Report of Geotechnical Exploration 2027 NGCC Geotechnical Investigation – Mill Creek Generating Station Louisville, Jefferson County, Kentucky S&ME Project No. 22360136

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April 21, 2023

April 21, 2023

Louisville Gas and Electric and Kentucky Utilities Company
820 West Broadway
Louisville, Kentucky 40202

Attention: Mr. Jeff Heun, P.E.

Reference: **Report of Geotechnical Exploration**
2027 NGCC Geotechnical Investigation
Mill Creek Generating Station
Louisville, Jefferson County, Kentucky
S&ME Project No. 22360136
Contract No. 1124902

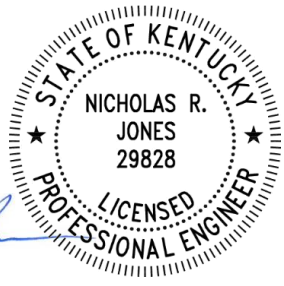
Dear Mr. Heun:

S&ME, Inc. (S&ME) has completed our geotechnical exploration for the planned 2027 NGCC Geotechnical Investigation – Mill Creek Generating Station located in Louisville, Jefferson County, Kentucky. This exploration was performed in general accordance with S&ME, Inc. Proposal No. 22360136 dated November 4, 2022, which was authorized by LG&E KU Services Company (LG&E-KU) on November 22, 2022, with Contract No. 1124902. The purpose of this exploration was to obtain preliminary geotechnical data at the site to support the construction of a new Natural Gas Combined Cycle (NGCC) unit at the existing Mill Creek Generating Station (Mill Creek).

This report explains our understanding of the project, documents our findings, and presents our conclusions and geotechnical engineering recommendations.

Sincerely,

S&ME, Inc.



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Project Engineer

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Report at a Glance

Key geotechnical findings based on our current understanding of the proposed project are presented below. These findings are presented as an overview and should not be used in place of the more detailed recommendations presented in the remainder of this report.

Category	Key Geotechnical Finding
Site Development Challenges	The site is generally consistent with other sites in the area and amenable to the proposed development. Specific geotechnical issues identified on this site that should be considered include: • Coal combustion residuals (CCR) fills; • Large cuts/fills; and • Remediation of soft/loose alluvial soil.
Subsurface Conditions	CCR fills up to 42.5 feet below existing grade, overlying alluvial deposits predominantly consisting of granular deposits. Groundwater ranged from about 50 feet to 70 feet below existing site grades.
Foundation Type	Deep foundations penetrating CCR fills, pile supported mats.
Slab Support	Slab-on-grade with remedial efforts.
Use of Site Soil as Fill	Site soils consist of CCR materials not recommended for use as structural fill.
Construction Dewatering	Construction dewatering may be required for local perched water and surface water infiltration.
Previous Development Impacts	The site was previously developed and currently serves as long term storage for CCR material.
Remedial Grading	Grading plans have not been provided; however, existing site grades indicate possibility of large scale cuts/fills.

1.0 Introduction

S&ME, Inc. (S&ME) is in the process of completing our geotechnical exploration for the planned 2027 NGCC Geotechnical Investigation – Mill Creek Generating Station located in Louisville, Jefferson County, Kentucky. This exploration was performed in general accordance with S&ME, Inc. Proposal No. 22360136 dated November 4, 2022, which was authorized by LG&E KU Services Company (LG&E-KU) on November 22, 2022, with Contract No. 1124902. The purpose of this exploration was to obtain preliminary geotechnical data at the site to support the construction of a new Natural Gas Combined Cycle (NGCC) unit at the existing Mill Creek Generating Station (Mill Creek).

This report explains our understanding of the project, documents our findings, and presents our conclusions and geotechnical engineering recommendations.

2.0 Project Information

Initial information for this project was provided via an email RFP by Mr. Paul Meyer with LG&E-KU on October 29, 2022 and through Zycus. The provided information consisted of a bid package, submittal documentation, and example contract. A list of these documents is listed below.

- 2027 NGCC Geotech Exhibits.pdf including an Exhibit SOW and Technical Specification providing loading information, specifications for sampling and testing, and Site Plans with boring locations and grading for EW Brown -Unit 1-2, EW Brown – Webb Farm, and Mill Creek.
- 2027 NGCC Geotechnical Investigation Contract.docx including a draft Services Authorization dated June 14, 2021.

The following bid forms were also provided for upload to Zycus during the bid process.

- Attachment CE – Bidder Commentary and Exceptions
- Attachment PA – Proposal Authorization
- Attachment RFC – Request for Clarification

In addition to the provided bid information S&ME took part in a pre-bid conference between LG&E-KU and potential bidders via phone on October 24, 2022. A project kick-off meeting to discuss the approved project scope, boring layouts, potential utility conflicts, and schedule was conducted via Zoom on November 18, 2022.

Based on our review of the provided information, we understand LG&E-KU has identified this site for a potential new NGCC unit. Two other sites are also under consideration for NGCC and supporting development at EW Brown Generating Station have been issued under separate cover. LG&E-KU identified eleven (11) borings at Mill Creek to support preliminary geotechnical recommendations for the structures and fills. Table 2.1, on the following page, summarizes the as-drilled locations at or near the locations provided by LG&E-KU. Latitude and longitude represent as-drilled locations, NAD83 Kentucky State Plane North.

Prior to mobilization of drilling equipment, and at the request of LG&E-KU, S&ME walked the site with LG&E-KU Project engineering personnel on November 21, 2022, to confirm access, identify site conditions that may delay drilling, identify potential utility conflicts, and marking boring locations for utility clearance and hydrovacuum excavations. Boring Locations are also presented in Appendix II.

Table 2.1 – Boring Location Summary

Boring Location	Surface Elevation (ft)	Latitude	Longitude	Depth (ft)
B-01	439	38.050764	-85.907452	80.5
B-02	438	38.050699	-85.907291	80.5
B-03	448	38.050632	-85.906825	80.5
B-04	462	38.050553	-85.906477	80
B-05	462	38.050505	-85.906267	80
B-06	461	38.050957	-85.906763	80
B-07	457	38.049996	-85.905256	81
B-08	455	38.050435	-85.905100	81
B-09	462	38.050123	-85.905844	80
B-10	461	38.050435	-85.905734	80.5
B-11	446	38.049834	-85.906565	80.5

Table 2.2 summarizes the expected major structures and loading based on information provided by LG&E-KU with associated boring locations.

Table 2.2 – Structure Summary

Structure	Anticipated Soil Pressure (psf)	Anticipated Footprint (LxW, ft)	Associated Boring Location(s)
Heat Recovery Steam Generator (HRSG) and Stack	6000	210 x 50	B-1
Single Shaft CT/ST/Generator	3500-5000	200 x 50-80	B-2
Turbine Building	4000	185 x 100-150	B-3, B-4, B-5
Gas Compressors	3000-4000	30 x 60	B-6
Cooling Tower Basin	2500	250 x 120	B-7, B-8
Demineralization Tank	3000	40' Diameter	B-9
Fire/Service Water Tank	3000	50" Diameter	B-10
GSU Transformer	3000	70 x 60	B-11
Administration Control Building (PEMB)	3000	80 x 100	-

Existing site elevations within the planned footprint range from El. 438 to El. 462.

3.0 Regional Geology

According to *Geologic Map of the Valley Station Quadrangle and part of the Kosmosdale Quadrangle, North-Central Kentucky*, dated 1972, and *Geologic Map of Kentucky*, 1981, the site is located in the Outer Bluegrass Region of Kentucky within Wisconsinan aged Glacial Outwash deposits consisting of clay, silt, sand, and gravel. Our borings generally encountered previously placed coal combustion residuals (CCR), or coal ash, at the surface and extending to elevations ranging from El. 415 to El. 439.5. Bedrock is estimated to range from about El. 350 to El. 320 and was not encountered in our exploration to elevations ranging from El. 357.7 to El. 382.0. Soil conditions underlying the fills were consistent with the reported geologic conditions for the site.

3.1 Review of Flood Hazards

A review of the FEMA National Flood Hazard Layer Map (https://www.fema.gov/flood-maps/national-flood-hazard-layer) indicates that each of the borings are located in FEMA Zone X, areas outside of the Special Flood Hazard Area (SFHA) and higher than the elevation of the 0.2-percent-annual-chance flood event generally determined using approximate methodologies. 100-year flood elevation data was not available for the site (borings B-1 through B-11). The FEMA map is shown in Figure 3.1 on the following page, with project location indicated in red.

Figure 3.1 – FEMA National Flood Hazard Layer Map

3.2 Review of Earthquake and Seismic Activity

The site is located approximately 100 miles east-southeast of the Wabash Valley Fault Zone. Additionally, the site is 190 miles northeast of the New Madrid Fault Zone. The Louisville, Kentucky area has experienced some earthquake activity within recent record keeping history. Within approximately 100 miles of this site, seismic events (magnitude 2.5+) have been recorded to range in magnitude from 2.5 to 4.9 between 1834 and 2023 (earthquake.usgs.gov) as shown in Figure 3.2 on the following page.

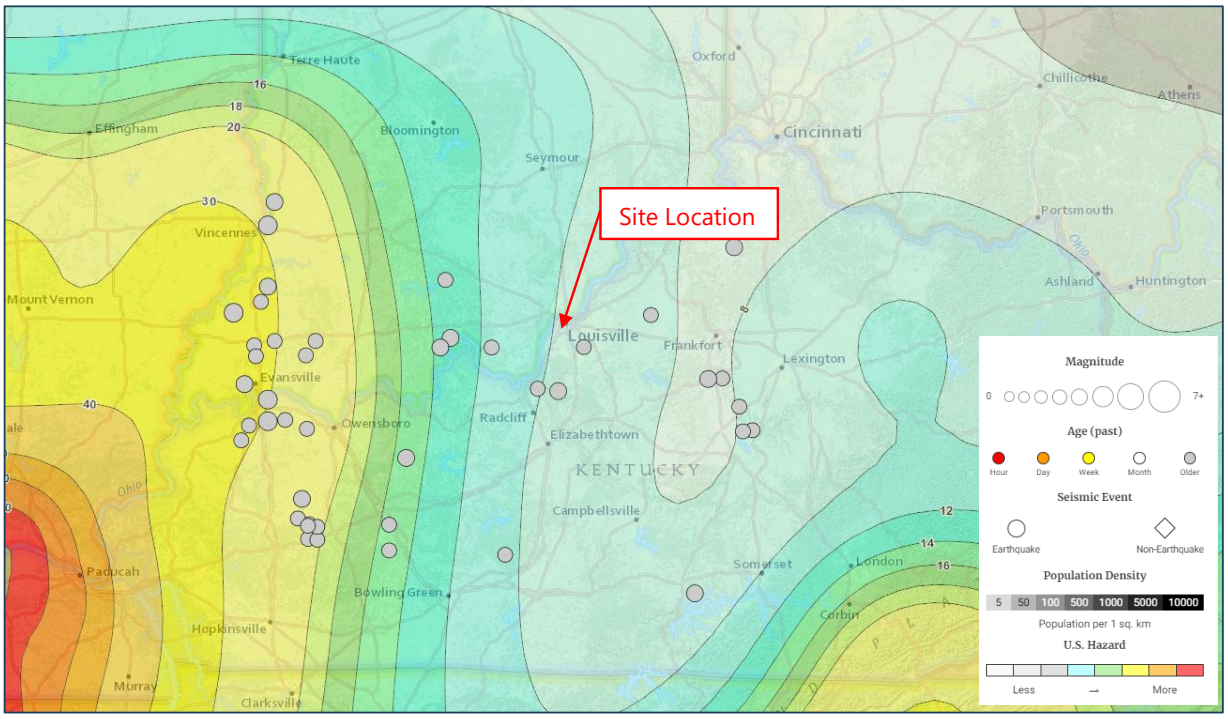

Figure 3.2 – Recent Seismic Activity

4.0 Exploration and Testing

The procedures used by S&ME for field and laboratory sampling and testing are in general accordance with ASTM procedures and established engineering practice. Appendix II contains brief descriptions of the procedures used in this exploration.

4.1 Site Surface Conditions

Information provided by LG&E-KU indicates the area underlying borings B-3 through B-11 serves as long term storage for Coal Combustion Residual (CCR) materials. This area is currently grass covered and generally flat on top, sloping down to the surrounding surface. B-3 and B-11 were advanced near the toe of the slope. Available aerial imagery shows the site was used for storage or staging for past construction activity. Borings B-1 and B-2 are within the existing coal pile area, which is generally flat and covered with mounded coal.

Existing elevations within the planned footprint range from approximately El. 438 to El. 441 (within the coal pile area) and El. 443 to El. 462 for the remaining portions.

4.2 Field Exploration

A total of eleven (11) soil test borings (labeled B-1 through B-11) were performed for this geotechnical exploration. The original planned CPT soundings encountered early refusal within CCR materials (B-3, B-5, B-6, and B-11) or dense alluvial deposits (B-1 and B-2). Borings were located in the field using handheld GPS equipment. Boring offsets due to utilities, obstructions, or difficulty drilling are shown as-drilled in the tables and figures of this report. Note Greg Wilson (LG&E-KU PE) permitted sampling at 5-foot intervals through the CCR materials in B-06 and Dan Sorg (LG&E-KU PE) permitted SPT sampling to begin at 40 feet (CPT depths) in borings B-1 and B-2.

The borings were advanced by a track-mounted Diedrich D-120 or CME-55 drill rig using 3 ¼ inch I.D. hollow stem augers. Soil samples were obtained using a split-barrel sampler driven by an automatic hammer system in general accordance with ASTM D1586. A general description of our field procedures, a test boring log legend, Boring Logs and CPT Logs are provided in Appendix II of this report. The stratification lines shown on the Boring Logs represent the approximate boundaries between soil types. The actual transitions may be more gradual than shown.

Boring coordinates and termination depths are summarized previously in Table 2.1. The approximate locations of the borings are shown on the Boring Location Plan (Figure 2) in Appendix I. Boring elevations were estimated from available topographic information.

We measured the groundwater level in each boring upon completion and prior to backfilling the borehole with bentonite-grout. Observed groundwater levels at the time of our exploration are shown in the following section.

4.2.1 Field Resistivity Testing

On November 30, 2022, we performed field soil resistivity testing at the requested location in general accordance with ASTM G57 "Standard Test Method for Field Measurement of Soil Resistivity using the Wenner Probe Four-Electrode Method" using an Advanced Geosciences Incorporated, Inc. (AGI) R8 SuperStingTM resistivity meter, which is calibrated annually by the manufacturer.

The soil resistivity testing consisted of a single pair of perpendicular linear arrays using a Wenner configuration at the ER-1 test location (as shown on Figure 2 in Appendix I). The ER-1 test array was generally oriented northwest-southeast and southwest-northeast (Lines A and B, respectively) and used an electrode ("a") spacing of 2.5, 5, 10, 15, 20, and 30 feet to determine the resistivity at increasing depths. The eighteen-inch stainless steel electrodes used for the surveys were inserted 4 to 12 inches into the ground, and soil conditions were noted at the survey location.

The results of the soil resistivity survey are provided in the attached tabulated spreadsheet "22360136_Mill Creek_Resistivity Data Sheet_ER-1," which presents the "a" spacing (feet and cm), electrode depth (inches), and associated calculated resistance (ohms), apparent resistivity (ohm/cm and ohm/ft), injected current (mA), and standard deviation.

Regardless of the thoroughness of a geophysical survey, there is always a possibility that actual conditions may not match the interpretations. The results should be considered accurate only to the degree implied by the methods used and the method's limitations and data coverage. The geophysical method used for this survey also has inherent limitations. Buried site metallic features (e.g., utilities, etc.) and overhead transmission lines can produce excessive noise and/or false responses in resistivity data.

4.3 Groundwater

Groundwater was encountered in each of the borings during the time of drilling and additional measurements were taken at the completion of each boring. Table 4.2, on the following page, summarizes our groundwater findings at the site.

Table 4.2 – Groundwater Summary

Boring No.	Depth During Drilling (ft)	Depth at Completion (ft)	Top of Boring Elevation (ft)	Groundwater Elevation at Completion (ft)
B-1	8.0 [1]	12.0 [2]	439	427
B-2	>30 [3]	Not Measured [3]	438	<408
B-3	54.0	50.0	448	398
B-4	70.0	70.0	462	392
B-5	70.0	70.0 [4]	462	392
B-6	68.0	70.0	461	391
B-7	58.0	56.0	457	401
B-8	58.0	54.0	455	401
B-9	68.0	66.0	462	396
B-10	64.0	62.0	461	399
B-11	45.0	50.0	446	396

Note:
1. Possibly perched water related to the adjacent ditch.
2. Reading taken after use of drilling fluid and may not reflect an accurate groundwater level.
3. Water level not measured due to use of drilling fluid beginning at 30 feet below existing grade.
4. Groundwater not encountered on subsequent reading due to soil cave in.

Groundwater readings in B-3 through B-11 are believed to be connected to the Ohio River levels. However, seasonal and periodic variations in precipitation as well as fluctuations in the adjacent Ohio River can affect the observed water level conditions. Long-term static groundwater readings can be obtained with the installation and periodic monitoring of piezometers.

4.4 Laboratory Testing

4.4.1 Classification Testing

Soil samples collected during the field exploration were transferred to our soil laboratory, where a geotechnical engineer or geologist visually examined each sample to estimate the distribution of grain-sizes, plasticity, organic content, moisture condition, color, presence of lenses and seams and apparent geological origin. The soil samples were classified according to the Unified Soil Classification System (ASTM D2487). The results of the classifications, as well as the field test results, are presented on the individual Boring Logs in Appendix II. Similar soils were grouped into strata on the logs and summarized in Section 4.1.

Selected spilt-spoon samples were assigned laboratory testing including:

- Natural Moisture Content (ASTM D2216)
- Atterberg Limits (ASTM D4318)
- Hydrometer Analysis (ASTM D422)

Classification and index testing were performed on select samples in general accordance with ASTM Standard testing procedures. The laboratory testing results are summarized in Tables III-1, III-2, and the Summary of Laboratory Test Data in Appendix III. Testing on CCR materials is indicated in table notes. Individual data sheets are also available in Appendix III.

4.4.2 Resistivity, pH, and Chemical Testing

Two (2) representative soil specimens were selected for chemical testing, including for pH, soluble sulfates, sulfides, chloride ion, and oxidation reduction (redox) potential. Chemical testing has been summarized in Table III-2 and Table III-3 in Appendix III along with individual chemical testing results. Data presented in this section is considered informational only. Interpretation and evaluation of these data are beyond our scope. S&ME recommends consulting with a qualified corrosion engineer.

The test results for resistivity, pH and chemical analysis are included in the Summary of Laboratory Test Data and on data sheets in Appendix III. Appendix III also contains an excerpt from the Ductile Iron Pipe Research Association (DIPRA), which is often used to help evaluate the corrosion potential for underground metal pipes, (Figure III-1), ACI 318-11 Requirements for Concrete Exposed to Sulfates (Figure III-2), and the American Concrete Institute (ACI) 318 Table 19.3.1.1 – Exposure Categories and Classes (Figure III-3). These figures are provided for reference only.

5.0 Subsurface Conditions

The following is a general description of subsurface conditions encountered in the borings. Detailed information is provided on the individual Boring Logs included in Appendix II. Fence diagrams are also included in Appendix II.

The borings were advanced through surface materials consisting of coal or topsoil into the underlying fills, generally consisting of CCR materials, and terminating in granular alluvial deposits.

5.1 Surface Materials

Borings B-1 and B-2 were conducted within the coal pile area, and advanced through coal. The remaining boring locations were advanced through grass covered surfaces which varied in thickness up to about 18 inches, as measured from the edge hydrovacuum excavation.

5.2 Fill Soils (CCR – Silty Sands (SM), Lean to Sandy Clays (CL))

Beneath the surficial topsoil, borings B-4 through B-10 generally encountered CCR materials ranging in depth from approximately 32.0 to 42.5; B-3 and B-11 encountered CCR materials to depths of 18.5 and 14 feet, respectively. These depths correspond to an average elevation of approximately El. 424 (El. 414.5 to El 432). CCR materials were laboratory classified as silty sand (SM) and described as dark gray with consistencies ranging from loose to very dense, although generally ranging from medium dense to dense. Several samples were also reported as very loose; however, these samples were conducted at the surface or bottom of the hydrovacuum excavation and were exposed to surface water prior to sampling. Thin layers of lean to sandy clay (CL) with sand lenses were encountered both above and below the CCR and may have served as a clay liner.

5.3 Alluvial Soils (SM, SP-SM, SP, GM, CL)

Poorly graded Sands with Silt (SP-SM) with varying amounts of gravel were the most predominant soils encountered in the borings. These soils were encountered in all the borings below the fills, or below the no sampling zone in B-1 and B-2 and extending to termination ranging from depths of 80.0 feet to 81.0 feet. These materials were generally brown in color with Standard Penetration Test (SPT) N-values recorded from 7 blows per foot (bpf) to 50 blows for 4 inches, indicating loose to very dense relative densities and medium stiff to stiff consistencies. Very soft and very loose materials were also reported at the beginning of sampling in B-1 and B-2; however, these soils were likely disturbed by the process of adding drilling fluid.

6.0 Site Seismicity

Based on the subsurface stratigraphy encountered at the project site between ground surface and estimated to 100 feet below existing grade, it is the opinion of S&ME that this site is best characterized by International Building Code Site Class D based on average N-values ($\overline{N}$) and shear wave velocities ($\overline{V}_s$) determined by downhole seismic testing performed near boring B-5. Table 6.1, on the following page, summarizes site coefficients and spectral response parameters for this site referencing ASCE 7 design code and considering Risk Category II.

Table 6.1 – Site Coefficients and Spectral Response Acceleration Parameters

Boring	Site Class	S_s	S_1	F_a	F_v	PGA_M	S_{DS}	S_{D1}
General Site	D	0.223g	0.112g	1.6	2.351	0.166	0.238g	0.176g

6.1 Downhole Seismic Geophysical Services

On March 23, 2023, we performed a downhole seismic survey within boring *B-05* in general accordance with ASTM D7400 "*Standard Test Methods for Downhole Seismic Testing"* using a Geometrics seismograph and 14 Hz downhole triaxial geophone. Energy for the seismic survey was generated by a 16-pound sledgehammer striking opposing ends of a wooden plank for obtaining surface wave measurements and a metal plate for P-wave measurements. Seismic velocities were obtained to a depth of about 95 feet for *B-05* using recorded depth intervals of 3 feet. Data analysis was conducted using the OYO Corporation's SeisImager™/SW software (*Pickwin™*) and the resulting shear wave velocity profiles for *B-05* are presented in Appendix II.

Regardless of the thoroughness of a geophysical survey, there is always a possibility that actual conditions may not match the interpretations. The results should be considered accurate only to the degree implied by the method used and the method's limitations and data coverage. In addition, site activity (e.g., heavy traffic, etc.) and overhead powerlines can cause noise/interference in downhole seismic data sets.

6.2 Liquefaction Potential

For a Site Class D, the site-modified peak ground acceleration (PGA_M) for the Maximum Considered Earthquake (MCE_G) is 0.166g. Per the USGS deaggregation tool (https://earthquake.usgs.gov/hazards/interactive/), the modal magnitude for the MCE_G is 7.77. Accordingly, our liquefaction triggering analyses used PGA_M = 0.166g and M = 7.77.

6.2.1 Screening

The simplified method for liquefaction triggering evaluation is only applicable for sand-like soils that are saturated. Additionally, the evaluation procedure is premised on field performance data where a "critical" layer is identified. The critical layer is at least several feet thick. Accordingly, the following soils were screened out of our triggering analyses:

1. Any unsaturated soils (i.e., soils above the water table).
2. Clay-like soils, defined as having a plasticity index (PI) of 7 or greater and/or a material index (I_C) of 2.6 or greater.
3. Isolated thin layers defined as less than 2 ft thick.

6.2.2 Triggering Analyses

Liquefaction is generally defined as the loss of a soil's shear strength due to the increase in porewater pressure resulting from seismic shaking (i.e., cyclic shearing). The potential consequences of liquefaction include settlement, bearing capacity failure, global instabilities, and lateral spreading.
Soils susceptible to liquefaction display sand-like behavior and generally consist of loose, saturated sands and low-plasticity silts. Boulanger and Idriss (2006)[1] demonstrates there is a narrow soil behavior transition zone between sand-like and clay-like behavior and suggest a plasticity index (PI) reference value of 7 be used for screening purposes. In other words, soils with PI values of less than 7 are considered to display sand-like behavior and susceptible to liquefaction. Accordingly, we initially screened the soils encountered at the site for liquefaction potential using these criteria.

Loose sandy or silty materials were encountered in our exploration; however, these materials are unsaturated (above the water table) and are not considered potentially liquefiable. Therefore, we do not consider liquefaction to be a design concern and Seismic Site Class D remains applicable.

7.0 Discussion and Recommendations

Based on the conditions encountered and the expected foundation types, S&ME has identified some areas that may require additional contractor design and constructions considerations.

7.1 Construction

7.1.1 CCR Fills

Coal combustion residual (CCR) materials (i.e., commonly known as POZ-O-TEC) were encountered in the upper 14 to 42.5 feet and were generally classified as silty sand (SM) based on laboratory gradations. Corrosion series testing was also performed with results presented in Appendix III. These fills varied in relative density from very loose to very dense, which may lead to differential settlements, reduced lateral support, or reduced bearing resistances. Additional soil preparation, modification, or amendment may be required to support structural loading and foundation design.

7.1.2 Site Grading

Preliminary grading plans were not provided; however, based on the existing surface elevations significant cuts or fills may be needed to obtain planned grades.

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[1] Boulanger, R. W., and Idriss, I. M. (2006), "Liquefaction Susceptibility Criteria for Silts and Clays", *Journal of Geotechnical and Geoenvironmental Engineering*, ASCE, V. 133, Issue 6, pp. 641-652.

7.1.3 Soft/Loose Alluvial Soil

Loose alluvial soils were encountered throughout our borings ranging in depth and thickness underlying the CCR materials. These loose zones may also lead to reduced bearing resistance, loss of lateral support, or difficulty during construction of deep foundations. Additional, structure specific, testing may be needed to identify or isolate these zones for final foundation recommendations.

7.2 Site Preparation

NGCC construction footprint encompasses a portion of the existing coal pile, existing drainage features, and utilities in the area. Recommendations for the relocation of existing utilities is beyond the scope of this report.

7.2.1 Stripping

Initial site preparation will include stripping of topsoil, root balls, and other vegetation as well as loose surface materials and encountered coal in the area of B-1 and B-2.

7.2.2 Removal of Existing Structures

Existing structures and utilities are present near borings B-1 and B-2, and previous site storage is evident from past aerials for much of the remaining locations. Some near surface construction debris may be encountered. Any structures encountered during grading should be demolished and removed, including shallow foundations, and backfilled with engineered fill.

7.2.3 Proofrolling

Following stripping, undercutting of any unstable surface soils, and/or necessary excavation to obtain the design subgrades, the exposed subgrade should be thoroughly proofrolled with a heavily loaded tandem-axle dump truck or similar rubber-tired equipment under the observation of the Geotechnical Engineer. The proofrolling will help reveal the presence of unstable or otherwise unsuitable surface materials through pumping and rutting. Areas that are unstable should be undercut as recommended by the Geotechnical Engineer. Further evaluation with hand auger borings and/or backhoe excavated test pits could also be required if unexpected conditions are encountered or for areas not accessible to proofrolling equipment.

7.3 Excavation

Excavation of near surface on-site soils will primarily consist of medium dense to dense granular soils. Sloughing and caving should be anticipated. All excavations should be laid back or braced in accordance with the most recent OSHA excavation rules and regulations (OSHA 29 CFR Part 1926). The contractor is solely responsible for site safety. This information is provided only as a service and under no circumstances should S&ME be assumed to be responsible for construction site safety.

7.3.1 Groundwater Considerations

Groundwater was encountered in borings B-3 through B-11 at the time of drilling and should be anticipated during excavations or soil augering. We anticipate groundwater, if encountered, will most likely be present at or about Ohio River elevations. Therefore, drilled shafts will likely require "wet method" installation using slurry or polymers, at the discretion of the contractor/LG&E-KU. Groundwater encountered in Borings B-1 and B-2 was likely perched above clayey materials encountered to depths of up to 37 feet and may also be attributed to the drainage ditch to the north and east.

For any shallow excavations, if pumping from a system of sumps and pumps cannot sufficiently maintain the water level below the plan bearing elevations, then more extensive dewatering techniques, such as wells or well-point system may be necessary for dewatering. S&ME recommends that construction dewatering and the release of pumped groundwater be performed in accordance with all applicable Federal, State, and Local requirements.

7.3.2 Structural Fill Placement

Undercut areas and/or areas requiring structural fill, should be raised to the design subgrade elevation with materials with the following minimum requirements:

- Fill should be free of deleterious materials and rock fragments greater than 4 inches in diameter;
- Uniformly spread in 6- to 8-inch thick loose lifts;
- Clay soil used as fill should be compacted to at least 95 percent of the soil's maximum dry density, as determined by a laboratory Modified Proctor compaction test (ASTM D-1557). See Appendix III for our laboratory results;
- If a clean granular soil (sand) is used as fill, it may not be possible to determine a maximum unit weight using ASTM D-698/1557. In this case, soils should be tested in accordance with ASTM D-4254, and a minimum relative density of 85% should be achieved or compaction should be controlled by test strips in the field at the time of placement;
- The moisture content should be controlled to within +/- 2 to 3 percent of optimum moisture content, depending on the moisture-density curve of the specific soil being placed.
- Fill placement should be monitored by a qualified Materials Technician working under the direction of the Geotechnical Engineer. In addition to this visual evaluation, the Technician should perform a sufficient amount of in-place field density tests to confirm that the required degree of compaction is being attained.
- Settlement plates may also be needed based on planned fill heights. The final determination of whether settlement plates and monitoring are needed should be determined after final grades are established. At that time, the final geotechnical exploration and design should include the number of settlement plates and locations.

Slope stability analyses should be performed on planned fill or cut slopes.

7.3.3 Use of Excavated Soils as Fill

The existing CCR materials near the surface are not currently planned for use as fill. Therefore, compaction testing was not performed on bulk samples obtained during drilling.

7.3.4 Use of Off-Site Borrow Materials as Fill

Imported fill used for site grading should consist of a clean (free of organics and debris), low plasticity soil (Liquid Limit less than 50, Plasticity Index less than 15) with moist (total) unit weight of at least 100 pcf and be evaluated by a Geotechnical Engineer prior to use. Depending on subgrade stability and the amount of borrow material needed, crushed stone, such as DGA, could be required.

7.4 Foundation Recommendations

The following recommendations are considered **preliminary** based on the information available at this time.

7.4.1 Dilled Shafts

The tables attached in Appendix IV of this report present design parameters for axial capacity analyses and lateral (LPILE) analyses. These parameters are also applicable to micropiles or auger cast-in-place (ACIP) piles and should be used by the structural engineer to determine the final depth of embedment coupled with the recommendations given in this report.

Drilled shafts will develop axial capacity from a combination of skin friction along the length of the pile and end bearing at the tip. The soil coefficients used in our axial capacity analyses were developed using published correlations relating soil skin friction and end bearing unit capacities to SPT N-values, and our experience with similar projects/foundations in similar geologic settings. The uplift capacity for shafts can be determined using the dead load of the deep foundation unit and the skin friction values along the sides of the foundation. The buoyant unit weight of concrete should be used below the groundwater levels as noted on each provided table.

Skin friction calculations are cumulative, generally neglecting the upper three (3) to four (4) feet. The provided net allowable bearing pressure and allowable skin friction values are based on a factor of safety of at least 3.0 and 2.0, respectively, with the understanding that load testing will not be performed. Structural capacity of drilled shafts should be evaluated by a structural engineer.

Drilled shaft design parameters were provided with the following considerations:

- Tip elevations for the drilled shaft foundations are expected to extend through the CCR materials into the underlying alluvial sands and gravels. See the Axial Capacity/LPILE Tables presented in Appendix IV of this report with recommended soil parameters.
- Lateral analyses will be performed by others using the geotechnical parameters provided in the attached Axial Capacity/LPILE Tables located in Appendix IV. These parameters may be used to perform analyses using the LPILE computer program. Some of the parameters may not be required,

depending on the version of the program being used. Lateral capacity analysis for foundation elements was beyond the scope of our services and have not been conducted.

7.4.2 Micropile Foundations

Based on our experience in the area and understanding of the project, we anticipate micropiles extending into medium dense to dense alluvial sands and gravels can be utilized for deep foundation support at the site. Micropiles are small (typically less than 12-inch) diameter, reinforced, low displacement grout-in-place piles. Typical installation of micropiles requires the installation and advancement of temporary, or permanent, casing and drilling tools through weaker soil strata or fill soils to bearing depth. The casing is then tremie grouted and reinforced with a rebar cage or single large diameter steel bar to provide lateral support to the pile. The pile is then typically grouted under pressure and the casing is retracted forming a grout to ground bond zone, depending on the type and use of the micropile, the casing may be plunged into the grout zone for additional lateral reinforcement. Pile support is primarily achieved by the frictional grout to ground resistance along the uncased portion of the pile to the adjacent soil. Due to the installation method, tip resistance is typically a small percentage of the total load carrying capacity. Additionally, significantly more downward movement of the pile is required to mobilize the tip resistance in comparison to the side shear resistance. As such, it is recommended that only the side shear resistance of the pile be used to estimate the required depth of the pile.

Micropile design parameters were provided with the following considerations:

- Micropile foundations for the planned structures should extend through the site fills to bear within the medium dense to dense underlying alluvial materials. For the purpose of this report, side resistance between pile and existing CCR fills (up to 42.5 feet below existing grade) has been reduced.
- S&ME performed analyses for the use of micropiles to support the planned NGCC structures in general accordance with the procedures and guidance provided in FHWA NHI-05-039 "Micropile Design and Construction" as published by the Federal Highway Administration (FHWA) in December 2005; however, detailed loading information is not available. Our recommended axial resistances and lateral design parameters presented for these foundations are based on our laboratory evaluation of the on-site soils and our experience with similar projects/foundations in similar geologic settings. Appendix IV presents general design parameters for axial capacity analyses and lateral (LPILE) analyses, to be performed by others.
- Micropiles should also be spaced at least 3-diameters (3D) from the nearest adjacent micropile and at least 6D from the nearest ACIP.
- We recommend micropiles be installed as Type B pressure grouted piles. Casing may either be temporary or permanent based on the lateral design; however, pile design will be the responsibility of the pile contractor.

7.4.3 Auger-Cast Pile Foundations

Auger-cast piles are installed by a continuous auger being bored into the existing ground. During augering, the rotational speed is attempted to be optimized to bring as few cuttings to the surface so that instead the cuttings are pushed against the sidewalls of the borehole to maintain sidewall stability as well as to strengthen the sidewall

for the eventual pile. Upon reaching the required depth, grout is pumped under pressure out of the bottom of the auger and the auger and cuttings are withdrawn while the borehole is filled with the grout mixture. In most cases, either a rebar cage or single large diameter rebar is placed in the grout to provide lateral support to the pile. Pile support is primarily achieved by the frictional resistance along the sidewall of the pile to the adjacent soil. Resistance at the pile tip is also provided; however, due to the installation method, tip resistance is typically a small percentage of the total load carrying capacity. Additionally, significantly more downward movement of the pile is required to mobilize the tip resistance in comparison to the side shear resistance. As such, it is recommended that only the side shear resistance of the pile be used to estimate the required depth of the pile.

The natural sandy and gravelly alluvial soils are well suited for construction of auger-cast pile foundations.

ACIP design parameters were provided with the following considerations:

- Tip elevations for the ACIP foundations are expected to extend through the CCR materials into the underlying alluvial sands and gravels. See the Axial Capacity/LPILE Tables presented in Appendix IV of this report with recommended soil parameters.
- Lateral analyses will be performed by others using the geotechnical parameters provided in the attached Axial Capacity/LPILE Tables located in Appendix IV. These parameters may be used to perform analyses using the LPILE computer program. Some of the parameters may not be required, depending on the version of the program being used. Lateral capacity analysis for foundation elements was beyond the scope of our services and have not been conducted.

7.4.4 Shallow Foundation Support

Based on the CCR materials encountered throughout the site, we recommend undercutting shallow foundations to bear on engineered fill. Foundations should then be sized to limit total settlement to less than 1-inch and differential settlement to less than ½-inch.

7.4.5 Slabs-on-Grade

Slabs on grade should be evaluated individually based on dimensions of the planned floor area, expected deformation, and final grade elevation. Based on the soils encountered onsite, we recommend slabs on grade bear on a compacted granular aggregate overlying newly placed and compacted, engineered fill.

7.4.6 Retaining Walls and Sub-Level Walls

Available plans do not provide details concerning retaining walls or sub-levels; however, below-grade portions of proposed structures, or walls acting as retaining walls, should be designed to withstand lateral earth pressures, as well as hydrostatic pressures, which may develop behind the walls. If it is anticipated that the walls of the proposed structures will be fixed at both the top and bottom preventing significant lateral deflections or rotations from occurring, then an "at-rest" earth pressure condition exists. If the walls can deflect a distance of at least 0.1 percent of their height, then an "active" earth pressure condition may be assumed for design purposes. The

magnitude of lateral earth pressures varies based on soil type, permissible wall movement, and configuration of backfill.

Because cohesive soils and granular soils with significant clay content can cause high magnitudes of lateral loads due to creep and swelling pressures, it is recommended that these materials not be used to backfill against below-grade walls. It is recommended that a free-draining granular material such as dense-graded aggregate (DGA) or a coarse angular gravel such as No. 57 limestone, be used as backfill against below-grade walls. This granular zone should be drained so that hydrostatic pressures do not develop against the wall, otherwise, the wall should be designed for hydrostatic loading. Additionally, we recommend granular backfill be placed at a minimum in a wedge formed by the back of the wall and a line rising from the base of the wall at a maximum 60-degree angle from the horizontal. It is unknown at this time what material type will be used behind the below-grade walls. Design parameters for the various conditions are presented in Table 7.2 below.

