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Hydrogeologic Study

Dan River Landfill

Duke Energy – Dan River Steam Station

Eden, North Carolina

Amec Foster Wheeler Project No. 7810140065

To: Duke Energy Carolinas, LLC

Date December 18, 2015

From: Amec Foster Wheeler

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1 Introduction

The purpose of this study was to evaluate the subsurface conditions in the proposed landfill area to obtain hydrogeologic information as required by the North Carolina Solid Waste Management Rule 15A NCAC 13B .0504(1)(c). This report provides a summary of the project site and setting, the field exploration activities, and the results from field exploration activities, including soil laboratory testing, calculations, and hydrogeologic drawings.

1.1 Project Description

Duke Energy intends to construct a landfill on Dan River Steam Station property to store existing coal combustion residuals (CCRs) currently stored in four units on site. The units consist of the Primary Ash Basin, Secondary Ash Basin, and two unlined ash structural fills (Ash Fills 1 and 2). Electricity production from coal combustion ceased on April 1, 2012 and the coal-fired plant is currently undergoing decommissioning; therefore, no new coal combustion residuals (CCRs) are currently being generated at Dan River Steam Station. A combined cycle plant on station property currently produces electricity from natural gas.

The proposed landfill will be constructed to facilitate placement of ash from existing on-site ash units in a lined facility by August 1, 2019 as required by the North Carolina Coal Ash Management Act of 2014. Duke Energy also intends to remove some of the on-site ash by rail to the existing Maplewood Landfill in Jetersville, Virginia.

1.2 Site Description

The Dan River Steam Station is located at 900 South Edgewood Road in Eden, Rockingham County, North Carolina as shown on **Drawing 1**. The proposed landfill will be located largely within the footprint of existing Ash Fill 1 on the northeastern end of the property and comprise a total area of approximately 26 acres. The ash within Ash Fill 1 will be removed prior to construction of the proposed landfill. The proposed landfill will be bounded by existing overhead electrical lines to the west and north, rail lines to the east, and a natural gas pipeline to the south.

The proposed landfill footprint is currently vegetated with grass in the vicinity of Ash Fill 1 and wooded in areas north of Ash Fill 1 as shown on **Drawing 2**. The majority of the site drains to an area between Ash Fills 1 and 2 which discharges into the Secondary Ash Basin and ultimately into the Dan River. A portion of the northern and eastern areas of the proposed landfill area drains to an existing stream east of the station property which discharges into the Dan River.

2 Geologic and Hydrogeologic Setting

2.1 Regional Geologic Setting

North Carolina is divided into distinct regions which are portions of three physiographic provinces: the Atlantic Coastal Plain, Piedmont, and Blue Ridge (Fenneman, 1938).

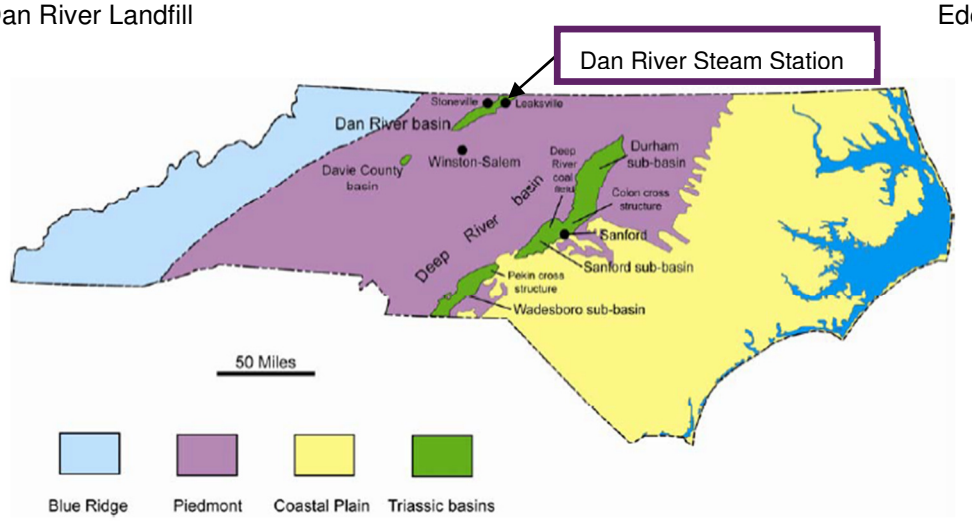

Illustration 1-Generalized Geologic Map of North Carolina, showing major geologic regions and the locations of Triassic basins and sub-basins (Reid and Milici, 2008)

The Dan River Steam Station is located within the Piedmont Province. The Piedmont is bounded to the east and southeast by the Atlantic Coastal Plain and to the west by the escarpment of the Blue Ridge Mountains, having a width of 150 to 225 miles (LeGrand, 2004). The topography of the Piedmont region is characterized by low, rounded hills and long, rolling, northeast-southwest trending ridges (Heath, 1984). Stream valley to ridge relief in most areas can range from 75 to 200 feet. The Piedmont region rises from an elevation of 300 feet above mean sea level along the Coastal Plain boundary, to an elevation of 1,500 feet at the base of the Blue Ridge Mountains (LeGrand, 2004).

Located within the Piedmont Province are two exposed rift basins that form two subparallel belts striking north-easterly, mainly across North Carolina (Olsen Et al., 1991). The eastern belt includes the broad Deep River basin and two small outliers, the Ellerbe basin in North Carolina and the Crowburg basin in South Carolina. The western belt includes the narrow Dan River basin and a small southerly outlier, the Davie County basin. The rift basins were formed approximately 220 million years ago during the Triassic Period as the supercontinent Pangea broke apart.

Sedimentation from runoff coming from the highlands deposited sand and silt and mud and created alluvial fans at the base of streams coming off the highlands. This deposition accumulated and formed the mudstones, siltstones, and sandstones found in the Dan River basin. Thayer (Thayer, 1970; cited in Olsen Et al., 1991) recognized a three-part stratigraphy for the Dan River basin, dividing the rocks of the Dan River Group (in ascending stratigraphic order) into the Pine Hall Formation, the Cow Branch Formation, and the Stoneville Formation. In general, Triassic basins display an overall tripartite stratigraphy consisting of a lower sequence of mainly reddish-brown, arkosic, coarse-grained sandstone and conglomerate, a middle sequence of mostly gray to black fossiliferous siltstone, carbonaceous shale, and thin coal beds, and an upper sequence of mainly reddish-brown siltstone, arkosic sandstone, pebbly sandstone, minor red and gray mudstone, and conglomerate.

2.2 Regional Hydrogeologic Setting

The groundwater system within the Piedmont region should be viewed as a two-unit system. The first unit, the regolith (encompassing residuum, saprolite, and weathered rock), contains and transports water through primary pore spaces in the soil and between rock particles. The second unit, the bedrock, has very limited pore spaces. Instead, water flows through and is stored in secondary conduits. These secondary conduits are sheet-like openings formed along rock fractures (Heath, 1980). A transition zone between the saprolite and bedrock is also common within the regolith of the Piedmont region. This transition zone will typically consist of partially weathered rock of the parent bedrock (Daniel and Dahlen, 2002).

Depending on the parent material and degree of weathering, the regolith can range in porosity between 20 and 30 percent, while the bedrock porosity is only 0.01 to 2 percent (Heath, 1984). Thus, the regolith serves as the principal storage reservoir for the underlying bedrock during recharge events (LeGrand,

2004). Hydraulic conductivities are similar in both the regolith and fractured bedrock and can range from 0.004 to 3.5 feet per day[1] (Heath, 1984). Fracture intensity, orientation, and aperture will dictate the hydraulic conductivity of the underlying bedrock.

Conceptually, the groundwater system in the Piedmont region is one in which the saprolite acts as a groundwater storage unit and bedrock functions as the main supply or transport unit and each unit functions are distinctly separate. Whereas Coastal Plain units typically serve as both, the regolith serves as a storage reservoir due to its high porosity and low yield, while the fractured bedrock serves as the main groundwater transport unit due to its low porosity and high yield. (Heath, 1984).

Groundwater will flow in the direction of high to low hydraulic head. Given that the topography of the Piedmont is predominantly composed of rounded hills and valleys, the water table closely mimics the land surface with less relief (LeGrand, 1988). Thus, topographic divides also serve as groundwater divides, with groundwater continuously flowing from ridge to valley, and, ultimately discharging at the nearest perennial stream. Locally, regolith and bedrock conditions and topography directly influence the hydraulic parameters of the groundwater system. Flow rates can differ from basin to basin by orders of several magnitudes (LeGrand, 2004). Additionally, Triassic Units in North Carolina often contain dikes and sills. These structural features weather differently and have been known to control groundwater flow horizontally and vertically at sites.

2.3 Site Geology

The rock types observed at the site include gray, fine-grained sandstone and greywacke, as well as, relatively soft, black, siltstone and shale. A geophysical survey was performed during this site hydrogeologic study in search of diabase dikes, however, based on the results of that survey, no diabase dikes are suspected in the vicinity of the proposed landfill site. The geophysical survey and corresponding results are discussed in greater detail in Section 4.7. A portion of the ESRI (derived from USGS Winston-Salem Quadrangle), 2015 geologic map depicting the approximate site vicinity and generalized rock descriptions is included in **Appendix VIII**.

2.4 Site Hydrostratigraphic Units

Based on previous studies at the site and experience in the Piedmont region, the following hydrostratigraphic units were selected for site characterization for this project:

- Soil Fill: Soil material that has either been dumped or compacted into place.
- Ash Fill: Ash (CCR Material) that has either been dumped or compacted into place.
- Alluvium: Soil material that has been deposited by fluvial processes.
- Residuum: The weathered, unconsolidated material typically found beneath the topsoil with very little of the physical characteristics of the parent bedrock retained.
- Saprolite: The unconsolidated product of weathered bedrock that usually retains some physical characteristics of the parent bedrock.
- Partially Weathered Rock (PWR): Saprolite and weathered rock with Standard Penetration Resistance of N>100.
- Weathered / Fractured Rock (WF): Rock below 4.25-inch hollow-stem auger refusal that was penetrated with tri-cone roller bit and/or rock that was cored with recovery <50% and/or Rock Quality Designation <50%.
- Sound Rock: Rock with Rock Core Recovery >75% and Rock Quality Designation >50%.

[1] Equivalent to approximately 1.4×10^{-6} to 1.2×10^{-3} centimeters per second (cm/s)

2.5 Site Groundwater

Groundwater recharge at the site is typical of the Piedmont physiographic province, in that it is derived from infiltration of local precipitation. Groundwater levels in the Piedmont are dynamic and fluctuate seasonally. Groundwater levels tend to decline beginning in the spring months of April and May due to increasing evaporation and plant transpiration. This decline tends to continue until late autumn when much of the vegetation becomes dormant. The fluctuation of groundwater levels compared to precipitation and season that is representative of the site is shown on the hydrographs for the select Duke Energy compliance monitoring wells included in the partial **Appendix V**.

3 Borings and Wells

3.1 Location Selection

The general goal of the boring and observation well network was to obtain sufficient hydrogeologic characterization for the hydrostratigraphic units within the proposed landfill footprint and compliance zone. Locations were primarily selected to provide data for the following:

- base grade determinations based on bedrock surface and long-term seasonal high groundwater levels;
- suitable soils for use in construction of the landfill; and
- design of a monitoring well network capable of early detection of potential releases from the landfill.

Borings and wells for Amec Foster Wheeler's current site study were selected primarily to fill the data gaps from previous study locations at a spatial distribution of approximately 1 boring or well per acre, as well as, target topographic highs and lows (potential groundwater recharge and discharge areas).

The majority of observation well locations for the current study was selected to be well pairs, meaning a relatively shallow well screened in overburden material was installed next to a deeper well screened in bedrock in order to characterize vertical components of groundwater flow. A few single shallow well locations were also selected to add water table measurement points to supplement groundwater surface mapping and long-term seasonal high groundwater calculations, as well as to pair with a few deeper wells that were being concurrently installed by others as discussed below in Sections 3.3 and 3.4. Surveyed locations of each boring and well used for the current study is shown on **Drawing 3**.

3.2 Historic Information

Twenty-six historic data locations from previous site work were used to support the current hydrogeologic study for the proposed Dan River Landfill. Four (4) existing Duke Energy voluntary and compliance monitoring wells, 10 Amec Foster Wheeler 2013 ash closure conceptual design observation wells, six (6) Amec Foster Wheeler 2013 ash closure conceptual design borings, and five (5) Amec Foster Wheeler 2014 supplemental ash closure assessment borings were selected to include. The following illustration summarizes the historic data locations selected for use:

Amec Foster Wheeler 2013 Assessment Wells
OW-301D
OW-302D
OW-303D
OW-304D
OW-305S
OW-305D
OW-306S
OW-306D
OW-320D
OW-321D

Duke Energy Voluntary & Compliance Wells
MW-12
MW-12D
MW-20S
MW-20D

Amec Foster Wheeler 2013 Assessment Borings
B-301
B-302
B-303
B-304
B-305
B-306C

Amec Foster Wheeler 2014 Assessment Borings
B-320
B-321
B-322
B-323
B-324

Illustration 2- Summary of Select Historic Data Locations

3.3 Concurrent Work By Others

During Amec Foster Wheeler's field work for the site hydrogeologic study, HDR, Inc. (HDR) began on-site monitoring well installation for Duke Energy's Comprehensive Groundwater Assessment project. Several of the monitoring well locations are in the vicinity of the proposed landfill and were selected to supplement bedrock and groundwater data for Amec Foster Wheeler's hydrogeologic study for the proposed Dan River Landfill. The following illustration summarizes the 15 HDR locations selected to include in Amec Foster Wheeler's current study:

HDR 2015 Groundwater Assessment Wells
GWA-1S
GWA-1D
GWA-2S
GWA-2D
GWA-3S
GWA-3D
GWA-11S
GWA-11D
AS-4D
AS-6D
AS-10D
AS-12S
MW-301BR
MW-303BR
MW-306BR

Illustration 3- Summary of Select HDR Monitoring Wells

3.4 Amec Foster Wheeler Current Study Borings and Wells

For the Dan River Landfill hydrogeologic study, Amec Foster Wheeler selected 12 stand-alone geotechnical boring locations (designated with prefix "B" and 400-series numbers), five (5) single shallow well locations (designated with prefix "OW" and 400-series numbers followed by "S" suffix), and 11 shallow/deep well pair locations (designated with prefix "OW" and 400-series numbers followed by "S/D" suffix) for a total of 39 additional data points (28 additional if you count well pairs as a single exploration

location) to be used in conjunction with the historic locations and locations by others mentioned above. The borings and wells used to support the current hydrogeologic study are illustrated below:

Amec Foster Wheeler 2015 Current Hydro Study Borings	Amec Foster Wheeler 2015 Proposed Landfill Hydro Study Wells		
B-451	OW-401S	OW-409D	OW-417S
B-452	OW-401D	OW-410S	OW-417D
B-453	OW-403S	OW-411S	OW-419S
B-454	OW-403D	OW-411D	
B-455	OW-404S	OW-412S	
B-456	OW-405S	OW-413S	
B-457	OW-405D	OW-414S	
B-458	OW-406S	OW-414D	
B-459	OW-406D	OW-415S	
B-460	OW-407S	OW-415D	
B-462	OW-407D	OW-416S	
B-463	OW-409S	OW-416D	

Illustration 4- Summary of Current Hydrogeologic Study Borings and Wells

Although Amec Foster Wheeler's locations OW-412S and OW-419S were installed as single shallow wells, HDR's work provided a deep well in close vicinity to each which essentially converts those locations into paired well locations. The combination Amec Foster Wheeler and HDR paired locations correlate as follows:

- OW-412S / AS-6D
- OW-419S / AS-10D

3.5 Regulatory Documentation

In accordance with the North Carolina Department of Environment and Natural Resources (NCDENR) Department of Water Quality (DWQ), Non-Residential Well Construction Records (GW-1b forms) were submitted within 30-days following installation for each observation well installed by Amec Foster Wheeler for the current study. The well construction records were submitted in two sets; and interim and final submittal, in order to meet the 30-day submittal deadline. Copies of both well record submittals are included in **Appendix II**.

4 Data Collection Methods

Field exploration for the current (2015) site study began on March 5, 2015 and was completed May 8, 2015. Field activities for the current site study consisted of subsurface utility locate, erosion and sediment control measure installation, boring and well installation, well development, field permeability "slug" testing, spatial survey, and geophysical survey. Information from historical soil test borings and observation wells were used to supplement data collected for the current (2015) site study.

4.1 Subsurface Utility Locate

Prior to beginning drilling activities for the current (2015) site study, Amec Foster Wheeler contracted McKim and Creed to perform subsurface utility scans in an approximate 25-foot radius surrounding each proposed boring and well location. McKim and Creed performed both electromagnetic (EM) scans and ground penetrating radar (GPR) scans at each proposed exploration location. Exploration locations were shifted as necessary to maintain a safe distance from subsurface utilities that were located, including any unknown utilities or anomalies that were located and marked. Shifted locations were verified with the Amec Foster Wheeler Lead Hydrogeologist and Duke Energy site and project personnel.

4.2 Erosion and Sediment Control Measures

Land disturbance due to subsurface exploration for the current (2015) site study was less than 1 acre; therefore, an Erosion and Sediment Control (E&SC) Permit was not required from the NCDENR Division of Energy, Mineral, and Land Resources. Although an E&SC Permit was not required, E&SC measures were installed as a best management practice.

Amec Foster Wheeler contracted Phillips and Jordan, Inc. to deploy compost filter socks at the down-gradient side of the drilling work area for each proposed exploration location prior to beginning drilling activities. The compost filter socks were secured in place with wooden stakes. Following drilling activities, the compost filter socks were either abandoned in-place at the drill location by opening the sock and spreading the mulch on the ground, or they were hauled to an on-site disposal area as directed by Duke Energy site personnel if they were not allowed to be abandoned in-place.

Several exploration locations required tree clearing to provide access. Tree clearing was performed using a forestry grinder that grinds trees and other vegetation close to ground level without disturbing the soil surface, leaving a roadbed of ground vegetation (mulch). Tree clearing activities were performed during the recommended timeframe with respect to the Northern Long-Eared Bat. Tree clearing was also kept to trees of 2-inch diameter or less.

4.3 Soil Test Borings

Information from historical soil test borings were used to supplement data collected for the current (2015) site study.

4.3.1 Historic Geotechnical Soil Test Borings

Data collected from six (6) Amec Foster Wheeler 2013 ash closure conceptual design borings, and five (5) Amec Foster Wheeler 2014 supplemental ash closure assessment borings were used to supplement the current site study.

Data collection methods for the 2013 soil test borings can be found in the AMEC *Data Report – Ash Basin Closure Conceptual Design for Dan River Station* dated September 19, 2013. Survey data and total depths for the 2013 soil test borings are included in **Table 1**.

The 2014 supplemental ash closure borings were performed using an all-terrain rubber-tired CME-550 drill rig and 3.25-inch I.D. hollow-stem augers. The 2014 borings were not advanced to auger refusal depths, rather they were terminated at approximately 5 to 15 feet into residual soils beneath the ash fill. Standard penetration tests (SPT) split-spoon samples were collected at 2.5-foot intervals in the upper ten feet and 5-foot intervals thereafter as per ASTM D1586. Advancement depths for the 2014 borings ranged from 48.9 feet below ground surface (bgs) in B-321 to 78.9 feet bgs in B-320. Bulk samples were collected in 5-gallon plastic buckets at field determined locations at various depth intervals. Ash fill material was targeted for bulk sampling from 2014 borings. Intact “undisturbed” samples of soil fill and ash fill were collected in select borings at select depths. Intact samples were taken at selected depths using a 3-inch thin-walled Shelby tube and piston-type sampler in accordance with ASTM D1587. Intact samples were sealed at the top and bottom with wax to protect against moisture loss and disturbance, labeled, and kept in the upright position while transported to the testing laboratory in accordance with ASTM D4220 for Group D samples. Laboratory testing results for samples collected from the 2014 borings are discussed in further detail below in Section 4.3. Water level measurements were not recorded from the 2014 soil test borings since the purpose of those boreholes was to provide supplemental ash characterization for ash closure, and not purposed for the landfill hydrogeologic study. The 2014 borings were abandoned upon completion from the bottom to ground surface using respective location drill cuttings. Abandoned boreholes were marked with stakes in the field for later survey. Survey data and total depths for the 2014 soil test borings are included in **Table 1**.

4.3.2 2015 Geotechnical Soil Test Borings

In addition to historic boring locations, Amec Foster Wheeler performed 12 stand-alone soil test borings and 15 soil test borings that became observation well locations during 2015 site study activities. The soil test borings were performed using 2 track-mounted Diedrich D-50 drill rigs and 4.25-inch I.D. hollow-stem augers. Each soil test boring for the current study was advanced to auger refusal depths and SPT split-spoon samples collected at 5-foot intervals as per ASTM D1586. The depths of the 2015 soil test borings ranged from 14.3 feet bgs in OW-409S (near the stream west of Ash Fill 1) to 98.2 feet bgs in B-462 (crest of Ash Fill 1). Composite or "bulk" geotechnical samples were collected in 5-gallon plastic buckets at field determined locations at various depth intervals. Soil material was targeted for bulk sampling to support the current site study, however, due to client request, some ash fill material was collected as bulk samples for separate purpose. Laboratory testing results for samples collected from the current study borings are discussed in further detail below in Section 4.5. Temporary PVC standpipes were installed in each current study geotechnical boring for 24-hour water level measurement. Upon obtaining 24-hour water level measurements, the 12 geotechnical soil test borings were abandoned from the bottom to ground surface using tremie methods with a neat cement grout. Abandoned boreholes were marked with stakes in the field for later survey. Survey data and total depths for the current study soil test borings are included in **Table 1**.

4.4 Observation Well Installation & Construction

Information from historical observation wells were used to supplement data collected for the current (2015) site study.

4.4.1 Historic Observation Wells

Data collected from ten (10) Amec Foster Wheeler 2013 ash closure conceptual design observation wells were used to supplement the current site study. Installation and construction methods for the 2013 observation wells can be found in the AMEC *Data Report – Ash Basin Closure Conceptual Design for Dan River Station* dated September 19, 2013. Well construction details and survey data for the 2013 wells have been included in **Table 1**.

No observation wells were installed during 2014 supplemental ash closure field activities.

4.4.2 2015 Observation Wells

During the current study field activities, Amec Foster Wheeler installed 5 single shallow wells and 11 shallow/deep well pairs, for a total of 27 new observations wells. Shallow wells for this project are defined as those wells constructed as Type II (described in Section 4.2.2.1), screened above auger refusal depths, and intended to monitor the upper-most aquifer water table surface (unconfined aquifer for this site). Deep wells for this project are defined as those wells constructed as Type III (described in Section 4.2.2.2) and screened at depths below auger refusal.

4.4.2.1 Type II Shallow Wells

The 11 paired shallow wells and 4 of the 5 single shallow wells (as installed by Amec Foster Wheeler, not including wells installed by others) were advanced as soil test borings described above in Section 4.1.2. One shallow well, OW-404S was advanced as an auger boring without split-spoon sampling. Geotechnical data for the OW-404 location was collected from a boring intended to be a deep well (OW-404D) which was later omitted.

Upon boring completion for the shallow well locations, a 2-inch I.D Type II observation well was installed to depths ranging from 14 feet bgs in OW-409S to 66 feet bgs in OW-411S. The Type II shallow wells were constructed of NSF Grade PVC Schedule 40 flush-joint threaded casing and 0.010-inch machine-slotted screen. Shallow well screened intervals ranged from 10-foot to 15-foot.

Attempts were made to install well screens so that they bracket the water table surface; however, in several locations the dense lithology encountered just above auger refusal depths tended to be relatively slow to produce water upon boring completion and water levels rose above the top of the screen after the well was installed. One location, OW-409S, has its water level above the screen due to artesian conditions. Another location, OW-406S, was unable to be screened across the water table surface due to particularly shallow water level, i.e. <3 feet bgs. Although the water table surface is above the screen in several shallow wells, the wells are screened above auger refusal in the regolith and are very likely hydraulically connected (see Section 2.2); therefore, such wells are likely still representative of the shallow aquifer surface. Groundwater occurrence is discussed in further detail below in Section 5.2.1.

The annular space between the borehole wall and the well screen was backfilled with a #2 size silica sand. The sand filter pack was placed approximately 2 feet above the top of the screen. A 1 to 2-foot thick bentonite chip seal was placed and hydrated above the sand filter pack. The remainder of the annular space was filled with a neat cement grout from the top of the bentonite seal, to near ground surface.

Each well was completed with an above-grade “stick-up” style 4-inch by 4-inch steel protective cover with locking cap. The protective cover was secured in place with a concrete collar and 2-foot by 2-foot concrete pad at ground surface.

A permanent aluminum well tag was affixed to the protective casing of each well using pop rivets. The information on each well tag include:

- Well identification name/number;
- Driller state registration number;
- Date well installed;
- Total depth of well;
- Depth/Diameter of casing;
- Depths/Diameter of screen;
- Depths of filter, seal, and grout materials; and
- A warning that well is non-potable.

A summary of boring and well construction details for the shallow Type II wells can be found in **Tables 1 and 2**. Graphical representation of boring and well logs are included in **Appendix I**.

4.4.2.2 Type III Deep Wells

The 11 paired deep wells (as installed by Amec Foster Wheeler, not including wells installed by others) were advanced by auger boring using 4.25-inch I.D. hollow-stem augers to refusal depth as a pilot hole, and then over-reamed with 8.25-inch I.D. hollow-stem augers.

Upon auger boring completion, a 6-inch I.D. NSF Grade PVC Schedule 40 flush-joint threaded outer casing was seated at the top of the bedrock surface, i.e. 8.25-inch auger refusal depth. The annular space between the borehole wall and the outer casing was grouted from the bottom up to near ground surface using a PVC grouting cap on the bottom of the casing that connected to tremie pipe, through which grout was pump. Outer casing grout was allowed to cure a minimum of 8 days prior to drill-out.

Drill-out involved drilling inside the 6-inch outer casing with a 5 $^{7/8}$ -inch diameter tri-cone or “roller cone” bit to depth of roller cone refusal below the outer casing. Roller cone bits can typically advance slightly further than augers to depths that may be more ideal to begin rock coring techniques. In some locations, roller cone refusal was not encountered and therefore, no rock coring performed (described in further detail below in Section 4.2.2.2.1).

Well construction differed for deep locations that were cored versus not cored as described in the following sections. However, each deep well, whether cored or not, was completed with similar protective casing, concrete pad, and well tag as described above for the shallow wells. A summary of boring and well construction details for the deep Type III wells can be found in **Tables 1 and 2**. Graphical representation boring and well logs are included in **Appendix I**.

4.4.2.2.1 Non-Rock Cored Locations

In 4 of the 11 deep borings (OW-401D, OW-405D, OW-406D, and OW-407D) the roller cone did not encounter refusal prior to extending approximately 15 to 18 feet below the bottom of the screened interval of the corresponding shallow well for the location. The roller cone was able to advance to such depths due to the exceptionally soft nature of the underlying siltstone/shale bedrock at such locations. Boring depths at such locations were terminated based upon extending a minimum of 15 feet below the corresponding shallow well's screen bottom since adequate screen separation for the shallow/deep pair had been achieved. The 15-foot screen separation was considered adequate based upon Amec Foster Wheeler experience at similar sites in the Piedmont with similar material and aquifer type.

Upon roller cone termination (based on sufficient screen separation achieved and not refusal), a Type III 2-inch I.D NSF Grade PVC Schedule 40 flush-joint threaded casing and 0.010-inch machine-slotted screen well was installed inside the 6-inch outer casing and extended to the final depth of the borehole. Screened intervals of 5 feet were installed at the bottom of the non-cored Type III deep wells. The annular space between the borehole wall and the well screen was backfilled with a #2 size silica sand. The sand filter pack was placed approximately 2 feet above the top of the screen. An approximate 4-foot thick bentonite chip seal was placed and hydrated above the sand filter pack. The remainder of the annular space was filled with a neat cement grout from the top of the bentonite seal, to near ground surface.

4.4.2.2.2 Rock Cored Locations

To define the stratigraphic relationship between soil and rock, if roller cone refusal was encountered prior to extending 15 feet below the corresponding shallow well's bottom screen depth, then NQ2 rock coring techniques were used to advance the borehole further to gain a better understanding of the bedrock conditions. NQ2 (nominal 3-inch diameter) rock coring techniques were performed below roller cone refusal in accordance with ASTM D2113 in the remaining 7 of 11 deep borings. Rock core intervals ranged in length from 6.8 feet cored in OW-401D to 23.8 feet cored in OW-411D. Rock core intervals were based on considerations of screen separation and water-bearing fracture locations. Rock cores were visually observed in the field for classification of rock type, color, weathering and fracturing. Percent recovery and rock quality designation (RQD) were calculated for each rock core interval. Rock core photo logs are included in **Appendix I**.

Screened intervals of 5 feet were installed in the rock cored Type III deep wells. For the 7 rock cored deep wells, a rubber k-packer was used in lieu of a sand filter pack. The k-packer was threaded into the PVC casing just above the top of the screen and consisted of 3 rubber flanges that form a seal between the corehole wall and well casing. Coated bentonite pellets were placed and hydrated on top of the k-packer ranging from approximately 3 feet to 21 feet thick in section length. The remainder of the annular space was filled with a neat cement grout from the top of the bentonite seal, to near ground surface.

4.4.3 HDR Groundwater Assessment Monitoring Wells

Installation and construction methods for the HDR monitoring wells were submitted by others under a separate report[2].

[2] HDR Engineering, Inc., "Comprehensive Site Assessment, Dan River Steam Station Ash Basin," August 14, 2014.

4.5 Laboratory Testing

Bulk samples, intact "undisturbed" samples, and split-spoon samples were transported to either the Amec Foster Wheeler Charlotte, North Carolina soil laboratory or the Geotechnics' soil laboratory in Raleigh, North Carolina. Laboratory soils testing was performed on bulk samples, relatively undisturbed samples (Shelby tubes), and split-spoon samples to evaluate soil characteristics, engineering properties, and vertical permeability of soils within and adjacent to the proposed landfill footprint. Samples were selected based on lithological representation and to evaluate samples from observation well screened intervals.

Soil laboratory testing was performed on the soil samples to evaluate the soil characteristics and generally consisted of the following tests: natural moisture content, grain size distribution, plasticity index (Atterberg limits), and specific gravity. Additional testing was performed on select bulk samples to evaluate engineering properties to be used in landfill design and included the following tests: Standard Proctor dry density, remolded consolidated-undrained triaxial tests, and remolded permeability tests. Additional testing was performed on select relatively undisturbed samples (Shelby tubes) to evaluate engineering properties to be used in landfill design and included the following tests: consolidated-undrained triaxial tests and remolded permeability tests. A summary of laboratory tests performed on the soil samples is included in **Table 4** and full laboratory reports are included as **Appendix IV**.

4.6 Well Development

Following well installation, each of the 2015 observation wells were developed to reduce sand, silt, clay and other fine particles that may have been introduced into the formation and/or filter pack during drilling and well installation processes. Well development was also performed to establish viable connection of the well with the aquifer. Well development was conducted using a 12-volt portable well pump and polyethylene tubing. The well pump was cleaned with a Liquinox® detergent solution followed by a deionized water rinse and new tubing used between wells. Development continued and water was removed and discharged onto the ground approximately 5 to 10 feet from the wellhead until water from the well visually appeared relatively clear and free of particulates.

4.7 Field Permeability "Slug" Testing

Field hydraulic conductivity "slug" testing was conducted between April 28, 2015 and May 8, 2015 in each of the 27 current study observation wells to evaluate the horizontal permeability of the subsurface materials surrounding the saturated portion of the screened interval using the following procedures:

- The water in the wells was displaced by placing a slug through the water table in the well (manual PVC slug, bailer, or pneumatic slug). When using the manual PVC slug or the bailer, the slug remained in the monitoring well until equilibrium was attained. The slug was then rapidly removed from the water causing a drop in the water level in the well. As the water flowed back into the well, the change in rising-head over time was recorded (rising-head test). Water in both OW-409S and OW-409D was displaced using a pneumatic slug system which consisted of pressurizing the well using a small air pump (forcing the water down). Immediately after maximum pressure was reached, a valve was opened to the atmosphere and the displaced water returns to static level (rising-head test).

- The change in head was measured using Level Troll® 700 Series data loggers and pressure transducers with vented cables and fast linear time sampling. The Level Troll® 700 has a 100 pounds per square inch (psi) pressure rating or 231 feet of water with an accuracy of ±0.05% full scale at 15°C (59°F) as specified by the manufacturer.

- The field hydraulic conductivity test data were input into Aqtesolv™ software for analysis. Both Bower and Rice Graphical and Hvorslev analysis methods were used.

Results of field permeability testing are discussed later in Section 5.2.3.

4.8 Boring and Well Survey

Following boring and well completion, Amec Foster Wheeler contracted McKim and Creed to survey the 12 geotechnical borings and 27 observation wells utilizing North Carolina State Plane coordinates, ground surface elevations, and top of PVC casing elevations (wells only). Survey data was collected on April 28-29, 2015. Respective survey data is summarized in **Table 1**.

4.9 Geophysical Survey

AMEC contracted Geo Solutions to complete field reconnaissance and geophysical evaluations at several locations associated with the existing and proposed coal ash facilities (see Appendix IX for more details). The primary objective was to evaluate the footprint for the proposed CCR landfill area (i.e. Ash Fill 1) for the presence or absence or potential diabase dike geologic structures which are known to be present in similar Triassic Basin geologic settings.

The purpose of this evaluation was to use both field reconnaissance and proven geophysical methods to locate, if present, potential diabase dike structures. Diabase dikes are geologic structures that typically are nearly vertical mafic igneous structures that appear linear in geologic maps. Geologic maps from this area indicate no diabase structures were present. However, geologic mapping of this area has not been completed in sufficient detail to identify small diabase dikes that could have an impact on site remediation planning. Diabase dikes can be identified through field reconnaissance by identification of diabase boulders (float) or through the use of a sensitive magnetometer to identify magnetic anomalies associated with the placement of the iron enriched igneous rock.

Geo Solutions completed field reconnaissance and an exploratory level magnetic evaluation using a Geometrics G-859 portable magnetometer equipped with a GPS satellite locating system. The magnetometer was attached to a plastic sled and pulled behind a Polaris Ranger ATV. The Geometrics Magnetometer utilized at Cesium Vapor detector with a collection rate of 2 samples per second. The spacing of the magnetic data collection is a function of sampling frequency and rate of travel. In general a field measurement of the strength of the earth's total magnetic field was made every meter of travel. This is considered a high resolution magnetic survey spacing.

The following findings were noted for both the field reconnaissance and the geophysical evaluations;

- Geo Solutions identified numerous boulders (float) at the site. However examination of the boulders indicated no presence of diabase rock material. The boulders appeared to be either riprap rock brought onto the site or typical Triassic Rocks based on the description from USGS geologic maps.
- A magnetic evaluation of the earth's magnetic field in the area of the proposed CCR landfill indicates that no diabase dikes are present. Surface metal interference did not impact the conclusions of this dike investigation.

5 Summary of Findings

5.1 Geologic Findings

5.1.1 Hydrostratigraphic Units

5.1.1.1 Soil Fill

Of the 21 select historic locations and 39 current study locations, 38 encountered soil fill. For this study, soil fill is defined as soil material that was artificially either dumped or compacted into place. In general, soil fill was encountered in locations drilled within the Ash Fill 1 footprint and was found primarily in 5 "zones":

- near the surface as soil cap over the ash fill;
- at the base of the ash fill in some areas;
- lenses or pockets within the ash fill;
- soil stockpile area on top of southern portion of the ash fill; and
- near access roads in vicinity of the existing ash fill perimeter.

Locations encountering soil fill as part of the ash fill's soil cap found the soil cap to range in thickness from approximately 0.5 feet in boring B-457 to 4 feet in boring B-460 across the majority of the ash fill, with the crest of the ash fill having a soil cap ranging from 7 feet thick in boring B-303 to 23.5 feet thick at the highest peak in boring B-462.

Locations encountering soil fill at the base of the ash fill found soil fill ranging in thickness from 1 foot in boring B-305 to 9.5 feet in boring B-459. Soil fill beneath the ash fill in borings OW-407S/D was noted to contain decomposing organic material, consistent with clear-cutting and burning of vegetative debris that occurred prior to ash fill placement.

Locations encountering lenses or pockets of soil fill within the ash fill found the soil lenses to range in thickness from 1.8 feet in borings OW-411S/D to 13.8 feet in boring B-321.

Locations within the soil stockpile area on top of the southern portion of the ash fill encountered soil fill ranging from 7 feet in boring OW-320D to 38.5 feet in boring B-322.

Locations in the vicinity of the existing ash fill perimeter access roads encountered soil fill ranging from 1.5 feet in boring OW-413S to 13.5 feet in boring B-301.

In general, soil fill material classified in the field ranged from clayey silts and silty clays to sandy silts and silty sands. Detailed lithological descriptions can be found on boring logs included in **Appendix I**. The laboratory tests performed on a few soil fill samples resulted in a Unified Soil Classification System (USCS) symbol of CL. A summary of laboratory testing can be found in **Table 4**.

A summary of the occurrence of soil fill can be found in **Table 2**. Portions of the soil fill occurrence at the site are depicted on Cross-Sections on **Drawings 8-11**.

5.1.1.2 Ash Fill (CCR Material)

Of the 21 select historic locations and 39 current study locations, ash fill was encountered in 29 borings. For this study, ash fill is defined as coal combustion residual (CCR) material that has been either dumped or compacted into place. In general, ash fill was encountered within the ash fill footprint and beneath the soil cap, including beneath the soil stockpile area. In general, the ash fill appears to slope downward from the crest towards the toe before tapering out near the toe. Not including minor ash lenses within soil fill material, ash fill ranges in thickness from 2 feet in boring OW-301D near the north toe of the ash fill to 59 feet in boring OW-303D at the crest of the ash fill.

The ash fill material in the field and in laboratory testing generally classified as a silt with a USCS classification of ML. Detailed lithological descriptions can be found on boring logs included in **Appendix I**. A summary of laboratory testing can be found in **Table 4**.

A summary of the occurrence of ash fill can be found in **Table 2**. Portions of the ash fill occurrence at the site are depicted on Cross-Sections on **Drawings 8-11**.

5.1.1.3 Alluvium

Of the 21 select historic locations and 39 current study locations, alluvium was encountered in 4 borings, OW-406S/D and OW-409S/D, each located near a stream feature to the west of Ash Fill 1. For this study, alluvium is defined as soil material that has been deposited by fluvial processes. Alluvium was

encountered at the surface to a depth of 7 feet bgs in OW-406S/D and to a depth of 4 feet bgs in OW-409S/D. Laboratory classification of alluvium at OW-406S/D resulted in an elastic silt (USCS classification of MH) and alluvium at OW-409S/D was classified in the field as a sandy clay. Detailed lithological descriptions can be found on boring logs included in **Appendix I**. A summary of laboratory testing can be found in **Table 4**.

A summary of the occurrence of alluvium can be found in **Table 2**. Portions of the alluvium occurrence at the site is depicted on Cross-Section B-B' on **Drawing 8**.

5.1.1.4 Residuum

Of the 21 select historic locations and 39 current study locations, residuum was encountered in 17 borings. For this study, residuum is defined as weathered, unconsolidated material retaining very little of the physical characteristics of the parent bedrock. Residuum is typically found beneath top soil, near the surface of natural ground. Residuum at the site ranges from 3 feet thick in borings OW-403S/D to 10 feet thick in borings B-453 and B-463.

In general, residuum material classified in the field ranged from clayey silts, clayey sands, and silty clays to sandy silts and silty sands. Detailed lithological descriptions can be found on boring logs included in **Appendix I**. The laboratory tests performed on a few residuum or residuum-containing samples resulted in a USCS classifications of CL to CH. A summary of laboratory testing can be found in **Table 4**.

A summary of the occurrence of residuum can be found in **Table 2**. Portions of the residuum occurrence at the site are depicted on Cross-Sections on **Drawings 8-11**.

5.1.1.5 Saprolite

Of the 21 select historic locations and 39 current study locations, saprolite was encountered in 47 borings. For this study, saprolite is defined as the unconsolidated product of weathered bedrock that typically retains some relic physical characteristics of the parent rock. Saprolite is typically found at or near the surface of natural ground or just beneath residuum if residuum is present. Saprolite also occurs as lenses or pockets within the partially weathered rock unit (described below in Section 5.1.1.6). Including lenses, saprolite thickness at the site ranges from 1 foot in boring OW-305D to 30 feet in boring OW-302D.

In general, field and laboratory testing classified saprolite as a mix of silty sands (USCS=SM), sandy silts (USCS=ML), clayey sands (USCS=SC), and sandy clays (USCS=CL and CH). Detailed lithological descriptions can be found on boring logs included in **Appendix I**. A summary of laboratory testing can be found in **Table 4**.

A summary of the occurrence of saprolite can be found in **Table 2**. Portions of the saprolite occurrence at the site are depicted on Cross-Sections on **Drawings 8-11**.

5.1.1.6 Partially Weathered Rock (PWR)

Of the 21 select historic locations and 39 current study locations, PWR was encountered in 50 borings. For this study, PWR is defined as saprolite and weathered rock with Standard Penetration Resistance of N>100. PWR is typically found just beneath saprolite and in some cases just beneath residuum if saprolite is absent. PWR also occurs as lenses or pockets within the saprolite unit (described above in Section 5.1.1.5). Including lenses, PWR thickness at the site ranges from 0.3 feet in boring OW-413S to 47 feet in boring OW-405D.

In general, field and laboratory testing classified PWR as a mix of silty sands (USCS=SM), sandy silts (USCS=ML), clayey sands (USCS=SC), and sandy clays (USCS=CL and CH). Detailed lithological descriptions can be found on boring logs included in **Appendix I**. A summary of laboratory testing can be found in **Table 4**.

A summary of the occurrence of PWR can be found in **Table 2**. Portions of the PWR occurrence at the site are depicted on Cross-Sections on **Drawings 8-11**.

5.1.1.7 Weathered / Fractured Bedrock (WF)

Of the 11 current study locations that were advanced to depths beyond auger refusal, WF was encountered in each of the 11 borings. For this study, WF is defined as rock below 4.25-inch hollow-stem auger refusal that was penetrated with tri-cone roller bit and/or rock that was cored with recovery <50% and/or Rock Quality Designation <50%. WF is typically found just beneath PWR and in some cases just beneath saprolite if PWR is absent. WF can also occur as lenses or zones within the sound bedrock unit (described below in Section 5.1.1.8). WF thickness encountered at the site ranges from 13 feet in boring OW-414D to 26.3 feet in boring OW-411D.

In general, field classification of the WF bedrock consisted of dark gray to black siltstone/shale and gray fine-grained sandstone and greywacke with intense fracturing. The siltstone/shale was a relatively soft unit and was not always observed using rock coring techniques (see above Section 4.4.2.2.1). Discoloration due to weathering and/or staining of fracture surfaces was not as commonly observed in the siltstone/shale as it was in the sandstone and greywacke rock types. Boring logs with detailed lithological descriptions and rock core photo logs (for locations that were cored) are included in **Appendix I**.

A summary of the occurrence of WF bedrock can be found in **Table 2**. Portions of the WF bedrock occurrence at the site are depicted on Cross-Sections on **Drawings 8-11**.

5.1.1.8 Sound Bedrock

Of the 11 current study locations that were advanced to depths beyond auger refusal, sound rock was encountered in only 1 boring, OW-409D. For this study, sound rock is defined as rock with core recovery >75% and Rock Quality Designation (RQD) >50%. RQD is defined as is a measure of the degree of fracturing measured as a percentage of the drill core containing lengths of 4 inches or more. In boring OW-409D, sound rock occurred in a zone within the WF bedrock unit from 18 to 24 feet bgs, and again below the WF bedrock from 29 to 34 feet bgs.

Field classification of the sound bedrock consisted of dark gray fine-grained sandstone with moderate fracturing and no visible signs of weathering or fracture staining. Boring logs with detailed lithological descriptions and rock core photo logs are included in **Appendix I**.

A summary of the occurrence of sound bedrock can be found in **Table 2**. Sound rock was not encountered in borings selected for cross-sections and is therefore not depicted on cross-sections.

5.1.2 Overburden Material Porosity and Specific Yield

A total of 23 split-spoon samples, 17 composite or “bulk” samples, and 3 intact or “undisturbed” samples from across the site and from various hydrostratigraphic units, were selected for particle size distribution analysis. Thirty-two of those 43 samples were analyzed for grain-size by sieve plus hydrometer. Eleven of the 43 samples were analyzed for grain-size by sieve only. Where both sieve and hydrometer results were available, Fetter (1994) and Bear (1972) diagrams were used to estimate specific yield and porosity based on grain-size distribution. For samples with sieve data only, specific yield and porosity was estimated from similar material types. It should be noted that while specific yield and effective porosity are not synonymous, in practice, they may be assumed to be approximately equal in value.

Specific yield or effective porosity ranges from 3% to 4% in samples containing soil fill; from 0.5% to 5% in samples containing ash fill; 3% in the alluvium sample; from 0.5% to 4% in samples containing residuum; from 2% to 23% in samples containing saprolite; and from 0.5% to 24% in samples containing PWR. It should be noted that for effective porosity ranges mentioned, samples containing material from more than one hydrostratigraphic unit, were counted twice, once for each unit contained.

5.1.3 Bedrock Secondary Porosity

Groundwater flow in the Triassic bedrock unit of the site is best characterized by having two flow regimes. The rock matrix is considered to contain primary porosity, which is essentially impervious, while fracture and/or joint flow are considered secondary porosity, and provide potential pathways for groundwater flow. For sedimentary rock types (similar to those found at the site), it is accepted practice to assume secondary bedrock porosity correlates with the effective porosity of the natural overlying weathered material, i.e. residuum, saprolite, and PWR. Therefore, Amec Foster Wheeler used effective porosity estimates from natural material samples (residuum, saprolite, and PWR) that were collected and analyzed during the current study, to estimate secondary bedrock porosity for the site. Using this method, the estimated secondary porosity for the bedrock at the site ranges from approximately 0.5% to 24%, which correlates well with literature values (Walton, 1991).

5.1.4 Fracture Trace Analysis

A limited fracture trace evaluation was performed to evaluate and classify potential fracture traces based on the regional geology and hydrogeology for the Dan River Triassic Basin and the relationship to the Dan River Landfill Hydrogeologic Characterization.

Typical methodology for a fracture or lineament analysis is often based on review of several different data sources consisting of topographic maps, aerial photographs and infrared photos. (USGS, 1999). The methodology for this limited evaluation was performed based on review of the Dan River 7.5 minute topographic quadrangle and consisted of performing a visual review of linear features observed on topographic variations and review of the North Carolina Geologic Map (NCDENR, 1990). The variations are associated with either current surface water features (rivers or mapped ephemeral streams) or dry erosion cut features in the topography greater than 500 feet in length and that are often traced to fractures in the geologic formation capable of transmitting groundwater to surface water via stream bank discharge. This technique is often used in North Carolina Piedmont geologic setting where vegetation and weathering patterns are not easily evaluated due to vegetation or urbanization. Additionally, the fracture evaluation or lineament evaluation was also governed by the basic hydrogeologic principle, that hydrogeology is often controlled by structure and geology.

Given this area is located in the Danville Triassic basin, the geologic origin of the area suggests multiple series of drop block structural movements and compression as erosional sequences were applied. This is believed to be the primary controlling factor for the position of the Dan River. Secondly, based on regional tectonics, the primary joints and major fractures that control water flow align with perennial streams in the area and generally are perpendicular to the main structural feature. Secondary joints and fractures are generally less pronounced and would have a less degree of influence on surface water flow or be discontinuous streams, ephemeral streams or dry cut drainage features.

The area around the proposed Dan River Landfill site was evaluated regionally first then locally to develop the lineaments shown on **Figure 2** in **Appendix VIII**. As noted, since the primary objective was to evaluate potential fracture traces near the site, the evaluation of the area focused on identifying patterns associated with the below criteria followed by classifying the fracture traces or linear features as they begin to emerge. As such, these techniques are often used to identify potential groundwater supply well sites and locate bedrock wells that can be used for contamination transport monitoring.

The trace criteria presented on **Figure 2** in **Appendix VIII** is as follows:

- Dark Blue Lines – represent lineaments possibly associated with major joint/faults/or strata that would have the greatest potential to direct and/or collect groundwater in the area.
- Dark Red Lines – represent suspected major fracture lines typical of surface water transport and shallow groundwater discharge points, and;
- Red Dashed Lines – represent suspected minor fracture traces that could cause minor drainage areas of the formation.

The resultant map and Rose Diagrams located in **Appendix VIII**, indicate that the most major structural geologic feature controls the orientation of the Dan River with a trend of northeast to southwest at 45 to 60 degrees from north (**Figure 3** of **Appendix VIII**). Major fractures appear at near right angles or less to the Dan River and are considered to be indicators of perpendicular fracture or joint features to this structure. These features trend northwest to southeast at 320 to 350 degrees from north (**Figure 4** of **Appendix VIII**). Minor fractures trend at lesser angels to the main fractures (**Figure 5** of **Appendix VIII**). Each of these fracture zones can be interpreted as being capable of transmitting water at the surface or groundwater at depth in bedrock.

5.2 Hydrogeologic Findings

5.2.1 Groundwater Occurrence

Each current study geotechnical boring had water levels measured at time of boring and at 24-hours following drilling, prior to their abandonment as described above in Section 4.3.2. Water levels were measured in observation wells at the time of boring (unless boring was advanced beyond auger refusal with either tri-cone roller bit or rock coring), 24-hours following installation, and monthly beginning in April 2015. Water level measurements recorded are summarized in **Table 3**.

Groundwater at the site was generally found to occur in unconfined, shallow aquifer conditions within the overburden material, i.e. soil fill, ash fill, residuum, saprolite, and PWR. Groundwater at the site flows from areas of higher hydraulic head to areas of lower hydraulic head at right angles (perpendicular) to equipotential lines (groundwater contours) as depicted on **Drawing 4**. The groundwater contours depicted on **Drawing 4** were created as a surface in AutoCAD using the September 15, 2015 shallow well groundwater elevations. The stream feature to the west of the proposed landfill footprint was assumed to have groundwater discharge elevation equal to the ground surface elevation at the stream centerline, and was used as a boundary condition for the contour surface created.

Shallow groundwater September 2015 generally occurs at the site from depths ranging between 8.26 and 51.07 feet below land surface (feet bgs) (elevation high of 581.54 feet at OW-301D to an elevation low of 534.95 feet at OW-416S) as shown on **Drawing 4**. Observation well OW-301D is located within the footprint of the proposed landfill. Other observation wells on site that exhibit shallower water table values tend to be located near stream locations. The general groundwater flow was observed to be from north to south towards the Dan River; however, localized shallow groundwater flow discharges radially from the center of the site towards ephemeral or seasonal streams to the east and west of the proposed landfill footprint as shown on **Drawing 4**.

5.2.2 Groundwater Gradients

5.2.2.1 Horizontal Gradients

The horizontal gradient of the shallow groundwater surface or water table, has a directly proportional effect on groundwater flow rates as seen in the calculation provided in **Appendix VII**. Horizontal groundwater gradients were calculated between shallow observation well locations by dividing the difference in elevation head by either the distance between an upgradient and downgradient equipotential (groundwater surface contour) with respect to the well location, or the distance between the well and either an upgradient or downgradient equipotential (as described and illustrated in **Appendix VII**).

5.2.2.2 Vertical Gradients

Vertical gradients for the site were estimated at paired well locations (consisting of a shallow and a deep well). The Freeze and Cherry (1979) approach was used to estimate vertical gradients, in which the vertical gradient is equal to the difference in groundwater elevations (shallow minus deep) divided by the difference in the mid-point elevation of the saturated screened interval (shallow minus deep). Vertical gradient computations are included in **Appendix VII**, summarized in **Table 7,** and depicted on **Drawing 12**.

5.2.3 Hydraulic Conductivity and Permeability

As mentioned above in Section 4.7, field "slug" tests were performed and analyzed to measure horizontal hydraulic conductivity in the 27 current study observation wells at the site. Parameters and results from field hydraulic conductivity testing are summarized in **Tables 5A** and **5B** and Aqtesolv™ analysis data sheets are included in **Appendix III**.

The results of the field hydraulic conductivity testing and analysis indicated that the average hydraulic conductivity (K) from both analysis methods (described above in Section 4.7) ranges from 4.86×10^{-6} centimeters per second (cm/sec) in OW-410S to 3.01×10^{-2} cm/sec in OW-406S. The geometric mean hydraulic conductivity value calculated from field slug testing is on the order of 5.97×10^{-4} cm/sec.

As shown on **Table 5B**, the mean hydraulic conductivities were computed for hydrostratigraphic units encountered in the saturated screened intervals of the wells, i.e. saprolite, PWR, and WF bedrock. The PWR and WF bedrock units resulted in mean hydraulic conductivity values an order of magnitude lower than those calculated from the saprolite unit (10^{-4} versus 10^{-3}); however, it should be noted that the saprolite unit had less contributing data points.

Vertical permeability was measured from "intact" or relatively undisturbed samples (Shelby tubes) and remolded bulk samples collected from several current study borings. These samples were tested in the laboratory using a constant-head permeameter. Results of laboratory permeability are summarized in **Table 5C**.

5.2.4 Groundwater Flow Rates

Groundwater flow velocity can be estimated using horizontal hydraulic conductivity, effective porosity of the medium (material in saturated portion of screened interval), and horizontal gradient using Darcy's Law (Fetter, 1994). The equation used and resulting flow velocities for the current study shallow groundwater wells are summarized in **Table 8**. The flow rates are based on horizontal hydraulic conductivities from "slug" tests (**Table 5B**), effective porosities from grain-size analysis (**Table 6**), and horizontal gradients obtained from September 15, 2015 groundwater surface contours (**Drawing 4**). The geometric mean groundwater flow rate for the study area is 2.63×10^{2} feet per year (ft/yr), with the slowest rate found at OW-410S (1.57×10^{0} ft/yr) and the fastest found at OW-409S (1.15×10^{4} ft/yr).

5.2.5 Estimated Long-Term Seasonal High Groundwater

The estimated Long-Term Seasonal High Groundwater (LTSHGW), as depicted on **Drawing 6**, was generated based on: 1) historical water level data collected from select existing Duke Energy voluntary and compliance wells; 2) water level data collected in select Amec Foster Wheeler 2013 ash closure conceptual design observation wells; and Amec Foster Wheeler 2015 hydrogeologic study wells; and 3) local precipitation data. LTSHGW levels were calculated or estimated for shallow aquifer wells with sufficient water level measurements that were not screened in ash fill material. Hydrographs of the water levels were developed for the existing Duke Energy wells to evaluate long-term seasonal high water levels relative to precipitation. Hydrographs of the observation wells were also developed to evaluate trends in water level elevations during the monitored period. Hydrographs are presented in **Appendix V**.

LTSHGW elevations for two Duke Energy wells (MW-12 and MW-20S) were calculated by adding the mean water level to 2.0 times the standard deviation. This intrawell approach was used for these locations due to the larger number of data points (or water level measurements) available. The calculation for LTSHGW at MW-12 and MW-20S is included in the table in **Appendix V**.

Duke Energy voluntary well MW-12 was selected as the reference scale for estimating LTSHGW at the remaining shallow aquifer wells which have more limited data sets. Well MW-12 was selected for this purpose due to the availability of historic water level data which reflect a peak water level measurement in the Spring of 2010, likely in response to the extreme wet winter in 2009 as shown by the precipitation data. The relatively extreme high water level measurement in MW-12 in April 2010 (which is actually

slightly higher than the calculated LTSHGW for MW-12) was used to conservatively scale-up the estimated LTSHGW for the remaining shallow aquifer wells. For each well included in estimated LTSHGW, an intrawell correlation graph versus MW-12 was created. The linear regression equation from each correlation graph was used to derive the estimated LTSHGW. The high water level elevation of 577.80 ft-MSL measured in MW-12 in April 2010 was input as "x" in each well's linear regression equation. Correlation graphs and a summary of linear regression equation inputs are included in **Appendix V**.

Too add conservatism to the MW-12 correlations, a slight modification factor, or safety factor, was included in the estimated LTSHGW at each well. Modification factors are well-specific and are equivalent to ten percent of the water level flux or range (difference between the maximum and minimum water levels recorded) at the respective well. Flux and modification factors are listed in the table in **Appendix V**.

Values for the estimated LTSHGW as shown on **Drawing 6** are included in the table and on hydrographs in **Appendix V**.

6 References

Bear, J., 1972, Dynamics of Fluids in Porous Media

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TABLES

TABLE 1
BORING & WELL SUMMARY
Dan River Landfill
Amec Foster Wheeler Project No: 7810-14-0065

	LOCATION ID	N.C. COORDINATES		SURVEY ELEVATIONS		24-hr or Stabilized Water Level *	STICK-UP	OUTER CASING INTERVAL 6-INCH, SCH. 40 PVC	INNER CASING OR RISER INTERVAL 2-INCH, SCH. 40 PVC	SCREEN INTERVAL 2-INCH, 0.010-INCH SLOT, SCH. 40 PVC	GROUT INTERVAL NEAT CEMENT	SEAL TYPE	SEAL INTERVAL	FILTER PACK INTERVAL #2 FILTER SAND	TOTAL WELL DEPTH	TOTAL BORING DEPTH
		NORTH	EAST	GROUND (ft-MSL)	TOC (ft-MSL)	(ft-bgs)	(ft-ags)	(ft-bgs)	(ft-bgs)	(ft-bgs)	(ft-bgs)		(ft-bgs)	(ft-bgs)	(ft-bgs)	(ft-bgs)
Amec Foster Wheeler 2013 Assessment Borings	B-301	1000089.36	1789712.67	589.95	N/A	NM	N/A	N/A	N/A	N/A	0 to 19.9	N/A	N/A	N/A	N/A	19.9
	B-302	999893.92	1790301.81	581.57	N/A	NM	N/A	N/A	N/A	N/A	0 to 29.0	N/A	N/A	N/A	N/A	29.0
	B-303	999836.81	1789648.88	647.18	N/A	NM	N/A	N/A	N/A	N/A	0 to 94.3	N/A	N/A	N/A	N/A	94.3
	B-304	999488.55	1789311.80	559.97	N/A	NM	N/A	N/A	N/A	N/A	0 to 16.0	N/A	N/A	N/A	N/A	16.0
	B-305	999348.01	1789908.89	557.74	N/A	NM	N/A	N/A	N/A	N/A	0 to 28.5	N/A	N/A	N/A	N/A	28.5
	B-306C	999455.79	1789643.29	610.56	N/A	NM	N/A	N/A	N/A	N/A	0 to 72.5	N/A	N/A	N/A	N/A	72.5
Amec Foster Wheeler 2014 Ash Closure Borings	B-320	99999816.36	1789493.89	644.24	N/A	NM	N/A	N/A	N/A	N/A	0 to 78.9	N/A	N/A	N/A	N/A	78.9
	B-321	100999622.36	1789428.91	598.62	N/A	NM	N/A	N/A	N/A	N/A	0 to 48.9	N/A	N/A	N/A	N/A	48.9
	B-322	101999437.80	1789610.84	613.41	N/A	NM	N/A	N/A	N/A	N/A	0 to 78.6	N/A	N/A	N/A	N/A	78.6
	B-323	102999633.57	1790044.91	596.13	N/A	NM	N/A	N/A	N/A	N/A	0 to 49.2	N/A	N/A	N/A	N/A	49.2
	B-324	103999876.11	1789871.08	632.46	N/A	NM	N/A	N/A	N/A	N/A	0 to 65.0	N/A	N/A	N/A	N/A	65.0
Amec Foster Wheeler 2015 Proposed Landfill Hydro Study Borings	B-451	1000272.95	1789688.17	629.97	N/A	Dry	N/A	N/A	N/A	N/A	0 to 31.8	N/A	N/A	N/A	N/A	31.8
	B-452	1000126.76	1790242.93	602.87	N/A	Dry	N/A	N/A	N/A	N/A	0 to 35.2	N/A	N/A	N/A	N/A	35.2
	B-453	1000280.97	1789142.56	583.27	N/A	10.30	N/A	N/A	N/A	N/A	0 to 26.2	N/A	N/A	N/A	N/A	26.2
	B-454	1000024.60	1789453.31	590.61	N/A	19.70	N/A	N/A	N/A	N/A	0 to 22.4	N/A	N/A	N/A	N/A	22.4
	B-455	1000054.42	1789917.24	591.25	N/A	23.20	N/A	N/A	N/A	N/A	0 to 38.0	N/A	N/A	N/A	N/A	38.0
	B-456	999975.45	1789087.19	589.73	N/A	28.65	N/A	N/A	N/A	N/A	0 to 29.6	N/A	N/A	N/A	N/A	29.6
	B-457	999975.23	1789253.32	609.61	N/A	24.90	N/A	N/A	N/A	N/A	0 to 33.6	N/A	N/A	N/A	N/A	33.6
	B-458	999793.47	1789196.19	592.04	N/A	27.80	N/A	N/A	N/A	N/A	0 to 48.3	N/A	N/A	N/A	N/A	48.3
	B-459	999645.13	1789651.08	594.55	N/A	34.60	N/A	N/A	N/A	N/A	0 to 53.4	N/A	N/A	N/A	N/A	53.4
	B-460	999550.50	1790013.02	574.97	N/A	25.50	N/A	N/A	N/A	N/A	0 to 35.0	N/A	N/A	N/A	N/A	35.0
	B-462	999828.31	1789842.43	648.31	N/A	83.50	N/A	N/A	N/A	N/A	0 to 98.2	N/A	N/A	N/A	N/A	98.2
	B-463	1000448.97	1789381.74	593.83	N/A	23.10	N/A	N/A	N/A	N/A	0 to 68.7	N/A	N/A	N/A	N/A	68.7
Amec Foster Wheeler 2013 Assessment Wells	OW-301D	1000081.18	1789709.28	589.80	593.99	6.36	4.19	N/A	+4.19 to 5.0	5.0 to 10.0	0 to 1.0	Bentonite	1.0 to 3.0	3.0 to 10.0	10.0	10.0
	OW-302D	999914.41	1790286.56	584.23	586.53	34.55	2.30	N/A	+2.30 to 38.0	38.0 to 43.0	0 to 32.0	Bentonite	32.0 to 34.0	34.0 to 43.0	43.0	43.0
	OW-303D	999824.86	1789651.66	647.87	650.43	76.93	2.56	N/A	+2.56 to 83.0	83.0 to 88.0	0 to 79.0	Bentonite	79.0 to 81.0	81.0 to 88.0	88.0	88.0
	OW-304D	999486.22	1789313.29	559.88	560.50	8.84	0.62	N/A	+0.62 to 22.0	22.0 to 27.0	0 to 18.0	Bentonite	18.0 to 20.0	20.0 to 27.0	27.0	27.0
	OW-305S	999358.83	1789900.39	560.25	561.22	11.17	0.97	N/A	+0.97 to 10.0	10.0 to 15.0	0 to 1.0	Bentonite	1.0 to 3.0	3.0 to 15.0	15.0	15.0
	OW-305D	999356.85	1789903.99	559.47	560.86	13.14	1.39	N/A	+1.39 to 18.0	18.0 to 23.0	0 to 14.0	Bentonite	14.0 to 16.0	16.0 to 23.0	23.0	23.0
	OW-306S	999458.06	1789646.33	610.46	609.85	Dry	-0.61	N/A	0.61 to 40.0	40.0 to 50.0	0 to 36.0	Bentonite	36.0 to 38.0	38.0 to 50.0	50.0	50.0
	OW-306D	999455.79	1789643.29	610.56	611.15	62.38	0.59	N/A	+0.59 to 68.0	68.0 to 73.0	0 to 64.0	Bentonite	64.0 to 66.0	66.0 to 73.0	73.0	75.0
	OW-320D	999367.94	1789665.05	609.80	610.39	63.56	0.59	N/A	+0.59 to 65.0	65.0 to 70.0	0 to 61.0	Bentonite	61.0 to 63.0	63.0 to 70.0	70.0	70.0
	OW-321D	1000102.41	1789109.72	588.92	592.01	Dry	3.09	N/A	+3.09 to 3.0	3.0 to 8.0	None	Bentonite	0 to 1.0	1.0 to 8.0	8.0	8.0

TABLE 1
BORING & WELL SUMMARY
Dan River Landfill
Amec Foster Wheeler Project No: 7810-14-0065

	LOCATION ID	N.C. COORDINATES		SURVEY ELEVATIONS		24-hr or Stabilized Water Level *	STICK-UP	OUTER CASING INTERVAL	INNER CASING OR RISER INTERVAL	SCREEN INTERVAL	GROUT INTERVAL	SEAL TYPE	SEAL INTERVAL	FILTER PACK INTERVAL	TOTAL WELL DEPTH	TOTAL BORING DEPTH
								6-INCH, SCH. 40 PVC	2-INCH, SCH. 40 PVC	2-INCH, 0.010-INCH SLOT, SCH. 40 PVC	NEAT CEMENT			#2 FILTER SAND		
		NORTH	EAST	GROUND (ft-MSL)	TOC (ft-MSL)	(ft-bgs)	(ft-ags)	(ft-bgs)	(ft-bgs)	(ft-bgs)	(ft-bgs)		(ft-bgs)	(ft-bgs)	(ft-bgs)	(ft-bgs)
Amec Foster Wheeler 2015 Proposed Landfill Hydro Study Wells	OW-401S	1000349.37	1788944.72	581.76	585.38	9.02	3.62	N/A	+3.62 to 13.9	13.9 to 28.9	0 to 10.0	Bentonite	10.0 to 12.0	12.0 to 30.0	29.2	30.0
	OW-401D	1000348.76	1788953.22	581.23	584.62	8.45	3.39	0 to 25.0	+3.39 to 41.7	41.7 to 46.7	0 to 36.0	Bentonite	36.0 to 39.8	39.8 to 47.0	47.0	47.0
	OW-403S	1000371.36	1789864.45	606.15	609.63	34.08	3.48	N/A	+3.48 to 34.7	34.7 to 49.7	0 to 31.0	Bentonite	31.0 to 33.0	33.0 to 50.0	50.0	50.4
	OW-403D	1000368.51	1789866.33	606.24	609.46	34.58	3.22	0 to 50.0	+3.22 to 62.2	62.2 to 67.2	0 to 58.0	Bentonite/K-Packer	58.0 to 61.8	N/A	67.5	67.5
	OW-404S	1000128.93	1790071.49	586.61	589.89	18.64	3.28	N/A	+3.28 to 14.7	14.7 to 29.7	0 to 11.0	Bentonite	11.0 to 13.0	13.0 to 30.0	30.0	30.0
	OW-404D	Not Surveyed				No Well Installed		0 to 40.5	No Well Installed. Outer Casing Only.							41.0
	OW-405S	1000247.90	1790306.80	588.15	591.06	49.87	2.91	N/A	+2.91 to 47.7	47.7 to 62.7	0 to 44.0	Bentonite	44.0 to 46.0	46.0 to 63.0	63.0	63.3
	OW-405D	1000241.46	1790309.16	589.01	592.16	49.76	3.15	0 to 50.5	+3.15 to 73.7	73.7 to 78.7	0 to 68.0	Bentonite	68.0 to 72.0	72.0 to 79.0	79.0	79.0
	OW-406S	1000031.19	1788810.44	567.55	571.33	2.54	3.78	N/A	+3.78 to 10.7	10.7 to 25.7	0 to 7.0	Bentonite	7.0 to 9.0	9.0 to 26.0	26.0	26.0
	OW-406D	1000027.08	1788805.30	567.62	571.13	2.69	3.51	0 to 20.5	+3.51 to 36.0	36.0 to 41.0	0 to 30.0	Bentonite	30.0 to 34.0	34.0 to 41.3	41.3	41.3
	OW-407S	999911.49	1789394.24	618.41	621.89	48.07	3.48	N/A	+3.48 to 48.2	48.2 to 63.2	0 to 44.5	Bentonite	44.5 to 46.5	46.5 to 63.5	63.5	63.8
	OW-407D	999909.88	1789392.91	618.24	621.89	50.67	3.65	0 to 63.5	+3.65 to 74.0	74.0 to 79.0	0 to 68.0	Bentonite	68.0 to 72.0	72.0 to 79.3	79.3	79.3
	OW-409S	999811.84	1788924.31	551.56	555.25	-2.18	3.69	N/A	+3.69 to 5.0	5.0 to 14.0	0 to 3.0	Bentonite	3.0 to 4.0	4.0 to 14.0	14.0	14.3
	OW-409D	999807.54	1788921.27	551.83	554.64	-2.27	2.81	0 to 8.0	+2.81 to 22.0	22.0 to 27.0	0 to 6.0	Bentonite/K-Packer	6.0 to 21.6	N/A	27.3	34.0
	OW-410S	999645.49	1789373.93	593.62	596.95	35.98	3.33	N/A	+3.33 to 39.2	39.2 to 54.2	0 to 35.0	Bentonite	35.0 to 37.0	37.0 to 54.5	54.5	54.5
	OW-410D	Not Surveyed				No Well Installed		0 to 53.5	No Well Installed. Outer Casing Only.							54.0
	OW-411S	999645.01	1789871.51	593.51	596.25	39.78	2.74	N/A	+2.74 to 50.7	50.7 to 65.7	0 to 47.0	Bentonite	47.0 to 49.0	49.0 to 66.0	66.0	66.4
	OW-411D	999642.73	1789878.53	593.41	596.43	43.68	3.02	0 to 54.5	+3.02 to 76.0	76.0 to 81.0	0 to 55.0	Bentonite/K-Packer	55.0 to 75.6	N/A	81.3	81.3
	OW-412S	999869.40	1790318.63	579.54	582.80	30.10	3.26	N/A	+3.26 to 42.7	42.7 to 57.7	0 to 39.0	Bentonite	39.0 to 41.0	41.0 to 58.0	58.0	59.0
	OW-413S	999572.45	1789133.91	562.09	565.34	12.67	3.25	N/A	+3.25 to 16.7	16.7 to 26.7	0 to 11.0	Bentonite	11.0 to 13.0	13.0 to 27.0	27.0	27.3
	OW-414S	999263.37	1789496.44	557.23	560.60	19.73	3.37	N/A	+3.37 to 14.2	14.2 to 29.2	0 to 10.0	Bentonite	10.0 to 12.0	12.0 to 29.5	29.5	30.0
	OW-414D	999264.62	1789498.89	557.53	560.11	19.83	2.58	0 to 29.5	+2.58 to 31.7	31.7 to 36.7	0 to 28.0	Bentonite/K-Packer	28.0 to 31.3	N/A	37.0	43.0
	OW-415S	999467.86	1790170.72	559.00	562.04	11.82	3.04	N/A	+3.04 to 7.7	7.7 to 17.7	0 to 4.0	Bentonite	4.0 to 6.0	6.0 to 24.0	18.0	24.6
	OW-415D	999469.47	1790168.29	558.86	561.52	13.89	2.66	0 to 24.5	+2.66 to 36.7	36.7 to 41.7	0 to 23.5	Bentonite/K-Packer	23.5 to 36.3	N/A	42.0	44.0
	OW-416S	999170.92	1789818.80	557.90	560.80	22.01	2.90	N/A	+2.90 to 18.7	18.7 to 28.7	0 to 15.0	Bentonite	15.0 to 17.0	17.0 to 32.5	29.0	32.5
	OW-416D	999169.85	1789814.13	558.21	561.08	25.40	2.87	0 to 29.0	+2.87 to 39.7	39.7 to 44.7	0 to 27.0	Bentonite/K-Packer	27.0 to 39.3	N/A	45.0	45.0
	OW-417S	1000389.94	1788347.32	594.15	597.68	21.78	3.53	N/A	+3.52 to 18.7	18.7 to 33.7	0 to 15.0	Bentonite	15.0 to 17.0	17.0 to 34.0	34.0	34.0
	OW-417D	1000386.14	1788350.65	594.18	597.58	18.05	3.40	0 to 33.0	+3.41 to 42.4	42.4 to 47.4	0 to 31.5	Bentonite/K-Packer	31.5 to 42.0	N/A	47.7	48.5
	OW-419S	1000097.28	1789099.12	588.92	592.19	20.97	3.27	N/A	+3.27 to 15.7	15.7 to 30.7	0 to 12.0	Bentonite	12.0 to 14.0	14.0 to 31.0	31.0	31.1
HDR 2015 Groundwater Assessment Wells	GWA-1S	1000434.35	1789508.44	598.83	601.39	26.26	2.56	N/A	+2.56 to 30.0	30.0 to 45.0	0 to 26.0	Bentonite	26.0 to 28.0	28.0 to 47.0	45.0	47.0
	GWA-1D	1000435.36	1789501.26	598.81	601.58	27.84	2.77	0 to 106.0	+2.77 to 114.0	114.0 to 119.0	0 to 110.0	Bentonite	110.0 to 112.0	112.0 to 120.0	119.0	120.0
	GWA-2S	1000192.16	1790142.81	584.97	587.57	20.85	2.60	N/A	+2.60 to 16.0	16.0 to 31.0	0 to 12.0	Bentonite	12.0 to 14.0	14.0 to 31.5	31.0	31.5
	GWA-2D	1000194.10	1790144.67	585.05	588.04	25.00	2.99	0 to 54.0	+2.99 to 56.0	56.0 to 61.0	0 to 52.0	Bentonite	52.0 to 55.0	55.0 to 69.0	61.0	69.0
	GWA-3S	999728.33	1790326.70	571.41	573.99	18.57	2.58	N/A	+2.58 to 13.80	13.8 to 28.8	0 to 8.3	Bentonite	8.3 to 10.3	10.3 to 28.8	28.8	29.0
	GWA-3D	999722.04	1790325.37	571.48	574.07	21.65	2.59	0 to 27.0	+2.59 to 34.0	34.0 to 39.0	0 to 29.0	Bentonite	29.0 to 32.0	32.0 to 44.0	39.0	41.6
	GWA-11S	999363.84	1790106.50	557.55	560.12	17.30	2.57	N/A	+2.57 to 10.0	10.0 to 25.0	0 to 6.0	Bentonite	6.0 to 8.5	8.5 to 25.0	25.0	26.0
	GWA-11D	999356.24	1790099.35	557.12	559.78	15.72	2.66	0 to 23.0	+2.66 to 29.5	29.5 to 34.5	0 to 26.0	Bentonite	26.0 to 28.0	28.0 to 34.0	34.0	41.7
	AS-4D	999349.09	1789893.62	559.22	562.13	14.62	2.91	0 to 27.0	+2.91 to 35.0	35.0 to 40.0	0 to 31.0	Bentonite	31.0 to 33.0	33.0 to 42.0	40.0	42.0
	AS-6D	999920.17	1790294.53	584.28	586.66	33.14	2.38	0 to 47.0	+2.38 to 56.0	56.0 to 61.0	0 to 51.0	Bentonite	51.0 to 54.0	54.0 to 62.0	61.0	62.0
	AS-10D	1000088.72	1789105.34	588.89	591.84	19.01	2.95	0 to 29.0	+2.95 to 38.0	38.0 to 43.0	0 to 34.0	Bentonite	34.0 to 36.0	36.0 to 44.0	44.0	44.2
	AS-12S	999538.00	1789125.21	557.00	559.70	8.09	2.70	N/A	+2.70 to 13.9	13.9 to 23.9	0 to 9.9	Bentonite	9.9 to 11.9	11.9 to 23.9	23.9	28.9
	MW-301BR	1000085.21	1789724.76	590.34	593.55	19.74	3.21	0 to 32.5	+3.21 to 37.0	37.0 to 42.0	0 to 31.5	Bentonite	31.5 to 35.0	35.0 to 82.5	42.0	82.5
	MW-303BR	999827.79	1789669.99	648.36	651.37	90.57	3.01	0 to 98.0	+3.01 to 137.0	137.0 to 142.0	0 to 126.0	Bentonite	126.0 to 135.0	135.0 to 150.5	142.0	150.5
	MW-306BR	999376.35	1789631.22	611.46	613.62	67.17	2.16	0 to 79.0	+2.16 to 102.0	102.0 to 107.0	0 to 96.5	Bentonite	96.5 to 99.0	99.0 to 115.0	107.0	130.0

Notes:

(ft-MSL) Feet - Mean Sea Level
(ft-bgs) Feet - Below Ground Surface
(ft-ags) Feet - Above Ground Surface
North Northing
East Easting
Ground Ground Surface
TOC Top of Casing

Stick-up Well Casing Stick-Up
Sch. 40 Schedule 40 Pipe
Neat Cement Cement Mixture without Bentonite
#2 Filter Sand Medium to Fine-Grained Silica Sand
Bentonite Bentonite Pellets
K-Packer Rubber Disc With Three Flange Seals. Seals between PVC Casing and Rock Core Hole

N/A Not Applicable
NA Not Available
* 24-hr Water Levels Displayed for Geotechnical "B" borings; Stabilized Water Levels from May 27, 2015 Displayed for Amec Foster Wheeler Wells; Stabilized Water Levels from June 29, 2015 for HDR, Inc. Wells
** Well Damaged in June 2015; Water Level Displayed is from May 27, 2015

Negative (-) value for Water Level denotes water level above ground surface
Positive (+) value for Inner Casing or Riser Interval denotes PVC casing terminated ags

TABLE 2
HYDROSTRATIGRAPHIC UNITS AND GROUNDWATER CONDITIONS SUMMARY
Dan River Landfill
Amec Foster Wheeler Project No. 7810-14-0065

WELL ID		SOIL FILL			ASH FILL			ALLUVIUM			RESIDUUM			SAPROLITE			PARTIALLY WEATHERED ROCK (PWR)			AUGER REFUSAL	ROLLER CONE REFUSAL	WEATHERED / FRACTURED ROCK			SOUND ROCK			CORING TERMINATION	SCREEN INTERVAL		WATER LEVEL[1]	PREDOMINANT HYDROSTRATIGRAPHIC UNIT IN SATURATED SCREEN INTERVAL
		Top (ft-bgs)	Bottom (ft-bgs)	Thick (ft)	Top (ft-bgs)	Bottom (ft-bgs)	Thick (ft)	Top (ft-bgs)	Bottom (ft-bgs)	Thick (ft)	Top (ft-bgs)	Bottom (ft-bgs)	Thick (ft)	Top (ft-bgs)	Bottom (ft-bgs)	Thick (ft)	Top (ft-bgs)	Bottom (ft-bgs)	Thick (ft)	(ft-bgs)	(ft-bgs)	Top (ft-bgs)	Bottom (ft-bgs)	Thick (ft)	Top (ft-bgs)	Bottom (ft-bgs)	Thick (ft)	(ft-bgs)	Top (ft-bgs)	Bottom (ft-bgs)	(ft-bgs)	
Amec Foster Wheeler 2013 Assessment Borings	B-301	0.0	13.5	13.5	Not Encountered			Not Encountered			Not Encountered			Not Encountered			13.5	19.9	6.4	19.9	N/A	Not Encountered			Not Encountered			N/A	N/A		NM	N/A
	B-302	0.0	23.5	23.5	Not Encountered			Not Encountered			Not Encountered			Not Encountered			23.5	29.0	5.5	N/A	29.0	Not Encountered			Not Encountered			N/A	N/A		NM	N/A
	B-303	0.0	7.0	7.0	7.0	18.5	11.5	Not Encountered			74.7	83.5	8.8	83.5	88.5	5.0	88.5	94.3	5.8	94.3	N/A	Not Encountered			Not Encountered			N/A	N/A		NM	N/A
		18.5	24.0	5.5	24.0	74.7	50.7																										
	B-304	0.0	6.0	6.0	Not Encountered			Not Encountered			Not Encountered			6.0	8.5	2.5	8.5	16.0	7.5	N/A	16.0	Not Encountered			Not Encountered			N/A	N/A		NM	N/A
	B-305	0.0	4.25	4.25	4.25	18.5	14.25	Not Encountered			19.5	23.5	4.0	Not Encountered			23.5	28.5	5.0	N/A	28.5	Not Encountered			Not Encountered			N/A	N/A		NM	N/A
		18.5	19.5	1.0																													
	B-306C	0.0	33.5	33.5	33.5	68.5	35.0	Not Encountered			Not Encountered			Not Encountered			68.5	72.5	4.0	72.5	N/A	Not Encountered			Not Encountered			N/A	N/A		NM	N/A
Amec Foster Wheeler 2014 Ash Closure Borings	B-320	0.0	19.0	19.0	19.0	64.0	45.0	Not Encountered			64.0	73.5	9.5	73.5	78.5	5.0	78.5	78.9	0.4	Not Encountered	N/A	Not Encountered			Not Encountered			N/A	N/A		NM	N/A
	B-321	0.0	2.4	2.4	2.4	24.8	22.4	Not Encountered			Not Encountered			Not Encountered			43.5	48.9	5.4	Not Encountered	N/A	Not Encountered			Not Encountered			N/A	N/A		NM	N/A
		24.8	38.6	13.8	38.6	43.5	4.9																										
	B-322	0.0	38.5	38.5	38.5	73.5	35.0	Not Encountered			Not Encountered			Not Encountered			73.5	78.6	5.1	Not Encountered	N/A	Not Encountered			Not Encountered			N/A	N/A		NM	N/A
	B-323	0.0	3.7	3.7	3.7	33.5	29.8	Not Encountered			38.5	43.5	5.0	43.5	48.5	5.0	48.5	49.2	0.7	Not Encountered	N/A	Not Encountered			Not Encountered			N/A	N/A		NM	N/A
		33.5	38.5	5.0																													
	B-324	0.0	3.4	3.4	3.4	58.6	55.2	Not Encountered			58.6	63.5	4.9	63.5	65.0	1.5	Not Encountered			Not Encountered	N/A	Not Encountered			Not Encountered			N/A	N/A		NM	N/A
Amec Foster Wheeler 2015 Proposed Landfill Hydro Study Borings	B-451	Not Encountered			Not Encountered			Not Encountered			0.0	8.5	8.5	8.5	28.5	20.0	28.5	31.8	3.3	31.8	N/A	Not Encountered			Not Encountered			N/A	N/A		Dry	N/A
	B-452	Not Encountered			Not Encountered			Not Encountered			0.0	8.5	8.5	Not Encountered			8.5	35.2	26.7	35.2	N/A	Not Encountered			Not Encountered			N/A	N/A		Dry	N/A
	B-453	Not Encountered			Not Encountered			Not Encountered			0.0	10.0	10.0	10.0	23.5	13.5	23.5	26.2	2.7	26.2	N/A	Not Encountered			Not Encountered			N/A	N/A		10.30	N/A
	B-454	Not Encountered			Not Encountered			Not Encountered			0.0	8.5	8.5	8.5	13.5	5.0	13.5	18.5	5.0	22.4	N/A	Not Encountered			Not Encountered			N/A	N/A		19.70	N/A
														18.5	22.0	3.5	22.0	22.4	0.4													
	B-455	Not Encountered			Not Encountered			Not Encountered			0.0	8.5	8.5	Not Encountered			8.5	38.0	29.5	38.0	N/A	Not Encountered			Not Encountered			N/A	N/A		23.20	N/A
	B-456	Not Encountered			Not Encountered			Not Encountered			0.0	3.5	3.5	3.5	13.5	10.0	13.5	29.6	16.1	29.6	N/A	Not Encountered			Not Encountered			N/A	N/A		28.65	N/A
	B-457	0.0	0.5	0.5	0.5	18.0	17.5	Not Encountered			Not Encountered			Not Encountered			28.5	33.6	5.1	33.6	N/A	Not Encountered			Not Encountered			N/A	N/A		24.90	N/A
		18.0	21.0	3.0	21.0	28.5	7.5																										
	B-458	20.0	28.5	8.5	0.0	20.0	20.0	Not Encountered			Not Encountered			Not Encountered			28.5	48.3	19.8	48.3	N/A	Not Encountered			Not Encountered			N/A	N/A		27.80	N/A
	B-459	0.0	2.0	2.0	2.0	24.0	22.0	Not Encountered			Not Encountered			43.5	48.5	5.0	48.5	53.4	4.9	53.4	N/A	Not Encountered			Not Encountered			N/A	N/A		34.60	N/A
		24.0	28.0	4.0	28.0	34.0	6.0																										
		34.0	43.5	9.5																													
	B-460	0.0	4.0	4.0	4.0	33.5	29.5	Not Encountered			Not Encountered			Not Encountered			33.5	35.0	1.5	35.0	N/A	Not Encountered			Not Encountered			N/A	N/A		25.50	N/A
	B-462	0.0	23.5	23.5	23.5	79.0	55.5	Not Encountered			Not Encountered			79.0	88.5	9.5	88.5	98.2	9.7	98.2	N/A	Not Encountered			Not Encountered			N/A	N/A		83.50	N/A
	B-463	Not Encountered			Not Encountered			Not Encountered			0.0	10.0	10.0	10.0	33.5	23.5	33.5	58.5	25.0	68.7	N/A	Not Encountered			Not Encountered			N/A	N/A		23.10	N/A
														58.5	63.5	5.0	63.5	68.7	5.2													
Amec Foster Wheeler 2013 Assessment Wells	OW-301D[2]	0.0	5.0	5.0	5.0	7.0	2.0	Not Encountered			Not Encountered			7.0	10.0	3.0	Not Encountered			10.0	N/A	Not Encountered			Not Encountered			N/A	5.0	10.0	6.36	PWR
	OW-302D	0.0	13.0	13.0	Not Encountered			Not Encountered			Not Encountered			13.0	43.0	30.0	Not Encountered			43.0	N/A	Not Encountered			Not Encountered			N/A	36.0	41.0	34.55	PWR
	OW-303D[2]	0.0	12.0	12.0	12.0	13.0	1.0	Not Encountered			Not Encountered			81.0	88.0	7.0	Not Encountered			88.0	N/A	Not Encountered			Not Encountered			N/A	83.0	88.0	76.93	SAPROLITE
		13.0	22.0	9.0	22.0	81.0	59.0																										
	OW-304D	0.0	6.0	6.0	6.0	12.0	6.0	Not Encountered			Not Encountered			12.0	27.0	15.0	Not Encountered			27.0	N/A	Not Encountered			Not Encountered			N/A	22.0	27.0	8.84	SAPROLITE
	OW-305S[2]	0.0	6.0	6.0	6.0	15.0	9.0	Not Encountered			Not Encountered			Not Encountered			Not Encountered			15.0	N/A	Not Encountered			Not Encountered			N/A	5.0	15.0	11.17	ASH FILL
	OW-305D[2]	0.0	3.0	3.0	3.0	4.0	1.0	Not Encountered			Not Encountered			23.0	24.0	1.0	Not Encountered			24.0	N/A	Not Encountered			Not Encountered			N/A	18.0	23.0	13.14	FILL
		4.0	6.0	2.0	6.0	15.5	9.5																										
		15.5	23.0	7.5																													
	OW-306S[2]	0.0	38.0	38.0	38.0	50.0	12.0	Not Encountered			Not Encountered			Not Encountered			Not Encountered			Not Encountered	N/A	Not Encountered			Not Encountered			N/A	40.0	50.0	Dry	N/A
	OW-306D[2]	0.0	38.0	38.0	38.0	72.0	34.0	Not Encountered			Not Encountered			72.0	75.0	3.0	Not Encountered			75.0	N/A	Not Encountered			Not Encountered			N/A	68.0	73.0	62.38	ASH FILL
	OW-320D[2]	0.0	37.0	37.0	37.0	68.0	31.0	Not Encountered			Not Encountered			68.0	70.0	2.0	Not Encountered			70.0	N/A	Not Encountered			Not Encountered			N/A	65.0	70.0	63.56	ASH FILL
	OW-321D[2]	0.0	8.0	8.0	Not Encountered			Not Encountered			Not Encountered			Not Encountered			Not Encountered			8.0	N/A	Not Encountered			Not Encountered			N/A	3.0	8.0	Dry	N/A

TABLE 2
HYDROSTRATIGRAPHIC UNITS AND GROUNDWATER CONDITIONS SUMMARY
Dan River Landfill
Amec Foster Wheeler Project No. 7810-14-0065

	WELL ID	SOIL FILL			ASH FILL			ALLUVIUM			RESIDUUM			SAPROLITE			PARTIALLY WEATHERED ROCK (PWR)			AUGER REFUSAL	ROLLER CONE REFUSAL	WEATHERED / FRACTURED ROCK			SOUND ROCK			CORING TERMINATION	SCREEN INTERVAL		WATER LEVEL[1]	PREDOMINANT HYDROSTRATIGRAPHIC UNIT IN SATURATED SCREEN INTERVAL
		Top (ft-bgs)	Bottom (ft-bgs)	Thick (ft)	Top (ft-bgs)	Bottom (ft-bgs)	Thick (ft)	Top (ft-bgs)	Bottom (ft-bgs)	Thick (ft)	Top (ft-bgs)	Bottom (ft-bgs)	Thick (ft)	Top (ft-bgs)	Bottom (ft-bgs)	Thick (ft)	Top (ft-bgs)	Bottom (ft-bgs)	Thick (ft)	(ft-bgs)	(ft-bgs)	Top (ft-bgs)	Bottom (ft-bgs)	Thick (ft)	Top (ft-bgs)	Bottom (ft-bgs)	Thick (ft)	(ft-bgs)	Top (ft-bgs)	Bottom (ft-bgs)	(ft-bgs)	
Amec Foster Wheeler 2015 Proposed Landfill Hydro Study Wells	OW-401S	Not Encountered			Not Encountered			Not Encountered			Not Encountered			0.0	8.5	8.5	8.5	18.5	10.0	30.0	N/A	Not Encountered			Not Encountered			N/A	13.9	28.9	9.02	PWR
														18.5	23.5	5.0	23.5	30.0	6.5													
	OW-401D	Not Encountered			Not Encountered			Not Encountered			Not Encountered			0.0	8.5	8.5	8.5	18.5	10.0	26.0	Not Encountered	26.0	47.0	21.0	Not Encountered			N/A	41.7	46.7	8.45	WF
														18.5	23.5	5.0	23.5	26.0	2.5													
	OW-403S	Not Encountered			Not Encountered			Not Encountered			0.0	3.0	3.0	3.0	13.5	10.5	13.5	18.5	5.0	50.4	N/A	Not Encountered			Not Encountered			N/A	34.7	49.7	34.08	PWR
														18.5	28.5	10.0	28.5	50.4	21.9													
	OW-403D	Not Encountered			Not Encountered			Not Encountered			0.0	3.0	3.0	3.0	13.5	10.5	13.5	18.5	5.0	50.5	60.7	50.5	67.5	17.0	Not Encountered			67.5	62.2	67.2	34.58	WF
														18.5	28.5	10.0	28.5	50.5	22.0													
	OW-404S	Not Encountered			Not Encountered			Not Encountered			Not Encountered			0.0	3.5	3.5	3.5	13.5	10.0	Not Encountered	N/A	Not Encountered			Not Encountered			N/A	14.7	29.7	18.64	PWR
														13.5	18.5	5.0	18.5	30.0	11.5													
	OW-404D	Not Encountered			Not Encountered			Not Encountered			Not Encountered			0.0	3.5	3.5	3.5	13.5	10.0	41.0	No Drilling Performed Below Auger Refusal								No Well Installed; Outer Casing Only			
														13.5	18.5	5.0	18.5	30.0	11.5													
														18.5	33.5	15.0	33.5	41.0	7.5													
	OW-405S	Not Encountered			Not Encountered			Not Encountered			0.0	8.5	8.5	8.5	18.5	10.0	18.5	63.3	44.8	63.3	N/A	Not Encountered			Not Encountered			N/A	47.7	62.7	49.87	PWR
	OW-405D	Not Encountered			Not Encountered			Not Encountered			0.0	8.5	8.5	8.5	18.5	10.0	18.5	65.5	47.0	65.5	Not Encountered	65.5	79.0	13.5	Not Encountered			N/A	73.7	78.7	49.76	WF
	OW-406S	Not Encountered			Not Encountered			0.0	7.0	7.0	Not Encountered			7.0	13.5	6.5	13.5	26.0	12.5	26.0	N/A	Not Encountered			Not Encountered			N/A	10.7	25.7	2.54	PWR
	OW-406D[3]	Not Encountered			Not Encountered			0.0	7.0	7.0	Not Encountered			7.0	13.5	6.5	13.5	21.0	7.5	21.0	21.5	21.0	41.3	20.3	Not Encountered			28.4	36.0	41.0	2.69	WF
	OW-407S	0.0	1.5	1.5	1.5	38.5	37.0	Not Encountered			Not Encountered			42.0	58.5	16.5	58.5	63.8	5.3	63.8	N/A	Not Encountered			Not Encountered			N/A	48.2	63.2	48.07	SAPROLITE
		38.5	42.0	3.5																												
	OW-407D	0.0	1.5	1.5	1.5	38.5	37.0	Not Encountered			Not Encountered			42.0	58.5	16.5	58.5	63.5	5.0	63.5	Not Encountered	63.5	79.3	15.8	Not Encountered			N/A	74.0	79.0	50.67	WF
		38.5	42.0	3.5																												
	OW-409S	Not Encountered			Not Encountered			0.0	4.0	4.0	Not Encountered			4.0	8.5	4.5	8.5	14.3	5.8	14.3	N/A	Not Encountered			Not Encountered			N/A	5.0	14.0	-2.18	PWR
	OW-409D	Not Encountered			Not Encountered			0.0	4.0	4.0	Not Encountered			4.0	8.0	4.0	Not Encountered			8.0	10.5	8.0	18.0	10.0	18.0	24.0	6.0	34.0	22.0	27.0	-2.27	WF
																						24.0	29.0	5.0	29.0	34.0	5.0					
	OW-410S	0.0	1.5	1.5	1.5	33.2	31.7	Not Encountered			Not Encountered			33.2	38.5	5.3	38.5	54.0	15.5	54.0	N/A	Not Encountered			Not Encountered			54.5	39.2	54.2	35.98	PWR
	OW-410D	0.0	1.5	1.5	1.5	33.2	31.7	Not Encountered			Not Encountered			33.2	38.5	5.3	38.5	54.5	16.0	54.5	No Drilling Performed Below Auger Refusal								No Well Installed; Outer Casing Only			
	OW-411S	0.0	2.0	2.0	2.0	18.0	16.0	Not Encountered			Not Encountered			31.0	38.5	7.5	38.5	58.5	20.0	66.4	N/A	Not Encountered			Not Encountered			66.4	50.7	65.7	39.78	PWR
		18.0	19.8	1.8	19.8	31.0	11.2							58.5	63.5	5.0	63.5	66.4	2.9													
	OW-411D	0.0	2.0	2.0	2.0	18.0	16.0	Not Encountered			Not Encountered			31.0	38.5	7.5	38.5	55.0	16.5	55.0	57.5	55.0	81.3	26.3	Not Encountered			81.3	76.0	81.0	43.68	WF
		18.0	19.8	1.8	19.8	31.0	11.2																									
	OW-412S	0.0	6.0	6.0	Not Encountered			Not Encountered			6.0	10.0	4.0	10.0	23.5	13.5	23.5	28.5	5.0	59.0	N/A	Not Encountered			Not Encountered			N/A	42.7	57.7	30.10	PWR
														28.5	33.5	5.0	33.5	43.5	10.0													
														43.5	48.5	5.0	48.5	59.0	10.5													
	OW-413S	0.0	1.5	1.5	Not Encountered			Not Encountered			Not Encountered			1.5	13.5	12.0	13.5	23.5	10.0	27.3	N/A	Not Encountered			Not Encountered			N/A	16.7	26.7	12.67	PWR
														23.5	27.0	3.5	27.0	27.3	0.3													
	OW-414S	0.0	3.0	3.0	3.0	18.0	15.0	Not Encountered			Not Encountered			18.0	23.5	5.5	23.5	30.0	6.5	30.0	N/A	Not Encountered			Not Encountered			N/A	14.2	29.2	19.73	PWR
	OW-414D	0.0	3.0	3.0	3.0	18.0	15.0	Not Encountered			Not Encountered			18.0	23.5	5.5	23.5	30.0	6.5	30.0	30.0	30.0	43.0	13.0	Not Encountered			43.0	31.7	36.7	19.83	WF
	OW-415S	Not Encountered			Not Encountered			Not Encountered			Not Encountered			0.0	8.5	8.5	8.5	13.5	5.0	24.6	N/A	Not Encountered			Not Encountered			N/A	7.7	17.7	11.82	SAPROLITE
														13.5	18.5	5.0	18.5	24.6	6.1													
	OW-415D	Not Encountered			Not Encountered			Not Encountered			Not Encountered			0.0	8.5	8.5	8.5	13.5	5.0	25.0	25.5	25.0	44.0	19.0	Not Encountered			44.0	36.7	41.7	13.89	WF
														13.5	18.5	5.0	18.5	25.0	6.5													
	OW-416S	0.0	8.0	8.0	Not Encountered			Not Encountered			Not Encountered			8.0	18.5	10.5	18.5	32.5	14.0	32.5	N/A	Not Encountered			Not Encountered			N/A	18.7	28.7	22.01	PWR
	OW-416D	0.0	8.0	8.0	Not Encountered			Not Encountered			Not Encountered			8.0	18.5	10.5	18.5	29.3	10.8	29.3	30.0	29.3	45.0	15.7	Not Encountered			45.0	39.7	44.7	25.40	WF
	OW-417S	Not Encountered			Not Encountered			Not Encountered			Not Encountered			0.0	8.5	8.5	8.5	13.5	5.0	34.0	N/A	Not Encountered			Not Encountered			N/A	18.7	33.7	21.78	SAPROLITE
														13.5	28.5	15.0	28.5	34.0	5.5													
	OW-417D	Not Encountered			Not Encountered			Not Encountered			Not Encountered			0.0	8.5	8.5	8.5	13.5	5.0	33.0	33.5	33.0	48.5	15.5	Not Encountered			48.5	42.4	47.4	18.05	WF
														13.5	28.5	15.0	28.5	33.0	4.5													
	OW-419S	Not Encountered			Not Encountered			Not Encountered			Not Encountered			0.0	8.5	8.5	8.5	31.1	22.6	31.1	N/A	Not Encountered			Not Encountered			N/A	15.7	30.7	20.97	PWR

TABLE 2
HYDROSTRATIGRAPHIC UNITS AND GROUNDWATER CONDITIONS SUMMARY
Dan River Landfill
Amec Foster Wheeler Project No. 7810-14-0065

	SOIL FILL			ASH FILL			ALLUVIUM			RESIDUUM			SAPROLITE			PARTIALLY WEATHERED ROCK (PWR)			AUGER REFUSAL	ROLLER CONE REFUSAL	WEATHERED / FRACTURED ROCK			SOUND ROCK			CORING TERMINATION
	Top (ft-bgs)	Bottom (ft-bgs)	Thick (ft)	Top (ft-bgs)	Bottom (ft-bgs)	Thick (ft)	Top (ft-bgs)	Bottom (ft-bgs)	Thick (ft)	Top (ft-bgs)	Bottom (ft-bgs)	Thick (ft)	Top (ft-bgs)	Bottom (ft-bgs)	Thick (ft)	Top (ft-bgs)	Bottom (ft-bgs)	Thick (ft)	(ft-bgs)	(ft-bgs)	Top (ft-bgs)	Bottom (ft-bgs)	Thick (ft)	Top (ft-bgs)	Bottom (ft-bgs)	Thick (ft)	(ft-bgs)
Minimum =	0.0	0.5	0.5	0.0	4.0	1.0	0.0	4.0	4.0	0.0	3.0	3.0	0.0	3.5	1.0	3.5	13.5	0.3	8.0	10.5	8.0	18.0	13.0	18.0	24.0	5.0	34.0
Maximum =	38.5	43.5	38.5	38.6	81.0	59.0	0.0	7.0	7.0	74.7	83.5	10.0	83.5	88.5	30.0	88.5	98.2	47.0	98.2	60.7	65.5	81.3	26.3	29.0	34.0	6.0	81.3
Average =	6.5	15.5	9.0	13.0	35.9	22.9	0.0	5.5	5.5	15.4	22.2	6.9	22.1	30.3	8.2	28.5	38.6	10.0	41.8	31.2	35.9	51.9	16.0	23.5	29.0	5.5	53.8

Notes:

Soil Fill Soil material that has either been dumped or compacted into place.
Ash Fill Ash (CCR Material) that has either been dumped or compacted into place.
Alluvium Soil material that has been deposited by fluvial processes.
Residuum The weathered, unconsolidated material typically found beneath the topsoil with very little of the physical characteristics of the parent bedrock retained.
Saprolite The unconsolidated product of weathered bedrock that usually retains some physical characteristics of the parent bedrock.
Partially Weathered Rock (PWR) Saprolite and weathered rock with Standard Penetration Resistance of N>100
Auger Refusal Auger refusal is defined as material that could not be penetrated with 4.25-inch hollow-stem augers
Roller Cone Refusal Roller cone refusal is defined as material that cound not be penetrated with tri-cone roller bit
Weathered /Fractured Rock (WF) Rock below auger refusal that was penetrated with tri-cone roller bit and/or rock that was cored with recovery <50% and/or Rock Quality Designation <50%
Sound Rock Rock with Rock Core Recovery >75% and Rock Quality Designation >50%

(ft-bgs) Feet below ground surface
N/A Not Applicable
NM Not Measured
1 Water level is 24-hour for borings; Water level is from May 27, 2015 for wells; Negative (-) value for water level denotes water level above ground surface.
2 Boring was drilled with direct-push Geoprobe® methods, and refusal depth recorded is a probe refusal rather than auger refusal.
3 OW-406D encountered roller cone refusal at 21.5 ft bgs, and was NQ Cored 21.5 to 28.4 ft bgs; however, due to poor core recovery, hole was over-reamed and advancement continued with roller cone to boring termination depth of 41.3 ft bgs.

TABLE 3
GROUNDWATER LEVEL SUMMARY
Dan River Landfill
Amec Foster Wheeler Project No. 7810-14-0065

Location ID		SURVEY ELEVATIONS		Time of Boring (TOB)		24-Hour			April 27-30, 2015			May 27, 2015		
		Ground Elev. (ft-MSL)	TOC Elev. (ft-MSL)	DTW (ft-bgs)	WL Elev. (ft-MSL)	DTW (ft-bgs)	DTW (ft-TOC)	WL Elev. (ft-MSL)	DTW (ft-bgs)	DTW (ft-TOC)	WL Elev. (ft-MSL)	DTW (ft-bgs)	DTW (ft-TOC)	WL Elev. (ft-MSL)
Amec Foster Wheeler 2013 Assessment Borings	B-301	589.95	N/A	NM	NM	NM	N/A	NM	N/A	N/A	N/A	N/A	N/A	N/A
	B-302	581.57	N/A	NM	NM	NM	N/A	NM	N/A	N/A	N/A	N/A	N/A	N/A
	B-303	647.18	N/A	NM	NM	NM	N/A	NM	N/A	N/A	N/A	N/A	N/A	N/A
	B-304	559.97	N/A	NM	NM	NM	N/A	NM	N/A	N/A	N/A	N/A	N/A	N/A
	B-305	557.74	N/A	NM	NM	NM	N/A	NM	N/A	N/A	N/A	N/A	N/A	N/A
	B-306C	610.56	N/A	NM	NM	NM	N/A	NM	N/A	N/A	N/A	N/A	N/A	N/A
Amec Foster Wheeler 2014 Ash Closure Borings	B-320	644.24	N/A	Dry	<565.34	NM	N/A	NM	N/A	N/A	N/A	N/A	N/A	N/A
	B-321	598.62	N/A	Dry	<549.72	NM	N/A	NM	N/A	N/A	N/A	N/A	N/A	N/A
	B-322	613.41	N/A	Dry	<534.81	NM	N/A	NM	N/A	N/A	N/A	N/A	N/A	N/A
	B-323	596.13	N/A	Dry	<546.93	NM	N/A	NM	N/A	N/A	N/A	N/A	N/A	N/A
	B-324	632.46	N/A	Dry	<567.46	NM	N/A	NM	N/A	N/A	N/A	N/A	N/A	N/A
Amec Foster Wheeler 2015 Proposed Landfill Hydro Study Borings	B-451	629.97	N/A	Dry	<598.17	Dry	N/A	<598.17	N/A	N/A	N/A	N/A	N/A	N/A
	B-452	602.87	N/A	Dry	<567.67	Dry	N/A	<567.67	N/A	N/A	N/A	N/A	N/A	N/A
	B-453	583.27	N/A	10.30	572.97	10.30	N/A	572.97	N/A	N/A	N/A	N/A	N/A	N/A
	B-454	590.61	N/A	Dry	<568.21	19.70	N/A	570.91	N/A	N/A	N/A	N/A	N/A	N/A
	B-455	591.25	N/A	Dry	<553.25	23.20	N/A	568.05	N/A	N/A	N/A	N/A	N/A	N/A
	B-456	589.73	N/A	Dry	<560.13	28.65	N/A	561.08	N/A	N/A	N/A	N/A	N/A	N/A
	B-457	609.61	N/A	Dry	<576.01	24.90	N/A	584.71	N/A	N/A	N/A	N/A	N/A	N/A
	B-458	592.04	N/A	Dry	<543.74	27.80	N/A	564.24	N/A	N/A	N/A	N/A	N/A	N/A
	B-459	594.55	N/A	35.90	558.65	34.60	N/A	559.95	N/A	N/A	N/A	N/A	N/A	N/A
	B-460	574.97	N/A	25.80	549.17	25.50	N/A	549.47	N/A	N/A	N/A	N/A	N/A	N/A
	B-462	648.31	N/A	84.30	564.01	83.50	N/A	564.81	N/A	N/A	N/A	N/A	N/A	N/A
	B-463	593.83	N/A	27.00	566.83	23.10	N/A	570.73	N/A	N/A	N/A	N/A	N/A	N/A
Duke Energy Voluntary & Compliance Wells	MW-12	590.71	593.59	NM	NM	18.20	21.08	572.51	15.98	18.86	574.73	17.55	20.43	573.16
	MW-12D	590.79	593.23	17.30	573.49	17.26	19.70	573.53	16.04	18.48	574.75	17.56	20.00	573.23
	MW-20S	559.71	562.28	5.81	553.90	5.42	7.99	554.29	1.48	4.05	558.23	2.99	5.56	556.72
	MW-20D	559.42	562.23	6.71	552.71	1.69	4.50	557.73	-0.46	2.35	559.88	1.17	3.98	558.25
Amec Foster Wheeler 2013 Assessment Wells	OW-301D	589.80	593.99	Dry	<574.80	Dry	Dry	<574.80	5.44	9.63	584.36	6.36	10.55	583.44
	OW-302D	584.23	586.53	Dry	<541.23	34.02	36.32	547.91	34.60	36.90	549.63	34.55	36.85	549.68
	OW-303D	647.87	650.43	NM	NM	76.17	78.73	569.14	76.03	78.59	571.84	76.93	79.49	570.94
	OW-304D	559.88	560.50	24.52	535.36	9.34	9.96	549.92	8.04	8.66	551.84	8.84	9.46	551.04
	OW-305S	560.25	561.22	11.00	549.25	12.33	13.30	546.95	11.93	12.90	548.32	11.17	12.14	549.08
	OW-305D	559.47	560.86	11.00	548.47	13.52	14.91	544.56	12.91	14.30	546.56	13.14	14.53	546.33
	OW-306S	610.46	609.85	48.00	562.46	Dry	Dry	<560.46	Dry	Dry	<560.46	Dry	Dry	<560.46
	OW-306D	610.56	611.15	48.00	562.56	63.41	64.00	546.56	62.46	63.05	548.10	62.38	62.97	548.18
	OW-320D	609.80	610.39	58.00	551.80	63.62	64.21	545.59	63.71	64.30	546.09	63.56	64.15	546.24
	OW-321D	588.92	592.01	Dry	<580.92	Dry	Dry	<580.92	Dry	Dry	<580.92	Dry	Dry	<580.92
Amec Foster Wheeler 2015 Proposed Landfill Hydro Study Wells	OW-401S	581.76	585.38	22.00	559.76	4.68	8.30	577.08	7.35	10.97	574.41	8.94	12.56	572.82
	OW-401D	581.23	584.62	NM	NM	3.01	6.40	578.22	6.88	10.27	574.35	8.45	11.84	572.78
	OW-403S	606.15	609.63	17.80	588.35	10.52	14.00	595.63	31.89	35.37	574.26	34.08	37.56	572.07
	OW-403D	606.24	609.46	32.00	574.24	27.98	31.20	578.26	32.43	35.65	573.81	34.58	37.80	571.66
	OW-404S	586.61	589.89	21.00	565.61	15.42	18.70	571.19	16.72	20.00	569.89	18.64	21.92	567.97
	OW-405S	588.15	591.06	Dry	<524.85	40.79	43.70	547.36	49.49	52.40	538.66	49.87	52.78	538.28
	OW-405D	589.01	592.16	NM	NM	31.05	34.20	557.96	49.34	52.49	539.67	49.76	52.91	539.25
	OW-406S	567.55	571.33	5.80	561.75	-2.18	1.60	569.73	1.36	5.14	566.19	2.54	6.32	565.01
	OW-406D	567.62	571.13	NM	NM	3.29	6.80	564.33	1.49	5.00	566.13	2.69	6.20	564.93
	OW-407S	618.41	621.89	54.90	563.51	42.42	45.90	575.99	47.67	51.15	570.74	48.07	51.55	570.34
	OW-407D	618.24	621.89	NM	NM	50.15	53.80	568.09	49.57	53.22	568.67	50.67	54.32	567.57
	OW-409S	551.56	555.25	1.50	550.06	-1.99	1.70	553.26	-3.29	0.40	554.85	-2.18	1.51	553.74
	OW-409D	551.83	554.64	NM	NM	artesian	artesian	>554.64	artesian	artesian	>554.64	-2.27	0.54	554.10
	OW-410S	593.62	596.95	Dry	<539.12	32.97	36.30	560.65	35.87	39.20	557.75	35.98	39.31	557.64
	OW-411S	593.51	596.25	Dry	<540.01	38.36	41.10	555.15	39.98	42.72	553.53	39.78	42.52	553.73
	OW-411D	593.41	596.43	42.70	550.71	39.88	42.90	553.53	42.99	46.01	550.42	43.68	46.70	549.73
	OW-412S	579.54	582.80	30.50	549.04	27.24	30.50	552.30	30.14	33.40	549.40	30.10	33.36	549.44
	OW-413S	562.09	565.34	12.30	549.79	7.95	11.20	554.14	11.55	14.80	550.54	12.67	15.92	549.42
	OW-414S	557.23	560.60	18.60	538.63	16.03	19.40	541.20	19.28	22.65	537.95	19.73	23.10	537.50
	OW-414D	557.53	560.11	NM	NM	17.32	19.90	540.21	19.82	22.40	537.71	19.83	22.41	537.70
	OW-415S	559.00	562.04	22.60	536.40	8.01	11.05	550.99	11.16	14.20	547.84	11.82	14.86	547.18
	OW-415D	558.86	561.52	NM	NM	11.89	14.55	546.97	13.79	16.45	545.07	13.89	16.55	544.97
	OW-416S	557.90	560.80	22.30	535.60	19.00	21.90	538.90	21.43	24.33	536.47	22.01	24.91	535.89
	OW-416D	558.21	561.08	NM	NM	20.53	23.40	537.68	25.06	27.93	533.15	25.40	28.27	532.81
	OW-417S	594.15	597.68	Dry	<560.15	17.57	21.10	576.58	19.94	23.47	574.21	21.78	25.31	572.37
	OW-417D	594.18	597.58	NM	NM	14.60	18.00	579.58	15.90	19.30	578.28	18.05	21.45	576.13
	OW-419S	588.92	592.19	16.00	572.92	16.33	19.60	572.59	19.33	22.60	569.59	20.97	24.24	567.95
HDR 2015 Groundwater Assessment Wells	GWA-1S	598.83	601.39	NA	NA	NA	NA	NA	NITD	NITD	NITD	NITD	NITD	NITD
	GWA-1D	598.81	601.58	NA	NA	NA	NA	NA	NITD	NITD	NITD	NITD	NITD	NITD
	GWA-2S	584.97	587.57	NA	NA	NA	NA	NA	NITD	NITD	NITD	NITD	NITD	NITD
	GWA-2D	585.05	588.04	NA	NA	NA	NA	NA	NITD	NITD	NITD	NITD	NITD	NITD
	GWA-3S	571.41	573.98	NA	NA	NA	NA	NA	17.90	20.47	553.51	18.47	21.04	552.94
	GWA-3D	571.48	574.04	NA	NA	NA	NA	NA	12.45	15.01	559.03	17.57	20.13	553.91
	GWA-11S	557.55	560.13	NA	NA	NA	NA	NA	16.12	18.70	541.43	17.35	19.93	540.20
	GWA-11D	557.12	559.77	NA	NA	NA	NA	NA	15.85	18.50	541.27	15.59	18.24	541.53
	AS-4D	559.22	562.17	NA	NA	NA	NA	NA	13.56	16.51	545.66	14.45	17.40	544.77
	AS-6D	584.28	586.66	NA	NA	NA	NA	NA	33.44	35.82	550.84	33.05	35.43	551.23
	AS-10D	588.89	591.84	NA	NA	NA	NA	NA	9.15	12.10	579.74	18.35	21.30	570.54
	AS-12S	557.00	559.70	NA	NA	NA	NA	NA	NITD	NITD	NITD	7.60	10.30	549.40
	MW-301BR	590.34	593.55	NA	NA	NA	NA	NA	NITD	NITD	NITD	19.04	22.25	571.30
	MW-303BR	648.36	651.37	NA	NA	NA	NA	NA	NITD	NITD	NITD	90.64	93.65	557.72
	MW-306BR	611.46	613.62	NA	NA	NA	NA	NA	NITD	NITD	NITD	NITD	NITD	NITD

Notes:

Ground	Ground Surface	**(ft-MSL)**	Feet - Mean Sea Level
TOC	Top of PVC Casing	**N/A**	Not Applicable
Elev	Elevation	**NA**	Not Available
DTW	Depth to Water	**NM**	Not Measured
WL	Water Level	**NITD**	Not Installed To-Date

Negative (-) DTW (ft-bgs) value denotes water level above ground surface

Duke Energy Background Well Survey, TOB, and 24-hour water level information obtained from historic 1) Duke Energy Records & Logs; 2) S&ME 2008 Monitoring Well Installation Report; and 3) MACTEC 2011 Monitoring Well Installation Report

TABLE 3
GROUNDWATER LEVEL SUMMARY
Dan River Landfill
Amec Foster Wheeler Project No. 7

Location ID		SURVEY ELEVATIONS		June 29, 2015			July 23, 2015			August 19, 2015			September 15, 2015		
		Ground Elev. (ft-MSL)	TOC Elev. (ft-MSL)	DTW (ft-bgs)	DTW (ft-TOC)	WL Elev. (ft-MSL)	DTW (ft-bgs)	DTW (ft-TOC)	WL Elev. (ft-MSL)	DTW (ft-bgs)	DTW (ft-TOC)	WL Elev. (ft-MSL)	DTW (ft-bgs)	DTW (ft-TOC)	WL Elev. (ft-MSL)
Amec Foster Wheeler 2013 Assessment Borings	B-301	589.95	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	B-302	581.57	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	B-303	647.18	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	B-304	559.97	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	B-305	557.74	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	B-306C	610.56	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Amec Foster Wheeler 2014 Ash Closure Borings	B-320	644.24	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	B-321	598.62	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	B-322	613.41	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	B-323	596.13	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	B-324	632.46	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Amec Foster Wheeler 2015 Proposed Landfill Hydro Study Borings	B-451	629.97	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	B-452	602.87	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	B-453	583.27	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	B-454	590.61	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	B-455	591.25	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	B-456	589.73	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	B-457	609.61	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	B-458	592.04	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	B-459	594.55	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	B-460	574.97	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	B-462	648.31	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	B-463	593.83	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Duke Energy Voluntary & Compliance Wells	MW-12	590.71	593.59	18.17	21.05	572.54	18.13	21.01	572.58	18.60	21.48	572.11	20.36	23.24	570.35
	MW-12D	590.79	593.23	18.24	20.68	572.55	18.19	20.63	572.60	17.69	20.13	573.10	20.44	22.88	570.35
	MW-20S	559.71	562.28	3.38	5.95	556.33	2.99	5.56	556.72	3.16	5.73	556.55	4.66	7.23	555.05
	MW-20D	559.42	562.23	1.43	4.24	557.99	1.04	3.85	558.38	1.16	3.97	558.26	2.84	5.65	556.58
Amec Foster Wheeler 2013 Assessment Wells	OW-301D	589.80	593.99	6.27	10.46	583.53	6.26	10.45	583.54	6.31	10.50	583.49	8.26	12.45	581.54
	OW-302D	584.23	586.53	34.49	36.79	549.74	34.48	36.78	549.75	34.57	36.87	549.66	35.07	37.37	549.16
	OW-303D	647.87	650.43	76.82	79.38	571.05	76.89	79.45	570.98	77.02	79.58	570.85	78.06	80.62	569.81
	OW-304D	559.88	560.50	9.39	10.01	550.49	9.94	10.56	549.94	9.57	10.19	550.31	10.53	11.15	549.35
	OW-305S	560.25	561.22	11.98	12.95	548.27	12.11	13.08	548.14	12.12	13.09	548.13	12.53	13.50	547.72
	OW-305D	559.47	560.86	13.18	14.57	546.29	13.27	14.66	546.20	13.26	14.65	546.21	14.06	15.45	545.41
	OW-306S	610.46	609.85	Dry	Dry	<560.46	Dry	Dry	<560.46	Dry	Dry	<560.46	Abandoned		
	OW-306D	610.56	611.15	62.49	63.08	548.07	62.42	63.01	548.14	62.54	63.13	548.02	Abandoned		
	OW-320D	609.80	610.39	NM (damaged)			NM (damaged)			NM (damaged)			NM (damaged)		
	OW-321D	588.92	592.01	Dry	Dry	<580.92	Dry	Dry	<580.92	Dry	Dry	<580.92	Dry	Dry	<580.92
Amec Foster Wheeler 2015 Proposed Landfill Hydro Study Wells	OW-401S	581.76	585.38	9.57	13.19	572.19	9.53	13.15	572.23	10.01	13.63	571.75	11.77	15.39	569.99
	OW-401D	581.23	584.62	9.08	12.47	572.15	9.08	12.47	572.15	9.52	12.91	571.71	11.29	14.68	569.94
	OW-403S	606.15	609.63	34.95	38.43	571.20	34.94	38.42	571.21	35.75	39.23	570.40	37.35	40.83	568.80
	OW-403D	606.24	609.46	35.40	38.62	570.84	35.42	38.64	570.82	36.20	39.42	570.04	37.80	41.02	568.44
	OW-404S	586.61	589.89	19.80	23.08	566.81	20.27	23.55	566.34	20.80	24.08	565.81	22.22	25.50	564.39
	OW-405S	588.15	591.06	49.74	52.65	538.41	49.79	52.70	538.36	49.21	52.12	538.94	51.07	53.98	537.08
	OW-405D	589.01	592.16	49.66	52.81	539.35	49.74	52.89	539.27	49.20	52.35	539.81	51.00	54.15	538.01
	OW-406S	567.55	571.33	2.54	6.32	565.01	2.42	6.20	565.13	2.37	6.15	565.18	3.62	7.40	563.93
	OW-406D	567.62	571.13	2.77	6.28	564.85	2.67	6.18	564.95	2.57	6.08	565.05	3.80	7.31	563.82
	OW-407S	618.41	621.89	48.25	51.73	570.16	48.35	51.83	570.06	48.49	51.97	569.92	49.53	53.01	568.88
	OW-407D	618.24	621.89	51.03	54.68	567.21	52.00	55.65	566.24	51.36	55.01	566.88	52.37	56.02	565.87
	OW-409S	551.56	555.25	-2.16	1.53	553.72	-3.08	0.61	554.64	-2.25	1.44	553.81	-1.44	2.25	553.00
	OW-409D	551.83	554.64	-2.08	0.73	553.91	-2.26	0.55	554.09	-2.11	0.70	553.94	-2.31	0.50	554.14
	OW-410S	593.62	596.95	36.34	39.67	557.28	36.52	39.85	557.10	36.66	39.99	556.96	37.46	40.79	556.16
	OW-411S	593.51	596.25	40.02	42.76	553.49	39.93	42.67	553.58	40.56	43.30	552.95	41.29	44.03	552.22
	OW-411D	593.41	596.43	43.84	46.86	549.57	43.43	46.45	549.98	44.76	47.78	548.65	45.41	48.43	548.00
	OW-412S	579.54	582.80	30.01	33.27	549.53	29.95	33.21	549.59	29.91	33.17	549.63	30.71	33.97	548.83
	OW-413S	562.09	565.34	12.94	16.19	549.15	12.73	15.98	549.36	13.29	16.54	548.80	14.00	17.25	548.09
	OW-414S	557.23	560.60	19.88	23.25	537.35	19.86	23.23	537.37	19.88	23.25	537.35	20.93	24.30	536.30
	OW-414D	557.53	560.11	20.10	22.68	537.43	20.13	22.71	537.40	20.16	22.74	537.37	21.19	23.77	536.34
	OW-415S	559.00	562.04	11.72	14.76	547.28	11.71	14.75	547.29	13.11	16.15	545.89	13.40	16.44	545.60
	OW-415D	558.86	561.52	13.91	16.57	544.95	13.85	16.51	545.01	13.72	16.38	545.14	15.31	17.97	543.55
	OW-416S	557.90	560.80	22.13	25.03	535.77	22.00	24.90	535.90	22.01	24.91	535.89	22.95	25.85	534.95
	OW-416D	558.21	561.08	25.80	28.67	532.41	25.53	28.40	532.68	25.33	28.20	532.88	26.34	29.21	531.87
	OW-417S	594.15	597.68	21.45	24.98	572.70	21.99	25.52	572.16	22.26	25.79	571.89	23.07	26.60	571.08
	OW-417D	594.18	597.58	17.87	21.27	576.31	17.82	21.22	576.36	17.51	20.91	576.67	19.17	22.57	575.01
	OW-419S	588.92	592.19	21.18	24.45	567.74	20.85	24.12	568.07	20.77	24.04	568.15	22.77	26.04	566.15
HDR 2015 Groundwater Assessment Wells	GWA-1S	598.83	601.39	26.26	28.82	572.57	26.37	28.93	572.46	27.17	29.73	571.66	28.23	30.79	570.60
	GWA-1D	598.81	601.58	27.84	30.61	570.97	27.78	30.55	571.03	28.48	31.25	570.33	30.05	32.82	568.76
	GWA-2S	584.97	587.57	20.85	23.45	564.12	erroneous reading			21.97	24.57	563.00	23.28	25.88	561.69
	GWA-2D	585.05	588.04	25.00	27.99	560.05	24.93	27.92	560.12	25.68	28.67	559.37	26.87	29.86	558.18
	GWA-3S	571.41	573.98	18.57	21.14	552.84	18.23	20.80	553.18	18.27	20.84	553.14	19.38	21.95	552.03
	GWA-3D	571.48	574.04	21.65	24.21	549.83	21.24	23.80	550.24	21.54	24.10	549.94	22.71	25.27	548.77
	GWA-11S	557.55	560.13	17.30	19.88	540.25	16.77	19.35	540.78	17.18	19.76	540.37	17.80	20.38	539.75
	GWA-11D	557.12	559.77	15.72	18.37	541.40	15.89	18.54	541.23	16.57	19.22	540.55	17.27	19.92	539.85
	AS-4D	559.22	562.17	14.62	17.57	544.60	14.60	17.55	544.62	14.79	17.74	544.43	15.40	18.35	543.82
	AS-6D	584.28	586.66	33.14	35.52	551.14	33.09	35.47	551.19	33.56	35.94	550.72	34.28	36.66	550.00
	AS-10D	588.89	591.84	19.01	21.96	569.88	19.35	22.30	569.54	19.23	22.18	569.66	21.00	23.95	567.89
	AS-12S	557.00	559.70	8.09	10.79	548.91	7.84	10.54	549.16	8.42	11.12	548.58	9.18	11.88	547.82
	MW-301BR	590.34	593.55	19.74	22.95	570.60	19.70	22.91	570.64	19.82	23.03	570.52	21.72	24.93	568.62
	MW-303BR	648.36	651.37	90.57	93.58	557.79	90.25	93.26	558.11	90.53	93.54	557.83	91.21	94.22	557.15
	MW-306BR	611.46	613.62	67.17	69.33	544.29	66.90	69.06	544.56	67.37	69.53	544.09	67.96	70.12	543.50

Notes:

Ground	Ground Surface	**(ft-MSL)**	Feet - Mean Sea Level
TOC	Top of PVC Casing	**N/A**	Not Applicable
Elev	Elevation	**NA**	Not Available
DTW	Depth to Water	**NM**	Not Measured
WL	Water Level	**NITD**	Not Installed To-Date

Negative (-) DTW (ft-bgs) value denotes water level above ground surface

Duke Energy Background Well Survey, TOB, and 24-hour water level information obtained from historic 1) Duke Energy Records & Logs; 2) S&ME 2008 Monitoring Well Installation Report; and 3) MACTEC 2011 Monitoring Well Installation Report

TABLE 4
LABORATORY TEST DATA SUMMARY
Dan River Landfill
Amec Foster Wheeler Project No. 7810-14-0065

LOCATION ID	SAMPLE DEPTH (ft-bgs)	SAMPLE TYPE[1]	HYDROSTRATIGRAPHIC UNIT(S)	USCS SYMBOL[2]	NATURAL MOISTURE CONTENT[3] (%)	GRAIN SIZE DISTRIBUTION				ATTERBERG LIMITS[4]		SPECIFIC GRAVITY (no units)	STANDARD PROCTOR[5]		Consolidated Undrained Triaxial[7] [ASTM D4767]				HYDRAULIC CONDUCTIVITY
						GRAVEL (%)	SAND (%)	SILT (%)	CLAY (%)	LL	PI		MDD (pcf)	OMC (%)	Effective Strength		Total Strength		Avg. K (cm/sec)
															c' (psf)	ϕ' (degrees)	c (psf)	ϕ (degrees)	
B-320	8.5-10	SS	Fill	CL	NT	2.6	35.9	61.5		40	17	2.68	NT	NT	NT	NT	NT	NT	NT
B-320	58.5-60	SS	Ash Fill	ML	NT	0.0	21.8	78.2		NP	NP	NT	NT	NT	NT	NT	NT	NT	NT
B-322	18.5-20	SS	Fill	CL	NT	2.6	33.8	63.6		32	10	NT	NT	NT	NT	NT	NT	NT	NT
B-322	68.5-70	SS	Ash Fill	ML	NT	0.0	0.9	99.1		NP	NP	NT	NT	NT	NT	NT	NT	NT	NT
B-322	38.5-48.5	Bulk	Ash Fill	ML	NT	1.6	29.3	69.1		38	9	2.41	87.5	23.2	NT	NT	NT	NT	NT
B-322	48.5-58.5	Bulk	Ash Fill	ML	NT	0.5	18.7	80.8		34	3	2.29	88.9	22.8	0	32	125	21	NT
B-324	43.5-45	SS	Ash Fill	ML	NT	0.0	44.3	55.7		NP	NP	NT	NT	NT	NT	NT	NT	NT	NT
B-324[6]	25-35	Bulk	Ash Fill	ML	NT	0.1	14.7	85.3		37 / NV	4 / NP	2.23	72.95	31.8	0	31	458	22	NT
B-451	0-10	Bulk	Residuum/Saprolite	CL	15.3	0.7	40.4	23.4	35.5	36	18	NT	NT	NT	NT	NT	NT	NT	NT
B-452	0-10	Bulk	Residuum/PWR	CH	22.4	3.8	12.1	29.6	54.5	63	37	2.79	96.5	24.9	NT	NT	NT	NT	NT
B-453	0-10	Bulk	Residuum	CH	27.2	0.3	23.7	41.5	34.5	57	29	NT	97.7	23.5	0	28	261	17	6.3E-07
B-455	0-10	Bulk	Residuum/PWR	CL	16.7	1.5	34.4	32.1	32.0	35	17	NT	NT	NT	NT	NT	NT	NT	NT
B-458	30-40	Bulk	PWR	CL	24.4	1.5	24.2	32.7	41.6	41	22	2.59	NT	NT	NT	NT	NT	NT	NT
B-459	43.5-45	SS	Saprolite	CL	14.5	0.0	41.4	58.6		31	14	NT	NT	NT	NT	NT	NT	NT	NT
B-463	0-10	Bulk	Residuum	CL	25.3	0	31.9	42.1	26.0	40	15	NT	100.9	21.8	NT	NT	NT	NT	7.1E-08
OW-401S	23.5-25	SS	PWR	SM	NT	0	57.6	23.4	19.0	NV	NP	NT	NT	NT	NT	NT	NT	NT	NT
OW-401D	15-25	Bulk	PWR/Saprolite	CL	14.9	0.5	32.0	25.3	42.2	41	22	NT	NT	NT	NT	NT	NT	NT	NT
OW-403S	33.5-40	SS	PWR	ML	NT	0	48.7	38.5	12.8	NV	NP	NT	NT	NT	NT	NT	NT	NT	NT
OW-403D	20-30	Bulk	Saprolite/PWR	CH	16.3	0.5	25.9	30.2	43.4	50	29	NT	NT	NT	NT	NT	NT	NT	NT
OW-404D	28.5-30	SS	PWR	SM	NT	0.0	64.0	25.8	10.2	NV	NP	NT	NT	NT	NT	NT	NT	NT	NT
OW-405S	13.5-15	SS	Saprolite	SM	14.0	0.0	58.4	41.6		38	11	NT	NT	NT	NT	NT	NT	NT	NT
OW-405S	53.5-60	SS	PWR	CL	NT	3.8	46.1	24.8	25.3	34	15	NT	NT	NT	NT	NT	NT	NT	NT
OW-406S	13.5-15	SS	PWR	SM	NT	0.0	75.2	17.1	7.7	NV	NP	NT	NT	NT	NT	NT	NT	NT	NT
OW-406D	5-15	Bulk	Residuum/Saprolite/PWR	CH	24.2	4.5	45.1	13.1	37.3	52	33	NT	NT	NT	NT	NT	NT	NT	NT
OW-406D	2-4	UD	Alluvium	MH	31.3	11.4	29.2	31.7	27.7	56	26	2.69	NT	NT	73	35	256	20	8.1E-07
OW-407S	53.5-55	SS	Saprolite	SM	NT	1.1	57.2	23.4	18.3	NV	NP	NT	NT	NT	NT	NT	NT	NT	NT
OW-407S	45-55	Bulk	Saprolite	CL	42.1	0.6	26.7	32.8	39.9	39	18	NT	NT	NT	NT	NT	NT	NT	NT
OW-407D	43.5-45.5	UD	Saprolite	CL	24.9	5.7	31.8	40.9	21.6	45	19	2.65	NT	NT	0	26	546	13	3.8E-07
OW-409S	9.8-15	SS	PWR	SM	NT	21.3	66.4	6.0	6.3	NV	NP	NT	NT	NT	NT	NT	NT	NT	NT

TABLE 4
LABORATORY TEST DATA SUMMARY
Dan River Landfill
Amec Foster Wheeler Project No. 7810-14-0065

LOCATION ID	SAMPLE DEPTH (ft-bgs)	SAMPLE TYPE[1]	HYDROSTRATIGRAPHIC UNIT(S)	USCS SYMBOL[2]	NATURAL MOISTURE CONTENT[3] (%)	GRAIN SIZE DISTRIBUTION				ATTERBERG LIMITS[4]		SPECIFIC GRAVITY (no units)	STANDARD PROCTOR[5]		Consolidated Undrained Triaxial[7] [ASTM D4767]				HYDRAULIC CONDUCTIVITY
						GRAVEL (%)	SAND (%)	SILT (%)	CLAY (%)	LL	PI		MDD (pcf)	OMC (%)	Effective Strength		Total Strength		Avg. K (cm/sec)
															c' (psf)	ϕ' (degrees)	c (psf)	ϕ (degrees)	
OW-410S	43.5-45	SS	PWR	SM	NT	0.0	63.3	23.1	13.6	NV	NP	NT	NT	NT	NT	NT	NT	NT	NT
OW-411S	58.5-60	SS	Saprolite	SM	NT	20.1	59.2	14.2	6.5	NV	NP	NT	NT	NT	NT	NT	NT	NT	NT
OW-412S	43.5-45	SS	Saprolite	SM	NT	6.7	62.8	21.3	9.2	NV	NP	NT	NT	NT	NT	NT	NT	NT	NT
OW-412S	10-20	Bulk	Saprolite	CL	12.8	1.2	40.7	35.8	22.3	32	14	NT	114.5	15.2	0	27	330	16	NT
OW-413S	18.5-20	SS	PWR	SC	NT	0	58.9	28.8	12.3	31	12	NT	NT	NT	NT	NT	NT	NT	NT
OW-413S	3.5-13.5	Bulk	Saprolite	CL	5.9	0.0	46.5	24.3	29.2	26	13	NT	NT	NT	NT	NT	NT	NT	NT
OW-414S	23.5-25	SS	PWR	SM	10.6	0.0	63.2	36.8		NP	NP	NT	NT	NT	NT	NT	NT	NT	NT
OW-415S	13.5-15	SS	Saprolite	SC	NT	0	56.2	30.2	13.6	36	12	NT	NT	NT	NT	NT	NT	NT	NT
OW-416S	23.5-25	SS	PWR	SC	NT	0.0	61.6	25.1	13.3	27	10	NT	NT	NT	NT	NT	NT	NT	NT
OW-416D	0-10	Bulk	Fill/Saprolite	CL	20.0	0.0	32.9	25.9	41.2	40	19	NT	NT	NT	NT	NT	NT	NT	NT
OW-417S	23.5-30	SS	Saprolite/PWR	SC	NT	0.0	57.3	26.0	16.7	31	12	NT	NT	NT	NT	NT	NT	NT	NT
OW-417D	2-4	UD	Saprolite	MH	26.5	0.0	32.6	41.7	25.7	50	21	2.88	NT	NT	655	16	805	8	3.4E-06
OW-417D	10-20	Bulk	PWR/Saprolite	CL	15.8	0.1	37.4	24.5	38.0	42	22	NT	NT	NT	NT	NT	NT	NT	NT
OW-419S	18.5-20	SS	PWR	SM	NT	14.3	66.0	10.6	9.1	NV	NP	NT	NT	NT	NT	NT	NT	NT	NT

Notes:

1 Sample type: SS = split spoon sample; Bulk = bulk sample; UD = Undisturbed (Shelby Tube).
2 Unified Soil Classification System (USCS) symbol: MH = inorganic silts with plasticity; ML = inorganic silts with slight plasticity; SC = clayey sand; SM = silty sand; CH = inorganic clay with plasticity; CL = inorganic clay with slight plasticity.
3 Natural moisture content was obtained from triaxial, one-dimensional consolidation, permeability, or other laboratory test reports. Values reported are averages where more than one result was reported.
4 Atterberg Limits: LL = Liquid Limit; PI = Plasticity Index; NP = Non Plastic
5 MDD = maximum dry density; OMC = optimum moisture content
6 Reported results are average values from 2 tests: 1 analyzed by Amec Foster Wheeler and 1 analyazed by Geotechnics, with the exception of Atterberg Limits, in which both values are shown.
7 Results are laboratory reported results and have not been modified.

ft-bgs = feet below ground surface
pcf = pounds per cubic foot
Avg. k = average hydraulic conductivity
NT = not tested
QNS = quantity not sufficient
PWR = partially weathered rock

c (psi) = total cohesion in pounds per square inch
φ (deg) = total friction angle in degrees
c' (psi) = effective cohesion in pounds per square inch
φ' (deg) = effective friction angle in degrees

TABLE 5A

SUMMARY OF INPUT VALUES FOR FIELD HYDRAULIC CONDUCTIVITY TEST ANALYSES

Dan River Landfill

Amec Foster Wheeler Project No. 7810-14-0065

WELL ID	Test Date	Test Method	Test Type	Well Depth (ft-bgs)	Static Water Level (ft-bgs)	Static Water Column Height (ft)	Saturated Aquifer Thickness[1] (ft)	Aquifer Type	Initial Displacement Reading[2] (ft)	Recovered Head[3] (ft)	% Recovery	Top of Screen (ft-bgs)	Total Screen Length (ft)	Water Column Above Screen[4] (ft)	Saturated Well Screen Length[5] (ft)	Radius of Well Casing (ft)	Radius of Screen[6] (ft)	Gravel Pack Porosity
OW-401S	5/7/2015	Mechanical Slug	Rising Head	29.20	7.72	21.48	21.48	Unconfined	4.227	0.044	98.96%	13.90	15.00	6.48	15.00	0.086	0.33	0.33
OW-401D	5/7/2015	Mechanical Slug	Rising Head	47.00	7.23	39.77	39.77	Unconfined	4.615	0.196	95.75%	41.70	5.00	34.77	5.00	0.086	0.244	0.33
OW-403S	5/7/2015	Mechanical Slug	Rising Head	50.00	32.52	17.48	17.48	Unconfined	4.054	0.22	94.57%	34.70	15.00	2.48	15.00	0.086	0.33	0.33
OW-403D	5/7/2015	Mechanical Slug	Rising Head	67.50	33.03	34.47	34.47	Unconfined	4.151	0.074	98.22%	62.20	5.00	29.47	5.00	0.086	0.125	NA
OW-404S	5/7/2015	Mechanical Slug	Rising Head	30.00	17.00	13.00	13.00	Unconfined	5.15	0.522	89.86%	14.70	15.00	0.00	12.70	0.086	0.33	0.33
OW-405S	5/6/2015	Mechanical Slug	Rising Head	63.00	49.59	13.41	13.41	Unconfined	2.937	0	100.00%	47.70	15.00	0.00	13.11	0.086	0.33	0.33
OW-405D	5/6/2015	Mechanical Slug	Rising Head	79.00	49.43	29.57	29.57	Unconfined	4.137	0.21	94.92%	73.70	5.00	24.57	5.00	0.086	0.244	0.33
OW-406S	5/7/2015	Mechanical Slug	Rising Head	26.00	1.56	24.44	24.44	Unconfined	6.335	0.048	99.24%	10.70	15.00	9.44	15.00	0.086	0.33	0.33
OW-406D	5/7/2015	Mechanical Slug	Rising Head	41.30	1.74	39.56	39.56	Unconfined	3.758	0.196	94.78%	36.00	5.00	34.56	5.00	0.086	0.244	NA
OW-407S	5/1/2015	Mechanical Slug	Rising Head	63.50	47.82	15.68	15.68	Unconfined	1.627	0.077	95.27%	48.20	15.00	0.68	15.00	0.086	0.33	0.33
OW-407D	5/1/2015	Mechanical Slug	Rising Head	79.30	49.71	29.59	29.59	Unconfined	5.638	0.487	91.36%	74.00	5.00	24.59	5.00	0.086	0.244	0.33
OW-409S	5/8/2015	Pneumatic Slug	Rising Head	14.00	+3.19	10.81	10.81	Unconfined	4.032	0	100.00%	5.00	9.00	1.81	9.00	0.086	0.33	0.33
OW-409D	5/8/2015	Pneumatic Slug	Rising Head	27.00	+3.11	23.89	23.89	Unconfined	0.209	0	100.00%	22.00	5.00	18.89	5.00	0.086	0.125	NA
OW-410S	4/30/2015	Bailer	Rising Head	54.50	35.87	18.63	18.63	Unconfined	2.73	0.227	91.68%	39.20	15.00	3.63	15.00	0.086	0.33	0.33
OW-411S	5/8/2015	Mechanical Slug	Rising Head	66.00	39.22	26.78	26.78	Unconfined	2.592	0.286	88.97%	50.70	15.00	11.78	15.00	0.086	0.33	0.33
OW-411D	5/7/2015	Mechanical Slug	Rising Head	81.30	42.75	38.55	38.55	Unconfined	3.467	0.023	99.34%	76.00	5.00	33.55	5.00	0.086	0.125	NA
OW-412S	4/30/2015	Bailer	Rising Head	58.00	30.14	27.86	27.86	Unconfined	2.093	0.019	99.09%	42.70	15.00	12.86	15.00	0.086	0.33	0.33
OW-413S	4/30/2015	Bailer	Rising Head	27.00	11.55	15.45	15.45	Unconfined	2.001	0.181	90.95%	16.70	10.00	5.45	10.00	0.086	0.33	0.33
OW-414S	4/29/2015	Bailer	Rising Head	29.50	19.48	10.02	10.02	Unconfined	2.389	0.538	77.48%	14.20	15.00	0.00	4.98	0.086	0.33	0.33
OW-414D	5/8/2015	Mechanical Slug	Rising Head	37.00	19.71	17.29	17.29	Unconfined	3.902	0.385	90.13%	31.70	5.00	12.29	5.00	0.086	0.125	NA
OW-415S	5/1/2015	Mechanical Slug	Rising Head	18.00	11.15	6.85	6.85	Unconfined	3.715	0.507	86.35%	7.70	10.00	0.00	6.55	0.086	0.33	0.33
OW-415D	5/1/2015	Mechanical Slug	Rising Head	42.00	13.84	28.16	28.16	Unconfined	4.489	0.718	84.01%	36.70	5.00	23.16	5.00	0.086	0.125	NA
OW-416S	5/8/2015	Bailer	Rising Head	29.00	21.43	7.57	7.57	Unconfined	2.027	0.311	84.66%	18.70	10.00	0.00	2.43	0.086	0.33	0.33
OW-416D	5/7/2015	Mechanical Slug	Rising Head	45.00	25.06	19.94	19.94	Unconfined	4.169	0.087	97.91%	39.70	5.00	14.94	5.00	0.086	0.125	NA
OW-417S	5/6/2015	Mechanical Slug	Rising Head	34.00	20.28	13.72	13.72	Unconfined	5.828	0.021	99.64%	18.70	15.00	0.00	13.42	0.086	0.33	0.33
OW-417D	5/6/2015	Mechanical Slug	Rising Head	47.70	16.24	31.46	31.46	Unconfined	4.594	0.02	99.56%	42.40	5.00	26.46	5.00	0.086	0.125	NA
OW-419S	5/1/2015	Mechanical Slug	Rising Head	31.00	17.35	13.65	13.65	Unconfined	2.214	0	100.00%	15.70	15.00	0.00	13.35	0.086	0.33	0.33

Notes:

Anisotropy ratio (Kv/Kh) is assumed to be 1
ft = feet NA = not applicable
ft-bgs = feet measured from below ground surface
"+" = above ground surface

1 Saturated thickness values were assumed to be the same as the static water column height (well fully penetrates aquifer).
2 Maximum Displacement Reading = the pressure transducer reading in feet for the maximum displacement observed during the test.
3 Recovered Head = final measurement recorded by the pressure transducer prior to stopping the test.
4 Water Column Above Screen is the depth from the water surface to the top of the well screen.
If the well screen is fully submerged, the unsaturated well screen length is zero.
5 Saturated Well Screen Length extends from the bottom of the screen interval to the water table if the screen brackets the water table, i.e. the submerged portion of the well screen.
If the well screen is fully submerged, the saturated well screen length is the full length of the screen interval.
6 According to James Butler in *The Design, Performance, and Analysis of Slug Tests* (1998), the effective radius of the well screen should include both the nominal radius of the well screen and the radius of the filter pack.

TABLE 5B
SUMMARY OF FIELD HYDRAULIC CONDUCTIVITY TEST RESULTS
Dan River Landfill
Amec Foster Wheeler Project No. 7810-14-0065

Well ID	Rising Head Test Results in cm/sec		Average K cm/sec	Predominant Hydrostratigraphic Unit in Saturated Screen Interval
	Bouwer & Rice	Hvorslev		
OW-401S	6.53E-04	9.03E-04	7.78E-04	Partially Weathered Rock (PWR)
OW-401D	3.53E-04	3.97E-04	3.75E-04	Weathered/Fractured Rock (WF)
OW-403S	1.14E-03	1.46E-03	1.30E-03	Partially Weathered Rock (PWR)
OW-403D	1.25E-04	1.39E-04	1.32E-04	Weathered/Fractured Rock (WF)
OW-404S	9.49E-03	6.34E-03	7.91E-03	Partially Weathered Rock (PWR)
OW-405S	4.02E-05	7.51E-05	5.76E-05	Partially Weathered Rock (PWR)
OW-405D	1.44E-04	1.60E-04	1.52E-04	Weathered/Fractured Rock (WF)
OW-406S	5.67E-02	3.61E-03	3.01E-02	Partially Weathered Rock (PWR)
OW-406D	2.53E-04	2.80E-04	2.67E-04	Weathered/Fractured Rock (WF)
OW-407S	1.47E-04	2.11E-04	1.79E-04	Saprolite
OW-407D	3.03E-04	3.48E-04	3.25E-04	Weathered/Fractured Rock (WF)
OW-409S	1.81E-02	2.63E-02	2.22E-02	Partially Weathered Rock (PWR)
OW-409D	3.00E-03	3.79E-03	3.39E-03	Weathered/Fractured Rock (WF)
OW-410S	4.07E-06	5.65E-06	4.86E-06	Partially Weathered Rock (PWR)
OW-411S	1.50E-04	2.02E-04	1.76E-04	Partially Weathered Rock (PWR)
OW-411D	2.19E-03	2.56E-03	2.38E-03	Weathered/Fractured Rock (WF)
OW-412S	2.57E-03	2.91E-03	2.74E-03	Partially Weathered Rock (PWR)
OW-413S	1.23E-03	1.46E-03	1.34E-03	Partially Weathered Rock (PWR)
OW-414S	2.92E-04	4.55E-04	3.73E-04	Partially Weathered Rock (PWR)
OW-414D	4.95E-05	6.29E-05	5.62E-05	Weathered/Fractured Rock (WF)
OW-415S	4.97E-03	7.18E-03	6.08E-03	Saprolite
OW-415D	1.20E-04	1.43E-04	1.31E-04	Weathered/Fractured Rock (WF)
OW-416S	1.57E-04	4.26E-04	2.92E-04	Partially Weathered Rock (PWR)
OW-416D	NR	2.97E-04	2.97E-04	Weathered/Fractured Rock (WF)
OW-417S	7.14E-03	1.31E-02	1.01E-02	Saprolite
OW-417D	3.62E-05	4.06E-05	3.84E-05	Weathered/Fractured Rock (WF)
OW-419S	1.36E-03	2.15E-03	1.76E-03	Partially Weathered Rock (PWR)
Max	***5.67E-02***	***2.63E-02***	***3.01E-02***	
Min	***4.07E-06***	***5.65E-06***	***4.86E-06***	
Geo Mean	***5.43E-04***	***6.17E-04***	***5.97E-04***	

Notes:

I.D. = Inside Diameter
cm/sec = Centimeters Per Second
K - Hydraulic Conductivity
NR - Not Run
GEO MEAN = Geometric Mean

Chart Data			
Color	COUNT	HYDROSTRATIGRAPHIC UNIT	K GEO MEAN (cm/sec)
Yellow	3	Saprolite	2.23E-03
Green	13	Partially Weathered Rock (PWR)	8.78E-04
Purple	11	Weathered/Fractured Rock (WF)	2.64E-04

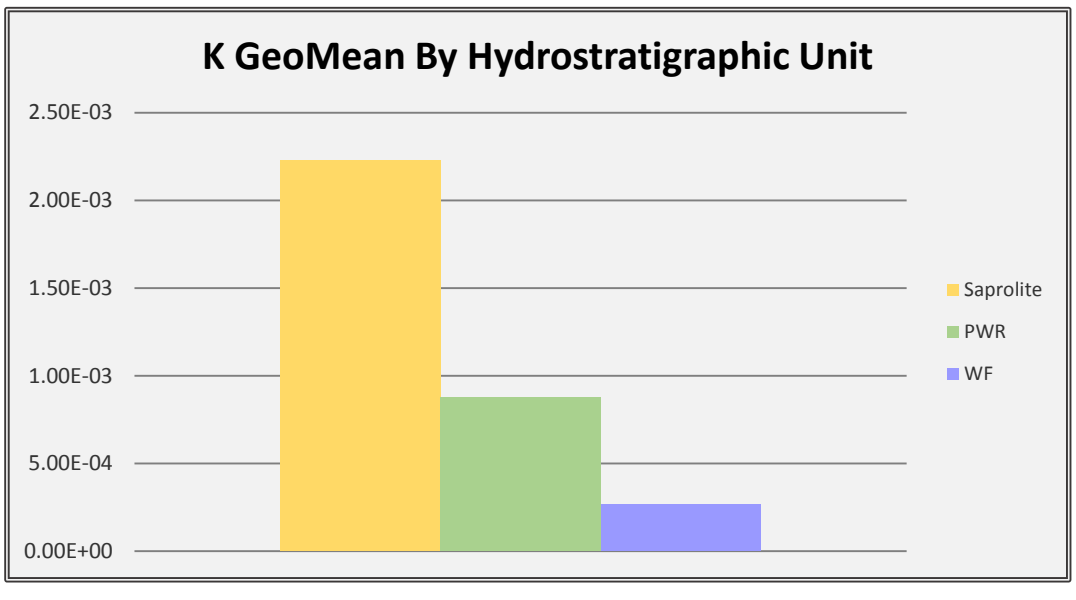


TABLE 5C
SUMMARY OF LABORATORY PERMEABILITY TEST RESULTS
Dan River Landfill
Amec Foster Wheeler Project No. 7810-14-0065

WELL ID	SAMPLE TYPE	SAMPLE DEPTH (ft-bgs)	CONFINING PRESSURE (psi)	PERMEABILITY (cm/sec)	HYDROSTRATIGRAPHIC UNIT
B-453	Bulk	0-10	55	6.30E-07	Residuum
B-463	Bulk	0-10	55	7.10E-08	Residuum
OW-406D	Intact (Shelby Tube)	2-4	55	8.10E-07	Residuum
OW-407D	Intact (Shelby Tube)	43.5-45.5	55	3.80E-07	Saprolite
OW-417D	Intact (Shelby Tube)	2-4	55	3.40E-06	Saprolite

Notes

ft-bgs = feet below ground surface

ft/day = feet per day

psi = pounds per square inch

cm/sec = centimeters per second

TABLE 6
POROSITY DATA SUMMARY
Dan River Landfill
Amec Foster Wheeler Project No. 7810-14-0065

LOCATION ID	SAMPLE TYPE	SAMPLE DEPTH (ft-bgs)	HYDROSTRATIGRAPHIC UNIT(S)	SOIL DESCRIPTION	USCS SYMBOL[1]	EFFECTIVE POROSITY[2] %	TOTAL POROSITY[2] %
B-320[3]	SS	8.5-10	Fill	Sandy Lean Clay	CL	4	47
B-320[3]	SS	58.5-60	Ash Fill	CCR Material	ML	2.5	48
B-322[3]	SS	18.5-20	Fill	Sandy Lean Clay	CL	4	47
B-322[3]	Bulk	38.5-48.5	Ash Fill	CCR Material	ML	4	47
B-322[3]	Bulk	48.5-58.5	Ash Fill	CCR Material	ML	2.5	48
B-324[3]	SS	43.5-45	Ash Fill	CCR Material	ML	5	46
B-324[3]	Bulk	25-35	Ash Fill	CCR Material	ML	0.5	50
B-451	Bulk	0-10	Residuum/Saprolite	Sandy Lean Clay	CL	4	47
B-452	Bulk	0-10	Residuum/PWR	Fat Clay with Sand	CH	0.5	50
B-453	Bulk	0-10	Residuum	Fat Clay with Sand	CH	2.5	48
B-455	Bulk	0-10	Residuum/PWR	Sandy Lean Clay	CL	4	47
B-458	Bulk	30-40	PWR	Lean Clay with Sand	CL	2.5	48
B-459[3]	SS	43.5-45	Saprolite	Sandy Lean Clay	CL	4.5	46
B-463	Bulk	0-10	Residuum	Lean Clay with Sand	CL	4	47
OW-401S	SS	23.5-25	PWR	Silty Sand	SM	14	44
OW-401D	Bulk	15-25	PWR/Saprolite	Sandy Lean Clay	CL	3	48
OW-403S	SS	33.5-40	PWR	Sandy Silt	ML	16	44
OW-403D	Bulk	20-30	Saprolite/PWR	Fat Clay with Sand	CH	2.5	48
OW-404D	SS	28.5-30	PWR	Silty Sand	SM	22	44
OW-405S[3]	SS	13.5-15	Saprolite	Silty Sand	SM	17	44
OW-405S	SS	53.5-60	PWR	Sandy Lean Clay	CL	5	46
OW-406S	SS	13.5-15	PWR	Silty Sand	SM	24	43
OW-406D[3]	Bulk	5-15	Saprolite/PWR	Sandy Fat Clay	CH	2	49
OW-406D	UD	2-4	Alluvium	Sandy Elastic Silt	MH	3	48
OW-407S	SS	53.5-55	Saprolite	Silty Sand	SM	14	44
OW-407S	Bulk	45-55	Saprolite	Lean Clay with Sand	CL	3	48
OW-407D	UD	43.5-45.5	Saprolite	Sandy Lean Clay	CL	4	47
OW-409S	SS	9.8-15	PWR	Silty Sand with Gravel	SM	20	44
OW-410S	SS	43.5-45	PWR	Silty Sand	SM	16	44
OW-411S	SS	58.5-60	Saprolite	Silty Sand with Gravel	SM	23	43
OW-412S	SS	43.5-45	Saprolite	Silty Sand	SM	19	44
OW-412S	Bulk	10-20	Saprolite	Sandy Lean Clay	CL	4.5	46
OW-413S	SS	18.5-20	PWR	Clayey Sand	SC	17	44
OW-413S	Bulk	3.5-13.5	Saprolite	Sandy Lean Clay	CL	5	46
OW-414S[3]	SS	23.5-25	PWR	Silty Sand	SM	16	44
OW-415S	SS	13.5-15	Saprolite	Clayey Sand	SC	16	44
OW-416S	SS	23.5-25	PWR	Clayey Sand	SC	16	44
OW-416D	Bulk	0-10	Fill/Saprolite	Sandy Lean Clay	CL	3	48
OW-417S	SS	23.5-30	Saprolite/PWR	Clayey Sand	SC	15	44
OW-417D	UD	2-4	Saprolite	Elastic Silt with Sand	MH	4	47
OW-417D	Bulk	10-20	PWR/Saprolite	Sandy Lean Clay	CL	4	47
OW-419S	SS	18.5-20	PWR	Silty Sand	SM	17	44
					Average	***8.8***	***46.1***

Notes

1 **USCS** Unified Soil Classification System (USCS) symbol: MH = inorganic silts with plasticity; ML = inorganic silts with slight plasticity; SC = clayey sand; SM = silty sand; CH = inorganic clay with plasticity; CL = inorganic clay with slight plasticity.

