAND, trace pebbles	14.5
15.00		S-SP	7	1/12"-2-2	2		23"				Top 5": Dark gray org. clayey SILT Bott 18": Light gr. & br. clayey SILT with sand-size silt grains & dark br. pigments	
		S-SP	8	4-4-5-5	9		21"				Gray & brown clayey SILT occasional pebbles and dark br. pigments	Gray and brown stiff CLAYEY SILT with occasional pebbles (Colluvial Deposit)
20.00		S-ST	2	NA	NA		16"				Bott: Brown plastic silty CLAY	21.0
25.00												Brown stiff plastic SILTY CLAY, trace or no pebbles (Colluvial Deposit)

NOTES: Borehole was drilled in soil by plugged hollow-stem augers (3-1/4" ID, 6-1/2" D. flights) which were advanced through and between the sampled intervals, and below 32.0' by using a rock core-barrel and washing out the soil with circulating drilling water, whereas rock was cored.

JOB No.: 6314.009	PROJECT: DACP	BORING No.: D-16
CLIENT: CUMBERLAND STEAM PLANT	START: 03-31-93	SPOON SIZE: 2" OD, 2' LONG
LOCATION: CUMBERLAND CITY, TENN.	END: 03-31-93	CORE SIZE: NX
CONTRACTOR: PSI INC.	ELEVATION: 381.3 FT.	G.W. DEPTH/EL.: 1.0/380.3 FT
DRILL RIG: CME, MODEL M-75	N. COOR.: 8,571.5 FT.	G.W. DATE: 04-01-93
GEOLOGIST: N.S. DRAKULICH	E. COOR.: 10,304.9 FT.	

ELEV (FT.)	DEPTH	SAMPLE TYPE	SAMPLE No.	PENETRATION RESIST. BLOWS/6 in.	N	TSF	RECOVERY (%) R	RQD	VOID	COLUMN SYMBOL	SOIL/ROCK DESCRIPTION SAMPLE	SEQUENCE
		S-SP	9	2-5-6-7	11		20"				Brown plastic silty CLAY, trace or no pebbles	Brown stiff plastic SILTY CLAY, trace or no pebbles (Colluvial Deposit)
												28.0
											A boulder encountered from 28.0' to 29.5'	Brown stiff plastic SILTY CLAY with occasional pebbles and boulders (Colluvial Deposit)
30.00		S-SP	10	6-6-5-7	11		0 18"				Top 9": Br. & dark br. plastic silty CLAY, occas. pebbles Bott 9": Br. silty CLAY, occas. pebbles	32.0
				SECONDARY RECOVERY SPOON REFUSAL AT 32.0								
			Run 1				33" 92%	30" 83%			Boulder	
35.00		S-SP	11	6-8-11-13	19		24"				Top 18": Br. & green silty CLAY, trace pebbles Bott 6": Grayish br. & green silty CLAY-clayey SILT, trace pebbles	Brown, grayish brown and green very stiff SILTY CLAY to CLAYEY SILT, with trace to occasional pebbles and boulders (Residual Soil)
			Run 2				6" 50%	0" 0%			Boulder	
40.00											Soil	43.5 T.O.R.
45.00			Run 3				48" 73%	24" 36%			Fresh, subvertically bedded, partially laminated dark gray & light gray calcilutite	Dark and light gray, fresh and sound subvertically bedded CALCILUTITE (Bedrock)
												49.0 End of Boring
50.00												

NOTES: Borehole was drilled in soil by plugged hollow-stem augers (3-1/4" ID, 6-1/2" D. flights) which were advanced through and between the sampled intervals, and below 32.0' by using a rock core-barrel and washing out the soil with circulating drilling water, whereas rock was cored.

JOB No.: 6314.009	PROJECT: DACP	BORING No.: D-17
CLIENT: CUMBERLAND STEAM PLANT	START: 03-30-93	SPOON SIZE: 2" OD, 2' LONG
LOCATION: CUMBERLAND CITY, TENN.	END: 03-30-93	CORE SIZE: NX
CONTRACTOR: PSI INC.	ELEVATION: 382.9 FT.	G.W. DEPTH/EL.: 1.5/381.4 FT
DRILL RIG: CME, MODEL M-75	N. COOR.: 8,543.0 FT.	G.W. DATE: 03-31-93
GEOLOGIST: N.S. DRAKULICH	E. COOR.: 10,125.2 FT.	

ELEV. (FT.)	DEPTH	SAMPLE TYPE	SAMPLE No.	PENETRATION RESIST. BLOWS/6 in.	N	TSF	RECOVERY (%) R	RQD	VOID	COLUMN SYMBOL	SOIL/ROCK DESCRIPTION SAMPLE	SEQUENCE
		S-SP	1	1-3-3-2	6		10"				Brown, grayish br. & yellowish br. silty CLAY FILL, some pebbles	
		S-SP	2	2-3-5-6	8		10"				As above, softer with visible voids, typical for FILL	
	5.00	S-SP	3	2-4-6-7	10		22"				Layered br. ground & black silty CLAY FILL, occasional to some pebbles, coarse sand & sandy pockets	Brown, grayish brown and yellowish brown medium stiff to very stiff GRAVELLY SILTY CLAY to CLAYEY SILT FILL (Compacted Structural Fill)
		S-ST	1	NA	NA		12"				Bott: Brown gravelly clayey SILT FILL, dry	
		S-SP	4	7-14-15-12	29		12"				Top half: Brown gravelly silty CLAY to clayey SILT FILL Bott: Br. silty GRAVEL FILL, dry	
	10.00			AUGERED								
		S-SP	5	10-12-15-18	27		15.5"				Brown silty CLAY FILL, some pebbles, dry	
												13.5
	15.00	S-SP	6	3-6-9-12	15		23"				Brown & gray gravelly silty CLAY & SILT with some dark brownish red pigments; pebbles are both angular & rounded, dry	Brown and brown & gray medium stiff to stiff GRAVELLY SILTY CLAY to CLAYEY SILT and SILTY CLAY to CLAYEY SILT, trace to some sand & pebbles (Colluvial Deposit)
	20.00	S-SP	7	2-3-5-6 WATER ENTERING BOREHOLE	8		0				Br. plastic silty CLAY, trace-some rounded pebbles and dark brown pigments; no water in hole	
				Pushed to 23'			24"					
	25.00											

NOTES: Borehole was drilled in soil by plugged hollow-stem augers (3-1/4" ID, 6-1/2" D. flights) which were advanced through and between the sampled intervals, whereas rock was cored.

JOB No.: 6314.009	PROJECT: DACP	BORING No.: D-17
CLIENT: CUMBERLAND STEAM PLANT	START: 03-30-93	SPOON SIZE: 2" OD, 2' LONG
LOCATION: CUMBERLAND CITY, TENN.	END: 03-30-93	CORE SIZE: NX
CONTRACTOR: PSI INC.	ELEVATION: 382.9 FT.	G.W. DEPTH/EL.: 1.5/381.4 FT
DRILL RIG: CME, MODEL M-75	N. COOR.: 8,543.0 FT.	G.W. DATE: 03-31-93
GEOLOGIST: N.S. DRAKULICH	E. COOR.: 10,125.2 FT.	

ELEV (FT.)	DEPTH	SAMPLE TYPE	SAMPLE No.	PENETRATION RESIST BLOWS/6 in.	N	TSF	RECOVERY (%) R	RQD	VOID	COLUMN SYMBOL	SOIL/ROCK DESCRIPTION SAMPLE	SEQUENCE
		S-ST	2	NA	NA		24"				Bott: Brown silty CLAY to clayey SILT, some SAND & dark brown pigments & bluish area; dry at top, moist at bottom	Brown and brown & gray medium stiff to stiff GRAVELLY SILTY CLAY to CLAYEY SILT and SILTY CLAY to CLAYEY SILT, trace to some sand & pebbles (Colluvial Deposit)
												28.5
	30.00	S-SP	8	3-3-4-6	7		24"				Brown & reddish br. plastic silty CLAY, no or trace pebbles, some black pigments, dry	Brown, reddish brown, and greenish brown, plastic, medium stiff to stiff SILTY CLAY, no to trace pebbles (Colluvial Deposit)
	35.00	S-SP	9	3-4-5-6	9		24"				Br. & greenish br, plastic silty CLAY, trace pebbles, some black pigments, dry	
	40.00	S-SP	10	3-4-4-6	8		24"				Top 10": Br. silty CLAY Bott 14": Br. & reddish br. sandy (f-c) silty CLAY, no pebbles, with 1"-2" clayey sand interbeds, wet	41.0
												Brown, reddish brown and yellowish brown medium stiff SANDY SILTY CLAY (Colluvial/Alluvial Deposit)
	45.00	S-SP	11	2-2-2-3	4		24"				Top 6": Yellowish br. sandy silty CLAY to silty clayey SAND, no pebbles Bott 18": Br. & reddish br. silty CLAY, no pebb. occasional black pigments	45.5 Brown and reddish brown soft to medium stiff SILTY CLAY changing into very dense CLAYEY GRAVEL (Residual Soil)
				BOULDER AT 48.0'							Water entering hole	
	50.00											

NOTES: Borehole was drilled in soil by plugged hollow-stem augers (3-1/4" ID, 6-1/2" D. flights) which were advanced through and between the sampled intervals, whereas rock was cored.

JOB No.: 6314.009	PROJECT: DACP	BORING No.: D-17
CLIENT: CUMBERLAND STEAM PLANT	START: 03-30-93	SPOON SIZE: 2" OD, 2' LONG
LOCATION: CUMBERLAND CITY, TENN.	END: 03-30-93	CORE SIZE: NX
CONTRACTOR: PSI INC.	ELEVATION: 382.9 FT.	G.W. DEPTH/EL.: 1.5/381.4 FT
DRILL RIG: CME, MODEL M-75	N. COOR.: 8,543.0 FT.	G.W. DATE: 03-31-93
GEOLOGIST: N.S. DRAKULICH	E. COOR.: 10,125.2 FT.	