Table 7.2 – Lateral Earth Pressure Coefficients

Material	Unit Weight (γ, pcf)	Effective Friction Angle (Φ')	Active (K_a)	At-Rest (K_o)	Passive (K_p)
In-situ Sands	120 to 125	32°	0.31	0.47	3.25
Compacted No. 57 Stone	125	40°	0.22	0.36	4.60

It is likely temporary shoring will be needed for below-grade excavations especially where excavations are adjacent to and potentially extend below existing structures. The design of temporary shoring is beyond the scope of our work.

8.0 Limitations of Report

This report has been prepared in accordance with generally accepted geotechnical engineering practice for specific application to this project. The conclusions and recommendations contained in this report are based upon applicable standards of our practice in this geographic area at the time this report was prepared. No other representation or warranty either express or implied, is made.

We relied on project information given to us to develop our conclusions and recommendations. If project information described in this report is not accurate, or if it changes during project development, we should be notified of the changes so that we can modify our recommendations based on this additional information if necessary.

Our conclusions and recommendations are based on limited data from a field exploration program. Subsurface conditions can vary widely between explored areas. Some variations may not become evident until construction.

conditions are encountered which appear different than those described in our report, we should be notified. This report should not be construed to represent subsurface conditions for the entire site.

S&ME should be retained to perform a final geotechnical exploration and to review the final plans and specifications to confirm that earthwork and other recommendations are properly interpreted and implemented.

For more information on the use and limitations of this report, please read the Geoprofessional Business Association (GBA) document that follows this page.

Important Information About Your

Geotechnical Engineering Report

Variations in subsurface conditions can be a principal cause of construction delays, cost overruns and claims. The following information is provided to assist you in understanding and managing the risk of these variations.

Geotechnical Findings Are Professional Opinions

Geotechnical engineers cannot specify material properties as other design engineers do. Geotechnical material properties have a far broader range on a given site than any manufactured construction material, and some geotechnical material properties may change over time because of exposure to air and water, or human activity.

Site exploration identifies subsurface conditions at the time of exploration and only at the points where subsurface tests are performed or samples obtained. Geotechnical engineers review field and laboratory data and then apply their judgment to render professional opinions about site subsurface conditions. Their recommendations rely upon these professional opinions. Variations in the vertical and lateral extent of subsurface materials may be encountered during construction that significantly impact construction schedules, methods and material volumes. While higher levels of subsurface exploration can mitigate the risk of encountering unanticipated subsurface conditions, no level of subsurface exploration can eliminate this risk.

Geotechnical Findings Are Professional Opinions

Professional geotechnical engineering judgment is required to develop a geotechnical exploration scope to obtain information necessary to support design and construction. A number of unique project factors are considered in developing the scope of geotechnical services, such as the exploration objective; the location, type, size and weight of the proposed structure; proposed site grades and improvements; the construction schedule and sequence; and the site geology.

Geotechnical engineers apply their experience with construction methods, subsurface conditions and exploration methods to develop the exploration scope. The scope of each exploration is unique based on available project and site information. Incomplete project information or constraints on the scope of exploration increases the risk of variations in subsurface conditions not being identified and addressed in the geotechnical report.

Services Are Performed for Specific Projects

Because the scope of each geotechnical exploration is unique, each geotechnical report is unique. Subsurface conditions are explored and recommendations are made for a specific project.

Subsurface information and recommendations may not be adequate for other uses. Changes in a proposed structure location, foundation loads, grades, schedule, etc. may require additional geotechnical exploration, analyses, and consultation. The geotechnical engineer should be consulted to determine if additional services are required in response to changes in proposed construction, location, loads, grades, schedule, etc.

Geo-Environmental Issues

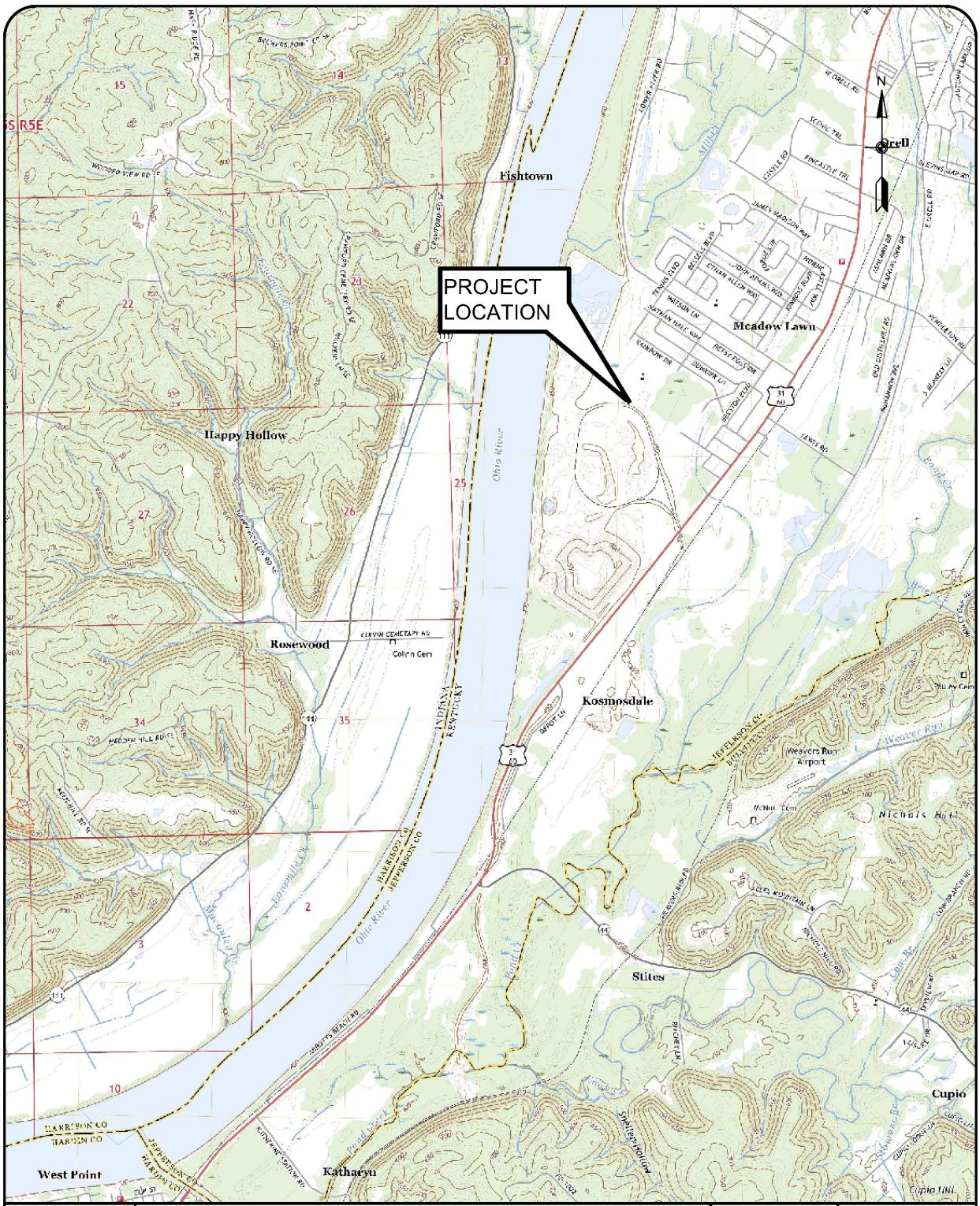
The equipment, techniques, and personnel used to perform a geo-environmental study differ significantly from those used for a geotechnical exploration. Indications of environmental contamination may be encountered incidental to performance of a geotechnical exploration but go unrecognized. Determination of the presence, type or extent of environmental contamination is beyond the scope of a geotechnical exploration.

Geotechnical Recommendations Are Not Final

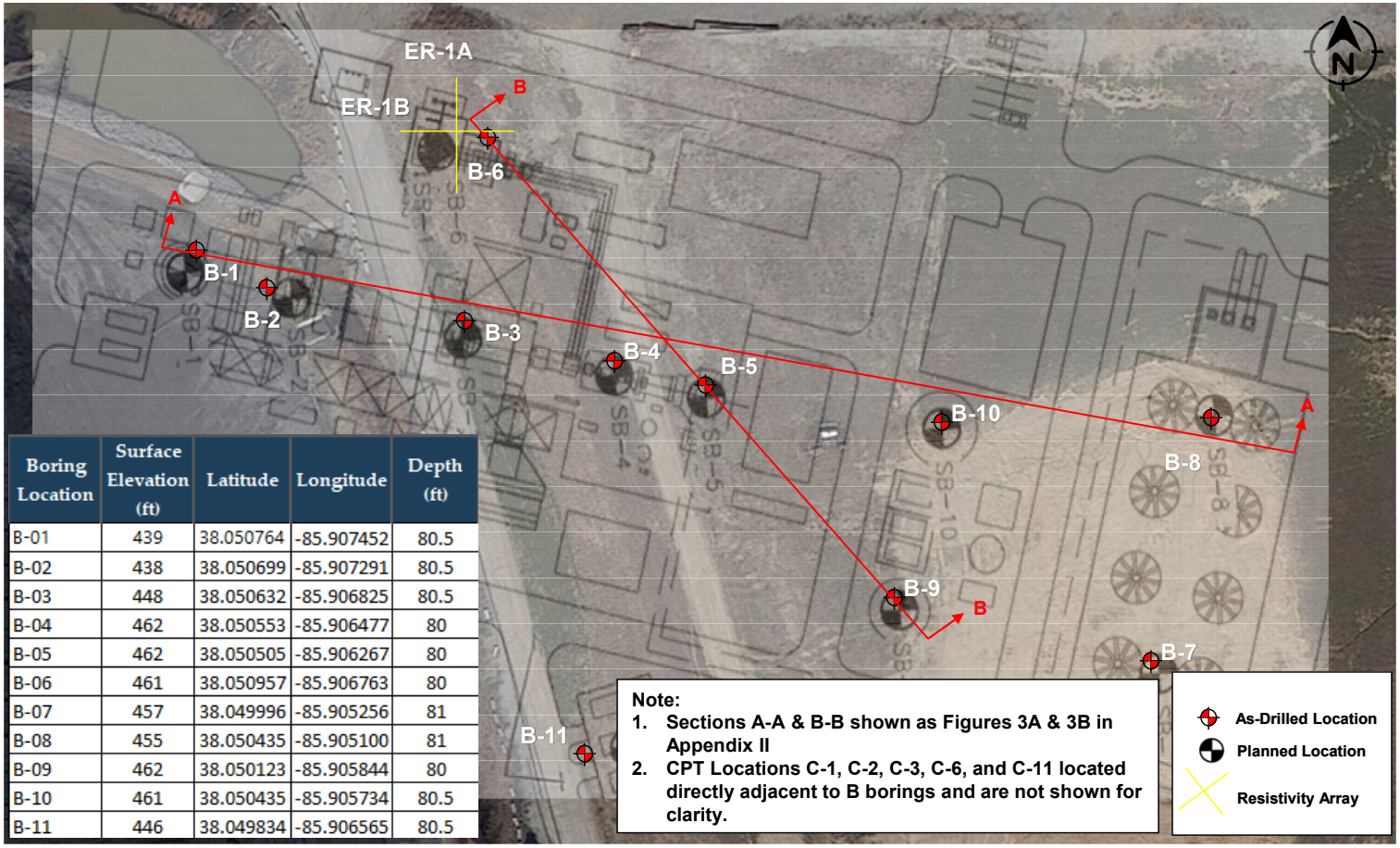
Recommendations are developed based on the geotechnical engineer's understanding of the proposed construction and professional opinion of site subsurface conditions. Observations and tests must be performed during construction to confirm subsurface conditions exposed by construction excavations are consistent with those assumed in development of recommendations. It is advisable to retain the geotechnical engineer that performed the exploration and developed the geotechnical recommendations to conduct tests and observations during construction. This may reduce the risk that variations in subsurface conditions will not be addressed as recommended in the geotechnical report.

Appendices

Appendix I – Site Location Map / Boring Location Plan



	Project Location Map	SCALE:	FIGURE NO.
	Project: 2027 NGCC Geotechnical Investigation Mill Creek Generating Station Louisville, Jefferson Co., Kentucky	NTS DATE: 01/27/2023	1
	Client:Louisville Gas and Electric and Kentucky Utilities Company	PROJECT NUMBER 22360136	



Boring Location	Surface Elevation (ft)	Latitude	Longitude	Depth (ft)
B-01	439	38.050764	-85.907452	80.5
B-02	438	38.050699	-85.907291	80.5
B-03	448	38.050632	-85.906825	80.5
B-04	462	38.050553	-85.906477	80
B-05	462	38.050505	-85.906267	80
B-06	461	38.050957	-85.906763	80
B-07	457	38.049996	-85.905256	81
B-08	455	38.050435	-85.905100	81
B-09	462	38.050123	-85.905844	80
B-10	461	38.050435	-85.905734	80.5
B-11	446	38.049834	-85.906565	80.5

Boring Location Plan

Mill Creek Generating Station
Louisville, Jefferson County, Kentucky

SCALE:

DATE: 4/20/2023

PROJECT NUMBER 22360136

FIGURE NO. 2

Appendix II – Test Boring Log Legend / Boring Logs / CPT Logs / Field Resistivity / Site Photos

TEST BORING LOG LEGEND

FINE AND COARSE GRAINED SOIL INFORMATION

COARSE GRAINED SOILS (SANDS AND GRAVELS)

N	Relative Density
0-4	Very Loose
5-10	Loose
11-30	Medium Dense
31-50	Dense
Over 50	Very Dense

FINE GRAINED SOILS (CLAYS AND SILTS)

N	Consistency
0-2	Very Soft
3-4	Soft
5-8	Medium Stiff
9-15	Stiff
16-30	Very Stiff
Over 30	Hard

PARTICLE SIZE

Boulders	Greater than 300 mm (12")
Cobbles	75 mm—300 mm (3-12")
Gravel	4.75 mm—75 mm (3/16-3")
Coarse Sand	2 mm—4.74 mm
Medium Sand	.425 mm—2 mm
Fine Sand	0.075 mm—0.425 mm
Silts and Clays	Less than 0.075 mm

The STANDARD PENETRATION TEST as defined by ASTM D 1586 is a method to obtain a disturbed soil sample for examination and testing and to obtain relative density and consistency information. A standard 1.4-inch I.D. / 2.0-inch O.D. split barrel sampler is driven three 6-inch increments with a 140 lb. hammer falling 30 inches. The hammer can either be of a trip, free-fall design, or actuated by a rope and cathead. The blow counts required to drive the sampler the final two 6-inch increments are added together and designated the N-value defined in the above tables.

ROCK PROPERTIES

RQD

Percent RQD	Quality
0-25	Very Poor
25-50	Poor
50-75	Fair
75-90	Good
90-100	Excellent

ROCK HARDNESS

Very Hard	Rock can be broken by heavy hammer blows.
Hard	Rock cannot be broken by thumb pressure, but can be broken by moderate hammer blows.
Moderately Hard	Small pieces can be broken off along sharp edges by considerable thumb pressure; can be broken with light hammer blows.
Soft	Rock is coherent but breaks very easily with thumb pressure at sharp edges and crumbles with firm hand pressure.
Very Soft	Rock disintegrates or easily compresses when touched; can be hard to very hard soil.

KEY

Undisturbed Sample

Standard Penetration Test Sample

Rock Core Sample

Core Diameter (I.D.)	Inches
BQ	1-7/16
NQ	1-7/8
HQ	2-1/2

$$\text{RQD} = \frac{\text{Sum of 4" and Longer Rock Pieces Recovered}}{\text{Length of Core Run}} \times 100$$
(Rock Quality Designation)

$$\text{REC} = \frac{\text{Length of Rock Core Recovered}}{\text{Length of Core Run}} \times 100$$
(Recovery)

SOIL PROPERTY SYMBOLS

N	Standard Penetration, BPF
NMC	Natural Moisture Content, %
LL	Liquid Limit, %
PL	Plastic Limit, %
PI	Plasticity Index, %
PPV	Pocket Penetrometer Value, TSF
Qu	Unconfined Compressive Strength, TSF
Yd	Dry Unit Weight, PCF
F	Fines Content

PLATE 3

PROJECT:	**2027 NGCC Geotechnical Investigation** **LG&E - Mill Creek Generating Station** **S&ME Project No. 22360136 - Mill Creek**	**BORING LOG: B-01** *Sheet 1 of 3*

DATE DRILLED: 01/11/2023	**ELEVATION:** 439 ft	**NOTES:**
DRILL RIG: Diedrich D-120 (ATC)	**DATUM:** NAVD88	
DRILLER: Horn and Associates	**BORING DEPTH:** 80.5 ft	
HAMMER TYPE: Auto Hammer (140 lb)	**CLOSURE:** Cement-Bentonite Grout	
DRILLING METHOD: 3-1/4" HSA	**LOGGED BY:** A. Carr	**LATITUDE:** 38.050764 **LONGITUDE:** -85.907452
SAMPLING METHOD: SS	**PROJECT COORDINATE SYSTEM -** NAD 1983 StatePlane Kentucky North FIPS 1601 Feet	

DEPTH (feet)	NOTES	Origin/Identifier	GRAPHIC	SAMPLE NO. (RECOVERY)	MATERIAL DESCRIPTION	BLOW COUNT DATA (SPT N-value)	STANDARD PENETRATION TEST DATA (△ % Fines, ○ NMC, ⊢ PL---LL; 20 40 60 80 100)	ELEVATION
0					Blank drilling - no samples obtained.			439
5								434
10								429
15								424
20	Hole Cave at 20.0 feet							419
25								414
29.0		Alluvium		SS-1 (18 in)	SANDY LEAN CLAY (CL), soft to medium stiff, red brown, wet to very moist	2-2-1 N = 3	●	
30								409

GROUNDWATER		DATE	DEPTH (FT)	REMARKS
ATD	▽	01/11/2023	8.0	
END OF DRILLING	▼	01/11/2023	12.0	
AFTER DRILLING	▼			
AFTER DRILLING	▼			

Vertical Accuracy: Estimated from topo map (Rounded 1 ft), Horizontal Accuracy: Handheld GPS (1 ft)

GROUNDWATER DEPTHS ARE NOT EXACT AND MAY VARY SUBSTANTIALLY FROM THOSE INDICATED. ATD = AT TIME OF DRILLING
LL=Liquid Limit, PL = Plastic Limit, NMC = Natural Moisture Content, PPV = Pocket Penetrometer (tsf), PTV = Pocket Torvane (tsf), AR = Auger Refusal

PROJECT:	**2027 NGCC Geotechnical Investigation** **LG&E - Mill Creek Generating Station** **S&ME Project No. 22360136 - Mill Creek**	**BORING LOG: B-01** *Sheet 2 of 3*

DATE DRILLED: 01/11/2023	**ELEVATION:** 439 ft	**NOTES:**
DRILL RIG: Diedrich D-120 (ATC)	**DATUM:** NAVD88	
DRILLER: Horn and Associates	**BORING DEPTH:** 80.5 ft	
HAMMER TYPE: Auto Hammer (140 lb)	**CLOSURE:** Cement-Bentonite Grout	
DRILLING METHOD: 3-1/4" HSA	**LOGGED BY:** A. Carr	**LATITUDE:** 38.050764 **LONGITUDE:** -85.907452
SAMPLING METHOD: SS	**PROJECT COORDINATE SYSTEM -** NAD 1983 StatePlane Kentucky North FIPS 1601 Feet	

DEPTH (feet)	NOTES	Origin/Identifier	GRAPHIC	SAMPLE NO. (RECOVERY)	MATERIAL DESCRIPTION	BLOW COUNT DATA (SPT N-value)	STANDARD PENETRATION TEST DATA (△ % Fines, ○ NMC, ⊢ PL---LL; 20 40 60 80 100)	ELEVATION
	32.0	Alluvium			SANDY LEAN CLAY (CL), medium stiff, red brown, wet to very moist			
35				SS-2 (15 in)		4-4-3 N = 7	●	404
	37.0				POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM), medium dense to dense, brown, very moist			
40				SS-3 (9 in)		5-7-6 N = 13	●	399
45				SS-4 (12 in)		6-9-8 N = 17	●	394
50				SS-5 (6 in)		3-4-7 N = 11	●	389
55				SS-6 (9 in)		9-12-13 N = 25	●	384
60				SS-7 (15 in)		15-14-12 N = 26	●	379

GROUNDWATER		DATE	DEPTH (FT)	REMARKS
ATD	▽	01/11/2023	8.0	
END OF DRILLING	▼	01/11/2023	12.0	
AFTER DRILLING	▼			
AFTER DRILLING	▼			

Vertical Accuracy: Estimated from topo map (Rounded 1 ft), Horizontal Accuracy: Handheld GPS (1 ft)

GROUNDWATER DEPTHS ARE NOT EXACT AND MAY VARY SUBSTANTIALLY FROM THOSE INDICATED. ATD = AT TIME OF DRILLING
LL=Liquid Limit, PL = Plastic Limit, NMC = Natural Moisture Content, PPV = Pocket Penetrometer (tsf), PTV = Pocket Torvane (tsf), AR = Auger Refusal

PROJECT:	**2027 NGCC Geotechnical Investigation** **LG&E - Mill Creek Generating Station** **S&ME Project No. 22360136 - Mill Creek**	**BORING LOG: B-01** *Sheet 3 of 3*

DATE DRILLED: 01/11/2023	**ELEVATION:** 439 ft	**NOTES:**
DRILL RIG: Diedrich D-120 (ATC)	**DATUM:** NAVD88	
DRILLER: Horn and Associates	**BORING DEPTH:** 80.5 ft	
HAMMER TYPE: Auto Hammer (140 lb)	**CLOSURE:** Cement-Bentonite Grout	
DRILLING METHOD: 3-1/4" HSA	**LOGGED BY:** A. Carr	**LATITUDE:** 38.050764 **LONGITUDE:** -85.907452
SAMPLING METHOD: SS	**PROJECT COORDINATE SYSTEM -** NAD 1983 StatePlane Kentucky North FIPS 1601 Feet	

DEPTH (feet)	NOTES	Origin/Identifier	GRAPHIC	SAMPLE NO. (RECOVERY)	MATERIAL DESCRIPTION	BLOW COUNT DATA (SPT N-value)	STANDARD PENETRATION TEST DATA (△ % Fines, ○ NMC, ⊢ PL---LL; 20 40 60 80 100)	ELEVATION
65				SS-8 (15 in)	POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM), medium dense to dense, brown, very moist	15-15-16 N = 31		374
	67.0				POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM), medium dense to dense, brown, moist to wet			
70		Alluvium		SS-9 (15 in)		4-8-14 N = 22		369
75				SS-10 (12 in)		10-19-26 N = 45		364
80				SS-11 (12 in)		10-12-12 N = 24		359
	80.5				Borehole terminated at 80.5 feet			
85								354
90								349
95								344

GROUNDWATER		DATE	DEPTH (FT)	REMARKS
ATD	▽	01/11/2023	8.0	
END OF DRILLING	▼	01/11/2023	12.0	
AFTER DRILLING	▼			
AFTER DRILLING	▼			

Vertical Accuracy: Estimated from topo map (Rounded 1 ft), Horizontal Accuracy: Handheld GPS (1 ft)

GROUNDWATER DEPTHS ARE NOT EXACT AND MAY VARY SUBSTANTIALLY FROM THOSE INDICATED. ATD = AT TIME OF DRILLING
LL=Liquid Limit, PL = Plastic Limit, NMC = Natural Moisture Content, PPV = Pocket Penetrometer (tsf), PTV = Pocket Torvane (tsf), AR = Auger Refusal

PROJECT: 2027 NGCC Geotechnical Investigation
LG&E - Mill Creek Generating Station
S&ME Project No. 22360136 - Mill Creek

BORING LOG: B-02
Sheet 1 of 3

DATE DRILLED: 01/11/2023	**ELEVATION:** 438 ft
DRILL RIG: Diedrich D-120 (ATC)	**DATUM:** NAVD88
DRILLER: Horn and Associates	**BORING DEPTH:** 80.5 ft
HAMMER TYPE: Auto Hammer (140 lb)	**CLOSURE:** Cement-Bentonite Grout
DRILLING METHOD: 3-1/4" HSA	**LOGGED BY:** N. Jones
SAMPLING METHOD: SS	

NOTES:

LATITUDE: 38.050699 **LONGITUDE:** -85.907291

PROJECT COORDINATE SYSTEM - NAD 1983 StatePlane Kentucky North FIPS 1601 Feet

DEPTH (feet)	NOTES	Origin/Identifier	GRAPHIC	SAMPLE NO. (RECOVERY)	MATERIAL DESCRIPTION	BLOW COUNT DATA (SPT N-value)	STANDARD PENETRATION TEST DATA (△ % Fines, ○ NMC, ⊢ PL---LL; 20 40 60 80 100)	ELEVATION
0					Blank drilling - no samples obtained.			438
5								433
10								428
15								423
20	Hole Cave at 20.0 feet							418
25								413
30	Begin using drilling fluid at 29 feet. 29.0	Alluvium		SS-1 (18 in)	SILTY SAND (SM), very loose to medium dense, red brown with gray, moist to very moist	1-1-1 N = 2		408

GROUNDWATER		DATE	DEPTH (FT)	REMARKS
ATD	▽			Drilling fluid used. Groundwater not measured.
END OF DRILLING	▼			Drilling fluid used. Groundwater not measured.
AFTER DRILLING	▼			
AFTER DRILLING	▼			

Vertical Accuracy: Estimated from topo map (Rounded 1 ft), Horizontal Accuracy: Handheld GPS (1 ft)

GROUNDWATER DEPTHS ARE NOT EXACT AND MAY VARY SUBSTANTIALLY FROM THOSE INDICATED. ATD = AT TIME OF DRILLING
LL=Liquid Limit, PL = Plastic Limit, NMC = Natural Moisture Content, PPV = Pocket Penetrometer (tsf), PTV = Pocket Torvane (tsf), AR = Auger Refusal

PROJECT:	**2027 NGCC Geotechnical Investigation** **LG&E - Mill Creek Generating Station** **S&ME Project No. 22360136 - Mill Creek**	**BORING LOG: B-02** *Sheet 2 of 3*

DATE DRILLED: 01/11/2023	**ELEVATION:** 438 ft	**NOTES:**
DRILL RIG: Diedrich D-120 (ATC)	**DATUM:** NAVD88	
DRILLER: Horn and Associates	**BORING DEPTH:** 80.5 ft	
HAMMER TYPE: Auto Hammer (140 lb)	**CLOSURE:** Cement-Bentonite Grout	
DRILLING METHOD: 3-1/4" HSA	**LOGGED BY:** N. Jones	**LATITUDE:** 38.050699 **LONGITUDE:** -85.907291
SAMPLING METHOD: SS	**PROJECT COORDINATE SYSTEM -** NAD 1983 StatePlane Kentucky North FIPS 1601 Feet	

DEPTH (feet)	NOTES	Origin/Identifier	GRAPHIC	SAMPLE NO. (RECOVERY)	MATERIAL DESCRIPTION	BLOW COUNT DATA (SPT N-value)	STANDARD PENETRATION TEST DATA (△ % Fines, ○ NMC, ⊢ PL---LL; 20 40 60 80 100)	ELEVATION
	32.0				SILTY SAND (SM), medium dense, red brown with gray, moist to very moist			
35	34.5	Alluvium		SS-2 (18 in)	POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM), medium dense, brown, moist	4-5-6 N = 11	●	403
40				SS-3 (18 in)		3-5-6 N = 11	●	398
45				SS-4 (18 in)		8-12-13 N = 25	●	393
50				SS-5 (18 in)		3-7-10 N = 17	●	388
55	Cobbles encountered in split-spoon at 55 feet.			SS-6 (18 in)		7-12-9 N = 21	●	383
60				SS-7 (18 in)		6-12-13 N = 25	●	378

GROUNDWATER		DATE	DEPTH (FT)	REMARKS
ATD	▽			Drilling fluid used. Groundwater not measured.
END OF DRILLING	▼			Drilling fluid used. Groundwater not measured.
AFTER DRILLING	▼			
AFTER DRILLING	▼			

Vertical Accuracy: Estimated from topo map (Rounded 1 ft), Horizontal Accuracy: Handheld GPS (1 ft)

GROUNDWATER DEPTHS ARE NOT EXACT AND MAY VARY SUBSTANTIALLY FROM THOSE INDICATED. ATD = AT TIME OF DRILLING
LL=Liquid Limit, PL = Plastic Limit, NMC = Natural Moisture Content, PPV = Pocket Penetrometer (tsf), PTV = Pocket Torvane (tsf), AR = Auger Refusal

PROJECT:	**2027 NGCC Geotechnical Investigation** **LG&E - Mill Creek Generating Station** **S&ME Project No. 22360136 - Mill Creek**	**BORING LOG: B-02** *Sheet 3 of 3*

DATE DRILLED: 01/11/2023	**ELEVATION:** 438 ft	**NOTES:**
DRILL RIG: Diedrich D-120 (ATC)	**DATUM:** NAVD88	
DRILLER: Horn and Associates	**BORING DEPTH:** 80.5 ft	
HAMMER TYPE: Auto Hammer (140 lb)	**CLOSURE:** Cement-Bentonite Grout	
DRILLING METHOD: 3-1/4" HSA	**LOGGED BY:** N. Jones	**LATITUDE:** 38.050699 **LONGITUDE:** -85.907291
SAMPLING METHOD: SS	**PROJECT COORDINATE SYSTEM -** NAD 1983 StatePlane Kentucky North FIPS 1601 Feet	

DEPTH (feet)	NOTES	Origin/Identifier	GRAPHIC	SAMPLE NO. (RECOVERY)	MATERIAL DESCRIPTION	BLOW COUNT DATA (SPT N-value)	STANDARD PENETRATION TEST DATA (△ % Fines, ○ NMC, ⊢ PL---LL; 20 40 60 80 100)	ELEVATION
65				SS-8 (18 in)	POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM), medium dense, brown, moist	8-13-11 N = 24		373
	65.5				SILTY GRAVEL WITH SAND (GM), medium dense, dark gray, moist to wet			
70		Alluvium		SS-9 (14 in)		6-9-12 N = 21		368
75				SS-10 (18 in)		7-10-15 N = 25		363
80				SS-11 (18 in)		7-8-10 N = 18		358
	80.5				Borehole terminated at 80.5 feet			
85								353
90								348
95								343

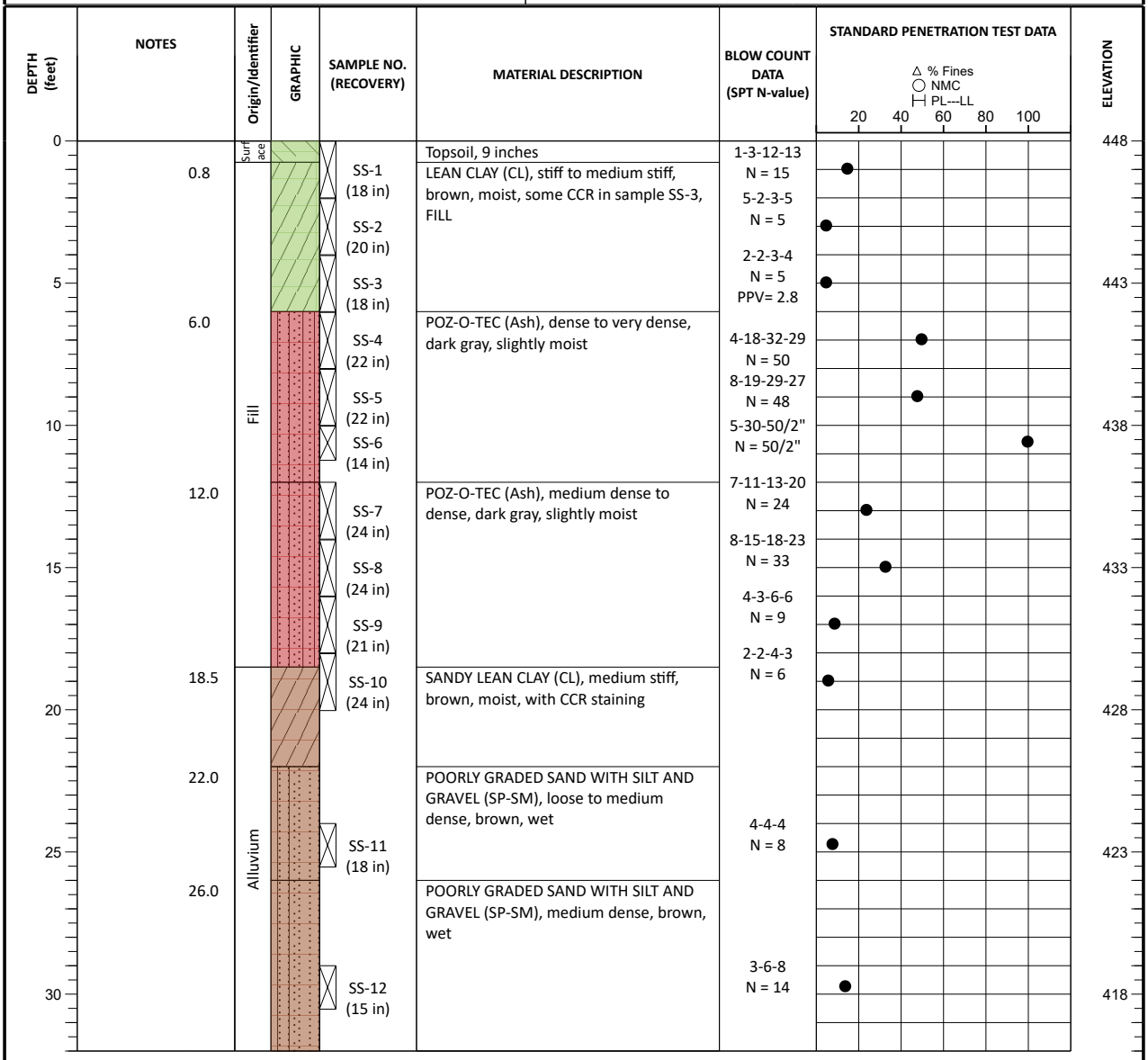
GROUNDWATER		DATE	DEPTH (FT)	REMARKS
ATD	▽			Drilling fluid used. Groundwater not measured.
END OF DRILLING	▼			Drilling fluid used. Groundwater not measured.
AFTER DRILLING	▼			
AFTER DRILLING	▼			

Vertical Accuracy: Estimated from topo map (Rounded 1 ft), Horizontal Accuracy: Handheld GPS (1 ft)

GROUNDWATER DEPTHS ARE NOT EXACT AND MAY VARY SUBSTANTIALLY FROM THOSE INDICATED. ATD = AT TIME OF DRILLING
LL=Liquid Limit, PL = Plastic Limit, NMC = Natural Moisture Content, PPV = Pocket Penetrometer (tsf), PTV = Pocket Torvane (tsf), AR = Auger Refusal

PROJECT:	**2027 NGCC Geotechnical Investigation** **LG&E - Mill Creek Generating Station** **S&ME Project No. 22360136 - Mill Creek**	**BORING LOG: B-03** *Sheet 1 of 3*

DATE DRILLED: 01/11/2023	**ELEVATION:** 448 ft	**NOTES:** Hydrovacuum excavation generally extends through surficial clays and sands and terminates at CCR materials.
DRILL RIG: CME-55 (Track)	**DATUM:** NAVD88	
DRILLER: Horn and Associates	**BORING DEPTH:** 80.5 ft	
HAMMER TYPE: Auto Hammer (140 lb)	**CLOSURE:** Cement-Bentonite Grout	
DRILLING METHOD: 3-1/4" HSA	**LOGGED BY:** A. Carr	**LATITUDE:** 38.050632 **LONGITUDE:** -85.906825
SAMPLING METHOD: SS	**PROJECT COORDINATE SYSTEM -** NAD 1983 StatePlane Kentucky North FIPS 1601 Feet	



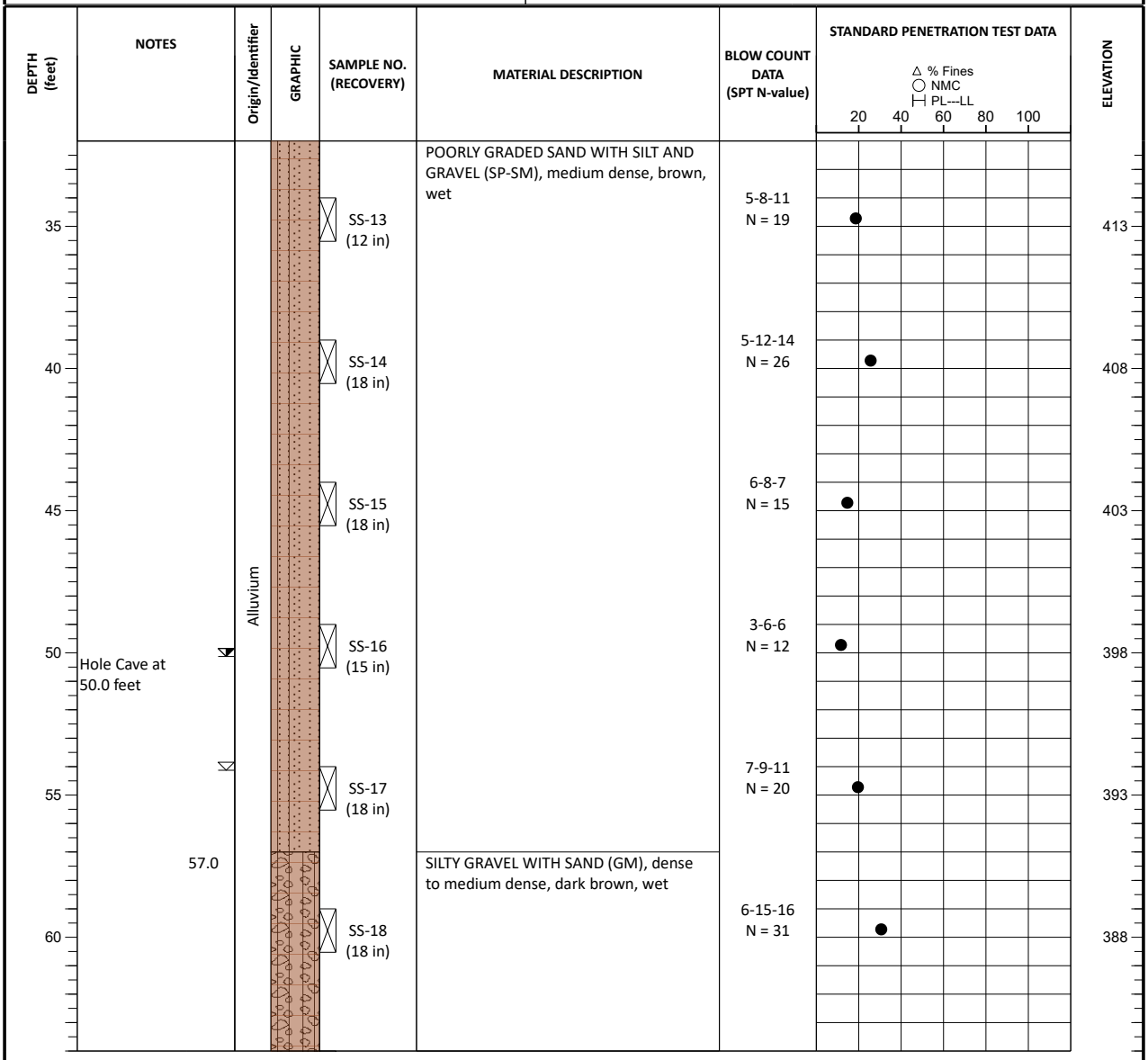
GROUNDWATER		DATE	DEPTH (FT)	REMARKS
ATD	▽	01/11/2023	54.0	
END OF DRILLING	▼	01/11/2023	50.0	
AFTER DRILLING	▼			
AFTER DRILLING	▼			