2 Porosity was calculated from hydrometers and Fetter and Bear Diagrams based on grain size (Calculations in Appendix VI).

3 Laboratory grain-size distribution was analyzed by sieve only (no hydrometer); Porosity was estimated based on similar material types.

ft-bgs Feet below ground surface
SS Split Spoon Sample
Bulk Bulk Sample
UD "Intact" Undisturbed Sample (Shelby Tube)
PWR Partially Weathered Rock

TABLE 7
GROUNDWATER VERTICAL GRADIENT SUMMARY
Dan River Landfill
Amec Foster Wheeler Project No. 7810-14-0065

WELL ID		DATE	VERTICAL GRADIENT (ft/ft)	DIRECTION
Amec Foster Wheeler	OW-401S/OW-401D	April 30, 2015	0.0026	DOWNWARD
	OW-401S/OW-401D	May 27, 2015	0.0017	DOWNWARD
	OW-401S/OW-401D	September 15, 2015	0.0021	DOWNWARD
	OW-403S/OW-403D	April 30, 2015	0.0203	DOWNWARD
	OW-403S/OW-403D	May 27, 2015	0.0185	DOWNWARD
	OW-403S/OW-403D	September 15, 2015	0.0173	DOWNWARD
	OW-405S/OW-405D	April 30, 2015	-0.0526	UPWARD
	OW-405S/OW-405D	May 27, 2015	-0.0511	UPWARD
	OW-405S/OW-405D	September 15, 2015	-0.0506	UPWARD
	OW-406S/OW-406D	April 30, 2015	0.0027	DOWNWARD
	OW-406S/OW-406D	May 27, 2015	0.0037	DOWNWARD
	OW-406S/OW-406D	September 15, 2015	0.0051	DOWNWARD
	OW-407S/OW-407D	April 30, 2015	0.0984	DOWNWARD
	OW-407S/OW-407D	May 27, 2015	0.1318	DOWNWARD
	OW-407S/OW-407D	September 15, 2015	0.1479	DOWNWARD
	OW-409S/OW-409D	May 8, 2015	-0.0124	UPWARD
	OW-409S/OW-409D	May 27, 2015	-0.0240	UPWARD
	OW-409S/OW-409D	September 15, 2015	-0.0769	UPWARD
	OW-411S/OW-411D	April 27-28, 2015	0.1522	DOWNWARD
	OW-411S/OW-411D	May 27, 2015	0.1958	DOWNWARD
	OW-411S/OW-411D	September 15, 2015	0.2066	DOWNWARD
*	OW-412S/AS-6D	September 15, 2015	-0.3287	UPWARD
Amec Foster Wheeler	OW-414S/OW-414D	April 29-30, 2015	0.0243	DOWNWARD
	OW-414S/OW-414D	May 27, 2015	-0.0217	UPWARD
	OW-414S/OW-414D	September 15, 2015	-0.0051	UPWARD
	OW-415S/OW-415D	April 30, 2015	0.1112	DOWNWARD
	OW-415S/OW-415D	May 27, 2015	0.0899	DOWNWARD
	OW-415S/OW-415D	September 15, 2015	0.0861	DOWNWARD
	OW-416S/OW-416D	April 29, 2015	0.1973	DOWNWARD
	OW-416S/OW-416D	May 27, 2015	0.1863	DOWNWARD
	OW-416S/OW-416D	September 15, 2015	0.1917	DOWNWARD
	OW-417S/OW-417D	April 30, 2015	-0.2264	UPWARD
	OW-417S/OW-417D	May 27, 2015	-0.2205	UPWARD
	OW-417S/OW-417D	September 15, 2015	-0.2395	UPWARD
*	OW-419S/AS-10D	September 15, 2015	-0.1261	UPWARD
HDR	GWA-1S/GWA-1D	September 15, 2015	0.0233	DOWNWARD
	GWA-2S/GWA-2D	September 15, 2015	0.1122	DOWNWARD
	GWA-3S/GWA-3D	September 15, 2015	0.2197	DOWNWARD
	GWA-11S/GWA-11D	September 15, 2015	-0.0091	UPWARD

Notes

(ft/ft) Feet per foot

* Well pair consisting of Amec Foster Wheeler "shallow" well and HDR "deep" well

Calculations are provided in Appendix VII

TABLE 8

GROUNDWATER FLOW VELOCITY SUMMARY

Dan River Landfill

Amec Foster Wheeler Project No: 7810-14-0065

						September 15, 2015			
		K		η			*i*	*v*	
WELL ID	TOC ELEVATION (ft-MSL)	HYDRAULIC CONDUCTIVITY (cm/s)	HYDRAULIC CONDUCTIVITY (ft/day)	POROSITY Effective η_e	POROSITY Total η_t	WATER LEVEL ELEVATION (ft-MSL)	GRADIENT (ft/ft)	FLOW VELOCITY (ft/yr)	PREDOMINANT HYDROSTRATIGRAPHIC UNITS IN SATURATED SCREEN INTERVAL
OW-401S	585.38	7.78E-04	2.20E+00	14%	44%	569.99	0.02	1.03E+02	Partially Weathered Rock (PWR)
OW-403S	609.63	1.30E-03	3.69E+00	16%	44%	568.80	0.07	5.64E+02	Partially Weathered Rock (PWR)
OW-404S*	589.89	7.91E-03	2.24E+01	22%	44%	564.39	0.06	2.20E+03	Partially Weathered Rock (PWR)
OW-405S	591.06	5.76E-05	1.63E-01	5%	46%	537.08	0.13	1.57E+02	Partially Weathered Rock (PWR)
OW-406S	571.33	3.01E-02	8.54E+01	24%	43%	563.93	0.03	3.77E+03	Partially Weathered Rock (PWR)
OW-407S	621.89	1.79E-04	5.07E-01	14%	44%	568.88	0.04	5.56E+01	Saprolite
OW-409S	555.25	2.22E-02	6.30E+01	20%	44%	553.00	0.10	1.15E+04	Partially Weathered Rock (PWR)
OW-410S	596.95	4.86E-06	1.38E-02	16%	44%	556.16	0.05	1.57E+00	Partially Weathered Rock (PWR)
OW-411S	596.25	1.76E-04	4.99E-01	23%	43%	552.22	0.03	2.54E+01	Partially Weathered Rock (PWR)
OW-412S	582.80	2.74E-03	7.76E+00	19%	44%	548.83	0.03	5.07E+02	Partially Weathered Rock (PWR)
OW-413S	565.34	1.34E-03	3.80E+00	17%	44%	548.09	0.05	3.75E+02	Partially Weathered Rock (PWR)
OW-414S**	560.60	3.73E-04	1.06E+00	16%	44%	536.30	0.05	1.30E+02	Partially Weathered Rock (PWR)
OW-415S	562.04	6.08E-03	1.72E+01	16%	44%	545.60	0.03	9.83E+02	Saprolite
OW-416S	560.80	2.92E-04	8.26E-01	16%	44%	534.95	0.06	1.19E+02	Partially Weathered Rock (PWR)
OW-417S	597.68	1.01E-02	2.87E+01	15%	44%	571.08	Not Calculated (outlier location)		Saprolite
OW-419S	592.19	1.76E-03	4.98E+00	17%	44%	566.15	0.03	3.53E+02	Partially Weathered Rock (PWR)
							Minimum	***1.57E+00***	
							Maximum	***1.15E+04***	
							Geometric Mean	***2.63E+02***	

Notes:

(ft-MSL)	Feet - Mean Sea Level
n_e	Effective porosity
n	Total Porosity
K	Hydraulic conductivity
i	Horizontal groundwater gradient
v	Groundwater flow velocity
*	Porosity values obtained from sample collected in OW-404D boring
**	Laboratory grain-size distribution was analyzed by sieve only (no hydrometer); Porosity was estimated based on similar material type

Flow Velocity = $(Ki)/n_e$

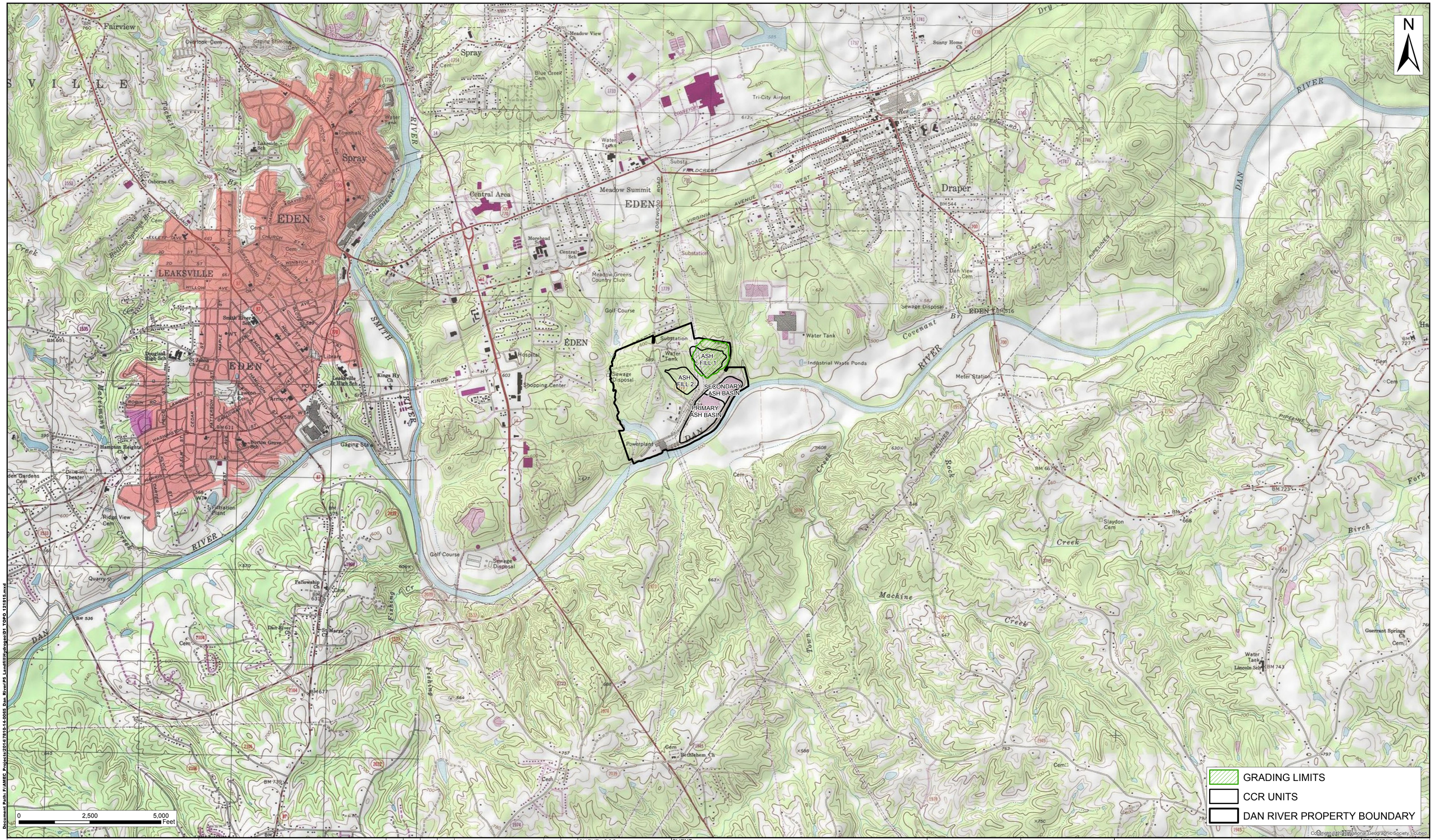
(ft/day)	Feet per day
(ft/yr)	Feet per year
(ft/ft)	Feet per foot

Hydraulic conductivity shown is average between Bouwer & Rice slug test analysis and Hvorslev analysis as shown in Table 5B; Slug test analysis sheets are included in Appendix III

Porosity estimated from Fetter and Bear Diagrams located in Appendix VI

Horizontal groundwater gradient calculations are located in Appendix VII

DRAWINGS



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PRELIMINARY
NOT FOR CONSTRUCTION

Courtney W. Murphy
NORTH CAROLINA LICENSED GEOLOGIST SEAL 2203 COURTNEY WITHERS MURPHY
12-18-15

REV	D	M	Y	ISSUE/REVISION DESCRIPTION	ENG.	APPR.
1	18	12	2015	UPDATE REPORT	CWM	JAB
0	15	7	2015	INITIAL SUBMITTAL	CWM	JAB

CLIENT LOGO: DUKE ENERGY.

CLIENT:
DUKE ENERGY CAROLINAS
ROCKINGHAM COUNTY, NC

Amec Foster Wheeler Environment & Infrastructure, Inc.
2801 YORKMONT ROAD, SUITE 100
CHARLOTTE, NC 28208
TEL: (704)357-8600 FAX: (704) 357-8638
LICENSURE: NC ENG: F-1253 NC GEOLOGY: C-247

amec foster wheeler

DATUM:	
PROJECTION:	
DRAWN BY:	JMS
REVIEWED BY:	CWM
SCALE:	AS SHOWN

DAN RIVER LANDFILL
HYDROGEOLOGIC STUDY

TOPOGRAPHIC SITE MAP

PROJECT NO:	7810-14-0065
REVISION NO:	1
DATE:	12/18/2015
DRAWING NO.	1

Plotted By:Jordan, Chris Sheet Set:HydroGeo Layout:2 SITE AERIAL December 18, 2015 09:56:00am Q:\Duke\DanRiver\7810140065_ABSAT Dan River Off Site LF\Plansheets\HydroGeo\Drawing 2 - Aerial.dwg

PRELIMINARY
NOT FOR CONSTRUCTION

Courtney W. Mashburn SEAL 2203 NORTH CAROLINA PROFESSIONAL GEOLOGIST 12-18-15

REV	D	M	Y	ISSUE/REVISION DESCRIPTION	ENG.	APPR.
1	18	12	2015	UPDATE REPORT	CWM	JAB
0	15	7	2015	INITIAL SUBMITTAL	CWM	JAB

CLIENT LOGO: DUKE ENERGY.

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amec foster wheeler

DATUM:	---
PROJECTION:	---
DRAWN BY:	CSJ
REVIEWED BY:	CWM
SCALE:	AS SHOWN

PROJECT: DAN RIVER LANDFILL
HYDROGEOLOGIC STUDY

TITLE: SITE AERIAL

PROJECT NO.:	7810-14-0065
REVISION NO.	1
DATE:	12/18/2015
DRAWING NO.	2

REFERENCES

1. EXISTING TOPOGRAPHIC INFORMATION WAS PRODUCED FROM PHOTOGRAMMETRIC METHODS FROM AERIAL PHOTOGRAPHY OBTAINED ON FEBRUARY 7, 2014 BY LDSI, INC.
2. EXISTING TOPOGRAPHIC INFORMATION WAS PRODUCED FROM LIGHT DETECTION AND RANGING (LIDAR) OBTAINED FROM NCDOT WEBSITE ON AUGUST 7, 2015.

LEGEND

- 700 — EXISTING MAJOR CONTOUR (10') [REF. 1]
- EXISTING MINOR CONTOUR (2') [REF. 1]
- 700 — EXISTING MAJOR CONTOUR (10') [REF. 2]
- EXISTING MINOR CONTOUR (2') [REF. 2]
- PROPERTY BOUNDARY
- LOW — LIMIT OF WASTE
- 100-YEAR FLOODPLAIN
- FM — FORCE MAIN SANITARY SEWER PIPE
- G — NATURAL GAS PIPELINE
- G — NATURAL GAS PIPELINE (NOT SURVEYED)
- XOH — OVERHEAD ELECTRIC UTILITY
- EXISTING UTILITY EASEMENT
- X — FENCE
- VEGETATION BOUNDARY
- PIPES
- S — SEWER MANHOLE
- RIP RAP
- STREAM
- WETLAND
- AMEC FOSTER WHEELER HISTORIC BORING
- AMEC FOSTER WHEELER HYDROGEOLOGIC STUDY LANDFILL BORING
- AMEC FOSTER WHEELER HISTORIC OBSERVATION WELL
- AMEC FOSTER WHEELER HYDROGEOLOGIC STUDY OBSERVATION WELL
- AMEC FOSTER WHEELER HYDROGEOLOGIC STUDY OBSERVATION WELL PAIR
- HDR, INC. GROUNDWATER ASSESSMENT WELL
- HDR, INC. GROUNDWATER ASSESSMENT WELL PAIR
- V — DUKE ENERGY VOLUNTARY WELL PAIR
- C — DUKE ENERGY COMPLIANCE WELL PAIR

100 0 100 200 FT

PRELIMINARY
NOT FOR CONSTRUCTION

Courtney W. Mehaffey
NORTH CAROLINA REGISTERED PROFESSIONAL SEAL 2203 GEOLOGIST
12-18-15

REV	D	M	Y	ISSUE/REVISION DESCRIPTION	ENG.	APPR.
1	18	12	2015	UPDATE REPORT	CWM	JAB
0	15	7	2015	INITIAL SUBMITTAL	CWM	JAB

CLIENT LOGO: DUKE ENERGY.

CLIENT: DUKE ENERGY CAROLINAS
ROCKINGHAM COUNTY, NC

Amec Foster Wheeler Environment & Infrastructure, Inc.
2801 YORKMONT ROAD, SUITE 100
CHARLOTTE, NC 28208
TEL: (704) 357-8600 FAX: (704) 357-8638
LICENSURE: NC ENG: F-1253 NC GEOLOGY: C-247

amec foster wheeler

DATUM:	---
PROJECTION:	---
DRAWN BY:	CSJ
REVIEWED BY:	CWM
SCALE:	AS SHOWN

PROJECT: DAN RIVER LANDFILL HYDROGEOLOGIC STUDY

TITLE: BORING LOCATION PLAN

PROJECT NO.:	7810-14-0065
REVISION NO.	1
DATE:	12/18/2015
DRAWING NO.	3

Plotted By:Jordan, Chris Sheet Set:HydroGeo Layout:3 Boring Location Plan December 18, 2015 09:56:35am Q:\Duke\DanRiver\7810140065_ABSAT Dan River Off Site LF\Plansheets\HydroGeo\3 Boring Location Plan.dwg

LEGEND

- EXISTING MAJOR CONTOUR (10') [REF. 1]
- EXISTING MINOR CONTOUR (2') [REF. 1]
- EXISTING MAJOR CONTOUR (10') [REF. 2]
- EXISTING MINOR CONTOUR (2') [REF. 2]
- GROUNDWATER CONTOUR (5') [REF. 3]
- PROPERTY BOUNDARY
- LIMIT OF WASTE
- 100-YEAR FLOODPLAIN
- FORCE MAIN SANITARY SEWER PIPE
- NATURAL GAS PIPELINE
- NATURAL GAS PIPELINE (NOT SURVEYED)
- OVERHEAD ELECTRIC UTILITY
- EXISTING UTILITY EASEMENT
- FENCE
- VEGETATION BOUNDARY
- PIPES
- SEWER MANHOLE
- RIP RAP
- STREAM
- WETLAND
- AMEC FOSTER WHEELER HISTORIC BORING
- AMEC FOSTER WHEELER HYDROGEOLOGIC STUDY BORING
- AMEC FOSTER WHEELER HISTORIC OBSERVATION WELL
- AMEC FOSTER WHEELER HYDROGEOLOGIC STUDY OBSERVATION WELL
- AMEC FOSTER WHEELER HYDROGEOLOGIC STUDY OBSERVATION WELL PAIR
- HDR, INC. GROUNDWATER ASSESSMENT WELL
- HDR, INC. GROUNDWATER ASSESSMENT WELL PAIR
- DUKE ENERGY VOLUNTARY WELL PAIR
- DUKE ENERGY COMPLIANCE WELL PAIR
- GROUNDWATER FLOW DIRECTION

100 0 100 200 FT

REFERENCES

1. EXISTING TOPOGRAPHIC INFORMATION WAS PRODUCED FROM PHOTOGRAMMETRIC METHODS FROM AERIAL PHOTOGRAPHY OBTAINED ON FEBRUARY 7, 2014 BY LDSI, INC.
2. EXISTING TOPOGRAPHIC INFORMATION WAS PRODUCED FROM LIGHT DETECTION AND RANGING (LIDAR) OBTAINED FROM NCDOT WEBSITE ON AUGUST 7, 2015.
3. GROUNDWATER SURFACE CONTOURS SHOWN WERE DERIVED FROM SHALLOW WATER TABLE WELLS. FOR WELL PAIR LOCATIONS, GROUNDWATER SURFACE ELEVATIONS SHOWN ARE FROM THE SHALLOW WELL.

PRELIMINARY
NOT FOR CONSTRUCTION

Courtney W. Murphy SEAL 2203 NORTH CAROLINA LICENSED GEOLOGIST 12-18-15

REV	D	M	Y	ISSUE/REVISION DESCRIPTION	ENG.	APPR.
1	18	12	2015	UPDATE REPORT	CWM	JAB
0	15	7	2015	INITIAL SUBMITTAL	CWM	JAB

CLIENT LOGO: DUKE ENERGY.

CLIENT: DUKE ENERGY CAROLINAS
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amec foster wheeler

DATUM:	---
PROJECTION:	---
DRAWN BY:	CSJ
REVIEWED BY:	CWM
SCALE:	AS SHOWN

PROJECT: DAN RIVER LANDFILL
HYDROGEOLOGIC STUDY

TITLE: GROUNDWATER SURFACE MAP
SEPTEMBER 15, 2015

PROJECT NO.: 7810-14-0065
REVISION NO.: 1
DATE: 12/18/2015
DRAWING NO.: 4

Plotted By:Jordan, Chris Sheet Set:HydroGeo Layout:4 Groundwater Surface - September 15 2015 December 18, 2015 09:57:15am Q:\Duke\DanRiver\7810140065_ABSAT Dan River Off Site LF\Plansheets\HydroGeo\4 Groundwater Surface - September 15, 2015.dwg

REFERENCES

1. EXISTING TOPOGRAPHIC INFORMATION WAS PRODUCED FROM PHOTOGRAMMETRIC METHODS FROM AERIAL PHOTOGRAPHY OBTAINED ON FEBRUARY 7, 2014 BY LDSI, INC.
2. EXISTING TOPOGRAPHIC INFORMATION WAS PRODUCED FROM LIGHT DETECTION AND RANGING (LIDAR) OBTAINED FROM NCDOT WEBSITE ON AUGUST 7, 2015.
3. BEDROCK SURFACE CONTOURS SHOWN WERE DERIVED FROM AUGER REFUSAL DEPTHS WHERE ENCOUNTERED, BUT WITH THE FOLLOWING EXCEPTIONS: 1) THE BEDROCK SURFACE AT OW-404S IS BASED ON THE AUGER REFUSAL DEPTH ENCOUNTERED IN ITS PAIRED BORING, OW-404D, WHICH DID NOT RECEIVE A WELL AND WAS NOT SURVEYED; 2) IF BORINGS OR WELLS OCCUPYING APPROXIMATELY THE SAME SPATIAL LOCATION (I.E. WELL PAIRS OR HISTORIC "B" BORINGS CORRESPONDING TO WELLS) HAD VARYING AUGER REFUSAL DEPTHS, THE AUGER REFUSAL DEPTH FOR THE BEDROCK SURFACE AT SUCH LOCATION WAS CHOSEN FROM THE BORING OR WELL IN WHICH ROCK CORE INFORMATION WAS COLLECTED BELOW AUGER REFUSAL DEPTH.

LEGEND

700	EXISTING MAJOR CONTOUR (10') [REF. 1]
	EXISTING MINOR CONTOUR (2') [REF. 1]
700	EXISTING MAJOR CONTOUR (10') [REF. 2]
	EXISTING MINOR CONTOUR (2') [REF. 2]
700	BEDROCK SURFACE CONTOUR (5') [REF. 3]
	PROPERTY BOUNDARY
LOW	LIMIT OF WASTE
	100-YEAR FLOODPLAIN
FM	FORCE MAIN SANITARY SEWER PIPE
G	NATURAL GAS PIPELINE
G	NATURAL GAS PIPELINE (NOT SURVEYED)
XOX	OVERHEAD ELECTRIC UTILITY
	EXISTING UTILITY EASEMENT
X	FENCE
	VEGETATION BOUNDARY
	PIPES
S	SEWER MANHOLE
	RIP RAP
	STREAM
	WETLAND
	AMEC FOSTER WHEELER HISTORIC BORING
	AMEC FOSTER WHEELER HYDROGEOLOGIC STUDY LANDFILL BORING
	AMEC FOSTER WHEELER HISTORIC OBSERVATION WELL
	AMEC FOSTER WHEELER HYDROGEOLOGIC STUDY OBSERVATION WELL
	AMEC FOSTER WHEELER HYDROGEOLOGIC STUDY OBSERVATION WELL PAIR
	HDR, INC. GROUNDWATER ASSESSMENT WELL
	HDR, INC. GROUNDWATER ASSESSMENT WELL PAIR
	DUKE ENERGY VOLUNTARY WELL PAIR
	DUKE ENERGY COMPLIANCE WELL PAIR

100 0 100 200 FT

PRELIMINARY
NOT FOR CONSTRUCTION

Courtney W. Mehaffey
NORTH CAROLINA PROFESSIONAL SEAL 2203 GEOLOGIST COURTNEY WHITNEY MEHAFFEY
12-18-15

REV	D	M	Y	ISSUE/REVISION DESCRIPTION	ENG.	APPR.
1	18	12	2015	UPDATE REPORT	CWM	JAB
0	15	7	2015	INITIAL SUBMITTAL	CWM	JAB

CLIENT LOGO: DUKE ENERGY.

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amec foster wheeler

DATUM:	---
PROJECTION:	---
DRAWN BY:	CSJ
REVIEWED BY:	CWM
SCALE:	AS SHOWN

PROJECT: DAN RIVER LANDFILL
HYDROGEOLOGIC STUDY

TITLE: BEDROCK SURFACE MAP

PROJECT NO.: 7810-14-0065
REVISION NO.: 1
DATE: 12/18/2015
DRAWING NO.: 5

Plotted By:Jordan, Chris Sheet Set:HydroGeo Layout:5 Top of Bedrock December 18, 2015 09:57:53am Q:\Duke\DanRiver\7810140065_ABSAT Dan River Off Site LF\Plansheets\HydroGeo\5 Top of Bedrock.dwg

REFERENCES

1. EXISTING TOPOGRAPHIC INFORMATION WAS PRODUCED FROM PHOTOGRAMMETRIC METHODS FROM AERIAL PHOTOGRAPHY OBTAINED ON FEBRUARY 7, 2014 BY LDSI, INC.
2. EXISTING TOPOGRAPHIC INFORMATION WAS PRODUCED FROM LIGHT DETECTION AND RANGING (LIDAR) OBTAINED FROM NCDOT WEBSITE ON AUGUST 7, 2015.
3. ESTIMATED LONG-TERM SEASONAL HIGH GROUNDWATER CONTOURS SHOWN WERE DERIVED FROM MONTHLY SHALLOW WATER TABLE WELL MEASUREMENTS COLLECTED OVER A TIME PERIOD OF AT LEAST SIX MONTHS. ESTIMATED LONG-TERM SEASON HIGH GROUNDWATER WAS NOT CALCULATED FOR WELLS WITH LESS THAN SIX MONTHS OF WATER LEVEL DATA OR FOR DEEPER AQUIFER WELLS.

LEGEND

- 700 — EXISTING MAJOR CONTOUR (10') [REF. 1]
- EXISTING MINOR CONTOUR (2') [REF. 1]
- 700 — EXISTING MAJOR CONTOUR (10') [REF. 2]
- EXISTING MINOR CONTOUR (2') [REF. 2]
- 700 — ESTIMATED LONG-TERM SEASONAL HIGH GROUNDWATER CONTOUR (5') [REF. 3]
- PROPERTY BOUNDARY
- LOW — LIMIT OF WASTE
- 100-YEAR FLOODPLAIN
- FM — FORCE MAIN SANITARY SEWER PIPE
- G — NATURAL GAS PIPELINE
- G — G — NATURAL GAS PIPELINE (NOT SURVEYED)
- XOW — XOW — OVERHEAD ELECTRIC UTILITY
- EXISTING UTILITY EASEMENT
- x — x — x — FENCE
- VEGETATION BOUNDARY
- PIPES
- S — SEWER MANHOLE
- RIP RAP
- STREAM
- WETLAND
- AMEC FOSTER WHEELER HISTORIC BORING
- AMEC FOSTER WHEELER HYDROGEOLOGIC STUDY LANDFILL BORING
- AMEC FOSTER WHEELER HISTORIC OBSERVATION WELL
- AMEC FOSTER WHEELER HYDROGEOLOGIC STUDY OBSERVATION WELL
- AMEC FOSTER WHEELER HYDROGEOLOGIC STUDY OBSERVATION WELL PAIR
- HDR, INC. GROUNDWATER ASSESSMENT WELL
- HDR, INC. GROUNDWATER ASSESSMENT WELL PAIR
- DUKE ENERGY VOLUNTARY WELL PAIR
- DUKE ENERGY COMPLIANCE WELL PAIR

100 0 100 200 FT

PRELIMINARY
NOT FOR CONSTRUCTION

Courtney W. Murphy SEAL NORTH CAROLINA LICENSED GEOLOGIST COURTNEY WITHERS MURPHY J 2203 12-18-15

REV	D	M	Y	ISSUE/REVISION DESCRIPTION	ENG.	APPR.
1	18	12	2015	UPDATE REPORT	CWM	JAB
0	15	7	2015	INITIAL SUBMITTAL	CWM	JAB

CLIENT LOGO: DUKE ENERGY.

CLIENT: DUKE ENERGY CAROLINAS
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LICENSURE: NC ENG: F-1253 NC GEOLOGY: C-247

amec foster wheeler

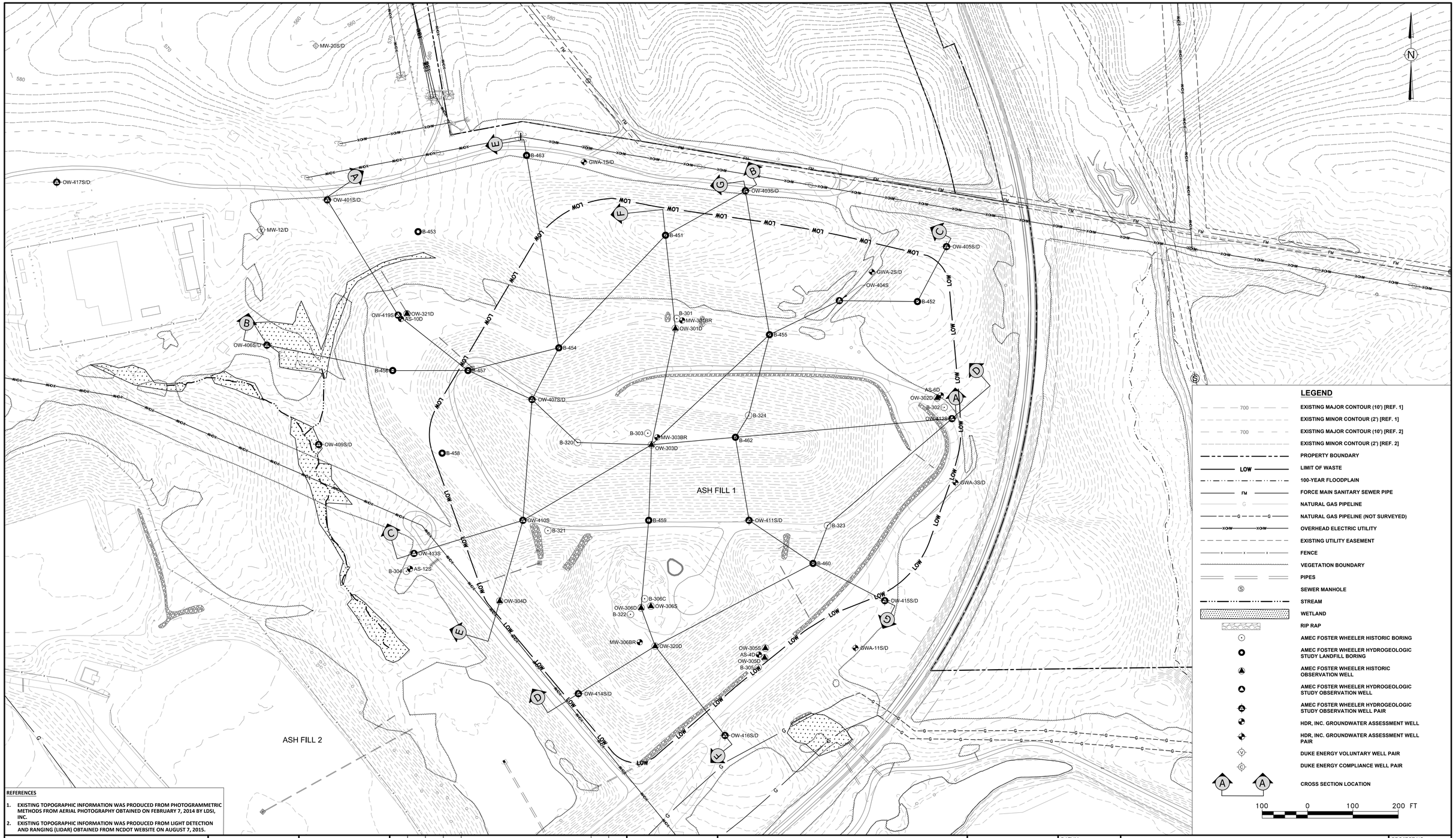
DATUM: ---
PROJECTION: ---
DRAWN BY: CSJ
REVIEWED BY: CWM
SCALE: AS SHOWN

PROJECT: DAN RIVER LANDFILL HYDROGEOLOGIC STUDY

TITLE: ESTIMATED LONG-TERM SEASONAL HIGH GROUNDWATER

PROJECT NO.: 7810-14-0065
REVISION NO. 1
DATE: 12/18/2015
DRAWING NO. 6

Plotted By:Jordan, Chris Sheet Set:HydroGeo Layout:6 Estimated Long-Term Seasonal High Groundwater December 18, 2015 09:58:24am Q:\Duke\DanRiver\7810140065_ABSAT Dan River Off Site LF\Plansheets\HydroGeo\6 Estimated Long-Term Seasonal High Groundwater.dwg



LEGEND

- EXISTING MAJOR CONTOUR (10') [REF. 1]
- EXISTING MINOR CONTOUR (2') [REF. 1]
- EXISTING MAJOR CONTOUR (10') [REF. 2]
- EXISTING MINOR CONTOUR (2') [REF. 2]
- PROPERTY BOUNDARY
- LIMIT OF WASTE
- 100-YEAR FLOODPLAIN
- FORCE MAIN SANITARY SEWER PIPE
- NATURAL GAS PIPELINE
- NATURAL GAS PIPELINE (NOT SURVEYED)
- OVERHEAD ELECTRIC UTILITY
- EXISTING UTILITY EASEMENT
- FENCE
- VEGETATION BOUNDARY
- PIPES
- SEWER MANHOLE
- STREAM
- WETLAND
- RIP RAP
- AMEC FOSTER WHEELER HISTORIC BORING
- AMEC FOSTER WHEELER HYDROGEOLOGIC STUDY LANDFILL BORING
- AMEC FOSTER WHEELER HISTORIC OBSERVATION WELL
- AMEC FOSTER WHEELER HYDROGEOLOGIC STUDY OBSERVATION WELL
- AMEC FOSTER WHEELER HYDROGEOLOGIC STUDY OBSERVATION WELL PAIR
- HDR, INC. GROUNDWATER ASSESSMENT WELL
- HDR, INC. GROUNDWATER ASSESSMENT WELL PAIR
- DUKE ENERGY VOLUNTARY WELL PAIR
- DUKE ENERGY COMPLIANCE WELL PAIR
- CROSS SECTION LOCATION

100 0 100 200 FT

REFERENCES

1. EXISTING TOPOGRAPHIC INFORMATION WAS PRODUCED FROM PHOTOGRAMMETRIC METHODS FROM AERIAL PHOTOGRAPHY OBTAINED ON FEBRUARY 7, 2014 BY LDSI, INC.
2. EXISTING TOPOGRAPHIC INFORMATION WAS PRODUCED FROM LIGHT DETECTION AND RANGING (LIDAR) OBTAINED FROM NCDOT WEBSITE ON AUGUST 7, 2015.

PRELIMINARY
NOT FOR CONSTRUCTION

Courtney W. Murphy SEAL 2203 NORTH CAROLINA LICENSED GEOLOGIST COURTNEY WITHERS MURPHY 12-18-15

REV	D	M	Y	ISSUE/REVISION DESCRIPTION	ENG.	APPR.
1	18	12	2015	UPDATE REPORT	CWM	JAB
0	15	7	2015	INITIAL SUBMITTAL	CWM	JAB

CLIENT LOGO: DUKE ENERGY.

CLIENT: DUKE ENERGY CAROLINAS
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LICENSURE: NC ENG: F-1253 NC GEOLOGY: C-247

amec foster wheeler

DATUM:	---
PROJECTION:	---
DRAWN BY:	CSJ
REVIEWED BY:	CWM
SCALE:	AS SHOWN

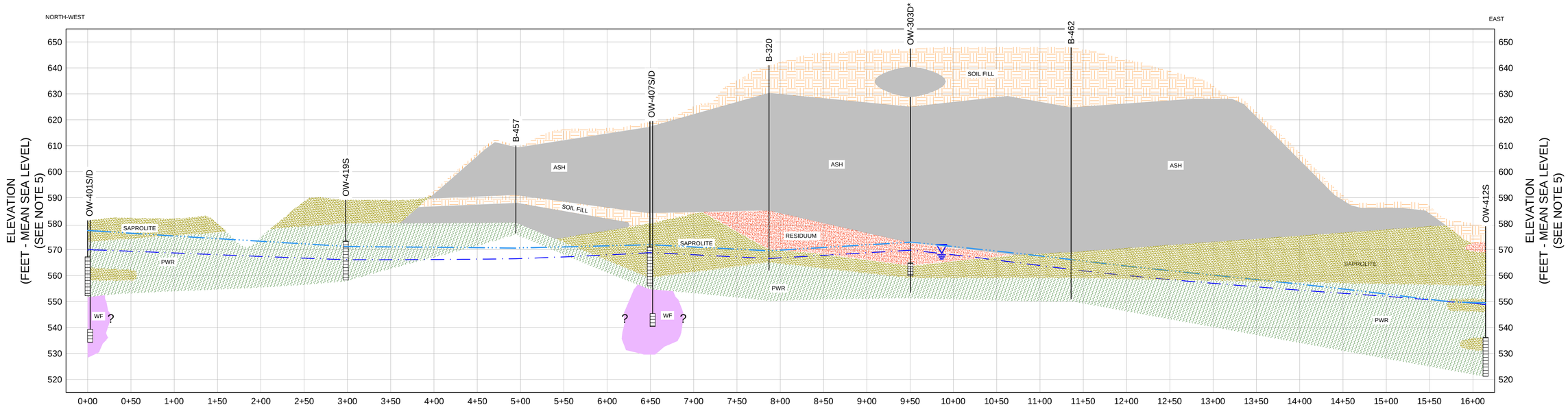
PROJECT: DAN RIVER LANDFILL HYDROGEOLOGIC STUDY

TITLE: HYDROGEOLOGIC CROSS-SECTION PLAN

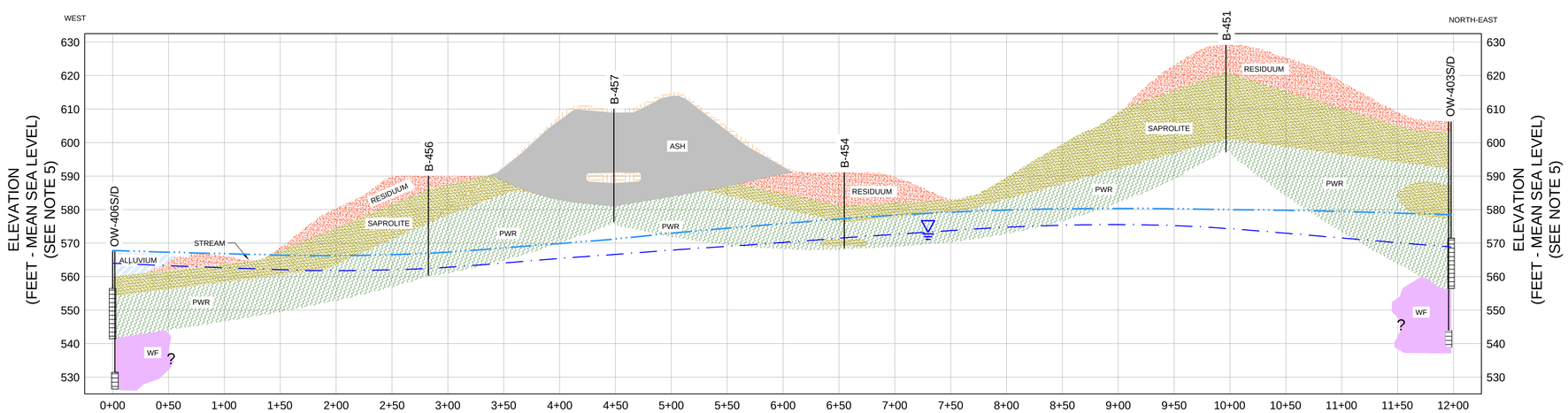
PROJECT NO.: 7810-14-0065
REVISION NO.: 1
DATE: 12/18/2015
DRAWING NO.: 7

Plotted By:Jordan, Chris Sheet Set:HydroGeo Layout:7 Hydrogeologic Cross Section Plan December 18, 2015 09:59:04am Q:\Duke\DanRiver\7810140065_ASSAT Dan River Off Site LF\Plansheets\HydroGeo\7 Hydrogeologic Cross Section Plan.dwg

CROSS SECTION A-A'



CROSS SECTION B-B'



LEGEND

- SHALLOW GROUNDWATER POTENTIOMETRIC SURFACE (SEE NOTE 1)
- ESTIMATED LONG-TERM SEASONAL HIGH GROUNDWATER SURFACE (SEE NOTE 2)
- SOIL FILL
- ASH FILL
- ALLUVIUM
- RESIDUUM
- SAPROLITE
- PARTIALLY WEATHERED ROCK (PWR) (SEE NOTE 3)
- WEATHERED/FRACTURED ROCK (WF) (SEE NOTE 4)

NOTE 1: DERIVED FROM SEPTEMBER 15, 2015 GROUNDWATER CONTOURS DEPICTED ON DRAWING 4
NOTE 2: DERIVED FROM GROUNDWATER CONTOURS DEPICTED ON DRAWING 6.
NOTE 3: SAPROLITE AND WEATHERED ROCK WITH STANDARD PENETRATION RESISTANCE OF N<100
NOTE 4: ROCK BELOW AUGER REFUSAL THAT WAS PENETRATED WITH TRI-CONE ROLLER BIT AND/OR ROCK CORE RECOVERY <50% AND/OR ROCK QUALITY DESIGNATION <50%
NOTE 5: CROSS SECTIONS SHOWN AT A HORIZONTAL SCALE OF 1"=60' AND VERTICAL SCALE OF 1"=20' (VERTICAL EXAGGERATION = 3)
*LITHOLOGY IS FROM CORRESPONDING BORING B-303
*LITHOLOGY IS FROM CORRESPONDING BORING OW-404D (IN WHICH A WELL WAS NOT INSTALLED.)

PRELIMINARY
NOT FOR CONSTRUCTION

REV	D	M	Y	ISSUE/REVISION DESCRIPTION	ENG.	APPR.
1	18	12	2015	UPDATE REPORT	CWM	JAB
0	15	7	2015	INITIAL SUBMITTAL	CWM	JAB

CLIENT LOGO: DUKE ENERGY.

CLIENT: DUKE ENERGY CAROLINAS
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TEL: (704) 357-8600 FAX: (704) 357-8638
LICENSURE: NC ENG: F-1253 NC GEOLOGY: C-247

DATUM: ---
PROJECTION: ---
DRAWN BY: CSJ
REVIEWED BY: CWM
SCALE: AS SHOWN

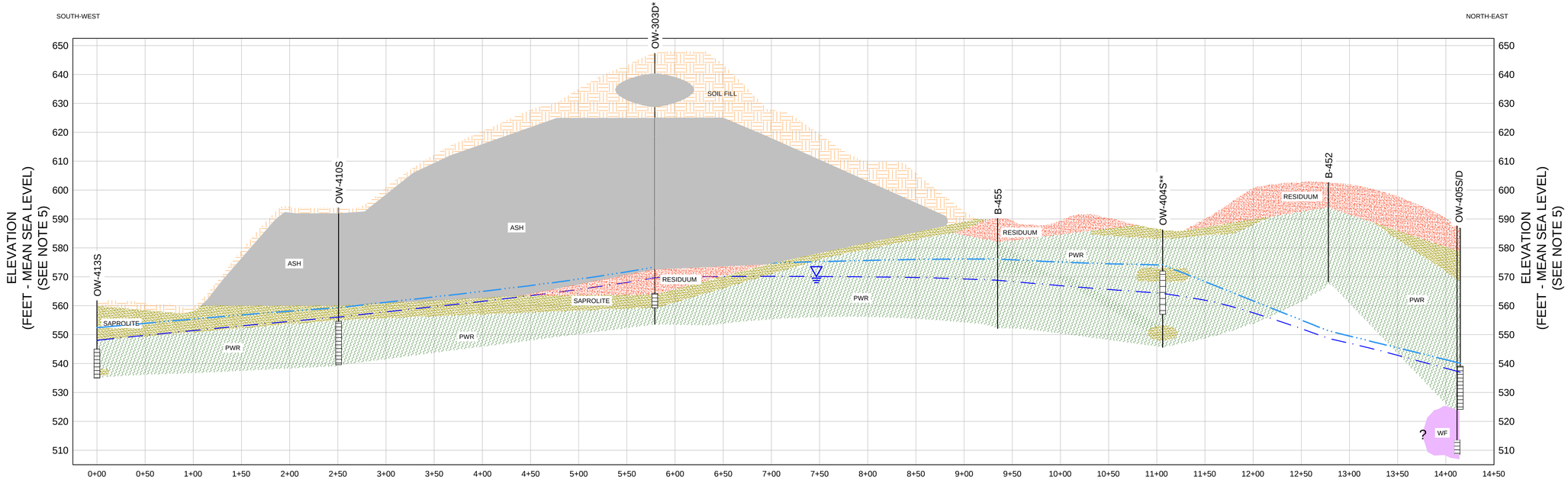
PROJECT: DAN RIVER LANDFILL HYDROGEOLOGIC STUDY

TITLE: CROSS SECTIONS A-A' AND B-B'

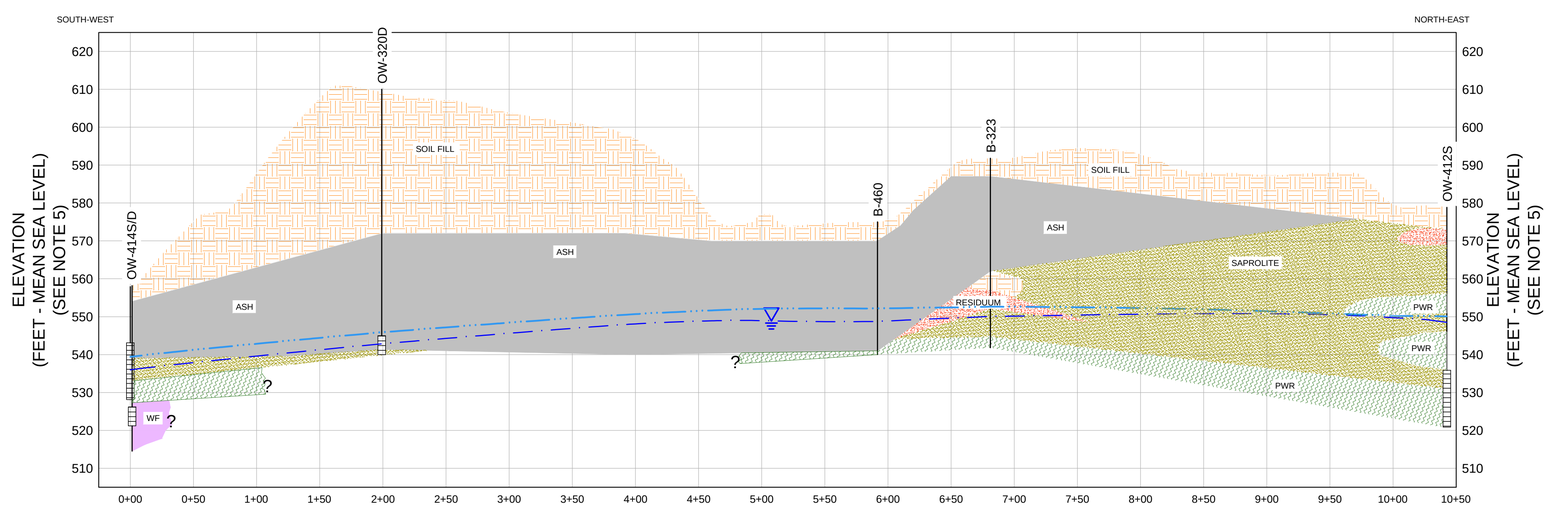
PROJECT NO.: 7810-14-0065
REVISION NO. 1
DATE: 12/18/2015
DRAWING NO. 8

Plotted By:Jordan, Chris Sheet Set:HydroGeo Layout:Sections 1 December 18, 2015 09:59:31am Q:\Duke\DanRiver\7810140065_ABSAT Dan River Off Site LF\Plansheets\HydroGeo\Geologic Sections.dwg

CROSS SECTION C-C'



CROSS SECTION D-D'



LEGEND

- SHALLOW GROUNDWATER POTENTIOMETRIC SURFACE (SEE NOTE 1)
- ESTIMATED LONG-TERM SEASONAL HIGH GROUNDWATER SURFACE (SEE NOTE 2)
- SOIL FILL
- ASH FILL
- ALLUVIUM
- RESIDUUM
- SAPROLITE
- PARTIALLY WEATHERED ROCK (PWR) (SEE NOTE 3)
- WEATHERED/FRACTURED ROCK (WF) (SEE NOTE 4)

NOTE 1: DERIVED FROM SEPTEMBER 15, 2015 GROUNDWATER CONTOURS DEPICTED ON DRAWING 4
NOTE 2: DERIVED FROM GROUNDWATER CONTOURS DEPICTED ON DRAWING 5
NOTE 3: SAPROLITE AND WEATHERED ROCK WITH STANDARD PENETRATION RESISTANCE OF N>100
NOTE 4: ROCK BELOW AUGER REFUSAL THAT WAS PENETRATED WITH TRI-CONE ROLLER BIT AND/OR ROCK CORE RECOVERY <50% AND/OR ROCK QUALITY DESIGNATION <50%
NOTE 5: CROSS SECTIONS SHOWN AT A HORIZONTAL SCALE OF 1"=60' AND VERTICAL SCALE OF 1"=20' (VERTICAL EXAGGERATION = 3)
*LITHOLOGY IS FROM CORRESPONDING BORING B-303
**LITHOLOGY IS FROM CORRESPONDING BORING OW-404D (IN WHICH A WELL WAS NOT INSTALLED)

40 FT
20
0
20
60 0 60 120 FT

PRELIMINARY
NOT FOR CONSTRUCTION

Courtney W. Marshall
NORTH CAROLINA PROFESSIONAL SEAL 2203 GEOLOGIST COURTNEY WYNNE MARSHALL
12/18/15

REV	D	M	Y	ISSUE/REVISION DESCRIPTION	ENG.	APPR.
1	18	12	2015	UPDATE REPORT	CWM	JAB
0	15	7	2015	INITIAL SUBMITTAL	CWM	JAB

CLIENT LOGO: DUKE ENERGY.

CLIENT: DUKE ENERGY CAROLINAS
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LICENSURE: NC ENG: F-1253 NC GEOLOGY: C-247

amec foster wheeler

DATUM: ---
PROJECTION: ---
DRAWN BY: CSJ
REVIEWED BY: CWM
SCALE: AS SHOWN

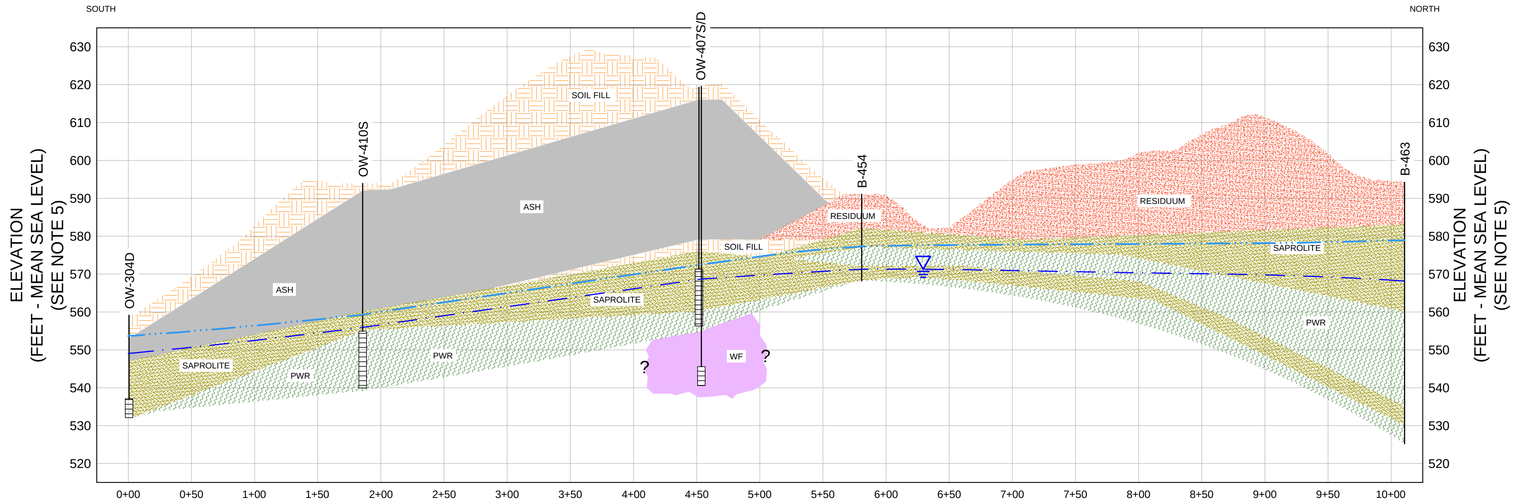
PROJECT: DAN RIVER LANDFILL HYDROGEOLOGIC STUDY

TITLE: CROSS SECTIONS C-C' AND D-D'

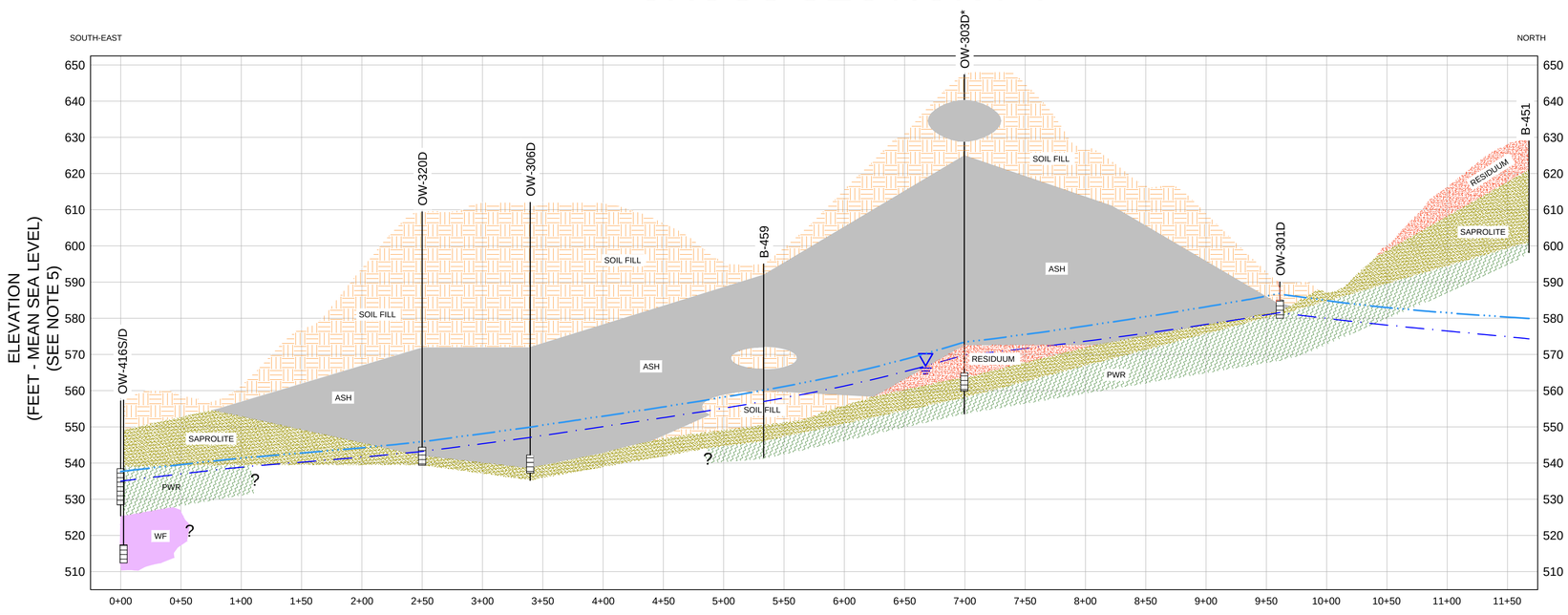
PROJECT NO.: 7810-14-0065
REVISION NO. 1
DATE: 12/18/2015
DRAWING NO. 9

Plotted By: Jordan, Chris Sheet Set: HydroGeo Layout: Sections 2 December 18, 2015 09:59:39am Q:\Duke\DanRiver\78\0140065_ABSAT Dan River Off Site LF\Plansheets\HydroGeo\Geologic Sections.dwg

CROSS SECTION E-E'



CROSS SECTION F-F'



LEGEND

- SHALLOW GROUNDWATER POTENTIOMETRIC SURFACE (SEE NOTE 1)
- ESTIMATED LONG-TERM SEASONAL HIGH GROUNDWATER SURFACE (SEE NOTE 2)
- SOIL FILL
- ASH FILL
- ALLUVIUM
- RESIDUUM
- SAPROLITE
- PARTIALLY WEATHERED ROCK (PWR) (SEE NOTE 3)
- WEATHERED/FRACTURED ROCK (WF) (SEE NOTE 4)

40 FT
20
0
20

60 0 60 120 FT

NOTE 1: DERIVED FROM SEPTEMBER 15, 2015 GROUNDWATER CONTOURS DEPICTED ON DRAWING 4
NOTE 2: DERIVED FROM GROUNDWATER CONTOURS DEPICTED ON DRAWING 4
NOTE 3: SAPROLITE AND WEATHERED ROCK WITH STANDARD PENETRATION RESISTANCE OF N<100
NOTE 4: WEATHERED ROCK WITH AUGER REFUSAL OR STANDARD PENETRATION RESISTANCE OF N>100 OR CONE ROLLER BIT AND/OR ROCK CORE RECOVERY <50% AND/OR ROCK QUALITY DESIGNATION <50%
NOTE 5: CROSS SECTIONS SHOWN AT A HORIZONTAL SCALE OF 1"=60' AND VERTICAL SCALE OF 1"=20' (VERTICAL EXAGGERATION = 3)
*LITHOLOGY IS FROM CORRESPONDING BORING B-303
*LITHOLOGY IS FROM CORRESPONDING BORING OW-404D (IN WHICH A WELL WAS NOT INSTALLED.)

PRELIMINARY
NOT FOR CONSTRUCTION

Courtney W. Mashburn SEAL 2203 NORTH CAROLINA PROFESSIONAL GEOLOGIST COURTNEY WARREN MASHBURN 12-18-15

REV	D	M	Y	ISSUE/REVISION DESCRIPTION	ENG.	APPR.
1	18	12	2015	UPDATE REPORT	CWM	JAB
0	15	7	2015	INITIAL SUBMITTAL	CWM	JAB

CLIENT LOGO: DUKE ENERGY.

CLIENT: DUKE ENERGY CAROLINAS
ROCKINGHAM COUNTY, NC

Amec Foster Wheeler Environment & Infrastructure, Inc.
2801 YORKMONT ROAD, SUITE 100
CHARLOTTE, NC 28208
TEL: (704) 357-8600 FAX: (704) 357-8638
LICENSURE: NC ENG: F-1253 NC GEOLOGY: C-247

amec foster wheeler

DATUM: ---
PROJECTION: ---
DRAWN BY: CSJ
REVIEWED BY: CWM
SCALE: AS SHOWN

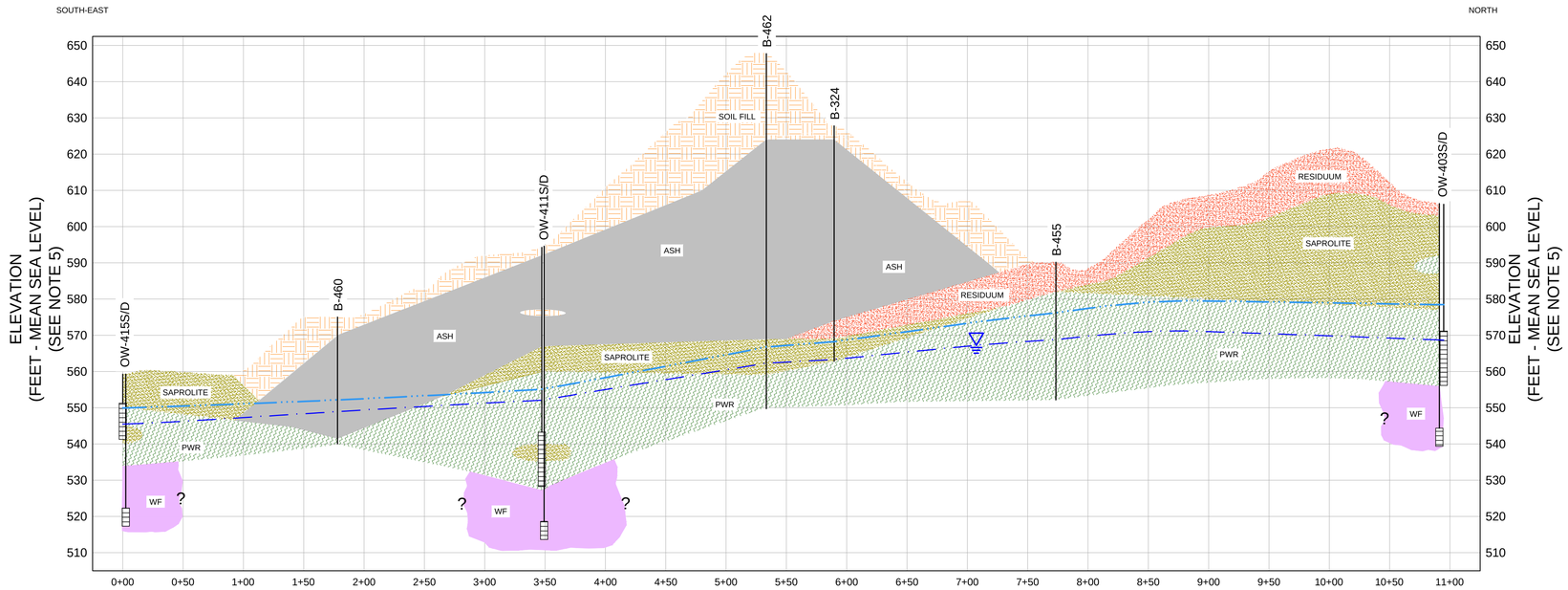
PROJECT: DAN RIVER LANDFILL HYDROGEOLOGIC STUDY

TITLE: CROSS SECTIONS E-E' AND F-F'

PROJECT NO.: 7810-14-0065
REVISION NO. 1
DATE: 12/18/2015
DRAWING NO. 10

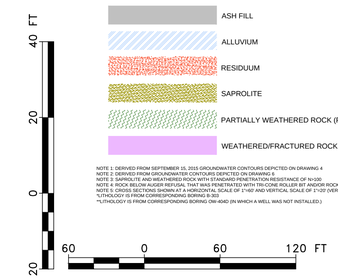
Plotted By:Jordan, Chris Sheet Set:HydroGeo Layout:Sections 3 December 18, 2015 09:59:49am Q:\Duke\DanRiver\7810140065_ABSAT Dan River Off Site LF\Plansheets\HydroGeo\Geologic Sections.dwg

CROSS SECTION G-G'



LEGEND

- SHALLOW GROUNDWATER POTENTIOMETRIC SURFACE (SEE NOTE 1)
- ESTIMATED LONG-TERM SEASONAL HIGH GROUNDWATER SURFACE (SEE NOTE 2)
- SOIL FILL
- ASH FILL
- ALLUVIUM
- RESIDUUM
- SAPROLITE
- PARTIALLY WEATHERED ROCK (PWR) (SEE NOTE 3)
- WEATHERED/FRACTURED ROCK (WF) (SEE NOTE 4)



NOTE 1: DERIVED FROM SEPTEMBER 15, 2015 GROUNDWATER CONTOURS DEPICTED ON DRAWING 4
NOTE 2: DERIVED FROM GROUNDWATER CONTOURS DEPICTED ON DRAWING 6
NOTE 3: ROCK BELOW AUGER REFUSAL THAT WAS PENETRATED WITH REDUCED PENETRATION RESISTANCE OF N=100
NOTE 4: ROCK BELOW AUGER REFUSAL THAT WAS PENETRATED WITH TRI-CONE ROLLER BIT AND/OR ROCK CORE RECOVERY <50% AND/OR ROCK QUALITY DESIGNATION <50%
NOTE 5: CROSS SECTIONS SHOWN AT A HORIZONTAL SCALE OF 1"=50' AND VERTICAL SCALE OF 1"=20' (VERTICAL EXAGGERATION = 3)
*LITHOLOGY IS FROM CORRESPONDING BORING B-302
**LITHOLOGY IS FROM CORRESPONDING BORING OW-404D (IN WHICH A WELL WAS NOT INSTALLED.)

PRELIMINARY
NOT FOR CONSTRUCTION

Courtney W. Marshall
NORTH CAROLINA LICENSED GEOLOGIST SEAL 2203 COURTNEY WYNNE MARSHALL
12-18-15

REV	D	M	Y	ISSUE/REVISION DESCRIPTION	ENG.	APPR.
1	18	12	2015	UPDATE REPORT	CWM	JAB
0	15	7	2015	INITIAL SUBMITTAL	CWM	JAB

CLIENT LOGO: DUKE ENERGY.

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CHARLOTTE, NC 28208
TEL: (704) 357-8600 FAX: (704) 357-8638
LICENSURE: NC ENG: F-1253 NC GEOLOGY: C-247

amec foster wheeler

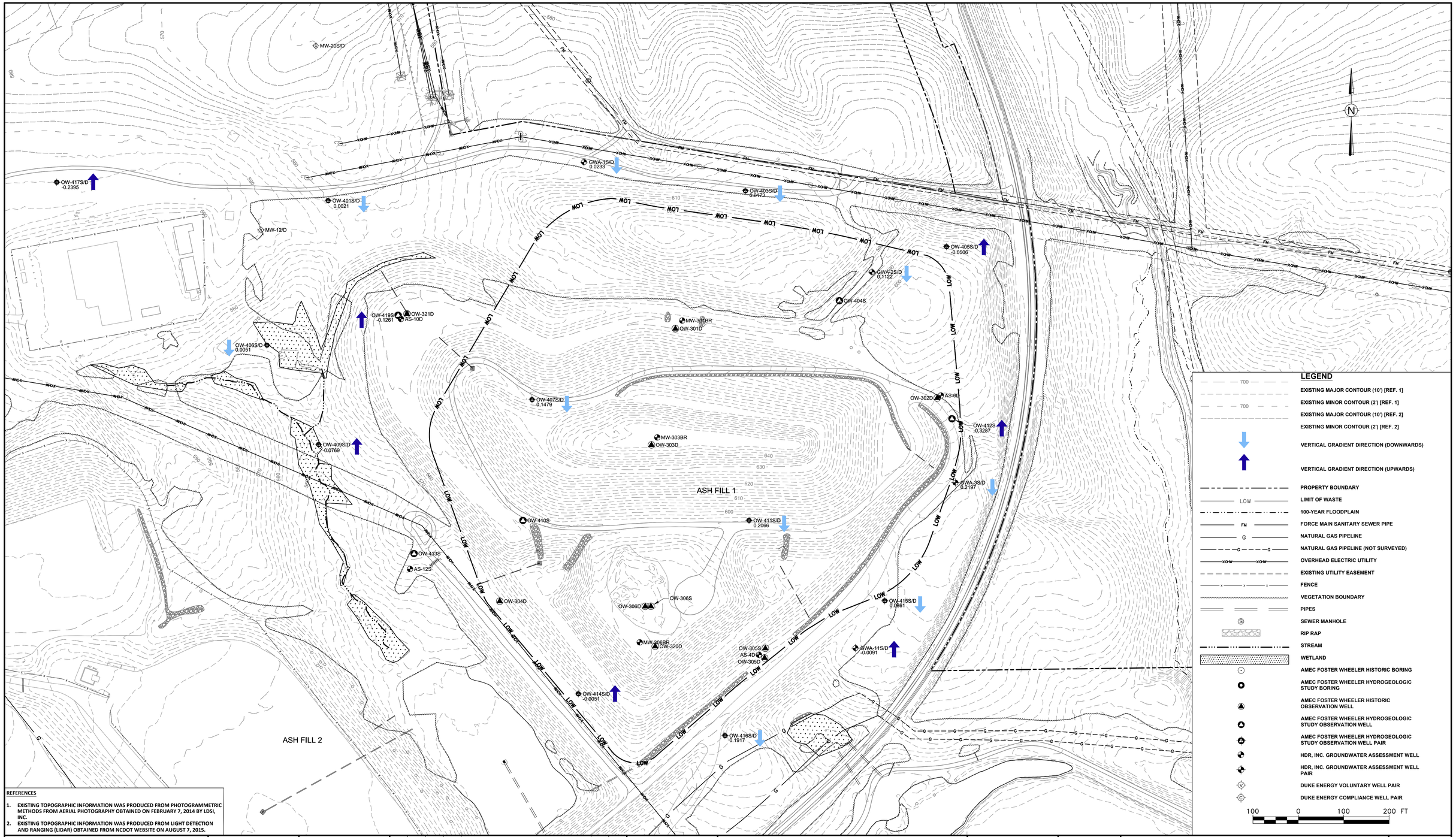
DATUM: ---
PROJECTION: ---
DRAWN BY: CSJ
REVIEWED BY: CWM
SCALE: AS SHOWN

PROJECT: DAN RIVER LANDFILL
HYDROGEOLOGIC STUDY

TITLE: CROSS SECTION G-G'

PROJECT NO.: 7810-14-0065
REVISION NO. 1
DATE: 12/18/2015
DRAWING NO. 11

Plotted By: Jordan, Chris Sheet Set: HydroGeo Layout: Sections 4 December 18, 2015 09:59:58am Q:\Duke\DanRiver\7810140065_ABSAT Dan River Off Site LF\Plansheets\HydroGeo\Geologic Sections.dwg



REFERENCES

1. EXISTING TOPOGRAPHIC INFORMATION WAS PRODUCED FROM PHOTOGRAMMETRIC METHODS FROM AERIAL PHOTOGRAPHY OBTAINED ON FEBRUARY 7, 2014 BY LDSI, INC.
2. EXISTING TOPOGRAPHIC INFORMATION WAS PRODUCED FROM LIGHT DETECTION AND RANGING (LIDAR) OBTAINED FROM NCDOT WEBSITE ON AUGUST 7, 2015.

PRELIMINARY
NOT FOR CONSTRUCTION

Courtney W. Murphy SEAL 2203 NORTH CAROLINA LICENSED GEOLOGIST COURTNEY WITHERS MURPHY 12-18-15

REV	D	M	Y	ISSUE/REVISION DESCRIPTION	ENG.	APPR.
1	18	12	2015	UPDATE REPORT	CWM	JAB
0	15	7	2015	INITIAL SUBMITTAL	CWM	JAB

CLIENT LOGO: DUKE ENERGY.

CLIENT: DUKE ENERGY CAROLINAS
ROCKINGHAM COUNTY, NC

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CHARLOTTE, NC 28208
TEL: (704) 357-8600 FAX: (704) 357-8638
LICENSURE: NC ENG: F-1253 NC GEOLOGY: C-247

amec foster wheeler

DATUM:	---
PROJECTION:	---
DRAWN BY:	CSJ
REVIEWED BY:	CWM
SCALE:	AS SHOWN

PROJECT: DAN RIVER LANDFILL HYDROGEOLOGIC STUDY

TITLE: GROUNDWATER VERTICAL GRADIENTS SEPTEMBER 15, 2015

PROJECT NO.: 7810-14-0065
REVISION NO. 1
DATE: 12/18/2015
DRAWING NO. 12

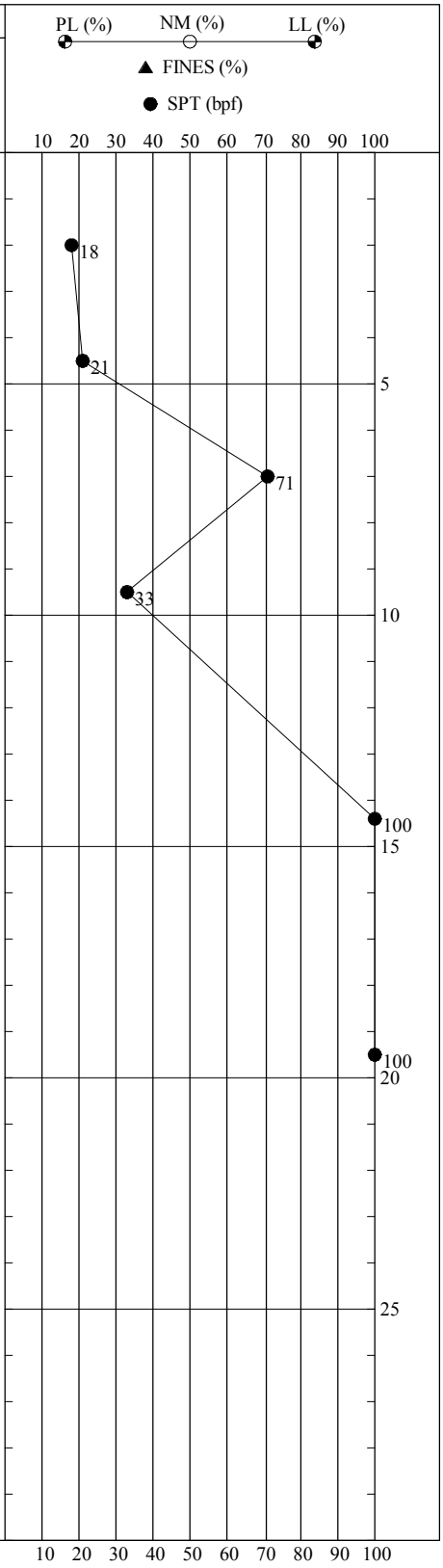
Plotted By:Jordan, Chris Sheet Set:HydroGeo Layout:12 Vertical Gradient - September 15 2015 December 18, 2015 10:00:33am Q:\Duke\DanRiver\7810140065_ABSAT Dan River Off Site LF\Plansheets\HydroGeo\12 Vertical Gradient - September 15, 2015.dwg

APPENDICES

APPENDIX I

Boring Logs, Well Logs and Rock Core Photo Logs

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	N-COUNT 1st 6" 2nd 6" 3rd 6"
0	FILL - brownish yellow (10YR 6/8), slightly fine sandy SILT (ML), stiff, trace black (2.5/N), trace very pale brown (10YR 8/2).		590.0			
				SS-1		5-8-10
				SS-2		5-7-14
5			585.0			
	FILL - light yellowish brown (3Y 6/4) with very dark gray (3/N) and red (2.5YR 5/7) SILT (ML), dry, hard.			SS-3		6-26-45
	FILL - brown (7.5YR 4/3), light brown (3Y 6/5), with black (2.5/Y), slightly fine sandy SILT (ML), trace wood, black slag in base.			SS-4		7-15-18
10			580.0			
	PARTIALLY WEATHERED ROCK sampled as - light olive brown (2.5Y 5/4), black (2.5N) fine to coarse sandy SILT (ML), dry, hard, with rock fragments.			SS-5		9-50/4"
15			575.0			
				SS-6		15-33-50/4.5"
20	Auger Refusal at 19.9 feet. Boring Terminated at 19.9 feet.		570.0			
25			565.0			
30			560.0			



AUGER BORING DDRSSAPC BORING LOGS.GPJ 7/13/15

DRILLER: Mark Ireland
EQUIPMENT: Diedrich D120 # 1503105
METHOD: Hollow Stem Auger
HOLE DIA.: 8 inch
REMARKS: 24-hour water level not measured

PREPARED BY: M. Harvey
CHECKED BY: J. Starnes

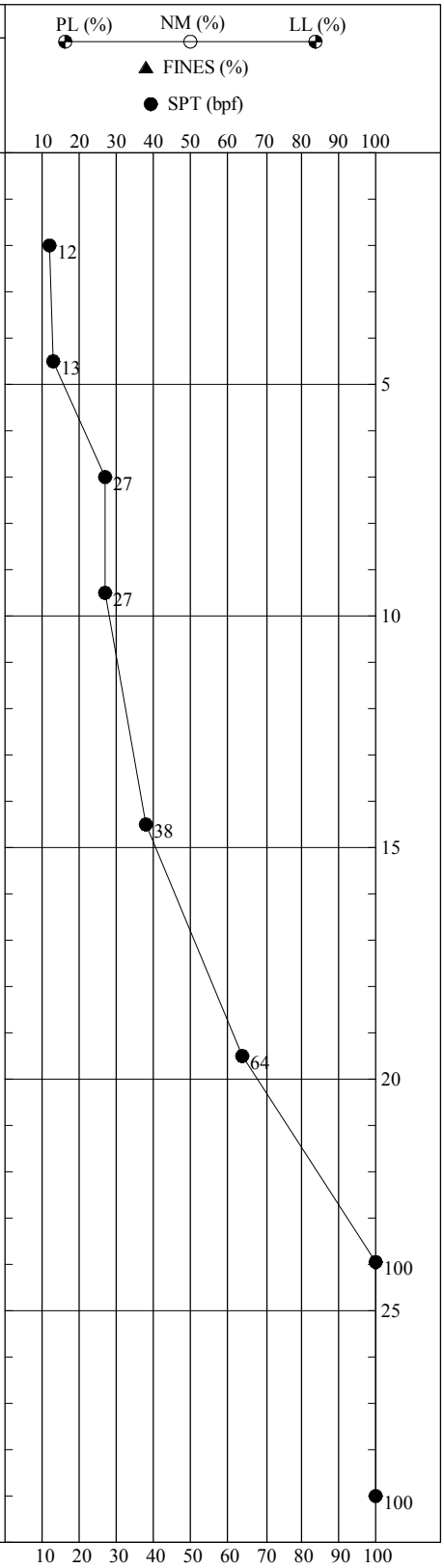
THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BETWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

AUGER BORING RECORD

PROJECT: Duke - Dan River Steam Station **BORING NO.:** B-301
COORD N: 36.495600
COORD E: -79.715300
DRILLED: June 19, 2013
PROJ. NO.: 6226-13-0002 **PAGE** 1 **OF** 1

MACTEC Engineering & Consulting, Inc.

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	N-COUNT 1st 6" 2nd 6" 3rd 6"
0	FILL - yellowish red (5YR 5/7) slightly fine sandy slightly clayey SILT (ML), moist, stiff.		581.6			
	Hollow Stem Auger (8 inches diameter) from 0 to 3.5 feet. Set casing and begin wash drilling with 4 inches diameter tricone roller bit.			SS-1		5-6-6
	FILL - strong brown (7.5YR 5/8) slightly fine sandy slightly micaceous SILT (ML), dry to moist, trace coarse sand, trace black (2.5/N).			SS-2		4-6-7
5			576.6			
	FILL - pale yellow (2.5Y 7/3), yellowish red (5YR 5/6) and very dark gray (3/N) silty SAND (SM), moist, very firm, trace clay, color in lenses not mottling.			SS-3		10-9-18
	FILL - reddish yellow (7.5 YR 6/8) light gray (7/N) and trace black (2.5/N) slightly fine sandy SILT (ML) dry, very stiff.			SS-4		5-11-16
10			571.6			
	UD-1, bottom of tube damaged, 15.5 inches recovery.			UD-1		
	FILL - reddish yellow (8YR 6/7) light gray (7/N), dark red (2.5YR 3/6) and black (2.5/N) slightly clayey, slightly fine sandy SILT (ML) dry, hard.			SS-5		9-15-23
15			566.6			
	UD-2, bottom of tube damaged, 5 inches recovery.			UD-2		
	FILL - yellowish brown (9YR 5/5) and black (2.5/N), slightly micaceous SILT (ML), trace very fine sand, dry, hard.			SS-6		21-30-34
20			561.6			
	UD-3, tube refused after 7 inches penetration, 6 inches recovery.			UD-3		
	PARTIALLY WEATHERED ROCK sampled as - dark gray (10YR 4/1) slightly fine sandy micaceous SILT (ML), hard.			SS-7		50/5"
25			556.6			
	PARTIALLY WEATHERED ROCK sampled as - dark grayish brown (2.5Y 3.5/1.5) SILT (ML).					
	Refusal at 29 feet. Boring Terminated at 29 feet.			SS-8		50/6"
30			551.6			



AUGER BORING DDRSSAPC BORING LOGS.GPJ 7/13/15

DRILLER: Mark Ireland
EQUIPMENT: Diedrich D120 # 1503105
METHOD: Hollow Stem Auger / Rotary Wash
HOLE DIA.: 8 inch / 4 inch
REMARKS: 24-hour water level not measured

PREPARED BY: M. Harvey
CHECKED BY: J. Starnes

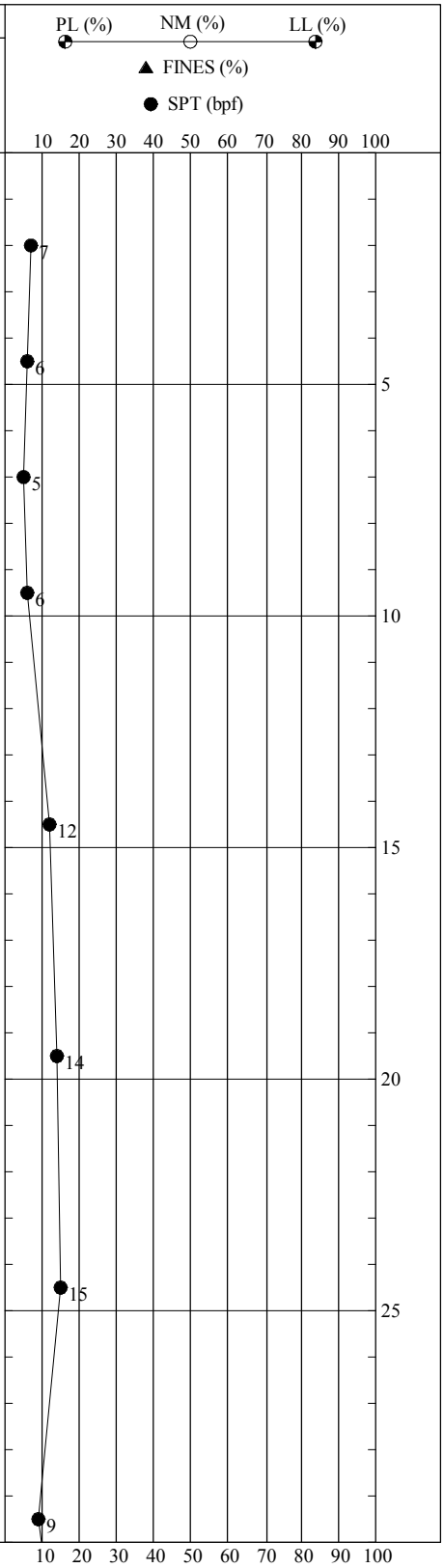
THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BETWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

AUGER BORING RECORD

PROJECT: Duke - Dan River Steam Station **BORING NO.:** B-302
COORD N: 36.495100
COORD E: -79.713300
DRILLED: June 4, 2013
PROJ. NO.: 6226-13-0002 **PAGE** 1 **OF** 1

MACTEC Engineering & Consulting, Inc.

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	N-COUNT 1st 6" 2nd 6" 3rd 6"	PL (%) NM (%) LL (%) ▲ FINES (%) ● SPT (bpf)
0	FILL - dark grayish brown (2.5Y 4/2) slightly fine to coarse sandy clayey SILT (CL), moist, firm, with wood and debris.		647.2				
	Hollow Stem Auger (8 inches diameter) from 0 to 28.5 feet.			SS-1		3-3-4	7
	Auger grinding, difficult drilling from 4 to 5 feet.			SS-2		3-2-4	6
5			642.2				
	FILL - dark yellowish brown (10YR 4/4) fine sandy clayey SILT (ML), moist, firm, with wood and debris.						
	ASH - dark gray (10YR 5/1) silty fine sand (SM) moist, loose, trace wood and debris.			SS-3		2-2-3	5
				SS-4		2-3-3	6
10	ASH/FILL - very dark gray (3/N) and dark grayish brown (2.5Y 4/2) silty fine SAND (SM) and slightly fine sandy clayey SILT (MH)		637.2				
	FILL/ASH - dark gray (4/N) brown (10YR 5/3) fine sandy clayey SILT (MH)						
	FILL/ASH - strong brown (8YR 5/8) fine sandy SILT (ML), dry, stiff.			SS-5		5-6-6	12
15			632.2				
	FILL - gray (5/N), dark grayish brown (10YR 4/2), light olive brown (2Y 4/3) slightly gravelly fine to coarse sandy clayey SILT (ML), moist, stiff, with abundant wood and debris. Wood has odor.			SS-6		6-6-8	14
20			627.2				
	ASH - dark gray (4/N) silty fine SAND (SM)			SS-7		5-7-8	15
25			622.2				
	Set casing and attempt wash drilling with 4 inches diameter tricone roller bit. No drilling fluid return. Resume auger drilling.						
	ASH - dark gray (4/N), SILT (ML) dry, stiff.			SS-8		5-4-5	9
30			617.2				



AUGER BORING DDRSSAPC BORING LOGS.GPJ 7/13/15

DRILLER: Mark Ireland
EQUIPMENT: Diedrich D120 # 1503105
METHOD: Hollow Stem Auger
HOLE DIA.: 8 inch
REMARKS: 24-hour water level not measured

PREPARED BY: M. Harvey
CHECKED BY: J. Starnes

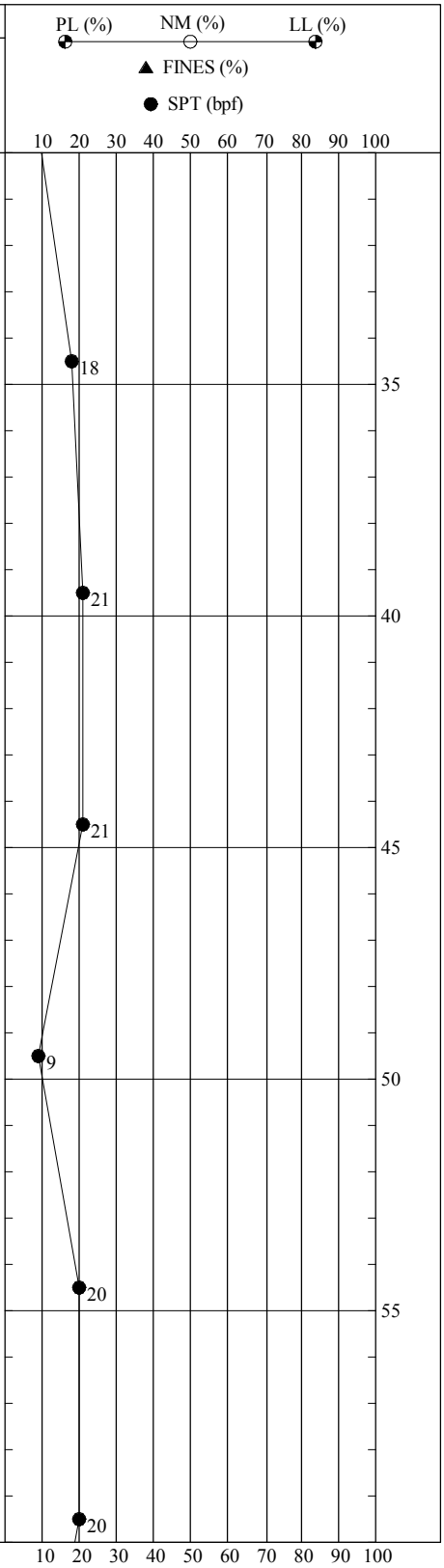
THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BETWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

AUGER BORING RECORD

PROJECT: Duke - Dan River Steam Station **BORING NO.:** B-303
COORD N: 36.494900
COORD E: -79.715500
DRILLED: June 25, 2013
PROJ. NO.: 6226-13-0002 **PAGE** 1 **OF** 4

MACTEC Engineering & Consulting, Inc.

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	N-COUNT 1st 6" 2nd 6" 3rd 6"	PL (%) NM (%) LL (%) ▲ FINES (%) ● SPT (bpf)
30			617.2				
	ASH - dark gray (4/N) silty fine SAND (SM) dry, firm.			SS-9		7-8-10	18
35			612.2				
	UD-1, 24 inches recovery.			UD-1			
	ASH - dark gray (4/N) silty fine SAND (SM) dry, very firm.			SS-10		4-9-12	21
40			607.2				
	ASH - dark gray (4/N) silt with SAND (ML), dry, very firm, trace gravel sized slag.			SS-11		10-11-10	21
45			602.2				
	UD-2, 24 inches recovery.			UD-2			
	ASH - dark gray (4/N) silty fine SAND (SM) dry, firm			SS-12		3-4-5	9
50			597.2				
	ASH - dark gray (4/N) silty fine SAND (SM) dry, firm			SS-13		10-9-11	20
55			592.2				
	ASH - dark gray (4/N) with gray (6/N) at base, SILT (ML) dry, very stiff.			SS-14		11-10-10	20
60			587.2				



AUGER BORING DDRSSAPC BORING LOGS.GPJ 7/13/15

DRILLER: Mark Ireland
EQUIPMENT: Diedrich D120 # 1503105
METHOD: Hollow Stem Auger
HOLE DIA.: 8 inch
REMARKS: 24-hour water level not measured

PREPARED BY: M. Harvey
CHECKED BY: J. Starnes

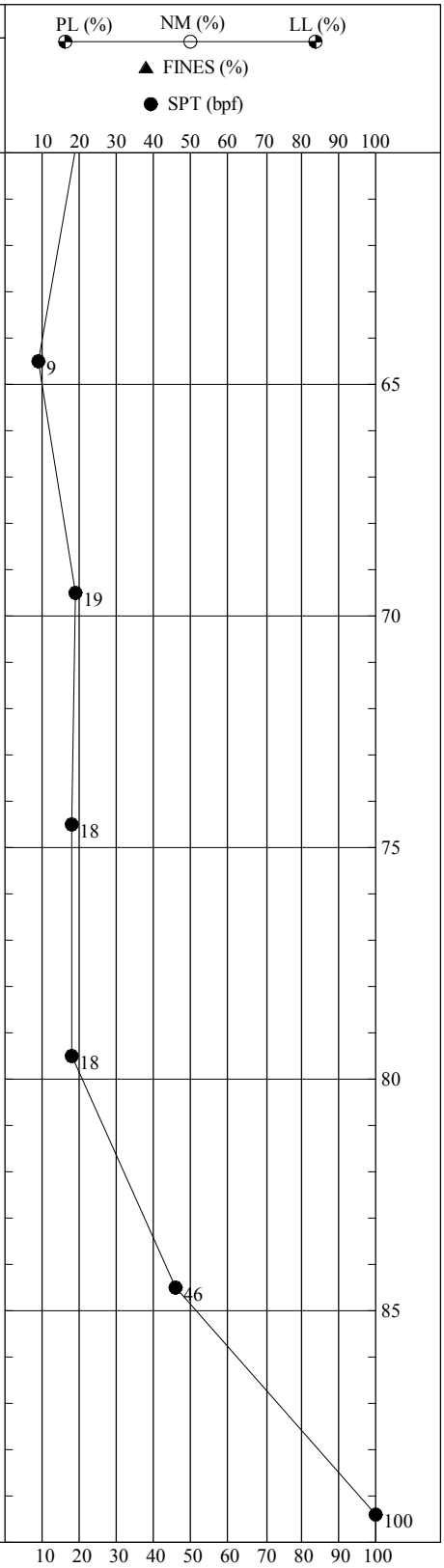
THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BETWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

AUGER BORING RECORD

PROJECT: Duke - Dan River Steam Station **BORING NO.:** B-303
COORD N: 36.494900
COORD E: -79.715500
DRILLED: June 25, 2013
PROJ. NO.: 6226-13-0002

MACTEC Engineering & Consulting, Inc.

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	N-COUNT 1st 6" 2nd 6" 3rd 6"	PL (%) NM (%) LL (%) ▲ FINES (%) ● SPT (bpf)
60			587.2				
	ASH - dark gray (4/N) silty fine sand (SM) moist, loose.			SS-15		3-4-5	9
65			582.2				
	ASH - dark gray (3/N) to gray (5/N) fine to very fine sand (SM) moist to wet, firm, trace water in spoon.			SS-16		9-8-11	19
70			577.2				
				SS-17		6-7-11	18
75	RESIDUUM - light olive brown, silty clayey fine SAND (SM), moist, firm.		572.2				
	RESIDUUM - olive brown (2.5Y 4/3) yellowish brown (10YR 5/4) with very dark gray (3/N) slightly fine gravelly fine to medium sandy SILT (ML), moist, stiff, trace mica.			SS-18		10-9-9	18
80	Stop drilling 6/20/13. Resume 6/25/13. Water in cuttings.		567.2				
	SAPROLITE - light yellowish brown (10YR 6/4) with light gray (7/N) and red (2.5YR 5/7) slightly fine sandy elastic SILT (MH), dry, hard, trace clay.			SS-19		8-15-31	46
85			562.2				
	PARTIALLY WEATHERED ROCK - sampled as: yellowish brown (10YR 5/5) slightly fine sandy SILT (ML) dry, hard.			SS-20		14-50/5"	100
90			557.2				



AUGER BORING DDRSSAPC BORING LOGS.GPJ 7/13/15

DRILLER: Mark Ireland
EQUIPMENT: Diedrich D120 # 1503105
METHOD: Hollow Stem Auger
HOLE DIA.: 8 inch
REMARKS: 24-hour water level not measured

PREPARED BY: M. Harvey
CHECKED BY: J. Starnes

THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BETWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

AUGER BORING RECORD

PROJECT: Duke - Dan River Steam Station **BORING NO.:** B-303
COORD N: 36.494900
COORD E: -79.715500
DRILLED: June 25, 2013
PROJ. NO.: 6226-13-0002 **PAGE** 3 **OF** 4

MACTEC Engineering & Consulting, Inc.

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	N-COUNT 1st 6" 2nd 6" 3rd 6"	PL (%) NM (%) LL (%) ▲ FINES (%) ● SPT (bpf) 10 20 30 40 50 60 70 80 90 100
90			557.2				
	PARTIALLY WEATHERED ROCK - sampled as: yellowish brown (10YR 5/4) fine sandy SILT (ML) dry, hard.			SS-21		49-50/4"	● 100
95	Refusal at 94.3 feet. Boring Terminated as 94.3 feet.		552.2				95
100			547.2				100
105			542.2				105
110			537.2				110
115			532.2				115
120			527.2				

AUGER BORING DDRSSAPC BORING LOGS.GPJ 7/13/15

DRILLER: Mark Ireland
EQUIPMENT: Diedrich D120 # 1503105
METHOD: Hollow Stem Auger
HOLE DIA.: 8 inch
REMARKS: 24-hour water level not measured

PREPARED BY: M. Harvey
CHECKED BY: J. Starnes

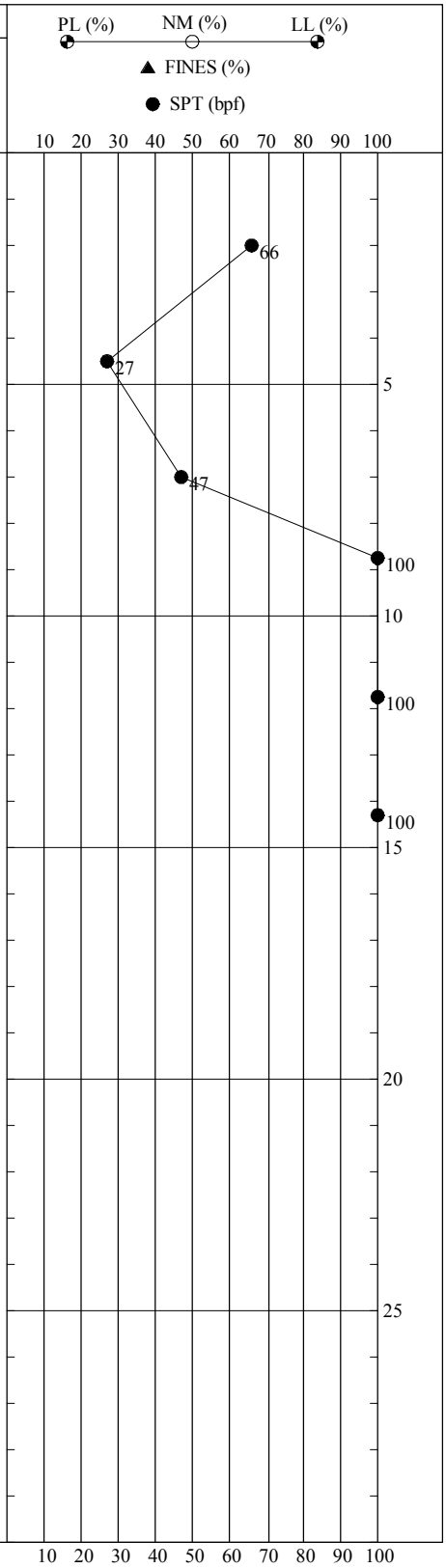
THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BETWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

AUGER BORING RECORD

PROJECT: Duke - Dan River Steam Station **BORING NO.:** B-303
COORD N: 36.494900
COORD E: -79.715500
DRILLED: June 25, 2013
PROJ. NO.: 6226-13-0002 **PAGE** 4 **OF** 4

MACTEC Engineering & Consulting, Inc.

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	N-COUNT 1st 6" 2nd 6" 3rd 6"	PL (%) NM (%) LL (%) ▲ FINES (%) ● SPT (bpf)
0	FILL - strong brown (7.5YR 5/6) slightly fine sandy micaceous SILT (ML) dry, hard.		560.0				
	Hollow Stem Auger (8 inches diameter) from 0 to 3.5 feet. Set casing and begin wash drilling with 4 inches diameter tricone roller bit.			SS-1		8-22-44	66
	FILL - strong brown (7.5YR 5/6) and very dark greenish gray (10Y 3/1), slightly micaceous SILT (ML) dry, very stiff.			SS-2		5-8-19	27
5			555.0				
	SAPROLITE - reddish yellow (7.5YR 6/6) and brown (7.5YR 5/2), clayey SILT (ML), moist, hard.			SS-3		9-10-37	47
	PARTIALLY WEATHERED ROCK - Sampled as: brown (7.5YR 5/4) fine sand SILT (ML) dry to moist, hard.			SS-4		50/3"	100
10			550.0				
	UD attempted at 11.5 feet, no penetration.						
	PARTIALLY WEATHERED ROCK - Sampled as: brown (7.5YR 4/2) slightly gravelly fine to coarse sandy ILT (ML) dry to moist, hard.			SS-5		50/3"	100
	PARTIALLY WEATHERED ROCK - Sampled as: strong brown (8YR 5/6) and brown (7YR 4/2) fine sandy slightly micaceous SILT (ML), moist, hard.			SS-6		49-50/3"	100
15			545.0				
	Refusal at 16.0 feet. Boring terminated at 16.0 feet.						
20			540.0				
25			535.0				
30			530.0				



AUGER BORING DDRSSAPC BORING LOGS.GPJ 7/13/15

DRILLER: Mark Ireland
EQUIPMENT: Diedrich D120 # 1503105
METHOD: Hollow Stem Auger / Rotary Wash
HOLE DIA.: 8 inch / 4 inch
REMARKS: 24-hour water level not measured

PREPARED BY: M. Harvey
CHECKED BY: J. Starnes

THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BETWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

AUGER BORING RECORD

PROJECT: Duke - Dan River Steam Station **BORING NO.:** B-304
COORD N: 36.494100
COORD E: -79.717300
DRILLED: June 4, 2013
PROJ. NO.: 6226-13-0002 **PAGE** 1 **OF** 1

MACTEC Engineering & Consulting, Inc.

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	N-COUNT 1st 6" 2nd 6" 3rd 6"	PL (%) NM (%) LL (%) ▲ FINES (%) ● SPT (bpf)
0	FILL - brownish yellow (10YR 6/6) slightly clayey fine sandy SILT (ML), moist, stiff.		557.7				
	Hollow Stem Auger (8 inches diameter) from 0 to 3.5 feet. Set casing and begin wash drilling with 4 inches diameter tricone roller bit.			SS-1		3-7-4	11
	ASH - black (2.5/N) with white (8/N) (pepper and salt) fine to medium sand (SM), dry, firm.			SS-2		4-7-6	13
5			552.7				
	ASH - dark gray (4/N), silty fine SAND (SM), dry, loose.			SS-3		2-2-3	5
	ASH - black (2.5/N) with minor specks of white (8/N), sandy SILT (ML), wet, very loose.			SS-4		1-1-1	2
10			547.7				
	UD-1, 23 inches recovery.			UD-1			
	ASH - dark gray (5Y 4/1) silty fine SAND (SM), wet, loose. (lense with moderate plasticity 14.5 to 15.0 feet)			SS-5		3-4-6	10
15			542.7				
	UD-2, 22.5 inches recovery.			UD-2			
	FILL - yellowish red (5YR 5/6) clayey SILT (MH), moist, very stiff.						
	RESIDUUM - reddish yellow (7.5YR 6/6) with black (2.5/N) silty fine to coarse SAND (SM), moist, very firm, trace mica.			SS-6		3-4-22	26
20			537.7				
	UD-3, damaged tube, no recovery.			UD-3			
	PARTIALLY WEATHERED ROCK - Sampled as: grayish brown (10YR 5/2) fine sandy SILT (ML) with rock fragments.			SS-7		50/2.25"	100
25			532.7				
	Refusal at 28.5 feet. Boring Terminated at 28.5 feet.			SS-8		50/0"	100
30			527.7				

AUGER BORING DDRSSAPC BORING LOGS.GPJ 11/30/15

DRILLER: Mark Ireland
EQUIPMENT: Diedrich D120 # 1503105
METHOD: Hollow Stem Auger / Rotary Wash
HOLE DIA.: 8 inch / 4 inch
REMARKS: 24-hour water level not measured

PREPARED BY: M. Harvey
CHECKED BY: J. Starnes

THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BETWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

AUGER BORING RECORD

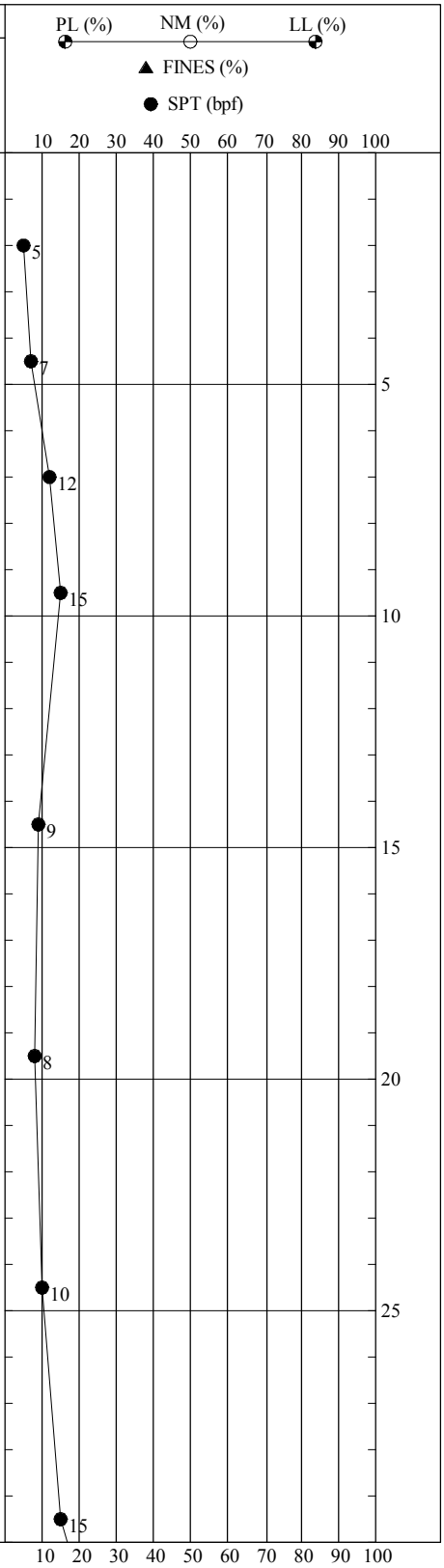
PROJECT: Duke - Dan River Steam Station **BORING NO.:** B-305
COORD N: 36.493600
COORD E: -79.714600
DRILLED: June 5, 2013
PROJ. NO.: 6226-13-0002 **PAGE** 1 **OF** 1

MACTEC Engineering & Consulting, Inc.

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.	LEGEND	ELEV (ft)
0	FILL - strong brown (7.5 YR 5/6) fine sandy silt (ML) dry, firm with trace manufactured gravel.		
	Hollow Stem Auger (8 inches diameter) full depth.		
5	FILL - yellowish red (5YR 4/6) and dark gray (4/N) fine to coarse sandy slightly clayey fine gravely SILT (ML), moist, stiff.		
	Sampler clogged with concrete rubble.		
10			
15	FILL - yellowish red (5YR 4/6) and dark gray 5YR 4/6) slightly clayey fine sandy SILT (ML), dry to moist, stiff.		
20	FILL - yellowish red (5YR 5/6) and dark gray (5YR 4/1) slightly fine clayey SILT (ML) dry, firm.		
25	FILL - yellowish brown (10YR 5/5) fine sandy SILT (ML), dry, stiff.		
30	FILL - strong brown (5YR 5/8) fine sandy SILT (ML), moist, stiff.		

SAMPLES

IDENT	TYPE	N-COUNT 1st 6" 2nd 6" 3rd 6"	SPT (bpf)
SS-1	X	3-3-2	5
SS-2	X	2-4-3	7
SS-3	X	5-5-7	12
SS-4	X	5-7-8	15
SS-5	X	2-4-5	9
SS-6	X	4-4-4	8
SS-7	X	3-5-5	10
SS-8	X	4-6-9	15



AUGER BORING DDRSSAPC BORING LOGS.GPJ 7/13/15

DRILLER: Mark Ireland
EQUIPMENT: Diedrich D120 # 1503105
METHOD: Hollow Stem Auger
HOLE DIA.: 8 inch
REMARKS: 24-hour water level not measured

PREPARED BY: M. Harvey
CHECKED BY: J. Starnes

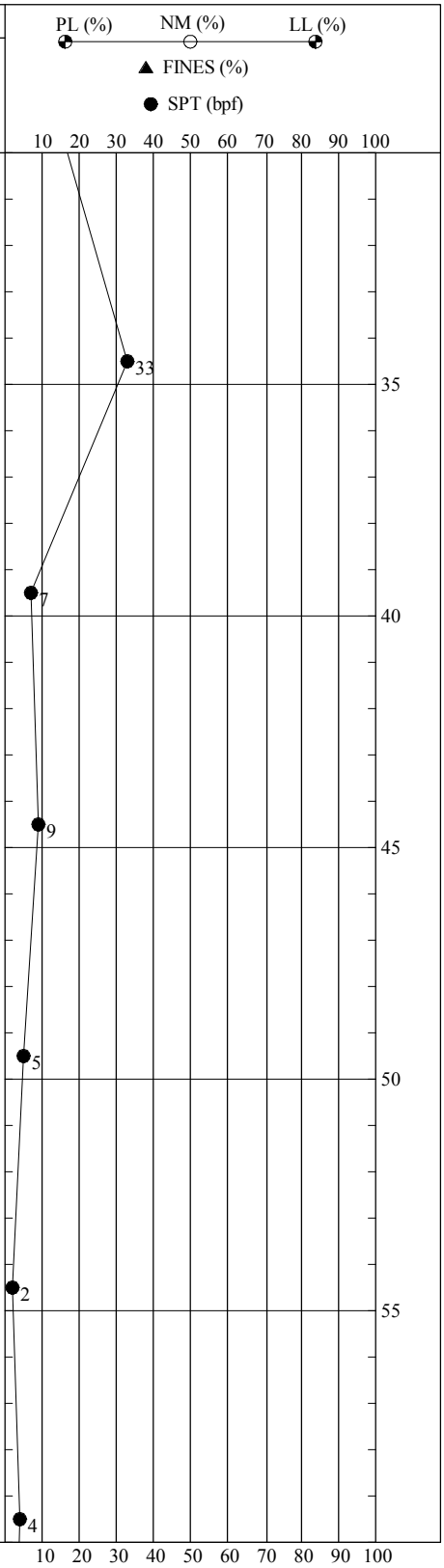
THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BETWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

AUGER BORING RECORD

PROJECT: Duke - Dan River Steam Station **BORING NO.:** B-306C
COORD N: 36.493900
COORD E: -79.715500
DRILLED: June 11, 2013
PROJ. NO.: 6226-13-0002 **PAGE** 1 **OF** 3

MACTEC Engineering & Consulting, Inc.

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	N-COUNT 1st 6" 2nd 6" 3rd 6"	PL (%) NM (%) LL (%) ▲ FINES (%) ● SPT (bpf)
30							
	FILL - brown (10YR 5/3) fine sandy SILT (ML), dry, hard, with wood.						
	ASH - dark gray (3/1) fine sandy SILT (ML), dry, hard.			SS-9		8-12-21	33
35							
	ASH - dark gray (4/N) fine sandy SILT (ML), stiff.			SS-10		6-6-1	7
40							
	ASH - dark gray (4/N) fine sandy SILT (ML), stiff.			SS-11		6-4-5	9
45							
	UD-1, 19 inches recovery. Bottom of tube damaged slightly.			UD-1			
	ASH - dark gray (4/N) fine sandy SILT (ML), moist, firm.			SS-12		2-2-3	5
50							
	ASH - dark gray (4/N) fine sandy SILT (ML) wet, soft.			SS-13		1-1-1	2
55							
	UD-2, no recovery. Tube intact, undamaged. Very soft.			UD-2			
	ASH - dark gray (4/N) fine sandy SILT (ML) wet, soft.			SS-14		1-2-2	4
60							



AUGER BORING DDRSSAPC BORING LOGS.GPJ 7/13/15

DRILLER: Mark Ireland
EQUIPMENT: Diedrich D120 # 1503105
METHOD: Hollow Stem Auger
HOLE DIA.: 8 inch
REMARKS: 24-hour water level not measured

PREPARED BY: M. Harvey
CHECKED BY: J. Starnes

THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BETWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

AUGER BORING RECORD

PROJECT: Duke - Dan River Steam Station **BORING NO.:** B-306C
COORD N: 36.493900
COORD E: -79.715500
DRILLED: June 11, 2013
PROJ. NO.: 6226-13-0002 **PAGE** 2 **OF** 3

MACTEC Engineering & Consulting, Inc.

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	N-COUNT 1st 6" 2nd 6" 3rd 6"	PL (%) NM (%) LL (%) ▲ FINES (%) ● SPT (bpf)
60							
	UD-3, 19.5 inches recovery.			UD-3			
	ASH - dark gray (4/N) fine sandy SILT (ML) wet, soft.			SS-15		1-1-2	3
65							
	PARTIALLY WEATHERED ROCK - Sampled as: brownish yellow (9YR 6/7) silty fine SAND (SM), dry, very dense.			SS-16		21-50/5.5"	100
70							
	Auger Refusal at 72.5 feet. Boring Terminated at 72.5 feet.						
75							
80							
85							
90							

10 20 30 40 50 60 70 80 90 100

AUGER BORING DDRSSAPC BORING LOGS.GPJ 7/13/15

DRILLER: Mark Ireland
EQUIPMENT: Diedrich D120 # 1503105
METHOD: Hollow Stem Auger
HOLE DIA.: 8 inch
REMARKS: 24-hour water level not measured

PREPARED BY: M. Harvey
CHECKED BY: J. Starnes

THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BETWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

AUGER BORING RECORD

PROJECT: Duke - Dan River Steam Station **BORING NO.:** B-306C
COORD N: 36.493900
COORD E: -79.715500
DRILLED: June 11, 2013
PROJ. NO.: 6226-13-0002 **PAGE** 3 **OF** 3

MACTEC Engineering & Consulting, Inc.

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.	LEGEND	ELEV (ft)	SAMPLES: IDENT	TYPE	N-COUNT 1st 6" 2nd 6" 3rd 6"	PL (%) NM (%) LL (%) ▲ FINES (%) ● SPT (bpf) 10 20 30 40 50 60 70 80 90 100
0	FILL - reddish yellow (5YR 6/8) reddish gray (5YR 5/2) clayey SILT, moist.		589.8				
5	coal		584.8				
	SAPROLITE - reddish yellow (5YR 6/8) reddish gray (5YR 5/2) clayey SILT with rock fragments.						
10	Probe Refusal at 10 feet.		579.8				
15			574.8				
20			569.8				
25			564.8				
30			559.8				

AUGER BORING DDRSSAPC BORING LOGS.GPJ 7/13/15

DRILLER: GEOLOGIC EXPLORATION
EQUIPMENT: GEOPROBE
METHOD: Direct Push
HOLE DIA.: 3.5 inch
REMARKS: Water Level = 6.36 feet bgs on May 27, 2015

PREPARED BY:
CHECKED BY:

THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BETWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

AUGER BORING RECORD

PROJECT: Duke - Dan River Steam Station **BORING NO.:** OW-301D
COORD N: 36.495600
COORD E: -79.715300
DRILLED: June 5, 2013
PROJ. NO.: 6226-13-0002 **PAGE** 1 **OF** 1

MACTEC Engineering & Consulting, Inc.

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.	LEGEND	ELEV (ft)	SAMPLES: IDENT	TYPE	N-COUNT 1st 6" 2nd 6" 3rd 6"	PL (%) NM (%) LL (%) ▲ FINES (%) ● SPT (bpf) 10 20 30 40 50 60 70 80 90 100
0	FILL - reddish yellow (5YR 6/8) SILT, dry.		584.2				
	FILL - reddish yellow (5YR 6/8) clayey SILT, dry, firm.						
5	FILL - yellow (10YR 7/8) SILT, dry.		579.2				
	FILL - yellow (10YR 7/8) SILT, dry.						
10			574.2				
	SAPROLITE - mottled yellow (10YR 7/8), light gray (10YR 7/1), red (2.5YR 5/8), SILT with rock fragments, moist.						
15			569.2				
20			564.2				
25			559.2				
30			554.2				

AUGER BORING DDRSSAPC BORING LOGS.GPJ 7/13/15

DRILLER: GEOLOGIC EXPLORATION
EQUIPMENT: GEOPROBE
METHOD: Direct Push and Hollow Stem Auger
HOLE DIA.: 3.5 inch / 4.25 inch
REMARKS: Water Level = 34.55 feet bgs on May 27, 2015

PREPARED BY:
CHECKED BY:

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AUGER BORING RECORD

PROJECT: Duke - Dan River Steam Station **BORING NO.:** OW-302D
COORD N: 36.495100
COORD E: -79.713400
DRILLED: June 4, 2013
PROJ. NO.: 6226-13-0002

MACTEC Engineering & Consulting, Inc.

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.	LEGEND	ELEV (ft)	SAMPLES: IDENT	TYPE	N-COUNT 1st 6" 2nd 6" 3rd 6"	PL (%) NM (%) LL (%) ▲ FINES (%) ● SPT (bpf) 10 20 30 40 50 60 70 80 90 100
30			554.2				
35			549.2				
40			544.2				
	Auger Refusal at 43 feet.						
45			539.2				
50			534.2				
55			529.2				
60			524.2				

AUGER BORING DDRSSAPC BORING LOGS.GPJ 7/13/15

DRILLER: GEOLOGIC EXPLORATION
EQUIPMENT: GEOPROBE
METHOD: Direct Push and Hollow Stem Auger
HOLE DIA.: 3.5 inch / 4.25 inch
REMARKS: Water Level = 34.55 feet bgs on May 27, 2015

PREPARED BY:
CHECKED BY:

THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BETWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

AUGER BORING RECORD

PROJECT: Duke - Dan River Steam Station **BORING NO.:** OW-302D
COORD N: 36.495100
COORD E: -79.713400
DRILLED: June 4, 2013
PROJ. NO.: 6226-13-0002

MACTEC Engineering & Consulting, Inc.

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	N-COUNT 1st 6" 2nd 6" 3rd 6"	PL (%) NM (%) LL (%) ▲ FINES (%) ● SPT (bpf) 10 20 30 40 50 60 70 80 90 100
0	FILL - brownish yellow (10YR 6/6) clayey SILT with some wood and organic matter.		647.9				
5			642.9				
10			637.9				
	ASH						
	FILL - brownish yellow (10YR 6/6) clayey SILT with some wood and organic matter.						
15			632.9				
20			627.9				
	ASH - dark bluish gray (10B 4/1) fine SILT.						
25			622.9				
30			617.9				

AUGER BORING DDRSSAPC BORING LOGS.GPJ 7/13/15

DRILLER: GEOLOGIC EXPLORATION
EQUIPMENT: GEOPROBE
METHOD: Direct Push
HOLE DIA.: 3.5 inch
REMARKS: Water Level = 76.93 feet bgs on May 27, 2015

PREPARED BY:
CHECKED BY:

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AUGER BORING RECORD

PROJECT: Duke - Dan River Steam Station **BORING NO.:** OW-303D
COORD N: 36.494900
COORD E: -79.715500
DRILLED: June 28, 2013
PROJ. NO.: 6226-13-0002

MACTEC Engineering & Consulting, Inc.

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.	LEGEND	ELEV (ft)	SAMPLES: IDENT	TYPE	N-COUNT 1st 6" 2nd 6" 3rd 6"	PL (%) NM (%) LL (%) ▲ FINES (%) ● SPT (bpf) 10 20 30 40 50 60 70 80 90 100
30			617.9				
35			612.9				
40			607.9				
45			602.9				
50			597.9				
55			592.9				
60			587.9				

AUGER BORING DDRSSAPC BORING LOGS.GPJ 7/13/15

DRILLER: GEOLOGIC EXPLORATION
EQUIPMENT: GEOPROBE
METHOD: Direct Push
HOLE DIA.: 3.5 inch
REMARKS: Water Level = 76.93 feet bgs on May 27, 2015

PREPARED BY:
CHECKED BY:

THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BETWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

AUGER BORING RECORD

PROJECT: Duke - Dan River Steam Station **BORING NO.:** OW-303D
COORD N: 36.494900
COORD E: -79.715500
DRILLED: June 28, 2013
PROJ. NO.: 6226-13-0002

MACTEC Engineering & Consulting, Inc.

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	N-COUNT 1st 6" 2nd 6" 3rd 6"	PL (%) NM (%) LL (%) ▲ FINES (%) ● SPT (bpf) 10 20 30 40 50 60 70 80 90 100
60			587.9				
65			582.9				
70			577.9				
75			572.9				
80	SAPROLITE - brownish yellow (10YR 8/6) clayey SILT, wet.		567.9				
85	SAPROLITE - tan gray (10YR 7/2) clayey SILT, wet.		562.9				
	Probe Refusal at 88 feet.						
90			557.9				

AUGER BORING DDRSSAPC BORING LOGS.GPJ 7/13/15

DRILLER: GEOLOGIC EXPLORATION
EQUIPMENT: GEOPROBE
METHOD: Direct Push
HOLE DIA.: 3.5 inch
REMARKS: Water Level = 76.93 feet bgs on May 27, 2015

PREPARED BY:
CHECKED BY:

THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BETWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

AUGER BORING RECORD

PROJECT: Duke - Dan River Steam Station **BORING NO.:** OW-303D
COORD N: 36.494900
COORD E: -79.715500
DRILLED: June 28, 2013
PROJ. NO.: 6226-13-0002

MACTEC Engineering & Consulting, Inc.

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.	LEGEND	ELEV (ft)	SAMPLES: IDENT	TYPE	N-COUNT 1st 6" 2nd 6" 3rd 6"	PL (%) NM (%) LL (%) ▲ FINES (%) ● SPT (bpf) 10 20 30 40 50 60 70 80 90 100
0	FILL - yellow (10YR 8/8) micaceous SILT, dry, firm.		559.9				
	FILL - yellow (10YR 8/8) micaceous SILT, moist, firm.						
5			554.9				
	FILL/ASH - light gray (5Y 7/1) micaceous SILT, wet.						
	ASH - dark gray (4/N) SILT, wet.						
10			549.9				
	SAPROLITE - reddish yellow (7.5 YR 7/8), with rock fragments, dry, firm.						
15			544.9				
20			539.9				
25			534.9				
	Auger Refusal at 27 feet.						
30			529.9				

AUGER BORING DDRSSAPC BORING LOGS.GPJ 7/13/15

DRILLER: GEOLOGIC EXPLORATION
EQUIPMENT: GEOPROBE
METHOD: Direct Push and Hollow Stem Auger
HOLE DIA.: 3.5 inch / 4.25 inch
REMARKS: Water Level = 8.84 feet bgs on May 27, 2015

PREPARED BY:
CHECKED BY:

THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BETWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

AUGER BORING RECORD

PROJECT: Duke - Dan River Steam Station **BORING NO.:** OW-304D
COORD N: 36.493900
COORD E: -79.716700
DRILLED: June 4, 2013
PROJ. NO.: 6226-13-0002 **PAGE** 1 **OF** 1

MACTEC Engineering & Consulting, Inc.

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	N-COUNT 1st 6" 2nd 6" 3rd 6"	PL (%) NM (%) LL (%) ▲ FINES (%) ● SPT (bpf) 10 20 30 40 50 60 70 80 90 100
0	FILL - yellow (10YR 7/6) SILT, moist.		559.5				
	ASH - gray (10YR 3/1) SILT, moist.						
	FILL - yellow (10YR 7/6) clayey SILT, moist.						
5			554.5				
	ASH - gray (Gley1 6/6) SILT, moist.						
10			549.5				
	ASH - gray (Gley 1 6/6) sandy SILT, wet.						
15			544.5				
	FILL - brown (7.5YR 5/2) clayey SILT, moist, firm.						
	FILL - yellow (10YR 8/6), clayey SILT, moist.						
	FILL/ASH - red yellow/gray (5YR 5/8) clayey SILT mixed with ASH, moist.						
20			539.5				
	FILL - reddish yellow (5YR 6/6) clayey SILT, moist.						
	SAPROLITE with Weathered Rock						
	Probe Refusal at 24 feet.						
25			534.5				
30			529.5				

AUGER BORING DDRSSAPC BORING LOGS.GPJ 11/30/15

DRILLER: GEOLOGIC EXPLORATION
EQUIPMENT: GEOPROBE
METHOD: Direct Push and Hollow Stem Auger
HOLE DIA.: 3.5 inch / 4.25 inch
REMARKS: Water Level = 13.14 feet bgs on May 27, 2015

PREPARED BY:
CHECKED BY:

THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BETWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

AUGER BORING RECORD

PROJECT: Duke - Dan River Steam Station **BORING NO.:** OW-305D
COORD N: 36.493600
COORD E: -79.714600
DRILLED: June 4, 2013
PROJ. NO.: 6226-13-0002 **PAGE** 1 **OF** 1

MACTEC Engineering & Consulting, Inc.

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	N-COUNT 1st 6" 2nd 6" 3rd 6"	PL (%) NM (%) LL (%) ▲ FINES (%) ● SPT (bpf) 10 20 30 40 50 60 70 80 90 100
0	FILL - yellow (10YR 7/6) SILT, moist.		560.3				
	FILL - gray (10YR 3/1) SILT, moist.						
	FILL - yellow (10YR 7/6) clayey SILT, moist.						
5			555.3				
	ASH - gray (Gley 1 6/6) SILT, moist.						
10			550.3				
	ASH - gray (GLEY 1 6/6), sandy SILT, wet.						
15	Probe Refusal at 15 feet.		545.3				
20			540.3				
25			535.3				
30			530.3				

AUGER BORING DDRSSAPC BORING LOGS.GPJ 7/13/15

DRILLER: GEOLOGIC EXPLORATION
EQUIPMENT: GEOPROBE
METHOD: Direct Push
HOLE DIA.: 3.5 inch
REMARKS: Water Level = 11.17 feet bgs on May 27, 2015

PREPARED BY:
CHECKED BY:

THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BETWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

AUGER BORING RECORD

PROJECT: Duke - Dan River Steam Station **BORING NO.:** OW-305S
COORD N: 999,358.896400
COORD E: 1,789,900.701000
DRILLED: June 4, 2013
PROJ. NO.: 6226-13-0002 **PAGE** 1 **OF** 1

MACTEC Engineering & Consulting, Inc.

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	N-COUNT 1st 6" 2nd 6" 3rd 6"	PL (%) NM (%) LL (%) ▲ FINES (%) ● SPT (bpf) 10 20 30 40 50 60 70 80 90 100
0	FILL - light red (10YR 7/7) micaceous clayey SILT, moist.		610.6				
	FILL - pinkish gray (7.5YR 6/2) SILT, moist.						
5			605.6				
	FILL - light red (10YR 7/7) micaceous clayey SILT, moist.						
10			600.6				
	FILL - yellow (10YR 7/6) clayey SILT, moist.						
15	FILL - yellow (10YR 7/6) clayey SILT, moist. soft.		595.6				
20			590.6				
	FILL - light yellowish brown (10YR 6/3) clayey SILT.						
25			585.6				
	FILL - dark greenish gray (5GY 4/1) clayey SILT.						
30			580.6				

AUGER BORING DDRSSAPC BORING LOGS.GPJ 7/13/15

DRILLER: GEOLOGIC EXPLORATION
EQUIPMENT: GEOPROBE
METHOD: Direct Push
HOLE DIA.: 3.5 inch
REMARKS: Water Level = 62.38 feet bgs on May 27, 2015

PREPARED BY:
CHECKED BY:

THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BETWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

AUGER BORING RECORD

PROJECT: Duke - Dan River Steam Station **BORING NO.:** OW-306D
COORD N: 36.493900
COORD E: -79.715500
DRILLED: June 5, 2013
PROJ. NO.: 6226-13-0002

MACTEC Engineering & Consulting, Inc.

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	N-COUNT 1st 6" 2nd 6" 3rd 6"	PL (%) NM (%) LL (%) ▲ FINES (%) ● SPT (bpf) 10 20 30 40 50 60 70 80 90 100
30			580.6				
	FILL/ASH - reddish brown (5YR 6/3), clayey SILT, moist, firm.						
35			575.6				
	ASH - dark gray (4/N) SILT, moist, soft.						
40			570.6				
	ASH - gray (5/N), fine SAND, moist.						
45			565.6				
50			560.6				
	ASH - dark gray (4/N) clayey SILT, moist.						
55	ASH - dark gray (4/N) fine SAND, wet.		555.6				
60			550.6				

AUGER BORING DDRSSAPC BORING LOGS.GPJ 7/13/15

DRILLER: GEOLOGIC EXPLORATION
EQUIPMENT: GEOPROBE
METHOD: Direct Push
HOLE DIA.: 3.5 inch
REMARKS: Water Level = 62.38 feet bgs on May 27, 2015

PREPARED BY:
CHECKED BY:

THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BETWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

AUGER BORING RECORD

PROJECT: Duke - Dan River Steam Station **BORING NO.:** OW-306D
COORD N: 36.493900
COORD E: -79.715500
DRILLED: June 5, 2013
PROJ. NO.: 6226-13-0002

MACTEC Engineering & Consulting, Inc.

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.	LEGEND	ELEV (ft)	SAMPLES: IDENT	TYPE	N-COUNT 1st 6" 2nd 6" 3rd 6"	PL (%) NM (%) LL (%) ▲ FINES (%) ● SPT (bpf) 10 20 30 40 50 60 70 80 90 100
60			550.6				
65			545.6				
70			540.6				
	SAPROLITE - mottled yellow (10YR 7/8), light gray (10YR 7/1), red (2.5YR 5/8), with rock fragments						
75	Probe Refusal at 75 feet.		535.6				
80			530.6				
85			525.6				
90			520.6				

AUGER BORING DDRSSAPC BORING LOGS.GPJ 7/13/15

DRILLER: GEOLOGIC EXPLORATION
EQUIPMENT: GEOPROBE
METHOD: Direct Push
HOLE DIA.: 3.5 inch
REMARKS: Water Level = 62.38 feet bgs on May 27, 2015

PREPARED BY:
CHECKED BY:

THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BETWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

AUGER BORING RECORD

PROJECT: Duke - Dan River Steam Station **BORING NO.:** OW-306D
COORD N: 36.493900
COORD E: -79.715500
DRILLED: June 5, 2013
PROJ. NO.: 6226-13-0002

MACTEC Engineering & Consulting, Inc.

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	N-COUNT 1st 6" 2nd 6" 3rd 6"	PL (%) NM (%) LL (%) ▲ FINES (%) ● SPT (bpf) 10 20 30 40 50 60 70 80 90 100
0	FILL - light red (10YR 7/7) clayey SILT, micaceous, moist.		610.5				
	FILL - pinkish gray (7.5YR 6/2) SILT, moist.						
5	FILL - light red (10YR 2/7) clayey SILT, micaceous, moist.		605.5				
10	FILL - yellow (10YR 7/6) clayey SILT, moist.		600.5				
15	FILL - yellow (10YR 8/8) SILT, moist, soft.		595.5				
20			590.5				
	FILL - light yellowish brown (10YR 6/3) clayey SILT.						
25			585.5				
	FILL - dark greenish gray (Gley 1 4/5GY) clayey SILT						
30			580.5				

AUGER BORING DDRSSAPC BORING LOGS.GPJ 7/13/15

DRILLER: GEOLOGIC EXPLORATION
EQUIPMENT: GEOPROBE
METHOD: Direct Push
HOLE DIA.: 3.5 inch
REMARKS: Water Level = dry to bottom of well on May 27, 2015
PREPARED BY:
CHECKED BY:

THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BETWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

AUGER BORING RECORD

PROJECT: Duke - Dan River Steam Station **BORING NO.:** OW-306S
COORD N: 36.493900
COORD E: -79.715500
DRILLED: June 5, 2013
PROJ. NO.: 6226-13-0002

MACTEC Engineering & Consulting, Inc.

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	N-COUNT 1st 6" 2nd 6" 3rd 6"	PL (%) NM (%) LL (%) ▲ FINES (%) ● SPT (bpf) 10 20 30 40 50 60 70 80 90 100
30			580.5				
	FILL - reddish brown (10YR 6/3) clayey SILT, firm, moist.						
35			575.5				
	ASH - dark gray (4/N) SILT, soft, moist.						
40			570.5				
	ASH - gray (5/N) fine SAND, moist.						
45			565.5				
50	Boring terminated at 50 feet.		560.5				
55			555.5				
60			550.5				

AUGER BORING DDRSSAPC BORING LOGS.GPJ 7/13/15

DRILLER: GEOLOGIC EXPLORATION
EQUIPMENT: GEOPROBE
METHOD: Direct Push
HOLE DIA.: 3.5 inch
REMARKS: Water Level = dry to bottom of well on May 27, 2015
PREPARED BY:
CHECKED BY:

THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BETWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

AUGER BORING RECORD

PROJECT: Duke - Dan River Steam Station **BORING NO.:** OW-306S
COORD N: 36.493900
COORD E: -79.715500
DRILLED: June 5, 2013
PROJ. NO.: 6226-13-0002

MACTEC Engineering & Consulting, Inc.

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	N-COUNT 1st 6" 2nd 6" 3rd 6"	PL (%) NM (%) LL (%) ▲ FINES (%) ● SPT (bpf) 10 20 30 40 50 60 70 80 90 100
0	FILL - light reddish brown (2.5YR 6/3) clayey SILT, moist.		609.8				
	FILL - light red (2.5YR 6/8) clayey SILT, moist.						
5			604.8				
	FILL - mottled light red (2.5YR 6/8) and reddish yellow (7.5YR 7/8), clayey SILT, moist.						
10			599.8				
	FILL - reddish yellow (7.5YR 7/8) clayey SILT, moist, firm.						
15			594.8				
	FILL - yellow (10YR 8/6) clayey SILT, firm moist.						
	FILL - brown (10YR 5/3) clayey SILT, moist, firm.						
20			589.8				
25			584.8				
	FILL - yellow (10YR 8/8) clayey SILT, moist.						
30			579.8				

AUGER BORING DDRSSAPC BORING LOGS.GPJ 7/13/15

DRILLER: GEOLOGIC EXPLORATION
EQUIPMENT: GEOPROBE
METHOD: Direct Push
HOLE DIA.: 3.5 inch
REMARKS: Water Level = 63.56 feet bgs on May 27, 2015

PREPARED BY:
CHECKED BY:

THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BETWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

AUGER BORING RECORD

PROJECT: Duke - Dan River Steam Station **BORING NO.:** OW-320D
COORD N: 36.495100
COORD E: -79.713400
DRILLED: June 13, 2013
PROJ. NO.: 6226-13-0002

MACTEC Engineering & Consulting, Inc.

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	N-COUNT 1st 6" 2nd 6" 3rd 6"	PL (%) NM (%) LL (%) ▲ FINES (%) ● SPT (bpf) 10 20 30 40 50 60 70 80 90 100
30			579.8				
	FILL - rock; aggregate.						
	FILL - yellow (10YR 8/8) medium SAND, dry.						
	FILL - mottled reddish yellow (5YR 7/8) and reddish yellow (7.5YR 8/6) clayey SILT, dry firm.						
35			574.8				
	ASH - dark gray (4/N) SILT, moist.						
40			569.8				
	ASH - gray (5/N) SILT, moist.						
45			564.8				
50			559.8				
	ASH - dark gray (4/N) fine SAND, moist.						
	ASH - gray (5/N) SILT, moist.						
55			554.8				
	ASH - dark gray (4/N) medium SAND, moist.						
	ASH - gray (5/N) clayey SILT, moist.						
	ASH - gray (5/N) SILT, wet.						
60			549.8				

AUGER BORING DDRSSAPC BORING LOGS.GPJ 7/13/15

DRILLER: GEOLOGIC EXPLORATION
EQUIPMENT: GEOPROBE
METHOD: Direct Push
HOLE DIA.: 3.5 inch
REMARKS: Water Level = 63.56 feet bgs on May 27, 2015

PREPARED BY:
CHECKED BY:

THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BETWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

AUGER BORING RECORD

PROJECT: Duke - Dan River Steam Station **BORING NO.:** OW-320D
COORD N: 36.495100
COORD E: -79.713400
DRILLED: June 13, 2013
PROJ. NO.: 6226-13-0002

MACTEC Engineering & Consulting, Inc.

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	N-COUNT 1st 6" 2nd 6" 3rd 6"	PL (%) NM (%) LL (%) ▲ FINES (%) ● SPT (bpf) 10 20 30 40 50 60 70 80 90 100
60			549.8				
65			544.8				
	SAPROLITE - gray (5/N) and light reddish brown (2.5YR 6/3) clayey SILT with rock fragments, moist.						
70	Probe Refusal at 70 feet.		539.8				
75			534.8				
80			529.8				
85			524.8				
90			519.8				

AUGER BORING DDRSSAPC BORING LOGS.GPJ 7/13/15

DRILLER: GEOLOGIC EXPLORATION
EQUIPMENT: GEOPROBE
METHOD: Direct Push
HOLE DIA.: 3.5 inch
REMARKS: Water Level = 63.56 feet bgs on May 27, 2015

PREPARED BY:
CHECKED BY:

THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BETWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

AUGER BORING RECORD

PROJECT: Duke - Dan River Steam Station **BORING NO.:** OW-320D
COORD N: 36.495100
COORD E: -79.713400
DRILLED: June 13, 2013
PROJ. NO.: 6226-13-0002 **PAGE** 3 **OF** 3

MACTEC Engineering & Consulting, Inc.

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	N-COUNT 1st 6" 2nd 6" 3rd 6"	PL (%) NM (%) LL (%) ▲ FINES (%) ● SPT (bpf) 10 20 30 40 50 60 70 80 90 100
0	FILL - yellowish brown (10YR 5/8) clayey SILT with organics, rock fragments, and glass shards.		588.9				
5			583.9				
	Probe Refusal at 8 feet.						
10			578.9				
15			573.9				
20			568.9				
25			563.9				
30			558.9				

AUGER BORING DDRSSAPC BORING LOGS.GPJ 7/13/15

DRILLER: GEOLOGIC EXPLORATION
EQUIPMENT: GEOPROBE
METHOD: Direct Push
HOLE DIA.: 3.5 inch
REMARKS: Water Level = dry to bottom of well on May 27, 2015
PREPARED BY:
CHECKED BY:

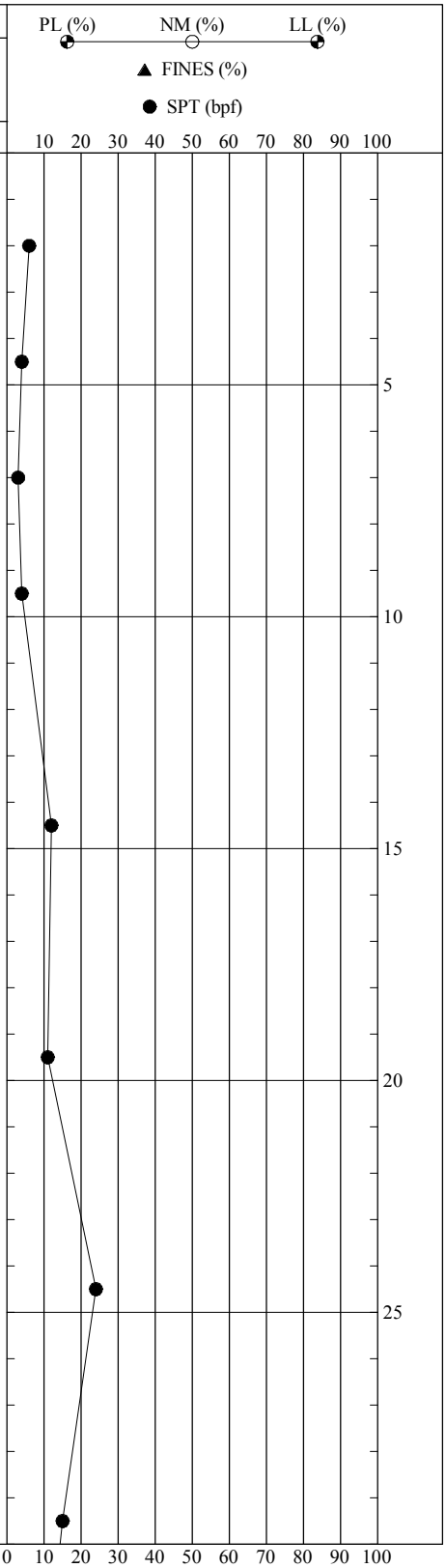
THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BETWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

AUGER BORING RECORD

PROJECT: Duke - Dan River Steam Station **BORING NO.:** OW-321D
COORD N: 36.495600
COORD E: -79.717400
DRILLED: June 27, 2013
PROJ. NO.: 6226-13-0002 **PAGE** 1 **OF** 1

MACTEC Engineering & Consulting, Inc.