ELEV. (FT.)	DEPTH	SAMPLE TYPE	SAMPLE No.	PENETRATION RESIST BLOWS/6 in.	N	TSF	RECOVERY (%) R	RQD	VOID	COLUMN SYMBOL	SOIL/ROCK DESCRIPTION SAMPLE	SEQUENCE
		S-SP	12	10-5-50/0	55/6"		11"				Brown saturate clayey GRAVEL (rock fragments)	Brown and reddish brown soft to medium stiff SILTY CLAY changing into very dense CLAYEY GRAVEL (Residual Soil)
				AUGER REFUSAL								51.0 T.O.R.
55.00			Run 1					102" 100%	102" 100%		Gray CALCILUTITE with subvertical bedding, fresh and sound (2 core pieces were 3' & 2' long)	Gray, massive, fresh and sound CALCILUTITE (Bedrock)
60.00												59.5 End of Boring
65.00												
70.00												
75.00												

NOTES: Borehole was drilled in soil by plugged hollow-stem augers (3-1/4" ID, 6-1/2" D. flights) which were advanced through and between the sampled intervals, whereas rock was cored.

JOB No.: 6314.009	PROJECT: DACP	BORING No.: D-22
CLIENT: CUMBERLAND STEAM PLANT	START: 04-07-93	SPOON SIZE: 2" OD, 2' LONG
LOCATION: CUMBERLAND CITY, TENN.	END: 04-08-93	CORE SIZE: NX
CONTRACTOR: PSI INC.	ELEVATION: 383.1 FT.	G.W. DEPTH/EL.: 5.5/377.6 FT
DRILL RIG: CME, MODEL M-75	N. COOR.: 8,661.2 FT.	G.W. DATE: 04-09-93 &
GEOLOGIST: N.S. DRAKULICH	E. COOR.: 9,706.2 FT.	04-12-93

ELEV (FT.)	DEPTH	SAMPLE TYPE	SAMPLE No.	PENETRATION RESIST BLOWS/6 in.	N	TSF	RECOVERY (%) R	RQD	VOID	COLUMN SYMBOL	SOIL/ROCK DESCRIPTION SAMPLE	SEQUENCE
		S-SP	1	2-4-4-4	8		12"				Red gravelly CLAY FILL; some gravel rounded, other angular rock fragments	
		S-SP	2	5-6-7-11	13		0				A pebble stuck in the split spoon shoe	
	5.00	S-SP	3	3-8-8-13	16		18"				Top 10": Br. clayey SILT FILL, some sand & pebbles Bott 8": Red gravelly silty CLAY FILL	Red, stiff to very stiff GRAVELLY SILTY CLAY FILL (Compacted Structural Fill - Exterrior Dike)
		S-SP	4	11-14-16-17	30		16"				Top 10": Brownish gray SILT FILL to gravelly SILT, tr. clay Bott 6": Red gravelly silty CLAY FILL	
		S-SP	5	4-7-8-8	15		14"				Red gravelly silty CLAY FILL	
	10.00	S-SP	6	10-12-16-16	28		14"				Top 10": Red gravelly silty CLAY FILL Bott 5": Grayish brown gravelly clayey SILT FILL, to SILT FILL	
				Auger started cutting rock at 13.0'								13.0
	15.00			AUGER REFUSAL								
			Run 1				15" 83%	15" 83%			A boulder; Light gray crystalline LIMESTONE BOULDER	
				CORE BARREL DROPPED								
		S-SP	7	16-17-50/0	67/6"		9"				Brown & reddish br. gravelly silty CLAY, with rock fragments	Red, dense CLAYEY GRAVEL FILL, a mixture of boulders, coarse pebbles, and red silty clay (Boulder Base of Exterior Dike)
	20.00		Run 2	Core barrel dropped three times: 19.5-20.5', 21.0'-22.0', and 22.5'-23.0'			19" 35%	14" 26%			Two boulders (10" & 9"): green and red crystalline LIMESTONE BOULDERS	
			Run 3	Core barrel dropped from 24.5' to 28.0'			12" 20%	0" 0%			A boulder from 23.0' to 24.5'	24.5
	25.00											(See sheet 2 of 3)

NOTES: Borehole was drilled in soil by plugged hollow-stem augers (3-1/4" ID, 6-1/2" D. flights) which were advanced through and between the sampled intervals, whereas rock was cored.

JOB No.: 6314.009	PROJECT: DACP	BORING No.: D-22
CLIENT: CUMBERLAND STEAM PLANT	START: 04-07-93	SPOON SIZE: 2" OD, 2' LONG
LOCATION: CUMBERLAND CITY, TENN.	END: 04-08-93	CORE SIZE: NX
CONTRACTOR: PSI INC.	ELEVATION: 383.1 FT.	G.W. DEPTH/EL.: 5.5/377.6 FT
DRILL RIG: CME, MODEL M-75	N. COOR.: 8,661.2 FT.	G.W. DATE: 04-09-93 &
GEOLOGIST: N.S. DRAKULICH	E. COOR.: 9,706.2 FT.	04-12-93

ELEV. (FT.)	DEPTH	SAMPLE TYPE	SAMPLE No.	PENETRATION RESIST BLOWS/6 in.	N	TSF	RECOVERY (%) R	RQD	VOID	COLUMN SYMBOL	SOIL/ROCK DESCRIPTION SAMPLE	SEQUENCE
			Run 3	Core barrel dropped from 24.5' to 28.0'			12" 20%	0" 0%			A boulder from 23.0' to 24.5'	
		S-SP	8	3-3-3-4	6		8"				Dark gray organic clayey SILT	Dark gray, medium stiff, organic CLAYEY SILT (Lacustrine Deposit)
	30.00											
	35.00											
		S-SP	9	5-5-8-12	13		21"				Top 4": Dk. gr. oganic SILT Bott 17": Bluish gray & brown silty CLAY, trace pebbles, trace dark br. organic pigments, trace roots	35.5
	40.00	S-SP	10	6-8-10-11	18		22"				Dark reddish brown clayey SILT and bluish gray plastic silty CLAY, mixed	Bluish gray and brown stiff to very stiff SILTY CLAY, trace to some pebbles, to GRAVELLY SILTY CLAY (Colluvial Deposit)
	45.00	S-SP	11	4-5-6-7	11		13"				Dark brown gravelly silty CLAY, trace bluish gray clay, with black & white chert pebbles	
												47.5
		S-SP	12	1-2-4-5	6*		24"				Top 12": Gray silty CLAY, stiff, becoming soft, trace pebbles & dark br. organic pigments Bott 12":(-->>)	Gray, stiff to very soft SILTY CLAY (Residual Soil)
	50.00											

NOTES: * Resistance to pentration in the lower portion of the sampled interval is due to a pebble clogged in the shoe.

JOB No.: 6314.009	PROJECT: DACP	BORING No.: D-22
CLIENT: CUMBERLAND STEAM PLANT	START: 04-07-93	SPOON SIZE: 2" OD, 2' LONG
LOCATION: CUMBERLAND CITY, TENN.	END: 04-08-93	CORE SIZE: NX
CONTRACTOR: PSI INC.	ELEVATION: 383.1 FT.	G.W. DEPTH/EL.: 5.5/377.6 FT
DRILL RIG: CME, MODEL M-75	N. COOR.: 8,661.2 FT.	G.W. DATE: 04-09-93 &
GEOLOGIST: N.S. DRAKULICH	E. COOR.: 9,706.2 FT.	04-12-93

ELEV (FT.)	DEPTH	SAMPLE TYPE	SAMPLE No.	PENETRATION RESIST. BLOWS/6 in.	N	TSF	RECOVERY (%) R	RQD	VOID	COLUMN SYMBOL	SOIL/ROCK DESCRIPTION SAMPLE	SEQUENCE
		S-SP	12	1-2-4-5	6*		24"				Bott 12": Gray very soft silty CLAY, occasional large chert pebbles, becoming clayey slurry	Gray, stiff to very soft SILTY CLAY (Residual Soil)
				AUGER REFUSAL								52.0 T.O.R.
			Run 4	Core barrel dropped from 53.0' to 54.0'			12" 50%	12" 50%			Gray massive CALCILUTITE; 2 equal pieces	Gray, massive, fresh and sound CALCILUTITE (Bedrock)
55.00			Run 5				28" 93%	13" 43%			Gray massive, fresh & sound CALCILUTITE; one piece 13" long, other pieces small	
												56.5 End of Boring
60.00												
65.00												
70.00												
75.00												

NOTES: * Resistance to pentration in the lower portion of the sampled interval is due to a pebble clogged in the shoe.

SUBSURFACE LOG

Project Number	175539009	Location	Cumberland Fossil
Project Name	CUF	Boring No.	**STN-43** Total Depth 62.0 ft
County	Stewart, TN	Surface Elevation	411.3 ft
Project Type	HSA	Date Started	6/15/09 Completed 6/16/09
Supervisor	D. Rogers Driller James Felts	Depth to Water	Dry Date/Time 6/16/09
Logged By	D. Rogers	Depth to Water	N/A Date/Time N/A

Lithology Elevation	Lithology Depth	Description	Overburden / Rock Core	Sample # / RQD	Depth / Run	Rec. Ft. / Rec. Ft.	Blows / Rec. %	Mois.Cont. % / Run Depth	Remarks
411.3	0.0	Top of Hole							
		Bottom Ash, black gray, damp, medium		SPT-1	0.0 - 1.5	1.3	5-10-10	10	
408.9	2.4			SPT-2	1.5 - 3.0	1.2	5-3-2	22	
		Clayey Gravel, brown, moist, loose to dense, some sand (GC)		SPT-3	3.0 - 4.5	1.2	2-8-5	24	
				SPT-4	4.5 - 6.0	0.9	3-3-4	19	
				SPT-5	6.0 - 7.5	1.0	4-4-7	21	
				SPT-6	7.5 - 8.1	0.5	23-50+	14	
				SPT-7	9.5 - 10.5	1.0	7-12	16	boulders 8.1-9.4 + 13.5-14.9
				SPT-8	10.5 - 12.0	1.5	4-7-16	13	
				SPT-9	12.0 - 13.5	0.6	3-14-33	13	
				SPT-10	15.0 - 16.5	0.4	3-4-3	12	
				SPT-11	16.5 - 18.0	1.2	2-1-2	21	
				SPT-12	18.0 - 19.5	1.3	1-1-2	22	
				SPT-13	19.5 - 21.0	0.6	2-1-5	20	
				SPT-14	21.0 - 22.5	0.3	17-12-10	4	gravel block spoon
388.7	22.6								
		Fly Ash, dark gray, wet, medium stiff		SPT-15	22.5 - 24.0	1.3	6-1-2	20	
				SPT-16	24.0 - 25.5	1.5	14-13-8	26	
				SPT-17	25.5 - 27.0	1.5	3-5-6	24	
				SPT-18	27.0 - 28.5	1.5	1-4-7	32	
				SPT-19	28.5 - 30.0	1.5	2-2-3	32	
				SPT-20	30.0 - 31.5	1.5	6-1-4	35	
				SPT-21	31.5 - 33.0		1-2-2	43	
				SPT-22	33.0 - 34.5	1.5	1-0-1	42	
				SPT-23	34.5 - 36.0	1.5	0-1-1	45	
375.3	36.0								