Vertical Accuracy: Estimated from topo map (Rounded 1 ft), Horizontal Accuracy: Handheld GPS (1 ft)

GROUNDWATER DEPTHS ARE NOT EXACT AND MAY VARY SUBSTANTIALLY FROM THOSE INDICATED. ATD = AT TIME OF DRILLING
LL=Liquid Limit, PL = Plastic Limit, NMC = Natural Moisture Content, PPV = Pocket Penetrometer (tsf), PTV = Pocket Torvane (tsf), AR = Auger Refusal

PROJECT:	2027 NGCC Geotechnical Investigation LG&E - Mill Creek Generating Station S&ME Project No. 22360136 - Mill Creek	**BORING LOG: B-03** *Sheet 2 of 3*

DATE DRILLED: 01/11/2023	**ELEVATION:** 448 ft	**NOTES:** Hydrovacuum excavation generally extends through surficial clays and sands and terminates at CCR materials.
DRILL RIG: CME-55 (Track)	**DATUM:** NAVD88	
DRILLER: Horn and Associates	**BORING DEPTH:** 80.5 ft	
HAMMER TYPE: Auto Hammer (140 lb)	**CLOSURE:** Cement-Bentonite Grout	
DRILLING METHOD: 3-1/4" HSA	**LOGGED BY:** A. Carr	**LATITUDE:** 38.050632 **LONGITUDE:** -85.906825
SAMPLING METHOD: SS	**PROJECT COORDINATE SYSTEM -** NAD 1983 StatePlane Kentucky North FIPS 1601 Feet	



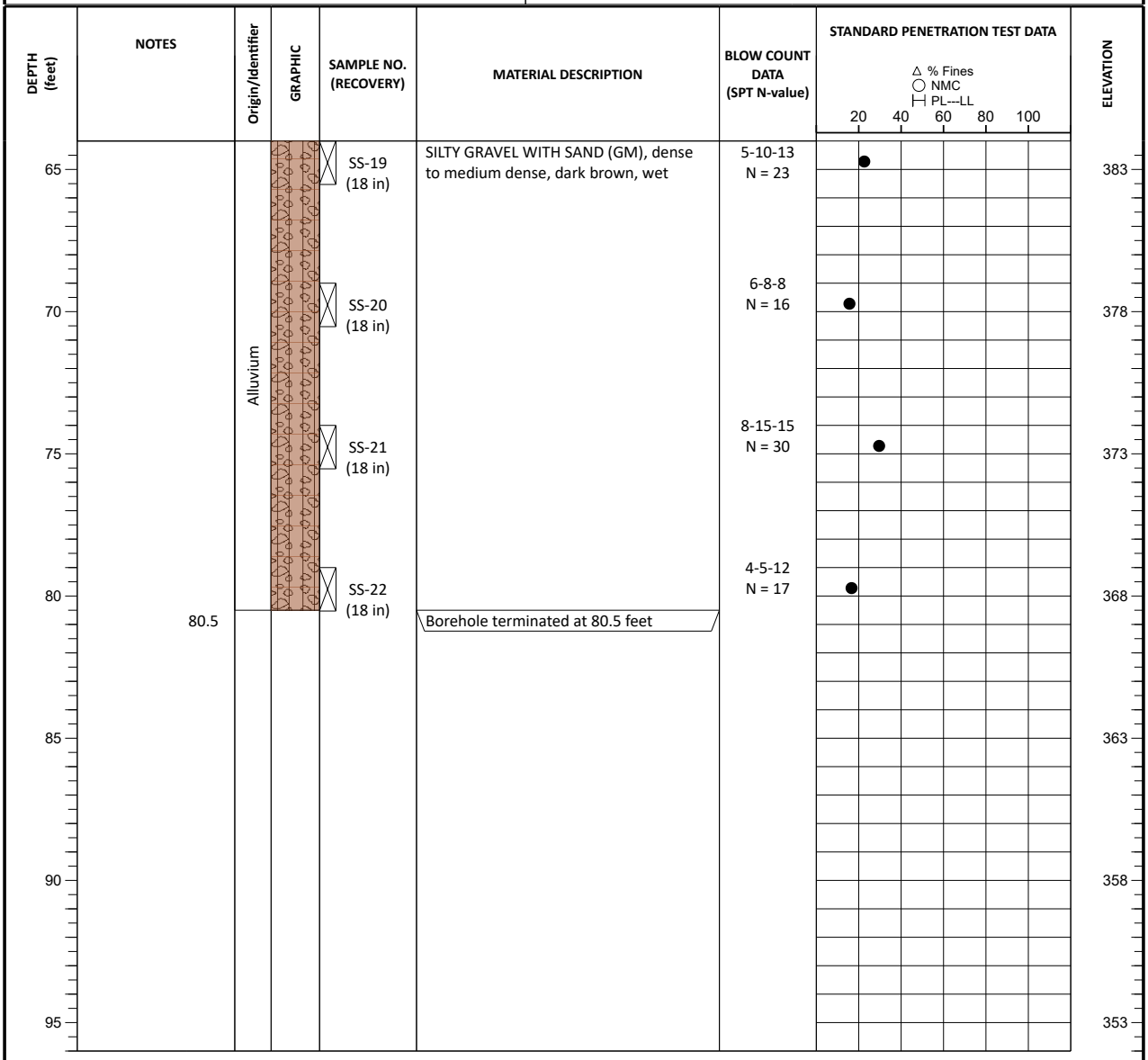
GROUNDWATER		DATE	DEPTH (FT)	REMARKS
ATD	▽	01/11/2023	54.0	
END OF DRILLING	▼	01/11/2023	50.0	
AFTER DRILLING	▼			
AFTER DRILLING	▼			

Vertical Accuracy: Estimated from topo map (Rounded 1 ft), Horizontal Accuracy: Handheld GPS (1 ft)

GROUNDWATER DEPTHS ARE NOT EXACT AND MAY VARY SUBSTANTIALLY FROM THOSE INDICATED. ATD = AT TIME OF DRILLING
LL=Liquid Limit, PL = Plastic Limit, NMC = Natural Moisture Content, PPV = Pocket Penetrometer (tsf), PTV = Pocket Torvane (tsf), AR = Auger Refusal

PROJECT:	2027 NGCC Geotechnical Investigation LG&E - Mill Creek Generating Station S&ME Project No. 22360136 - Mill Creek	**BORING LOG: B-03** *Sheet 3 of 3*

DATE DRILLED: 01/11/2023	**ELEVATION:** 448 ft	**NOTES:** Hydrovacuum excavation generally extends through surficial clays and sands and terminates at CCR materials.
DRILL RIG: CME-55 (Track)	**DATUM:** NAVD88	
DRILLER: Horn and Associates	**BORING DEPTH:** 80.5 ft	
HAMMER TYPE: Auto Hammer (140 lb)	**CLOSURE:** Cement-Bentonite Grout	
DRILLING METHOD: 3-1/4" HSA	**LOGGED BY:** A. Carr	**LATITUDE:** 38.050632 **LONGITUDE:** -85.906825
SAMPLING METHOD: SS	**PROJECT COORDINATE SYSTEM -** NAD 1983 StatePlane Kentucky North FIPS 1601 Feet	



GROUNDWATER		DATE	DEPTH (FT)	REMARKS
ATD	▽	01/11/2023	54.0	
END OF DRILLING	▼	01/11/2023	50.0	
AFTER DRILLING	▼			
AFTER DRILLING	▼			

Vertical Accuracy: Estimated from topo map (Rounded 1 ft), Horizontal Accuracy: Handheld GPS (1 ft)

GROUNDWATER DEPTHS ARE NOT EXACT AND MAY VARY SUBSTANTIALLY FROM THOSE INDICATED. ATD = AT TIME OF DRILLING
LL=Liquid Limit, PL = Plastic Limit, NMC = Natural Moisture Content, PPV = Pocket Penetrometer (tsf), PTV = Pocket Torvane (tsf), AR = Auger Refusal

PROJECT: 2027 NGCC Geotechnical Investigation
LG&E - Mill Creek Generating Station
S&ME Project No. 22360136 - Mill Creek

BORING LOG: B-04
Sheet 1 of 3

DATE DRILLED: 12/15/2022	**ELEVATION:** 462 ft
DRILL RIG: Diedrich D-50 (track)	**DATUM:** NAVD88
DRILLER: T. Frost	**BORING DEPTH:** 80.0 ft
HAMMER TYPE: Auto Hammer (140 lb)	**CLOSURE:** Cement-Bentonite Grout
DRILLING METHOD: 3-1/4" HSA	**LOGGED BY:** A. Carr
SAMPLING METHOD: SS	**PROJECT COORDINATE SYSTEM -** NAD 1983 StatePlane Kentucky North FIPS 1601 Feet

NOTES: Hydrovacuum excavation generally extends through surficial clays and sands and terminates at CCR materials.

LATITUDE: 38.050553 **LONGITUDE:** -85.906477

DEPTH (feet)	NOTES	Origin/Identifier	GRAPHIC	SAMPLE NO. (RECOVERY)	MATERIAL DESCRIPTION	BLOW COUNT DATA (SPT N-value)	ELEVATION
0					Topsoil, 18 inches		462
	1.5				Hydrovacuum excavation - no samples obtained.		
5							457
	6.0	Fill		SS-1 (9 in)	POZ-O-TEC (Ash), loose, dark gray and light gray, slightly moist	1-3-5-6 N = 8	
	7.5				POORLY GRADED SAND (SP), medium dense, gray, slightly moist	5-10-18-51 N = 28	
	8.5			SS-2 (24 in)	POZ-O-TEC (Ash), dense to very dense, dark gray and light gray, slightly moist	8-18-19-17 N = 37	
10				SS-3 (24 in)			452
				SS-4 (24 in)		15-27-40-50 N = 67	
	14.0				POZ-O-TEC (Ash), medium dense, dark gray and light gray, slightly moist	7-15-15-15 N = 30	
15				SS-5 (24 in)			447
	16.0			SS-6 (20 in)	POZ-O-TEC (Ash), very dense to dense, dark gray and light gray, slightly moist to moist	13-23-34-50/2" N = 57	
				SS-7 (24 in)		8-22-26-34 N = 48	
20							442
	23.0				POZ-O-TEC (Ash), medium dense, dark gray and light gray, slightly moist	5-9-13 N = 22	
25				SS-8 (18 in)			437
						9-12-18 N = 30	
30				SS-9 (18 in)			432

STANDARD PENETRATION TEST DATA
△ % Fines
○ NMC
⊢ PL---LL
20 40 60 80 100

GROUNDWATER		DATE	DEPTH (FT)	REMARKS
ATD	▽	12/15/2022	70.0	
END OF DRILLING	▼	12/16/2022	70.0	
AFTER DRILLING	▼	12/20/2022		Not measured due to cave-in at 70 feet.
AFTER DRILLING	▼			

Vertical Accuracy: Estimated from topo map (Rounded 1 ft), Horizontal Accuracy: Handheld GPS (1 ft)

GROUNDWATER DEPTHS ARE NOT EXACT AND MAY VARY SUBSTANTIALLY FROM THOSE INDICATED. ATD = AT TIME OF DRILLING
LL=Liquid Limit, PL = Plastic Limit, NMC = Natural Moisture Content, PPV = Pocket Penetrometer (tsf), PTV = Pocket Torvane (tsf), AR = Auger Refusal

PROJECT:	2027 NGCC Geotechnical Investigation LG&E - Mill Creek Generating Station S&ME Project No. 22360136 - Mill Creek	**BORING LOG: B-04** *Sheet 2 of 3*

DATE DRILLED: 12/15/2022	**ELEVATION:** 462 ft	**NOTES:** Hydrovacuum excavation generally extends through surficial clays and sands and terminates at CCR materials.
DRILL RIG: Diedrich D-50 (track)	**DATUM:** NAVD88	
DRILLER: T. Frost	**BORING DEPTH:** 80.0 ft	
HAMMER TYPE: Auto Hammer (140 lb)	**CLOSURE:** Cement-Bentonite Grout	
DRILLING METHOD: 3-1/4" HSA	**LOGGED BY:** A. Carr	**LATITUDE:** 38.050553 **LONGITUDE:** -85.906477
SAMPLING METHOD: SS	**PROJECT COORDINATE SYSTEM -** NAD 1983 StatePlane Kentucky North FIPS 1601 Feet	

DEPTH (feet)	NOTES	Origin/Identifier	GRAPHIC	SAMPLE NO. (RECOVERY)	MATERIAL DESCRIPTION	BLOW COUNT DATA (SPT N-value)	STANDARD PENETRATION TEST DATA (△ % Fines, ○ NMC, ⊢ PL---LL; 20 40 60 80 100)	ELEVATION
	32.0	Fill		SS-10 (16 in)	POZ-O-TEC (Ash), very dense, dark gray and light gray, slightly moist	8-14-50 N = 64		
35								427
	39.0	Alluvium		SS-11 (18 in)	POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM), loose, orange brown to light brown, slightly moist, black staining	5-4-3 N = 7		
40								422
				SS-12 (15 in)		3-5-5 N = 10		
45								417
				SS-13 (15 in)		3-3-4 N = 7		
50								412
	52.0			SS-14 (18 in)	POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM), medium dense to dense, dark brown, slightly moist to moist	3-5-9 N = 14		
55								407
				SS-15 (12 in)		6-13-14 N = 27		
60								402
						12-25-22		

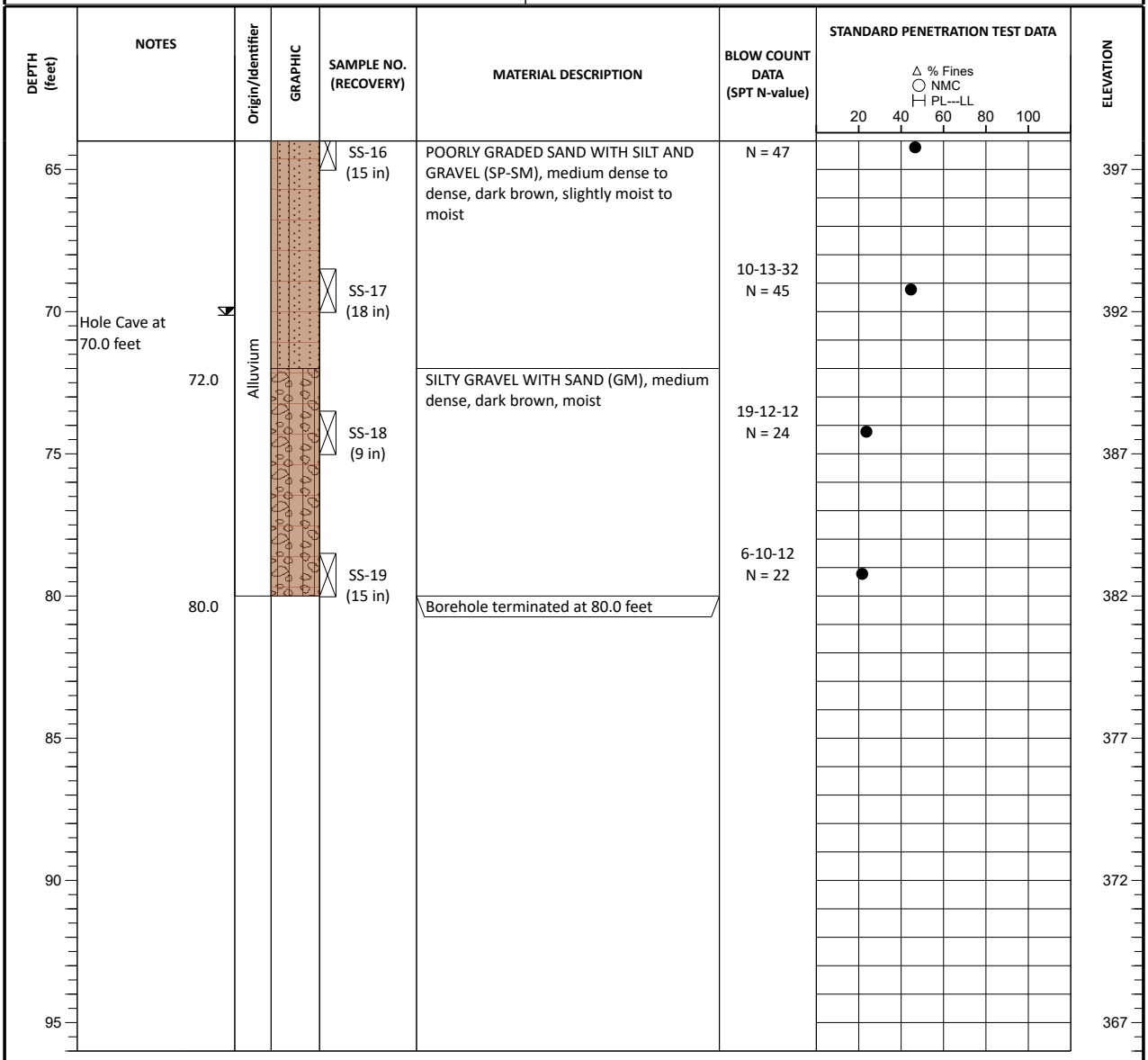
GROUNDWATER		DATE	DEPTH (FT)	REMARKS
ATD	▽	12/15/2022	70.0	
END OF DRILLING	▼	12/16/2022	70.0	
AFTER DRILLING	▼	12/20/2022		Not measured due to cave-in at 70 feet.
AFTER DRILLING	▼			

Vertical Accuracy: Estimated from topo map (Rounded 1 ft), Horizontal Accuracy: Handheld GPS (1 ft)

GROUNDWATER DEPTHS ARE NOT EXACT AND MAY VARY SUBSTANTIALLY FROM THOSE INDICATED. ATD = AT TIME OF DRILLING
LL=Liquid Limit, PL = Plastic Limit, NMC = Natural Moisture Content, PPV = Pocket Penetrometer (tsf), PTV = Pocket Torvane (tsf), AR = Auger Refusal

PROJECT:	2027 NGCC Geotechnical Investigation LG&E - Mill Creek Generating Station S&ME Project No. 22360136 - Mill Creek	**BORING LOG: B-04** *Sheet 3 of 3*

DATE DRILLED: 12/15/2022	**ELEVATION:** 462 ft	**NOTES:** Hydrovacuum excavation generally extends through surficial clays and sands and terminates at CCR materials.
DRILL RIG: Diedrich D-50 (track)	**DATUM:** NAVD88	
DRILLER: T. Frost	**BORING DEPTH:** 80.0 ft	
HAMMER TYPE: Auto Hammer (140 lb)	**CLOSURE:** Cement-Bentonite Grout	
DRILLING METHOD: 3-1/4" HSA	**LOGGED BY:** A. Carr	**LATITUDE:** 38.050553 **LONGITUDE:** -85.906477
SAMPLING METHOD: SS	**PROJECT COORDINATE SYSTEM -** NAD 1983 StatePlane Kentucky North FIPS 1601 Feet	

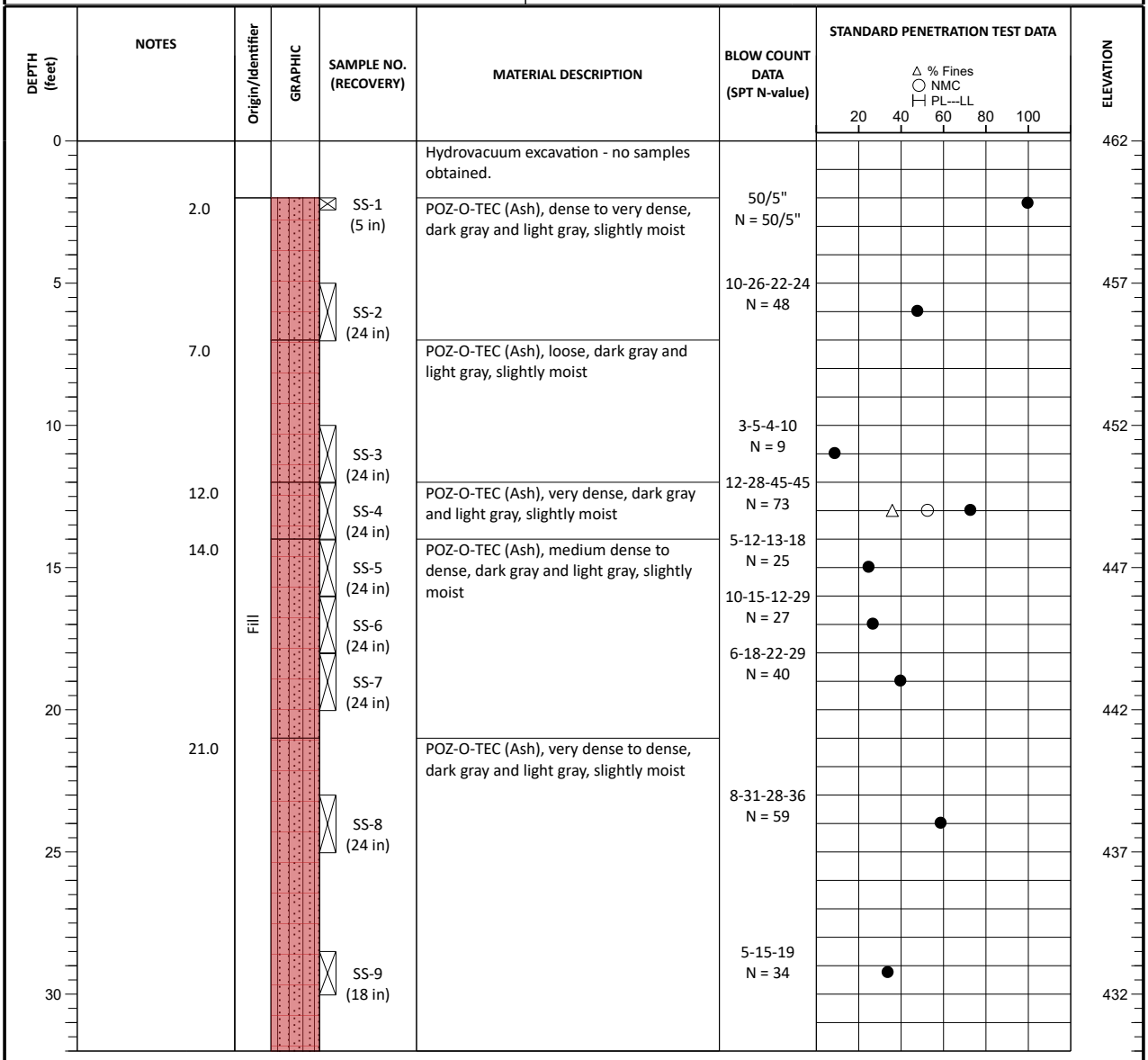


GROUNDWATER		DATE	DEPTH (FT)	REMARKS
ATD	▽	12/15/2022	70.0	
END OF DRILLING	▼	12/16/2022	70.0	
AFTER DRILLING	▼	12/20/2022		Not measured due to cave-in at 70 feet.
AFTER DRILLING	▼			

Vertical Accuracy: Estimated from topo map (Rounded 1 ft), Horizontal Accuracy: Handheld GPS (1 ft)

GROUNDWATER DEPTHS ARE NOT EXACT AND MAY VARY SUBSTANTIALLY FROM THOSE INDICATED. ATD = AT TIME OF DRILLING
LL=Liquid Limit, PL = Plastic Limit, NMC = Natural Moisture Content, PPV = Pocket Penetrometer (tsf), PTV = Pocket Torvane (tsf), AR = Auger Refusal

PROJECT:	2027 NGCC Geotechnical Investigation LG&E - Mill Creek Generating Station S&ME Project No. 22360136 - Mill Creek	**BORING LOG: B-05** *Sheet 1 of 3*
DATE DRILLED: 12/13/2022	**ELEVATION:** 462 ft	**NOTES:** Hydrovacuum excavation generally extends through surficial clays and sands and terminates at CCR materials.
DRILL RIG: Diedrich D-50 (track)	**DATUM:** NAVD88	
DRILLER: T. Frost	**BORING DEPTH:** 80.0 ft	
HAMMER TYPE: Auto Hammer (140 lb)	**CLOSURE:** Cement-Bentonite Grout	
DRILLING METHOD: 3-1/4" HSA	**LOGGED BY:** A. Carr	**LATITUDE:** 38.050505 **LONGITUDE:** -85.906267
SAMPLING METHOD: SS	**PROJECT COORDINATE SYSTEM -** NAD 1983 StatePlane Kentucky North FIPS 1601 Feet	



GROUNDWATER		DATE	DEPTH (FT)	REMARKS
ATD	▽	12/13/2022	70.0	
END OF DRILLING	▼	12/14/2022	70.0	
AFTER DRILLING	▼	12/20/2022		Groundwater not encountered.
AFTER DRILLING	▼			

Vertical Accuracy: Estimated from topo map (Rounded 1 ft), Horizontal Accuracy: Handheld GPS (1 ft)

GROUNDWATER DEPTHS ARE NOT EXACT AND MAY VARY SUBSTANTIALLY FROM THOSE INDICATED. ATD = AT TIME OF DRILLING
LL=Liquid Limit, PL = Plastic Limit, NMC = Natural Moisture Content, PPV = Pocket Penetrometer (tsf), PTV = Pocket Torvane (tsf), AR = Auger Refusal

PROJECT:	2027 NGCC Geotechnical Investigation LG&E - Mill Creek Generating Station S&ME Project No. 22360136 - Mill Creek	**BORING LOG: B-05** *Sheet 2 of 3*

DATE DRILLED: 12/13/2022	**ELEVATION:** 462 ft	**NOTES:** Hydrovacuum excavation generally extends through surficial clays and sands and terminates at CCR materials.
DRILL RIG: Diedrich D-50 (track)	**DATUM:** NAVD88	
DRILLER: T. Frost	**BORING DEPTH:** 80.0 ft	
HAMMER TYPE: Auto Hammer (140 lb)	**CLOSURE:** Cement-Bentonite Grout	
DRILLING METHOD: 3-1/4" HSA	**LOGGED BY:** A. Carr	**LATITUDE:** 38.050505 **LONGITUDE:** -85.906267
SAMPLING METHOD: SS	**PROJECT COORDINATE SYSTEM -** NAD 1983 StatePlane Kentucky North FIPS 1601 Feet	

DEPTH (feet)	NOTES	Origin/Identifier	GRAPHIC	SAMPLE NO. (RECOVERY)	MATERIAL DESCRIPTION	BLOW COUNT DATA (SPT N-value)	STANDARD PENETRATION TEST DATA (△ % Fines, ○ NMC, ⊢ PL---LL; 20 40 60 80 100)	ELEVATION
	32.0	Fill		SS-10 (18 in)	POZ-O-TEC (Ash), medium dense, dark gray and light gray, slightly moist	8-10-10 N = 20		
35								427
	37.0	Alluvium		SS-11 (18 in)	POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM), medium dense, orange brown, slightly moist	4-6-7 N = 13		
40								422
				SS-12 (18 in)		6-9-8 N = 17		
45								417
				SS-13 (12 in)		4-7-10 N = 17		
50								412
				SS-14 (12 in)		5-7-6 N = 13		
55								407
	57.0			SS-15 (15 in)	POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM), dense to medium dense, brown, slightly moist to moist	6-14-19 N = 33		
60								402
						14-16-12		

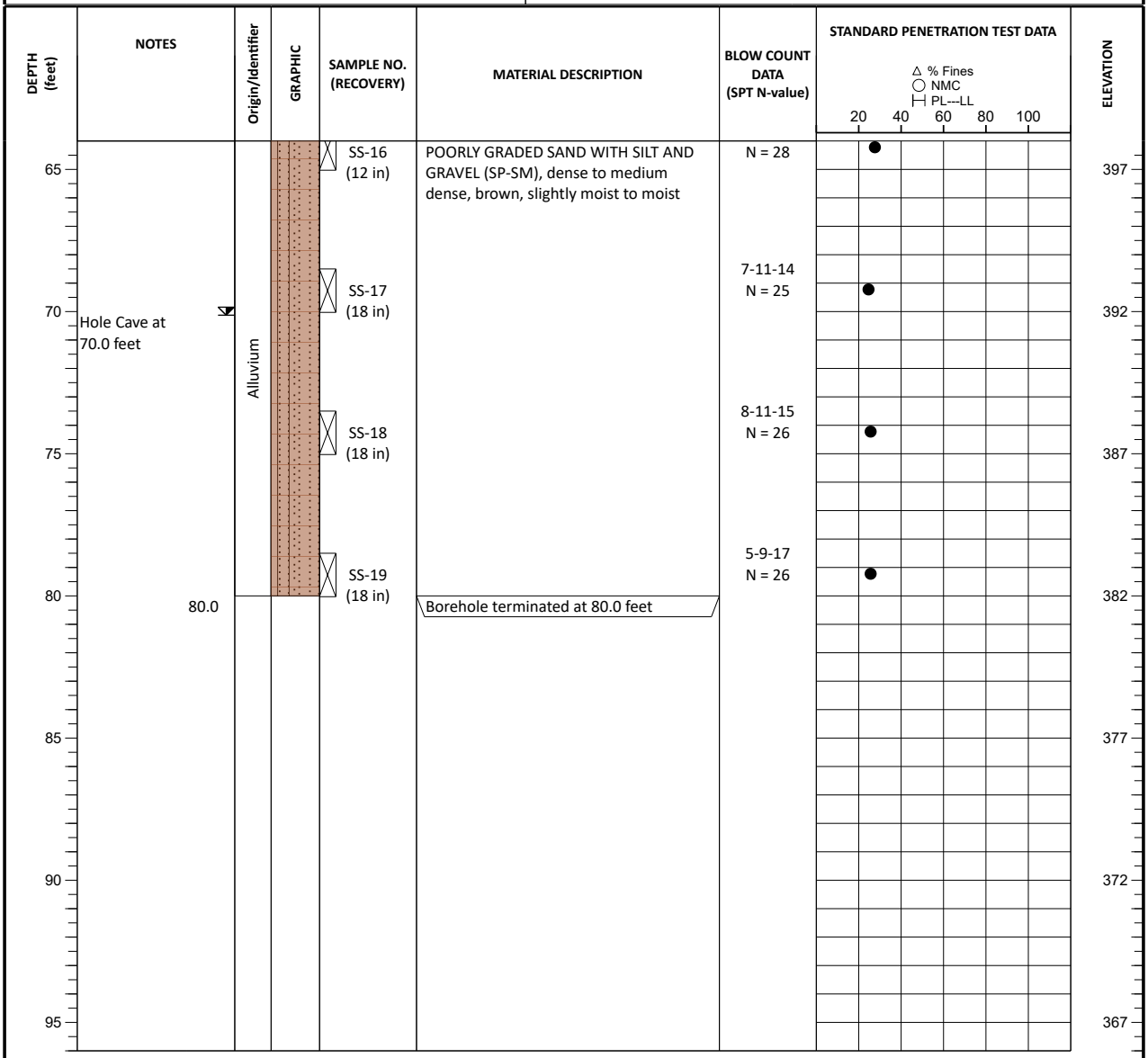
GROUNDWATER		DATE	DEPTH (FT)	REMARKS
ATD	▽	12/13/2022	70.0	
END OF DRILLING	▼	12/14/2022	70.0	
AFTER DRILLING	▼	12/20/2022		Groundwater not encountered.
AFTER DRILLING	▼			

Vertical Accuracy: Estimated from topo map (Rounded 1 ft), Horizontal Accuracy: Handheld GPS (1 ft)

GROUNDWATER DEPTHS ARE NOT EXACT AND MAY VARY SUBSTANTIALLY FROM THOSE INDICATED. ATD = AT TIME OF DRILLING
LL=Liquid Limit, PL = Plastic Limit, NMC = Natural Moisture Content, PPV = Pocket Penetrometer (tsf), PTV = Pocket Torvane (tsf), AR = Auger Refusal

PROJECT:	2027 NGCC Geotechnical Investigation LG&E - Mill Creek Generating Station S&ME Project No. 22360136 - Mill Creek	**BORING LOG: B-05** *Sheet 3 of 3*

DATE DRILLED: 12/13/2022	**ELEVATION:** 462 ft	**NOTES:** Hydrovacuum excavation generally extends through surficial clays and sands and terminates at CCR materials.
DRILL RIG: Diedrich D-50 (track)	**DATUM:** NAVD88	
DRILLER: T. Frost	**BORING DEPTH:** 80.0 ft	
HAMMER TYPE: Auto Hammer (140 lb)	**CLOSURE:** Cement-Bentonite Grout	
DRILLING METHOD: 3-1/4" HSA	**LOGGED BY:** A. Carr	**LATITUDE:** 38.050505 **LONGITUDE:** -85.906267
SAMPLING METHOD: SS	**PROJECT COORDINATE SYSTEM -** NAD 1983 StatePlane Kentucky North FIPS 1601 Feet	



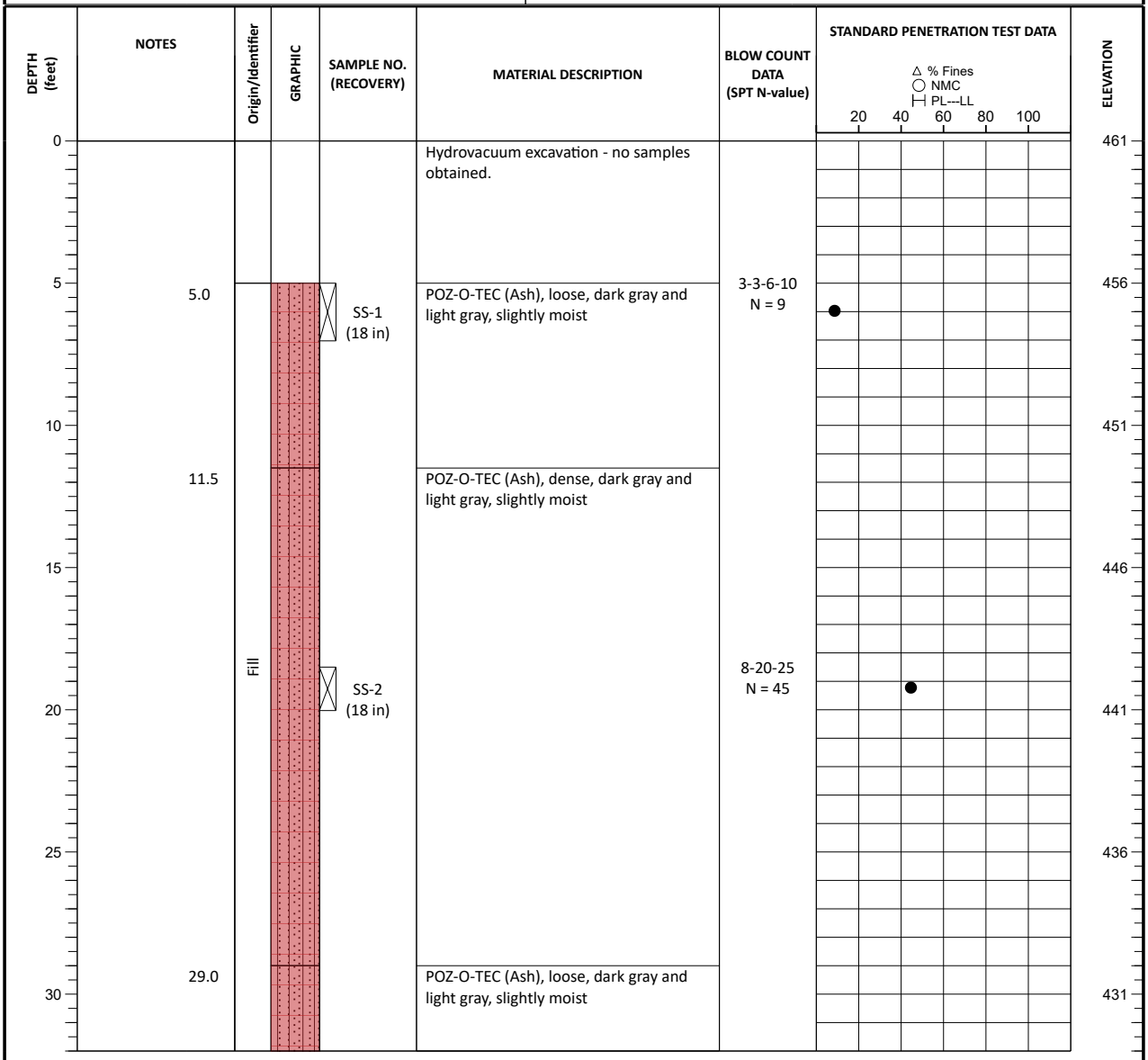
GROUNDWATER		DATE	DEPTH (FT)	REMARKS
ATD	▽	12/13/2022	70.0	
END OF DRILLING	▼	12/14/2022	70.0	
AFTER DRILLING	▼	12/20/2022		Groundwater not encountered.
AFTER DRILLING	▼			