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	(Rec") N-COUNT or Rec%/RQD% 6"- 6"- 6"- 6"
0	FILL: Brown (7.5YR 4/3), Firm to Soft, Clayey SILT (ML) with Trace Mica, Wood, and Rock Fragments, Moist		644.2			
				SS-1		(8) 4-3-3
	Trace Ash			SS-2		(5) 2-2-2
5			639.2			
	FILL: Olive-Gray (5Y 5/2) to Brown (10YR 4/3), Soft to Stiff, Fine Sandy Lean CLAY (CL) with Trace Mica, Roots, and Rock Fragments, Low Plasticity, Moist			SS-3		(5) 2-1-2
				SS-4		(18) 2-2-2
10			634.2	UD-1		(19)
	Trace Wood Fragments and Ash			SS-5		(11) 2-4-8
15			629.2			
	ASH FILL: Dark Gray (GLEY 3/N), CCR Material that Classifies as Very Stiff and Firm, Fine Sandy Silt (ML), Non-Plastic, Moist			SS-6		(18) 6-5-6
20			624.2	UD-2		(27)
				SS-7		(18) 7-11-13
25			619.2			
				SS-8		(15) 6-7-8
30			614.2			



DUKE ABSAT GEOTECHNICAL BORING LOG DR ONSITE LANDFILL BORING LOGS 7810140065.GPJ AMEC DUKE ABSAT.GDT 7/6/15

CONTRACTOR:	S&ME, Inc.
LOGGED BY:	E. Ruffer
EQUIPMENT:	CME-550
DRILL METHOD:	3.25 HSA
HOLE DIAMETER:	6"
CLOSURE METHOD:	Grout
REMARKS:	Boring located on Ash Fill 1; 24-hour water level not measured

REVIEWED BY: _____

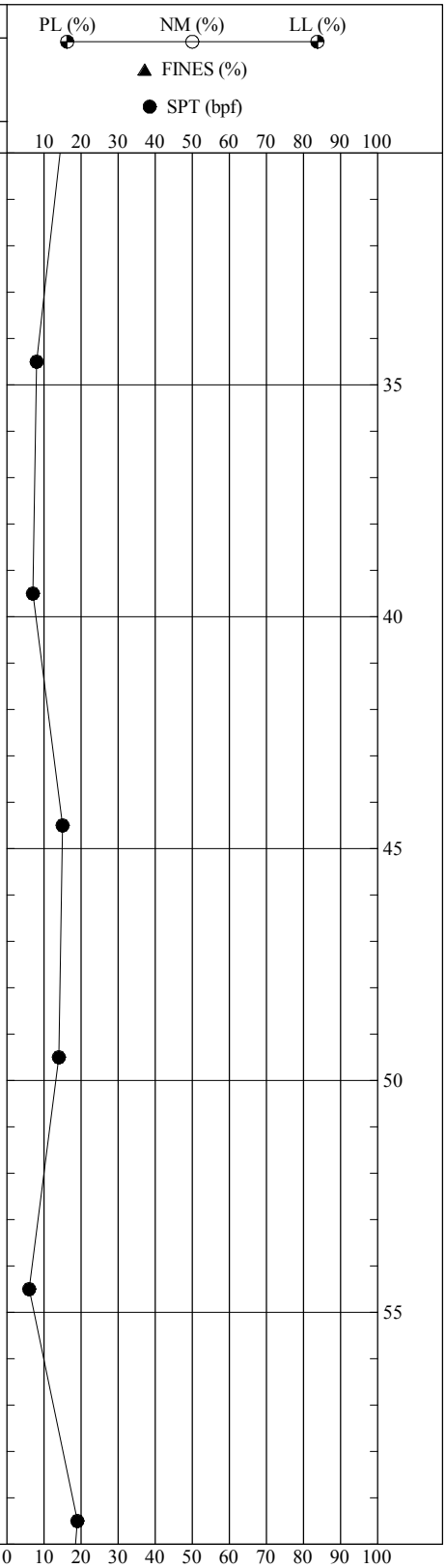
GEOTECHNICAL BORING RECORD

PROJECT NAME: Dan River On-Site Landfill
PROJECT NO.: 7810-14-0065 **START DATE:** 11/20/2014
COORD N: 99999816 **COMP. DATE:** 11/20/2014
COORD E: 1789494 **Page** 1 **of** 3
LOCATION: Eden, North Carolina

BORING NO.: B-320

amec foster wheeler

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	(Rec") N-COUNT or Rec%/RQD% 6"- 6"- 6"- 6"	PL (%) NM (%) LL (%) ▲ FINES (%) ● SPT (bpf)
30	ASH FILL: Dark Gray (GLEY 3/N), CCR Material that Classifies as Very Stiff and Firm, Fine Sandy Silt (ML), Non-Plastic, Moist		614.2	UD-3		(25.75)	
				SS-9		(18) 5-4-4	
35			609.2				
				SS-10		(18) 4-4-3	
40			604.2				
				SS-11		(18) 6-7-8	
45			599.2				
				SS-12		(18) 4-6-8	
50			594.2				
				SS-13		(18) 2-3-3	
55			589.2				
				SS-14		(18) 3-7-12	
60			584.2				



DUKE ABSAT GEOTECHNICAL BORING LOG DR ONSITE LANDFILL BORING LOGS 7810140065.GPJ AMEC DUKE ABSAT.GDT 7/6/15

CONTRACTOR:	S&ME, Inc.
LOGGED BY:	E. Ruffer
EQUIPMENT:	CME-550
DRILL METHOD:	3.25 HSA
HOLE DIAMETER:	6"
CLOSURE METHOD:	Grout
REMARKS:	Boring located on Ash Fill 1; 24-hour water level not measured

REVIEWED BY: _____

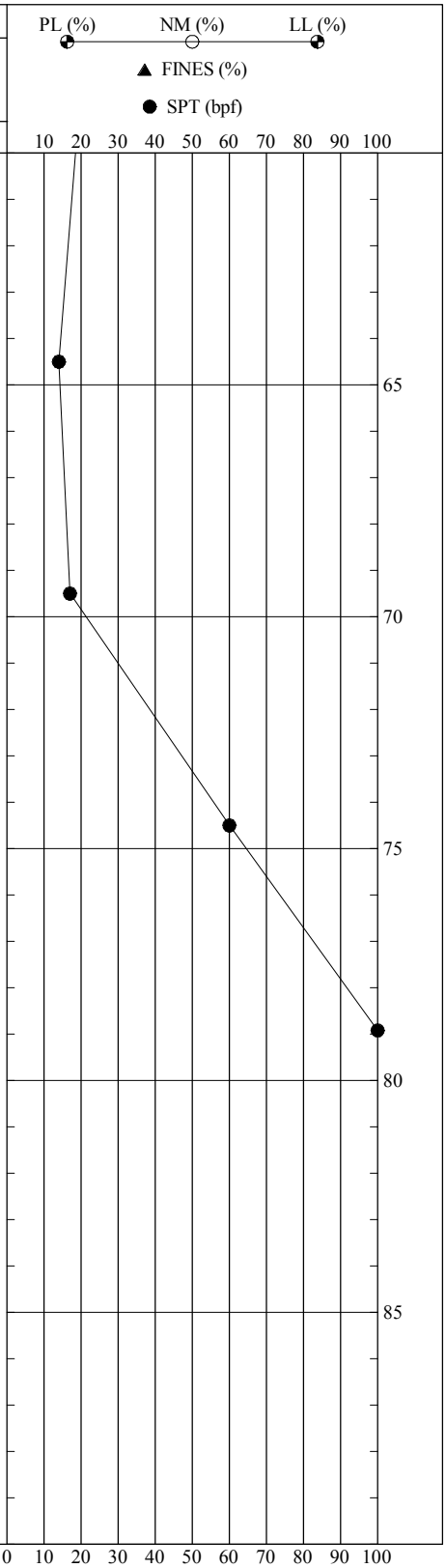
GEOTECHNICAL BORING RECORD

PROJECT NAME: Dan River On-Site Landfill
PROJECT NO.: 7810-14-0065 **START DATE:** 11/20/2014
COORD N: 99999816 **COMP. DATE:** 11/20/2014
COORD E: 1789494 **Page** 2 **of** 3
LOCATION: Eden, North Carolina

BORING NO.: B-320

amec foster wheeler

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	(Rec") N-COUNT or Rec%/RQD% 6"- 6"- 6"- 6"
60	ASH FILL: Dark Gray (GLEY 3/N), CCR Material that Classifies as Very Stiff and Firm, Fine Sandy Silt (ML), Non-Plastic, Moist		584.2			
65	RESIDUUM: Pale Brown (2.5Y 8/4) and Gray (2.5Y 6/1) Stiff, Fine Sandy SILT (ML) with Trace Wood and Rock Fragments, Non-Plastic, Moist		579.2	SS-15		3-5-9
70	RESIDUUM: Yellow-Brown (10YR 5/6), Medium-Dense, Silty Fine SAND (SM) with Trace Wood and Rock Fragments		574.2	SS-16		(12) 6-5-12
75	SAPROLITE: Pale Brown (2.5YR 8/4) and Brown-Yellow (10YR 6/8), Very Dense, Silty Fine SAND (SM) with Trace Mica and Rock Fragments, Non-Plastic, Moist		569.2	SS-17		23-24-36
80	PARTIALLY WEATHERED ROCK: When Sampled Becomes Pale Brown (10YR 8/3) and Yellow (10YR 8/8), Very Dense, Silty Fine SAND (SM) with Trace Rock Fragments, Non-Plastic, Moist **Boring Terminated at 78.9 ft bgs**		564.2	SS-18		50/5
85			559.2			
90			554.2			



DUKE ABSAT GEOTECHNICAL BORING LOG DR ONSITE LANDFILL BORING LOGS 7810140065.GPJ AMEC DUKE ABSAT.GDT 7/6/15

CONTRACTOR:	S&ME, Inc.
LOGGED BY:	E. Ruffer
EQUIPMENT:	CME-550
DRILL METHOD:	3.25 HSA
HOLE DIAMETER:	6"
CLOSURE METHOD:	Grout
REMARKS:	Boring located on Ash Fill 1; 24-hour water level not measured

REVIEWED BY: _____

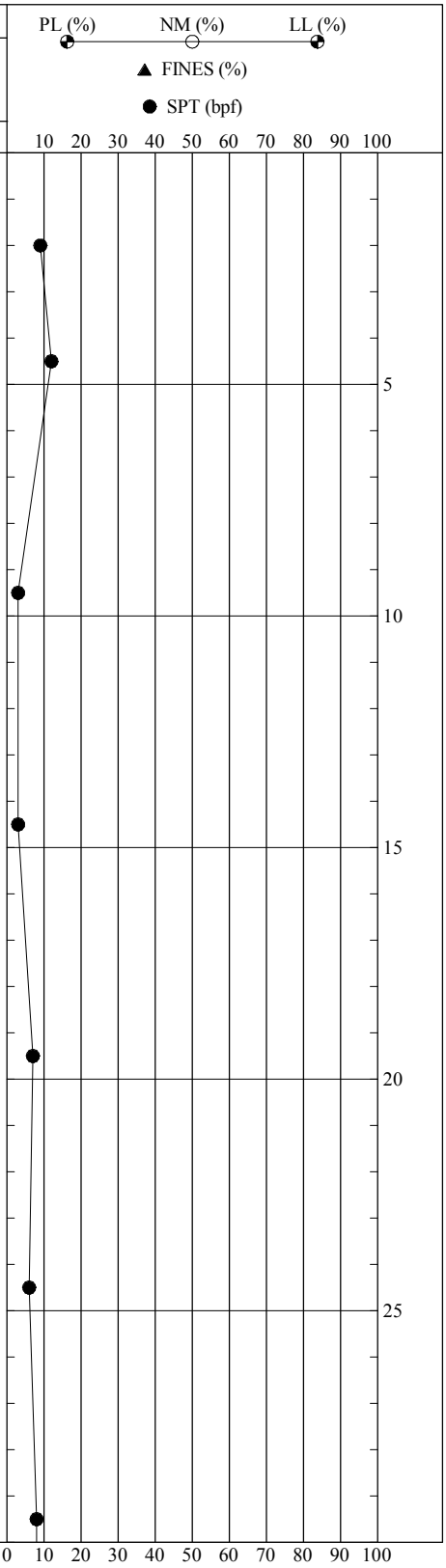
GEOTECHNICAL BORING RECORD

PROJECT NAME: Dan River On-Site Landfill
PROJECT NO.: 7810-14-0065 **START DATE:** 11/20/2014
COORD N: 99999816 **COMP. DATE:** 11/20/2014
COORD E: 1789494 **Page** 3 **of** 3
LOCATION: Eden, North Carolina

BORING NO.: B-320

amec foster wheeler

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	(Rec") N-COUNT or Rec%/RQD% 6"- 6"- 6"- 6"
0	FILL: Brown (7.5YR 5/6), Gray (7.5YR 6/1), and Light Gray (7.5YR 7/1), Loose, Silty Fine SAND (SM) with Trace Rock Fragments, Non-Plastic, Moist		598.6	SS-1		(7) 3-5-4
	ASH FILL: Dark Gray (GLEY 3/N), CCR Material that Classifies as Stiff to Soft, Fine Sandy SILT (ML), Non-Plastic, Moist			SS-2		(15) 5-5-7
5			593.6	UD-1		(25.75)
	Becomes Soft			SS-3		(18) 2-1-2
10			588.6	UD-2		(23)
				SS-4		(18) 2-1-2
15			583.6			
	Becomes Firm			SS-5		(18) 2-3-4
20			578.6	UD-3		
				SS-6		(18) 2-3-3
25	FILL: Yellow-Red (5YR 4/6), Firm, Clayey SILT (ML) with Trace Mica, Roots, and Rock Fragments, Low Plasticity, Moist		573.6			
	28.5 ft to 29.5 ft Ash Lense			SS-7		(14) 2-4-4
30			568.6			



DUKE ABSAT GEOTECHNICAL BORING LOG DR ONSITE LANDFILL BORING LOGS 7810140065.GPJ AMEC DUKE ABSAT.GDT 7/6/15

CONTRACTOR:	S&ME, Inc.
LOGGED BY:	E. Ruffer
EQUIPMENT:	CME-550
DRILL METHOD:	3.25 HSA
HOLE DIAMETER:	6"
CLOSURE METHOD:	Grout
REMARKS:	Boring located on Ash Fill 1; 24-hour water level not measured

REVIEWED BY: _____

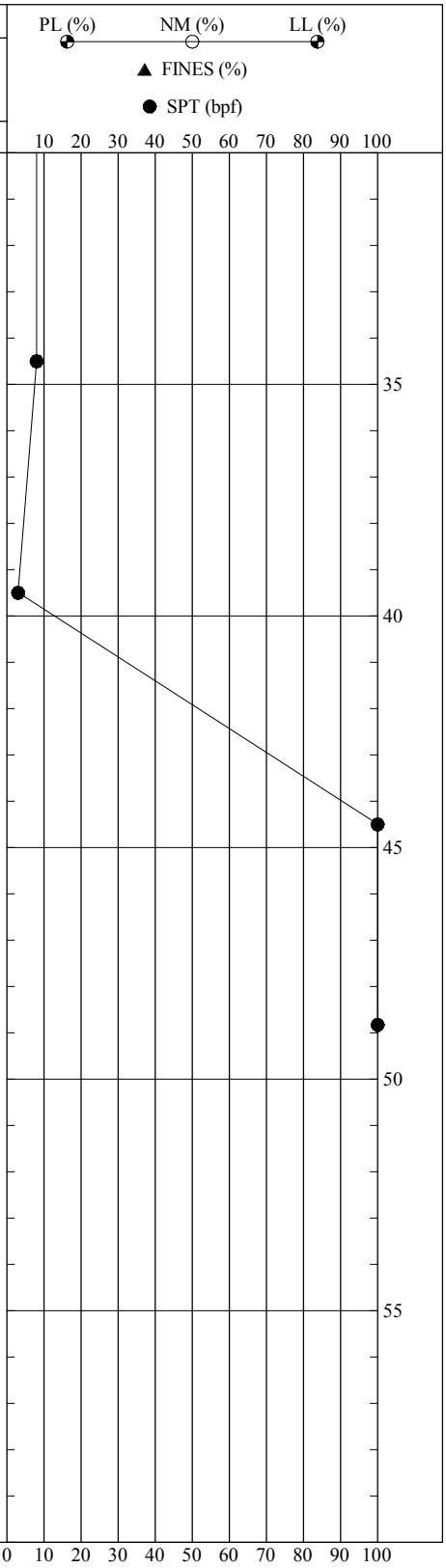
GEOTECHNICAL BORING RECORD

PROJECT NAME: Dan River On-Site Landfill
PROJECT NO.: 7810-14-0065 **START DATE:** 11/20/2014
COORD N: 100999622 **COMP. DATE:** 11/20/2014
COORD E: 1789429 **Page** 1 **of** 2
LOCATION: Eden, North Carolina

BORING NO.: B-321

amec foster wheeler

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	(Rec") N-COUNT or Rec%/RQD% 6"- 6"- 6"- 6"
30	FILL: Brown-Yellow (10YR 6/8), Firm, Silty CLAY (CL) with Trace Rock Fragments, Low Plasticity, Moist		568.6			
	33.5 ft to 34.5 ft Ash Lense			SS-8		(15) 7-4-4
35			563.6			
	ASH FILL: Dark Gray (GLEY 3/N), CCR Material that Classifies as Soft, Fine Sandy SILT (ML), Non-Plastic, Wet			SS-9		(14) 1-2-1
40			558.6			
	PARTIALLY WEATHERED ROCK: When Sampled Becomes Brown (7.5YR 4/6), Very Dense, Silty Fine SAND (SM) with Trace Mica and Rock Fragments, Non-Plastic, Moist			SS-10		(12) 6-6-50/4
45			553.6			
				SS-11		50/4
	Boring Terminated at 48.9 ft bgs					
50			548.6			
55			543.6			
60			538.6			



DUKE ABSAT GEOTECHNICAL BORING LOG DR ONSITE LANDFILL BORING LOGS 7810140065.GPJ AMEC DUKE ABSAT.GDT 7/6/15

CONTRACTOR:	S&ME, Inc.
LOGGED BY:	E. Ruffer
EQUIPMENT:	CME-550
DRILL METHOD:	3.25 HSA
HOLE DIAMETER:	6"
CLOSURE METHOD:	Grout
REMARKS:	Boring located on Ash Fill 1; 24-hour water level not measured

REVIEWED BY: _____

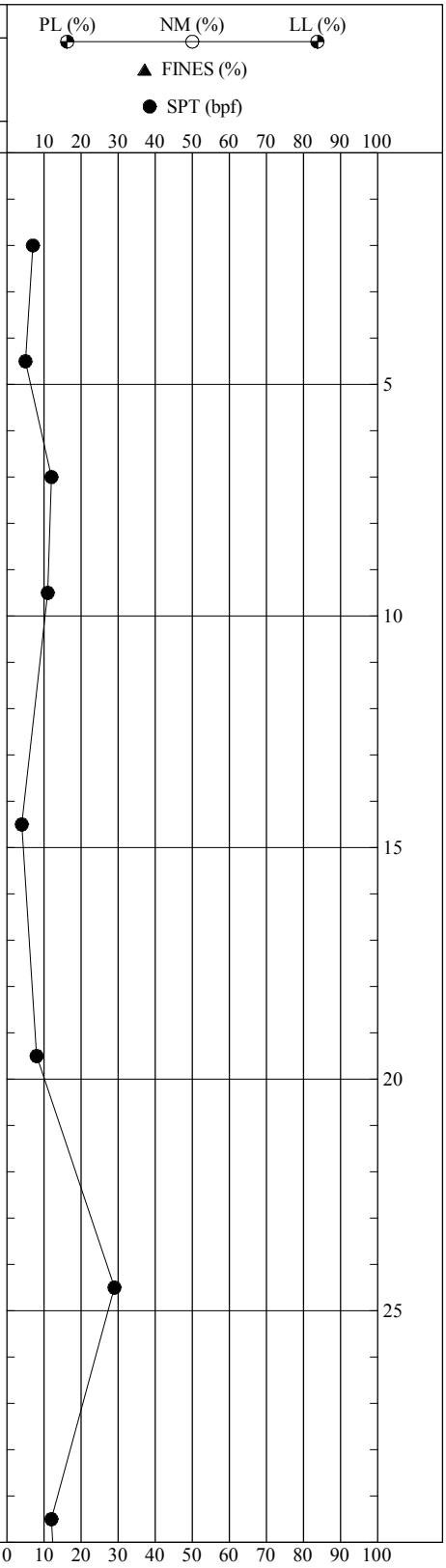
GEOTECHNICAL BORING RECORD

PROJECT NAME: Dan River On-Site Landfill
PROJECT NO.: 7810-14-0065 **START DATE:** 11/20/2014
COORD N: 100999622 **COMP. DATE:** 11/20/2014
COORD E: 1789429 **Page 2 of 2**
LOCATION: Eden, North Carolina

BORING NO.: B-321

amec foster wheeler

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	(Rec") N-COUNT or Rec%/RQD% 6"- 6"- 6"- 6"
0	FILL: Red-Brown (5YR 4/4), Firm, Clayey SILT (MH-ML) with Trace Sand, Mica, and Rock Fragments, Low Plasticity, Moist		613.4			
				SS-1		(8) 3-3-4
				SS-2		(7) 3-2-3
5			608.4			
	FILL: Brown (7.5YR 5/8), Stiff to Soft, Clayey SILT (MH-ML) with Trace Sand, Mica, and Rock Fragments, Low Plasticity, Moist			SS-3		(15) 5-6-6
				SS-4		(12) 3-5-6
10			603.4	UD-1		(17.25)
	Becomes Soft			SS-5		(14) 2-2-2
15			598.4			
	FILL: Dark Gray-Brown (10YR 3/2) and Black (10YR 2/1), Firm, Sandy Lean CLAY (CL) with Trace Wood and Rock Fragments. Low Plasticity, Moist			SS-6		(17) 2-4-4
20	FILL: Black (10YR 2/1), Loose, Silty Fine SAND (SM) with Trace Mica and Rock Fragments, Non-Plastic, Moist		593.4	UD-2		(21.5)
	FILL: Dark Gray (10YR 3/1), Very Stiff, Silty CLAY (CL) with Trace Mica and Rock Fragments, Low to Medium Plasticity, Moist			SS-7		(5) 11-12-17
25			588.4			
				SS-8		(5) 3-4-8
30			583.4			



DUKE ABSAT GEOTECHNICAL BORING LOG DR ONSITE LANDFILL BORING LOGS 7810140065.GPJ AMEC DUKE ABSAT.GDT 7/6/15

CONTRACTOR:	S&ME, Inc.
LOGGED BY:	E. Ruffer
EQUIPMENT:	CME-550
DRILL METHOD:	3.25 HSA
HOLE DIAMETER:	6"
CLOSURE METHOD:	Grout
REMARKS:	Boring located on Ash Fill 1; 24-hour water level not measured

REVIEWED BY: _____

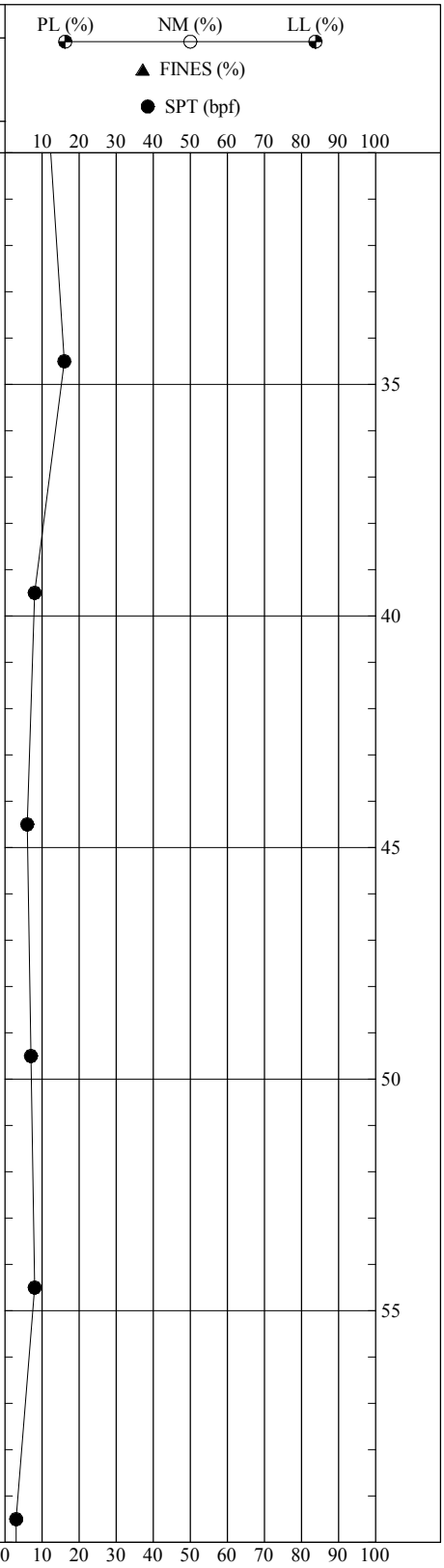
GEOTECHNICAL BORING RECORD

PROJECT NAME: Dan River On-Site Landfill
PROJECT NO.: 7810-14-0065 **START DATE:** 11/19/2014
COORD N: 101999438 **COMP. DATE:** 11/19/2014
COORD E: 1789611 **Page** 1 **of** 3
LOCATION: Eden, North Carolina

BORING NO.: B-322

amec foster wheeler

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	(Rec") N-COUNT or Rec%/RQD% 6"- 6"- 6"
30	FILL: Dark Gray (10YR 3/1), Very Stiff, Silty CLAY (CL) with Trace Mica and Rock Fragments, Low to Medium Plasticity, Moist		583.4	UD-3		(16.5)
	FILL: Dark Brown (10YR 2/2), Very Stiff, CLAY (CL) with Trace Sand and Rock Fragments, Low Plasticity, Moist			SS-9		8-7-9
35			578.4			
	ASH FILL: Dark Gray (GLEY 3/N) CCR Material that Classifies as Loose, Fine Sandy SILT (ML) and SILT with Sand (ML), Non-Plastic, Moist to Wet			SS-10		(15) 3-4-4
40			573.4			
				SS-11		(13) 2-3-3
45			568.4			
				SS-12		(18) 1-3-4
50			563.4			
	Becomes Wet			SS-13		(13) 6-5-3
55			558.4			
				SS-14		(18) 2-1-2
60			553.4			



DUKE ABSAT GEOTECHNICAL BORING LOG DR ONSITE LANDFILL BORING LOGS 7810140065.GPJ AMEC DUKE ABSAT.GDT 7/6/15

CONTRACTOR:	S&ME, Inc.
LOGGED BY:	E. Ruffer
EQUIPMENT:	CME-550
DRILL METHOD:	3.25 HSA
HOLE DIAMETER:	6"
CLOSURE METHOD:	Grout
REMARKS:	Boring located on Ash Fill 1; 24-hour water level not measured

REVIEWED BY: _____

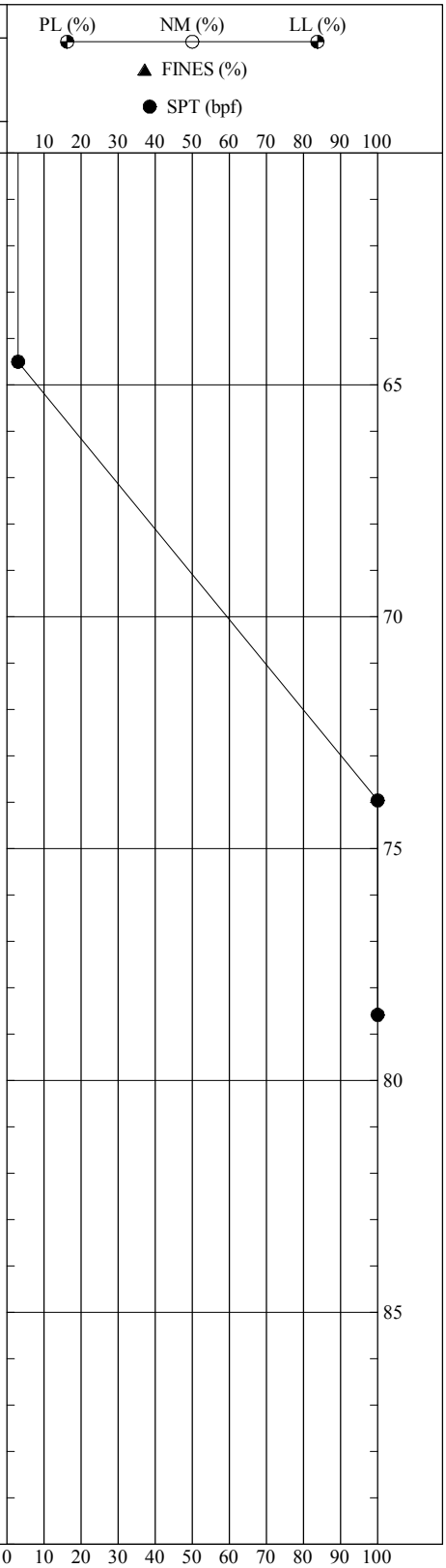
GEOTECHNICAL BORING RECORD

PROJECT NAME: Dan River On-Site Landfill
PROJECT NO.: 7810-14-0065 **START DATE:** 11/19/2014
COORD N: 101999438 **COMP. DATE:** 11/19/2014
COORD E: 1789611 **Page** 2 **of** 3
LOCATION: Eden, North Carolina

BORING NO.: B-322

amec foster wheeler

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	(Rec") N-COUNT or Rec%/RQD% 6"- 6"- 6"- 6"
60	ASH FILL: Dark Gray (GLEY 3/N) CCR Material that Classifies as Loose, Fine Sandy SILT (ML) and SILT with Sand (ML), Non-Plastic, Moist to Wet		553.4			
				SS-15		(18) 2-1-2
65			548.4			
				SS-16		(18) 1
70			543.4			
	PARTIALLY WEATHERED ROCK: When Sampled Becomes Brown (7.5YR 5/8) and Gray (10YR 6/1), Very Dense, Silty Fine SAND (SM) with Rock Fragments, Non-Plastic, Moist			SS-17		(5) 50/5.5
75			538.4			
	Boring Terminated at 78.6 ft bgs			SS-18		(1) 50/1
80			533.4			
85			528.4			
90			523.4			



DUKE ABSAT GEOTECHNICAL BORING LOG DR ONSITE LANDFILL BORING LOGS 7810140065.GPJ AMEC DUKE ABSAT.GDT 7/6/15

CONTRACTOR:	S&ME, Inc.
LOGGED BY:	E. Ruffer
EQUIPMENT:	CME-550
DRILL METHOD:	3.25 HSA
HOLE DIAMETER:	6"
CLOSURE METHOD:	Grout
REMARKS:	Boring located on Ash Fill 1; 24-hour water level not measured

REVIEWED BY: _____

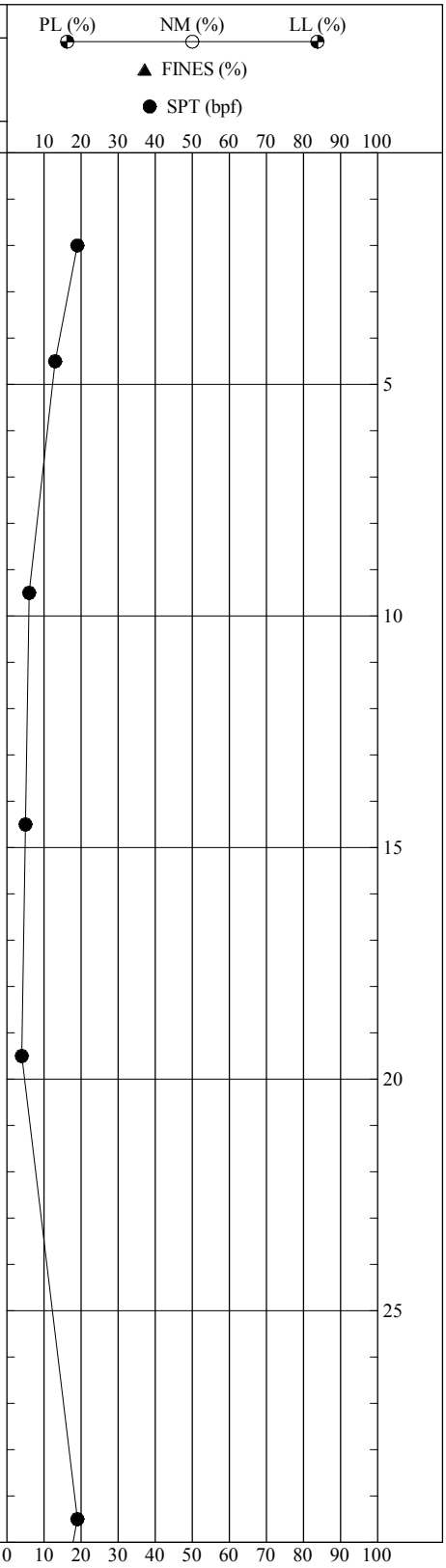
GEOTECHNICAL BORING RECORD

PROJECT NAME: Dan River On-Site Landfill
PROJECT NO.: 7810-14-0065 **START DATE:** 11/19/2014
COORD N: 101999438 **COMP. DATE:** 11/19/2014
COORD E: 1789611 **Page** 3 **of** 3
LOCATION: Eden, North Carolina

BORING NO.: B-322

amec foster wheeler

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	(Rec") N-COUNT or Rec%/RQD% 6"- 6"- 6"- 6"
0	FILL: Brown-Yellow (10YR 6/8) and Dark Gray (10YR 4/1), Medium Dense, Silty Fine SAND (SM) with Trace Mica and Rock Fragments, Non-Plastic, Moist		596.1			
				SS-1		(13) 9-9-10
	ASH FILL: Dark Gray (GLEY 3/N), CCR Material that Classifies as Stiff to Soft, Fine Sandy SILT (ML), Non-Plastic, Moist to Wet			SS-2		(17) 6-6-7
5			591.1	UD-1		(27)
				SS-3		(16) 2-3-3
10			586.1	UD-2		
				SS-4		(14) 2-2-3
15			581.1			
				SS-5		(18) 1-2-2
20			576.1	UD-3		(3)
				UD-4		(18)
25			571.1			
				SS-6		(18) 8-10-9
30			566.1			



DUKE ABSAT GEOTECHNICAL BORING LOG DR ONSITE LANDFILL BORING LOGS 7810140065.GPJ AMEC DUKE ABSAT.GDT 7/6/15

CONTRACTOR:	S&ME, Inc.
LOGGED BY:	E. Ruffer
EQUIPMENT:	CME-550
DRILL METHOD:	3.25 HSA
HOLE DIAMETER:	6"
CLOSURE METHOD:	Grout
REMARKS:	Boring located on Ash Fill 1; 24-hour water level not measured

REVIEWED BY: _____

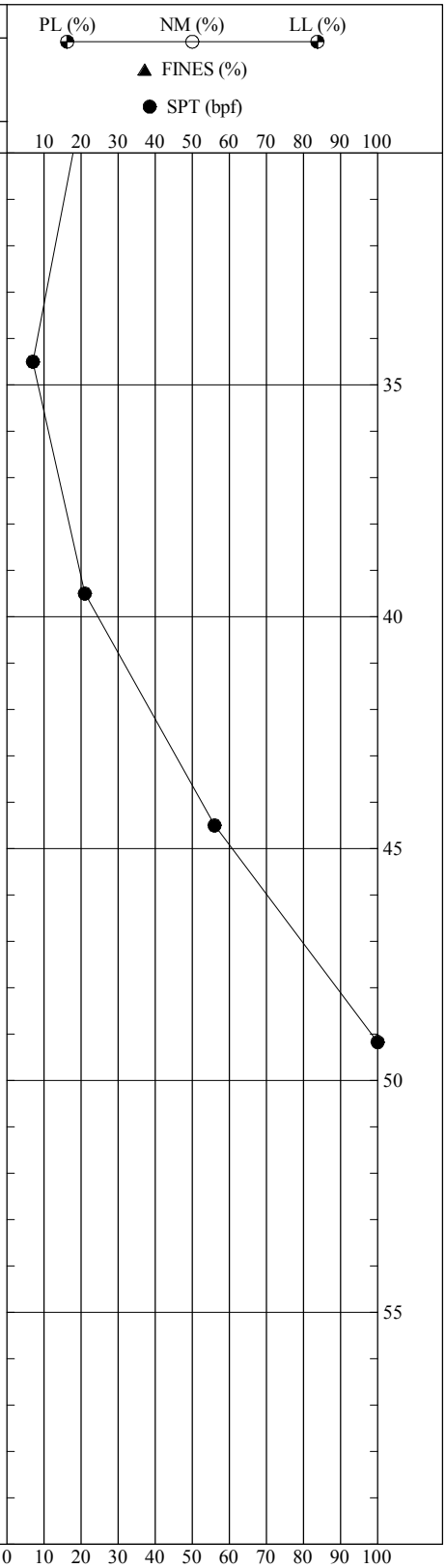
GEOTECHNICAL BORING RECORD

PROJECT NAME: Dan River On-Site Landfill
PROJECT NO.: 7810-14-0065 **START DATE:** 11/19/2014
COORD N: 102999634 **COMP. DATE:** 11/19/2014
COORD E: 1790045 **Page** 1 **of** 2
LOCATION: Eden, North Carolina

BORING NO.: B-323

amec foster wheeler

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	(Rec") N-COUNT or Rec%/RQD% 6"- 6"- 6"- 6"
30	ASH FILL: Dark Gray (GLEY 3/N), CCR Material that Classifies as Stiff to Soft, Fine Sandy SILT (ML), Non-Plastic, Moist to Wet		566.1			
	FILL: Yellow-Brown (10YR 5/4) and Dark Gray (10YR 3/1), Fine Sandy SILT (ML) with Trace Mica and Rock Fragments, Non-Plastic, Moist to Wet			SS-7		(18) 3-3-4
35			561.1			
	RESIDUUM: Red-Yellow (5YR 6/8), Medium Dense, Silty Fine SAND (SM) with Trace Mica and Rock Fragments, Non-Plastic, Moist			SS-8		(18) 8-9-12
40			556.1			
	SAPROLITE: Red-Yellow (7.5YR 7/6), Very Dense, Silty Fine SAND (SM) with Trace Mica and Manganese Staining, Non-Plastic, Moist			SS-9		(16) 13-21-35
45			551.1			
	PARTIALLY WEATHERED ROCK: When Sampled Becomes, Tan (10Yr 8/2), Very Dense, Silty Fine to Medium SAND (SM) with Trace Mica and Rock Fragments, Non-Plastic, Moist			SS-10		(8) 42-50/2
50	**Boring Terminated at 49.2 ft bgs**		546.1			
55			541.1			
60			536.1			



DUKE ABSAT GEOTECHNICAL BORING LOG DR ONSITE LANDFILL BORING LOGS 7810140065.GPJ AMEC DUKE ABSAT.GDT 7/6/15

CONTRACTOR:	S&ME, Inc.
LOGGED BY:	E. Ruffer
EQUIPMENT:	CME-550
DRILL METHOD:	3.25 HSA
HOLE DIAMETER:	6"
CLOSURE METHOD:	Grout
REMARKS:	Boring located on Ash Fill 1; 24-hour water level not measured

REVIEWED BY: _____

GEOTECHNICAL BORING RECORD

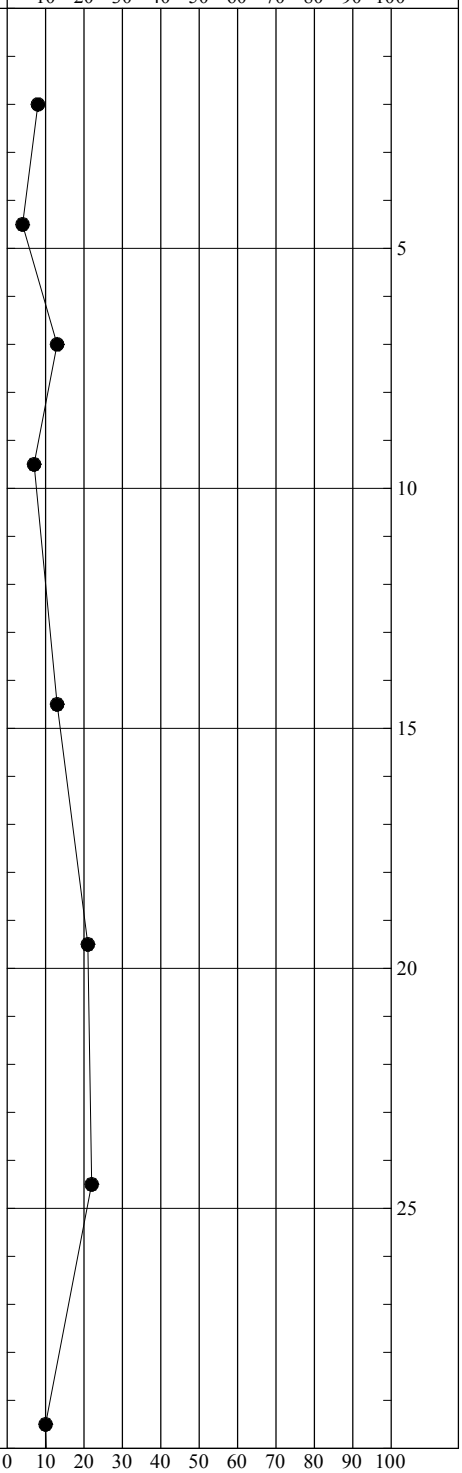
PROJECT NAME: Dan River On-Site Landfill
PROJECT NO.: 7810-14-0065 **START DATE:** 11/19/2014
COORD N: 102999634 **COMP. DATE:** 11/19/2014
COORD E: 1790045 **Page 2 of 2**
LOCATION: Eden, North Carolina

BORING NO.: B-323

amec foster wheeler

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	(Rec") N-COUNT or Rec%/RQD% 6"- 6"- 6"- 6"
0	FILL: Red-Yellow (7.5YR 6/8), Loose, Silty Fine SAND (SM), Non-Plastic, Dry to Moist		632.5	SS-1		(10) 3-4-4
	ASH FILL: Dark Gray (10YR 4/1), CCR Material that Classifies as Soft to Very Stiff, Fine Sandy SILT (ML), Non-Plastic, Moist to Wet Soft			SS-2		(18) 3-2-2
5	Becomes Stiff		627.5	SS-3		(18) 5-6-7
				SS-4		(18) 4-3-4
10			622.5			
				SS-5		(16) 6-6-7
15			617.5			
	Becomes Very Stiff			SS-6		(18) 6-8-13
20			612.5			
				SS-7		(18) 8-11-11
25			607.5			
	Becomes Stiff			SS-8		(16) 5-5-5
30			602.5			

PL (%) NM (%) LL (%) ▲ FINES (%) ● SPT (bpf)



DUKE ABSAT GEOTECHNICAL BORING LOG DR ONSITE LANDFILL BORING LOGS 7810140065.GPJ AMEC DUKE ABSAT.GDT 7/6/15

CONTRACTOR:	S&ME, Inc.
LOGGED BY:	M. Flanik
EQUIPMENT:	CME-550
DRILL METHOD:	3.25 HSA
HOLE DIAMETER:	6"
CLOSURE METHOD:	Grout
REMARKS:	Boring located on Ash Fill 1; 24-hour water level not measured

REVIEWED BY: _____

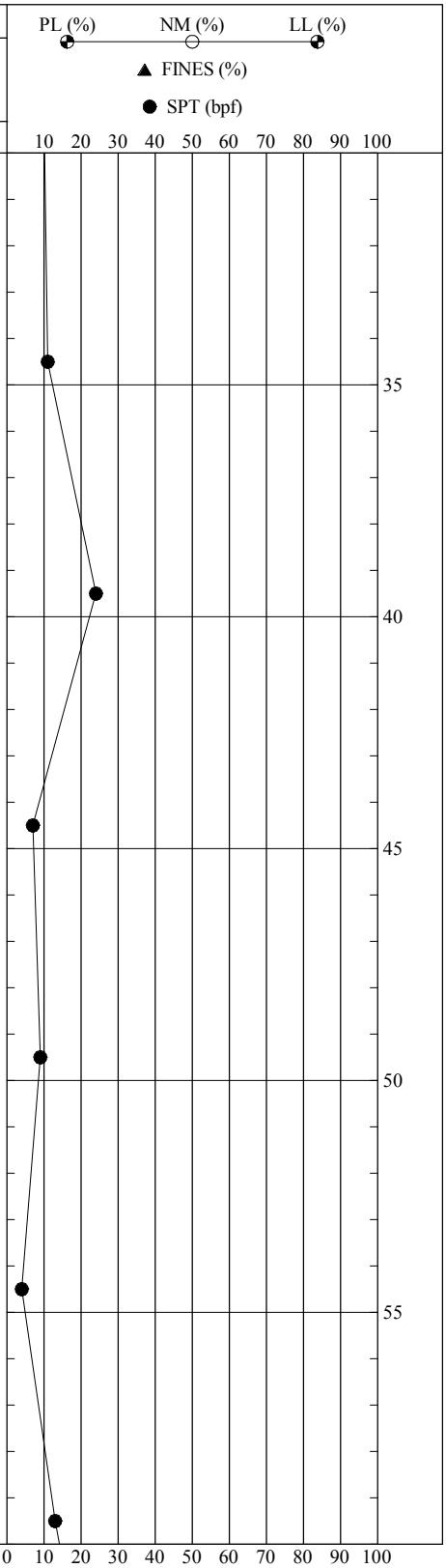
GEOTECHNICAL BORING RECORD

PROJECT NAME: Dan River On-Site Landfill
PROJECT NO.: 7810-14-0065 **START DATE:** 12/1/2014
COORD N: 103999876 **COMP. DATE:** 12/1/2014
COORD E: 1789871 **Page** 1 **of** 3
LOCATION: Eden, North Carolina

BORING NO.: B-324

amec foster wheeler

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	(Rec") N-COUNT or Rec%/RQD% 6"- 6"- 6"- 6"
30	ASH FILL: Dark Gray (10YR 4/1), CCR Material that Classifies as Soft to Very Stiff, Fine Sandy SILT (ML), Non-Plastic, Moist to Wet Soft		602.5			
				SS-9		(18) 5-5-6
35			597.5			
	Becomes Very Stiff			SS-10		(18) 5-11-13
40			592.5			
	Becomes Firm to Stiff (Wet 43.5 ft to 44 ft)			SS-11		(18) 2-3-4
45			587.5			
				SS-12		(18) 4-4-5
50			582.5			
	Becomes Soft and Wet			SS-13		(18) 2-2-2
55			577.5			
	RESIDUUM: Brown-Yellow (10YR 6/8), Medium Dense, Silty Fine SAND (SM), Non-Plastic, Moist to Wet			SS-14		(18) 6-5-8
60			572.5			



DUKE ABSAT GEOTECHNICAL BORING LOG DR ONSITE LANDFILL BORING LOGS 7810140065.GPJ AMEC DUKE ABSAT.GDT 7/6/15

CONTRACTOR:	S&ME, Inc.
LOGGED BY:	M. Flanik
EQUIPMENT:	CME-550
DRILL METHOD:	3.25 HSA
HOLE DIAMETER:	6"
CLOSURE METHOD:	Grout
REMARKS:	Boring located on Ash Fill 1; 24-hour water level not measured

REVIEWED BY: _____

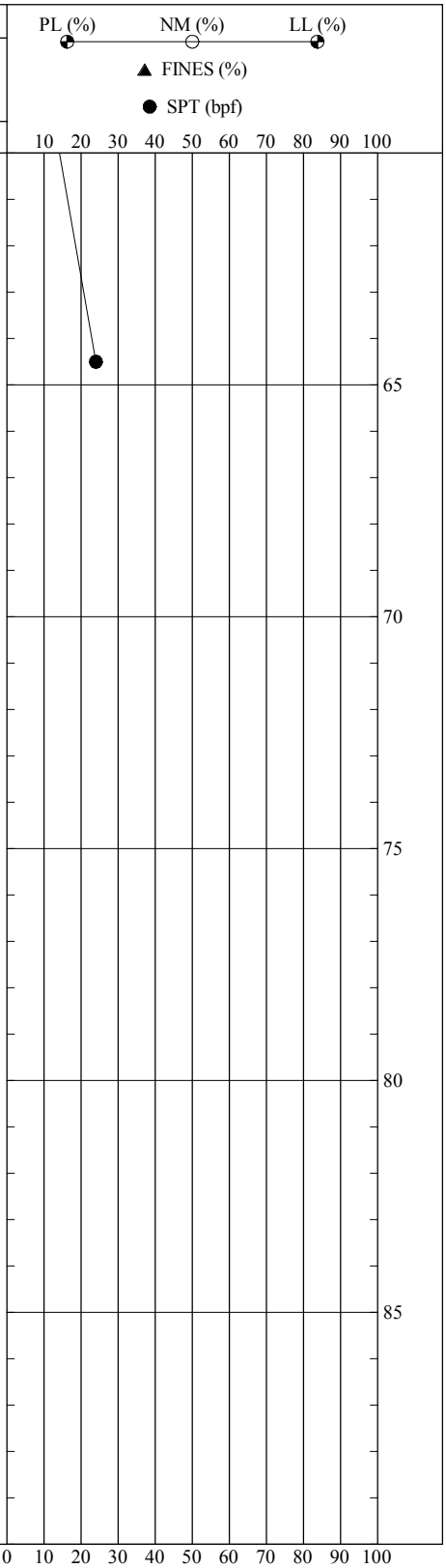
GEOTECHNICAL BORING RECORD

PROJECT NAME: Dan River On-Site Landfill
PROJECT NO.: 7810-14-0065 **START DATE:** 12/1/2014
COORD N: 103999876 **COMP. DATE:** 12/1/2014
COORD E: 1789871 **Page** 2 **of** 3
LOCATION: Eden, North Carolina

BORING NO.: B-324

amec foster wheeler

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	(Rec") N-COUNT or Rec%/RQD% 6"- 6"- 6"- 6"
60	RESIDUUM: Brown-Yellow (10YR 6/8), Medium Dense, Silty Fine SAND (SM), Non-Plastic, Moist to Wet		572.5			
	SAPROLITE: Yellow-Brown(10YR 5/8) and Yellow-Red (5YR 5/5), Medium Dense, Silty Medium to Fine SAND (SM), Non-Plastic, Moist			SS-15		(18) 5-10-14
65	**Boring Terminated at 65 ft bgs**		567.5			
70			562.5			
75			557.5			
80			552.5			
85			547.5			
90			542.5			



DUKE ABSAT GEOTECHNICAL BORING LOG DR ONSITE LANDFILL BORING LOGS 7810140065.GPJ AMEC DUKE ABSAT.GDT 7/6/15

CONTRACTOR:	S&ME, Inc.
LOGGED BY:	M. Flanik
EQUIPMENT:	CME-550
DRILL METHOD:	3.25 HSA
HOLE DIAMETER:	6"
CLOSURE METHOD:	Grout
REMARKS:	Boring located on Ash Fill 1; 24-hour water level not measured

REVIEWED BY: _____

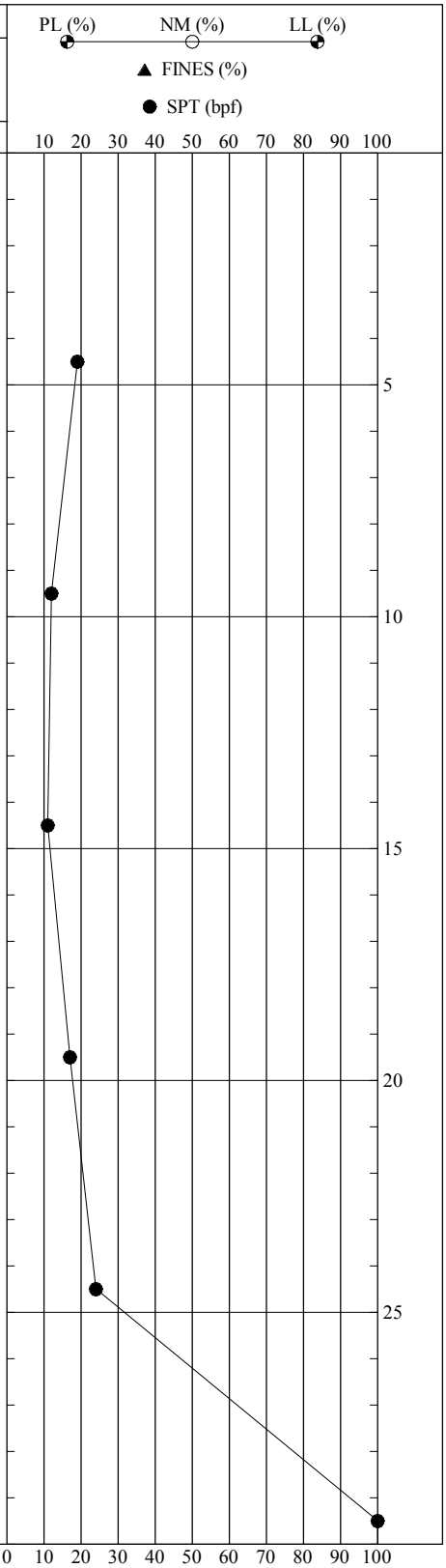
GEOTECHNICAL BORING RECORD

PROJECT NAME: Dan River On-Site Landfill
PROJECT NO.: 7810-14-0065 **START DATE:** 12/1/2014
COORD N: 103999876 **COMP. DATE:** 12/1/2014
COORD E: 1789871 **Page** 3 **of** 3
LOCATION: Eden, North Carolina

BORING NO.: B-324

amec foster wheeler

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	(Rec") N-COUNT or Rec%/RQD% 6"- 6"- 6"- 6"
0	RESIDUUM: Yellow-Brown (10YR 5/4), Very Stiff, Sandy Lean CLAY (CL), Low Plasticity, Dry to Moist		630.0			
				SS-1		(18) 3-8-11
5			625.0			
	SAPROLITE: Gray-Brown (10YR 5/2), Medium Dense, Silty Fine to Medium SAND (SM), Non-Plastic, Moist			SS-2		(18) 6-7-5
10			620.0			
				SS-3		(18) 4-5-6
15			615.0			
	SAPROLITE: Gray-Brown (10YR 5/2) to Brown-Red (5 YR 4/4), Very Stiff, Fine Sandy SILT (ML), Low to Medium Plasticity, Moist			SS-4		(18) 5-7-10
20			610.0			
	SAPROLITE: Brown (7.5YR 5/6), Medium Dense, Silty Fine to Coarse SAND (SM), with Rock Fragments, Non-Plastic, Moist			SS-5		(18) 4-8-16
25			605.0			
	PARTIALLY WEATHERED ROCK: When Sampled Becomes Light Brown (7.5YR 6/4), Very Dense, Fine to Coarse SAND (SM) with Rock Fragments, Non-Plastic, Moist			SS-6		(15.6) 17-38-50/5
30			600.0			



DUKE ABSAT GEOTECHNICAL BORING LOG DR ONSITE LANDFILL BORING LOGS 7810140065.GPJ AMEC DUKE ABSAT.GDT 7/6/15

CONTRACTOR:	SAEDACCO
LOGGED BY:	L. Eaves
EQUIPMENT:	CME-550
DRILL METHOD:	4.25 HSA
HOLE DIAMETER:	7"
CLOSURE METHOD:	Grout
REMARKS:	Boring located north of Ash Fill 1; 24-hour water level was dry to bottom of boring

REVIEWED BY: _____

GEOTECHNICAL BORING RECORD

PROJECT NAME: Dan River On-Site Landfill
PROJECT NO.: 7810-14-0065 **START DATE:** 3/24/2015
COORD N: 1000273 **COMP. DATE:** 3/24/2015
COORD E: 1789688 **Page** 1 **of** 2
LOCATION: Eden, North Carolina

BORING NO.: B-451

amec foster wheeler

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	(Rec") N-COUNT or Rec%/RQD% 6"- 6"- 6"- 6"	PL (%) NM (%) LL (%) ▲ FINES (%) ● SPT (bpf) 10 20 30 40 50 60 70 80 90 100
30	PARTIALLY WEATHERED ROCK: When Sampled Becomes Light Brown (7.5YR 6/4), Very Dense, Fine to Coarse SAND (SM) with Rock Fragments, Non-Plastic, Moist		600.0	SS-7		(9.6) 34-50/4	
	Auger Refusal at 31.8 ft						
35			595.0				
40			590.0				
45			585.0				
50			580.0				
55			575.0				
60			570.0				

0 10 20 30 40 50 60 70 80 90 100

DUKE ABSAT GEOTECHNICAL BORING LOG DR ONSITE LANDFILL BORING LOGS 7810140065.GPJ AMEC DUKE ABSAT.GDT 7/6/15

CONTRACTOR:	SAEDACCO
LOGGED BY:	L. Eaves
EQUIPMENT:	CME-550
DRILL METHOD:	4.25 HSA
HOLE DIAMETER:	7"
CLOSURE METHOD:	Grout
REMARKS:	Boring located north of Ash Fill 1; 24-hour water level was dry to bottom of boring

REVIEWED BY: _____

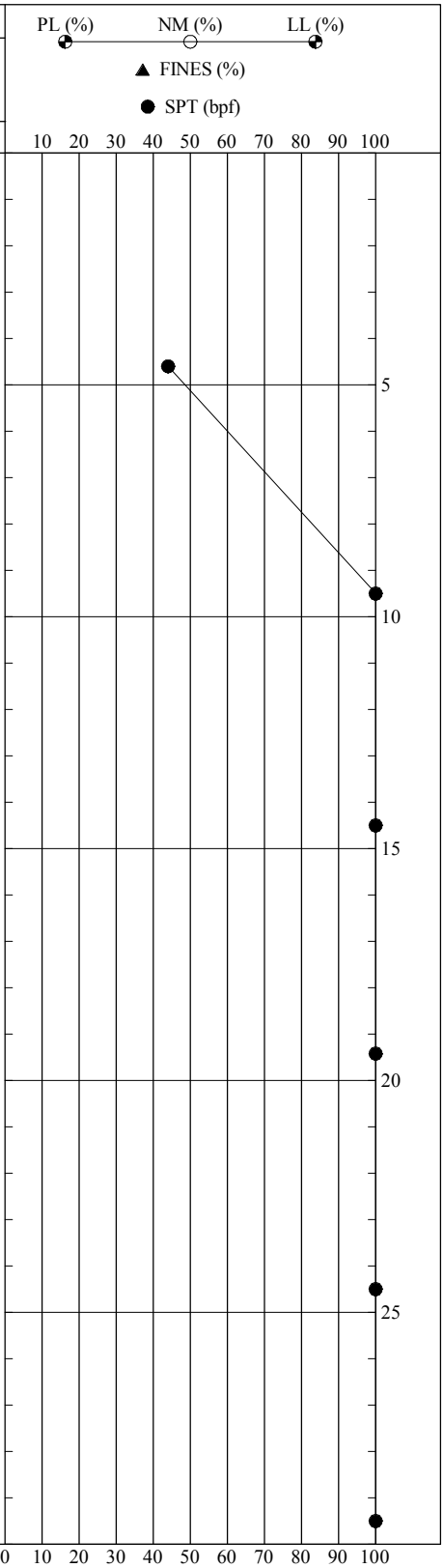
GEOTECHNICAL BORING RECORD

PROJECT NAME: Dan River On-Site Landfill
PROJECT NO.: 7810-14-0065 **START DATE:** 3/24/2015
COORD N: 1000273 **COMP. DATE:** 3/24/2015
COORD E: 1789688 **Page** 2 **of** 2
LOCATION: Eden, North Carolina

BORING NO.: B-451

amec foster wheeler

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	(Rec") N-COUNT or Rec%/RQD% 6"- 6"- 6"- 6"
0	RESIDUUM: Orange (7.5YR 5/8), Fat CLAY (CH) with Sand, High Plasticity, Dry to Moist		602.9			
5			597.9	SS-1		(18) 10-18-26
10	PARTIALLY WEATHERED ROCK: When Sampled Becomes Orange (7.5YR 6/6), Very Hard, Fine to Coarse Sandy SILT (ML), Low Plasticity, Dry		592.9	SS-2		(12) 10-20-50/5.5
15	PARTIALLY WEATHERED ROCK: When Sampled Becomes Orange (7.5YR 5/8), Very Dense, Silty Fine to Coarse SAND (SM) with Trace Clay and Rock Fragments, Non-Plastic, Moist		587.9	SS-3		(14.4) 17-49-50/2
20	PARTIALLY WEATHERED ROCK: When Sampled Becomes Tan (10YR 6/6) and Black (10YR 2/1), Very Dense, Silty Fine SAND to Fine Sandy SILT with Rock Fragments and Trace Mica, Non-Plastic, Dry to Moist		582.9	SS-4		(10.8) 27-50/5
25			577.9	SS-5		(9.6) 24-49-50/4
30			572.9	SS-6		(12) 25-50-50/2



DUKE ABSAT GEOTECHNICAL BORING LOG DR ONSITE LANDFILL BORING LOGS 7810140065.GPJ AMEC DUKE ABSAT.GDT 7/6/15

CONTRACTOR:	SAEDACCO
LOGGED BY:	S. Protopappas
EQUIPMENT:	CME-550
DRILL METHOD:	4.25 HSA
HOLE DIAMETER:	7"
CLOSURE METHOD:	Grout
REMARKS:	Boring located northeast of Ash Fill 1; 24-hour water level was dry to bottom of boring

REVIEWED BY: _____

GEOTECHNICAL BORING RECORD

PROJECT NAME: Dan River On-Site Landfill
PROJECT NO.: 7810-14-0065 **START DATE:** 3/16/2015
COORD N: 1000127 **COMP. DATE:** 3/16/2015
COORD E: 1790243 **Page** 1 **of** 2
LOCATION: Eden, North Carolina

BORING NO.: B-452

amec foster wheeler

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	(Rec") N-COUNT or Rec%/RQD% 6"- 6"- 6"- 6"	PL (%) NM (%) LL (%) ▲ FINES (%) ● SPT (bpf) 10 20 30 40 50 60 70 80 90 100
30	PARTIALLY WEATHERED ROCK: When Sampled Becomes Tan (10YR 6/6) and Black (10YR 2/1), Very Dense, Silty Fine SAND to Fine Sandy SILT with Rock Fragments and Trace Mica, Non-Plastic, Dry to Moist		572.9				
				SS-7		(12) 30-50/3	●
35			567.9	SS-8		50/2	● 35
	Auger Refusal at 35.2 ft bgs						
40			562.9				40
45			557.9				45
50			552.9				50
55			547.9				55
60			542.9				

0 10 20 30 40 50 60 70 80 90 100

DUKE ABSAT GEOTECHNICAL BORING LOG DR ONSITE LANDFILL BORING LOGS 7810140065.GPJ AMEC DUKE ABSAT.GDT 7/6/15

CONTRACTOR:	SAEDACCO
LOGGED BY:	S. Protopappas
EQUIPMENT:	CME-550
DRILL METHOD:	4.25 HSA
HOLE DIAMETER:	7"
CLOSURE METHOD:	Grout
REMARKS:	Boring located northeast of Ash Fill 1; 24-hour water level was dry to bottom of boring

REVIEWED BY: _____

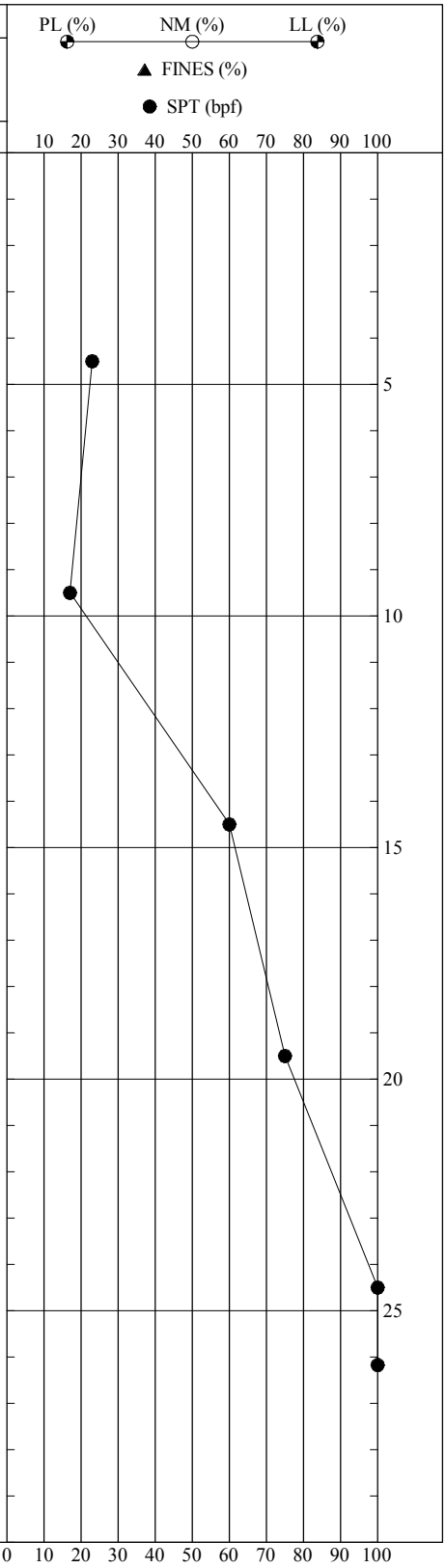
GEOTECHNICAL BORING RECORD

PROJECT NAME: Dan River On-Site Landfill
PROJECT NO.: 7810-14-0065 **START DATE:** 3/16/2015
COORD N: 1000127 **COMP. DATE:** 3/16/2015
COORD E: 1790243 **Page** 2 **of** 2
LOCATION: Eden, North Carolina

BORING NO.: B-452

amec foster wheeler

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	(Rec") N-COUNT or Rec%/RQD% 6"- 6"- 6"- 6"
0	RESIDUUM: Yellow-Brown (10YR 6/4), Very Stiff, Fat CLAY (CH), High Plasticity, Moist		583.3			
				SS-1		(18) 6-9-14
5			578.3			
				SS-2		(18) 6-8-9
10	SAPROLITE: Tan-Brown (10YR 6/4), Very Stiff, Fine Sandy SILT (ML) with Rock Fragments, Low Plasticity, Moist		573.3			
	SAPROLITE: Dark brown (10YR 3/3), Very Dense, Silty Fine to Coarse SAND (SM) with Rock Fragments, Non-Plastic, Moist			SS-3		(18) 12-25-35
15			568.3			
				SS-4		(12) 22-29-46
20			563.3			
	PARTIALLY WEATHERED ROCK: When Sampled Becomes Dark Gray to Black (5YR 3/1), Very Dense, Silty Fine to Coarse SAND (SM), Non-Plastic, Moist			SS-5		(10.8) 20-40-50/2
25			558.3			
				SS-6		(0) 50/2
	Auger Refusal at 26.2 ft bgs					
30			553.3			



DUKE ABSAT GEOTECHNICAL BORING LOG DR ONSITE LANDFILL BORING LOGS 7810140065.GPJ AMEC DUKE ABSAT.GDT 12/10/15

CONTRACTOR:	SAEDACCO
LOGGED BY:	L. Eaves
EQUIPMENT:	CME-550
DRILL METHOD:	4.25 HSA
HOLE DIAMETER:	7"
CLOSURE METHOD:	Grout
REMARKS:	Boring located northwest of Ash Fill 1; 24-hour water level = 10.30 feet bgs

REVIEWED BY: _____

GEOTECHNICAL BORING RECORD

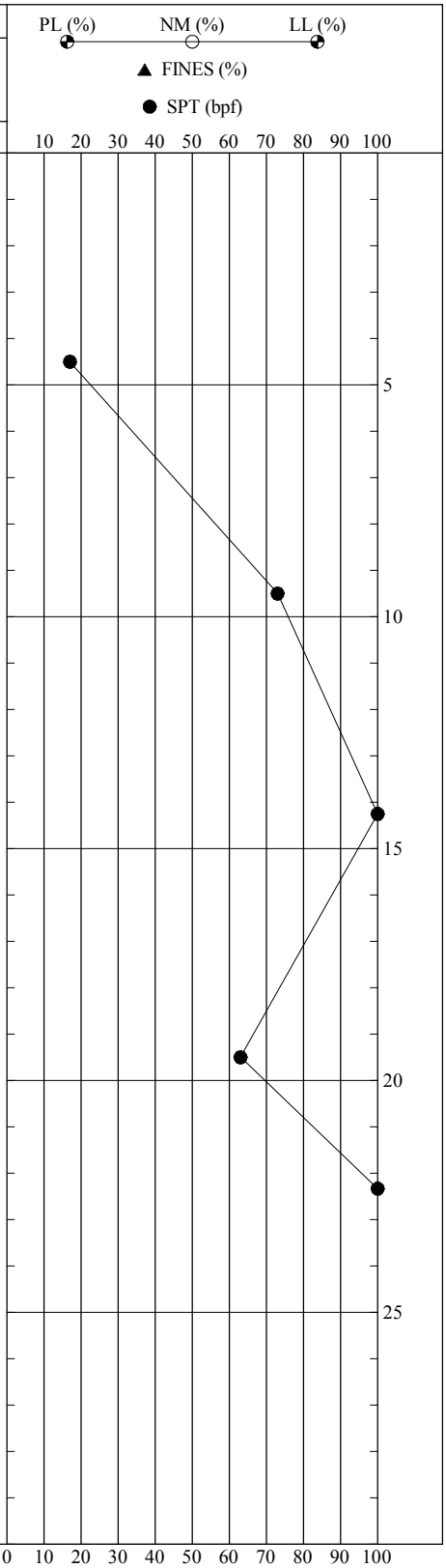
PROJECT NAME: Dan River On-Site Landfill
PROJECT NO.: 7810-14-0065 **START DATE:** 3/24/2015
COORD N: 1000281 **COMP. DATE:** 3/24/2015
COORD E: 1789143 **Page** 1 **of** 1
LOCATION: Eden, North Carolina

BORING NO.: B-453

amec foster wheeler

DUKE ABSAT GEOTECHNICAL BORING LOG DR ONSITE LANDFILL BORING LOGS 7810140065.GPJ AMEC DUKE ABSAT.GDT 7/6/15

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.	ELEV (ft)	SAMPLES IDENT	TYPE	(Rec") N-COUNT or Rec%/RQD% 6"- 6"- 6"- 6"
0	RESIDUUM: Orange and Blue (5YR 5/8) and (GLEY2 6/10B), Very Stiff, Fine Sandy SILT (ML), Low Plasticity, Moist	590.6			
			SS-1		(18) 4-6-11
5		585.6			
	SAPROLITE: Dark Gray and Black (GLEY 12.5/N), Very Hard, Silty Fine to Coarse SAND (SM), Non-Plastic, Dry		SS-2		(18) 35-36-37
10		580.6			
	PARTIALLY WEATHERED ROCK: When Sampled Becomes Dark Gray and Black (GLEY 12.5/N), Very Hard, Silty Fine to Coarse SAND (SM), Non-Plastic, Dry		SS-3		(9) 36-50/3
15		575.6			
	SAPROLITE: Dark Gray and Black (GLEY 12.5/N), Very Hard, Silty Fine to Coarse SAND (SM), Non-Plastic, Dry		SS-4		(18) 16-23-40
20		570.6			
	PARTIALLY WEATHERED ROCK: When Sampled Becomes Dark Gray and Black (GLEY 12.5/N), Very Hard, Silty Fine to Coarse SAND (SM) with Rock Fragments, Non-Plastic, Dry		SS-5		(4) 50/4
	Auger Refusal at 22.4 ft bgs				
25		565.6			
30		560.6			



CONTRACTOR:	SAEDACCO
LOGGED BY:	S. Protopappas
EQUIPMENT:	CME-550
DRILL METHOD:	4.25 HSA
HOLE DIAMETER:	7"
CLOSURE METHOD:	Grout
REMARKS:	Boring located near north toe of Ash Fill 1; 24-hour water level = 19.70 feet bgs

REVIEWED BY: _____

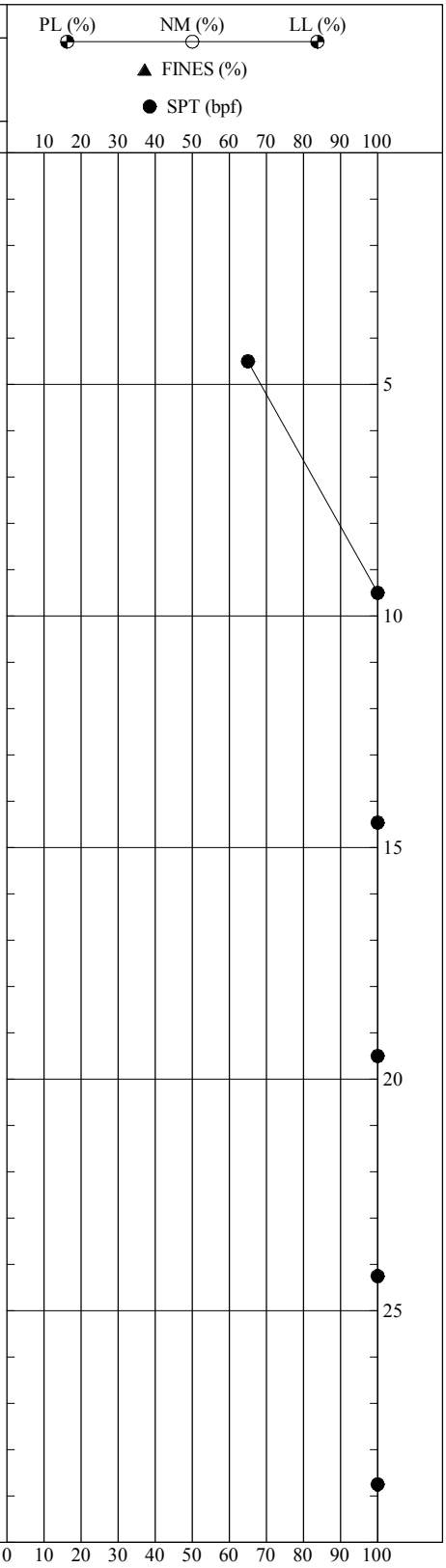
GEOTECHNICAL BORING RECORD

PROJECT NAME: Dan River On-Site Landfill
PROJECT NO.: 7810-14-0065 **START DATE:** 3/10/2015
COORD N: 1000025 **COMP. DATE:** 3/11/2015
COORD E: 1789453 **Page** 1 **of** 1
LOCATION: Eden, North Carolina

BORING NO.: B-454

amec foster wheeler

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	(Rec") N-COUNT or Rec%/RQD% 6"- 6"- 6"- 6"
0	RESIDUUM: Light Brown (10YR 7/6) to Brown (7.5YR 4/6) , Very Hard, Fine Sandy Lean CLAY (CL), Low Plasticity, Dry to Moist		591.3			
				SS-1		(18) 7-27-38
5			586.3			
	PARTIALLY WEATHERED ROCK: When Sampled Becomes Brown (7.5YR 4/6), Blue-Gray (GLEY1 5/N), and Dark Gray (5Y 4/1), Silty Fine to Coarse SAND (SM) with Rock Fragments, Non-Plastic, Moist			SS-2		(16) 20-45-50/4
10			581.3			
				SS-3		(10.8) 25-50/5.5
15			576.3			
				SS-4		(15) 28-50-50/3
20			571.3			
				SS-5		(9) 16-50/3
25			566.3			
				SS-6		(3) 50/3
30			561.3			



DUKE ABSAT GEOTECHNICAL BORING LOG DR ONSITE LANDFILL BORING LOGS 7810140065.GPJ AMEC DUKE ABSAT.GDT 7/6/15

CONTRACTOR:	SAEDACCO
LOGGED BY:	S. Protopappas
EQUIPMENT:	CME-550
DRILL METHOD:	4.25 HSA
HOLE DIAMETER:	7"
CLOSURE METHOD:	Grout
REMARKS:	Boring located near north toe of Ash Fill 1; 24-hour water level = 23.20 feet bgs

REVIEWED BY: _____

GEOTECHNICAL BORING RECORD

PROJECT NAME: Dan River On-Site Landfill
PROJECT NO.: 7810-14-0065 **START DATE:** 3/12/2015
COORD N: 1000054 **COMP. DATE:** 3/12/2015
COORD E: 1789917 **Page** 1 **of** 2
LOCATION: Eden, North Carolina

BORING NO.: B-455

amec foster wheeler

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	(Rec") N-COUNT or Rec%/RQD% 6"- 6"- 6"- 6"	PL (%) NM (%) LL (%) ▲ FINES (%) ● SPT (bpf) 10 20 30 40 50 60 70 80 90 100
30	PARTIALLY WEATHERED ROCK: When Sampled Becomes Brown (7.5YR 4/6), Blue-Gray (GLEY1 5/N), and Dark Gray (5Y 4/1), Silty Fine to Coarse SAND (SM) with Rock Fragments, Non-Plastic, Moist		561.3				
				SS-7	⊠	(3) 50/3	●
35			556.3				35
				SS-8	⊠	(2) 50/2	●
	Auger Refusal at 38 ft bgs						
40			551.3				40
45			546.3				45
50			541.3				50
55			536.3				55
60			531.3				

0 10 20 30 40 50 60 70 80 90 100

DUKE ABSAT GEOTECHNICAL BORING LOG DR ONSITE LANDFILL BORING LOGS 7810140065.GPJ AMEC DUKE ABSAT.GDT 7/6/15

CONTRACTOR:	SAEDACCO
LOGGED BY:	S. Protopappas
EQUIPMENT:	CME-550
DRILL METHOD:	4.25 HSA
HOLE DIAMETER:	7"
CLOSURE METHOD:	Grout
REMARKS:	Boring located near north toe of Ash Fill 1; 24-hour water level = 23.20 feet bgs

REVIEWED BY: _____

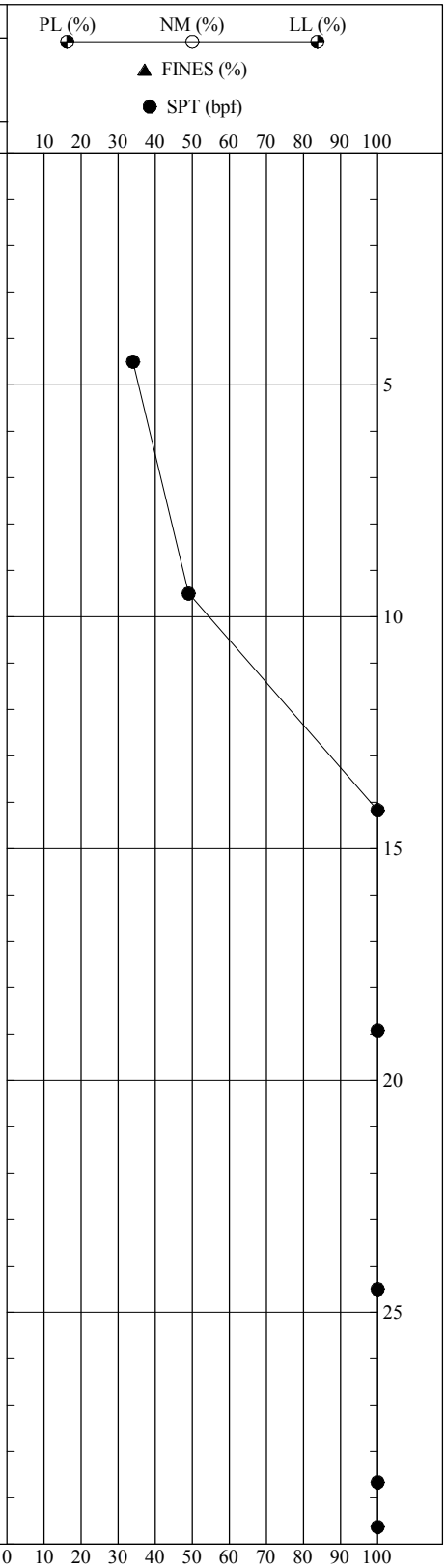
GEOTECHNICAL BORING RECORD

PROJECT NAME: Dan River On-Site Landfill
PROJECT NO.: 7810-14-0065 **START DATE:** 3/12/2015
COORD N: 1000054 **COMP. DATE:** 3/12/2015
COORD E: 1789917 **Page 2 of 2**
LOCATION: Eden, North Carolina

BORING NO.: B-455

amec foster wheeler

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	(Rec") N-COUNT or Rec%/RQD% 6"- 6"- 6"- 6"
0	RESIDUUM: Light Brown (10YR 7/6), Hard, Clayey SILT (ML) with Manganese Staining, Low Plasticity, Moist		589.7			
	SAPROLITE: Orange (7.5YR 5/8), Hard, CLAY (CL) with Manganese Staining, Low Plasticity, Moist			SS-1		(18) 9-12-22
5			584.7			
				SS-2		(18) 9-17-32
10	SAPROLITE: Dark Brown (10YR 2/2), Hard, SILT (ML) with Manganese Staining, Low Plasticity, Moist		579.7			
	PARTIALLY WEATHERED ROCK: When Sampled Becomes Gray (5Y 6/1), Very Hard, Silty Fine SAND (SM) with Rock Fragments, Non-Plastic			SS-3		(8) 65-50/2
15			574.7			
				SS-4		(5) 50/5
20	PARTIALLY WEATHERED ROCK: Tan, Very Hard, Fine Sandy SILT (ML) with Rock Fragments and Trace Mica, Non-Plastic, Dry to Moist		569.7			
				SS-5		(15.6) 20-25-50/4
25			564.7			
				SS-6		(2) 50/2
				SS-7		(1.5)
30	PARTIALLY WEATHERED ROCK: When Sampled		559.7			



DUKE ABSAT GEOTECHNICAL BORING LOG DR ONSITE LANDFILL BORING LOGS 7810140065.GPJ AMEC DUKE ABSAT.GDT 7/6/15

CONTRACTOR:	SAEDACCO
LOGGED BY:	S. Protopappas
EQUIPMENT:	CME-550
DRILL METHOD:	4.25 HSA
HOLE DIAMETER:	7"
CLOSURE METHOD:	Grout
REMARKS:	Located northwest of Ash Fill 1; 24-hour water level = 28.65 feet bgs

REVIEWED BY: _____

GEOTECHNICAL BORING RECORD

PROJECT NAME: Dan River On-Site Landfill
PROJECT NO.: 7810-14-0065 **START DATE:** 3/10/2015
COORD N: 999975 **COMP. DATE:** 3/10/2015
COORD E: 1789087 **Page** 1 **of** 2
LOCATION: Eden, North Carolina

BORING NO.: B-456

amec foster wheeler

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	SAMPLES TYPE	SAMPLES (Rec") N-COUNT or Rec%/RQD% 6"- 6"- 6"- 6"	PL (%) NM (%) LL (%) ▲ FINES (%) ● SPT (bpf) 10 20 30 40 50 60 70 80 90 100
30	Becomes Dark Gray (10Y 4/1), Very Hard, Silty Fine SAND (SM) with Rock Fragments, Non-Plastic **Auger Refusal at 29.6 ft bgs**		559.7			50/1.5	
35			554.7				
40			549.7				
45			544.7				
50			539.7				
55			534.7				
60			529.7				

0 10 20 30 40 50 60 70 80 90 100

DUKE ABSAT GEOTECHNICAL BORING LOG DR ONSITE LANDFILL BORING LOGS 7810140065.GPJ AMEC DUKE ABSAT.GDT 7/6/15

CONTRACTOR:	SAEDACCO
LOGGED BY:	S. Protopappas
EQUIPMENT:	CME-550
DRILL METHOD:	4.25 HSA
HOLE DIAMETER:	7"
CLOSURE METHOD:	Grout
REMARKS:	Located northwest of Ash Fill 1; 24-hour water level = 28.65 feet bgs

REVIEWED BY: _____

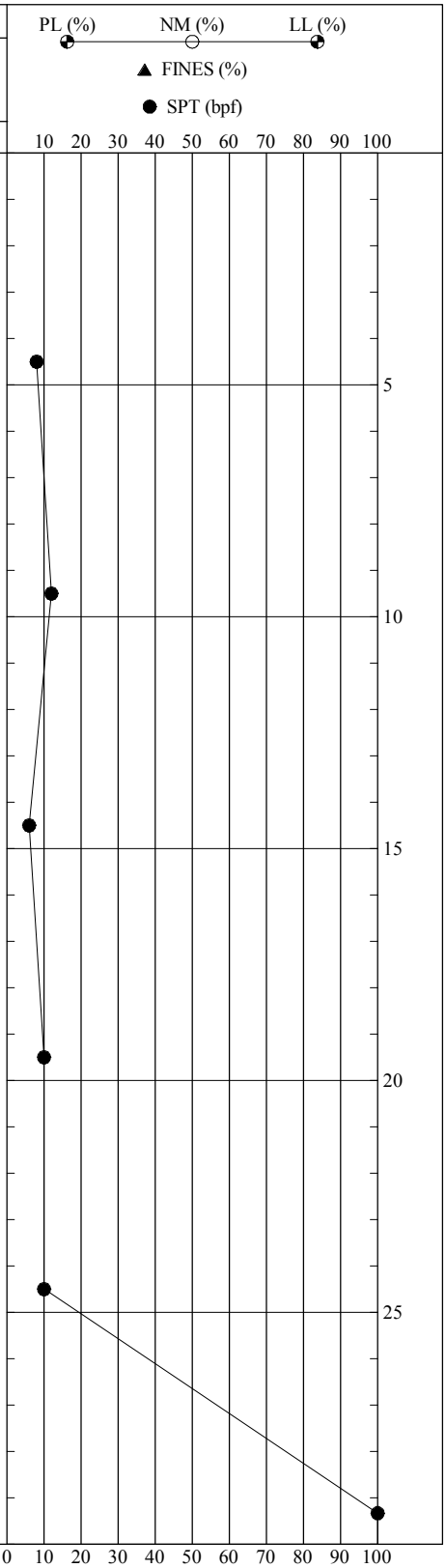
GEOTECHNICAL BORING RECORD

PROJECT NAME: Dan River On-Site Landfill
PROJECT NO.: 7810-14-0065 **START DATE:** 3/10/2015
COORD N: 999975 **COMP. DATE:** 3/10/2015
COORD E: 1789087 **Page 2 of 2**
LOCATION: Eden, North Carolina

BORING NO.: B-456

amec foster wheeler

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	(Rec") N-COUNT or Rec%/RQD% 6"- 6"- 6"- 6"
0	FILL: Brown (10YR 4/6), Fine Sandy SILT (ML), Low to Medium Plasticity, Wet		609.6			
	ASH FILL: Dark Gray (10YR 4/1), CCR Material that Classifies as Firm to Stiff, Fine Sandy SILT (ML), Non-Plastic, Moist					
				SS-1		(18) 4-4-4
5			604.6			
				SS-2		(14.4) 5-5-7
10			599.6			
				SS-3		(18) 3-3-3
15			594.6			
	FILL: Gray-Brown (10YR 4/6), Loose, Silty Fine SAND (SM) with Rock Fragments, Non-Plastic, Moist					
				SS-4		(18) 3-4-6
20			589.6			
	ASH FILL: Dark Gray (10YR 4/1), CCR Material that Classifies as Firm to Stiff, Fine Sandy SILT (ML), Non-Plastic, Moist to Wet					
				SS-5		(18) 5-5-5
25			584.6			
	PARTIALLY WEATHERED ROCK: When Sampled Becomes Brown-Tan (7.5YR 7/4), Very Dense, Silty Fine to Coarse SAND (SM), Non-Plastic, Moist					
				SS-6		(9.6) 34-50/4
30			579.6			



DUKE ABSAT GEOTECHNICAL BORING LOG DR ONSITE LANDFILL BORING LOGS 7810140065.GPJ AMEC DUKE ABSAT.GDT 7/6/15

CONTRACTOR:	SAEDACCO
LOGGED BY:	L. Eaves
EQUIPMENT:	CME-550
DRILL METHOD:	4.25 HSA
HOLE DIAMETER:	7"
CLOSURE METHOD:	Grout
REMARKS:	Boring located on Ash Fill 1; 24-hour water level = 24.90 feet bgs

REVIEWED BY: _____

GEOTECHNICAL BORING RECORD

PROJECT NAME: Dan River On-Site Landfill
PROJECT NO.: 7810-14-0065 **START DATE:** 3/20/2015
COORD N: 999975 **COMP. DATE:** 3/20/2015
COORD E: 1789253 **Page** 1 **of** 2
LOCATION: Eden, North Carolina

BORING NO.: B-457

amec foster wheeler

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	(Rec") N-COUNT or Rec%/RQD% 6"- 6"- 6"- 6"	PL (%) NM (%) LL (%) ▲ FINES (%) ● SPT (bpf) 10 20 30 40 50 60 70 80 90 100
30	PARTIALLY WEATHERED ROCK: When Sampled Becomes Brown-Tan (7.5YR 7/4), Very Dense, Silty Fine to Coarse SAND (SM), Non-Plastic, Moist		579.6				
				SS-7		(0) 50/2	
	Auger Refusal at 33.6 ft bgs						
35			574.6				
40			569.6				
45			564.6				
50			559.6				
55			554.6				
60			549.6				

0 10 20 30 40 50 60 70 80 90 100

DUKE ABSAT GEOTECHNICAL BORING LOG DR ONSITE LANDFILL BORING LOGS 7810140065.GPJ AMEC DUKE ABSAT.GDT 7/6/15

CONTRACTOR:	SAEDACCO
LOGGED BY:	L. Eaves
EQUIPMENT:	CME-550
DRILL METHOD:	4.25 HSA
HOLE DIAMETER:	7"
CLOSURE METHOD:	Grout
REMARKS:	Boring located on Ash Fill 1; 24-hour water level = 24.90 feet bgs

REVIEWED BY: _____

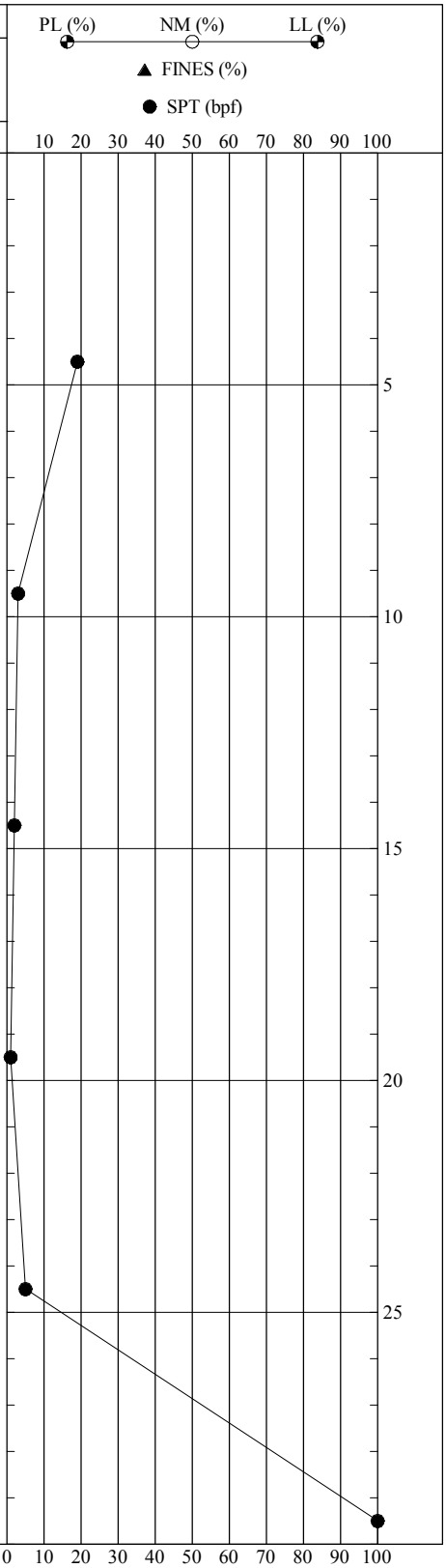
GEOTECHNICAL BORING RECORD

PROJECT NAME: Dan River On-Site Landfill
PROJECT NO.: 7810-14-0065 **START DATE:** 3/20/2015
COORD N: 999975 **COMP. DATE:** 3/20/2015
COORD E: 1789253 **Page** 2 **of** 2
LOCATION: Eden, North Carolina

BORING NO.: B-457

amec foster wheeler

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	(Rec") N-COUNT or Rec%/RQD% 6"- 6"- 6"- 6"
0	ASH FILL: Dark Gray and Black (5YR 2.5/1), CCR Material that Classifies as Very Stiff to Very Soft Fine Sandy SILT (ML), Non-Plastic, Moist to Wet		592.0			
				SS-1		(18) 3-8-11
5			587.0			
	Becomes Soft			SS-2		(18) 3-1-2
10			582.0			
				SS-3		(18) 2-1-1
15			577.0			
	Becomes Wet			SS-4		(6) 1-WOH-1
20	POSSIBLE FILL: Light Brown and Gray (10YR 5/2), Firm, Coarse Sandy CLAY (CL), Medium Plasticity, Moist		572.0			
				SS-5		(18) 1-2-3
25			567.0			
	PARTIALLY WEATHERED ROCK: When Sampled Becomes Brown (7.5 YR 5/6), Very Dense, Lean CLAY (CL) with Sand and Rock Fragments, Low-Plasticity, Moist			SS-6		(16) 12-31-50/4
30			562.0			



DUKE ABSAT GEOTECHNICAL BORING LOG DR ONSITE LANDFILL BORING LOGS 7810140065.GPJ AMEC DUKE ABSAT.GDT 7/6/15

CONTRACTOR:	SAEDACCO
LOGGED BY:	S. Protopappas
EQUIPMENT:	CME-550
DRILL METHOD:	4.25 HSA
HOLE DIAMETER:	7"
CLOSURE METHOD:	Grout
REMARKS:	Boring located on Ash Fill 1; 24-hour water level = 27.80 feet bgs

REVIEWED BY: _____

GEOTECHNICAL BORING RECORD

PROJECT NAME: Dan River On-Site Landfill
PROJECT NO.: 7810-14-0065 **START DATE:** 3/11/2015
COORD N: 999793 **COMP. DATE:** 3/11/2015
COORD E: 1789196 **Page** 1 **of** 2
LOCATION: Eden, North Carolina

BORING NO.: B-458

amec foster wheeler

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	(Rec") N-COUNT or Rec%/RQD% 6"- 6"- 6"- 6"	PL (%) NM (%) LL (%) ▲ FINES (%) ● SPT (bpf) 10 20 30 40 50 60 70 80 90 100
30	PARTIALLY WEATHERED ROCK: When Sampled Becomes Brown (7.5 YR 5/6), Very Dense, Lean CLAY (CL) with Sand and Rock Fragments, Low-Plasticity, Moist		562.0				
				SS-7		(10) 33-50/4	
35			557.0				35
				SS-8		(14) 39-50-50/2	
40			552.0				40
				SS-9		(5) 50/5	
45			547.0				45
				SS-10		(3) 50/3	
	Auger Refusal at 48.3 ft bgs						
50			542.0				50
55			537.0				55
60			532.0				0 10 20 30 40 50 60 70 80 90 100

DUKE ABSAT GEOTECHNICAL BORING LOG DR ONSITE LANDFILL BORING LOGS 7810140065.GPJ AMEC DUKE ABSAT.GDT 7/6/15

CONTRACTOR:	SAEDACCO
LOGGED BY:	S. Protopappas
EQUIPMENT:	CME-550
DRILL METHOD:	4.25 HSA
HOLE DIAMETER:	7"
CLOSURE METHOD:	Grout
REMARKS:	Boring located on Ash Fill 1; 24-hour water level = 27.80 feet bgs

REVIEWED BY: _____

GEOTECHNICAL BORING RECORD

PROJECT NAME: Dan River On-Site Landfill
PROJECT NO.: 7810-14-0065 **START DATE:** 3/11/2015
COORD N: 999793 **COMP. DATE:** 3/11/2015
COORD E: 1789196 **Page 2 of 2**
LOCATION: Eden, North Carolina

BORING NO.: B-458

amec foster wheeler

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	(Rec") N-COUNT or Rec%/RQD% 6"- 6"- 6"- 6"	PL (%) NM (%) LL (%) ▲ FINES (%) ● SPT (bpf) 10 20 30 40 50 60 70 80 90 100
0	FILL: Red-Brown (7.5YR 4/6), Fine to Medium Sandy SILT (ML) with Rock Fragments, Low Plasticity, Moist		594.6	AUGER-1			
	ASH FILL: Dark Gray (10YR 4/1), CCR Material that Classifies as Firm to Stiff, Fine Sandy SILT (ML), Non-Plastic, Moist to Wet						
5			589.6				5
				SS-1		(5) 4-3-3	
10			584.6				10
				SS-2		(4) 2-3-3	
15			579.6				15
	Becomes Wet			SS-3		(12) 2-4-7	
20			574.6				20
	FILL: Red-Brown (7.5YR 4/6), Firm, Silty CLAY (CL) with Trace Ash, Low to Medium Plasticity, Moist to Wet			SS-4		(18) 1-3-3	
25			569.6				25
	ASH FILL: Dark Gray (10YR 4/1), CCR Material that Classifies as Stiff, Fine Sandy SILT (ML), Non-Plastic, Wet			SS-5		(18) 3-5-5	
30			564.6				

0 10 20 30 40 50 60 70 80 90 100

DUKE ABSAT GEOTECHNICAL BORING LOG DR ONSITE LANDFILL BORING LOGS 7810140065.GPJ AMEC DUKE ABSAT.GDT 7/6/15

CONTRACTOR:	SAEDACCO
LOGGED BY:	L. Eaves
EQUIPMENT:	CME-550
DRILL METHOD:	4.25 HSA
HOLE DIAMETER:	7"
CLOSURE METHOD:	Grout
REMARKS:	Boring located on Ash Fill 1; SS-8 last blow count innaccurate due to running out of rods; 24-hour water level = 34.60 feet bgs

REVIEWED BY: _____

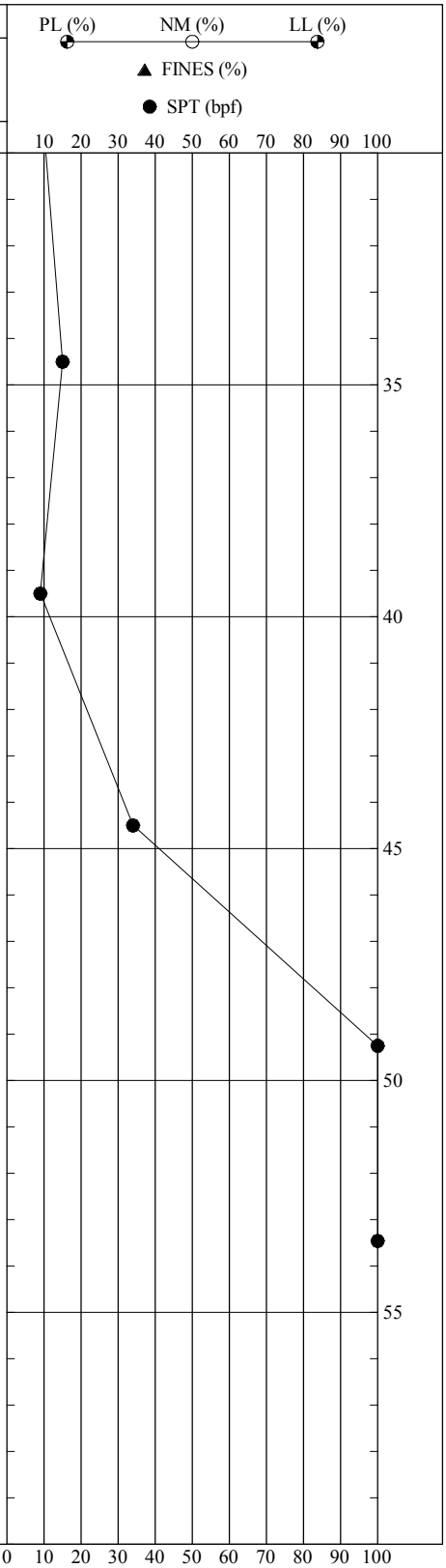
GEOTECHNICAL BORING RECORD

PROJECT NAME: Dan River On-Site Landfill
PROJECT NO.: 7810-14-0065 **START DATE:** 3/18/2015
COORD N: 999645 **COMP. DATE:** 3/18/2015
COORD E: 1789651 **Page** 1 **of** 2
LOCATION: Eden, North Carolina

BORING NO.: B-459

amec foster wheeler

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	(Rec") N-COUNT or Rec%/RQD% 6"- 6"- 6"- 6"
30	ASH FILL: Dark Gray (10YR 4/1), CCR Material that Classifies as Stiff, Fine Sandy SILT (ML), Non-Plastic, Wet		564.6			
				SS-6		(14) 12-7-8
35	POSSIBLE FILL: Tan (7.5YR 7/4), Stiff, Fine to Medium Sandy SILT (ML) with Mica, Low Plasticity, Moist		559.6			
				SS-7		(5) 8-5-4
40			554.6			
	SAPROLITE: Light Gray (7.5YR 7/1), Hard, Sandy Lean CLAY (CL), Low Plasticity, Moist			SS-8		(6) 6-19-15+
45			549.6			
	PARTIALLY WEATHERED ROCK: When Sampled Becomes, Tan (7.5YR 7/4), Very Dense, Silty Fine to Coarse SAND (SM) with Rock Fragments, Non-Plastic, Moist			SS-9		(9) 25-50/3
50			544.6			
	Auger Refusal at 53.4 ft			SS-10		(11.5) 25-50/5.5
55			539.6			
60			534.6			



DUKE ABSAT GEOTECHNICAL BORING LOG DR ONSITE LANDFILL BORING LOGS 7810140065.GPJ AMEC DUKE ABSAT.GDT 7/6/15

CONTRACTOR:	SAEDACCO
LOGGED BY:	L. Eaves
EQUIPMENT:	CME-550
DRILL METHOD:	4.25 HSA
HOLE DIAMETER:	7"
CLOSURE METHOD:	Grout
REMARKS:	Boring located on Ash Fill 1; SS-8 last blow count innaccurate due to running out of rods; 24-hour water level = 34.60 feet bgs

REVIEWED BY: _____

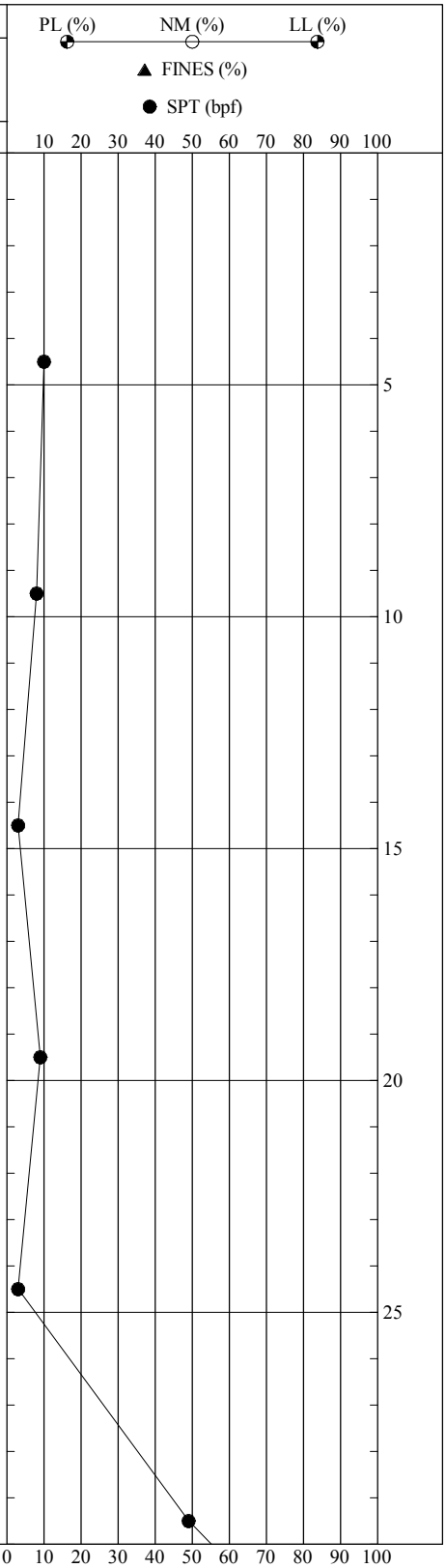
GEOTECHNICAL BORING RECORD

PROJECT NAME: Dan River On-Site Landfill
PROJECT NO.: 7810-14-0065 **START DATE:** 3/18/2015
COORD N: 999645 **COMP. DATE:** 3/18/2015
COORD E: 1789651 **Page 2 of 2**
LOCATION: Eden, North Carolina

BORING NO.: B-459

amec foster wheeler

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	(Rec") N-COUNT or Rec%/RQD% 6"- 6"- 6"- 6"
0	FILL: Brown-Orange (7.5YR 6/6), Stiff, Silty CLAY (CL), Medium Plasticity, Moist		575.0			
				SS-1		(18) 4-4-6
5	ASH FILL: Dark Gray (10YR 4/1), CCR Material that Classifies as Stiff to Soft, Fine Sandy SILT (ML), Low Plasticity, Moist to Wet		570.0			
				SS-2		(18) 3-4-4
10			565.0			
	Becomes Soft			SS-3		(8.4) 2-1-2
15			560.0			
	Becomes Stiff and Wet			SS-4		(18) 3-4-5
20			555.0			
	Becomes Soft			SS-5		(18) 3-2-1
25			550.0			
				SS-6		(18) 2-1-48
30			545.0			



DUKE ABSAT GEOTECHNICAL BORING LOG DR ONSITE LANDFILL BORING LOGS 7810140065.GPJ AMEC DUKE ABSAT.GDT 7/6/15

CONTRACTOR:	SAEDACCO
LOGGED BY:	L. Eaves
EQUIPMENT:	CME-550
DRILL METHOD:	4.25 HSA
HOLE DIAMETER:	7"
CLOSURE METHOD:	Grout
REMARKS:	Boring located on Ash Fill 1; 24-hour water level = 25.50 feet bgs

REVIEWED BY: _____

GEOTECHNICAL BORING RECORD

PROJECT NAME: Dan River On-Site Landfill
PROJECT NO.: 7810-14-0065 **START DATE:** 3/16/2015
COORD N: 999551 **COMP. DATE:** 3/16/2015
COORD E: 1790013 **Page** 1 **of** 2
LOCATION: Eden, North Carolina

BORING NO.: B-460

amec foster wheeler

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	(Rec") N-COUNT or Rec%/RQD% 6"- 6"- 6"- 6"	PL (%) NM (%) LL (%) ▲ FINES (%) ● SPT (bpf) 10 20 30 40 50 60 70 80 90 100
30	ASH FILL: Dark Gray (10YR 4/1), CCR Material that Classifies as Stiff to Soft, Fine Sandy SILT (ML), Low Plasticity, Moist to Wet		545.0				
	PARTIALLY WEATHERED ROCK: When Sampled Becomes Tan (7.5YR 7/4), Very Dense, Silty Fine to Coarse SAND (SM), Non-Plastic, Moist			SS-7		(1) 50/1	
35	**Auger Refusal at 35 ft bgs**		540.0				
40			535.0				
45			530.0				
50			525.0				
55			520.0				
60			515.0				

0 10 20 30 40 50 60 70 80 90 100

DUKE ABSAT GEOTECHNICAL BORING LOG DR ONSITE LANDFILL BORING LOGS 7810140065.GPJ AMEC DUKE ABSAT.GDT 7/6/15

CONTRACTOR:	SAEDACCO
LOGGED BY:	L. Eaves
EQUIPMENT:	CME-550
DRILL METHOD:	4.25 HSA
HOLE DIAMETER:	7"
CLOSURE METHOD:	Grout
REMARKS:	Boring located on Ash Fill 1; 24-hour water level = 25.50 feet bgs

REVIEWED BY: _____

GEOTECHNICAL BORING RECORD

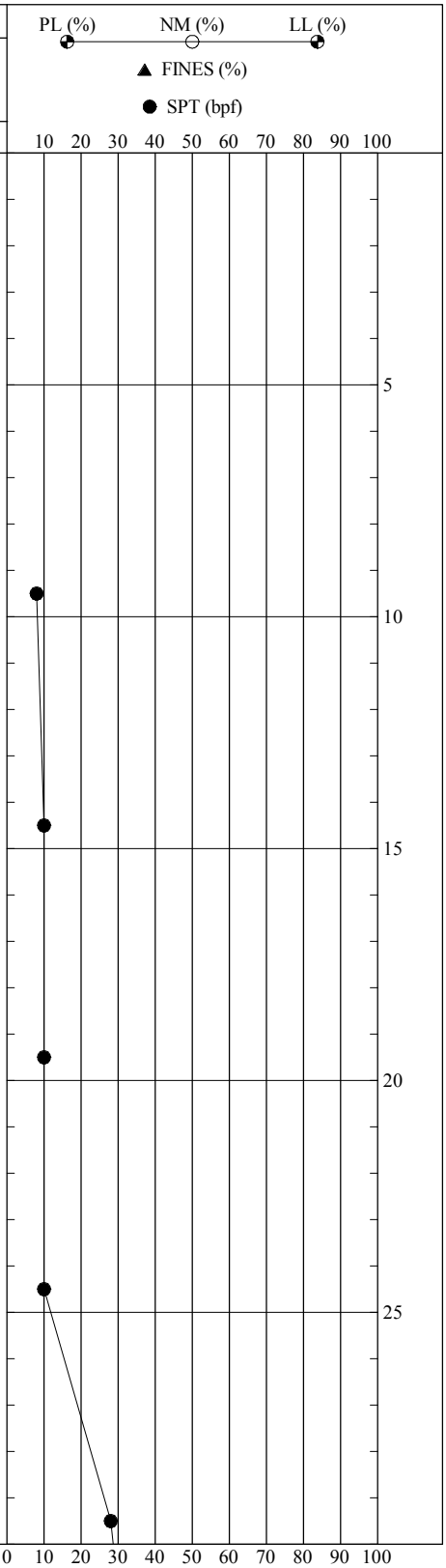
PROJECT NAME: Dan River On-Site Landfill
PROJECT NO.: 7810-14-0065 **START DATE:** 3/16/2015
COORD N: 999551 **COMP. DATE:** 3/16/2015
COORD E: 1790013 **Page 2 of 2**
LOCATION: Eden, North Carolina

BORING NO.: B-460

amec foster wheeler

DUKE ABSAT GEOTECHNICAL BORING LOG DR ONSITE LANDFILL BORING LOGS 7810140065.GPJ AMEC DUKE ABSAT.GDT 7/6/15

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	(Rec") N-COUNT or Rec%/RQD% 6"- 6"- 6"- 6"
0	FILL: Red-Brown (2.5YR 2.5/6), Stiff, Silty CLAY (CH/CL) with Fine Sand, Rock Fragments, and Trace Ash, High to Low Plasticity, Moist		648.3			
				AUGER-1		
5			643.3			
				SS-1		(18) 5-4-4
10			638.3			
	Becomes Medium Plasticity			SS-2		(12) 3-3-7
15			633.3			
	Becomes Low Plasticity			SS-3		(12) 10-6-4
20			628.3			
	ASH FILL: Dark Gray (10YR 4/1), CCR Material that Classifies as Hard to Firm, Fine Sandy SILT (ML), Non-Plastic, Dry to Moist			SS-4		(15.6) 5-5-5
25			623.3			
				SS-5		(18) 11-13-15
30			618.3			



CONTRACTOR:	SAEDACCO
LOGGED BY:	L. Eaves
EQUIPMENT:	CME-550
DRILL METHOD:	4.25 HSA
HOLE DIAMETER:	7"
CLOSURE METHOD:	Grout
REMARKS:	Boring located on crest of Ash Fill 1; 24-hour water level = 83.50 feet bgs

REVIEWED BY: _____

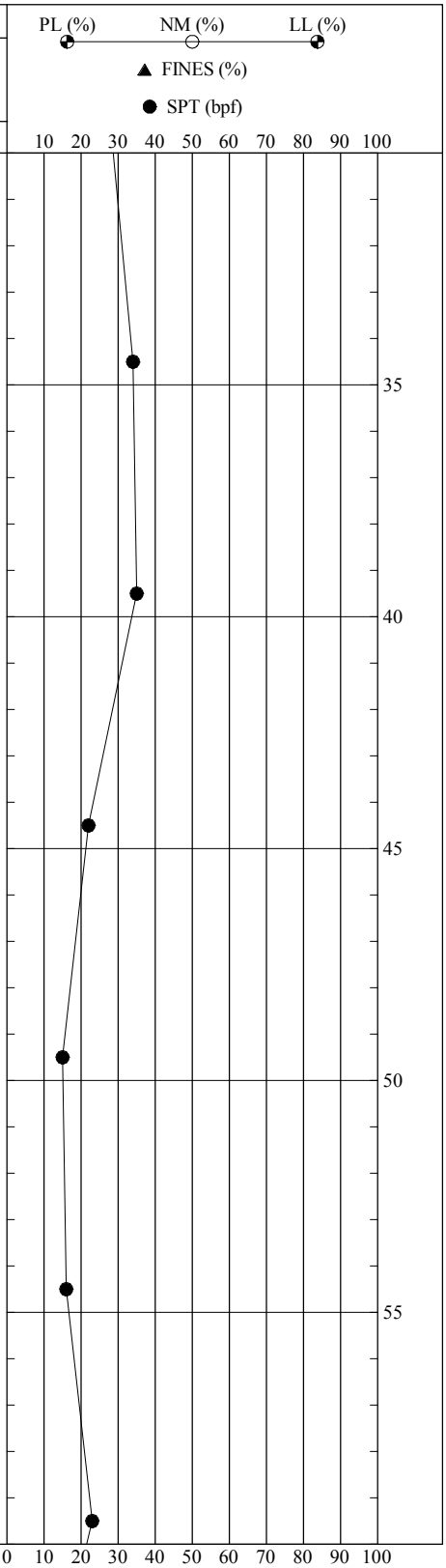
GEOTECHNICAL BORING RECORD

PROJECT NAME: Dan River On-Site Landfill
PROJECT NO.: 7810-14-0065 **START DATE:** 3/17/2015
COORD N: 999828 **COMP. DATE:** 3/18/2015
COORD E: 1789842 **Page** 1 **of** 4
LOCATION: Eden, North Carolina

BORING NO.: B-462

amec foster wheeler

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	(Rec") N-COUNT or Rec%/RQD% 6"- 6"- 6"- 6"
30	ASH FILL: Dark Gray (10YR 4/1), CCR Material that Classifies as Hard to Firm, Fine Sandy SILT (ML), Non-Plastic, Dry to Moist		618.3			
				SS-6		(14.4) 3-12-22
35			613.3			
				SS-7		(18) 6-13-22
40			608.3			
				SS-8		(18) 3-7-15
45			603.3			
				SS-9		(14.4) 5-7-8
50			598.3			
				SS-10		(12) 7-7-9
55			593.3			
				SS-11		(14.4) 6-11-12
60			588.3			



DUKE ABSAT GEOTECHNICAL BORING LOG DR ONSITE LANDFILL BORING LOGS 7810140065.GPJ AMEC DUKE ABSAT.GDT 7/6/15

CONTRACTOR:	SAEDACCO
LOGGED BY:	L. Eaves
EQUIPMENT:	CME-550
DRILL METHOD:	4.25 HSA
HOLE DIAMETER:	7"
CLOSURE METHOD:	Grout
REMARKS:	Boring located on crest of Ash Fill 1; 24-hour water level = 83.50 feet bgs

REVIEWED BY: _____

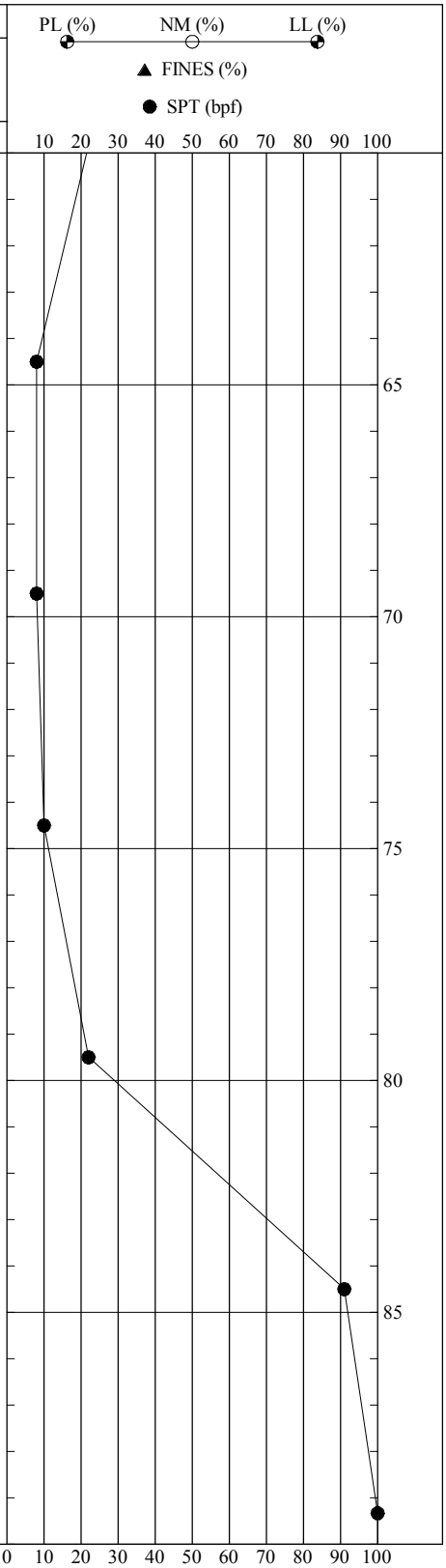
GEOTECHNICAL BORING RECORD

PROJECT NAME: Dan River On-Site Landfill
PROJECT NO.: 7810-14-0065 **START DATE:** 3/17/2015
COORD N: 999828 **COMP. DATE:** 3/18/2015
COORD E: 1789842 **Page** 2 **of** 4
LOCATION: Eden, North Carolina

BORING NO.: B-462

amec foster wheeler

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	(Rec") N-COUNT or Rec%/RQD% 6"- 6"- 6"- 6"
60	ASH FILL: Dark Gray (10YR 4/1), CCR Material that Classifies as Hard to Firm, Fine Sandy SILT (ML), Non-Plastic, Dry to Moist		588.3			
				SS-12		(13.2) 4-3-5
65			583.3			
				SS-13		(18) 2-4-4
70			578.3			
				SS-14		(14.4) 3-3-7
75			573.3			
	SAPROLITE: Brown-Tan (10YR 7/6), Very Stiff to Very Hard, Clayey SILT (ML), Low to Medium Plasticity, Moist			SS-15		(18) 5-8-14
80			568.3			
				SS-16		(15.6) 14-41-50
85			563.3			
	PARTIALLY WEATHERED ROCK: When Sampled Becomes Tan (7.5YR 7/4), Very Dense, Silty Fine to Coarse SAND (SM), Low Plasticity, Moist			SS-17		(8.4) 37-50/4
90			558.3			



DUKE ABSAT GEOTECHNICAL BORING LOG DR ONSITE LANDFILL BORING LOGS 7810140065.GPJ AMEC DUKE ABSAT.GDT 7/6/15

CONTRACTOR:	SAEDACCO
LOGGED BY:	L. Eaves
EQUIPMENT:	CME-550
DRILL METHOD:	4.25 HSA
HOLE DIAMETER:	7"
CLOSURE METHOD:	Grout
REMARKS:	Boring located on crest of Ash Fill 1; 24-hour water level = 83.50 feet bgs

REVIEWED BY: _____

GEOTECHNICAL BORING RECORD

PROJECT NAME: Dan River On-Site Landfill
PROJECT NO.: 7810-14-0065 **START DATE:** 3/17/2015
COORD N: 999828 **COMP. DATE:** 3/18/2015
COORD E: 1789842 **Page** 3 **of** 4
LOCATION: Eden, North Carolina

BORING NO.: B-462

amec foster wheeler

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	(Rec") N-COUNT or Rec%/RQD% 6"- 6"- 6"- 6"	PL (%) NM (%) LL (%) ▲ FINES (%) ● SPT (bpf) 10 20 30 40 50 60 70 80 90 100
90	PARTIALLY WEATHERED ROCK: When Sampled Becomes Tan (7.5YR 7/4), Very Dense, Silty Fine to Coarse SAND (SM), Low Plasticity, Moist		558.3				
				SS-18		(0) 50/1	
95			553.3				95
				SS-19		(0) 50/2	
	Auger Refusal at 98.2 ft bgs						
100			548.3				100
105			543.3				105
110			538.3				110
115			533.3				115
120			528.3				

0 10 20 30 40 50 60 70 80 90 100

DUKE ABSAT GEOTECHNICAL BORING LOG DR ONSITE LANDFILL BORING LOGS 7810140065.GPJ AMEC DUKE ABSAT.GDT 7/6/15

CONTRACTOR:	SAEDACCO
LOGGED BY:	L. Eaves
EQUIPMENT:	CME-550
DRILL METHOD:	4.25 HSA
HOLE DIAMETER:	7"
CLOSURE METHOD:	Grout
REMARKS:	Boring located on crest of Ash Fill 1; 24-hour water level = 83.50 feet bgs

REVIEWED BY: _____

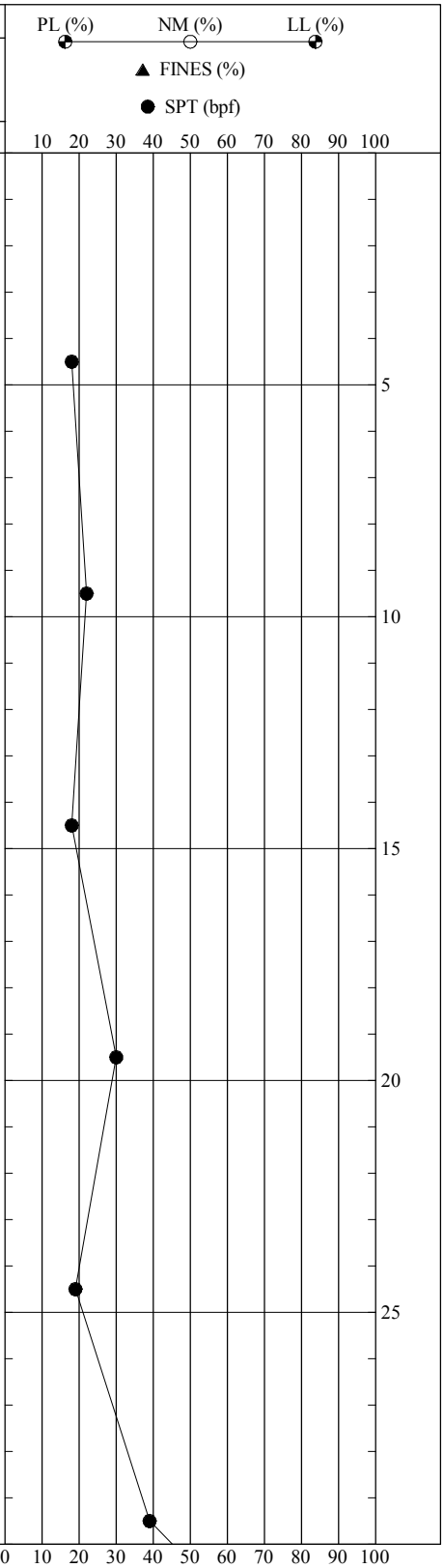
GEOTECHNICAL BORING RECORD

PROJECT NAME: Dan River On-Site Landfill
PROJECT NO.: 7810-14-0065 **START DATE:** 3/17/2015
COORD N: 999828 **COMP. DATE:** 3/18/2015
COORD E: 1789842 **Page** 4 **of** 4
LOCATION: Eden, North Carolina

BORING NO.: B-462

amec foster wheeler

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	(Rec") N-COUNT or Rec%/RQD% 6"- 6"- 6"- 6"
0	RESIDUUM: Yellow-Red (5YR 4/6) to Red-Brown (10YR 5/4), Very Stiff, Lean Clay with Sand (CL), Low Plasticity, Moist		593.8			
				SS-1		(18) 7-8-10
5			588.8			
				SS-2		(18) 7-10-12
10	SAPROLITE: Red-Brown (10YR 5/4), Medium Dense, Silty Fine SAND (SM), Non-Plastic, Moist		583.8			
				SS-3		(18) 7-8-10
15			578.8			
	SAPROLITE: Red-Brown (10YR 5/4), Very Stiff, Fine Sandy SILT (ML), Low Plasticity, Moist			SS-4		(18) 10-13-17
20			573.8			
	SAPROLITE: Red-Brown (10YR 5/4), Medium Dense to Dense, Silty Fine SAND (SM), Non-Plastic, Moist			SS-5		(18) 4-9-10
25			568.8			
				SS-6		(18) 8-15-24
30			563.8			



DUKE ABSAT GEOTECHNICAL BORING LOG DR ONSITE LANDFILL BORING LOGS 7810140065.GPJ AMEC DUKE ABSAT.GDT 7/6/15

CONTRACTOR:	SAEDACCO
LOGGED BY:	L. Eaves
EQUIPMENT:	CME-550
DRILL METHOD:	4.25 HSA
HOLE DIAMETER:	7"
CLOSURE METHOD:	Grout
REMARKS:	Boring located north of Ash Fill 1; 24-hour water level = 23.10 feet bgs

REVIEWED BY: _____

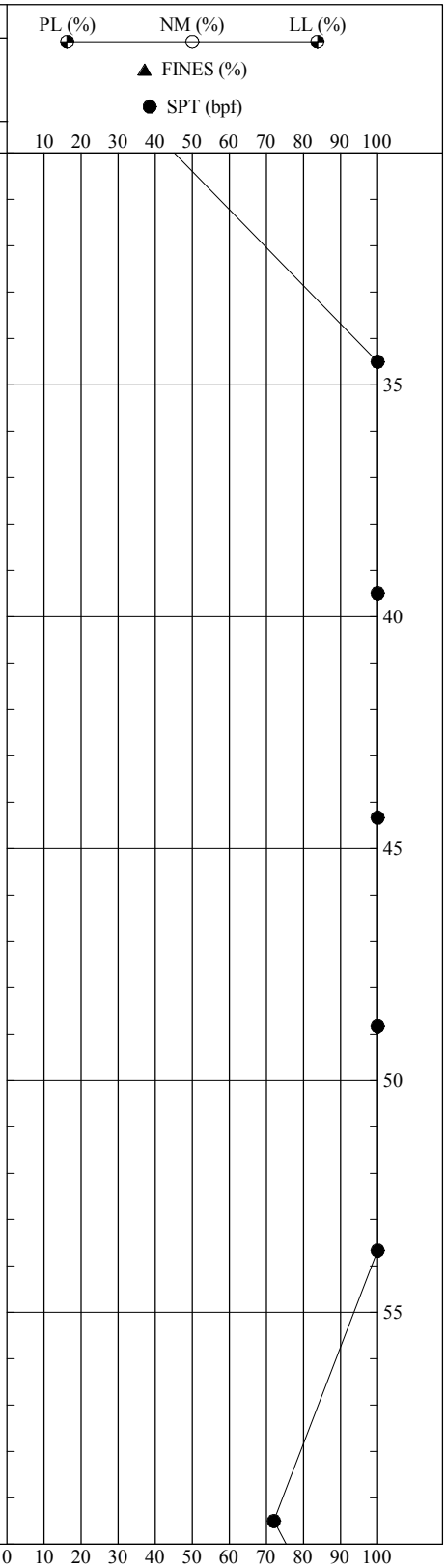
GEOTECHNICAL BORING RECORD

PROJECT NAME: Dan River On-Site Landfill
PROJECT NO.: 7810-14-0065 **START DATE:** 3/24/2015
COORD N: 1000449 **COMP. DATE:** 3/25/2015
COORD E: 1789382 **Page** 1 **of** 3
LOCATION: Eden, North Carolina

BORING NO.: B-463

amec foster wheeler

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	(Rec") N-COUNT or Rec%/RQD% 6"- 6"- 6"- 6"
30	SAPROLITE: Red-Brown (10YR 5/4), Medium Dense to Dense, Silty Fine SAND (SM), Non-Plastic, Moist		563.8			
	PARTIALLY WEATHERED ROCK: When Sampled Becomes Light Brown (7.5YR 7/4), Very Dense, Silty Fine SAND (SM), Non-Plastic, Moist			SS-7		(8.4) 21-45-50/2
35			558.8			
				SS-8		(12) 17-32-50/5.5
40			553.8			
				SS-9		(9.6) 30-50/4
45			548.8			
				SS-10		(3.6) 50/4
50			543.8			
				SS-11		(2) 50/2
55			538.8			
	SAPROLITE: Light Brown (7.5YR 7/4), Very Dense, Silty Fine SAND (SM), with Mica and Rock Fragments, Non-Plastic, Moist to Wet			SS-12		(13.2) 15-27-45
60			533.8			



DUKE ABSAT GEOTECHNICAL BORING LOG DR ONSITE LANDFILL BORING LOGS 7810140065.GPJ AMEC DUKE ABSAT.GDT 7/6/15

CONTRACTOR:	SAEDACCO
LOGGED BY:	L. Eaves
EQUIPMENT:	CME-550
DRILL METHOD:	4.25 HSA
HOLE DIAMETER:	7"
CLOSURE METHOD:	Grout
REMARKS:	Boring located north of Ash Fill 1; 24-hour water level = 23.10 feet bgs

REVIEWED BY: _____

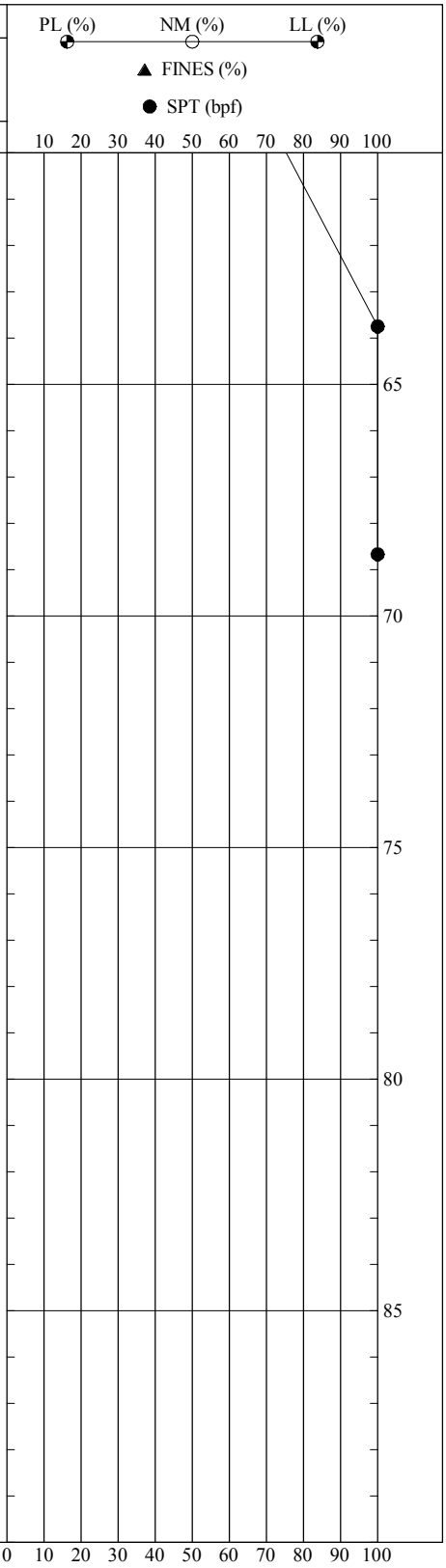
GEOTECHNICAL BORING RECORD

PROJECT NAME: Dan River On-Site Landfill
PROJECT NO.: 7810-14-0065 **START DATE:** 3/24/2015
COORD N: 1000449 **COMP. DATE:** 3/25/2015
COORD E: 1789382 **Page** 2 **of** 3
LOCATION: Eden, North Carolina

BORING NO.: B-463

amec foster wheeler

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	(Rec") N-COUNT or Rec%/RQD% 6"- 6"- 6"- 6"
60	SAPROLITE: Light Brown (7.5YR 7/4), Very Dense, Silty Fine SAND (SM), with Mica and Rock Fragments, Non-Plastic, Moist to Wet		533.8			
	PARTIALLY WEATHERED ROCK: When Sampled Becomes Gray (5YR 5/1), Very Dense, Silty Fine to Medium SAND (SM) with Rock Fragments, Non-Plastic, Moist			SS-13		(2.4) 50/3
65			528.8			
				SS-14		(2) 50/2
	Auger Refusal at 68.7 ft bgs					
70			523.8			
75			518.8			
80			513.8			
85			508.8			
90			503.8			



DUKE ABSAT GEOTECHNICAL BORING LOG DR ONSITE LANDFILL BORING LOGS 7810140065.GPJ AMEC DUKE ABSAT.GDT 7/6/15

CONTRACTOR:	SAEDACCO
LOGGED BY:	L. Eaves
EQUIPMENT:	CME-550
DRILL METHOD:	4.25 HSA
HOLE DIAMETER:	7"
CLOSURE METHOD:	Grout
REMARKS:	Boring located north of Ash Fill 1; 24-hour water level = 23.10 feet bgs

REVIEWED BY: _____

GEOTECHNICAL BORING RECORD

PROJECT NAME: Dan River On-Site Landfill
PROJECT NO.: 7810-14-0065 **START DATE:** 3/24/2015
COORD N: 1000449 **COMP. DATE:** 3/25/2015
COORD E: 1789382 **Page** 3 **of** 3
LOCATION: Eden, North Carolina

BORING NO.: B-463

amec foster wheeler

DUKE ABSAT GEOTECHNICAL BORING LOG DR ONSITE LANDFILL BORING LOGS 7810140065.GPJ AMEC DUKE ABSAT.GDT 7/6/15

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	SAMPLES TYPE	SAMPLES (Rec") N-COUNT or Rec%/RQD% 6"- 6"- 6"- 6"	PL (%) NM (%) LL (%) ▲ FINES (%) ● SPT (bpf) 10 20 30 40 50 60 70 80 90 100
0	SAPROLITE: Orange-Brown (7.5YR 7/8), Very Dense, Silty Fine to Medium SAND (SM) with Rock Fragments, Non-Plastic, Dry to Moist		581.2				
5			576.2				
10	PARTIALLY WEATHERED ROCK: When Sampled Becomes Very Dense, Tan (10YR 6/4), Silty Fine to Coarse SAND (SM) with Mica, Non-Plastic, Dry to Moist Becomes Gray (5YR 5/1)		571.2				
15			566.2				
20	SAPROLITE: Gray (5YR 5/1), Very Hard, Fine Sandy Lean CLAY (CL) with Mica, Low Plasticity, Dry to Moist		561.2	UD-1		(24)	
25	PARTIALLY WEATHERED ROCK: When Sampled Becomes Gray (5YR 5/1), Very Dense, Silty Fine SAND (SM) with Mica and Rock Fragments, Non-Plastic, Moist **Auger Refusal at 26 ft bgs**; **Begin 5 7/8" Roller Cone**		556.2				
30	WEATHERED / FRACTURED ROCK: (No Samples Obtained; Fluid Return is Black)		551.2				

CONTRACTOR:	SAEDACCO
LOGGED BY:	M. Flanik
EQUIPMENT:	CME-550
DRILL METHOD:	4.25 / 8.25 HSA; 5 7/8 RC
HOLE DIAMETER:	12" to 6"
CLOSURE METHOD:	Type III Observation Well Installed
REMARKS:	Located northwest of Ash Fill 1; Water level = 8.45 feet bgs on May 27, 2015

REVIEWED BY: _____

GEOTECHNICAL BORING RECORD

PROJECT NAME: Dan River On-Site Landfill
PROJECT NO.: 7810-14-0065 **START DATE:** 4/8/2015
COORD N: 1000349 **COMP. DATE:** 4/16/2015
COORD E: 1788953 **Page** 1 **of** 2
LOCATION: Eden, North Carolina

BORING NO.: OW-401D

amec foster wheeler

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	SAMPLES TYPE	SAMPLES (Rec") N-COUNT or Rec%/RQD% 6"- 6"- 6"- 6"	PL (%) NM (%) LL (%) ▲ FINES (%) ● SPT (bpf) 0 10 20 30 40 50 60 70 80 90 100
30	WEATHERED / FRACTURED ROCK: (No Samples Obtained; Fluid Return is Black)		551.2				
35			546.2				
40			541.2				
45			536.2				
	Boring Terminated at 47 ft bgs **Soil Lithologic Descriptions Obtained From OW-401S Boring**						
50			531.2				
55			526.2				
60			521.2				

DUKE ABSAT GEOTECHNICAL BORING LOG DR ONSITE LANDFILL BORING LOGS 7810140065.GPJ AMEC DUKE ABSAT.GDT 7/6/15

CONTRACTOR:	SAEDACCO
LOGGED BY:	M. Flanik
EQUIPMENT:	CME-550
DRILL METHOD:	4.25 / 8.25 HSA; 5 7/8 RC
HOLE DIAMETER:	12" to 6"
CLOSURE METHOD:	Type III Observation Well Installed
REMARKS:	Located northwest of Ash Fill 1; Water level = 8.45 feet bgs on May 27, 2015

REVIEWED BY: _____

GEOTECHNICAL BORING RECORD

PROJECT NAME: Dan River On-Site Landfill
PROJECT NO.: 7810-14-0065 **START DATE:** 4/8/2015
COORD N: 1000349 **COMP. DATE:** 4/16/2015
COORD E: 1788953 **Page** 2 **of** 2
LOCATION: Eden, North Carolina

BORING NO.: OW-401D

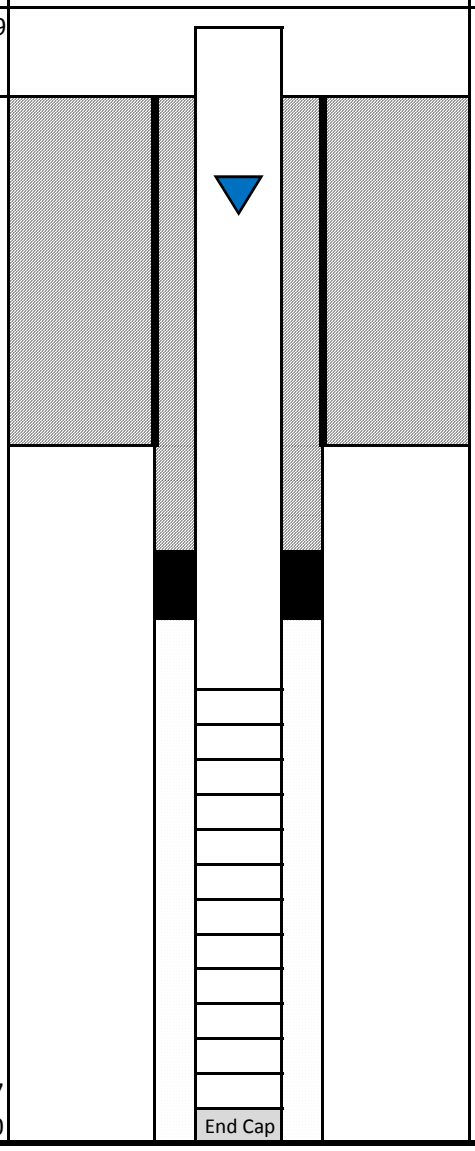
amec foster wheeler

WELL CONSTRUCTION REPORT

WELL ID: **OW-401 D**

PROJECT:	Dan River Landfill
PROJECT NO:	7810-14-0065
PROJECT LOCATION:	Dan River Steam Station; Eden, North Carolina

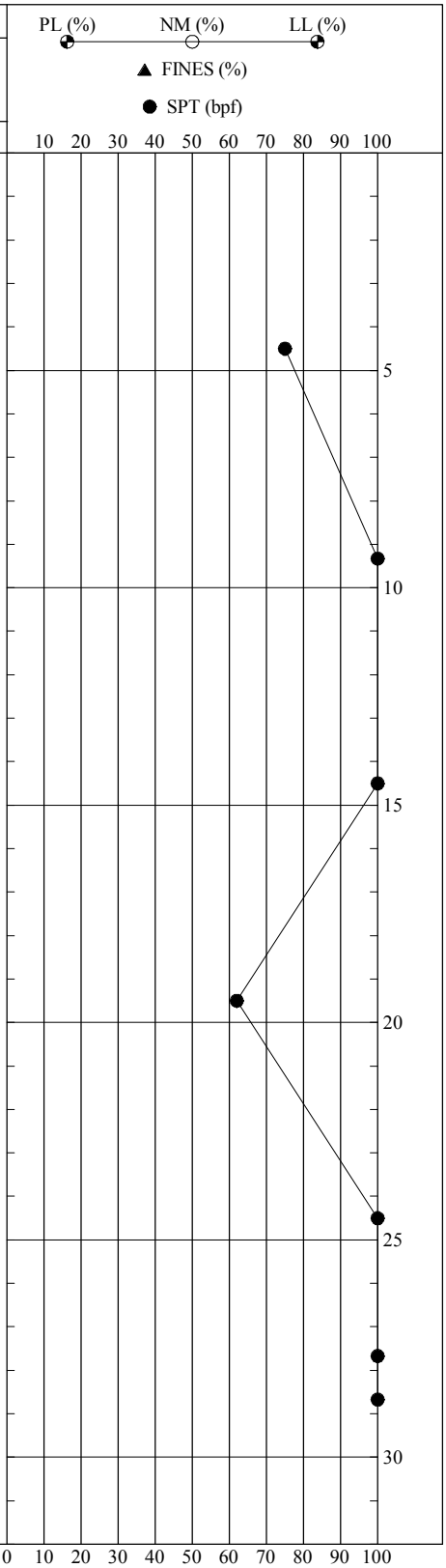
DRILLING CONTRACTOR:	**SAEDACCO**	WATER LEVEL:	**8.45 ft BGS on 5/27/2015**
DRILLING METHOD:	**8.25" HSA/6"RC**	LATITUDE:	**36.4963**
DATE COMPLETED:	**4/16/2015**	LONGITUDE:	**-79.7179**
LOGGED BY:	**Flanik/Clark**	GS ELEVATION:	**581.23 feet**
Cave-In Below Well:	**None**	TOC ELEVATION:	**584.62 feet**
(not depicted)		DATUM:	**Mean Sea Level (MSL)**

Depth (ft-bgs)	WELL DIAGRAM	Elev (ft-MSL)	WELL CONSTRUCTION DETAILS
+3.39		584.62 TOC	PROTECTIVE CASING: Diameter: 4-inch x 4-inch square; Type: Steel Stickup; Interval: +4 to 2 feet bgs
0		581.23 GS	OUTER CASING: Diameter: 6-inch; Type: Sch. 40 PVC; Interval: 0 to 25 feet bgs
25.0		556.23	INNER CASING: Diameter: 2-inch; Type: Sch. 40 PVC; Interval: +3.39 to 41.7 feet bgs
36.0		545.23	SCREEN: Diameter: 2-inch; Type: Sch. 40 PVC; Interval: 41.7 to 46.7 feet bgs
39.8		541.43	FILTER PACK: Type: #2 Silica Sand; Interval: 39.8 to 47 feet bgs
41.7		539.53	SEAL: Type: Bentonite; Interval: 36 to 39.8 feet bgs
46.7		534.53	GROUT: Type: Neat Cement; Interval: 0 to 36 feet bgs
47.0	End Cap	534.23	

NOTES: GS=ground surface; TOC=top of inner PVC casing; bgs=below ground surface

Not To Scale

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	(Rec") N-COUNT or Rec%/RQD% 6"- 6"- 6"- 6"
0	SAPROLITE: Orange-Brown (7.5YR 7/8), Very Dense, Silty Fine to Medium SAND (SM) with Rock Fragments, Non-Plastic, Dry to Moist		581.8			
				SS-1		(12) 20-25-50
5			576.8			
	PARTIALLY WEATHERED ROCK: When Sampled Becomes Very Dense, Tan (10YR 6/4), Silty Fine to Coarse SAND (SM) with Mica, Non-Plastic, Dry to Moist			SS-2		(9.6) 28-50/4
10			571.8			
	Becomes Gray (5YR 5/1)			SS-3		(13.2) 22-39-50/5
15			566.8			
	SAPROLITE: Gray (5YR 5/1), Very Hard, Fine Sandy Lean CLAY (CL) with Mica, Low Plasticity, Dry to Moist			SS-4		(18) 11-19-43
20			561.8			
	Becomes Wet					
	PARTIALLY WEATHERED ROCK: When Sampled Becomes Gray (5YR 5/1), Very Dense, Silty Fine SAND (SM) with Mica and Rock Fragments, Non-Plastic, Moist			SS-5		(14.4) 14-29-50/4
25			556.8			
				SS-6		(8) 32-50/2
				SS-7		(0) 50/2
30	**Auger Refusal at 30 ft bgs**		551.8			



DUKE ABSAT GEOTECHNICAL BORING LOG DR ONSITE LANDFILL BORING LOGS 7810140065.GPJ AMEC DUKE ABSAT.GDT 7/6/15

CONTRACTOR:	SAEDACCO
LOGGED BY:	L. Eaves
EQUIPMENT:	CME-550
DRILL METHOD:	4.25 HSA
HOLE DIAMETER:	7"
CLOSURE METHOD:	Type II Observation Well Installed
REMARKS:	Located northwest of Ash Fill 1; Water level = 8.94 feet bgs on May 27, 2015

REVIEWED BY: _____

GEOTECHNICAL BORING RECORD

PROJECT NAME: Dan River On-Site Landfill
PROJECT NO.: 7810-14-0065 **START DATE:** 3/26/2015
COORD N: 1000349 **COMP. DATE:** 3/26/2015
COORD E: 1788945 **Page** 1 **of** 1
LOCATION: Eden, North Carolina

BORING NO.: OW-401S

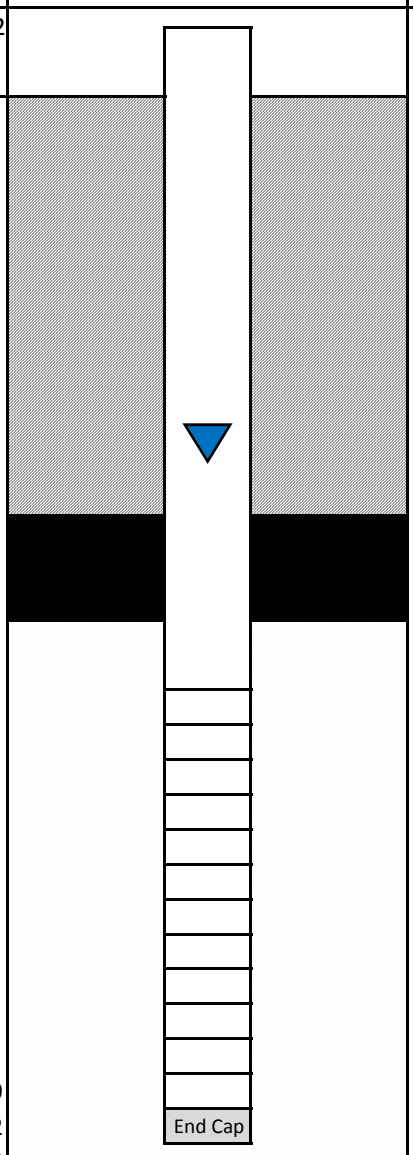
amec foster wheeler

WELL CONSTRUCTION REPORT

WELL ID: **OW-401 S**

PROJECT:	Dan River Landfill
PROJECT NO:	7810-14-0065
PROJECT LOCATION:	Dan River Steam Station; Eden, North Carolina

DRILLING CONTRACTOR:	**SAEDACCO**	WATER LEVEL:	**8.94 ft BGS on 5/27/2015**
DRILLING METHOD:	**4.25" HSA**	LATITUDE:	**36.4963**
DATE COMPLETED:	**3/26/2015**	LONGITUDE:	**-79.7179**
LOGGED BY:	**L. Eaves**	GS ELEVATION:	**581.76 feet**
Cave-In Below Well:	**None**	TOC ELEVATION:	**585.38 feet**
(not depicted)		DATUM:	**Mean Sea Level (MSL)**

Depth (ft-bgs)	WELL DIAGRAM	Elev (ft-MSL)	WELL CONSTRUCTION DETAILS
+3.62		585.38 TOC	PROTECTIVE CASING: Diameter: 4-inch x 4-inch square; Type: Steel Stickup; Interval: +4 to 2 feet bgs
0		581.76 GS	OUTER CASING: Diameter: Not Applicable; Type: Not Applicable; Interval: Not Applicable
10.0		571.76	INNER CASING: Diameter: 2-inch; Type: Sch. 40 PVC; Interval: +3.54 to 13.9 feet bgs
12.0		569.76	SCREEN: Diameter: 2-inch; Type: Sch. 40 PVC; Interval: 13.9 to 28.9 feet bgs
13.9		567.86	FILTER PACK: Type: #2 Silica Sand; Interval: 12 to 30 feet bgs
			SEAL: Type: Bentonite; Interval: 10 to 12 feet bgs
			GROUT: Type: Neat Cement; Interval: 0 to 10 feet bgs
28.9		552.86	
29.2	End Cap	552.56	
30.0		551.76	

NOTES: GS=ground surface; TOC=top of inner PVC casing; bgs=below ground surface

Not To Scale

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	(Rec") N-COUNT or Rec%/RQD% 6"- 6"- 6"- 6"	PL (%) NM (%) LL (%) ▲ FINES (%) ● SPT (bpf) 10 20 30 40 50 60 70 80 90 100
0	RESIDUUM: Red-Yellow (7.5YR 7/8), Silty Fine SAND (SM), Non-Plastic, Dry to Moist		606.2				
	SAPROLITE: Red-Yellow (7.5YR 7/6), Medium Dense to Very Dense, Silty Fine to Medium SAND (SM) with Rock Fragments, Non-Plastic, Dry to Moist						
5			601.2				
10			596.2				
	PARTIALLY WEATHERED ROCK: When Sampled Becomes Light Brown (7.5YR 6/4), Very Dense, Silty Fine to Coarse SAND (SM), Non-Plastic, Dry to Moist						
15			591.2				
	SAPROLITE: Light Brown (7.5YR 6/4) to Red-Yellow (7.5YR 7/8), Very Hard, Fat CLAY with Sand (CH), High Plasticity, Moist						
20			586.2	UD-1	■	(12)	
25			581.2				
	PARTIALLY WEATHERED ROCK: When Sampled Becomes Yellow-Brown (10YR 6/4) to Dark Gray (10YR 3/1), Very Dense, Fine Sandy SILT (ML), Non-Plastic, Moist						
30			576.2				

DUKE ABSAT GEOTECHNICAL BORING LOG DR ONSITE LANDFILL BORING LOGS 7810140065.GPJ AMEC DUKE ABSAT.GDT 7/6/15

CONTRACTOR:	SAEDACCO
LOGGED BY:	M. Flanik / R. Clark
EQUIPMENT:	CME-550
DRILL METHOD:	4.25 / 8.25 HSA; 5 7/8 RC; NQ2 CORE
HOLE DIAMETER:	12" to 6" to 3"
CLOSURE METHOD:	Type III Observation Well Installed
REMARKS:	Located north of Ash Fill 1; Water level = 34.58 feet bgs on May 27, 2015

REVIEWED BY: _____

GEOTECHNICAL BORING RECORD

PROJECT NAME: Dan River On-Site Landfill
PROJECT NO.: 7810-14-0065 **START DATE:** 4/7/2015
COORD N: 1000369 **COMP. DATE:** 4/15/2015
COORD E: 1789866 **Page** 1 **of** 3
LOCATION: Eden, North Carolina

BORING NO.: OW-403D

amec foster wheeler

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	(Rec") N-COUNT or Rec%/RQD% 6"- 6"- 6"- 6"	PL (%) NM (%) LL (%) ▲ FINES (%) ● SPT (bpf) 10 20 30 40 50 60 70 80 90 100
30	PARTIALLY WEATHERED ROCK: When Sampled Becomes Yellow-Brown (10YR 6/4) to Dark Gray (10YR 3/1), Very Dense, Fine Sandy SILT (ML), Non-Plastic, Moist		576.2				
35			571.2				
40	Becomes Dark Gray (10YR 3/1)		566.2				
45			561.2				
50	**Auger Refusal at 50.5 ft bgs; Begin 5 7/8" Roller Cone** WEATHERED / FRACTURED ROCK: (No Samples Obtained)		556.2				
55			551.2				
60			546.2				

0 10 20 30 40 50 60 70 80 90 100

DUKE ABSAT GEOTECHNICAL BORING LOG DR ONSITE LANDFILL BORING LOGS 7810140065.GPJ AMEC DUKE ABSAT.GDT 7/6/15

CONTRACTOR:	SAEDACCO
LOGGED BY:	M. Flanik / R. Clark
EQUIPMENT:	CME-550
DRILL METHOD:	4.25 / 8.25 HSA; 5 7/8 RC; NQ2 CORE
HOLE DIAMETER:	12" to 6" to 3"
CLOSURE METHOD:	Type III Observation Well Installed
REMARKS:	Located north of Ash Fill 1; Water level = 34.58 feet bgs on May 27, 2015

REVIEWED BY: _____

GEOTECHNICAL BORING RECORD

PROJECT NAME: Dan River On-Site Landfill
PROJECT NO.: 7810-14-0065 **START DATE:** 4/7/2015
COORD N: 1000369 **COMP. DATE:** 4/15/2015
COORD E: 1789866 **Page** 2 **of** 3
LOCATION: Eden, North Carolina

BORING NO.: OW-403D

amec foster wheeler

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	(Rec") N-COUNT or Rec%/RQD% 6"- 6"- 6"- 6"	PL (%) NM (%) LL (%) ▲ FINES (%) ● SPT (bpf) 10 20 30 40 50 60 70 80 90 100
60	**Roller Cone Refusal at 60.7 ft bgs**; **Begin NQ2 Core**		546.2				
	WEATHERED / FRACTURED ROCK: Black SILTSTONE / SHALE, Moderately Fractured, Low Angle and Horizontal Fractures with Trace Staining on Fractures			CORE-1		83/0	
						86/36	
65			541.2	CORE-2			65
	Boring Terminated at 67.5 ft bgs **Soil Lithologic Descriptions Obtained From OW-403S Boring**						
70			536.2				70
75			531.2				75
80			526.2				80
85			521.2				85
90			516.2				

0 10 20 30 40 50 60 70 80 90 100

DUKE ABSAT GEOTECHNICAL BORING LOG DR ONSITE LANDFILL BORING LOGS 7810140065.GPJ AMEC DUKE ABSAT.GDT 7/6/15

CONTRACTOR:	SAEDACCO
LOGGED BY:	M. Flanik / R. Clark
EQUIPMENT:	CME-550
DRILL METHOD:	4.25 / 8.25 HSA; 5 7/8 RC; NQ2 CORE
HOLE DIAMETER:	12" to 6" to 3"
CLOSURE METHOD:	Type III Observation Well Installed
REMARKS:	Located north of Ash Fill 1; Water level = 34.58 feet bgs on May 27, 2015

REVIEWED BY: _____

GEOTECHNICAL BORING RECORD

PROJECT NAME: Dan River On-Site Landfill
PROJECT NO.: 7810-14-0065 **START DATE:** 4/7/2015
COORD N: 1000369 **COMP. DATE:** 4/15/2015
COORD E: 1789866 **Page** 3 **of** 3
LOCATION: Eden, North Carolina

BORING NO.: OW-403D

amec foster wheeler

PROJECT:	DAN RIVER LANDFILL DAN RIVER STEAM STATION, Eden, NC Amec Foster Wheeler Project No. 7810-14-0065	ROCK CORE PHOTO LOG:	OW-403D

CLIENT:	**Duke Energy**	AUGER REFUSAL DEPTH:	**50.5**	**ft bgs**		LATITUDE:	**36.4964**
DATE DRILLED:	**4/15/2015**	ROLLER CONE REFUSAL DEPTH:	**60.7**	**ft bgs**		LONGITUDE:	**-79.7148**
DRILL RIG:	**Diedrich D-50 Turbo**	CORING TERMINATION DEPTH:	**67.5**	**ft bgs**		GROUND ELEVATION:	**606.24**
DRILLER:	**Richy Lemire**	WATER LEVEL:	**35.65 ft bgs on 4/30/15**			NOTES: Type III Monitoring Well Installed to 67.5 ft bgs with 5-ft screen 62.2-67.2 ft bgs.	
LOGGED BY:	**Rodney Clark**						
CORE SIZE:	**NQ2**						

CORE BOX #: 1 of 1
TOP OF BOX: 60.7 ft bgs
BOTTOM OF BOX: 67.5 ft bgs

DESCRIPTION:

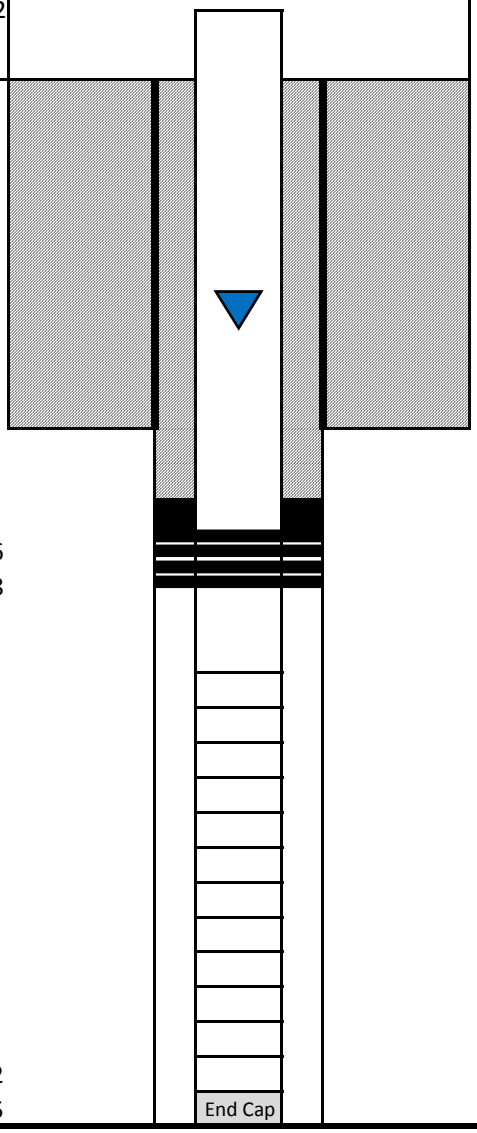
60.7 to 67.5 ft bgs: **WEATHERED / FRACTURED ROCK**: Black **SILTSTONE / SHALE**; Moderately Fractured, Horizontal and Low Angle Fractures with Trace Staining on Fractures

WELL CONSTRUCTION REPORT

WELL ID: **OW-403 D**

PROJECT:	Dan River Landfill
PROJECT NO:	7810-14-0065
PROJECT LOCATION:	Dan River Steam Station; Eden, North Carolina

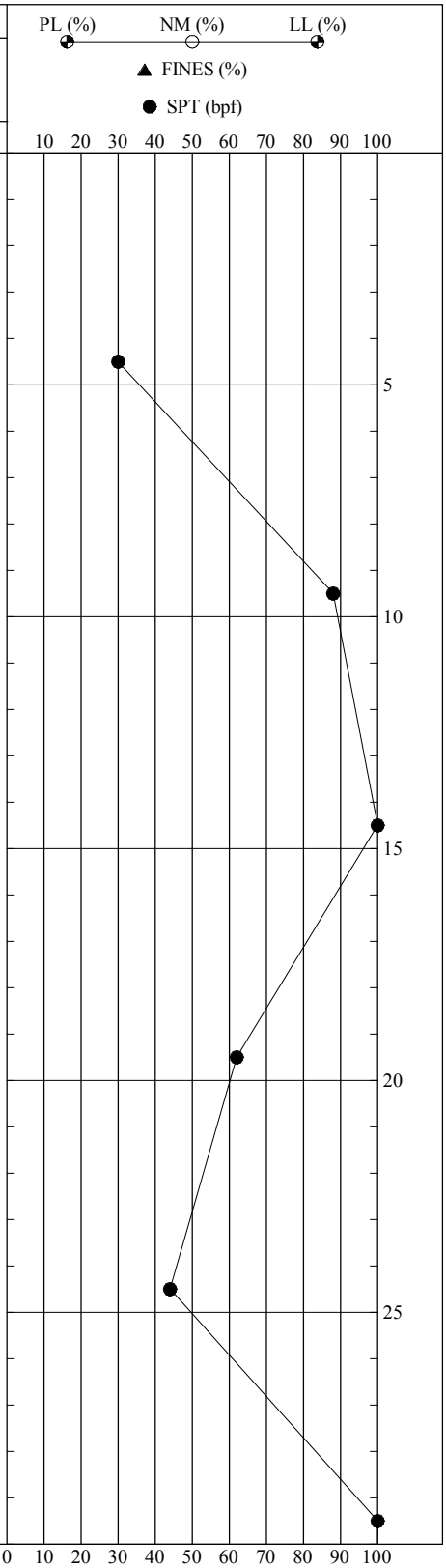
DRILLING CONTRACTOR:	**SAEDACCO**	WATER LEVEL:	**34.58 ft BGS on 5/27/2015**
DRILLING METHOD:	**8.25"HSA/NQ2 core**	LATITUDE:	**36.4964**
DATE COMPLETED:	**4/16/2015**	LONGITUDE:	**-79.7148**
LOGGED BY:	**Flanik/Clark**	GS ELEVATION:	**606.24 feet**
Cave-In Below Well:	**None**	TOC ELEVATION:	**609.46 feet**
(not depicted)		DATUM:	**Mean Sea Level (MSL)**

Depth (ft-bgs)	WELL DIAGRAM	Elev (ft-MSL)	WELL CONSTRUCTION DETAILS
+3.22		609.46 TOC	PROTECTIVE CASING:
0		606.24 GS	Diameter: 4-inch x 4-inch square Type: Steel Stickup Interval: +4 to 2 feet bgs
			OUTER CASING:
			Diameter: 6-inch Type: Sch. 40 PVC Interval: 0 to 50 feet bgs
			INNER CASING:
50.0		556.24	Diameter: 2-inch Type: Sch. 40 PVC Interval: +3.22 to 62.2 feet bgs
58.0		548.24	
61.6		544.64	SCREEN:
61.8		544.44	Diameter: 2-inch Type: Sch. 40 PVC Interval: 62.2 to 67.2 feet bgs
62.2		544.04	
			FILTER PACK:
			Type: Not Applicable Interval: Not Applicable
			SEAL:
			Type: Bentonite & K-Packer Interval: 58 to 61.8 feet bgs
			GROUT:
			Type: Neat Cement Interval: 0 to 58 feet bgs
67.2		539.04	
67.5	End Cap	538.74	

NOTES: GS=ground surface; TOC=top of inner PVC casing; bgs=below ground surface

Not To Scale

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	(Rec") N-COUNT or Rec%/RQD% 6"- 6"- 6"- 6"
0	RESIDUUM: Red-Yellow (7.5YR 7/8), Silty Fine SAND (SM), Non-Plastic, Dry to Moist		606.2			
	SAPROLITE: Red-Yellow (7.5YR 7/6), Medium Dense to Very Dense, Silty Fine to Medium SAND (SM) with Rock Fragments, Non-Plastic, Dry to Moist			SS-1		(18) 7-12-18
5			601.2			
				SS-2		(18) 14-39-49
10			596.2			
	PARTIALLY WEATHERED ROCK: When Sampled Becomes Light Brown (7.5YR 6/4), Very Dense, Silty Fine to Coarse SAND (SM), Non-Plastic, Dry to Moist			SS-3		(10.8) 23-50/5.5
15			591.2			
	SAPROLITE: Light Brown (7.5YR 6/4) to Red-Yellow (7.5YR 7/8), Very Hard, Fat CLAY with Sand (CH), High Plasticity, Moist			SS-4		(18) 12-24-38
20			586.2			
				SS-5		(18) 10-16-28
25			581.2			
	PARTIALLY WEATHERED ROCK: When Sampled Becomes Yellow-Brown (10YR 6/4) to Dark Gray (10YR 3/1), Very Dense, Fine Sandy SILT (ML), Non-Plastic, Moist			SS-6		(13.2) 25-45-50/4
30			576.2			



DUKE ABSAT GEOTECHNICAL BORING LOG DR ONSITE LANDFILL BORING LOGS 7810140065.GPJ AMEC DUKE ABSAT.GDT 7/6/15

CONTRACTOR:	SAEDACCO
LOGGED BY:	L. Eaves
EQUIPMENT:	CME-550
DRILL METHOD:	4.25 HSA
HOLE DIAMETER:	7"
CLOSURE METHOD:	Type II Observation Well Installed
REMARKS:	Located north of Ash Fill 1; Water level = 34.08 feet bgs on May 27, 2015

REVIEWED BY: _____

GEOTECHNICAL BORING RECORD

PROJECT NAME: Dan River On-Site Landfill
PROJECT NO.: 7810-14-0065 **START DATE:** 3/30/2015
COORD N: 1000371 **COMP. DATE:** 3/30/2015
COORD E: 1789864 **Page** 1 **of** 2
LOCATION: Eden, North Carolina

BORING NO.: OW-403S

amec foster wheeler

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	(Rec") N-COUNT or Rec%/RQD% 6"- 6"- 6"- 6"	PL (%) NM (%) LL (%) ▲ FINES (%) ● SPT (bpf) 10 20 30 40 50 60 70 80 90 100
30	PARTIALLY WEATHERED ROCK: When Sampled Becomes Yellow-Brown (10YR 6/4) to Dark Gray (10YR 3/1), Very Dense, Fine Sandy SILT (ML), Non-Plastic, Moist		576.2				
				SS-7		(14.4) 11-29-50/5	
35			571.2				35
				SS-8		(9) 47-50/3	
40			566.2				40
	Becomes Dark Gray (10YR 3/1)						
				SS-9		(13.2) 16-36-50/5	
45			561.2				45
				SS-10		(6) 21-50/2	
50			556.2	SS-11		(4.8) 50/5	50
	Auger Refusal at 50.4 ft bgs						
55			551.2				55
60			546.2				

DUKE ABSAT GEOTECHNICAL BORING LOG DR ONSITE LANDFILL BORING LOGS 7810140065.GPJ AMEC DUKE ABSAT.GDT 7/6/15

CONTRACTOR:	SAEDACCO
LOGGED BY:	L. Eaves
EQUIPMENT:	CME-550
DRILL METHOD:	4.25 HSA
HOLE DIAMETER:	7"
CLOSURE METHOD:	Type II Observation Well Installed
REMARKS:	Located north of Ash Fill 1; Water level = 34.08 feet bgs on May 27, 2015

REVIEWED BY: _____

GEOTECHNICAL BORING RECORD

PROJECT NAME: Dan River On-Site Landfill
PROJECT NO.: 7810-14-0065 **START DATE:** 3/30/2015
COORD N: 1000371 **COMP. DATE:** 3/30/2015
COORD E: 1789864 **Page** 2 **of** 2
LOCATION: Eden, North Carolina

BORING NO.: OW-403S

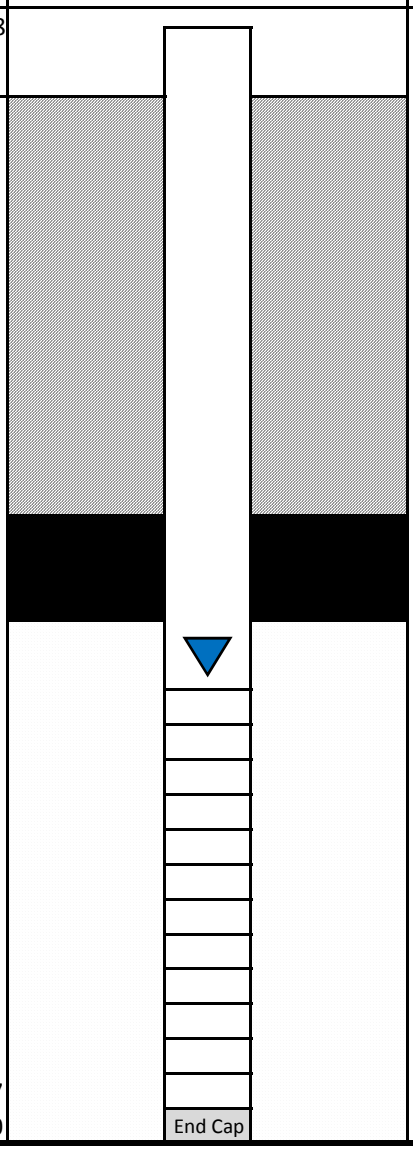
amec foster wheeler

WELL CONSTRUCTION REPORT

WELL ID: **OW-403 S**

PROJECT:	Dan River Landfill
PROJECT NO:	7810-14-0065
PROJECT LOCATION:	Dan River Steam Station; Eden, North Carolina

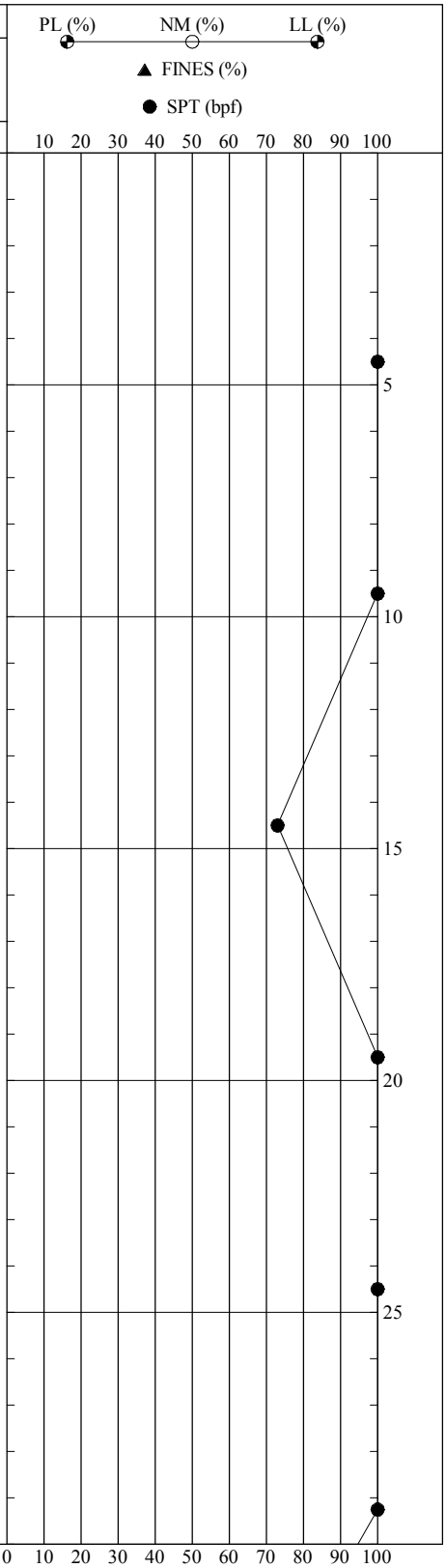
DRILLING CONTRACTOR:	**SAEDACCO**	WATER LEVEL:	**34.08 ft BGS on 5/27/2015**
DRILLING METHOD:	**4.25" HSA**	LATITUDE:	**36.4964**
DATE COMPLETED:	**3/30/2015**	LONGITUDE:	**-79.7148**
LOGGED BY:	**L. Eaves**	GS ELEVATION:	**606.15 feet**
Cave-In Below Well:	**50-50.4 ft bgs**	TOC ELEVATION:	**609.63 feet**
(not depicted)		DATUM:	**Mean Sea Level (MSL)**

Depth (ft-bgs)	WELL DIAGRAM	Elev (ft-MSL)	WELL CONSTRUCTION DETAILS
+3.48		609.63 TOC	PROTECTIVE CASING: Diameter: 4-inch x 4-inch square; Type: Steel Stickup; Interval: +4 to 2 feet bgs
0		606.15 GS	OUTER CASING: Diameter: Not Applicable; Type: Not Applicable; Interval: Not Applicable
31.0		575.15	INNER CASING: Diameter: 2-inch; Type: Sch. 40 PVC; Interval: +3.48 to 34.7 feet bgs
33.0		573.15	SCREEN: Diameter: 2-inch; Type: Sch. 40 PVC; Interval: 34.7 to 49.7 feet bgs
34.7		571.45	FILTER PACK: Type: #2 Silica Sand; Interval: 33 to 50 feet bgs
			SEAL: Type: Bentonite; Interval: 31 to 33 feet bgs
			GROUT: Type: Neat Cement; Interval: 0 to 31 feet bgs
49.7		556.45	
50.0	End Cap	556.15	

NOTES: GS=ground surface; TOC=top of inner PVC casing; bgs=below ground surface

Not To Scale

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	(Rec") N-COUNT or Rec%/RQD% 6"- 6"- 6"- 6"
0	SAPROLITE: Yellow-Brown (10YR 5/6), Silty Fine SAND (SM), Non-Plastic, Dry to Moist					
	PARTIALLY WEATHERED ROCK: When Sampled Becomes Yellow-Brown (10YR 5/6), Very Dense, Silty Fine SAND (SM), Non-Plastic, Dry to Moist			SS-1		(14.4) 20-36-50/5
5						
				SS-2		(13.2) 17-45-50/3
10						
	SAPROLITE: Yellow-Brown (10YR 5/6), Very Dense, Silty Fine SAND (SM), Non-Plastic, Dry to Moist			SS-3		(15.6) 15-23-50
15						
	PARTIALLY WEATHERED ROCK: When Sampled Becomes Yellow-Brown (10YR 5/6) to Dark Gray-Brown (10YR 4/2), Very Dense, Silty Fine SAND (SM), Non-Plastic, Dry to Moist			SS-4		(13.2) 15-39-50/5
20						
	Becomes Dark Gray-Brown (10YR 4/2)			SS-5		(12) 39-50-50/5
25						
				SS-6		(8.4) 31-50/3
30						



DUKE ABSAT GEOTECHNICAL BORING LOG DR ONSITE LANDFILL BORING LOGS 7810140065.GPJ AMEC DUKE ABSAT.GDT 7/6/15

CONTRACTOR:	SAEDACCO
LOGGED BY:	L. Eaves
EQUIPMENT:	CME-550
DRILL METHOD:	4.25 / 8.25 HSA; 5 7/8 RC; NQ2 CORE
HOLE DIAMETER:	12" to 6" to 3"
CLOSURE METHOD:	Outer casing closed with expandable well cap and covered with construction barrel.
REMARKS:	Located northeast of Ash Fill 1. Outer Casing set to 40.5 ft bgs, but no well installed.