SUBSURFACE LOG

Project Number 175539009 | Location Cumberland Fossil

Project Name CUF | Boring No. **STN-43** | Total Depth 62.0 ft

Lithology Elevation	Lithology Depth	Description	Overburden / Rock Core	Sample # / RQD	Depth / Run	Rec. Ft. / Rec. Ft.	Blows / Rec. %	Mois.Cont. % / Run Depth	Remarks
		Bottom Ash, black gray, wet, dense *(Continued)*		SPT-24	36.0 - 37.5	1.5	21-18-20	28	
				SPT-25	37.5 - 39.0	1.5	10-12-11	25	
371.8	39.5								
		Fly Ash, gray, wet, stiff		SPT-26	39.0 - 40.5	1.5	12-5-2	49	
				SPT-27	40.5 - 42.0	1.5	2-2-3	35	
368.6	42.7								
		Lean Clay, brown and gray, wet, very stiff, some sand, little gravel (CL)		SPT-28	42.0 - 43.5	1.5	0-17-26	11	
				SPT-29	43.5 - 45.0	1.5	12-14-18	16	
				SPT-30	45.0 - 46.5	1.5	16-9-9	18	several cobbles
				SPT-31	47.5 - 49.0	0.3	9-7-6	16	
				SPT-32	50.0 - 51.5	1.5	1-3-5	25	
				SPT-33	52.5 - 54.0	1.5	9-7-6	25	
				SPT-34	55.0 - 56.5	1.5	5-7-7	24	
				SPT-35	57.5 - 59.0	1.5	3-5-7	25	
349.9	61.4			SPT-36	60.0 - 61.5	1.5	5-7-20	31	
349.3	62.0	Shale, brown, soft, (augered)							
		Auger Refusal / Bottom of Hole							
		Top of Rock = 61.4 Elevation (349.9)							

SUBSURFACE LOG

Project Number	175539009	Location	Cumberland Fossil
Project Name	CUF	Boring No.	**STN-43 A** Total Depth 65.7 ft
County	Stewart, TN	Surface Elevation	411.3 ft
Project Type	Mud Rotary	Date Started	6/22/09 Completed 6/24/09
Supervisor	D. Rogers Driller J. Felts	Depth to Water	Dry Date/Time 6/24/09
Logged By	Norman Puckett	Depth to Water	N/A Date/Time N/A

Lithology Elevation	Lithology Depth	Description	Overburden / Rock Core	Sample # / RQD	Depth / Run	Rec. Ft. / Rec. Ft.	Blows / Rec. %	Mois.Cont. % / Run Depth	Remarks
411.3	0.0	Top of Hole							
408.9	2.4	Bottom Ash, black gray, damp, medium							
		Clayey Gravel, brown, moist, medium stiff, some sand (GC)							SI Installed to 65.7'
				ST-1	18.0 - 20.0	0.0		--	
				ST-2	20.0 - 22.0	1.0		--	
388.7	22.6								
		Fly Ash, dark gray, wet, medium stiff							
				ST-3	26.0 - 28.0	0.2		--	
				ST-4	29.0 - 31.0	2.0		--	
375.3	36.0								

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SUBSURFACE LOG

Project Number 175539009 | Location Cumberland Fossil

Project Name CUF | Boring No. **STN-43 A** | Total Depth 65.7 ft

Lithology Elevation	Lithology Depth	Description	Overburden / Rock Core	Sample # / RQD	Depth / Run	Rec. Ft. / Rec. Ft.	Blows / Rec. %	Mois.Cont. % / Run Depth	Remarks
371.8	39.5	Bottom Ash, black gray, wet, dense *(Continued)*							
368.6	42.7	Fly Ash, gray, wet, stiff							
		Lean Clay, brown and gray, wet, very stiff, some sand, little gravel (CL)		ST-5	47.0 - 49.0	2.0		--	
				ST-6	50.0 - 52.0	1.9		--	
347.6	63.7								
345.6	65.7	Bedrock (Rollered for SI Socket)							
		No Refusal / Bottom of Hole Top of Rock = 63.7 Elevation (347.6)							

SUBSURFACE LOG

Project Number	175539009	Location	Cumberland Fossil
Project Name	CUF	Boring No.	**STN-44** Total Depth 73.9 ft
County	Stewart, TN	Surface Elevation	419.5 ft
Project Type	HSA 3.25	Date Started	6/11/09 Completed 6/12/09
Supervisor	D. Rogers Driller James Felts	Depth to Water	13.2 ft Date/Time 6/11/09
Logged By	D. Rogers	Depth to Water	N/A Date/Time N/A

Lithology Elevation	Lithology Depth	Description	Overburden / Rock Core	Sample # / RQD	Depth / Run	Rec. Ft. / Rec. Ft.	Blows / Rec. %	Mois.Cont. % / Run Depth	Remarks
419.5	0.0	Top of Hole							
		Gypsum, tan white, moist, very stiff		SPT-1	0.0 - 1.5	1.3	4-7-9	12	PZ Installed Screen 27.0-37.0
				SPT-2	1.5 - 3.0	1.4	6-9-7	17	
				SPT-3	3.0 - 4.5	1.5	4-5-5	17	
				SPT-4	4.5 - 6.0	1.3	2-4-4	15	
				SPT-5	6.0 - 7.5	1.4	2-6-8	16	
				SPT-6	7.5 - 9.0	1.5	8-23-16	10	damp
				SPT-7	9.0 - 10.5	1.5	13-28-36	17	moist
				SPT-8	10.5 - 12.0	1.5	13-33-42	16	
				SPT-9	12.0 - 13.5	1.5	4-22-36	18	13.0 wet lens
				SPT-10	13.5 - 15.0	1.5	19-38-47	23	
				SPT-11	15.0 - 16.5	4.5	29-38-49	24	
				SPT-12	16.5 - 18.0	1.5	37-42-49	26	
400.2	19.3			SPT-13	18.0 - 19.5	1.0	7-8-8	22	19.3 gravel
398.6	20.9	Gravel, gray, medium		SPT-14	19.5 - 21.0	0.5	4-4-4	20	19.3+20.9 geotextile
		Fly Ash, dark gray, wet, stiff, lensed		SPT-15	21.0 - 22.5	1.5	11-12-16	32	
				SPT-16	22.5 - 24.0	1.5	10-8-10	47	
				SPT-17	24.0 - 25.5	1.5	9-9-7	26	revert 24 and down
392.5	27.0			SPT-18	25.5 - 27.0	1.5	4-5-8	39	
		Fly Ash, dark gray, wet, very soft		SPT-19	27.0 - 28.5	1.5	1-0-0	40	
				SPT-20	28.5 - 30.0	1.5	0-0-0	69	
				SPT-21	30.0 - 31.5	1.3	1-0-0	49	
387.5	32.0								
386.7	32.8	Lean Clay, light red-brown, wet, stiff, little sand, some gravel (CL)		SPT-22	31.5 - 33.0	1.5	7-7-6	37	
				SPT-23	33.0 - 34.5	1.3	3-2-3	45	
		Fly Ash, dark gray, wet, soft to stiff		SPT-24	34.5 - 36.0	1.5	3-1-5	37	

SUBSURFACE LOG

Project Number 175539009 | Location Cumberland Fossil

Project Name CUF | Boring No. **STN-44** | Total Depth 73.9 ft

Lithology Elevation	Lithology Depth	Description	Overburden / Rock Core	Sample # / RQD	Depth / Run	Rec. Ft. / Rec. Ft.	Blows / Rec. %	Mois.Cont. % / Run Depth	Remarks
		Fly Ash, dark gray, wet, soft to stiff *(Continued)*		SPT-25	36.0 - 37.5	1.5	3-0-0	38	
				SPT-26	37.5 - 39.0	1.5	3-1-1	36	
				SPT-27	39.0 - 40.5	1.5	1-0-1	45	
				SPT-28	40.5 - 42.0	1.3	1-1-1	39	
				SPT-29	42.0 - 43.5	0.9	3-1-2	40	
374.9	44.6			SPT-30	43.5 - 45.0	1.5	3-2-8	44	
		Bottom Ash, dark black-gray, wet, medium to very dense		SPT-31	45.0 - 46.5	1.5	6-7-10	21	
371.5	48.0			SPT-32	46.5 - 48.0	1.5	40-49-38	22	
		Fly Ash, dark gray, wet, soft		SPT-33	48.0 - 49.5	1.5	3-1-2	52	
				SPT-34	49.5 - 51.0	1.5	3-2-1	52	
				SPT-35	51.0 - 52.5	1.5	0-1-12	45	
				SPT-36	52.5 - 54.0	1.3	10-6-7	43	
				SPT-37	54.0 - 55.5	1.5	0-1-2	38	
363.4	56.1			SPT-38	55.5 - 57.0	1.1	0-1-2	26	
		Lean Clay, dark brown and gray, wet, medium stiff, some organics, mottled (CL)		SPT-39	57.0 - 58.5	1.5	2-7-7	23	
				SPT-40	58.5 - 60.0	1.5	2-3-3	27	
				SPT-41	60.0 - 61.5	1.2	2-3-5	24	
357.5	62.0			SPT-42	61.5 - 63.0	1.5	5-7-9	24	
		Lean Clay, brown and gray, wet, very stiff, mottled (CL)		SPT-43	63.0 - 64.5	1.2	3-6-6	25	
				SPT-44	65.0 - 66.5	1.5	5-5-5	24	
				SPT-45	67.5 - 69.0	1.5	3-4-4	26	
349.0	70.5			SPT-46	70.0 - 70.7	0.6	19-50+	18	
		Rock (augered)							
345.6	73.9			SPT-47	72.5 - 73.1	0.6	42-50+	9	
		Auger Refusal / Bottom of Hole Top of Rock = 70.5 Elevation (349.0)							

SUBSURFACE LOG

Project Number	175539009	Location	Cumberland Fossil
Project Name	CUF	Boring No.	**STN-45** Total Depth 63.2 ft
County	Stewart, TN	Surface Elevation	411.6 ft
Project Type	HSA 3.25	Date Started	6/24/09 Completed 6/26/09
Supervisor	D. Rogers Driller J. Felts	Depth to Water	12.5 ft Date/Time 6/25/09
Logged By	Norman Puckett	Depth to Water	N/A Date/Time N/A