Vertical Accuracy: Estimated from topo map (Rounded 1 ft), Horizontal Accuracy: Handheld GPS (1 ft)

GROUNDWATER DEPTHS ARE NOT EXACT AND MAY VARY SUBSTANTIALLY FROM THOSE INDICATED. ATD = AT TIME OF DRILLING
LL=Liquid Limit, PL = Plastic Limit, NMC = Natural Moisture Content, PPV = Pocket Penetrometer (tsf), PTV = Pocket Torvane (tsf), AR = Auger Refusal

PROJECT:	2027 NGCC Geotechnical Investigation LG&E - Mill Creek Generating Station S&ME Project No. 22360136 - Mill Creek	**BORING LOG: B-06** *Sheet 1 of 3*

DATE DRILLED: 12/20/2022	**ELEVATION:** 461 ft	**NOTES:** Hydrovacuum excavation generally extends through surficial clays and sands and terminates at CCR materials.
DRILL RIG: Diedrich D-50 (track)	**DATUM:** NAVD88	
DRILLER: T. Frost	**BORING DEPTH:** 80.0 ft	
HAMMER TYPE: Auto Hammer (140 lb)	**CLOSURE:** Cement-Bentonite Grout	
DRILLING METHOD: 3-1/4" HSA	**LOGGED BY:** A. Carr	**LATITUDE:** 38.050957 **LONGITUDE:** -85.906763
SAMPLING METHOD: SS	**PROJECT COORDINATE SYSTEM -** NAD 1983 StatePlane Kentucky North FIPS 1601 Feet	



GROUNDWATER		DATE	DEPTH (FT)	REMARKS
ATD	▽	12/20/2022	68.0	
END OF DRILLING	▼	12/21/2022	70.0	
AFTER DRILLING	▼			
AFTER DRILLING	▼			

Vertical Accuracy: Estimated from topo map (Rounded 1 ft), Horizontal Accuracy: Handheld GPS (1 ft)

GROUNDWATER DEPTHS ARE NOT EXACT AND MAY VARY SUBSTANTIALLY FROM THOSE INDICATED. ATD = AT TIME OF DRILLING
LL=Liquid Limit, PL = Plastic Limit, NMC = Natural Moisture Content, PPV = Pocket Penetrometer (tsf), PTV = Pocket Torvane (tsf), AR = Auger Refusal

PROJECT:	**2027 NGCC Geotechnical Investigation** **LG&E - Mill Creek Generating Station** **S&ME Project No. 22360136 - Mill Creek**	**BORING LOG: B-06** *Sheet 2 of 3*

DATE DRILLED: 12/20/2022	**ELEVATION:** 461 ft	**NOTES:** Hydrovacuum excavation generally extends through surficial clays and sands and terminates at CCR materials.
DRILL RIG: Diedrich D-50 (track)	**DATUM:** NAVD88	
DRILLER: T. Frost	**BORING DEPTH:** 80.0 ft	
HAMMER TYPE: Auto Hammer (140 lb)	**CLOSURE:** Cement-Bentonite Grout	
DRILLING METHOD: 3-1/4" HSA	**LOGGED BY:** A. Carr	**LATITUDE:** 38.050957 **LONGITUDE:** -85.906763
SAMPLING METHOD: SS	**PROJECT COORDINATE SYSTEM -** NAD 1983 StatePlane Kentucky North FIPS 1601 Feet	

DEPTH (feet)	NOTES	Origin/Identifier	GRAPHIC	SAMPLE NO. (RECOVERY)	MATERIAL DESCRIPTION	BLOW COUNT DATA (SPT N-value)	STANDARD PENETRATION TEST DATA (△ % Fines, ○ NMC, ⊢ PL---LL; 20 40 60 80 100)	ELEVATION
		Fill		SS-3 (24 in)	POZ-O-TEC (Ash), loose, dark gray and light gray, slightly moist	4-4-6-9 N = 10		
35	34.5				SANDY LEAN CLAY (CL), stiff, brown, slightly moist, with sand lenses			426
	39.0	Alluvium		SS-4 (18 in)	POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM), medium dense, light brown, slightly moist	5-7-6 N = 13		
40								421
				SS-5 (18 in)		5-7-8 N = 15		
45								416
				SS-6 (18 in)		5-8-10 N = 18		
50								411
	51.5				POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM), dense to medium dense, dark brown, slightly moist to wet			
				SS-7 (18 in)		15-20-25 N = 45		
55								406
				SS-8 (15 in)		14-20-23 N = 43		
60								401
						11-15-15		

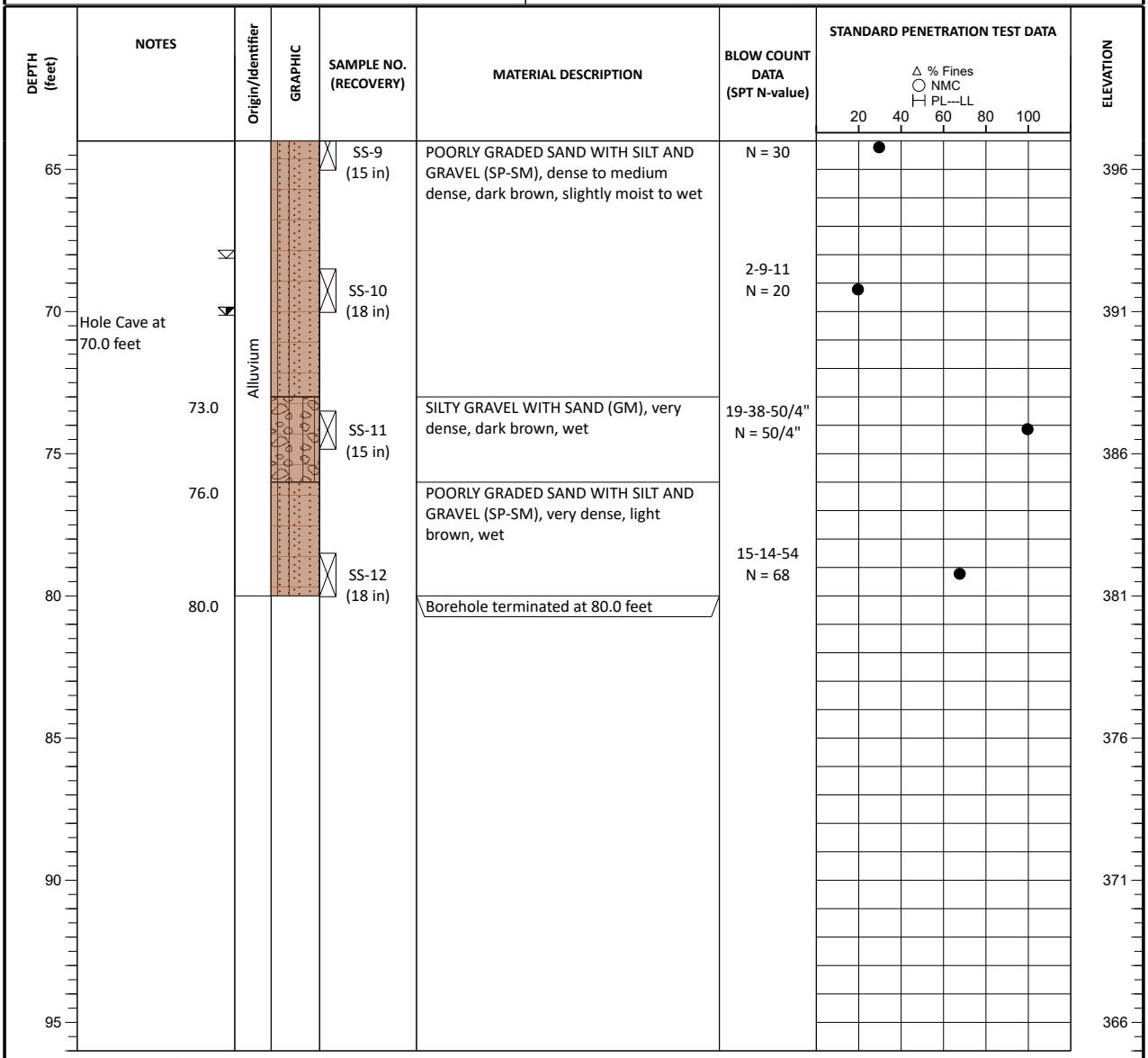
GROUNDWATER		DATE	DEPTH (FT)	REMARKS
ATD	▽	12/20/2022	68.0	
END OF DRILLING	▼	12/21/2022	70.0	
AFTER DRILLING	▼			
AFTER DRILLING	▼			

Vertical Accuracy: Estimated from topo map (Rounded 1 ft), Horizontal Accuracy: Handheld GPS (1 ft)

GROUNDWATER DEPTHS ARE NOT EXACT AND MAY VARY SUBSTANTIALLY FROM THOSE INDICATED. ATD = AT TIME OF DRILLING
LL=Liquid Limit, PL = Plastic Limit, NMC = Natural Moisture Content, PPV = Pocket Penetrometer (tsf), PTV = Pocket Torvane (tsf), AR = Auger Refusal

PROJECT:	**2027 NGCC Geotechnical Investigation** **LG&E - Mill Creek Generating Station** **S&ME Project No. 22360136 - Mill Creek**	**BORING LOG: B-06** *Sheet 3 of 3*

DATE DRILLED: 12/20/2022	**ELEVATION:** 461 ft	**NOTES:** Hydrovacuum excavation generally extends through surficial clays and sands and terminates at CCR materials.
DRILL RIG: Diedrich D-50 (track)	**DATUM:** NAVD88	
DRILLER: T. Frost	**BORING DEPTH:** 80.0 ft	
HAMMER TYPE: Auto Hammer (140 lb)	**CLOSURE:** Cement-Bentonite Grout	
DRILLING METHOD: 3-1/4" HSA	**LOGGED BY:** A. Carr	**LATITUDE:** 38.050957 **LONGITUDE:** -85.906763
SAMPLING METHOD: SS	**PROJECT COORDINATE SYSTEM -** NAD 1983 StatePlane Kentucky North FIPS 1601 Feet	



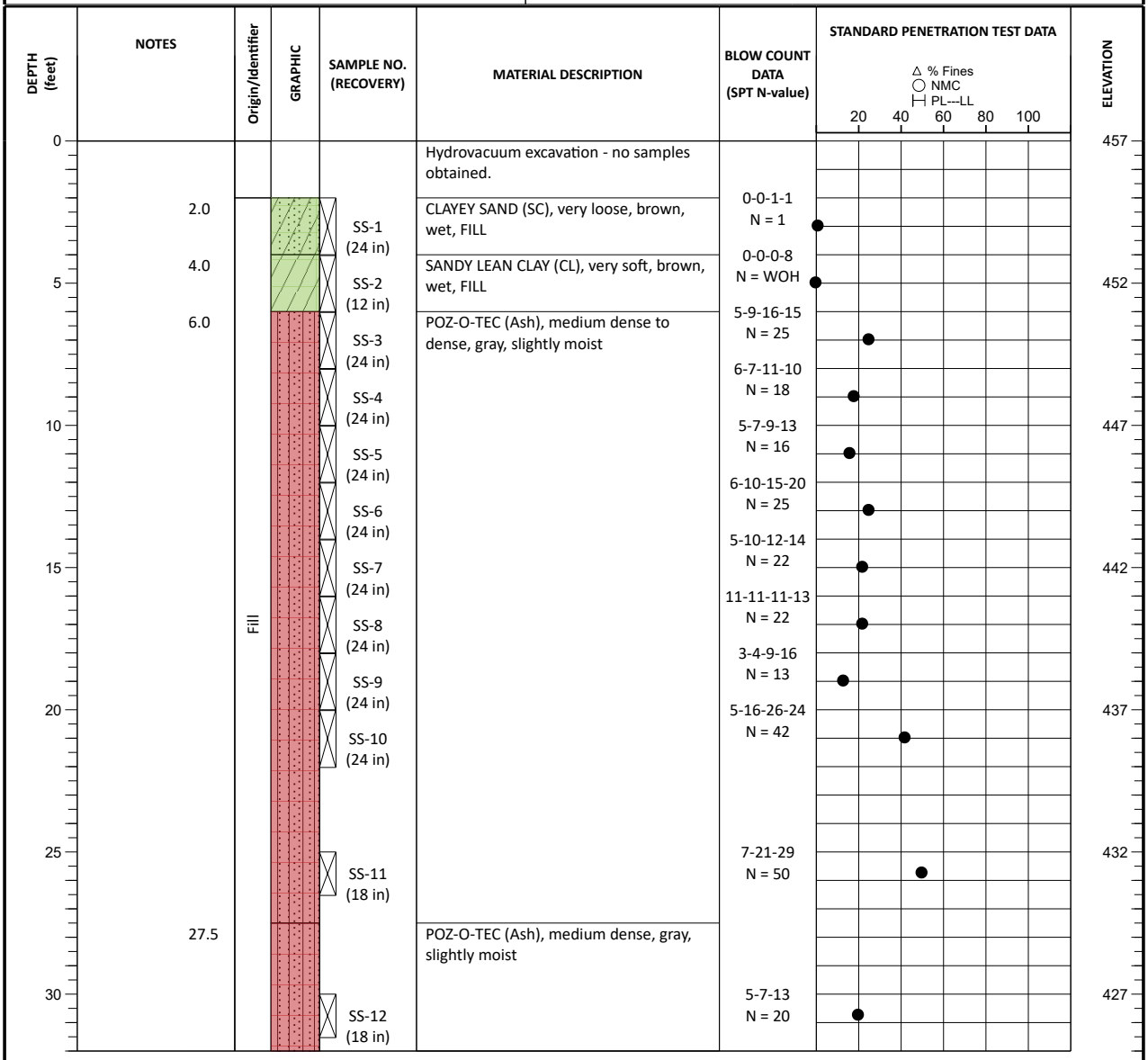
GROUNDWATER		DATE	DEPTH (FT)	REMARKS
ATD	▽	12/20/2022	68.0	
END OF DRILLING	▼	12/21/2022	70.0	
AFTER DRILLING	▼			
AFTER DRILLING	▼			

Vertical Accuracy: Estimated from topo map (Rounded 1 ft), Horizontal Accuracy: Handheld GPS (1 ft)

GROUNDWATER DEPTHS ARE NOT EXACT AND MAY VARY SUBSTANTIALLY FROM THOSE INDICATED. ATD = AT TIME OF DRILLING
LL=Liquid Limit, PL = Plastic Limit, NMC = Natural Moisture Content, PPV = Pocket Penetrometer (tsf), PTV = Pocket Torvane (tsf), AR = Auger Refusal

PROJECT:	2027 NGCC Geotechnical Investigation LG&E - Mill Creek Generating Station S&ME Project No. 22360136 - Mill Creek	**BORING LOG: B-07** *Sheet 1 of 3*

DATE DRILLED: 01/10/2023	**ELEVATION:** 457 ft	**NOTES:** Hydrovacuum excavation generally extends through surficial clays and sands and terminates at CCR materials.
DRILL RIG: CME-55 (Track)	**DATUM:** NAVD88	
DRILLER: Horn and Associates	**BORING DEPTH:** 81.0 ft	
HAMMER TYPE: Auto Hammer (140 lb)	**CLOSURE:** Cement-Bentonite Grout	
DRILLING METHOD: 3-1/4" HSA	**LOGGED BY:** A. Carr	**LATITUDE:** 38.049996 **LONGITUDE:** -85.905256
SAMPLING METHOD: SS	**PROJECT COORDINATE SYSTEM -** NAD 1983 StatePlane Kentucky North FIPS 1601 Feet	



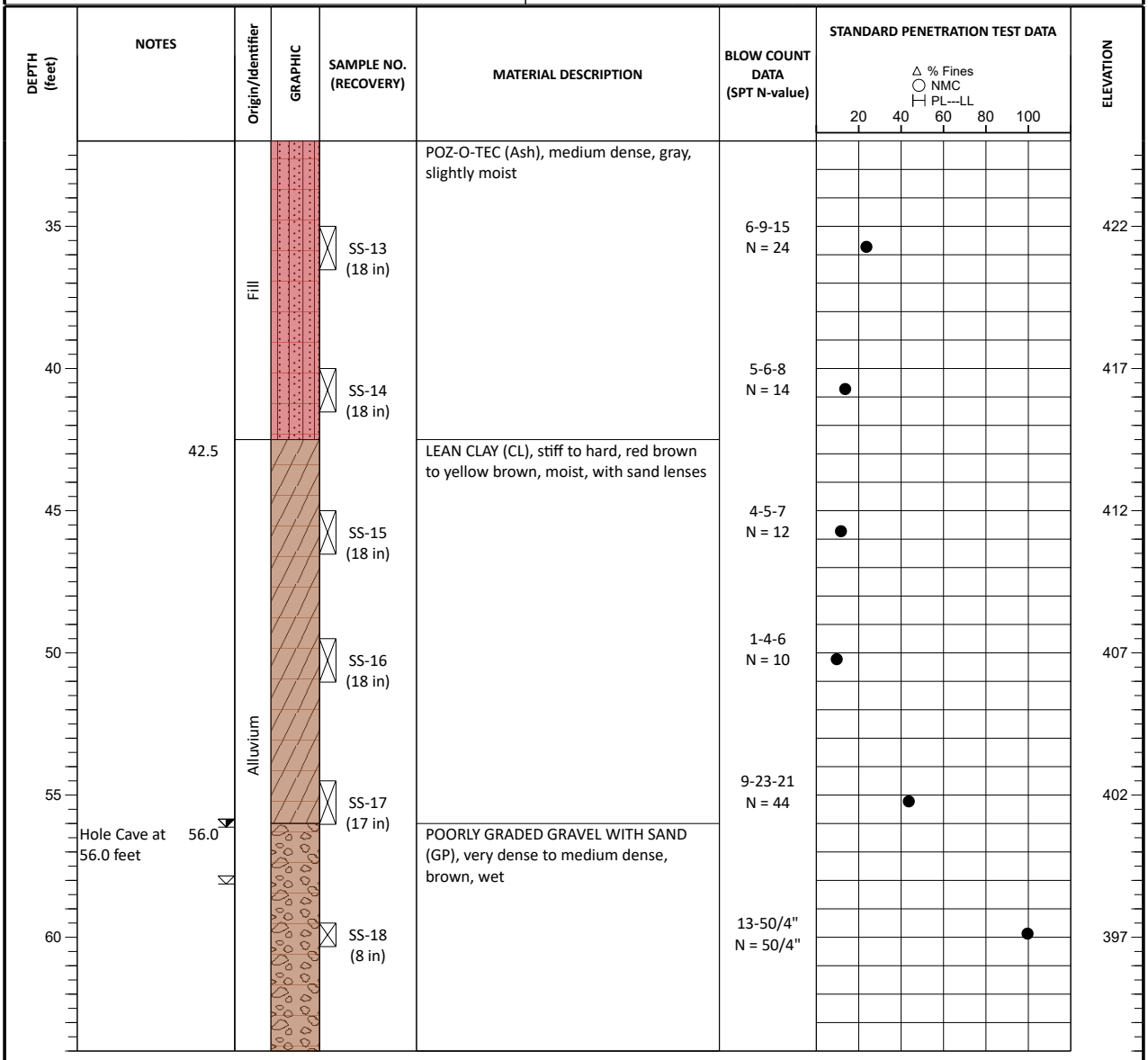
GROUNDWATER		DATE	DEPTH (FT)	REMARKS
ATD	▽	01/10/2023	58.0	
END OF DRILLING	▼	01/10/2023	56.0	
AFTER DRILLING	▼			
AFTER DRILLING	▼			

Vertical Accuracy: Estimated from topo map (Rounded 1 ft), Horizontal Accuracy: Handheld GPS (1 ft)

GROUNDWATER DEPTHS ARE NOT EXACT AND MAY VARY SUBSTANTIALLY FROM THOSE INDICATED. ATD = AT TIME OF DRILLING
LL=Liquid Limit, PL = Plastic Limit, NMC = Natural Moisture Content, PPV = Pocket Penetrometer (tsf), PTV = Pocket Torvane (tsf), AR = Auger Refusal

PROJECT:	**2027 NGCC Geotechnical Investigation** **LG&E - Mill Creek Generating Station** **S&ME Project No. 22360136 - Mill Creek**	**BORING LOG: B-07** *Sheet 2 of 3*

DATE DRILLED: 01/10/2023	**ELEVATION:** 457 ft	**NOTES:** Hydrovacuum excavation generally extends through surficial clays and sands and terminates at CCR materials.
DRILL RIG: CME-55 (Track)	**DATUM:** NAVD88	
DRILLER: Horn and Associates	**BORING DEPTH:** 81.0 ft	
HAMMER TYPE: Auto Hammer (140 lb)	**CLOSURE:** Cement-Bentonite Grout	
DRILLING METHOD: 3-1/4" HSA	**LOGGED BY:** A. Carr	**LATITUDE:** 38.049996 **LONGITUDE:** -85.905256
SAMPLING METHOD: SS	**PROJECT COORDINATE SYSTEM -** NAD 1983 StatePlane Kentucky North FIPS 1601 Feet	



GROUNDWATER		DATE	DEPTH (FT)	REMARKS
ATD	▽	01/10/2023	58.0	
END OF DRILLING	▼	01/10/2023	56.0	
AFTER DRILLING	▼			
AFTER DRILLING	▼			

Vertical Accuracy: Estimated from topo map (Rounded 1 ft), Horizontal Accuracy: Handheld GPS (1 ft)

GROUNDWATER DEPTHS ARE NOT EXACT AND MAY VARY SUBSTANTIALLY FROM THOSE INDICATED. ATD = AT TIME OF DRILLING
LL=Liquid Limit, PL = Plastic Limit, NMC = Natural Moisture Content, PPV = Pocket Penetrometer (tsf), PTV = Pocket Torvane (tsf), AR = Auger Refusal

PROJECT:	2027 NGCC Geotechnical Investigation LG&E - Mill Creek Generating Station S&ME Project No. 22360136 - Mill Creek	**BORING LOG: B-07** *Sheet 3 of 3*

DATE DRILLED: 01/10/2023	**ELEVATION:** 457 ft	**NOTES:** Hydrovacuum excavation generally extends through surficial clays and sands and terminates at CCR materials.
DRILL RIG: CME-55 (Track)	**DATUM:** NAVD88	
DRILLER: Horn and Associates	**BORING DEPTH:** 81.0 ft	
HAMMER TYPE: Auto Hammer (140 lb)	**CLOSURE:** Cement-Bentonite Grout	
DRILLING METHOD: 3-1/4" HSA	**LOGGED BY:** A. Carr	**LATITUDE:** 38.049996 **LONGITUDE:** -85.905256
SAMPLING METHOD: SS	**PROJECT COORDINATE SYSTEM -** NAD 1983 StatePlane Kentucky North FIPS 1601 Feet	

DEPTH (feet)	NOTES	Origin/Identifier	GRAPHIC	SAMPLE NO. (RECOVERY)	MATERIAL DESCRIPTION	BLOW COUNT DATA (SPT N-value)	STANDARD PENETRATION TEST DATA (△ % Fines, ○ NMC, ⊢ PL---LL; 20 40 60 80 100)	ELEVATION
65				SS-19 (11 in)	POORLY GRADED GRAVEL WITH SAND (GP), very dense to medium dense, brown, wet	11-10-10 N = 20		392
70		Alluvium		SS-20 (9 in)		4-6-10 N = 16		387
	72.5				POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM), medium dense to dense, brown, wet			
75				SS-21 (12 in)		7-11-13 N = 24		382
80				SS-22 (15 in)		10-17-16 N = 33		377
	81.0				Borehole terminated at 81.0 feet			
85								372
90								367
95								362

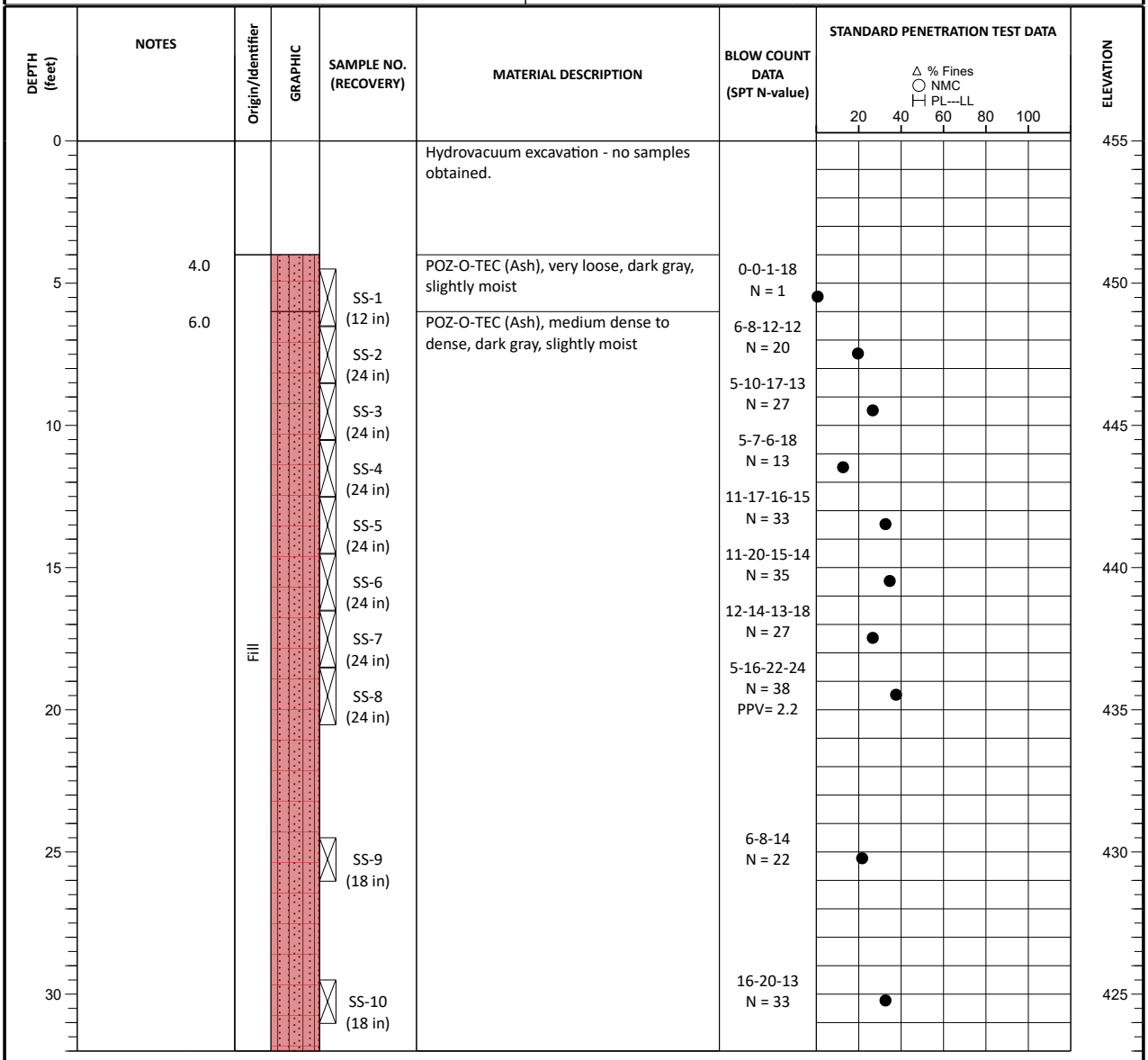
GROUNDWATER		DATE	DEPTH (FT)	REMARKS
ATD	▽	01/10/2023	58.0	
END OF DRILLING	▼	01/10/2023	56.0	
AFTER DRILLING	▼			
AFTER DRILLING	▼			

Vertical Accuracy: Estimated from topo map (Rounded 1 ft), Horizontal Accuracy: Handheld GPS (1 ft)

GROUNDWATER DEPTHS ARE NOT EXACT AND MAY VARY SUBSTANTIALLY FROM THOSE INDICATED. ATD = AT TIME OF DRILLING
LL=Liquid Limit, PL = Plastic Limit, NMC = Natural Moisture Content, PPV = Pocket Penetrometer (tsf), PTV = Pocket Torvane (tsf), AR = Auger Refusal

PROJECT:	2027 NGCC Geotechnical Investigation LG&E - Mill Creek Generating Station S&ME Project No. 22360136 - Mill Creek	**BORING LOG: B-08** *Sheet 1 of 3*

DATE DRILLED: 01/09/2023	**ELEVATION:** 455 ft	**NOTES:** Hydrovacuum excavation generally extends through surficial clays and sands and terminates at CCR materials.
DRILL RIG: Diedrich D-120 (ATC)	**DATUM:** NAVD88	
DRILLER: Horn and Associates	**BORING DEPTH:** 81.0 ft	
HAMMER TYPE: Auto Hammer (140 lb)	**CLOSURE:** Cement-Bentonite Grout	
DRILLING METHOD: 3-1/4" HSA	**LOGGED BY:** A. Carr	**LATITUDE:** 38.050435 **LONGITUDE:** -85.905100
SAMPLING METHOD: SS	**PROJECT COORDINATE SYSTEM -** NAD 1983 StatePlane Kentucky North FIPS 1601 Feet	



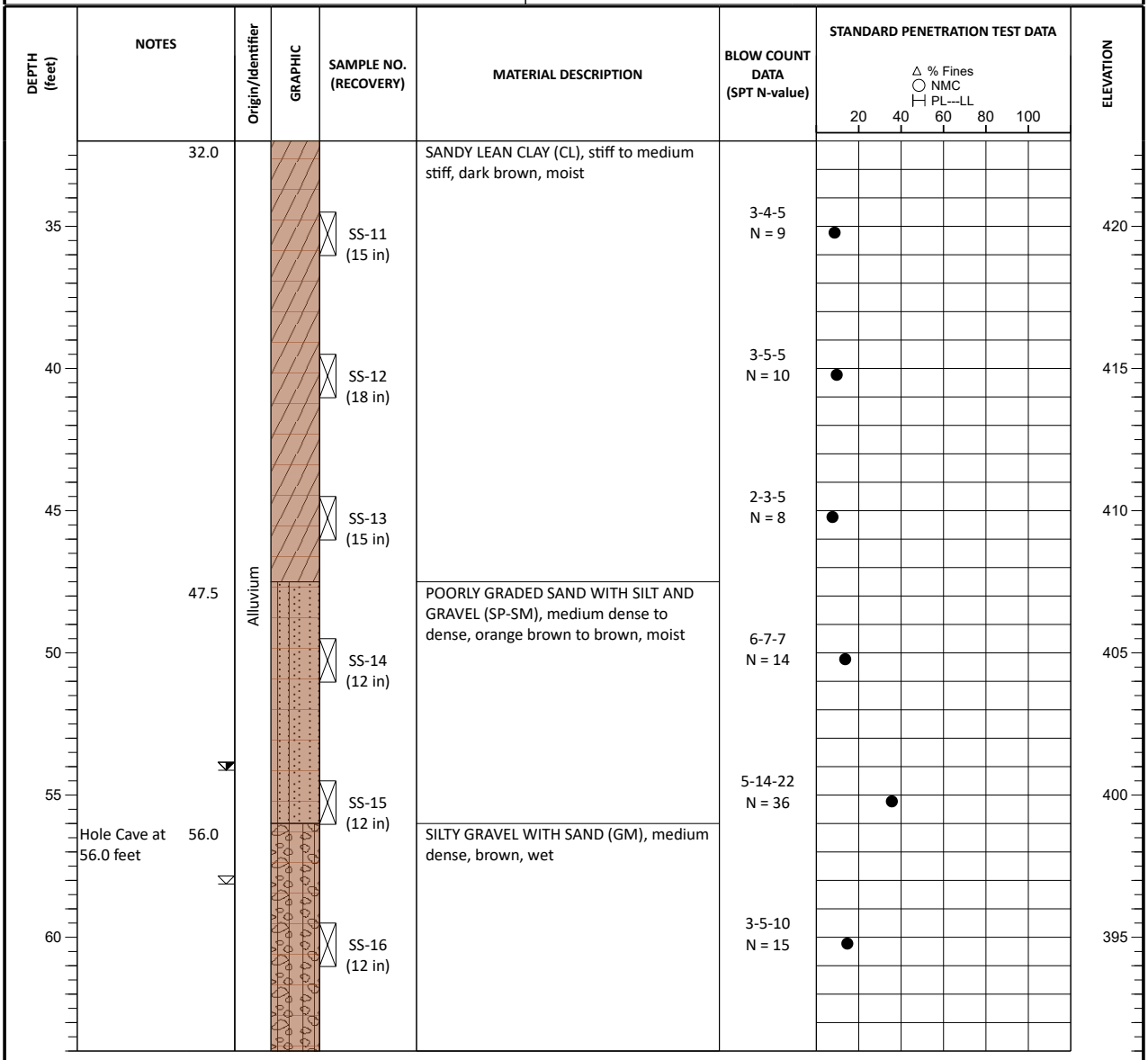
GROUNDWATER		DATE	DEPTH (FT)	REMARKS
ATD	▽	01/09/2023	58.0	
END OF DRILLING	▼	01/10/2023	54.0	
AFTER DRILLING	▼			
AFTER DRILLING	▼			

Vertical Accuracy: Estimated from topo map (Rounded 1 ft), Horizontal Accuracy: Handheld GPS (1 ft)

GROUNDWATER DEPTHS ARE NOT EXACT AND MAY VARY SUBSTANTIALLY FROM THOSE INDICATED. ATD = AT TIME OF DRILLING
LL=Liquid Limit, PL = Plastic Limit, NMC = Natural Moisture Content, PPV = Pocket Penetrometer (tsf), PTV = Pocket Torvane (tsf), AR = Auger Refusal

PROJECT:	2027 NGCC Geotechnical Investigation LG&E - Mill Creek Generating Station S&ME Project No. 22360136 - Mill Creek	**BORING LOG: B-08** *Sheet 2 of 3*

DATE DRILLED: 01/09/2023	**ELEVATION:** 455 ft	**NOTES:** Hydrovacuum excavation generally extends through surficial clays and sands and terminates at CCR materials.
DRILL RIG: Diedrich D-120 (ATC)	**DATUM:** NAVD88	
DRILLER: Horn and Associates	**BORING DEPTH:** 81.0 ft	
HAMMER TYPE: Auto Hammer (140 lb)	**CLOSURE:** Cement-Bentonite Grout	
DRILLING METHOD: 3-1/4" HSA	**LOGGED BY:** A. Carr	**LATITUDE:** 38.050435 **LONGITUDE:** -85.905100
SAMPLING METHOD: SS	**PROJECT COORDINATE SYSTEM -** NAD 1983 StatePlane Kentucky North FIPS 1601 Feet	



GROUNDWATER		DATE	DEPTH (FT)	REMARKS
ATD	▽	01/09/2023	58.0	
END OF DRILLING	▼	01/10/2023	54.0	
AFTER DRILLING	▼			
AFTER DRILLING	▼			

Vertical Accuracy: Estimated from topo map (Rounded 1 ft), Horizontal Accuracy: Handheld GPS (1 ft)

GROUNDWATER DEPTHS ARE NOT EXACT AND MAY VARY SUBSTANTIALLY FROM THOSE INDICATED. ATD = AT TIME OF DRILLING
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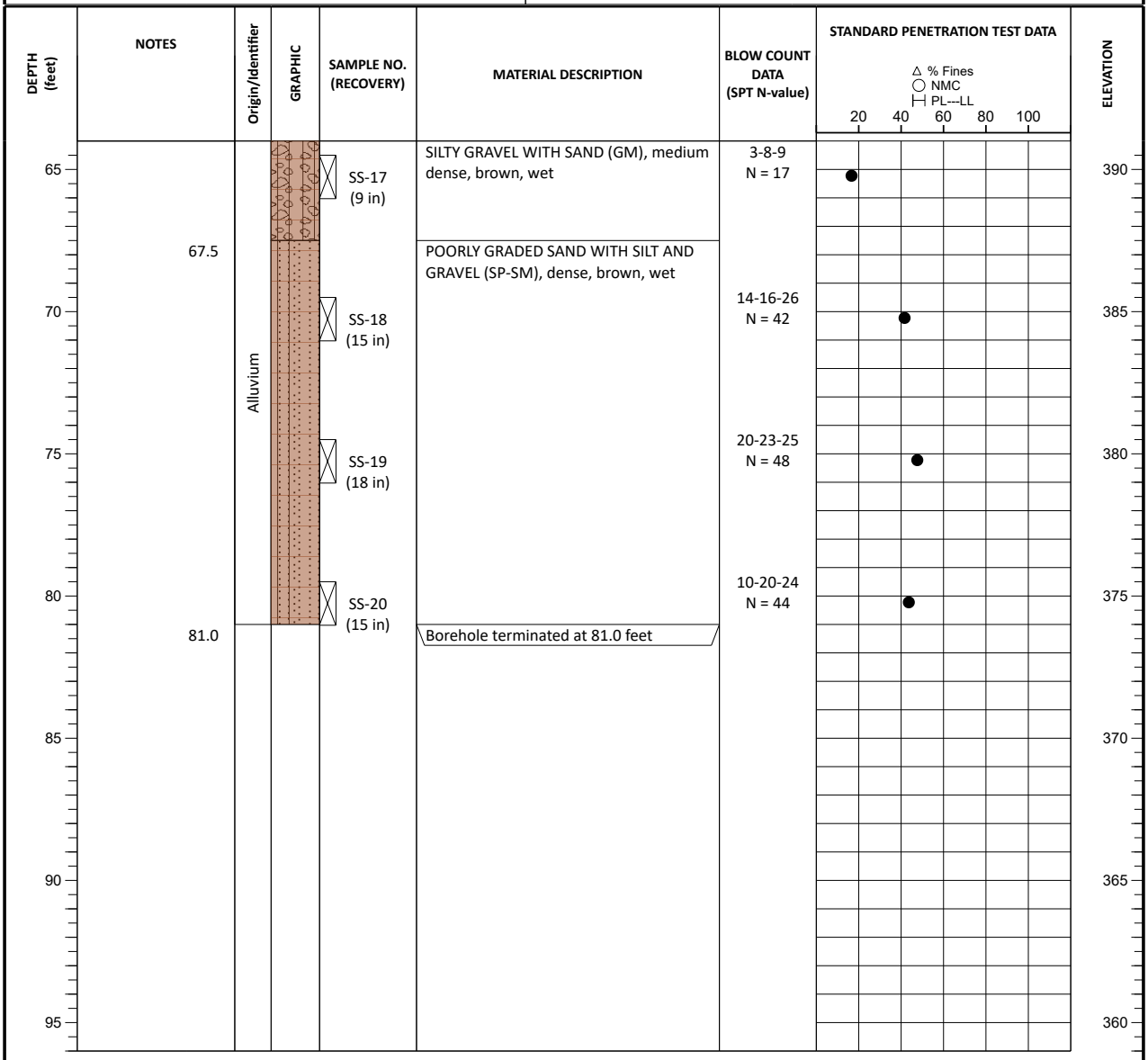
PROJECT:	**2027 NGCC Geotechnical Investigation** **LG&E - Mill Creek Generating Station** **S&ME Project No. 22360136 - Mill Creek**	**BORING LOG: B-08** *Sheet 3 of 3*