REVIEWED BY: _____

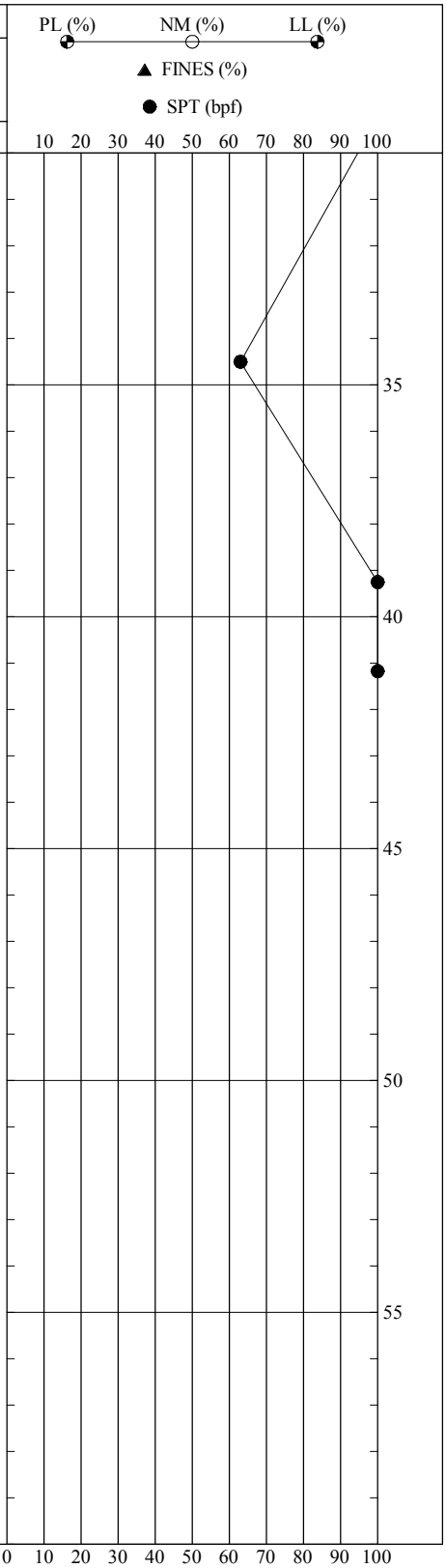
GEOTECHNICAL BORING RECORD

PROJECT NAME: Dan River On-Site Landfill
PROJECT NO.: 7810-14-0065 **START DATE:** 4/7/2015
COORD N: **COMP. DATE:** 4/9/2015
COORD E: **Page** 1 **of** 2
LOCATION: Eden, North Carolina

BORING NO.: OW-404D

amec foster wheeler

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	(Rec") N-COUNT or Rec%/RQD% 6"- 6"- 6"- 6"
30	PARTIALLY WEATHERED ROCK: When Sampled Becomes Yellow-Brown (10YR 5/6) to Dark Gray-Brown (10YR 4/2), Very Dense, Silty Fine SAND (SM), Non-Plastic, Dry to Moist					
	SAPROLITE: Dark Gray-Brown (10YR 3/2), Very Dense, Silty Fine to Coarse SAND (SM) with Rock Fragments, Non-Plastic, Moist			SS-7		(15.6) 13-18-45
35						
	PARTIALLY WEATHERED ROCK: When Sampled Becomes Dark Gray-Brown (10YR 3/2), Very Dense, Silty Fine to Coarse SAND (SM) with Rock Fragments, Non-Plastic, Moist			SS-8		(4.8) 15-50/3
40				SS-9		(0) 50/2
	Auger Refusal at 41 ft bgs					
45						
50						
55						
60						



DUKE ABSAT GEOTECHNICAL BORING LOG DR ONSITE LANDFILL BORING LOGS 7810140065.GPJ AMEC DUKE ABSAT.GDT 7/6/15

CONTRACTOR:	SAEDACCO
LOGGED BY:	L. Eaves
EQUIPMENT:	CME-550
DRILL METHOD:	4.25 / 8.25 HSA; 5 7/8 RC; NQ2 CORE
HOLE DIAMETER:	12" to 6" to 3"
CLOSURE METHOD:	Outer casing closed with expandable well cap and covered with construction barrel.
REMARKS:	Located northeast of Ash Fill 1. Outer Casing set to 40.5 ft bgs, but no well installed.

REVIEWED BY: _____

GEOTECHNICAL BORING RECORD

PROJECT NAME: Dan River On-Site Landfill
PROJECT NO.: 7810-14-0065 **START DATE:** 4/7/2015
COORD N: **COMP. DATE:** 4/9/2015
COORD E: **Page** 2 **of** 2
LOCATION: Eden, North Carolina

BORING NO.: OW-404D

amec foster wheeler

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	(Rec") N-COUNT or Rec%/RQD% 6"- 6"- 6"- 6"	PL (%) NM (%) LL (%) ▲ FINES (%) ● SPT (bpf) 10 20 30 40 50 60 70 80 90 100
0	SAPROLITE: Yellow-Brown (10YR 5/6), Silty Fine SAND (SM), Non-Plastic, Dry to Moist		586.6				
	PARTIALLY WEATHERED ROCK: When Sampled Becomes Yellow-Brown (10YR 5/6), Very Dense, Silty Fine SAND (SM), Non-Plastic, Dry to Moist						
5			581.6				
10			576.6				
	SAPROLITE: Yellow-Brown (10YR 5/6), Very Dense, Silty Fine SAND (SM), Non-Plastic, Dry to Moist						
15			571.6				
	PARTIALLY WEATHERED ROCK: When Sampled Becomes Yellow-Brown (10YR 5/6) to Dark Gray-Brown (10YR 4/2), Very Dense, Silty Fine SAND (SM), Non-Plastic, Dry to Moist						
20			566.6				
	Becomes Dark Gray-Brown (10YR 4/2)						
25			561.6				
30			556.6				

0 10 20 30 40 50 60 70 80 90 100

DUKE ABSAT GEOTECHNICAL BORING LOG DR ONSITE LANDFILL BORING LOGS 7810140065.GPJ AMEC DUKE ABSAT.GDT 7/6/15

CONTRACTOR:	SAEDACCO
LOGGED BY:	L. Eaves
EQUIPMENT:	CME-550
DRILL METHOD:	4.25 HSA
HOLE DIAMETER:	7"
CLOSURE METHOD:	Type II Observation Well Installed
REMARKS:	Located northeast of Ash Fill 1; Water level = 18.64 feet bgs on May 27, 2015

REVIEWED BY: _____

GEOTECHNICAL BORING RECORD

PROJECT NAME: Dan River On-Site Landfill
PROJECT NO.: 7810-14-0065 **START DATE:** 4/7/2015
COORD N: 1000129 **COMP. DATE:** 4/7/2015
COORD E: 1790071 **Page** 1 **of** 2
LOCATION: Eden, North Carolina

BORING NO.: OW-404S

amec foster wheeler

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	SAMPLES TYPE	SAMPLES (Rec") N-COUNT or Rec%/RQD% 6"- 6"- 6"- 6"	PL (%) NM (%) LL (%) ▲ FINES (%) ● SPT (bpf) 10 20 30 40 50 60 70 80 90 100
30	**Boring Terminated at 30 ft bgs** **Soil Lithologic Descriptions Obtained From OW-404D Boring**		556.6				
35			551.6				
40			546.6				
45			541.6				
50			536.6				
55			531.6				
60			526.6				

0 10 20 30 40 50 60 70 80 90 100

DUKE ABSAT GEOTECHNICAL BORING LOG DR ONSITE LANDFILL BORING LOGS 7810140065.GPJ AMEC DUKE ABSAT.GDT 7/6/15

CONTRACTOR:	SAEDACCO
LOGGED BY:	L. Eaves
EQUIPMENT:	CME-550
DRILL METHOD:	4.25 HSA
HOLE DIAMETER:	7"
CLOSURE METHOD:	Type II Observation Well Installed
REMARKS:	Located northeast of Ash Fill 1; Water level = 18.64 feet bgs on May 27, 2015

REVIEWED BY: _____

GEOTECHNICAL BORING RECORD

PROJECT NAME: Dan River On-Site Landfill
PROJECT NO.: 7810-14-0065 **START DATE:** 4/7/2015
COORD N: 1000129 **COMP. DATE:** 4/7/2015
COORD E: 1790071 **Page 2 of 2**
LOCATION: Eden, North Carolina

BORING NO.: OW-404S

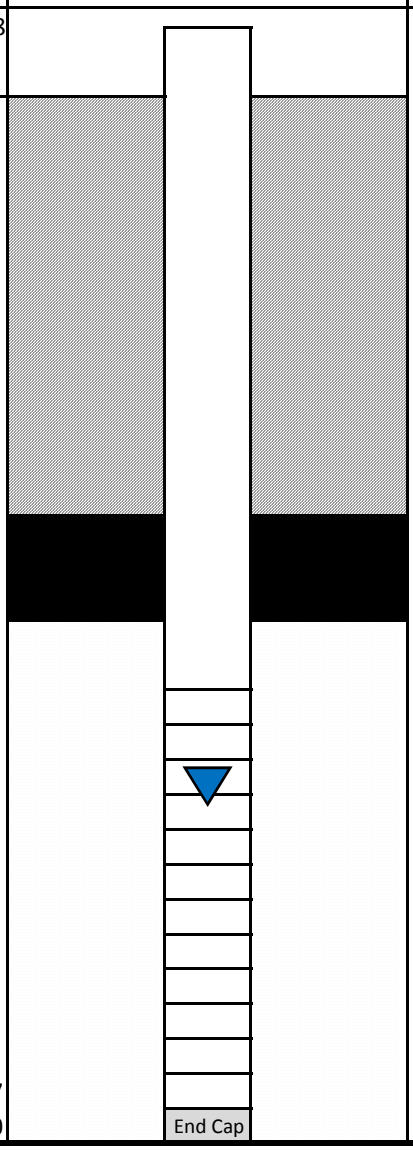
amec foster wheeler

WELL CONSTRUCTION REPORT

WELL ID: **OW-404 S**

PROJECT:	Dan River Landfill
PROJECT NO:	7810-14-0065
PROJECT LOCATION:	Dan River Steam Station; Eden, North Carolina

DRILLING CONTRACTOR:	**SAEDACCO**	WATER LEVEL:	**18.64 ft BGS on 5/27/2015**
DRILLING METHOD:	**4.25" HSA**	LATITUDE:	**36.4957**
DATE COMPLETED:	**4/7/2015**	LONGITUDE:	**-79.7141**
LOGGED BY:	**L. Eaves**	GS ELEVATION:	**586.61 feet**
Cave-In Below Well:	**None**	TOC ELEVATION:	**589.89 feet**
(not depicted)		DATUM:	**Mean Sea Level (MSL)**

Depth (ft-bgs)	WELL DIAGRAM	Elev (ft-MSL)	WELL CONSTRUCTION DETAILS
+3.28		589.89 TOC	PROTECTIVE CASING:
0		586.61 GS	Diameter: 4-inch x 4-inch square Type: Steel Stickup Interval: +4 to 2 feet bgs
			OUTER CASING: Diameter: Not Applicable Type: Not Applicable Interval: Not Applicable
			INNER CASING: Diameter: 2-inch Type: Sch. 40 PVC Interval: +3.28 to 14.7 feet bgs
11.0		575.61	
			SCREEN: Diameter: 2-inch Type: Sch. 40 PVC Interval: 14.7 to 29.7 feet bgs
13.0		573.61	
14.7		571.91	
			FILTER PACK: Type: #2 Silica Sand Interval: 13 to 30 feet bgs
			SEAL: Type: Bentonite Interval: 11 to 13 feet bgs
			GROUT: Type: Neat Cement Interval: 0 to 11 feet bgs
29.7		556.91	
30.0	End Cap	556.61	

NOTES: GS=ground surface; TOC=top of inner PVC casing; bgs=below ground surface

Not To Scale

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	SAMPLES TYPE	SAMPLES (Rec") N-COUNT or Rec%/RQD% 6"- 6"- 6"- 6"	PL (%) NM (%) LL (%) ▲ FINES (%) ● SPT (bpf) 10 20 30 40 50 60 70 80 90 100
0	RESIDUUM: Yellow (10YR 7/8), Dense, Silty Fine SAND (SM), Low Plasticity, Dry to Moist		589.0				
5			584.0				
	SAPROLITE: Brown-Yellow (10YR 6/8), Very Stiff, Fine Sandy SILT (ML), Low Plasticity, Moist						
10			579.0				
	SAPROLITE: Brown-Yellow (10YR 6/8), Dense, Silty Fine SAND (SM), Low Plasticity, Moist						
15			574.0				
	PARTIALLY WEATHERED ROCK: Brown-Yellow (10YR 6/8), Very Dense, Sandy Lean CLAY (CL), Low Plasticity, Moist						
20			569.0				
25			564.0				
30			559.0				

0 10 20 30 40 50 60 70 80 90 100

DUKE ABSAT GEOTECHNICAL BORING LOG DR ONSITE LANDFILL BORING LOGS 7810140065.GPJ AMEC DUKE ABSAT.GDT 11/11/15

CONTRACTOR:	SAEDACCO
LOGGED BY:	R. Clark
EQUIPMENT:	CME-550
DRILL METHOD:	4.25 / 8.25 HSA; 5 7/8 RC
HOLE DIAMETER:	12" to 6"
CLOSURE METHOD:	Type III Observation Well Installed
REMARKS:	Located northeast of Ash Fill 1; Water level = 49.76 feet bgs on May 27, 2015

REVIEWED BY: _____

GEOTECHNICAL BORING RECORD

PROJECT NAME: Dan River On-Site Landfill
PROJECT NO.: 7810-14-0065 **START DATE:** 4/13/2015
COORD N: 1000241 **COMP. DATE:** 4/13/2015
COORD E: 1790309 **Page** 1 **of** 3
LOCATION: Eden, North Carolina

BORING NO.: OW-405D

amec foster wheeler

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	SAMPLES TYPE	SAMPLES (Rec") N-COUNT or Rec%/RQD% 6"- 6"- 6"- 6"	PL (%) NM (%) LL (%) ▲ FINES (%) ● SPT (bpf) 10 20 30 40 50 60 70 80 90 100
30	PARTIALLY WEATHERED ROCK: Brown-Yellow (10YR 6/8), Very Dense, Sandy Lean CLAY (CL), Low Plasticity, Moist		559.0				
35			554.0				
40			549.0				
45			544.0				
50	**When Over-Reaming Pilot Hole, 8.25" Auger Refusal at 51 ft bgs; Begin 5 7/8" Roller Cone**		539.0				
55			534.0				
60			529.0				

0 10 20 30 40 50 60 70 80 90 100

DUKE ABSAT GEOTECHNICAL BORING LOG DR ONSITE LANDFILL BORING LOGS 7810140065.GPJ AMEC DUKE ABSAT.GDT 11/11/15

CONTRACTOR:	SAEDACCO
LOGGED BY:	R. Clark
EQUIPMENT:	CME-550
DRILL METHOD:	4.25 / 8.25 HSA; 5 7/8 RC
HOLE DIAMETER:	12" to 6"
CLOSURE METHOD:	Type III Observation Well Installed
REMARKS:	Located northeast of Ash Fill 1; Water level = 49.76 feet bgs on May 27, 2015

REVIEWED BY: _____

GEOTECHNICAL BORING RECORD

PROJECT NAME: Dan River On-Site Landfill
PROJECT NO.: 7810-14-0065 **START DATE:** 4/13/2015
COORD N: 1000241 **COMP. DATE:** 4/13/2015
COORD E: 1790309 **Page** 2 **of** 3
LOCATION: Eden, North Carolina

BORING NO.: OW-405D

amec foster wheeler

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	(Rec") N-COUNT or Rec%/RQD% 6"- 6"- 6"- 6"	PL (%) NM (%) LL (%) ▲ FINES (%) ● SPT (bpf) 10 20 30 40 50 60 70 80 90 100
60	PARTIALLY WEATHERED ROCK: Brown-Yellow (10YR 6/8), Very Dense, Sandy Lean CLAY (CL), Low Plasticity, Moist		529.0				
65	**Pilot Hole 4.25" Auger Refusal at 65.5 ft bgs** WEATHERED / FRACTURED ROCK: (No Samples Obtained)		524.0				
70			519.0				
75			514.0				
80	**Boring Terminated at 79 ft bgs** **Soil Lithologic Descriptions Obtained From OW-405S Boring**		509.0				
85			504.0				
90			499.0				

0 10 20 30 40 50 60 70 80 90 100

DUKE ABSAT GEOTECHNICAL BORING LOG DR ONSITE LANDFILL BORING LOGS 7810140065.GPJ AMEC DUKE ABSAT.GDT 11/11/15

CONTRACTOR:	SAEDACCO
LOGGED BY:	R. Clark
EQUIPMENT:	CME-550
DRILL METHOD:	4.25 / 8.25 HSA; 5 7/8 RC
HOLE DIAMETER:	12" to 6"
CLOSURE METHOD:	Type III Observation Well Installed
REMARKS:	Located northeast of Ash Fill 1; Water level = 49.76 feet bgs on May 27, 2015

REVIEWED BY: _____

GEOTECHNICAL BORING RECORD

PROJECT NAME: Dan River On-Site Landfill
PROJECT NO.: 7810-14-0065 **START DATE:** 4/13/2015
COORD N: 1000241 **COMP. DATE:** 4/13/2015
COORD E: 1790309 **Page** 3 **of** 3
LOCATION: Eden, North Carolina

BORING NO.: OW-405D

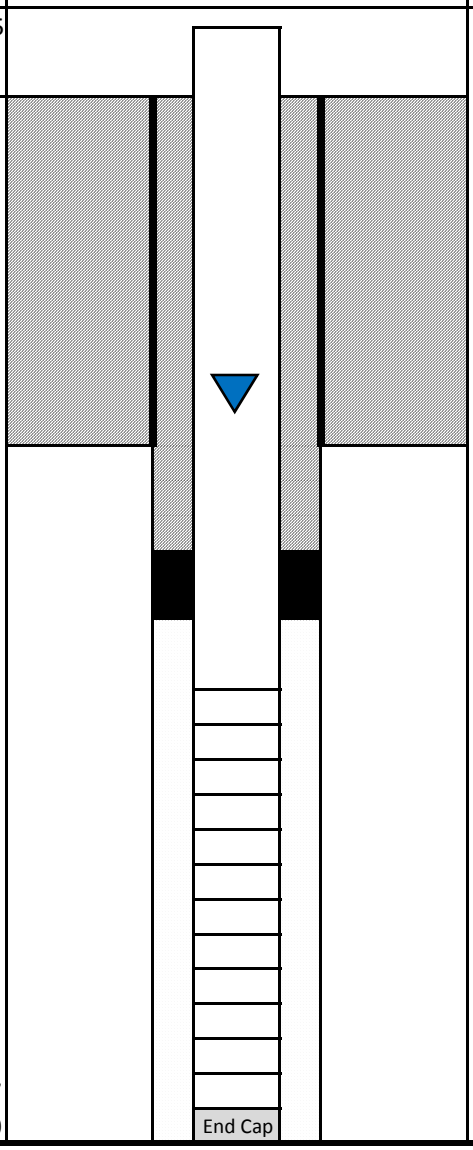
amec foster wheeler

WELL CONSTRUCTION REPORT

WELL ID: **OW-405 D**

PROJECT:	Dan River Landfill
PROJECT NO:	7810-14-0065
PROJECT LOCATION:	Dan River Steam Station; Eden, North Carolina

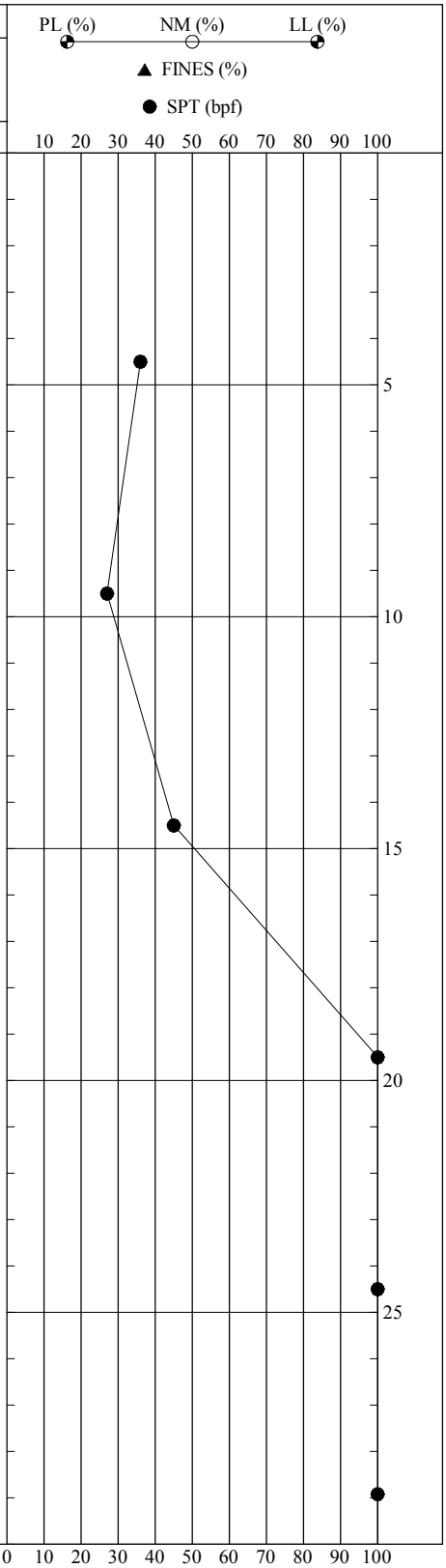
DRILLING CONTRACTOR:	**SAEDACCO**	WATER LEVEL:	**49.76 ft BGS on 5/27/2015**
DRILLING METHOD:	**8.25"HSA/6"RC**	LATITUDE:	**36.4960**
DATE COMPLETED:	**4/23/2015**	LONGITUDE:	**-79.7133**
LOGGED BY:	**R. Clark**	GS ELEVATION:	**589.01 feet**
Cave-In Below Well:	**None**	TOC ELEVATION:	**592.16 feet**
(not depicted)		DATUM:	**Mean Sea Level (MSL)**

Depth (ft-bgs)	WELL DIAGRAM	Elev (ft-MSL)	WELL CONSTRUCTION DETAILS
+3.15		592.16 TOC	PROTECTIVE CASING: Diameter: 4-inch x 4-inch square; Type: Steel Stickup; Interval: +4 to 2 feet bgs
0		589.01 GS	OUTER CASING: Diameter: 6-inch; Type: Sch. 40 PVC; Interval: 0 to 50.5 feet bgs
50.5		538.51	INNER CASING: Diameter: 2-inch; Type: Sch. 40 PVC; Interval: +3.15 to 73.7 feet bgs
68.0		521.01	SCREEN: Diameter: 2-inch; Type: Sch. 40 PVC; Interval: 73.7 to 78.7 feet bgs
72.0		517.01	FILTER PACK: Type: #2 Silica Sand; Interval: 72 to 79 feet bgs
73.7		515.31	SEAL: Type: Bentonite; Interval: 68 to 72 feet bgs
78.7		510.31	GROUT: Type: Neat Cement; Interval: 0 to 68 feet bgs
79.0	End Cap	510.01	

NOTES: GS=ground surface; TOC=top of inner PVC casing; bgs=below ground surface

Not to Scale

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	(Rec") N-COUNT or Rec%/RQD% 6"- 6"- 6"- 6"
0	RESIDUUM: Yellow (10YR 7/8), Dense, Silty Fine SAND (SM), Low Plasticity, Dry to Moist		588.2			
				SS-1		(18) 9-15-21
5			583.2			
	SAPROLITE: Brown-Yellow (10YR 6/8), Very Stiff, Fine Sandy SILT (ML), Low Plasticity, Moist			SS-2		(18) 9-12-15
10			578.2			
	SAPROLITE: Brown-Yellow (10YR 6/8), Dense, Silty Fine SAND (SM), Low Plasticity, Moist			SS-3		(13.2) 10-18-27
15			573.2			
	PARTIALLY WEATHERED ROCK: Brown-Yellow (10YR 6/8), Very Dense, Sandy Lean CLAY (CL), Low Plasticity, Moist			SS-4		(14.4) 24-40-50/5
20			568.2			
				SS-5		(12) 20-46-50/3
25			563.2			
				SS-6		(4.8) 50/5
30			558.2			



DUKE ABSAT GEOTECHNICAL BORING LOG DR ONSITE LANDFILL BORING LOGS 7810140065.GPJ AMEC DUKE ABSAT.GDT 7/6/15

CONTRACTOR:	SAEDACCO
LOGGED BY:	L. Eaves
EQUIPMENT:	CME-550
DRILL METHOD:	4.25 HSA
HOLE DIAMETER:	7"
CLOSURE METHOD:	Type II Observation Well Installed
REMARKS:	Located northeast of Ash Fill 1; Water level = 49.87 feet bgs on May 27, 2015

REVIEWED BY: _____

GEOTECHNICAL BORING RECORD

PROJECT NAME: Dan River On-Site Landfill
PROJECT NO.: 7810-14-0065 **START DATE:** 4/2/2015
COORD N: 1000248 **COMP. DATE:** 4/6/2015
COORD E: 1790307 **Page** 1 **of** 3
LOCATION: Eden, North Carolina

BORING NO.: OW-405S

amec foster wheeler

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	(Rec") N-COUNT or Rec%/RQD% 6"- 6"- 6"- 6"	PL (%) NM (%) LL (%) ▲ FINES (%) ● SPT (bpf) 10 20 30 40 50 60 70 80 90 100
30	PARTIALLY WEATHERED ROCK: Brown-Yellow (10YR 6/8), Very Dense, Sandy Lean CLAY (CL), Low Plasticity, Moist		558.2				
				SS-7		(10.8) 30-47-50/2	
35			553.2				35
				SS-8		(8) 44-50/2	
40			548.2				40
				SS-9		(4.8) 44-50/2	
45			543.2				45
				SS-10		(6) 37-50/3	
50			538.2				50
				SS-11		(6) 20-50/2	
55			533.2				55
				SS-12		(4.8) 50/5	
60			528.2				

0 10 20 30 40 50 60 70 80 90 100

DUKE ABSAT GEOTECHNICAL BORING LOG DR ONSITE LANDFILL BORING LOGS 7810140065.GPJ AMEC DUKE ABSAT.GDT 7/6/15

CONTRACTOR:	SAEDACCO
LOGGED BY:	L. Eaves
EQUIPMENT:	CME-550
DRILL METHOD:	4.25 HSA
HOLE DIAMETER:	7"
CLOSURE METHOD:	Type II Observation Well Installed
REMARKS:	Located northeast of Ash Fill 1; Water level = 49.87 feet bgs on May 27, 2015

REVIEWED BY: _____

GEOTECHNICAL BORING RECORD

PROJECT NAME: Dan River On-Site Landfill
PROJECT NO.: 7810-14-0065 **START DATE:** 4/2/2015
COORD N: 1000248 **COMP. DATE:** 4/6/2015
COORD E: 1790307 **Page** 2 **of** 3
LOCATION: Eden, North Carolina

BORING NO.: OW-405S

amec foster wheeler

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	SAMPLES TYPE	SAMPLES (Rec") N-COUNT or Rec%/RQD% 6"- 6"- 6"- 6"	PL (%) NM (%) LL (%) ▲ FINES (%) ● SPT (bpf) 10 20 30 40 50 60 70 80 90 100
60	PARTIALLY WEATHERED ROCK: Brown-Yellow (10YR 6/8), Very Dense, Sandy Lean CLAY (CL), Low Plasticity, Moist		528.2				
	Auger Refusal at 63.3 ft bgs						
65			523.2				
70			518.2				
75			513.2				
80			508.2				
85			503.2				
90			498.2				

0 10 20 30 40 50 60 70 80 90 100

DUKE ABSAT GEOTECHNICAL BORING LOG DR ONSITE LANDFILL BORING LOGS 7810140065.GPJ AMEC DUKE ABSAT.GDT 7/6/15

CONTRACTOR:	SAEDACCO
LOGGED BY:	L. Eaves
EQUIPMENT:	CME-550
DRILL METHOD:	4.25 HSA
HOLE DIAMETER:	7"
CLOSURE METHOD:	Type II Observation Well Installed
REMARKS:	Located northeast of Ash Fill 1; Water level = 49.87 feet bgs on May 27, 2015

REVIEWED BY: _____

GEOTECHNICAL BORING RECORD

PROJECT NAME: Dan River On-Site Landfill
PROJECT NO.: 7810-14-0065 **START DATE:** 4/2/2015
COORD N: 1000248 **COMP. DATE:** 4/6/2015
COORD E: 1790307 **Page** 3 **of** 3
LOCATION: Eden, North Carolina

BORING NO.: OW-405S

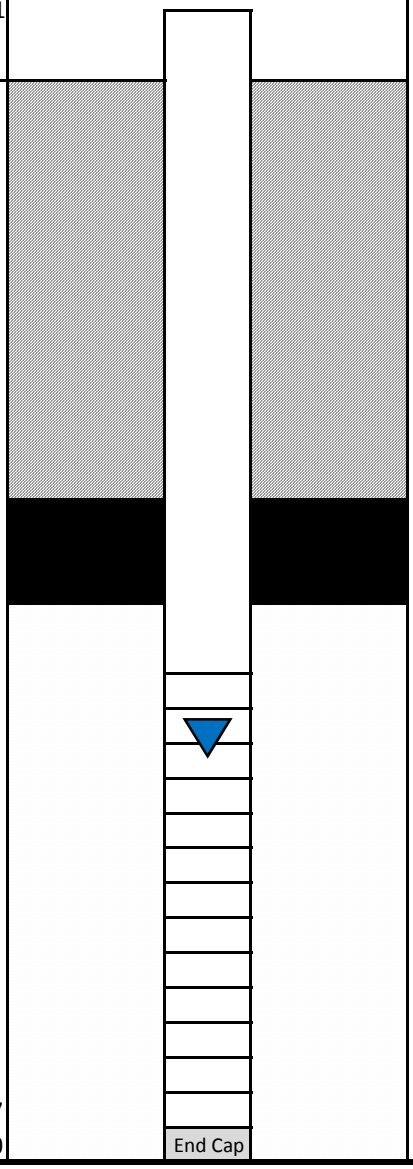
amec foster wheeler

WELL CONSTRUCTION REPORT

WELL ID: **OW-405 S**

PROJECT:	Dan River Landfill
PROJECT NO:	7810-14-0065
PROJECT LOCATION:	Dan River Steam Station; Eden, North Carolina

DRILLING CONTRACTOR:	**SAEDACCO**	WATER LEVEL:	**49.87 ft BGS on 5/27/2015**
DRILLING METHOD:	**4.25" HSA**	LATITUDE:	**36.4961**
DATE COMPLETED:	**4/7/2015**	LONGITUDE:	**-79.7133**
LOGGED BY:	**L. Eaves**	GS ELEVATION:	**588.15 feet**
Cave-In Below Well:	**63-63.3 ft bgs**	TOC ELEVATION:	**591.06 feet**
(not depicted)		DATUM:	**Mean Sea Level (MSL)**

Depth (ft-bgs)	WELL DIAGRAM	Elev (ft-MSL)	WELL CONSTRUCTION DETAILS
+2.91		591.06 TOC	PROTECTIVE CASING: Diameter: 4-inch x 4-inch square Type: Steel Stickup Interval: +3.5 to 2 feet bgs
0		588.15 GS	OUTER CASING: Diameter: Not Applicable Type: Not Applicable Interval: Not Applicable
			INNER CASING: Diameter: 2-inch Type: Sch. 40 PVC Interval: +2.91 to 47.7 feet bgs
44.0		544.15	
			SCREEN: Diameter: 2-inch Type: Sch. 40 PVC Interval: 47.7 to 62.7 feet bgs
46.0		542.15	
47.7		540.45	
			FILTER PACK: Type: #2 Silica Sand Interval: 46 to 63 feet bgs
			SEAL: Type: Bentonite Interval: 44 to 46 feet bgs
			GROUT: Type: Neat Cement Interval: 0 to 44 feet bgs
62.7		525.45	
63.0	End Cap	525.15	

NOTES: GS=ground surface; TOC=top of inner PVC casing; bgs=below ground surface

Not to Scale

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	SAMPLES TYPE	SAMPLES (Rec") N-COUNT or Rec%/RQD% 6"- 6"- 6"- 6"	PL (%) NM (%) LL (%) ▲ FINES (%) ● SPT (bpf) 10 20 30 40 50 60 70 80 90 100
0	ALLUVIUM: Gray-Brown (10YR 4/2), Stiff, Fine Sandy Elastic SILT (MH), High Plasticity, Moist		567.6				
				UD-1		(24)	
5			562.6				5
	SAPROLITE: Gray-Brown (10YR 4/2), Very Stiff, Sandy Fat CLAY (CH) with Rock Fragments, High Plasticity, Dry to Moist						
10			557.6				10
	PARTIALLY WEATHERED ROCK: When Sampled Becomes Brown (10YR 5/3), Very Dense, Silty Fine to Medium SAND (SM), Non-Plastic, Moist						
15			552.6				15
	PARTIALLY WEATHERED ROCK: When Sampled Becomes Dark Gray (7.5YR 4/1), Fine to Medium SAND (SM) with Rock Fragments, Non-Plastic, Moist to Wet						
20			547.6				20
	Auger Refusal at 21 ft bgs; **Begin 5 7/8" Roller Cone**						
	WEATHERED / FRACTURED ROCK: (No Samples Obtained); **Roller Cone Refusal at 21.5 ft bgs**; **Begin NQ2 Core**					79/21	
	WEATHERED / FRACTURED ROCK: Black SILTSTONE / SHALE Interbedded with Fine-Grained SANDSTONE, Moderately Weathered, Intensely Fractured, Low Angle and Horizontal Fractures with Trace Mineralization on Fractures			CORE-1			
25			542.6			20/0	25
				CORE-2			
	Poor Recovery on Core; **Switch Back to 5 7/8" Roller Cone**						
	WEATHERED / FRACTURED ROCK: (No Samples Obtained)						
30			537.6				

0 10 20 30 40 50 60 70 80 90 100

DUKE ABSAT GEOTECHNICAL BORING LOG DR ONSITE LANDFILL BORING LOGS 7810140065.GPJ AMEC DUKE ABSAT.GDT 7/6/15

CONTRACTOR:	SAEDACCO
LOGGED BY:	M. Flanik / R. Clark
EQUIPMENT:	CME-550
DRILL METHOD:	4.25 / 8.25 HSA; 5 7/8 RC
HOLE DIAMETER:	12" to 6"
CLOSURE METHOD:	Type III Observation Well Installed
REMARKS:	Located northwest of Ash Fill 1; Water level = 2.69 feet bgs on May 27, 2015

REVIEWED BY: _____

GEOTECHNICAL BORING RECORD

PROJECT NAME: Dan River On-Site Landfill
PROJECT NO.: 7810-14-0065 **START DATE:** 4/6/2015
COORD N: 1000027 **COMP. DATE:** 4/6/2015
COORD E: 1788805 **Page** 1 **of** 2
LOCATION: Eden, North Carolina

BORING NO.: OW-406D

amec foster wheeler

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	SAMPLES TYPE	SAMPLES (Rec") N-COUNT or Rec%/RQD% 6"- 6"- 6"- 6"	PL (%) NM (%) LL (%) ▲ FINES (%) ● SPT (bpf) 10 20 30 40 50 60 70 80 90 100
30	WEATHERED / FRACTURED ROCK: (No Samples Obtained)		537.6				
35			532.6				
40			527.6				
	Boring Terminated at 41.3 ft bgs **Soil Lithologic Descriptions Obtained From OW-406S Boring**						
45			522.6				
50			517.6				
55			512.6				
60			507.6				

0 10 20 30 40 50 60 70 80 90 100

DUKE ABSAT GEOTECHNICAL BORING LOG DR ONSITE LANDFILL BORING LOGS 7810140065.GPJ AMEC DUKE ABSAT.GDT 7/6/15

CONTRACTOR:	SAEDACCO
LOGGED BY:	M. Flanik / R. Clark
EQUIPMENT:	CME-550
DRILL METHOD:	4.25 / 8.25 HSA; 5 7/8 RC
HOLE DIAMETER:	12" to 6"
CLOSURE METHOD:	Type III Observation Well Installed
REMARKS:	Located northwest of Ash Fill 1; Water level = 2.69 feet bgs on May 27, 2015

REVIEWED BY: _____

GEOTECHNICAL BORING RECORD

PROJECT NAME: Dan River On-Site Landfill
PROJECT NO.: 7810-14-0065 **START DATE:** 4/6/2015
COORD N: 1000027 **COMP. DATE:** 4/6/2015
COORD E: 1788805 **Page 2 of 2**
LOCATION: Eden, North Carolina

BORING NO.: OW-406D

amec foster wheeler

PROJECT:	DAN RIVER LANDFILL DAN RIVER STEAM STATION, Eden, NC Amec Foster Wheeler Project No. 7810-14-0065	ROCK CORE PHOTO LOG:	OW-406D

CLIENT:	**Duke Energy**	AUGER REFUSAL DEPTH:	**21.0**	**ft bgs**		LATITUDE:	**36.4954**
DATE DRILLED:	**4/17/2015**	ROLLER CONE REFUSAL DEPTH:	**21.5**	**ft bgs**		LONGITUDE:	**-79.7184**
DRILL RIG:	**Diedrich D-50 Turbo**	CORING TERMINATION DEPTH:	**28.4**	**ft bgs**		GROUND ELEVATION:	**567.62**
DRILLER:	**Richy Lemire**	WATER LEVEL:	**5.00 ft bgs on 4/30/15**			NOTES: Type III Monitoring Well Installed to 41.3 ft bgs with 5-ft screen 36.0-41.0 ft bgs. Switched back to 5 7/8" roller cone: over-reamed from 21.5-28.4 ft, then continued roller cone to 41.3 ft bgs.	
LOGGED BY:	**Rodney Clark**						
CORE SIZE:	**NQ2**						

CORE BOX #: 1 of 1
TOP OF BOX: 21.5 ft bgs
BOTTOM OF BOX: 28.4 ft bgs

DESCRIPTION:

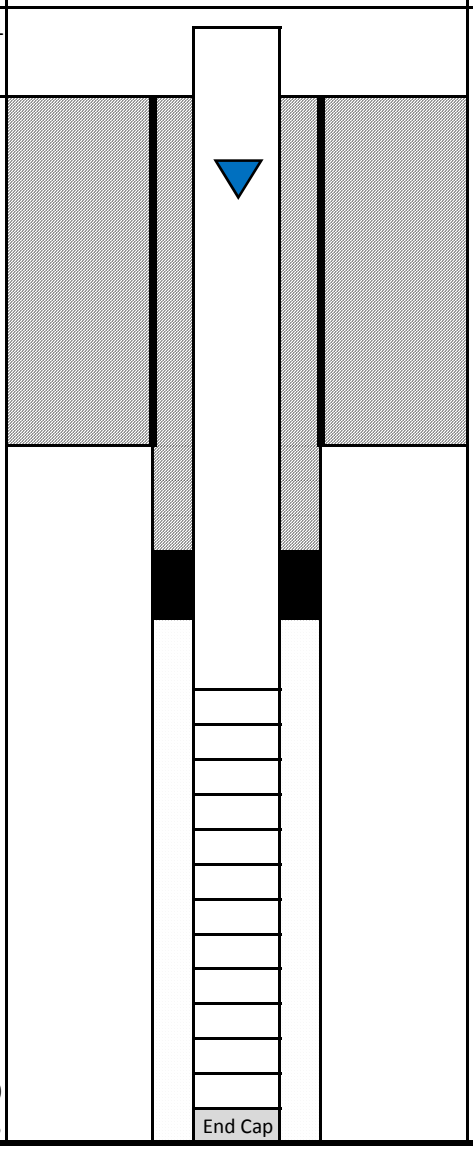
21.5 to 28.4 ft bgs: **WEATHERED / FRACTURED ROCK**: Black **SILTSTONE / SHALE** Interbedded with Fine-Grained **SANDSTONE**; Intensely Fractured, Horizontal and Low Angle Fractures with Trace Mineralization on Fractures

WELL CONSTRUCTION REPORT

WELL ID: **OW-406 D**

PROJECT:	Dan River Landfill
PROJECT NO:	7810-14-0065
PROJECT LOCATION:	Dan River Steam Station; Eden, North Carolina

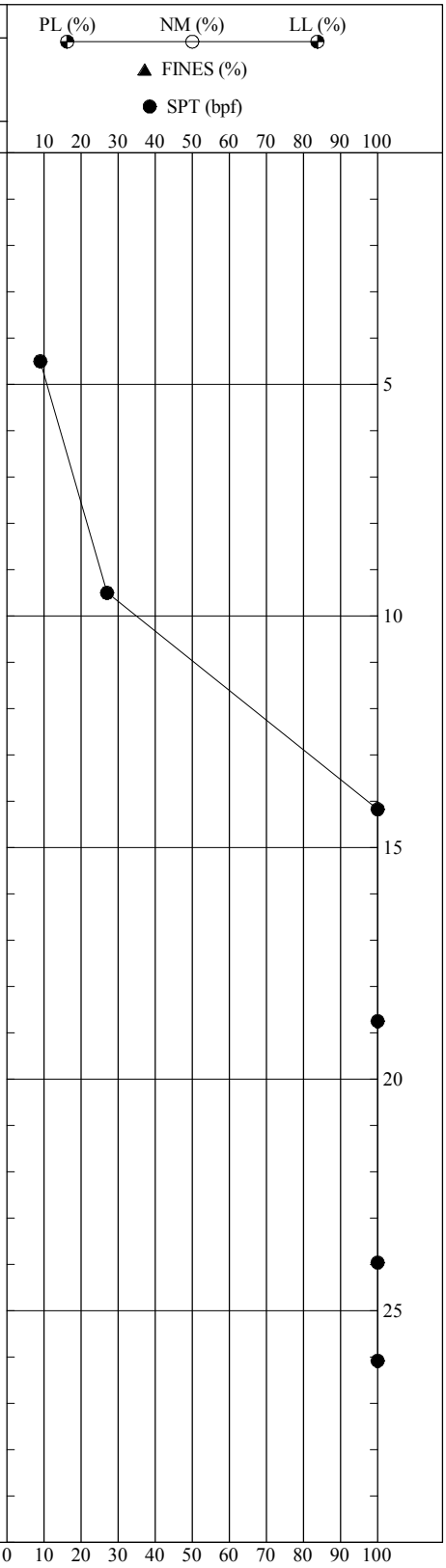
DRILLING CONTRACTOR:	**SAEDACCO**	WATER LEVEL:	**2.69 ft BGS on 5/27/2015**
DRILLING METHOD:	**8.25" HSA/6"RC/NQ2/3"RC**	LATITUDE:	**36.4954**
DATE COMPLETED:	**4/20/2015**	LONGITUDE:	**-79.7184**
LOGGED BY:	**Flanik/Clark**	GS ELEVATION:	**567.62 feet**
Cave-In Below Well:	**None**	TOC ELEVATION:	**571.13 feet**
(not depicted)		DATUM:	**Mean Sea Level (MSL)**

Depth (ft-bgs)	WELL DIAGRAM	Elev (ft-MSL)	WELL CONSTRUCTION DETAILS
+3.51		571.13 TOC	PROTECTIVE CASING: Diameter: 4-inch x 4-inch square; Type: Steel Stickup; Interval: +4 to 2 feet bgs
0		567.62 GS	OUTER CASING: Diameter: 6-inch; Type: Sch. 40 PVC; Interval: 0 to 20.5 feet bgs
20.5		547.12	INNER CASING: Diameter: 2-inch; Type: Sch. 40 PVC; Interval: +3.51 to 36 feet bgs
30.0		537.62	SCREEN: Diameter: 2-inch; Type: Sch. 40 PVC; Interval: 36 to 41 feet bgs
34.0		533.62	FILTER PACK: Type: #2 Silica Sand; Interval: 34 to 41.3 feet bgs
36.0		531.62	SEAL: Type: Bentonite; Interval: 30 to 34 feet bgs
41.0		526.62	GROUT: Type: Neat Cement; Interval: 0 to 30 feet bgs
41.3	End Cap	526.32	

NOTES: GS=ground surface; TOC=top of inner PVC casing; bgs=below ground surface

Not to Scale

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	(Rec") N-COUNT or Rec%/RQD% 6"- 6"- 6"- 6"
0	ALLUVIUM: Gray-Brown (10YR 4/2), Stiff, Fine Sandy Elastic SILT (MH), High Plasticity, Moist		567.6			
				SS-1		(6) 3-4-5
5			562.6			
	SAPROLITE: Gray-Brown (10YR 4/2), Very Stiff, Sandy Fat CLAY (CH) with Rock Fragments, High Plasticity, Dry to Moist					
				SS-2		(14.4) 11-9-18
10			557.6			
	PARTIALLY WEATHERED ROCK: When Sampled Becomes Brown (10YR 5/3), Very Dense, Silty Fine to Medium SAND (SM), Non-Plastic, Moist			SS-3		(7.2) 39-50/2
15			552.6			
	PARTIALLY WEATHERED ROCK: When Sampled Becomes Dark Gray (7.5YR 4/1), Fine to Medium SAND (SM) with Rock Fragments, Non-Plastic, Moist to Wet			SS-4		(3) 50/3
20			547.6			
				SS-5		(4.8) 50/5.5
25			542.6			
	Auger Refusal at 26 ft bgs			SS-6		(0) 50/1
30			537.6			



DUKE ABSAT GEOTECHNICAL BORING LOG DR ONSITE LANDFILL BORING LOGS 7810140065.GPJ AMEC DUKE ABSAT.GDT 7/6/15

CONTRACTOR:	SAEDACCO
LOGGED BY:	L. Eaves
EQUIPMENT:	CME-550
DRILL METHOD:	4.25 HSA
HOLE DIAMETER:	7"
CLOSURE METHOD:	Type II Observation Well Installed
REMARKS:	Located northwest of Ash Fill 1; Water level = 2.54 feet bgs on May 27, 2015

REVIEWED BY: _____

GEOTECHNICAL BORING RECORD

PROJECT NAME: Dan River On-Site Landfill
PROJECT NO.: 7810-14-0065 **START DATE:** 4/1/2015
COORD N: 1000031 **COMP. DATE:** 4/1/2015
COORD E: 1788810 **Page** 1 **of** 1
LOCATION: Eden, North Carolina

BORING NO.: OW-406S

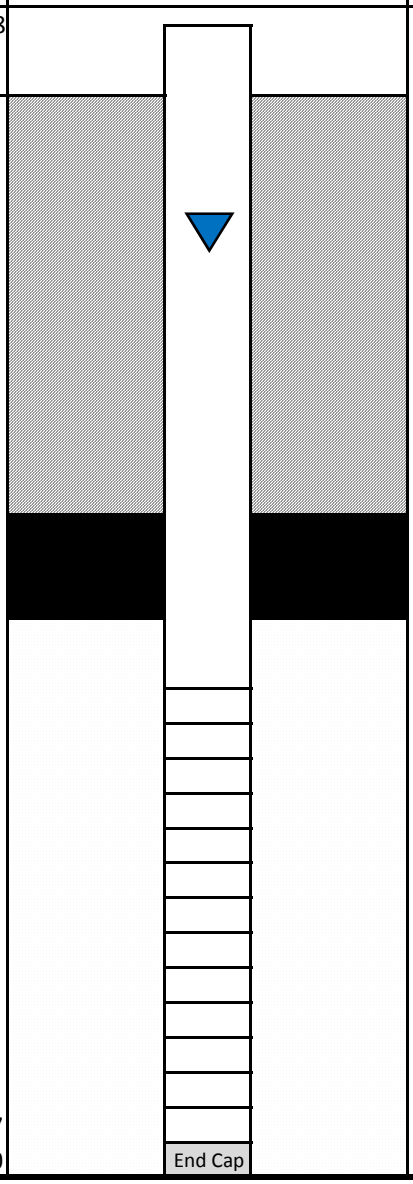
amec foster wheeler

WELL CONSTRUCTION REPORT

WELL ID: **OW-406 S**

PROJECT:	Dan River Landfill
PROJECT NO:	7810-14-0065
PROJECT LOCATION:	Dan River Steam Station; Eden, North Carolina

DRILLING CONTRACTOR:	**SAEDACCO**	WATER LEVEL:	**2.54 ft BGS on 5/27/2015**
DRILLING METHOD:	**4.25" HSA**	LATITUDE:	**36.4954**
DATE COMPLETED:	**4/1/2015**	LONGITUDE:	**-79.7184**
LOGGED BY:	**L. Eaves**	GS ELEVATION:	**567.55 feet**
Cave-In Below Well:	**None**	TOC ELEVATION:	**571.33 feet**
(not depicted)		DATUM:	**Mean Sea Level (MSL)**

Depth (ft-bgs)	WELL DIAGRAM	Elev (ft-MSL)	WELL CONSTRUCTION DETAILS
+3.78		571.33 TOC	PROTECTIVE CASING:
0		567.55 GS	Diameter: 4-inch x 4-inch square Type: Steel Stickup Interval: +4 to 2 feet bgs
			OUTER CASING: Diameter: Not Applicable Type: Not Applicable Interval: Not Applicable
			INNER CASING: Diameter: 2-inch Type: Sch. 40 PVC Interval: +3.78 to 10.7 feet bgs
7.0		560.55	
			SCREEN: Diameter: 2-inch Type: Sch. 40 PVC Interval: 10.7 to 25.7 feet bgs
9.0		558.55	
10.7		556.85	
			FILTER PACK: Type: #2 Silica Sand Interval: 9 to 26 feet bgs
			SEAL: Type: Bentonite Interval: 7 to 9 feet bgs
			GROUT: Type: Neat Cement Interval: 0 to 7 feet bgs
25.7		541.85	
26.0	End Cap	541.55	

NOTES: GS=ground surface; TOC=top of inner PVC casing; bgs=below ground surface

Not to Scale

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	(Rec") N-COUNT or Rec%/RQD% 6"- 6"- 6"- 6"	PL (%) NM (%) LL (%) ▲ FINES (%) ● SPT (bpf) 10 20 30 40 50 60 70 80 90 100
0	FILL: Yellow (10YR 7/8), Silty Fine SAND (SM) with Trace Roots		618.2				
	ASH FILL: Dark Gray (GLEY 4/N), CCR Material that Classifies as Loose to Medium Dense, Silty Fine to Medium SAND (SM), Non-Plastic, Moist						
5			613.2				
10			608.2				
15			603.2				
20	Possible Perched Water		598.2				
25			593.2				
30			588.2				

0 10 20 30 40 50 60 70 80 90 100

DUKE ABSAT GEOTECHNICAL BORING LOG DR ONSITE LANDFILL BORING LOGS 7810140065.GPJ AMEC DUKE ABSAT.GDT 7/6/15

CONTRACTOR:	SAEDACCO
LOGGED BY:	M. Flanik
EQUIPMENT:	CME-550
DRILL METHOD:	4.25 / 8.25 HSA; 5 7/8 RC
HOLE DIAMETER:	12" to 6"
CLOSURE METHOD:	Type III Observation Well Installed
REMARKS:	Located on Ash Fill 1; Water level = 50.67 feet bgs on May 27, 2015

REVIEWED BY: _____

GEOTECHNICAL BORING RECORD

PROJECT NAME: Dan River On-Site Landfill
PROJECT NO.: 7810-14-0065 **START DATE:** 3/16/2015
COORD N: 999910 **COMP. DATE:** 3/16/2015
COORD E: 1789393 **Page** 1 **of** 3
LOCATION: Eden, North Carolina

BORING NO.: OW-407D

amec foster wheeler

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	(Rec") N-COUNT or Rec%/RQD% 6"- 6"- 6"- 6"	PL (%) NM (%) LL (%) ▲ FINES (%) ● SPT (bpf) 10 20 30 40 50 60 70 80 90 100
30	ASH FILL: Dark Gray (GLEY 4/N), CCR Material that Classifies as Loose to Medium Dense, Silty Fine to Medium SAND (SM), Non-Plastic, Moist		588.2				
35			583.2				
	FILL: Green-Gray (6/1), Clayey Fine to Medium SAND (SC) with Trace Organics, Loose, Medium Plasticity, Wet						
40	FILL: Black (2.5/N), Highly Decomposed/Burned Organics, Non-Plastic, Wet		578.2				
	SAPROLITE: Yellow-Brown (10YR 5/8) and Gray (10YR 6/1), Very Stiff, Lean CLAY (CL), Low Plasticity, Moist			UD-1		(15)	
45			573.2				
	SAPROLITE: Yellow-Brown (10YR 5/8) and Gray (10YR 6/1), Dense to Very Dense Lean CLAY with Sand (CL), Low Plasticity, Moist						
50			568.2				
	SAPROLITE: Brown (7.5YR 5/6), Very Dense, Silty Fine to Medium SAND (SM), Non-Plastic, Moist						
55			563.2				
60			558.2				

DUKE ABSAT GEOTECHNICAL BORING LOG DR ONSITE LANDFILL BORING LOGS 7810140065.GPJ AMEC DUKE ABSAT.GDT 7/6/15

CONTRACTOR:	SAEDACCO
LOGGED BY:	M. Flanik
EQUIPMENT:	CME-550
DRILL METHOD:	4.25 / 8.25 HSA; 5 7/8 RC
HOLE DIAMETER:	12" to 6"
CLOSURE METHOD:	Type III Observation Well Installed
REMARKS:	Located on Ash Fill 1; Water level = 50.67 feet bgs on May 27, 2015

REVIEWED BY: _____

GEOTECHNICAL BORING RECORD

PROJECT NAME: Dan River On-Site Landfill
PROJECT NO.: 7810-14-0065 **START DATE:** 3/16/2015
COORD N: 999910 **COMP. DATE:** 3/16/2015
COORD E: 1789393 **Page** 2 **of** 3
LOCATION: Eden, North Carolina

BORING NO.: OW-407D

amec foster wheeler

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	SAMPLES TYPE	SAMPLES (Rec") N-COUNT or Rec%/RQD% 6"- 6"- 6"- 6"	PL (%) NM (%) LL (%) ▲ FINES (%) ● SPT (bpf) 10 20 30 40 50 60 70 80 90 100
60	PARTIALLY WEATHERED ROCK: When Sampled Becomes Yellow-Brown (10YR 5/6) and Dark Gray-Brown (10 YR 4/2), Silty Fine to Medium SAND (SM) with Rock Fragments, Moist to Wet		558.2				
	Auger Refusal at 63.5 ft bgs; Begin 5 7/8" Roller Cone						
	WEATHERED / FRACTURED ROCK: (No Samples Obtained)						
65			553.2				
70			548.2				
75			543.2				
80	**Boring Terminated at 79.3 ft bgs** **Soil/Ash Lithologic Descriptions Obtained From OW-407S Boring**		538.2				
85			533.2				
90			528.2				

0 10 20 30 40 50 60 70 80 90 100

DUKE ABSAT GEOTECHNICAL BORING LOG DR ONSITE LANDFILL BORING LOGS 7810140065.GPJ AMEC DUKE ABSAT.GDT 7/6/15

CONTRACTOR:	SAEDACCO
LOGGED BY:	M. Flanik
EQUIPMENT:	CME-550
DRILL METHOD:	4.25 / 8.25 HSA; 5 7/8 RC
HOLE DIAMETER:	12" to 6"
CLOSURE METHOD:	Type III Observation Well Installed
REMARKS:	Located on Ash Fill 1; Water level = 50.67 feet bgs on May 27, 2015

REVIEWED BY: _____

GEOTECHNICAL BORING RECORD

PROJECT NAME: Dan River On-Site Landfill
PROJECT NO.: 7810-14-0065 **START DATE:** 3/16/2015
COORD N: 999910 **COMP. DATE:** 3/16/2015
COORD E: 1789393 **Page** 3 **of** 3
LOCATION: Eden, North Carolina

BORING NO.: OW-407D

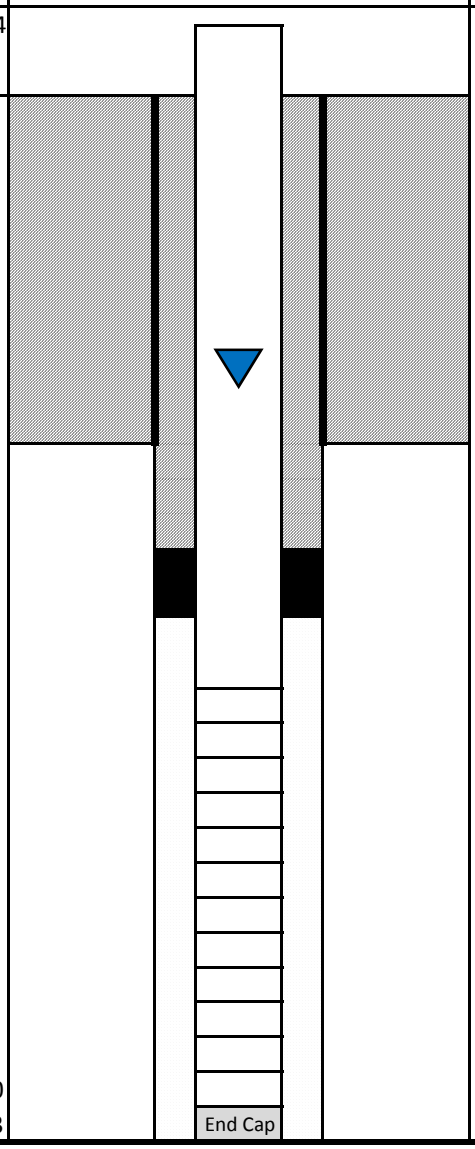
amec foster wheeler

WELL CONSTRUCTION REPORT

WELL ID: **OW-407 D**

PROJECT:	Dan River Landfill
PROJECT NO:	7810-14-0065
PROJECT LOCATION:	Dan River Steam Station; Eden, North Carolina

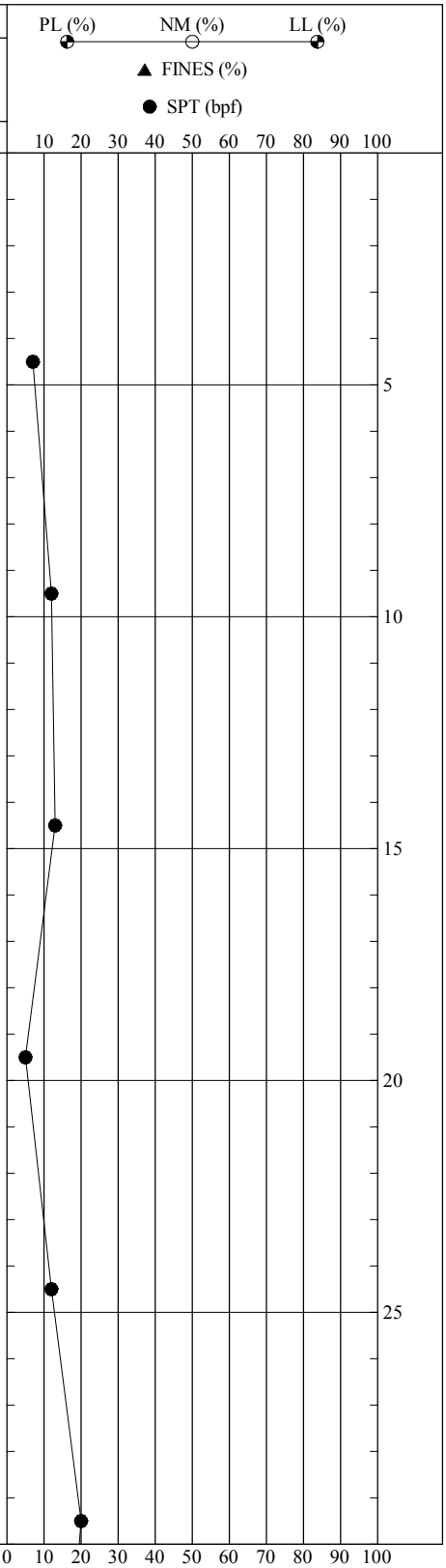
DRILLING CONTRACTOR:	**SAEDACCO**	WATER LEVEL:	**50.67 ft BGS on 5/27/2015**
DRILLING METHOD:	**8.25" HSA/6"RC**	LATITUDE:	**36.4951**
DATE COMPLETED:	**4/22/2015**	LONGITUDE:	**-79.7164**
LOGGED BY:	**Flanik/Eaves**	GS ELEVATION:	**618.24 feet**
Cave-In Below Well:	**None**	TOC ELEVATION:	**621.89 feet**
(not depicted)		DATUM:	**Mean Sea Level (MSL)**

Depth (ft-bgs)	WELL DIAGRAM	Elev (ft-MSL)	WELL CONSTRUCTION DETAILS
+3.64		621.89 TOC	PROTECTIVE CASING: Diameter: 4-inch x 4-inch square; Type: Steel Stickup; Interval: +4 to 2 feet bgs
0		618.24 GS	OUTER CASING: Diameter: 6-inch; Type: Sch. 40 PVC; Interval: 0 to 63.5 feet bgs
63.5		554.74	INNER CASING: Diameter: 2-inch; Type: Sch. 40 PVC; Interval: +3.64 to 74 feet bgs
68.0		550.24	SCREEN: Diameter: 2-inch; Type: Sch. 40 PVC; Interval: 74 to 79 feet bgs
72.0		546.24	FILTER PACK: Type: #2 Silica Sand; Interval: 72 to 79.3 feet bgs
74.0		544.24	SEAL: Type: Bentonite; Interval: 68 to 72 feet bgs
			GROUT: Type: Neat Cement; Interval: 0 to 68 feet bgs
79.0		539.24	
79.3	End Cap	538.94	

NOTES: GS=ground surface; TOC=top of inner PVC casing; bgs=below ground surface

Not to Scale

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	(Rec") N-COUNT or Rec%/RQD% 6"- 6"- 6"- 6"
0	FILL: Yellow (10YR 7/8), Silty Fine SAND (SM) with Trace Roots		618.4			
	ASH FILL: Dark Gray (GLEY 4/N), CCR Material that Classifies as Loose to Medium Dense, Silty Fine to Medium SAND (SM), Non-Plastic, Moist			SS-1		(6) 1-2-5
5			613.4			
				SS-2		(14.4) 2-5-7
10			608.4			
				SS-3		(18) 4-5-8
15			603.4			
				SS-4		(18) 2-2-3
20			598.4			
	Possible Perched Water			SS-5		(18) 5-5-7
25			593.4			
				SS-6		(18) 4-9-11
30			588.4			



DUKE ABSAT GEOTECHNICAL BORING LOG DR ONSITE LANDFILL BORING LOGS 7810140065.GPJ AMEC DUKE ABSAT.GDT 7/6/15

CONTRACTOR:	SAEDACCO
LOGGED BY:	M. Flanik
EQUIPMENT:	CME-550
DRILL METHOD:	4.25 HSA
HOLE DIAMETER:	7"
CLOSURE METHOD:	Type II Observation Well Installed
REMARKS:	Located on Ash Fill 1; Water level = 48.07 feet bgs on May 27, 2015

REVIEWED BY: _____

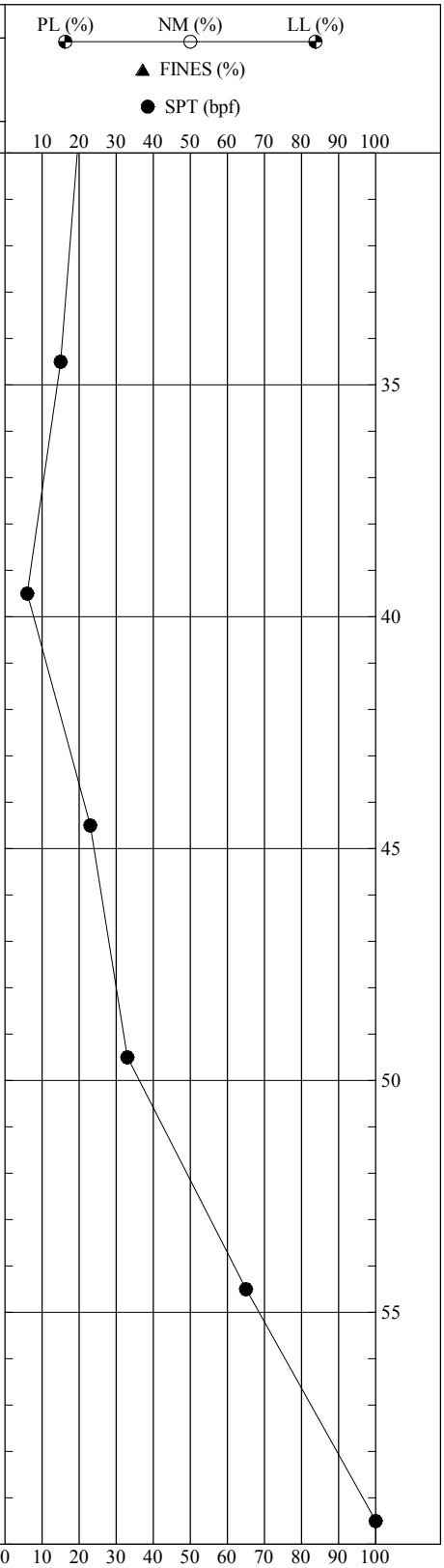
GEOTECHNICAL BORING RECORD

PROJECT NAME: Dan River On-Site Landfill
PROJECT NO.: 7810-14-0065 **START DATE:** 3/16/2015
COORD N: 999911 **COMP. DATE:** 3/16/2015
COORD E: 1789394 **Page** 1 **of** 3
LOCATION: Eden, North Carolina

BORING NO.: OW-407S

amec foster wheeler

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	(Rec") N-COUNT or Rec%/RQD% 6"- 6"- 6"- 6"
30	ASH FILL: Dark Gray (GLEY 4/N), CCR Material that Classifies as Loose to Medium Dense, Silty Fine to Medium SAND (SM), Non-Plastic, Moist		588.4			
				SS-7		(18) 4-3-12
35			583.4			
	FILL: Green-Gray (6/1), Clayey Fine to Medium SAND (SC) with Trace Organics, Loose, Medium Plasticity, Wet			SS-8		(18) 2-3-3
40	FILL: Black (2.5/N), Highly Decomposed/Burned Organics, Non-Plastic, Wet		578.4			
	SAPROLITE: Yellow-Brown (10YR 5/8) and Gray (10YR 6/1), Very Stiff, Lean CLAY (CL), Low Plasticity, Moist			SS-9		(18) 6-9-14
45			573.4			
	SAPROLITE: Yellow-Brown (10YR 5/8) and Gray (10YR 6/1), Dense to Very Dense Lean CLAY with Sand (CL), Low Plasticity, Moist			SS-10		(18) 9-18-15
50			568.4			
	SAPROLITE: Brown (7.5YR 5/6), Very Dense, Silty Fine to Medium SAND (SM), Non-Plastic, Moist			SS-11		(18) 11-24-41
55			563.4			
				SS-12		(17.5) 30-48-50/5.5
60			558.4			



DUKE ABSAT GEOTECHNICAL BORING LOG DR ONSITE LANDFILL BORING LOGS 7810140065.GPJ AMEC DUKE ABSAT.GDT 7/6/15

CONTRACTOR:	SAEDACCO
LOGGED BY:	M. Flanik
EQUIPMENT:	CME-550
DRILL METHOD:	4.25 HSA
HOLE DIAMETER:	7"
CLOSURE METHOD:	Type II Observation Well Installed
REMARKS:	Located on Ash Fill 1; Water level = 48.07 feet bgs on May 27, 2015

REVIEWED BY: _____

GEOTECHNICAL BORING RECORD

PROJECT NAME: Dan River On-Site Landfill
PROJECT NO.: 7810-14-0065 **START DATE:** 3/16/2015
COORD N: 999911 **COMP. DATE:** 3/16/2015
COORD E: 1789394 **Page 2 of 3**
LOCATION: Eden, North Carolina

BORING NO.: OW-407S

amec foster wheeler

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	(Rec") N-COUNT or Rec%/RQD% 6"- 6"- 6"- 6"	PL (%) NM (%) LL (%) ▲ FINES (%) ● SPT (bpf) 10 20 30 40 50 60 70 80 90 100
60	PARTIALLY WEATHERED ROCK: When Sampled Becomes Yellow-Brown (10YR 5/6) and Dark Gray-Brown (10 YR 4/2), Silty Fine to Medium SAND (SM) with Rock Fragments, Moist to Wet		558.4	SS-13		(3) 50/3	
	Auger Refusal at 63.8 ft bgs						
65			553.4				
70			548.4				
75			543.4				
80			538.4				
85			533.4				
90			528.4				

DUKE ABSAT GEOTECHNICAL BORING LOG DR ONSITE LANDFILL BORING LOGS 7810140065.GPJ AMEC DUKE ABSAT.GDT 7/6/15

CONTRACTOR:	SAEDACCO
LOGGED BY:	M. Flanik
EQUIPMENT:	CME-550
DRILL METHOD:	4.25 HSA
HOLE DIAMETER:	7"
CLOSURE METHOD:	Type II Observation Well Installed
REMARKS:	Located on Ash Fill 1; Water level = 48.07 feet bgs on May 27, 2015

REVIEWED BY: _____

GEOTECHNICAL BORING RECORD

PROJECT NAME: Dan River On-Site Landfill
PROJECT NO.: 7810-14-0065 **START DATE:** 3/16/2015
COORD N: 999911 **COMP. DATE:** 3/16/2015
COORD E: 1789394 **Page** 3 **of** 3
LOCATION: Eden, North Carolina

BORING NO.: OW-407S

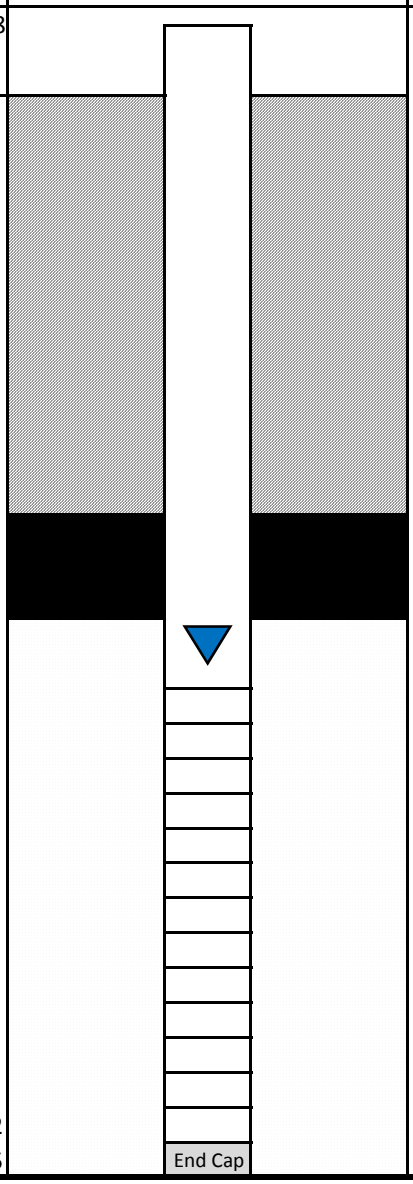
amec foster wheeler

WELL CONSTRUCTION REPORT

WELL ID: **OW-407 S**

PROJECT:	Dan River Landfill
PROJECT NO:	7810-14-0065
PROJECT LOCATION:	Dan River Steam Station; Eden, North Carolina

DRILLING CONTRACTOR:	**SAEDACCO**	WATER LEVEL:	**48.07 ft BGS on 5/27/2015**
DRILLING METHOD:	**4.25" HSA**	LATITUDE:	**36.4951**
DATE COMPLETED:	**3/16/2015**	LONGITUDE:	**-79.7164**
LOGGED BY:	**M. Flanik**	GS ELEVATION:	**618.41 feet**
Cave-In Below Well: (not depicted)	**63.5-63.8 ft bgs**	TOC ELEVATION:	**621.89 feet**
		DATUM:	**Mean Sea Level (MSL)**

Depth (ft-bgs)	WELL DIAGRAM	Elev (ft-MSL)	WELL CONSTRUCTION DETAILS
+3.48		621.89 TOC	PROTECTIVE CASING: Diameter: 4-inch x 4-inch square Type: Steel Stickup Interval: +4 to 2 feet bgs
0		618.41 GS	OUTER CASING: Diameter: Not Applicable Type: Not Applicable Interval: Not Applicable
			INNER CASING: Diameter: 2-inch Type: Sch. 40 PVC Interval: +3.48 to 48.2 feet bgs
44.5		573.91	
			SCREEN: Diameter: 2-inch Type: Sch. 40 PVC Interval: 48.2 to 63.2 feet bgs
46.5		571.91	
48.2		570.21	
			FILTER PACK: Type: #2 Silica Sand Interval: 46.5 to 63.5 feet bgs
			SEAL: Type: Bentonite Interval: 44.5 to 46.5 feet bgs
			GROUT: Type: Neat Cement Interval: 0 to 44.5 feet bgs
63.2		555.21	
63.5	End Cap	554.91	

NOTES: GS=ground surface; TOC=top of inner PVC casing; bgs=below ground surface

Not to Scale

DUKE ABSAT GEOTECHNICAL BORING LOG DR ONSITE LANDFILL BORING LOGS 7810140065.GPJ AMEC DUKE ABSAT.GDT 7/6/15

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	SAMPLES TYPE	SAMPLES (Rec") N-COUNT or Rec%/RQD% 6"- 6"- 6"- 6"	PL (%) NM (%) LL (%) ▲ FINES (%) ● SPT (bpf)
0	ALLUVIUM: Yellow-Brown (10YR 5/8), Stiff, Sandy CLAY (CL) with Organics and Trace Rock Fragments, Low to Medium Plasticity, Wet		551.8				
	SAPROLITE: Mottled Gray (10YR 6/1) and Yellow (10YR 7/8) Stiff, Fine Sandy CLAY (CH), High Plasticity, Moist			UD-1		(20.4)	
5			546.8				5
	Auger Refusal at 8 ft bgs; Begin 5 7/8" Roller Cone WEATHERED / FRACTURED ROCK: (No Samples Obtained)						
10	**Roller Cone Refusal at 10.5 ft bgs; Begin NQ2 Core** WEATHERED / FRACTURED ROCK: Dark Gray, SILTSTONE / SHALE, Intensely Fractured, Horizontal, Low, and High Angle Fractures, No Staining		541.8	CORE-1		46/0	10
15			536.8	CORE-2		68/19	15
	SOUND ROCK: Dark Gray, Fine-Grained SANDSTONE, Moderately Fractured, Horizontal, Low, and High Angle Fractures, No Staining						
20			531.8	CORE-3		92/58	20
25	WEATHERED / FRACTURED ROCK: Dark Gray, SILTSTONE / SHALE, Intensely Fractured, Horizontal, Low, and High Angle Fractures, No Staining		526.8	CORE-4		78/26	25
30			521.8				

0 10 20 30 40 50 60 70 80 90 100

CONTRACTOR:	SAEDACCO
LOGGED BY:	M. Flanik
EQUIPMENT:	CME-550
DRILL METHOD:	4.25 / 8.25 HSA; 5 7/8 RC; NQ2 CORE
HOLE DIAMETER:	12" to 6" to 3"
CLOSURE METHOD:	Type III Observation Well Installed
REMARKS:	Located west of Ash Fill 1; Water level = +2.27 feet ags on May 27, 2015

REVIEWED BY: _____

GEOTECHNICAL BORING RECORD

PROJECT NAME: Dan River On-Site Landfill
PROJECT NO.: 7810-14-0065 **START DATE:** 4/1/2015
COORD N: 999808 **COMP. DATE:** 4/1/2015
COORD E: 1788921 **Page** 1 **of** 2
LOCATION: Eden, North Carolina

BORING NO.: OW-409D

amec foster wheeler

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	SAMPLES TYPE	SAMPLES (Rec") N-COUNT or Rec%/RQD% 6"- 6"- 6"- 6"	PL (%) NM (%) LL (%) ▲ FINES (%) ● SPT (bpf) 0 10 20 30 40 50 60 70 80 90 100
30	SOUND ROCK: Dark Gray, Fine-Grained SANDSTONE, Moderately Fractured, Horizontal, Low, and High Angle Fractures, No Staining, High Angle Quartz-Healed Joints		521.8	CORE-5		100/78	
35	**Boring Terminated at 34 ft bgs** **Soil Lithologic Descriptions Obtained From OW-409S Boring**		516.8				
40			511.8				
45			506.8				
50			501.8				
55			496.8				
60			491.8				

DUKE ABSAT GEOTECHNICAL BORING LOG DR ONSITE LANDFILL BORING LOGS 7810140065.GPJ AMEC DUKE ABSAT.GDT 7/6/15

CONTRACTOR:	SAEDACCO
LOGGED BY:	M. Flanik
EQUIPMENT:	CME-550
DRILL METHOD:	4.25 / 8.25 HSA; 5 7/8 RC; NQ2 CORE
HOLE DIAMETER:	12" to 6" to 3"
CLOSURE METHOD:	Type III Observation Well Installed
REMARKS:	Located west of Ash Fill 1; Water level = +2.27 feet ags on May 27, 2015

REVIEWED BY: _____

GEOTECHNICAL BORING RECORD

PROJECT NAME: Dan River On-Site Landfill
PROJECT NO.: 7810-14-0065 **START DATE:** 4/1/2015
COORD N: 999808 **COMP. DATE:** 4/1/2015
COORD E: 1788921 **Page** 2 **of** 2
LOCATION: Eden, North Carolina

BORING NO.: OW-409D

amec foster wheeler

PROJECT:	DAN RIVER LANDFILL DAN RIVER STEAM STATION, Eden, NC Amec Foster Wheeler Project No. 7810-14-0065	ROCK CORE PHOTO LOG:	OW-409D

CLIENT:	**Duke Energy**	AUGER REFUSAL DEPTH:	**8.0**	**ft bgs**		LATITUDE:	**36.4948**
DATE DRILLED:	**4/13-14/2015**	ROLLER CONE REFUSAL DEPTH:	**10.5**	**ft bgs**		LONGITUDE:	**-79.7180**
DRILL RIG:	**Diedrich D-50**	CORING TERMINATION DEPTH:	**34.0**	**ft bgs**		GROUND ELEVATION:	**551.83**
DRILLER:	**Stefan Smith**	WATER LEVEL:	**artesian (ags) on 4/30/15**			NOTES: Type III Monitoring Well Installed to 27.3 ft bgs with 5-ft screen 22.0-27.0 ft bgs.	
LOGGED BY:	**Lee Eaves**						
CORE SIZE:	**NQ2**						

CORE BOX #: 1 of 2
TOP OF BOX: 10.5 ft bgs
BOTTOM OF BOX: 29.8 ft bgs

CORE BOX #: 2 of 2
TOP OF BOX: 29.8 ft bgs
BOTTOM OF BOX: 34.0 ft bgs

DESCRIPTION:

10.5 to 18 ft bgs: **WEATHERED / FRACTURED ROCK**: Dark Gray, **SILTSTONE / SHALE**, Intensely Fractured, Horizontal, Low, and High Angle Fractures, No Staining

18 to 24 ft bgs: **SOUND ROCK**: Dark Gray, Fine-Grained **SANDSTONE**, Moderately Fractured, Horizontal, Low, and High Angle Fractures, No Staining

24 to 29 ft bgs: **WEATHERED / FRACTURED ROCK**: Dark Gray, **SILTSTONE / SHALE**, Intensely Fractured, Horizontal, Low, and High Angle Fractures, No Staining

29 to 34 ft bgs: **SOUND ROCK**: Dark Gray, Fine-Grained **SANDSTONE**, Moderately Fractured, Horizontal, Low, and High Angle Fractures, No Staining, High Angle Quartz-Healed Joints

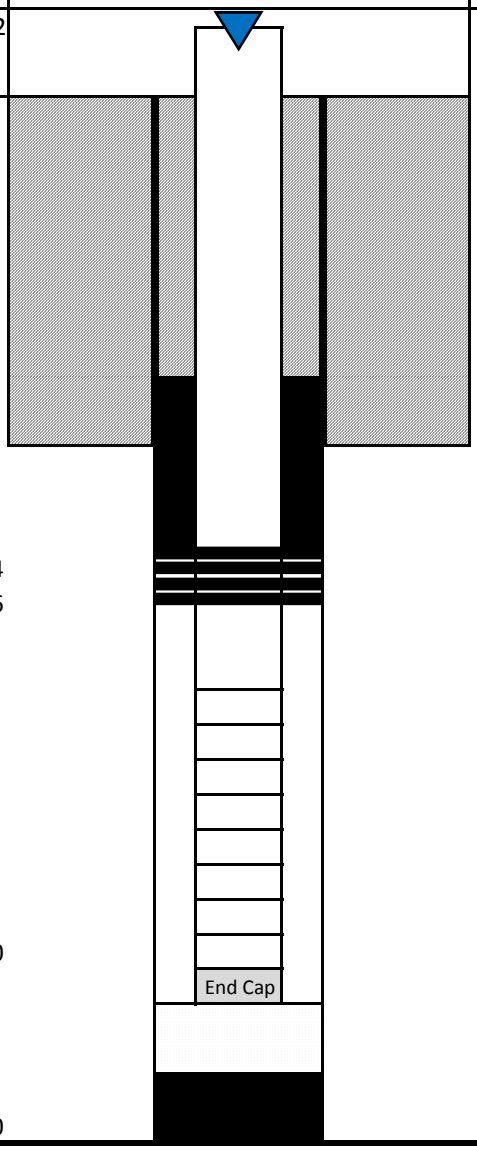
amec foster wheeler

WELL CONSTRUCTION REPORT

WELL ID: **OW-409 D**

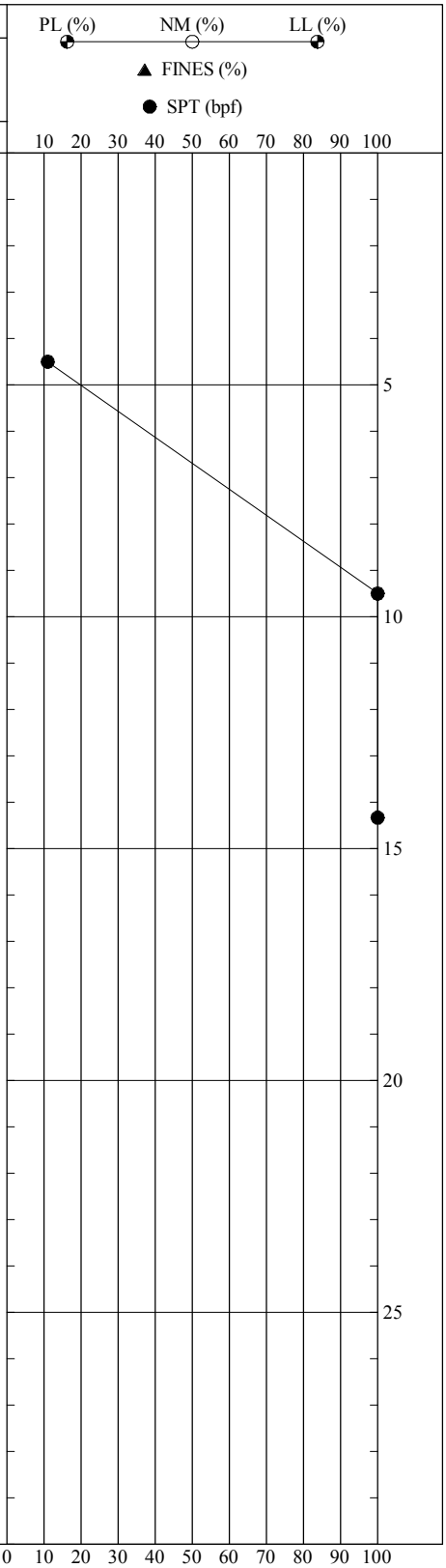
PROJECT:	Dan River Landfill
PROJECT NO:	7810-14-0065
PROJECT LOCATION:	Dan River Steam Station; Eden, North Carolina

DRILLING CONTRACTOR:	**SAEDACCO**	WATER LEVEL:	**+2.27 ft AGS on 5/27/2015**
DRILLING METHOD:	**8.25"HSA/NQ2 core**	LATITUDE:	**36.4948**
DATE COMPLETED:	**4/14/2015**	LONGITUDE:	**-79.7180**
LOGGED BY:	**Flanik/Eaves**	GS ELEVATION:	**551.83 feet**
Cave-In Below Well:	**None**	TOC ELEVATION:	**554.64 feet**
(not depicted)		DATUM:	**Mean Sea Level (MSL)**

Depth (ft-bgs)	WELL DIAGRAM	Elev (ft-MSL)	WELL CONSTRUCTION DETAILS
+2.82		554.64 TOC	PROTECTIVE CASING:
0		551.83 GS	Diameter: 4-inch x 4-inch square Type: Steel Stickup Interval: +3.5 to 2 feet bgs
			OUTER CASING:
			Diameter: 6-inch Type: Sch. 40 PVC Interval: 0 to 8 feet bgs
6.0		545.83	INNER CASING:
8.0		543.83	Diameter: 2-inch Type: Sch. 40 PVC Interval: +2.82 to 22 feet bgs
21.4		530.43	SCREEN:
21.6		530.23	Diameter: 2-inch Type: Sch. 40 PVC Interval: 22 to 27 feet bgs
22.0		529.83	FILTER PACK:
			Type: Not Applicable Interval: Not Applicable
			SEAL:
			Type: Bentonite & K-Packer Interval: 6 to 21.6 feet bgs
27.0		524.83	
27.3	End Cap	524.53	GROUT:
31.5		520.33	Type: Neat Cement Interval: 0 to 6 feet bgs
34.0		517.83	

NOTES: GS=ground surface; TOC=top of inner PVC casing; ags=above ground surface; bgs=below ground surface Not To Scale

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	(Rec") N-COUNT or Rec%/RQD% 6"- 6"- 6"- 6"
0	ALLUVIUM: Yellow-Brown (10YR 5/8), Stiff, Sandy CLAY (CL) with Organics and Trace Rock Fragments, Low to Medium Plasticity, Wet		551.6			
				SS-1		(18) 3-4-7
5	SAPROLITE: Mottled Gray (10YR 6/1) and Yellow (10YR 7/8) Stiff, Fine Sandy CLAY (CH), High Plasticity, Moist		546.6			
				SS-2		(12) 40-25-50/5.5
10	PARTIALLY WEATHERED ROCK: When Sampled Becomes Dark Gray (3/N), Micaceous,Silty Coarse to Fine SAND (SM) with Gravel (Rock Fragments), Non-Plastic, Moist		541.6			
				SS-3		(8.4) 49-50/4
15	**Auger Refusal at 14.3 ft bgs**		536.6			
20			531.6			
25			526.6			
30			521.6			



DUKE ABSAT GEOTECHNICAL BORING LOG DR ONSITE LANDFILL BORING LOGS 7810140065.GPJ AMEC DUKE ABSAT.GDT 7/6/15

CONTRACTOR:	SAEDACCO
LOGGED BY:	M. Flanik
EQUIPMENT:	CME-550
DRILL METHOD:	4.25 HSA
HOLE DIAMETER:	7"
CLOSURE METHOD:	Type II Observation Well Installed
REMARKS:	Located west of Ash Fill 1; SS-8 sample split into 2 jars: (Jar A = 8.5 to 9.8 ft bgs) & (Jar B = 9.8 to 10 ft bgs); Water level = +2.18 feet ags on May 27, 2015

REVIEWED BY: _____

GEOTECHNICAL BORING RECORD

PROJECT NAME: Dan River On-Site Landfill
PROJECT NO.: 7810-14-0065 **START DATE:** 4/1/2015
COORD N: 999812 **COMP. DATE:** 4/1/2015
COORD E: 1788924 **Page** 1 **of** 1
LOCATION: Eden, North Carolina

BORING NO.: OW-409S

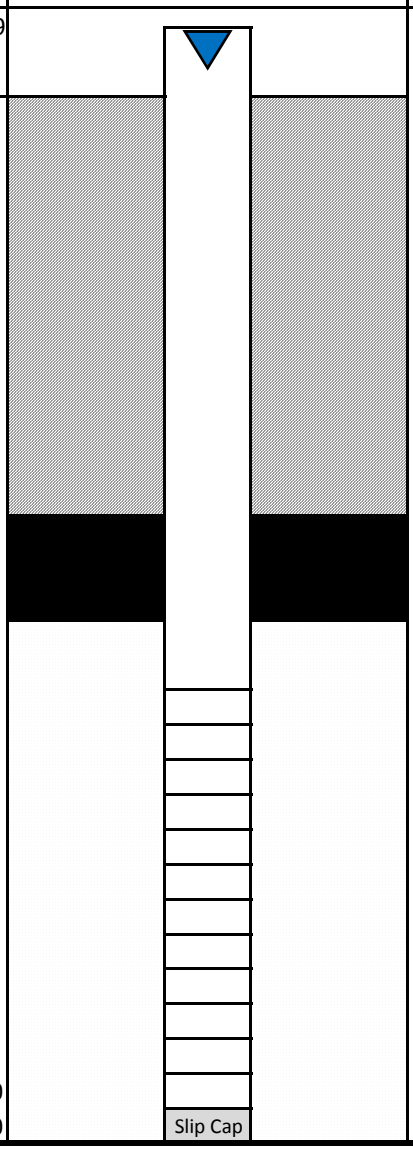
amec foster wheeler

WELL CONSTRUCTION REPORT

WELL ID: **OW-409 S**

PROJECT:	Dan River Landfill
PROJECT NO:	7810-14-0065
PROJECT LOCATION:	Dan River Steam Station; Eden, North Carolina

DRILLING CONTRACTOR:	**SAEDACCO**	WATER LEVEL:	**+2.18 ft AGS on 5/27/2015**
DRILLING METHOD:	**4.25" HSA**	LATITUDE:	**36.4948**
DATE COMPLETED:	**4/1/2015**	LONGITUDE:	**-79.7180**
LOGGED BY:	**M. Flanik**	GS ELEVATION:	**551.56 feet**
Cave-In Below Well:	**14-14.3 ft bgs**	TOC ELEVATION:	**555.25 feet**
(not depicted)		DATUM:	**Mean Sea Level (MSL)**

Depth (ft-bgs)	WELL DIAGRAM	Elev (ft-MSL)	WELL CONSTRUCTION DETAILS
+3.69		555.25 TOC	PROTECTIVE CASING: Diameter: 4-inch x 4-inch square Type: Steel Stickup Interval: +4 to 2 feet bgs
0		551.56 GS	OUTER CASING: Diameter: Not Applicable Type: Not Applicable Interval: Not Applicable
			INNER CASING: Diameter: 2-inch Type: Sch. 40 PVC Interval: +3.69 to 5 feet bgs
3.0		548.56	
			SCREEN: Diameter: 2-inch Type: Sch. 40 PVC Interval: 5 to 14 feet bgs
4.0		547.56	
5.0		546.56	
			FILTER PACK: Type: #2 Silica Sand Interval: 4 to 14 feet bgs
			SEAL: Type: Bentonite Interval: 3 to 4 feet bgs
			GROUT: Type: Neat Cement Interval: 0 to 3 feet bgs
14.0		537.56	
14.0	Slip Cap	537.56	

NOTES: GS=ground surface; TOC=top of inner PVC casing; bgs=below ground surface

Not To Scale

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	(Rec") N-COUNT or Rec%/RQD% 6"- 6"- 6"- 6"	PL (%) NM (%) LL (%) ▲ FINES (%) ● SPT (bpf) 10 20 30 40 50 60 70 80 90 100
0	FILL: Yellow-Brown (10YR 5/8), Sandy CLAY (CL), with Trace Gravel, Slag Fragments, and Metal Debris						
	ASH FILL: Dark Gray (5/N), CCR Material that Classifies as Stiff to Very Soft, Fine Sandy SILT (ML), Non-Plastic, Moist to Wet Stiff						
5							
	Firm						
10							
	Very Soft						
15							
	Firm						
20							
	Stiff						
25							
	Becomes Very Soft and Wet						
30							

0 10 20 30 40 50 60 70 80 90 100

DUKE ABSAT GEOTECHNICAL BORING LOG DR ONSITE LANDFILL BORING LOGS 7810140065.GPJ AMEC DUKE ABSAT.GDT 7/6/15

CONTRACTOR:	SAEDACCO
LOGGED BY:	M. Flanik
EQUIPMENT:	CME-550
DRILL METHOD:	4.25 / 8.25 HSA
HOLE DIAMETER:	12"
CLOSURE METHOD:	Outer casing closed with expandable well cap and covered with construction barrel.
REMARKS:	Located on Ash Fill 1. Outer casing set to 53.5 ft bgs, but no well installed.

REVIEWED BY: _____

GEOTECHNICAL BORING RECORD

PROJECT NAME: Dan River On-Site Landfill
PROJECT NO.: 7810-14-0065 **START DATE:** 3/30/2015
COORD N: **COMP. DATE:** 3/30/2015
COORD E: **Page** 1 **of** 2
LOCATION: Eden, North Carolina

BORING NO.: OW-410D

amec foster wheeler

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	SAMPLES TYPE	SAMPLES (Rec") N-COUNT or Rec%/RQD% 6"- 6"- 6"- 6"	PL (%) NM (%) LL (%) ▲ FINES (%) ● SPT (bpf) 10 20 30 40 50 60 70 80 90 100
30	ASH FILL: Dark Gray (5/N), CCR Material that Classifies as Stiff to Very Soft, Fine Sandy SILT (ML), Non-Plastic, Moist to Wet Stiff						
	SAPROLITE: Yellow (10YR 7/8), Medium Dense, Silty Fine to Medium SAND (SM) with Rock Fragments, Non-Plastic, Dry to Moist						
35							
	PARTIALLY WEATHERED ROCK: When Sampled Becomes Very Dense, Gray (10YR 6/1) Silty Fine to Medium SAND (SM), Non-Plastic, Moist						
40							
	PARTIALLY WEATHERED ROCK: When Sampled Becomes Very Dense, Yellow (10YR 7/8) Silty Fine to Coarse SAND (SM), Non-Plastic, Dry to Wet						
45							
50	Becomes Wet						
	PARTIALLY WEATHERED ROCK: When Sampled Becomes Very Dense, Blue-Gray (4/15 PB), Micaceous, Silty Medium SAND (SM) with Rock Fragments, Non-Plastic, Wet to Moist						
55	**Auger Refusal at 54 ft bgs** **Soil/Ash Lithologic Descriptions Obtained From OW-410S Boring**						
60							

0 10 20 30 40 50 60 70 80 90 100

DUKE ABSAT GEOTECHNICAL BORING LOG DR ONSITE LANDFILL BORING LOGS 7810140065.GPJ AMEC DUKE ABSAT.GDT 7/6/15

CONTRACTOR:	SAEDACCO
LOGGED BY:	M. Flanik
EQUIPMENT:	CME-550
DRILL METHOD:	4.25 / 8.25 HSA
HOLE DIAMETER:	12"
CLOSURE METHOD:	Outer casing closed with expandable well cap and covered with construction barrel.
REMARKS:	Located on Ash Fill 1. Outer casing set to 53.5 ft bgs, but no well installed.

REVIEWED BY: _____

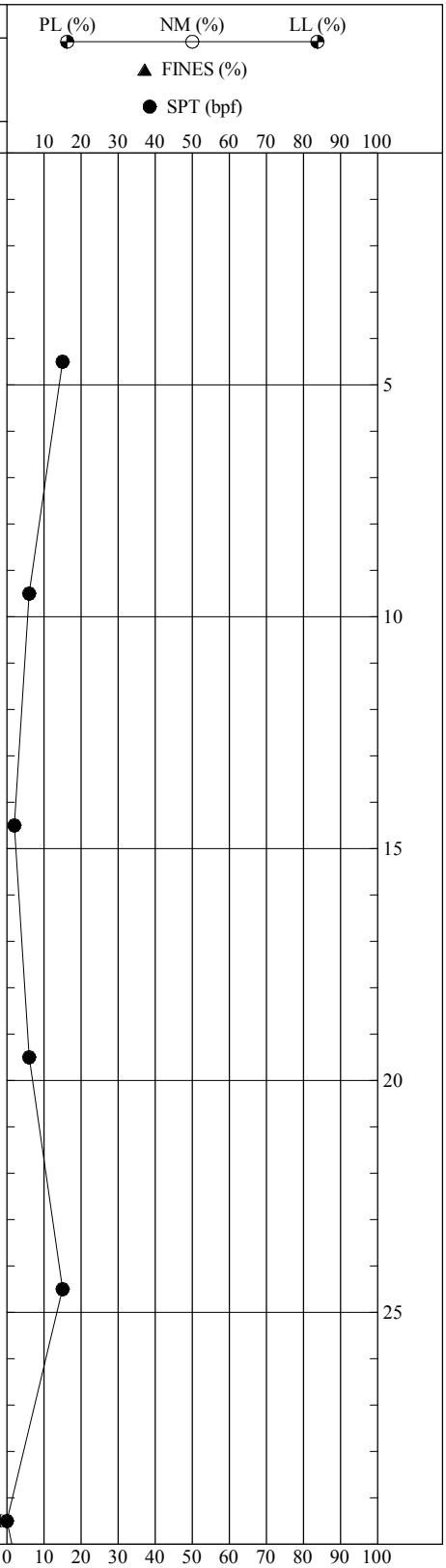
GEOTECHNICAL BORING RECORD

PROJECT NAME: Dan River On-Site Landfill
PROJECT NO.: 7810-14-0065 **START DATE:** 3/30/2015
COORD N: **COMP. DATE:** 3/30/2015
COORD E: **Page** 2 **of** 2
LOCATION: Eden, North Carolina

BORING NO.: OW-410D

amec foster wheeler

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	(Rec") N-COUNT or Rec%/RQD% 6"- 6"- 6"- 6"
0	FILL: Yellow-Brown (10YR 5/8), Sandy CLAY (CL), with Trace Gravel, Slag Fragments, and Metal Debris		593.6			
	ASH FILL: Dark Gray (5/N), CCR Material that Classifies as Stiff to Very Soft, Fine Sandy SILT (ML), Non-Plastic, Moist to Wet Stiff			SS-1		(12) 2-6-9
5			588.6			
	Firm			SS-2		(18) 2-2-4
10			583.6			
	Very Soft			SS-3		(18) 1-1-1
15			578.6			
	Firm			SS-4		(18) 2-3-3
20			573.6			
	Stiff			SS-5		(18) 6-7-8
25			568.6			
	Becomes Very Soft and Wet			SS-6		(18) 1-WOH-WOH
30			563.6			



DUKE ABSAT GEOTECHNICAL BORING LOG DR ONSITE LANDFILL BORING LOGS 7810140065.GPJ AMEC DUKE ABSAT.GDT 7/6/15

CONTRACTOR:	SAEDACCO
LOGGED BY:	M. Flanik
EQUIPMENT:	CME-550
DRILL METHOD:	4.25 HSA
HOLE DIAMETER:	7"
CLOSURE METHOD:	Type II Observation Well Installed
REMARKS:	Located on Ash Fill 1; Water level = 35.98 feet bgs on May 27, 2015

REVIEWED BY: _____

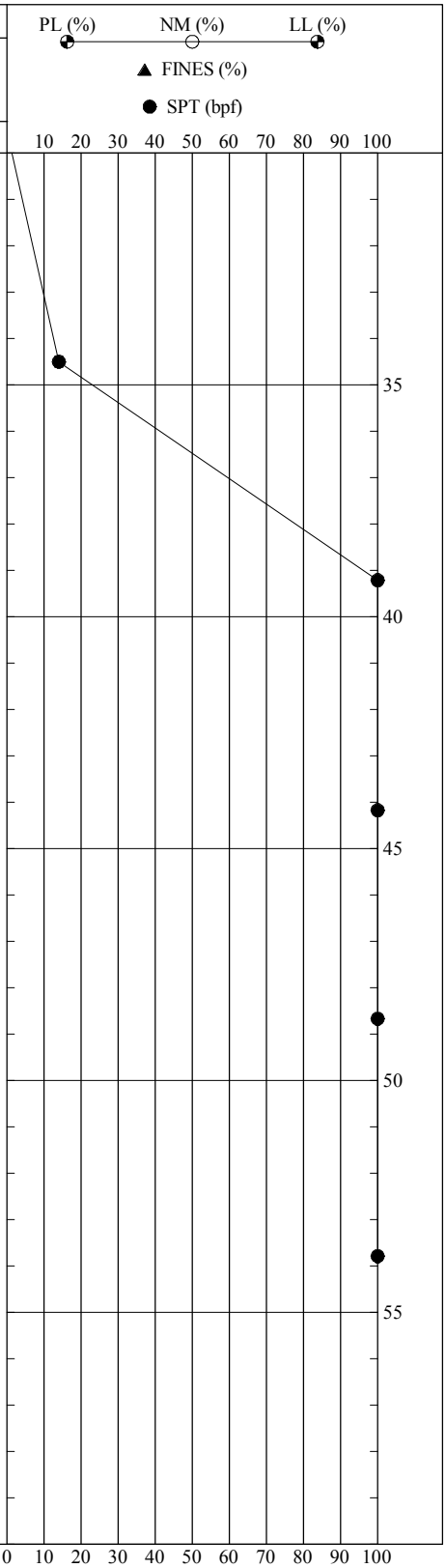
GEOTECHNICAL BORING RECORD

PROJECT NAME: Dan River On-Site Landfill
PROJECT NO.: 7810-14-0065 **START DATE:** 3/26/2015
COORD N: 999645 **COMP. DATE:** 3/26/2015
COORD E: 1789374 **Page** 1 **of** 2
LOCATION: Eden, North Carolina

BORING NO.: OW-410S

amec foster wheeler

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	(Rec") N-COUNT or Rec%/RQD% 6"- 6"- 6"- 6"
30	ASH FILL: Dark Gray (5/N), CCR Material that Classifies as Stiff to Very Soft, Fine Sandy SILT (ML), Non-Plastic, Moist to Wet Stiff		563.6			
	SAPROLITE: Yellow (10YR 7/8), Medium Dense, Silty Fine to Medium SAND (SM) with Rock Fragments, Non-Plastic, Dry to Moist			SS-7		(18) 1-1-13
35			558.6			
	PARTIALLY WEATHERED ROCK: When Sampled Becomes Very Dense, Gray (10YR 6/1) Silty Fine to Medium SAND (SM), Non-Plastic, Moist			SS-8		(8.5) 21-50/2.5
40			553.6			
	PARTIALLY WEATHERED ROCK: When Sampled Becomes Very Dense, Yellow (10YR 7/8) Silty Fine to Coarse SAND (SM), Non-Plastic, Dry to Wet			SS-9		(7.2) 41-50/2
45			548.6			
				SS-10		(0) 50/2
50	Becomes Wet		543.6			
	PARTIALLY WEATHERED ROCK: When Sampled Becomes Very Dense, Blue-Gray (4/15 PB), Micaceous, Silty Medium SAND (SM) with Rock Fragments, Non-Plastic, Wet to Moist			SS-11		(3.5) 50/3.5
55	**Auger Refusal at 54.5 ft bgs**		538.6			
60			533.6			



DUKE ABSAT GEOTECHNICAL BORING LOG DR ONSITE LANDFILL BORING LOGS 7810140065.GPJ AMEC DUKE ABSAT.GDT 7/6/15

CONTRACTOR:	SAEDACCO
LOGGED BY:	M. Flanik
EQUIPMENT:	CME-550
DRILL METHOD:	4.25 HSA
HOLE DIAMETER:	7"
CLOSURE METHOD:	Type II Observation Well Installed
REMARKS:	Located on Ash Fill 1; Water level = 35.98 feet bgs on May 27, 2015

REVIEWED BY: _____

GEOTECHNICAL BORING RECORD

PROJECT NAME: Dan River On-Site Landfill
PROJECT NO.: 7810-14-0065 **START DATE:** 3/26/2015
COORD N: 999645 **COMP. DATE:** 3/26/2015
COORD E: 1789374 **Page** 2 **of** 2
LOCATION: Eden, North Carolina

BORING NO.: OW-410S

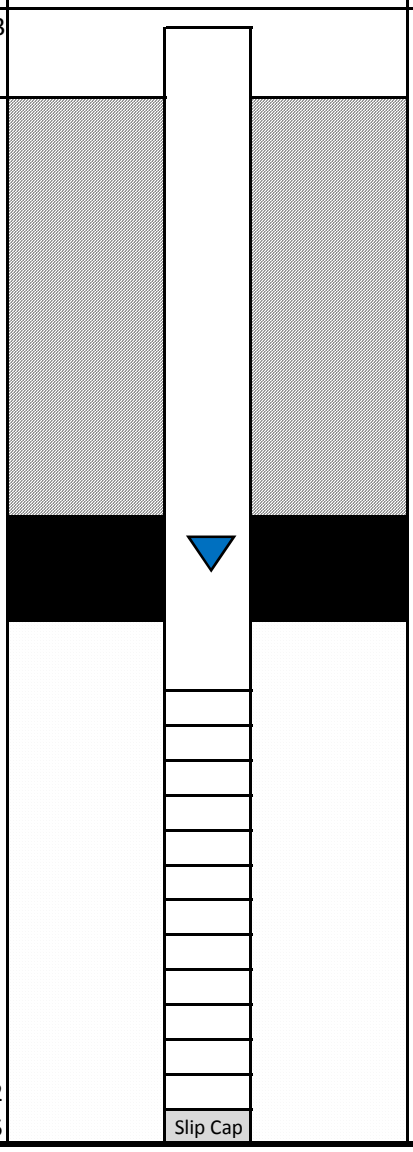
amec foster wheeler

WELL CONSTRUCTION REPORT

WELL ID: **OW-410 S**

PROJECT:	Dan River Landfill
PROJECT NO:	7810-14-0065
PROJECT LOCATION:	Dan River Steam Station; Eden, North Carolina

DRILLING CONTRACTOR:	**SAEDACCO**	WATER LEVEL:	**35.98 ft BGS on 5/27/2015**
DRILLING METHOD:	**4.25" HSA**	LATITUDE:	**36.4944**
DATE COMPLETED:	**3/26/2015**	LONGITUDE:	**-79.7165**
LOGGED BY:	**M. Flanik**	GS ELEVATION:	**593.62 feet**
Cave-In Below Well: (not depicted)	**None**	TOC ELEVATION:	**596.95 feet**
		DATUM:	**Mean Sea Level (MSL)**

Depth (ft-bgs)	WELL DIAGRAM	Elev (ft-MSL)	WELL CONSTRUCTION DETAILS
+3.33		596.95 TOC	PROTECTIVE CASING: Diameter: 4-inch x 4-inch square; Type: Steel Stickup; Interval: +4 to 2 feet bgs
0		593.62 GS	OUTER CASING: Diameter: Not Applicable; Type: Not Applicable; Interval: Not Applicable
35.0		558.62	INNER CASING: Diameter: 2-inch; Type: Sch. 40 PVC; Interval: +3.33 to 39.2 feet bgs
37.0		556.62	SCREEN: Diameter: 2-inch; Type: Sch. 40 PVC; Interval: 39.2 to 54.2 feet bgs
39.2		554.42	FILTER PACK: Type: #2 Silica Sand; Interval: 37 to 54.5 feet bgs
			SEAL: Type: Bentonite; Interval: 35 to 37 feet bgs
			GROUT: Type: Neat Cement; Interval: 0 to 35 feet bgs
54.2		539.42	
54.5	Slip Cap	539.12	

NOTES: GS=ground surface; TOC=top of inner PVC casing; bgs=below ground surface

Not to Scale

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	SAMPLES TYPE	SAMPLES (Rec") N-COUNT or Rec%/RQD% 6"- 6"- 6"- 6"	PL (%) NM (%) LL (%) ▲ FINES (%) ● SPT (bpf) 10 20 30 40 50 60 70 80 90 100
0	FILL: Yellow (10YR 7/6), Silty Fine SAND (SM) with Trace Organics		593.4				
	ASH FILL: Dark Gray (4/N), CCR Material that Classifies as Stiff to Soft, Fine Sandy SILT (ML), Non-Plastic, Moist with Pockets of Wet						
5			588.4				
	Becomes Soft						
10			583.4				
15			578.4				
	FILL: Yellow (10YR 7/8), Sandy CLAY (CL) with Trace Organics and Ash, Low Plasticity, Moist						
20	ASH FILL: Dary Gray (4/N), CCR Material that Classifies as Soft to Stiff, Fine Sandy SILT (ML) with Trace Organics and Clay Layers, Non-Plastic, Moist to Wet Soft		573.4				
25			568.4				
	Becomes Stiff						
30			563.4				

0 10 20 30 40 50 60 70 80 90 100

DUKE ABSAT GEOTECHNICAL BORING LOG DR ONSITE LANDFILL BORING LOGS 7810140065.GPJ AMEC DUKE ABSAT.GDT 7/6/15

CONTRACTOR:	SAEDACCO
LOGGED BY:	M. Flanik / L. Eaves
EQUIPMENT:	CME-550
DRILL METHOD:	4.25 / 8.25 HSA; 5 7/8 RC; NQ2 CORE
HOLE DIAMETER:	12" to 6" to 3"
CLOSURE METHOD:	Type III Observation Well Installed
REMARKS:	Located on Ash Fill 1; Water level = 43.68 feet bgs on May 27, 2015

REVIEWED BY: _____

GEOTECHNICAL BORING RECORD

PROJECT NAME: Dan River On-Site Landfill
PROJECT NO.: 7810-14-0065 **START DATE:** 3/23/2015
COORD N: 999643 **COMP. DATE:** 3/23/2015
COORD E: 1789879 **Page** 1 **of** 3
LOCATION: Eden, North Carolina

BORING NO.: OW-411D

amec foster wheeler

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	SAMPLES TYPE	SAMPLES (Rec") N-COUNT or Rec%/RQD% 6"- 6"- 6"- 6"	PL (%) NM (%) LL (%) ▲ FINES (%) ● SPT (bpf) 10 20 30 40 50 60 70 80 90 100
30			563.4				
	SAPROLITE: Yellow (10Yr 8/6), Very Dense/Very Hard, Silty Fine SAND to Sandy SILT (SM-ML), Non-Plastic to Low Plasticity, Moist to Dry						
35			558.4				
	PARTIALLY WEATHERED ROCK: When Sampled Becomes Yellow (10YR 7/6) to Brown-Yellow (10YR 6/8), Very Dense, Silty Fine SAND (SM), Non-Plastic, Moist to Dry						
40			553.4				
45			548.4				
	Becomes Micaceous						
50			543.4				
	PARTIALLY WEATHERED ROCK: When Sampled Becomes Gray (6/N), Very Dense, Silty Fine SAND (SM), Non-Plastic, Moist to Dry						
	Auger Refusal at 55 ft bgs; Begin 5 7/8" Roller Cone						
55	WEATHERED / FRACTURED ROCK: (No Samples Obtained)		538.4				
	Roller Cone Refusal at 57.5 ft bgs; Begin NQ2 Core						
	WEATHERED / FRACTURED ROCK: Gray, Fine-Grained SANDSTONE, Intensely Fractured, Horizontal, Vertical, Low, and High Angle Fractures, No Staining Staining On Fractures 58 to 59 ft bgs					47/0	
60			533.4				

0 10 20 30 40 50 60 70 80 90 100

DUKE ABSAT GEOTECHNICAL BORING LOG DR ONSITE LANDFILL BORING LOGS 7810140065.GPJ AMEC DUKE ABSAT.GDT 7/6/15

CONTRACTOR:	SAEDACCO
LOGGED BY:	M. Flanik / L. Eaves
EQUIPMENT:	CME-550
DRILL METHOD:	4.25 / 8.25 HSA; 5 7/8 RC; NQ2 CORE
HOLE DIAMETER:	12" to 6" to 3"
CLOSURE METHOD:	Type III Observation Well Installed
REMARKS:	Located on Ash Fill 1; Water level = 43.68 feet bgs on May 27, 2015

REVIEWED BY: _____

GEOTECHNICAL BORING RECORD

PROJECT NAME: Dan River On-Site Landfill
PROJECT NO.: 7810-14-0065 **START DATE:** 3/23/2015
COORD N: 999643 **COMP. DATE:** 3/23/2015
COORD E: 1789879 **Page 2 of 3**
LOCATION: Eden, North Carolina

BORING NO.: OW-411D

amec foster wheeler

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	SAMPLES TYPE	SAMPLES (Rec") N-COUNT or Rec%/RQD% 6"- 6"- 6"- 6"	PL (%) NM (%) LL (%) ▲ FINES (%) ● SPT (bpf) 10 20 30 40 50 60 70 80 90 100
60	WEATHERED / FRACTURED ROCK: Gray, Fine-Grained SANDSTONE, Intensely Fractured, Horizontal, Vertical, Low, and High Angle Fractures, No Staining		533.4				
						93/45	
	Thin MUDSTONE Layer 64 ft bgs						
65			528.4				
						74/43	
70			523.4				
						100/23	
75			518.4				
						92/19	
	Vertical Fracture 78 to 78.5 ft bgs						
						100/13	
80			513.4				
	Boring Terminated at 81.3 ft bgs **Soil/Ash Lithologic Descriptions Obtained From OW-411S Boring**						
85			508.4				
90			503.4				

0 10 20 30 40 50 60 70 80 90 100

DUKE ABSAT GEOTECHNICAL BORING LOG DR ONSITE LANDFILL BORING LOGS 7810140065.GPJ AMEC DUKE ABSAT.GDT 7/6/15

CONTRACTOR:	SAEDACCO
LOGGED BY:	M. Flanik / L. Eaves
EQUIPMENT:	CME-550
DRILL METHOD:	4.25 / 8.25 HSA; 5 7/8 RC; NQ2 CORE
HOLE DIAMETER:	12" to 6" to 3"
CLOSURE METHOD:	Type III Observation Well Installed
REMARKS:	Located on Ash Fill 1; Water level = 43.68 feet bgs on May 27, 2015

REVIEWED BY: _____

GEOTECHNICAL BORING RECORD

PROJECT NAME: Dan River On-Site Landfill
PROJECT NO.: 7810-14-0065 **START DATE:** 3/23/2015
COORD N: 999643 **COMP. DATE:** 3/23/2015
COORD E: 1789879 **Page** 3 **of** 3
LOCATION: Eden, North Carolina

BORING NO.: OW-411D

amec foster wheeler

PROJECT:	DAN RIVER LANDFILL DAN RIVER STEAM STATION, Eden, NC Amec Foster Wheeler Project No. 7810-14-0065	ROCK CORE PHOTO LOG:	OW-411D

CLIENT:	**Duke Energy**	AUGER REFUSAL DEPTH:	**55.0**	**ft bgs**		LATITUDE:	**36.4944**
DATE DRILLED:	**4/16/2015**	ROLLER CONE REFUSAL DEPTH:	**57.5**	**ft bgs**		LONGITUDE:	**-79.7147**
DRILL RIG:	**Diedrich D-50**	CORING TERMINATION DEPTH:	**81.3**	**ft bgs**		GROUND ELEVATION:	**593.41**
DRILLER:	**Stefan Smith**	WATER LEVEL:	**35.65 ft bgs on 4/30/15**			NOTES: Type III Monitoring Well Installed to 81.3 ft bgs with 5-ft screen 76.0-81.0 ft bgs.	
LOGGED BY:	**Lee Eaves**						
CORE SIZE:	**NQ2**						

CORE BOX #: 1 of 2
TOP OF BOX: 57.5 ft bgs
BOTTOM OF BOX: 75.7 ft bgs

CORE BOX #: 2 of 2
TOP OF BOX: 75.7 ft bgs
BOTTOM OF BOX: 81.3 ft bgs

DESCRIPTION:

57.5 to 81 ft bgs: **WEATHERED / FRACTURED ROCK**: Gray, Fine-Grained **SANDSTONE**, Intensely Fractured, Horizontal, Vertical, Low, and High Angle Fractures, No Staining

WELL CONSTRUCTION REPORT

WELL ID: **OW-411 D**

PROJECT:	Dan River Landfill
PROJECT NO:	7810-14-0065
PROJECT LOCATION:	Dan River Steam Station; Eden, North Carolina

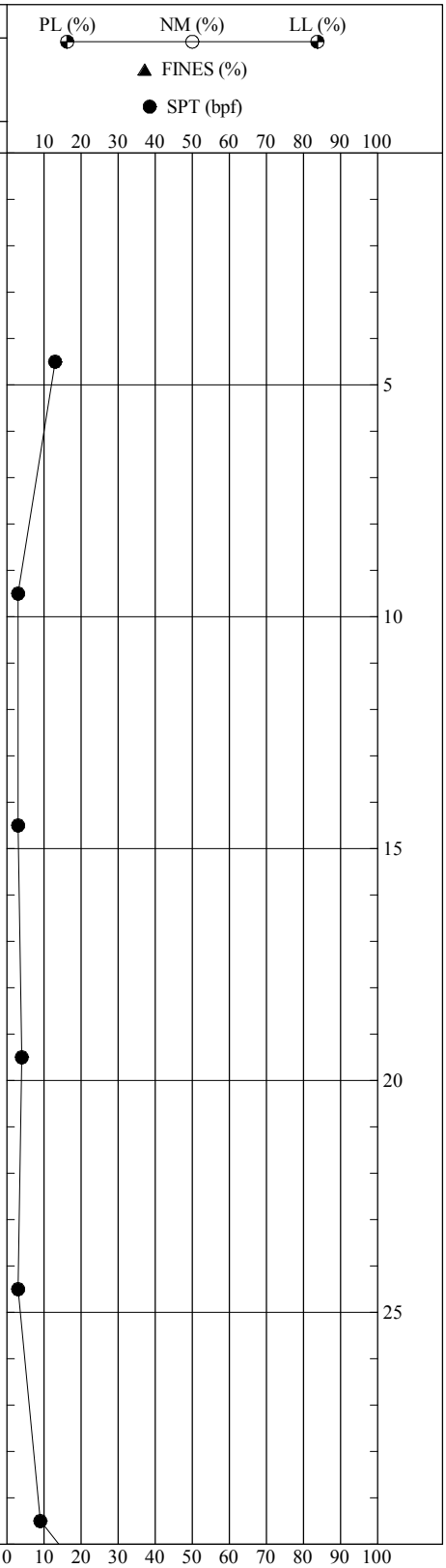
DRILLING CONTRACTOR:	**SAEDACCO**	WATER LEVEL:	**43.68 ft BGS on 5/27/2015**
DRILLING METHOD:	**8.25"HSA/NQ2 core**	LATITUDE:	**36.4944**
DATE COMPLETED:	**4/21/2015**	LONGITUDE:	**-79.7147**
LOGGED BY:	**Flanik/Eaves**	GS ELEVATION:	**593.41 feet**
Cave-In Below Well:	**None**	TOC ELEVATION:	**596.43 feet**
(not depicted)		DATUM:	**Mean Sea Level (MSL)**

Depth (ft-bgs)	WELL DIAGRAM	Elev (ft-MSL)	WELL CONSTRUCTION DETAILS
+3.02		596.43 TOC	PROTECTIVE CASING:
0		593.41 GS	Diameter: 4-inch x 4-inch square Type: Steel Stickup Interval: +3.5 to 2 feet bgs
			OUTER CASING:
			Diameter: 6-inch Type: Sch. 40 PVC Interval: 0 to 54.5 feet bgs
			INNER CASING:
54.5		538.91	Diameter: 2-inch Type: Sch. 40 PVC
55.0		538.41	Interval: +3.02 to 76 feet bgs
75.4		518.01	SCREEN:
75.6		517.81	Diameter: 2-inch Type: Sch. 40 PVC
76.0		517.41	Interval: 76 to 81 feet bgs
			FILTER PACK:
			Type: Not Applicable Interval: Not Applicable
			SEAL:
			Type: Bentonite & K-Packer Interval: 55 to 75.6 feet bgs
			GROUT:
			Type: Neat Cement
81.0		512.41	Interval: 0 to 55 feet bgs
81.3	End Cap	512.11	

Not to Scale

NOTES: GS=ground surface; TOC=top of inner PVC casing; bgs=below ground surface

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	(Rec") N-COUNT or Rec%/RQD% 6"- 6"- 6"- 6"
0	FILL: Yellow (10YR 7/6), Silty Fine SAND (SM) with Trace Organics		593.5			
	ASH FILL: Dark Gray (4/N), CCR Material that Classifies as Stiff to Soft, Fine Sandy SILT (ML), Non-Plastic, Moist with Pockets of Wet			SS-1		(13.2) 5-6-7
5			588.5			
	Becomes Soft			SS-2		(15.6) 2-1-2
10			583.5			
				SS-3		(22.8) 2-1-2
15			578.5			
	FILL: Yellow (10YR 7/8), Sandy CLAY (CL) with Trace Organics and Ash, Low Plasticity, Moist			SS-4		(10.8) 2-2-2
20	ASH FILL: Dary Gray (4/N), CCR Material that Classifies as Soft to Stiff, Fine Sandy SILT (ML) with Trace Organics and Clay Layers, Non-Plastic, Moist to Wet Soft		573.5			
				SS-5		(1.2) 2-1-2
25			568.5			
	Becomes Stiff			SS-6		(13.2) 4-4-5
30			563.5			



DUKE ABSAT GEOTECHNICAL BORING LOG DR ONSITE LANDFILL BORING LOGS 7810140065.GPJ AMEC DUKE ABSAT.GDT 7/6/15

CONTRACTOR:	SAEDACCO
LOGGED BY:	M. Flanik
EQUIPMENT:	CME-550
DRILL METHOD:	4.25 HSA
HOLE DIAMETER:	7"
CLOSURE METHOD:	Type II Observation Well Installed
REMARKS:	Located on Ash Fill 1; Water level = 39.78 feet bgs on May 27, 2015

REVIEWED BY: _____

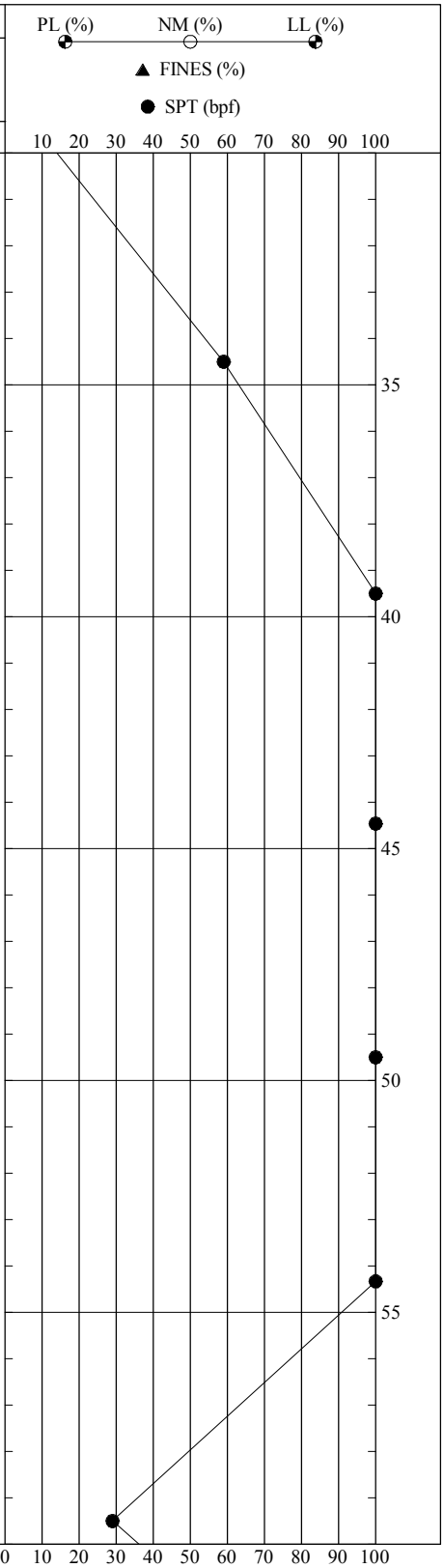
GEOTECHNICAL BORING RECORD

PROJECT NAME: Dan River On-Site Landfill
PROJECT NO.: 7810-14-0065 **START DATE:** 3/20/2015
COORD N: 999645 **COMP. DATE:** 3/23/2015
COORD E: 1789872 **Page** 1 **of** 3
LOCATION: Eden, North Carolina

BORING NO.: OW-411S

amec foster wheeler

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	(Rec") N-COUNT or Rec%/RQD% 6"- 6"- 6"- 6"
30			563.5			
	SAPROLITE: Yellow (10Yr 8/6), Very Dense/Very Hard, Silty Fine SAND to Sandy SILT (SM-ML), Non-Plastic to Low Plasticity, Moist to Dry					
				SS-7		(14.4) 9-20-39
35			558.5			
	PARTIALLY WEATHERED ROCK: When Sampled Becomes Yellow (10YR 7/6) to Brown-Yellow (10YR 6/8), Very Dense, Silty Fine SAND (SM), Non-Plastic, Moist to Dry					
				SS-8		(16.5) 9-26-50/4.5
40			553.5			
				SS-9		(9.6) 15-50/5.5
45			548.5			
	Becomes Micaceous					
				SS-10		(16.8) 24-29-50/5
50			543.5			
	PARTIALLY WEATHERED ROCK: When Sampled Becomes Gray (6/N), Very Dense, Silty Fine SAND (SM), Non-Plastic, Moist to Dry					
				SS-11		(9.6) 35-50/4
55			538.5			
	SAPROLITE: Gray (5/N) and Light Gray (7/N), Medium-Dense, Silty Fine to Coarse SAND (SM) with Gravel, Non-Plastic, Moist					
				SS-12		(13.2) 12-13-16
60			533.5			



DUKE ABSAT GEOTECHNICAL BORING LOG DR ONSITE LANDFILL BORING LOGS 7810140065.GPJ AMEC DUKE ABSAT.GDT 7/6/15

CONTRACTOR:	SAEDACCO
LOGGED BY:	M. Flanik
EQUIPMENT:	CME-550
DRILL METHOD:	4.25 HSA
HOLE DIAMETER:	7"
CLOSURE METHOD:	Type II Observation Well Installed
REMARKS:	Located on Ash Fill 1; Water level = 39.78 feet bgs on May 27, 2015

REVIEWED BY: _____

GEOTECHNICAL BORING RECORD

PROJECT NAME: Dan River On-Site Landfill
PROJECT NO.: 7810-14-0065 **START DATE:** 3/20/2015
COORD N: 999645 **COMP. DATE:** 3/23/2015
COORD E: 1789872 **Page 2 of 3**
LOCATION: Eden, North Carolina

BORING NO.: OW-411S

amec foster wheeler

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	(Rec") N-COUNT or Rec%/RQD% 6"- 6"- 6"- 6"	PL (%) NM (%) LL (%) ▲ FINES (%) ● SPT (bpf) 10 20 30 40 50 60 70 80 90 100
60	SAPROLITE: Gray (5/N) and Light Gray (7/N), Medium-Dense, Silty Fine to Coarse SAND (SM) with Gravel, Non-Plastic, Moist		533.5				
	PARTIALLY WEATHERED ROCK: When Sampled Becomes Gray (5/N), Very Dense, Silty Fine to Coarse SAND (SM) with Rock Fragments, Non-Plastic, Moist to Wet			SS-13		(6) 28-50/5.5	
65			528.5				65
				SS-14		(2.4) 50/5	
	Auger Refusal at 66.4 ft bgs						
70			523.5				70
75			518.5				75
80			513.5				80
85			508.5				85
90			503.5				

0 10 20 30 40 50 60 70 80 90 100

DUKE ABSAT GEOTECHNICAL BORING LOG DR ONSITE LANDFILL BORING LOGS 7810140065.GPJ AMEC DUKE ABSAT.GDT 7/6/15

CONTRACTOR:	SAEDACCO
LOGGED BY:	M. Flanik
EQUIPMENT:	CME-550
DRILL METHOD:	4.25 HSA
HOLE DIAMETER:	7"
CLOSURE METHOD:	Type II Observation Well Installed
REMARKS:	Located on Ash Fill 1; Water level = 39.78 feet bgs on May 27, 2015

REVIEWED BY: _____

GEOTECHNICAL BORING RECORD

PROJECT NAME: Dan River On-Site Landfill
PROJECT NO.: 7810-14-0065 **START DATE:** 3/20/2015
COORD N: 999645 **COMP. DATE:** 3/23/2015
COORD E: 1789872 **Page** 3 **of** 3
LOCATION: Eden, North Carolina

BORING NO.: OW-411S

amec foster wheeler

WELL CONSTRUCTION REPORT

WELL ID: **OW-411 S**

PROJECT:	Dan River Landfill
PROJECT NO:	7810-14-0065
PROJECT LOCATION:	Dan River Steam Station; Eden, North Carolina

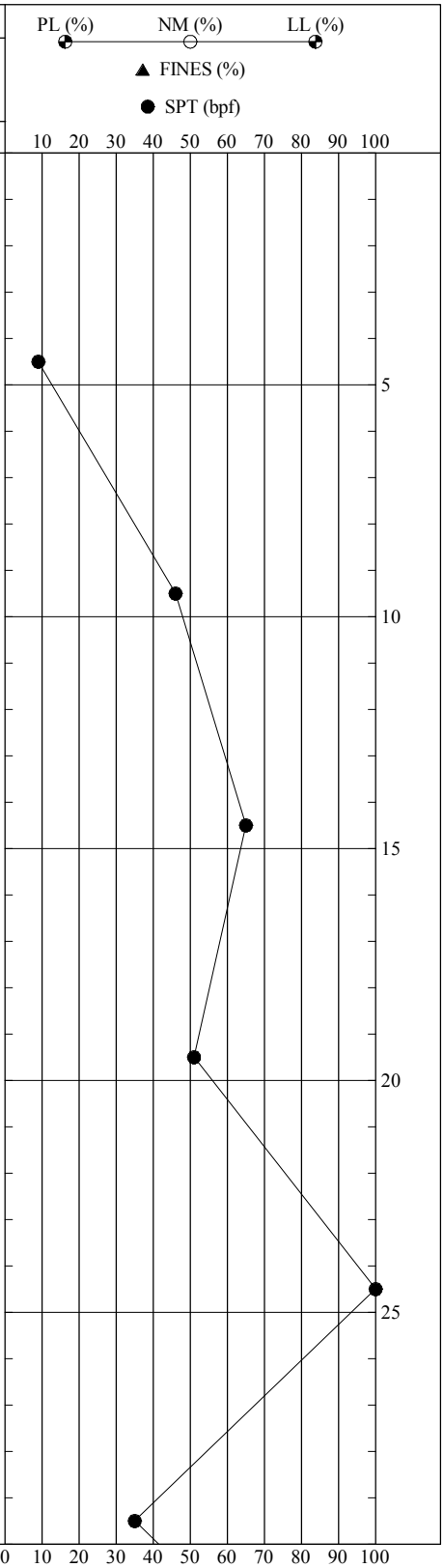
DRILLING CONTRACTOR:	**SAEDACCO**	WATER LEVEL:	**39.78 ft BGS on 5/27/2015**
DRILLING METHOD:	**4.25" HSA**	LATITUDE:	**36.4944**
DATE COMPLETED:	**3/23/2015**	LONGITUDE:	**-79.7148**
LOGGED BY:	**M. Flanik**	GS ELEVATION:	**593.51 feet**
Cave-In Below Well: (not depicted)	**66-66.4 ft bgs**	TOC ELEVATION:	**596.25 feet**
		DATUM:	**Mean Sea Level (MSL)**

Depth (ft-bgs)	WELL DIAGRAM	Elev (ft-MSL)	WELL CONSTRUCTION DETAILS
+2.75		596.25 TOC	PROTECTIVE CASING:
0		593.51 GS	Diameter: 4-inch x 4-inch square Type: Steel Stickup Interval: +3.5 to 2 feet bgs
			OUTER CASING: Diameter: Not Applicable Type: Not Applicable Interval: Not Applicable
			INNER CASING: Diameter: 2-inch Type: Sch. 40 PVC Interval: +2.75 to 50.7 feet bgs
47.0		546.51	
			SCREEN: Diameter: 2-inch Type: Sch. 40 PVC Interval: 50.7 to 65.7 feet bgs
49.0		544.51	
50.7		542.81	
			FILTER PACK: Type: #2 Silica Sand Interval: 49 to 66 feet bgs
			SEAL: Type: Bentonite Interval: 47 to 49 feet bgs
			GROUT: Type: Neat Cement Interval: 0 to 47 feet bgs
65.7		527.81	
66.0	End Cap	527.51	