Lithology Elevation	Lithology Depth	Description	Overburden / Rock Core	Sample # / RQD	Depth / Run	Rec. Ft. / Rec. Ft.	Blows / Rec. %	Mois.Cont. % / Run Depth	Remarks
411.6	0.0	Top of Hole							
		Bottom Ash, Bottom Ash, black, moist, dense		SPT-1	0.0 - 1.5		9-13-14	8	
409.1	2.5			SPT-2	1.5 - 3.0		13-15-16	8	
		Gypsum, Gypsum, tan-white, moist, very stiff to medium stiff.		SPT-3	3.0 - 4.5		10-15-12	12	
				SPT-4	4.5 - 6.0		14-26-23	18	
				SPT-5	6.0 - 7.5		10-2-4	19	
402.6	9.0			SPT-6	7.5 - 9.0		2-4-2	18	
		Fly Ash, gypsum and clay interlensed, brown, black and gray, moist to wet, soft to stiff		SPT-7	9.0 - 10.5		2-6-2	15	Cobbles, Boulders 9.7-11.7, 16.3-17.3, 18.5-19.1, 19.1-20.1
				SPT-8	10.5 - 12.0		1-4-4	11	
				SPT-9	12.0 - 13.5		1-0-3	20	
				SPT-10	13.5 - 15.0		1-2-2	24	
				SPT-11	15.0 - 16.5		2-3-9	24	
				SPT-12	16.5 - 18.0		2-5-8	14	
				SPT-13	18.0 - 19.5		3-6-8	17	
				SPT-14	20.1 - 21.6		1-3-22	12	
				SPT-15	22.0 - 23.5		3-6-3	1	
				SPT-16	23.5 - 25.0		2-1-1	26	
386.1	25.5			SPT-17	25.0 - 26.5		3-38-15	24	
		Fly Ash, Flyash, black to brownish gray, moist to wet, very stiff to soft to very stiff		SPT-18	26.5 - 27.0		22-34-17	35	
				SPT-19	28.0 - 29.5		9-15-16	28	
				SPT-20	30.0 - 31.5		0-3-8	49	
				SPT-21	31.5 - 33.0		0-0-0	30	
				SPT-22	33.0 - 34.5		0-0-4	21	
				SPT-23	34.5 - 36.0		3-3-4	12	

SUBSURFACE LOG

Project Number 175539009 | Location Cumberland Fossil

Project Name CUF | Boring No. **STN-45** | Total Depth 63.2 ft

Lithology Elevation	Lithology Depth	Description	Overburden / Rock Core	Sample # / RQD	Depth / Run	Rec. Ft. / Rec. Ft.	Blows / Rec. %	Mois.Cont. % / Run Depth	Remarks
		Fly Ash, Flyash, black to brownish gray, moist to wet, very stiff to soft to very stiff *(Continued)*		SPT-24	36.0 - 37.5		3-4-5	17	
				SPT-25	37.5 - 39.0		8-9-12	17	
371.6	40.0			SPT-26	39.0 - 39.6		23-50+/0.1	17	
		Concrete (cored)							
369.6	42.0								
		Bottom Ash, Clay and Gravel, dark gray and brown, wet		SPT-27	42.0 - 43.0		0-1	--	
367.3	44.3			SPT-28	43.0 - 44.2		0-2-50+/0.2	12	
		Concrete (cored)							Wire in Core Barrel. TVA CUF Advised to Proceed
364.5	47.1								
		Lean Clay, light brown to brown mottled, soft to stiff (CL)		SPT-29	47.5 - 49.0		3-4-4	32	
				SPT-30	49.0 - 50.5		3-4-5	36	
				SPT-31	50.5 - 52.0		1-2-2	40	
348.9	62.7			SPT-32	62.0 - 62.7		8-50+/0.2	15	
348.4	63.2	Rock (Augered)							
		Auger Refusal / Bottom of Hole							
		Top of Rock = 62.7 Elevation (348.9)							

SUBSURFACE LOG

Project Number	175539009	Location	Cumberland Fossil		
Project Name	CUF	Boring No.	**STN-45C**	Total Depth	15.0 ft
County	Stewart, TN	Surface Elevation	411.6 ft		
Project Type	HSA 4.25	Date Started	8/14/08	Completed	8/14/09
Supervisor	D. Rogers	Driller	Mark Martin	Depth to Water	7.0 ft	Date/Time	8/14/09
Logged By	D. Rogers	Depth to Water	N/A	Date/Time	N/A

Lithology Elevation	Lithology Depth	Description	Overburden / Rock Core	Sample # / RQD	Depth / Run	Rec. Ft. / Rec. Ft.	Blows / Rec. %	Mois.Cont. % / Run Depth	Remarks
411.6	0.0	Top of Hole							
411.1	0.5	Gypsum							
		Bottom Ash							
408.6	3.0								profile boring
		Gypsum							
									Wet below 7 ft
402.1	9.5								
401.1	10.5	Cobbles							
		Clay, brown-gray mottled, little gravel (CL)							
396.6	15.0								
		No Refusal / Bottom of Hole							

SUBSURFACE LOG

Project Number	175539009	Location	Cumberland Fossil
Project Name	CUF	Boring No.	**STN-46** Total Depth 73.6 ft
County	Stewart, TN	Surface Elevation	420.3 ft
Project Type	HSA 3.25	Date Started	7/7/09 Completed 7/9/09
Supervisor	D. Rogers Driller J. Felts	Depth to Water	23.0 ft Date/Time 7/7/09
Logged By	James Felts	Depth to Water	N/A Date/Time N/A

Lithology Elevation	Lithology Depth	Description	Overburden / Rock Core	Sample # / RQD	Depth / Run	Rec. Ft. / Rec. Ft.	Blows / Rec. %	Mois.Cont. % / Run Depth	Remarks
420.3	0.0	Top of Hole							
		Gypsum, tan-white, stiff to very stiff, damp to moist		SPT-1	0.0 - 1.5	1.1	3-5-7	10	
				SPT-2	1.5 - 3.0	1.2	6-13-15	10	
				SPT-3	3.0 - 4.5	1.0	12-18-20	11	
				SPT-4	4.5 - 6.0	1.1	5-10-9	10	
				SPT-5	6.0 - 7.5	1.3	5-7-8	11	
				SPT-6	7.5 - 9.0	1.2	6-10-19	11	
				SPT-7	9.0 - 10.5	1.2	10-18-22	9	
				SPT-8	10.5 - 12.0	1.0	12-19-30	11	
				SPT-9	12.0 - 13.5	1.5	36-28-22	19	
				SPT-10	13.5 - 14.4	0.9	26-50+/0.4	9	
				SPT-11	15.0 - 16.5	1.4	22-26-37	22	
				SPT-12	16.5 - 18.0	1.0	8-10-13	7	
400.8	19.5			SPT-13	18.0 - 19.5	0.9	5-6-6	8	
399.3	21.0	Crushed stone		SPT-14	19.5 - 21.0	0.9	3-3-2	27	drainage layer
		Fly Ash, dark gray-brown, wet, medium stiff to Very stiff, silt to sand size, layers of bottom ash 44.0 to 50.0		SPT-15	21.0 - 22.5	1.4	3-6-8	34	
				SPT-16	22.5 - 24.0	1.3	2-4-8	33	
				SPT-17	24.0 - 25.5	1.2	2-4-6	45	
				SPT-18	25.5 - 27.0	1.3	4-6-7	30	
				SPT-19	27.0 - 28.5	1.1	3-7-11	28	
				SPT-20	28.5 - 30.0	1.2	5-9-12	27	
				SPT-21	30.0 - 31.5	1.4	4-9-16	28	
				SPT-22	31.5 - 33.0	1.1	6-9-14	30	
				SPT-23	33.0 - 34.5	1.2	5-8-15	35	
				SPT-24	34.5 - 36.0	1.4	7-15-21	30	

SUBSURFACE LOG

Project Number 175539009 | Location Cumberland Fossil

Project Name CUF | Boring No. **STN-46** | Total Depth 73.6 ft

Lithology Elevation	Lithology Depth	Description	Overburden / Rock Core	Sample # / RQD	Depth / Run	Rec. Ft. / Rec. Ft.	Blows / Rec. %	Mois.Cont. % / Run Depth	Remarks
		Fly Ash, dark gray-brown, wet, medium stiff to Very stiff, silt to sand size, layers of bottom ash 44.0 to 50.0 *(Continued)*		SPT-25	36.0 - 37.5	1.3	7-21-33	48	
				SPT-26	37.5 - 39.0	1.1	10-18-29	34	
				SPT-27	39.0 - 40.5	1.4	28-34-9	24	
				SPT-28	40.5 - 42.0	1.5	2-10-8	35	
				SPT-29	42.0 - 43.5	1.3	3-4-6	38	
				SPT-30	43.5 - 45.0	1.4	14-20-6	30	
				SPT-31	45.0 - 46.5	1.0	6-8-4	23	
				SPT-32	46.5 - 48.0	1.1	3-6-5	37	
				SPT-33	48.0 - 49.5	0.8	4-4-8	20	
369.3	51.0			SPT-34	49.5 - 51.0	0.9	20-36-20	18	
		Boulders (Likely construction debris, rubble)		SPT-35	51.0 - 52.1	1.0	12-23-	17	
				SPT-36	52.5 - 52.6	0.0	50+/0.1	--	
							50+/0.1		
				SPT-37	54.0 - 54.1	0.0	50+/0.1	--	
				SPT-38	55.5 - 55.6	0.0	50+/0.1	--	
363.4	56.9								
		Lean Clay, brown-gray mottled, medium stiff, wet (CL)		SPT-39	57.0 - 58.5	0.8	3-4-4	30	
				SPT-40	58.5 - 60.0	0.8	4-6-6	36	
				SPT-41	60.0 - 61.5	1.1	3-4-3	33	
				SPT-42	61.5 - 63.0	1.3	3-3-5	36	
				SPT-43	63.0 - 64.5	1.0	2-3-3	31	
				SPT-44	64.5 - 66.0	1.2	2-2-3	31	
				SPT-45	66.0 - 66.1	0.0	50+/0.1	--	
353.5	66.8								
		Rock							(Roller Bit used for BR confirmation)
346.7	73.6								
		No Refusal / Bottom of Hole Top of Rock = 66.8 Elevation (353.5)							