DATE DRILLED: 01/09/2023	**ELEVATION:** 455 ft	**NOTES:** Hydrovacuum excavation generally extends through surficial clays and sands and terminates at CCR materials.
DRILL RIG: Diedrich D-120 (ATC)	**DATUM:** NAVD88	
DRILLER: Horn and Associates	**BORING DEPTH:** 81.0 ft	
HAMMER TYPE: Auto Hammer (140 lb)	**CLOSURE:** Cement-Bentonite Grout	
DRILLING METHOD: 3-1/4" HSA	**LOGGED BY:** A. Carr	**LATITUDE:** 38.050435 **LONGITUDE:** -85.905100
SAMPLING METHOD: SS	**PROJECT COORDINATE SYSTEM -** NAD 1983 StatePlane Kentucky North FIPS 1601 Feet	

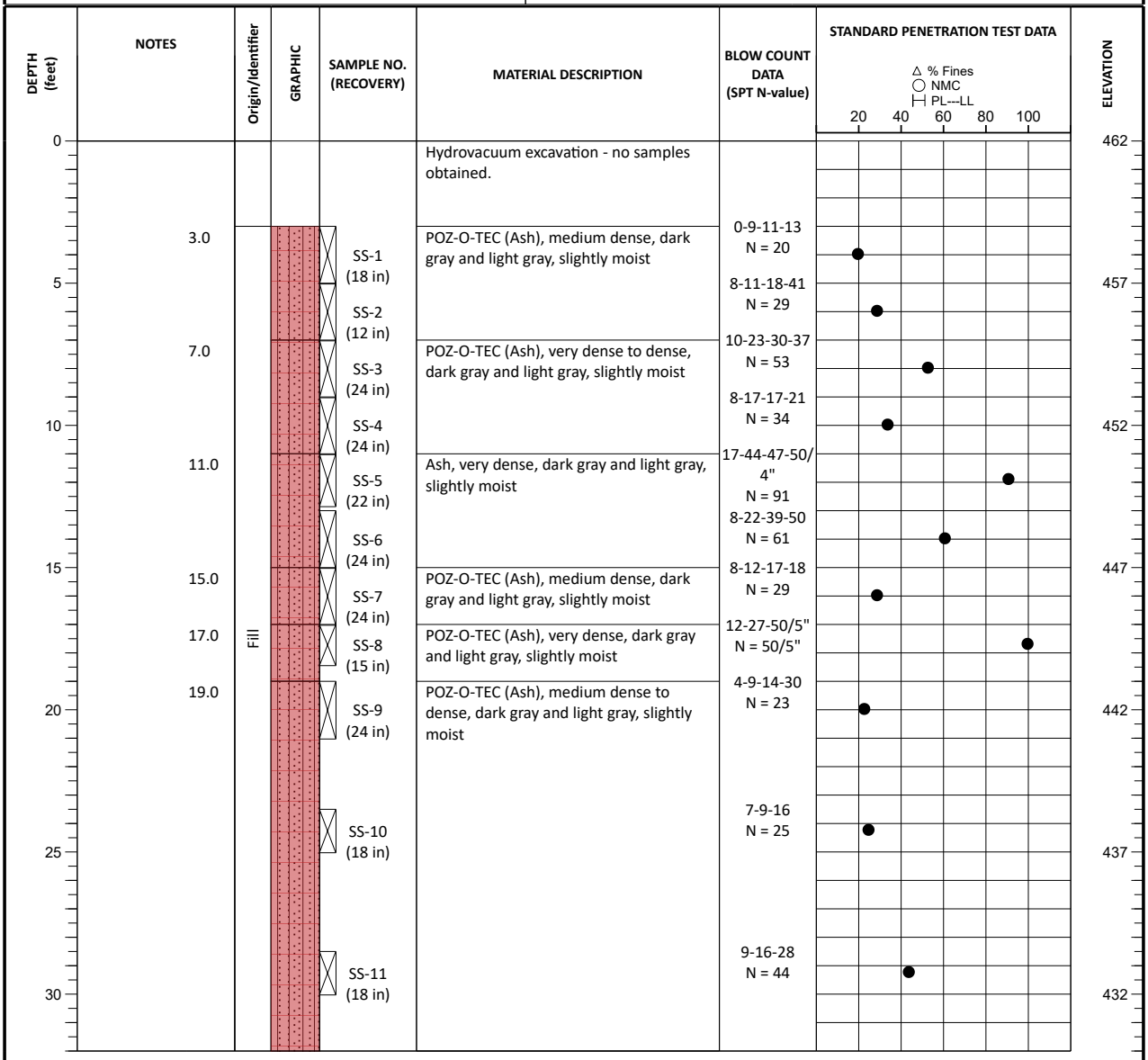


GROUNDWATER		DATE	DEPTH (FT)	REMARKS
ATD	▽	01/09/2023	58.0	
END OF DRILLING	▼	01/10/2023	54.0	
AFTER DRILLING	▼			
AFTER DRILLING	▼			

Vertical Accuracy: Estimated from topo map (Rounded 1 ft), Horizontal Accuracy: Handheld GPS (1 ft)

GROUNDWATER DEPTHS ARE NOT EXACT AND MAY VARY SUBSTANTIALLY FROM THOSE INDICATED. ATD = AT TIME OF DRILLING
LL=Liquid Limit, PL = Plastic Limit, NMC = Natural Moisture Content, PPV = Pocket Penetrometer (tsf), PTV = Pocket Torvane (tsf), AR = Auger Refusal

PROJECT:	2027 NGCC Geotechnical Investigation LG&E - Mill Creek Generating Station S&ME Project No. 22360136 - Mill Creek	**BORING LOG: B-09** *Sheet 1 of 3*
DATE DRILLED: 12/21/2022	**ELEVATION:** 462 ft	**NOTES:** Hydrovacuum excavation generally extends through surficial clays and sands and terminates at CCR materials.
DRILL RIG: Diedrich D-50 (track)	**DATUM:** NAVD88	
DRILLER: T. Frost	**BORING DEPTH:** 80.0 ft	
HAMMER TYPE: Auto Hammer (140 lb)	**CLOSURE:** Cement-Bentonite Grout	
DRILLING METHOD: 3-1/4" HSA	**LOGGED BY:** A. Carr	**LATITUDE:** 38.050123 **LONGITUDE:** -85.905844
SAMPLING METHOD: SS	**PROJECT COORDINATE SYSTEM -** NAD 1983 StatePlane Kentucky North FIPS 1601 Feet	



GROUNDWATER		DATE	DEPTH (FT)	REMARKS
ATD	▽	12/21/2022	68.0	
END OF DRILLING	▼	12/22/2022	66.0	
AFTER DRILLING	▼			
AFTER DRILLING	▼			

Vertical Accuracy: Estimated from topo map (Rounded 1 ft), Horizontal Accuracy: Handheld GPS (1 ft)

GROUNDWATER DEPTHS ARE NOT EXACT AND MAY VARY SUBSTANTIALLY FROM THOSE INDICATED. ATD = AT TIME OF DRILLING
LL=Liquid Limit, PL = Plastic Limit, NMC = Natural Moisture Content, PPV = Pocket Penetrometer (tsf), PTV = Pocket Torvane (tsf), AR = Auger Refusal

PROJECT:	2027 NGCC Geotechnical Investigation LG&E - Mill Creek Generating Station S&ME Project No. 22360136 - Mill Creek	**BORING LOG: B-09** *Sheet 2 of 3*

DATE DRILLED: 12/21/2022	**ELEVATION:** 462 ft	**NOTES:** Hydrovacuum excavation generally extends through surficial clays and sands and terminates at CCR materials.
DRILL RIG: Diedrich D-50 (track)	**DATUM:** NAVD88	
DRILLER: T. Frost	**BORING DEPTH:** 80.0 ft	
HAMMER TYPE: Auto Hammer (140 lb)	**CLOSURE:** Cement-Bentonite Grout	
DRILLING METHOD: 3-1/4" HSA	**LOGGED BY:** A. Carr	**LATITUDE:** 38.050123 **LONGITUDE:** -85.905844
SAMPLING METHOD: SS	**PROJECT COORDINATE SYSTEM -** NAD 1983 StatePlane Kentucky North FIPS 1601 Feet	

DEPTH (feet)	NOTES	Origin/Identifier	GRAPHIC	SAMPLE NO. (RECOVERY)	MATERIAL DESCRIPTION	BLOW COUNT DATA (SPT N-value)	STANDARD PENETRATION TEST DATA (△ % Fines, ○ NMC, ⊢ PL---LL; 20 40 60 80 100)	ELEVATION
35		Fill		SS-12 (18 in)	POZ-O-TEC (Ash), medium dense to dense, dark gray and light gray, slightly moist	7-10-12 N = 22		427
				SS-13 (18 in)		8-13-17 N = 30		
40	39.5	Alluvium			POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM), medium dense, brown, slightly moist, with coal fragments			422
	42.0			SS-14 (18 in)	LEAN CLAY (CL), stiff, orange brown to light brown, moist, with sand lenses	5-6-8 N = 14		
45								417
	48.0			SS-15 (12 in)	SANDY LEAN CLAY (CL), stiff, gray brown and orange brown, moist, with sand lenses	2-4-6 N = 10		
50								412
	52.0			SS-16 (12 in)	POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM), medium dense, light brown, moist	4-8-14 N = 22		
55								407
				SS-17 (9 in)		4-6-9 N = 15		
60								402
	62.0				SILTY GRAVEL WITH SAND (GM), medium dense to dense, light brown and dark brown, wet	16-16-11		

GROUNDWATER		DATE	DEPTH (FT)	REMARKS
ATD	▽	12/21/2022	68.0	
END OF DRILLING	▼	12/22/2022	66.0	
AFTER DRILLING	▼			
AFTER DRILLING	▼			

Vertical Accuracy: Estimated from topo map (Rounded 1 ft), Horizontal Accuracy: Handheld GPS (1 ft)

GROUNDWATER DEPTHS ARE NOT EXACT AND MAY VARY SUBSTANTIALLY FROM THOSE INDICATED. ATD = AT TIME OF DRILLING
LL=Liquid Limit, PL = Plastic Limit, NMC = Natural Moisture Content, PPV = Pocket Penetrometer (tsf), PTV = Pocket Torvane (tsf), AR = Auger Refusal

PROJECT:	**2027 NGCC Geotechnical Investigation** **LG&E - Mill Creek Generating Station** **S&ME Project No. 22360136 - Mill Creek**	**BORING LOG: B-09** *Sheet 3 of 3*

DATE DRILLED: 12/21/2022	**ELEVATION:** 462 ft	**NOTES:** Hydrovacuum excavation generally extends through surficial clays and sands and terminates at CCR materials.
DRILL RIG: Diedrich D-50 (track)	**DATUM:** NAVD88	
DRILLER: T. Frost	**BORING DEPTH:** 80.0 ft	
HAMMER TYPE: Auto Hammer (140 lb)	**CLOSURE:** Cement-Bentonite Grout	
DRILLING METHOD: 3-1/4" HSA	**LOGGED BY:** A. Carr	**LATITUDE:** 38.050123 **LONGITUDE:** -85.905844
SAMPLING METHOD: SS	**PROJECT COORDINATE SYSTEM -** NAD 1983 StatePlane Kentucky North FIPS 1601 Feet	

DEPTH (feet)	NOTES	Origin/Identifier	GRAPHIC	SAMPLE NO. (RECOVERY)	MATERIAL DESCRIPTION	BLOW COUNT DATA (SPT N-value)	STANDARD PENETRATION TEST DATA (△ % Fines, ○ NMC, ⊢ PL---LL; 20 40 60 80 100)	ELEVATION
65				SS-18 (9 in)	SILTY GRAVEL WITH SAND (GM), medium dense to dense, light brown and dark brown, wet	N = 27		397
70	Hole Cave at 70.0 feet	Alluvium		SS-19 (12 in)		12-13-19 N = 32		392
75				SS-20 (15 in)		10-17-23 N = 40		387
	76.0				POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM), dense, light brown, wet			
80	80.0			SS-21 (18 in)	Borehole terminated at 80.0 feet	11-18-29 N = 47		382
85								377
90								372
95								367

GROUNDWATER		DATE	DEPTH (FT)	REMARKS
ATD	▽	12/21/2022	68.0	
END OF DRILLING	▼	12/22/2022	66.0	
AFTER DRILLING	▼			
AFTER DRILLING	▼			

Vertical Accuracy: Estimated from topo map (Rounded 1 ft), Horizontal Accuracy: Handheld GPS (1 ft)

GROUNDWATER DEPTHS ARE NOT EXACT AND MAY VARY SUBSTANTIALLY FROM THOSE INDICATED. ATD = AT TIME OF DRILLING
LL=Liquid Limit, PL = Plastic Limit, NMC = Natural Moisture Content, PPV = Pocket Penetrometer (tsf), PTV = Pocket Torvane (tsf), AR = Auger Refusal

PROJECT:	**2027 NGCC Geotechnical Investigation** **LG&E - Mill Creek Generating Station** **S&ME Project No. 22360136 - Mill Creek**	**BORING LOG: B-10** *Sheet 1 of 3*

DATE DRILLED: 01/09/2023	**ELEVATION:** 461 ft	**NOTES:** Hydrovacuum excavation generally extends through surficial clays and sands and terminates at CCR materials.
DRILL RIG: CME-55 (Track)	**DATUM:** NAVD88	
DRILLER: Horn and Associates	**BORING DEPTH:** 80.5 ft	
HAMMER TYPE: Auto Hammer (140 lb)	**CLOSURE:** Cement-Bentonite Grout	
DRILLING METHOD: 3-1/4" HSA	**LOGGED BY:** A. Carr	**LATITUDE:** 38.050435 **LONGITUDE:** -85.905734
SAMPLING METHOD: SS	**PROJECT COORDINATE SYSTEM -** NAD 1983 StatePlane Kentucky North FIPS 1601 Feet	

DEPTH (feet)	NOTES	Origin/Identifier	GRAPHIC	SAMPLE NO. (RECOVERY)	MATERIAL DESCRIPTION	BLOW COUNT DATA (SPT N-value)	STANDARD PENETRATION TEST DATA (△ % Fines, ○ NMC, ⊢ PL---LL; 20 40 60 80 100)	ELEVATION
0					Hydrovacuum excavation - no samples obtained.			461
2.5		Fill		SS-1 (24 in)	POZ-O-TEC (Ash), medium dense, dark gray, slightly moist	7-11-19-13 N = 30		
4.5				SS-2 (24 in)	POZ-O-TEC (Ash), loose, dark gray, slightly moist	3-5-3-4 N = 8		456
6.5				SS-3 (24 in)	POZ-O-TEC (Ash), medium dense to dense, dark gray, slightly moist	2-14-10-22 N = 24		
10				SS-4 (24 in)		14-21-22-22 N = 43		451
				SS-5 (24 in)		10-20-22-12 N = 42		
				SS-6 (24 in)		8-14-22-15 N = 36		
15				SS-7 (24 in)		9-14-20-14 N = 34		446
				SS-8 (24 in)		6-9-15-15 N = 24		
20				SS-9 (24 in)		7-9-11-11 N = 20		441
25				SS-10 (18 in)		6-9-12 N = 21		436
30				SS-11 (18 in)		7-15-12 N = 27		431

GROUNDWATER		DATE	DEPTH (FT)	REMARKS
ATD	▽	01/09/2023	64.0	
END OF DRILLING	▼	01/10/2023	62.0	
AFTER DRILLING	▼			
AFTER DRILLING	▼			

Vertical Accuracy: Estimated from topo map (Rounded 1 ft), Horizontal Accuracy: Handheld GPS (1 ft)

GROUNDWATER DEPTHS ARE NOT EXACT AND MAY VARY SUBSTANTIALLY FROM THOSE INDICATED. ATD = AT TIME OF DRILLING
LL=Liquid Limit, PL = Plastic Limit, NMC = Natural Moisture Content, PPV = Pocket Penetrometer (tsf), PTV = Pocket Torvane (tsf), AR = Auger Refusal

PROJECT:	**2027 NGCC Geotechnical Investigation** **LG&E - Mill Creek Generating Station** **S&ME Project No. 22360136 - Mill Creek**	**BORING LOG: B-10** *Sheet 2 of 3*

DATE DRILLED: 01/09/2023	**ELEVATION:** 461 ft	**NOTES:** Hydrovacuum excavation generally extends through surficial clays and sands and terminates at CCR materials.
DRILL RIG: CME-55 (Track)	**DATUM:** NAVD88	
DRILLER: Horn and Associates	**BORING DEPTH:** 80.5 ft	
HAMMER TYPE: Auto Hammer (140 lb)	**CLOSURE:** Cement-Bentonite Grout	
DRILLING METHOD: 3-1/4" HSA	**LOGGED BY:** A. Carr	**LATITUDE:** 38.050435 **LONGITUDE:** -85.905734
SAMPLING METHOD: SS	**PROJECT COORDINATE SYSTEM -** NAD 1983 StatePlane Kentucky North FIPS 1601 Feet	

DEPTH (feet)	NOTES	Origin/Identifier	GRAPHIC	SAMPLE NO. (RECOVERY)	MATERIAL DESCRIPTION	BLOW COUNT DATA (SPT N-value)	STANDARD PENETRATION TEST DATA (△ % Fines, ○ NMC, ⊢ PL---LL; 20 40 60 80 100)	ELEVATION
35		Fill		SS-12 (18 in)	POZ-O-TEC (Ash), medium dense to dense, dark gray, slightly moist	9-15-22 N = 37		426
	37.5				LEAN CLAY (CL), stiff to medium stiff, orange brown to brown, moist			
40		Alluvium		SS-13 (18 in)		5-5-8 N = 13		421
45	44.5			SS-14 (18 in)	POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM), medium dense, brown to light brown, slightly moist	4-3-3 N = 6		416
50				SS-15 (12 in)		5-8-11 N = 19		411
	52.5				SILTY GRAVEL WITH SAND (GM), medium dense to dense, brown, moist			
55				SS-16 (9 in)		5-7-8 N = 15		406
60				SS-17 (18 in)		8-16-23 N = 39		401
	62.5				SILTY GRAVEL WITH SAND (GM), medium dense, brown, moist to wet			

GROUNDWATER		DATE	DEPTH (FT)	REMARKS
ATD	▽	01/09/2023	64.0	
END OF DRILLING	▼	01/10/2023	62.0	
AFTER DRILLING	▼			
AFTER DRILLING	▼			

Vertical Accuracy: Estimated from topo map (Rounded 1 ft), Horizontal Accuracy: Handheld GPS (1 ft)

GROUNDWATER DEPTHS ARE NOT EXACT AND MAY VARY SUBSTANTIALLY FROM THOSE INDICATED. ATD = AT TIME OF DRILLING
LL=Liquid Limit, PL = Plastic Limit, NMC = Natural Moisture Content, PPV = Pocket Penetrometer (tsf), PTV = Pocket Torvane (tsf), AR = Auger Refusal

PROJECT:	2027 NGCC Geotechnical Investigation LG&E - Mill Creek Generating Station S&ME Project No. 22360136 - Mill Creek	**BORING LOG: B-10** *Sheet 3 of 3*

DATE DRILLED: 01/09/2023	**ELEVATION:** 461 ft	**NOTES:** Hydrovacuum excavation generally extends through surficial clays and sands and terminates at CCR materials.
DRILL RIG: CME-55 (Track)	**DATUM:** NAVD88	
DRILLER: Horn and Associates	**BORING DEPTH:** 80.5 ft	
HAMMER TYPE: Auto Hammer (140 lb)	**CLOSURE:** Cement-Bentonite Grout	
DRILLING METHOD: 3-1/4" HSA	**LOGGED BY:** A. Carr	**LATITUDE:** 38.050435 **LONGITUDE:** -85.905734
SAMPLING METHOD: SS	**PROJECT COORDINATE SYSTEM -** NAD 1983 StatePlane Kentucky North FIPS 1601 Feet	

DEPTH (feet)	NOTES	Origin/Identifier	GRAPHIC	SAMPLE NO. (RECOVERY)	MATERIAL DESCRIPTION	BLOW COUNT DATA (SPT N-value)	STANDARD PENETRATION TEST DATA (△ % Fines, ○ NMC, ⊢ PL---LL; 20 40 60 80 100)	ELEVATION
65	Hole Cave at 64.0 feet	Alluvium		SS-18 (12 in)	SILTY GRAVEL WITH SAND (GM), medium dense, brown, moist to wet	4-8-12 N = 20		396
70				SS-19 (12 in)		3-8-10 N = 18		391
75				SS-20 (18 in)		6-10-15 N = 25		386
	77.5				POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM), medium dense, brown, wet			
80				SS-21 (15 in)		9-9-13 N = 22		381
	80.5				Borehole terminated at 80.5 feet			
85								376
90								371
95								366

GROUNDWATER		DATE	DEPTH (FT)	REMARKS
ATD	▽	01/09/2023	64.0	
END OF DRILLING	▼	01/10/2023	62.0	
AFTER DRILLING	▼			
AFTER DRILLING	▼			

Vertical Accuracy: Estimated from topo map (Rounded 1 ft), Horizontal Accuracy: Handheld GPS (1 ft)

GROUNDWATER DEPTHS ARE NOT EXACT AND MAY VARY SUBSTANTIALLY FROM THOSE INDICATED. ATD = AT TIME OF DRILLING
LL=Liquid Limit, PL = Plastic Limit, NMC = Natural Moisture Content, PPV = Pocket Penetrometer (tsf), PTV = Pocket Torvane (tsf), AR = Auger Refusal

PROJECT: 2027 NGCC Geotechnical Investigation
LG&E - Mill Creek Generating Station
S&ME Project No. 22360136 - Mill Creek

BORING LOG: B-11
Sheet 1 of 3

DATE DRILLED: 01/10/2023	**ELEVATION:** 446 ft
DRILL RIG: Diedrich D-120 (ATC)	**DATUM:** NAVD88
DRILLER: Horn and Associates	**BORING DEPTH:** 83.0 ft
HAMMER TYPE: Auto Hammer (140 lb)	**CLOSURE:** Cement-Bentonite Grout
DRILLING METHOD: 3-1/4" HSA	**LOGGED BY:** A. Carr
SAMPLING METHOD: SS	

NOTES: Hydrovacuum excavation generally extends through surficial clays and sands and terminates at CCR materials.

LATITUDE: 38.049834 **LONGITUDE:** -85.906565

PROJECT COORDINATE SYSTEM - NAD 1983 StatePlane Kentucky North FIPS 1601 Feet

DEPTH (feet)	NOTES	Origin/Identifier	GRAPHIC	SAMPLE NO. (RECOVERY)	MATERIAL DESCRIPTION	BLOW COUNT DATA (SPT N-value)	ELEVATION
0					Hydrovacuum excavation - no samples obtained.		446
2.5		Fill		SS-1 (20 in)	POZ-O-TEC (Ash), medium dense to dense, dark gray, slightly moist	5-6-12-14 N = 18	
5				SS-2 (24 in)		3-6-25-49 N = 31	441
				SS-3 (24 in)		13-20-16-13 N = 36	
8.5				SS-4 (24 in)	POZ-O-TEC (Ash), medium dense to very dense, dark gray, slightly moist	15-13-14-10 N = 27	
10				SS-5 (24 in)		2-8-9-13 N = 17	436
				SS-6 (4 in)		50 N = WOH	
15				SS-7 (24 in)		9-11-10-10 N = 21 PPV= 2.8	431
16.5				SS-8 (24 in)	SANDY LEAN CLAY (CL), stiff, red brown, slightly moist	5-8-7-8 N = 15 PPV= 3.8	
20				SS-9 (24 in)		4-6-8-9 N = 14	426
20.5		Alluvium		SS-10 (18 in)	POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM), medium dense to loose, brown, slightly moist	1-7-7-6 N = 14	
25				SS-11 (15 in)		3-5-7 N = 12	421
30						3-6-5	416

STANDARD PENETRATION TEST DATA
△ % Fines
○ NMC
⊢ PL---LL
20 40 60 80 100

GROUNDWATER		DATE	DEPTH (FT)	REMARKS
ATD	▽	01/10/2023	45.0	
END OF DRILLING	▼	01/11/2023	50.0	
AFTER DRILLING	▼			
AFTER DRILLING	▼			

Vertical Accuracy: Estimated from topo map (Rounded 1 ft), Horizontal Accuracy: Handheld GPS (1 ft)

GROUNDWATER DEPTHS ARE NOT EXACT AND MAY VARY SUBSTANTIALLY FROM THOSE INDICATED. ATD = AT TIME OF DRILLING
LL=Liquid Limit, PL = Plastic Limit, NMC = Natural Moisture Content, PPV = Pocket Penetrometer (tsf), PTV = Pocket Torvane (tsf), AR = Auger Refusal

PROJECT:	**2027 NGCC Geotechnical Investigation** **LG&E - Mill Creek Generating Station** **S&ME Project No. 22360136 - Mill Creek**	**BORING LOG: B-11** *Sheet 2 of 3*

DATE DRILLED: 01/10/2023	**ELEVATION:** 446 ft	**NOTES:** Hydrovacuum excavation generally extends through surficial clays and sands and terminates at CCR materials.
DRILL RIG: Diedrich D-120 (ATC)	**DATUM:** NAVD88	
DRILLER: Horn and Associates	**BORING DEPTH:** 83.0 ft	
HAMMER TYPE: Auto Hammer (140 lb)	**CLOSURE:** Cement-Bentonite Grout	
DRILLING METHOD: 3-1/4" HSA	**LOGGED BY:** A. Carr	**LATITUDE:** 38.049834 **LONGITUDE:** -85.906565
SAMPLING METHOD: SS	**PROJECT COORDINATE SYSTEM -** NAD 1983 StatePlane Kentucky North FIPS 1601 Feet	

DEPTH (feet)	NOTES	Origin/Identifier	GRAPHIC	SAMPLE NO. (RECOVERY)	MATERIAL DESCRIPTION	BLOW COUNT DATA (SPT N-value)	STANDARD PENETRATION TEST DATA (△ % Fines, ○ NMC, ⊢ PL---LL; 20 40 60 80 100)	ELEVATION
35		Alluvium		SS-12 (15 in)	POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM), medium dense to loose, brown, slightly moist	N = 11		411
				SS-13 (15 in)		4-4-6 N = 10		
40	39.5			SS-14 (9 in)	POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM), medium dense, brown, slightly moist to moist	7-7-12 N = 19		406
45				SS-15 (9 in)		4-7-6 N = 13		401
50	48.5 Hole Cave at 50.0 feet			SS-16 (12 in)	SILTY GRAVEL WITH SAND (GM), medium dense, brown, wet	7-8-10 N = 18		396
55				SS-17 (9 in)		5-7-12 N = 19		391
60	60.0			SS-18 (18 in)	POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM), medium dense, brown, wet	2-8-13 N = 21		386

GROUNDWATER		DATE	DEPTH (FT)	REMARKS
ATD	▽	01/10/2023	45.0	
END OF DRILLING	▼	01/11/2023	50.0	
AFTER DRILLING	▼			
AFTER DRILLING	▼			

Vertical Accuracy: Estimated from topo map (Rounded 1 ft), Horizontal Accuracy: Handheld GPS (1 ft)

GROUNDWATER DEPTHS ARE NOT EXACT AND MAY VARY SUBSTANTIALLY FROM THOSE INDICATED. ATD = AT TIME OF DRILLING
LL=Liquid Limit, PL = Plastic Limit, NMC = Natural Moisture Content, PPV = Pocket Penetrometer (tsf), PTV = Pocket Torvane (tsf), AR = Auger Refusal

PROJECT:	**2027 NGCC Geotechnical Investigation** **LG&E - Mill Creek Generating Station** **S&ME Project No. 22360136 - Mill Creek**	**BORING LOG: B-11** *Sheet 3 of 3*

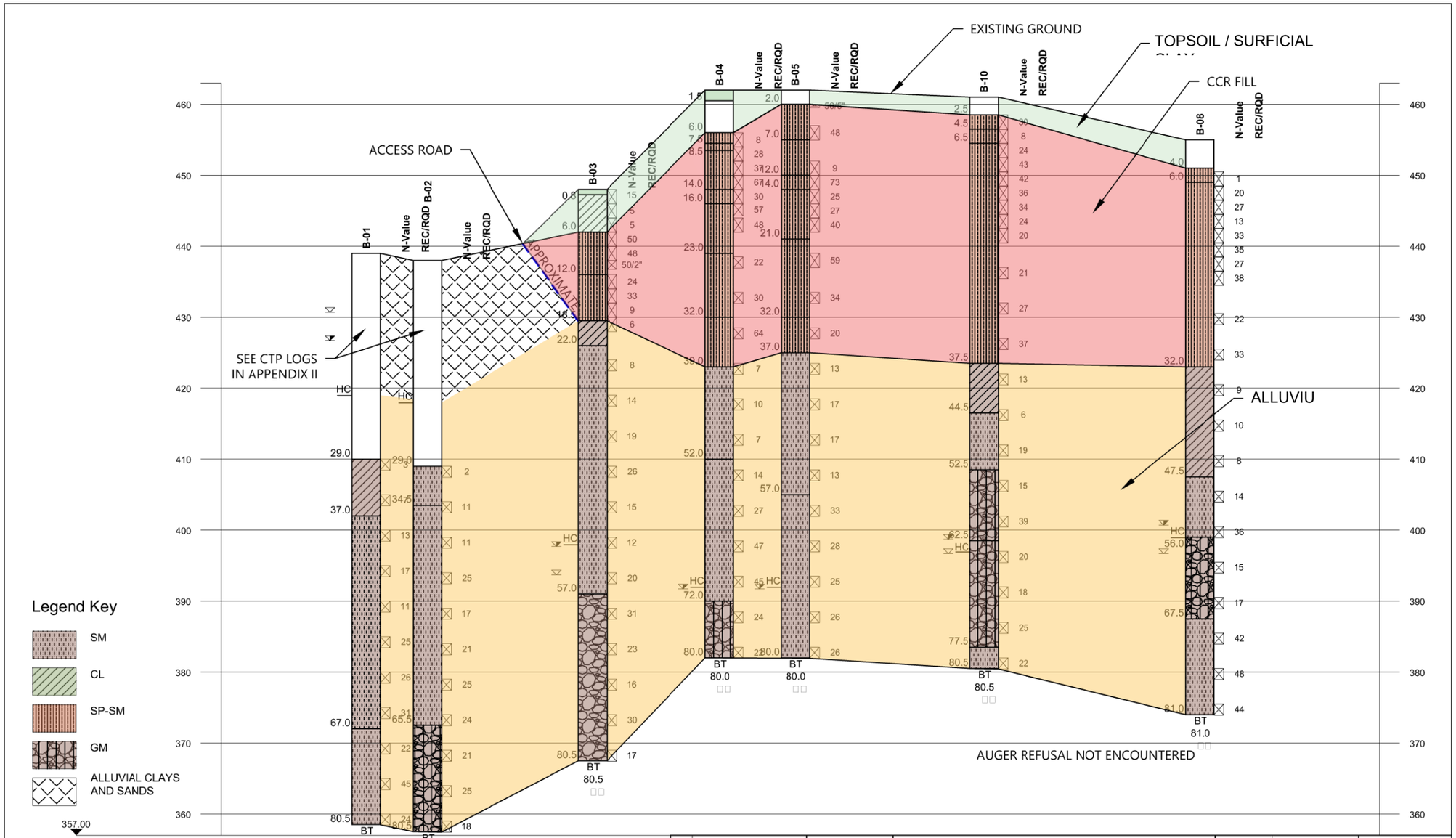
DATE DRILLED: 01/10/2023	**ELEVATION:** 446 ft	**NOTES:** Hydrovacuum excavation generally extends through surficial clays and sands and terminates at CCR materials.
DRILL RIG: Diedrich D-120 (ATC)	**DATUM:** NAVD88	
DRILLER: Horn and Associates	**BORING DEPTH:** 83.0 ft	
HAMMER TYPE: Auto Hammer (140 lb)	**CLOSURE:** Cement-Bentonite Grout	
DRILLING METHOD: 3-1/4" HSA	**LOGGED BY:** A. Carr	**LATITUDE:** 38.049834 **LONGITUDE:** -85.906565
SAMPLING METHOD: SS	**PROJECT COORDINATE SYSTEM -** NAD 1983 StatePlane Kentucky North FIPS 1601 Feet	

DEPTH (feet)	NOTES	Origin/Identifier	GRAPHIC	SAMPLE NO. (RECOVERY)	MATERIAL DESCRIPTION	BLOW COUNT DATA (SPT N-value)	STANDARD PENETRATION TEST DATA (△ % Fines, ○ NMC, ⊢ PL---LL; 20 40 60 80 100)	ELEVATION
65					POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM), medium dense, brown, wet			381
				SS-19 (18 in)		3-5-13 N = 18		
70		Alluvium						376
				SS-20 (18 in)		5-10-15 N = 25		
75								371
				SS-21 (18 in)		10-7-6 N = 13		
80								366
				SS-22 (18 in)		9-8-13 N = 21		
	83.0				Borehole terminated at 83.0 feet			
85								361
90								356
95								351

GROUNDWATER		DATE	DEPTH (FT)	REMARKS
ATD	▽	01/10/2023	45.0	
END OF DRILLING	▼	01/11/2023	50.0	
AFTER DRILLING	▼			
AFTER DRILLING	▼			

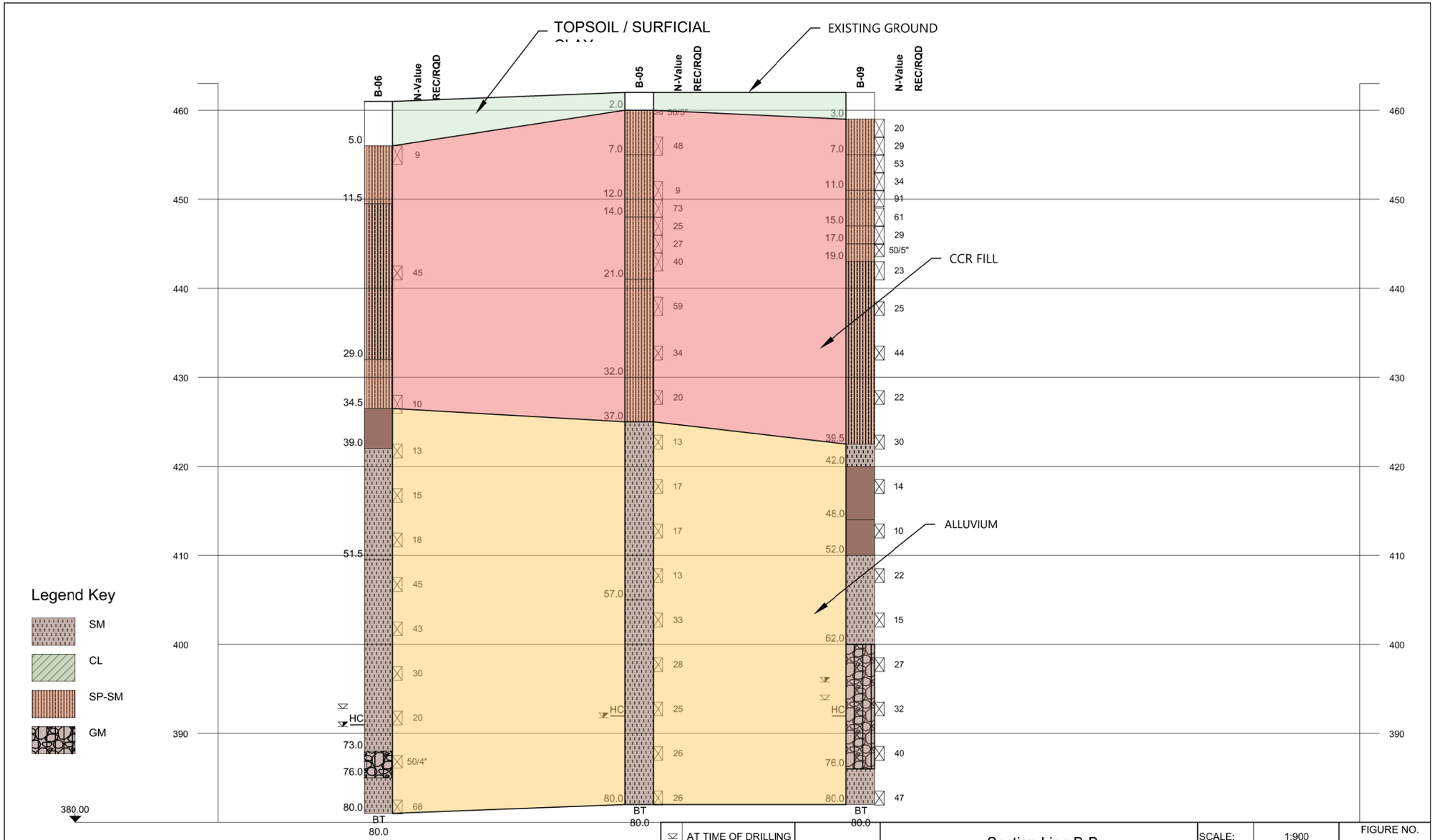
Vertical Accuracy: Estimated from topo map (Rounded 1 ft), Horizontal Accuracy: Handheld GPS (1 ft)

GROUNDWATER DEPTHS ARE NOT EXACT AND MAY VARY SUBSTANTIALLY FROM THOSE INDICATED. ATD = AT TIME OF DRILLING
LL=Liquid Limit, PL = Plastic Limit, NMC = Natural Moisture Content, PPV = Pocket Penetrometer (tsf), PTV = Pocket Torvane (tsf), AR = Auger Refusal



The depictec stratigraphy is shown for illustrative purposes only and is not warranted. Separations between different strata may be gradual and likely vary considerably from those shown. Profiles between nearby borings have been estimated using reasonable engineering care and judgement. The actual subsurface concitions will vary between boring locations.