NOTES: GS=ground surface; TOC=top of inner PVC casing; bgs=below ground surface

Not to Scale

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	(Rec") N-COUNT or Rec%/RQD% 6"- 6"- 6"- 6"
0	FILL: Silty GRAVEL (GM) with Sand and Trace Organics		579.5			
	FILL: Brown-Yellow (10YR 6/6), Stiff, Sandy CLAY (CL) with Trace Organics and Ash, Low Plasticity, Moist					
	Possible Perched Water					
				SS-1		(14.4) 6-4-5
5	Root/Wood Debris		574.5			
	RESIDUUM: Yellow (10YR 7/6), Dense, Silty Fine SAND (SM), Non-Plastic, Dry					
				SS-2		(8.4) 7-13-33
10	SAPROLITE: Yellow (10YR 7/8) with Dark Yellow-Brown (10YR 4/4) Streaks, Very Dense, Sandy Lean CLAY (CL), Low Plasticity, Dry to Moist		569.5			
				SS-3		(18) 14-19-46
15			564.5			
				SS-4		(18) 7-24-27
20			559.5			
	PARTIALLY WEATHERED ROCK: When Sampled Becomes Light Gray (3YR 7/1) and Dark Gray (3YR 3/1), Very Hard, Sandy SILT (ML) with Minor Layers of Silty Fine SAND (SM), Non-plastic to Low Plasticity, Moist to Dry			SS-5		(17.5) 7-21-50/5.5
25			554.5			
	SAPROLITE: Gray (10YR 6/1) and Brown-Yellow (10YR 6/8), Dense, Silty Fine SAND (SM) to Sandy SILT (ML), Non-Plastic to Low Plasticity, Moist			SS-6		(12) 11-20-15
30			549.5			



DUKE ABSAT GEOTECHNICAL BORING LOG DR ONSITE LANDFILL BORING LOGS 7810140065.GPJ AMEC DUKE ABSAT.GDT 7/6/15

CONTRACTOR:	SAEDACCO
LOGGED BY:	M. Flanik
EQUIPMENT:	CME-550
DRILL METHOD:	4.25 HSA
HOLE DIAMETER:	7"
CLOSURE METHOD:	Type II Observation Well Installed
REMARKS:	Located near east toe of Ash Fill 1; Water level = 30.10 feet bgs on May 27, 2015

REVIEWED BY: _____

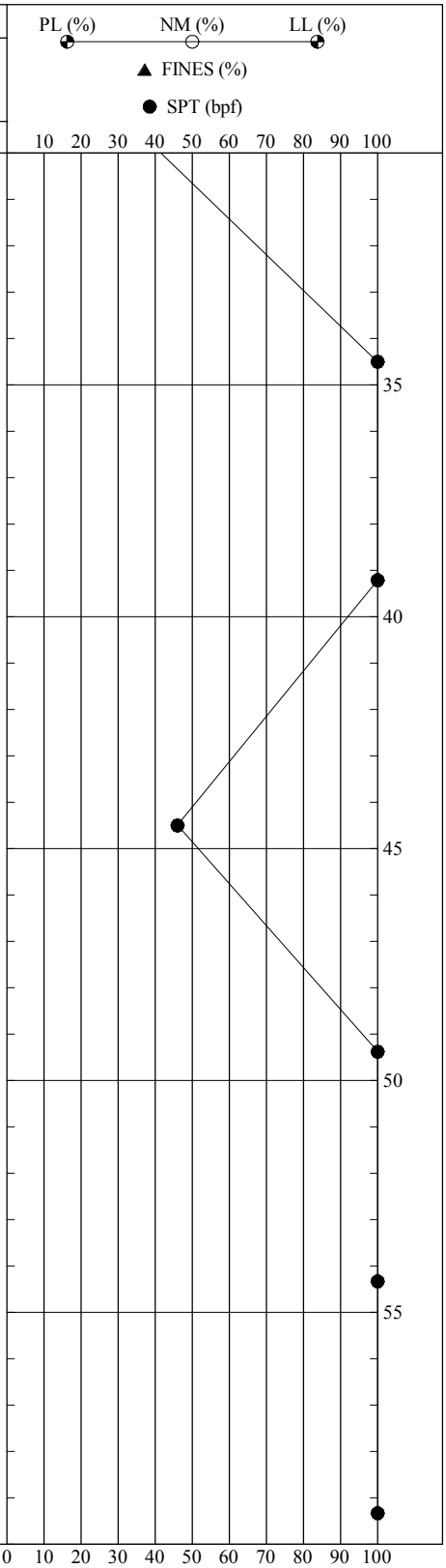
GEOTECHNICAL BORING RECORD

PROJECT NAME: Dan River On-Site Landfill
PROJECT NO.: 7810-14-0065 **START DATE:** 3/18/2015
COORD N: 999869 **COMP. DATE:** 3/18/2015
COORD E: 1790319 **Page** 1 **of** 2
LOCATION: Eden, North Carolina

BORING NO.: OW-412S

amec foster wheeler

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	(Rec") N-COUNT or Rec%/RQD% 6"- 6"- 6"- 6"
30	SAPROLITE: Gray (10YR 6/1) and Brown-Yellow (10YR 6/8), Dense, Silty Fine SAND (SM) to Sandy SILT (ML), Non-Plastic to Low Plasticity, Moist		549.5			
	PARTIALLY WEATHERED ROCK: When Sampled Becomes Brown-Yellow (10YR 6/8) and Dark Yellow-Brown (10Yr 4/6), Very Dense, Medium to Coarse SAND (SM) with Rock Fragments, Non-Plastic, Moist			SS-7		(12) 10-40-50/4.5
35			544.5			
				SS-8		(8.4) 9-50/2.5
40	Wet Cuttings		539.5			
	SAPROLITE: Brown-Yellow (10YR 6/6), Dense, Silty Fine to Coarse SAND (SM) with Rock Fragments, Non-Plastic, Moist			SS-9		(14.4) 5-19-27
45			534.5			
	PARTIALLY WEATHERED ROCK: Yellow-Brown (10YR 5/8), Very Dense, Silty Fine SAND (SM) with Trace Rocdk Fragments, Non-Plastic, Moist			SS-10		(8.4) 20-50/4.5
50			529.5			
				SS-11		(9.6) 14-50/4
55	PARTIALLY WEATHERED ROCK: When Sampled Becomes Gray (5/N), SILT to fine SAND (ML-SM) with Rock Fragments, Non-Plastic, Moist		524.5			
				SS-12		(7.2) 28-50/4
60	**Auger Refusal at 59 ft bgs**		519.5			



DUKE ABSAT GEOTECHNICAL BORING LOG DR ONSITE LANDFILL BORING LOGS 7810140065.GPJ AMEC DUKE ABSAT.GDT 7/6/15

CONTRACTOR:	SAEDACCO
LOGGED BY:	M. Flanik
EQUIPMENT:	CME-550
DRILL METHOD:	4.25 HSA
HOLE DIAMETER:	7"
CLOSURE METHOD:	Type II Observation Well Installed
REMARKS:	Located near east toe of Ash Fill 1; Water level = 30.10 feet bgs on May 27, 2015

REVIEWED BY: _____

GEOTECHNICAL BORING RECORD

PROJECT NAME: Dan River On-Site Landfill
PROJECT NO.: 7810-14-0065 **START DATE:** 3/18/2015
COORD N: 999869 **COMP. DATE:** 3/18/2015
COORD E: 1790319 **Page 2 of 2**
LOCATION: Eden, North Carolina

BORING NO.: OW-412S

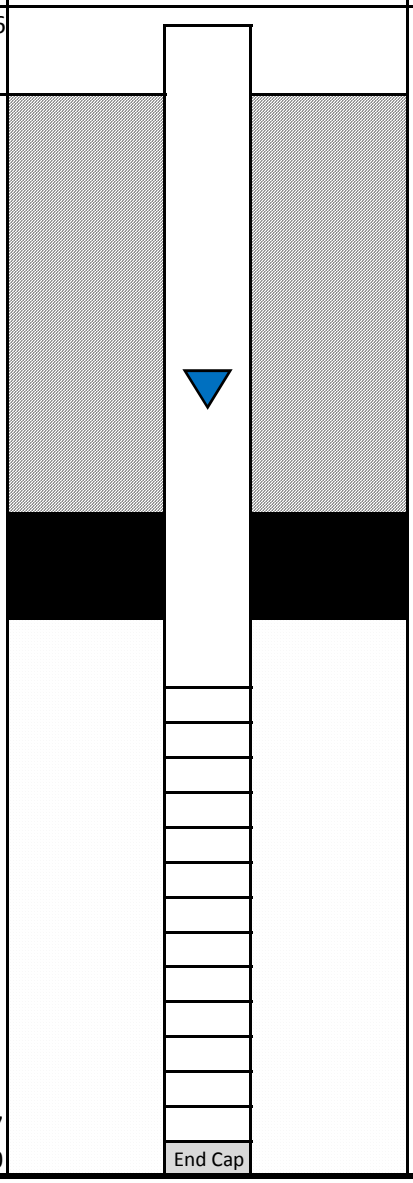
amec foster wheeler

WELL CONSTRUCTION REPORT

WELL ID: **OW-412 S**

PROJECT:	Dan River Landfill
PROJECT NO:	7810-14-0065
PROJECT LOCATION:	Dan River Steam Station; Eden, North Carolina

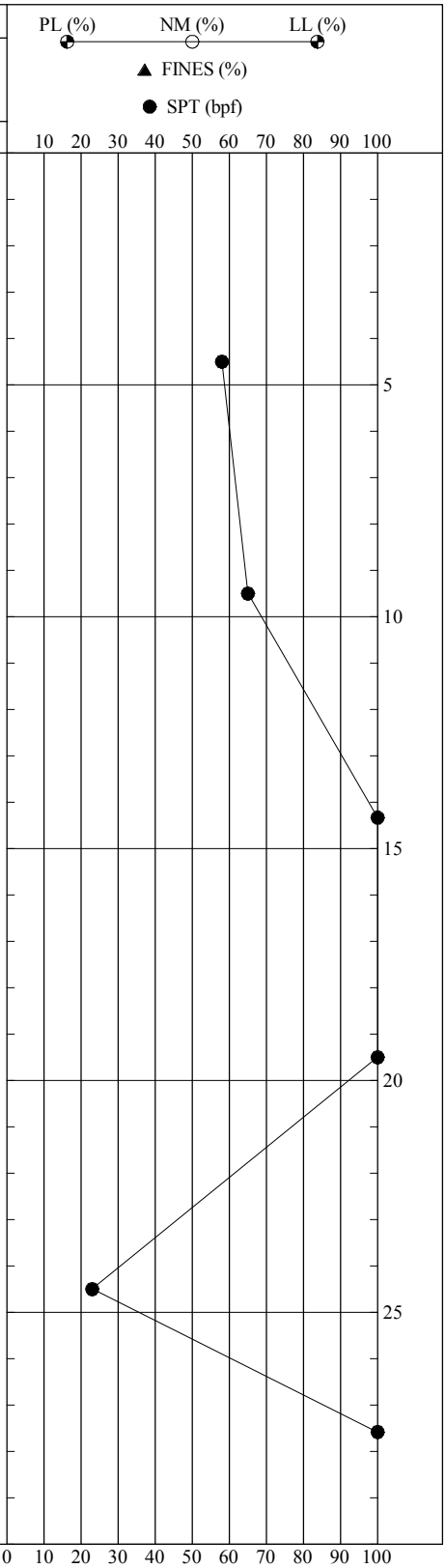
DRILLING CONTRACTOR:	**SAEDACCO**	WATER LEVEL:	**30.10 ft BGS on 5/27/2015**
DRILLING METHOD:	**4.25" HSA**	LATITUDE:	**36.4950**
DATE COMPLETED:	**3/18/2015**	LONGITUDE:	**-79.7132**
LOGGED BY:	**M. Flanik**	GS ELEVATION:	**579.54 feet**
Cave-In Below Well:	**58-59 ft bgs**	TOC ELEVATION:	**582.80 feet**
(not depicted)		DATUM:	**Mean Sea Level (MSL)**

Depth (ft-bgs)	WELL DIAGRAM	Elev (ft-MSL)	WELL CONSTRUCTION DETAILS
+3.26		582.80 TOC	PROTECTIVE CASING: Diameter: 4-inch x 4-inch square; Type: Steel Stickup; Interval: +4 to 2 feet bgs
0		579.54 GS	OUTER CASING: Diameter: Not Applicable; Type: Not Applicable; Interval: Not Applicable
39.0		540.54	INNER CASING: Diameter: 2-inch; Type: Sch. 40 PVC; Interval: +3.26 to 42.7 feet bgs
41.0		538.54	SCREEN: Diameter: 2-inch; Type: Sch. 40 PVC; Interval: 42.7 to 57.7 feet bgs
42.7		536.84	FILTER PACK: Type: #2 Silica Sand; Interval: 41 to 58 feet bgs
			SEAL: Type: Bentonite; Interval: 39 to 41 feet bgs
			GROUT: Type: Neat Cement; Interval: 0 to 39 feet bgs
57.7		521.84	
58.0	End Cap	521.54	

NOTES: GS=ground surface; TOC=top of inner PVC casing; bgs=below ground surface

Not to Scale

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	(Rec") N-COUNT or Rec%/RQD% 6"- 6"- 6"- 6"
0	FILL: Yellow-Brown (10YR 5/8), Silty Fine SAND (SM), with Organics and Trace Gravel		562.1			
	SAPROLITE: Yellow (10YR 7/6), Very Dense, Fine Sandy Lean CLAY (CL), Low Plasticity, Dry to Moist			SS-1		(12) 7-13-45
5			557.1			
				SS-2		(18) 6-15-50
10			552.1			
	PARTIALLY WEATHERED ROCK: When Sampled Becomes Yellow (10YR 7/6) to Yellow-Brown (10YR 5/6), Very Dense, Micaceous, Clayey Fine SAND (SC) with Trace Rock Fragments, Low Plasticity, Moist			SS-3		(9.6) 17-50/4
15			547.1			
				SS-4		(13.2) 16-24-50/2
20			542.1			
	SAPROLITE: Dark Gray (10YR 4/1), Very Stiff, SILT to Fine SAND (ML-SM), Non-Plastic, Moist to Wet			SS-5		(18) 19-19-4
25			537.1			
	PARTIALLY WEATHERED ROCK: When Sampled Becomes Dark Gray (10YR 4/1), Very Dense, Medium to Fine SAND (SM) with Trace Rock Fragments, Non-Plastic, Moist to Wet			SS-6		(3.6) 26-50/1
	Auger Refusal at 27.3 ft bgs					
30			532.1			



DUKE ABSAT GEOTECHNICAL BORING LOG DR ONSITE LANDFILL BORING LOGS 7810140065.GPJ AMEC DUKE ABSAT.GDT 7/6/15

CONTRACTOR:	SAEDACCO
LOGGED BY:	M. Flanik
EQUIPMENT:	CME-550
DRILL METHOD:	4.25 HSA
HOLE DIAMETER:	7"
CLOSURE METHOD:	Type II Observation Well Installed
REMARKS:	Located west of Ash Fill 1; Water level = 12.67 feet bgs on May 27, 2015

REVIEWED BY: _____

GEOTECHNICAL BORING RECORD

PROJECT NAME: Dan River On-Site Landfill
PROJECT NO.: 7810-14-0065 **START DATE:** 3/13/2015
COORD N: 999572 **COMP. DATE:** 3/13/2015
COORD E: 1789134 **Page** 1 **of** 1
LOCATION: Eden, North Carolina

BORING NO.: OW-413S

amec foster wheeler

WELL CONSTRUCTION REPORT

WELL ID: **OW-413 S**

PROJECT:	Dan River Landfill
PROJECT NO:	7810-14-0065
PROJECT LOCATION:	Dan River Steam Station; Eden, North Carolina

DRILLING CONTRACTOR:	**SAEDACCO**	WATER LEVEL:	**12.67 ft BGS on 5/27/2015**
DRILLING METHOD:	**4.25" HSA**	LATITUDE:	**36.4942**
DATE COMPLETED:	**3/13/2015**	LONGITUDE:	**-79.7173**
LOGGED BY:	**M. Flanik**	GS ELEVATION:	**562.09 feet**
Cave-In Below Well: (not depicted)	**27-27.3 ft bgs**	TOC ELEVATION:	**565.34 feet**
		DATUM:	**Mean Sea Level (MSL)**

Depth (ft-bgs)	WELL DIAGRAM	Elev (ft-MSL)	WELL CONSTRUCTION DETAILS
+3.25		565.34 TOC	PROTECTIVE CASING:
0		562.09 GS	Diameter: 4-inch x 4-inch square Type: Steel Stickup Interval: +4 to 2 feet bgs
			OUTER CASING: Diameter: Not Applicable Type: Not Applicable Interval: Not Applicable
			INNER CASING: Diameter: 2-inch Type: Sch. 40 PVC Interval: +3.25 to 16.7 feet bgs
11.0		551.09	
			SCREEN: Diameter: 2-inch Type: Sch. 40 PVC Interval: 16.7 to 26.7 feet bgs
13.0		549.09	
16.7		545.39	
			FILTER PACK: Type: #2 Silica Sand Interval: 13 to 27 feet bgs
			SEAL: Type: Bentonite Interval: 11 to 13 feet bgs
			GROUT: Type: Neat Cement Interval: 0 to 11 feet bgs
26.7		535.39	
27.0	End Cap	535.09	

NOTES: GS=ground surface; TOC=top of PVC casing; bgs=below ground surface

Not to Scale

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	(Rec") N-COUNT or Rec%/RQD% 6"- 6"- 6"- 6"	PL (%) NM (%) LL (%) ▲ FINES (%) ● SPT (bpf) 10 20 30 40 50 60 70 80 90 100
0	FILL: Yellow (10YR 7/8), Silty Fine SAND (SM), Low Plasticity, Moist		557.5				
	ASH FILL: Dark Gray (4/N), CCR Material that Classifies as Stiff to Very Soft Fine Sandy SILT (ML), Non-Plastic, Moist to Wet Stiff						
5	Becomes Wet		552.5				
	Becomes Very Soft						
10			547.5				
15			542.5				
	SAPROLITE: Brown-Yellow (10YR 6/8), Dense, Silty Sandy GRAVEL (GM), Non-Plastic, Moist to Wet			UD-1	■	(8.4)	
20			537.5				
	PARTIALLY WEATHERED ROCK: When Sampled Becomes Yellow (10YR 8/8) to Brown-Yellow (10YR 6/8), Very Dense, Silty Fine SAND (SM) with Rock Fragments, Non-Plastic, Moist to Dry						
25			532.5				
30	**Auger Refusal at 30 ft bgs; Begin 5 7/8" Roller Cone; Roller Cone Refusal at 30 ft bgs; Begin NQ2 Core**		527.5				

0 10 20 30 40 50 60 70 80 90 100

DUKE ABSAT GEOTECHNICAL BORING LOG DR ONSITE LANDFILL BORING LOGS 7810140065.GPJ AMEC DUKE ABSAT.GDT 7/6/15

CONTRACTOR:	SAEDACCO
LOGGED BY:	M. Flanik
EQUIPMENT:	CME-550
DRILL METHOD:	4.25 / 8.25 HSA; 5 7/8 RC; NQ2 CORE
HOLE DIAMETER:	12" to 6" to 3"
CLOSURE METHOD:	Type III Observation Well Installed
REMARKS:	Located at southwest toe of Ash Fill 1; Water level = 19.83 feet bgs on May 27, 2015

REVIEWED BY: _____

GEOTECHNICAL BORING RECORD

PROJECT NAME: Dan River On-Site Landfill
PROJECT NO.: 7810-14-0065 **START DATE:** 3/25/2015
COORD N: 999265 **COMP. DATE:** 3/25/2015
COORD E: 1789499 **Page** 1 **of** 2
LOCATION: Eden, North Carolina

BORING NO.: OW-414D

amec foster wheeler

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	(Rec") N-COUNT or Rec%/RQD% 6"- 6"- 6"- 6"	PL (%) NM (%) LL (%) ▲ FINES (%) ● SPT (bpf) 10 20 30 40 50 60 70 80 90 100
30	WEATHERED / FRACTURED ROCK: Gray, Fine-Grained SANDSTONE, Intensely Fractured, Horizontal, Low, and High Angle Fractures with Staining		527.5	CORE-1		80/23	
35			522.5	CORE-2		77/7	
40			517.5	CORE-3		64/17	
	Boring Terminated at 43 ft bgs **Soil/Ash Lithologic Descriptions Obtained From OW-414S Boring**						
45			512.5				
50			507.5				
55			502.5				
60			497.5				

0 10 20 30 40 50 60 70 80 90 100

DUKE ABSAT GEOTECHNICAL BORING LOG DR ONSITE LANDFILL BORING LOGS 7810140065.GPJ AMEC DUKE ABSAT.GDT 7/6/15

CONTRACTOR:	SAEDACCO
LOGGED BY:	M. Flanik
EQUIPMENT:	CME-550
DRILL METHOD:	4.25 / 8.25 HSA; 5 7/8 RC; NQ2 CORE
HOLE DIAMETER:	12" to 6" to 3"
CLOSURE METHOD:	Type III Observation Well Installed
REMARKS:	Located at southwest toe of Ash Fill 1; Water level = 19.83 feet bgs on May 27, 2015

REVIEWED BY: _____

GEOTECHNICAL BORING RECORD

PROJECT NAME: Dan River On-Site Landfill
PROJECT NO.: 7810-14-0065 **START DATE:** 3/25/2015
COORD N: 999265 **COMP. DATE:** 3/25/2015
COORD E: 1789499 **Page** 2 **of** 2
LOCATION: Eden, North Carolina

BORING NO.: OW-414D

amec foster wheeler

PROJECT:	DAN RIVER LANDFILL DAN RIVER STEAM STATION, Eden, NC Amec Foster Wheeler Project No. 7810-14-0065	ROCK CORE PHOTO LOG:	OW-414D

CLIENT:	**Duke Energy**	AUGER REFUSAL DEPTH:	**30.0**	**ft bgs**		LATITUDE:	**36.4933**
DATE DRILLED:	**4/13/2015**	ROLLER CONE REFUSAL DEPTH:	**30.0**	**ft bgs**		LONGITUDE:	**-79.7160**
DRILL RIG:	**Diedrich D-50**	CORING TERMINATION DEPTH:	**43.0**	**ft bgs**		GROUND ELEVATION:	**557.53**
DRILLER:	**Stefan Smith**	WATER LEVEL:	**22.40 ft bgs on 4/30/15**			NOTES: Type III Monitoring Well Installed to 37.0 ft bgs with 5-ft screen 31.7-36.7 ft bgs.	
LOGGED BY:	**Lee Eaves**						
CORE SIZE:	**NQ2**						

CORE BOX #: 1 of 1
TOP OF BOX: 30.0 ft bgs
BOTTOM OF BOX: 43.0 ft bgs

DESCRIPTION:

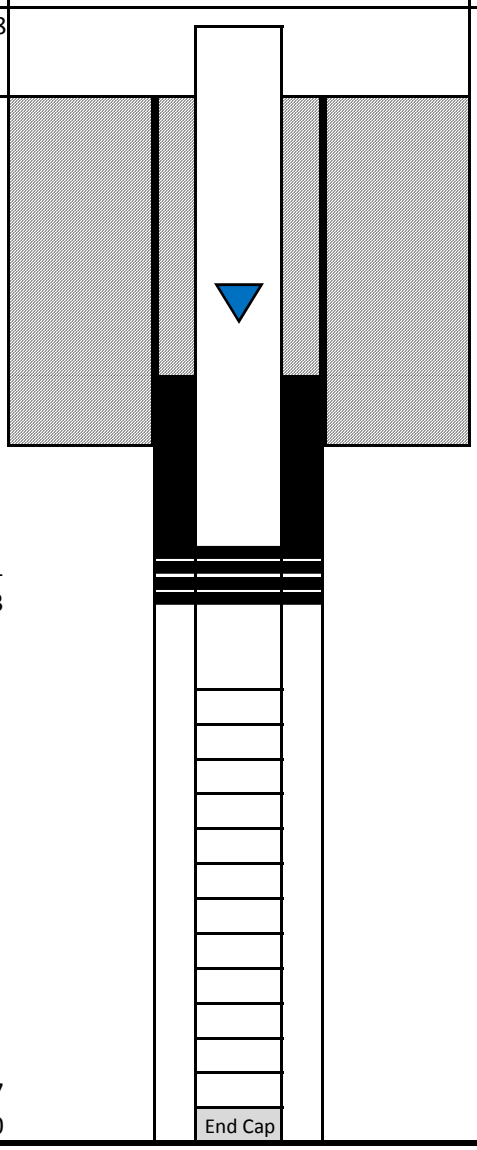
30 to 43 ft bgs: **WEATHERED / FRACTURED ROCK**: Gray, Fine-Grained **SANDSTONE**, Intensely Fractured, Horizontal, Low, and High Angle Fractures with Staining

WELL CONSTRUCTION REPORT

WELL ID: **OW-414 D**

PROJECT:	Dan River Landfill
PROJECT NO:	7810-14-0065
PROJECT LOCATION:	Dan River Steam Station; Eden, North Carolina

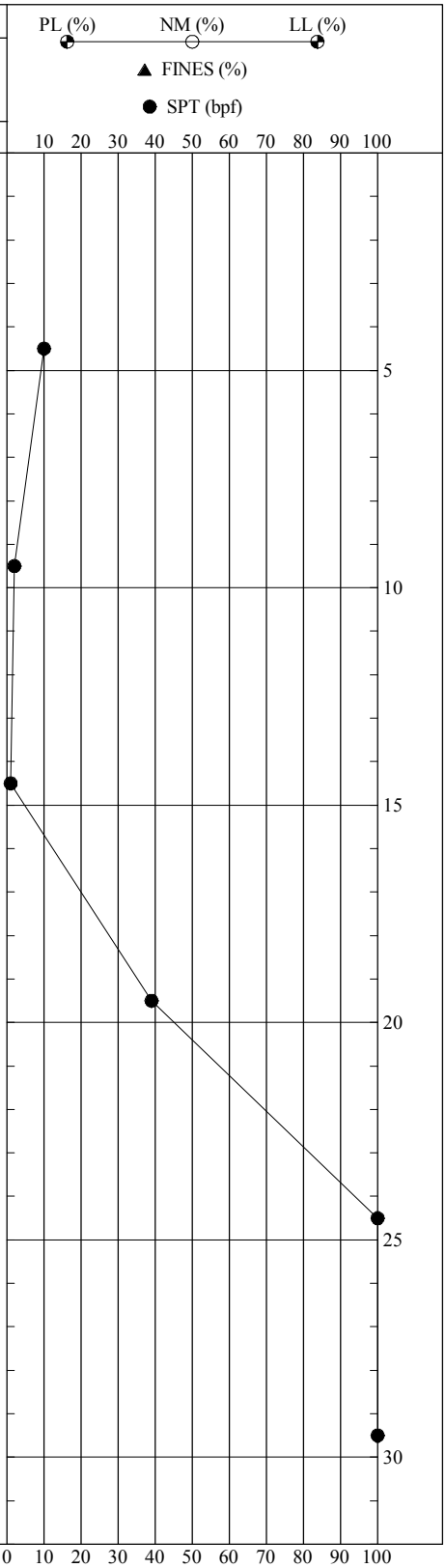
DRILLING CONTRACTOR:	**SAEDACCO**	WATER LEVEL:	**19.83 ft BGS on 5/27/2015**
DRILLING METHOD:	**8.25"HSA/NQ2 core**	LATITUDE:	**36.4933**
DATE COMPLETED:	**4/13/2015**	LONGITUDE:	**-79.7160**
LOGGED BY:	**Flanik/Eaves**	GS ELEVATION:	**557.53 feet**
Cave-In Below Well:	**37-43 ft bgs**	TOC ELEVATION:	**560.11 feet**
(not depicted)		DATUM:	**Mean Sea Level (MSL)**

Depth (ft-bgs)	WELL DIAGRAM	Elev (ft-MSL)	WELL CONSTRUCTION DETAILS
+2.58		560.11 TOC	PROTECTIVE CASING: Diameter: 4-inch x 4-inch square; Type: Steel Stickup; Interval: +3 to 2 feet bgs
0		557.53 GS	OUTER CASING: Diameter: 6-inch; Type: Sch. 40 PVC; Interval: 0 to 29.5 feet bgs
28.0		529.53	INNER CASING: Diameter: 2-inch; Type: Sch. 40 PVC; Interval: +2.58 to 31.7 feet bgs
29.5		528.03	
31.1		526.43	SCREEN: Diameter: 2-inch; Type: Sch. 40 PVC; Interval: 31.7 to 36.7 feet bgs
31.3		526.23	
31.7		525.83	FILTER PACK: Type: Not Applicable; Interval: Not Applicable
			SEAL: Type: Bentonite & K-Packer; Interval: 28 to 31.3 feet bgs
			GROUT: Type: Neat Cement; Interval: 0 to 28 feet bgs
36.7		520.83	
37.0	End Cap	520.53	

NOTES: GS=ground surface; TOC=top of inner PVC casing; bgs=below ground surface

Not to Scale

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	(Rec") N-COUNT or Rec%/RQD% 6"- 6"- 6"- 6"
0	FILL: Yellow (10YR 7/8), Silty Fine SAND (SM), Low Plasticity, Moist		557.2			
	ASH FILL: Dark Gray (4/N), CCR Material that Classifies as Stiff to Very Soft Fine Sandy SILT (ML), Non-Plastic, Moist to Wet Stiff			SS-1		(7.2) 5-6-4
5	Becomes Wet		552.2			
	Becomes Very Soft			SS-2		(7.2) 2-1-1
10			547.2			
				SS-3		(3.6) 1-WOH-1
15			542.2			
	SAPROLITE: Brown-Yellow (10YR 6/8), Dense, Silty SAND (SM) with Rock Fragments, Non-Plastic, Moist to Wet			SS-4		(2.4) 13-19-20
20			537.2			
	PARTIALLY WEATHERED ROCK: When Sampled Becomes Yellow (10YR 8/8) to Brown-Yellow (10YR 6/8), Very Dense, Silty Fine SAND (SM) with Rock Fragments, Non-Plastic, Moist to Dry			SS-5		(13.2) 11-25-50/3
25			532.2			
				SS-6		(12) 12-17-50/5
30	**Auger Refusal at 30 ft bgs**		527.2			



DUKE ABSAT GEOTECHNICAL BORING LOG DR ONSITE LANDFILL BORING LOGS 7810140065.GPJ AMEC DUKE ABSAT.GDT 7/6/15

CONTRACTOR:	SAEDACCO
LOGGED BY:	M. Flanik
EQUIPMENT:	CME-550
DRILL METHOD:	4.25 HSA
HOLE DIAMETER:	7"
CLOSURE METHOD:	Type II Observation Well Installed
REMARKS:	Located at southwest toe of Ash Fill 1; Water level = 19.73 feet bgs on May 27, 2015

REVIEWED BY: _____

GEOTECHNICAL BORING RECORD

PROJECT NAME: Dan River On-Site Landfill
PROJECT NO.: 7810-14-0065 **START DATE:** 3/24/2015
COORD N: 999263 **COMP. DATE:** 3/24/2015
COORD E: 1789496 **Page** 1 **of** 1
LOCATION: Eden, North Carolina

BORING NO.: OW-414S

amec foster wheeler

WELL CONSTRUCTION REPORT

WELL ID: **OW-414 S**

PROJECT:	Dan River Landfill
PROJECT NO:	7810-14-0065
PROJECT LOCATION:	Dan River Steam Station; Eden, North Carolina

DRILLING CONTRACTOR:	**SAEDACCO**	WATER LEVEL:	**19.73 ft BGS on 5/27/2015**
DRILLING METHOD:	**4.25" HSA**	LATITUDE:	**36.4933**
DATE COMPLETED:	**3/25/2015**	LONGITUDE:	**-79.7160**
LOGGED BY:	**M. Flanik**	GS ELEVATION:	**557.23 feet**
Cave-In Below Well: (not depicted)	**29.5-30 ft bgs**	TOC ELEVATION:	**560.60 feet**
		DATUM:	**Mean Sea Level (MSL)**

Depth (ft-bgs)	WELL DIAGRAM	Elev (ft-MSL)	WELL CONSTRUCTION DETAILS
+3.37		560.60 TOC	PROTECTIVE CASING:
0		557.23 GS	Diameter: 4-inch x 4-inch square Type: Steel Stickup Interval: +4 to 2 feet bgs
			OUTER CASING: Diameter: Not Applicable Type: Not Applicable Interval: Not Applicable
			INNER CASING: Diameter: 2-inch Type: Sch. 40 PVC Interval: +3.37 to 14.2 feet bgs
10.0		547.23	
			SCREEN: Diameter: 2-inch Type: Sch. 40 PVC Interval: 14.2 to 29.2 feet bgs
12.0		545.23	
14.2		543.03	
			FILTER PACK: Type: #2 Silica Sand Interval: 12 to 29.5 feet bgs
			SEAL: Type: Bentonite Interval: 10 to 12 feet bgs
			GROUT: Type: Neat Cement Interval: 0 to 10 feet bgs
29.2		528.03	
29.5	End Cap	527.73	

NOTES: GS=ground surface; TOC=top of inner PVC casing; bgs=below ground surface

Not to Scale

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	SAMPLES TYPE	SAMPLES (Rec") N-COUNT or Rec%/RQD% 6"- 6"- 6"- 6"	PL (%) NM (%) LL (%) ▲ FINES (%) ● SPT (bpf) 10 20 30 40 50 60 70 80 90 100
0	SAPROLITE: Yellow (10YR 7/8), Dense, Silty Fine SAND (SM), Non-Plastic, Moist to Dry		558.9				
5			553.9				
	PARTIALLY WEATHERED ROCK: When Sampled Becomes Yellow (10YR 8/6), Very Dense, Silty Fine SAND (SM), Non-Plastic, Moist to Dry						
10			548.9				
	SAPROLITE: Yellow-Tan (10YR 8/4), Very Dense, Clayey Fine to Medium SAND (SC) with Manganese Staining, Low Plasticity, Moist to Dry						
15			543.9				
	PARTIALLY WEATHERED ROCK: When Sampled Becomes Pale Brown (10YR 7/3) to Gray (6/N), Very Dense, Silty Fine SAND (SM) with Rock Fragments, Non-Plastic, Dry to Moist						
20			538.9				
	Becomes Gray (6/N) **Auger Refusal at 25 ft bgs**; **Begin 5 7/8" Roller Cone**						
25	WEATHERED / FRACTURED ROCK: (No Samples Obtained); **Roller Cone Refusal at 25.5 ft bgs**; **Begin NQ2 Core**		533.9			(4.8)	
	WEATHERED / FRACTURED ROCK: Fine-Grained GRAYWACKE, Intensely Fractured, Horizontal, Low, and High Angle Fractures, No Staining to Moderate Staining			CORE-1			
30			528.9				

CONTRACTOR:	SAEDACCO
LOGGED BY:	M. Flanik
EQUIPMENT:	CME-550
DRILL METHOD:	4.25 / 8.25 HSA; 5 7/8 RC; NQ2 CORE
HOLE DIAMETER:	12" to 6" to 3"
CLOSURE METHOD:	Type III Observation Well Installed
REMARKS:	Located near southeast toe of Ash Fill 1; Water level = 13.89 feet bgs on May 27, 2015

REVIEWED BY: _____

GEOTECHNICAL BORING RECORD

PROJECT NAME: Dan River On-Site Landfill
PROJECT NO.: 7810-14-0065 **START DATE:** 3/18/2015
COORD N: 999469 **COMP. DATE:** 3/18/2015
COORD E: 1790168 **Page** 1 **of** 2
LOCATION: Eden, North Carolina

BORING NO.: OW-415D

amec foster wheeler

DUKE ABSAT GEOTECHNICAL BORING LOG DR ONSITE LANDFILL BORING LOGS 7810140065.GPJ AMEC DUKE ABSAT.GDT 7/6/15

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	SAMPLES TYPE	SAMPLES (Rec") N-COUNT or Rec%/RQD% 6"- 6"- 6"- 6"	PL (%) NM (%) LL (%) ▲ FINES (%) ● SPT (bpf) 10 20 30 40 50 60 70 80 90 100
30	WEATHERED / FRACTURED ROCK: Fine-Grained GRAYWACKE, Intensely Fractured, Horizontal, Low, and High Angle Fractures, No Staining to Moderate Staining		528.9			(3.3)	
				CORE-2			
						(3.8)	
35			523.9				
				CORE-3			
	Moderate to Slight Staining 39 to 43 ft bgs					(4.6)	
40			518.9				
				CORE-4			
45	**Boring Terminated at 44 ft bgs** **Soil Lithologic Descriptions Obtained From OW-415S Boring**		513.9				
50			508.9				
55			503.9				
60			498.9				

0 10 20 30 40 50 60 70 80 90 100

DUKE ABSAT GEOTECHNICAL BORING LOG DR ONSITE LANDFILL BORING LOGS 7810140065.GPJ AMEC DUKE ABSAT.GDT 7/6/15

CONTRACTOR:	SAEDACCO
LOGGED BY:	M. Flanik
EQUIPMENT:	CME-550
DRILL METHOD:	4.25 / 8.25 HSA; 5 7/8 RC; NQ2 CORE
HOLE DIAMETER:	12" to 6" to 3"
CLOSURE METHOD:	Type III Observation Well Installed
REMARKS:	Located near southeast toe of Ash Fill 1; Water level = 13.89 feet bgs on May 27, 2015

REVIEWED BY: _____

GEOTECHNICAL BORING RECORD

PROJECT NAME: Dan River On-Site Landfill
PROJECT NO.: 7810-14-0065 **START DATE:** 3/18/2015
COORD N: 999469 **COMP. DATE:** 3/18/2015
COORD E: 1790168 **Page 2 of 2**
LOCATION: Eden, North Carolina

BORING NO.: OW-415D

amec foster wheeler

PROJECT:	DAN RIVER LANDFILL DAN RIVER STEAM STATION, Eden, NC Amec Foster Wheeler Project No. 7810-14-0065	ROCK CORE PHOTO LOG:	OW-415D

CLIENT:	**Duke Energy**	AUGER REFUSAL DEPTH:	**25.0**	**ft bgs**		LATITUDE:	**36.4939**
DATE DRILLED:	**4/8-9/2015**	ROLLER CONE REFUSAL DEPTH:	**25.5**	**ft bgs**		LONGITUDE:	**-79.7137**
DRILL RIG:	**Diedrich D-50**	CORING TERMINATION DEPTH:	**44.0**	**ft bgs**		GROUND ELEVATION:	**558.86**
DRILLER:	**Stefan Smith**	WATER LEVEL:	**16.45 ft bgs on 4/30/15**			NOTES: Type III Monitoring Well Installed to 42.0 ft bgs with 5-ft screen 36.7-41.7 ft bgs.	
LOGGED BY:	**Lee Eaves**						
CORE SIZE:	**NQ2**						

CORE BOX #: 1 of 2
TOP OF BOX: 25.5 ft bgs
BOTTOM OF BOX: 42.5 ft bgs

CORE BOX #: 2 of 2
TOP OF BOX: 42.5 ft bgs
BOTTOM OF BOX: 44.0 ft bgs

DESCRIPTION:

25.5 to 44 ft bgs: **WEATHERED / FRACTURED ROCK**: Fine-Grained **GRAYWACKE**, Intensely Fractured, Horizontal, Low, and High Angle Fractures, No Staining to Moderate Staining

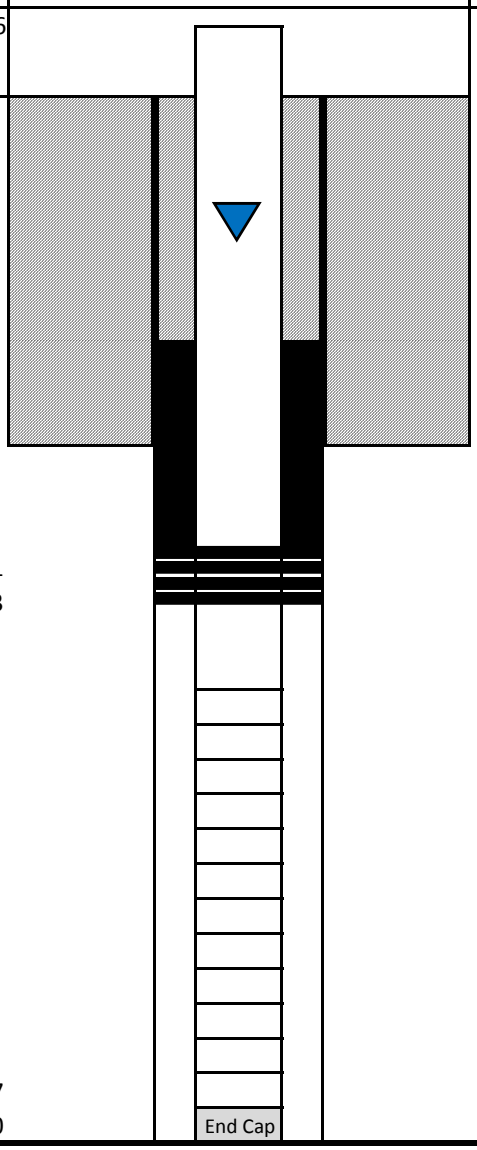
amec foster wheeler

WELL CONSTRUCTION REPORT

WELL ID: **OW-415 D**

PROJECT:	Dan River Landfill
PROJECT NO:	7810-14-0065
PROJECT LOCATION:	Dan River Steam Station; Eden, North Carolina

DRILLING CONTRACTOR:	**SAEDACCO**	WATER LEVEL:	**13.89 ft BGS on 5/27/2015**
DRILLING METHOD:	**8.25"HSA/NQ2 core**	LATITUDE:	**36.4939**
DATE COMPLETED:	**4/9/2015**	LONGITUDE:	**-79.7137**
LOGGED BY:	**Flanik/Eaves**	GS ELEVATION:	**558.86 feet**
Cave-In Below Well:	**42-44 ft bgs**	TOC ELEVATION:	**561.52 feet**
(not depicted)		DATUM:	**Mean Sea Level (MSL)**

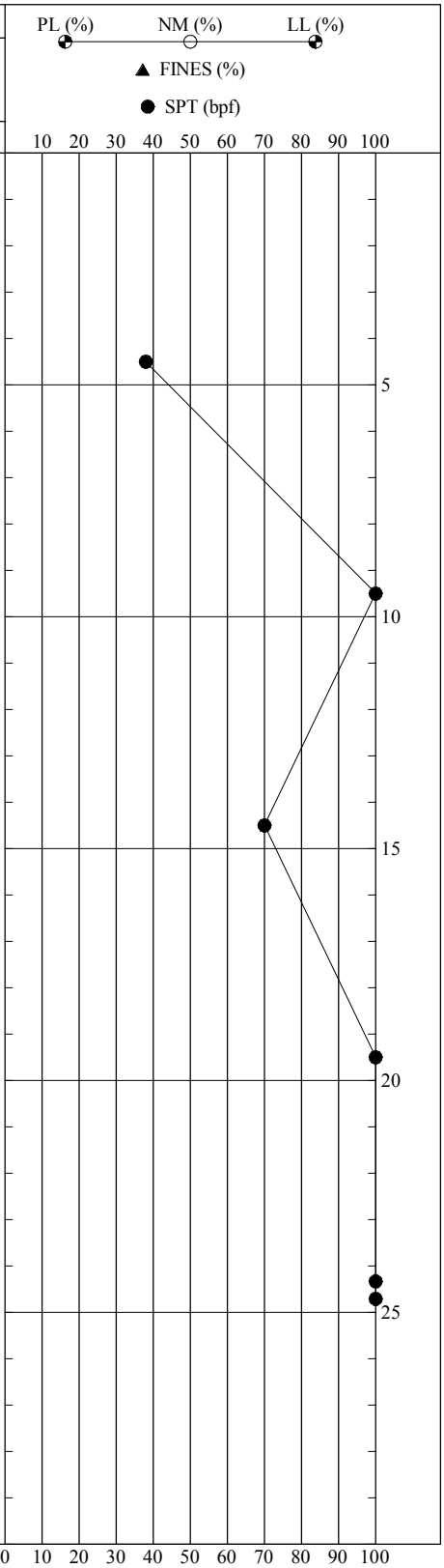
Depth (ft-bgs)	WELL DIAGRAM	Elev (ft-MSL)	WELL CONSTRUCTION DETAILS
+2.66		561.52 TOC	PROTECTIVE CASING: Diameter: 4-inch x 4-inch square; Type: Steel Stickup; Interval: +3 to 2 feet bgs
0		558.86 GS	
			OUTER CASING: Diameter: 6-inch; Type: Sch. 40 PVC; Interval: 0 to 24.5 feet bgs
23.5		535.36	
			INNER CASING: Diameter: 2-inch; Type: Sch. 40 PVC; Interval: +2.66 to 36.7 feet bgs
24.5		534.36	
36.1		522.76	SCREEN: Diameter: 2-inch; Type: Sch. 40 PVC; Interval: 36.7 to 41.7 feet bgs
36.3		522.56	
36.7		522.16	
			FILTER PACK: Type: Not Applicable; Interval: Not Applicable
			SEAL: Type: Bentonite & K-Packer; Interval: 23.5 to 36.3 feet bgs
			GROUT: Type: Neat Cement; Interval: 0 to 23.5 feet bgs
41.7		517.16	
42.0	End Cap	516.86	

NOTES: GS=ground surface; TOC=top of inner PVC casing; bgs=below ground surface

Not to Scale

DUKE ABSAT GEOTECHNICAL BORING LOG DR ONSITE LANDFILL BORING LOGS 7810140065.GPJ AMEC DUKE ABSAT.GDT 7/6/15

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	(Rec") N-COUNT or Rec%/RQD% 6"- 6"- 6"- 6"
0	SAPROLITE: Yellow (10YR 7/8), Dense, Silty Fine SAND (SM), Non-Plastic, Moist to Dry		559.0			
				SS-1		(18) 5-10-28
5			554.0			
	PARTIALLY WEATHERED ROCK: When Sampled Becomes Yellow (10YR 8/6), Very Dense, Silty Fine SAND (SM), Non-Plastic, Moist to Dry			SS-2		(14.4) 8-42-50/4
10			549.0			
	SAPROLITE: Yellow-Tan (10YR 8/4), Very Dense, Clayey Fine to Medium SAND (SC) with Manganese Staining, Low Plasticity, Moist to Dry			SS-3		(18) 13-26-44
15			544.0			
	PARTIALLY WEATHERED ROCK: When Sampled Becomes Pale Brown (10YR 7/3) to Gray (6/N), Very Dense, Silty Fine SAND (SM) with Rock Fragments, Non-Plastic, Dry to Moist			SS-4		(14.4) 16-49-50/4
20			539.0			
	Becomes Gray (6/N)			SS-5		(9.6) 30-50/4
				SS-6		(1.2) 50/2.5
25	**Auger Refusal at 24.6 ft bgs**		534.0			
30			529.0			



CONTRACTOR:	SAEDACCO
LOGGED BY:	M. Flanik
EQUIPMENT:	CME-550
DRILL METHOD:	4.25 HSA
HOLE DIAMETER:	7"
CLOSURE METHOD:	Type II Observation Well Installed
REMARKS:	Located near southeast toe of Ash Fill 1; Water level = 11.82 feet bgs on May 27, 2015

REVIEWED BY: _____

GEOTECHNICAL BORING RECORD

PROJECT NAME: Dan River On-Site Landfill
PROJECT NO.: 7810-14-0065 **START DATE:** 3/10/2015
COORD N: 999468 **COMP. DATE:** 3/10/2015
COORD E: 1790171 **Page** 1 **of** 1
LOCATION: Eden, North Carolina

BORING NO.: OW-415S

amec foster wheeler

WELL CONSTRUCTION REPORT

WELL ID: **OW-415 S**

PROJECT:	Dan River Landfill
PROJECT NO:	7810-14-0065
PROJECT LOCATION:	Dan River Steam Station; Eden, North Carolina

DRILLING CONTRACTOR:	**SAEDACCO**	WATER LEVEL:	**11.82 ft BGS on 5/27/2015**
DRILLING METHOD:	**4.25" HSA**	LATITUDE:	**36.4939**
DATE COMPLETED:	**3/10/2015**	LONGITUDE:	**-79.7137**
LOGGED BY:	**M. Flanik**	GS ELEVATION:	**559.00 feet**
Cave-In Below Well: (not depicted)	**24-24.6 ft bgs**	TOC ELEVATION:	**562.04 feet**
		DATUM:	**Mean Sea Level (MSL)**

Depth (ft-bgs)	WELL DIAGRAM	Elev (ft-MSL)	WELL CONSTRUCTION DETAILS
+3.04		562.04 TOC	PROTECTIVE CASING:
0		559.00 GS	Diameter: 4-inch x 4-inch square Type: Steel Stickup Interval: +3.5 to 2 feet bgs
			OUTER CASING: Diameter: Not Applicable Type: Not Applicable Interval: Not Applicable
			INNER CASING: Diameter: 2-inch Type: Sch. 40 PVC Interval: +3.04 to 7.7 feet bgs
4.0		555.00	
			SCREEN: Diameter: 2-inch Type: Sch. 40 PVC Interval: 7.7 to 17.7 feet bgs
6.0		553.00	
7.7		551.30	
			FILTER PACK: Type: #2 Silica Sand Interval: 6 to 24 feet bgs
			SEAL: Type: Bentonite Interval: 4 to 6 feet bgs
			GROUT: Type: Neat Cement Interval: 0 to 4 feet bgs
17.7		541.30	
18.0	End Cap	541.00	
24.0		535.00	

NOTES: GS=ground surface; TOC=top of inner PVC casing; bgs=below ground surface

Not to Scale

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	SAMPLES TYPE	SAMPLES (Rec") N-COUNT or Rec%/RQD% 6"- 6"- 6"- 6"	PL (%) NM (%) LL (%) ▲ FINES (%) ● SPT (bpf) 10 20 30 40 50 60 70 80 90 100
0	FILL: Yellow (10YR 7/8), Firm, Sandy Lean CLAY (CL), with Trace Roots, Gravel, and Metal Debris, Low Plasticity, Moist		558.2				
5			553.2				
	SAPROLITE: Yellow (10YR 7/6) to Yellow (10YR 7/6) with Brown (10YR 4/3) Streaks, Medium-Dense to Dense, Silty Fine SAND (SM), Non-Plastic, Moist						
10			548.2				
15			543.2				
	PARTIALLY WEATHERED ROCK: When Sampled Becomes Yellow-Tan (10YR 7/4) Clayey Fine to Coarse SAND (SC) with Rock Fragments, Low Plasticity, Moist to Dry						
20			538.2				
25			533.2				
	PARTIALLY WEATHERED ROCK: When Sampled Becomes Pale Brown (10YR 7/4) Silty Coarse to Fine SAND (SM), Non-Plastic, Moist to Wet						
30			528.2				

DUKE ABSAT GEOTECHNICAL BORING LOG DR ONSITE LANDFILL BORING LOGS 7810140065.GPJ AMEC DUKE ABSAT.GDT 7/6/15

CONTRACTOR:	SAEDACCO
LOGGED BY:	M. Flanik
EQUIPMENT:	CME-550
DRILL METHOD:	4.25 / 8.25 HSA; 5 7/8 RC; NQ2 CORE
HOLE DIAMETER:	12" to 6" to 3"
CLOSURE METHOD:	Type III Observation Well Installed
REMARKS:	Located south of Ash Fill 1; Water level = 25.40 feet bgs on May 27, 2015

REVIEWED BY: _____

GEOTECHNICAL BORING RECORD

PROJECT NAME: Dan River On-Site Landfill
PROJECT NO.: 7810-14-0065 **START DATE:** 3/12/2015
COORD N: 999170 **COMP. DATE:** 3/12/2015
COORD E: 1789814 **Page** 1 **of** 2
LOCATION: Eden, North Carolina

BORING NO.: OW-416D

amec foster wheeler

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	SAMPLES TYPE	SAMPLES (Rec") N-COUNT or Rec%/RQD% 6"- 6"- 6"- 6"	PL (%) NM (%) LL (%) ▲ FINES (%) ● SPT (bpf) 0 10 20 30 40 50 60 70 80 90 100
30	**Auger Refusal at 29.3 ft bgs**;**Begin 5 7/8" Roller Cone** WEATHERED / FRACTURED ROCK: (No Samples Obtained); **Roller Cone Refusal at 30 ft bgs**; **Begin NQ2 Core** WEATHERED / FRACTURED ROCK: Brown-Gray, Fine-Grained SANDSTONE, Moderately Weathered and Intensely Fractured, Horizontal, Low, and High Angle Fractures with Heavy Staining		528.2	CORE-1		74/8	
35			523.2	CORE-2		76/18	
	WEATHERED / FRACTURED ROCK: Fine-Grained GRAYWACKE, Intensely Fractured, Horizontal, Low, and High Angle Fractures, Slight to Moderate Staining						
40			518.2	CORE-3		88/28	
	Staining on Fracture 44.5 ft bgs						
45	**Boring Terminated at 45 ft bgs** **Soil Lithologic Descriptions Obtained From OW-416S Boring**		513.2				
50			508.2				
55			503.2				
60			498.2				

DUKE ABSAT GEOTECHNICAL BORING LOG DR ONSITE LANDFILL BORING LOGS 7810140065.GPJ AMEC DUKE ABSAT.GDT 7/6/15

CONTRACTOR:	SAEDACCO
LOGGED BY:	M. Flanik
EQUIPMENT:	CME-550
DRILL METHOD:	4.25 / 8.25 HSA; 5 7/8 RC; NQ2 CORE
HOLE DIAMETER:	12" to 6" to 3"
CLOSURE METHOD:	Type III Observation Well Installed
REMARKS:	Located south of Ash Fill 1; Water level = 25.40 feet bgs on May 27, 2015

REVIEWED BY: _____

GEOTECHNICAL BORING RECORD

PROJECT NAME: Dan River On-Site Landfill
PROJECT NO.: 7810-14-0065 **START DATE:** 3/12/2015
COORD N: 999170 **COMP. DATE:** 3/12/2015
COORD E: 1789814 **Page 2 of 2**
LOCATION: Eden, North Carolina

BORING NO.: OW-416D

amec foster wheeler

PROJECT:	DAN RIVER LANDFILL DAN RIVER STEAM STATION, Eden, NC Amec Foster Wheeler Project No. 7810-14-0065	ROCK CORE PHOTO LOG:	OW-416D

CLIENT:	**Duke Energy**	AUGER REFUSAL DEPTH:	**29.5**	**ft bgs**		LATITUDE:	**36.4931**
DATE DRILLED:	**4/15-16/2015**	ROLLER CONE REFUSAL DEPTH:	**30.0**	**ft bgs**		LONGITUDE:	**-79.7147**
DRILL RIG:	**Diedrich D-50**	CORING TERMINATION DEPTH:	**45.0**	**ft bgs**		GROUND ELEVATION:	**558.21**
DRILLER:	**Stefan Smith**	WATER LEVEL:	**27.93 ft bgs on 4/29/15**			NOTES: Type III Monitoring Well Installed to 45.0 ft bgs with 5-ft screen 39.7-44.7.	
LOGGED BY:	**Lee Eaves**						
CORE SIZE:	**NQ2**						

CORE BOX #: 1 of 1
TOP OF BOX: 30.0 ft bgs
BOTTOM OF BOX: 45.0 ft bgs

DESCRIPTION:

30 to 38 ft bgs: **WEATHERED / FRACTURED ROCK**: Brown-Gray, Fine-Grained **SANDSTONE**, Moderately Weathered and Intensely Fractured, Horizontal, Low, and High Angle Fractures with Heavy Staining

38 to 45 ft bgs: **WEATHERED / FRACTURED ROCK**: Fine-Grained **GRAYWACKE**, Intensely Fractured, Horizontal, Low, and High Angle Fractures, Slight to Moderate Staining

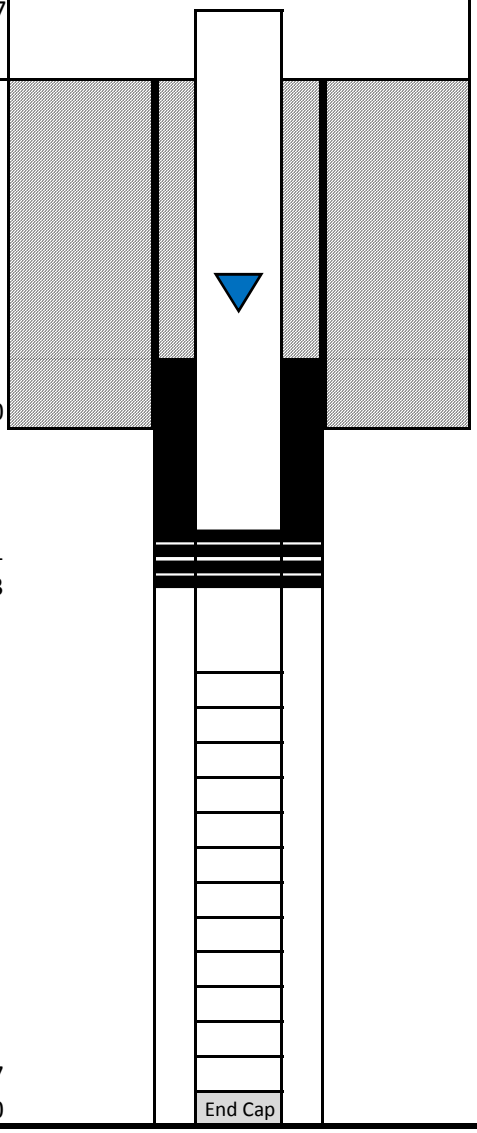
amec foster wheeler

WELL CONSTRUCTION REPORT

WELL ID: **OW-416 D**

PROJECT:	Dan River Landfill
PROJECT NO:	7810-14-0065
PROJECT LOCATION:	Dan River Steam Station; Eden, North Carolina

DRILLING CONTRACTOR:	**SAEDACCO**	WATER LEVEL:	**25.40 ft BGS on 5/27/2015**
DRILLING METHOD:	**8.25"HSA/NQ2 core**	LATITUDE:	**36.4931**
DATE COMPLETED:	**4/16/2015**	LONGITUDE:	**-79.7149**
LOGGED BY:	**Flanik/Eaves**	GS ELEVATION:	**558.21 feet**
Cave-In Below Well:	**None**	TOC ELEVATION:	**561.08 feet**
(not depicted)		DATUM:	**Mean Sea Level (MSL)**

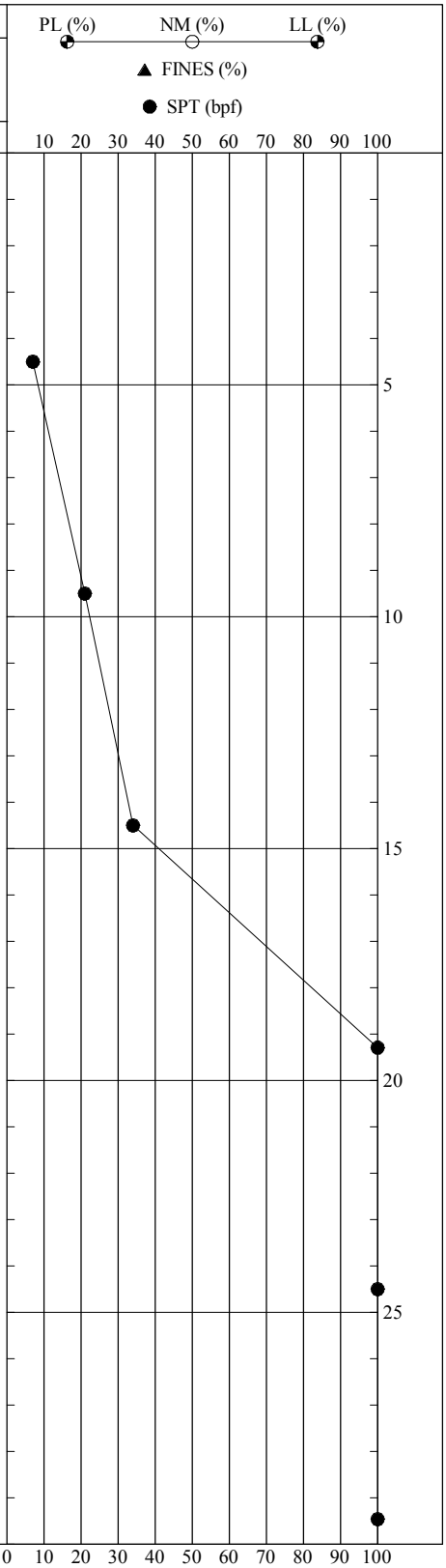
Depth (ft-bgs)	WELL DIAGRAM	Elev (ft-MSL)	WELL CONSTRUCTION DETAILS
+2.87		561.08 TOC	PROTECTIVE CASING:
0		558.21 GS	Diameter: 4-inch x 4-inch square Type: Steel Stickup Interval: +3.5 to 2 feet bgs
			OUTER CASING:
			Diameter: 6-inch Type: Sch. 40 PVC Interval: 0 to 29 feet bgs
27.0		531.21	INNER CASING:
29.0		529.21	Diameter: 2-inch Type: Sch. 40 PVC Interval: +2.87 to 39.7 feet bgs
39.1		519.11	SCREEN:
39.3		518.91	Diameter: 2-inch Type: Sch. 40 PVC Interval: 39.7 to 44.7 feet bgs
39.7		518.51	
			FILTER PACK:
			Type: Not Applicable Interval: Not Applicable
			SEAL:
			Type: Bentonite & K-Packer Interval: 27 to 39.3 feet bgs
			GROUT:
			Type: Neat Cement
44.7		513.51	Interval: 0 to 27 feet bgs
45.0	End Cap	513.21	

NOTES: GS=ground surface; TOC=top of inner PVC casing; bgs=below ground surface

Not to Scale

DUKE ABSAT GEOTECHNICAL BORING LOG DR ONSITE LANDFILL BORING LOGS 7810140065.GPJ AMEC DUKE ABSAT.GDT 7/6/15

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	(Rec") N-COUNT or Rec%/RQD% 6"- 6"- 6"- 6"
0	FILL: Yellow (10YR 7/8), Firm, Sandy Lean CLAY (CL), with Trace Roots, Gravel, and Metal Debris, Low Plasticity, Moist		557.9			
				SS-1		(15.6) 3-3-4
5			552.9			
	SAPROLITE: Yellow (10YR 7/6) to Yellow (10YR 7/6) with Brown (10YR 4/3) Streaks, Medium-Dense to Dense, Silty Fine SAND (SM), Non-Plastic, Moist			SS-2		(18) 3-6-15
10			547.9			
				SS-3		(18) 9-10-24
15			542.9			
	PARTIALLY WEATHERED ROCK: When Sampled Becomes Yellow-Tan (10YR 7/4) Clayey Fine to Coarse SAND (SC) with Rock Fragments, Low Plasticity, Moist to Dry			SS-4		(9.5) 20-50/3.5
20			537.9			
				SS-5		(14.4) 12-23-50/3
25			532.9			
				SS-6		(10.8) 25-50/5.5
30			527.9			



CONTRACTOR:	SAEDACCO
LOGGED BY:	M. Flanik
EQUIPMENT:	CME-550
DRILL METHOD:	4.25 HSA
HOLE DIAMETER:	7"
CLOSURE METHOD:	Type II Observation Well Installed
REMARKS:	Located south of Ash Fill 1; Water level = 22.01 feet bgs on May 27, 2015

REVIEWED BY: _____

GEOTECHNICAL BORING RECORD

PROJECT NAME: Dan River On-Site Landfill
PROJECT NO.: 7810-14-0065 **START DATE:** 3/11/2015
COORD N: 999171 **COMP. DATE:** 3/11/2015
COORD E: 1789819 **Page** 1 **of** 2
LOCATION: Eden, North Carolina

BORING NO.: OW-416S

amec foster wheeler

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	(Rec") N-COUNT or Rec%/RQD% 6"- 6"- 6"- 6"	PL (%) NM (%) LL (%) ▲ FINES (%) ● SPT (bpf) 10 20 30 40 50 60 70 80 90 100
30	PARTIALLY WEATHERED ROCK: When Sampled Becomes Pale Brown (10YR 7/4) to Gray (6/N), Silty Coarse to Fine SAND (SM) with Rock Fragments, Non-Plastic, Moist to Wet Becomes Gray (6/N)		527.9	SS-7		(1) 50/1	
	Auger Refusal at 32.5 ft bgs						
35			522.9				
40			517.9				
45			512.9				
50			507.9				
55			502.9				
60			497.9				

DUKE ABSAT GEOTECHNICAL BORING LOG DR ONSITE LANDFILL BORING LOGS 7810140065.GPJ AMEC DUKE ABSAT.GDT 7/6/15

CONTRACTOR:	SAEDACCO
LOGGED BY:	M. Flanik
EQUIPMENT:	CME-550
DRILL METHOD:	4.25 HSA
HOLE DIAMETER:	7"
CLOSURE METHOD:	Type II Observation Well Installed
REMARKS:	Located south of Ash Fill 1; Water level = 22.01 feet bgs on May 27, 2015

REVIEWED BY: _____

GEOTECHNICAL BORING RECORD

PROJECT NAME: Dan River On-Site Landfill
PROJECT NO.: 7810-14-0065 **START DATE:** 3/11/2015
COORD N: 999171 **COMP. DATE:** 3/11/2015
COORD E: 1789819 **Page 2 of 2**
LOCATION: Eden, North Carolina

BORING NO.: OW-416S

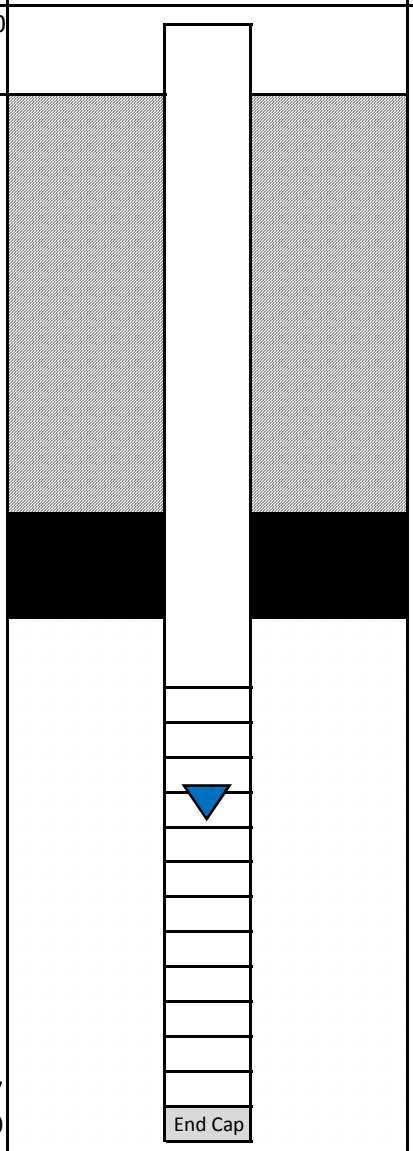
amec foster wheeler

WELL CONSTRUCTION REPORT

WELL ID: **OW-416 S**

PROJECT:	Dan River Landfill
PROJECT NO:	7810-14-0065
PROJECT LOCATION:	Dan River Steam Station; Eden, North Carolina

DRILLING CONTRACTOR:	**SAEDACCO**	WATER LEVEL:	**22.01 ft BGS on 5/27/2015**
DRILLING METHOD:	**4.25" HSA**	LATITUDE:	**36.4931**
DATE COMPLETED:	**3/11/2015**	LONGITUDE:	**-79.7149**
LOGGED BY:	**M. Flanik**	GS ELEVATION:	**557.90 feet**
Cave-In Below Well: (not depicted)	**None**	TOC ELEVATION:	**560.80 feet**
		DATUM:	**Mean Sea Level (MSL)**

Depth (ft-bgs)	WELL DIAGRAM	Elev (ft-MSL)	WELL CONSTRUCTION DETAILS
+2.90		560.80 TOC	PROTECTIVE CASING:
0		557.90 GS	Diameter: 4-inch x 4-inch square Type: Steel Stickup Interval: +3.5 to 2 feet bgs
			OUTER CASING: Diameter: Not Applicable Type: Not Applicable Interval: Not Applicable
			INNER CASING: Diameter: 2-inch Type: Sch. 40 PVC Interval: +2.90 to 18.7 feet bgs
15.0		542.90	
			SCREEN: Diameter: 2-inch Type: Sch. 40 PVC Interval: 18.7 to 28.7 feet bgs
17.0		540.90	
18.7		539.20	
			FILTER PACK: Type: #2 Silica Sand Interval: 17 to 32.5 feet bgs
			SEAL: Type: Bentonite Interval: 15 to 17 feet bgs
			GROUT: Type: Neat Cement Interval: 0 to 15 feet bgs
28.7		529.20	
29.0	End Cap	528.90	
32.5		525.40	

NOTES: GS=ground surface; TOC=top of inner PVC casing; bgs=below ground surface

Not to Scale

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	SAMPLES TYPE	SAMPLES (Rec") N-COUNT or Rec%/RQD% 6"- 6"- 6"- 6"	PL (%) NM (%) LL (%) ▲ FINES (%) ● SPT (bpf) 10 20 30 40 50 60 70 80 90 100
0	SAPROLITE: Yellow (10YR 7/8), Hard, Elastic SILT with Sand (MH) with Rock Fragments, Low Plasticity, Dry		594.2	UD-1		(20.4)	
5			589.2				
	PARTIALLY WEATHERED ROCK: Brown-Yellow (10YR 6/6), Very Dense, Silty Fine to Medium SAND (SM), Non-Plastic, Dry						
10			584.2				
	SAPROLITE: Brown-Yellow (10YR 6/6), Very Hard, Sandy Lean CLAY (CL) with Rock Fragments, Low Plasticity, Dry to Moist						
15			579.2				
	SAPROLITE: Dark Gray-Brown (10YR 4/2), Dense, Silty Fine SAND (SM), Non-Plastic, Moist						
20			574.2				
	SAPROLITE: Yellow-Tan (10YR 6/6), Very Dense, Clayey SAND (SC), Low Plasticity, Moist						
25			569.2				
	PARTIALLY WEATHERED ROCK: When Sampled Becomes Gray (7.5YR 6/1), Very Dense, Silty Fine SAND (SM) with Rock Fragments, Non-Plastic, Dry to Moist						
30			564.2				

DUKE ABSAT GEOTECHNICAL BORING LOG DR ONSITE LANDFILL BORING LOGS 7810140065.GPJ AMEC DUKE ABSAT.GDT 7/6/15

CONTRACTOR:	SAEDACCO
LOGGED BY:	M. Flanik
EQUIPMENT:	CME-550
DRILL METHOD:	4.25 / 8.25 HSA; 5 7/8 RC; NQ2 CORE
HOLE DIAMETER:	12" to 6" to 3"
CLOSURE METHOD:	Type III Observation Well Installed
REMARKS:	Located northwest of Ash Fill 1; Water level = 18.05 feet bgs on May 27, 2015

REVIEWED BY: _____

GEOTECHNICAL BORING RECORD

PROJECT NAME: Dan River On-Site Landfill
PROJECT NO.: 7810-14-0065 **START DATE:** 4/2/2015
COORD N: 1000386 **COMP. DATE:** 4/2/2015
COORD E: 1788351 **Page** 1 **of** 2
LOCATION: Eden, North Carolina

BORING NO.: OW-417D

amec foster wheeler

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	(Rec") N-COUNT or Rec%/RQD% 6"- 6"- 6"- 6"	PL (%) NM (%) LL (%) ▲ FINES (%) ● SPT (bpf) 10 20 30 40 50 60 70 80 90 100
30	PARTIALLY WEATHERED ROCK: When Sampled Becomes Gray (7.5YR 6/1), Very Dense, Silty Fine SAND (SM) with Rock Fragments, Non-Plastic, Dry to Moist **Auger Refusal at 33 ft bgs; Begin 5 7/8" Roller Cone**		564.2				
	WEATHERED / FRACTURED ROCK: (No Samples Obtained); **Roller Cone Refusal at 33.5 ft bgs; Begin NQ2 Core**						
35	WEATHERED / FRACTURED ROCK: Fine-Grained GRAYWACKE, Intensely Fractured, Horizontal, Low, and High Angle Fractures, Moderate to Slight Staining		559.2	CORE-1		74/0	
	WEATHERED / FRACTURED ROCK: Fine-Grained GRAYWACKE, Moderately Fractured, Horizontal, Low, and High Angle Fractures, No Staining						
40			554.2	CORE-2		100/24	
45			549.2	CORE-3		100/48	
	Boring Terminated at 48.5 ft bgs **Soil Lithologic Descriptions Obtained From OW-417S Boring**						
50			544.2				
55			539.2				
60			534.2				

0 10 20 30 40 50 60 70 80 90 100

DUKE ABSAT GEOTECHNICAL BORING LOG DR ONSITE LANDFILL BORING LOGS 7810140065.GPJ AMEC DUKE ABSAT.GDT 7/6/15

CONTRACTOR:	SAEDACCO
LOGGED BY:	M. Flanik
EQUIPMENT:	CME-550
DRILL METHOD:	4.25 / 8.25 HSA; 5 7/8 RC; NQ2 CORE
HOLE DIAMETER:	12" to 6" to 3"
CLOSURE METHOD:	Type III Observation Well Installed
REMARKS:	Located northwest of Ash Fill 1; Water level = 18.05 feet bgs on May 27, 2015

REVIEWED BY: _____

GEOTECHNICAL BORING RECORD

PROJECT NAME: Dan River On-Site Landfill
PROJECT NO.: 7810-14-0065 **START DATE:** 4/2/2015
COORD N: 1000386 **COMP. DATE:** 4/2/2015
COORD E: 1788351 **Page 2 of 2**
LOCATION: Eden, North Carolina

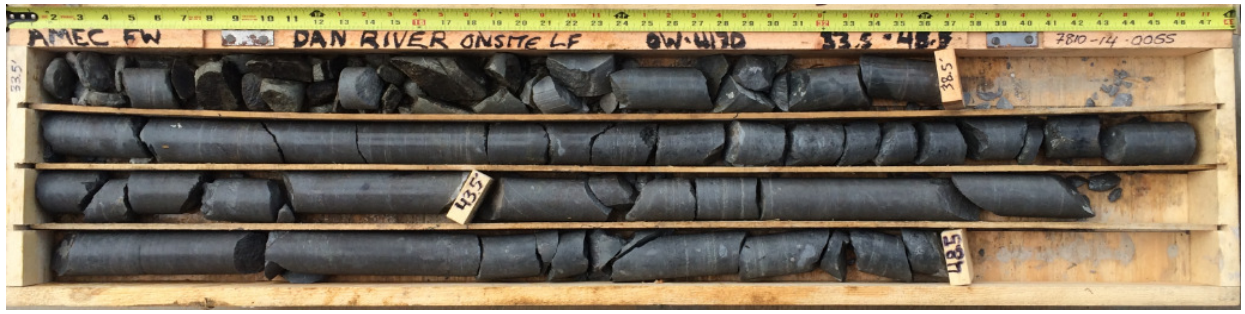
BORING NO.: OW-417D

amec foster wheeler

PROJECT:	DAN RIVER LANDFILL DAN RIVER STEAM STATION, Eden, NC Amec Foster Wheeler Project No. 7810-14-0065	ROCK CORE PHOTO LOG:	OW-417D

CLIENT:	**Duke Energy**	AUGER REFUSAL DEPTH:	**33.0**	**ft bgs**		LATITUDE:	**36.4964**
DATE DRILLED:	**4/14-15/2015**	ROLLER CONE REFUSAL DEPTH:	**33.5**	**ft bgs**		LONGITUDE:	**-79.7200**
DRILL RIG:	**Diedrich D-50 Turbo**	CORING TERMINATION DEPTH:	**48.5**	**ft bgs**		GROUND ELEVATION:	**594.18**
DRILLER:	**Richy Lemire**	WATER LEVEL:	**19.30 ft bgs on 4/30/15**			NOTES: Type III Monitoring Well Installed to 47.7 ft bgs with 5-ft screen 42.4-47.4 ft bgs.	
LOGGED BY:	**Rodney Clark**						
CORE SIZE:	**NQ2**						

CORE BOX #: 1 of 1
TOP OF BOX: 33.5 ft bgs
BOTTOM OF BOX: 48.5 ft bgs



DESCRIPTION:

33.5 to 38.5 ft bgs: **WEATHERED / FRACTURED ROCK**: Fine-Grained **GRAYWACKE**, Intensely Fractured, Horizontal, Low, and High Angle Fractures, Moderate to Slight Staining

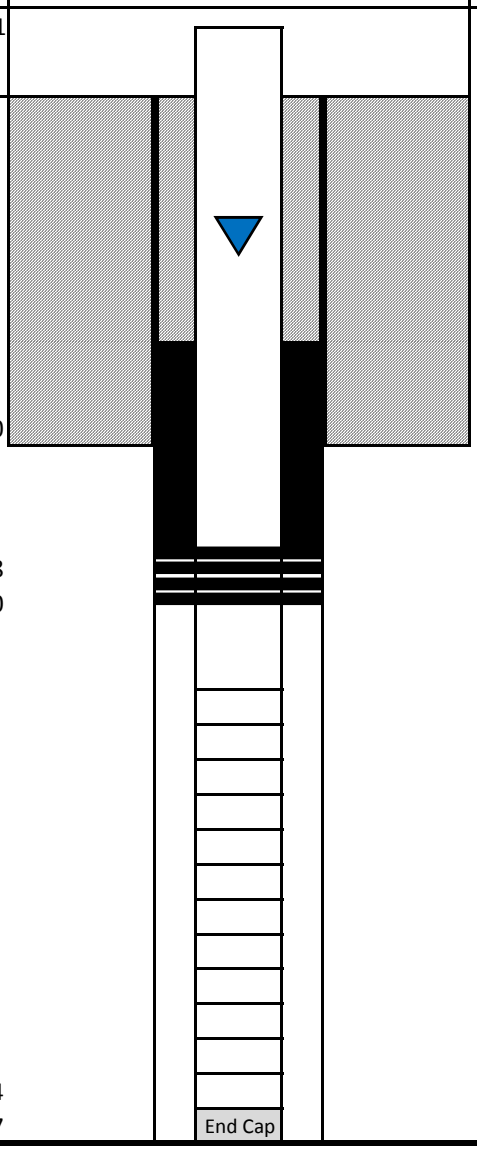
38.5 to 48.5 ft bgs: **WEATHERED / FRACTURED ROCK**: Fine-Grained **GRAYWACKE**, Moderately Fractured, Horizontal, Low, and High Angle Fractures, No Staining

WELL CONSTRUCTION REPORT

WELL ID: **OW-417 D**

PROJECT:	Dan River Landfill
PROJECT NO:	7810-14-0065
PROJECT LOCATION:	Dan River Steam Station; Eden, North Carolina

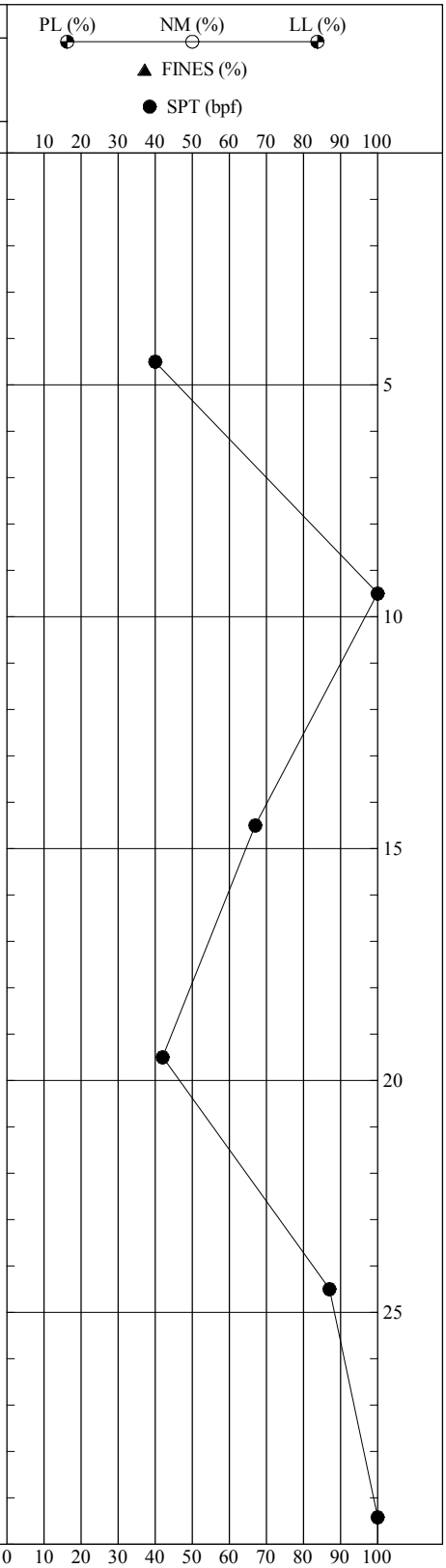
DRILLING CONTRACTOR:	**SAEDACCO**	WATER LEVEL:	**18.05 ft BGS on 5/27/2015**
DRILLING METHOD:	**8.25"HSA/NQ2 core**	LATITUDE:	**36.4964**
DATE COMPLETED:	**4/14/2015**	LONGITUDE:	**-79.7200**
LOGGED BY:	**Flanik/Clark**	GS ELEVATION:	**594.18 feet**
Cave-In Below Well:	**47.7-48.5 ft bgs**	TOC ELEVATION:	**597.58 feet**
(not depicted)		DATUM:	**Mean Sea Level (MSL)**

Depth (ft-bgs)	WELL DIAGRAM	Elev (ft-MSL)	WELL CONSTRUCTION DETAILS
+3.41		597.58 TOC	PROTECTIVE CASING: Diameter: 4-inch x 4-inch square; Type: Steel Stickup; Interval: +4 to 2 feet bgs
0		594.18 GS	OUTER CASING: Diameter: 6-inch; Type: Sch. 40 PVC; Interval: 0 to 33 feet bgs
31.5		562.68	INNER CASING: Diameter: 2-inch; Type: Sch. 40 PVC; Interval: +3.41 to 42.4 feet bgs
33.0		561.18	
41.8		552.38	SCREEN: Diameter: 2-inch; Type: Sch. 40 PVC; Interval: 42.4 to 47.4 feet bgs
42.0		552.18	
42.4		551.78	FILTER PACK: Type: Not Applicable; Interval: Not Applicable
			SEAL: Type: Bentonite & K-Packer; Interval: 31.5 to 42 feet bgs
			GROUT: Type: Neat Cement; Interval: 0 to 31.5 feet bgs
47.4		546.78	
47.7	End Cap	546.48	

NOTES: GS=ground surface; TOC=top of inner PVC casing; bgs=below ground surface

Not to Scale

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	(Rec") N-COUNT or Rec%/RQD% 6"- 6"- 6"- 6"
0	SAPROLITE: Yellow (10YR 7/8), Hard, Elastic SILT with Sand (MH) with Rock Fragments, Low Plasticity, Dry		594.2			
				SS-1		(18) 8-11-29
5			589.2			
	PARTIALLY WEATHERED ROCK: Brown-Yellow (10YR 6/6), Very Dense, Silty Fine to Medium SAND (SM), Non-Plastic, Dry			SS-2		(13.2) 15-42-50/5
10			584.2			
	SAPROLITE: Brown-Yellow (10YR 6/6), Very Hard, Sandy Lean CLAY (CL) with Rock Fragments, Low Plasticity, Dry to Moist			SS-3		(14.4) 12-32-35
15			579.2			
	SAPROLITE: Dark Gray-Brown (10YR 4/2), Dense, Silty Fine SAND (SM), Non-Plastic, Moist			SS-4		(18) 10-16-26
20			574.2			
	SAPROLITE: Yellow-Tan (10YR 6/6), Very Dense, Clayey SAND (SC), Low Plasticity, Moist			SS-5		(13.2) 7-37-50
25			569.2			
	PARTIALLY WEATHERED ROCK: When Sampled Becomes Gray (7.5YR 6/1), Very Dense, Silty Fine SAND (SM) with Rock Fragments, Non-Plastic, Dry to Moist			SS-6		(9.6) 25-50/5
30			564.2			



DUKE ABSAT GEOTECHNICAL BORING LOG DR ONSITE LANDFILL BORING LOGS 7810140065.GPJ AMEC DUKE ABSAT.GDT 7/6/15

CONTRACTOR:	SAEDACCO
LOGGED BY:	L. Eaves
EQUIPMENT:	CME-550
DRILL METHOD:	4.25 HSA
HOLE DIAMETER:	7"
CLOSURE METHOD:	Type II Observation Well Installed
REMARKS:	Located northwest of Ash Fill 1; Water level = 21.78 feet bgs on May 27, 2015

REVIEWED BY: _____

GEOTECHNICAL BORING RECORD

PROJECT NAME: Dan River On-Site Landfill
PROJECT NO.: 7810-14-0065 **START DATE:** 4/1/2015
COORD N: 1000390 **COMP. DATE:** 4/1/2015
COORD E: 1788347 **Page** 1 **of** 2
LOCATION: Eden, North Carolina

BORING NO.: OW-417S

amec foster wheeler

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	(Rec") N-COUNT or Rec%/RQD% 6"- 6"- 6"- 6"	PL (%) NM (%) LL (%) ▲ FINES (%) ● SPT (bpf) 10 20 30 40 50 60 70 80 90 100
30	PARTIALLY WEATHERED ROCK: When Sampled Becomes Gray (7.5YR 6/1), Very Dense, Silty Fine SAND (SM) with Rock Fragments, Non-Plastic, Dry to Moist		564.2	SS-7	⊠	(5) 50/5	●
	Auger Refusal at 34 ft bgs						
35			559.2				
40			554.2				
45			549.2				
50			544.2				
55			539.2				
60			534.2				

0 10 20 30 40 50 60 70 80 90 100

DUKE ABSAT GEOTECHNICAL BORING LOG DR ONSITE LANDFILL BORING LOGS 7810140065.GPJ AMEC DUKE ABSAT.GDT 7/6/15

CONTRACTOR:	SAEDACCO
LOGGED BY:	L. Eaves
EQUIPMENT:	CME-550
DRILL METHOD:	4.25 HSA
HOLE DIAMETER:	7"
CLOSURE METHOD:	Type II Observation Well Installed
REMARKS:	Located northwest of Ash Fill 1; Water level = 21.78 feet bgs on May 27, 2015

REVIEWED BY: _____

GEOTECHNICAL BORING RECORD

PROJECT NAME: Dan River On-Site Landfill
PROJECT NO.: 7810-14-0065 **START DATE:** 4/1/2015
COORD N: 1000390 **COMP. DATE:** 4/1/2015
COORD E: 1788347 **Page** 2 **of** 2
LOCATION: Eden, North Carolina

BORING NO.: OW-417S

amec foster wheeler

WELL CONSTRUCTION REPORT

WELL ID: **OW-417 S**

PROJECT:	Dan River Landfill
PROJECT NO:	7810-14-0065
PROJECT LOCATION:	Dan River Steam Station; Eden, North Carolina

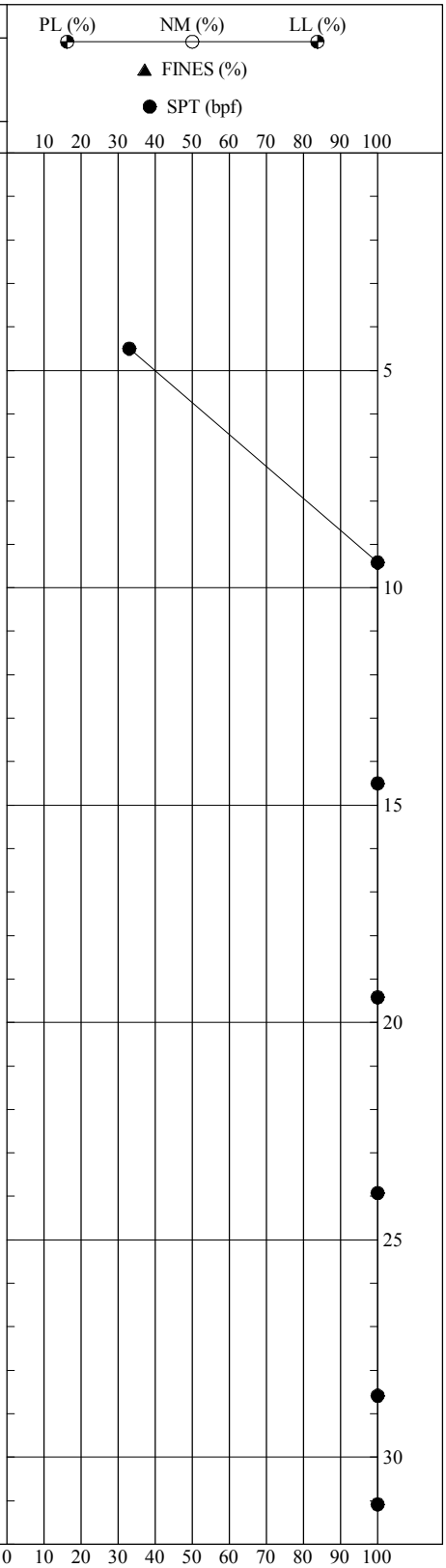
DRILLING CONTRACTOR:	**SAEDACCO**	WATER LEVEL:	**21.78 ft BGS on 5/27/2015**
DRILLING METHOD:	**4.25" HSA**	LATITUDE:	**36.4964**
DATE COMPLETED:	**4/1/2015**	LONGITUDE:	**-79.7200**
LOGGED BY:	**L. Eaves**	GS ELEVATION:	**594.15 feet**
Cave-In Below Well:	**None**	TOC ELEVATION:	**597.68 feet**
(not depicted)		DATUM:	**Mean Sea Level (MSL)**

Depth (ft-bgs)	WELL DIAGRAM	Elev (ft-MSL)	WELL CONSTRUCTION DETAILS
+3.52		597.68 TOC	PROTECTIVE CASING:
0		594.15 GS	Diameter: 4-inch x 4-inch square Type: Steel Stickup Interval: +4 to 2 feet bgs
			OUTER CASING: Diameter: Not Applicable Type: Not Applicable Interval: Not Applicable
			INNER CASING: Diameter: 2-inch Type: Sch. 40 PVC Interval: +3.52 to 18.7 feet bgs
15.0		579.15	
			SCREEN: Diameter: 2-inch Type: Sch. 40 PVC Interval: 18.7 to 33.7 feet bgs
17.0		577.15	
18.7		575.45	
			FILTER PACK: Type: #2 Silica Sand Interval: 17 to 34 feet bgs
			SEAL: Type: Bentonite Interval: 15 to 17 feet bgs
			GROUT: Type: Neat Cement Interval: 0 to 15 feet bgs
33.7		560.45	
34.0	End Cap	560.15	

NOTES: GS=ground surface; TOC=top of inner PVC casing; bgs=below ground surface

Not to Scale

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	(Rec") N-COUNT or Rec%/RQD% 6"- 6"- 6"- 6"
0	SAPROLITE: Dark Yellow-Brown (10YR 4/6), Hard, Fine Sandy Clayey SILT (ML) with Rock Fragments, Medium Plasticity, Moist		588.9			
				SS-1		(18) 5-7-26
5	SAPROLITE: Dark Yellow-Brown (10YR 4/6), Dense, Silty Fine to Medium SAND (SM), Non-Plastic, Moist		583.9			
	PARTIALLY WEATHERED ROCK: When Sampled Becomes Tan-Gray (7.5 YR 6/4), Very Dense, Silty Fine to Medium SAND (SM) with Rock Fragments, Non-Plastic, Moist			SS-2		(10.8) 46-50/5
10			578.9			
				SS-3		(13) 16-33-50/1
15			573.9			
				SS-4		(9.6) 46-50/5
20			568.9			
				SS-5		(5) 50/5
25			563.9			
				SS-6		(0) 50/1
30			558.9			
				SS-7		(0) 50/1
	Boring Terminated at 31.1 ft bgs					



DUKE ABSAT GEOTECHNICAL BORING LOG DR ONSITE LANDFILL BORING LOGS 7810140065.GPJ AMEC DUKE ABSAT.GDT 7/6/15

CONTRACTOR:	SAEDACCO
LOGGED BY:	Eaves/Flanik
EQUIPMENT:	CME-550
DRILL METHOD:	4.25 HSA
HOLE DIAMETER:	7"
CLOSURE METHOD:	Type II Observation Well Installed
REMARKS:	Located northwest of Ash Fill 1; Water level = 20.97 feet bgs on May 27, 2015

REVIEWED BY: _____

GEOTECHNICAL BORING RECORD

PROJECT NAME: Dan River On-Site Landfill
PROJECT NO.: 7810-14-0065 **START DATE:** 3/23/2015
COORD N: 1000097 **COMP. DATE:** 3/31/2015
COORD E: 1789099 **Page** 1 **of** 1
LOCATION: Eden, North Carolina

BORING NO.: OW-419S

amec foster wheeler

WELL CONSTRUCTION REPORT

WELL ID: **OW-419 S**

PROJECT:	Dan River Landfill
PROJECT NO:	7810-14-0065
PROJECT LOCATION:	Dan River Steam Station; Eden, North Carolina

DRILLING CONTRACTOR:	**SAEDACCO**	WATER LEVEL:	**20.97 ft BGS on 5/27/2015**
DRILLING METHOD:	**4.25" HSA**	LATITUDE:	**36.4956**
DATE COMPLETED:	**3/31/2015**	LONGITUDE:	**-79.7174**
LOGGED BY:	**Eaves/Flanik**	GS ELEVATION:	**588.92 feet**
Cave-In Below Well:	**None**	TOC ELEVATION:	**592.19 feet**
(not depicted)	**31-31.1 ft bgs**	DATUM:	**Mean Sea Level (MSL)**

Depth (ft-bgs)	WELL DIAGRAM	Elev (ft-MSL)	WELL CONSTRUCTION DETAILS
+3.27		592.19 TOC	PROTECTIVE CASING:
0		588.92 GS	Diameter: 4-inch x 4-inch square Type: Steel Stickup Interval: +4 to 2 feet bgs
			OUTER CASING: Diameter: Not Applicable Type: Not Applicable Interval: Not Applicable
			INNER CASING: Diameter: 2-inch Type: Sch. 40 PVC Interval: +3.27 to 15.7 feet bgs
12.0		576.92	
			SCREEN: Diameter: 2-inch Type: Sch. 40 PVC Interval: 15.7 to 30.7 feet bgs
14.0		574.92	
15.7		573.22	
			FILTER PACK: Type: #2 Silica Sand Interval: 14 to 31 feet bgs
			SEAL: Type: Bentonite Interval: 12 to 14 feet bgs
			GROUT: Type: Neat Cement Interval: 0 to 12 feet bgs
30.7		558.22	
31.0	End Cap	557.92	

NOTES: GS=ground surface; TOC=top of inner PVC casing; bgs=below ground surface

Not to Scale

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BORING NUMBER AS-4D

CLIENT Duke Energy Carolinas
PROJECT NAME Dan River - CSA Groundwater Assessment
PROJECT NUMBER 244782
PROJECT LOCATION Rockingham County, NC
DATE STARTED 3/23/12 **COMPLETED** 3/30/15
GROUND ELEVATION 559.22 ft **HOLE SIZE(S)** 6,4 inches
DRILLING CONTRACTOR Parratt-Wolff, Inc.
NORTHING 999349.09 **EASTING** 1789893.62
DRILLING METHOD Mud Rotary, HQ Core
GROUND WATER LEVELS:
LOGGED BY B. Booth **CHECKED BY** M. Pelletier
DATE/TIME 6/26/2015 2:25:00 PM 14.55 ft / Elev 544.67 ft
NOTES Ash Storage Area 1
DATE/TIME ---

DEPTH (ft)	SAMPLE TYPE/ NO./CORE RUN	BLOW COUNTS (N VALUE)	SOIL RECOVERY (in)	ROCK RECOVERY %	ROCK RQD %	DESCRIPTION	REMARKS
0						(SP-SM) **SAND WITH SILT AND GRAVEL**, Reddish Brown (5YR 5/6), Dry, (FILL)	0' - 5' Hand Augered
						ASH as (SM) **SILTY SAND WITH GRAVEL**, Gray (GLEY 2 6/N), (LANDFILL)	
						ASH as (SP-SM) **SAND WITH SILT AND GRAVEL**, Reddish Brown (5YR 5/6), Dry, (LANDFILL)	3.5' Total Inorganic and TOC Samples Obtained
5						**ASH** as (SM) **SILTY SAND**, Gray (GLEY 2 6/N), (LANDFILL)	5.0'-7.0' Push Shelby Tube
	UD - 1		24				
10							
	SS - 1	11-11-6 (17)	12			**ASH** as (ML) **SILT WITH SAND**, Very Stiff, Bluish Black (GLEY 2 2.5/1), Medium Plasticity, Cohesive, (LANDFILL)	11.0' Total Inorganic and TOC Samples Obtained
15							
	SS - 2	3-6-6 (12)	12			Continued: Stiff, Dark Greenish Gray (GLEY 1 3/1), Low Plasticity, Wet	
20							
	SS - 3	3-23-47 (70)	12			(ML) **GRAVELLY SILT WITH SAND**, Hard, Yellowish Brown (10YR 5/4), Medium Plasticity, Moist, Cohesive, (SAPROLITE)	21.0' Total Inorganic and TOC Samples Obtained
25							

MONITORING WELL

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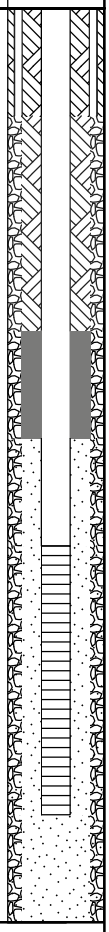
BORING NUMBER AS-4D

CLIENT Duke Energy Carolinas
PROJECT NAME Dan River - CSA Groundwater Assessment
PROJECT NUMBER 244782
PROJECT LOCATION Rockingham County, NC

DEPTH (ft)	SAMPLE TYPE/ NO./CORE RUN	BLOW COUNTS (N VALUE)	SOIL RECOVERY (in)	ROCK RECOVERY %	ROCK RQD %	DESCRIPTION	REMARKS
25						(GP-GC) **GRAVEL WITH CLAY AND SAND**, Very Dense, Pale Yellow (5Y 7/3), Medium Plasticity, Moist, Cohesive, (SAPROLITE)	
	SS - 4	50/3"	3			**SANDSTONE**, Strong, Bluish Gray (GLEY 2 5/1), Fine to Medium Grained, Micaceous, Moderately Decomposed, Slightly Disintegrated	27.0' Set 6" Casing; Enter with HQ Core 27.0' - 32.0' Open Hole Field Permeability Test 27.3' - 42' Moderately to Slightly Decomposed, Slightly Disintegrated 27.3' - 32' Fractures Throughout, Partially Open, Fe Stained
30	RC - 1			92	55		
							31.5' Healed Fractures Observed 32.0' - 33.6' Infilled Fractures and Secondary Mineralization With Calcite. Numerous Fractures Observed Throughout Core. All Were Very Narrow.
	RC - 2			100	45		
35							
						Continued: No Mica Observed	
	RC - 3A			100	31		37.5' - 42' Fractured, Very Narrow to Extremely Narrow, Slickensides, Secondary Calcite Mineralization, Fe Staining 38.5' - 39' Fine Grained Deposits
40	RC - 3B			100	0		40' - 40.5' Interbedded Shale
	RC - 4			95	44		Monitoring Well Installed on 3/30/2015 Screened Interval Set at 35' - 40' Boring Terminated at 42.0' BGS

MONITORING WELL



Bottom of borehole at 42.0 feet.

NORTH CAROLINA BORING LOG - GINT STD US LAB.GDT - 7/27/15 10:12 - C:\PWWORKING\TPA\D0672181\DAN RIVER.GPJ

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BORING NUMBER AS-6D

CLIENT Duke Energy Carolinas
PROJECT NAME Dan River - CSA Groundwater Assessment
PROJECT NUMBER 244782
PROJECT LOCATION Rockingham County, NC
DATE STARTED 4/11/15 **COMPLETED** 4/21/15
GROUND ELEVATION 584.28 ft **HOLE SIZE(S)** 8,4 inches
DRILLING CONTRACTOR Parratt-Wolff, Inc.
NORTHING 999920.17 **EASTING** 1790294.53
DRILLING METHOD Hollow Stem Auger, Tri-Cone, HQ Core
GROUND WATER LEVELS:
LOGGED BY T. Schmucker **CHECKED BY** M. Pelletier
DATE/TIME 6/26/2015 2:10:00 PM 33.03 ft / Elev 551.25 ft
NOTES Ash Storage Area 1
DATE/TIME ---

DEPTH (ft)	SAMPLE TYPE/ NO./CORE RUN	BLOW COUNTS (N VALUE)	SOIL RECOVERY (in)	ROCK RECOVERY %	ROCK RQD %	DESCRIPTION	REMARKS	MONITORING WELL
0						(SM) **SILTY SAND**, Reddish Brown (5YR 5/4), Non Plastic, Moist, Non Cohesive, (SOIL)	0' - 4.5' Hand Augered	
						(ML) **SILT**, Yellowish Red (5YR 4/6), Non Plastic, Moist, Cohesive, (SOIL)		
						(SM) **SILTY SAND**, Red (2.5YR 4/6), Non Plastic, Moist, Non Cohesive, (SOIL)		
5	SS - 1	3-7-10 (17)	8			Continued: Medium Dense, Yellowish Red (5YR 4/6)	4.0' - 4.5' Environmental Sample 4.5' - 44.8' Advance with 4 1/4" HSA	
10	SS - 2	7-18-27 (45)	9			(ML) **SILT**, Hard, Strong Brown (7.5YR 5/6), Non Plastic, Moist, Non Cohesive, (SOIL)		
15	SS - 3	7-14-24 (38)	8			(SM) **SILTY SAND**, Dense, Yellowish Red (5YR 5/6), Non Plastic, Moist, Non Cohesive, (SOIL)		
20	SS - 4	6-9-17 (26)	10			(ML) **SANDY SILT,** Very Stiff, Yellowish Red (5YR 5/8), Non Plastic, Moist, Non Cohesive, (SOIL)	19.5'-21.0' Environmental Sample from SS-4 Single Band of Fe/Mn Stained Clay (Black)	
25								

NORTH CAROLINA BORING LOG - GINT STD US LAB.GDT - 7/27/15 10:12 - C:\PWWORKING\TPA\D0672181\DAN RIVER.GPJ

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BORING NUMBER AS-6D

CLIENT Duke Energy Carolinas
PROJECT NAME Dan River - CSA Groundwater Assessment
PROJECT NUMBER 244782
PROJECT LOCATION Rockingham County, NC

DEPTH (ft)	SAMPLE TYPE/ NO./CORE RUN	BLOW COUNTS (N VALUE)	SOIL RECOVERY (in)	ROCK RECOVERY %	ROCK RQD %	DESCRIPTION	REMARKS	MONITORING WELL
25	SS - 5	8-14-21 (35)				(ML) **SILT**, Hard, Layered Colors - Dark Gray (5YR 4/1), Dark Reddish Brown (5YR 3/4), Black (5YR 2.5/1), Non Plastic, Moist, Non Cohesive, (SAPROLITE)		
30	SS - 6	5-7-8 (15)				(SP-SM) **SAND WITH SILT**, Medium Dense, Reddish Yellow (7.5YR 6/6), Non Plastic, Moist, Non Cohesive, (SAPROLITE)		
35	SS - 7	11-17-20 (37)				(SM) **SILTY SAND**, Dense, Reddish Yellow (7.5YR 6/6), Non Plastic, Moist, Non Cohesive, (SAPROLITE)		
40	SS - 8	12-17-38 (55)				(CH) **CLAY**, Hard, Black (5YR 2.5/1), High Plasticity, Wet, Cohesive, (SAPROLITE)	39.5' - 41.0' Environmental Sample from SS-8	
45	SS - 9	50/4"	4				4 Inches of Recovery was Slough Auger Refusal at 44.8'	
						MUDSTONE, Weak, Dark Gray (7.5YR 4/1), Fine Grained, Thinly Bedded	Used Mud Rotary and 8" Tri-cone Bit to Advance to 47'; Set 6" PVC Casing at 47' 47' Enter with HQ Core	
50	RC - 1			84	28	**SANDSTONE**, Weak, Light Olive Brown (2.5Y 5/6), Fine Grained, Thinly Bedded	48.5' Fe and Mn Staining 48.5' - 50' Highly Decomposed, Moderately Disintegrated and Intensely Fractured	

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BORING NUMBER AS-6D

CLIENT Duke Energy Carolinas
PROJECT NAME Dan River - CSA Groundwater Assessment
PROJECT NUMBER 244782
PROJECT LOCATION Rockingham County, NC

DEPTH (ft)	SAMPLE TYPE/ NO./CORE RUN	BLOW COUNTS (N VALUE)	SOIL RECOVERY (in)	ROCK RECOVERY %	ROCK RQD %	DESCRIPTION	REMARKS	MONITORING WELL
50						**MUDSTONE**, Weak, Dark Gray (GLEY 1 4/N), Fine Grained, Medium Bedded	45° Bedding, Open Fractured with no Mineralization 50' - 52' Fresh, Competent	
	RC - 2			80	75	**SILTSTONE**, Moderately Strong, Dark Gray (2.5Y 4/1), Fine Grained, Medium Bedded	52' - 55' Fresh, Competent 40° - 50° Bedding, Fe Stained Fractures at 53'	
55								
	RC - 3			92	39	**MUDSTONE**, Moderately Strong, Dark Gray (2.5Y 4/1), Fine Grained **SANDSTONE**, Weak, Gray (2.5Y 6/1), Fine Grained, Thinly Bedded	Slightly Decomposed, Fracture Zone 58' with Fe/Mn Staining, Fractures with Quartz/Calcite 59.5' Calcite in Disintegrated Fracture Zone 60' Clay In-Filled Fractures	
60								
	RC - 4			100	80	**MUDSTONE**, Strong, Dark Gray (GLEY 1 4/N), Fine Grained, Thinly Bedded	60' - 62' Fresh, Competent Monitoring Well Installed on 4/21/2015 Screened Interval Set at 56'-61' Boring Terminated at 62.0' BGS	

Bottom of borehole at 62.0 feet.

NORTH CAROLINA BORING LOG - GINT STD US LAB.GDT - 7/27/15 10:12 - C:\PWWORKING\TPA\D0672181\DAN RIVER.GPJ

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BORING NUMBER AS-10D

CLIENT Duke Energy Carolinas
PROJECT NAME Dan River - CSA Groundwater Assessment
PROJECT NUMBER 244782
PROJECT LOCATION Rockingham County, NC
DATE STARTED 4/7/15 **COMPLETED** 4/10/15
GROUND ELEVATION 588.89 ft **HOLE SIZE(S)** 8,5 inches
DRILLING CONTRACTOR Parratt-Wolff, Inc.
NORTHING 1000088.72 **EASTING** 1789105.34
DRILLING METHOD Hollow Stem Auger, Tri-Cone, HQ Core
GROUND WATER LEVELS:
LOGGED BY T. Schmucker **CHECKED BY** M. Pelletier
DATE/TIME 6/26/2015 1:43:00 PM 18.83 ft / Elev 570.06 ft
NOTES Ash Storage Area 1
DATE/TIME ---

DEPTH (ft)	SAMPLE TYPE/ NO./CORE RUN	BLOW COUNTS (N VALUE)	SOIL RECOVERY (in)	ROCK RECOVERY %	ROCK RQD %	DESCRIPTION	REMARKS	MONITORING WELL
0						(SC) **CLAYEY SAND**, Yellowish Brown (10YR 5/6), Non Plastic, Moist, Non Cohesive, (SOIL)	0' - 5' Hand Augered	
5							4' - 4.5' Environmental Sample	
	SS - 1	2-36-50/3"	9			(SM) **SILTY SAND**, Very Dense, Yellowish Brown (10YR 5/6), Non Plastic, Moist, Non Cohesive, (SAPROLITE)	5' Advance with 4 1/4" HSA 5' Relict Clay Filled Fractures	
10								
	SS - 2	10-47-50/1"	8			(ML) **SILT**, Hard, Light Olive Brown (2.5Y 5/4), Non Plastic, Moist, Non Cohesive, (SAPROLITE)		
15								
	SS - 3	36-50/3"	9			Continued: Yellowish Brown (10YR 5/6) and Very Dark Gray (10YR 3/1)	15' - 15.5' Environmental Sample from SS-3	
20								
	SS - 4	10-36-24 (60)	9					
25								

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BORING NUMBER AS-10D

CLIENT Duke Energy Carolinas
PROJECT NAME Dan River - CSA Groundwater Assessment
PROJECT NUMBER 244782
PROJECT LOCATION Rockingham County, NC

DEPTH (ft)	SAMPLE TYPE/ NO./CORE RUN	BLOW COUNTS (N VALUE)	SOIL RECOVERY (in)	ROCK RECOVERY %	ROCK RQD %	DESCRIPTION	REMARKS	MONITORING WELL
25	SS - 5	50/3"	3			(ML) **SILT**, Dark Grayish Brown (10YR 4/2), (SAPROLITE)	Rig Chatter at 27'	
	SS - 6	50/2"	2				Refusal at 28'; Environmental Sample from SS-6 and Bulk Sample from 28' for HFO Reamed with 8" Tri-Cone to 28.5'; Set and Grouted 6" PVC Casing and Grouted to Surface; Enter with HQ Core	
30	RC - 1			100	100	**SANDSTONE**, Strong, Bluish Black (GLEY 2 2.5/1), Fine Grained, Thickly Bedded, Fresh, Competent		
	RC - 2			100	100	**SILTSTONE**, Strong, Black (GLEY 1 2.5/N), Thickly Bedded, with Laminations, Fresh, Competent	28.5' - 33.5' Open Hole Field Permeability Test 28.5' - 39' Fresh, Competent 29.5' Cemented Joint 30' Slickenside Fracture 30' Joints, 40°, Calcite In-Filling 31.4' Fe Stained Joint 32.3' Calcite Crystallization 28.5' - 35' Sedimentary Depositional Structures and Bioturbation Common	
35	RC - 3			100	100			
	RC - 4			100	87	**SANDSTONE**, Strong, Black (GLEY 2 2.5/1), Fine Grained, Medium to Thickly Bedded, Fresh, Competent	39' - 40' Intensely Disintegrated, Moderately Decomposed	
40	RC - 5			100	100		40' Healed Joints, 40°, Quartz Infilling; 41' Slickenside Quartz Fracture Reamed Hole with 5-Inch Roller Cone Bit. Monitoring Well Installed on 4/25/2015 Screened Interval Installed from 38' - 43' BGS Boring Terminated at 44.2' BGS	

Bottom of borehole at 44.2 feet.

NORTH CAROLINA BORING LOG - GINT STD US LAB.GDT - 7/27/15 10:12 - C:\PW\WORKING\TPA\D0672181\DAN RIVER.GPJ

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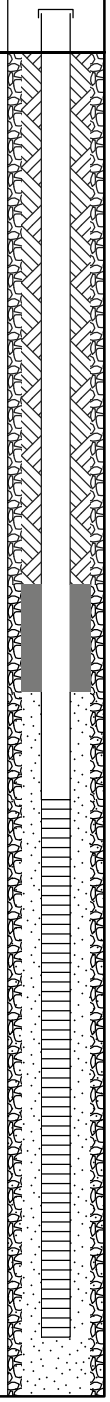
BORING NUMBER AS-12S

CLIENT Duke Energy Carolinas
PROJECT NAME Dan River - CSA Groundwater Assessment
PROJECT NUMBER 244782
PROJECT LOCATION Rockingham County, NC
DATE STARTED 5/4/15 **COMPLETED** 5/9/15
GROUND ELEVATION 557 ft **HOLE SIZE(S)** 8,4 inches
DRILLING CONTRACTOR EnviroProbe Integrated Solutions, Inc.
NORTHING 999538 **EASTING** 1789125.21
DRILLING METHOD 4 1/4" Hollow Stem Auger
GROUND WATER LEVELS:
LOGGED BY M. Sheehan **CHECKED BY** B. Costner
DATE/TIME 6/26/2015 2:27:00 PM 8.05 ft / Elev 548.95 ft
NOTES Ash Storage Area 2
DATE/TIME ---

DEPTH (ft)	SAMPLE TYPE/ NO./CORE RUN	BLOW COUNTS (N VALUE)	SOIL RECOVERY (in)	ROCK RECOVERY %	ROCK RQD %	DESCRIPTION	REMARKS
0						(ML) **SILT**, Brown (7.5YR 5/4), Non Plastic, Dry, Non Cohesive, (SOIL)	
5							Hand Auger Refusal at 4.5'
	SS - 1	42-27-39 (66)	18			Continued: Hard, Light Brown (7.5YR 6/4)	
10							
	SS - 2	48-29-32 (61)	18			Continued: Brown (7.5YR 5/3), Moist, (SAPROLITE)	
15							
	SS - 3	50/4"	4			Continued: Cohesive	
20							
	SS - 4	50/5"	5			Continued: Very Dark Bluish Gray (5B 3/1), Non Cohesive	~20.5' Water in Bottom of SS-4
	SS - 5	50/3"	3				4 1/4" HSA Refusal at 23.9' 23.9' Enter with HQ Core
25							

MONITORING WELL



NORTH CAROLINA BORING LOG - GINT STD US LAB.GDT - 7/27/15 10:12 - C:\PWWORKING\TPA\D0672181\DAN RIVER.GPJ

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BORING NUMBER AS-12S

CLIENT Duke Energy Carolinas
PROJECT NAME Dan River - CSA Groundwater Assessment
PROJECT NUMBER 244782
PROJECT LOCATION Rockingham County, NC

DEPTH (ft)	SAMPLE TYPE/ NO./CORE RUN	BLOW COUNTS (N VALUE)	SOIL RECOVERY (in)	ROCK RECOVERY %	ROCK RQD %	DESCRIPTION	REMARKS		MONITORING WELL
25	RC - 1			96	76	**SILTSTONE**, Strong, Gray (N5), Very Fine Grained, Thickly Bedded, Fresh, Competent	23.9' - 28.9' Fresh, Competent		
	RC - 2			100	84		Coring Terminated at 28.9' BGS; Surface Casing Abandoned Due to Running Sands Entering Below Surface Casing Monitoring Well Installed on 5/9/2015 Screened Interval Set at 13.9' - 23.9' BGS		

Bottom of borehole at 28.9 feet.

NORTH CAROLINA BORING LOG - GINT STD US LAB.GDT - 7/27/15 10:12 - C:\PWWORKING\TPA\D0672181\DAN RIVER.GPJ

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BORING NUMBER GWA-1S

CLIENT Duke Energy Carolinas
PROJECT NAME Dan River - CSA Groundwater Assessment
PROJECT NUMBER 244782
PROJECT LOCATION Rockingham County, NC
DATE STARTED 5/21/15 **COMPLETED** 5/21/15
GROUND ELEVATION 598.83 ft **HOLE SIZE(S)** 8 inches
DRILLING CONTRACTOR SAEDACCO, Inc.
NORTHING 1000434.35 **EASTING** 1789508.44
DRILLING METHOD 4 1/4" Hollow Stem Auger
GROUND WATER LEVELS:
LOGGED BY J. Pendleton **CHECKED BY** B. Costner
DATE/TIME 6/29/2015 8:55:00 AM 26.25 ft / Elev 572.58 ft
NOTES Outside Waste Boundary
DATE/TIME ---

DEPTH (ft)	SAMPLE TYPE/ NO./CORE RUN	BLOW COUNTS (N VALUE)	SOIL RECOVERY (in)	ROCK RECOVERY %	ROCK RQD %	DESCRIPTION	REMARKS		MONITORING WELL
0						See GWA-1D for Lithology	0' - 5' Hand Augered		
5									
10									
15									
20									
25									

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BORING NUMBER GWA-1S

CLIENT Duke Energy Carolinas
PROJECT NAME Dan River - CSA Groundwater Assessment
PROJECT NUMBER 244782
PROJECT LOCATION Rockingham County, NC

DEPTH (ft)	SAMPLE TYPE/ NO./CORE RUN	BLOW COUNTS (N VALUE)	SOIL RECOVERY (in)	ROCK RECOVERY %	ROCK RQD %	DESCRIPTION	REMARKS		MONITORING WELL
25						See GWA-1D for Lithology			
30									
							33' - 35' Kd, HFO, and Mineralogy Samples Obtained		
35	UD - 1		18				34' - 36' Undisturbed Sample Obtained		
40									
45							Monitoring Well Installed on 5/21/15 Screened Interval Set at 30' - 45' BGS Terminated Boring at 47' BGS		

Bottom of borehole at 47.0 feet.

NORTH CAROLINA BORING LOG - GINT STD US LAB.GDT - 7/27/15 10:12 - C:\PWWORKING\TPA\D0672181\DAN RIVER.GPJ

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BORING NUMBER GWA-1D

CLIENT Duke Energy Carolinas
PROJECT NAME Dan River - CSA Groundwater Assessment
PROJECT NUMBER 244782
PROJECT LOCATION Rockingham County, NC
DATE STARTED 5/7/15 **COMPLETED** 5/21/15
GROUND ELEVATION 598.81 ft **HOLE SIZE(S)** 13,4 inches
DRILLING CONTRACTOR Cascade Drilling, L.P.
NORTHING 1000435.36 **EASTING** 1789501.26
DRILLING METHOD Hollow Stem Auger, HQ Core
GROUND WATER LEVELS:
LOGGED BY D. Bishuk **CHECKED BY** B. Costner
DATE/TIME 6/29/2015 8:59:00 AM 27.80 ft / Elev 571.01 ft
NOTES Outside Waste Boundary
DATE/TIME ---

DEPTH (ft)	SAMPLE TYPE/ NO./CORE RUN	BLOW COUNTS (N VALUE)	SOIL RECOVERY (in)	ROCK RECOVERY %	ROCK RQD %	DESCRIPTION	REMARKS	MONITORING WELL
0						(CL) **CLAY**, Red (2.5YR 4/8) Mottled with Yellow (10YR 8/6), Low Plasticity, Dry, Cohesive, Contains Some Silt and Fine to Coarse Sand, (SOIL)	0' - 5' Hand Augered	
5						(SM) **SILTY SAND**, Red (2.5YR 4/8) Mottled with Yellow (10YR 8/6), Non Plastic, Dry, Cohesive, (SOIL)		
	SS - 1	8-13-17 (30)	18			(SC) **CLAYEY SAND**, Dense, Red (10R 4/8) Mottled with Reddish Yellow (5YR 7/6), Low Plasticity, Moist, Cohesive, (SOIL)		
10								
	SS - 2	6-7-12 (19)	18			(ML) **SILT WITH SAND**, Very Stiff, Brownish Yellow (10YR 6/8) Mottled with Reddish Yellow (5YR 6/8), Non Plastic, Moist, Cohesive, Micaceous, (SAPROLITE)	10' Fe and Mn Staining Along Relict Bedding at 35°-40°, Occasional Relict Fractures at 60°-80°	
15								
	SS - 3	5-10-12 (22)	18			Continued: Red (2.5YR 5/8) Mottled with Yellowish Red (5YR 4/6)	15' Fe and Mn Staining Along Relict Bedding at 35°-40°, Occasional Relict Fractures at 60°-80°	
20								
	SS - 4	4-8-13 (21)	18			Continued: Strong Brown (7.5YR 5/8) Mottled with Reddish Yellow (7.5YR 6/8) and Black (7.5YR 2.5/1) Along Relict Bedding and Fractures	20' Abundant Mn Staining on Relict Bedding at 35°-40° and Relict Fractures at 60°-80°	
25								

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BORING NUMBER GWA-1D

CLIENT Duke Energy Carolinas
PROJECT NAME Dan River - CSA Groundwater Assessment
PROJECT NUMBER 244782
PROJECT LOCATION Rockingham County, NC

DEPTH (ft)	SAMPLE TYPE/ NO./CORE RUN	BLOW COUNTS (N VALUE)	SOIL RECOVERY (in)	ROCK RECOVERY %	ROCK RQD %	DESCRIPTION	REMARKS		MONITORING WELL
25	SS - 5	4-8-13 (21)	18			(ML) **SILT WITH SAND**, Very Stiff, Strong Brown (7.5YR 5/8) Mottled with Reddish Yellow (7.5YR 6/8), Non Plastic, Moist, Cohesive, Micaceous, (SAPROLITE) *(continued)*	25' Abundant Fe and Mn Staining on Relict Bedding Planes at 35°-40° and Relict Fractures at 70°		
30	SS - 6	4-10-13 (23)	18			Continued: Brown (10YR 5/3) Mottled with Yellowish Brown (10YR 5/8) and Brownish Yellow (10YR 6/8)	30' Trace Fe and Mn Staining on Relict Bedding Planes at 35°-40° and Relict Fractures at 70° 30'-31.5' Total Inorganic and TOC Samples Obtained		
35	SS - 7	7-10-18 (28)	18			Continued: Brown (10YR 5/3) Mottled with Yellowish Brown (10YR 5/8) and Brownish Yellow (10YR 6/8)	35' Abundant Mn Staining on Relict Bedding Planes at 40° and Relict Fractures at 70°		
40	SS - 8	50/6"	6			(ML) **GRAVELLY SILT WITH SAND**, Hard, Brownish Yellow (10YR 6/8) Mottled with Yellow (10YR 7/8) and Very Dark Gray (10YR 3/1) Along Relict Fractures, Non Plastic, Moist, Cohesive, Micaceous, (SAPROLITE)	40' - 40.5' Total Inorganic and TOC Samples Obtained		
45	SS - 9	50/6"	6			(ML) **SILT WITH SAND**, Hard, Yellow (10YR 7/6) Mottled with Brownish Yellow (10YR 6/8), Non Plastic, Moist, Cohesive, Micaceous, (SAPROLITE)			
50									

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BORING NUMBER GWA-1D

CLIENT Duke Energy Carolinas
PROJECT NAME Dan River - CSA Groundwater Assessment
PROJECT NUMBER 244782
PROJECT LOCATION Rockingham County, NC

DEPTH (ft)	SAMPLE TYPE/ NO./CORE RUN	BLOW COUNTS (N VALUE)	SOIL RECOVERY (in)	ROCK RECOVERY %	ROCK RQD %	DESCRIPTION	REMARKS	MONITORING WELL
50	SS - 10	50/5"	5			(ML) **SILT WITH SAND**, Hard, Yellow (10YR 7/6) Mottled with Brownish Yellow (10YR 6/8), Non Plastic, Moist, Cohesive, Micaceous, (SAPROLITE) *(continued)*		
55	SS - 11	50/4"	4			(SM) **SILTY SAND WITH GRAVEL**, Very Dense, Pale Brown (10YR 6/3), Relict Bedding Fractures Coated with Strong Brown (7.5YR 4/1) and Dark Gray (7.5YR 4/1), Non Plastic, Moist, Non Cohesive, Micaceous, (SAPROLITE)	55' Fe Staining and Occasional Mn Staining on Relict Bedding Planes at 40° and Relict Fractures at 70°	
60	SS - 12	50/5"	5			(ML) **SILT WITH SAND**, Hard, Brownish Yellow (10YR 6/8), Non Plastic, Moist, Cohesive, Micaceous, (SAPROLITE)		
65	SS - 13	50/5"	5			(CL) **CLAY WITH SAND**, Hard, Yellowish Brown (10YR 5/4) Mottled with Strong Brown (7.5YR 5/6), Relict Bedding Fractures Coated with Very Dark Gray (10YR 3/1), Low Plasticity, Wet, Cohesive, Trace Gravel, Micaceous, (SAPROLITE)	65' Frequent Mn Staining on Relict Bedding Planes at 40° and Relict Fractures at 60° - 80°; Saprolite Contains Unweathered Fine Sandstone Clasts	
70	SS - 14	50/3"	3			(ML) **SILT**, Hard, Yellowish Brown (10YR 5/6) Mottled with Very Dark Gray (10YR 3/1), Non Plastic, Wet, Cohesive, Trace Sand, Micaceous, (SAPROLITE)	70' Trace Mn Staining on Relict Fractures	
75								

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BORING NUMBER GWA-1D

CLIENT Duke Energy Carolinas
PROJECT NAME Dan River - CSA Groundwater Assessment
PROJECT NUMBER 244782
PROJECT LOCATION Rockingham County, NC

DEPTH (ft)	SAMPLE TYPE/ NO./CORE RUN	BLOW COUNTS (N VALUE)	SOIL RECOVERY (in)	ROCK RECOVERY %	ROCK RQD %	DESCRIPTION	REMARKS		MONITORING WELL
75	SS - 15	50/3"	3			(ML) **GRAVELLY SILT WITH SAND**, Hard, Yellowish Brown (10YR 5/6) Mottled with Strong Brown (7.5YR 5/8), Non Plastic, Wet, Cohesive, Micaceous, (SAPROLITE)	75' Trace Fe and Mn Staining, Abundant Unweathered Siltstone and Sandstone Clasts		
80	SS - 16	50/5"	5			(CL) **GRAVELLY CLAY WITH SAND**, Hard, Dark Gray (7.5YR 4/1) Mottled with Gray (7.5YR 5/1), Low Plasticity, Wet, Cohesive, Micaceous, (SAPROLITE)	80' Abundant Unweathered Siltstone Clasts		
85	SS - 17	50/6"	6			Continued: Gray (10YR 5/1)			
90	SS - 18	50/0"	0						
95	SS - 19	50/1"	1						
100									

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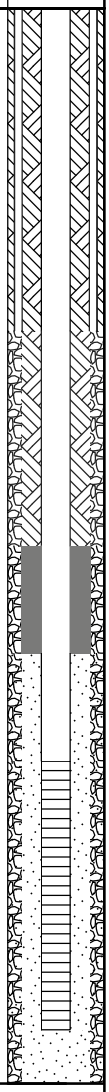
BORING NUMBER GWA-1D

CLIENT Duke Energy Carolinas
PROJECT NAME Dan River - CSA Groundwater Assessment
PROJECT NUMBER 244782
PROJECT LOCATION Rockingham County, NC

DEPTH (ft)	SAMPLE TYPE/ NO./CORE RUN	BLOW COUNTS (N VALUE)	SOIL RECOVERY (in)	ROCK RECOVERY %	ROCK RQD %	DESCRIPTION	REMARKS
100	SS - 20	50/3"	3			(GW-GC) **GRAVEL WITH CLAY AND SAND**, Very Dense, Dark Gray (7.5YR 4/1) Mottled with Gray (7.5YR 5/1), Non Plastic, Wet, Cohesive, (WEATHERED ROCK)	
	SS - 21	50/1"	1				
105							105' Enter with HQ Core
	RC - 1			100	0	**SANDSTONE**, Strong, Black (GLEY 1 2.5/N), Fine Grained, Thinly Bedded, Micaceous, Pyritic	105' - 112' Slightly Decomposed, Slightly Disintegrated 105' - 106' Very Intensely Fractured 106' - 109' Moderately Fractured 106.4' - 107.4' Fractures: 60°, Healed with Calcite 107.5' - 110' Fractures: 30°- 40°, Trace Pyrite and Calcite Mineralization
	RC - 2			100	70		109' - 113' Intensely Fractured 110' - 113' Slickensides; Fractures Contain Quartz and Calcite
110							
	RC - 3			100	74	**SILTSTONE** and **SHALE**, Strong, Black (GLEY 1 2.5/N), Laminated to Thinly Bedded, Micaceous, Trace Pyrite	112' - 120' Slickensides Observed on Some Fractures
115							
	RC - 4			100	72		Monitoring Well Installed on 5/21/15 Screened Interval Set at 114'-119' BGS Boring Terminated at 120' BGS
120							

MONITORING WELL



Bottom of borehole at 120.0 feet.

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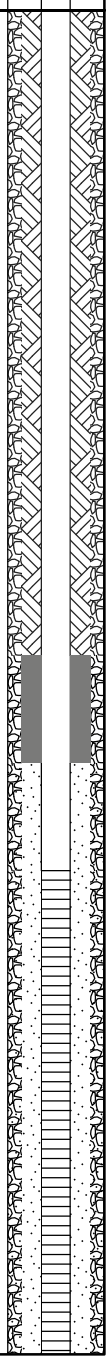
BORING NUMBER GWA-2S

CLIENT Duke Energy Carolinas
PROJECT NAME Dan River - CSA Groundwater Assessment
PROJECT NUMBER 244782
PROJECT LOCATION Rockingham County, NC
DATE STARTED 5/16/15 **COMPLETED** 5/18/15
GROUND ELEVATION 584.97 ft **HOLE SIZE(S)** 8 inches
DRILLING CONTRACTOR Parratt-Wolff, Inc.
NORTHING 1000192.16 **EASTING** 1790142.81
DRILLING METHOD 4 1/4" Hollow Stem Auger, 3 1/4" Casing Advancer
GROUND WATER LEVELS:
LOGGED BY T. Schmucker **CHECKED BY** B. Costner
DATE/TIME 6/26/2015 1:59:00 PM 20.85 ft / Elev 564.12 ft
NOTES NE of Ash Storage 1
DATE/TIME ---

DEPTH (ft)	SAMPLE TYPE/ NO./CORE RUN	BLOW COUNTS (N VALUE)	SOIL RECOVERY (in)	ROCK RECOVERY %	ROCK RQD %	DESCRIPTION	REMARKS		MONITORING WELL
0						See GWA-2D for Lithology	0' - 5' Hand Augered		
5	UD - 1						Advance from 5' - 31.5' BGS with 4 1/4" HSA 5' - 6.7' Undisturbed Sample Obtained		
10							7' Conducted Flush Bottom Permeability Test 7' - 12' Conducted Open Hole Permeability Test		
15							16' Conducted Flush Bottom Permeability Test 16' - 21' Conducted Open Hole Permeability Test		
20								▼	
25									



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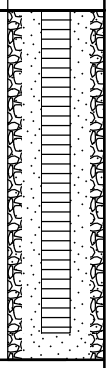
BORING NUMBER GWA-2S

CLIENT Duke Energy Carolinas
PROJECT NAME Dan River - CSA Groundwater Assessment
PROJECT NUMBER 244782
PROJECT LOCATION Rockingham County, NC

DEPTH (ft)	SAMPLE TYPE/ NO./CORE RUN	BLOW COUNTS (N VALUE)	SOIL RECOVERY (in)	ROCK RECOVERY %	ROCK RQD %	DESCRIPTION	REMARKS		MONITORING WELL
25						See GWA-2D for Lithology			
30							Monitoring Well Installed on 5/18/15 Screened Interval Set at 16' - 31' BGS Boring Terminated at 31.5' BGS		

Bottom of borehole at 31.5 feet.

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BORING NUMBER GWA-2D

CLIENT Duke Energy Carolinas
PROJECT NAME Dan River - CSA Groundwater Assessment
PROJECT NUMBER 244782
PROJECT LOCATION Rockingham County, NC
DATE STARTED 5/9/15 **COMPLETED** 5/15/15
GROUND ELEVATION 585.05 ft **HOLE SIZE(S)** 8,4 inches
DRILLING CONTRACTOR Parratt-Wolff, Inc.
NORTHING 1000194.1 **EASTING** 1790144.67
DRILLING METHOD 4 1/4" Hollow Stem Auger, HQ Core
GROUND WATER LEVELS:
LOGGED BY T. Schmucker **CHECKED BY** B. Costner
DATE/TIME 6/26/2015 2:05:00 PM 24.77 ft / Elev 560.28 ft
NOTES NE of Ash Storage Cell 1
DATE/TIME ---

DEPTH (ft)	SAMPLE TYPE/ NO./CORE RUN	BLOW COUNTS (N VALUE)	SOIL RECOVERY (in)	ROCK RECOVERY %	ROCK RQD %	DESCRIPTION	REMARKS	MONITORING WELL
0						(SM) **SILTY SAND**, Strong Brown (7.5YR 5/6), Non Plastic, Moist, Non Cohesive, (SOIL)	0' - 5' Hand Augered	
5	SS - 1	2-1-3 (4)	6			Continued: Very Loose, Strong Brown (7.5YR 5/8) to Yellowish Brown (10YR 5/8)		
10	SS - 2	16-50/4"	8			(SW-SM) **SAND WITH SILT**, Very Dense, Strong Brown (7.5YR 5/6), Medium Plasticity, Moist, Cohesive, (SAPROLITE)		
15	SS - 3	18-50/4"	8			(ML) **SILT**, Hard, Yellowish Brown (10YR 5/6), Medium Plasticity, Moist, Cohesive, (SAPROLITE)		
20	SS - 4	8-21-50/4"	6				19' - 20' Total Inorganics and TOC Samples Obtained	
25	SS - 5	16-50/4"	10			(SM) **SILTY SAND**, Very Dense, Yellowish Brown (10YR 5/6), Medium Plasticity, Moist, Cohesive, (SAPROLITE)	24' - 25' Total Inorganics and TOC Samples Obtained	

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CLIENT Duke Energy Carolinas
PROJECT NAME Dan River - CSA Groundwater Assessment
PROJECT NUMBER 244782
PROJECT LOCATION Rockingham County, NC

DEPTH (ft)	SAMPLE TYPE/ NO./CORE RUN	BLOW COUNTS (N VALUE)	SOIL RECOVERY (in)	ROCK RECOVERY %	ROCK RQD %	DESCRIPTION	REMARKS	MONITORING WELL
25						(SM) **SILTY SAND**, Very Dense, Yellowish Brown (10YR 5/6), Medium Plasticity, Moist, Cohesive, (SAPROLITE) *(continued)*		
30	SS - 6	8-15-50/4"	11			(ML) **SILT**, Hard, Yellowish Brown (10YR 6/4), Medium Plasticity, Moist, Cohesive, (SAPROLITE)		
35	SS - 7	50/4"	4			Continued: Very Pale Brown (10YR 7/4)		
40	SS - 8	18-50/4"	10			(ML) **SANDY SILT,** Hard, Brownish Yellow (10YR 6/6), Non Plastic, Moist, Non Cohesive, (SAPROLITE)		
45	SS - 9	50/6"	6			(SM) **SILTY SAND**, Very Dense, Yellowish Brown (10YR 5/4), Non Plastic, Moist, Cohesive, (SAPROLITE)		
50	SS - 10	26-50/2"	8				49' - 50' Total Inorganics and TOC Samples Obtained	

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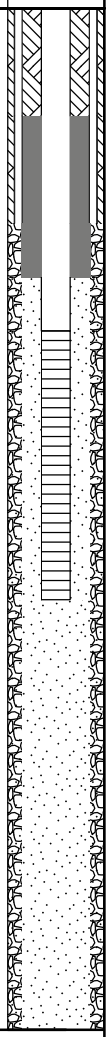
CLIENT Duke Energy Carolinas
PROJECT NAME Dan River - CSA Groundwater Assessment
PROJECT NUMBER 244782
PROJECT LOCATION Rockingham County, NC

DEPTH (ft)	SAMPLE TYPE/ NO./CORE RUN	BLOW COUNTS (N VALUE)	SOIL RECOVERY (in)	ROCK RECOVERY %	ROCK RQD %	DESCRIPTION	REMARKS
50						(SM) **SILTY SAND**, Very Dense, Yellowish Brown (10YR 5/4), Non Plastic, Moist, Cohesive, (SAPROLITE) *(continued)*	
							54' Enter with HQ Core
	SS - 11	50/1"	1			**SANDSTONE**, Moderately Strong, Very Dark Grayish Brown (10YR 3/2), Fine Grained, Thinly Bedded	54' - 59' Conducted Open Hole Permeability Test
55							
	RC - 1			100	90		
						Continued: Strong, Very Dark Bluish Gray (GLEY 2 3/1)	57' - 59.7' Slightly Decomposed, Slightly Disintegrated
60						**MUDSTONE**, Strong, Very Dark Bluish Gray (GLEY 2 3/1), Fine Grained, Thinly Bedded	59.7' - 62.7' Fresh, Slightly Disintegrated, Moderately Fractured with Calcite Infilling, Relict Bedding at 40°-60°
	RC - 2			100	80		
						SANDSTONE, Strong, Very Dark Bluish Gray (GLEY 2 3/1), Fine Grained, Thinly Bedded	
65						**MUDSTONE**, Strong, Black (GLEY 1 2.5/1), Fine Grained, Thinly Bedded	64.6' - 69' Fresh, Slightly Disintegrated, Slightly Fractured with Calcite Infilling
	RC - 3			100	92		
							Monitoring Well Installed on 5/15/15 Screened Interval Set at 56' - 61' BGS Boring Terminated at 69' BGS

MONITORING WELL



Bottom of borehole at 69.0 feet.

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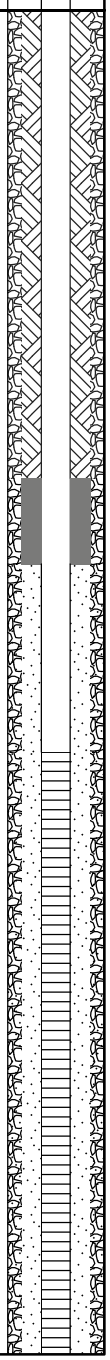
BORING NUMBER GWA-3S

CLIENT Duke Energy Carolinas
PROJECT NAME Dan River - CSA Groundwater Assessment
PROJECT NUMBER 244782
PROJECT LOCATION Rockingham County, NC
DATE STARTED 4/9/15 **COMPLETED** 4/10/15
GROUND ELEVATION 571.41 ft **HOLE SIZE(S)** 8 inches
DRILLING CONTRACTOR EnviroProbe Integrated Solutions, Inc.
NORTHING 999728.33 **EASTING** 1790326.7
DRILLING METHOD 4 1/4" Hollow Stem Auger
GROUND WATER LEVELS:
LOGGED BY M. Pelletier **CHECKED BY** B. Costner
DATE/TIME 6/26/2015 2:17:00 PM 18.45 ft / Elev 552.96 ft
NOTES E of Ash Storage 1
DATE/TIME ---

DEPTH (ft)	SAMPLE TYPE/ NO./CORE RUN	BLOW COUNTS (N VALUE)	SOIL RECOVERY (in)	ROCK RECOVERY %	ROCK RQD %	DESCRIPTION	REMARKS		MONITORING WELL
0						See GWA-3D for Lithology	Boring Advanced for Purpose of Collecting Undisturbed Sample and Installing Monitoring Well		
5									
10									
15									
20									
25									



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BORING NUMBER GWA-3S

CLIENT Duke Energy Carolinas
PROJECT NAME Dan River - CSA Groundwater Assessment
PROJECT NUMBER 244782
PROJECT LOCATION Rockingham County, NC

DEPTH (ft)	SAMPLE TYPE/ NO./CORE RUN	BLOW COUNTS (N VALUE)	SOIL RECOVERY (in)	ROCK RECOVERY %	ROCK RQD %	DESCRIPTION	REMARKS		MONITORING WELL
25	UD - 1		9			(SM) **SILTY SAND**, See GWA-3D for Lithology	25' - 25.8' Contains Multiple Rock Fragments Showing Relict Platy Structures Monitoring Well Installed on 4/10/2015 Screened Interval Set at 13.8' - 23.8' BGS Boring Terminated at 29.0' BGS		

Bottom of borehole at 29.0 feet.

NORTH CAROLINA BORING LOG - GINT STD US LAB.GDT - 7/27/15 10:12 - C:\PWWORKING\TPA\D0672181\DAN RIVER.GPJ

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BORING NUMBER GWA-3D

CLIENT Duke Energy Carolinas
PROJECT NAME Dan River - CSA Groundwater Assessment
PROJECT NUMBER 244782
PROJECT LOCATION Rockingham County, NC
DATE STARTED 4/6/15 **COMPLETED** 4/13/15
GROUND ELEVATION 571.48 ft **HOLE SIZE(S)** 12,4 inches
DRILLING CONTRACTOR EnviroProbe Integrated Solutions, Inc.
NORTHING 999722.04 **EASTING** 1790325.37
DRILLING METHOD Hollow Stem Auger, HQ Core
GROUND WATER LEVELS:
LOGGED BY M. Pelletier, D. Bishuk **CHECKED BY** B. Costner
DATE/TIME 6/26/2015 2:14:00 PM 21.66 ft / Elev 549.82 ft
NOTES E of Ash Storage 1
DATE/TIME ---

DEPTH (ft)	SAMPLE TYPE/ NO./CORE RUN	BLOW COUNTS (N VALUE)	SOIL RECOVERY (in)	ROCK RECOVERY %	ROCK RQD %	DESCRIPTION	REMARKS
0						(ML) **SANDY SILT**, Brown (10YR 4/3), Non Plastic, Non Cohesive, Trace Mica, Roots and Organics, (FILL)	0' - 5' Hand Augered
						(CL) **CLAY**, Yellowish Red (5YR 4/6), Medium Plasticity, Moist, Cohesive, Contains Silt and Trace Mica, (FILL)	
5						(CL) **CLAY WITH SAND**, Red (5YR 4/6), Low Plasticity, Moist, Non Cohesive, Trace Mica, (FILL)	4.5' Total Inorganics and TOC Samples Obtained 5' Fe and Mn Stained
	SS - 1	8-21-30 (51)	18			(ML) **SANDY SILT**, Hard, Light Yellowish Brown (2.5Y 6/3), Non Plastic, Dry, Non Cohesive, (SAPROLITE)	
10	SS - 2	17-31-50 (81)	18			Continued: Very Pale Brown (10YR 7/3), Red (7.5YR 5/6) and Dark Reddish Gray (7.5YR 4/1)	
15	SS - 3	9-11-18 (29)	18			Continued: Very Stiff	
20	SS - 4	30-30-50/5"	16			(CL) **CLAY WITH SILT,** Hard, Brownish Yellow (10YR 6/6) and Red (2.5YR 5/6), Moist, Low Plasticity, Moist, Cohesive, Mica, Relict Structures, (SAPROLITE)	20' Total Inorganics and TOC Samples Obtained 21.4' - 22.4' Note: SS-5 Originally Labelled as 21.4' - 22.4', Corrected on Sample Jar Labels but Not on Photo of Spoon
	SS - 5	37-50/6"	12				
25							

MONITORING WELL

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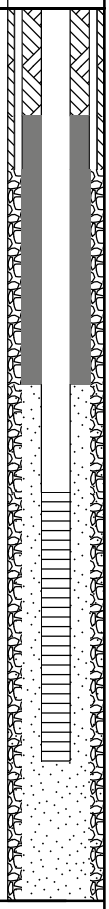
BORING NUMBER GWA-3D

CLIENT Duke Energy Carolinas
PROJECT NAME Dan River - CSA Groundwater Assessment
PROJECT NUMBER 244782
PROJECT LOCATION Rockingham County, NC

DEPTH (ft)	SAMPLE TYPE/ NO./CORE RUN	BLOW COUNTS (N VALUE)	SOIL RECOVERY (in)	ROCK RECOVERY %	ROCK RQD %	DESCRIPTION	REMARKS
25	SS - 6	37-50/5"	11			(SM) **SILTY SAND**, Very Dense, Yellowish Brown (10YR 5/6), Non Plastic, Moist, Non Cohesive, (SAPROLITE)	25' Total Inorganics and TOC Samples Obtained
						(SW) **SAND**, Very Dense, Pale Brown (10YR 6/3), Non Plastic, Moist, Non Cohesive, (WEATHERED ROCK)	
	SS - 6	50/5"	5				
30	RC - 1			100	26	**SANDSTONE**, Moderate, Yellowish Brown (10YR 5/6) to Very Dark Gray (10YR 3/4), Fine Grained	27.7' - 41.6' Enter with HQ Core Many Fractures are Parallel with Bedding and a Second Set Runs Perpendicular to Bedding. Some Perpendicular Fractures Appear to Be at Least Partially Open. Fractures Along Bedding, 30º - 40°; Fractures Perpendicular to Bedding, 50º - 60°; Fractures Are Fe/Mn Stained and Partially Open 28' Reamed Hole with 8 1/4" HSA; Installed 6" PVC Casing and Grouted to Surface 28' - 31.6' Open Hole Field Permeability Test
35	RC - 2			75	45		34.5' - 35.5' Vertical Fracture 36.2' - 36.6' Highly Friable 36.6' Fractures Increasingly Open 38.5' - 38.9' Intensely Fractured and Disintegrated 38.9' - 41.6' Fresh, Unfractured 28' - 38.9' Intensely Fractured with Intense Mn Staining
40	RC - 3			94	94	**SILTSTONE**, Very Strong, Very Dark Gray (GLEY 1 N/3) and White Vug Infillings (GLEY 1 N/8), Very Fine Grained, Massive	40 - 41.5' Irregularly Shaped Vugs with Calcite Infilling Monitoring Well Installed on 4/13/15 Screened Interval Set at 34' - 39' BGS Boring Terminated at 41.6 ft BGS

MONITORING WELL



Bottom of borehole at 41.6 feet.

NORTH CAROLINA BORING LOG - GINT STD US LAB.GDT - 7/27/15 10:12 - C:\PWWORKING\TPA\D0672181\DAN RIVER.GPJ

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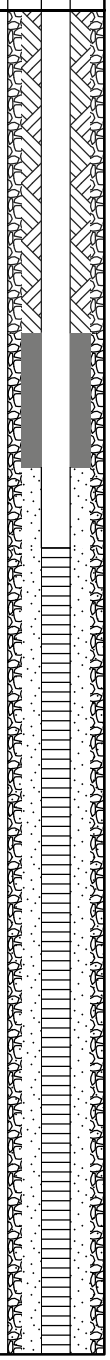
BORING NUMBER GWA-11S

CLIENT Duke Energy Carolinas
PROJECT NAME Dan River - CSA Groundwater Assessment
PROJECT NUMBER 244782
PROJECT LOCATION Rockingham County, NC
DATE STARTED 3/24/15 **COMPLETED** 3/25/15
GROUND ELEVATION 557.55 ft **HOLE SIZE(S)** 8 inches
DRILLING CONTRACTOR EnviroProbe Integrated Solutions, Inc.
NORTHING 999363.84 **EASTING** 1790106.5
DRILLING METHOD 4 1/4" Hollow Stem Auger
GROUND WATER LEVELS:
LOGGED BY M. Pelletier **CHECKED BY** B. Costner
DATE/TIME 6/26/2015 2:20:00 PM 17.20 ft / Elev 540.35 ft
NOTES E of Ash Storage 1
DATE/TIME ---

DEPTH (ft)	SAMPLE TYPE/ NO./CORE RUN	BLOW COUNTS (N VALUE)	SOIL RECOVERY (in)	ROCK RECOVERY %	ROCK RQD %	DESCRIPTION	REMARKS		MONITORING WELL
0						See GWA-11D for Lithology	Boring Advanced for Purpose of Obtaining Undisturbed Sample and Installing Monitoring Well 0' - 5' Hand Augered		
5									
10									
15									
20									
	UD - 1								
25							Monitoring Well Installed on 3/25/2015		



NORTH CAROLINA BORING LOG - GINT STD US LAB.GDT - 7/27/15 10:12 - C:\PWWORKING\TPA\D0672181\DAN RIVER.GPJ

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BORING NUMBER GWA-11S

CLIENT Duke Energy Carolinas
PROJECT NAME Dan River - CSA Groundwater Assessment
PROJECT NUMBER 244782
PROJECT LOCATION Rockingham County, NC

DEPTH (ft)	SAMPLE TYPE/ NO./CORE RUN	BLOW COUNTS (N VALUE)	SOIL RECOVERY (in)	ROCK RECOVERY %	ROCK RQD %	DESCRIPTION	REMARKS		MONITORING WELL
25						See GWA-11D for Lithology	Screened Interval Set at 10' - 25' BGS Boring Terminated at 26' BGS		

Bottom of borehole at 26.0 feet.

NORTH CAROLINA BORING LOG - GINT STD US LAB.GDT - 7/27/15 10:12 - C:\PWWORKING\TPA\D0672181\DAN RIVER.GPJ

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BORING NUMBER GWA-11D

CLIENT Duke Energy Carolinas
PROJECT NAME Dan River - CSA Groundwater Assessment
PROJECT NUMBER 244782
PROJECT LOCATION Rockingham County, NC
DATE STARTED 3/21/15 **COMPLETED** 4/6/15
GROUND ELEVATION 557.12 ft **HOLE SIZE(S)** 10,4 inches
DRILLING CONTRACTOR EnviroProbe Integrated Solutions, Inc.
NORTHING 999356.24 **EASTING** 1790099.35
DRILLING METHOD Hollow Stem Auger, HQ Core
GROUND WATER LEVELS:
LOGGED BY M. Pelletier, D. Bishuk **CHECKED BY** B. Costner
DATE/TIME 6/26/2015 2:21:00 PM 15.67 ft / Elev 541.45 ft
NOTES SE of Ash Storage 1
DATE/TIME ---

DEPTH (ft)	SAMPLE TYPE/ NO./CORE RUN	BLOW COUNTS (N VALUE)	SOIL RECOVERY (in)	ROCK RECOVERY %	ROCK RQD %	DESCRIPTION	REMARKS	MONITORING WELL
0						(CL) **CLAY**, Olive Brown (2.5Y 4/4), Medium Plasticity, Moist, Cohesive, Contains Mica and Abundant Organics, (FILL)	0' - 5' Hand Augered	
						Continued: Red (2.5YR 4/8) to Strong Brown (7.5YR 4/6), Low Plasticity		
5	SS - 1	6-6-7 (13)	10			Continued: Stiff, Light Brown (5YR 5/6), Contains Organics, (FILL)	Advance 4 1/4" HSA to 27'	
10	SS - 2	7-8-11 (19)	18			(ML) **SILT WITH SAND**, Very Stiff, Brownish Yellow (10YR 5/6), Non Plastic, Dry, Non Cohesive, Contains Mica, (SOIL)	10' - 11.5' Environmental Samples Obtained	
15	SS - 3	7-14-18 (32)	18			(SP-SM) **SAND WITH SILT**, Dense, Light Yellowish Brown (10YR 6/4), Non Plastic, Moist, Non Cohesive, Mica, (SOIL)		
20	SS - 4	10-17-37 (54)	18			Continued: Yellowish Brown (10YR 5/4), Low Plasticity, Relict Structures, (WEATHERED ROCK)		
25							23' - 25' Collected Kd Sample	

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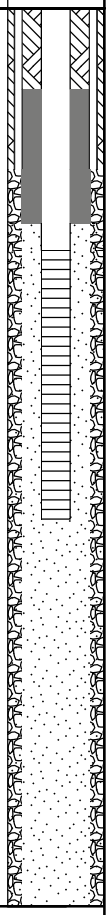
BORING NUMBER GWA-11D

CLIENT Duke Energy Carolinas
PROJECT NAME Dan River - CSA Groundwater Assessment
PROJECT NUMBER 244782
PROJECT LOCATION Rockingham County, NC

DEPTH (ft)	SAMPLE TYPE/ NO./CORE RUN	BLOW COUNTS (N VALUE)	SOIL RECOVERY (in)	ROCK RECOVERY %	ROCK RQD %	DESCRIPTION	REMARKS
25	SS - 5	8-27-43 (70)	18			(ML) **SILT WITH SAND**, Hard, Yellowish Brown (10YR 5/4), Non Plastic, Moist, Non Cohesive, with Relict Fractures Evident, (SAPROLITE)	25' Fe Stained Relict Fractures 25' - 26.5' Environmental Samples Obtained
	SS - 6	50/6"	6				26.9' Auger Refusal
30	RC - 1			88	59	**SANDSTONE**, Very Strong, Bluish Black (5B 2.5/1), Fine to Medium Grained	27.5' Enter with HQ Core 27.45' - 31.7' Open Hole Field Permeability Test 27.6' Fractures, 30º - 45°, Highly Weathered, Stained 29' Color Changes to Brownish Gray
35	RC - 2			100	82		31.4' Trace Mica Visible 33.0' Fractures Are Largely Vertical and Healed with Calcite; Pale Green Crystals Occupy Some Fractures 34.2' Alternating Light and Dark Bedding at 30º Appears When Core is Wet 27.6' Fresh 27.6' - 28.8' Intensely Fractured 28.8' - 31.7' Slightly Fractured
40	RC - 3			100	88		Monitoring Well Installed on 4/2/15 Screened Interval Set at 29.5' - 34.5' BGS Boring Terminated at 41.7' BGS

MONITORING WELL



Bottom of borehole at 41.7 feet.