SUBSURFACE LOG

Project Number	175555021	Location	N 730950, E 1511730
Project Name	CUF BAP Safety Factor	Boring No.	**STN-1-16** Total Depth 48.0 ft
County	Stewart County, Tennessee	Surface Elevation	407 ft
Project Type	Geotechnical Exploration	Date Started	3/22/16 Completed 3/22/16
Supervisor	B. Blakely Driller K. Clements	Depth to Water	11.2 ft Date/Time 3/22/16
Logged By	B. Blakely	Depth to Water	17.2 ft Date/Time 3/23/16

Lithology Elevation	Lithology Depth	Description	Overburden / Rock Core	Sample # / RQD	Depth / Run	Rec. Ft. / Rec. Ft.	Blows / Rec. %	Mois.Cont. % / Run Depth	Remarks
407.0	0.0	Top of Hole							
		BOTTOM ASH, black, moist, dense, coarse grained		SPT-1	0.0 - 0.8	0.8	33-50+/0.3'	6	
				SPT-2	2.5 - 4.0	1.5	17-39-46	8	
				SPT-3	5.0 - 6.5	1.5	16-42-42	9	
399.5	7.5								
		Lean Clay With Sand (CL), brown, moist, medium stiff to stiff		SPT-4	7.5 - 9.0	0.9	4-5-7	20	
				SPT-5	10.0 - 11.5	0.7	1-1-3	23	BULK-1 from 10.0' to 15.0' (MC = 21) LL: 43 PL: 17 PI: 26)
394.0	13.0								
		BOTTOM ASH, black, moist to wet, very loose to medium dense, coarse grained		SPT-6	12.5 - 14.0	0.8	3-5-7	14	
				SPT-7	15.0 - 16.5	1.2	3-3-4	13	
				SPT-8	17.5 - 19.0	0.1	2-2-2	17	Wet at 17.5'
				SPT-9	20.0 - 21.5	1.0	1-1-2	24	
				SPT-10	25.0 - 26.5	1.5	2-2-3	25	BULK-2 from 25.0' to 30.0' (MC = 17)
				SPT-11	30.0 - 31.5	1.5	5-8-15	24	
372.0	35.0								
				SPT-12	35.0 - 36.5	1.5	WOH-2-3	42	

SUBSURFACE LOG

Project Number 175555021 | Location N 730950, E 1511730

Project Name CUF BAP Safety Factor | Boring No. **STN-1-16** | Total Depth 48.0 ft

Lithology			Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	
Elevation	Depth	Description	Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	Remarks
		Sandy Fat Clay (CH), light brown to reddish brown with gray mottling, moist to wet, soft to very stiff *(Continued)*		SPT-13	40.0 - 41.5	1.5	WOH-1-2	43	LL: 75 PL: 25 PI: 50 (35.0'-41.5')
				SPT-14	45.0 - 46.5	1.5	22-17-8	42	
359.0	48.0	- Rock fragments from 46.3' to 46.5'							
		Auger Refusal / Bottom of Hole							WOH = Weight of Hammer MC = Moisture Content LL = Liquid Limit PL = Plastic Limit PI = Plasticity Index

1" temporary observation well installed at tip depth 48.0'.
Observation well removed and backfilled on 3/23/16.

SUBSURFACE LOG

Project Number	175555021	Location	N 730820, E 1511450
Project Name	CUF BAP Safety Factor	Boring No.	**STN-2-16** Total Depth 49.0 ft
County	Stewart County, Tennessee	Surface Elevation	403 ft
Project Type	Geotechnical Exploration	Date Started	3/22/16 Completed 3/22/16
Supervisor	B. Blakely Driller K. Clements	Depth to Water	15.3 ft Date/Time 3/22/16
Logged By	B. Blakely	Depth to Water	15.5 ft Date/Time 3/23/16

Lithology Elevation	Lithology Depth	Description	Overburden / Rock Core	Sample # / RQD	Depth / Run	Rec. Ft. / Rec. Ft.	Blows / Rec. %	Mois.Cont. % / Run Depth	Remarks
403.0	0.0	Top of Hole							
		BOTTOM ASH, black, moist, dense, coarse grained		SPT-1	0.0 - 1.5	1.5	3-14-25	13	
				SPT-2	2.5 - 4.0	1.5	11-18-21	15	
398.0	5.0								
		Sandy Lean Clay (CL), brown, moist to wet, medium stiff to stiff		SPT-3	5.0 - 6.5	1.1	1-2-3	22	
				SPT-4	7.5 - 9.0	0.7	4-6-6	34	LL: 44 PL: 19 PI: 25 (7.5'-11.5')
				SPT-5	10.0 - 11.5	1.5	2-3-3	19	
		- Rock fragment at 13.8'		SPT-6	12.5 - 13.8	0.6	3-6-50+/0.3'	30	Wet at 12.5'
				SPT-7	15.0 - 16.5	0.8	10-4-10	25	
385.5	17.5								
		FLY ASH, dark grayish brown to black, wet, very soft to medium stiff, fine grained		SPT-8	17.5 - 19.0	1.0	4-2-1	39	
				SPT-9	20.0 - 21.5	1.5	WOR-WOR-WOR	45	
		- Mixed with Bottom Ash from 25.0' to 30.0'		SPT-10	25.0 - 26.5	1.5	1-3-5	22	LL: NP PL: NP PI: NP (25.0'-26.5')
373.0	30.0								
		Sandy Fat Clay (CH), reddish brown, moist to wet, soft to medium stiff, occasional chert		SPT-11	30.0 - 31.5	1.5	1-3-5	26	
				SPT-12	35.0 - 36.5	0.6	1-1-2	27	

SUBSURFACE LOG

Project Number 175555021 | Location N 730820, 1511450

Project Name CUF BAP Safety Factor | Boring No. **STN-2-16** | Total Depth 49.0 ft

Lithology			Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	
Elevation	Depth	Description	Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	Remarks
		Sandy Fat Clay (CH), reddish brown, moist to wet, soft to medium stiff, occasional chert *(Continued)*		SPT-13	40.0 - 41.5	1.2	2-3-4	26	LL: 63 PL: 21 PI: 42 (40.0'-46.5')
				SPT-14	45.0 - 46.5	1.5	3-2-3	29	
354.0	49.0	Auger Refusal / Bottom of Hole							WOR = Weight of Rods LL = Liquid Limit PL = Plastic Limit PI = Plasticity Index NP = Nonplastic

1" temporary observation well installed at tip depth 49.0'.
Observation well removed and backfilled on 3/23/16.

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SUBSURFACE LOG

Project Number	175539009	Location	Cumberland Fossil
Project Name	CUF	Boring No.	**STN-13** Total Depth 75.2 ft
County	Stewart, TN	Surface Elevation	396.5 ft
Project Type	HSA 3.25	Date Started	6/12/09 Completed 6/16/09
Supervisor	D. Rogers Driller Mark Martin	Depth to Water	10.5 ft Date/Time 6/12/09
Logged By	Ryan J Riker	Depth to Water	N/A Date/Time N/A

Lithology Elevation	Lithology Depth	Description	Overburden / Rock Core	Sample # / RQD	Depth / Run	Rec. Ft. / Rec. Ft.	Blows / Rec. %	Mois.Cont. % / Run Depth	Remarks
396.5	0.0	Top of Hole							
		Bottom Ash, dark grayish brown, damp to moist, medium dense to medium dense		SPT-1	0.0 - 1.5	1.5	5-8-9	--	
				SPT-2	1.5 - 3.0	1.4	8-10-11	--	
				SPT-3	3.0 - 4.5	1.5	5-11-11	--	
				SPT-4	4.5 - 6.0	0.9	2-2-4	--	
389.4	7.1			SPT-5	6.0 - 7.5	1.4	5-5-18	--	
		Fly Ash, dark gray, moist to wet, soft to very stiff		SPT-6	7.5 - 9.0	1.2	8-5-12	--	
				SPT-7	9.0 - 10.5	1.5	12-10-12	--	Revert below 11 feet
				SPT-8	10.5 - 12.0	1.3	2-4-7	--	
				SPT-9	12.0 - 13.5	1.1	2-4-9	--	
				SPT-10	13.5 - 15.0	0.7	1-2-2	--	
				SPT-11	15.0 - 16.5	1.0	0-0-0	--	
				SPT-12	16.5 - 18.0	1.1	0-0-0	--	
				SPT-13	18.0 - 19.5	1.5	0-0-0	--	
				SPT-14	19.5 - 21.0	1.4	0-0-0	--	
				SPT-15	21.0 - 22.5	1.0	0-0-0	--	
				SPT-16	22.5 - 24.0	1.2	0-0-0	--	
				SPT-17	24.0 - 25.5	1.1	0-0-2	--	
369.4	27.1			SPT-18	25.5 - 27.0	0.8	1-2-4	--	
368.0	28.5	Lean Clay, brown gray, wet, soft, mottled, gravelly (CL)		SPT-19	27.0 - 28.5	1.0	2-2-2	--	
				SPT-20	28.5 - 29.9	1.0	0-0-0	--	
		Fly Ash, dark gray, moist to wet, soft to very stiff		SPT-21	30.0 - 30.9	0.6	0-0-0	--	
				SPT-22	31.5 - 31.9	1.5	8-16-21	--	
				SPT-23	33.0 - 34.5	1.5	3-5-6	--	
				SPT-24	34.5 - 36.0	1.5	7-17-23	--	

Project Number 175539009 Location Cumberland Fossil

Project Name CUF Boring No. **STN-13** Total Depth 75.2 ft

Lithology Elevation	Lithology Depth	Description	Overburden / Rock Core	Sample # / RQD	Depth / Run	Rec. Ft. / Rec. Ft.	Blows / Rec. %	Mois.Cont. % / Run Depth	Remarks
		Fly Ash, dark gray, moist to wet, soft to very stiff *(Continued)*		SPT-25	36.0 - 37.5	1.3	6-3-6	--	
				SPT-26	37.5 - 39.0	1.5	2-2-2	--	
356.3	40.2			SPT-27	39.0 - 40.5	1.5	0-0-2	--	
		Lean Clay, brown gray, wet, soft stiff, mottled, gravelly, sandy below 59' (CL)		SPT-28	40.5 - 42.0	0.5	7-2-2	--	
				SPT-29	42.0 - 43.5	1.5	5-8-8	--	
				SPT-30	45.0 - 46.5	1.5	1-7-9	--	
				SPT-31	47.5 - 49.0	0.7	7-7-8	--	
				SPT-32	50.0 - 51.5	0.8	5-6-6	--	
				SPT-33	52.5 - 54.0	1.1	2-2-3	--	
				SPT-34	55.0 - 56.5	0.8	0-0-3	--	
				SPT-35	57.5 - 59.0	0.7	9-12-9	--	
				SPT-36	60.0 - 61.5	0.6	0-5-5	--	
				SPT-37	62.5 - 64.0	1.3	19-20-22	--	
				SPT-38	65.0 - 66.5	0.9	7-10-9	--	
329.0	67.5								
		Silty Gravel, gray to brown, wet, medium dense, (GM)		SPT-39	67.5 - 69.0	1.0	3-7-8	--	
				SPT-40	70.0 - 71.5	1.1	17-21-17	--	
				SPT-41	72.5 - 74.0	1.0	7-5-4	--	
321.3	75.2			SPT-42	75.0 - 75.2	0.0	50+/0.2	--	
		Auger Refusal / Bottom of Hole							