Section Line A-A	
2027 NGCC Geotechnical Investigation LG&E -Mill Creek	
SCALE:	1:900
DATE:	Mar 15, 2023
PROJECT NUMBER:	22360136 -Mill Creek
FIGURE NO.	3A



The depicted stratigraphy is shown for illustrative purposes only and is not warranted. Separations between different strata may be gradual and likely vary considerably from those shown. Profiles between nearby borings have been estimated using reasonable engineering care and judgement. The actual subsurface concitions will vary between boring locations.

▽	AT TIME OF DRILLING
▼	END OF DRILLING
▼	AFTER DRILLING

Section Line B-B

2027 NGCC Geotechnical Investigation
LG&E-KU - Mill Creek Generating Station

SCALE:	1:900
DATE:	Mar 15, 2023
PROJECT NUMBER:	22360136 -Mill Creek

FIGURE NO.

3B

2027 NGCC Geotechnical Investigation

LG&E - Mill Creek Generating Station

S&ME Project No. 22360136 - Mill Creek

Cone Penetration Test

Header Sheet

CPT Material Graphics

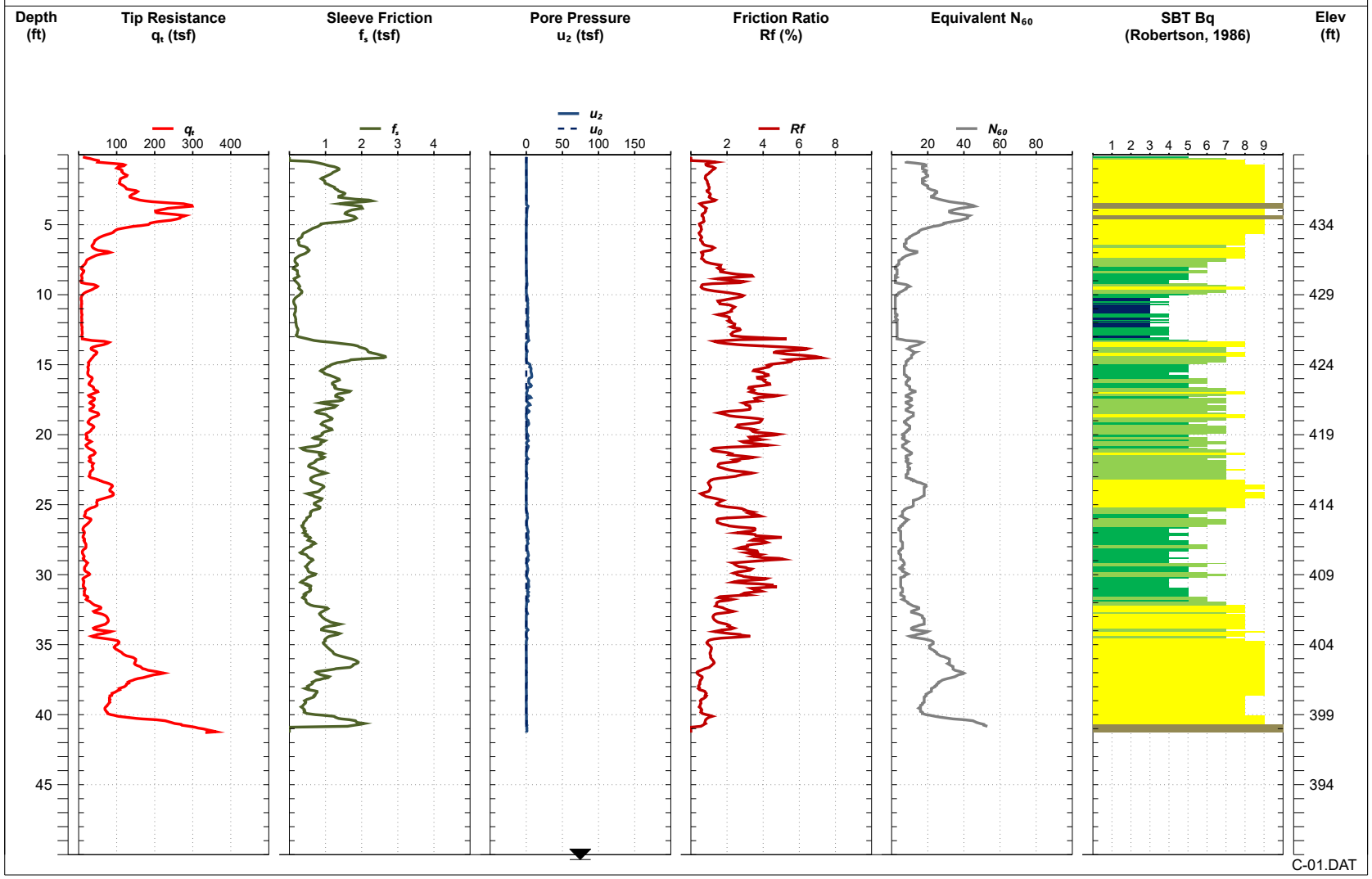
- Sensitive, Fine Grained Soils
- Organic Soils, Peats
- Clays-Clay to Silty Clay
- Silt Mixtures-Clayey Silt to Silty Clay
- Sand Mixtures-Silty Sand to Sandy Silt
- Sands-Clean Sand to Silty Sand
- Gravelly Sand to Sand
- Very Stiff Clay to Clayey Sand
- Very Stiff Fine Grained Soils

2027 NGCC Geotechnical Investigation
LG&E - Mill Creek Generating Station
S&ME Project No. 22360136 - Mill Creek

Cone Penetration Test

C-01

Date:	30-Nov-2022	**Latitude:**	38.050764	**Total Depth:**	41.3 ft
Estimated Water Depth:	50.0 ft	**Longitude:**	-85.90745	**Termination Criteria:**	Target depth
Rig/Operator:	Marooka/MWright | TWhitehead	**Elevation:**	439.00	**Cone Size:**	

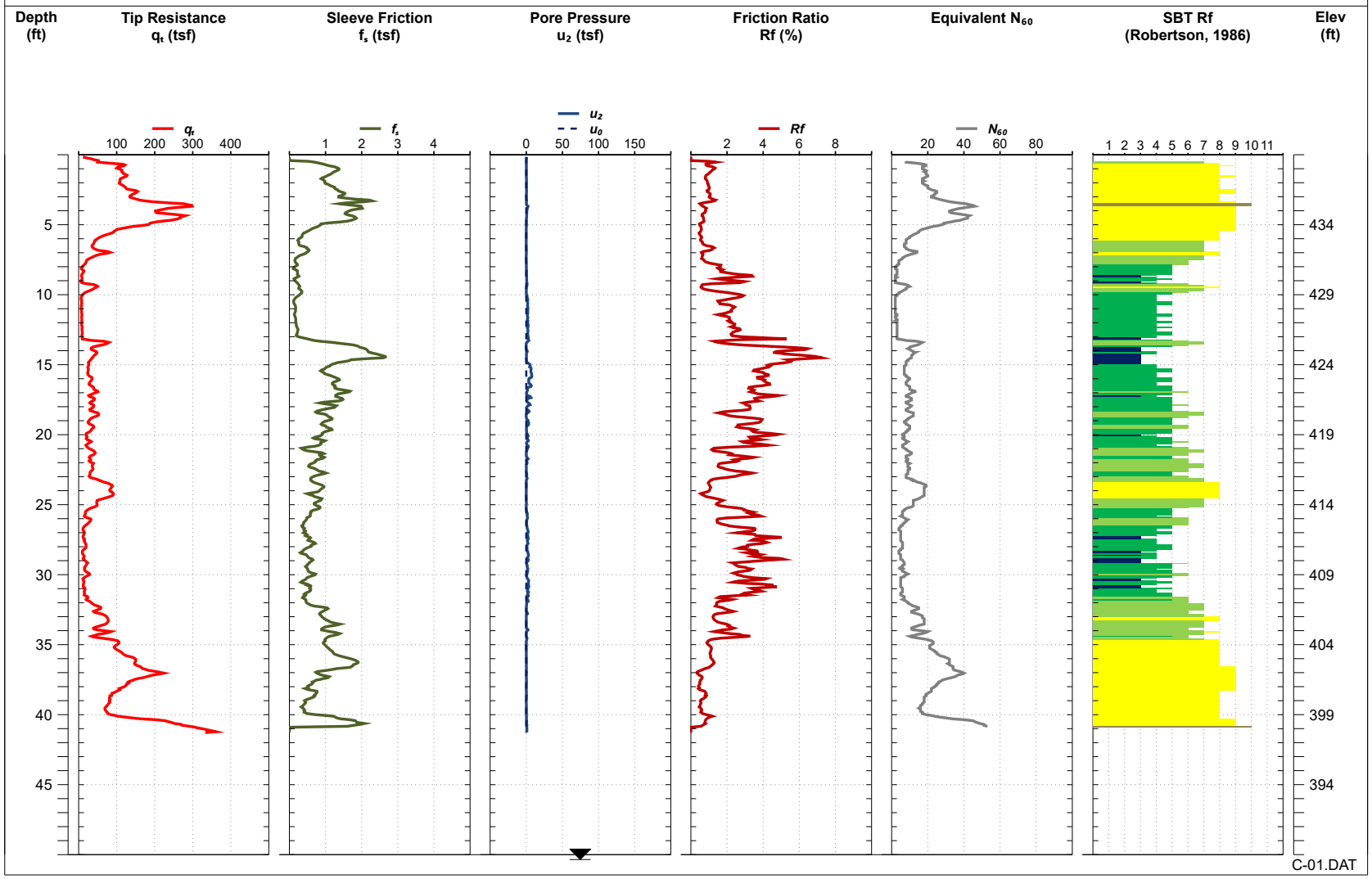


2027 NGCC Geotechnical Investigation
LG&E - Mill Creek Generating Station
S&ME Project No. 22360136 - Mill Creek

Cone Penetration Test

C-01

Date:	30-Nov-2022	**Latitude:**	38.050764	**Total Depth:**	41.3 ft
Estimated Water Depth:	50.0 ft	**Longitude:**	-85.90745	**Termination Criteria:**	Target depth
Rig/Operator:	Marooka/MWright | TWhitehead	**Elevation:**	439.00	**Cone Size:**	

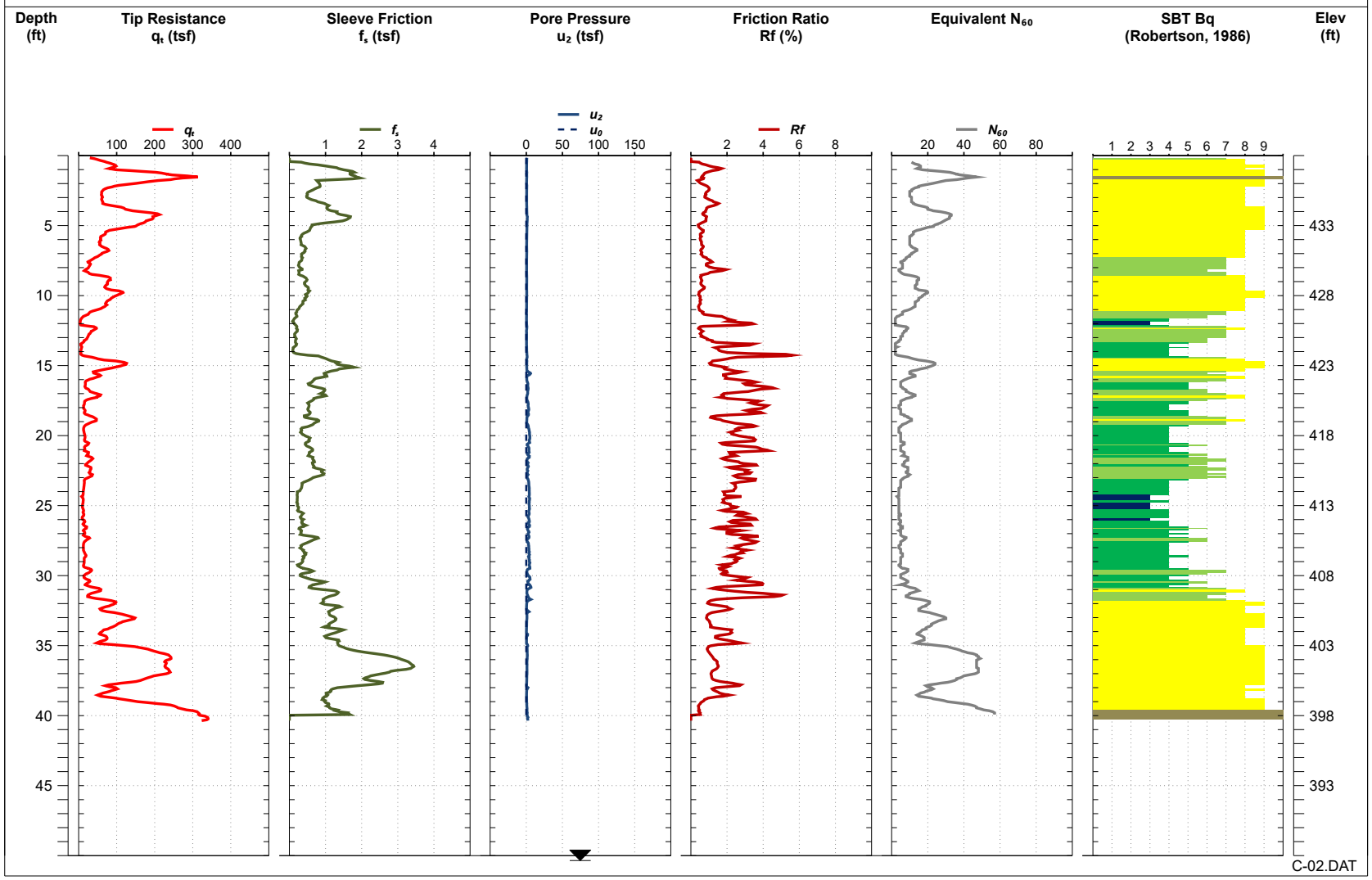


2027 NGCC Geotechnical Investigation
LG&E - Mill Creek Generating Station
S&ME Project No. 22360136 - Mill Creek

Cone Penetration Test

C-02

Date:	30-Nov-2022	**Latitude:**	38.050707	**Total Depth:**	40.4 ft
Estimated Water Depth:	50.0 ft	**Longitude:**	-85.90721	**Termination Criteria:**	Target depth
Rig/Operator:	Marooka/MWright | TWhitehead	**Elevation:**	438.00	**Cone Size:**	

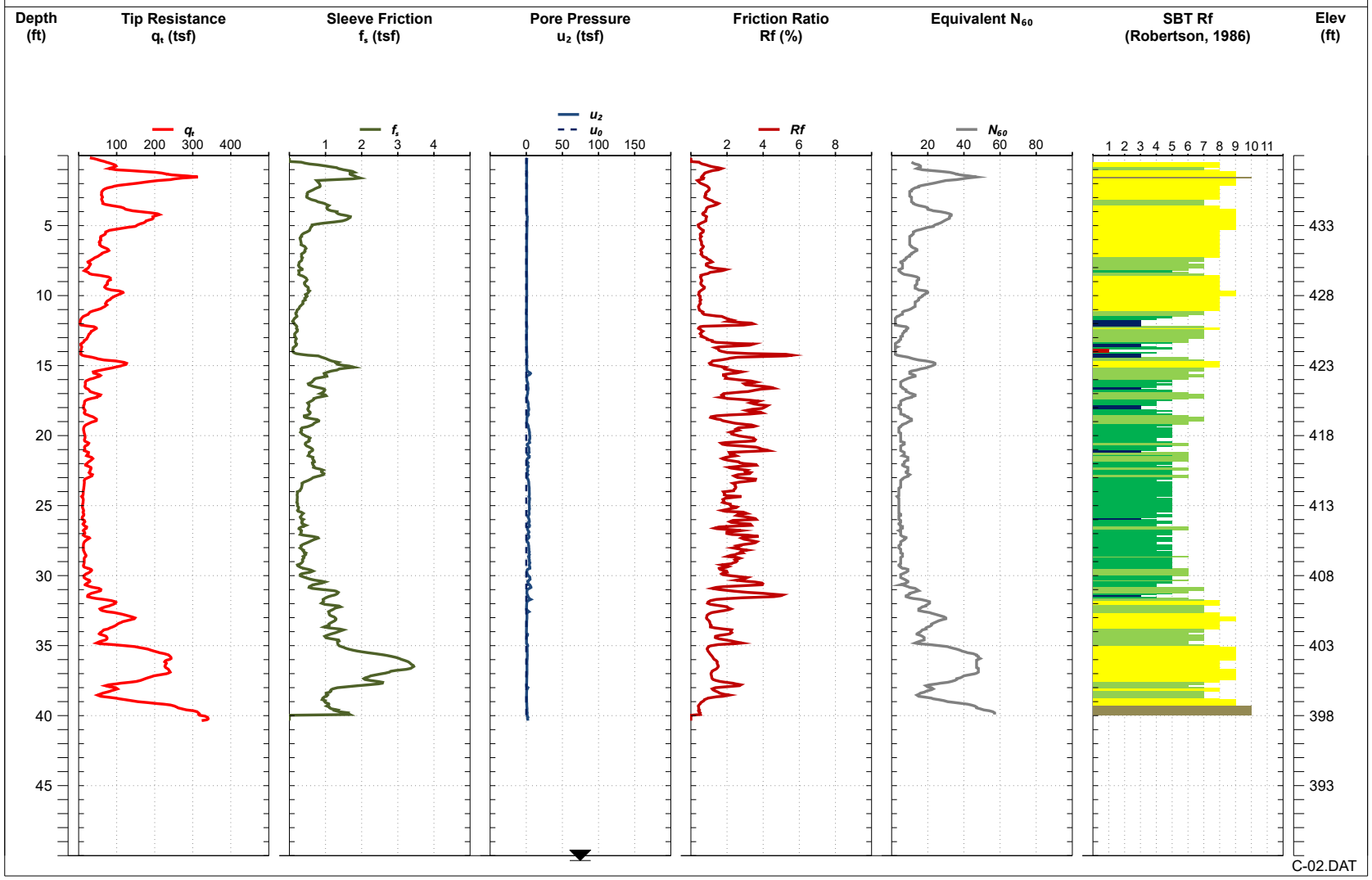


2027 NGCC Geotechnical Investigation
LG&E - Mill Creek Generating Station
S&ME Project No. 22360136 - Mill Creek

Cone Penetration Test

C-02

Date:	30-Nov-2022	**Latitude:**	38.050707	**Total Depth:**	40.4 ft
Estimated Water Depth:	50.0 ft	**Longitude:**	-85.90721	**Termination Criteria:**	Target depth
Rig/Operator:	Marooka/MWright | TWhitehead	**Elevation:**	438.00	**Cone Size:**	

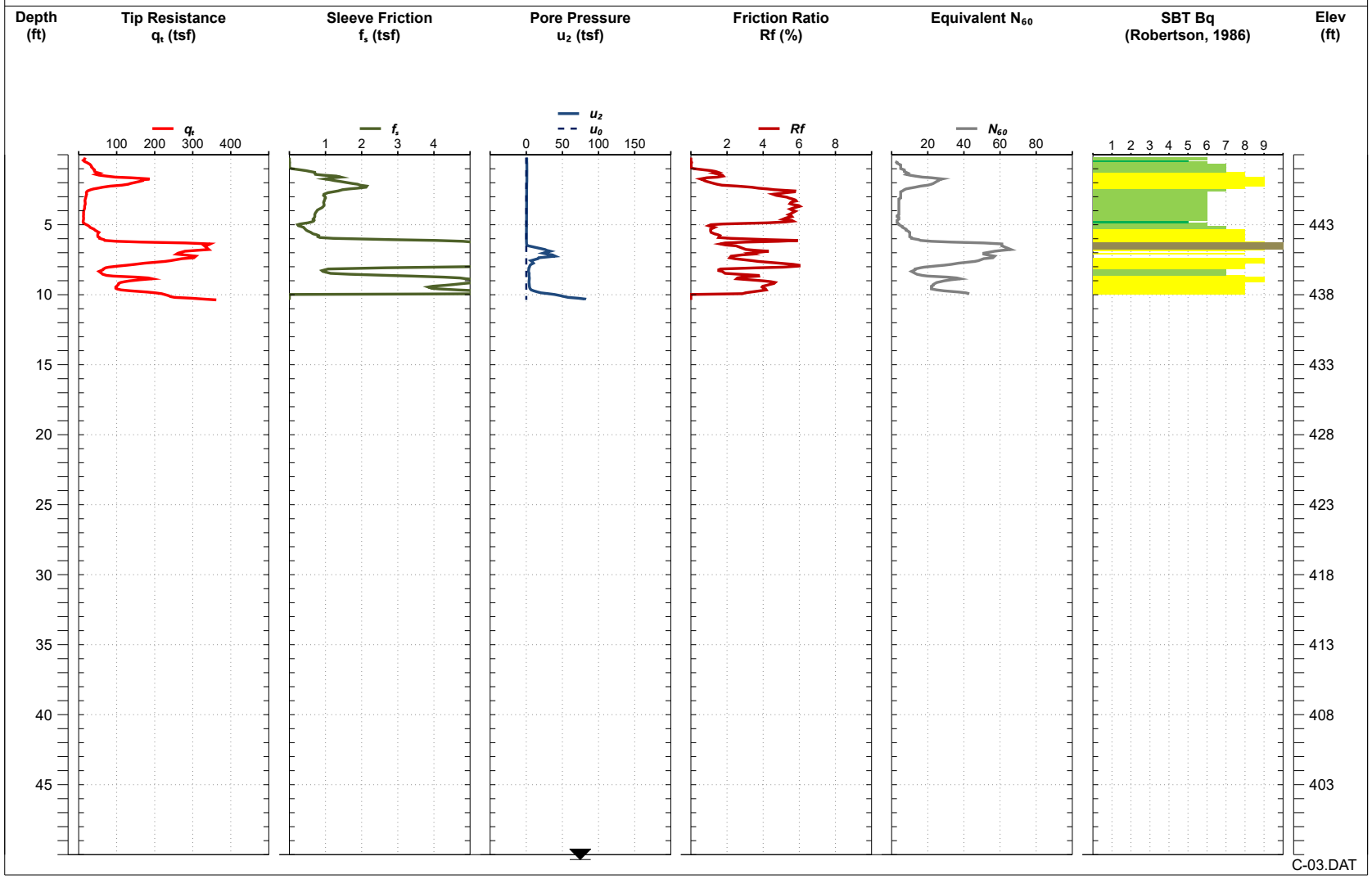


2027 NGCC Geotechnical Investigation
LG&E - Mill Creek Generating Station
S&ME Project No. 22360136 - Mill Creek

Cone Penetration Test

C-03

Date:	29-Nov-2022	**Latitude:**	38.050632	**Total Depth:**	10.4 ft
Estimated Water Depth:	50.0 ft	**Longitude:**	-85.90682	**Termination Criteria:**	Target depth
Rig/Operator:	Marooka/MWright | TWhitehead	**Elevation:**	448.00	**Cone Size:**	

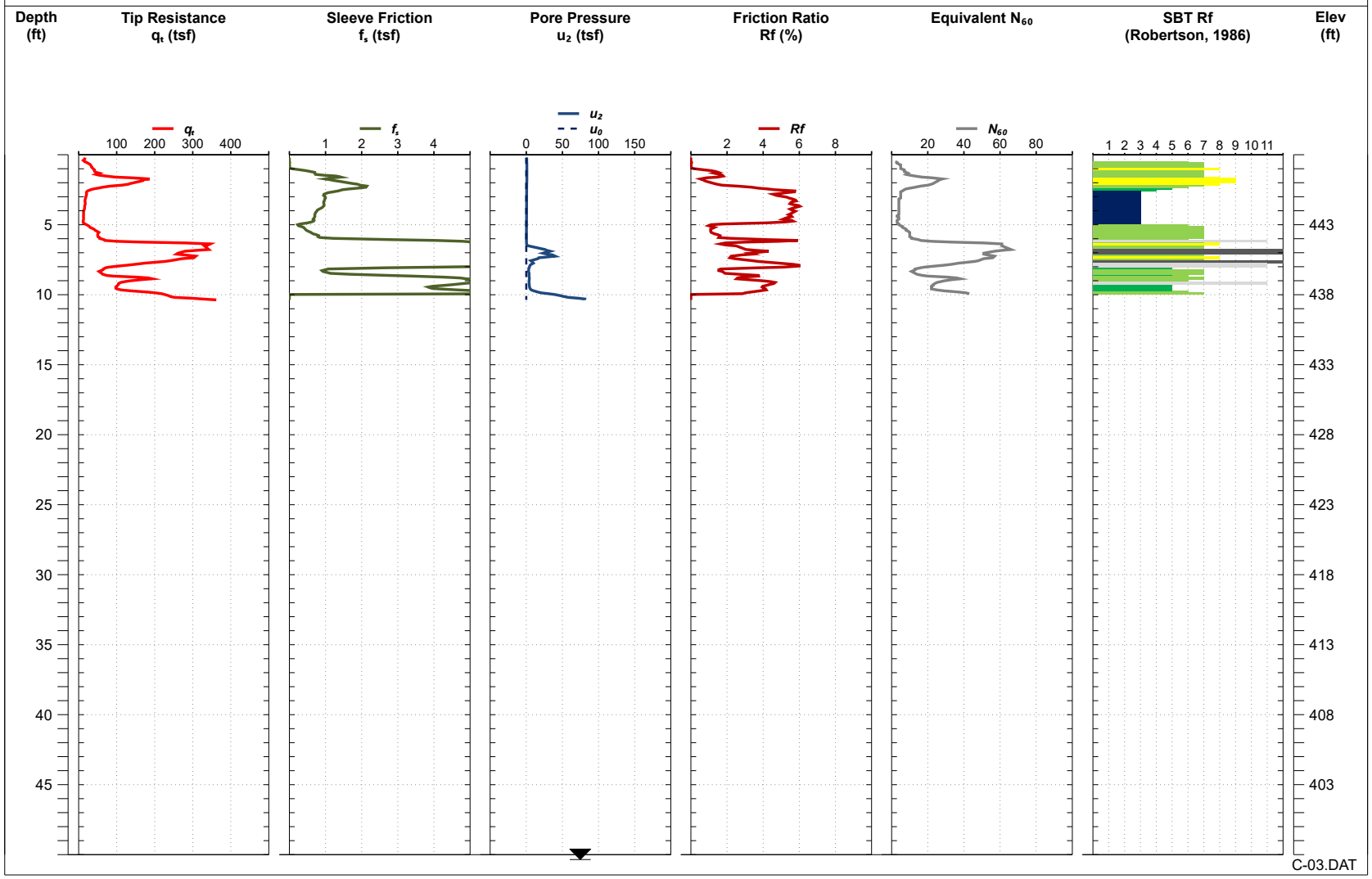


2027 NGCC Geotechnical Investigation
LG&E - Mill Creek Generating Station
S&ME Project No. 22360136 - Mill Creek

Cone Penetration Test

C-03

Date:	29-Nov-2022	**Latitude:**	38.050632	**Total Depth:**	10.4 ft
Estimated Water Depth:	50.0 ft	**Longitude:**	-85.90682	**Termination Criteria:**	Target depth
Rig/Operator:	Marooka/MWright | TWhitehead	**Elevation:**	448.00	**Cone Size:**	

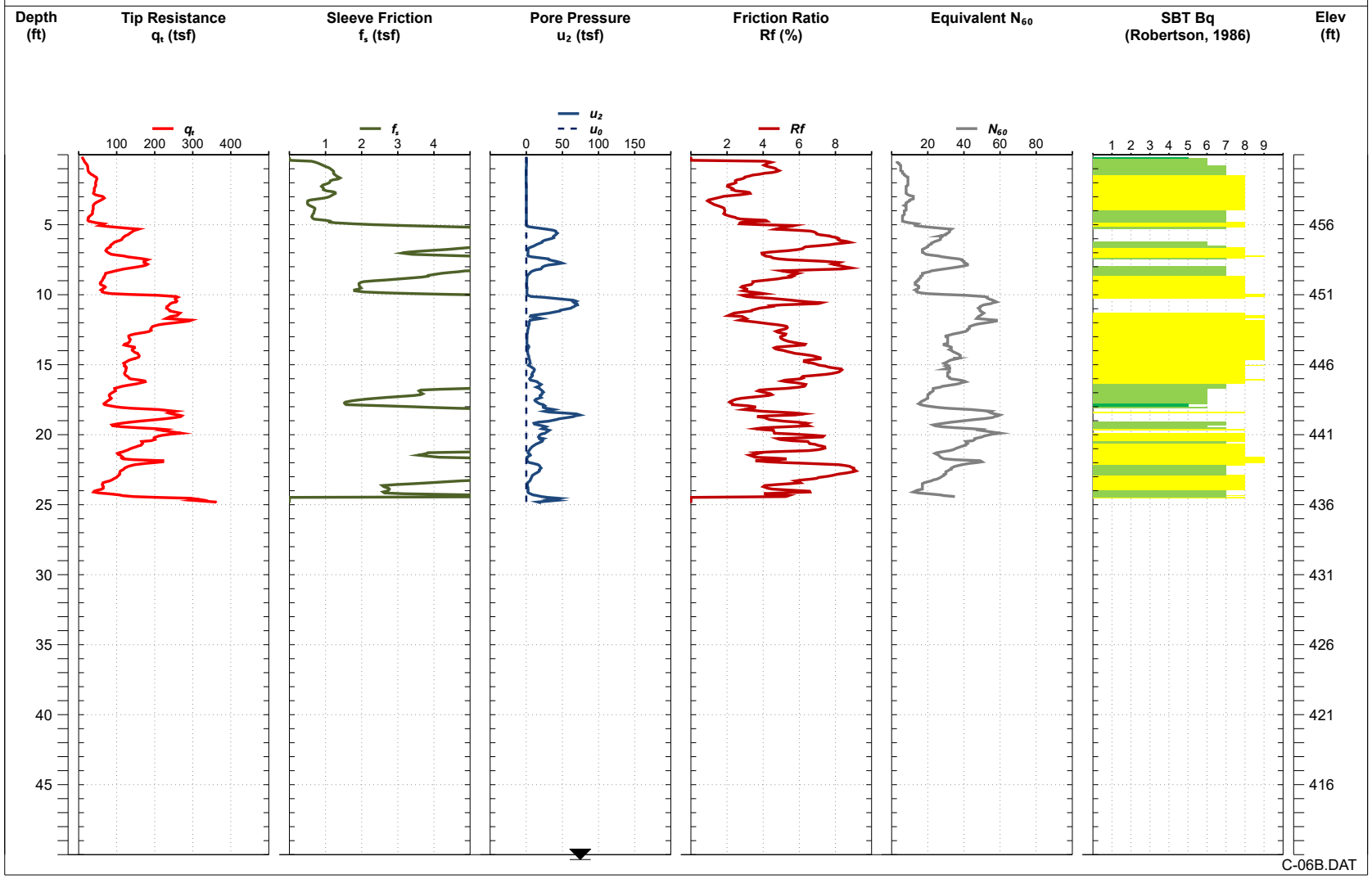


2027 NGCC Geotechnical Investigation
LG&E - Mill Creek Generating Station
S&ME Project No. 22360136 - Mill Creek

Cone Penetration Test

C-06

Date:	29-Nov-2022	**Latitude:**	38.050955	**Total Depth:**	24.9 ft
Estimated Water Depth:	50.0 ft	**Longitude:**	-85.90686	**Termination Criteria:**	Target depth
Rig/Operator:	Marooka/MWright | TWhitehead	**Elevation:**	461.00	**Cone Size:**	

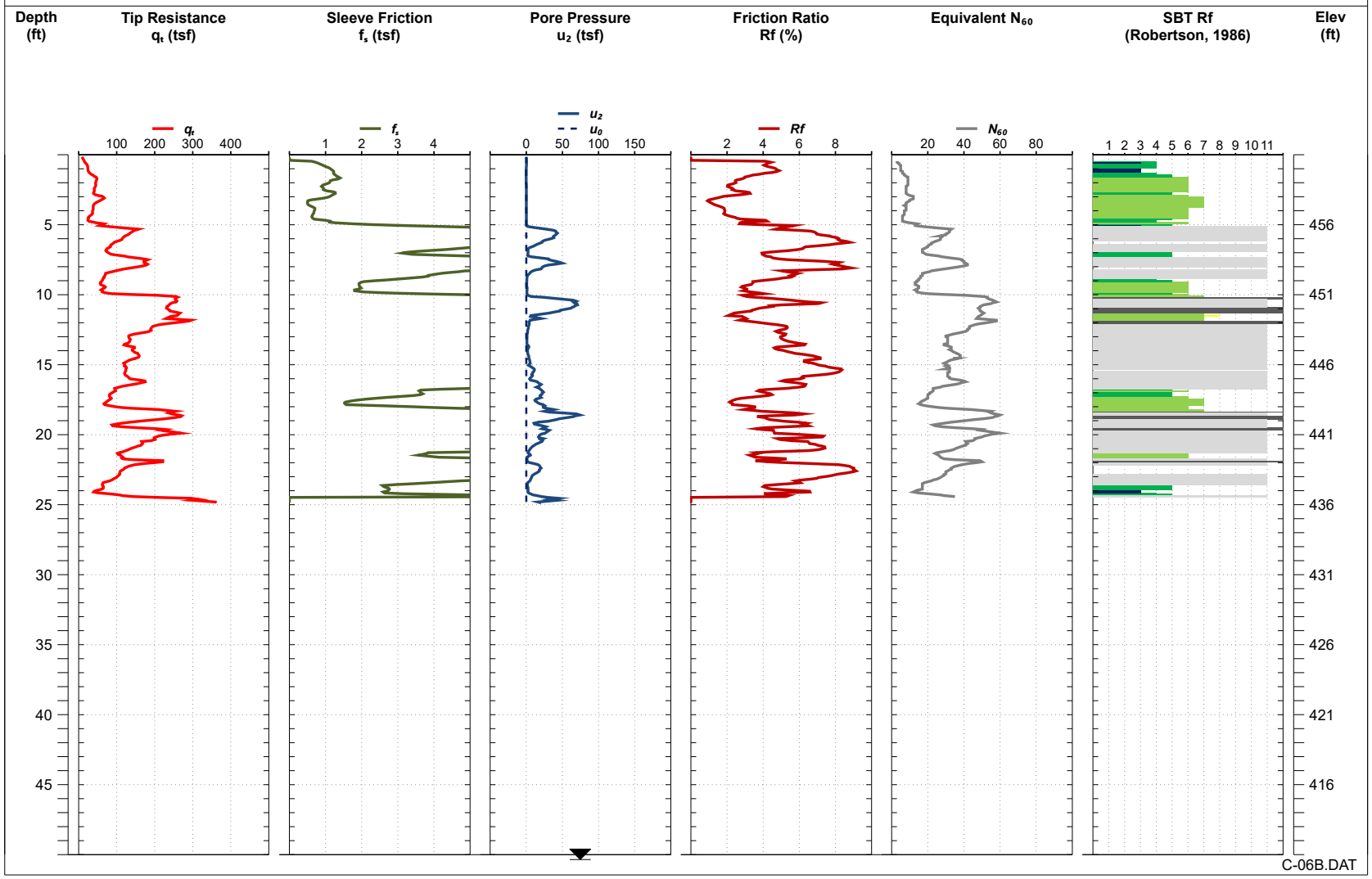


2027 NGCC Geotechnical Investigation
LG&E - Mill Creek Generating Station
S&ME Project No. 22360136 - Mill Creek

Cone Penetration Test

C-06

Date:	29-Nov-2022	**Latitude:**	38.050955	**Total Depth:**	24.9 ft
Estimated Water Depth:	50.0 ft	**Longitude:**	-85.90686	**Termination Criteria:**	Target depth
Rig/Operator:	Marooka/MWright | TWhitehead	**Elevation:**	461.00	**Cone Size:**	