NORTH CAROLINA BORING LOG - GINT STD US LAB.GDT - 7/27/15 10:12 - C:\PWWORKING\TPA\D0672181\DAN RIVER.GPJ

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BORING NUMBER MW-301BR

CLIENT Duke Energy Carolinas
PROJECT NAME Dan River - CSA Groundwater Assessment
PROJECT NUMBER 244782
PROJECT LOCATION Rockingham County, NC
DATE STARTED 3/31/15 **COMPLETED** 4/2/15
GROUND ELEVATION 590.34 ft **HOLE SIZE(S)** 12,4 inches
DRILLING CONTRACTOR Parratt-Wolff, Inc.
NORTHING 1000085.21 **EASTING** 1789724.76
DRILLING METHOD Hollow Stem Auger, Tri-Cone, HQ Core
GROUND WATER LEVELS:
LOGGED BY T. Schmucker **CHECKED BY** M. Pelletier
DATE/TIME 6/29/2015 8:00:00 AM 19.70 ft / Elev 570.64 ft
NOTES N Edge of Ash Storage 1
DATE/TIME ---

DEPTH (ft)	SAMPLE TYPE/ NO./CORE RUN	BLOW COUNTS (N VALUE)	SOIL RECOVERY (in)	ROCK RECOVERY %	ROCK RQD %	DESCRIPTION	REMARKS
0						(CL) **CLAY**, Dark Reddish Brown (5YR 3/2), Medium Plasticity, Moist, Cohesive, (FILL)	Note: Blow Counts May be Inaccurate Due to Occasional Hammer Malfunctions
							3.0'-4.0'- Environmental Sample Obtained from Hand Auger Cuttings
5							
	SS - 1	9-10-15 (25)	9			(CL) **CLAY with SAND**, Very Stiff, Reddish Brown (5YR 4/3), Non-Plastic, Moist, Noncohesive, (FILL)	5' - 6.5' Environmental Samples Obtained
10							
	SS - 2	29-31-45 (76)	16			**DECOMPOSED MUDSTONE**, Weak, Very Dark Gray (5YR 3/1), Fine Grained, Laminated, (WEATHERED ROCK)	10' - 20' Trace Mica
15							
	SS - 3	37-50/2"	8			**DECOMPOSED SILTSTONE**, Weak, Dark Grayish Brown (10YR 4/2), Fine Grained, Laminated, (WEATHERED ROCK)	15' - 16.5' Environmental Samples Obtained 15' - 20' Trace Quartz
20							
	SS - 4	15-50/4"	7				
25							

MONITORING WELL

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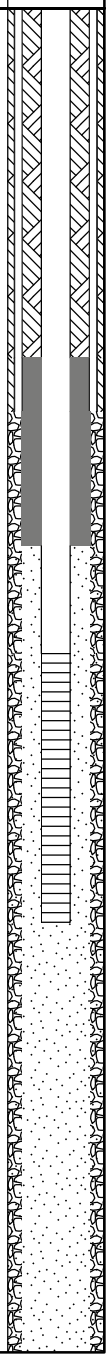
BORING NUMBER MW-301BR

CLIENT Duke Energy Carolinas
PROJECT NAME Dan River - CSA Groundwater Assessment
PROJECT NUMBER 244782
PROJECT LOCATION Rockingham County, NC

DEPTH (ft)	SAMPLE TYPE/ NO./CORE RUN	BLOW COUNTS (N VALUE)	SOIL RECOVERY (in)	ROCK RECOVERY %	ROCK RQD %	DESCRIPTION	REMARKS
25	SS - 5	31-50/1"	7			**DECOMPOSED SILTSTONE**, Weak, Brown (7.5YR 4/3), Fine Grained, Laminated, (WEATHERED ROCK)	25' - 30' Trace Mica
30	SS - 6	50/3"	3			**DECOMPOSED ROCK** as (CL) **CLAY**, Hard, Very Dark Gray (7.5YR 3/1), Medium Plasticity, Wet, Cohesive, (WEATHERED ROCK)	30' - 30.3' Environmental Samples Obtained 30' - 31.5' Fe Stained 32.5' Enter with HQ Core
35	RC - 1			100	65	**SANDSTONE**, Very Strong, Very Dark Bluish Gray (GLEY2 3/1), Fine Grained, Thickly Bedded	32.5' - 37.5' Slightly Decomposed, Moderately Disintegrated, Moderately Fractured with Fe and Green Mineral Stains, Fining Upward Sequence 32.5' - 37.5' Open Hole Field Permeability Test 36' - 42.1' Packer Test
40	RC - 2			100	23	Continued: Very Dark Gray (GLEY1 3/N) to Light Yellowish Brown (10YR 6/4)	37.5' - 41' Moderately Decomposed, Moderately Disintegrated, Intensely Fractured with Fe Stains
45	RC - 3			100	68	**MUDSTONE**, Strong, Very Dark Greenish Gray (GLEY2 3/1), Fine Grained, Thickly Bedded	41' - 42.1' Fresh, Competent, Slightly Fractured 42.1' - 44.8' Slightly Decomposed, Moderately Disintegrated, Slightly Fractured with Calcite Mineralization
50	RC - 4			100	42	**SANDSTONE**, Very Strong, Dark Bluish Gray (GLEY2 4/1), Fine Grained, Thickly Bedded Continued: Bluish Gray (GLEY2 5/1)	44.8' - 51' Moderately Decomposed, Moderately Disintegrated, Intensely Fracture with Fe Stains 45' - Tight Fracture 46' - 51' Slightly Decomposed, Moderately Disintegrated, Moderately Fractured with Fe Stains 46' - 56' Fining Upward Sequence 47.8' Open Fracture 48.3' - 54.4' Packer Test

MONITORING WELL



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BORING NUMBER MW-301BR

CLIENT Duke Energy Carolinas
PROJECT NAME Dan River - CSA Groundwater Assessment
PROJECT NUMBER 244782
PROJECT LOCATION Rockingham County, NC

DEPTH (ft)	SAMPLE TYPE/ NO./CORE RUN	BLOW COUNTS (N VALUE)	SOIL RECOVERY (in)	ROCK RECOVERY %	ROCK RQD %	DESCRIPTION	REMARKS		MONITORING WELL
50						**SANDSTONE**, Very Strong, Bluish Gray (GLEY2 5/1), Fine Grained, Thickly Bedded	50.6' - Open Fracture		
	RC - 5			100	67	Continued: Grayish Brown (10YR 5/2) to Dark Yellowish Brown (10YR 4/6) to Bluish Gray (GLEY2 5/1)	51' - 56' Slightly Decomposed, Slightly Disintegrated, Intensely Fractured with Fe Stains 53.6' Open Fracture		
55							55' Partially Open Fracture		
	RC - 6			100	85	Continued: Dark Bluish Gray (GLEY2 4/1)	56' Partially Open Fracture 56' - 61.1' Slightly Decomposed, Slightly Disintegrated, Moderately Fractured		
60									
	RC - 7			100	97		61.1' - 64.1' Slightly Decomposed, Slightly Disintegrated, Slightly Fractured with Calcite Mineralization 62.9' Open Fracture		
65						**MUDSTONE**, Strong, Bluish Black (GLEY2 2.5/1), Fine Grained, Thickly Bedded	64.1' - 77.3' Fresh, Competent, Fractures with Calcite Mineralization		
	RC - 8			100	98	**SANDSTONE**, Very Strong, Dark Bluish Gray (GLEY2 4/1), Fine Grained, Thickly Bedded	66' - 66.7' Partially Open to Open Fractures		
70									
	RC - 9			100	100		71' - 79' Fining Upward Sequence		
75									

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PROJECT LOCATION Rockingham County, NC

DEPTH (ft)	SAMPLE TYPE/ NO./CORE RUN	BLOW COUNTS (N VALUE)	SOIL RECOVERY (in)	ROCK RECOVERY %	ROCK RQD %	DESCRIPTION	REMARKS		MONITORING WELL
75						**SANDSTONE**, Very Strong, Dark Bluish Gray (GLEY2 4/1), Fine Grained, Thickly Bedded *(continued)*	76.5' - 82.5' Packer Test		
	RC - 10			100	79	Continued: Bluish Gray (GLEY2 5/1)	77.3' - 79' Slightly Decomposed, Moderately Disintegrated, Intensely Fractured with Calcite Mineralization 77.5' Partially Open Fracture 81' - 81.3' Open to Partially Open Fracture Zone, Fining Upward Sequence 81.3' - 82.5' Slightly Decomposed, Slightly Disintegrated, Slightly Fractured with Calcite Mineralization Monitoring Well Installed on 4/2/15 Screened Interval Set at 37' - 42' BGS Boring Terminated at 82.5' BGS		
80						**MUDSTONE**, Strong, Very Dark Bluish Gray (GLEY2 3/1), Fine Grained, Thickly Bedded			
	RC - 11			100	100	**SANDSTONE**, Very Strong, Bluish Gray (GLEY2 5/1), Thickly Bedded			

Bottom of borehole at 82.5 feet.

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BORING NUMBER MW-303BR

CLIENT Duke Energy Carolinas
PROJECT NAME Dan River - CSA Groundwater Assessment
PROJECT NUMBER 244782
PROJECT LOCATION Rockingham County, NC
DATE STARTED 4/8/15 **COMPLETED** 5/1/15
GROUND ELEVATION 648.36 ft **HOLE SIZE(S)** 12,4 inches
DRILLING CONTRACTOR EnviroProbe Integrated Solutions, Inc.
NORTHING 999827.79 **EASTING** 1789669.99
DRILLING METHOD Hollow Stem Auger, HQ Core
GROUND WATER LEVELS:
LOGGED BY J. Schubert **CHECKED BY** B. Costner
DATE/TIME 6/26/2015 1:50:00 PM 90.51 ft / Elev 557.85 ft
NOTES Central Ash Storage 1
DATE/TIME ---

DEPTH (ft)	SAMPLE TYPE/ NO./CORE RUN	BLOW COUNTS (N VALUE)	SOIL RECOVERY (in)	ROCK RECOVERY %	ROCK RQD %	DESCRIPTION	REMARKS	MONITORING WELL
0						(ML) **SILT WITH GRAVEL**, Grayish Brown (10YR 5/2) and Mottled, Non Plastic, Moist, Non Cohesive, Micaceous, Clayey, (FILL)	0' - 5' Hand Augered	
5	SS - 1	11-4-6 (10)	9			Continued: Stiff, Grayish Brown (10YR 5/2) to Light Yellowish Brown (10YR 6/4)	5' Advance with 3 1/4" HSA	
10	SS - 2	4-3-2 (5)	18			**ASH** as (SM) **SILTY SAND WITH GRAVEL**, Loose, Dark Gray (GLEY 1 4/N), Non Plastic, Moist, Non Cohesive, (LANDFILL)	10' - 11.5' Total Inorganics and TOC Samples Obtained	
15	SS - 3	4-4-5 (9)	12			(ML) **SILT WITH GRAVEL**, Stiff, Yellowish Brown (10YR 5/6), Non Plastic, Moist, Non Cohesive, Clayey (FILL)		
20	SS - 4	6-11-12 (23)	18			Continued: Very Stiff, Red (2.5YR 4/8), Low Plasticity, Cohesive	21' - 21.4' Contains Wood Fragments	
25							23' Top of Ash Inferred By Visual Inspection of Drill Cuttings	

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CLIENT Duke Energy Carolinas
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PROJECT NUMBER 244782
PROJECT LOCATION Rockingham County, NC

DEPTH (ft)	SAMPLE TYPE/ NO./CORE RUN	BLOW COUNTS (N VALUE)	SOIL RECOVERY (in)	ROCK RECOVERY %	ROCK RQD %	DESCRIPTION	REMARKS		MONITORING WELL
25	SS - 5	5-4-7 (11)	18			**ASH** as (ML) **SILT WITH SAND**, Stiff, Very Dark Gray (5Y 3/1), Non Plastic, Moist to Dry, Non Cohesive, Traces of Clay and Gravel (LANDFILL)	25' - 26.5' Total Inorganics and TOC Samples Obtained		
30	SS - 6	5-4-5 (9)	15			Continued: Dark Gray (10YR 4/1), Dry			
35	SS - 7	4-6-7 (13)	18						
40	SS - 8	10-9-10 (19)	18			Continued: Very Stiff			
45	SS - 9	9-8-9 (17)	18			Continued: Very Dark Gray (10YR 3/1), Contains Trace Clay			
50									

NORTH CAROLINA BORING LOG - GINT STD US LAB.GDT - 7/27/15 10:12 - C:\PWWORKING\TPA\D0672181\DAN RIVER.GPJ

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CLIENT Duke Energy Carolinas
PROJECT NAME Dan River - CSA Groundwater Assessment
PROJECT NUMBER 244782
PROJECT LOCATION Rockingham County, NC

DEPTH (ft)	SAMPLE TYPE/ NO./CORE RUN	BLOW COUNTS (N VALUE)	SOIL RECOVERY (in)	ROCK RECOVERY %	ROCK RQD %	DESCRIPTION	REMARKS	MONITORING WELL
50	SS - 10	5-4-8 (12)	18			**ASH** as (SM) **SILTY SAND**, Medium Dense, Dark Gray (GLEY 1 4/N), Non Plastic, Moist to Dry, Non Cohesive, Fine Grained, (LANDFILL)	50' - 51.5' Total Inorganics and TOC Samples Obtained	
55	SS - 11	7-7-9 (16)	18			**ASH** as (ML) **SILT WITH SAND**, Very Stiff, Black (GLEY 1 2.5/N), Non Plastic, Moist, Non Cohesive, (LANDFILL)		
60	SS - 12	14-15-15 (30)	18			Continued: Dark Gray (10YR 4/1), Fine Grained		
65	SS - 13	3-3-4 (7)	15			Continued: Medium, Very Dark Greenish Gray (10Y 3/1), Trace Clay		
70	SS - 14	4-4-2 (6)	18			Continued: Dark Gray (10YR 4/1), Laminated and Fine Grained		
75								

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BORING NUMBER MW-303BR

CLIENT Duke Energy Carolinas
PROJECT NAME Dan River - CSA Groundwater Assessment
PROJECT NUMBER 244782
PROJECT LOCATION Rockingham County, NC

DEPTH (ft)	SAMPLE TYPE/ NO./CORE RUN	BLOW COUNTS (N VALUE)	SOIL RECOVERY (in)	ROCK RECOVERY %	ROCK RQD %	DESCRIPTION	REMARKS		MONITORING WELL
75	SS - 15	6-8-11 (19)	18			**ASH** as (ML) **SILT WITH SAND**, Very Stiff, Dark Gray (GLEY 1 4/N), Non Plastic, Moist to Wet, Non Cohesive, Trace Gravel, Fine Grained, (LANDFILL) *(continued)*	75' - 76.5' Total Inorganics, SPLP, and TOC Samples Obtained		
80	SS - 16	5-10-13 (23)	18			(ML) **SILT WITH SAND**, Very Stiff, Brown (10YR 4/3), Thinly Bedded, Highly Weathered, Very Weak, (SAPROLITE)	80' - 81.5' Total Inorganics and TOC Samples Obtained 80' - 81.5' Fractured, Mn Staining Along Fractures		
85	SS - 17	20-25-37 (62)	18			**DECOMPOSED SILTSTONE**, Weak, Yellowish Brown (10YR 5/8), Micaceous, (WEATHERED ROCK)	85' - 86.5' Vertical to Near Vertical Fractures, Fe and Mn Staining 85' - 86.5' Highly Decomposed, Moderately Disintegrated, and Moderately Fractured		
90	SS - 18	15-25-28 (53)	18			Continued: Light Reddish Brown (5YR 6/3) to Yellowish Red (5YR 5/6)	90' - 91.5' Total Inorganics and TOC Samples Obtained	▼	
95	SS - 19	50/6"	6				97' Installed 6" PVC Casing		
100	RC - 1			100	0	**SANDSTONE**, Strong, Dark Gray (2.5Y 4/1) to Very Dark Gray (2.5Y 3/1), Fine Grained, Thinly Bedded, Bioturbation, Micaceous, Silty	98' 3 1/4" Auger Refusal, Reamed Borehole to 98.3' with 8 1/4" HSA 98.3' Enter with HQ Core 98' - 103.1' Packer Test		

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BORING NUMBER MW-303BR

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PROJECT NAME Dan River - CSA Groundwater Assessment
PROJECT NUMBER 244782
PROJECT LOCATION Rockingham County, NC

DEPTH (ft)	SAMPLE TYPE/ NO./CORE RUN	BLOW COUNTS (N VALUE)	SOIL RECOVERY (in)	ROCK RECOVERY %	ROCK RQD %	DESCRIPTION	REMARKS		MONITORING WELL
100									
	RC - 2			76	44	**SANDSTONE**, Strong, Dark Gray (2.5Y 4/1) to Very Dark Gray (2.5Y 3/1), Fine Grained, Thinly Bedded, Bioturbation, Micaceous, Silty *(continued)*	98.3' - 100' Two Fractures Perpendicular to Bedding, Some Fe and Calcite Precipitate on Fracture Planes 98.3' - 100' Thin Beds Dipping at 45°, Highly Disturbed by Ripples 102' - 104.5' Fractures Perpendicular to Bedding 103' - 109.1' Packer Test		
105									
	RC - 3			100	60		105.3' - 106.5' Contains Shale and Silt		
110									
	RC - 4			82	82	Continued: Interbedded with Shaley Siltstone, Apparent Soft Sediment Deformation			
115									
	RC - 5			100	100				
120									
	RC - 6			100	100		124' - 130.1' Packer Test		
125									

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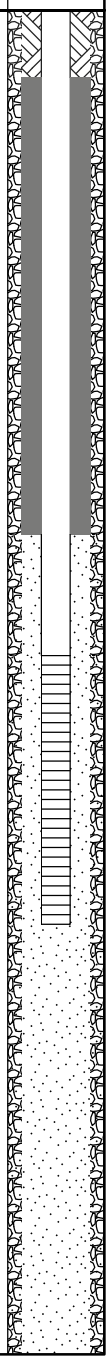
PROJECT LOCATION Rockingham County, NC

DEPTH (ft)	SAMPLE TYPE/ NO./CORE RUN	BLOW COUNTS (N VALUE)	SOIL RECOVERY (in)	ROCK RECOVERY %	ROCK RQD %	DESCRIPTION	REMARKS	MONITORING WELL
125								
	RC - 7			100	92	**SANDSTONE**, Strong, Dark Gray (2.5Y 4/1) to Very Dark Gray (2.5Y 3/1), Fine Grained, Thinly Bedded, Silty (*continued*)	125.3' - 130' Bedding Planes Dipping at 45° 125.7' - 126.3' Slightly Fractured Zone 126.5' - 128.5' Silty and Organic Material Present and Minor Fractures Present	
130								
	RC - 8			100	80	Continued: Gray (GLEY 1 5/N), Medium to Thickly Bedded	130.3' - 135.3' Moderately Fractured 134' - 135' Multiple Fractures Present	
135								
	RC - 9			100	80		135.3' - 140.3' Moderately Fractured 137' - 143.1' Packer Test Conducted 138' - 140.2' Large Fractures Present	
140								
	RC - 10			100	72	Continued: Fine to Medium Grained	140.3' - 145.3' Moderately Fractured 143' - 144.2' Multiple Fractures Present 143' - 150.5' Packer Test Conducted	
145								
	RC - 11			100	65	Continued: Gray (GLEY 1 5/N), Medium Grained, Medium to Thickly Bedded	145.3' - 150.5' Moderately Fractured 147.7' - 148.3' Dark Shale Zone Encountered Monitoring Well Installed on 5/1/2015 Screened Interval Set at 137' - 142' BGS Boring Terminated at 150.5' BGS	
150								



NORTH CAROLINA BORING LOG - GINT STD US LAB.GDT - 7/27/15 10:12 - C:\PWWORKING\TPA\D0672181\DAN RIVER.GPJ

440 S. Church Street, Suite 900
Charlotte, NC 28202-2075
Phone: 704-338-6700
hdrinc.com/follow-us

BORING NUMBER MW-303BR

CLIENT Duke Energy Carolinas
PROJECT NAME Dan River - CSA Groundwater Assessment
PROJECT NUMBER 244782
PROJECT LOCATION Rockingham County, NC

DEPTH (ft)	SAMPLE TYPE/ NO./CORE RUN	BLOW COUNTS (N VALUE)	SOIL RECOVERY (in)	ROCK RECOVERY %	ROCK RQD %	DESCRIPTION	REMARKS		MONITORING WELL
150									

Bottom of borehole at 150.5 feet.

NORTH CAROLINA BORING LOG - GINT STD US LAB.GDT - 7/27/15 10:12 - C:\PWWORKING\TPA\D0672181\DAN RIVER.GPJ

440 S. Church Street, Suite 900
Charlotte, NC 28202-2075
Phone: 704-338-6700
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BORING NUMBER MW-306BR

CLIENT Duke Energy Carolinas
PROJECT NAME Dan River - CSA Groundwater Assessment
PROJECT NUMBER 244782
PROJECT LOCATION Rockingham County, NC
DATE STARTED 5/16/15 **COMPLETED** 5/22/15
GROUND ELEVATION 611.46 ft **HOLE SIZE(S)** 10,4 inches
DRILLING CONTRACTOR Cascade Drilling, L.P.
NORTHING 999376.35 **EASTING** 1789631.22
DRILLING METHOD Sonic, HQ Core
GROUND WATER LEVELS:
LOGGED BY M. Sheehan **CHECKED BY** B. Costner
DATE/TIME 6/26/2015 1:30:00 PM 67.12 ft / Elev 544.34 ft
NOTES Ash Storage 1
DATE/TIME ---

DEPTH (ft)	SAMPLE TYPE/ NO./CORE RUN	BLOW COUNTS (N VALUE)	SOIL RECOVERY (in)	ROCK RECOVERY %	ROCK RQD %	DESCRIPTION	REMARKS		MONITORING WELL
0						See MW-306BR-A for Lithology	Advance with 10" Sonic Tooling		
5									
10									
15									
20									
25									

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BORING NUMBER MW-306BR

CLIENT Duke Energy Carolinas
PROJECT NAME Dan River - CSA Groundwater Assessment
PROJECT NUMBER 244782
PROJECT LOCATION Rockingham County, NC

DEPTH (ft)	SAMPLE TYPE/ NO./CORE RUN	BLOW COUNTS (N VALUE)	SOIL RECOVERY (in)	ROCK RECOVERY %	ROCK RQD %	DESCRIPTION	REMARKS		MONITORING WELL
25						See MW-306BR-A for Lithology			
30									
35									
40									
45									
50									

NORTH CAROLINA BORING LOG - GINT STD US LAB.GDT - 7/27/15 10:12 - C:\PWWORKING\TPA\D0672181\DAN RIVER.GPJ

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BORING NUMBER MW-306BR

CLIENT Duke Energy Carolinas
PROJECT NAME Dan River - CSA Groundwater Assessment
PROJECT NUMBER 244782
PROJECT LOCATION Rockingham County, NC

DEPTH (ft)	SAMPLE TYPE/ NO./CORE RUN	BLOW COUNTS (N VALUE)	SOIL RECOVERY (in)	ROCK RECOVERY %	ROCK RQD %	DESCRIPTION	REMARKS		MONITORING WELL
50						See MW-306BR-A for Lithology			
55									
60									
65									
								▼	
70									
75									

NORTH CAROLINA BORING LOG - GINT STD US LAB.GDT - 7/27/15 10:12 - C:\PWWORKING\TPA\D0672181\DAN RIVER.GPJ

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Phone: 704-338-6700
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BORING NUMBER MW-306BR

CLIENT Duke Energy Carolinas
PROJECT NAME Dan River - CSA Groundwater Assessment
PROJECT NUMBER 244782
PROJECT LOCATION Rockingham County, NC

DEPTH (ft)	SAMPLE TYPE/ NO./CORE RUN	BLOW COUNTS (N VALUE)	SOIL RECOVERY (in)	ROCK RECOVERY %	ROCK RQD %	DESCRIPTION	REMARKS	MONITORING WELL
75						See MW-306BR-A for Lithology		
							79' Installed 6" PVC Casing	
80						**SANDSTONE**, Very Strong, Greenish Gray (Gley1 5/1), Fine Grained, Thickly Bedded	79' Enter with HQ Core Fresh, Slightly Fractured, 45º Fractures 79' - 84' Open Hole Field Permeability Test	
	RC - 1			93	93			
							Fresh, Unfractured, Highly Cemented	
85							85' - 92' Packer Test	
	RC - 2			96	96			
							Fresh, Unfractured, Highly Cemented	
90						Continued: Fine to Medium Grained		
							90' - 97' Packer Test	
	RC - 3			100	90			
95						Continued: Dark Gray (Gley1 4/N) to Gray (Gley1 5/N), Fine Grained	Slightly Decomposed, Slightly Fractured, Partial Circulation Loss at 96.5', Fractures with Heavy Fe Staining at 100.2', Highly Cemented	
100	RC - 4			96	90			

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BORING NUMBER MW-306BR

CLIENT Duke Energy Carolinas
PROJECT NAME Dan River - CSA Groundwater Assessment
PROJECT NUMBER 244782
PROJECT LOCATION Rockingham County, NC

DEPTH (ft)	SAMPLE TYPE/ NO./CORE RUN	BLOW COUNTS (N VALUE)	SOIL RECOVERY (in)	ROCK RECOVERY %	ROCK RQD %	DESCRIPTION	REMARKS		MONITORING WELL
100							100' - 107' Packer Test		
						SANDSTONE, Very Strong, Dark Gray (Gley 1 4/N) to Gray (Gley 1 5/N), Fine to Medium Grained, Thickly Bedded *(continued)*	Slightly Decomposed, Slightly Fractured, Fracture with Heavy Fe Staining at 104.5'		
105									
	RC - 5			87	79	**SILTSTONE**, Strong, Gray (Gley1 5/N), Very Fine Grained, Thickly Bedded			
110									
115									
	RC - 6			100	100				
						SANDSTONE, Very Strong, Gray (Gley1 5/N), Medium to Coarse Grained, Thickly Bedded	Fresh, Unfractured		
120									
							123' - 130' Packer Test		
125									

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BORING NUMBER MW-306BR

CLIENT Duke Energy Carolinas
PROJECT NAME Dan River - CSA Groundwater Assessment
PROJECT NUMBER 244782
PROJECT LOCATION Rockingham County, NC

DEPTH (ft)	SAMPLE TYPE/ NO./CORE RUN	BLOW COUNTS (N VALUE)	SOIL RECOVERY (in)	ROCK RECOVERY %	ROCK RQD %	DESCRIPTION	REMARKS		MONITORING WELL
125									
	RC - 7			99	99	**SILTSTONE**, Strong, Dark Gray (Gley1 4/N), Fine to Very Fine Grained, Thickly Bedded	Fresh, Unfractured		
130							Monitoring Well Installed on 5/22/15 Screened Interval Set at 102' - 107' BGS Boring Terminated at 130' BGS		

Bottom of borehole at 130.0 feet.

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BORING NUMBER MW-306BR-A

CLIENT Duke Energy Carolinas
PROJECT NAME Dan River - CSA Groundwater Assessment
PROJECT NUMBER 244782
PROJECT LOCATION Rockingham County, NC
DATE STARTED 3/24/15 **COMPLETED** 4/23/15
GROUND ELEVATION 611.46 ft **HOLE SIZE(S)** 12 inches
DRILLING CONTRACTOR EnviroProbe Integrated Solutions, Inc.
NORTHING 999379.35 **EASTING** 1789634.22
DRILLING METHOD Hollow Stem Auger
GROUND WATER LEVELS:
LOGGED BY J. Schubert **CHECKED BY** B. Costner
DATE/TIME ---
NOTES Ash Storage 1
DATE/TIME ---

DEPTH (ft)	SAMPLE TYPE/ NO./CORE RUN	BLOW COUNTS (N VALUE)	SOIL RECOVERY (in)	ROCK RECOVERY %	ROCK RQD %	DESCRIPTION	REMARKS		MONITORING WELL
0						(ML) **SANDY SILT**, Reddish Brown (2.5YR 4/3), Low Plasticity, Moist, Cohesive, (FILL)	Advance with 4 1/4" HSA		
5									
	SS - 1	3-3-5 (8)	16			(ML) **SANDY SILT WITH GRAVEL**, Medium, Red (2.5YR 5/6), Low Plasticity, Moist, Cohesive, (FILL)			
10									
	SS - 2	7-2-3 (5)	9			Continued: Yellowish Red (5YR 4/6)			
15									
	SS - 3	4-29-33 (62)	16.5			(CL) **CLAY WITH SILT**, Hard, Strong Brown (7.5YR 5/6), Low Plasticity, Moist, Cohesive, (FILL)			
20									
	SS - 4	4-5-4 (9)	18			(CL) **CLAY WITH GRAVEL**, Stiff, Strong Brown (7.5YR 5/6), Low Plasticity, Moist, Cohesive, (FILL)			
25									

NORTH CAROLINA BORING LOG - GINT STD US LAB.GDT - 7/27/15 10:12 - C:\PWWORKING\TPA\D0672181\DAN RIVER.GPJ

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Phone: 704-338-6700
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BORING NUMBER MW-306BR-A

CLIENT Duke Energy Carolinas
PROJECT NAME Dan River - CSA Groundwater Assessment
PROJECT NUMBER 244782
PROJECT LOCATION Rockingham County, NC

DEPTH (ft)	SAMPLE TYPE/ NO./CORE RUN	BLOW COUNTS (N VALUE)	SOIL RECOVERY (in)	ROCK RECOVERY %	ROCK RQD %	DESCRIPTION	REMARKS		MONITORING WELL
25	SS - 5	7-6-4 (10)	18			(CL) **CLAY WITH SILT AND GRAVEL**, Stiff, Yellowish Brown (10YR 4/4), Medium Plasticity, Moist, Cohesive, (FILL)			
30	SS - 6	4-6-9 (15)	18			(CL) **CLAY WITH SILT**, Stiff, Dark Yellowish Brown (10YR 3/4), Medium Plasticity, Cohesive, (FILL)			
35	SS - 7	2-7-11 (18)	18			(CL) **CLAY WITH SILT AND GRAVEL**, Very Stiff, Brown (7.5YR 4/2), Medium Plasticity, Moist, Cohesive, (FILL)			
40	SS - 8	4-4-4 (8)	18			**ASH**, Gray (10YR 5/1), Non Plastic, Moist, Non Cohesive, (LANDFILL)	40' - 41.5' Total Inorganics and TOC Samples Obtained		
45	SS - 9	3-4-5 (9)	15			Continued: Gray (7.5YR 6/1)	45' Horizontal Laminations		
50									

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BORING NUMBER MW-306BR-A

CLIENT Duke Energy Carolinas
PROJECT NAME Dan River - CSA Groundwater Assessment
PROJECT NUMBER 244782
PROJECT LOCATION Rockingham County, NC

DEPTH (ft)	SAMPLE TYPE/ NO./CORE RUN	BLOW COUNTS (N VALUE)	SOIL RECOVERY (in)	ROCK RECOVERY %	ROCK RQD %	DESCRIPTION	REMARKS		MONITORING WELL
50	SS - 10	3-4-3 (7)	12			**ASH**, Gray (7.5YR 5/1), Non Plastic, Moist, Non Cohesive, (LANDFILL) *(continued)*			
55	SS - 11	4-3-3 (6)	18			Continued: Light Brownish Gray (2.5Y 6/2) with Very Dark Gray (2.5Y 3/1)	55' - 56.5' Total Inorganics and TOC Samples Obtained		
60	SS - 12	4-5-2 (7)	14.5			Continued: Very Dark Gray (5Y 3/1)			
65	SS - 13	4-6-6 (12)	18			Continued: Very Dark Gray (2.5Y 3/1), Wet			
70	SS - 14	1-2-2 (4)	18			Continued: Soft, Wet			
75									

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BORING NUMBER MW-306BR-A

CLIENT Duke Energy Carolinas
PROJECT NAME Dan River - CSA Groundwater Assessment
PROJECT NUMBER 244782
PROJECT LOCATION Rockingham County, NC

DEPTH (ft)	SAMPLE TYPE/ NO./CORE RUN	BLOW COUNTS (N VALUE)	SOIL RECOVERY (in)	ROCK RECOVERY %	ROCK RQD %	DESCRIPTION	REMARKS		MONITORING WELL
75									
	SS - 15	50/1"	1			**SANDSTONE**, Weak, Brown (10YR 5/3), Fine Grained, Laminated			
							75.3' - 80' Unable to Recover Sample From Auger Flights		
						No Recovery			
							80' SPT Refusal; 4 1/4" Auger Refusal at 82.5' 81' Reamed Borehole with 8 1/4" HSA; Installed 6" PVC Casing 82.5' Enter with HQ Core; No Returns While Coring, Core Bit Cut Through Outer Casing, Decided to Abandon Hole and Grout to Surface Boring Terminated at 82.5' BGS		
80									
	SS - 16	50/0"	0						

Bottom of borehole at 82.5 feet.

NORTH CAROLINA BORING LOG - GINT STD US LAB.GDT - 7/27/15 10:12 - C:\PWWORKING\TPA\D0672181\DAN RIVER.GPJ

APPENDIX II

North Carolina Department of Environment and Natural Resources (NCDENR) Well Construction Record Submittals

526 South Church Street
Charlotte, NC 28202

Mailing Address:
PO Box 1006
Mail Code EC13K
Charlotte, NC 28201-1006

704 382 4761

704 382 6240 fax

April 8, 2015

North Carolina Department of Environment and Natural Resources
Division of Water Resources
Information Processing Unit
1617 Mail Service Center
Raleigh, NC 27699-1617

Subject: Well Construction Records
Duke Energy Carolinas, LLC
Dan River Steam Station
900 S Edgewood Road, Eden, NC 27288

Dear DWR Representative:

Duke Energy is providing well construction records for fourteen (14) non-water supply monitoring wells installed at Duke Energy's Dan River Steam Station in Eden, North Carolina between March 10, 2015 and April 1, 2015. These monitoring wells were installed in the vicinity of the Ash Storage Area 1 in the northeastern portion of the Dan River site. Per 15A NCAC 02C .0307(a), these records are being submitted within 30 days of completion of construction.

Records are provided for observation wells

OW-401S,	OW-410S,	OW-415S,
OW-403S,	OW-411S,	OW-416S,
OW-406S,	OW-412S,	OW-417S, and
OW-407S,	OW-413S,	OW-419S
OW-409S,	OW-414S,	

If you have any questions, please feel free to contact me at 704-382-4761 or at Sean.DeNeale@duke-energy.com

Sincerely,

Sean DeNeale

Sean DeNeale, Engineer II
Environmental Services

cc: Elizabeth Werner, NCDENR Solid Waste Section

WELL CONSTRUCTION RECORD

This form can be used for single or multiple wells

1. Well Contractor Information:

Stefan Smith

Well Contractor Name

3576-A

NC Well Contractor Certification Number

SAEDACCO

Company Name

2. Well Construction Permit #: N/A

List all applicable well permits (i.e. County, State, Variance, Injection, etc.)

3. Well Use (check well use):

Water Supply Well:

☐Agricultural ☐Municipal/Public

☐Geothermal (Heating/Cooling Supply) ☐Residential Water Supply (single)

☐Industrial/Commercial ☐Residential Water Supply (shared)

☐Irrigation

Non-Water Supply Well:

☑Monitoring ☐Recovery

Injection Well:

☐Aquifer Recharge ☐Groundwater Remediation

☐Aquifer Storage and Recovery ☐Salinity Barrier

☐Aquifer Test ☐Stormwater Drainage

☐Experimental Technology ☐Subsidence Control

☐Geothermal (Closed Loop) ☐Tracer

☐Geothermal (Heating/Cooling Return) ☐Other (explain under #21 Remarks)

4. Date Well(s) Completed: 3/26/15 **Well ID#** OW-401 S

5a. Well Location:

Duke Energy-Dan River — Facility/Owner Name

N/A — Facility ID# (if applicable)

900 S. Edgewood Rd, Eden, NC

Physical Address, City, and Zip

Rockingham — County

798908886870 — Parcel Identification No. (PIN)

5b. Latitude and Longitude in degrees/minutes/seconds or decimal degrees:
(if well field, one lat/long is sufficient)

36.4963 N -79.7179 W

6. Is (are) the well(s): ☑**Permanent** or ☐**Temporary**

7. Is this a repair to an existing well: ☐**Yes** or ☑**No**

If this is a repair, fill out known well construction information and explain the nature of the repair under #21 remarks section or on the back of this form.

8. Number of wells constructed: 1

*For multiple injection or non-water supply wells **ONLY** with the **same construction**, you can submit one form.*

9. Total well depth below land surface: 29.2 **(ft.)**

For multiple wells list all depths if different (example- 3@200' and 2@100')

10. Static water level below top of casing: 9.9 **(ft.)**

If water level is above casing, use "+"

11. Borehole diameter: 7 **(in.)**

12. Well construction method: auger

(i.e. auger, rotary, cable, direct push, etc.)

FOR WATER SUPPLY WELLS ONLY:

13a. Yield (gpm) N/A **Method of test:** N/A

13b. Disinfection type: N/A **Amount:** N/A

For Internal Use ONLY:

14. WATER ZONES

FROM	TO	DESCRIPTION
N/A ft.	N/A ft.	N/A
N/A ft.	N/A ft.	N/A

15. OUTER CASING (for multi-cased wells) OR LINER (if applicable)

FROM	TO	DIAMETER	THICKNESS	MATERIAL
N/A ft.	N/A ft.	N/A in.	N/A	N/A

16. INNER CASING OR TUBING (geothermal closed-loop)

FROM	TO	DIAMETER	THICKNESS	MATERIAL
0 ft.	13.9 ft.	2 in.	Sch. 40	PVC
N/A ft.	N/A ft.	N/A in.	N/A	N/A

17. SCREEN

FROM	TO	DIAMETER	SLOT SIZE	THICKNESS	MATERIAL
13.9 ft.	28.9 ft.	2 in.	0.010	Sch. 40	PVC
N/A ft.	N/A ft.	N/A in.	N/A	N/A	N/A

18. GROUT

FROM	TO	MATERIAL	EMPLACEMENT METHOD & AMOUNT
0 ft.	10 ft.	Neat Cement	Tremie
10 ft.	12 ft.	Bentonite	Pour & Hydrate
N/A ft.	N/A ft.	N/A	N/A

19. SAND/GRAVEL PACK (if applicable)

FROM	TO	MATERIAL	EMPLACEMENT METHOD
12 ft.	30 ft.	#2 Silica Sand	wash
N/A ft.	N/A ft.	N/A	N/A

20. DRILLING LOG (attach additional sheets if necessary)

FROM	TO	DESCRIPTION (color, hardness, soil/rock type, grain size, etc.)
0 ft.	7 ft.	Silty Sand
7 ft.	18.5 ft.	PWR
18.5 ft.	23.5 ft.	Silty Sand
23.5 ft.	30 ft.	PWR
ft.	ft.	
ft.	ft.	
ft.	ft.	

21. REMARKS

N/A

22. Certification:

Signature of Certified Well Contractor — Date: 04/07/15

By signing this form, I hereby certify that the well(s) was (were) constructed in accordance with 15A NCAC 02C .0100 or 15A NCAC 02C .0200 Well Construction Standards and that a copy of this record has been provided to the well owner.

23. Site diagram or additional well details:

You may use the back of this page to provide additional well site details or well construction details. You may also attach additional pages if necessary.

SUBMITTAL INSTUCTIONS

24a. For All Wells: Submit this form within 30 days of completion of well construction to the following:

Division of Water Resources, Information Processing Unit,
1617 Mail Service Center, Raleigh, NC 27699-1617

24b. For Injection Wells ONLY: In addition to sending the form to the address in 24a above, also submit a copy of this form within 30 days of completion of well construction to the following:

Division of Water Resources, Underground Injection Control Program,
1636 Mail Service Center, Raleigh, NC 27699-1636

24c. For Water Supply & Injection Wells:

Also submit one copy of this form within 30 days of completion of well construction to the county health department of the county where constructed.

WELL CONSTRUCTION RECORD

This form can be used for single or multiple wells

For Internal Use ONLY:

1. Well Contractor Information:

Stefan Smith
Well Contractor Name

3576-A
NC Well Contractor Certification Number

SAEDACCO
Company Name

2. Well Construction Permit #: N/A
List all applicable well permits (i.e. County, State, Variance, Injection, etc.)

3. Well Use (check well use):

Water Supply Well:
☐Agricultural ☐Municipal/Public
☐Geothermal (Heating/Cooling Supply) ☐Residential Water Supply (single)
☐Industrial/Commercial ☐Residential Water Supply (shared)
☐Irrigation

Non-Water Supply Well:
☑Monitoring ☐Recovery

Injection Well:
☐Aquifer Recharge ☐Groundwater Remediation
☐Aquifer Storage and Recovery ☐Salinity Barrier
☐Aquifer Test ☐Stormwater Drainage
☐Experimental Technology ☐Subsidence Control
☐Geothermal (Closed Loop) ☐Tracer
☐Geothermal (Heating/Cooling Return) ☐Other (explain under #21 Remarks)

4. Date Well(s) Completed: 3/30/15 **Well ID#** OW-403 S

5a. Well Location:

Duke Energy-Dan River — Facility/Owner Name
N/A — Facility ID# (if applicable)

900 S. Edgewood Rd, Eden, NC
Physical Address, City, and Zip

Rockingham — County
798908886870 — Parcel Identification No. (PIN)

5b. Latitude and Longitude in degrees/minutes/seconds or decimal degrees:
(if well field, one lat/long is sufficient)

36.4963 N -79.7148 W

6. Is (are) the well(s): ☑**Permanent** or ☐**Temporary**

7. Is this a repair to an existing well: ☐**Yes** or ☑**No**
If this is a repair, fill out known well construction information and explain the nature of the repair under #21 remarks section or on the back of this form.

8. Number of wells constructed: 1
*For multiple injection or non-water supply wells **ONLY** with the **same construction**, you can submit one form.*

9. Total well depth below land surface: 50 **(ft.)**
For multiple wells list all depths if different (example- 3@200' and 2@100')

10. Static water level below top of casing: 17 **(ft.)**
If water level is above casing, use "+"

11. Borehole diameter: 7 **(in.)**

12. Well construction method: auger
(i.e. auger, rotary, cable, direct push, etc.)

FOR WATER SUPPLY WELLS ONLY:

13a. Yield (gpm) N/A **Method of test:** N/A

13b. Disinfection type: N/A **Amount:** N/A

14. WATER ZONES

FROM	TO	DESCRIPTION
N/A ft.	N/A ft.	N/A
N/A ft.	N/A ft.	N/A

15. OUTER CASING (for multi-cased wells) OR LINER (if applicable)

FROM	TO	DIAMETER	THICKNESS	MATERIAL
N/A ft.	N/A ft.	N/A in.	N/A	N/A

16. INNER CASING OR TUBING (geothermal closed-loop)

FROM	TO	DIAMETER	THICKNESS	MATERIAL
0 ft.	34.7 ft.	2 in.	Sch. 40	PVC
N/A ft.	N/A ft.	N/A in.	N/A	N/A

17. SCREEN

FROM	TO	DIAMETER	SLOT SIZE	THICKNESS	MATERIAL
34.7 ft.	49.7 ft.	2 in.	0.010	Sch. 40	PVC
N/A ft.	N/A ft.	N/A in.	N/A	N/A	N/A

18. GROUT

FROM	TO	MATERIAL	EMPLACEMENT METHOD & AMOUNT
0 ft.	31 ft.	Neat Cement	Tremie
31 ft.	33 ft.	Bentonite	Pour & Hydrate
N/A ft.	N/A ft.	N/A	N/A

19. SAND/GRAVEL PACK (if applicable)

FROM	TO	MATERIAL	EMPLACEMENT METHOD
33 ft.	50 ft.	#2 Silica Sand	wash
N/A ft.	N/A ft.	N/A	N/A

20. DRILLING LOG (attach additional sheets if necessary)

FROM	TO	DESCRIPTION (color, hardness, soil/rock type, grain size, etc.)
0 ft.	13.5 ft.	Silty Sand
13.5 ft.	18.5 ft.	PWR
18.5 ft.	23 ft.	Sandy Silt
23 ft.	25 ft.	Sandy Clayey Silt
25 ft.	50.4 ft.	PWR
ft.	ft.	
ft.	ft.	

21. REMARKS

N/A

22. Certification:

Signature of Certified Well Contractor — Date: 04/07/15

By signing this form, I hereby certify that the well(s) was (were) constructed in accordance with 15A NCAC 02C .0100 or 15A NCAC 02C .0200 Well Construction Standards and that a copy of this record has been provided to the well owner.

23. Site diagram or additional well details:
You may use the back of this page to provide additional well site details or well construction details. You may also attach additional pages if necessary.

SUBMITTAL INSTUCTIONS

24a. For All Wells: Submit this form within 30 days of completion of well construction to the following:

Division of Water Resources, Information Processing Unit,
1617 Mail Service Center, Raleigh, NC 27699-1617

24b. For Injection Wells ONLY: In addition to sending the form to the address in 24a above, also submit a copy of this form within 30 days of completion of well construction to the following:

Division of Water Resources, Underground Injection Control Program,
1636 Mail Service Center, Raleigh, NC 27699-1636

24c. For Water Supply & Injection Wells:
Also submit one copy of this form within 30 days of completion of well construction to the county health department of the county where constructed.

WELL CONSTRUCTION RECORD

This form can be used for single or multiple wells

For Internal Use ONLY:

1. Well Contractor Information:

Stefan Smith
Well Contractor Name

3576-A
NC Well Contractor Certification Number

SAEDACCO
Company Name

2. Well Construction Permit #: N/A
List all applicable well permits (i.e. County, State, Variance, Injection, etc.)

3. Well Use (check well use):

Water Supply Well:
- ☐Agricultural
- ☐Municipal/Public
- ☐Geothermal (Heating/Cooling Supply)
- ☐Residential Water Supply (single)
- ☐Industrial/Commercial
- ☐Residential Water Supply (shared)
- ☐Irrigation

Non-Water Supply Well:
- ☑Monitoring
- ☐Recovery

Injection Well:
- ☐Aquifer Recharge
- ☐Groundwater Remediation
- ☐Aquifer Storage and Recovery
- ☐Salinity Barrier
- ☐Aquifer Test
- ☐Stormwater Drainage
- ☐Experimental Technology
- ☐Subsidence Control
- ☐Geothermal (Closed Loop)
- ☐Tracer
- ☐Geothermal (Heating/Cooling Return)
- ☐Other (explain under #21 Remarks)

4. Date Well(s) Completed: 4/1/15 **Well ID#** OW-406 S

5a. Well Location:

Duke Energy-Dan River — Facility/Owner Name
N/A — Facility ID# (if applicable)

900 S. Edgewood Rd, Eden, NC
Physical Address, City, and Zip

Rockingham — County
798908886870 — Parcel Identification No. (PIN)

5b. Latitude and Longitude in degrees/minutes/seconds or decimal degrees:
(if well field, one lat/long is sufficient)

36.4954 N -79.7183 W

6. Is (are) the well(s): ☑**Permanent** or ☐**Temporary**

7. Is this a repair to an existing well: ☐**Yes** or ☑**No**
If this is a repair, fill out known well construction information and explain the nature of the repair under #21 remarks section or on the back of this form.

8. Number of wells constructed: 1
*For multiple injection or non-water supply wells **ONLY** with the **same construction**, you can submit one form.*

9. Total well depth below land surface: 26 **(ft.)**
For multiple wells list all depths if different (example- 3@200' and 2@100')

10. Static water level below top of casing: 4.6 **(ft.)**
If water level is above casing, use "+"

11. Borehole diameter: 7 **(in.)**

12. Well construction method: auger
(i.e. auger, rotary, cable, direct push, etc.)

FOR WATER SUPPLY WELLS ONLY:

13a. Yield (gpm) N/A **Method of test:** N/A

13b. Disinfection type: N/A **Amount:** N/A

14. WATER ZONES

FROM	TO	DESCRIPTION
N/A ft.	N/A ft.	N/A
N/A ft.	N/A ft.	N/A

15. OUTER CASING (for multi-cased wells) OR LINER (if applicable)

FROM	TO	DIAMETER	THICKNESS	MATERIAL
N/A ft.	N/A ft.	N/A in.	N/A	N/A

16. INNER CASING OR TUBING (geothermal closed-loop)

FROM	TO	DIAMETER	THICKNESS	MATERIAL
0 ft.	10.7 ft.	2 in.	Sch. 40	PVC
N/A ft.	N/A ft.	N/A in.	N/A	N/A

17. SCREEN

FROM	TO	DIAMETER	SLOT SIZE	THICKNESS	MATERIAL
10.7 ft.	25.7 ft.	2 in.	0.010	Sch. 40	PVC
N/A ft.	N/A ft.	N/A in.	N/A	N/A	N/A

18. GROUT

FROM	TO	MATERIAL	EMPLACEMENT METHOD & AMOUNT
0 ft.	7 ft.	Neat Cement	Tremie
7 ft.	9 ft.	Bentonite	Pour & Hydrate
N/A ft.	N/A ft.	N/A	N/A

19. SAND/GRAVEL PACK (if applicable)

FROM	TO	MATERIAL	EMPLACEMENT METHOD
9 ft.	26 ft.	#2 Silica Sand	wash
N/A ft.	N/A ft.	N/A	N/A

20. DRILLING LOG (attach additional sheets if necessary)

FROM	TO	DESCRIPTION (color, hardness, soil/rock type, grain size, etc.)
0 ft.	7 ft.	Clay
7 ft.	11 ft.	Silty Sand
11 ft.	26 ft.	PWR
ft.	ft.	
ft.	ft.	
ft.	ft.	
ft.	ft.	

21. REMARKS

N/A

22. Certification:

Signature of Certified Well Contractor — Date: 04/07/15

By signing this form, I hereby certify that the well(s) was (were) constructed in accordance with 15A NCAC 02C .0100 or 15A NCAC 02C .0200 Well Construction Standards and that a copy of this record has been provided to the well owner.

23. Site diagram or additional well details:
You may use the back of this page to provide additional well site details or well construction details. You may also attach additional pages if necessary.

SUBMITTAL INSTUCTIONS

24a. For All Wells: Submit this form within 30 days of completion of well construction to the following:

Division of Water Resources, Information Processing Unit,
1617 Mail Service Center, Raleigh, NC 27699-1617

24b. For Injection Wells ONLY: In addition to sending the form to the address in 24a above, also submit a copy of this form within 30 days of completion of well construction to the following:

Division of Water Resources, Underground Injection Control Program,
1636 Mail Service Center, Raleigh, NC 27699-1636

24c. For Water Supply & Injection Wells:
Also submit one copy of this form within 30 days of completion of well construction to the county health department of the county where constructed.

WELL CONSTRUCTION RECORD

This form can be used for single or multiple wells

For Internal Use ONLY:

1. Well Contractor Information:

Richy Lemire

Well Contractor Name

2593-A

NC Well Contractor Certification Number

SAEDACCO

Company Name

2. Well Construction Permit #: N/A

List all applicable well permits (i.e. County, State, Variance, Injection, etc.)

3. Well Use (check well use):

Water Supply Well:

- ☐ Agricultural
- ☐ Municipal/Public
- ☐ Geothermal (Heating/Cooling Supply)
- ☐ Residential Water Supply (single)
- ☐ Industrial/Commercial
- ☐ Residential Water Supply (shared)
- ☐ Irrigation

Non-Water Supply Well:

- ☑ Monitoring
- ☐ Recovery

Injection Well:

- ☐ Aquifer Recharge
- ☐ Groundwater Remediation
- ☐ Aquifer Storage and Recovery
- ☐ Salinity Barrier
- ☐ Aquifer Test
- ☐ Stormwater Drainage
- ☐ Experimental Technology
- ☐ Subsidence Control
- ☐ Geothermal (Closed Loop)
- ☐ Tracer
- ☐ Geothermal (Heating/Cooling Return)
- ☐ Other (explain under #21 Remarks)

4. Date Well(s) Completed: 3/16/15 **Well ID#** OW-407 S

5a. Well Location:

Duke Energy-Dan River — Facility/Owner Name

N/A — Facility ID# (if applicable)

900 S. Edgewood Rd, Eden, NC — Physical Address, City, and Zip

Rockingham — County

798908886870 — Parcel Identification No. (PIN)

5b. Latitude and Longitude in degrees/minutes/seconds or decimal degrees:
(if well field, one lat/long is sufficient)

36.4951 N -79.7163 W

6. Is (are) the well(s): ☑ **Permanent** or ☐ **Temporary**

7. Is this a repair to an existing well: ☐ **Yes** or ☑ **No**

If this is a repair, fill out known well construction information and explain the nature of the repair under #21 remarks section or on the back of this form.

8. Number of wells constructed: 1

*For multiple injection or non-water supply wells **ONLY** with the **same construction**, you can submit one form.*

9. Total well depth below land surface: 63.5 **(ft.)**

For multiple wells list all depths if different (example- 3@200' and 2@100')

10. Static water level below top of casing: 48.9 **(ft.)**

If water level is above casing, use "+"

11. Borehole diameter: 7 **(in.)**

12. Well construction method: auger

(i.e. auger, rotary, cable, direct push, etc.)

FOR WATER SUPPLY WELLS ONLY:

13a. Yield (gpm) N/A **Method of test:** N/A

13b. Disinfection type: N/A **Amount:** N/A

14. WATER ZONES

FROM	TO	DESCRIPTION
N/A ft.	N/A ft.	N/A
N/A ft.	N/A ft.	N/A

15. OUTER CASING (for multi-cased wells) OR LINER (if applicable)

FROM	TO	DIAMETER	THICKNESS	MATERIAL
N/A ft.	N/A ft.	N/A in.	N/A	N/A

16. INNER CASING OR TUBING (geothermal closed-loop)

FROM	TO	DIAMETER	THICKNESS	MATERIAL
0 ft.	48.2 ft.	2 in.	Sch. 40	PVC
N/A ft.	N/A ft.	N/A in.	N/A	N/A

17. SCREEN

FROM	TO	DIAMETER	SLOT SIZE	THICKNESS	MATERIAL
48.2 ft.	63.2 ft.	2 in.	0.010	Sch. 40	PVC
N/A ft.	N/A ft.	N/A in.	N/A	N/A	N/A

18. GROUT

FROM	TO	MATERIAL	EMPLACEMENT METHOD & AMOUNT
0 ft.	44.5 ft.	Neat Cement	Tremie
44.5 ft.	46.5 ft.	Bentonite	Pour & Hydrate
N/A ft.	N/A ft.	N/A	N/A

19. SAND/GRAVEL PACK (if applicable)

FROM	TO	MATERIAL	EMPLACEMENT METHOD
46.5 ft.	63.5 ft.	#2 Silica Sand	wash
N/A ft.	N/A ft.	N/A	N/A

20. DRILLING LOG (attach additional sheets if necessary)

FROM	TO	DESCRIPTION (color, hardness, soil/rock type, grain size, etc.)
0 ft.	1.5 ft.	Fill: Silty Sand
1.5 ft.	38.5 ft.	Fill: Ash
38.5 ft.	43.5 ft.	Organic Debris
43.5 ft.	48.5 ft.	Sandy Clay
48.5 ft.	54 ft.	Clayey Sand
54 ft.	58.5 ft.	Silty Sand
58.5 ft.	63.8 ft.	PWR

21. REMARKS

N/A

22. Certification:

Richy L Lemire — Signature of Certified Well Contractor

04/07/15 — Date

By signing this form, I hereby certify that the well(s) was (were) constructed in accordance with 15A NCAC 02C .0100 or 15A NCAC 02C .0200 Well Construction Standards and that a copy of this record has been provided to the well owner.

23. Site diagram or additional well details:

You may use the back of this page to provide additional well site details or well construction details. You may also attach additional pages if necessary.

SUBMITTAL INSTUCTIONS

24a. For All Wells: Submit this form within 30 days of completion of well construction to the following:

Division of Water Resources, Information Processing Unit,
1617 Mail Service Center, Raleigh, NC 27699-1617

24b. For Injection Wells ONLY: In addition to sending the form to the address in 24a above, also submit a copy of this form within 30 days of completion of well construction to the following:

Division of Water Resources, Underground Injection Control Program,
1636 Mail Service Center, Raleigh, NC 27699-1636

24c. For Water Supply & Injection Wells:

Also submit one copy of this form within 30 days of completion of well construction to the county health department of the county where constructed.

WELL CONSTRUCTION RECORD

This form can be used for single or multiple wells

1. Well Contractor Information:

Richy Lemire

Well Contractor Name

2593-A

NC Well Contractor Certification Number

SAEDACCO

Company Name

2. Well Construction Permit #: N/A

List all applicable well permits (i.e. County, State, Variance, Injection, etc.)

3. Well Use (check well use):

Water Supply Well:

- ☐Agricultural
- ☐Municipal/Public
- ☐Geothermal (Heating/Cooling Supply)
- ☐Residential Water Supply (single)
- ☐Industrial/Commercial
- ☐Residential Water Supply (shared)
- ☐Irrigation

Non-Water Supply Well:

- ☑Monitoring
- ☐Recovery

Injection Well:

- ☐Aquifer Recharge
- ☐Groundwater Remediation
- ☐Aquifer Storage and Recovery
- ☐Salinity Barrier
- ☐Aquifer Test
- ☐Stormwater Drainage
- ☐Experimental Technology
- ☐Subsidence Control
- ☐Geothermal (Closed Loop)
- ☐Tracer
- ☐Geothermal (Heating/Cooling Return)
- ☐Other (explain under #21 Remarks)

4. Date Well(s) Completed: 4/1/15 **Well ID#** OW-409 S

5a. Well Location:

Duke Energy-Dan River — Facility/Owner Name

N/A — Facility ID# (if applicable)

900 S. Edgewood Rd, Eden, NC — Physical Address, City, and Zip

Rockingham — County

798908886870 — Parcel Identification No. (PIN)

5b. Latitude and Longitude in degrees/minutes/seconds or decimal degrees:
(if well field, one lat/long is sufficient)

36.4948 N -79.7179 W

6. Is (are) the well(s): ☑**Permanent** or ☐**Temporary**

7. Is this a repair to an existing well: ☐**Yes** or ☑**No**

If this is a repair, fill out known well construction information and explain the nature of the repair under #21 remarks section or on the back of this form.

8. Number of wells constructed: 1

*For multiple injection or non-water supply wells **ONLY** with the **same construction**, you can submit one form.*

9. Total well depth below land surface: 14 **(ft.)**

For multiple wells list all depths if different (example- 3@200' and 2@100')

10. Static water level below top of casing: 1.3 **(ft.)**

If water level is above casing, use "+"

11. Borehole diameter: 7 **(in.)**

12. Well construction method: auger

(i.e. auger, rotary, cable, direct push, etc.)

FOR WATER SUPPLY WELLS ONLY:

13a. Yield (gpm) N/A **Method of test:** N/A

13b. Disinfection type: N/A **Amount:** N/A

For Internal Use ONLY:

14. WATER ZONES

FROM	TO	DESCRIPTION
N/A ft.	N/A ft.	N/A
N/A ft.	N/A ft.	N/A

15. OUTER CASING (for multi-cased wells) OR LINER (if applicable)

FROM	TO	DIAMETER	THICKNESS	MATERIAL
N/A ft.	N/A ft.	N/A in.	N/A	N/A

16. INNER CASING OR TUBING (geothermal closed-loop)

FROM	TO	DIAMETER	THICKNESS	MATERIAL
0 ft.	5 ft.	2 in.	Sch. 40	PVC
N/A ft.	N/A ft.	N/A in.	N/A	N/A

17. SCREEN

FROM	TO	DIAMETER	SLOT SIZE	THICKNESS	MATERIAL
5 ft.	14 ft.	2 in.	0.010	Sch. 40	PVC
N/A ft.	N/A ft.	N/A in.	N/A	N/A	N/A

18. GROUT

FROM	TO	MATERIAL	EMPLACEMENT METHOD & AMOUNT
0 ft.	3 ft.	Neat Cement	Tremie
3 ft.	4 ft.	Bentonite	Pour & Hydrate
N/A ft.	N/A ft.	N/A	N/A

19. SAND/GRAVEL PACK (if applicable)

FROM	TO	MATERIAL	EMPLACEMENT METHOD
4 ft.	14 ft.	#2 Silica Sand	wash
N/A ft.	N/A ft.	N/A	N/A

20. DRILLING LOG (attach additional sheets if necessary)

FROM	TO	DESCRIPTION (color, hardness, soil/rock type, grain size, etc.)
0 ft.	7 ft.	Sandy Clay
7 ft.	14 ft.	PWR
ft.	ft.	
ft.	ft.	
ft.	ft.	
ft.	ft.	
ft.	ft.	

21. REMARKS

N/A

22. Certification:

Richy L Lemire — Signature of Certified Well Contractor

04/07/15 — Date

By signing this form, I hereby certify that the well(s) was (were) constructed in accordance with 15A NCAC 02C .0100 or 15A NCAC 02C .0200 Well Construction Standards and that a copy of this record has been provided to the well owner.

23. Site diagram or additional well details:

You may use the back of this page to provide additional well site details or well construction details. You may also attach additional pages if necessary.

SUBMITTAL INSTUCTIONS

24a. For All Wells: Submit this form within 30 days of completion of well construction to the following:

Division of Water Resources, Information Processing Unit,
1617 Mail Service Center, Raleigh, NC 27699-1617

24b. For Injection Wells ONLY: In addition to sending the form to the address in 24a above, also submit a copy of this form within 30 days of completion of well construction to the following:

Division of Water Resources, Underground Injection Control Program,
1636 Mail Service Center, Raleigh, NC 27699-1636

24c. For Water Supply & Injection Wells:

Also submit one copy of this form within 30 days of completion of well construction to the county health department of the county where constructed.

WELL CONSTRUCTION RECORD

This form can be used for single or multiple wells

1. Well Contractor Information:

Richy Lemire

Well Contractor Name

2593-A

NC Well Contractor Certification Number

SAEDACCO

Company Name

2. Well Construction Permit #: N/A

List all applicable well permits (i.e. County, State, Variance, Injection, etc.)

3. Well Use (check well use):

Water Supply Well:

☐Agricultural ☐Municipal/Public

☐Geothermal (Heating/Cooling Supply) ☐Residential Water Supply (single)

☐Industrial/Commercial ☐Residential Water Supply (shared)

☐Irrigation

Non-Water Supply Well:

☑Monitoring ☐Recovery

Injection Well:

☐Aquifer Recharge ☐Groundwater Remediation

☐Aquifer Storage and Recovery ☐Salinity Barrier

☐Aquifer Test ☐Stormwater Drainage

☐Experimental Technology ☐Subsidence Control

☐Geothermal (Closed Loop) ☐Tracer

☐Geothermal (Heating/Cooling Return) ☐Other (explain under #21 Remarks)

4. Date Well(s) Completed: 3/26/15 **Well ID#** OW-410 S

5a. Well Location:

Duke Energy-Dan River — Facility/Owner Name

N/A — Facility ID# (if applicable)

900 S. Edgewood Rd, Eden, NC

Physical Address, City, and Zip

Rockingham — County

798908886870 — Parcel Identification No. (PIN)

5b. Latitude and Longitude in degrees/minutes/seconds or decimal degrees:
(if well field, one lat/long is sufficient)

36.4943 N -79.7164 W

6. Is (are) the well(s): ☑**Permanent** or ☐**Temporary**

7. Is this a repair to an existing well: ☐**Yes** or ☑**No**

If this is a repair, fill out known well construction information and explain the nature of the repair under #21 remarks section or on the back of this form.

8. Number of wells constructed: 1

*For multiple injection or non-water supply wells **ONLY** with the **same construction**, you can submit one form.*

9. Total well depth below land surface: 54.5 **(ft.)**

For multiple wells list all depths if different (example- 3@200' and 2@100')

10. Static water level below top of casing: 39.3 **(ft.)**

If water level is above casing, use "+"

11. Borehole diameter: 7 **(in.)**

12. Well construction method: auger

(i.e. auger, rotary, cable, direct push, etc.)

FOR WATER SUPPLY WELLS ONLY:

13a. Yield (gpm) N/A **Method of test:** N/A

13b. Disinfection type: N/A **Amount:** N/A

For Internal Use ONLY:

14. WATER ZONES

FROM	TO	DESCRIPTION
N/A ft.	N/A ft.	N/A
N/A ft.	N/A ft.	N/A

15. OUTER CASING (for multi-cased wells) OR LINER (if applicable)

FROM	TO	DIAMETER	THICKNESS	MATERIAL
N/A ft.	N/A ft.	N/A in.	N/A	N/A

16. INNER CASING OR TUBING (geothermal closed-loop)

FROM	TO	DIAMETER	THICKNESS	MATERIAL
0 ft.	39.2 ft.	2 in.	Sch. 40	PVC
N/A ft.	N/A ft.	N/A in.	N/A	N/A

17. SCREEN

FROM	TO	DIAMETER	SLOT SIZE	THICKNESS	MATERIAL
39.2 ft.	54.2 ft.	2 in.	0.010	Sch. 40	PVC
N/A ft.	N/A ft.	N/A in.	N/A	N/A	N/A

18. GROUT

FROM	TO	MATERIAL	EMPLACEMENT METHOD & AMOUNT
0 ft.	35 ft.	Neat Cement	Tremie
35 ft.	37 ft.	Bentonite	Pour & Hydrate
N/A ft.	N/A ft.	N/A	N/A

19. SAND/GRAVEL PACK (if applicable)

FROM	TO	MATERIAL	EMPLACEMENT METHOD
37 ft.	54.5 ft.	#2 Silica Sand	wash
N/A ft.	N/A ft.	N/A	N/A

20. DRILLING LOG (attach additional sheets if necessary)

FROM	TO	DESCRIPTION (color, hardness, soil/rock type, grain size, etc.)
0 ft.	1.5 ft.	Fill: Sandy Clay
1.5 ft.	34.7 ft.	Fill: Ash
34.7 ft.	38.5 ft.	Silty Sand
38.5 ft.	54.5 ft.	PWR
ft.	ft.	
ft.	ft.	
ft.	ft.	

21. REMARKS

N/A

22. Certification:

Richy Lemire — Signature of Certified Well Contractor

04/07/15 — Date

By signing this form, I hereby certify that the well(s) was (were) constructed in accordance with 15A NCAC 02C .0100 or 15A NCAC 02C .0200 Well Construction Standards and that a copy of this record has been provided to the well owner.

23. Site diagram or additional well details:

You may use the back of this page to provide additional well site details or well construction details. You may also attach additional pages if necessary.

SUBMITTAL INSTUCTIONS

24a. For All Wells: Submit this form within 30 days of completion of well construction to the following:

Division of Water Resources, Information Processing Unit,
1617 Mail Service Center, Raleigh, NC 27699-1617

24b. For Injection Wells ONLY: In addition to sending the form to the address in 24a above, also submit a copy of this form within 30 days of completion of well construction to the following:

Division of Water Resources, Underground Injection Control Program,
1636 Mail Service Center, Raleigh, NC 27699-1636

24c. For Water Supply & Injection Wells:

Also submit one copy of this form within 30 days of completion of well construction to the county health department of the county where constructed.

WELL CONSTRUCTION RECORD

This form can be used for single or multiple wells

For Internal Use ONLY:

1. Well Contractor Information:

Richy Lemire

Well Contractor Name

2593-A

NC Well Contractor Certification Number

SAEDACCO

Company Name

2. Well Construction Permit #: N/A

List all applicable well permits (i.e. County, State, Variance, Injection, etc.)

3. Well Use (check well use):

Water Supply Well:

☐Agricultural ☐Municipal/Public

☐Geothermal (Heating/Cooling Supply) ☐Residential Water Supply (single)

☐Industrial/Commercial ☐Residential Water Supply (shared)

☐Irrigation

Non-Water Supply Well:

☑Monitoring ☐Recovery

Injection Well:

☐Aquifer Recharge ☐Groundwater Remediation

☐Aquifer Storage and Recovery ☐Salinity Barrier

☐Aquifer Test ☐Stormwater Drainage

☐Experimental Technology ☐Subsidence Control

☐Geothermal (Closed Loop) ☐Tracer

☐Geothermal (Heating/Cooling Return) ☐Other (explain under #21 Remarks)

4. Date Well(s) Completed: 3/23/15 **Well ID#** OW-411 S

5a. Well Location:

Duke Energy-Dan River — Facility/Owner Name

N/A — Facility ID# (if applicable)

900 S. Edgewood Rd, Eden, NC — Physical Address, City, and Zip

Rockingham — County

798908886870 — Parcel Identification No. (PIN)

5b. Latitude and Longitude in degrees/minutes/seconds or decimal degrees:
(if well field, one lat/long is sufficient)

36.4944 N -79.7147 W

6. Is (are) the well(s): ☑**Permanent** or ☐**Temporary**

7. Is this a repair to an existing well: ☐**Yes** or ☑**No**

If this is a repair, fill out known well construction information and explain the nature of the repair under #21 remarks section or on the back of this form.

8. Number of wells constructed: 1

*For multiple injection or non-water supply wells **ONLY** with the **same construction**, you can submit one form.*

9. Total well depth below land surface: 66 **(ft.)**

For multiple wells list all depths if different (example- 3@200' and 2@100')

10. Static water level below top of casing: 44.1 **(ft.)**

If water level is above casing, use "+"

11. Borehole diameter: 7 **(in.)**

12. Well construction method: auger

(i.e. auger, rotary, cable, direct push, etc.)

FOR WATER SUPPLY WELLS ONLY:

13a. Yield (gpm) N/A **Method of test:** N/A

13b. Disinfection type: N/A **Amount:** N/A

14. WATER ZONES

FROM	TO	DESCRIPTION
N/A ft.	N/A ft.	N/A
N/A ft.	N/A ft.	N/A

15. OUTER CASING (for multi-cased wells) OR LINER (if applicable)

FROM	TO	DIAMETER	THICKNESS	MATERIAL
N/A ft.	N/A ft.	N/A in.	N/A	N/A

16. INNER CASING OR TUBING (geothermal closed-loop)

FROM	TO	DIAMETER	THICKNESS	MATERIAL
0 ft.	50.7 ft.	2 in.	Sch. 40	PVC
N/A ft.	N/A ft.	N/A in.	N/A	N/A

17. SCREEN

FROM	TO	DIAMETER	SLOT SIZE	THICKNESS	MATERIAL
50.7 ft.	65.7 ft.	2 in.	0.010	Sch. 40	PVC
N/A ft.	N/A ft.	N/A in.	N/A	N/A	N/A

18. GROUT

FROM	TO	MATERIAL	EMPLACEMENT METHOD & AMOUNT
0 ft.	47 ft.	Neat Cement	Tremie
47 ft.	49 ft.	Bentonite	Pour & Hydrate
N/A ft.	N/A ft.	N/A	N/A

19. SAND/GRAVEL PACK (if applicable)

FROM	TO	MATERIAL	EMPLACEMENT METHOD
49 ft.	66 ft.	#2 Silica Sand	wash
N/A ft.	N/A ft.	N/A	N/A

20. DRILLING LOG (attach additional sheets if necessary)

FROM	TO	DESCRIPTION (color, hardness, soil/rock type, grain size, etc.)
0 ft.	2 ft.	Fill: Silty Sand
2 ft.	31 ft.	Fill: Ash (Sandy Clay 18-19.8)
31 ft.	38.5 ft.	Silty Sand / Sandy Silt
38.5 ft.	58.5 ft.	PWR
58.5 ft.	60 ft.	Silty Sand
60 ft.	66.4 ft.	PWR
ft.	ft.	

21. REMARKS

N/A

22. Certification:

Richy L Lemire — Signature of Certified Well Contractor

04/07/15 — Date

By signing this form, I hereby certify that the well(s) was (were) constructed in accordance with 15A NCAC 02C .0100 or 15A NCAC 02C .0200 Well Construction Standards and that a copy of this record has been provided to the well owner.

23. Site diagram or additional well details:

You may use the back of this page to provide additional well site details or well construction details. You may also attach additional pages if necessary.

SUBMITTAL INSTUCTIONS

24a. For All Wells: Submit this form within 30 days of completion of well construction to the following:

Division of Water Resources, Information Processing Unit,
1617 Mail Service Center, Raleigh, NC 27699-1617

24b. For Injection Wells ONLY: In addition to sending the form to the address in 24a above, also submit a copy of this form within 30 days of completion of well construction to the following:

Division of Water Resources, Underground Injection Control Program,
1636 Mail Service Center, Raleigh, NC 27699-1636

24c. For Water Supply & Injection Wells:

Also submit one copy of this form within 30 days of completion of well construction to the county health department of the county where constructed.

WELL CONSTRUCTION RECORD

This form can be used for single or multiple wells

1. Well Contractor Information:

Richy Lemire

Well Contractor Name

2593-A

NC Well Contractor Certification Number

SAEDACCO

Company Name

2. Well Construction Permit #: N/A

List all applicable well permits (i.e. County, State, Variance, Injection, etc.)

3. Well Use (check well use):

Water Supply Well:

☐Agricultural ☐Municipal/Public

☐Geothermal (Heating/Cooling Supply) ☐Residential Water Supply (single)

☐Industrial/Commercial ☐Residential Water Supply (shared)

☐Irrigation

Non-Water Supply Well:

☑Monitoring ☐Recovery

Injection Well:

☐Aquifer Recharge ☐Groundwater Remediation

☐Aquifer Storage and Recovery ☐Salinity Barrier

☐Aquifer Test ☐Stormwater Drainage

☐Experimental Technology ☐Subsidence Control

☐Geothermal (Closed Loop) ☐Tracer

☐Geothermal (Heating/Cooling Return) ☐Other (explain under #21 Remarks)

4. Date Well(s) Completed: 3/18/15 **Well ID#** OW-412 S

5a. Well Location:

Duke Energy-Dan River — Facility/Owner Name

N/A — Facility ID# (if applicable)

900 S. Edgewood Rd, Eden, NC

Physical Address, City, and Zip

Rockingham — County

798908886870 — Parcel Identification No. (PIN)

5b. Latitude and Longitude in degrees/minutes/seconds or decimal degrees:
(if well field, one lat/long is sufficient)

36.4950 N -79.7132 W

6. Is (are) the well(s): ☑**Permanent** or ☐**Temporary**

7. Is this a repair to an existing well: ☐**Yes** or ☑**No**

If this is a repair, fill out known well construction information and explain the nature of the repair under #21 remarks section or on the back of this form.

8. Number of wells constructed: 1

*For multiple injection or non-water supply wells **ONLY** with the **same construction**, you can submit one form.*

9. Total well depth below land surface: 58 **(ft.)**

For multiple wells list all depths if different (example- 3@200' and 2@100')

10. Static water level below top of casing: 33.5 **(ft.)**

If water level is above casing, use "+"

11. Borehole diameter: 7 **(in.)**

12. Well construction method: auger

(i.e. auger, rotary, cable, direct push, etc.)

FOR WATER SUPPLY WELLS ONLY:

13a. Yield (gpm) N/A **Method of test:** N/A

13b. Disinfection type: N/A **Amount:** N/A

For Internal Use ONLY:

14. WATER ZONES

FROM	TO	DESCRIPTION
N/A ft.	N/A ft.	N/A
N/A ft.	N/A ft.	N/A

15. OUTER CASING (for multi-cased wells) OR LINER (if applicable)

FROM	TO	DIAMETER	THICKNESS	MATERIAL
N/A ft.	N/A ft.	N/A in.	N/A	N/A

16. INNER CASING OR TUBING (geothermal closed-loop)

FROM	TO	DIAMETER	THICKNESS	MATERIAL
0 ft.	42.7 ft.	2 in.	Sch. 40	PVC
N/A ft.	N/A ft.	N/A in.	N/A	N/A

17. SCREEN

FROM	TO	DIAMETER	SLOT SIZE	THICKNESS	MATERIAL
42.7 ft.	57.7 ft.	2 in.	0.010	Sch. 40	PVC
N/A ft.	N/A ft.	N/A in.	N/A	N/A	N/A

18. GROUT

FROM	TO	MATERIAL	EMPLACEMENT METHOD & AMOUNT
0 ft.	39 ft.	Neat Cement	Tremie
39 ft.	41 ft.	Bentonite	Pour & Hydrate
N/A ft.	N/A ft.	N/A	N/A

19. SAND/GRAVEL PACK (if applicable)

FROM	TO	MATERIAL	EMPLACEMENT METHOD
41 ft.	58 ft.	#2 Silica Sand	wash
N/A ft.	N/A ft.	N/A	N/A

20. DRILLING LOG (attach additional sheets if necessary)

FROM	TO	DESCRIPTION (color, hardness, soil/rock type, grain size, etc.)
0 ft.	0.5 ft.	Fill: Silty Gravel
0.5 ft.	6 ft.	Fill: Sandy Clay
6 ft.	23.5 ft.	Silty Sand
23.5 ft.	59 ft.	PWR (Silty Sand zones 28.5-30 & 41-45)
ft.	ft.	
ft.	ft.	
ft.	ft.	

21. REMARKS

N/A

22. Certification:

Richy Lemire — Signature of Certified Well Contractor

04/07/15 — Date

By signing this form, I hereby certify that the well(s) was (were) constructed in accordance with 15A NCAC 02C .0100 or 15A NCAC 02C .0200 Well Construction Standards and that a copy of this record has been provided to the well owner.

23. Site diagram or additional well details:

You may use the back of this page to provide additional well site details or well construction details. You may also attach additional pages if necessary.

SUBMITTAL INSTUCTIONS

24a. For All Wells: Submit this form within 30 days of completion of well construction to the following:

Division of Water Resources, Information Processing Unit,
1617 Mail Service Center, Raleigh, NC 27699-1617

24b. For Injection Wells ONLY: In addition to sending the form to the address in 24a above, also submit a copy of this form within 30 days of completion of well construction to the following:

Division of Water Resources, Underground Injection Control Program,
1636 Mail Service Center, Raleigh, NC 27699-1636

24c. For Water Supply & Injection Wells:

Also submit one copy of this form within 30 days of completion of well construction to the county health department of the county where constructed.

WELL CONSTRUCTION RECORD

This form can be used for single or multiple wells

1. Well Contractor Information:

Richy Lemire

Well Contractor Name

2593-A

NC Well Contractor Certification Number

SAEDACCO

Company Name

2. Well Construction Permit #: N/A

List all applicable well permits (i.e. County, State, Variance, Injection, etc.)

3. Well Use (check well use):

Water Supply Well:

☐Agricultural ☐Municipal/Public

☐Geothermal (Heating/Cooling Supply) ☐Residential Water Supply (single)

☐Industrial/Commercial ☐Residential Water Supply (shared)

☐Irrigation

Non-Water Supply Well:

☑Monitoring ☐Recovery

Injection Well:

☐Aquifer Recharge ☐Groundwater Remediation

☐Aquifer Storage and Recovery ☐Salinity Barrier

☐Aquifer Test ☐Stormwater Drainage

☐Experimental Technology ☐Subsidence Control

☐Geothermal (Closed Loop) ☐Tracer

☐Geothermal (Heating/Cooling Return) ☐Other (explain under #21 Remarks)

4. Date Well(s) Completed: 3/13/15 **Well ID#** OW-413 S

5a. Well Location:

Duke Energy-Dan River — Facility/Owner Name

N/A — Facility ID# (if applicable)

900 S. Edgewood Rd, Eden, NC

Physical Address, City, and Zip

Rockingham — County

798908886870 — Parcel Identification No. (PIN)

5b. Latitude and Longitude in degrees/minutes/seconds or decimal degrees:
(if well field, one lat/long is sufficient)

36.4941 N -79.7172 W

6. Is (are) the well(s): ☑**Permanent** or ☐**Temporary**

7. Is this a repair to an existing well: ☐**Yes** or ☑**No**

If this is a repair, fill out known well construction information and explain the nature of the repair under #21 remarks section or on the back of this form.

8. Number of wells constructed: 1

*For multiple injection or non-water supply wells **ONLY** with the **same construction**, you can submit one form.*

9. Total well depth below land surface: 27 **(ft.)**

For multiple wells list all depths if different (example- 3@200' and 2@100')

10. Static water level below top of casing: 14.1 **(ft.)**

If water level is above casing, use "+"

11. Borehole diameter: 7 **(in.)**

12. Well construction method: auger

(i.e. auger, rotary, cable, direct push, etc.)

FOR WATER SUPPLY WELLS ONLY:

13a. Yield (gpm) N/A **Method of test:** N/A

13b. Disinfection type: N/A **Amount:** N/A

For Internal Use ONLY:

14. WATER ZONES

FROM	TO	DESCRIPTION
N/A ft.	N/A ft.	N/A
N/A ft.	N/A ft.	N/A

15. OUTER CASING (for multi-cased wells) OR LINER (if applicable)

FROM	TO	DIAMETER	THICKNESS	MATERIAL
N/A ft.	N/A ft.	N/A in.	N/A	N/A

16. INNER CASING OR TUBING (geothermal closed-loop)

FROM	TO	DIAMETER	THICKNESS	MATERIAL
0 ft.	16.7 ft.	2 in.	Sch. 40	PVC
N/A ft.	N/A ft.	N/A in.	N/A	N/A

17. SCREEN

FROM	TO	DIAMETER	SLOT SIZE	THICKNESS	MATERIAL
16.7 ft.	26.7 ft.	2 in.	0.010	Sch. 40	PVC
N/A ft.	N/A ft.	N/A in.	N/A	N/A	N/A

18. GROUT

FROM	TO	MATERIAL	EMPLACEMENT METHOD & AMOUNT
0 ft.	11 ft.	Neat Cement	Tremie
11 ft.	13 ft.	Bentonite	Pour & Hydrate
N/A ft.	N/A ft.	N/A	N/A

19. SAND/GRAVEL PACK (if applicable)

FROM	TO	MATERIAL	EMPLACEMENT METHOD
13 ft.	27 ft.	#2 Silica Sand	wash
N/A ft.	N/A ft.	N/A	N/A

20. DRILLING LOG (attach additional sheets if necessary)

FROM	TO	DESCRIPTION (color, hardness, soil/rock type, grain size, etc.)
0 ft.	1.5 ft.	Fill: Silty Sand
1.5 ft.	8.5 ft.	Silty Sand
8.5 ft.	24.5 ft.	PWR
24.5 ft.	27 ft.	Silty Sand
27 ft.	27.3 ft.	PWR
ft.	ft.	
ft.	ft.	

21. REMARKS

N/A

22. Certification:

Richy Lemire — Signature of Certified Well Contractor

04/07/15 — Date

By signing this form, I hereby certify that the well(s) was (were) constructed in accordance with 15A NCAC 02C .0100 or 15A NCAC 02C .0200 Well Construction Standards and that a copy of this record has been provided to the well owner.

23. Site diagram or additional well details:

You may use the back of this page to provide additional well site details or well construction details. You may also attach additional pages if necessary.

SUBMITTAL INSTUCTIONS

24a. For All Wells: Submit this form within 30 days of completion of well construction to the following:

Division of Water Resources, Information Processing Unit,
1617 Mail Service Center, Raleigh, NC 27699-1617

24b. For Injection Wells ONLY: In addition to sending the form to the address in 24a above, also submit a copy of this form within 30 days of completion of well construction to the following:

Division of Water Resources, Underground Injection Control Program,
1636 Mail Service Center, Raleigh, NC 27699-1636

24c. For Water Supply & Injection Wells:

Also submit one copy of this form within 30 days of completion of well construction to the county health department of the county where constructed.

WELL CONSTRUCTION RECORD

This form can be used for single or multiple wells

1. Well Contractor Information:

Richy Lemire

Well Contractor Name

2593-A

NC Well Contractor Certification Number

SAEDACCO

Company Name

2. Well Construction Permit #: N/A

List all applicable well permits (i.e. County, State, Variance, Injection, etc.)

3. Well Use (check well use):

Water Supply Well:

☐Agricultural ☐Municipal/Public

☐Geothermal (Heating/Cooling Supply) ☐Residential Water Supply (single)

☐Industrial/Commercial ☐Residential Water Supply (shared)

☐Irrigation

Non-Water Supply Well:

☑Monitoring ☐Recovery

Injection Well:

☐Aquifer Recharge ☐Groundwater Remediation

☐Aquifer Storage and Recovery ☐Salinity Barrier

☐Aquifer Test ☐Stormwater Drainage

☐Experimental Technology ☐Subsidence Control

☐Geothermal (Closed Loop) ☐Tracer

☐Geothermal (Heating/Cooling Return) ☐Other (explain under #21 Remarks)

4. Date Well(s) Completed: 3/25/15 **Well ID#** OW-414 S

5a. Well Location:

Duke Energy-Dan River — Facility/Owner Name

N/A — Facility ID# (if applicable)

900 S. Edgewood Rd, Eden, NC

Physical Address, City, and Zip

Rockingham — County

798908886870 — Parcel Identification No. (PIN)

5b. Latitude and Longitude in degrees/minutes/seconds or decimal degrees:
(if well field, one lat/long is sufficient)

36.4933 N -79.7160 W

6. Is (are) the well(s): ☑**Permanent** or ☐**Temporary**

7. Is this a repair to an existing well: ☐**Yes** or ☑**No**

If this is a repair, fill out known well construction information and explain the nature of the repair under #21 remarks section or on the back of this form.

8. Number of wells constructed: 1

*For multiple injection or non-water supply wells **ONLY** with the **same construction**, you can submit one form.*

9. Total well depth below land surface: 29.5 **(ft.)**

For multiple wells list all depths if different (example- 3@200' and 2@100')

10. Static water level below top of casing: 22.4 **(ft.)**

If water level is above casing, use "+"

11. Borehole diameter: 7 **(in.)**

12. Well construction method: auger

(i.e. auger, rotary, cable, direct push, etc.)

FOR WATER SUPPLY WELLS ONLY:

13a. Yield (gpm) N/A **Method of test:** N/A

13b. Disinfection type: N/A **Amount:** N/A

For Internal Use ONLY:

14. WATER ZONES

FROM	TO	DESCRIPTION
N/A ft.	N/A ft.	N/A
N/A ft.	N/A ft.	N/A

15. OUTER CASING (for multi-cased wells) OR LINER (if applicable)

FROM	TO	DIAMETER	THICKNESS	MATERIAL
N/A ft.	N/A ft.	N/A in.	N/A	N/A

16. INNER CASING OR TUBING (geothermal closed-loop)

FROM	TO	DIAMETER	THICKNESS	MATERIAL
0 ft.	14.2 ft.	2 in.	Sch. 40	PVC
N/A ft.	N/A ft.	N/A in.	N/A	N/A

17. SCREEN

FROM	TO	DIAMETER	SLOT SIZE	THICKNESS	MATERIAL
14.2 ft.	29.2 ft.	2 in.	0.010	Sch. 40	PVC
N/A ft.	N/A ft.	N/A in.	N/A	N/A	N/A

18. GROUT

FROM	TO	MATERIAL	EMPLACEMENT METHOD & AMOUNT
0 ft.	10 ft.	Neat Cement	Tremie
10 ft.	12 ft.	Bentonite	Pour & Hydrate
N/A ft.	N/A ft.	N/A	N/A

19. SAND/GRAVEL PACK (if applicable)

FROM	TO	MATERIAL	EMPLACEMENT METHOD
12 ft.	29.5 ft.	#2 Silica Sand	wash
N/A ft.	N/A ft.	N/A	N/A

20. DRILLING LOG (attach additional sheets if necessary)

FROM	TO	DESCRIPTION (color, hardness, soil/rock type, grain size, etc.)
0 ft.	3 ft.	Fill: Silty Sand
3 ft.	18 ft.	Fill: Ash
18 ft.	23.5 ft.	Silty Sandy Gravel
23.5 ft.	30 ft.	PWR
ft.	ft.	
ft.	ft.	
ft.	ft.	

21. REMARKS

N/A

22. Certification:

Richy Lemire — Signature of Certified Well Contractor

04/07/15 — Date

By signing this form, I hereby certify that the well(s) was (were) constructed in accordance with 15A NCAC 02C .0100 or 15A NCAC 02C .0200 Well Construction Standards and that a copy of this record has been provided to the well owner.

23. Site diagram or additional well details:

You may use the back of this page to provide additional well site details or well construction details. You may also attach additional pages if necessary.

SUBMITTAL INSTUCTIONS

24a. For All Wells: Submit this form within 30 days of completion of well construction to the following:

Division of Water Resources, Information Processing Unit,
1617 Mail Service Center, Raleigh, NC 27699-1617

24b. For Injection Wells ONLY: In addition to sending the form to the address in 24a above, also submit a copy of this form within 30 days of completion of well construction to the following:

Division of Water Resources, Underground Injection Control Program,
1636 Mail Service Center, Raleigh, NC 27699-1636

24c. For Water Supply & Injection Wells:

Also submit one copy of this form within 30 days of completion of well construction to the county health department of the county where constructed.

WELL CONSTRUCTION RECORD

This form can be used for single or multiple wells

1. Well Contractor Information:

Richy Lemire

Well Contractor Name

2593-A

NC Well Contractor Certification Number

SAEDACCO

Company Name

2. Well Construction Permit #: N/A

List all applicable well permits (i.e. County, State, Variance, Injection, etc.)

3. Well Use (check well use):

Water Supply Well:

☐Agricultural ☐Municipal/Public

☐Geothermal (Heating/Cooling Supply) ☐Residential Water Supply (single)

☐Industrial/Commercial ☐Residential Water Supply (shared)

☐Irrigation

Non-Water Supply Well:

☑Monitoring ☐Recovery

Injection Well:

☐Aquifer Recharge ☐Groundwater Remediation

☐Aquifer Storage and Recovery ☐Salinity Barrier

☐Aquifer Test ☐Stormwater Drainage

☐Experimental Technology ☐Subsidence Control

☐Geothermal (Closed Loop) ☐Tracer

☐Geothermal (Heating/Cooling Return) ☐Other (explain under #21 Remarks)

4. Date Well(s) Completed: 3/10/15 **Well ID#** OW-415 S

5a. Well Location:

Duke Energy-Dan River — Facility/Owner Name

N/A — Facility ID# (if applicable)

900 S. Edgewood Rd, Eden, NC

Physical Address, City, and Zip

Rockingham — County

798908886870 — Parcel Identification No. (PIN)

5b. Latitude and Longitude in degrees/minutes/seconds or decimal degrees:
(if well field, one lat/long is sufficient)

36.4939 N -79.7137 W

6. Is (are) the well(s): ☑**Permanent** or ☐**Temporary**

7. Is this a repair to an existing well: ☐**Yes** or ☑**No**

If this is a repair, fill out known well construction information and explain the nature of the repair under #21 remarks section or on the back of this form.

8. Number of wells constructed: 1

*For multiple injection or non-water supply wells **ONLY** with the **same construction**, you can submit one form.*

9. Total well depth below land surface: 24 **(ft.)**

For multiple wells list all depths if different (example- 3@200' and 2@100')

10. Static water level below top of casing: 14.05 **(ft.)**

If water level is above casing, use "+"

11. Borehole diameter: 7 **(in.)**

12. Well construction method: auger

(i.e. auger, rotary, cable, direct push, etc.)

FOR WATER SUPPLY WELLS ONLY:

13a. Yield (gpm) N/A **Method of test:** N/A

13b. Disinfection type: N/A **Amount:** N/A

For Internal Use ONLY:

14. WATER ZONES

FROM	TO	DESCRIPTION
N/A ft.	N/A ft.	N/A
N/A ft.	N/A ft.	N/A

15. OUTER CASING (for multi-cased wells) OR LINER (if applicable)

FROM	TO	DIAMETER	THICKNESS	MATERIAL
N/A ft.	N/A ft.	N/A in.	N/A	N/A

16. INNER CASING OR TUBING (geothermal closed-loop)

FROM	TO	DIAMETER	THICKNESS	MATERIAL
0 ft.	7.7 ft.	2 in.	Sch. 40	PVC
N/A ft.	N/A ft.	N/A in.	N/A	N/A

17. SCREEN

FROM	TO	DIAMETER	SLOT SIZE	THICKNESS	MATERIAL
7.7 ft.	17.7 ft.	2 in.	0.010	Sch. 40	PVC
N/A ft.	N/A ft.	N/A in.	N/A	N/A	N/A

18. GROUT

FROM	TO	MATERIAL	EMPLACEMENT METHOD & AMOUNT
0 ft.	4 ft.	Neat Cement	Tremie
4 ft.	6 ft.	Bentonite	Pour & Hydrate
N/A ft.	N/A ft.	N/A	N/A

19. SAND/GRAVEL PACK (if applicable)

FROM	TO	MATERIAL	EMPLACEMENT METHOD
6 ft.	24 ft.	#2 Silica Sand	wash
N/A ft.	N/A ft.	N/A	N/A

20. DRILLING LOG (attach additional sheets if necessary)

FROM	TO	DESCRIPTION (color, hardness, soil/rock type, grain size, etc.)
0 ft.	8.5 ft.	Silty Sand
8.5 ft.	13.5 ft.	PWR
13.5 ft.	18.5 ft.	Silty Sand
18.5 ft.	24.6 ft.	PWR
ft.	ft.	
ft.	ft.	
ft.	ft.	

21. REMARKS

N/A

22. Certification:

Richy L Lemire — Signature of Certified Well Contractor

04/07/15 — Date

By signing this form, I hereby certify that the well(s) was (were) constructed in accordance with 15A NCAC 02C .0100 or 15A NCAC 02C .0200 Well Construction Standards and that a copy of this record has been provided to the well owner.

23. Site diagram or additional well details:

You may use the back of this page to provide additional well site details or well construction details. You may also attach additional pages if necessary.

SUBMITTAL INSTUCTIONS

24a. For All Wells: Submit this form within 30 days of completion of well construction to the following:

Division of Water Resources, Information Processing Unit,
1617 Mail Service Center, Raleigh, NC 27699-1617

24b. For Injection Wells ONLY: In addition to sending the form to the address in 24a above, also submit a copy of this form within 30 days of completion of well construction to the following:

Division of Water Resources, Underground Injection Control Program,
1636 Mail Service Center, Raleigh, NC 27699-1636

24c. For Water Supply & Injection Wells:

Also submit one copy of this form within 30 days of completion of well construction to the county health department of the county where constructed.

WELL CONSTRUCTION RECORD

This form can be used for single or multiple wells

1. Well Contractor Information:

Richy Lemire

Well Contractor Name

2593-A

NC Well Contractor Certification Number

SAEDACCO

Company Name

2. Well Construction Permit #: N/A

List all applicable well permits (i.e. County, State, Variance, Injection, etc.)

3. Well Use (check well use):

Water Supply Well:

☐Agricultural ☐Municipal/Public

☐Geothermal (Heating/Cooling Supply) ☐Residential Water Supply (single)

☐Industrial/Commercial ☐Residential Water Supply (shared)

☐Irrigation

Non-Water Supply Well:

☑Monitoring ☐Recovery

Injection Well:

☐Aquifer Recharge ☐Groundwater Remediation

☐Aquifer Storage and Recovery ☐Salinity Barrier

☐Aquifer Test ☐Stormwater Drainage

☐Experimental Technology ☐Subsidence Control

☐Geothermal (Closed Loop) ☐Tracer

☐Geothermal (Heating/Cooling Return) ☐Other (explain under #21 Remarks)

4. Date Well(s) Completed: 3/11/15 **Well ID#** OW-416 S

5a. Well Location:

Duke Energy-Dan River — Facility/Owner Name

N/A — Facility ID# (if applicable)

900 S. Edgewood Rd, Eden, NC

Physical Address, City, and Zip

Rockingham — County

798908886870 — Parcel Identification No. (PIN)

5b. Latitude and Longitude in degrees/minutes/seconds or decimal degrees:
(if well field, one lat/long is sufficient)

36.4931 N -79.7149 W

6. Is (are) the well(s): ☑**Permanent** or ☐**Temporary**

7. Is this a repair to an existing well: ☐**Yes** or ☑**No**

If this is a repair, fill out known well construction information and explain the nature of the repair under #21 remarks section or on the back of this form.

8. Number of wells constructed: 1

*For multiple injection or non-water supply wells **ONLY** with the **same construction**, you can submit one form.*

9. Total well depth below land surface: 32.5 **(ft.)**

For multiple wells list all depths if different (example- 3@200' and 2@100')

10. Static water level below top of casing: 24.9 **(ft.)**

If water level is above casing, use "+"

11. Borehole diameter: 7 **(in.)**

12. Well construction method: auger

(i.e. auger, rotary, cable, direct push, etc.)

FOR WATER SUPPLY WELLS ONLY:

13a. Yield (gpm) N/A **Method of test:** N/A

13b. Disinfection type: N/A **Amount:** N/A

For Internal Use ONLY:

14. WATER ZONES

FROM	TO	DESCRIPTION
N/A ft.	N/A ft.	N/A
N/A ft.	N/A ft.	N/A

15. OUTER CASING (for multi-cased wells) OR LINER (if applicable)

FROM	TO	DIAMETER	THICKNESS	MATERIAL
N/A ft.	N/A ft.	N/A in.	N/A	N/A

16. INNER CASING OR TUBING (geothermal closed-loop)

FROM	TO	DIAMETER	THICKNESS	MATERIAL
0 ft.	18.7 ft.	2 in.	Sch. 40	PVC
N/A ft.	N/A ft.	N/A in.	N/A	N/A

17. SCREEN

FROM	TO	DIAMETER	SLOT SIZE	THICKNESS	MATERIAL
18.7 ft.	28.7 ft.	2 in.	0.010	Sch. 40	PVC
N/A ft.	N/A ft.	N/A in.	N/A	N/A	N/A

18. GROUT

FROM	TO	MATERIAL	EMPLACEMENT METHOD & AMOUNT
0 ft.	15 ft.	Neat Cement	Tremie
15 ft.	17 ft.	Bentonite	Pour & Hydrate
N/A ft.	N/A ft.	N/A	N/A

19. SAND/GRAVEL PACK (if applicable)

FROM	TO	MATERIAL	EMPLACEMENT METHOD
17 ft.	32.5 ft.	#2 Silica Sand	wash
N/A ft.	N/A ft.	N/A	N/A

20. DRILLING LOG (attach additional sheets if necessary)

FROM	TO	DESCRIPTION (color, hardness, soil/rock type, grain size, etc.)
0 ft.	5 ft.	Fill: Sandy Silt
5 ft.	18.5 ft.	Silty Sand / Sandy Silt
18.5 ft.	32.5 ft.	PWR
ft.	ft.	
ft.	ft.	
ft.	ft.	
ft.	ft.	

21. REMARKS

N/A

22. Certification:

Richy L Lemire — Signature of Certified Well Contractor

04/07/15 — Date

By signing this form, I hereby certify that the well(s) was (were) constructed in accordance with 15A NCAC 02C .0100 or 15A NCAC 02C .0200 Well Construction Standards and that a copy of this record has been provided to the well owner.

23. Site diagram or additional well details:

You may use the back of this page to provide additional well site details or well construction details. You may also attach additional pages if necessary.

SUBMITTAL INSTUCTIONS

24a. For All Wells: Submit this form within 30 days of completion of well construction to the following:

Division of Water Resources, Information Processing Unit,
1617 Mail Service Center, Raleigh, NC 27699-1617

24b. For Injection Wells ONLY: In addition to sending the form to the address in 24a above, also submit a copy of this form within 30 days of completion of well construction to the following:

Division of Water Resources, Underground Injection Control Program,
1636 Mail Service Center, Raleigh, NC 27699-1636

24c. For Water Supply & Injection Wells:

Also submit one copy of this form within 30 days of completion of well construction to the county health department of the county where constructed.

WELL CONSTRUCTION RECORD

This form can be used for single or multiple wells

1. Well Contractor Information:

Stefan Smith

Well Contractor Name

3576-A

NC Well Contractor Certification Number

SAEDACCO

Company Name

2. Well Construction Permit #: N/A

List all applicable well permits (i.e. County, State, Variance, Injection, etc.)

3. Well Use (check well use):

Water Supply Well:

- ☐Agricultural
- ☐Municipal/Public
- ☐Geothermal (Heating/Cooling Supply)
- ☐Residential Water Supply (single)
- ☐Industrial/Commercial
- ☐Residential Water Supply (shared)
- ☐Irrigation

Non-Water Supply Well:

- ☑Monitoring
- ☐Recovery

Injection Well:

- ☐Aquifer Recharge
- ☐Groundwater Remediation
- ☐Aquifer Storage and Recovery
- ☐Salinity Barrier
- ☐Aquifer Test
- ☐Stormwater Drainage
- ☐Experimental Technology
- ☐Subsidence Control
- ☐Geothermal (Closed Loop)
- ☐Tracer
- ☐Geothermal (Heating/Cooling Return)
- ☐Other (explain under #21 Remarks)

4. Date Well(s) Completed: 4/1/15 **Well ID#** OW-417 S

5a. Well Location:

Duke Energy-Dan River — Facility/Owner Name

N/A — Facility ID# (if applicable)

900 S. Edgewood Rd, Eden, NC — Physical Address, City, and Zip

Rockingham — County

798908886870 — Parcel Identification No. (PIN)

5b. Latitude and Longitude in degrees/minutes/seconds or decimal degrees:
(if well field, one lat/long is sufficient)

36.4964 N -79.7199 W

6. Is (are) the well(s): ☑**Permanent** or ☐**Temporary**

7. Is this a repair to an existing well: ☐**Yes** or ☑**No**

If this is a repair, fill out known well construction information and explain the nature of the repair under #21 remarks section or on the back of this form.

8. Number of wells constructed: 1

*For multiple injection or non-water supply wells **ONLY** with the **same construction**, you can submit one form.*

9. Total well depth below land surface: 34 **(ft.)**

For multiple wells list all depths if different (example- 3@200' and 2@100')

10. Static water level below top of casing: 24.1 **(ft.)**

If water level is above casing, use "+"

11. Borehole diameter: 7 **(in.)**

12. Well construction method: auger

(i.e. auger, rotary, cable, direct push, etc.)

FOR WATER SUPPLY WELLS ONLY:

13a. Yield (gpm) N/A **Method of test:** N/A

13b. Disinfection type: N/A **Amount:** N/A

For Internal Use ONLY:

14. WATER ZONES

FROM	TO	DESCRIPTION
N/A ft.	N/A ft.	N/A
N/A ft.	N/A ft.	N/A

15. OUTER CASING (for multi-cased wells) OR LINER (if applicable)

FROM	TO	DIAMETER	THICKNESS	MATERIAL
N/A ft.	N/A ft.	N/A in.	N/A	N/A

16. INNER CASING OR TUBING (geothermal closed-loop)

FROM	TO	DIAMETER	THICKNESS	MATERIAL
0 ft.	18.7 ft.	2 in.	Sch. 40	PVC
N/A ft.	N/A ft.	N/A in.	N/A	N/A

17. SCREEN

FROM	TO	DIAMETER	SLOT SIZE	THICKNESS	MATERIAL
18.7 ft.	33.7 ft.	2 in.	0.010	Sch. 40	PVC
N/A ft.	N/A ft.	N/A in.	N/A	N/A	N/A

18. GROUT

FROM	TO	MATERIAL	EMPLACEMENT METHOD & AMOUNT
0 ft.	15 ft.	Neat Cement	Tremie
15 ft.	17 ft.	Bentonite	Pour & Hydrate
N/A ft.	N/A ft.	N/A	N/A

19. SAND/GRAVEL PACK (if applicable)

FROM	TO	MATERIAL	EMPLACEMENT METHOD
17 ft.	34 ft.	#2 Silica Sand	wash
N/A ft.	N/A ft.	N/A	N/A

20. DRILLING LOG (attach additional sheets if necessary)

FROM	TO	DESCRIPTION (color, hardness, soil/rock type, grain size, etc.)
0 ft.	8.5 ft.	Silty Sand
8.5 ft.	13.5 ft.	PWR
13.5 ft.	23.5 ft.	Silty Sand
23.5 ft.	34 ft.	PWR
ft.	ft.	
ft.	ft.	
ft.	ft.	

21. REMARKS

N/A

22. Certification:

Signature of Certified Well Contractor — Date: 04/07/15

By signing this form, I hereby certify that the well(s) was (were) constructed in accordance with 15A NCAC 02C .0100 or 15A NCAC 02C .0200 Well Construction Standards and that a copy of this record has been provided to the well owner.

23. Site diagram or additional well details:

You may use the back of this page to provide additional well site details or well construction details. You may also attach additional pages if necessary.

SUBMITTAL INSTUCTIONS

24a. For All Wells: Submit this form within 30 days of completion of well construction to the following:

Division of Water Resources, Information Processing Unit,
1617 Mail Service Center, Raleigh, NC 27699-1617

24b. For Injection Wells ONLY: In addition to sending the form to the address in 24a above, also submit a copy of this form within 30 days of completion of well construction to the following:

Division of Water Resources, Underground Injection Control Program,
1636 Mail Service Center, Raleigh, NC 27699-1636

24c. For Water Supply & Injection Wells:

Also submit one copy of this form within 30 days of completion of well construction to the county health department of the county where constructed.

WELL CONSTRUCTION RECORD

This form can be used for single or multiple wells

1. Well Contractor Information:

Richy Lemire

Well Contractor Name

2593-A

NC Well Contractor Certification Number

SAEDACCO

Company Name

2. Well Construction Permit #: N/A

List all applicable well permits (i.e. County, State, Variance, Injection, etc.)

3. Well Use (check well use):

Water Supply Well:

☐Agricultural ☐Municipal/Public

☐Geothermal (Heating/Cooling Supply) ☐Residential Water Supply (single)

☐Industrial/Commercial ☐Residential Water Supply (shared)

☐Irrigation

Non-Water Supply Well:

☑Monitoring ☐Recovery

Injection Well:

☐Aquifer Recharge ☐Groundwater Remediation

☐Aquifer Storage and Recovery ☐Salinity Barrier

☐Aquifer Test ☐Stormwater Drainage

☐Experimental Technology ☐Subsidence Control

☐Geothermal (Closed Loop) ☐Tracer

☐Geothermal (Heating/Cooling Return) ☐Other (explain under #21 Remarks)

4. Date Well(s) Completed: 3/31/15 **Well ID#** OW-419 S

5a. Well Location:

Duke Energy-Dan River — Facility/Owner Name

N/A — Facility ID# (if applicable)

900 S. Edgewood Rd, Eden, NC

Physical Address, City, and Zip

Rockingham — County

798908886870 — Parcel Identification No. (PIN)

5b. Latitude and Longitude in degrees/minutes/seconds or decimal degrees:
(if well field, one lat/long is sufficient)

36.4956 N -79.7174 W

6. Is (are) the well(s): ☑**Permanent** or ☐**Temporary**

7. Is this a repair to an existing well: ☐**Yes** or ☑**No**

If this is a repair, fill out known well construction information and explain the nature of the repair under #21 remarks section or on the back of this form.

8. Number of wells constructed: 1

*For multiple injection or non-water supply wells **ONLY** with the **same construction**, you can submit one form.*

9. Total well depth below land surface: 31 **(ft.)**

For multiple wells list all depths if different (example- 3@200' and 2@100')

10. Static water level below top of casing: 23.2 **(ft.)**

If water level is above casing, use "+"

11. Borehole diameter: 7 **(in.)**

12. Well construction method: auger

(i.e. auger, rotary, cable, direct push, etc.)

FOR WATER SUPPLY WELLS ONLY:

13a. Yield (gpm) N/A **Method of test:** N/A

13b. Disinfection type: N/A **Amount:** N/A

For Internal Use ONLY:

14. WATER ZONES

FROM	TO	DESCRIPTION
N/A ft.	N/A ft.	N/A
N/A ft.	N/A ft.	N/A

15. OUTER CASING (for multi-cased wells) OR LINER (if applicable)

FROM	TO	DIAMETER	THICKNESS	MATERIAL
N/A ft.	N/A ft.	N/A in.	N/A	N/A

16. INNER CASING OR TUBING (geothermal closed-loop)

FROM	TO	DIAMETER	THICKNESS	MATERIAL
0 ft.	15.7 ft.	2 in.	Sch. 40	PVC
N/A ft.	N/A ft.	N/A in.	N/A	N/A

17. SCREEN

FROM	TO	DIAMETER	SLOT SIZE	THICKNESS	MATERIAL
15.7 ft.	30.7 ft.	2 in.	0.010	Sch. 40	PVC
N/A ft.	N/A ft.	N/A in.	N/A	N/A	N/A

18. GROUT

FROM	TO	MATERIAL	EMPLACEMENT METHOD & AMOUNT
0 ft.	12 ft.	Neat Cement	Tremie
12 ft.	14 ft.	Bentonite	Pour & Hydrate
N/A ft.	N/A ft.	N/A	N/A

19. SAND/GRAVEL PACK (if applicable)

FROM	TO	MATERIAL	EMPLACEMENT METHOD
14 ft.	31 ft.	#2 Silica Sand	wash
N/A ft.	N/A ft.	N/A	N/A

20. DRILLING LOG (attach additional sheets if necessary)

FROM	TO	DESCRIPTION (color, hardness, soil/rock type, grain size, etc.)
0 ft.	5 ft.	Fill: Sandy Silt
5 ft.	8.5 ft.	Silty Sand
8.5 ft.	31.1 ft.	PWR
ft.	ft.	
ft.	ft.	
ft.	ft.	
ft.	ft.	

21. REMARKS

N/A

22. Certification:

Richy Lemire — Signature of Certified Well Contractor

04/07/15 — Date

By signing this form, I hereby certify that the well(s) was (were) constructed in accordance with 15A NCAC 02C .0100 or 15A NCAC 02C .0200 Well Construction Standards and that a copy of this record has been provided to the well owner.

23. Site diagram or additional well details:

You may use the back of this page to provide additional well site details or well construction details. You may also attach additional pages if necessary.

SUBMITTAL INSTUCTIONS

24a. For All Wells: Submit this form within 30 days of completion of well construction to the following:

Division of Water Resources, Information Processing Unit,
1617 Mail Service Center, Raleigh, NC 27699-1617

24b. For Injection Wells ONLY: In addition to sending the form to the address in 24a above, also submit a copy of this form within 30 days of completion of well construction to the following:

Division of Water Resources, Underground Injection Control Program,
1636 Mail Service Center, Raleigh, NC 27699-1636

24c. For Water Supply & Injection Wells:

Also submit one copy of this form within 30 days of completion of well construction to the county health department of the county where constructed.

526 South Church Street
Charlotte, NC 28202

Mailing Address:
PO Box 1006
Mail Code EC13K
Charlotte, NC 28201-1006

704 382 4761

704 382 6240 fax

May 6, 2015

North Carolina Department of Environment and Natural Resources
Division of Water Resources
Information Processing Unit
1617 Mail Service Center
Raleigh, NC 27699-1617

Subject: Well Construction Records
Duke Energy Carolinas, LLC
Dan River Steam Station
900 S Edgewood Road, Eden, NC 27288

Dear DWR Representative:

Duke Energy is providing well construction records for thirteen (13) non-water supply monitoring wells installed at Duke Energy's Dan River Steam Station in Eden, North Carolina between April 7, 2015 and April 23, 2015. These monitoring wells were installed in the vicinity of the Ash Storage Area 1 in the northeastern portion of the Dan River site. Per 15A NCAC 02C .0307(a), these records are being submitted within 30 days of completion of construction.

Records are provided for observation wells

OW-401D,	OW-406D,	OW-415D,
OW-403D,	OW-407D,	OW-416D, and
OW-404S,	OW-409D,	OW-417D
OW-405S,	OW-411D,	
OW-405D,	OW-414D,	

If you have any questions, please feel free to contact me at 704-382-4761 or at Sean.DeNeale@duke-energy.com

Sincerely,

Sean DeNeale

Sean DeNeale, Engineer II
Environmental Services

cc: Elizabeth Werner, NCDENR Solid Waste Section

WELL CONSTRUCTION RECORD

This form can be used for single or multiple wells

1. Well Contractor Information:

Richy Lemire

Well Contractor Name

2593-A

NC Well Contractor Certification Number

SAEDACCO

Company Name

2. Well Construction Permit #: N/A

List all applicable well permits (i.e. County, State, Variance, Injection, etc.)

3. Well Use (check well use):

Water Supply Well:

☐Agricultural ☐Municipal/Public

☐Geothermal (Heating/Cooling Supply) ☐Residential Water Supply (single)

☐Industrial/Commercial ☐Residential Water Supply (shared)

☐Irrigation

Non-Water Supply Well:

☑Monitoring ☐Recovery

Injection Well:

☐Aquifer Recharge ☐Groundwater Remediation

☐Aquifer Storage and Recovery ☐Salinity Barrier

☐Aquifer Test ☐Stormwater Drainage

☐Experimental Technology ☐Subsidence Control

☐Geothermal (Closed Loop) ☐Tracer

☐Geothermal (Heating/Cooling Return) ☐Other (explain under #21 Remarks)

4. Date Well(s) Completed: 4/14/15 **Well ID#** OW-417 D

5a. Well Location:

Duke Energy-Dan River — Facility/Owner Name

N/A — Facility ID# (if applicable)

900 S. Edgewood Rd, Eden, NC

Physical Address, City, and Zip

Rockingham — County

798908886870 — Parcel Identification No. (PIN)

5b. Latitude and Longitude in degrees/minutes/seconds or decimal degrees:
(if well field, one lat/long is sufficient)

36.4964 N -79.7200 W

6. Is (are) the well(s): ☑**Permanent** or ☐**Temporary**

7. Is this a repair to an existing well: ☐**Yes** or ☑**No**

If this is a repair, fill out known well construction information and explain the nature of the repair under #21 remarks section or on the back of this form.

8. Number of wells constructed: 1

*For multiple injection or non-water supply wells **ONLY** with the **same construction**, you can submit one form.*

9. Total well depth below land surface: 47.7 **(ft.)**

For multiple wells list all depths if different (example- 3@200' and 2@100')

10. Static water level below top of casing: 19.30 **(ft.)**

If water level is above casing, use "+"

11. Borehole diameter: 3 **(in.)**

12. Well construction method: 8.25 HSA / NQ2 core

(i.e. auger, rotary, cable, direct push, etc.)

FOR WATER SUPPLY WELLS ONLY:

13a. Yield (gpm) N/A **Method of test:** N/A

13b. Disinfection type: N/A **Amount:** N/A

For Internal Use ONLY:

14. WATER ZONES

FROM	TO	DESCRIPTION
N/A ft.	N/A ft.	N/A
N/A ft.	N/A ft.	N/A

15. OUTER CASING (for multi-cased wells) OR LINER (if applicable)

FROM	TO	DIAMETER	THICKNESS	MATERIAL
0 ft.	33 ft.	6 in.	Sch. 40	PVC

16. INNER CASING OR TUBING (geothermal closed-loop)

FROM	TO	DIAMETER	THICKNESS	MATERIAL
0 ft.	42.4 ft.	2 in.	Sch. 40	PVC
N/A ft.	N/A ft.	N/A in.	N/A	N/A

17. SCREEN

FROM	TO	DIAMETER	SLOT SIZE	THICKNESS	MATERIAL
42.4 ft.	47.4 ft.	2 in.	0.010	Sch. 40	PVC
N/A ft.	N/A ft.	N/A in.	N/A	N/A	N/A

18. GROUT

FROM	TO	MATERIAL	EMPLACEMENT METHOD & AMOUNT
0 ft.	31.5 ft.	Neat Cement	Tremie
31.5 ft.	41.8 ft.	Bentonite	Pour & Hydrate
41.8 ft.	42 ft.	K-packer	place

19. SAND/GRAVEL PACK (if applicable)

FROM	TO	MATERIAL	EMPLACEMENT METHOD
N/A ft.	N/A ft.	N/A	N/A
N/A ft.	N/A ft.	N/A	N/A

20. DRILLING LOG (attach additional sheets if necessary)

FROM	TO	DESCRIPTION (color, hardness, soil/rock type, grain size, etc.)
0 ft.	8.5 ft.	Silty Sand
8.5 ft.	13.5 ft.	PWR
13.5 ft.	23.5 ft.	Silty Sand
23.5 ft.	33 ft.	PWR
33 ft.	47.7 ft.	Bedrock
ft.	ft.	
ft.	ft.	

21. REMARKS

N/A

22. Certification:

Richy Lemire — Signature of Certified Well Contractor

05/06/15 — Date

By signing this form, I hereby certify that the well(s) was (were) constructed in accordance with 15A NCAC 02C .0100 or 15A NCAC 02C .0200 Well Construction Standards and that a copy of this record has been provided to the well owner.

23. Site diagram or additional well details:

You may use the back of this page to provide additional well site details or well construction details. You may also attach additional pages if necessary.

SUBMITTAL INSTUCTIONS

24a. For All Wells: Submit this form within 30 days of completion of well construction to the following:

Division of Water Resources, Information Processing Unit,
1617 Mail Service Center, Raleigh, NC 27699-1617

24b. For Injection Wells ONLY: In addition to sending the form to the address in 24a above, also submit a copy of this form within 30 days of completion of well construction to the following:

Division of Water Resources, Underground Injection Control Program,
1636 Mail Service Center, Raleigh, NC 27699-1636

24c. For Water Supply & Injection Wells:

Also submit one copy of this form within 30 days of completion of well construction to the county health department of the county where constructed.

WELL CONSTRUCTION RECORD

This form can be used for single or multiple wells

1. Well Contractor Information:

Stefan Smith

Well Contractor Name

3576-A

NC Well Contractor Certification Number

SAEDACCO

Company Name

2. Well Construction Permit #: N/A

List all applicable well permits (i.e. County, State, Variance, Injection, etc.)

3. Well Use (check well use):

Water Supply Well:

☐Agricultural ☐Municipal/Public

☐Geothermal (Heating/Cooling Supply) ☐Residential Water Supply (single)

☐Industrial/Commercial ☐Residential Water Supply (shared)

☐Irrigation

Non-Water Supply Well:

☑Monitoring ☐Recovery

Injection Well:

☐Aquifer Recharge ☐Groundwater Remediation

☐Aquifer Storage and Recovery ☐Salinity Barrier

☐Aquifer Test ☐Stormwater Drainage

☐Experimental Technology ☐Subsidence Control

☐Geothermal (Closed Loop) ☐Tracer

☐Geothermal (Heating/Cooling Return) ☐Other (explain under #21 Remarks)

4. Date Well(s) Completed: 4/16/15 **Well ID#** OW-416 D

5a. Well Location:

Duke Energy-Dan River — Facility/Owner Name

N/A — Facility ID# (if applicable)

900 S. Edgewood Rd, Eden, NC

Physical Address, City, and Zip

Rockingham — County

798908886870 — Parcel Identification No. (PIN)

5b. Latitude and Longitude in degrees/minutes/seconds or decimal degrees:
(if well field, one lat/long is sufficient)

36.4931 N -79.7149 W

6. Is (are) the well(s): ☑**Permanent** or ☐**Temporary**

7. Is this a repair to an existing well: ☐**Yes** or ☑**No**

If this is a repair, fill out known well construction information and explain the nature of the repair under #21 remarks section or on the back of this form.

8. Number of wells constructed: 1

*For multiple injection or non-water supply wells **ONLY** with the **same construction**, you can submit one form.*

9. Total well depth below land surface: 45 **(ft.)**

For multiple wells list all depths if different (example- 3@200' and 2@100')

10. Static water level below top of casing: 27.93 **(ft.)**

If water level is above casing, use "+"

11. Borehole diameter: 3 **(in.)**

12. Well construction method: 8.25 HSA / NQ2 core

(i.e. auger, rotary, cable, direct push, etc.)

FOR WATER SUPPLY WELLS ONLY:

13a. Yield (gpm) N/A **Method of test:** N/A

13b. Disinfection type: N/A **Amount:** N/A

For Internal Use ONLY:

14. WATER ZONES

FROM	TO	DESCRIPTION
N/A ft.	N/A ft.	N/A
N/A ft.	N/A ft.	N/A

15. OUTER CASING (for multi-cased wells) OR LINER (if applicable)

FROM	TO	DIAMETER	THICKNESS	MATERIAL
0 ft.	29 ft.	6 in.	Sch. 40	PVC

16. INNER CASING OR TUBING (geothermal closed-loop)

FROM	TO	DIAMETER	THICKNESS	MATERIAL
0 ft.	39.7 ft.	2 in.	Sch. 40	PVC
N/A ft.	N/A ft.	N/A in.	N/A	N/A

17. SCREEN

FROM	TO	DIAMETER	SLOT SIZE	THICKNESS	MATERIAL
39.7 ft.	44.7 ft.	2 in.	0.010	Sch. 40	PVC
N/A ft.	N/A ft.	N/A in.	N/A	N/A	N/A

18. GROUT

FROM	TO	MATERIAL	EMPLACEMENT METHOD & AMOUNT
0 ft.	27 ft.	Neat Cement	Tremie
27 ft.	29 ft.	Bentonite	Pour & Hydrate
39.1 ft.	39.3 ft.	K-packer	place

19. SAND/GRAVEL PACK (if applicable)

FROM	TO	MATERIAL	EMPLACEMENT METHOD
N/A ft.	N/A ft.	N/A	N/A
N/A ft.	N/A ft.	N/A	N/A

20. DRILLING LOG (attach additional sheets if necessary)

FROM	TO	DESCRIPTION (color, hardness, soil/rock type, grain size, etc.)
0 ft.	5 ft.	Fill: Sandy Silt
5 ft.	18.5 ft.	Silty Sand/Sandy Silt
18.5 ft.	29.5 ft.	PWR
29.5 ft.	45 ft.	Bedrock
ft.	ft.	
ft.	ft.	
ft.	ft.	

21. REMARKS

N/A

22. Certification:

Stefan Smith — Signature of Certified Well Contractor

05/06/15 — Date

By signing this form, I hereby certify that the well(s) was (were) constructed in accordance with 15A NCAC 02C .0100 or 15A NCAC 02C .0200 Well Construction Standards and that a copy of this record has been provided to the well owner.

23. Site diagram or additional well details:

You may use the back of this page to provide additional well site details or well construction details. You may also attach additional pages if necessary.

SUBMITTAL INSTUCTIONS

24a. For All Wells: Submit this form within 30 days of completion of well construction to the following:

Division of Water Resources, Information Processing Unit,
1617 Mail Service Center, Raleigh, NC 27699-1617

24b. For Injection Wells ONLY: In addition to sending the form to the address in 24a above, also submit a copy of this form within 30 days of completion of well construction to the following:

Division of Water Resources, Underground Injection Control Program,
1636 Mail Service Center, Raleigh, NC 27699-1636

24c. For Water Supply & Injection Wells:

Also submit one copy of this form within 30 days of completion of well construction to the county health department of the county where constructed.

WELL CONSTRUCTION RECORD

This form can be used for single or multiple wells

1. Well Contractor Information:

Stefan Smith

Well Contractor Name

3576-A

NC Well Contractor Certification Number

SAEDACCO

Company Name

2. Well Construction Permit #: N/A

List all applicable well permits (i.e. County, State, Variance, Injection, etc.)

3. Well Use (check well use):

Water Supply Well:

☐Agricultural ☐Municipal/Public

☐Geothermal (Heating/Cooling Supply) ☐Residential Water Supply (single)

☐Industrial/Commercial ☐Residential Water Supply (shared)

☐Irrigation

Non-Water Supply Well:

☑Monitoring ☐Recovery

Injection Well:

☐Aquifer Recharge ☐Groundwater Remediation

☐Aquifer Storage and Recovery ☐Salinity Barrier

☐Aquifer Test ☐Stormwater Drainage

☐Experimental Technology ☐Subsidence Control

☐Geothermal (Closed Loop) ☐Tracer

☐Geothermal (Heating/Cooling Return) ☐Other (explain under #21 Remarks)

4. Date Well(s) Completed: 4/9/15 **Well ID#** OW-415 D

5a. Well Location:

Duke Energy-Dan River — Facility/Owner Name

N/A — Facility ID# (if applicable)

900 S. Edgewood Rd, Eden, NC

Physical Address, City, and Zip

Rockingham — County

798908886870 — Parcel Identification No. (PIN)

5b. Latitude and Longitude in degrees/minutes/seconds or decimal degrees:
(if well field, one lat/long is sufficient)

36.4939 N -79.7137 W

6. Is (are) the well(s): ☑**Permanent** or ☐**Temporary**

7. Is this a repair to an existing well: ☐**Yes** or ☑**No**

If this is a repair, fill out known well construction information and explain the nature of the repair under #21 remarks section or on the back of this form.

8. Number of wells constructed: 1

*For multiple injection or non-water supply wells **ONLY** with the **same construction**, you can submit one form.*

9. Total well depth below land surface: 42 **(ft.)**

For multiple wells list all depths if different (example- 3@200' and 2@100')

10. Static water level below top of casing: 16.45 **(ft.)**

If water level is above casing, use "+"

11. Borehole diameter: 3 **(in.)**

12. Well construction method: 8.25 HSA / NQ2 core

(i.e. auger, rotary, cable, direct push, etc.)

FOR WATER SUPPLY WELLS ONLY:

13a. Yield (gpm) N/A **Method of test:** N/A

13b. Disinfection type: N/A **Amount:** N/A

For Internal Use ONLY:

14. WATER ZONES

FROM	TO	DESCRIPTION
N/A ft.	N/A ft.	N/A
N/A ft.	N/A ft.	N/A

15. OUTER CASING (for multi-cased wells) OR LINER (if applicable)

FROM	TO	DIAMETER	THICKNESS	MATERIAL
0 ft.	24.5 ft.	6 in.	Sch. 40	PVC

16. INNER CASING OR TUBING (geothermal closed-loop)

FROM	TO	DIAMETER	THICKNESS	MATERIAL
0 ft.	36.7 ft.	2 in.	Sch. 40	PVC
N/A ft.	N/A ft.	N/A in.	N/A	N/A

17. SCREEN

FROM	TO	DIAMETER	SLOT SIZE	THICKNESS	MATERIAL
36.7 ft.	41.7 ft.	2 in.	0.010	Sch. 40	PVC
N/A ft.	N/A ft.	N/A in.	N/A	N/A	N/A

18. GROUT

FROM	TO	MATERIAL	EMPLACEMENT METHOD & AMOUNT
0 ft.	23.5 ft.	Neat Cement	Tremie
23.5 ft.	25.5 ft.	Bentonite	Pour & Hydrate
36.1 ft.	36.3 ft.	K-packer	place

19. SAND/GRAVEL PACK (if applicable)

FROM	TO	MATERIAL	EMPLACEMENT METHOD
N/A ft.	N/A ft.	N/A	N/A
N/A ft.	N/A ft.	N/A	N/A

20. DRILLING LOG (attach additional sheets if necessary)

FROM	TO	DESCRIPTION (color, hardness, soil/rock type, grain size, etc.)
0 ft.	8.5 ft.	Silty Sand
8.5 ft.	13.5 ft.	PWR
13.5 ft.	18.5 ft.	Silty Sand
18.5 ft.	25 ft.	PWR
25 ft.	42 ft.	Bedrock
ft.	ft.	
ft.	ft.	

21. REMARKS

N/A

22. Certification:

Stefan Smith — Signature of Certified Well Contractor

05/06/15 — Date

By signing this form, I hereby certify that the well(s) was (were) constructed in accordance with 15A NCAC 02C .0100 or 15A NCAC 02C .0200 Well Construction Standards and that a copy of this record has been provided to the well owner.

23. Site diagram or additional well details:

You may use the back of this page to provide additional well site details or well construction details. You may also attach additional pages if necessary.

SUBMITTAL INSTUCTIONS

24a. For All Wells: Submit this form within 30 days of completion of well construction to the following:

Division of Water Resources, Information Processing Unit,
1617 Mail Service Center, Raleigh, NC 27699-1617

24b. For Injection Wells ONLY: In addition to sending the form to the address in 24a above, also submit a copy of this form within 30 days of completion of well construction to the following:

Division of Water Resources, Underground Injection Control Program,
1636 Mail Service Center, Raleigh, NC 27699-1636

24c. For Water Supply & Injection Wells:

Also submit one copy of this form within 30 days of completion of well construction to the county health department of the county where constructed.

WELL CONSTRUCTION RECORD

This form can be used for single or multiple wells

1. Well Contractor Information:

Stefan Smith

Well Contractor Name

3576-A

NC Well Contractor Certification Number

SAEDACCO

Company Name

2. Well Construction Permit #: N/A

List all applicable well permits (i.e. County, State, Variance, Injection, etc.)

3. Well Use (check well use):

Water Supply Well:

- ☐Agricultural
- ☐Municipal/Public
- ☐Geothermal (Heating/Cooling Supply)
- ☐Residential Water Supply (single)
- ☐Industrial/Commercial
- ☐Residential Water Supply (shared)
- ☐Irrigation

Non-Water Supply Well:

- ☑Monitoring
- ☐Recovery

Injection Well:

- ☐Aquifer Recharge
- ☐Groundwater Remediation
- ☐Aquifer Storage and Recovery
- ☐Salinity Barrier
- ☐Aquifer Test
- ☐Stormwater Drainage
- ☐Experimental Technology
- ☐Subsidence Control
- ☐Geothermal (Closed Loop)
- ☐Tracer
- ☐Geothermal (Heating/Cooling Return)
- ☐Other (explain under #21 Remarks)

4. Date Well(s) Completed: 4/13/15 **Well ID#** OW-414 D

5a. Well Location:

Duke Energy-Dan River — Facility/Owner Name

N/A — Facility ID# (if applicable)

900 S. Edgewood Rd, Eden, NC

Physical Address, City, and Zip

Rockingham — County

798908886870 — Parcel Identification No. (PIN)

5b. Latitude and Longitude in degrees/minutes/seconds or decimal degrees:
(if well field, one lat/long is sufficient)

36.4933 N -79.7160 W

6. Is (are) the well(s): ☑**Permanent** or ☐**Temporary**

7. Is this a repair to an existing well: ☐**Yes** or ☑**No**

If this is a repair, fill out known well construction information and explain the nature of the repair under #21 remarks section or on the back of this form.

8. Number of wells constructed: 1

*For multiple injection or non-water supply wells **ONLY** with the **same construction**, you can submit one form.*

9. Total well depth below land surface: 37 **(ft.)**

For multiple wells list all depths if different (example- 3@200' and 2@100')

10. Static water level below top of casing: 22.40 **(ft.)**

If water level is above casing, use "+"

11. Borehole diameter: 3 **(in.)**

12. Well construction method: 8.25 HSA / NQ2 core

(i.e. auger, rotary, cable, direct push, etc.)

FOR WATER SUPPLY WELLS ONLY:

13a. Yield (gpm) N/A **Method of test:** N/A

13b. Disinfection type: N/A **Amount:** N/A

For Internal Use ONLY:

14. WATER ZONES

FROM	TO	DESCRIPTION
N/A ft.	N/A ft.	N/A
N/A ft.	N/A ft.	N/A

15. OUTER CASING (for multi-cased wells) OR LINER (if applicable)

FROM	TO	DIAMETER	THICKNESS	MATERIAL
0 ft.	29.5 ft.	6 in.	Sch. 40	PVC

16. INNER CASING OR TUBING (geothermal closed-loop)

FROM	TO	DIAMETER	THICKNESS	MATERIAL
0 ft.	31.7 ft.	2 in.	Sch. 40	PVC
N/A ft.	N/A ft.	N/A in.	N/A	N/A

17. SCREEN

FROM	TO	DIAMETER	SLOT SIZE	THICKNESS	MATERIAL
31.7 ft.	36.7 ft.	2 in.	0.010	Sch. 40	PVC
N/A ft.	N/A ft.	N/A in.	N/A	N/A	N/A

18. GROUT

FROM	TO	MATERIAL	EMPLACEMENT METHOD & AMOUNT
0 ft.	28 ft.	Neat Cement	Tremie
28 ft.	30 ft.	Bentonite	Pour & Hydrate
31.1 ft.	31.3 ft.	K-packer	place

19. SAND/GRAVEL PACK (if applicable)

FROM	TO	MATERIAL	EMPLACEMENT METHOD
N/A ft.	N/A ft.	N/A	N/A
N/A ft.	N/A ft.	N/A	N/A

20. DRILLING LOG (attach additional sheets if necessary)

FROM	TO	DESCRIPTION (color, hardness, soil/rock type, grain size, etc.)
0 ft.	3 ft.	Fill: Silty Sand
3 ft.	18 ft.	Fill: Ash
18 ft.	23.5 ft.	Silty Sandy Gravel
23.5 ft.	30 ft.	PWR
30 ft.	37 ft.	Bedrock
ft.	ft.	
ft.	ft.	

21. REMARKS

N/A

22. Certification:

Stefan Smith — Signature of Certified Well Contractor

05/06/15 — Date

By signing this form, I hereby certify that the well(s) was (were) constructed in accordance with 15A NCAC 02C .0100 or 15A NCAC 02C .0200 Well Construction Standards and that a copy of this record has been provided to the well owner.

23. Site diagram or additional well details:

You may use the back of this page to provide additional well site details or well construction details. You may also attach additional pages if necessary.

SUBMITTAL INSTUCTIONS

24a. For All Wells: Submit this form within 30 days of completion of well construction to the following:

Division of Water Resources, Information Processing Unit,
1617 Mail Service Center, Raleigh, NC 27699-1617

24b. For Injection Wells ONLY: In addition to sending the form to the address in 24a above, also submit a copy of this form within 30 days of completion of well construction to the following:

Division of Water Resources, Underground Injection Control Program,
1636 Mail Service Center, Raleigh, NC 27699-1636

24c. For Water Supply & Injection Wells:

Also submit one copy of this form within 30 days of completion of well construction to the county health department of the county where constructed.

WELL CONSTRUCTION RECORD

This form can be used for single or multiple wells

1. Well Contractor Information:

Richy Lemire

Well Contractor Name

2593-A

NC Well Contractor Certification Number

SAEDACCO

Company Name

2. Well Construction Permit #: N/A

List all applicable well permits (i.e. County, State, Variance, Injection, etc.)

3. Well Use (check well use):

Water Supply Well:

☐Agricultural ☐Municipal/Public

☐Geothermal (Heating/Cooling Supply) ☐Residential Water Supply (single)

☐Industrial/Commercial ☐Residential Water Supply (shared)

☐Irrigation

Non-Water Supply Well:

☑Monitoring ☐Recovery

Injection Well:

☐Aquifer Recharge ☐Groundwater Remediation

☐Aquifer Storage and Recovery ☐Salinity Barrier

☐Aquifer Test ☐Stormwater Drainage

☐Experimental Technology ☐Subsidence Control

☐Geothermal (Closed Loop) ☐Tracer

☐Geothermal (Heating/Cooling Return) ☐Other (explain under #21 Remarks)

4. Date Well(s) Completed: 4/21/15 **Well ID#** OW-411 D

5a. Well Location:

Duke Energy-Dan River — Facility/Owner Name

N/A — Facility ID# (if applicable)

900 S. Edgewood Rd, Eden, NC

Physical Address, City, and Zip

Rockingham — County

798908886870 — Parcel Identification No. (PIN)

5b. Latitude and Longitude in degrees/minutes/seconds or decimal degrees:
(if well field, one lat/long is sufficient)

36.4944 N -79.7147 W

6. Is (are) the well(s): ☑**Permanent** or ☐**Temporary**

7. Is this a repair to an existing well: ☐**Yes** or ☑**No**

If this is a repair, fill out known well construction information and explain the nature of the repair under #21 remarks section or on the back of this form.

8. Number of wells constructed: 1

*For multiple injection or non-water supply wells **ONLY** with the **same construction**, you can submit one form.*

9. Total well depth below land surface: 81.3 **(ft.)**

For multiple wells list all depths if different (example- 3@200' and 2@100')

10. Static water level below top of casing: 46.01 **(ft.)**

If water level is above casing, use "+"

11. Borehole diameter: 3 **(in.)**

12. Well construction method: 8.25 HSA / NQ2 core

(i.e. auger, rotary, cable, direct push, etc.)

FOR WATER SUPPLY WELLS ONLY:

13a. Yield (gpm) N/A **Method of test:** N/A

13b. Disinfection type: N/A **Amount:** N/A

For Internal Use ONLY:

14. WATER ZONES

FROM	TO	DESCRIPTION
N/A ft.	N/A ft.	N/A
N/A ft.	N/A ft.	N/A

15. OUTER CASING (for multi-cased wells) OR LINER (if applicable)

FROM	TO	DIAMETER	THICKNESS	MATERIAL
0 ft.	54.5 ft.	6 in.	Sch. 40	PVC

16. INNER CASING OR TUBING (geothermal closed-loop)

FROM	TO	DIAMETER	THICKNESS	MATERIAL
0 ft.	76 ft.	2 in.	Sch. 40	PVC
N/A ft.	N/A ft.	N/A in.	N/A	N/A

17. SCREEN

FROM	TO	DIAMETER	SLOT SIZE	THICKNESS	MATERIAL
76 ft.	81 ft.	2 in.	0.010	Sch. 40	PVC
N/A ft.	N/A ft.	N/A in.	N/A	N/A	N/A

18. GROUT

FROM	TO	MATERIAL	EMPLACEMENT METHOD & AMOUNT
0 ft.	55 ft.	Neat Cement	Tremie
55 ft.	57.5 ft.	Bentonite	Pour & Hydrate
75.4 ft.	75.6 ft.	K-packer	place

19. SAND/GRAVEL PACK (if applicable)

FROM	TO	MATERIAL	EMPLACEMENT METHOD
N/A ft.	N/A ft.	N/A	N/A
N/A ft.	N/A ft.	N/A	N/A

20. DRILLING LOG (attach additional sheets if necessary)

FROM	TO	DESCRIPTION (color, hardness, soil/rock type, grain size, etc.)
0 ft.	2 ft.	Fill: Silty Sand
2 ft.	31 ft.	Fill: Ash (Sandy Clay 18-19.8)
31 ft.	38.5 ft.	Silty Sand/Sandy Silt
38.5 ft.	58.5 ft.	PWR
58.5 ft.	60 ft.	Silty Sand
60 ft.	55 ft.	PWR
55 ft.	81.3 ft.	Bedrock

21. REMARKS

N/A

22. Certification:

Richy Lemire — Signature of Certified Well Contractor

05/06/15 — Date

By signing this form, I hereby certify that the well(s) was (were) constructed in accordance with 15A NCAC 02C .0100 or 15A NCAC 02C .0200 Well Construction Standards and that a copy of this record has been provided to the well owner.

23. Site diagram or additional well details:

You may use the back of this page to provide additional well site details or well construction details. You may also attach additional pages if necessary.

SUBMITTAL INSTUCTIONS

24a. For All Wells: Submit this form within 30 days of completion of well construction to the following:

Division of Water Resources, Information Processing Unit,
1617 Mail Service Center, Raleigh, NC 27699-1617

24b. For Injection Wells ONLY: In addition to sending the form to the address in 24a above, also submit a copy of this form within 30 days of completion of well construction to the following:

Division of Water Resources, Underground Injection Control Program,
1636 Mail Service Center, Raleigh, NC 27699-1636

24c. For Water Supply & Injection Wells:

Also submit one copy of this form within 30 days of completion of well construction to the county health department of the county where constructed.

WELL CONSTRUCTION RECORD

This form can be used for single or multiple wells

1. Well Contractor Information:

Stefan Smith

Well Contractor Name

3576-A

NC Well Contractor Certification Number

SAEDACCO

Company Name

2. Well Construction Permit #: N/A

List all applicable well permits (i.e. County, State, Variance, Injection, etc.)

3. Well Use (check well use):

Water Supply Well:

☐Agricultural ☐Municipal/Public

☐Geothermal (Heating/Cooling Supply) ☐Residential Water Supply (single)

☐Industrial/Commercial ☐Residential Water Supply (shared)

☐Irrigation

Non-Water Supply Well:

☑Monitoring ☐Recovery

Injection Well:

☐Aquifer Recharge ☐Groundwater Remediation

☐Aquifer Storage and Recovery ☐Salinity Barrier

☐Aquifer Test ☐Stormwater Drainage

☐Experimental Technology ☐Subsidence Control

☐Geothermal (Closed Loop) ☐Tracer

☐Geothermal (Heating/Cooling Return) ☐Other (explain under #21 Remarks)

4. Date Well(s) Completed: 4/14/15 **Well ID#** OW-409 D

5a. Well Location:

Duke Energy-Dan River — Facility/Owner Name

N/A — Facility ID# (if applicable)

900 S. Edgewood Rd, Eden, NC

Physical Address, City, and Zip

Rockingham — County

798908886870 — Parcel Identification No. (PIN)

5b. Latitude and Longitude in degrees/minutes/seconds or decimal degrees:
(if well field, one lat/long is sufficient)

36.4948 N -79.7180 W

6. Is (are) the well(s): ☑**Permanent** or ☐**Temporary**

7. Is this a repair to an existing well: ☐**Yes** or ☑**No**

If this is a repair, fill out known well construction information and explain the nature of the repair under #21 remarks section or on the back of this form.

8. Number of wells constructed: 1

*For multiple injection or non-water supply wells **ONLY** with the **same construction**, you can submit one form.*

9. Total well depth below land surface: 27.3 **(ft.)**

For multiple wells list all depths if different (example- 3@200' and 2@100')

10. Static water level below top of casing: + **(ft.)**

If water level is above casing, use "+"

11. Borehole diameter: 3 **(in.)**

12. Well construction method: 8.25 HSA / NQ2 core

(i.e. auger, rotary, cable, direct push, etc.)

FOR WATER SUPPLY WELLS ONLY:

13a. Yield (gpm) N/A **Method of test:** N/A

13b. Disinfection type: N/A **Amount:** N/A

For Internal Use ONLY:

14. WATER ZONES

FROM	TO	DESCRIPTION
N/A ft.	N/A ft.	N/A
N/A ft.	N/A ft.	N/A

15. OUTER CASING (for multi-cased wells) OR LINER (if applicable)

FROM	TO	DIAMETER	THICKNESS	MATERIAL
0 ft.	8 ft.	6 in.	Sch. 40	PVC

16. INNER CASING OR TUBING (geothermal closed-loop)

FROM	TO	DIAMETER	THICKNESS	MATERIAL
0 ft.	22 ft.	2 in.	Sch. 40	PVC
N/A ft.	N/A ft.	N/A in.	N/A	N/A

17. SCREEN

FROM	TO	DIAMETER	SLOT SIZE	THICKNESS	MATERIAL
22 ft.	27 ft.	2 in.	0.010	Sch. 40	PVC
N/A ft.	N/A ft.	N/A in.	N/A	N/A	N/A

18. GROUT

FROM	TO	MATERIAL	EMPLACEMENT METHOD & AMOUNT
0 ft.	6 ft.	Neat Cement	Tremie
6 ft.	8 ft.	Bentonite	Pour & Hydrate
21.4 ft.	21.6 ft.	K-packer	place

19. SAND/GRAVEL PACK (if applicable)

FROM	TO	MATERIAL	EMPLACEMENT METHOD
N/A ft.	N/A ft.	N/A	N/A
N/A ft.	N/A ft.	N/A	N/A

20. DRILLING LOG (attach additional sheets if necessary)

FROM	TO	DESCRIPTION (color, hardness, soil/rock type, grain size, etc.)
0 ft.	7 ft.	Sandy Clay
7 ft.	8 ft.	PWR
8 ft.	27.3 ft.	Bedrock
ft.	ft.	
ft.	ft.	
ft.	ft.	
ft.	ft.	

21. REMARKS

N/A

22. Certification:

Stefan Smith — Signature of Certified Well Contractor

05/06/15 — Date

By signing this form, I hereby certify that the well(s) was (were) constructed in accordance with 15A NCAC 02C .0100 or 15A NCAC 02C .0200 Well Construction Standards and that a copy of this record has been provided to the well owner.

23. Site diagram or additional well details:

You may use the back of this page to provide additional well site details or well construction details. You may also attach additional pages if necessary.

SUBMITTAL INSTUCTIONS

24a. For All Wells: Submit this form within 30 days of completion of well construction to the following:

Division of Water Resources, Information Processing Unit,
1617 Mail Service Center, Raleigh, NC 27699-1617

24b. For Injection Wells ONLY: In addition to sending the form to the address in 24a above, also submit a copy of this form within 30 days of completion of well construction to the following:

Division of Water Resources, Underground Injection Control Program,
1636 Mail Service Center, Raleigh, NC 27699-1636

24c. For Water Supply & Injection Wells:

Also submit one copy of this form within 30 days of completion of well construction to the county health department of the county where constructed.

WELL CONSTRUCTION RECORD

This form can be used for single or multiple wells

For Internal Use ONLY:

1. Well Contractor Information:

Richy Lemire

Well Contractor Name

2593-A

NC Well Contractor Certification Number

SAEDACCO

Company Name

2. Well Construction Permit #: N/A

List all applicable well permits (i.e. County, State, Variance, Injection, etc.)

3. Well Use (check well use):

Water Supply Well:

☐Agricultural ☐Municipal/Public

☐Geothermal (Heating/Cooling Supply) ☐Residential Water Supply (single)

☐Industrial/Commercial ☐Residential Water Supply (shared)

☐Irrigation

Non-Water Supply Well:

☑Monitoring ☐Recovery

Injection Well:

☐Aquifer Recharge ☐Groundwater Remediation

☐Aquifer Storage and Recovery ☐Salinity Barrier

☐Aquifer Test ☐Stormwater Drainage

☐Experimental Technology ☐Subsidence Control

☐Geothermal (Closed Loop) ☐Tracer

☐Geothermal (Heating/Cooling Return) ☐Other (explain under #21 Remarks)

4. Date Well(s) Completed: 4/22/15 **Well ID#** OW-407 D

5a. Well Location:

Duke Energy-Dan River — Facility/Owner Name

N/A — Facility ID# (if applicable)

900 S. Edgewood Rd, Eden, NC

Physical Address, City, and Zip

Rockingham — County

798908886870 — Parcel Identification No. (PIN)

5b. Latitude and Longitude in degrees/minutes/seconds or decimal degrees:
(if well field, one lat/long is sufficient)

36.4951 N -79.7164 W

6. Is (are) the well(s): ☑**Permanent** or ☐**Temporary**

7. Is this a repair to an existing well: ☐**Yes** or ☑**No**

If this is a repair, fill out known well construction information and explain the nature of the repair under #21 remarks section or on the back of this form.

8. Number of wells constructed: 1

*For multiple injection or non-water supply wells **ONLY** with the **same construction**, you can submit one form.*

9. Total well depth below land surface: 79.3 **(ft.)**

For multiple wells list all depths if different (example- 3@200' and 2@100')

10. Static water level below top of casing: 53.22 **(ft.)**

If water level is above casing, use "+"

11. Borehole diameter: 6 **(in.)**

12. Well construction method: 8.25 HSA / 6"roller cone

(i.e. auger, rotary, cable, direct push, etc.)

FOR WATER SUPPLY WELLS ONLY:

13a. Yield (gpm) N/A **Method of test:** N/A

13b. Disinfection type: N/A **Amount:** N/A

14. WATER ZONES

FROM	TO	DESCRIPTION
N/A ft.	N/A ft.	N/A
N/A ft.	N/A ft.	N/A

15. OUTER CASING (for multi-cased wells) OR LINER (if applicable)

FROM	TO	DIAMETER	THICKNESS	MATERIAL
0 ft.	63.5 ft.	6 in.	Sch. 40	PVC

16. INNER CASING OR TUBING (geothermal closed-loop)

FROM	TO	DIAMETER	THICKNESS	MATERIAL
0 ft.	74 ft.	2 in.	Sch. 40	PVC
N/A ft.	N/A ft.	N/A in.	N/A	N/A

17. SCREEN

FROM	TO	DIAMETER	SLOT SIZE	THICKNESS	MATERIAL
74 ft.	79 ft.	2 in.	0.010	Sch. 40	PVC
N/A ft.	N/A ft.	N/A in.	N/A	N/A	N/A

18. GROUT

FROM	TO	MATERIAL	EMPLACEMENT METHOD & AMOUNT
0 ft.	68 ft.	Neat Cement	Tremie
68 ft.	72 ft.	Bentonite	Pour & Hydrate
N/A ft.	N/A ft.	N/A	N/A

19. SAND/GRAVEL PACK (if applicable)

FROM	TO	MATERIAL	EMPLACEMENT METHOD
72 ft.	79.3 ft.	#2 Silica Sand	wash
N/A ft.	N/A ft.	N/A	N/A

20. DRILLING LOG (attach additional sheets if necessary)

FROM	TO	DESCRIPTION (color, hardness, soil/rock type, grain size, etc.)
0 ft.	1.5 ft.	Fill: Silty Sand
1.5 ft.	38.5 ft.	Fill: Ash
38.5 ft.	43.5 ft.	Organic Debris
43.5 ft.	48.5 ft.	Sandy Clay
48.5 ft.	54 ft.	Clayey Sand
54 ft.	58.5 ft.	Silty Sand
58.5 ft.	63.8 ft.	PWR

21. REMARKS

63.8' to 79.3' Soft Bedrock

22. Certification:

Richy Lemire — Signature of Certified Well Contractor

05/06/15 — Date

By signing this form, I hereby certify that the well(s) was (were) constructed in accordance with 15A NCAC 02C .0100 or 15A NCAC 02C .0200 Well Construction Standards and that a copy of this record has been provided to the well owner.