SUBSURFACE LOG

Project Number	175539009	Location	Cumberland Fossil
Project Name	CUF	Boring No.	**STN-13**
		Total Depth	75.2 ft

Lithology		Description	Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	Remarks
Elevation	Depth		Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	
		Top of Rock = 75.2 Elevation (321.3)							

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SUBSURFACE LOG

Project Number	175539009	Location	Cumberland Fossil
Project Name	CUF	Boring No.	**STN-17** Total Depth 117.4 ft
County	Stewart, TN	Surface Elevation	428.4 ft
Project Type	HSA 3.25	Date Started	7/7/09 Completed 7/9/09
Supervisor	D. Rogers Driller Mark Martin	Depth to Water	33.0 ft Date/Time 7/7/09
Logged By	Kurt Shellhause	Depth to Water	N/A Date/Time N/A

Lithology Elevation	Lithology Depth	Description	Overburden / Rock Core	Sample # / RQD	Depth / Run	Rec. Ft. / Rec. Ft.	Blows / Rec. %	Mois.Cont. % / Run Depth	Remarks
428.4	0.0	Top of Hole							
		Fly Ash, grayish brown, dry to damp, medium stiff to very stiff		SPT-1	0.0 - 1.5	0.8	3-11-20	19	
				SPT-2	1.5 - 3.0	0.8	20-39-57	20	
				SPT-3	3.0 - 4.5	0.8	50+	27	water from auger got into sample
				SPT-4	4.5 - 6.0	0.8	44-50+	17	
				SPT-5	6.0 - 7.5	0.4	50+0.3	16	
				SPT-6	7.5 - 9.0	0.6	31-50+	19	
				SPT-7	9.0 - 10.5	0.6	20-50+	20	
				SPT-8	10.5 - 12.0	0.8	37-50+	18	
				SPT-9	12.0 - 13.5	0.3	50+	18	
				SPT-10	13.5 - 15.0	0.7	37-50+	18	
				SPT-11	15.0 - 16.5	0.8	37-50+	18	
				SPT-12	16.5 - 18.0	0.6	43-50+	20	
				SPT-13	18.0 - 19.5	0.8	15-36-38	20	
				SPT-14	19.5 - 21.0	0.8	8-5-10	17	
				SPT-15	21.0 - 22.5	0.8	24-50+	20	
				SPT-16	22.5 - 24.0	0.8	14-12-18	18	
				SPT-17	24.0 - 25.5	0.8	29-49-50+	17	
				SPT-18	25.5 - 27.0	0.8	17-26-33	18	
				SPT-19	27.0 - 28.5	0.8	20-27-28	20	
				SPT-20	28.5 - 30.0	0.8	20-20-19	23	
398.4	30.0								
		Fly Ash, grayish brown, wet, soft to very soft		SPT-21	30.0 - 31.5	0.8	5-7-6	23	Flyash becoming more moist and plastic
				SPT-22	31.5 - 33.0	0.6	2-3-2	20	
				SPT-23	33.0 - 34.5	0.8	1-1-5	27	Hit groundwater table, samples are wet and plastic
				SPT-24	34.5 - 36.0	0.8	1-1-3	25	

SUBSURFACE LOG

Project Number 175539009 | Location Cumberland Fossil

Project Name CUF | Boring No. **STN-17** | Total Depth 117.4 ft

Lithology Elevation	Lithology Depth	Description	Overburden / Rock Core	Sample # / RQD	Depth / Run	Rec. Ft. / Rec. Ft.	Blows / Rec. %	Mois.Cont. % / Run Depth	Remarks
390.9	37.5			SPT-25	36.0 - 37.5	0.8	1-2-6	30	
		Fly Ash And Gypsum, grayish brown with white, wet, stiff to very stiff		SPT-26	37.5 - 39.0	0.3	50+	23	Encountered gypsum
				SPT-27	39.0 - 40.5	0.8	30-14-7	23	0.7' gypsum present
387.4	41.0			SPT-28	40.5 - 42.0	0.8	2-2-3	48	gypsum flyash mix/slurry
		Fly Ash, grayish brown, wet, very soft		SPT-29	42.0 - 43.5	0.8	4-4-3	35	
				SPT-30	43.5 - 45.0	0.8	1-2-2	34	flyash with traces of red clay
				SPT-31	45.0 - 46.5	0.8	0-0-0	36	0.3' of flyash mixed with brown clay
				SPT-32	46.5 - 48.0	0.8	1-4-3	33	silty lines of black in flyash
				SPT-33	48.0 - 49.5	0.6	1-2-3	38	0.1' layer of black gravely bottom ash
				SPT-34	49.5 - 51.0	0.6	2-5-3	37	black gravely bottom ash
				SPT-35	51.0 - 52.5	0.8	5-8-13	41	present in sample
				SPT-36	52.5 - 54.0	0.8	3-4-5	35	
				SPT-37	54.0 - 55.5	0.8	5-7-9	19	
				SPT-38	55.5 - 57.0	0.8	0-0-0	34	weight of hammer
				SPT-39	57.0 - 58.5	0.8	2-1-1	39	
				SPT-40	58.5 - 60.0	0.8	1-3-3	30	
				SPT-41	60.0 - 61.5	0.8	0-12-7	34	weight of hammer
				SPT-42	61.5 - 63.0	0.8	13-15-16	35	
				SPT-43	63.0 - 64.5	0.8	4-4-7	34	
				SPT-44	64.5 - 66.5	0.8	2-3-7	47	
				SPT-45	66.0 - 67.5	0.8	9-16-30	29	
				SPT-46	67.5 - 69.0	0.8	5-10-17	39	
				SPT-47	69.0 - 70.5	0.8	3-5-10	41	
				SPT-48	70.5 - 72.0	0.8	2-4-8	40	
				SPT-49	72.0 - 73.5	0.8	4-16-20	39	
				SPT-50	73.5 - 76.5	0.8	1-2-3	43	weight of rod, no recovery
				SPT-51	76.5 - 78.0	0.0	0-0-0	47	weight of rod

SUBSURFACE LOG

Project Number 175539009 | Location Cumberland Fossil

Project Name CUF | Boring No. **STN-17** | Total Depth 117.4 ft

Lithology Elevation	Lithology Depth	Description	Overburden / Rock Core	Sample # / RQD	Depth / Run	Rec. Ft. / Rec. Ft.	Blows / Rec. %	Mois.Cont. % / Run Depth	Remarks
		Fly Ash, grayish brown, wet, very soft *(Continued)*		SPT-52	78.0 - 79.5	0.8	0-3-4	48	weight of rod, weight of rod
				SPT-53	79.5 - 81.0	0.8	0-0-3	49	weight of rod
				SPT-54	81.0 - 82.5	0.8	0-0-0	39	weight of hammer
				SPT-55	82.5 - 84.0	0.8	0-0-0	45	weight of rod,
				SPT-56	84.0 - 85.5	0.8	0-0-2	38	WOR, soil more plastic
				SPT-57	85.5 - 87.0	0.8	0-0-0	47	WOR
				SPT-58	87.0 - 88.5	0.8	0-0-0	37	WOR
338.4	90.0			SPT-59	88.5 - 90.0	0.8	0-0-0	32	Begining of natural soils, gravely brown clay
		Lean Clay With Sand And Gravel, brown, wet, stiff to very stiff, (CL)		SPT-60	90.0 - 91.5	0.5	3-10-10	29	well graded angular gravel
				SPT-61	92.5 - 94.0	0.4	20-11-16	21	Gravel blocked spoon enterence
				SPT-62	95.0 - 96.5	0.3	4-20-20	21	
				SPT-63	97.5 - 99.0	0.8	0-5-6	27	Possible blowback in sample
				SPT-64	100.0 - 101.5	0.5	0-6-15	25	Possible blowback in sample
				SPT-65	102.5 - 104.0	0.3	14-23-23	16	
				SPT-66	105.0 - 106.5	0.6	30-30-12	22	Strains of red clay
				SPT-67	107.5 - 109.0	0.6	6-19-44	20	
				SPT-68	110.0 - 111.5	0.8	17-15-19	23	well rounded and angular gravel
				SPT-69	112.5 - 114.0	0.8	11-29-27	24	
				SPT-70	115.0 - 116.5	0.8	13-16-14	18	
311.0	117.4	Auger Refusal / Bottom of Hole							Auger refusal

SUBSURFACE LOG

Project Number	175539009	Location	Cumberland Fossil
Project Name	CUF	Boring No.	**STN-18** Total Depth 65.6 ft
County	Stewart, TN	Surface Elevation	401.2 ft
Project Type	HSA 3.25	Date Started	6/9/09 Completed 6/9/09
Supervisor	D. Rogers Driller Mark Martin	Depth to Water	10.5 ft Date/Time 6/9/09
Logged By	Ryan J Riker	Depth to Water	N/A Date/Time N/A