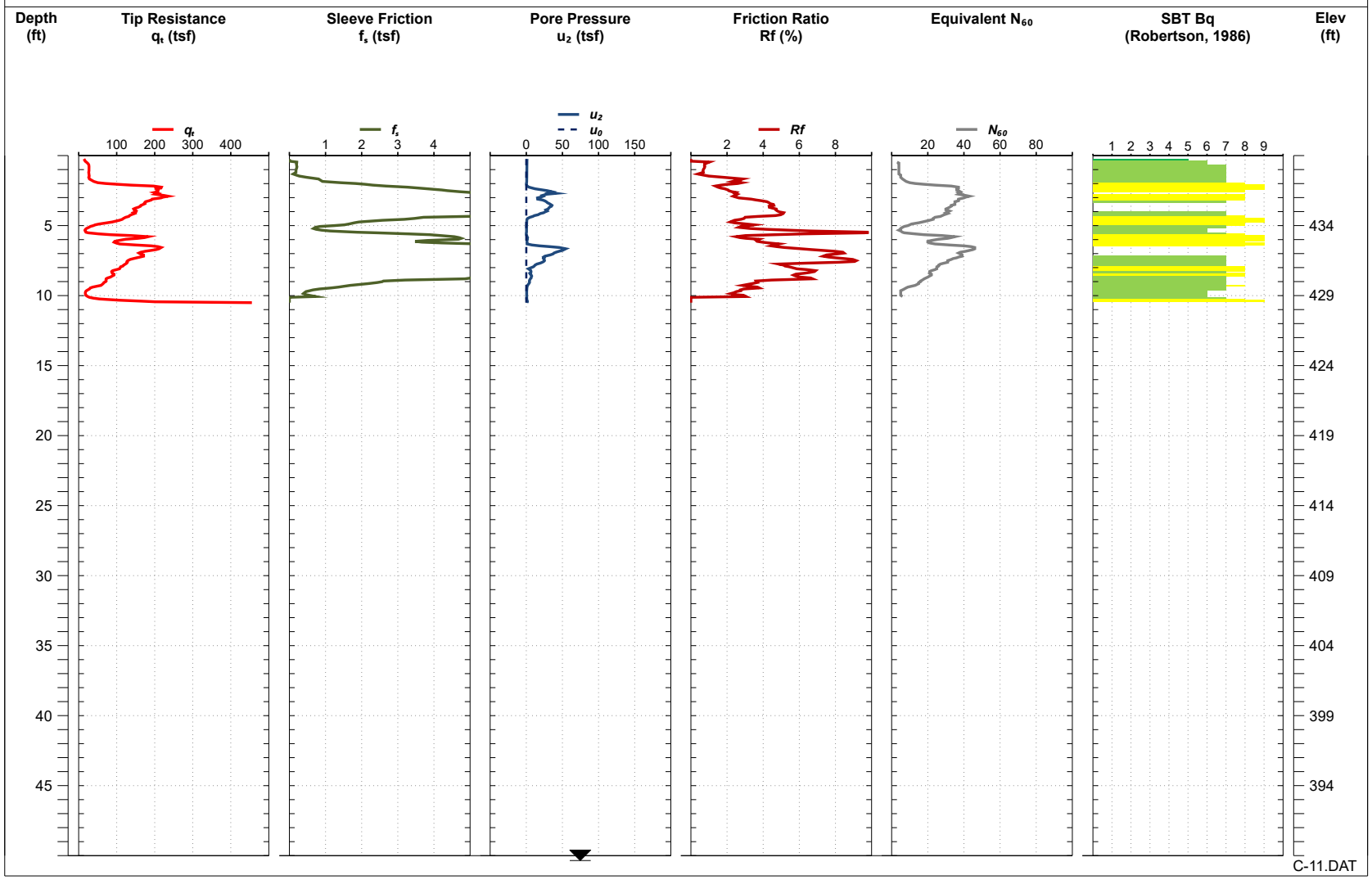


2027 NGCC Geotechnical Investigation
LG&E - Mill Creek Generating Station
S&ME Project No. 22360136 - Mill Creek

Cone Penetration Test

C-11

Date:	30-Nov-2022	**Latitude:**	38.049907	**Total Depth:**	10.5 ft
Estimated Water Depth:	50.0 ft	**Longitude:**	-85.90648	**Termination Criteria:**	Target depth
Rig/Operator:	Marooka/MWright | TWhitehead	**Elevation:**	439.00	**Cone Size:**	

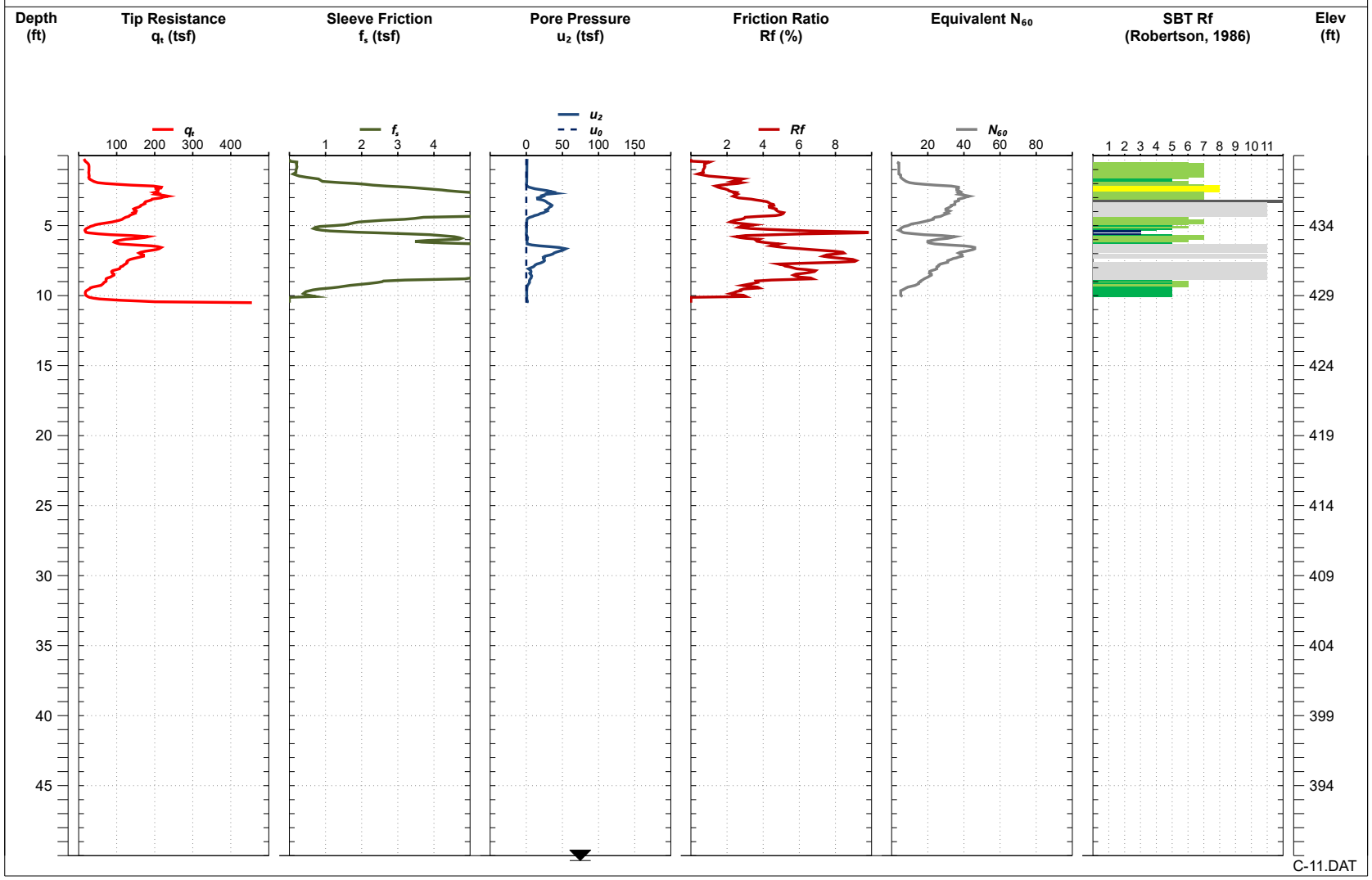


2027 NGCC Geotechnical Investigation
LG&E - Mill Creek Generating Station
S&ME Project No. 22360136 - Mill Creek

Cone Penetration Test

C-11

Date:	30-Nov-2022	**Latitude:**	38.049907	**Total Depth:**	10.5 ft
Estimated Water Depth:	50.0 ft	**Longitude:**	-85.90648	**Termination Criteria:**	Target depth
Rig/Operator:	Marooka/MWright | TWhitehead	**Elevation:**	439.00	**Cone Size:**	



Soil Resistivity Data Sheet
Wenner Four-Electrode Method

Project: LG&E 2027 NGCC Mill Creek **Project #:** 22360136

Project Location: Louisville, KY **Station #:** ER-1 Line-A (NW-SE)

Date: 11/30/2022 **Time:** 12:10 PM

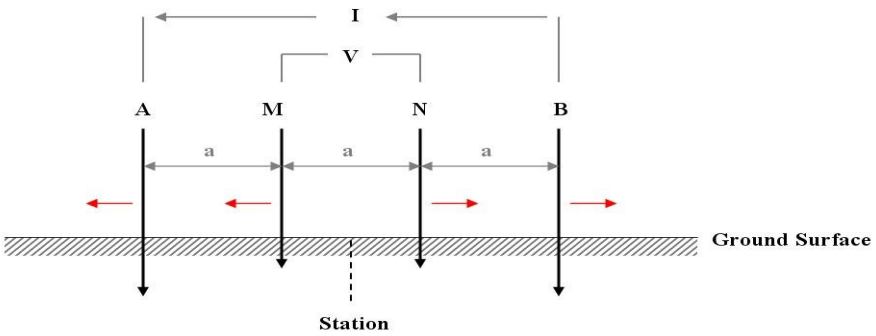
Weather & Temperature: 35°F, Sunny

Soil Conditions: Moist to Wet Clay

Performed By (Name of Tester) Adam Gostic

Additional Notes:

$\rho = 2\pi \cdot a \cdot R$



"a" Spacing (feet)	"a" Spacing (centimeters)	Electrode Depth (Inches)	Resistance (Ω)	ρ Apparent Resistivity (Ω·cm)	ρ Apparent Resistivity (Ω·ft)	Injected Current (mA)	Standard Deviation (%)
2.5	76.20	4	9.596	4594.37	150.73	66.45	0.00%
5	152.40	6	6.142	5881.33	192.96	69.85	0.00%
10	304.80	12	3.376	6465.44	212.12	1125.00	0.00%
15	457.20	12	2.150	6176.26	202.63	1141.00	0.00%
20	609.60	12	1.516	5806.64	190.51	1162.00	0.00%
30	914.40	12	0.984	5654.01	185.50	1120.00	0.00%

Soil Resistivity Data Sheet
Wenner Four-Electrode Method

Project: LG&E 2027 NGCC Mill Creek **Project #:** 22360136

Project Location: Louisville, KY **Station #:** ER-1 Line-B (SW-NE)

Date: 11/30/2022 **Time:** 12:35 PM

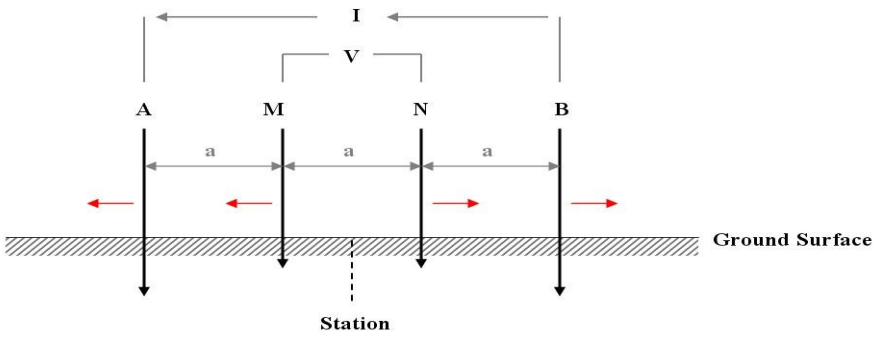
Weather & Temperature: 35°F, Sunny

Soil Conditions: Moist to Wet Clay

Performed By (Name of Tester) Adam Gostic

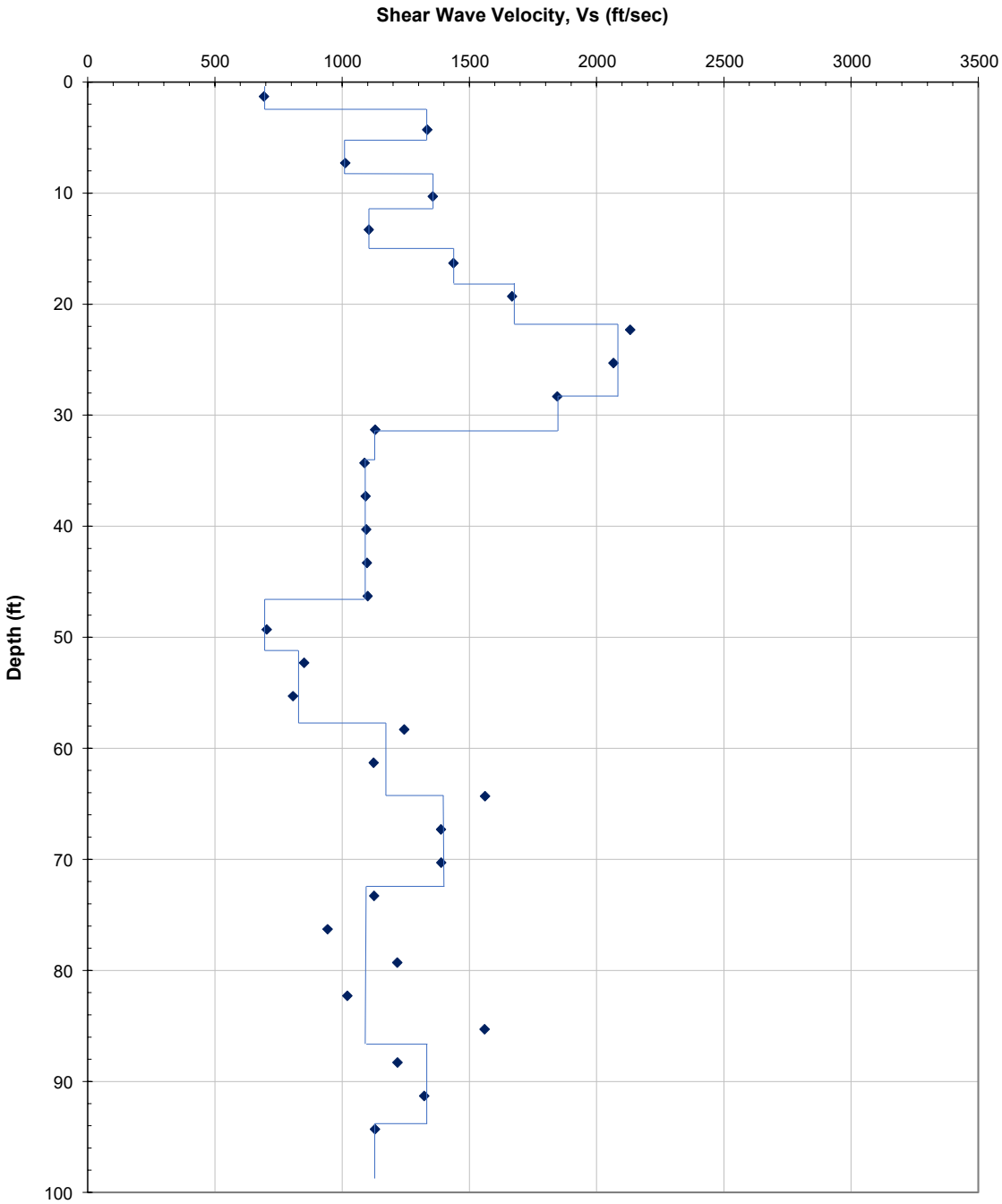
Additional Notes: Half of Line-B descended a slope. Outer electrode relief at 30 ft a-spacing ≈ 12 ft.

$\rho = 2\pi \cdot a \cdot R$



"a" Spacing (feet)	"a" Spacing (centimeters)	Electrode Depth (Inches)	Resistance (Ω)	ρ Apparent Resistivity (Ω·cm)	ρ Apparent Resistivity (Ω·ft)	Injected Current (mA)	Standard Deviation (%)
2.5	76.20	4	9.553	4573.78	150.06	64.15	0.00%
5	152.40	6	6.525	6248.08	204.99	76.25	0.00%
10	304.80	12	3.287	6295.00	206.53	1021.00	0.00%
15	457.20	12	1.912	5492.56	180.20	1007.00	0.00%
20	609.60	12	1.309	5013.78	164.49	903.70	0.00%
30	914.40	12	0.790	4540.56	148.97	905.70	0.00%

Shear Wave Velocity Profile B-5
2027 NGCC Geotech Investigation, Downhole Seismic
Louisville, Kentucky
22360136



Mill Creek
2027 NGCC Geotechnical Investigation – Site Photos
Louisville, Jefferson County, Kentucky
S&ME Project No. 22360136

Date: 1/31/2023

Photographer: Nick Jones

1	**Location / Orientation**	General Site Conditions, looking northeast.
	Remarks	

Date: 1/31/2023

Photographer: Nick Jones

2	**Location / Orientation**	General Site Conditions, looking east.
	Remarks	

Mill Creek
2027 NGCC Geotechnical Investigation – Site Photos
Louisville, Jefferson County, Kentucky
S&ME Project No. 22360136

Date: 1/31/2023

Photographer: Nick Jones

3	**Location / Orientation**	General Site Conditions, looking south.
	Remarks	

Date: 1/31/2023

Photographer: Nick Jones

4	**Location / Orientation**	General Site Conditions, looking southwest.
	Remarks	

Mill Creek
2027 NGCC Geotechnical Investigation – Site Photos
Louisville, Jefferson County, Kentucky
S&ME Project No. 22360136

Date: 1/31/2023

Photographer: Nick Jones

5	**Location / Orientation**	Site access to B-1/B-2 (Coal Pile), looking west.
	Remarks	Prior to drilling, access was created by site personnel and the HDPE pipe was buried and covered by steal plates.

Date: 1/31/2023

Photographer: Nick Jones

6	**Location / Orientation**	View of B-3 to B-11 (Fill Slope), looking southeast.
	Remarks	

Summary of Field Procedures

♦ Boring and Sampling

Soil Test Boring with Hollow-Stem Auger

Soil sampling and penetration testing were performed in general accordance with ASTM D1586, *Standard Test Method for Penetration Test and Split Barrel Sampling of Soils*. Borings were made by mechanically twisting a continuous steel hollow stem auger into the soil. At regular intervals, soil samples were obtained with a standard 1.4-inch I. D., 2-inch O. D., split barrel sampler. The sampler was first seated six inches to penetrate any loose cuttings, then driven an additional 12 inches with blows of a 140-pound hammer falling 30 inches. The number of hammer blows required to drive the sampler through the two final six inch increments was recorded as the penetration resistance (SPT N) value. The N-value, when properly interpreted by qualified professional staff, is an index of the soil strength and foundation support capability.

Electronic Cone Penetrometer (CPT) Soundings

CPT soundings consist of a conical pointed penetrometer which is hydraulically pushed into the soil at a slow, measured rate. Procedures for measurement of the tip resistance and side friction resistance to push generally follow those described by ASTM D5778, *Standard Test Method for Performing Electronic Friction Cone and Piezocone Penetration Testing of Soils*.

A penetrometer with a conical tip having a 60 degree apex angle and a cone base area of 10 cm2 was advanced into the soil at a constant rate of 20 mm/s. The force on the conical point required to penetrate the soil was measured electronically every 50 mm penetration to obtain the cone resistance q_c. A friction sleeve is present on the penetrometer immediately behind the cone tip. The force exerted on the sleeve was measured electronically at a minimum of every 50 mm penetration and divided by the surface area of the sleeve to obtain the friction sleeve resistance value f_s. A pore pressure element mounted immediately behind the cone tip was used to measure the pore pressure induced during advancement of the cone into the soil.

Using this procedure soil samples are not obtained. Soil classification was made on the basis of comparison of the tip resistance, sleeve resistance and pore pressure values to values measured at other locations in known soil types, using experience with similar soils and exercising engineering judgment.

Bulk Samples

At selected locations and depths, representative bulk samples of the soils were obtained by randomly taking shovel loads from the cuttings or spoil brought to the surface, until a sample of 30 to 50 pounds was obtained. The sample was placed in a cloth or plastic sack marked with appropriate descriptive information. Samples were protected from freezing at all times.

Refusal to Drilling

Refusal to the soil drilling methods used at this site may result from encountering hard cemented soil, soft weathered rock, coarse gravel, cobbles or boulders, thin rock seams, or the upper surface of sound continuous

rock. Core drilling would be required to determine the character and continuity of materials below refusal of the soil auger in natural soils. Where fills are present, refusal to drilling may also result from encountering buried debris, building materials, or objects. Backhoe test pits would be required to expose and identify buried materials below refusal levels in filled areas.

Refusal to CPT Push

Refusal to the cone penetrometer equipment occurred when the reaction weight of the CPT rig was exceeded by the thrust required to push the conical tip further into the ground. At that point the rig tended to lift off the ground. Refusal may have resulted from encountering hard cemented or indurated soils, soft weathered rock, coarse gravel, cobbles or boulders, thin rock seams, or the upper surface of sound continuous rock. Where fills are present, refusal to the CPT rig may also have resulted from encountering buried debris, building materials, or objects.

Installation of Temporary PVC Casing (Observation Well)

Water level readings taken during boring operations do not provide information on long term fluctuations of the water table. In several of the borings, a temporary observation well will be constructed by inserting PVC casing to the indicated depth. A slotted PVC well screen will be attached to the bottom of the PVC pipe to allow subsurface water to enter the well. Soil will be mounded around the observation wells at the ground surface to prevent surface runoff from entering the borehole.

Borehole Closure

Following collection of relevant geotechnical data, boreholes were backfilled with a mixture of cement-bentonite grout and soil cuttings.

Preservation and Transporting of Soil Samples with Control of Field Moisture

Procedures for preserving soil samples obtained in the field and transportation of samples to the laboratory generally followed those given in ASTM D4220, *Standard Practice for Preserving and Transporting Soil Samples* for Group B samples as defined in Section 4. Group B samples are those samples not suspected of being contaminated and for which only water content and classification, proctor, relative density, or profile logging will be performed. Group B samples also include bulk samples that are intended to be remolded in the laboratory for compaction, swell pressure, percent swell, consolidation, permeability, CBR, or shear testing. Representative samples of the cuttings or split spoon samples, or representative bulk samples, were placed in suitably identified, sealed glass jars or plastic containers and transported to the laboratory. Sample identification numbers on the containers corresponded to sample numbers recorded on field boring records or test pit records. Thin-walled tube samples were sealed at the ends with paraffin and capped with plastic end caps.

♦ Field Tests of Earth Materials

The subsurface conditions encountered during drilling were reported on a field test boring record by the chief driller. The record contains information about the drilling method, samples attempted and sample recovery, indications of materials in the borings such as coarse gravel, cobbles, etc., and indications of materials encountered between sample intervals. Representative soil samples were placed in glass jars and transported

to the laboratory along with the field boring records. Recovered samples not expended in laboratory tests are commonly retained in our laboratory for 60 days following completion of drilling. Field boring records are retained at our office.

Measurement of Static Water Levels

Water level readings were made in the open boreholes immediately after completing drilling and withdrawal of the tools. Where feasible, measurements were repeated after an elapsed period of 24 hours to gauge the stabilized water level. Procedures for measurement of liquid levels in open boreholes are described in ASTM D4750, *Standard Test Method for Determining Subsurface Liquid Levels in a Borehole or Monitoring Well (Observation Well)*. A calibrated cable with electrical wire encased, equipped with a weighted sensing tip at one end and an electric meter at the other, was slowly lowered into each borehole until the liquid surface was penetrated by the weighted end. Contact with the water closed an electric circuit and was recorded by the meter. The depth reading on the cable was then recorded relative to a reference point on the surface. Measurements made by this method were then repeated until approximately consistent values were obtained.

Downhole Shear Wave Velocity Test (Geophone)

Shear wave velocity measurements were performed using downhole methods in general accordance with ASTM D7400, *Standard Test Methods for Downhole Seismic Testing*. For downhole surveys, a triaxial geophone is lowered in the hole and coupled to the borehole sidewall. At various depths, generally every 3 to 5 feet, the horizontal geophone records a pair of opposite polarity horizontally polarized vertical shear wave generated at the surface of the borehole. The shear wave is typically generated at the surface by hitting opposite ends of a plank coupled to the ground surface and a vertical geophone used to record compression. Corrections for the source offset are typically made, however corrections for verticality are not required.

Field Resistivity Testing

Apparent resistivity of the soil was measured at selected locations in the field by measuring the voltage potential between four equally spaced, in-line direct current electrodes in the Wenner Electrode Arrangement as described in ASTM D6431, *Standard Guide for Using the Direct Current Resistivity Method for Subsurface Investigation*. Using the measured voltages, resistivity was estimated using the approach described in *A Method of Measuring Earth Resistivity*, U. S. Bureau of Standards Bulletin No. 258, by Dr. F. Wenner, in which the average resistivity of the soil to a depth of "A" is given by:

$$r = 191.5 \times AE/I, \text{ where:}$$

r = Average resistivity of soil, ohm-cm
A = Distance between electrodes, cm
E = Measured Voltage, Volts
I = Current, Amperes

Appendix III – Laboratory Testing Summaries and Data Sheets

Table III-1 – Laboratory Data Summary (Soil)

Boring	Depth (ft)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	USCS Classification	Undrained Shear Strength (psf)
B-1	39.0 to 40.5	NP	NP	NP	Poorly Graded Sand with Silt (SP-SM)	-
B-5 [1]	12.0 to 14.0	NP	NP	NP	Silty Sand (SM)	-
B-5	43.5 to 45.0	NP	NP	NP	Poorly Graded Sand with Silt (SP-SM)	-
B-8	39.5 to 41.0	37	22	15	Sandy Lean Clay (CL)	-
B-10	64.0-65.5	NP	NP	NP	Silty Gravel with Sand (GM)	-

Note:
1. Sample obtained within CCR material.

Table III-2 – Corrosion Series Laboratory Test Results Summary (Soil)

Boring	Sample ID	Sample Depth (ft)	pH	Electrical Resistivity (ohm-cm)	Redox Potential (mV)	Sulfate (mg/kg)	Sulfide (mg/kg)	Chloride (mg/kg)
B-5 [1]	SS-4	12.0 to 14.0	9.2	1,200	93 to 120	7,000	BRL [2]	BRL [3]
B-5	SS-12	43.5 to 45.0	7.6	2,700	81 to 89	870	BRL [4]	15

Note:
1. Sample obtained within CCR material.
2. BRL = below reporting limit. Reporting limit is 66.1 mg/kg
3. Reporting Limit is 170 mg/kg.
4. Reporting Limit is 45.3 mg/kg.

Table III-3 – Concrete Exposure Classes

Boring	Sample	Depth (ft)	Freezing and Thawing (F)	Sulfate (S)	In Contact with Water (W)	Corrosion Protection of Reinforcement (C)
B-5 [1]	SS-4	12.0 to 14.0	F0	S2	W1	C1
B-5	SS-12	43.5 to 45.0	F0	S1	W1	C1

Note:
1. Sample obtained within CCR material.

Soil Test Evaluation for Ductile Iron Pipe

(10-Point System)*

Soil Characteristics	*Points*
Resistivity (ohm-cm)**	
<1,500	10
≥1,500-1,800	8
>1,800-2,100	5
>2,100-2,500	2
>2,500-3,000	1
>3,000	0
pH	
0-2	5
2-4	3
4-6.5	0
6.5-7.5	0 ***
7.5-8.5	0
>8.5	3
Redox potential	
>+100 mv	0
+50 to +100 mv	3.5
0 to +50 mv	4
Negative	5
Sulfides	
Positive	3.5
Trace	2
Negative	0
Moisture	
Poor drainage, continuously wet	2
Fair drainage, generally moist	1
Good drainage, generally dry	0

*Ten points–corrosive to Ductile Iron pipe. Protection is indicated.

**Based on water-saturated soil box. This method is designed to obtain the lowest–and most accurate–resistivity reading.

***If sulfides are present and low (<100 mv) or negative redox-potential results are obtained, 3 points should be given for this range.

Note: DIPRA recommends that the soil sample used in the 10-point evaluation be taken at pipe depth rather than at the surface. Soil corrosivity readings can vary substantially from the surface to pipe depth.

Figure III-1 – Soil Test Evaluation for Ductile Iron Pipe Table

ACI 318-11 Requirements for Concrete Exposed to Sulfates

Exposure Class (Concrete in contact with soluble sulfates in soil/sea water)	Max. w/cm	Minimum f'_c, psi	ASTM C150 Cementitious Type	ASTM C1012 expansion
S0 – Low sulfates*	N/A	2500	NA	
S1 - Moderate sulfates*	0.50	4000	Type II	0.10% at 6 m
S2 - Severe sulfates*	0.45	4500	Type V	0.05% at 6 m or 0.10% at 12 m
S3 – Very severe sulfates*	0.45	4500	Type V+pozzolan or slag	0.10% at 18 m

*Sulfate concentration is provided in ACI 318-11

Figure III-2 – ACI 318 Requirements for Concrete Exposed to Sulfates

Category	Class	Condition	
Freezing and thawing (F)	F0	Concrete not exposed to freezing-and-thawing cycles	
	F1	Concrete exposed to freezing-and-thawing cycles with limited exposure to water	
	F2	Concrete exposed to freezing-and-thawing cycles with frequent exposure to water	
	F3	Concrete exposed to freezing-and-thawing cycles with frequent exposure to water and exposure to deicing chemicals	
Sulfate (S)		Water-soluble sulfate (SO_4^{2-}) in soil, percent by mass[1]	Dissolved sulfate (SO_4^{2-}) in water, ppm[2]
	S0	$SO_4^{2-} < 0.10$	$SO_4^{2-} < 150$
	S1	$0.10 \le SO_4^{2-} < 0.20$	$150 \le SO_4^{2-} < 1500$ or seawater
	S2	$0.20 \le SO_4^{2-} \le 2.00$	$1500 \le SO_4^{2-} \le 10{,}000$
	S3	$SO_4^{2-} > 2.00$	$SO_4^{2-} > 10{,}000$
In contact with water (W)	W0	Concrete dry in service Concrete in contact with water and low permeability is not required	
	W1	Concrete in contact with water and low permeability is required	
Corrosion protection of reinforcement (C)	C0	Concrete dry or protected from moisture	
	C1	Concrete exposed to moisture but not to an external source of chlorides	
	C2	Concrete exposed to moisture and an external source of chlorides from deicing chemicals, salt, brackish water, seawater, or spray from these sources	

[1]Percent sulfate by mass in soil shall be determined by ASTM C1580.

[2]Concentration of dissolved sulfates in water, in ppm, shall be determined by ASTM D516 or ASTM D4130.

Figure III-3 – ACI 318 Table 19.3.1.1 Exposure Categories and Classes

Form No. TR-2310LEX-SUM1
Revision No. : 0a
Revision Date. : 11/15/20

Lab Summary

S&ME, Inc - Lexington 2020 Liberty Road, Suite 105, Lexington, KY 40505

Project No.: 22360136 Report Date: 02/24/23

Project Name: 2027 NGCC - Mill Creek

Client Name: LG&E-KU

Client Address: 820 West Broadway, Louisville, KY

BORING NO.	SAMPLE DEPTH, FT.	SAMPLE NO/TYPE	USCS	NATURAL MOISTURE CONTENT,%	ATT. LIMITS L.L.	P.L.	P. I.	APPROX % RET.ON #40	MAX DRY DENSITY, PCF @ OPT MC % (STD. PROCTOR)	WET UNIT WEIGHT, PCF	DRY UNIT WEIGHT, PCF	PH	LEAST ELECTRICAL RESISITVITY, Ω-CM	% FINER THAN NO. 200	INTER-POLATED AT 95% CBR, %
B-1	39-40.5	S-3, SS	SP-SM	13.0	NP			48						5.6	
B-5	12-14.0	S-4, SS	SM	52.6	NP							9.2	1,200	52.0	
B-5	43.5-45	S-12, SS	SP-SM	6.2	NP							7.6	2,700	14.6	
B-8	39.5-41	S-12, SS	CL	25.7	37	22	15	2							
B-10	64-65.5	S-18, SS	GM	10.7	NP			77							

Notes:

Jacob Folsom — *Technical Responsibility*

Jacob Folsom

Laboratory Services Manager — *Position*

02/27/23 — *Date*

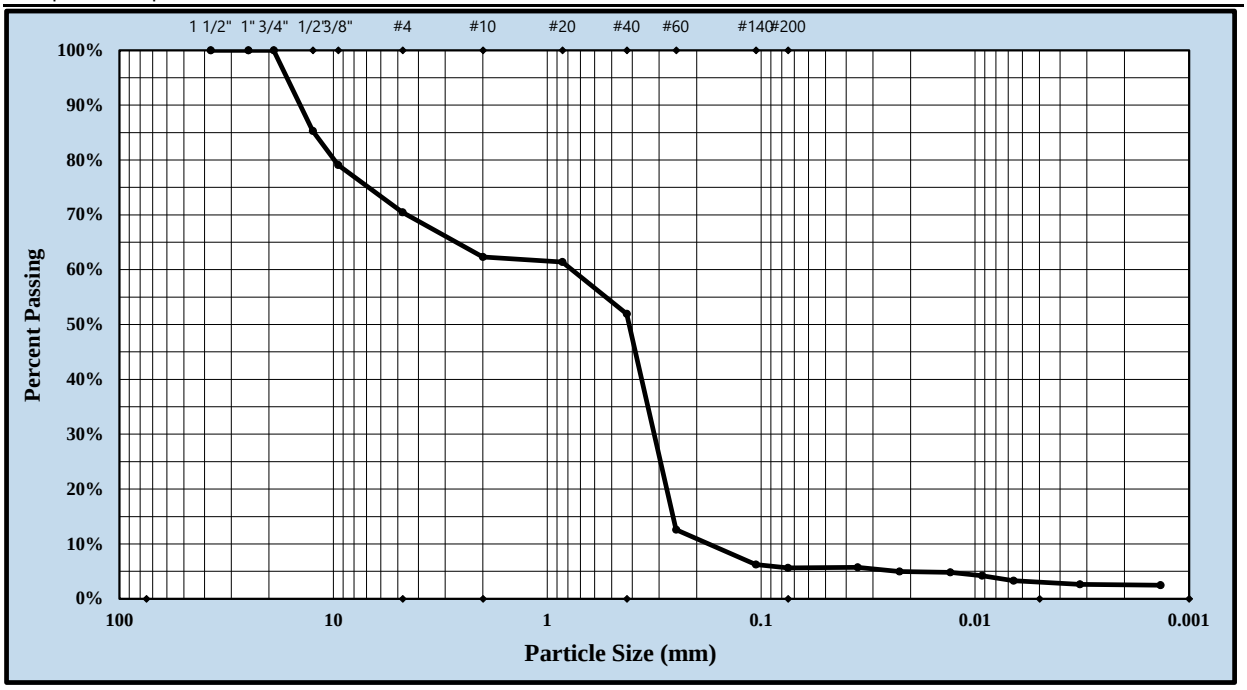
Form No. TR-D422-2
Revision No. 2LEXd
Revision Date: 06/21/22

PARTICLE SIZE ANALYSIS OF SOIL

ASTM D422

S&ME, Inc. - New Albany: 400 Industrial Boulevard, New Albany, IN 47150

Project #:	22360136	Report Date:	2/20/23
Project Name:	2027 NGCC- Mill Creek	Test Date(s):	2/16/23
Client Name:	LG&E-KU		
Client Address:	820 West Broadway, Louisville, KY		
Type:	SS	Sample Date:	11/21/22
Location:	B-1	Depth (ft.):	39.0-40.5
Sample Description:	POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM), brown		SP-SM



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt Size	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and >2.00 mm (#10)	Clay Size	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Nom. Maximum Particle Size:	3/4"	Gravel:	30%	Silt Size:	3%
Silt & Clay (% Passing #200):	6%	Total Sand:	65%	Clay Size:	3%
Assumed Relative Density:	2.650	Moisture Content:	13%		
Liquid Limit:	NP	Plastic Limit:	NP	Plastic Index:	NP
Coarse Sand:	8%	Medium Sand:	10%	Fine Sand:	46%

Description of Sand and Gravel: Rounded ☒ Angular ☐ Hard & Durable ☒ Soft ☐ Weathered & Friable ☐

Mechanical Stirring Apparatus A — Dispersion Period: 1 min. — Dispersing Agent: Sodium Hexametaphosphate: 40 g./ Liter

References / Comments / Deviations:

D10: 0.18 mm, D30: 0.32 mm, D60: 0.77 mm Specimen did not meet sample size requirement. All available material used.