23. Site diagram or additional well details:

You may use the back of this page to provide additional well site details or well construction details. You may also attach additional pages if necessary.

SUBMITTAL INSTUCTIONS

24a. For All Wells: Submit this form within 30 days of completion of well construction to the following:

Division of Water Resources, Information Processing Unit,
1617 Mail Service Center, Raleigh, NC 27699-1617

24b. For Injection Wells ONLY: In addition to sending the form to the address in 24a above, also submit a copy of this form within 30 days of completion of well construction to the following:

Division of Water Resources, Underground Injection Control Program,
1636 Mail Service Center, Raleigh, NC 27699-1636

24c. For Water Supply & Injection Wells:

Also submit one copy of this form within 30 days of completion of well construction to the county health department of the county where constructed.

WELL CONSTRUCTION RECORD

This form can be used for single or multiple wells

1. Well Contractor Information:

Richy Lemire

Well Contractor Name

2593-A

NC Well Contractor Certification Number

SAEDACCO

Company Name

2. Well Construction Permit #: N/A

List all applicable well permits (i.e. County, State, Variance, Injection, etc.)

3. Well Use (check well use):

Water Supply Well:

☐Agricultural ☐Municipal/Public

☐Geothermal (Heating/Cooling Supply) ☐Residential Water Supply (single)

☐Industrial/Commercial ☐Residential Water Supply (shared)

☐Irrigation

Non-Water Supply Well:

☑Monitoring ☐Recovery

Injection Well:

☐Aquifer Recharge ☐Groundwater Remediation

☐Aquifer Storage and Recovery ☐Salinity Barrier

☐Aquifer Test ☐Stormwater Drainage

☐Experimental Technology ☐Subsidence Control

☐Geothermal (Closed Loop) ☐Tracer

☐Geothermal (Heating/Cooling Return) ☐Other (explain under #21 Remarks)

4. Date Well(s) Completed: 4/20/15 **Well ID#** OW-406 D

5a. Well Location:

Duke Energy-Dan River — Facility/Owner Name

N/A — Facility ID# (if applicable)

900 S. Edgewood Rd, Eden, NC

Physical Address, City, and Zip

Rockingham — County

798908886870 — Parcel Identification No. (PIN)

5b. Latitude and Longitude in degrees/minutes/seconds or decimal degrees:
(if well field, one lat/long is sufficient)

36.4954 N -79.7184 W

6. Is (are) the well(s): ☑**Permanent** or ☐**Temporary**

7. Is this a repair to an existing well: ☐**Yes** or ☑**No**

If this is a repair, fill out known well construction information and explain the nature of the repair under #21 remarks section or on the back of this form.

8. Number of wells constructed: 1

*For multiple injection or non-water supply wells **ONLY** with the **same construction**, you can submit one form.*

9. Total well depth below land surface: 41.3 **(ft.)**

For multiple wells list all depths if different (example- 3@200' and 2@100')

10. Static water level below top of casing: 5.00 **(ft.)**

If water level is above casing, use "+"

11. Borehole diameter: 6 **(in.)**

12. Well construction method: 8.25 HSA / 6"roller cone

(i.e. auger, rotary, cable, direct push, etc.)

FOR WATER SUPPLY WELLS ONLY:

13a. Yield (gpm) N/A **Method of test:** N/A

13b. Disinfection type: N/A **Amount:** N/A

For Internal Use ONLY:

14. WATER ZONES

FROM	TO	DESCRIPTION
N/A ft.	N/A ft.	N/A
N/A ft.	N/A ft.	N/A

15. OUTER CASING (for multi-cased wells) OR LINER (if applicable)

FROM	TO	DIAMETER	THICKNESS	MATERIAL
0 ft.	20.5 ft.	6 in.	Sch. 40	PVC

16. INNER CASING OR TUBING (geothermal closed-loop)

FROM	TO	DIAMETER	THICKNESS	MATERIAL
0 ft.	36 ft.	2 in.	Sch. 40	PVC
N/A ft.	N/A ft.	N/A in.	N/A	N/A

17. SCREEN

FROM	TO	DIAMETER	SLOT SIZE	THICKNESS	MATERIAL
36 ft.	41 ft.	2 in.	0.010	Sch. 40	PVC
N/A ft.	N/A ft.	N/A in.	N/A	N/A	N/A

18. GROUT

FROM	TO	MATERIAL	EMPLACEMENT METHOD & AMOUNT
0 ft.	30 ft.	Neat Cement	Tremie
30 ft.	34 ft.	Bentonite	Pour & Hydrate
N/A ft.	N/A ft.	N/A	N/A

19. SAND/GRAVEL PACK (if applicable)

FROM	TO	MATERIAL	EMPLACEMENT METHOD
34 ft.	41.3 ft.	#2 Silica Sand	wash
N/A ft.	N/A ft.	N/A	N/A

20. DRILLING LOG (attach additional sheets if necessary)

FROM	TO	DESCRIPTION (color, hardness, soil/rock type, grain size, etc.)
0 ft.	7 ft.	Silty Clay
7 ft.	11 ft.	Silty Sand
11 ft.	26 ft.	PWR
26 ft.	41.3 ft.	Soft Bedrock
ft.	ft.	
ft.	ft.	
ft.	ft.	

21. REMARKS

N/A

22. Certification:

Richy Lemire — Signature of Certified Well Contractor

05/06/15 — Date

By signing this form, I hereby certify that the well(s) was (were) constructed in accordance with 15A NCAC 02C .0100 or 15A NCAC 02C .0200 Well Construction Standards and that a copy of this record has been provided to the well owner.

23. Site diagram or additional well details:

You may use the back of this page to provide additional well site details or well construction details. You may also attach additional pages if necessary.

SUBMITTAL INSTUCTIONS

24a. For All Wells: Submit this form within 30 days of completion of well construction to the following:

Division of Water Resources, Information Processing Unit,
1617 Mail Service Center, Raleigh, NC 27699-1617

24b. For Injection Wells ONLY: In addition to sending the form to the address in 24a above, also submit a copy of this form within 30 days of completion of well construction to the following:

Division of Water Resources, Underground Injection Control Program,
1636 Mail Service Center, Raleigh, NC 27699-1636

24c. For Water Supply & Injection Wells:

Also submit one copy of this form within 30 days of completion of well construction to the county health department of the county where constructed.

WELL CONSTRUCTION RECORD

This form can be used for single or multiple wells

1. Well Contractor Information:

Stefan Smith

Well Contractor Name

3576-A

NC Well Contractor Certification Number

SAEDACCO

Company Name

2. Well Construction Permit #: N/A

List all applicable well permits (i.e. County, State, Variance, Injection, etc.)

3. Well Use (check well use):

Water Supply Well:

☐Agricultural ☐Municipal/Public

☐Geothermal (Heating/Cooling Supply) ☐Residential Water Supply (single)

☐Industrial/Commercial ☐Residential Water Supply (shared)

☐Irrigation

Non-Water Supply Well:

☑Monitoring ☐Recovery

Injection Well:

☐Aquifer Recharge ☐Groundwater Remediation

☐Aquifer Storage and Recovery ☐Salinity Barrier

☐Aquifer Test ☐Stormwater Drainage

☐Experimental Technology ☐Subsidence Control

☐Geothermal (Closed Loop) ☐Tracer

☐Geothermal (Heating/Cooling Return) ☐Other (explain under #21 Remarks)

4. Date Well(s) Completed: 4/7/15 **Well ID#** OW-405 S

5a. Well Location:

Duke Energy-Dan River — Facility/Owner Name

N/A — Facility ID# (if applicable)

900 S. Edgewood Rd, Eden, NC

Physical Address, City, and Zip

Rockingham — County

798908886870 — Parcel Identification No. (PIN)

5b. Latitude and Longitude in degrees/minutes/seconds or decimal degrees:
(if well field, one lat/long is sufficient)

36.4961 N -79.7133 W

6. Is (are) the well(s): ☑**Permanent** or ☐**Temporary**

7. Is this a repair to an existing well: ☐**Yes** or ☑**No**

If this is a repair, fill out known well construction information and explain the nature of the repair under #21 remarks section or on the back of this form.

8. Number of wells constructed: 1

*For multiple injection or non-water supply wells **ONLY** with the **same construction**, you can submit one form.*

9. Total well depth below land surface: 63 **(ft.)**

For multiple wells list all depths if different (example- 3@200' and 2@100')

10. Static water level below top of casing: 52.40 **(ft.)**

If water level is above casing, use "+"

11. Borehole diameter: 7 **(in.)**

12. Well construction method: auger

(i.e. auger, rotary, cable, direct push, etc.)

FOR WATER SUPPLY WELLS ONLY:

13a. Yield (gpm) N/A **Method of test:** N/A

13b. Disinfection type: N/A **Amount:** N/A

For Internal Use ONLY:

14. WATER ZONES

FROM	TO	DESCRIPTION
N/A ft.	N/A ft.	N/A
N/A ft.	N/A ft.	N/A

15. OUTER CASING (for multi-cased wells) OR LINER (if applicable)

FROM	TO	DIAMETER	THICKNESS	MATERIAL
N/A ft.	N/A ft.	N/A in.	N/A	N/A

16. INNER CASING OR TUBING (geothermal closed-loop)

FROM	TO	DIAMETER	THICKNESS	MATERIAL
0 ft.	47.7 ft.	2 in.	Sch. 40	PVC
N/A ft.	N/A ft.	N/A in.	N/A	N/A

17. SCREEN

FROM	TO	DIAMETER	SLOT SIZE	THICKNESS	MATERIAL
47.7 ft.	62.7 ft.	2 in.	0.010	Sch. 40	PVC
N/A ft.	N/A ft.	N/A in.	N/A	N/A	N/A

18. GROUT

FROM	TO	MATERIAL	EMPLACEMENT METHOD & AMOUNT
0 ft.	44 ft.	Neat Cement	Tremie
44 ft.	46 ft.	Bentonite	Pour & Hydrate
N/A ft.	N/A ft.	N/A	N/A

19. SAND/GRAVEL PACK (if applicable)

FROM	TO	MATERIAL	EMPLACEMENT METHOD
46 ft.	63 ft.	#2 Silica Sand	wash
N/A ft.	N/A ft.	N/A	N/A

20. DRILLING LOG (attach additional sheets if necessary)

FROM	TO	DESCRIPTION (color, hardness, soil/rock type, grain size, etc.)
0 ft.	8.5 ft.	Silty Sand
8.5 ft.	13.5 ft.	Sandy Silt
13.5 ft.	18.5 ft.	Silty Sand
18.5 ft.	63 ft.	PWR
ft.	ft.	
ft.	ft.	
ft.	ft.	

21. REMARKS

N/A

22. Certification:

Stefan Smith — Signature of Certified Well Contractor

05/06/15 — Date

By signing this form, I hereby certify that the well(s) was (were) constructed in accordance with 15A NCAC 02C .0100 or 15A NCAC 02C .0200 Well Construction Standards and that a copy of this record has been provided to the well owner.

23. Site diagram or additional well details:

You may use the back of this page to provide additional well site details or well construction details. You may also attach additional pages if necessary.

SUBMITTAL INSTUCTIONS

24a. For All Wells: Submit this form within 30 days of completion of well construction to the following:

Division of Water Resources, Information Processing Unit,
1617 Mail Service Center, Raleigh, NC 27699-1617

24b. For Injection Wells ONLY: In addition to sending the form to the address in 24a above, also submit a copy of this form within 30 days of completion of well construction to the following:

Division of Water Resources, Underground Injection Control Program,
1636 Mail Service Center, Raleigh, NC 27699-1636

24c. For Water Supply & Injection Wells:

Also submit one copy of this form within 30 days of completion of well construction to the county health department of the county where constructed.

WELL CONSTRUCTION RECORD

This form can be used for single or multiple wells

1. Well Contractor Information:

Richy Lemire

Well Contractor Name

2593-A

NC Well Contractor Certification Number

SAEDACCO

Company Name

2. Well Construction Permit #: N/A

List all applicable well permits (i.e. County, State, Variance, Injection, etc.)

3. Well Use (check well use):

Water Supply Well:

☐Agricultural ☐Municipal/Public

☐Geothermal (Heating/Cooling Supply) ☐Residential Water Supply (single)

☐Industrial/Commercial ☐Residential Water Supply (shared)

☐Irrigation

Non-Water Supply Well:

☑Monitoring ☐Recovery

Injection Well:

☐Aquifer Recharge ☐Groundwater Remediation

☐Aquifer Storage and Recovery ☐Salinity Barrier

☐Aquifer Test ☐Stormwater Drainage

☐Experimental Technology ☐Subsidence Control

☐Geothermal (Closed Loop) ☐Tracer

☐Geothermal (Heating/Cooling Return) ☐Other (explain under #21 Remarks)

4. Date Well(s) Completed: 4/23/15 **Well ID#** OW-405 D

5a. Well Location:

Duke Energy-Dan River — Facility/Owner Name

N/A — Facility ID# (if applicable)

900 S. Edgewood Rd, Eden, NC

Physical Address, City, and Zip

Rockingham — County

798908886870 — Parcel Identification No. (PIN)

5b. Latitude and Longitude in degrees/minutes/seconds or decimal degrees:
(if well field, one lat/long is sufficient)

36.4960 N -79.7133 W

6. Is (are) the well(s): ☑**Permanent** or ☐**Temporary**

7. Is this a repair to an existing well: ☐**Yes** or ☑**No**

If this is a repair, fill out known well construction information and explain the nature of the repair under #21 remarks section or on the back of this form.

8. Number of wells constructed: 1

*For multiple injection or non-water supply wells ONLY with the **same construction**, you can submit one form.*

9. Total well depth below land surface: 79 **(ft.)**

For multiple wells list all depths if different (example- 3@200' and 2@100')

10. Static water level below top of casing: 52.49 **(ft.)**

If water level is above casing, use "+"

11. Borehole diameter: 6 **(in.)**

12. Well construction method: 8.25 HSA / 6" Roller Cone

(i.e. auger, rotary, cable, direct push, etc.)

FOR WATER SUPPLY WELLS ONLY:

13a. Yield (gpm) N/A **Method of test:** N/A

13b. Disinfection type: N/A **Amount:** N/A

For Internal Use ONLY:

14. WATER ZONES

FROM	TO	DESCRIPTION
N/A ft.	N/A ft.	N/A
N/A ft.	N/A ft.	N/A

15. OUTER CASING (for multi-cased wells) OR LINER (if applicable)

FROM	TO	DIAMETER	THICKNESS	MATERIAL
0 ft.	50.5 ft.	6 in.	Sch. 40	PVC

16. INNER CASING OR TUBING (geothermal closed-loop)

FROM	TO	DIAMETER	THICKNESS	MATERIAL
0 ft.	73.7 ft.	2 in.	Sch. 40	PVC
N/A ft.	N/A ft.	N/A in.	N/A	N/A

17. SCREEN

FROM	TO	DIAMETER	SLOT SIZE	THICKNESS	MATERIAL
73.7 ft.	78.7 ft.	2 in.	0.010	Sch. 40	PVC
N/A ft.	N/A ft.	N/A in.	N/A	N/A	N/A

18. GROUT

FROM	TO	MATERIAL	EMPLACEMENT METHOD & AMOUNT
0 ft.	68 ft.	Neat Cement	Tremie
68 ft.	72 ft.	Bentonite	Pour & Hydrate
N/A ft.	N/A ft.	N/A	N/A

19. SAND/GRAVEL PACK (if applicable)

FROM	TO	MATERIAL	EMPLACEMENT METHOD
72 ft.	79 ft.	N/A	N/A
N/A ft.	N/A ft.	N/A	N/A

20. DRILLING LOG (attach additional sheets if necessary)

FROM	TO	DESCRIPTION (color, hardness, soil/rock type, grain size, etc.)
0 ft.	8.5 ft.	Silty Sand
8.5 ft.	13.5 ft.	Sandy Silt
13.5 ft.	18.5 ft.	Silty Sand
18.5 ft.	65.5 ft.	PWR
65.5 ft.	79 ft.	Soft Bedrock
ft.	ft.	
ft.	ft.	

21. REMARKS

N/A

22. Certification:

Richy Lemire — Signature of Certified Well Contractor

05/06/15 — Date

By signing this form, I hereby certify that the well(s) was (were) constructed in accordance with 15A NCAC 02C .0100 or 15A NCAC 02C .0200 Well Construction Standards and that a copy of this record has been provided to the well owner.

23. Site diagram or additional well details:

You may use the back of this page to provide additional well site details or well construction details. You may also attach additional pages if necessary.

SUBMITTAL INSTUCTIONS

24a. For All Wells: Submit this form within 30 days of completion of well construction to the following:

Division of Water Resources, Information Processing Unit,
1617 Mail Service Center, Raleigh, NC 27699-1617

24b. For Injection Wells ONLY: In addition to sending the form to the address in 24a above, also submit a copy of this form within 30 days of completion of well construction to the following:

Division of Water Resources, Underground Injection Control Program,
1636 Mail Service Center, Raleigh, NC 27699-1636

24c. For Water Supply & Injection Wells:

Also submit one copy of this form within 30 days of completion of well construction to the county health department of the county where constructed.

WELL CONSTRUCTION RECORD

This form can be used for single or multiple wells

1. Well Contractor Information:

Stefan Smith

Well Contractor Name

3576-A

NC Well Contractor Certification Number

SAEDACCO

Company Name

2. Well Construction Permit #: N/A

List all applicable well permits (i.e. County, State, Variance, Injection, etc.)

3. Well Use (check well use):

Water Supply Well:

☐Agricultural ☐Municipal/Public

☐Geothermal (Heating/Cooling Supply) ☐Residential Water Supply (single)

☐Industrial/Commercial ☐Residential Water Supply (shared)

☐Irrigation

Non-Water Supply Well:

☑Monitoring ☐Recovery

Injection Well:

☐Aquifer Recharge ☐Groundwater Remediation

☐Aquifer Storage and Recovery ☐Salinity Barrier

☐Aquifer Test ☐Stormwater Drainage

☐Experimental Technology ☐Subsidence Control

☐Geothermal (Closed Loop) ☐Tracer

☐Geothermal (Heating/Cooling Return) ☐Other (explain under #21 Remarks)

4. Date Well(s) Completed: 4/7/15 **Well ID#** OW-404 S

5a. Well Location:

Duke Energy-Dan River — Facility/Owner Name

N/A — Facility ID# (if applicable)

900 S. Edgewood Rd, Eden, NC

Physical Address, City, and Zip

Rockingham — County

798908886870 — Parcel Identification No. (PIN)

5b. Latitude and Longitude in degrees/minutes/seconds or decimal degrees:
(if well field, one lat/long is sufficient)

36.4957 N -79.7141 W

6. Is (are) the well(s): ☑**Permanent** or ☐**Temporary**

7. Is this a repair to an existing well: ☐**Yes** or ☑**No**

If this is a repair, fill out known well construction information and explain the nature of the repair under #21 remarks section or on the back of this form.

8. Number of wells constructed: 1

*For multiple injection or non-water supply wells **ONLY** with the **same construction**, you can submit one form.*

9. Total well depth below land surface: 30 **(ft.)**

For multiple wells list all depths if different (example- 3@200' and 2@100')

10. Static water level below top of casing: 20.00 **(ft.)**

If water level is above casing, use "+"

11. Borehole diameter: 7 **(in.)**

12. Well construction method: auger

(i.e. auger, rotary, cable, direct push, etc.)

FOR WATER SUPPLY WELLS ONLY:

13a. Yield (gpm) N/A **Method of test:** N/A

13b. Disinfection type: N/A **Amount:** N/A

For Internal Use ONLY:

14. WATER ZONES

FROM	TO	DESCRIPTION
N/A ft.	N/A ft.	N/A
N/A ft.	N/A ft.	N/A

15. OUTER CASING (for multi-cased wells) OR LINER (if applicable)

FROM	TO	DIAMETER	THICKNESS	MATERIAL
N/A ft.	N/A ft.	N/A in.	N/A	N/A

16. INNER CASING OR TUBING (geothermal closed-loop)

FROM	TO	DIAMETER	THICKNESS	MATERIAL
0 ft.	14.7 ft.	2 in.	Sch. 40	PVC
N/A ft.	N/A ft.	N/A in.	N/A	N/A

17. SCREEN

FROM	TO	DIAMETER	SLOT SIZE	THICKNESS	MATERIAL
14.7 ft.	29.7 ft.	2 in.	0.010	Sch. 40	PVC
N/A ft.	N/A ft.	N/A in.	N/A	N/A	N/A

18. GROUT

FROM	TO	MATERIAL	EMPLACEMENT METHOD & AMOUNT
0 ft.	11 ft.	Neat Cement	Tremie
11 ft.	13 ft.	Bentonite	Pour & Hydrate
N/A ft.	N/A ft.	N/A	N/A

19. SAND/GRAVEL PACK (if applicable)

FROM	TO	MATERIAL	EMPLACEMENT METHOD
13 ft.	30 ft.	#2 Silica Sand	wash
N/A ft.	N/A ft.	N/A	N/A

20. DRILLING LOG (attach additional sheets if necessary)

FROM	TO	DESCRIPTION (color, hardness, soil/rock type, grain size, etc.)
0 ft.	3 ft.	Silty Sand
3 ft.	30 ft.	PWR
ft.	ft.	
ft.	ft.	
ft.	ft.	
ft.	ft.	
ft.	ft.	

21. REMARKS

N/A

22. Certification:

Stefan Smith — Signature of Certified Well Contractor

05/06/15 — Date

By signing this form, I hereby certify that the well(s) was (were) constructed in accordance with 15A NCAC 02C .0100 or 15A NCAC 02C .0200 Well Construction Standards and that a copy of this record has been provided to the well owner.

23. Site diagram or additional well details:

You may use the back of this page to provide additional well site details or well construction details. You may also attach additional pages if necessary.

SUBMITTAL INSTUCTIONS

24a. For All Wells: Submit this form within 30 days of completion of well construction to the following:

Division of Water Resources, Information Processing Unit,
1617 Mail Service Center, Raleigh, NC 27699-1617

24b. For Injection Wells ONLY: In addition to sending the form to the address in 24a above, also submit a copy of this form within 30 days of completion of well construction to the following:

Division of Water Resources, Underground Injection Control Program,
1636 Mail Service Center, Raleigh, NC 27699-1636

24c. For Water Supply & Injection Wells:

Also submit one copy of this form within 30 days of completion of well construction to the county health department of the county where constructed.

WELL CONSTRUCTION RECORD

This form can be used for single or multiple wells

1. Well Contractor Information:

Richy Lemire

Well Contractor Name

2593-A

NC Well Contractor Certification Number

SAEDACCO

Company Name

2. Well Construction Permit #: N/A

List all applicable well permits (i.e. County, State, Variance, Injection, etc.)

3. Well Use (check well use):

Water Supply Well:

☐Agricultural ☐Municipal/Public

☐Geothermal (Heating/Cooling Supply) ☐Residential Water Supply (single)

☐Industrial/Commercial ☐Residential Water Supply (shared)

☐Irrigation

Non-Water Supply Well:

☑Monitoring ☐Recovery

Injection Well:

☐Aquifer Recharge ☐Groundwater Remediation

☐Aquifer Storage and Recovery ☐Salinity Barrier

☐Aquifer Test ☐Stormwater Drainage

☐Experimental Technology ☐Subsidence Control

☐Geothermal (Closed Loop) ☐Tracer

☐Geothermal (Heating/Cooling Return) ☐Other (explain under #21 Remarks)

4. Date Well(s) Completed: 4/16/15 **Well ID#** OW-403 D

5a. Well Location:

Duke Energy-Dan River — Facility/Owner Name

N/A — Facility ID# (if applicable)

900 S. Edgewood Rd, Eden, NC

Physical Address, City, and Zip

Rockingham — County

798908886870 — Parcel Identification No. (PIN)

5b. Latitude and Longitude in degrees/minutes/seconds or decimal degrees:
(if well field, one lat/long is sufficient)

36.4963 N -79.7147 W

6. Is (are) the well(s): ☑**Permanent** or ☐**Temporary**

7. Is this a repair to an existing well: ☐**Yes** or ☑**No**

If this is a repair, fill out known well construction information and explain the nature of the repair under #21 remarks section or on the back of this form.

8. Number of wells constructed: 1

*For multiple injection or non-water supply wells **ONLY** with the **same construction**, you can submit one form.*

9. Total well depth below land surface: 67.5 **(ft.)**

For multiple wells list all depths if different (example- 3@200' and 2@100')

10. Static water level below top of casing: 35.65 **(ft.)**

If water level is above casing, use "+"

11. Borehole diameter: 3 **(in.)**

12. Well construction method: 8.25 HSA / NQ2 core

(i.e. auger, rotary, cable, direct push, etc.)

FOR WATER SUPPLY WELLS ONLY:

13a. Yield (gpm) N/A **Method of test:** N/A

13b. Disinfection type: N/A **Amount:** N/A

For Internal Use ONLY:

14. WATER ZONES

FROM	TO	DESCRIPTION
N/A ft.	N/A ft.	N/A
N/A ft.	N/A ft.	N/A

15. OUTER CASING (for multi-cased wells) OR LINER (if applicable)

FROM	TO	DIAMETER	THICKNESS	MATERIAL
0 ft.	50 ft.	6 in.	Sch. 40	PVC

16. INNER CASING OR TUBING (geothermal closed-loop)

FROM	TO	DIAMETER	THICKNESS	MATERIAL
0 ft.	62.2 ft.	2 in.	Sch. 40	PVC
N/A ft.	N/A ft.	N/A in.	N/A	N/A

17. SCREEN

FROM	TO	DIAMETER	SLOT SIZE	THICKNESS	MATERIAL
62.2 ft.	67.2 ft.	2 in.	0.010	Sch. 40	PVC
N/A ft.	N/A ft.	N/A in.	N/A	N/A	N/A

18. GROUT

FROM	TO	MATERIAL	EMPLACEMENT METHOD & AMOUNT
0 ft.	58 ft.	Neat Cement	Tremie
58 ft.	61.6 ft.	Bentonite	Pour & Hydrate
61.6 ft.	61.8 ft.	K-packer	place

19. SAND/GRAVEL PACK (if applicable)

FROM	TO	MATERIAL	EMPLACEMENT METHOD
N/A ft.	N/A ft.	N/A	N/A
N/A ft.	N/A ft.	N/A	N/A

20. DRILLING LOG (attach additional sheets if necessary)

FROM	TO	DESCRIPTION (color, hardness, soil/rock type, grain size, etc.)
0 ft.	13.5 ft.	Silty Sand
13.5 ft.	18.5 ft.	PWR
18.5 ft.	23 ft.	Sandy Silt
23 ft.	25 ft.	Sandy Clayey Silt
25 ft.	50.5 ft.	PWR
50.5 ft.	67.5 ft.	Bedrock
ft.	ft.	

21. REMARKS

N/A

22. Certification:

Richy Lemire — Signature of Certified Well Contractor

05/06/15 — Date

By signing this form, I hereby certify that the well(s) was (were) constructed in accordance with 15A NCAC 02C .0100 or 15A NCAC 02C .0200 Well Construction Standards and that a copy of this record has been provided to the well owner.

23. Site diagram or additional well details:
You may use the back of this page to provide additional well site details or well construction details. You may also attach additional pages if necessary.

SUBMITTAL INSTUCTIONS

24a. For All Wells: Submit this form within 30 days of completion of well construction to the following:

Division of Water Resources, Information Processing Unit,
1617 Mail Service Center, Raleigh, NC 27699-1617

24b. For Injection Wells ONLY: In addition to sending the form to the address in 24a above, also submit a copy of this form within 30 days of completion of well construction to the following:

Division of Water Resources, Underground Injection Control Program,
1636 Mail Service Center, Raleigh, NC 27699-1636

24c. For Water Supply & Injection Wells:
Also submit one copy of this form within 30 days of completion of well construction to the county health department of the county where constructed.

WELL CONSTRUCTION RECORD

This form can be used for single or multiple wells

1. Well Contractor Information:

Richy Lemire

Well Contractor Name

2593-A

NC Well Contractor Certification Number

SAEDACCO

Company Name

2. Well Construction Permit #: N/A

List all applicable well permits (i.e. County, State, Variance, Injection, etc.)

3. Well Use (check well use):

Water Supply Well:

- ☐Agricultural
- ☐Municipal/Public
- ☐Geothermal (Heating/Cooling Supply)
- ☐Residential Water Supply (single)
- ☐Industrial/Commercial
- ☐Residential Water Supply (shared)
- ☐Irrigation

Non-Water Supply Well:

- ☑Monitoring
- ☐Recovery

Injection Well:

- ☐Aquifer Recharge
- ☐Groundwater Remediation
- ☐Aquifer Storage and Recovery
- ☐Salinity Barrier
- ☐Aquifer Test
- ☐Stormwater Drainage
- ☐Experimental Technology
- ☐Subsidence Control
- ☐Geothermal (Closed Loop)
- ☐Tracer
- ☐Geothermal (Heating/Cooling Return)
- ☐Other (explain under #21 Remarks)

4. Date Well(s) Completed: 4/16/15 **Well ID#** OW-401 D

5a. Well Location:

Duke Energy-Dan River — Facility/Owner Name

N/A — Facility ID# (if applicable)

900 S. Edgewood Rd, Eden, NC

Physical Address, City, and Zip

Rockingham — County

798908886870 — Parcel Identification No. (PIN)

5b. Latitude and Longitude in degrees/minutes/seconds or decimal degrees:
(if well field, one lat/long is sufficient)

36.4963 N -79.7179 W

6. Is (are) the well(s): ☑**Permanent** or ☐**Temporary**

7. Is this a repair to an existing well: ☐**Yes** or ☑**No**

If this is a repair, fill out known well construction information and explain the nature of the repair under #21 remarks section or on the back of this form.

8. Number of wells constructed: 1

For multiple injection or non-water supply wells ONLY with the same construction, you can submit one form.

9. Total well depth below land surface: 47 **(ft.)**

For multiple wells list all depths if different (example- 3@200' and 2@100')

10. Static water level below top of casing: 10.27 **(ft.)**

If water level is above casing, use "+"

11. Borehole diameter: 6 **(in.)**

12. Well construction method: 8.25 HSA / 6"roller cone

(i.e. auger, rotary, cable, direct push, etc.)

FOR WATER SUPPLY WELLS ONLY:

13a. Yield (gpm) N/A **Method of test:** N/A

13b. Disinfection type: N/A **Amount:** N/A

For Internal Use ONLY:

14. WATER ZONES

FROM	TO	DESCRIPTION
N/A ft.	N/A ft.	N/A
N/A ft.	N/A ft.	N/A

15. OUTER CASING (for multi-cased wells) OR LINER (if applicable)

FROM	TO	DIAMETER	THICKNESS	MATERIAL
0 ft.	25 ft.	6 in.	Sch. 40	PVC

16. INNER CASING OR TUBING (geothermal closed-loop)

FROM	TO	DIAMETER	THICKNESS	MATERIAL
0 ft.	41.7 ft.	2 in.	Sch. 40	PVC
N/A ft.	N/A ft.	N/A in.	N/A	N/A

17. SCREEN

FROM	TO	DIAMETER	SLOT SIZE	THICKNESS	MATERIAL
41.7 ft.	46.7 ft.	2 in.	0.010	Sch. 40	PVC
N/A ft.	N/A ft.	N/A in.	N/A	N/A	N/A

18. GROUT

FROM	TO	MATERIAL	EMPLACEMENT METHOD & AMOUNT
0 ft.	36 ft.	Neat Cement	Tremie
36 ft.	39.8 ft.	Bentonite	Pour & Hydrate
N/A ft.	N/A ft.	N/A	N/A

19. SAND/GRAVEL PACK (if applicable)

FROM	TO	MATERIAL	EMPLACEMENT METHOD
39.8 ft.	47 ft.	#2 Silica Sand	wash
N/A ft.	N/A ft.	N/A	N/A

20. DRILLING LOG (attach additional sheets if necessary)

FROM	TO	DESCRIPTION (color, hardness, soil/rock type, grain size, etc.)
0 ft.	7 ft.	Silty Sand
7 ft.	18.5 ft.	PWR
18.5 ft.	23.5 ft.	Silty Sand
23.5 ft.	26 ft.	PWR
26 ft.	47 ft.	Soft Bedrock
ft.	ft.	
ft.	ft.	

21. REMARKS

N/A

22. Certification:

Richy Lemire — Signature of Certified Well Contractor

05/06/15 — Date

By signing this form, I hereby certify that the well(s) was (were) constructed in accordance with 15A NCAC 02C .0100 or 15A NCAC 02C .0200 Well Construction Standards and that a copy of this record has been provided to the well owner.

23. Site diagram or additional well details:

You may use the back of this page to provide additional well site details or well construction details. You may also attach additional pages if necessary.

SUBMITTAL INSTUCTIONS

24a. For All Wells: Submit this form within 30 days of completion of well construction to the following:

Division of Water Resources, Information Processing Unit,
1617 Mail Service Center, Raleigh, NC 27699-1617

24b. For Injection Wells ONLY: In addition to sending the form to the address in 24a above, also submit a copy of this form within 30 days of completion of well construction to the following:

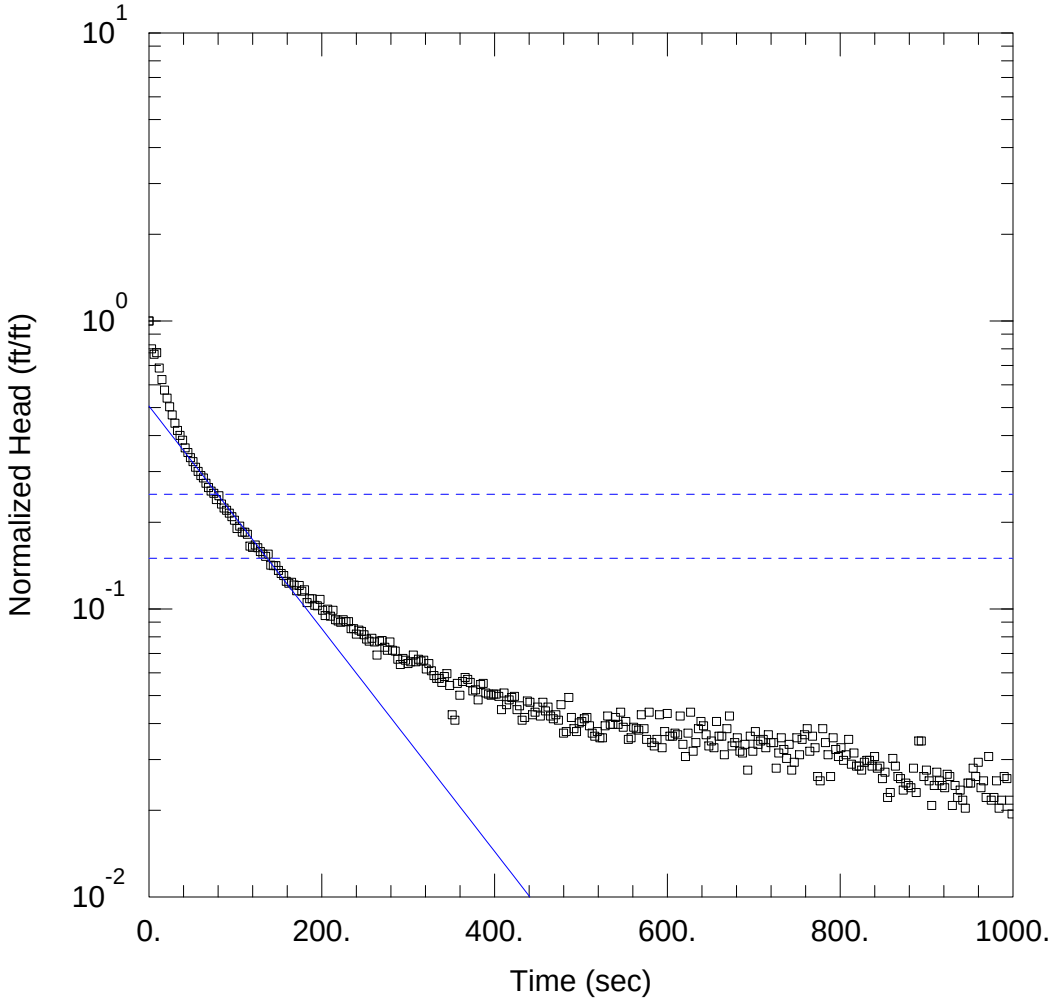
Division of Water Resources, Underground Injection Control Program,
1636 Mail Service Center, Raleigh, NC 27699-1636

24c. For Water Supply & Injection Wells:

Also submit one copy of this form within 30 days of completion of well construction to the county health department of the county where constructed.

APPENDIX III

Field Hydraulic Conductivity “Slug Test” Data



RISING HEAD TEST

PROJECT INFORMATION

Company: AMEC Foster Wheeler
Client: Duke Energy
Project: 7810140065.04.405
Location: Dan River
Test Well: OW-419 S
Test Date: 5-7-15

AQUIFER DATA

Saturated Thickness: 13.65 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (OW-419 S)

Initial Displacement: 2.214 ft
Total Well Penetration Depth: 15. ft
Casing Radius: 0.086 ft

Static Water Column Height: 13.65 ft
Screen Length: 15. ft
Well Radius: 0.33 ft
Gravel Pack Porosity: 0.33

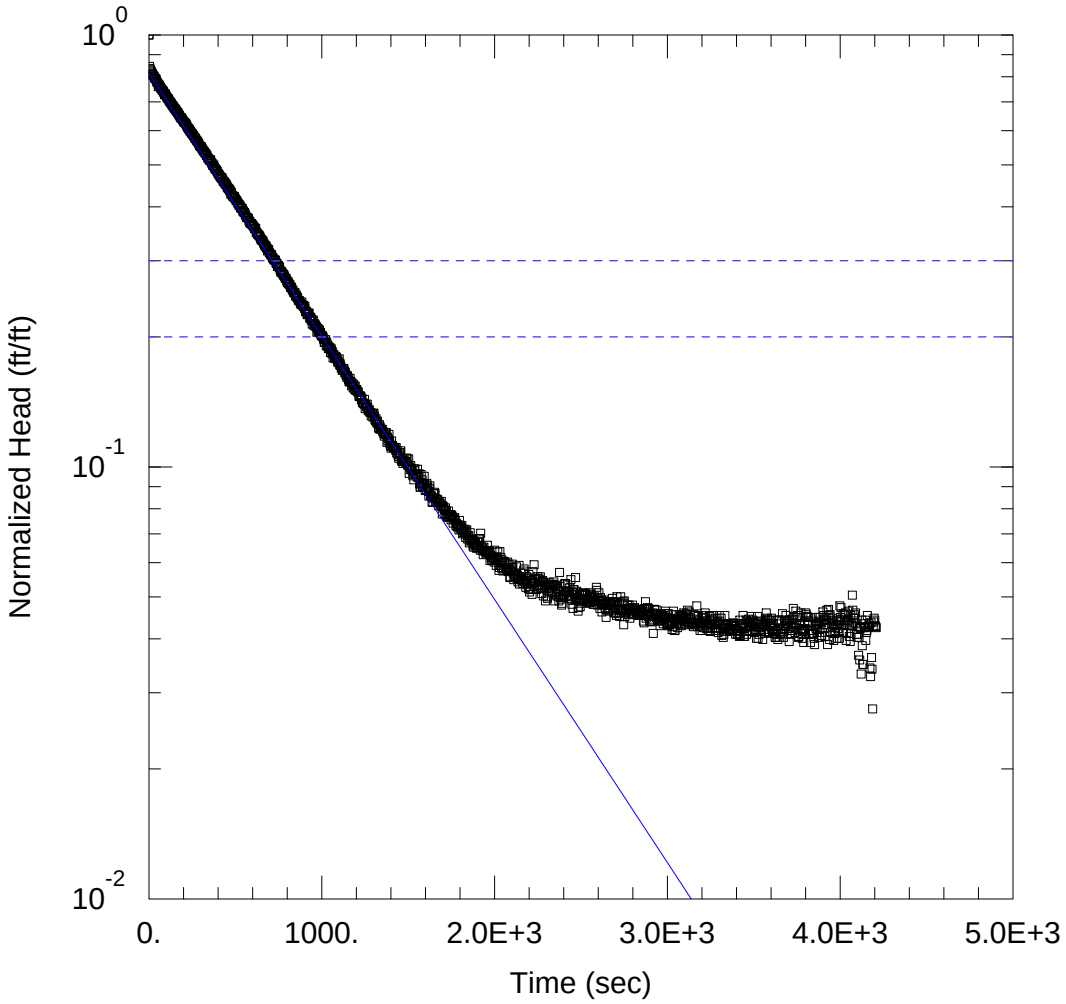
SOLUTION

Aquifer Model: Unconfined

Solution Method: Hvorslev

K = 0.002153 cm/sec

y0 = 1.121 ft



RISING HEAD TEST

PROJECT INFORMATION

Company: AMEC Foster Wheeler
Client: Duke Energy
Project: 7810140065.04.405
Location: Dan River
Test Well: OW-401 D
Test Date: 5-7-15

AQUIFER DATA

Saturated Thickness: 39.77 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (OW-401 D)

Initial Displacement: 4.615 ft
Total Well Penetration Depth: 39.77 ft
Casing Radius: 0.086 ft

Static Water Column Height: 39.77 ft
Screen Length: 5. ft
Well Radius: 0.244 ft
Gravel Pack Porosity: 0.33

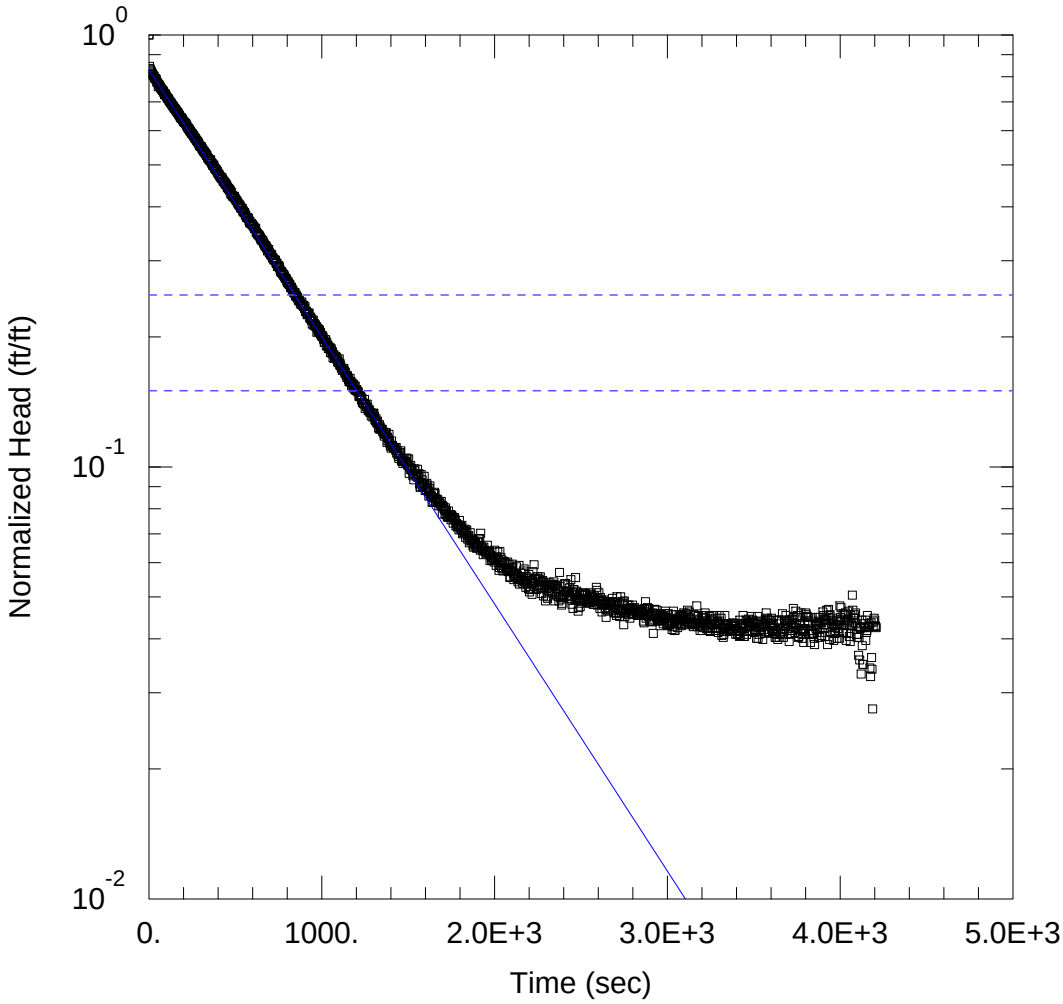
SOLUTION

Aquifer Model: Unconfined

Solution Method: Bouwer-Rice

K = 0.0003532 cm/sec

y0 = 3.762 ft



RISING HEAD TEST

PROJECT INFORMATION

Company: AMEC Foster Wheeler
Client: Duke Energy
Project: 7810140065.04.405
Location: Dan River
Test Well: OW-401 D
Test Date: 5-7-15

AQUIFER DATA

Saturated Thickness: 39.77 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (OW-401 D)

Initial Displacement: 4.615 ft
Total Well Penetration Depth: 39.77 ft
Casing Radius: 0.086 ft

Static Water Column Height: 39.77 ft
Screen Length: 5. ft
Well Radius: 0.244 ft
Gravel Pack Porosity: 0.33

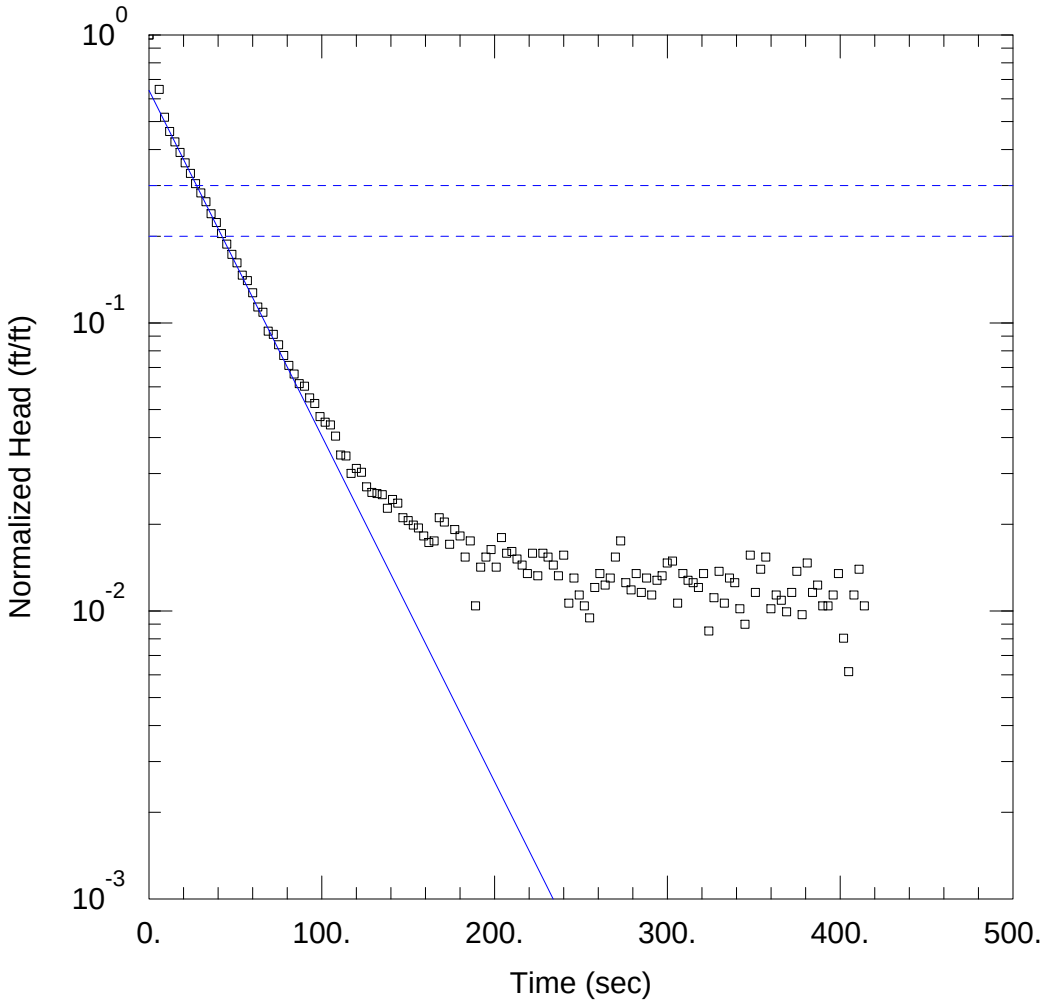
SOLUTION

Aquifer Model: Unconfined

Solution Method: Hvorslev

K = 0.0003965 cm/sec

y0 = 3.831 ft



RISING HEAD TEST

PROJECT INFORMATION

Company: AMEC Foster Wheeler
Client: Duke Energy
Project: 7810140065.04.405
Location: Dan River
Test Well: OW-401 S
Test Date: 5-7-15

AQUIFER DATA

Saturated Thickness: 21.4 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (OW-401 S)

Initial Displacement: 4.227 ft
Total Well Penetration Depth: 21.4 ft
Casing Radius: 0.086 ft

Static Water Column Height: 21.4 ft
Screen Length: 15. ft
Well Radius: 0.33 ft

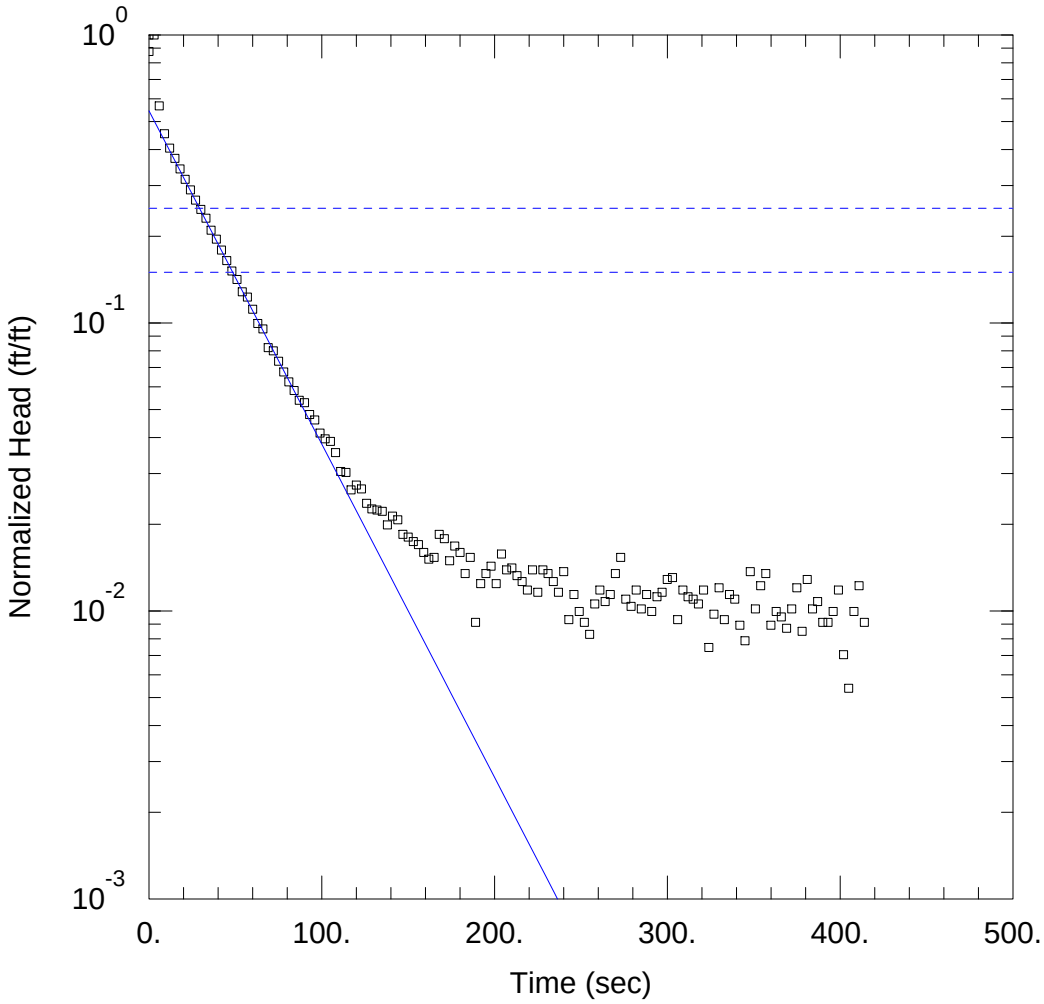
SOLUTION

Aquifer Model: Unconfined

K = 0.0006525 cm/sec

Solution Method: Bouwer-Rice

y0 = 2.713 ft



RISING HEAD TEST

PROJECT INFORMATION

Company: AMEC Foster Wheeler
Client: Duke Energy
Project: 7810140065.04.405
Location: Dan River
Test Well: OW-401 S
Test Date: 5-7-15

AQUIFER DATA

Saturated Thickness: 21.4 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (OW-401 S)

Initial Displacement: 4.824 ft
Total Well Penetration Depth: 21.4 ft
Casing Radius: 0.086 ft

Static Water Column Height: 21.4 ft
Screen Length: 15. ft
Well Radius: 0.33 ft

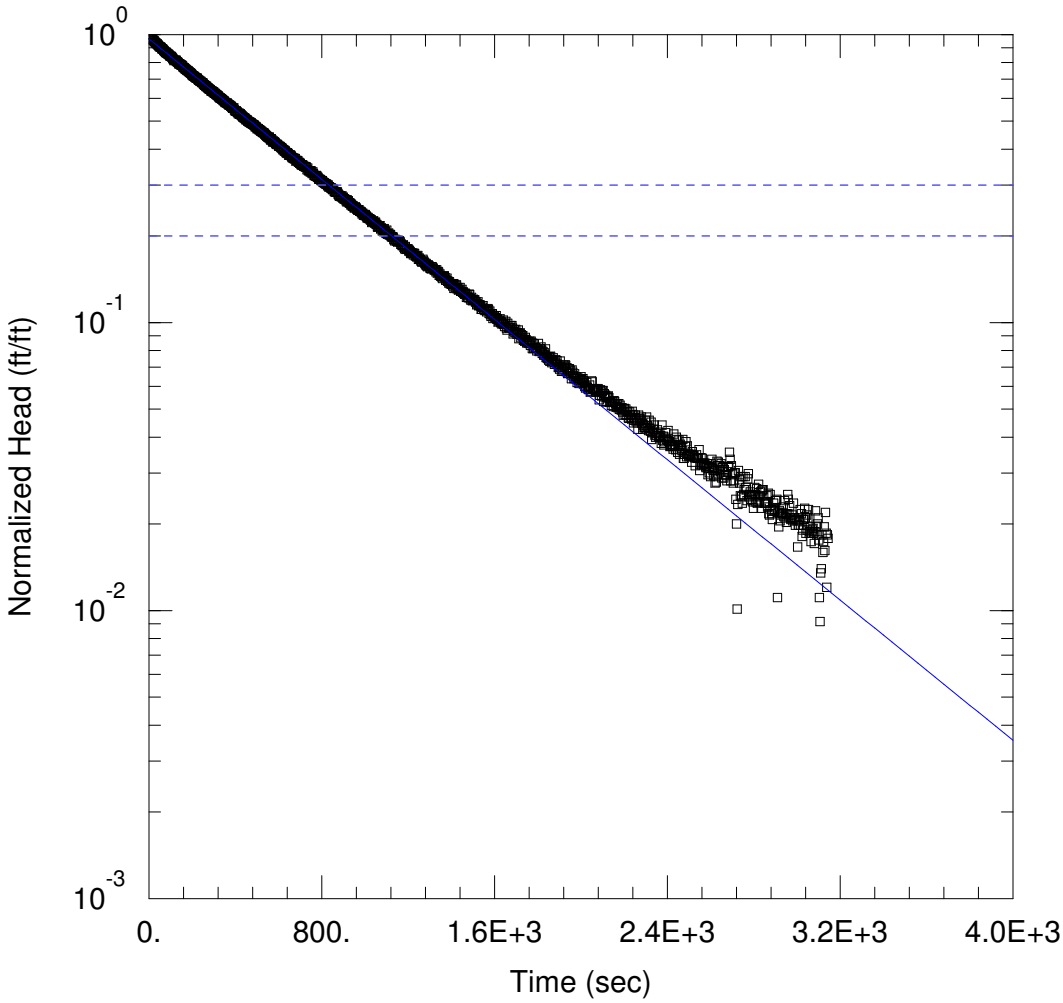
SOLUTION

Aquifer Model: Unconfined

K = 0.0009031 cm/sec

Solution Method: Hvorslev

y0 = 2.629 ft



RISING HEAD TEST

PROJECT INFORMATION

Company: AMEC Foster Wheeler
Client: Duke Energy
Project: 7810140065.04.405
Location: Dan River
Test Well: OW-403 D
Test Date: 5-7-15

AQUIFER DATA

Saturated Thickness: 34.47 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (OW-403 D)

Initial Displacement: 4.151 ft
Total Well Penetration Depth: 34.47 ft
Casing Radius: 0.086 ft

Static Water Column Height: 34.47 ft
Screen Length: 5. ft
Well Radius: 0.125 ft

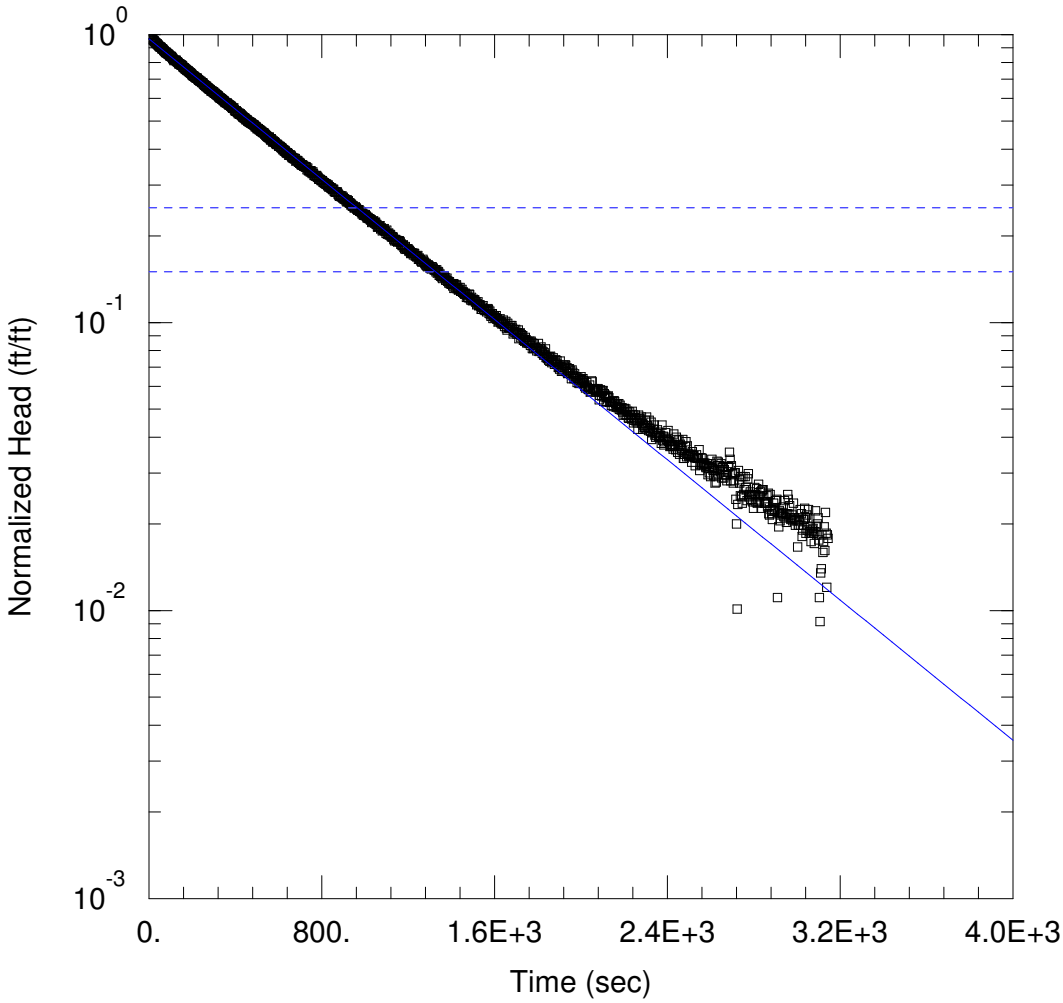
SOLUTION

Aquifer Model: Unconfined

Solution Method: Bouwer-Rice

K = 0.0001248 cm/sec

y0 = 4.005 ft



RISING HEAD TEST

PROJECT INFORMATION

Company: AMEC Foster Wheeler
Client: Duke Energy
Project: 7810140065.04.405
Location: Dan River
Test Well: OW-403 D
Test Date: 5-7-15

AQUIFER DATA

Saturated Thickness: 34.47 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (OW-403 D)

Initial Displacement: 4.151 ft
Total Well Penetration Depth: 34.47 ft
Casing Radius: 0.086 ft

Static Water Column Height: 34.47 ft
Screen Length: 5. ft
Well Radius: 0.125 ft

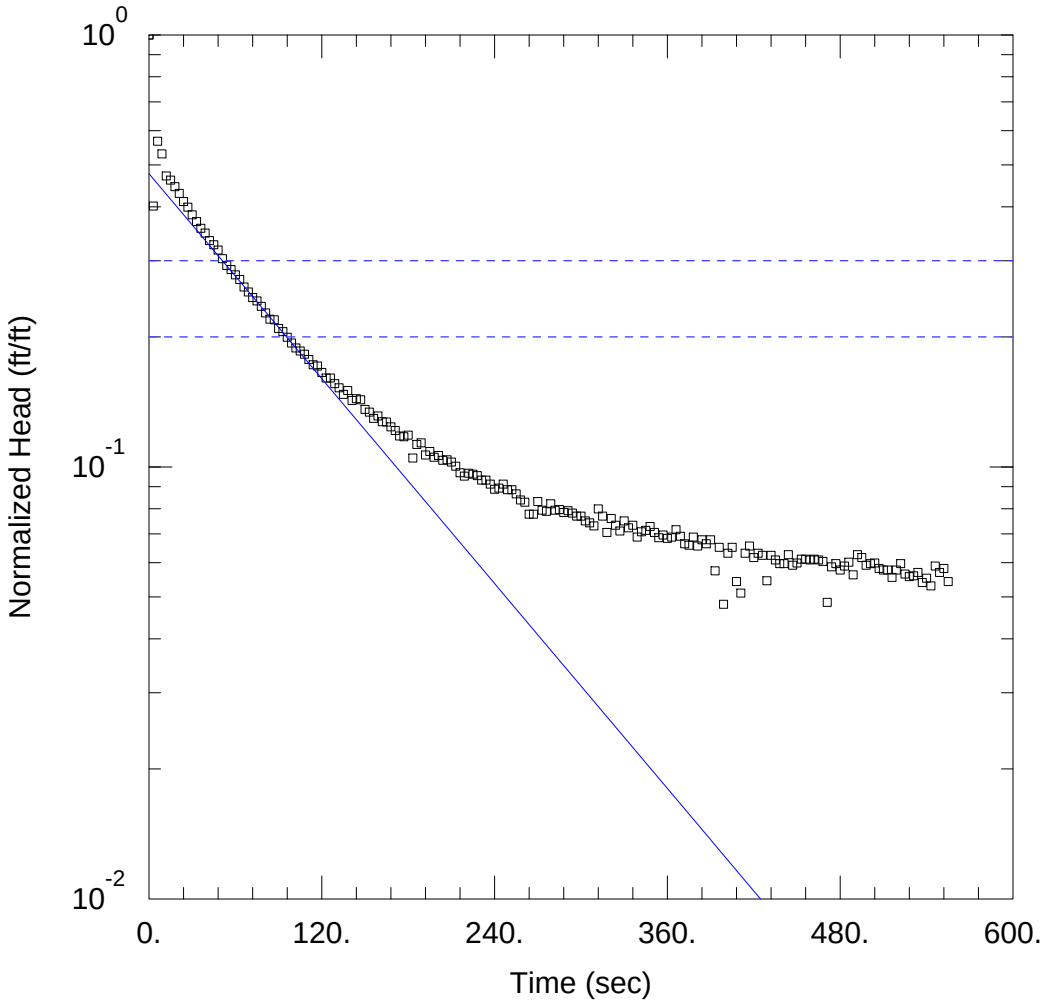
SOLUTION

Aquifer Model: Unconfined

K = 0.0001385 cm/sec

Solution Method: Hvorslev

y0 = 4.005 ft



RISING HEAD TEST

PROJECT INFORMATION

Company: AMEC Foster Wheeler
Client: Duke Energy
Project: 7810140065.04.405
Location: Dan River
Test Well: OW-403 S
Test Date: 5-7-15

AQUIFER DATA

Saturated Thickness: 17.48 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (OW-403 S)

Initial Displacement: 4.054 ft
Total Well Penetration Depth: 17.48 ft
Casing Radius: 0.086 ft

Static Water Column Height: 17.48 ft
Screen Length: 15. ft
Well Radius: 0.33 ft
Gravel Pack Porosity: 0.33

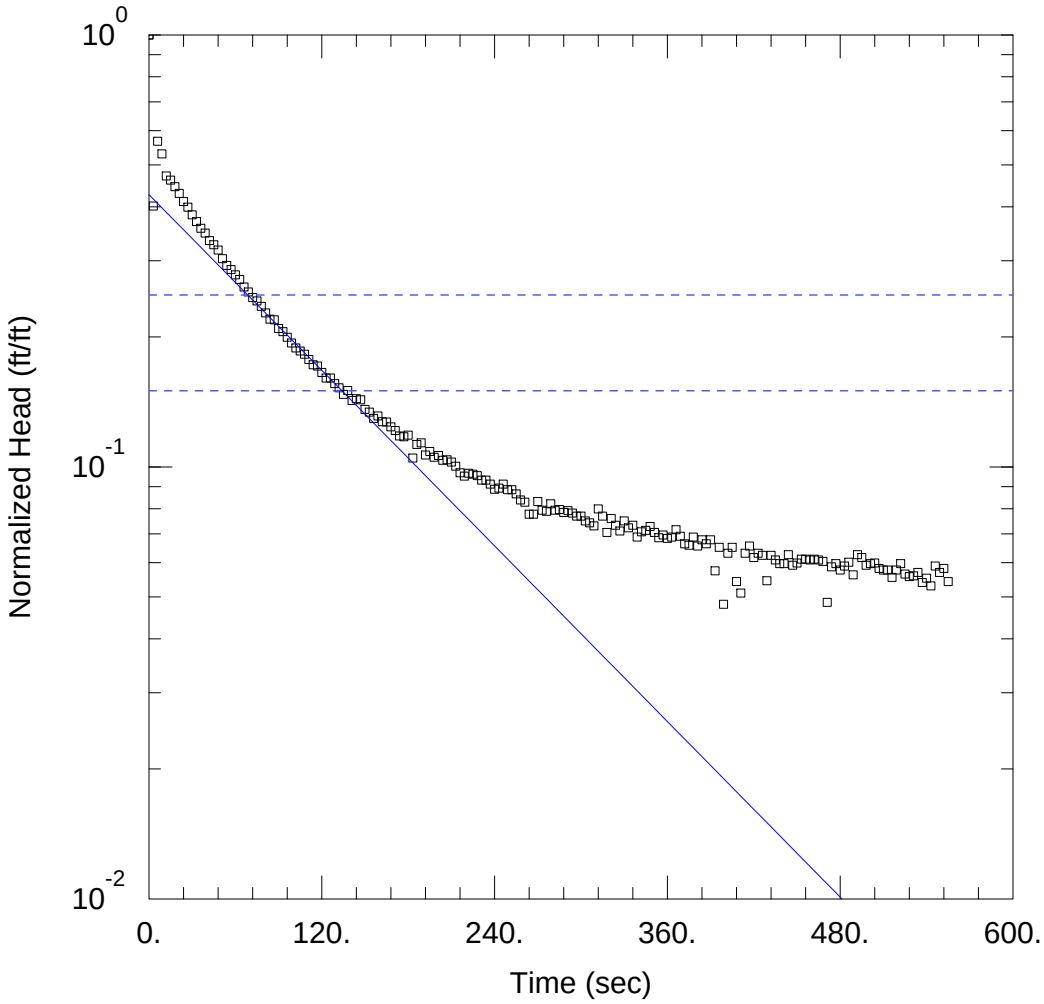
SOLUTION

Aquifer Model: Unconfined

Solution Method: Bouwer-Rice

K = 0.00114 cm/sec

y0 = 1.935 ft



RISING HEAD TEST

PROJECT INFORMATION

Company: AMEC Foster Wheeler
Client: Duke Energy
Project: 7810140065.04.405
Location: Dan River
Test Well: OW-403 S
Test Date: 5-7-15

AQUIFER DATA

Saturated Thickness: 17.48 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (OW-403 S)

Initial Displacement: 4.054 ft
Total Well Penetration Depth: 17.48 ft
Casing Radius: 0.086 ft

Static Water Column Height: 17.48 ft
Screen Length: 15. ft
Well Radius: 0.33 ft
Gravel Pack Porosity: 0.33

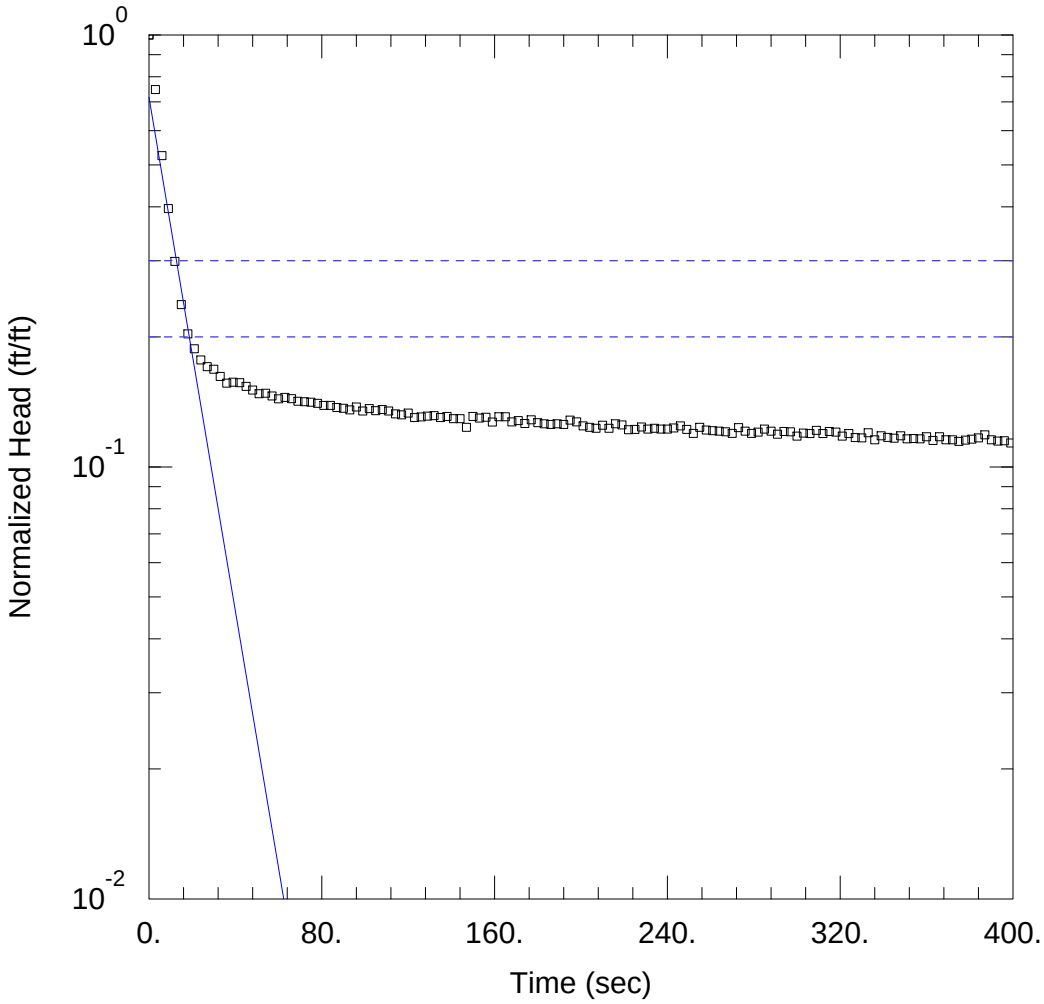
SOLUTION

Aquifer Model: Unconfined

Solution Method: Hvorslev

K = 0.001462 cm/sec

y0 = 1.73 ft



RISING HEAD TEST

PROJECT INFORMATION

Company: AMEC Foster Wheeler
Client: Duke Energy
Project: 7810140065.04.405
Location: Dan River
Test Well: OW-404 S
Test Date: 5-7-15

AQUIFER DATA

Saturated Thickness: 13. ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (OW-404 S)

Initial Displacement: 5.15 ft
Total Well Penetration Depth: 15. ft
Casing Radius: 0.086 ft

Static Water Column Height: 13. ft
Screen Length: 15. ft
Well Radius: 0.33 ft
Gravel Pack Porosity: 0.33

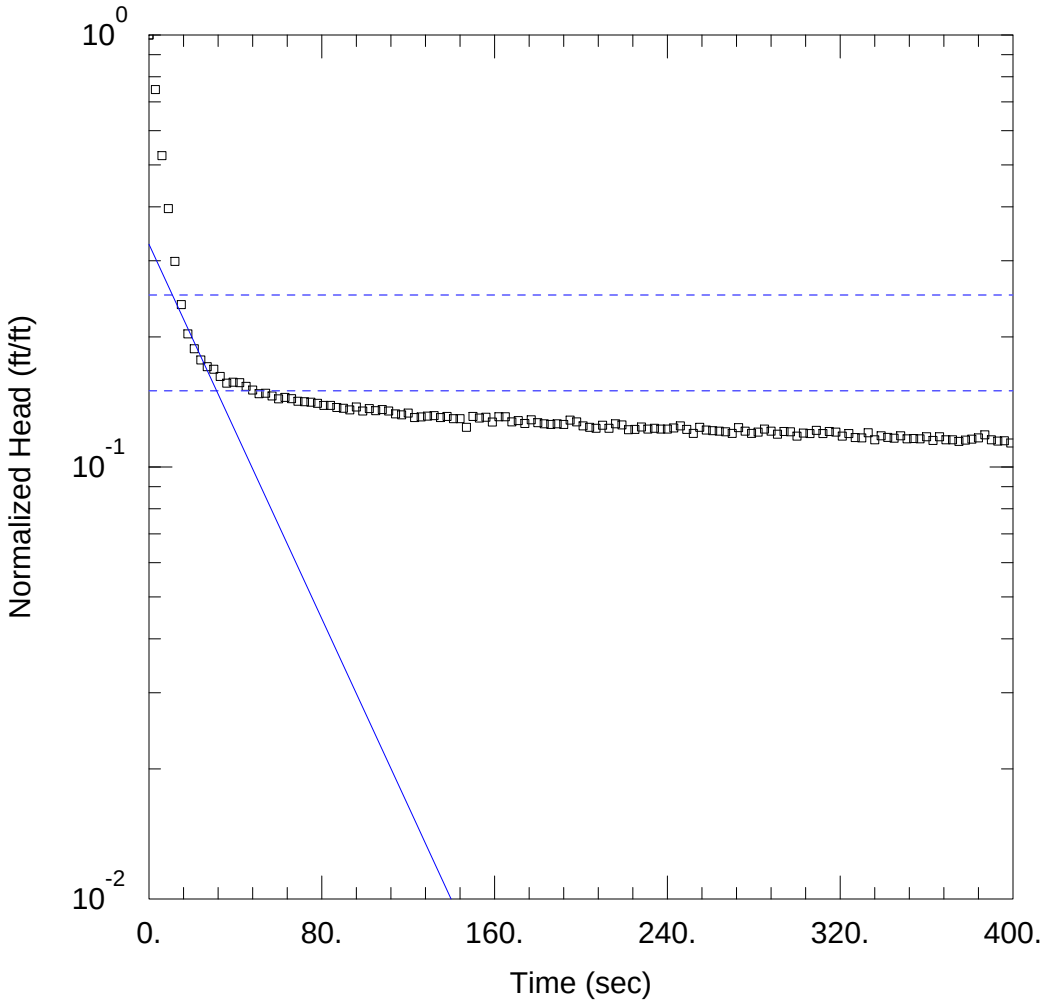
SOLUTION

Aquifer Model: Unconfined

Solution Method: Bouwer-Rice

K = 0.009489 cm/sec

y0 = 3.695 ft



RISING HEAD TEST

PROJECT INFORMATION

Company: AMEC Foster Wheeler
Client: Duke Energy
Project: 7810140065.04.405
Location: Dan River
Test Well: OW-404 S
Test Date: 5-7-15

AQUIFER DATA

Saturated Thickness: 13. ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (OW-404 S)

Initial Displacement: 5.15 ft
Total Well Penetration Depth: 15. ft
Casing Radius: 0.086 ft

Static Water Column Height: 13. ft
Screen Length: 15. ft
Well Radius: 0.33 ft
Gravel Pack Porosity: 0.33

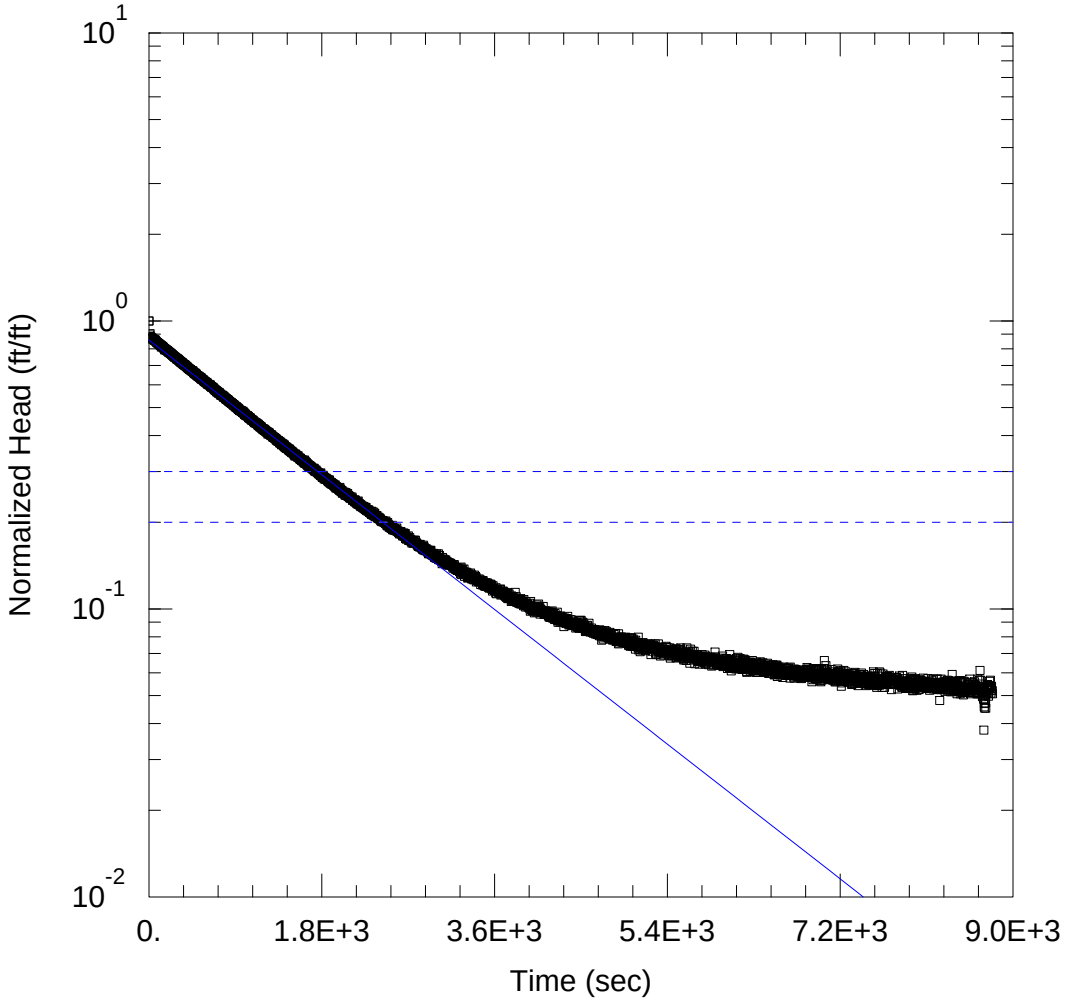
SOLUTION

Aquifer Model: Unconfined

Solution Method: Hvorslev

K = 0.006337 cm/sec

y0 = 1.687 ft



RISING HEAD TEST

PROJECT INFORMATION

Company: AMEC Foster Wheeler
Client: Duke Energy
Project: 7810140065.04.405
Location: Dan River
Test Well: OW-405 D
Test Date: 5-7-15

AQUIFER DATA

Saturated Thickness: 29.57 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (OW-405 D)

Initial Displacement: 4.137 ft
Total Well Penetration Depth: 29.57 ft
Casing Radius: 0.086 ft

Static Water Column Height: 29.57 ft
Screen Length: 5. ft
Well Radius: 0.244 ft
Gravel Pack Porosity: 0.33

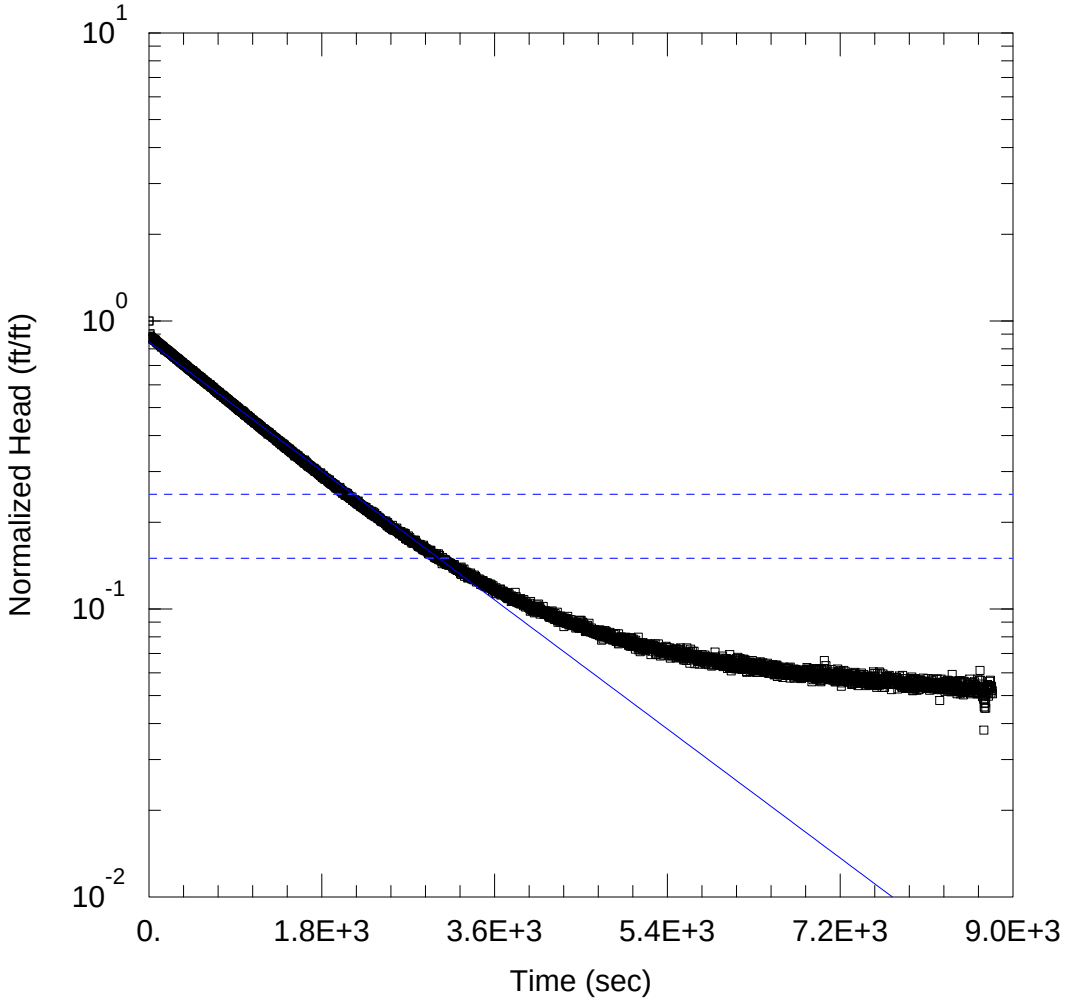
SOLUTION

Aquifer Model: Unconfined

Solution Method: Bouwer-Rice

K = 0.0001442 cm/sec

y0 = 3.551 ft



RISING HEAD TEST

PROJECT INFORMATION

Company: AMEC Foster Wheeler
Client: Duke Energy
Project: 7810140065.04.405
Location: Dan River
Test Well: OW-405 D
Test Date: 5-7-15

AQUIFER DATA

Saturated Thickness: 29.57 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (OW-405 D)

Initial Displacement: 4.137 ft
Total Well Penetration Depth: 29.57 ft
Casing Radius: 0.086 ft

Static Water Column Height: 29.57 ft
Screen Length: 5. ft
Well Radius: 0.244 ft
Gravel Pack Porosity: 0.33

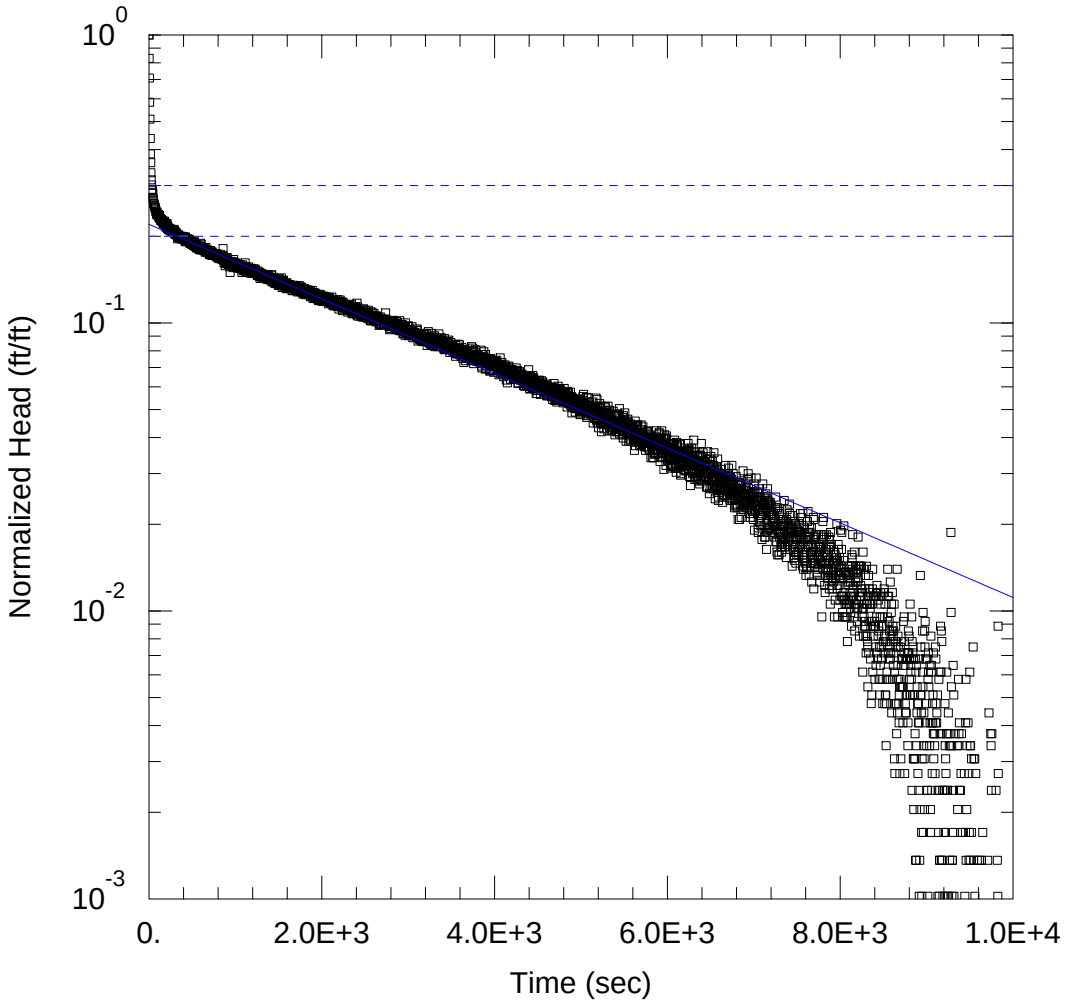
SOLUTION

Aquifer Model: Unconfined

Solution Method: Hvorslev

K = 0.0001596 cm/sec

y0 = 3.498 ft



RISING HEAD TEST

PROJECT INFORMATION

Company: AMEC Foster Wheeler
Client: Duke Energy
Project: 7810140065.04.405
Location: Dan River
Test Well: OW-405 S
Test Date: 5-7-15

AQUIFER DATA

Saturated Thickness: 13.41 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (OW-405 S)

Initial Displacement: 2.937 ft
Total Well Penetration Depth: 15. ft
Casing Radius: 0.086 ft

Static Water Column Height: 13.41 ft
Screen Length: 15. ft
Well Radius: 0.33 ft
Gravel Pack Porosity: 0.33

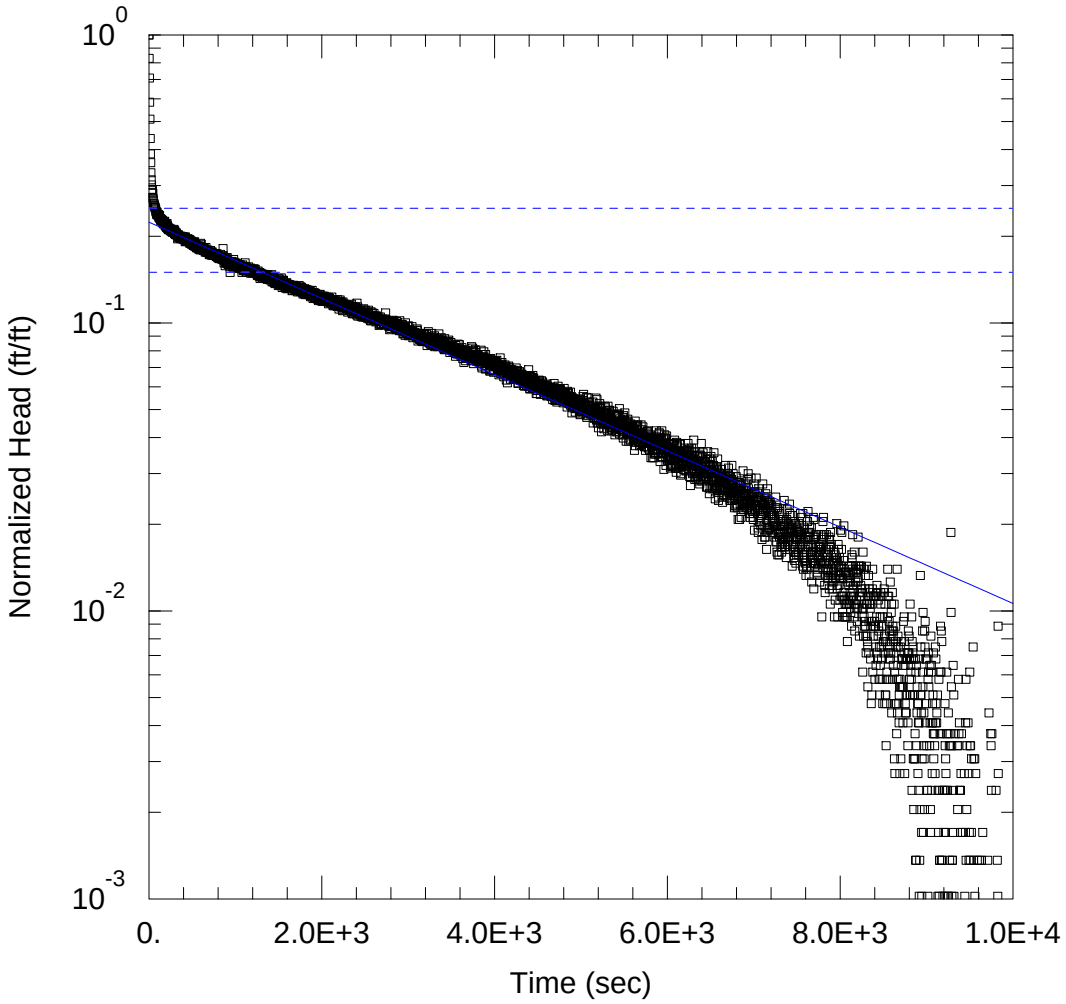
SOLUTION

Aquifer Model: Unconfined

Solution Method: Bouwer-Rice

K = 4.016E-5 cm/sec

y0 = 0.6459 ft



RISING HEAD TEST

PROJECT INFORMATION

Company: AMEC Foster Wheeler
Client: Duke Energy
Project: 7810140065.04.405
Location: Dan River
Test Well: OW-405 S
Test Date: 5-7-15

AQUIFER DATA

Saturated Thickness: 13.41 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (OW-405 S)

Initial Displacement: 2.937 ft
Total Well Penetration Depth: 15. ft
Casing Radius: 0.086 ft

Static Water Column Height: 13.41 ft
Screen Length: 15. ft
Well Radius: 0.33 ft
Gravel Pack Porosity: 0.33

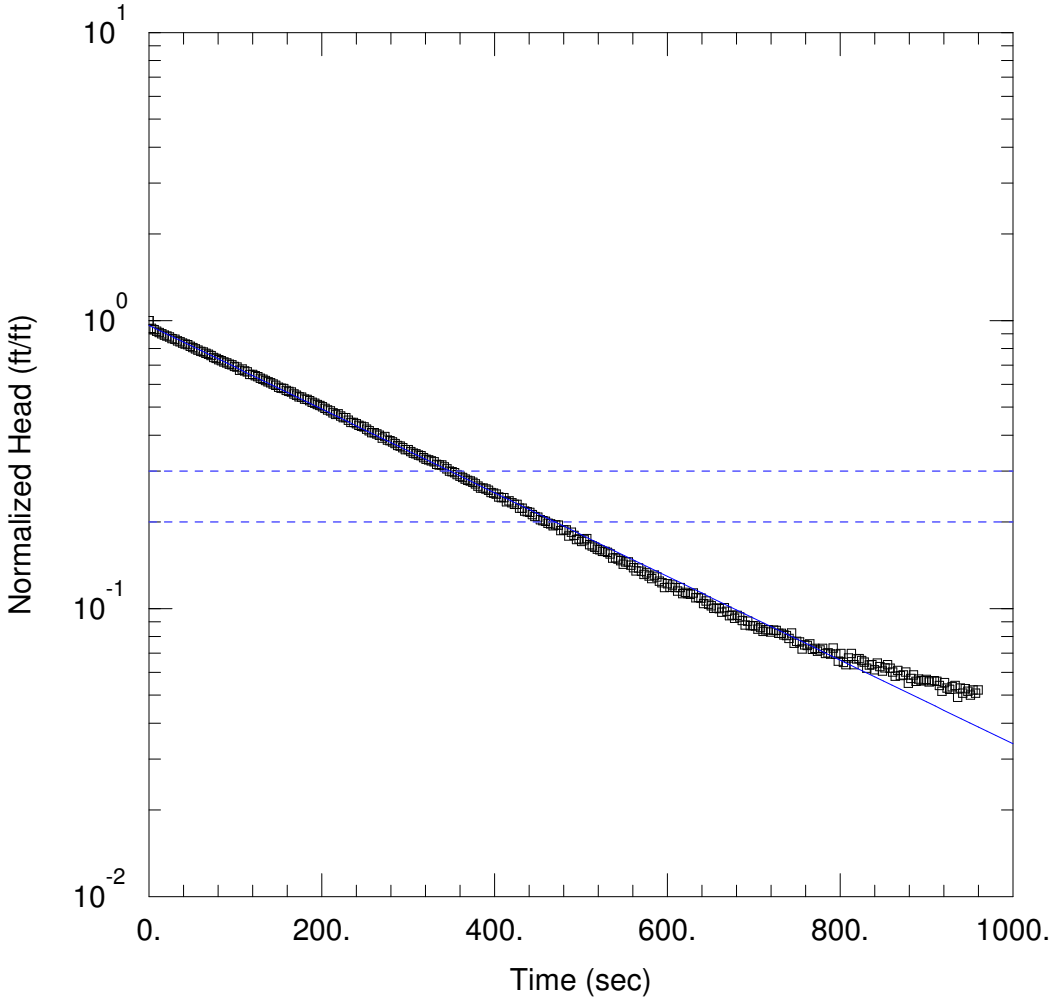
SOLUTION

Aquifer Model: Unconfined

Solution Method: Hvorslev

K = 7.505E-5 cm/sec

y0 = 0.6572 ft



RISING HEAD TEST

PROJECT INFORMATION

Company: AMEC Foster Wheeler
Client: Duke Energy
Project: 7810140065.04.405
Location: Dan River
Test Well: OW-406 D
Test Date: 5-7-15

AQUIFER DATA

Saturated Thickness: 39.56 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (OW-406 D)

Initial Displacement: 3.758 ft
Total Well Penetration Depth: 39.56 ft
Casing Radius: 0.086 ft

Static Water Column Height: 39.56 ft
Screen Length: 5. ft
Well Radius: 0.244 ft

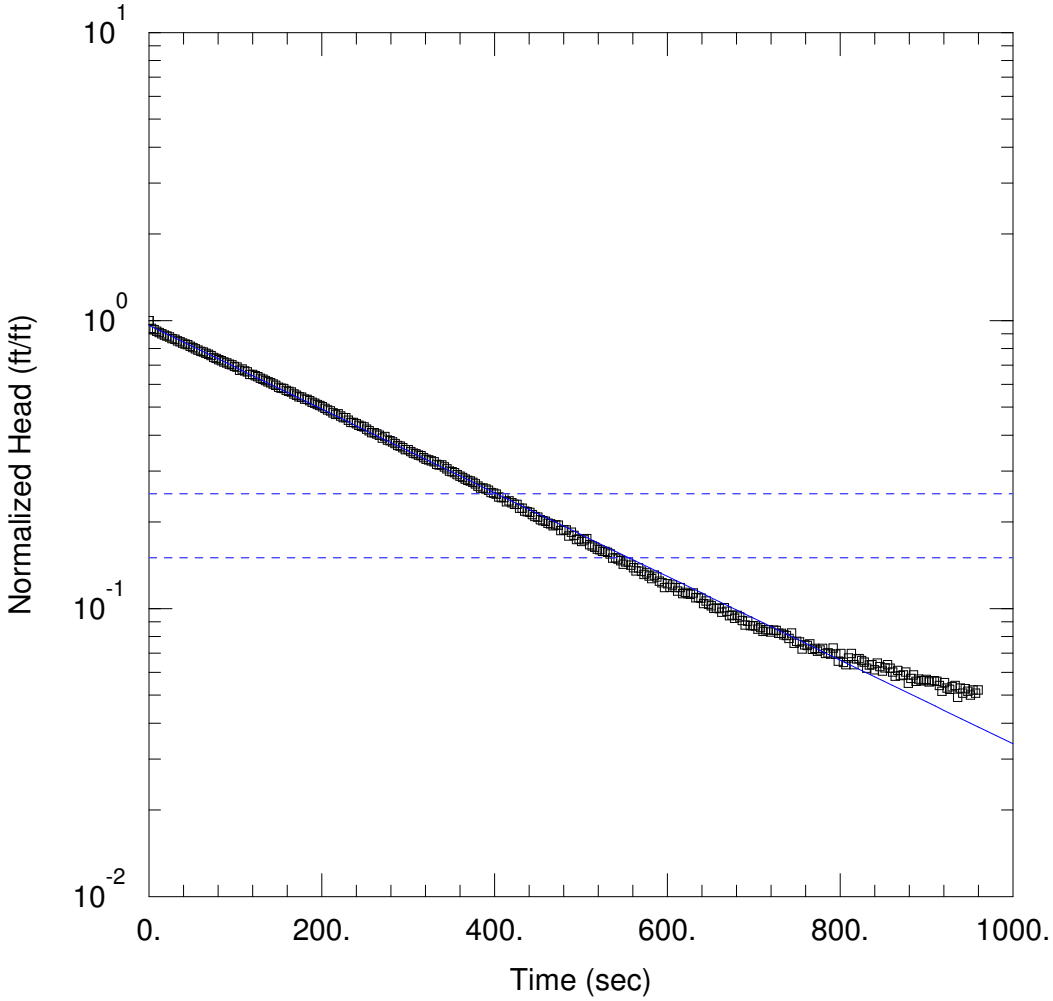
SOLUTION

Aquifer Model: Unconfined

K = 0.0002531 cm/sec

Solution Method: Bouwer-Rice

y0 = 3.614 ft



RISING HEAD TEST

PROJECT INFORMATION

Company: AMEC Foster Wheeler
Client: Duke Energy
Project: 7810140065.04.405
Location: Dan River
Test Well: OW-406 D
Test Date: 5-7-15

AQUIFER DATA

Saturated Thickness: 39.56 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (OW-406 D)

Initial Displacement: 3.758 ft
Total Well Penetration Depth: 39.56 ft
Casing Radius: 0.086 ft

Static Water Column Height: 39.56 ft
Screen Length: 5. ft
Well Radius: 0.244 ft

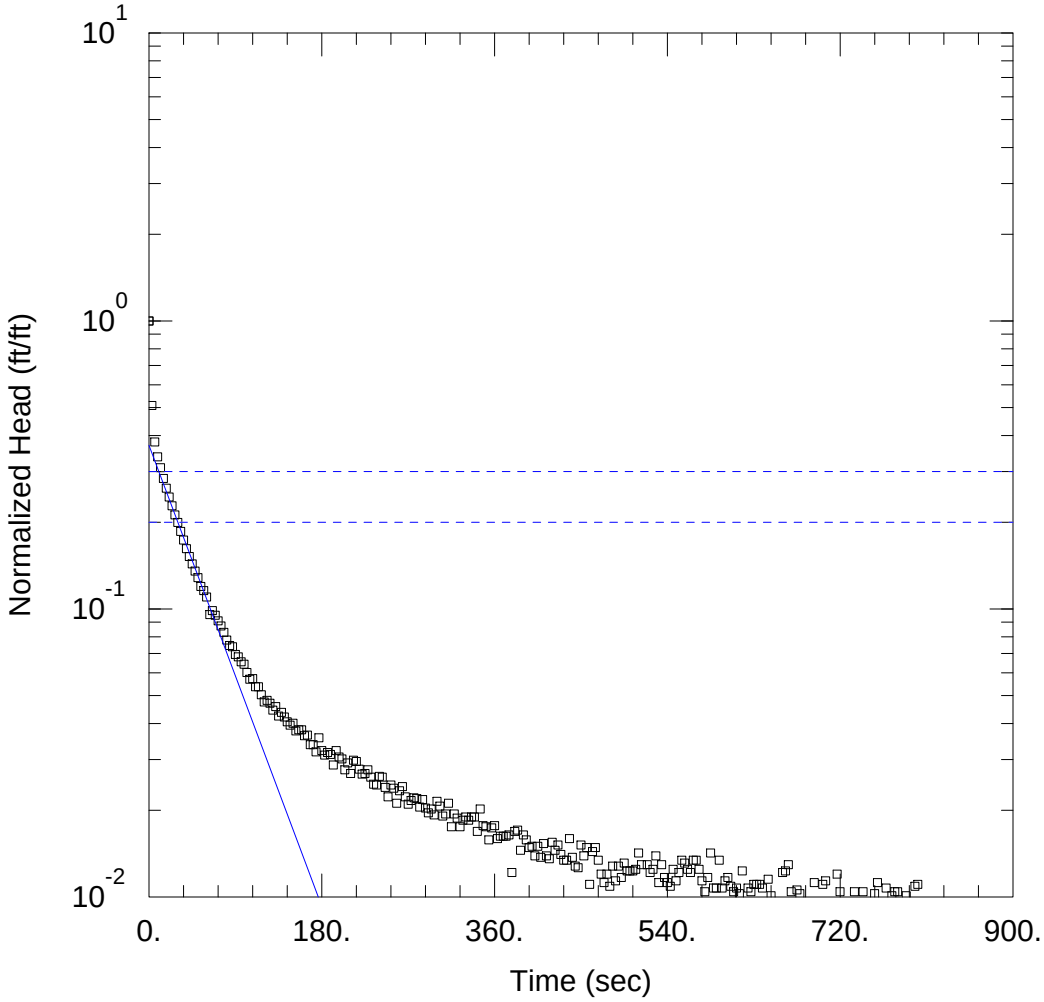
SOLUTION

Aquifer Model: Unconfined

Solution Method: Hvorslev

K = 0.00028 cm/sec

y0 = 3.614 ft



RISING HEAD TEST

PROJECT INFORMATION

Company: AMEC Foster Wheeler
Client: Duke Energy
Project: 7810140065.04.405
Location: Dan River
Test Well: OW-406 S
Test Date: 5-7-15

AQUIFER DATA

Saturated Thickness: 24.44 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (OW-406 S)

Initial Displacement: 6.335 ft
Total Well Penetration Depth: 24.44 ft
Casing Radius: 0.086 ft

Static Water Column Height: 24.44 ft
Screen Length: 15. ft
Well Radius: 0.33 ft
Gravel Pack Porosity: 0.33

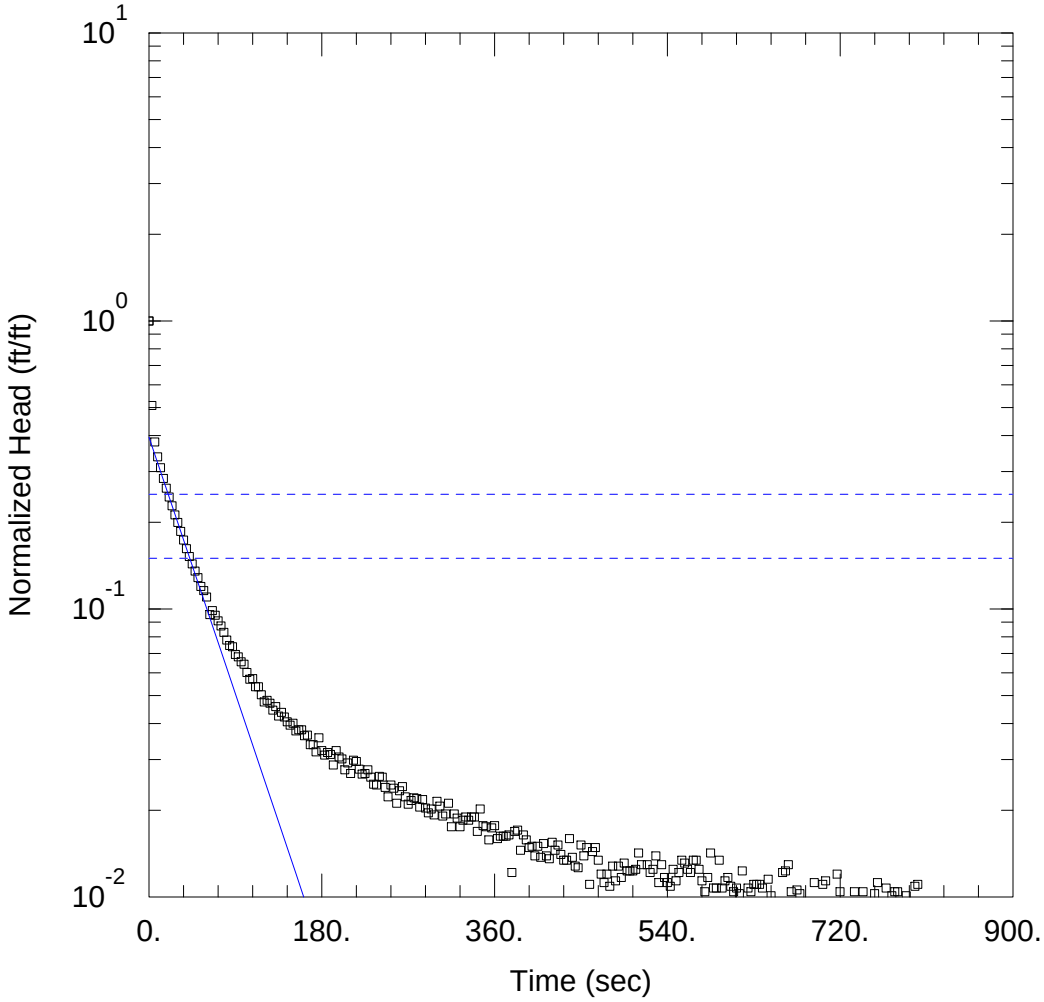
SOLUTION

Aquifer Model: Unconfined

Solution Method: Bouwer-Rice

K = -0.05666 cm/sec

y0 = 2.342 ft



RISING HEAD TEST

PROJECT INFORMATION

Company: AMEC Foster Wheeler
Client: Duke Energy
Project: 7810140065.04.405
Location: Dan River
Test Well: OW-406 S
Test Date: 5-7-15

AQUIFER DATA

Saturated Thickness: 24.44 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (OW-406 S)

Initial Displacement: 6.335 ft
Total Well Penetration Depth: 24.44 ft
Casing Radius: 0.086 ft

Static Water Column Height: 24.44 ft
Screen Length: 15. ft
Well Radius: 0.33 ft
Gravel Pack Porosity: 0.33

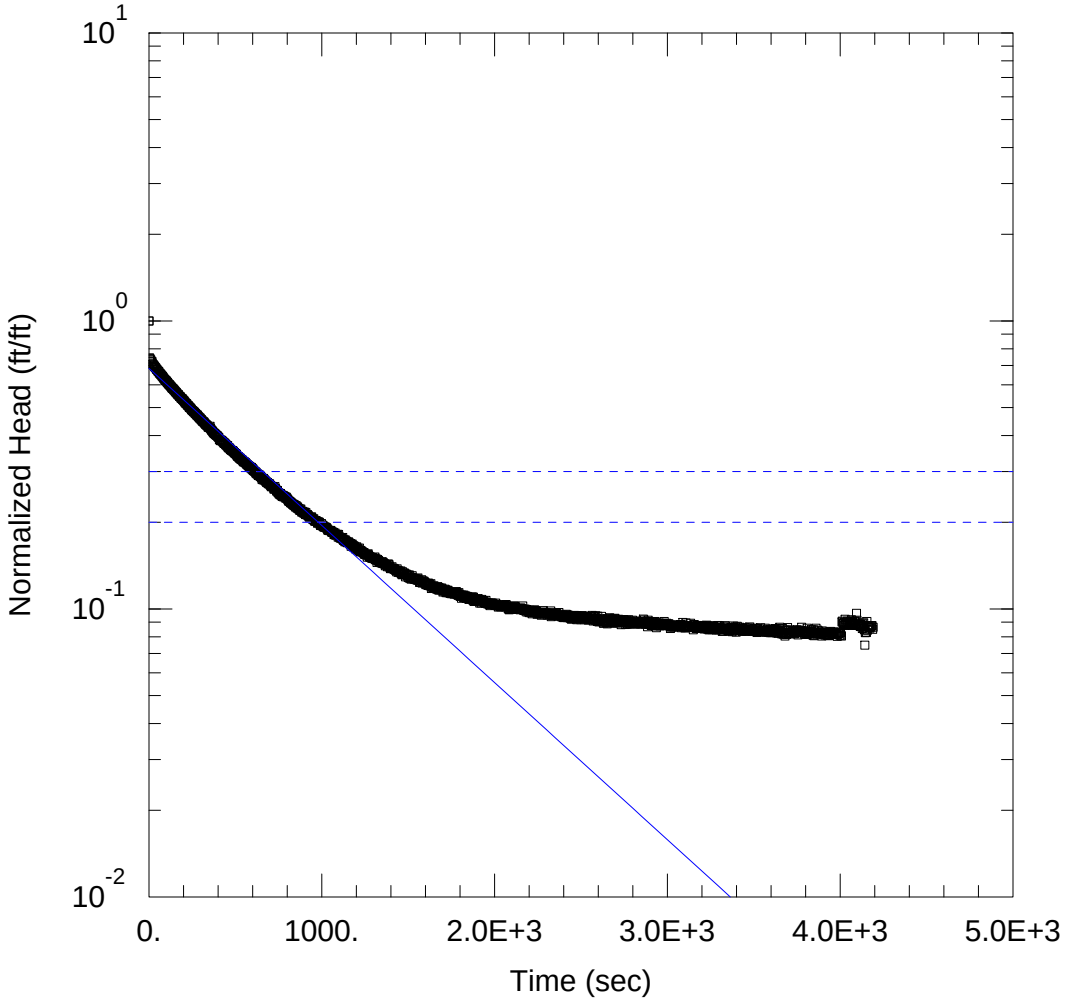
SOLUTION

Aquifer Model: Unconfined

Solution Method: Hvorslev

K = 0.003614 cm/sec

y0 = 2.5 ft



RISING HEAD TEST

PROJECT INFORMATION

Company: AMEC Foster Wheeler
Client: Duke Energy
Project: 7810140065.04.405
Location: Dan River
Test Well: OW-407 D
Test Date: 5-7-15

AQUIFER DATA

Saturated Thickness: 29.59 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (OW-407 D)

Initial Displacement: 5.638 ft
Total Well Penetration Depth: 29.59 ft
Casing Radius: 0.086 ft

Static Water Column Height: 29.59 ft
Screen Length: 5. ft
Well Radius: 0.244 ft
Gravel Pack Porosity: 0.33

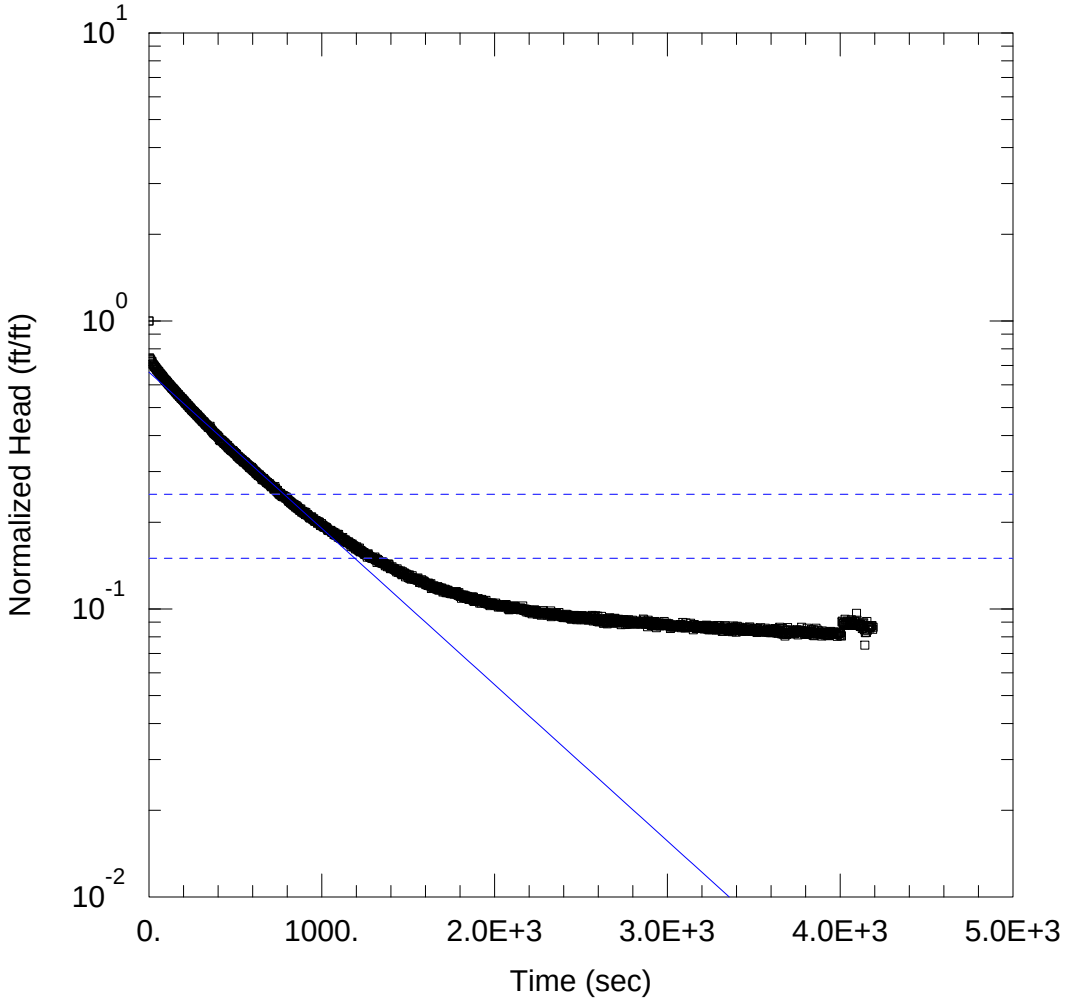
SOLUTION

Aquifer Model: Unconfined

Solution Method: Bouwer-Rice

K = 0.0003029 cm/sec

y0 = 3.859 ft



RISING HEAD TEST

PROJECT INFORMATION

Company: AMEC Foster Wheeler
Client: Duke Energy
Project: 7810140065.04.405
Location: Dan River
Test Well: OW-407 D
Test Date: 5-7-15

AQUIFER DATA

Saturated Thickness: 29.59 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (OW-407 D)

Initial Displacement: 5.638 ft
Total Well Penetration Depth: 29.59 ft
Casing Radius: 0.086 ft

Static Water Column Height: 29.59 ft
Screen Length: 5. ft
Well Radius: 0.244 ft
Gravel Pack Porosity: 0.33

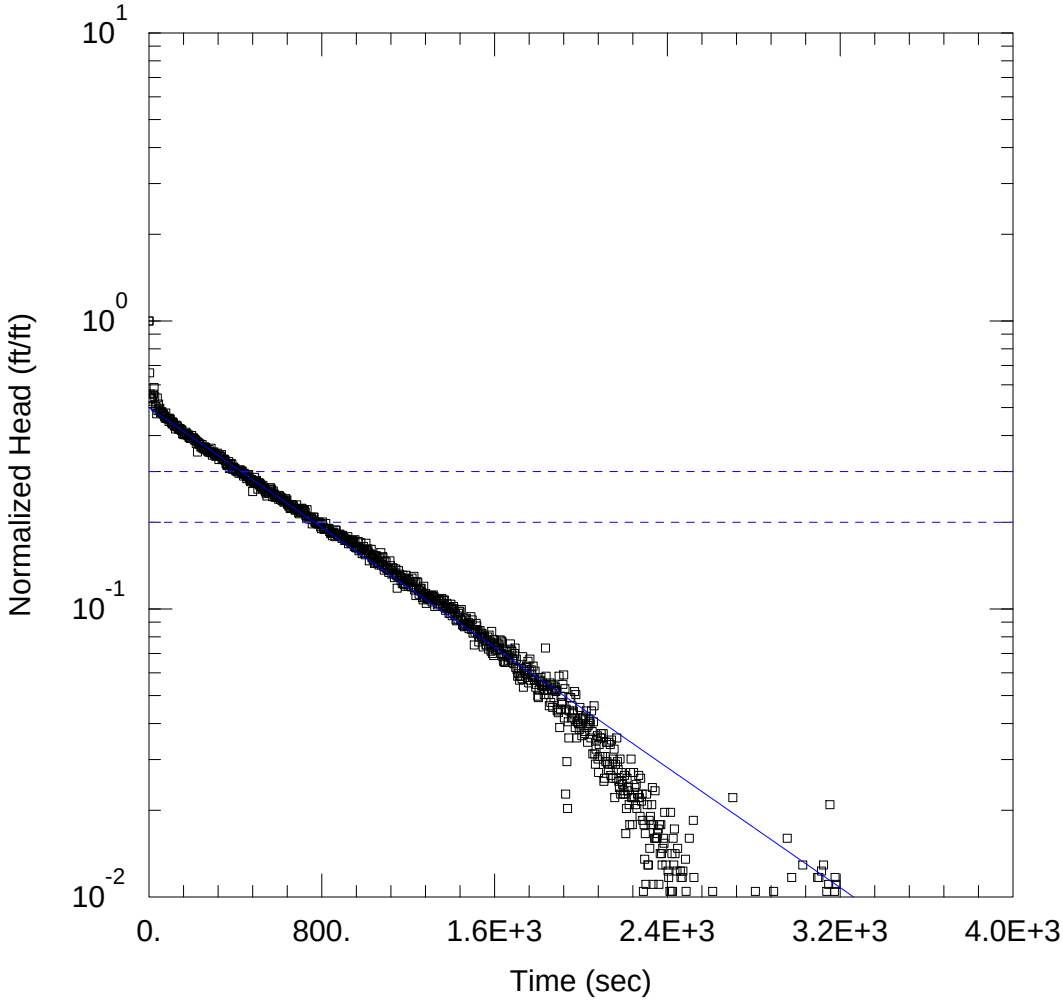
SOLUTION

Aquifer Model: Unconfined

Solution Method: Hvorslev

K = 0.000348 cm/sec

y0 = 3.744 ft



RISING HEAD TEST

PROJECT INFORMATION

Company: AMEC Foster Wheeler
Client: Duke Energy
Project: 7810140065.04.405
Location: Dan River
Test Well: OW-407 S
Test Date: 5-7-15

AQUIFER DATA

Saturated Thickness: 15.68 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (OW-407 S)

Initial Displacement: 1.627 ft
Total Well Penetration Depth: 15.68 ft
Casing Radius: 0.086 ft

Static Water Column Height: 15.68 ft
Screen Length: 15. ft
Well Radius: 0.33 ft
Gravel Pack Porosity: 0.33

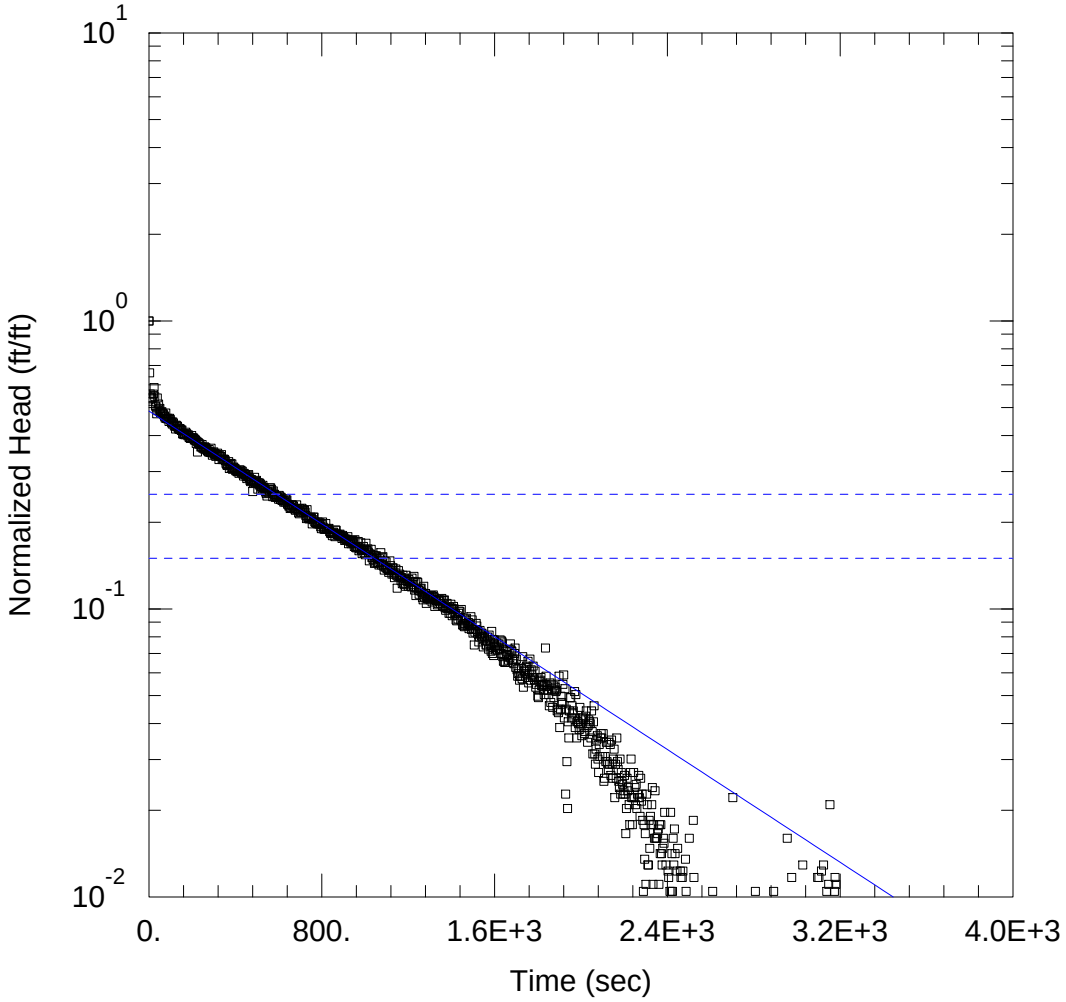
SOLUTION

Aquifer Model: Unconfined

Solution Method: Bouwer-Rice

K = 0.0001468 cm/sec

y0 = 0.8142 ft



RISING HEAD TEST

PROJECT INFORMATION

Company: AMEC Foster Wheeler
Client: Duke Energy
Project: 7810140065.04.405
Location: Dan River
Test Well: OW-407 S
Test Date: 5-7-15

AQUIFER DATA

Saturated Thickness: 15.68 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (OW-407 S)

Initial Displacement: 1.627 ft
Total Well Penetration Depth: 15.68 ft
Casing Radius: 0.086 ft

Static Water Column Height: 15.68 ft
Screen Length: 15. ft
Well Radius: 0.33 ft
Gravel Pack Porosity: 0.33

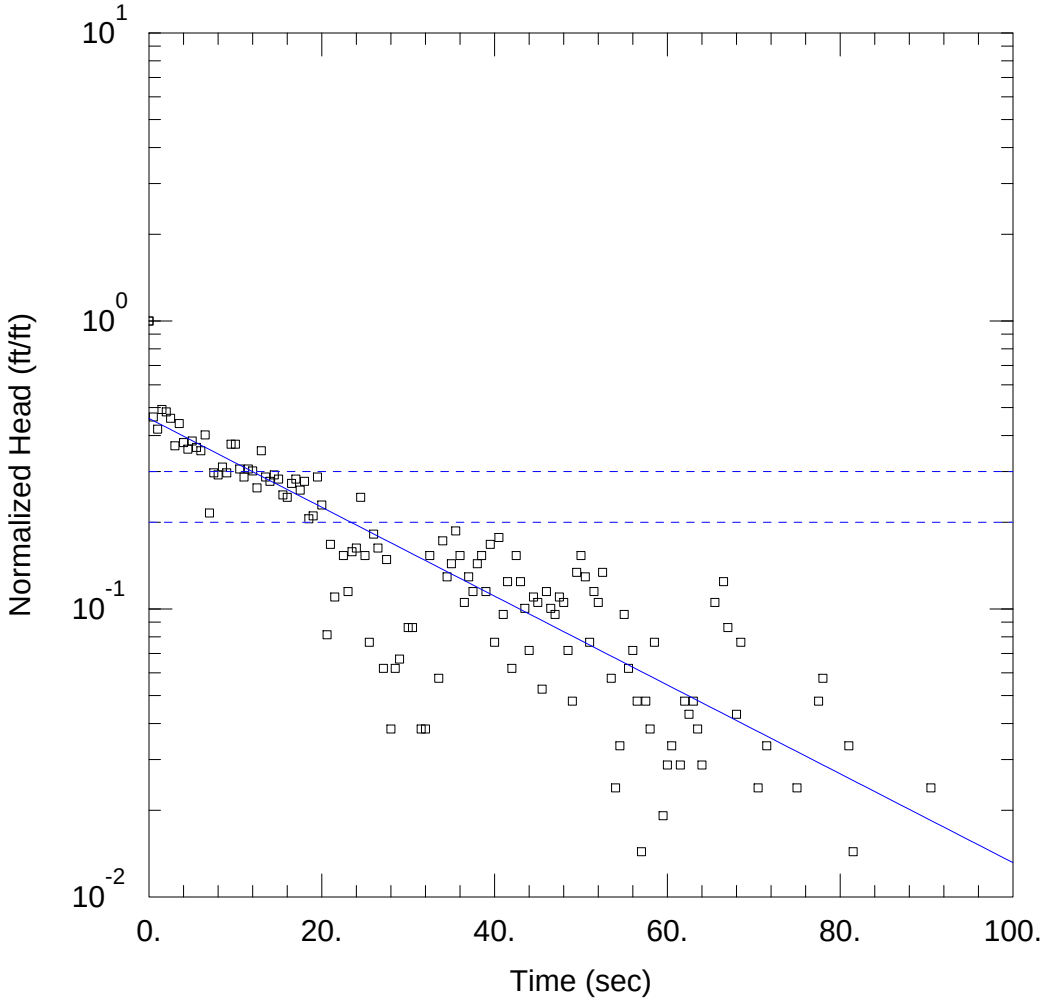
SOLUTION

Aquifer Model: Unconfined

Solution Method: Hvorslev

K = 0.0002112 cm/sec

y0 = 0.7911 ft



RISING HEAD TEST

PROJECT INFORMATION

Company: AMEC Foster Wheeler
Client: Duke Energy
Project: 7810140065.04.405
Location: Dan River
Test Well: OW-409 D
Test Date: 5-7-15

AQUIFER DATA

Saturated Thickness: 23.89 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (OW-409 D)

Initial Displacement: 0.209 ft
Total Well Penetration Depth: 23.89 ft
Casing Radius: 0.086 ft

Static Water Column Height: 23.89 ft
Screen Length: 5. ft
Well Radius: 0.125 ft

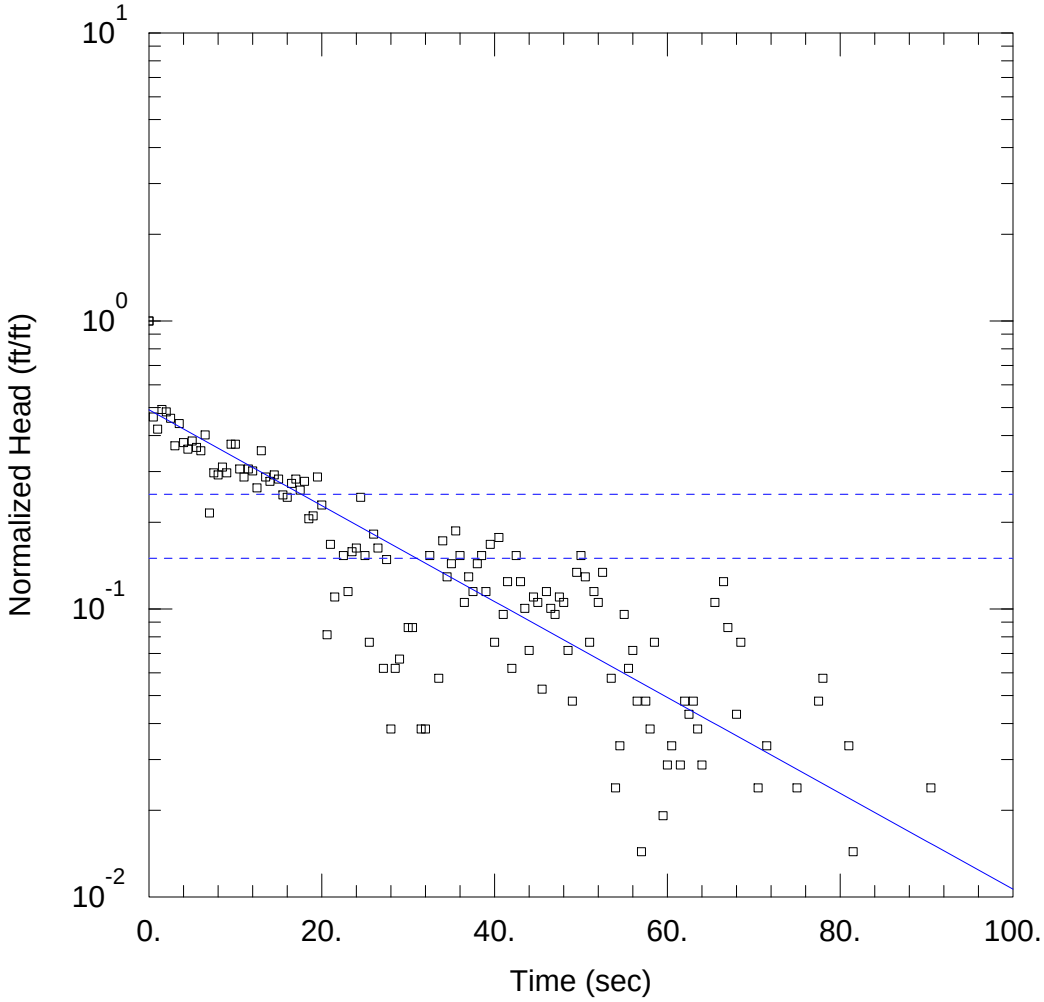
SOLUTION

Aquifer Model: Unconfined

Solution Method: Bouwer-Rice

K = 0.003001 cm/sec

y0 = 0.09585 ft



RISING HEAD TEST

PROJECT INFORMATION

Company: AMEC Foster Wheeler
Client: Duke Energy
Project: 7810140065.04.405
Location: Dan River
Test Well: OW-409 D
Test Date: 5-7-15

AQUIFER DATA

Saturated Thickness: 23.89 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (OW-409 D)

Initial Displacement: 0.209 ft
Total Well Penetration Depth: 23.89 ft
Casing Radius: 0.086 ft

Static Water Column Height: 23.89 ft
Screen Length: 5. ft
Well Radius: 0.125 ft

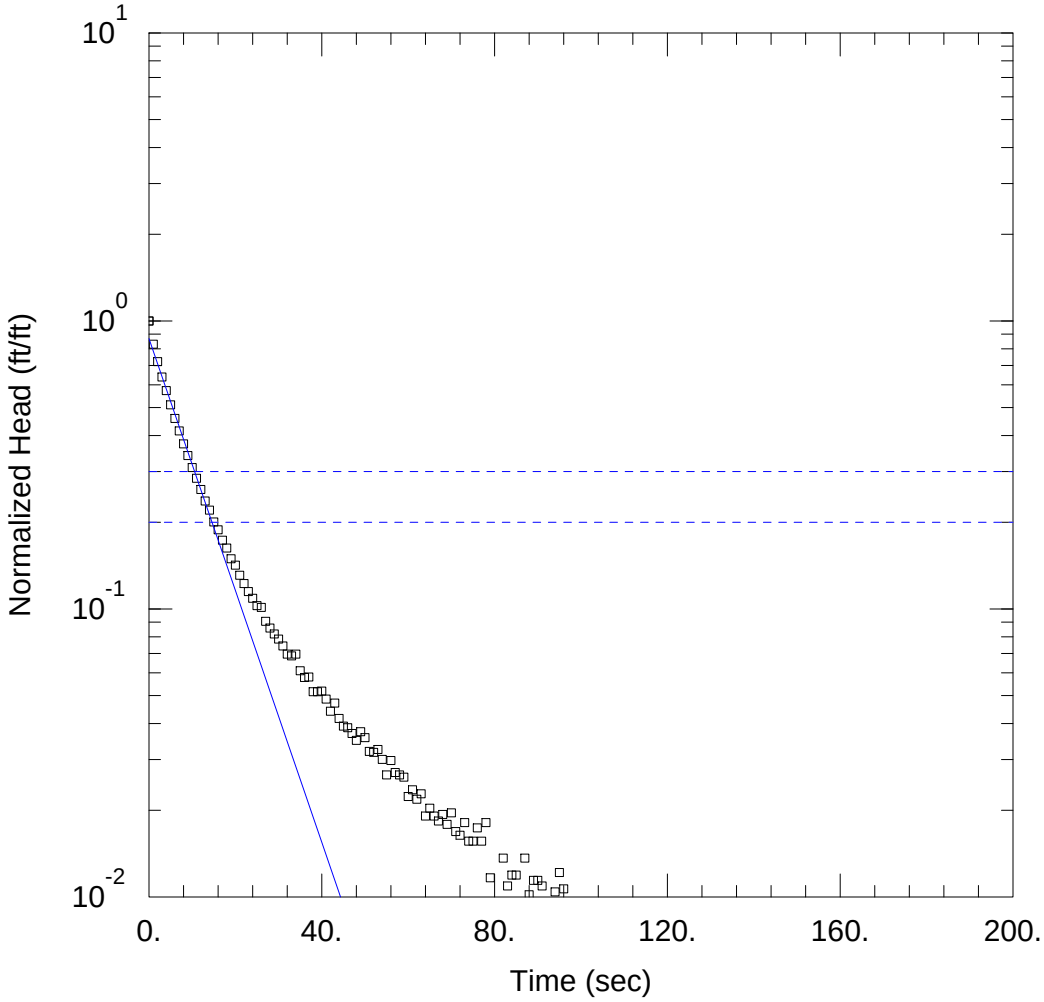
SOLUTION

Aquifer Model: Unconfined

Solution Method: Hvorslev

K = 0.003786 cm/sec

y0 = 0.1027 ft



RISING HEAD TEST

PROJECT INFORMATION

Company: AMEC Foster Wheeler
Client: Duke Energy
Project: 7810140065.04.405
Location: Dan River
Test Well: OW-409 S
Test Date: 5-7-15

AQUIFER DATA

Saturated Thickness: 10.81 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (OW-409 S)

Initial Displacement: 4.032 ft
Total Well Penetration Depth: 10.81 ft
Casing Radius: 0.086 ft

Static Water Column Height: 10.81 ft
Screen Length: 9. ft
Well Radius: 0.33 ft
Gravel Pack Porosity: 0.33

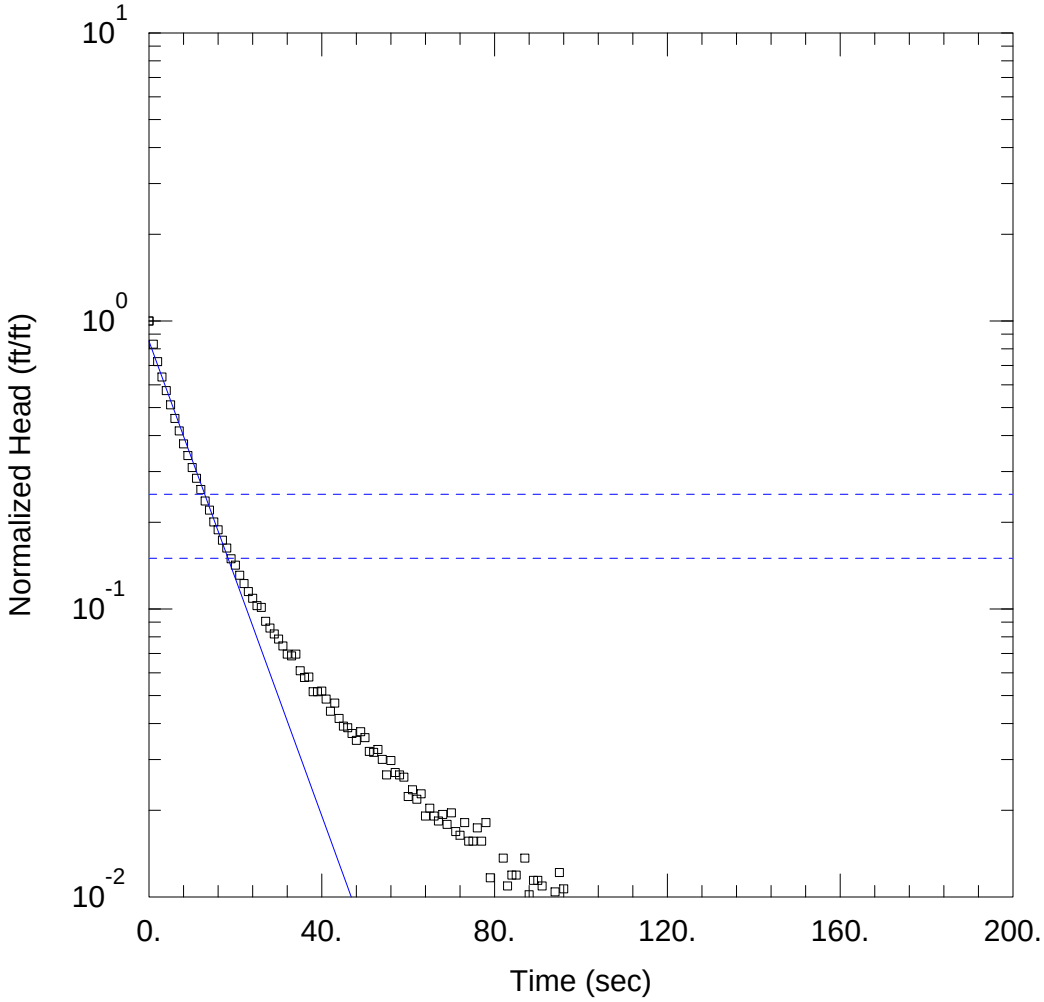
SOLUTION

Aquifer Model: Unconfined

Solution Method: Bouwer-Rice

K = 0.01814 cm/sec

y0 = 3.5 ft



RISING HEAD TEST

PROJECT INFORMATION

Company: AMEC Foster Wheeler
Client: Duke Energy
Project: 7810140065.04.405
Location: Dan River
Test Well: OW-409 S
Test Date: 5-7-15

AQUIFER DATA

Saturated Thickness: 10.81 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (OW-409 S)

Initial Displacement: 4.032 ft
Total Well Penetration Depth: 10.81 ft
Casing Radius: 0.086 ft

Static Water Column Height: 10.81 ft
Screen Length: 9. ft
Well Radius: 0.33 ft
Gravel Pack Porosity: 0.33

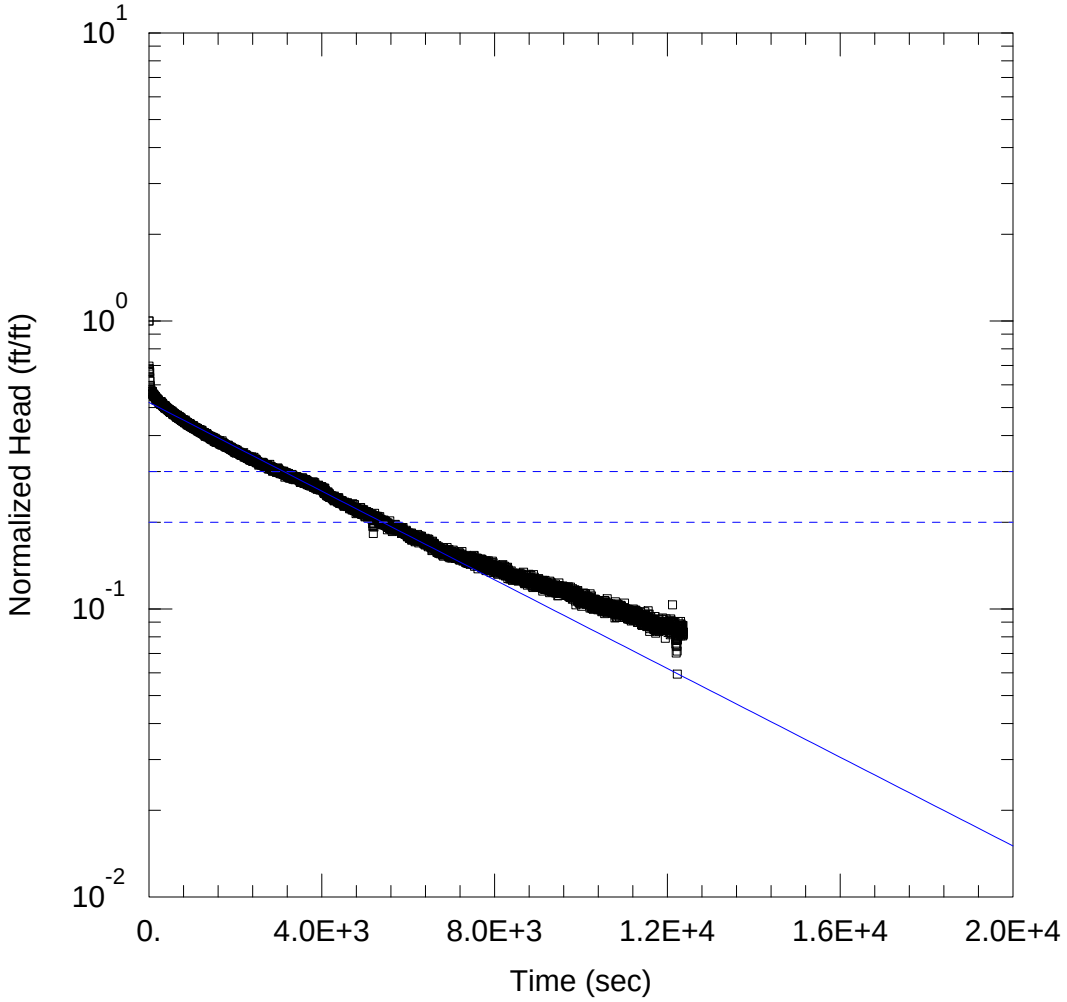
SOLUTION

Aquifer Model: Unconfined

Solution Method: Hvorslev

K = 0.02628 cm/sec

y0 = 3.429 ft



RISING HEAD TEST

PROJECT INFORMATION

Company: AMEC Foster Wheeler
Client: Duke Energy
Project: 7810140065.04.405
Location: Dan River
Test Well: OW-410 S
Test Date: 5-7-15

AQUIFER DATA

Saturated Thickness: 18.63 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (OW-410 S)

Initial Displacement: 2.73 ft
Total Well Penetration Depth: 18.63 ft
Casing Radius: 0.086 ft

Static Water Column Height: 18.63 ft
Screen Length: 15. ft
Well Radius: 0.33 ft

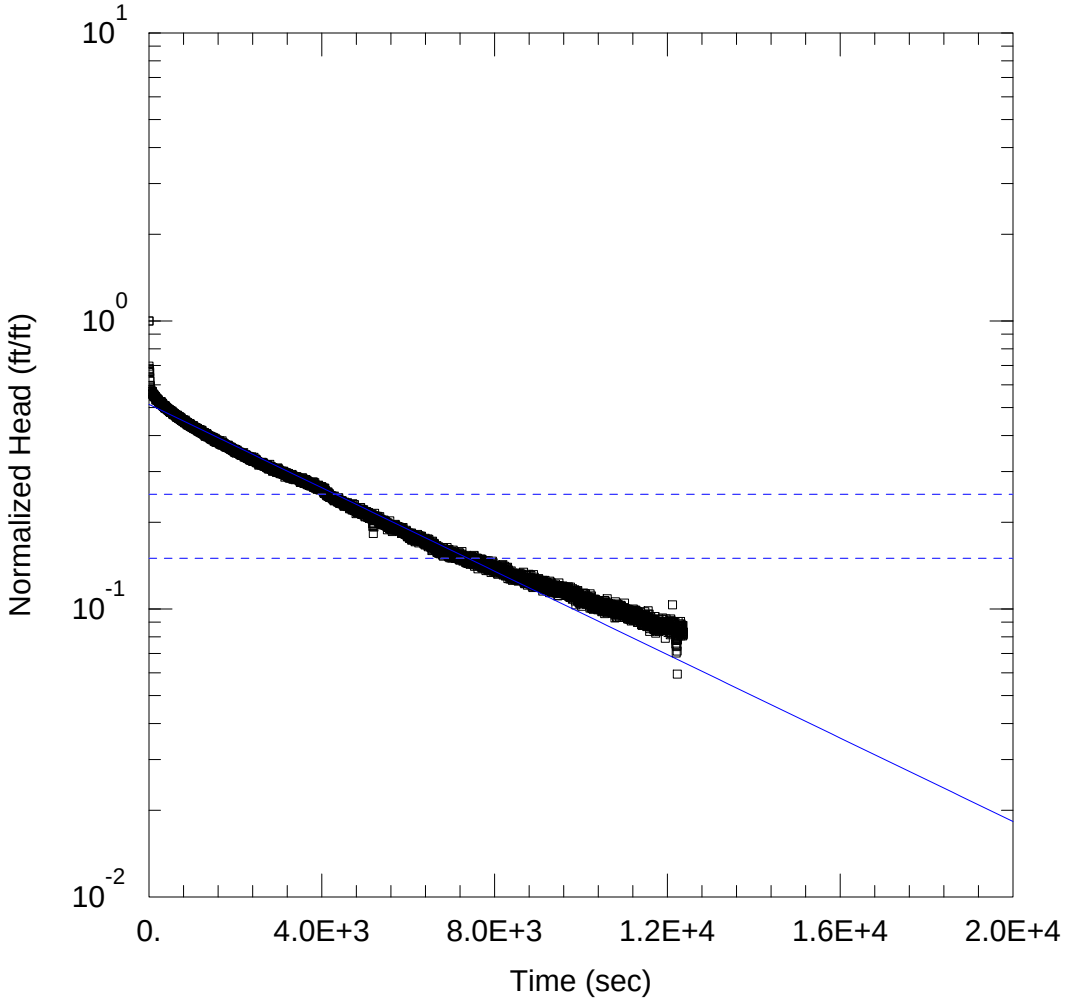
SOLUTION

Aquifer Model: Unconfined

Solution Method: Bouwer-Rice

K = 4.071E-6 cm/sec

y0 = 1.423 ft



RISING HEAD TEST

PROJECT INFORMATION

Company: AMEC Foster Wheeler
Client: Duke Energy
Project: 7810140065.04.405
Location: Dan River
Test Well: OW-410 S
Test Date: 5-7-15