Lithology Elevation	Lithology Depth	Description	Overburden / Rock Core	Sample # / RQD	Depth / Run	Rec. Ft. / Rec. Ft.	Blows / Rec. %	Mois.Cont. % / Run Depth	Remarks
401.2	0.0	Top of Hole							
		Bottom Ash, dark gray to black, damp to wet, medium dense to dense		SPT-1	0.0 - 1.5	1.0	4-8-8	9	
				SPT-2	1.5 - 3.0	1.1	4-10-15	18	
				SPT-3	3.0 - 4.5	1.3	11-14-12	21	
				SPT-4	4.5 - 6.0	1.1	4-6-14	15	
				SPT-5	6.0 - 7.5	1.4	15-15-18	9	
393.0	8.2								
392.2	9.0	Gypsum, white to tan, wet, very stiff		SPT-6	7.5 - 9.0	1.3	8-22-23	23	
				SPT-7	9.0 - 10.5	1.0	8-10-6	3	Revert used at 10.0' ground water encountered
389.2	12.0	Gravel With Clay, brown to brownish yellow, wet, medium dense, (GC)		SPT-8	10.5 - 12.0	0.7	6-7-6	3	
		Fly Ash, gray to dark gray, damp to wet, very soft to very stiff		SPT-9	12.0 - 13.5	0.3	10-11-7	34	
				SPT-10	13.5 - 15.0	0.7	6-3-2	43	
				SPT-11	15.0 - 16.5	1.0	WOH-WOH-13	38	
				SPT-12	16.5 - 18.0	1.2	1-2-2	44	
				SPT-13	18.0 - 19.5	1.5	WOH-WOH-	40	
				SPT-14	19.5 - 21.0	0.2	WOH 2-1-1	47	
				SPT-15	21.0 - 22.5	0.9	1-1-50+/.3	31	
				SPT-16	22.5 - 24.0	0.9	31-23-8	19	
				SPT-17	24.0 - 25.5	1.0	3-4-4	41	
				SPT-18	25.5 - 27.0	1.5	WOR-WOR-	43	
				SPT-19	27.0 - 28.5	1.4	WOR 3-1-3	37	
				SPT-20	28.5 - 30.0	1.4	WOR-WOR-	36	
				SPT-21	30.0 - 31.5	1.4	WOR WOR-1-4	38	
				SPT-22	31.5 - 33.0	1.4	3-11-9	40	
				SPT-23	33.0 - 34.5	1.4	3-4-4	32	
				SPT-24	34.5 - 36.0	0.4	4-3-2	30	

SUBSURFACE LOG

Project Number 175539009 | Location Cumberland Fossil

Project Name CUF | Boring No. **STN-18** | Total Depth 65.6 ft

Lithology Elevation	Lithology Depth	Description	Overburden / Rock Core	Sample # / RQD	Depth / Run	Rec. Ft. / Rec. Ft.	Blows / Rec. %	Mois.Cont. % / Run Depth	Remarks
		Fly Ash, gray to dark gray, damp to wet, very soft to very stiff *(Continued)*		SPT-25	36.0 - 37.5	0.9	WOH-	48	
				SPT-26	37.5 - 39.0	1.5	WOH- WOH	54	
				SPT-27	39.0 - 40.5	1.5	WOR-2-2 WOR-1-1	49	
				SPT-28	40.5 - 42.0	1.5	WOH-	47	
				SPT-29	42.0 - 43.5	1.5	WOH- WOH	41	
357.0	44.2			SPT-30	43.5 - 45.0	1.3	WOR-2-2 4-11-13	33	
		Lean Clay, brown, wet, firm to very stiff, (CL)		SPT-31	45.0 - 46.5	0.0	6-10-13	--	sample retainer broke, sample lost
				SPT-32	47.5 - 49.0	1.4	9-12-14	33	
				SPT-33	50.0 - 51.5	1.1	4-8-13	32	
				SPT-34	52.5 - 54.0	1.5	9-10-10	34	
				SPT-35	55.0 - 56.5	1.5	8-8-8	23	
				SPT-36	57.5 - 59.0	0.6	7-9-11	34	
				SPT-37	60.0 - 61.5	1.5	3-3-3	26	boring backfilled with 2 bags of bentonite grout and 2 bags of portland cement
				SPT-38	62.5 - 64.0	1.0	6-15-4	32	
335.6	65.6			SPT-39	65.0 - 66.5	0.5	22-50+/.1	35	
		Auger Refusal / Bottom of Hole Top of Rock = 65.6 Elevation (335.6)							

SUBSURFACE LOG

Project Number	175539009	Location	Cumberland Fossil
Project Name	CUF	Boring No.	**STN-19** Total Depth 51.5 ft
County	Stewart, TN	Surface Elevation	410.9 ft
Project Type	HSA 3.25	Date Started	6/2/09 Completed 6/2/09
Supervisor	D. Rogers Driller Mark Martin	Depth to Water	Dry Date/Time 6/2/09
Logged By	Ryan J Riker	Depth to Water	N/A Date/Time N/A

Lithology Elevation	Lithology Depth	Description	Overburden / Rock Core	Sample # / RQD	Depth / Run	Rec. Ft. / Rec. Ft.	Blows / Rec. %	Mois.Cont. % / Run Depth	Remarks
410.9	0.0	Top of Hole							
409.4	1.5	Bottom Ash, dark gray to black, damp, dense		SPT-1	0.0 - 1.5	0.9	7-13-17	10	
		Fat Clay, brown, damp to moist, firm to very stiff, (CH)		SPT-2	1.5 - 3.0	1.0	10-9-13	11	
				SPT-3	3.0 - 4.5	0.7	6-6-10	11	
				SPT-4	4.5 - 6.0	0.9	2-3-4	20	
403.4	7.5			SPT-5	6.0 - 7.5	1.0	13-14-14	17	
		Lean Clay, brown to light gray, moist to wet, soft to very stiff, Manganese concretions (CL)		SPT-6	7.5 - 9.0	0.8	6-8-13	14	
				SPT-7	9.0 - 10.5	1.1	9-10-10	25	
				SPT-8	10.5 - 12.0	0.7	5-5-9	22	
				SPT-9	12.0 - 13.5	0.7	13-14-21	20	
				SPT-10	13.5 - 15.0	0.7	13-12-12	24	
				SPT-11	15.0 - 16.5	0.8	6-20-10	19	Gravels common from 15.0 to 21.0
				SPT-12	16.5 - 18.0	0.1	2-2-3	--	
				SPT-13	18.0 - 19.5	0.8	WOR-3-6	19	
				SPT-14	19.5 - 21.0	0.3	2-6-11	24	
				SPT-15	21.0 - 22.5	1.1	8-22-32	14	
				SPT-16	22.5 - 24.0	1.2	8-6-8	19	
				SPT-17	24.0 - 25.5	1.0	9-17-15	19	
				SPT-18	25.5 - 27.0	0.3	4-9-9	18	
383.7	27.2								
		Fly Ash, gray to light gray, moist to wet, medium stiff to stiff		SPT-19	27.0 - 28.5	1.5	10-4-4	32	
				SPT-20	28.5 - 30.0	1.2	WOR-3-3	43	
				SPT-21	30.0 - 31.5	0.5	WOR-1-15	35	Auger lost at depth 50' backfilled boring with 3 bags of quikgrout and 3 bags of portland cement.
				SPT-22	31.5 - 33.0	0.6	20-10-8	24	
				SPT-23	33.0 - 34.5	1.5	2-2-2	42	
				SPT-24	34.5 - 36.0	1.5	4-5-5	53	

SUBSURFACE LOG

Project Number 175539009 | Location Cumberland Fossil

Project Name CUF | Boring No. **STN-19** | Total Depth 51.5 ft

Lithology Elevation	Lithology Depth	Description	Overburden / Rock Core	Sample # / RQD	Depth / Run	Rec. Ft. / Rec. Ft.	Blows / Rec. %	Mois.Cont. % / Run Depth	Remarks
373.4	37.5	Lean Clay, brown with gray, wet, stiff, mottled (CL)		SPT-25	36.0 - 37.5	1.3	5-9-11	36	
				SPT-26	37.5 - 39.0	1.0	2-5-8	21	
				SPT-27	40.0 - 41.5	1.1	4-4-5	23	
				SPT-28	42.5 - 44.0	1.4	9-17-21	18	
				SPT-29	45.0 - 46.5	1.2	6-9-17	22	
363.4	47.5	Highly weathered limestone, light gray		SPT-30	47.5 - 49.0	0.2	7-50+/.2	17	
359.6	51.3			SPT-31	50.0 - 51.5	0.3	5-15-50+/.3	23	
359.4	51.5	Auger Refusal / Bottom of Hole Top of Rock = 47.5 Elevation (363.4)							

SUBSURFACE LOG

Project Number	175539009	Location	Cumberland Fossil		
Project Name	CUF	Boring No.	**STN-19 C**	Total Depth	22.0 ft
County	Stewart, TN	Surface Elevation	410.9 ft		
Project Type	HSA 4.25	Date Started	8/14/09	Completed	8/14/09
Supervisor	D. Rogers	Driller	Mark Martin	Depth to Water	Dry	Date/Time	8/14/09
Logged By	D. Rogers	Depth to Water	N/A	Date/Time	N/A

Lithology			Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	
Elevation	Depth	Description	Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	Remarks
410.9	0.0	Top of Hole							
		Bottom ash							
406.9	4.0								
		Clayey Gravel with cobbles (GC)							
				ST-1	10.5 - 12.5	1.4		--	cobbles 12.6-14.9
				ST-2	15.0 - 16.0	0.9		--	tube refusal cobbles 16-17.4
				ST-3	17.5 - 19.5	0.7		--	pushed rock
				ST-4	20.0 - 22.0	1.2		--	
388.9	22.0	No Refusal / Bottom of Hole							

SUBSURFACE LOG

Project Number	175539009	Location	Cumberland Fossil
Project Name	CUF	Boring No.	**STN-20** Total Depth 55.5 ft
County	Stewart, TN	Surface Elevation	419.3 ft
Project Type	HSA 3.25	Date Started	6/1/09 Completed 6/1/09
Supervisor	Daniel Rogers Driller Mark Martin	Depth to Water	Dry Date/Time 6/1/09
Logged By	Ryan J Riker	Depth to Water	N/A Date/Time N/A