Jacob Folsom	Jacob Folsom	Lab Services Manager	2/23/2023
Technical Responsibility	*Signature*	*Position*	*Date*

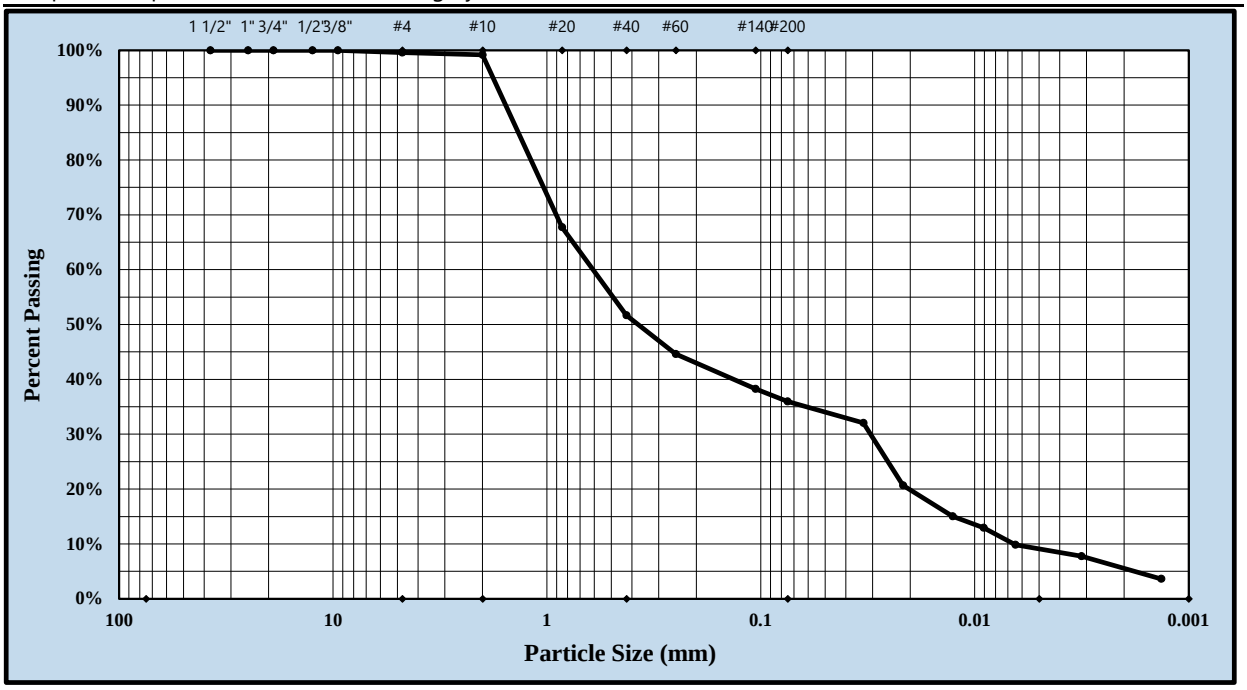
Form No. TR-D422-2
Revision No. 2LEXd
Revision Date: 06/21/22

PARTICLE SIZE ANALYSIS OF SOIL

ASTM D422

S&ME, Inc. - Lexington: 2020 Liberty Road, Suite 105, Lexington, KY 40505

Project #:	22360136	Report Date:	1/17/23
Project Name:	2027 NGCC - Mill Creek	Test Date(s):	1/11/23
Client Name:	LG&E-KU		
Client Address:	820 West Broadway, Louisville, KY		
Type:	SS	Sample Date:	11/21-23/2022
Location:	MCB-5	Depth (ft.):	12.0 - 14.0
Sample Description:	SILTY SAND (SM), gray		



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt Size	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and >2.00 mm (#10)	Clay Size	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Nom. Maximum Particle Size:	#10	Gravel:	0.4%	Silt Size:	26.9%
Silt & Clay (% Passing #200):	36.0%	Total Sand:	63.6%	Clay Size:	9.1%
Assumed Relative Density:	2.650	Moisture Content:	52.6%		
Liquid Limit:	NP	Plastic Limit:	NP	Plastic Index:	NP
Coarse Sand:	0.4%	Medium Sand:	47.5%	Fine Sand:	15.7%

Description of Sand and Gravel — Rounded ☐ Angular ☒ Hard & Durable ☒ Soft ☐ Weathered & Friable ☐

Mechanical Stirring Apparatus A — Dispersion Period: 1 min. Dispersing Agent: Sodium Hexametaphosphate: 40 g./ Liter

References / Comments / Deviations:

Jacob Folsom	Jacob Folsom	Lab Services Manager	1/17/2023
Technical Responsibility	*Signature*	*Position*	*Date*

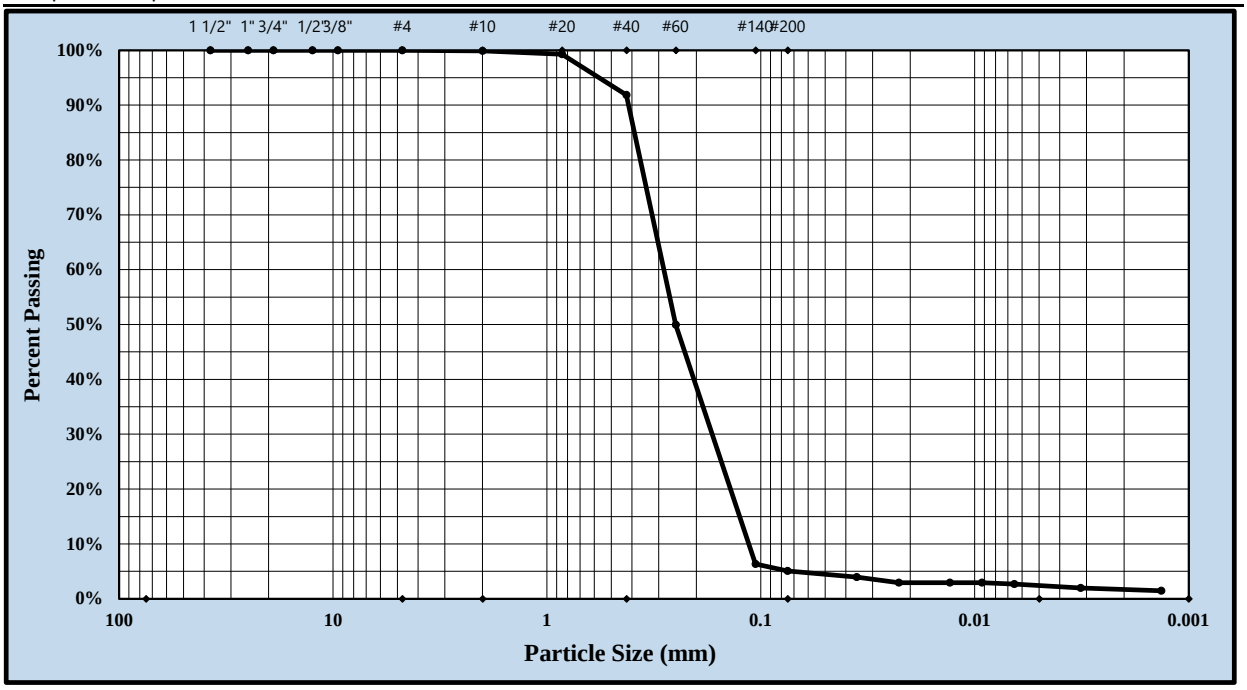
Form No. TR-D422-2
Revision No. 2LEXd
Revision Date: 06/21/22

PARTICLE SIZE ANALYSIS OF SOIL

ASTM D422

S&ME, Inc. - Lexington: 2020 Liberty Road, Suite 105, Lexington, KY 40505

Project #:	22360136	Report Date:	1/17/23
Project Name:	2027 NGCC - Mill Creek	Test Date(s):	1/12/23
Client Name:	LG&E-KU		
Client Address:	820 West Broadway, Louisville, KY		
Type:	SS	Sample Date:	11/21-23/2022
Location:	MCB-5	Depth (ft.):	43.5 - 45.0
Sample Description:	POORLY GRADED SAND WITH SILT (SP-SM), brown		



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt Size	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and >2.00 mm (#10)	Clay Size	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Nom. Maximum Particle Size:	#20	Gravel:	0.0%	Silt Size:	2.6%
Silt & Clay (% Passing #200):	5.1%	Total Sand:	94.9%	Clay Size:	2.4%
Assumed Relative Density:	2.650	Moisture Content:	6.2%		
Liquid Limit:	NP	Plastic Limit:	NP	Plastic Index:	NP
Coarse Sand:	0.1%	Medium Sand:	8.0%	Fine Sand:	86.8%

Description of Sand and Gravel — Rounded ☐ Angular ☒ Hard & Durable ☒ Soft ☐ Weathered & Friable ☐

Mechanical Stirring Apparatus A — Dispersion Period: 1 min. — Dispersing Agent: Sodium Hexametaphosphate: 40 g./ Liter

References / Comments / Deviations:

D10: 0.11 mm, D30: 0.17 mm, D60: 0.28 mm

Jacob Folsom	Jacob Folsom	Lab Services Manager	1/23/2023
Technical Responsibility	*Signature*	*Position*	*Date*

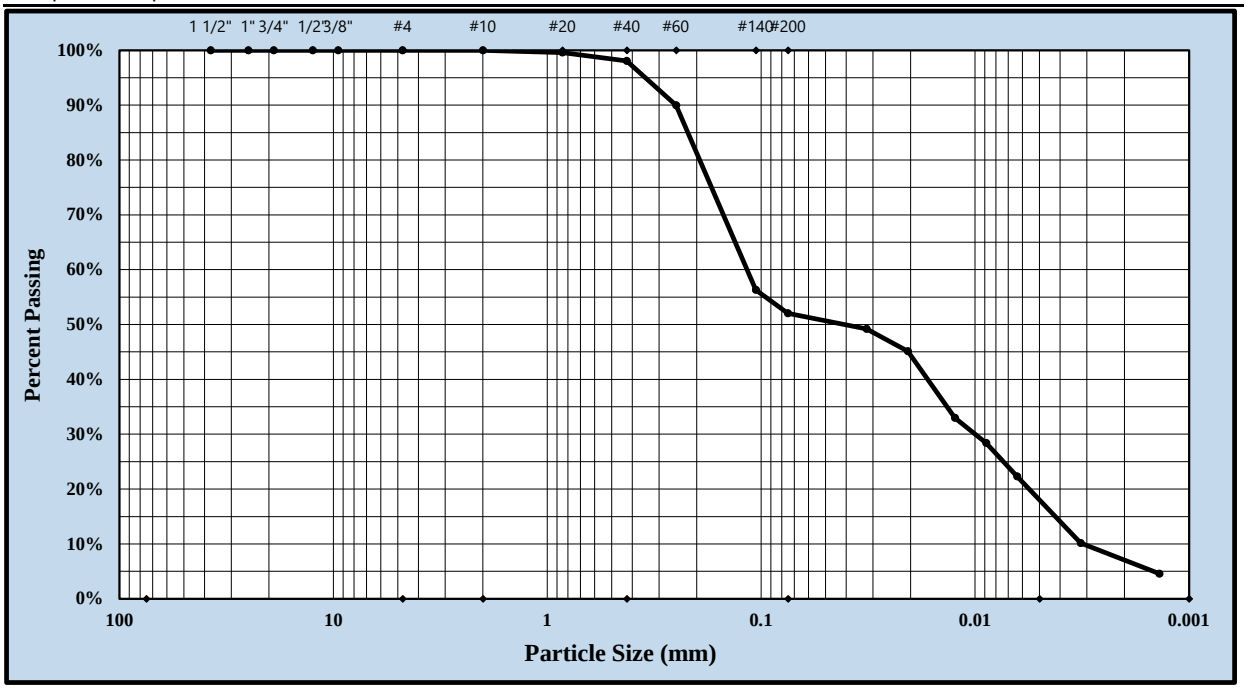
Form No. TR-D422-2
Revision No. 2LEXd
Revision Date: 06/21/22

PARTICLE SIZE ANALYSIS OF SOIL

ASTM D422

S&ME, Inc. - New Albany: 400 Industrial Boulevard, New Albany, IN 47150

Project #:	22360136	Report Date:	2/20/23
Project Name:	2027 NGCC- Mill Creek	Test Date(s):	2/16/23
Client Name:	LG&E-KU		
Client Address:	820 West Broadway, Louisville, KY		
Type:	SS	Sample Date:	11/21/22
Location:	B-8	Depth (ft.):	39.5-41.0
Sample Description:	SANDY LEAN CLAY (CL), brown		CL



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt Size	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and >2.00 mm (#10)	Clay Size	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Nom. Maximum Particle Size:	#20	Gravel:	0.0%	Silt Size:	34.0%
Silt & Clay (% Passing #200):	52.0%	Total Sand:	48.0%	Clay Size:	18.0%
Assumed Relative Density:	2.650	Moisture Content:	25.7%		
Liquid Limit:	37	Plastic Limit:	22	Plastic Index:	15
Coarse Sand:	0.0%	Medium Sand:	2.0%	Fine Sand:	46.0%

Description of Sand and Gravel — Rounded ☐ Angular ☐ Hard & Durable ☐ Soft ☐ Weathered & Friable ☐

Mechanical Stirring Apparatus A — Dispersion Period: 1 min. — Dispersing Agent: Sodium Hexametaphosphate: 40 g./ Liter

References / Comments / Deviations:

Jacob Folsom	Jacob Folsom	Lab Services Manager	2/23/2023
Technical Responsibility	*Signature*	*Position*	*Date*

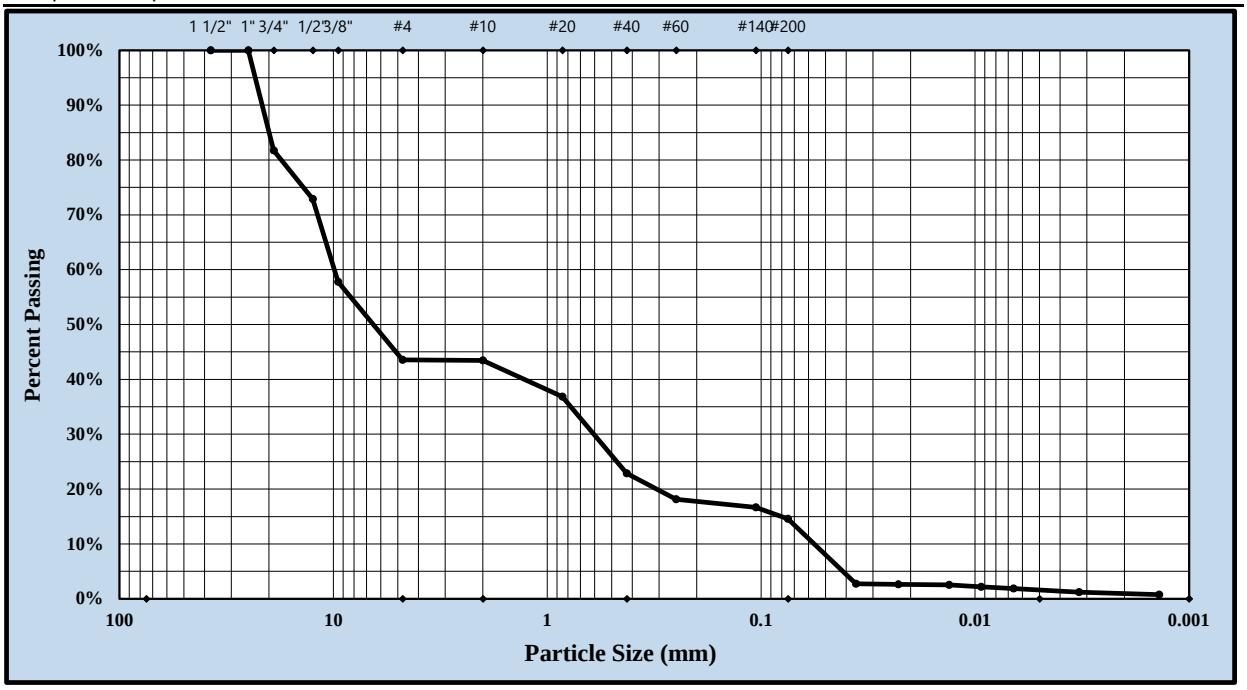
Form No. TR-D422-2
Revision No. 2LEXd
Revision Date: 06/21/22

PARTICLE SIZE ANALYSIS OF SOIL

ASTM D422

S&ME, Inc. - New Albany: 400 Industrial Boulevard, New Albany, IN 47150

Project #:	22360136	Report Date:	2/20/23
Project Name:	2027 NGCC- Mill Creek	Test Date(s):	2/16/23
Client Name:	LG&E-KU		
Client Address:	820 West Broadway, Louisville, KY		
Type:	SS	Sample Date:	11/21/22
Location:	B-10	Depth (ft.):	64.0-65.5
Sample Description:	SILTY GRAVEL WITH SAND (GM), brown		GM



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt Size	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and >2.00 mm (#10)	Clay Size	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Nom. Maximum Particle Size:	1"	Gravel:	56%	Silt Size:	13%
Silt & Clay (% Passing #200):	15%	Total Sand:	29%	Clay Size:	2%
Assumed Relative Density:	2.650	Moisture Content:	11%		
Liquid Limit:	NP	Plastic Limit:	NP	Plastic Index:	NP
Coarse Sand:	0%	Medium Sand:	21%	Fine Sand:	8%

Description of Sand and Gravel — Rounded ☒ Angular ☐ Hard & Durable ☒ Soft ☐ Weathered & Friable ☐

Mechanical Stirring Apparatus A — Dispersion Period: 1 min. — Dispersing Agent: Sodium Hexametaphosphate: 40 g./ Liter

References / Comments / Deviations:

Specimen did not meet sample size requirement. All available material used.

Jacob Folsom	Jacob Folsom	Lab Services Manager	2/23/2023
Technical Responsibility	*Signature*	*Position*	*Date*

Form No: TR-2310LEX-G57-T289-R
Revision No. 0
Revision Date: 04/16/21

LEAST ELECTRICAL RESISTIVTY AND pH FOR CORROSION

Electrical resistivity by Wenner 4-Pin

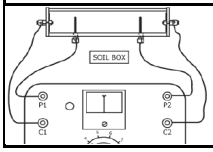
Quality Assurance ASTM G57, AASHTO T 289

S&ME, Inc. - Lexington: 2020 Liberty Road, Suite 105, Lexington, KY 40505

Project #:	**22360136**	Report Date:	01/17/23
Project Name:	2027 NGCC - Mill Creek	Test Date(s):	01/13/23
Client Name:	LG&E-KU		
Client Address:	820 West Broadway, Louisville, KY		
		Sample Date:	11/21 - 11/23/22

Boring/Location	Depth (ft.)	pH	Least Electrical Resistivity, Ω-cm	Water content for ER measurement
MCB-5	12-14	9.2	1,200	66.1%
MCB-5	43.5-45	7.6	2,700	23.8%

Electrical Resistivity Method



A voltage is impressed between the outer electrodes, and the voltage drop between the inner electrodes is measured using a voltmeter.

RESISTIVITY, ρ, Ω*cm = (R) * A / a

a, inner electrode spacing, cm : 7.2

A, cross sectional area perpendicualr to flow, cm^2: 7.2

Notes / Deviations / References:

Jacob Folsom — *Technical Responsibility*
Jacob Folsom — *Signature*
Lab Services Manager — *Position*
1/23/2023 — *Date*

AES

ANALYTICAL ENVIRONMENTAL SERVICES, INC.

January 23, 2023

Jacob Folsom
S&ME, Inc.

2020 Liberty Rd.
Lexington KY 40505

RE: CEC/NGCC

Dear Jacob Folsom: Order No: 2301F21

Analytical Environmental Services, Inc. received 7 samples on January 13, 2023 3:11 pm for the analyses presented in following report.

"No problems were encountered during the analyses except as noted in the Case Narrative or by qualifiers in the report or QC Summary. Additionally, all results for the associated Quality Control samples were within EPA and/or AES established limits.
AES's accreditations are as follows:
-NELAP/State of Florida Laboratory ID E87582 for analysis of Non-Potable Water, Solid & Chemical Materials, Air & Emissions Volatile Organics, and Drinking Water Microbiology & Metals, effective 07/01/22-06/30/23.
State of Georgia, Department of Natural Resources ID #800 for analysis of Drinking Water Metals, effective through 06/30/23 and Total Coliforms/ E. coli, effective 04/20/20-04/24/23.
-AIHA-LAP, LLC Laboratory ID: 100671 for Industrial Hygiene samples (Metals and PCM Asbestos), Environmental Lead (Paint, Soil, Dust Wipes, Air), and Environmental Microbiology (Fungal) Direct Examination, effective until 11/01/23.
These results relate only to the items tested as received. This report may only be reproduced in full.

If you have any questions regarding these test results, please feel free to call.

Sincerely,

Eben D. Buchanan, Jr.

Eben Buchanan

Project Manager

3080 Presidential Drive • Atlanta, Georgia 30340 • Tel: 770.457.8177 • Fax: 770.457.8188 • Toll Free: 800.972.4889
www.aesatlanta.com

ANALYTICAL ENVIRONMENTAL SERVICES, INC.
3080 Presidential Drive Atlanta, GA 30340-3704
Phone: (770) 457-8177 / Toll-Free: (800) 972-4889 / Fax: (770) 457-8188

AES

CHAIN OF CUSTODY

Work Order: 230F21

Date: 01/11/2023 Page 1 of 1

COMPANY:	ADDRESS:
S&ME	2020 Liberty Road Lexington, KY 40505
PHONE: 859 293-5518	EMAIL: jfolsom@smeinc.com
SAMPLED BY:	SIGNATURE:

#	SAMPLE ID	SAMPLED: DATE	SAMPLED: TIME	GRAB	COMPOSITE	MATRIX (see codes)	Sulfates	Chloride Ions	Oxygen Reduction	Sulfides										REMARKS	Number of Containers
							PRESERVATION (see codes)														
							NA	NA	NA	NA											
1	CEC B-1 3.5-5	10/25/22					✔	✔	✔	✔											1
2	CEC B-2 3-5	10/25/22					✔	✔	✔	✔											1
3	CEC B-3 6-10	10/25/22			✔		✔	✔	✔	✔											1
4	CEC B-4 composite	10/25/22			✔		✔	✔	✔	✔											1
5																					
6	NGCC B-4 10-12	11/23/22					✔	✔	✔	✔											1
7	NGCC MCB-5 12-14	11/23/22					✔	✔	✔	✔											1
8	NGCC MCB-5 43.5-45	11/23/22					✔	✔	✔	✔											1
9																					
10																					
11																					
12																					
13																					
14																					

Visit our website www.aesatlanta.com for downloadable COCs and to log in to your AESAccess account.

RELINQUISHED BY:	DATE/TIME:	RECEIVED BY:	DATE/TIME:
1.		1. MyJu	1/13/23 1511
2.		2.	
3.		3.	

SPECIAL INSTRUCTIONS/COMMENTS:

SHIPMENT METHOD
OUT: / / VIA:
IN: / / VIA:
client FedEx UPS US mail courier
other: _____

PROJECT INFORMATION
PROJECT NAME: CEC/NGCC
PROJECT #:
SITE ADDRESS:
SEND REPORT TO: Jacob Folsom
INVOICE TO (IF DIFFERENT FROM ABOVE):
QUOTE #:_____ PO#:_____

RECEIPT
Total # of Containers

Turnaround Time (TAT) Request
- ☑ Standard
- ☐ 2 Business Day Rush
- ☐ Next Business Day Rush
- ☐ Same-Day Rush **(auth req.)**
- ☐ Other _____

STATE PROGRAM (if any): _____
E-mail? ☐ Fax? ☐
DATA PACKAGE: I ○ II ○ III ○ IV ○

Submission of samples to the laboratory constitutes acceptance of AES's Terms & Conditions. Client assumes sole responsibility for damage or loss of samples before we accept them. Samples received after 3PM or on Saturday are considered as received the following business day. If no TAT is marked on COC, AES will proceed with standard TAT. Samples are disposed of 30 days after completion of report unless other arrangements are made.

7.11.18_CO

Matrix Codes: A = Air GW = Groundwater SE = Sediment SO = Soil SW = Surface Water ST=Stormwater WW = Waste Water W = Water (Blanks) DW = Drinking Water (Blanks) O = Other (specify)

Preservative Codes: H+I = Hydrochloric acid + ice I = Ice only N = Nitric acid S+I = Sulfuric acid + ice S/M+I = Sodium Bisulfate/Methanol + ice O = Other (specify) NA = None

White Copy - Original; Yellow Copy - Client

Analytical Environmental Services, Inc **Date:** 23-Jan-23

Client:	S&ME, Inc.	**Client Sample ID:**	NGCC MCB-5 12-14
Project Name:	CEC/NGCC	**Collection Date:**	11/23/2022
Lab ID:	2301F21-006	**Matrix:**	Solid

Analyses	Result	Reporting Limit	Qual	Units	BatchID	Dilution Factor	Date Analyzed	Analyst
Sulfide by SW9030B/9034					**(SW9030B)**			
Sulfide	BRL	66.1	H	mg/Kg-dry	349766	1	01/19/2023 16:15	AA
Oxidation/Reduction Potential by ASTM G200-9								
Oxidation-Reduction Potential	120	1.0	H	mV	R506536	1	01/18/2023 14:22	AH
Oxidation-Reduction Potential	110	1.0	H	mV	R506536	1	01/18/2023 14:22	AH
Oxidation-Reduction Potential	93	1.0	H	mV	R506536	1	01/18/2023 14:22	AH
ION SCAN SW9056A					**(SW9056A)**			
Chloride	BRL	170	H	mg/Kg-dry	349744	10	01/19/2023 17:58	BI
Sulfate	7000	170	H	mg/Kg-dry	349744	10	01/19/2023 17:58	BI
PERCENT MOISTURE D2216								
Percent Moisture	40.1	0		wt%	R506205	1	01/15/2023 00:00	JW

Qualifiers:

*	Value exceeds maximum contaminant level	E	Estimated (value above quantitation range)
BRL	Below reporting limit	S	Spike Recovery outside limits due to matrix
H	Holding times for preparation or analysis exceeded	Narr	See case narrative
N	Analyte not NELAC certified	F	Analyzed in the lab which is a deviation from the method
B	Analyte detected in the associated method blank	<	Less than Result value
>	Greater than Result value	J	Estimated value detected below Reporting Limit

Analytical Environmental Services, Inc **Date:** 23-Jan-23

Client:	S&ME, Inc.	**Client Sample ID:**	NGCC MCB-5 43.5-45
Project Name:	CEC/NGCC	**Collection Date:**	11/23/2022
Lab ID:	2301F21-007	**Matrix:**	Solid

Analyses	Result	Reporting Limit	Qual	Units	BatchID	Dilution Factor	Date Analyzed	Analyst
Sulfide by SW9030B/9034					**(SW9030B)**			
Sulfide	BRL	45.3	H	mg/Kg-dry	349766	1	01/19/2023 16:15	AA
Oxidation/Reduction Potential by ASTM G200-9								
Oxidation-Reduction Potential	81	1.0	H	mV	R506536	1	01/18/2023 14:22	AH
Oxidation-Reduction Potential	82	1.0	H	mV	R506615	1	01/19/2023 09:00	AH
Oxidation-Reduction Potential	89	1.0	H	mV	R506536	1	01/18/2023 14:22	AH
ION SCAN SW9056A					**(SW9056A)**			
Chloride	15	11	H	mg/Kg-dry	349744	1	01/19/2023 18:14	BI
Sulfate	870	11	H	mg/Kg-dry	349744	1	01/19/2023 18:14	BI
PERCENT MOISTURE D2216								
Percent Moisture	13.4	0		wt%	R506205	1	01/15/2023 00:00	JW

Qualifiers:

*	Value exceeds maximum contaminant level	E	Estimated (value above quantitation range)
BRL	Below reporting limit	S	Spike Recovery outside limits due to matrix
H	Holding times for preparation or analysis exceeded	Narr	See case narrative
N	Analyte not NELAC certified	F	Analyzed in the lab which is a deviation from the method
B	Analyte detected in the associated method blank	<	Less than Result value
>	Greater than Result value	J	Estimated value detected below Reporting Limit

Summary of Laboratory Procedures

Recovered disturbed and undisturbed samples and the drillers' field logs were transported to the laboratory where they were examined by the geotechnical engineer. Selected samples representative of certain groups of soils were subjected to simple classification tests by hand or other simple means.

Recovered disturbed and undisturbed samples and the drillers' field logs were transported to the laboratory where they were examined by the geotechnical engineer. Selected samples representative of certain groups of soils were subjected to simple classification tests by hand or other simple means. Other samples were tested in the laboratory to determine their strength or consolidation properties.

♦ Laboratory Tests of Soil

Examination of Split Spoon Soil Samples

Soil and rock samples and field boring records were reviewed in the laboratory by the geotechnical engineer. Soils were classified in general accordance with the visual-manual method described in ASTM D 2488, *Standard Practice for Description and Identification of Soils (Visual-Manual Method)*. The geotechnical engineer also prepared the final boring records enclosed with this report.

Moisture Content Testing of Soil Samples by Oven Drying

Moisture content was determined in general conformance with the methods outlined in ASTM D2216, "Standard Test Method for Laboratory Determination of Water (Moisture) Content of Soil or Rock by Mass." This method is limited in scope to Group B, C, or D samples of earth materials which do not contain appreciable amounts of organic material, soluble solids such as salt or reactive solids such as cement. This method is also limited to samples which do not contain contamination.

A representative portion of the soil was divided from the sample using one of the methods described in Section 9 of ASTM D2216. The split portion was then placed in a drying oven and heated to approximately 110 degrees C overnight or until a constant mass was achieved after repetitive weighing. The moisture content of the soil was then computed as the mass of water removed from the sample by drying, divided by the mass of the sample dry, times 100 percent. No attempt was made to exclude any particular particle size from the portion split from the sample.

Liquid and Plastic Limits Testing

Atterberg limits of the soils was determined generally following the methods described by ASTM D4318, *Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils*. Albert Atterberg originally defined "limits of consistency" of fine grained soils in terms of their relative ease of deformation at various moisture contents. In current engineering usage, the liquid limit of a soil is defined as the moisture content, in percent, marking the upper limit of viscous flow and the boundary with a semi-liquid state. The plastic limit defines the lower limit of plastic behavior, above which a soil behaves plastically below which it retains its shape upon drying. The plasticity index (PI) is the range of water content over which a soil behaves plastically. Numerically, the PI is the difference between liquid limit and plastic limit values.

Representative portions of fine grained Group A, B, C, or D samples were prepared using the wet method described in Section 10.1 of ASTM D4318. The liquid limit of each sample was determined using the multipoint method (Method A) described in Section 11. The liquid limit is by definition the moisture content where 25 drops of a hand operated liquid limit device are required to close a standard width groove cut in a soil sample placed in the device. After each test, the moisture content of the sample was adjusted and the sample replaced in the device. The test was repeated to provide a minimum of three widely spaced combinations of N versus moisture content. When plotted on semilog paper, the liquid limit moisture content was determined by straight line interpolation between the data points at N equals 25 blows.

The plastic limit was determined using the procedure described in Section 17 of ASTM D4318. A selected portion of the soil used in the liquid limit test was kneaded and rolled by hand until it could no longer be rolled to a 3.2 mm thread on a glass plate. This procedure was repeated until at least 6 grams of material was accumulated, at which point the moisture content was determined using the methods described in ASTM D2216.

Grain Size Analysis of Samples

The distribution of particle sizes greater than 75 µm was determined in general accordance with the procedures described by ASTM D421, *Standard Practice for Dry Preparation of Soil Samples for Particle-Size Analysis and Determination of Soil Constants*, and D422, *Standard Test Method for Particle Size Analysis of Soils*. During preparation samples were divided into two portions. The material coarser than the No. 30 U.S. sieve size fraction was dry sieved through a nest of standard sieves as described in Article 6. Material passing the No. 30 sieve was independently passed through a nest of sieves down to the No. 200 size.

Grain Size Analysis of Samples with Hydrometer

The distribution of particle sizes was determined in general accordance with the procedures described by ASTM D421, *Standard Practice for Dry Preparation of Soil Samples for Particle-Size Analysis and Determination of Soil Constants*, and D422, *Standard Test Method for Particle Size Analysis of Soils*. During preparation samples were divided into two portions. The material coarser than the No. 10 U.S. sieve size fraction was dry sieved through a nest of standard sieves as described in Article 6. Material passing the No. 10 sieve was soaked in demineralized water and a dispersing agent, then the soil-water slurry placed in a glass sedimentation chamber and the specific gravity of the slurry recorded at various time intervals. The grain size distribution was calculated from the time rate of sedimentation of the various size particles. After the final hydrometer reading was obtained, the suspension was washed through the No. 200 sieve. The remaining material retained on the No. 200 sieve was oven dried, and then passed through a standard nest of sieves.

Percent Fines Determination of Samples

A selected specimen of soils was washed over a No. 200 sieve after being thoroughly mixed and dried. This test was conducted in general accordance with ASTM D1140, *Standard Test Method for Amount of Material Finer Than the No. 200 Sieve*. Method A, using water to wash the sample through the sieve without soaking the sample for a prescribed period of time, was used and the percentage by weight of material washing through the sieve was deemed the "percent fines" or percent clay and silt fraction.

Soil Resistivity of Samples

This method is used to evaluate soil resistivity for the control of corrosion of buried structures, both for the estimation of expected corrosion rates and for the design of cathodic protection systems. Laboratory soil resistivity tests were run in general accordance with the procedure laid out in ASTM G57, *Standard Test Method for Field Measurement of Soil Resistivity using the Wenner Four-Electrode Method*. Laboratory tests were performed using Section 7.2.

A soil sample representative of the area of interest was mixed thoroughly and brought to saturation by adding only a sufficient amount of distilled water to produce a slight amount of surface water. The sample was condition overnight allowing excess surface water to evaporate. The saturated stiff slurry sample was placed in the soil box in layers, eliminating air spaces as far as practicable. A voltage was impressed across the outer electrodes. The voltage drop across the inner electrodes was measured with both the current and voltage drop recorded, if a separate ammeter and voltmeter were used. Where a resistivity meter was used, the resistance was read directly. The saturated measurement will provide an approaching minimum resistivity.

Laboratory Sulfate Ion Content Test

External sulfate can occur when concrete is in contact with sulfate containing water e.g. seawater, swamp water, ground water or sewage water. The often massive formation of gypsum and ettringite formed during the external sulfate attack may cause concrete to crack and scale.

Water soluble sulfate ion content is determined using either Method A or B as described by AASHTO T-290-95(2003), *Determining Water-Soluble Sulfate Ion Content in Soil*. Soil specimens were first prepared by splitting and quartering representative portions from recovered samples as described in Section 7.2.

Method A, the Gravimetric Method, determines sulfate content by precipitation of barium sulfate from a heated solution of the soil and chemical reagents. Method B, the Turbidimetric Method, relies on a photoelectric colorimeter to determine the turbidity of a barium sulfate suspension after chemical reagents are added. Laboratory test data sheets will indicate the method used.

Laboratory Chloride Ion Content Test

Water soluble chloride ion content is determined using either Method A or B as described by AASHTO T-291-94(2004), *Determining Water-Soluble chloride Ion Content in Soil*. Soil specimens were first prepared by splitting and quartering representative portions from recovered samples as described in Section 7.2.

Method A, the Mohr Titration Method, determines chloride ion content using silver nitrate in a suspended solution of the soil and distilled water. A reaction between a potassium chromate indicator solution and the silver nitrate produces a red-silver chromate precipitate.

Method B utilizes a pH/mV meter with chloride ion selective electrodes. When inserted into the suspension the meter records the activity of the chloride ions. These readings are compared to a set of calibration curves to determine the ion content in mg/kg.

Appendix IV– LPILE Tables

Report of Geotechnical Exploration
2027 NGCC Geotechnical Investigation
LG&E - Mill Creek Generating Station

Project No. 22360136
4/21/2023

LG&E - Mill Creek Generating Station

Boring: General Site Groundwater Encountered: Groundwater encountered between 50 and 70 feet below existing grade.

Stratum Layer No.	Depth Below Existing Grade		LPILE Soil Type (p-y Curve)	Description	Total Unit Weight	ϕ	Undrained Shear Strength, s_u	Unconfined Compressive Strength, q_u	LPILE Design Parameters			Allowable End Bearing Pressure[2]	Allowable Skin Resistance (Soil to Concrete)		Allowable Skin Resistance (Soil to Steel)[5]	
	Top of Layer	Bottom of Layer							k	ε_{50}	RQD		Compression[3]	Uplift[4]	Compression[3]	Uplift[4]
	(ft)	(ft)			(pcf)	(deg)	(psf)	(psi)	(pci)		(%)	(psf)	(psf)	(psf)	(psf)	(psf)
1	0	3		Topsoil/Frost Zone	125	-	-	-	-	-	-	-	-	-	-	-
2	3	42.5	Sand (Reese)	CCR, FILL, loose to dense [7]	110	26	-	-	25	-	-	-	0 - 340	0 - 255	0 - 255	0 - 190
3 [1]	18.5	70	Sand (Reese)	Sands, loose to dense	110-130	28-32	-	-	25-225	-	-	2800 - 12000	335 - 740	250 - 550	250 - 550	190 - 415
4 [1]	70	80	Sand (Reese)	Sands, medium dense to dense	125-130	32-34	-	-	60-125	-	-	6400 - 12000	380 - 550	285 - 410	285 - 410	210 - 310

Notes:

[1] When below the groundwater table, as in the case of flooding, use the effective unit weight, γ' = γ - 62.4 pcf and add hydrostatic water pressure

[2] FS = 3.0; Typically industry practice references a FS of 2.0 when load testing is performed and a FS between 2.5 and 3.0 without load testing.

[3] FS = 2.0 ; Typically industry practice references a FS on the order of 1.25 when load testing is performed and a FS of 2.0 or greater without load testing.

[4] Uplift taken as 75% of compression skin resistance.

[5] Applies to permanent steel casing.

[6] Allowable Skin Resistance is limited by the strength of concrete taken as f'_c = 4,000 psi for this project.

[7] CCR fills may contain zones of loose materials and may not provide lateral/axial support.

Report of Geotechnical Exploration
2027 NGCC Geotechnical Investigation
LG&E - Mill Creek Generating Station

Project No. 22360136
4/21/2023

LG&E - Mill Creek Generating Station

Boring: B-2 Groundwater Encountered: Groundwater not measured - drilling fluid used.

Stratum Layer No.	Depth Below Existing Grade		LPILE Soil Type (p-y Curve)	Description	Total Unit Weight	ϕ	Undrained Shear Strength, s_u	Unconfined Compressive Strength, q_u	LPILE Design Parameters			Allowable End Bearing Pressure[2]	Allowable Skin Resistance (Soil to Concrete)		Allowable Skin Resistance (Soil to Steel)[5]	
	Top of Layer	Bottom of Layer							k	ε_{50}	RQD		Compression[3]	Uplift[4]	Compression[3]	Uplift[4]
	(ft)	(ft)			(pcf)	(deg)	(psf)	(psi)	(pci)		(%)	(psf)	(psf)	(psf)	(psf)	(psf)
1	0	3		Topsoil/Frost Zone	110	-	-	-	-	-	-	-	-	-	-	-
2	3	7.5	Sand (Reese)	CPT - Sands/Silty Sands, medium dense to dense		36	-	-	90	-	-	-	370	280	280	210
3	7.5	15	Sand (Reese)	CPT - Silt mixtures,		34	-	-	90	-	-	-	310	230	230	175
4	15	28	Stiff Clay w/o Water (Reese)	CPT - Silt mixtures,		-	1,000	-	-	0.007	-	-	275	205	135	100
5	28	34.5	Sand (Reese)	SILTY SAND (SM), loose		28	-	-	25	-	-	-	170	130	130	95
6	34.5	65.5	Sand (Reese)	POORLY GRADED SAND with SILT and GRAVEL (SP-SM), medium dense		32	-	-	90	-	-	7,600	670	500	500	375
7[1]	65.5	80.5	Sand (Reese)	SILTY GRAVEL with SAND (GM), medium dense		34	-	-	60	-	-	8,400	540	405	405	305

Notes:

[1] When below the groundwater table, as in the case of flooding, use the effective unit weight, γ′ = γ - 62.4 pcf and add hydrostatic water pressure

[2] FS = 3.0; Typically industry practice references a FS of 2.0 when load testing is performed and a FS between 2.5 and 3.0 without load testing.

[3] FS = 2.0 ; Typically industry practice references a FS on the order of 1.25 when load testing is performed and a FS of 2.0 or greater without load testing.

[4] Uplift taken as 75% of compression skin resistance.

[5] Applies to permanent steel casing.

[6] Allowable Skin Resistance is limited by the strength of concrete taken as f'_c = 4,000 psi for this project.