Lithology Elevation	Lithology Depth	Description	Overburden / Rock Core	Sample # / RQD	Depth / Run	Rec. Ft. / Rec. Ft.	Blows / Rec. %	Mois.Cont. % / Run Depth	Remarks
419.3	0.0	Top of Hole							
		Gypsum, white tan, damp to moist, very stiff to very stiff		SPT-1	0.0 - 1.5	0.9	4-12-19	8	
				SPT-2	1.5 - 3.0	1.3	14-32-32	9	
				SPT-3	3.0 - 4.5	1.3	14-23-25	10	
				SPT-4	4.5 - 6.0	1.1	9-18-46	10	
				SPT-5	6.0 - 7.5	0.8	46-50+/.4	14	
				SPT-6	7.5 - 9.0	1.4	18-32-31	19	
				SPT-7	9.0 - 10.5	1.5	10-18-35	21	
				SPT-8	10.5 - 12.0	1.5	19-36-50	24	
				SPT-9	12.0 - 13.5	0.8	39-50+/.3	18	
				SPT-10	13.5 - 15.0	1.3	17-49-50+/.3	24	
402.8	16.5			SPT-11	15.0 - 16.5	1.5	23-25-48	25	
		Gravel With Clay, gray, wet, medium dense to dense, (GC) (Visual)		SPT-12	16.5 - 18.0	1.0	15-13-19	21	
				SPT-13	18.0 - 19.5	0.2	4-4-6	37	
398.3	21.0			SPT-14	19.5 - 21.0	0.1	4-5-6	2	
		Fly Ash, dark gray to light brown, wet to saturated, soft to very stiff, laminated		SPT-15	21.0 - 22.5	0.5	3-12-16	34	
				SPT-16	22.5 - 24.0	1.5	3-6-11	41	
				SPT-17	24.0 - 25.5	1.1	8-10-18	42	
				SPT-18	25.5 - 27.0	0.5	3-4-6	42	
				SPT-19	27.0 - 28.5	1.2	7-19-25	39	
				SPT-20	28.5 - 30.0	0.6	7-10-15	43	
				SPT-21	30.0 - 31.5	1.4	2-6-12	42	
				SPT-22	31.5 - 33.0	0.8	3-9-10	42	
				SPT-23	33.0 - 34.5	0.6	5-7-10	42	
				SPT-24	34.5 - 36.0	0.5	2-2-5	39	

SUBSURFACE LOG

Project Number 175539009 | Location Cumberland Fossil

Project Name CUF | Boring No. **STN-20** | Total Depth 55.5 ft

Lithology			Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	
Elevation	Depth	Description	Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	Remarks
		Fly Ash, dark gray to light brown, wet to saturated, soft to very stiff, laminated *(Continued)*		SPT-25	36.0 - 37.5	0.9	2-2-3	34	
				SPT-26	37.5 - 39.0	0.7	1-1-2	38	
				SPT-27	39.0 - 40.5	1.4	2-3-4	51	
				SPT-28	40.5 - 42.0	1.1	WOH-	48	
375.8	43.5			SPT-29	42.0 - 43.5	1.3	WOH- WOH 2-1-2	42	
374.3	45.0	Lean Clay, dark gray to black, wet, stiff, with organics, few gravels (CL)		SPT-30	43.5 - 45.0	0.5	WOR-3-5	30	
				SPT-31	45.0 - 46.5	0.5	WOR-4-6	24	
		Lean Clay, red brown to light brown, moist, stiff to very stiff, (CL)		SPT-32	47.5 - 49.0	0.9	6-9-10	28	
				SPT-33	50.0 - 51.5	0.6	1-4-42	26	
				SPT-34	52.5 - 54.0	1.1	5-6-9	24	
363.8	55.5								
		Auger Refusal / Bottom of Hole Top of Rock = 55.0 Elevation (364.3)		SPT-35	55.0 - 56.5	0.6	9-50+/.1	28	

STRATUM ELEV.	DEPTH	VISUAL SOIL DESCRIPTION	D	SR	K	N	CR	RQD	REMARKS
	0.0								
	0.5	Crushed Limestone Gravel							Surface Materials: Crushed Limestone Gravel
		Stiff to very stiff, tan and red, FAT CLAY, CH, with chert (FILL)	2.5	12		11			
			4.5	16		14			Drilled by: B. Grissom J. Thomas
	8.0		7.0	18		20			Drilling Method: HSA
		Firm, red and gray, FAT CLAY, CH, with chert (FILL)	9.5	12		6			Logged by ALF
	12.0								
		Very stiff, tan, LEAN CLAY, CL (FILL)	14.5	12		20			▽ Water level - 15.4 feet at 4:46 PM, 12/17/91
	17.0								
		Very stiff, brown FAT CLAY, CH, with limestone fragments (FILL)	19.5	14		19			
	22.0								
		Stiff, brown LEAN CLAY, CL, with chert (FILL)	24.5	18		12			Piezometer - Set 45.5 feet of one-inch PVC pipe; hand-slotted lower 10 feet
			29.5	18		22			
	32.0								
		Very stiff, tan and brown FAT CLAY, CH (RESIDUUM)	34.5	18		19			
			39.5	18		17			
	45.0								
		REFUSAL NOT ENCOUNTERED; BORING TERMINATED AT 45.0 FEET	44.5	18		17			

D - Sample depth (Ft.)
SR - Sample recovery (In.)
K - Soil Symbols
N - Penetration (Blows/Ft.)
CR - Core Recovery (percent)
RQD - Rock Quality Designation

5	18		10	
10	15		23	
			100	80

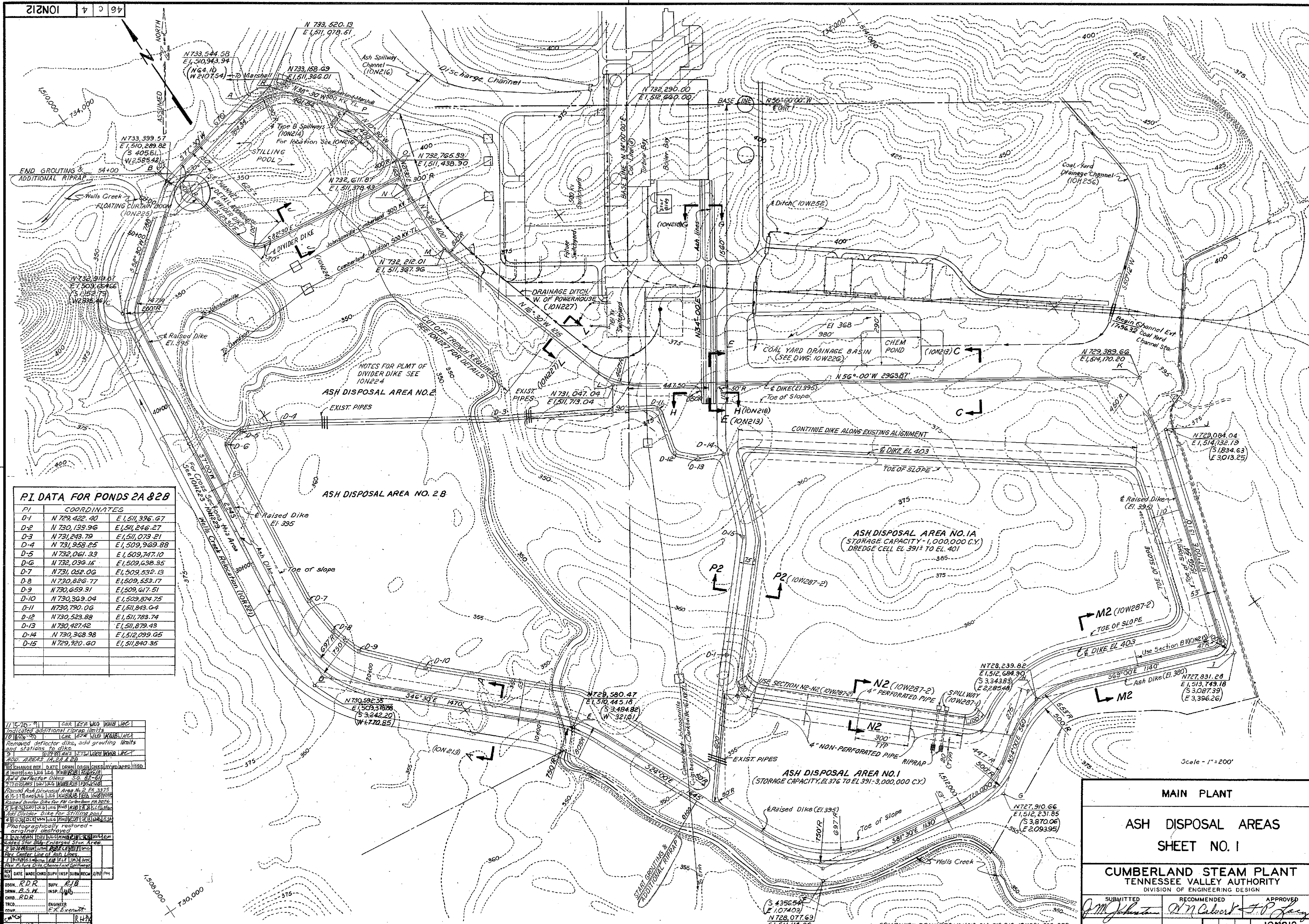
SYMBOLS:
- Standard Pen. Test
- Undisturbed Sample
- Water level, time of drilling
- Water level
- C Caved depth of boring
- Rock Core
- Loss of Water

TEST BORING RECORD

BORING NUMBER B-1
DATE DRILLED December 10, 1991
PROJECT NUMBER 417.91199.05
PROJECT TVA Cumberland Ash Pond
PAGE 1 OF 1

LAW ENGINEERING

ATTACHMENT B
HISTORICAL DRAWINGS



P.I. DATA FOR PONDS 2A & 2B		
PI	COORDINATES	
D-1	N 729,422.40	E 1,511,396.67
D-2	N 730,133.96	E 1,511,246.27
D-3	N 731,243.79	E 1,511,073.21
D-4	N 731,958.25	E 1,509,969.88
D-5	N 732,061.33	E 1,509,747.10
D-6	N 732,036.15	E 1,509,638.35
D-7	N 731,052.06	E 1,509,532.13
D-8	N 730,826.77	E 1,509,553.17
D-9	N 730,659.31	E 1,509,617.51
D-10	N 730,369.04	E 1,509,874.75
D-11	N 730,790.06	E 1,511,843.64
D-12	N 730,523.88	E 1,511,783.74
D-13	N 730,427.42	E 1,511,879.43
D-14	N 730,368.98	E 1,512,099.65
D-15	N 729,920.60	E 1,511,840.35

MAIN PLANT

ASH DISPOSAL AREAS
SHEET NO. 1

CUMBERLAND STEAM PLANT
TENNESSEE VALLEY AUTHORITY
DIVISION OF ENGINEERING DESIGN

SUBMITTED	RECOMMENDED	APPROVED
J. M. Johnston	W. N. Calvert	F. P. Lacy

KNOXVILLE | 1-13-69 | 46 | C | 4 | 10N212 R11

RECORD DRAWING AS CONSTRUCTED 7-24-74