AQUIFER DATA

Saturated Thickness: 18.63 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (OW-410 S)

Initial Displacement: 2.73 ft
Total Well Penetration Depth: 18.63 ft
Casing Radius: 0.086 ft

Static Water Column Height: 18.63 ft
Screen Length: 15. ft
Well Radius: 0.33 ft

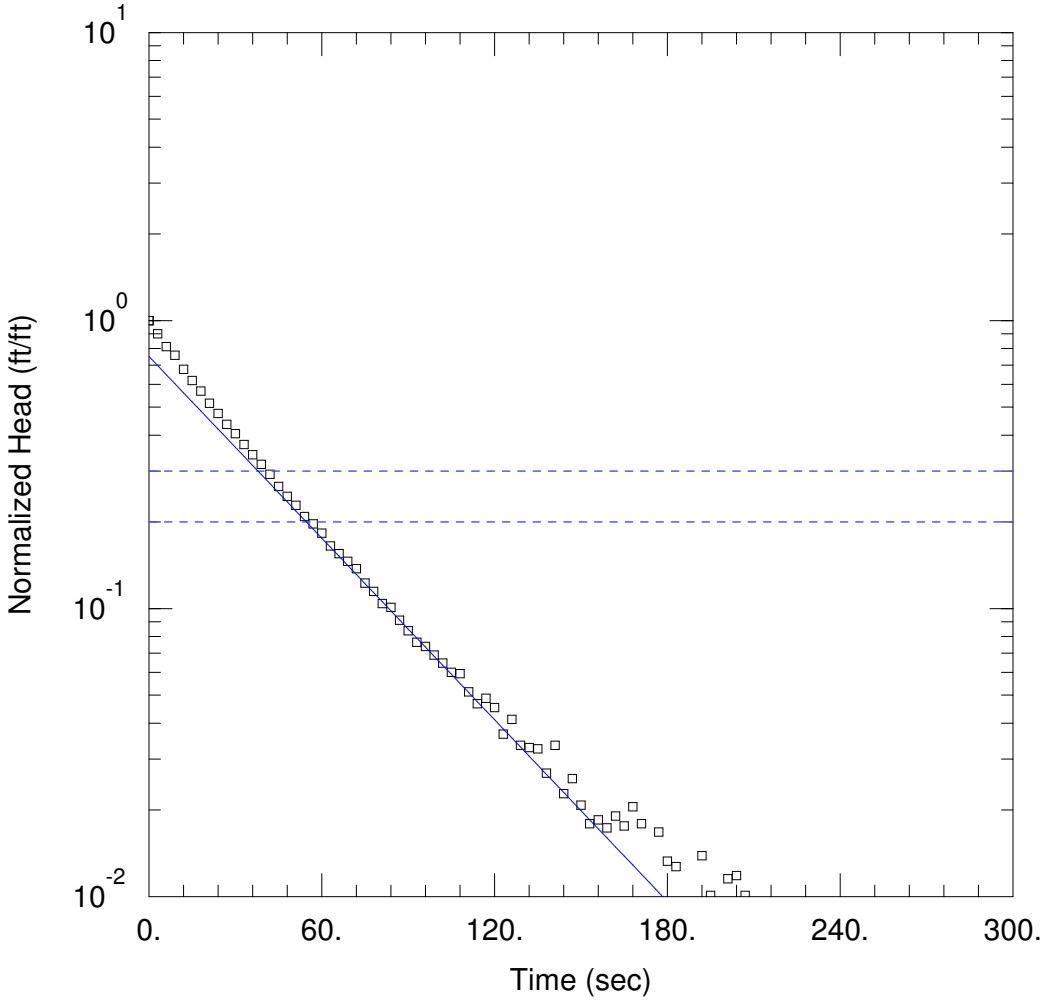
SOLUTION

Aquifer Model: Unconfined

Solution Method: Hvorslev

K = 5.652E-6 cm/sec

y0 = 1.402 ft



RISING HEAD TEST

PROJECT INFORMATION

Company: AMEC Foster Wheeler
Client: Duke Energy
Project: 7810140065.04.405
Location: Dan River
Test Well: OW-411 D
Test Date: 5-7-15

AQUIFER DATA

Saturated Thickness: 38.55 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (OW-411 D)

Initial Displacement: 3.467 ft
Total Well Penetration Depth: 38.55 ft
Casing Radius: 0.086 ft

Static Water Column Height: 38.55 ft
Screen Length: 5. ft
Well Radius: 0.125 ft

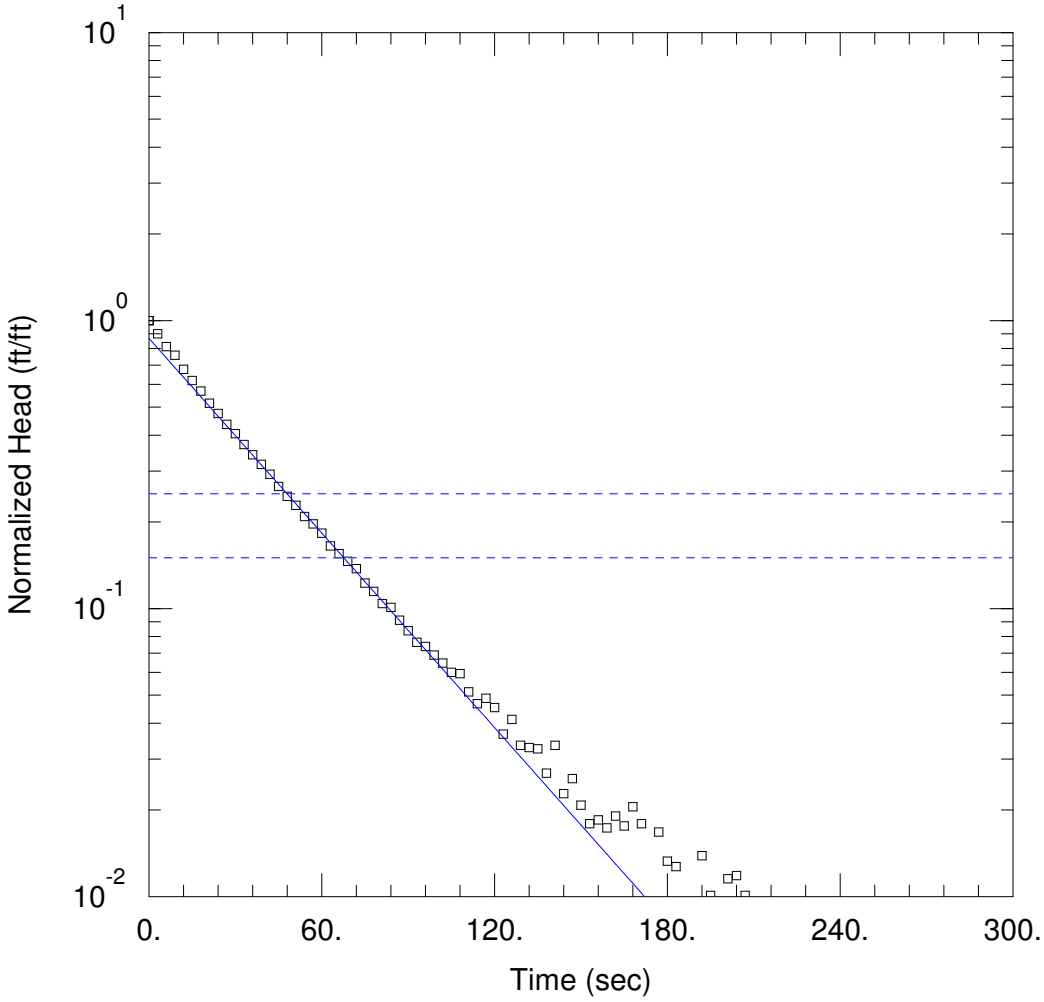
SOLUTION

Aquifer Model: Unconfined

Solution Method: Bouwer-Rice

K = 0.002188 cm/sec

y0 = 2.6 ft



RISING HEAD TEST

PROJECT INFORMATION

Company: AMEC Foster Wheeler
Client: Duke Energy
Project: 7810140065.04.405
Location: Dan River
Test Well: OW-411 D
Test Date: 5-7-15

AQUIFER DATA

Saturated Thickness: 38.55 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (OW-411 D)

Initial Displacement: 3.467 ft
Total Well Penetration Depth: 38.55 ft
Casing Radius: 0.086 ft

Static Water Column Height: 38.55 ft
Screen Length: 5. ft
Well Radius: 0.125 ft

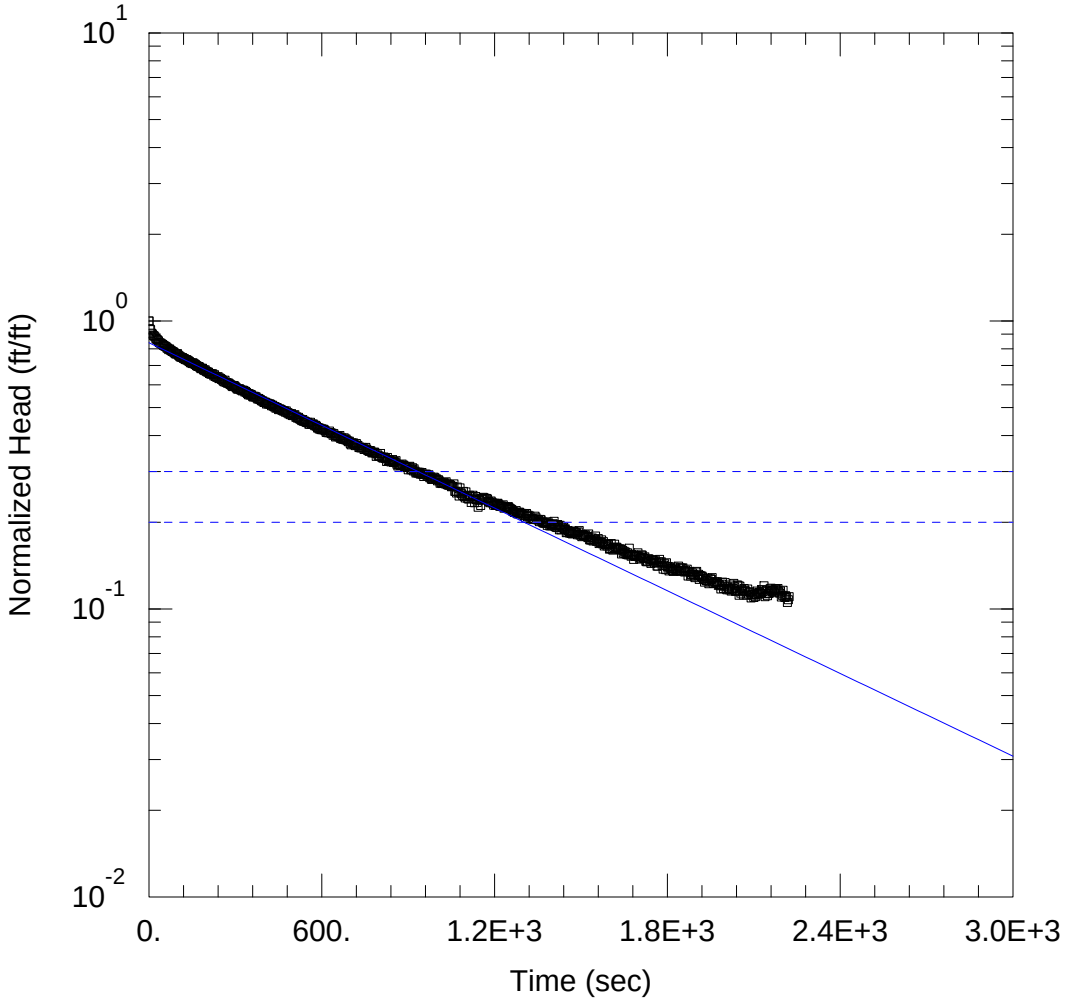
SOLUTION

Aquifer Model: Unconfined

Solution Method: Hvorslev

K = 0.002562 cm/sec

y0 = 3.006 ft



RISING HEAD TEST

PROJECT INFORMATION

Company: AMEC Foster Wheeler
Client: Duke Energy
Project: 7810140065.04.405
Location: Dan River
Test Well: OW-411 S
Test Date: 5-7-15

AQUIFER DATA

Saturated Thickness: 26.78 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (OW-411 S)

Initial Displacement: 2.592 ft
Total Well Penetration Depth: 26.78 ft
Casing Radius: 0.086 ft

Static Water Column Height: 26.78 ft
Screen Length: 15. ft
Well Radius: 0.33 ft
Gravel Pack Porosity: 0.33

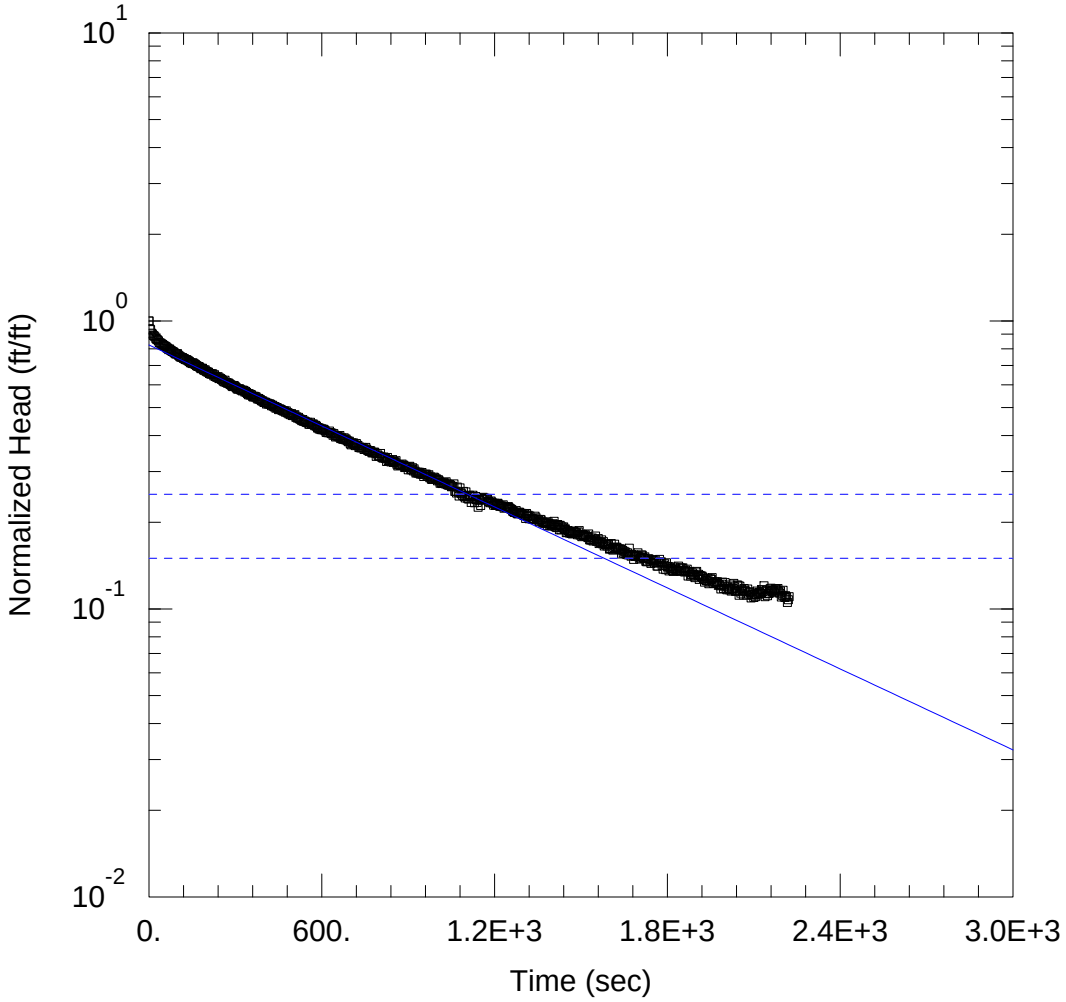
SOLUTION

Aquifer Model: Unconfined

Solution Method: Bouwer-Rice

K = 0.0001502 cm/sec

y0 = 2.178 ft



RISING HEAD TEST

PROJECT INFORMATION

Company: AMEC Foster Wheeler
Client: Duke Energy
Project: 7810140065.04.405
Location: Dan River
Test Well: OW-411 S
Test Date: 5-7-15

AQUIFER DATA

Saturated Thickness: 26.78 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (OW-411 S)

Initial Displacement: 2.592 ft
Total Well Penetration Depth: 26.78 ft
Casing Radius: 0.086 ft

Static Water Column Height: 26.78 ft
Screen Length: 15. ft
Well Radius: 0.33 ft
Gravel Pack Porosity: 0.33

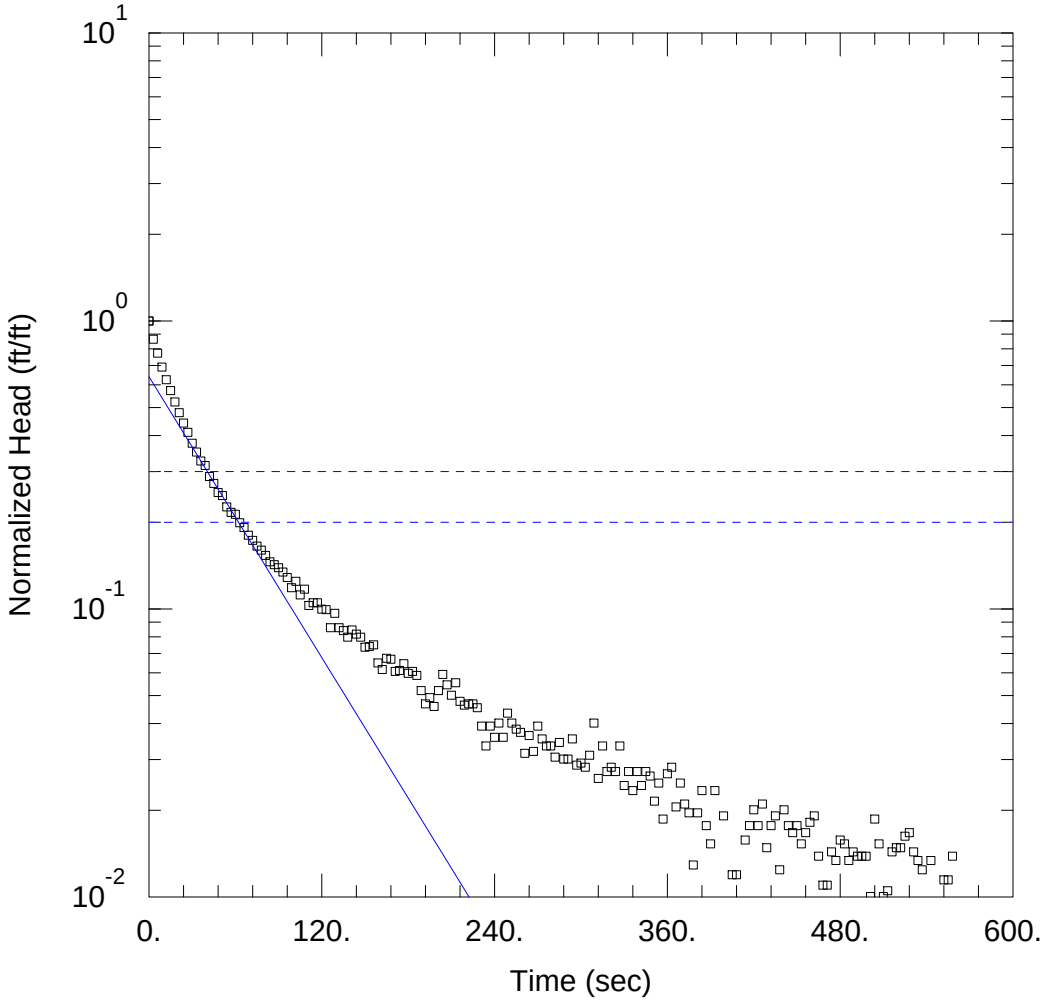
SOLUTION

Aquifer Model: Unconfined

Solution Method: Hvorslev

K = 0.0002022 cm/sec

y0 = 2.139 ft



RISING HEAD TEST

PROJECT INFORMATION

Company: AMEC Foster Wheeler
Client: Duke Energy
Project: 7810140065.04.405
Location: Dan River
Test Well: OW-412 S
Test Date: 5-7-15

AQUIFER DATA

Saturated Thickness: 27.86 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (OW-412 S)

Initial Displacement: 2.093 ft
Total Well Penetration Depth: 27.86 ft
Casing Radius: 0.086 ft

Static Water Column Height: 27.86 ft
Screen Length: 15. ft
Well Radius: 0.33 ft
Gravel Pack Porosity: 0.33

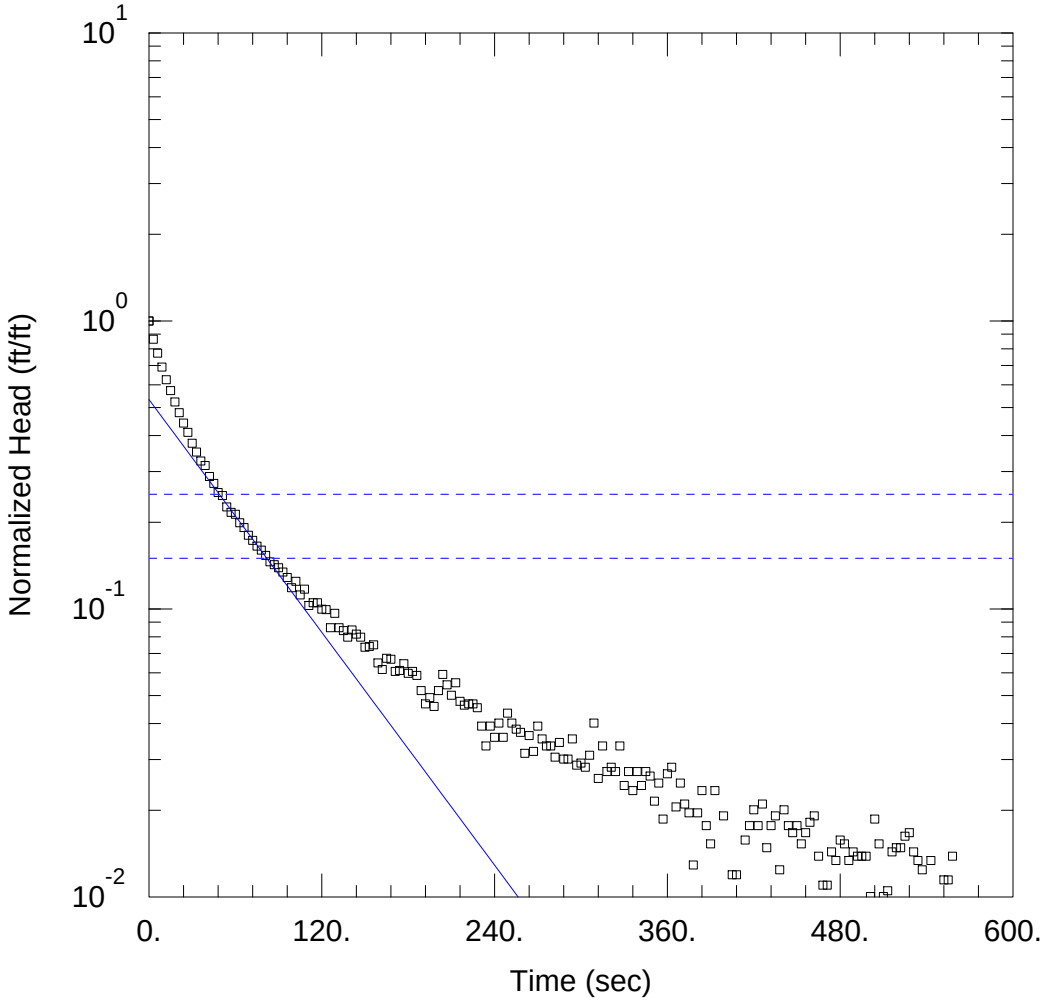
SOLUTION

Aquifer Model: Unconfined

Solution Method: Bouwer-Rice

K = 0.002569 cm/sec

y0 = 1.339 ft



RISING HEAD TEST

PROJECT INFORMATION

Company: AMEC Foster Wheeler
Client: Duke Energy
Project: 7810140065.04.405
Location: Dan River
Test Well: OW-412 S
Test Date: 5-7-15

AQUIFER DATA

Saturated Thickness: 27.86 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (OW-412 S)

Initial Displacement: 2.093 ft
Total Well Penetration Depth: 27.86 ft
Casing Radius: 0.086 ft

Static Water Column Height: 27.86 ft
Screen Length: 15. ft
Well Radius: 0.33 ft
Gravel Pack Porosity: 0.33

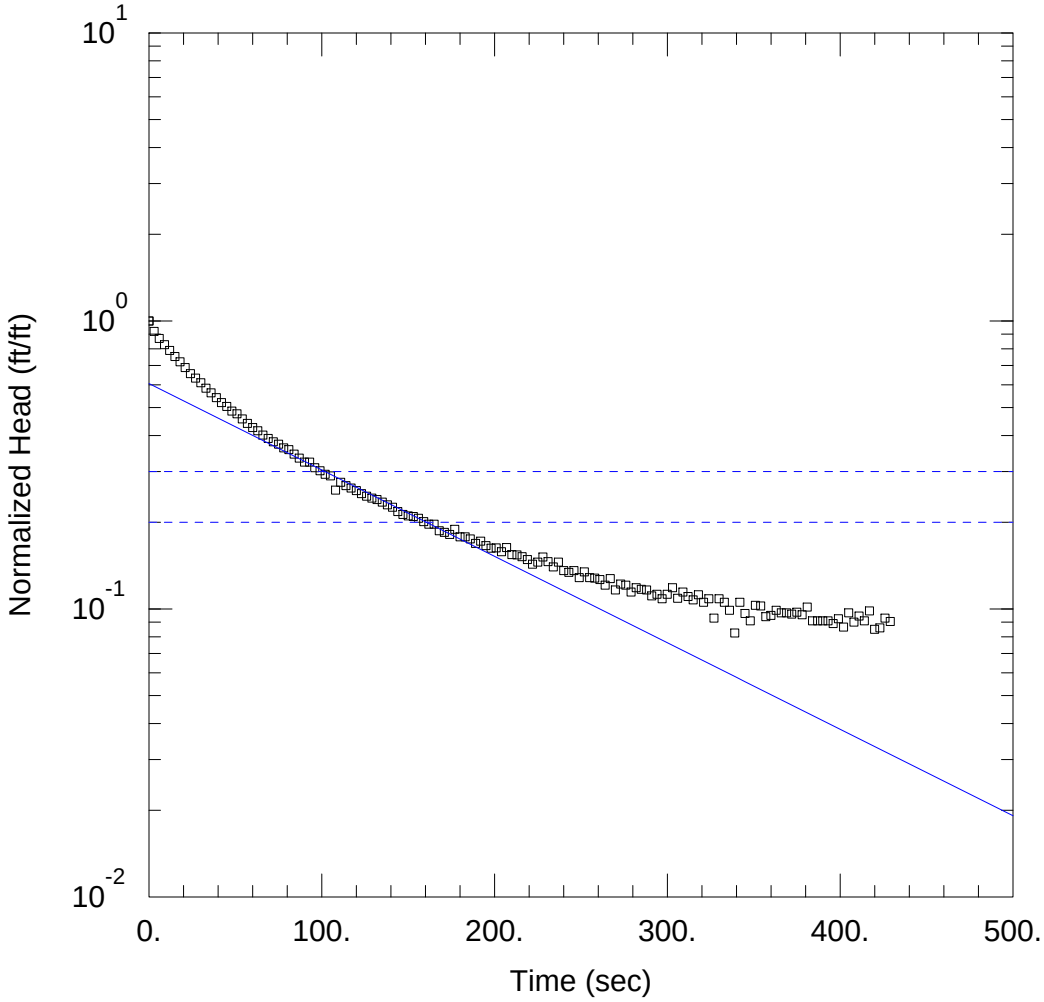
SOLUTION

Aquifer Model: Unconfined

Solution Method: Hvorslev

K = 0.002906 cm/sec

y0 = 1.116 ft



RISING HEAD TEST

PROJECT INFORMATION

Company: AMEC Foster Wheeler
Client: Duke Energy
Project: 7810140065.04.405
Location: Dan River
Test Well: OW-413 S
Test Date: 5-7-15

AQUIFER DATA

Saturated Thickness: 15.45 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (OW-413 S)

Initial Displacement: 2.001 ft
Total Well Penetration Depth: 15.45 ft
Casing Radius: 0.086 ft

Static Water Column Height: 15.45 ft
Screen Length: 10. ft
Well Radius: 0.33 ft
Gravel Pack Porosity: 0.33

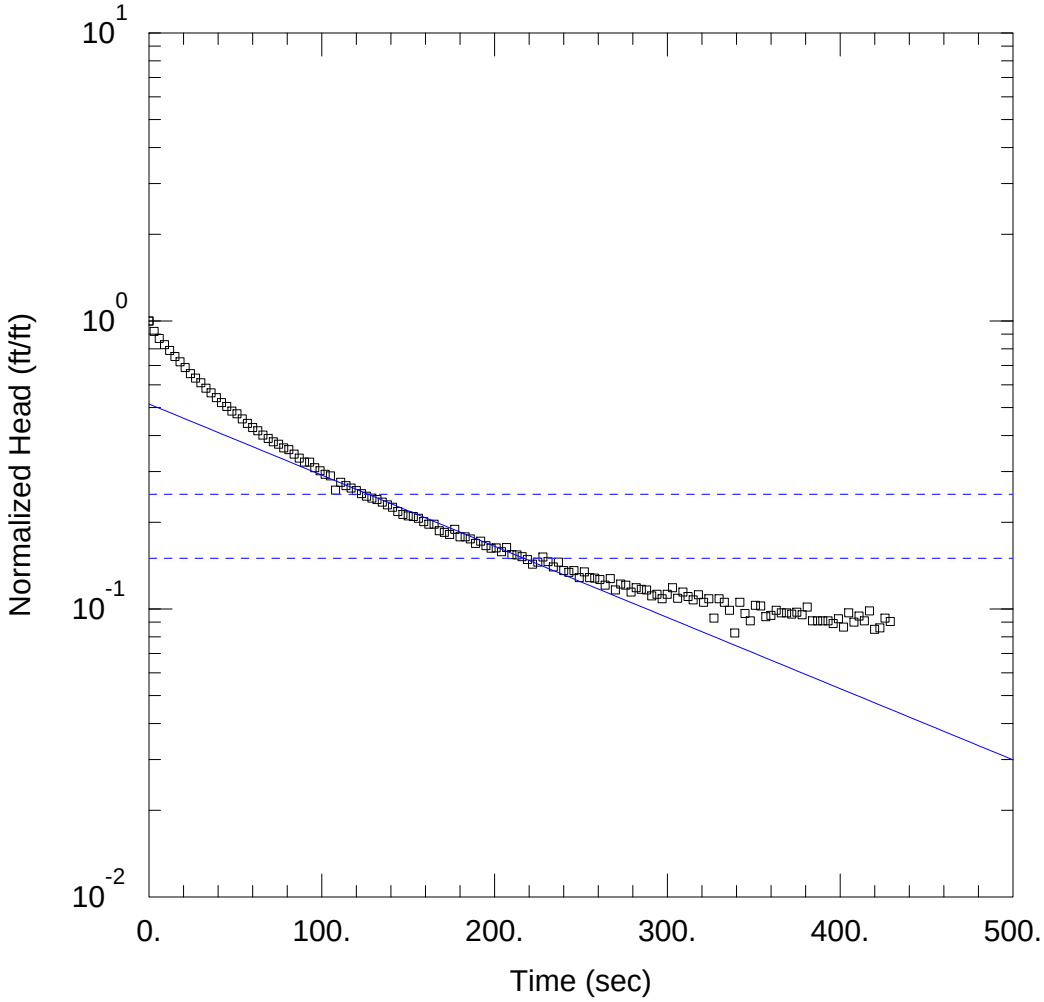
SOLUTION

Aquifer Model: Unconfined

Solution Method: Bouwer-Rice

K = 0.001226 cm/sec

y0 = 1.212 ft



RISING HEAD TEST

PROJECT INFORMATION

Company: AMEC Foster Wheeler
Client: Duke Energy
Project: 7810140065.04.405
Location: Dan River
Test Well: OW-413 S
Test Date: 5-7-15

AQUIFER DATA

Saturated Thickness: 15.45 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (OW-413 S)

Initial Displacement: 2.001 ft
Total Well Penetration Depth: 15.45 ft
Casing Radius: 0.086 ft

Static Water Column Height: 15.45 ft
Screen Length: 10. ft
Well Radius: 0.33 ft
Gravel Pack Porosity: 0.33

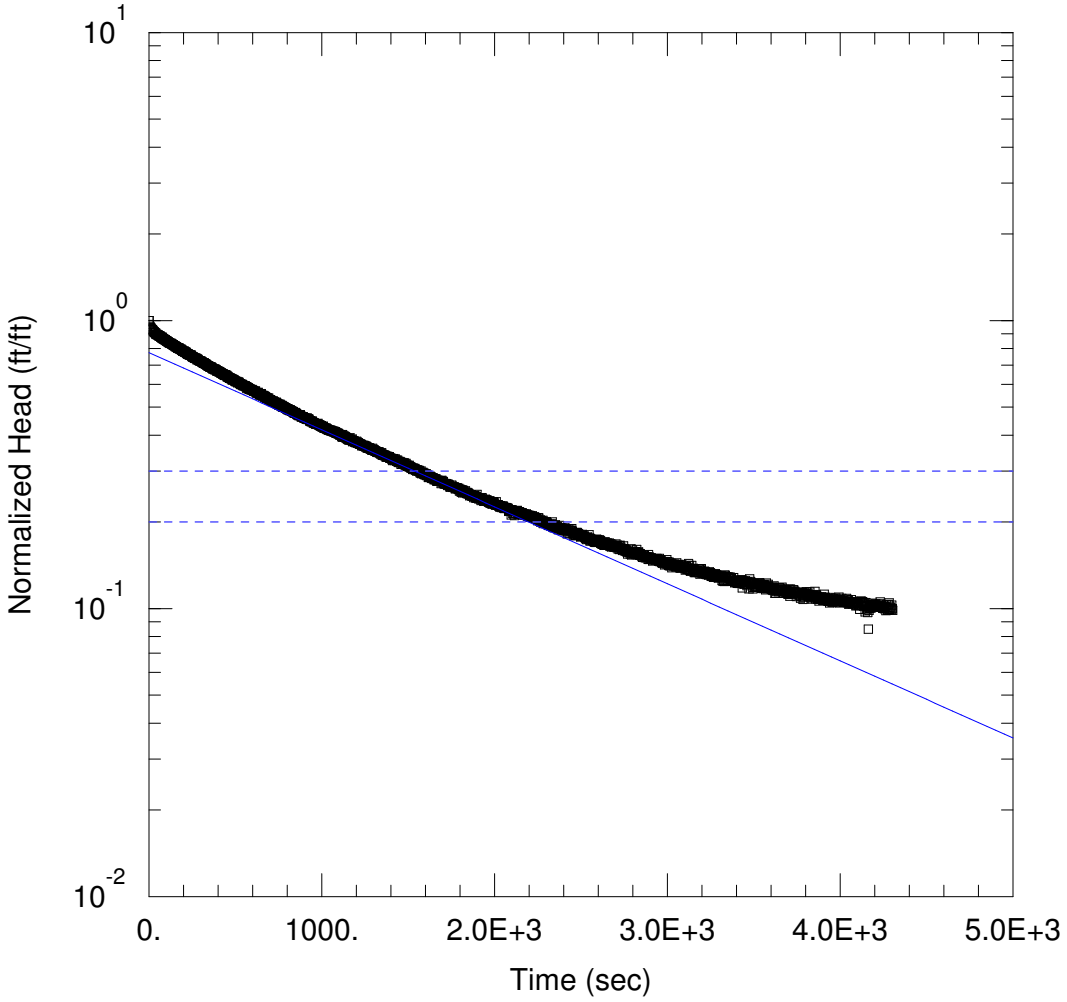
SOLUTION

Aquifer Model: Unconfined

Solution Method: Hvorslev

K = 0.001455 cm/sec

y0 = 1.03 ft



RISING HEAD TEST

PROJECT INFORMATION

Company: AMEC Foster Wheeler
Client: Duke Energy
Project: 7810140065.04.405
Location: Dan River
Test Well: OW-414 D
Test Date: 5-7-15

AQUIFER DATA

Saturated Thickness: 17.29 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (OW-414 D)

Initial Displacement: 3.902 ft
Total Well Penetration Depth: 17.29 ft
Casing Radius: 0.086 ft

Static Water Column Height: 17.29 ft
Screen Length: 5. ft
Well Radius: 0.125 ft

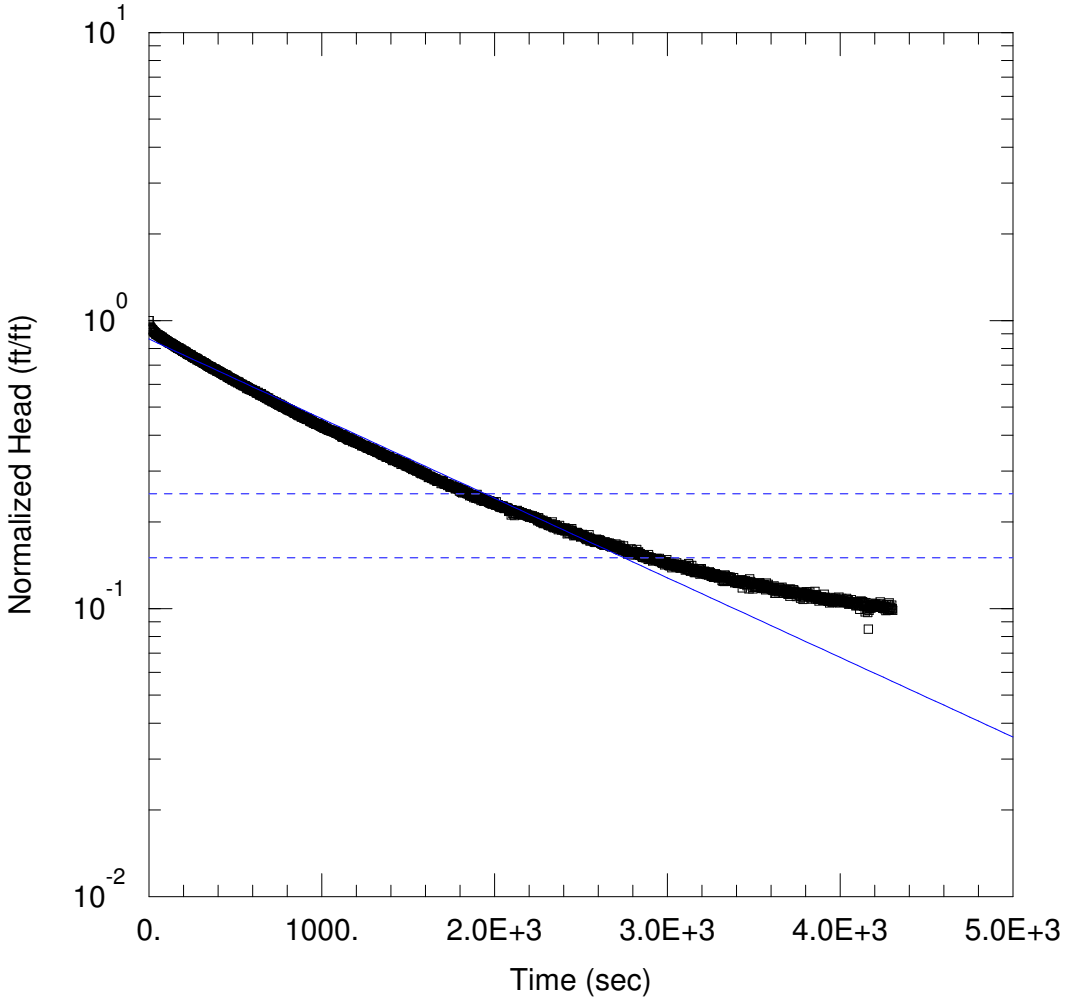
SOLUTION

Aquifer Model: Unconfined

Solution Method: Bouwer-Rice

K = 4.949E-5 cm/sec

y0 = 3.017 ft



RISING HEAD TEST

PROJECT INFORMATION

Company: AMEC Foster Wheeler
Client: Duke Energy
Project: 7810140065.04.405
Location: Dan River
Test Well: OW-414 D
Test Date: 5-7-15

AQUIFER DATA

Saturated Thickness: 17.29 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (OW-414 D)

Initial Displacement: 3.902 ft
Total Well Penetration Depth: 17.29 ft
Casing Radius: 0.086 ft

Static Water Column Height: 17.29 ft
Screen Length: 5. ft
Well Radius: 0.125 ft

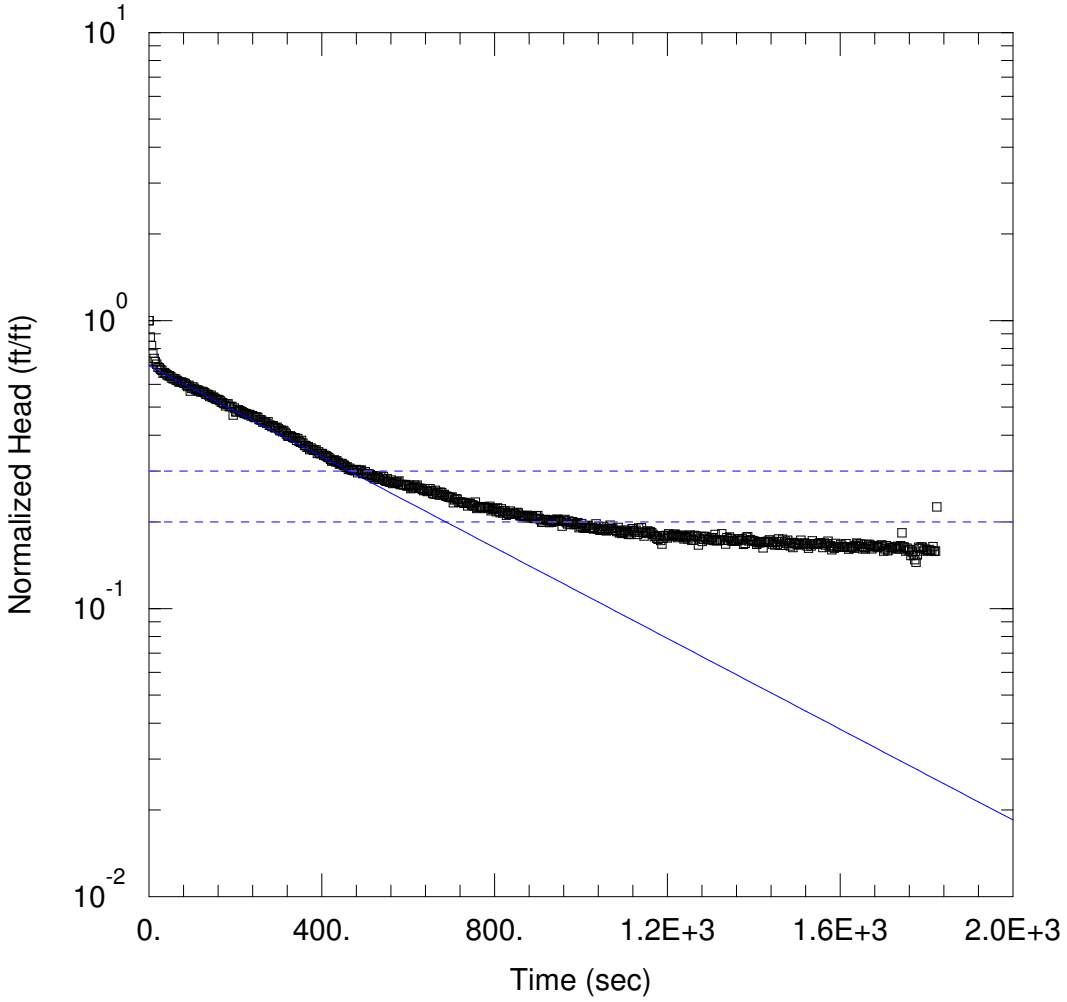
SOLUTION

Aquifer Model: Unconfined

K = 6.286E-5 cm/sec

Solution Method: Hvorslev

y0 = 3.365 ft



RISING HEAD TEST

PROJECT INFORMATION

Company: AMEC Foster Wheeler
Client: Duke Energy
Project: 7810140065.04.405
Location: Dan River
Test Well: OW-414 S
Test Date: 5-7-15

AQUIFER DATA

Saturated Thickness: 10.02 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (OW-414 S)

Initial Displacement: 2.389 ft
Total Well Penetration Depth: 10.02 ft
Casing Radius: 0.086 ft

Static Water Column Height: 10.02 ft
Screen Length: 10. ft
Well Radius: 0.33 ft
Gravel Pack Porosity: 0.33

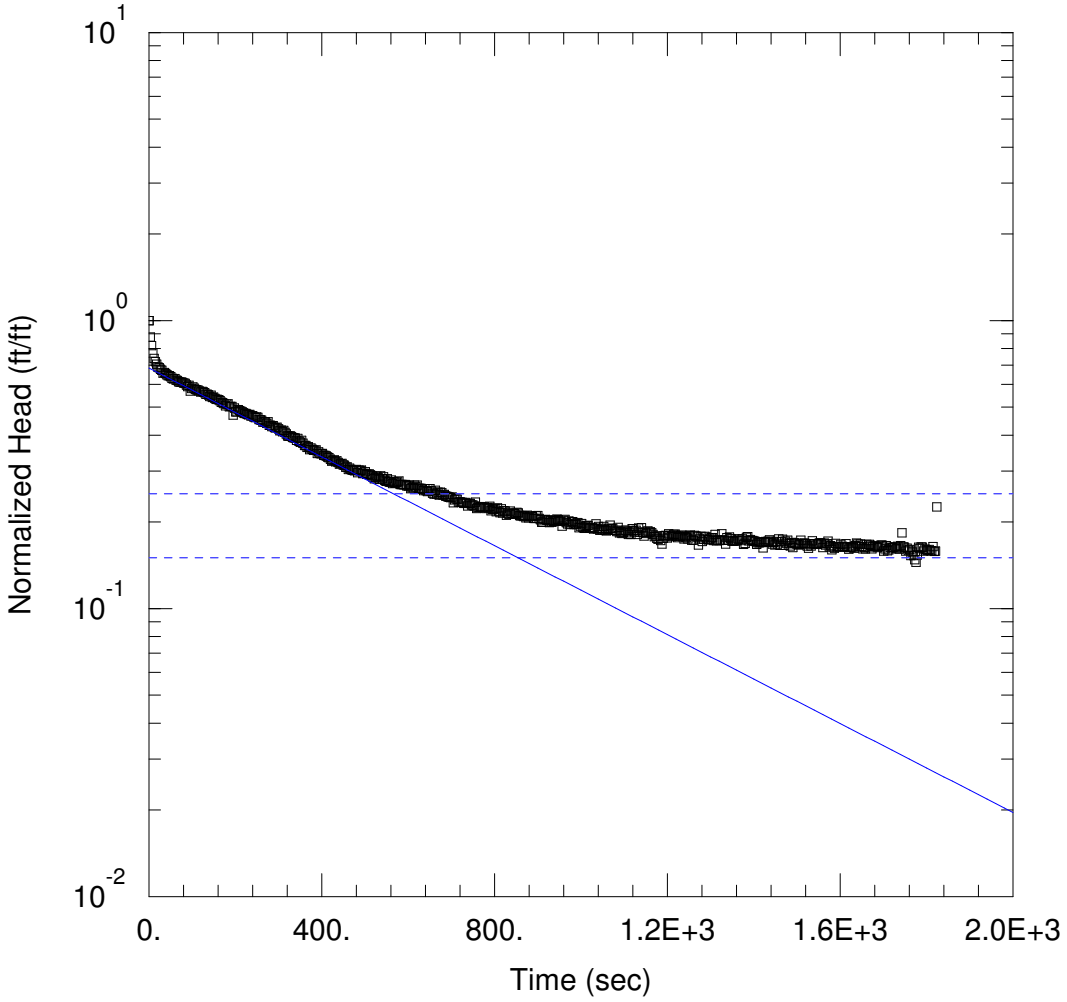
SOLUTION

Aquifer Model: Unconfined

Solution Method: Bouwer-Rice

K = 0.0002919 cm/sec

y0 = 1.662 ft



RISING HEAD TEST

PROJECT INFORMATION

Company: AMEC Foster Wheeler
Client: Duke Energy
Project: 7810140065.04.405
Location: Dan River
Test Well: OW-414 S
Test Date: 5-7-15

AQUIFER DATA

Saturated Thickness: 10.02 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (OW-414 S)

Initial Displacement: 2.389 ft
Total Well Penetration Depth: 10.02 ft
Casing Radius: 0.086 ft

Static Water Column Height: 10.02 ft
Screen Length: 10. ft
Well Radius: 0.33 ft
Gravel Pack Porosity: 0.33

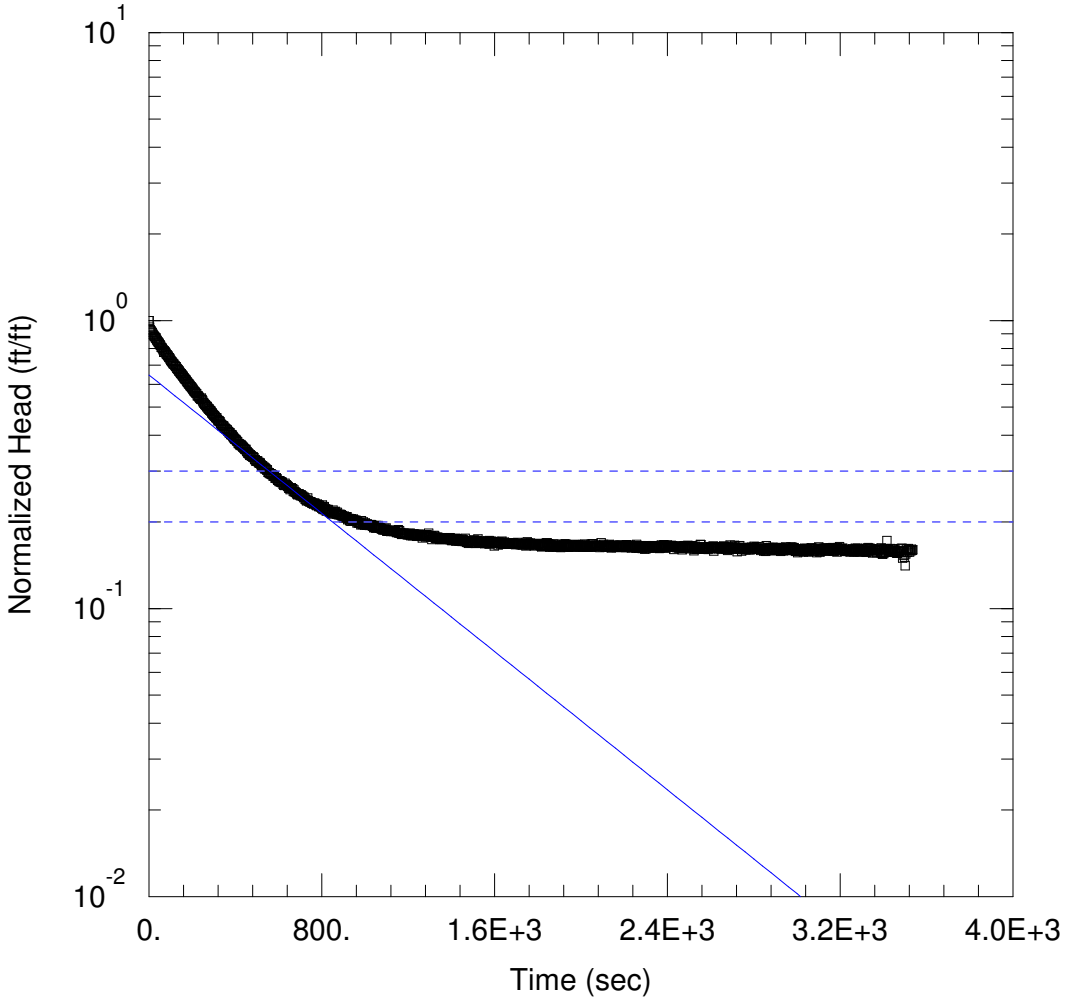
SOLUTION

Aquifer Model: Unconfined

Solution Method: Hvorslev

K = 0.0004545 cm/sec

y0 = 1.635 ft



RISING HEAD TEST

PROJECT INFORMATION

Company: AMEC Foster Wheeler
Client: Duke Energy
Project: 7810140065.04.405
Location: Dan River
Test Well: OW-415 D
Test Date: 5-7-15

AQUIFER DATA

Saturated Thickness: 28.16 ft
Anisotropy Ratio (Kz/Kr): 1.

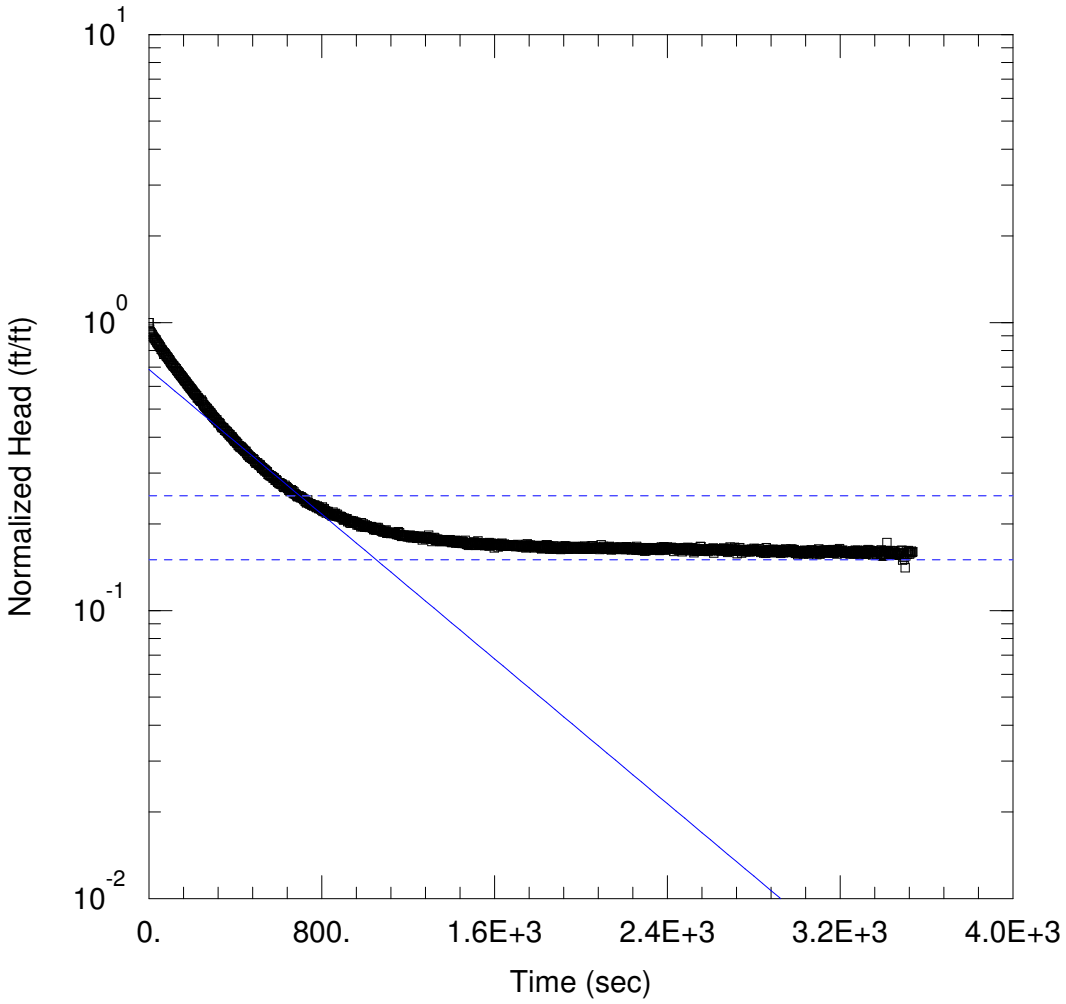
WELL DATA (OW-415 D)

Initial Displacement: 4.489 ft
Total Well Penetration Depth: 28.16 ft
Casing Radius: 0.086 ft
Static Water Column Height: 28.16 ft
Screen Length: 5. ft
Well Radius: 0.125 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 0.0001196 cm/sec
y0 = 2.903 ft



RISING HEAD TEST

PROJECT INFORMATION

Company: AMEC Foster Wheeler
Client: Duke Energy
Project: 7810140065.04.405
Location: Dan River
Test Well: OW-415 D
Test Date: 5-7-15

AQUIFER DATA

Saturated Thickness: 28.16 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (OW-415 D)

Initial Displacement: 4.489 ft
Total Well Penetration Depth: 28.16 ft
Casing Radius: 0.086 ft

Static Water Column Height: 28.16 ft
Screen Length: 5. ft
Well Radius: 0.125 ft

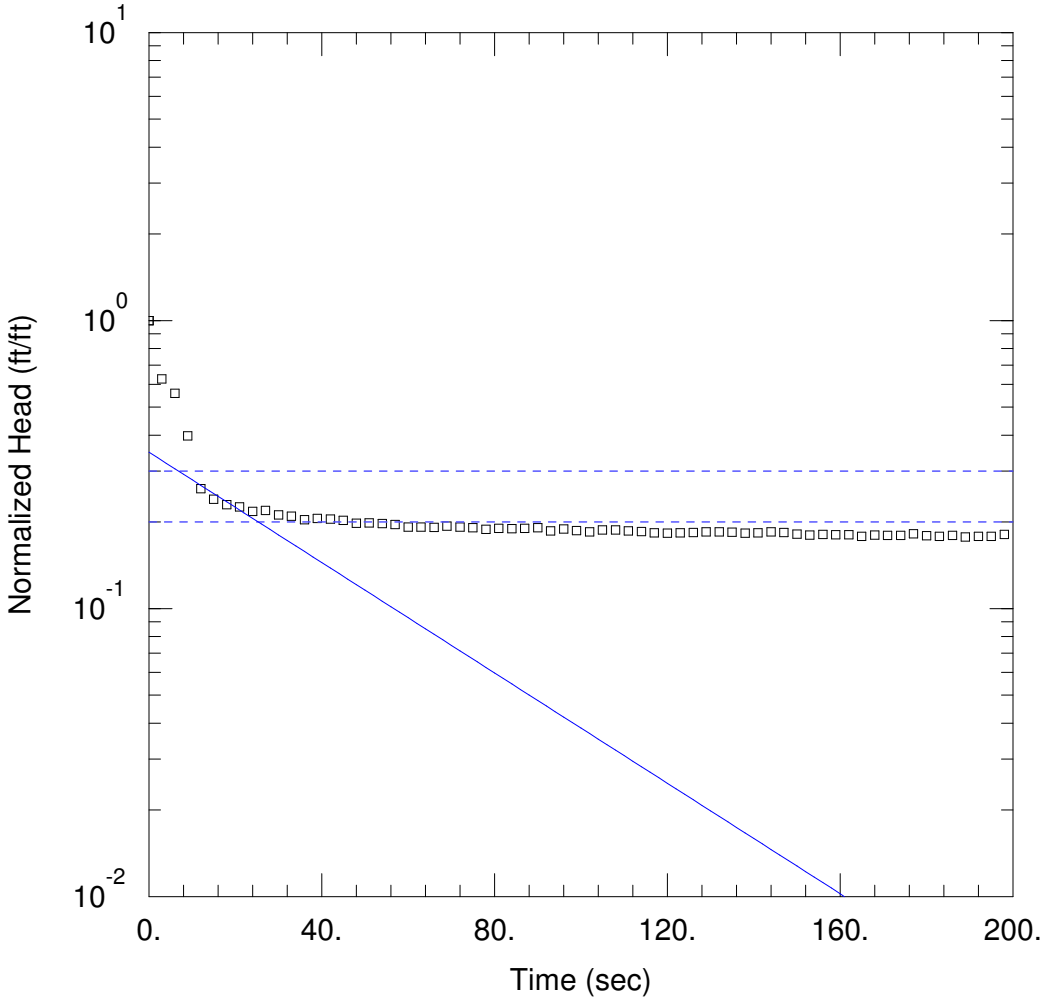
SOLUTION

Aquifer Model: Unconfined

K = 0.0001429 cm/sec

Solution Method: Hvorslev

y0 = 3.086 ft



RISING HEAD TEST

PROJECT INFORMATION

Company: AMEC Foster Wheeler
Client: Duke Energy
Project: 7810140065.04.405
Location: Dan River
Test Well: OW-415 S
Test Date: 5-7-15

AQUIFER DATA

Saturated Thickness: 6.85 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (OW-415 S)

Initial Displacement: 3.715 ft
Total Well Penetration Depth: 10. ft
Casing Radius: 0.086 ft

Static Water Column Height: 6.85 ft
Screen Length: 10. ft
Well Radius: 0.33 ft
Gravel Pack Porosity: 0.33

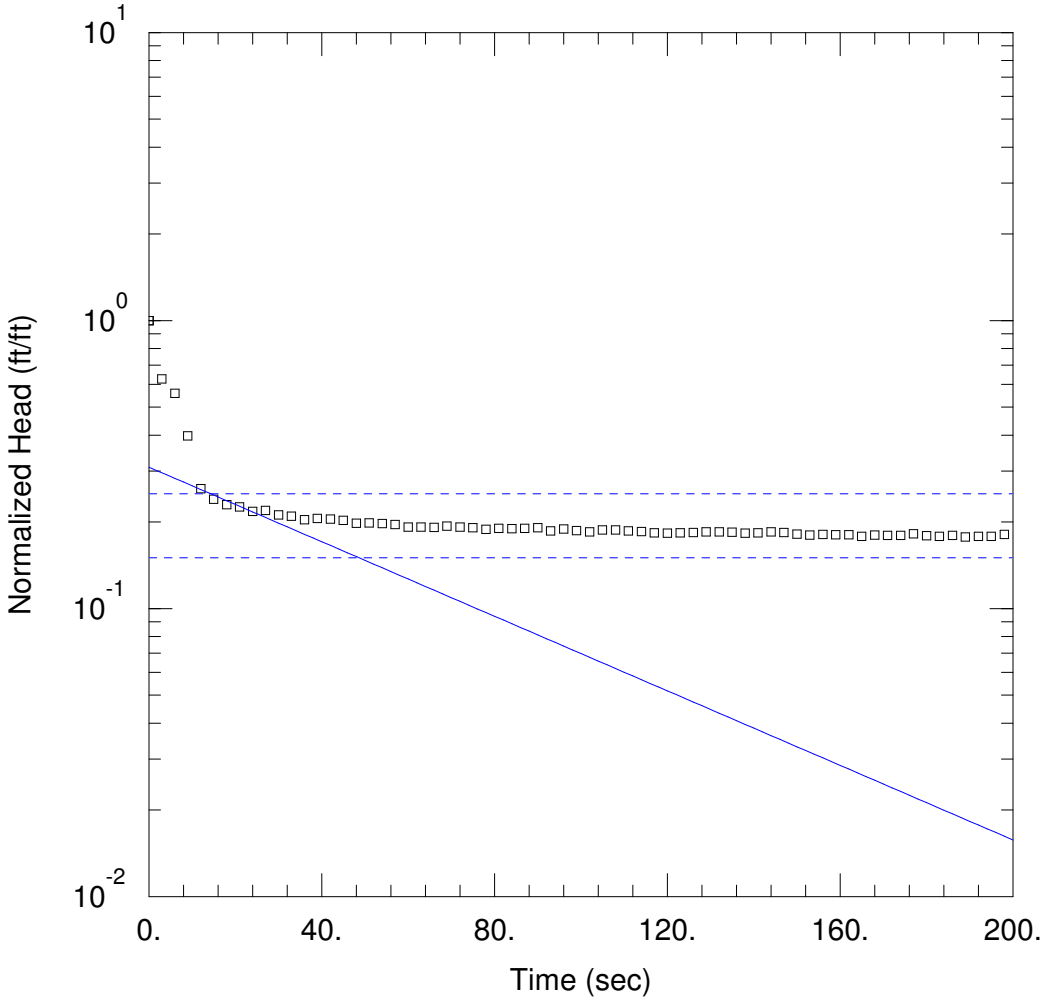
SOLUTION

Aquifer Model: Unconfined

Solution Method: Bouwer-Rice

K = 0.004973 cm/sec

y0 = 1.296 ft



RISING HEAD TEST

PROJECT INFORMATION

Company: AMEC Foster Wheeler
Client: Duke Energy
Project: 7810140065.04.405
Location: Dan River
Test Well: OW-415 S
Test Date: 5-7-15

AQUIFER DATA

Saturated Thickness: 6.85 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (OW-415 S)

Initial Displacement: 3.715 ft
Total Well Penetration Depth: 10. ft
Casing Radius: 0.086 ft

Static Water Column Height: 6.85 ft
Screen Length: 10. ft
Well Radius: 0.33 ft
Gravel Pack Porosity: 0.33

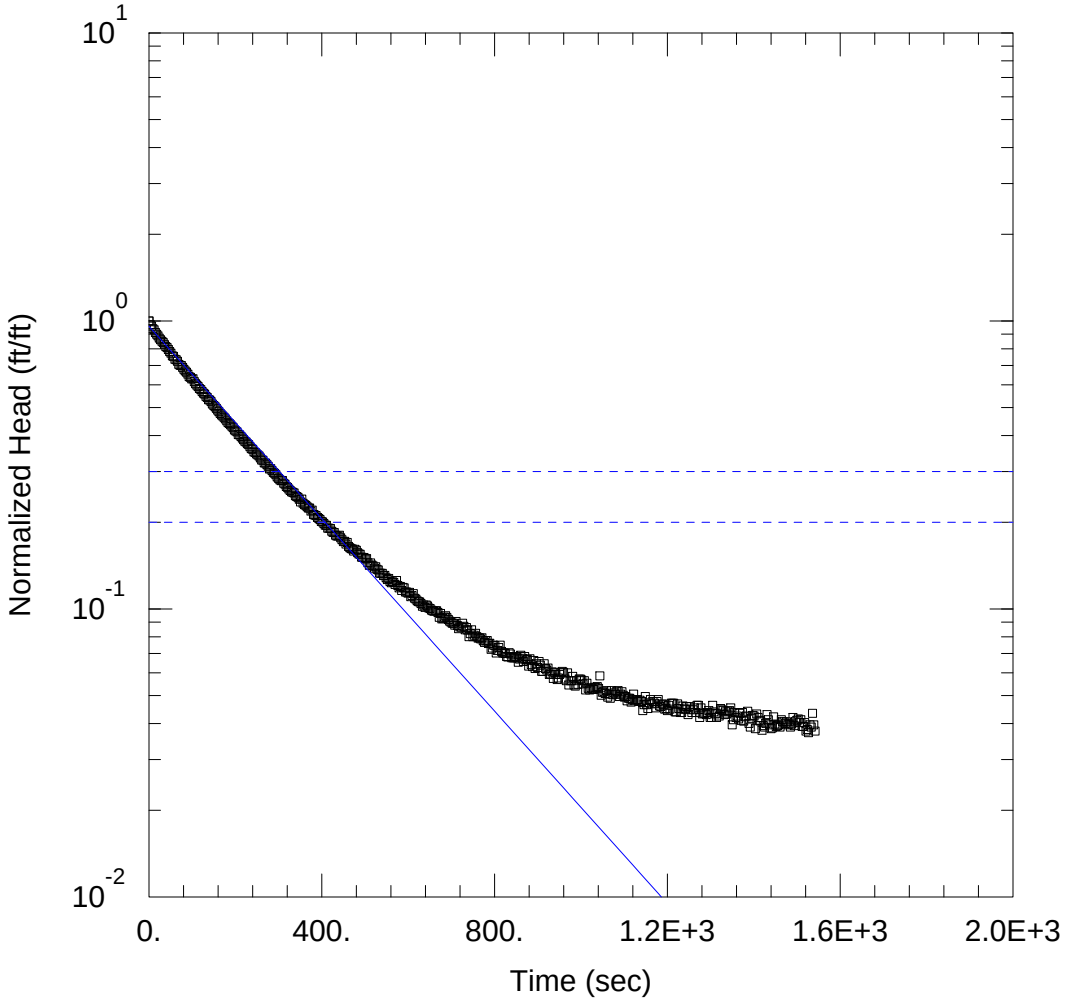
SOLUTION

Aquifer Model: Unconfined

Solution Method: Hvorslev

K = 0.007183 cm/sec

y0 = 1.15 ft



RISING HEAD TEST

PROJECT INFORMATION

Company: AMEC Foster Wheeler
Client: Duke Energy
Project: 7810140065.04.405
Location: Dan River
Test Well: OW-416 D
Test Date: 5-7-15

AQUIFER DATA

Saturated Thickness: 19.94 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (OW-416 D)

Initial Displacement: 4.169 ft
Total Well Penetration Depth: 19.94 ft
Casing Radius: 0.086 ft

Static Water Column Height: 19.94 ft
Screen Length: 5. ft
Well Radius: 0.125 ft
Gravel Pack Porosity: 0.33

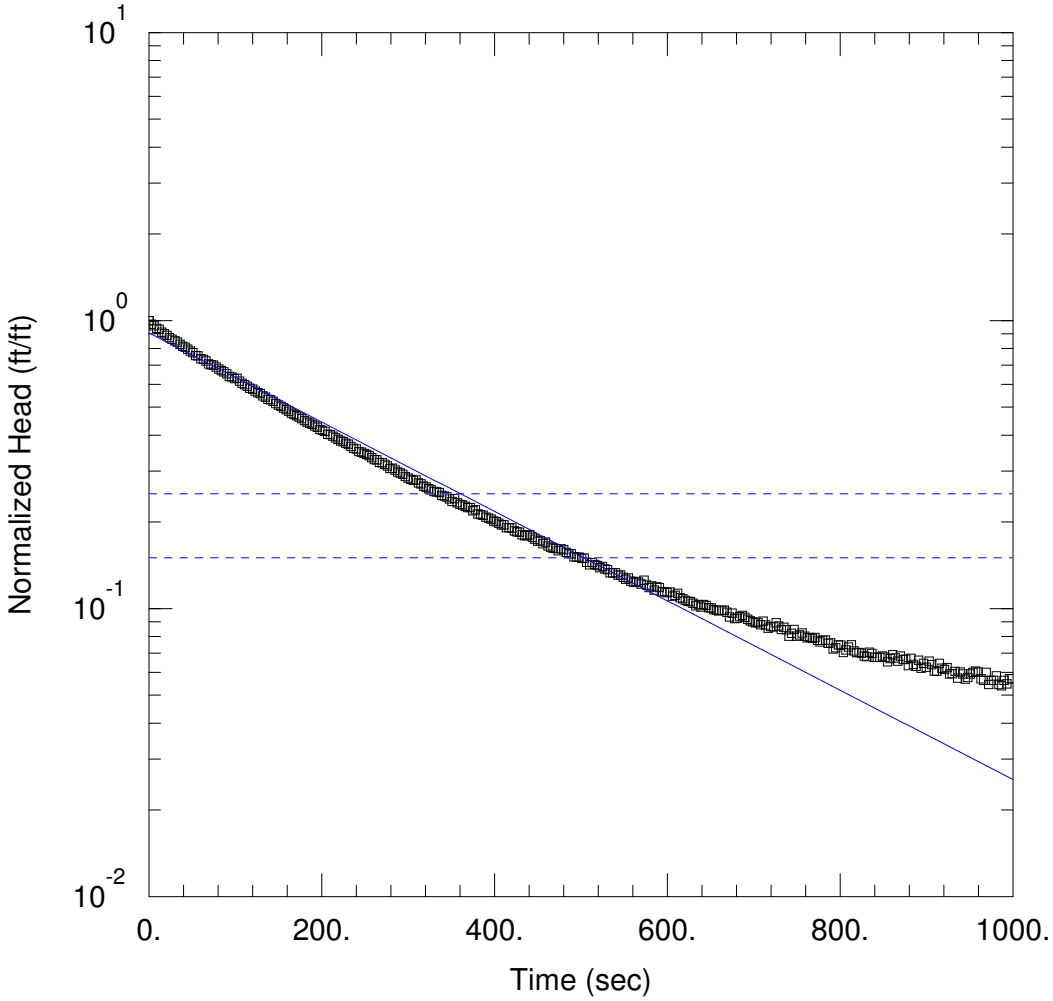
SOLUTION

Aquifer Model: Unconfined

Solution Method: Bouwer-Rice

K = -0.001869 cm/sec

y0 = 3.992 ft



RISING HEAD TEST

PROJECT INFORMATION

Company: AMEC Foster Wheeler
Client: Duke Energy
Project: 7810140065.04.405
Location: Dan River
Test Well: OW-416 D
Test Date: 5-7-15

AQUIFER DATA

Saturated Thickness: 19.94 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (OW-416 D)

Initial Displacement: 4.169 ft
Total Well Penetration Depth: 19.94 ft
Casing Radius: 0.086 ft

Static Water Column Height: 19.94 ft
Screen Length: 5. ft
Well Radius: 0.125 ft

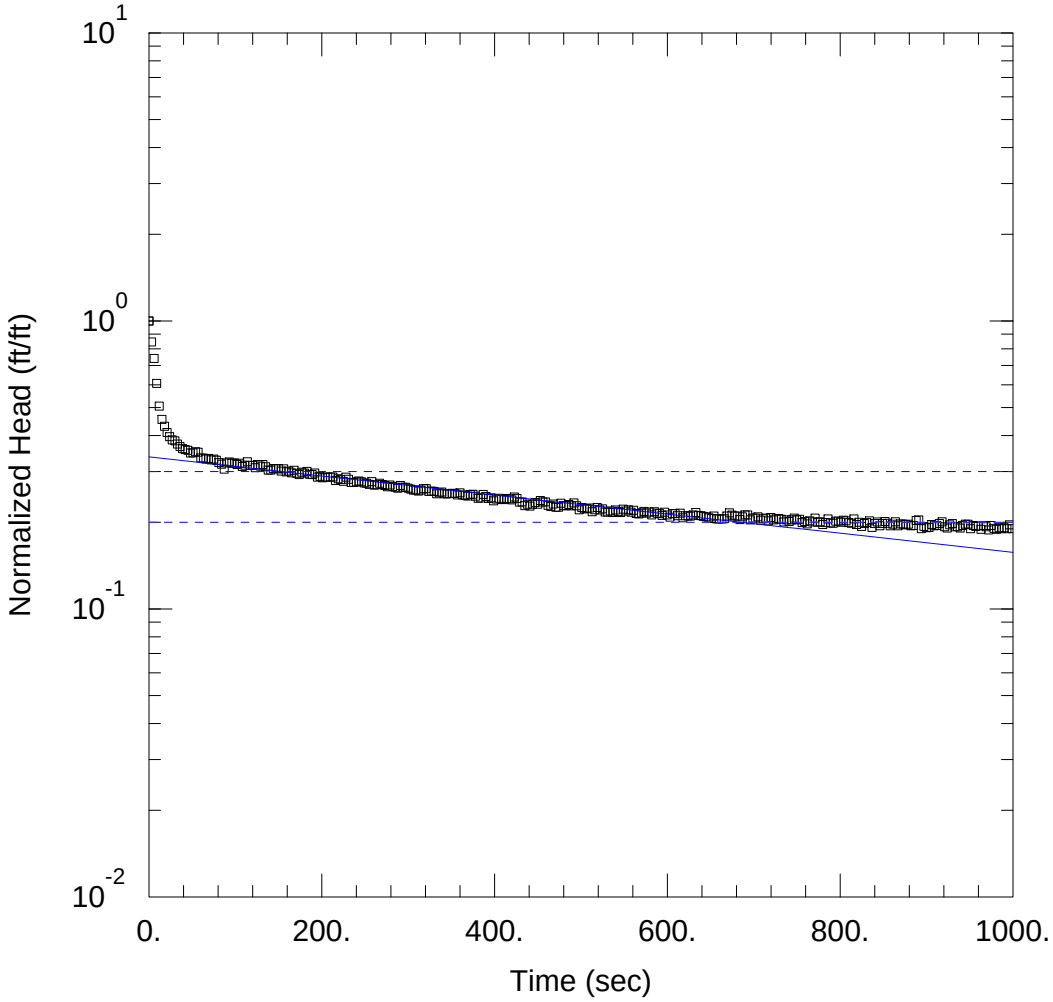
SOLUTION

Aquifer Model: Unconfined

K = 0.0002971 cm/sec

Solution Method: Hvorslev

y0 = 3.781 ft



RISING HEAD TEST

PROJECT INFORMATION

Company: AMEC Foster Wheeler
Client: Duke Energy
Project: 7810140065.04.405
Location: Dan River
Test Well: OW-416 S
Test Date: 5-7-15

AQUIFER DATA

Saturated Thickness: 7.57 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (OW-416 S)

Initial Displacement: 2.027 ft
Total Well Penetration Depth: 10. ft
Casing Radius: 0.086 ft

Static Water Column Height: 7.57 ft
Screen Length: 10. ft
Well Radius: 0.33 ft
Gravel Pack Porosity: 0.33

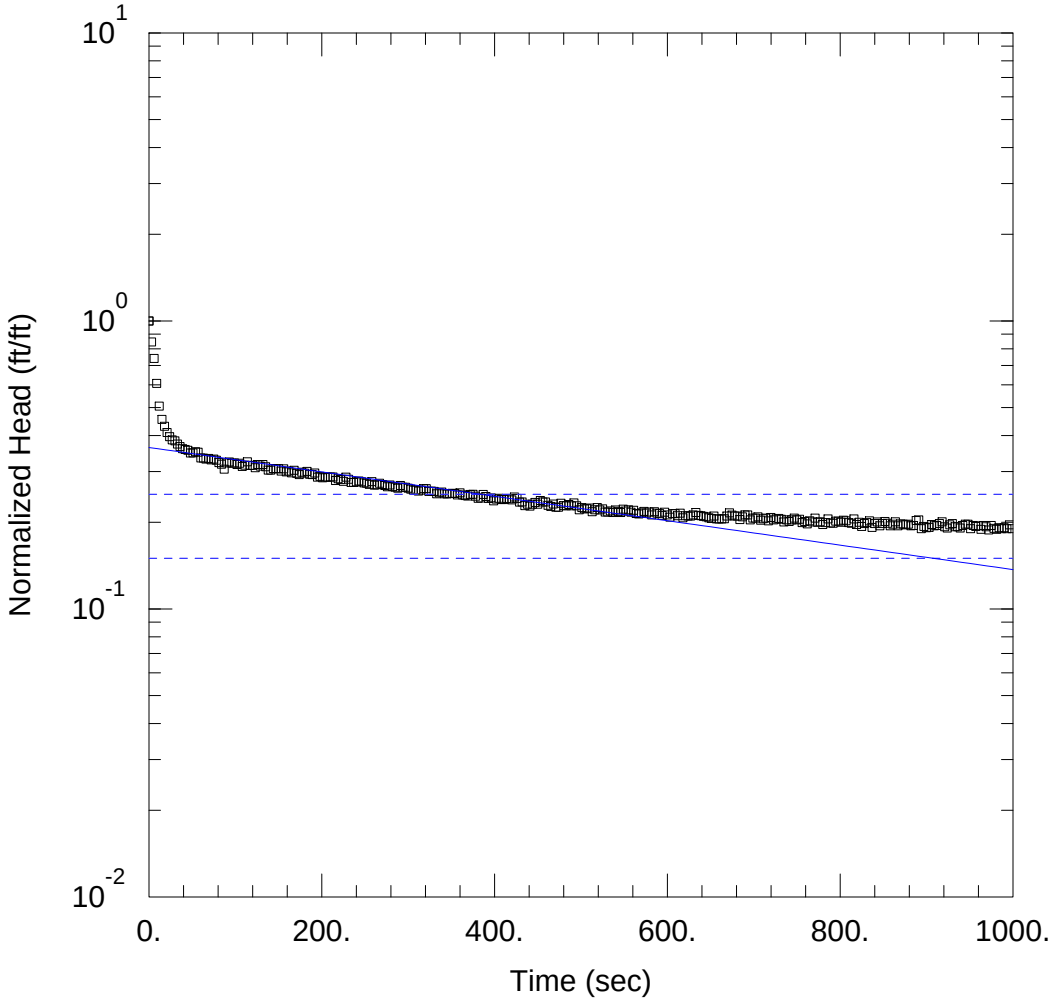
SOLUTION

Aquifer Model: Unconfined

Solution Method: Bouwer-Rice

K = 0.0001574 cm/sec

y0 = 0.6834 ft



RISING HEAD TEST

PROJECT INFORMATION

Company: AMEC Foster Wheeler
Client: Duke Energy
Project: 7810140065.04.405
Location: Dan River
Test Well: OW-416 S
Test Date: 5-7-15

AQUIFER DATA

Saturated Thickness: 7.57 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (OW-416 S)

Initial Displacement: 2.027 ft
Total Well Penetration Depth: 10. ft
Casing Radius: 0.086 ft

Static Water Column Height: 7.57 ft
Screen Length: 10. ft
Well Radius: 0.33 ft
Gravel Pack Porosity: 0.33

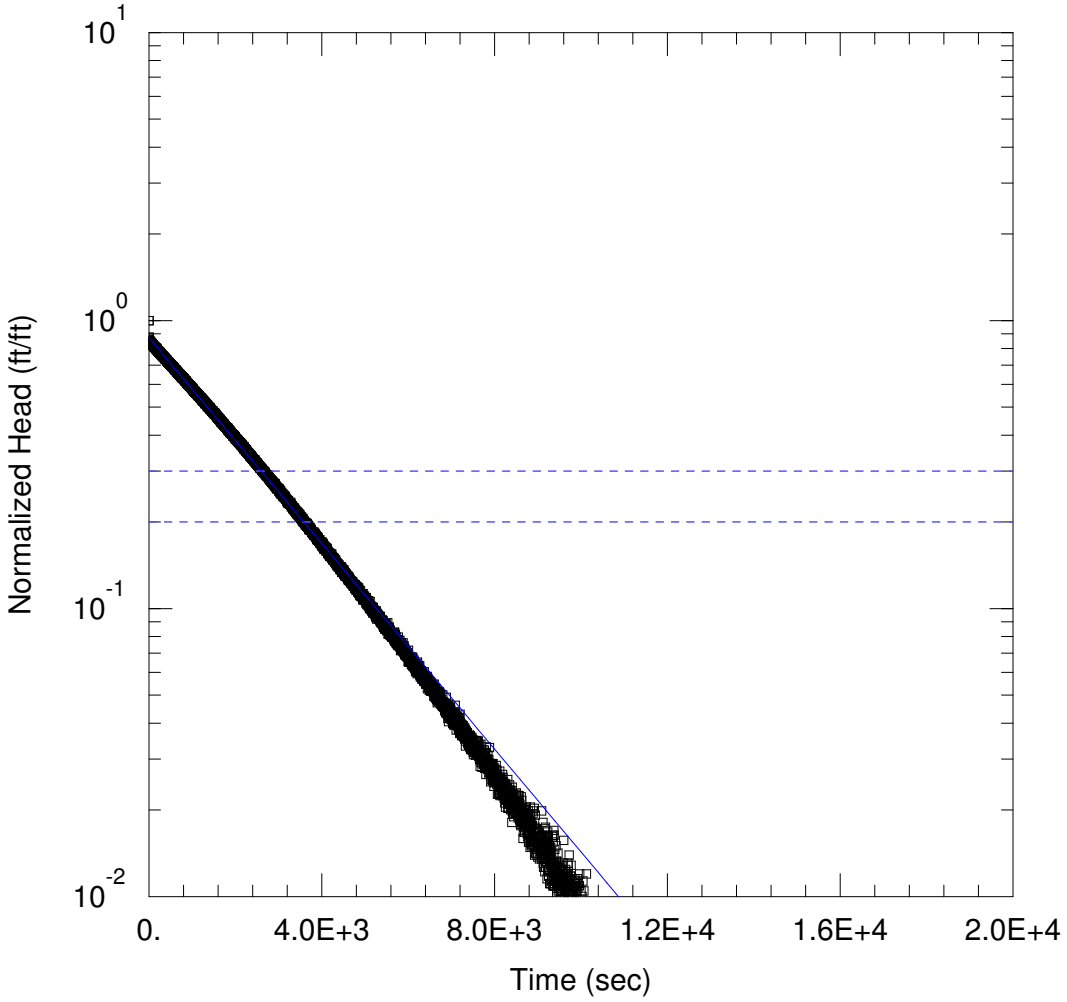
SOLUTION

Aquifer Model: Unconfined

Solution Method: Hvorslev

K = 0.0004257 cm/sec

y0 = 0.7369 ft



RISING HEAD TEST

PROJECT INFORMATION

Company: AMEC Foster Wheeler
Client: Duke Energy
Project: 7810140065.04.405
Location: Dan River
Test Well: OW-417 D
Test Date: 5-7-15

AQUIFER DATA

Saturated Thickness: 31.46 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (OW-417 D)

Initial Displacement: 4.594 ft
Total Well Penetration Depth: 31.46 ft
Casing Radius: 0.086 ft

Static Water Column Height: 31.46 ft
Screen Length: 5. ft
Well Radius: 0.125 ft

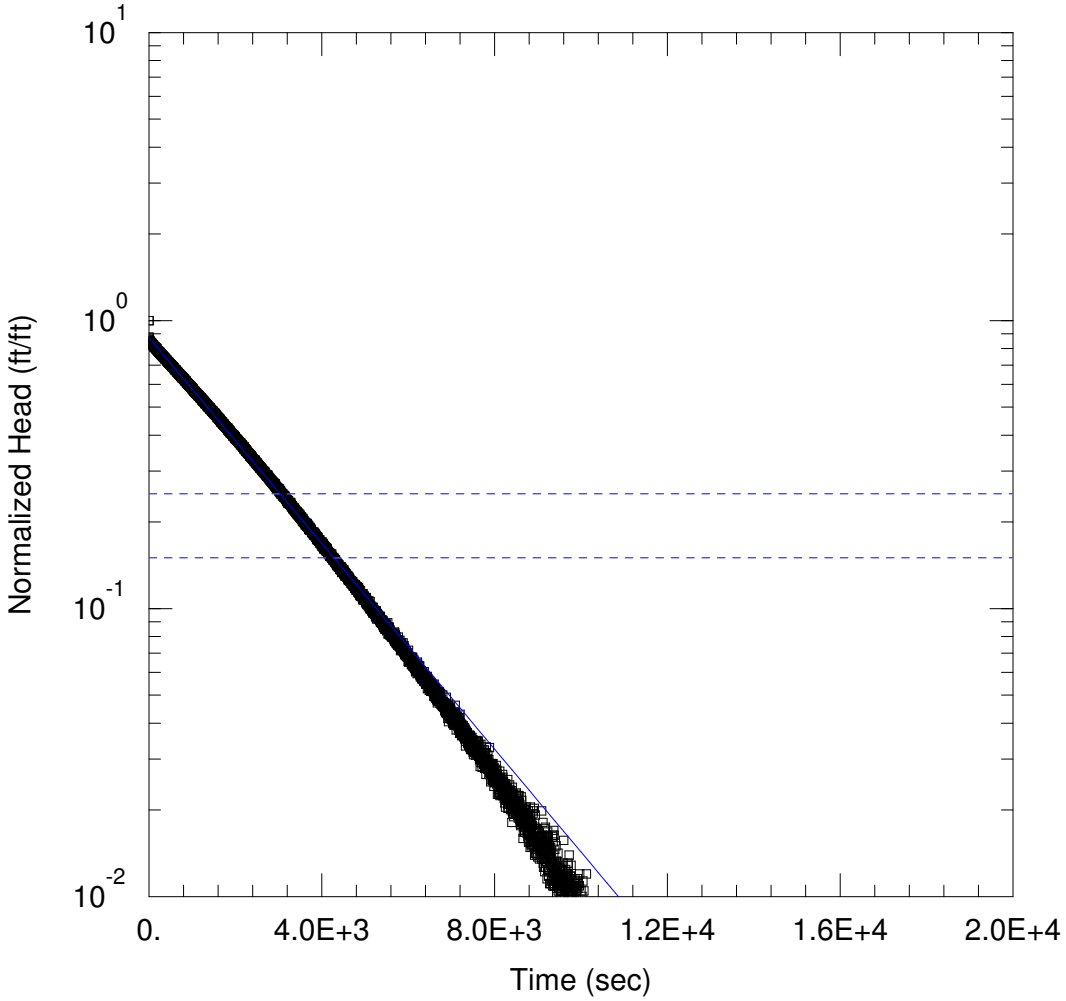
SOLUTION

Aquifer Model: Unconfined

Solution Method: Bouwer-Rice

K = 3.615E-5 cm/sec

y0 = 4.003 ft



RISING HEAD TEST

PROJECT INFORMATION

Company: AMEC Foster Wheeler
Client: Duke Energy
Project: 7810140065.04.405
Location: Dan River
Test Well: OW-417 D
Test Date: 5-7-15

AQUIFER DATA

Saturated Thickness: 31.46 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (OW-417 D)

Initial Displacement: 4.594 ft
Total Well Penetration Depth: 31.46 ft
Casing Radius: 0.086 ft

Static Water Column Height: 31.46 ft
Screen Length: 5. ft
Well Radius: 0.125 ft

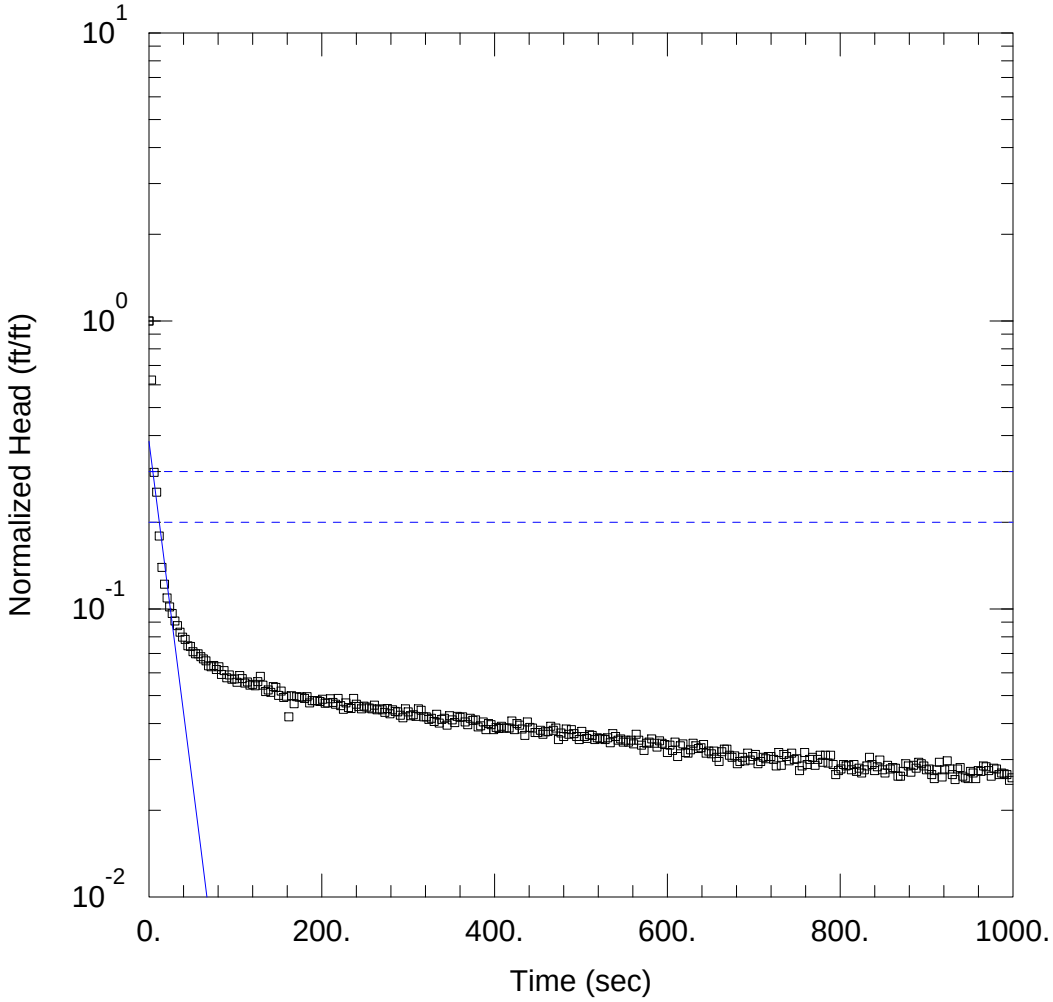
SOLUTION

Aquifer Model: Unconfined

K = 4.061E-5 cm/sec

Solution Method: Hvorslev

y0 = 4.003 ft



RISING HEAD TEST

PROJECT INFORMATION

Company: AMEC Foster Wheeler
Client: Duke Energy
Project: 7810140065.04.405
Location: Dan River
Test Well: OW-417 S
Test Date: 5-7-15

AQUIFER DATA

Saturated Thickness: 13.72 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (OW-417 S)

Initial Displacement: 5.828 ft
Total Well Penetration Depth: 15. ft
Casing Radius: 0.086 ft

Static Water Column Height: 13.72 ft
Screen Length: 15. ft
Well Radius: 0.33 ft
Gravel Pack Porosity: 0.33

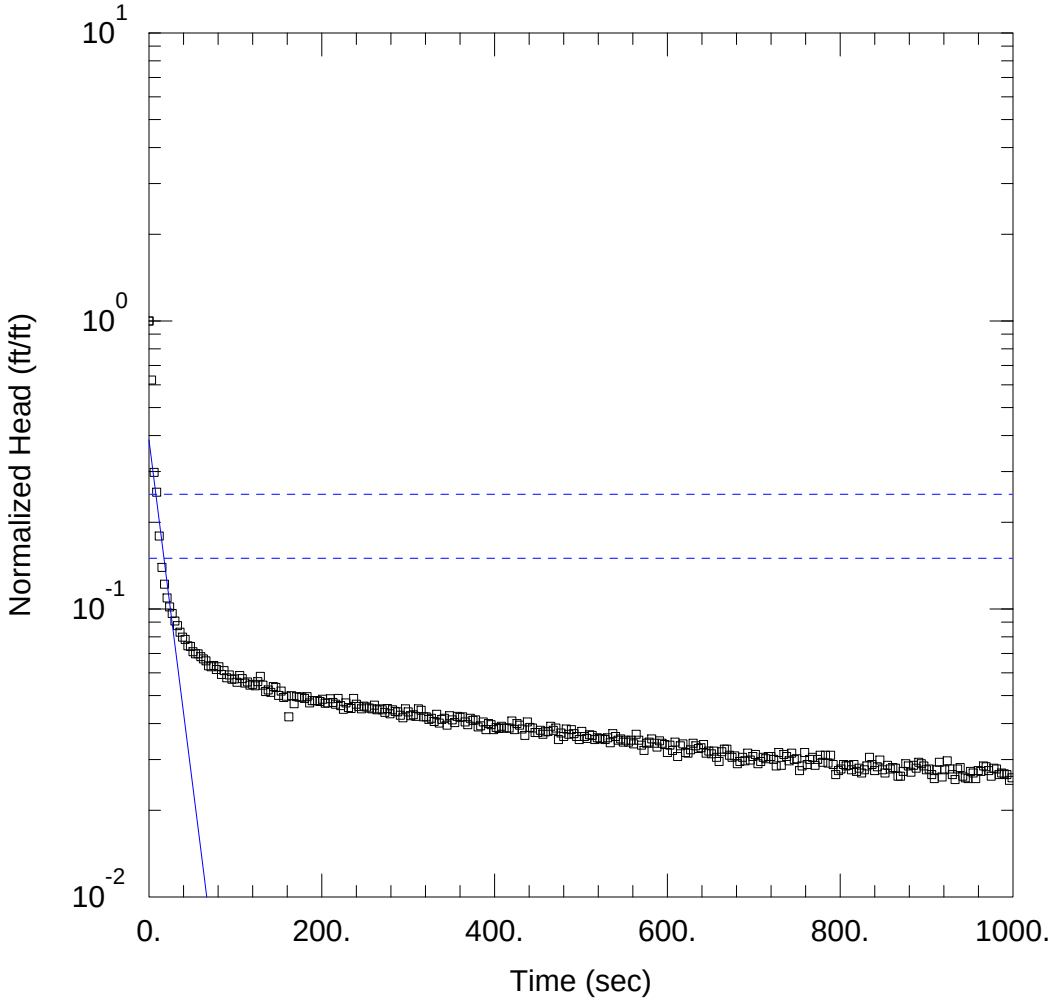
SOLUTION

Aquifer Model: Unconfined

Solution Method: Bouwer-Rice

K = 0.007143 cm/sec

y0 = 2.224 ft



RISING HEAD TEST

PROJECT INFORMATION

Company: AMEC Foster Wheeler
Client: Duke Energy
Project: 7810140065.04.405
Location: Dan River
Test Well: OW-417 S
Test Date: 5-7-15

AQUIFER DATA

Saturated Thickness: 13.72 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (OW-417 S)

Initial Displacement: 5.828 ft
Total Well Penetration Depth: 15. ft
Casing Radius: 0.086 ft

Static Water Column Height: 13.72 ft
Screen Length: 15. ft
Well Radius: 0.33 ft
Gravel Pack Porosity: 0.33

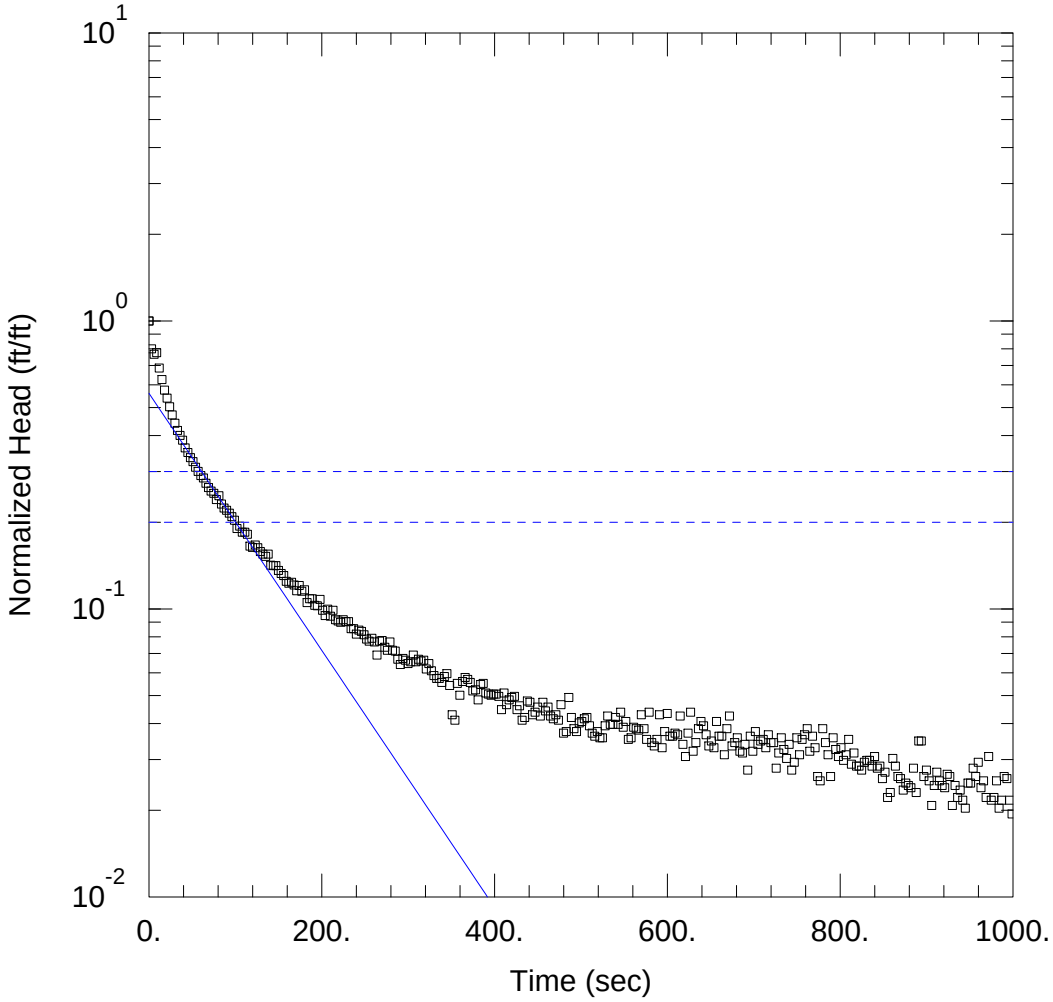
SOLUTION

Aquifer Model: Unconfined

Solution Method: Hvorslev

K = 0.01314 cm/sec

y0 = 2.25 ft



RISING HEAD TEST

PROJECT INFORMATION

Company: AMEC Foster Wheeler
Client: Duke Energy
Project: 7810140065.04.405
Location: Dan River
Test Well: OW-419 S
Test Date: 5-7-15

AQUIFER DATA

Saturated Thickness: 13.65 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (OW-419 S)

Initial Displacement: 2.214 ft
Total Well Penetration Depth: 15. ft
Casing Radius: 0.086 ft

Static Water Column Height: 13.65 ft
Screen Length: 15. ft
Well Radius: 0.33 ft
Gravel Pack Porosity: 0.33

SOLUTION

Aquifer Model: Unconfined

Solution Method: Bouwer-Rice

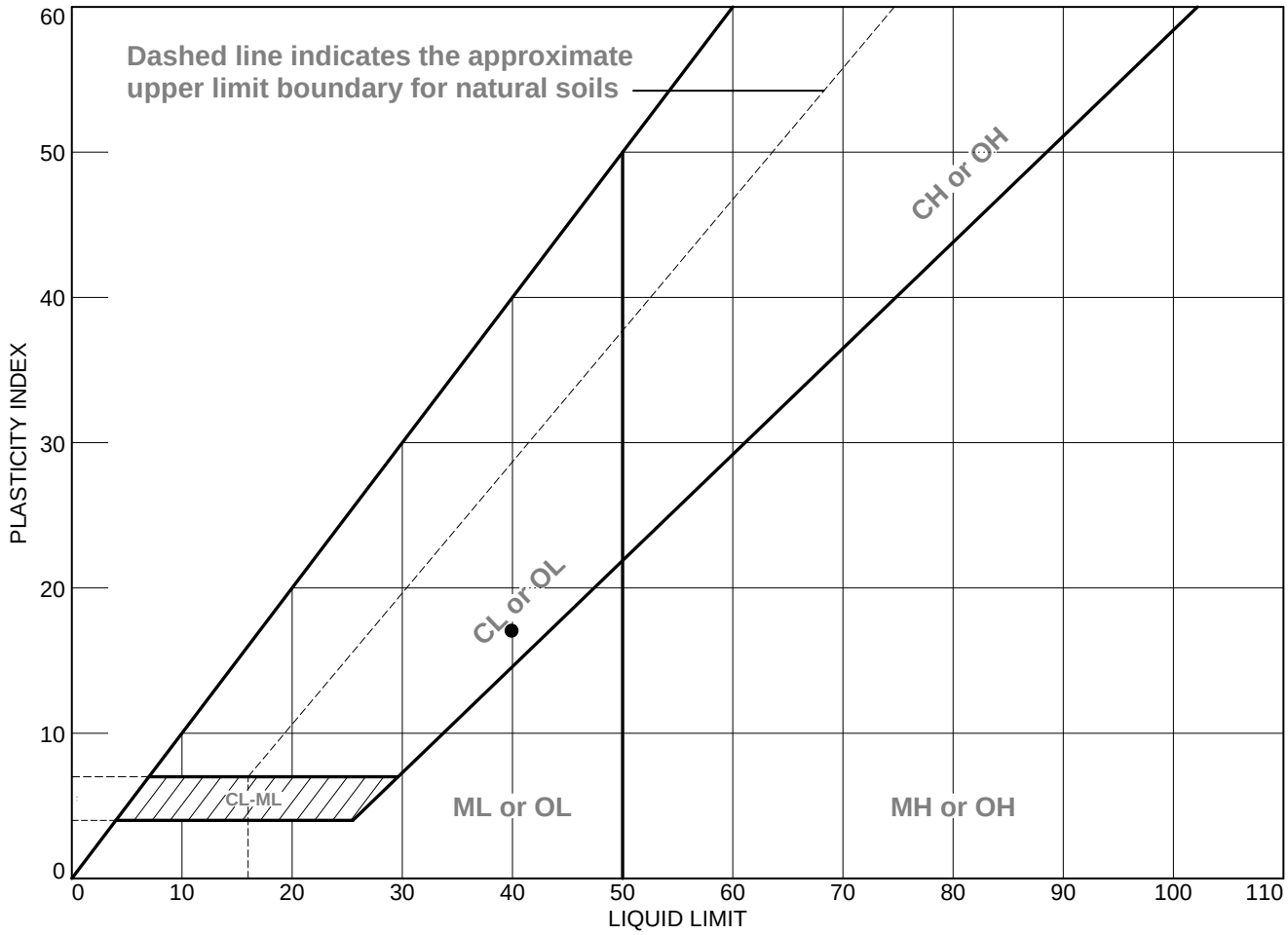
K = 0.00136 cm/sec

y0 = 1.241 ft

APPENDIX IV

Laboratory Test Data Sheets

LIQUID AND PLASTIC LIMITS TEST REPORT



SOIL DATA

SYMBOL	SOURCE	SAMPLE NO.	DEPTH	NATURAL WATER CONTENT (%)	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	USCS
●	B320	SS-4	8.5 - 10	NR	23	40	17	CL
■	B320	SS-14	58.5 - 60	NR	NP	NV	NP	ML

Client: Duke Energy
Project: Dan River Steam Station Ash Removal
Project No.: 7810140065 **Figure**

Tested By: D. Kopitsky **Checked By:** T. Landis

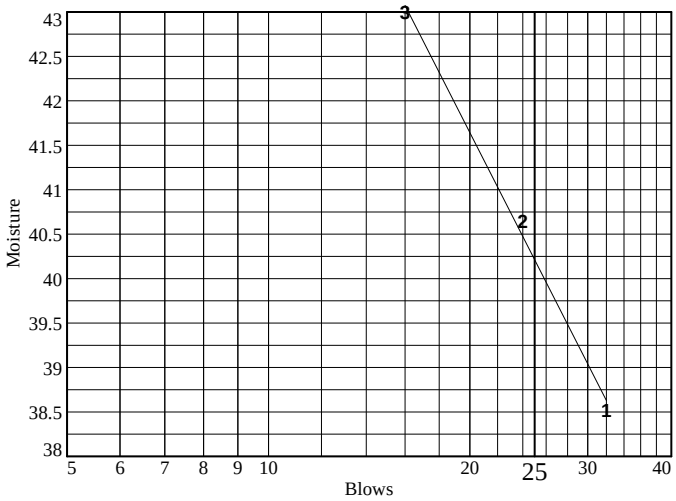
LIQUID AND PLASTIC LIMIT TEST DATA

5/27/2015

Client: Duke Energy
Project: Dan River Steam Station Ash Removal
Project Number: 7810140065
Location: B320
Depth: 8.5 - 10 **Sample Number:** SS-4
Material Description: Olive Gray Sandy Lean Clay
USCS: CL **AASHTO:** A-6(9)
Tested by: D. Kopitsky **Checked by:** T. Landis

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	36.95	36.42	36.67			
Dry+Tare	31.16	30.57	30.53			
Tare	16.13	16.18	16.25			
# Blows	32	24	16			
Moisture	38.5	40.7	43.0			



Liquid Limit= 40
Plastic Limit= 23
Plasticity Index= 17
Natural Moisture= NR

Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	17.65	17.58			
Dry+Tare	16.4	16.29			
Tare	10.9	10.7			
Moisture	22.7	23.1			

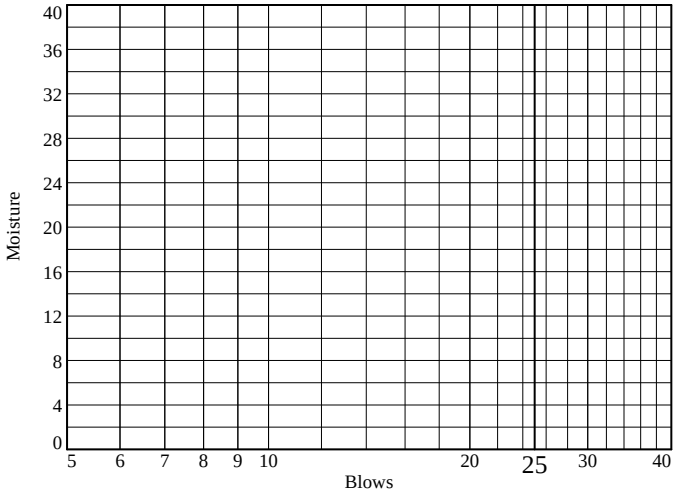
LIQUID AND PLASTIC LIMIT TEST DATA

5/27/2015

Client: Duke Energy
Project: Dan River Steam Station Ash Removal
Project Number: 7810140065
Location: B320
Depth: 58.5 - 60 **Sample Number:** SS-14
Material Description: Dark Gray CCR Material
USCS: ML **AASHTO:** A-4(0)
Tested by: D. Kopitsky **Checked by:** T. Landis

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare						
Dry+Tare						
Tare						
# Blows						
Moisture						

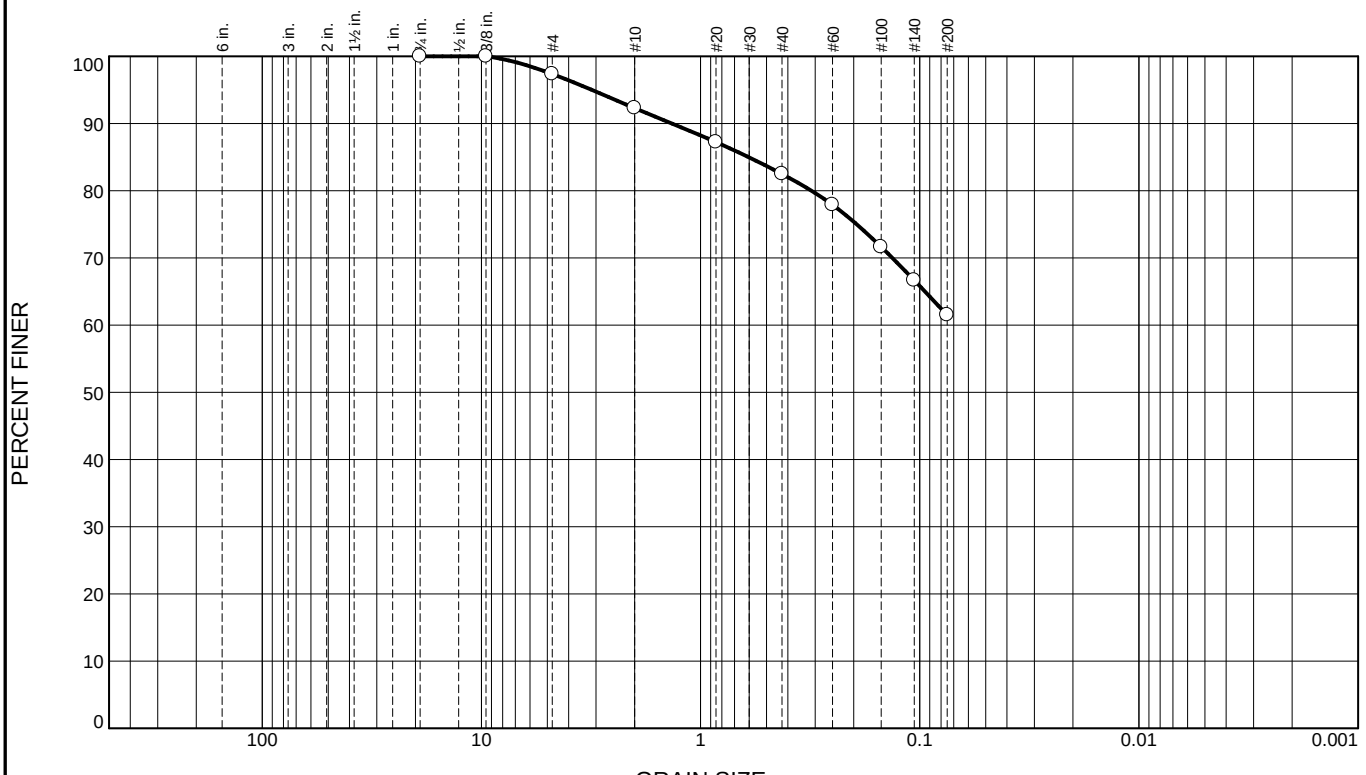


Liquid Limit= NV
Plastic Limit= NP
Plasticity Index= NP
Natural Moisture= NR

Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare					
Dry+Tare					
Tare					
Moisture					

Particle Size Analysis ASTM D422



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	2.6	5.1	9.8	21.0	61.5	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/4	100.0		
3/8	100.0		
#4	97.4		
#10	92.3		
#20	87.2		
#40	82.5		
#60	77.9		
#100	71.6		
#140	66.7		
#200	61.5		

* (no specification provided)

Soil Description

Olive Gray Sandy Lean Clay

Atterberg Limits

PL= 23 LL= 40 PI= 17

Coefficients

D_{90}= 1.3526 D_{85}= 0.6046 D_{60}=
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= CL AASHTO= A-6(9)

Remarks

Fill from Ash Fill 1
Specific Gravity = 2.682

Source of Sample: B320 **Depth:** 8.5 - 10
Sample Number: SS-4 **Date:** 12-12-14

amec

Client: Duke Energy
Project: Dan River Steam Station Ash Removal
Project No: 7810140065 **Figure**

Tested By: D. Kopitsky **Checked By:** T. Landis

GRAIN SIZE DISTRIBUTION TEST DATA

5/27/2015

Client: Duke Energy
Project: Dan River Steam Station Ash Removal
Project Number: 7810140065
Location: B320
Depth: 8.5 - 10 **Sample Number:** SS-4
Material Description: Olive Gray Sandy Lean Clay
Date: 12-12-14 **PL:** 23 **LL:** 40 **PI:** 17
USCS Classification: CL **AASHTO Classification:** A-6(9)
Testing Remarks: Fill from Ash Fill 1
Specific Gravity = 2.682
Tested by: D. Kopitsky **Checked by:** T. Landis

Sieve Test Data

Dry Sample and Tare (grams)	Tare (grams)	Cumulative Pan Tare Weight (grams)	Sieve Opening Size	Cumulative Weight Retained (grams)	Percent Finer
121.23	0.00	0.00	3/4	0.00	100.0
			3/8	0.00	100.0
			#4	3.21	97.4
			#10	9.35	92.3
			#20	15.49	87.2
			#40	21.24	82.5
			#60	26.80	77.9
			#100	34.40	71.6
			#140	40.41	66.7
			#200	46.68	61.5

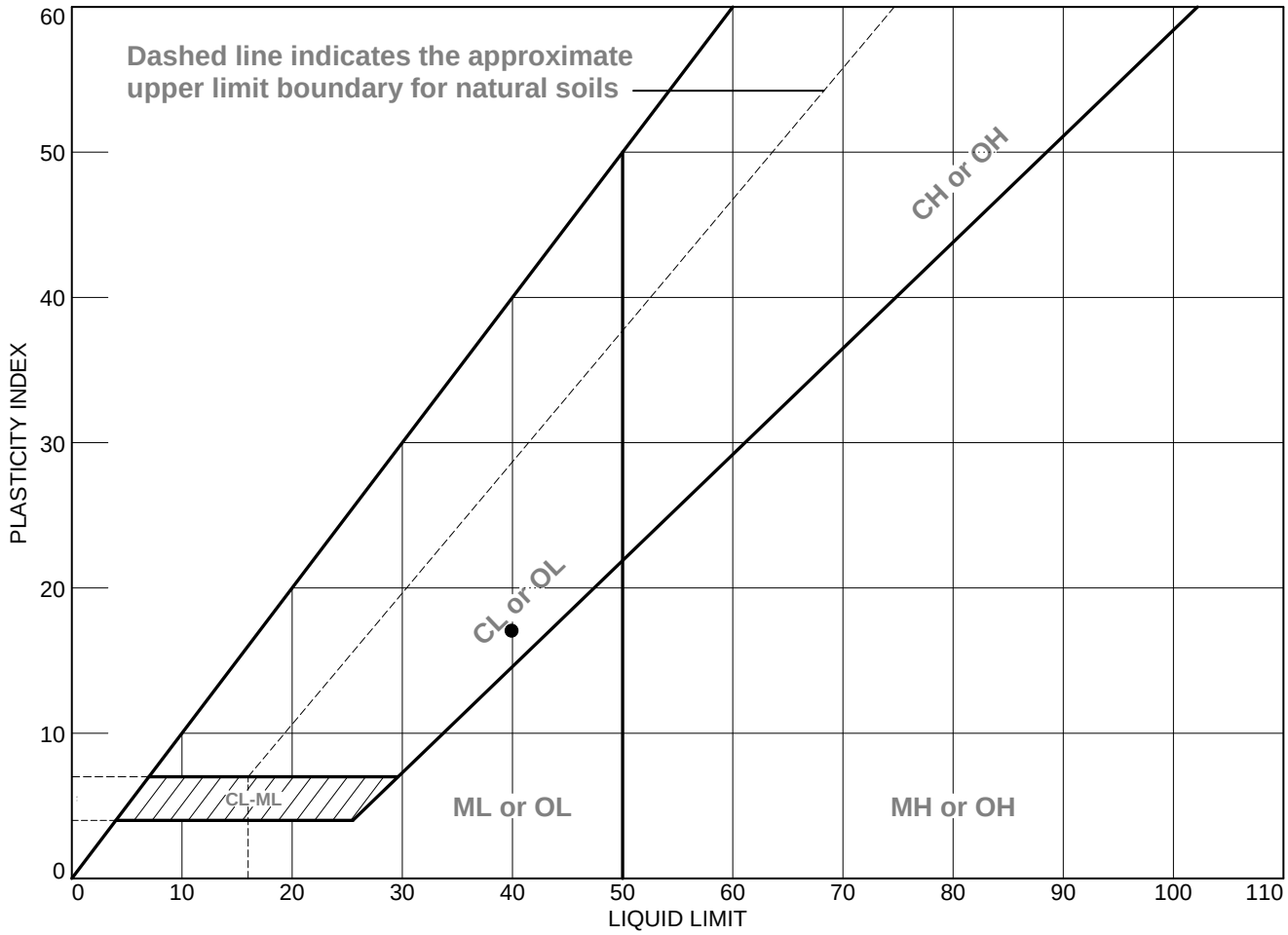
Fractional Components

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	0.0	2.6	2.6	5.1	9.8	21.0	35.9			61.5

D_5	D_{10}	D_{15}	D_{20}	D_{30}	D_{40}	D_{50}	D_{60}	D_{80}	D_{85}	D_{90}	D_{95}
								0.3119	0.6046	1.3526	3.1374

Fineness Modulus
0.84

LIQUID AND PLASTIC LIMITS TEST REPORT



SOIL DATA

SYMBOL	SOURCE	SAMPLE NO.	DEPTH	NATURAL WATER CONTENT (%)	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	USCS
●	B320	SS-4	8.5 - 10	NR	23	40	17	CL
■	B320	SS-14	58.5 - 60	NR	NP	NV	NP	ML

Client: Duke Energy
Project: Dan River Steam Station Ash Removal
Project No.: 7810140065 **Figure**

Tested By: D. Kopitsky **Checked By:** T. Landis

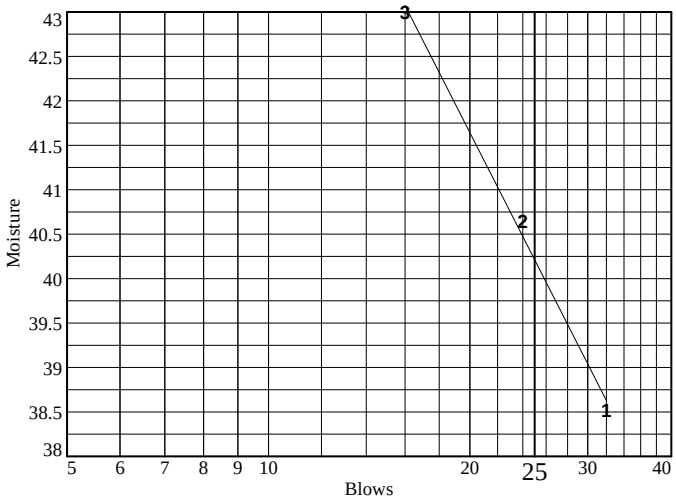
LIQUID AND PLASTIC LIMIT TEST DATA

5/27/2015

Client: Duke Energy
Project: Dan River Steam Station Ash Removal
Project Number: 7810140065
Location: B320
Depth: 8.5 - 10 **Sample Number:** SS-4
Material Description: Olive Gray Sandy Lean Clay
USCS: CL **AASHTO:** A-6(9)
Tested by: D. Kopitsky **Checked by:** T. Landis

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	36.95	36.42	36.67			
Dry+Tare	31.16	30.57	30.53			
Tare	16.13	16.18	16.25			
# Blows	32	24	16			
Moisture	38.5	40.7	43.0			



Liquid Limit= 40
Plastic Limit= 23
Plasticity Index= 17
Natural Moisture= NR

Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	17.65	17.58			
Dry+Tare	16.4	16.29			
Tare	10.9	10.7			
Moisture	22.7	23.1			

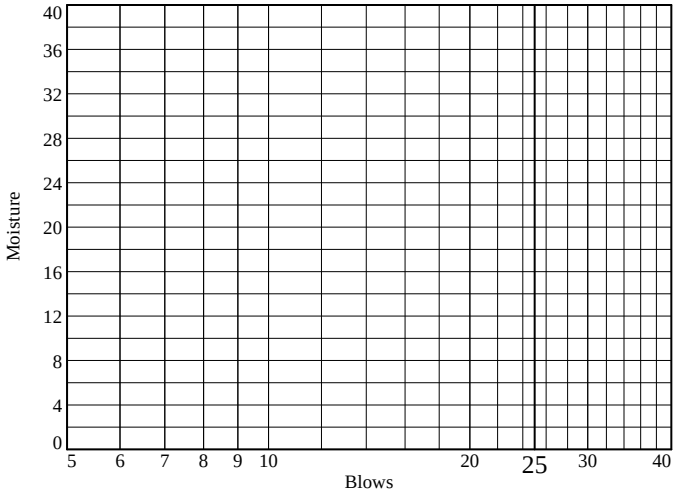
LIQUID AND PLASTIC LIMIT TEST DATA

5/27/2015

Client: Duke Energy
Project: Dan River Steam Station Ash Removal
Project Number: 7810140065
Location: B320
Depth: 58.5 - 60 **Sample Number:** SS-14
Material Description: Dark Gray CCR Material
USCS: ML **AASHTO:** A-4(0)
Tested by: D. Kopitsky **Checked by:** T. Landis

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare						
Dry+Tare						
Tare						
# Blows						
Moisture						

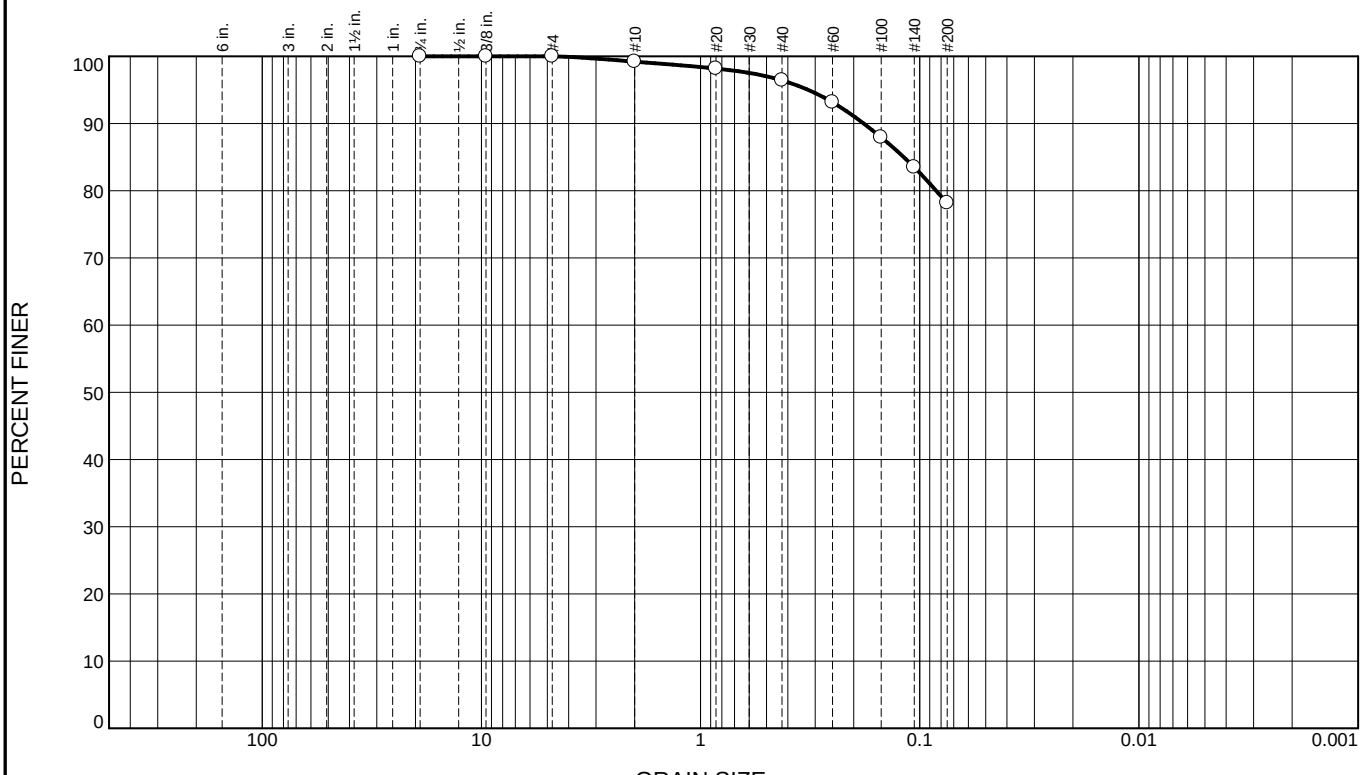


Liquid Limit= NV
Plastic Limit= NP
Plasticity Index= NP
Natural Moisture= NR

Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare					
Dry+Tare					
Tare					
Moisture					

Particle Size Analysis ASTM D422



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.8	2.8	18.2	78.2	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/4	100.0		
3/8	100.0		
#4	100.0		
#10	99.2		
#20	98.2		
#40	96.4		
#60	93.1		
#100	87.9		
#140	83.5		
#200	78.2		

* (no specification provided)

Soil Description

Dark Gray CCR Material

Atterberg Limits

PL= NP LL= NV PI= NP

Coefficients

D_{90}= 0.1803 D_{85}= 0.1184 D_{60}=
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= ML AASHTO= A-4(0)

Remarks

Ash from Ash Fill 1

Source of Sample: B320 **Depth:** 58.5 - 60
Sample Number: SS-14 **Date:** 12-12-14

Client: Duke Energy
Project: Dan River Steam Station Ash Removal
Project No: 7810140065 **Figure**

Tested By: D. Kopitsky **Checked By:** T. Landis

GRAIN SIZE DISTRIBUTION TEST DATA

5/27/2015

Client: Duke Energy
Project: Dan River Steam Station Ash Removal
Project Number: 7810140065
Location: B320
Depth: 58.5 - 60 **Sample Number:** SS-14
Material Description: Dark Gray CCR Material
Date: 12-12-14 **PL:** NP **LL:** NV **PI:** NP
USCS Classification: ML **AASHTO Classification:** A-4(0)
Testing Remarks: Ash from Ash Fill 1
Tested by: D. Kopitsky **Checked by:** T. Landis

Sieve Test Data

Dry Sample and Tare (grams)	Tare (grams)	Cumulative Pan Tare Weight (grams)	Sieve Opening Size	Cumulative Weight Retained (grams)	Percent Finer
106.36	0.00	0.00	3/4	0.00	100.0
			3/8	0.00	100.0
			#4	0.00	100.0
			#10	0.85	99.2
			#20	1.95	98.2
			#40	3.81	96.4
			#60	7.29	93.1
			#100	12.84	87.9
			#140	17.56	83.5
			#200	23.23	78.2

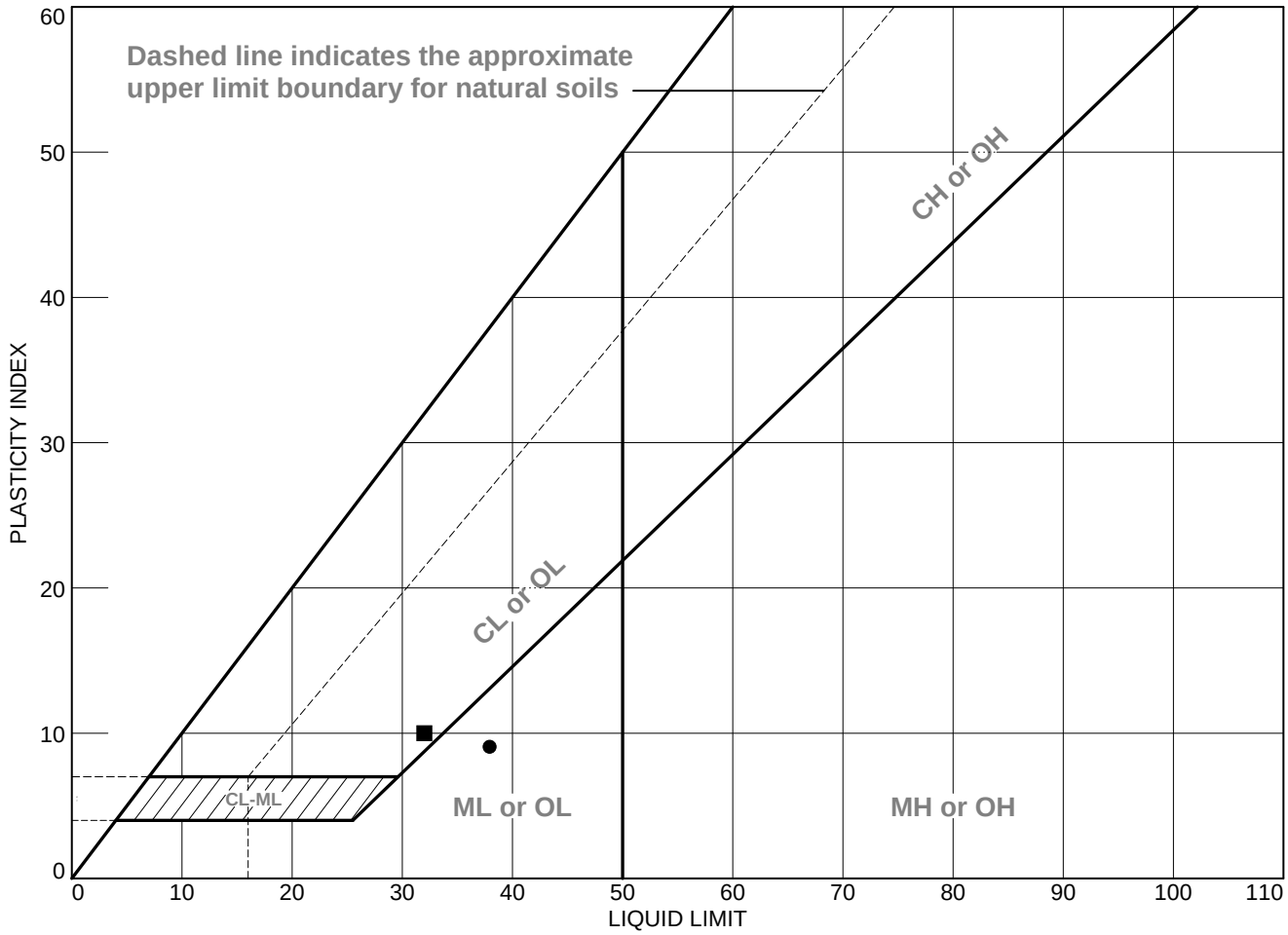
Fractional Components

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	0.0	0.0	0.0	0.8	2.8	18.2	21.8			78.2

D_5	D_{10}	D_{15}	D_{20}	D_{30}	D_{40}	D_{50}	D_{60}	D_{80}	D_{85}	D_{90}	D_{95}
								0.0842	0.1184	0.1803	0.3230

Fineness Modulus
0.22

LIQUID AND PLASTIC LIMITS TEST REPORT



SOIL DATA

SYMBOL	SOURCE	SAMPLE NO.	DEPTH	NATURAL WATER CONTENT (%)	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	USCS
●	B322	B322	38.5 - 48.5	NR	29	38	9	ML
■	B322	SS-6	18.5 - 20	NR	22	32	10	CL
▲	B322	SS-16	68.5 - 70	NR	NP	NV	NP	ML

amec

Client: Duke Energy
Project: Dan River Steam Station Ash Removal

Project No.: 7810140065 **Figure**

Tested By: D. Kopitsky **Checked By:** T. Landis

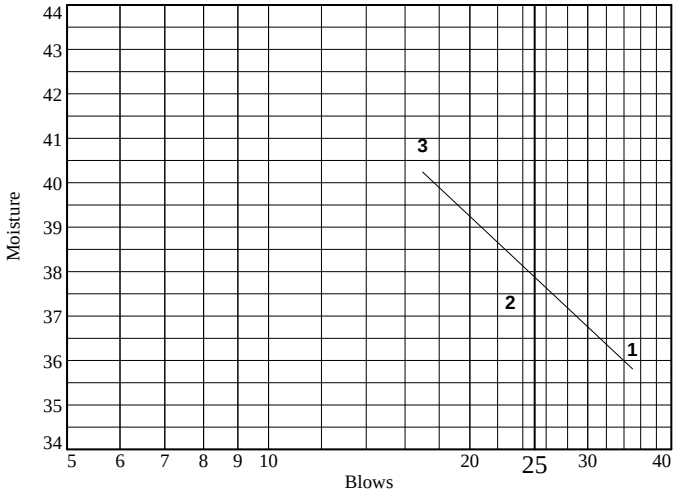
LIQUID AND PLASTIC LIMIT TEST DATA

5/27/2015

Client: Duke Energy
Project: Dan River Steam Station Ash Removal
Project Number: 7810140065
Location: B322
Depth: 38.5 - 48.5 **Sample Number:** B322
Material Description: Dark Gray CCR Material
USCS: ML **AASHTO:** A-4(6)
Tested by: D. Kopitsky **Checked by:** T. Landis

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	35.76	35.53	35.45			
Dry+Tare	30.55	30.26	29.84			
Tare	16.18	16.14	16.11			
# Blows	35	23	17			
Moisture	36.3	37.3	40.9			



Liquid Limit= 38
Plastic Limit= 29
Plasticity Index= 9
Natural Moisture= NR

Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	17.6	18.46			
Dry+Tare	16.04	16.85			
Tare	10.79	11.34			
Moisture	29.7	29.2			

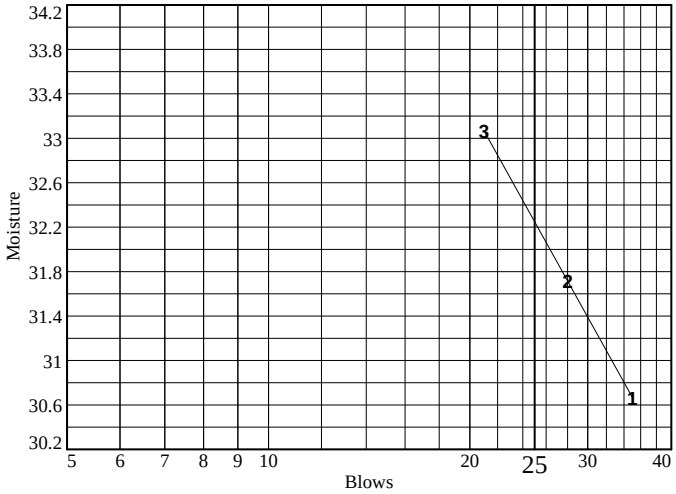
LIQUID AND PLASTIC LIMIT TEST DATA

5/27/2015

Client: Duke Energy
Project: Dan River Steam Station Ash Removal
Project Number: 7810140065
Location: B322
Depth: 18.5 - 20 **Sample Number:** SS-6
Material Description: Dark Gray-Brown & Black Sandy Lean Clay
USCS: CL **AASHTO:** A-4(5)
Tested by: D. Kopitsky **Checked by:** T. Landis

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	38.15	36.39	36.21			
Dry+Tare	32.98	31.55	31.23			
Tare	16.12	16.29	16.17			
# Blows	35	28	21			
Moisture	30.7	31.7	33.1			



Liquid Limit= 32
Plastic Limit= 22
Plasticity Index= 10
Natural Moisture= NR

Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	18.22	17.94			
Dry+Tare	17.03	16.68			
Tare	11.42	11			
Moisture	21.2	22.2			

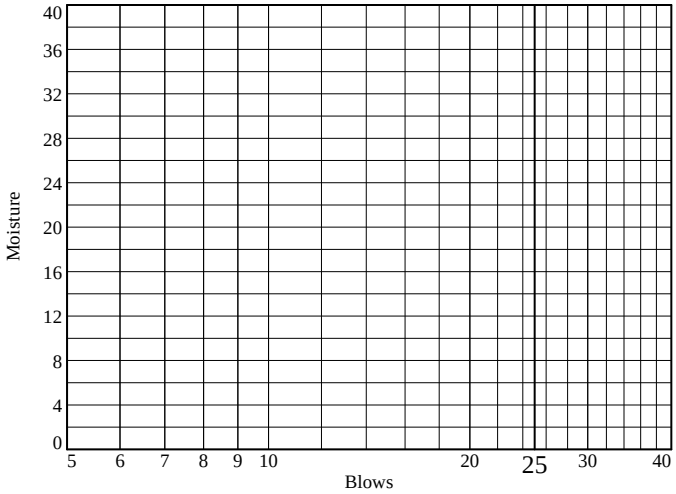
LIQUID AND PLASTIC LIMIT TEST DATA

5/27/2015

Client: Duke Energy
Project: Dan River Steam Station Ash Removal
Project Number: 7810140065
Location: B322
Depth: 68.5 - 70 **Sample Number:** SS-16
Material Description: Dark Gray CCR Material
USCS: ML **AASHTO:** A-4(0)
Tested by: D. Kopitsky **Checked by:** T. Landis

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare						
Dry+Tare						
Tare						
# Blows						
Moisture						

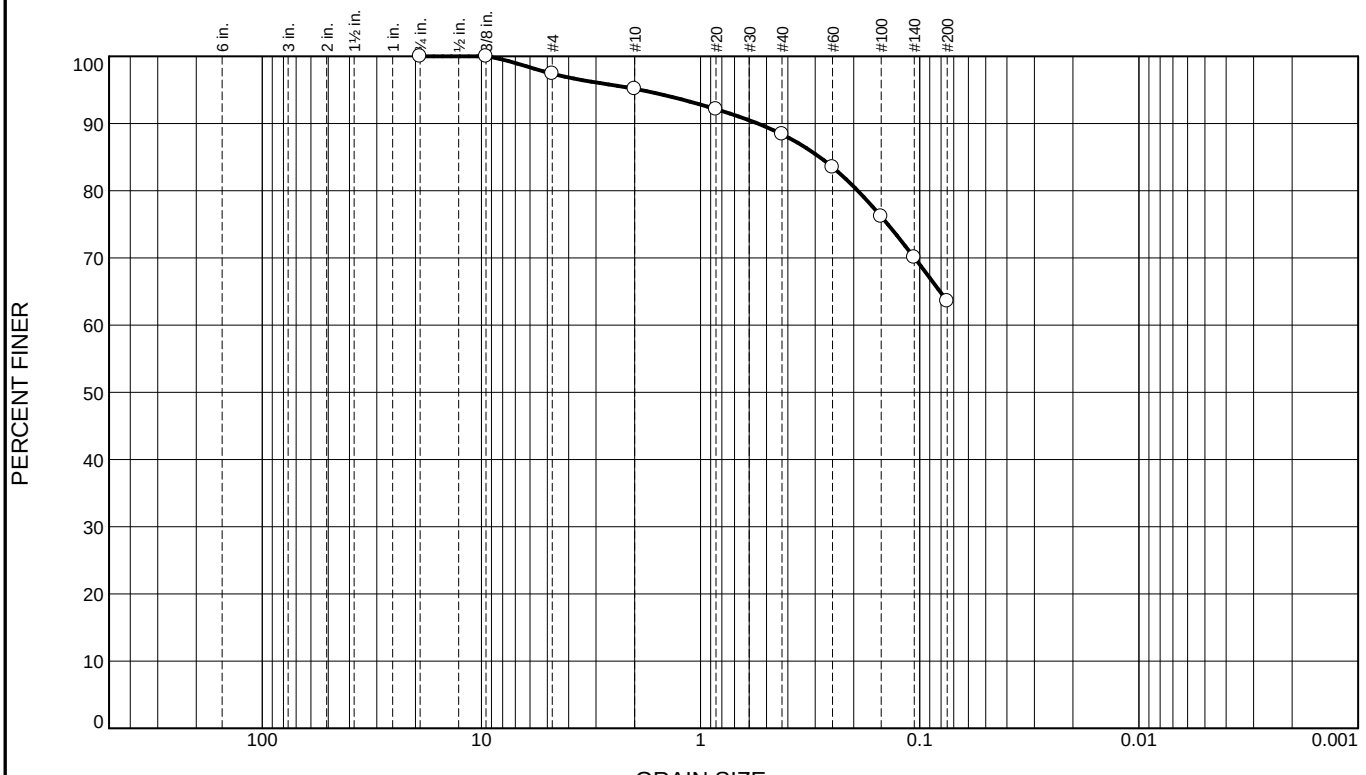


Liquid Limit= NV
Plastic Limit= NP
Plasticity Index= NP
Natural Moisture= NR

Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare					
Dry+Tare					
Tare					
Moisture					

Particle Size Analysis ASTM D422



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	2.6	2.2	6.8	24.8	63.6	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/4	100.0		
3/8	100.0		
#4	97.4		
#10	95.2		
#20	92.1		
#40	88.4		
#60	83.5		
#100	76.2		
#140	70.1		
#200	63.6		

* (no specification provided)

Soil Description

Dark Gray-Brown & Black Sandy Lean Clay

Atterberg Limits

PL= 22 LL= 32 PI= 10

Coefficients

D_{90}= 0.5490 D_{85}= 0.2865 D_{60}=
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= CL AASHTO= A-4(5)

Remarks

Fill from Ash Fill 1

Source of Sample: B322 **Depth:** 18.5 - 20
Sample Number: SS-6 **Date:** 12-12-14

amec

Client: Duke Energy
Project: Dan River Steam Station Ash Removal
Project No: 7810140065 **Figure**

Tested By: D. Kopitsky **Checked By:** T. Landis

GRAIN SIZE DISTRIBUTION TEST DATA

5/27/2015

Client: Duke Energy
Project: Dan River Steam Station Ash Removal
Project Number: 7810140065
Location: B322
Depth: 18.5 - 20 **Sample Number:** SS-6
Material Description: Dark Gray-Brown & Black Sandy Lean Clay
Date: 12-12-14 **PL:** 22 **LL:** 32 **PI:** 10
USCS Classification: CL **AASHTO Classification:** A-4(5)
Testing Remarks: Fill from Ash Fill 1
Tested by: D. Kopitsky **Checked by:** T. Landis

Sieve Test Data

Dry Sample and Tare (grams)	Tare (grams)	Cumulative Pan Tare Weight (grams)	Sieve Opening Size	Cumulative Weight Retained (grams)	Percent Finer
133.83	0.00	0.00	3/4	0.00	100.0
			3/8	0.00	100.0
			#4	3.48	97.4
			#10	6.47	95.2
			#20	10.55	92.1
			#40	15.54	88.4
			#60	22.09	83.5
			#100	31.90	76.2
			#140	40.07	70.1
			#200	48.74	63.6

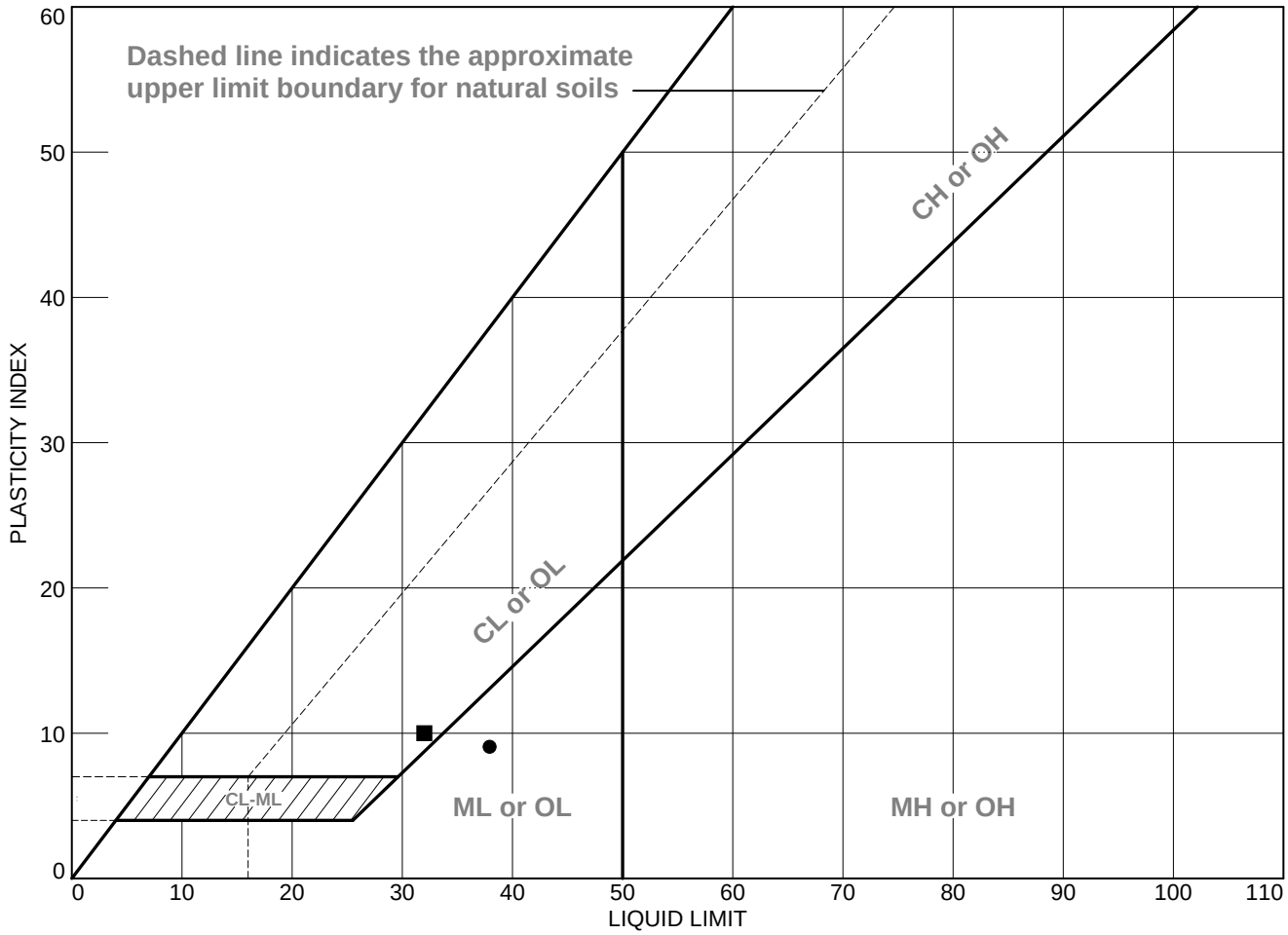
Fractional Components

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	0.0	2.6	2.6	2.2	6.8	24.8	33.8			63.6

D_5	D_{10}	D_{15}	D_{20}	D_{30}	D_{40}	D_{50}	D_{60}	D_{80}	D_{85}	D_{90}	D_{95}
								0.1919	0.2865	0.5490	1.8811

Fineness Modulus
0.61

LIQUID AND PLASTIC LIMITS TEST REPORT



SOIL DATA

SYMBOL	SOURCE	SAMPLE NO.	DEPTH	NATURAL WATER CONTENT (%)	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	USCS
●	B322	B322	38.5 - 48.5	NR	29	38	9	ML
■	B322	SS-6	18.5 - 20	NR	22	32	10	CL
▲	B322	SS-16	68.5 - 70	NR	NP	NV	NP	ML

amec

Client: Duke Energy
Project: Dan River Steam Station Ash Removal

Project No.: 7810140065 **Figure**

Tested By: D. Kopitsky **Checked By:** T. Landis

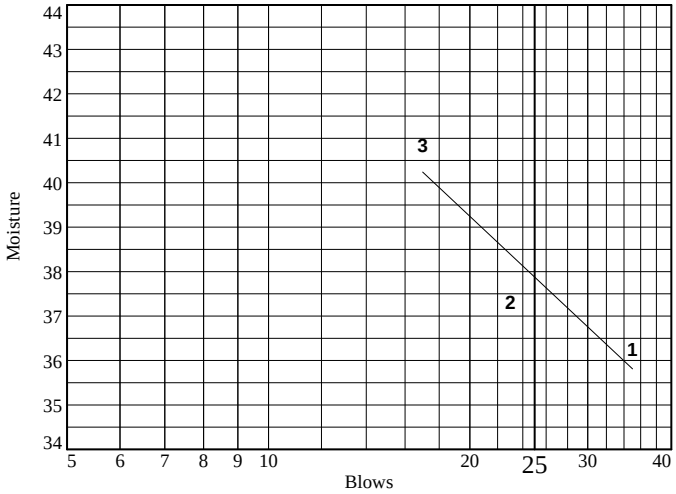
LIQUID AND PLASTIC LIMIT TEST DATA

5/27/2015

Client: Duke Energy
Project: Dan River Steam Station Ash Removal
Project Number: 7810140065
Location: B322
Depth: 38.5 - 48.5 **Sample Number:** B322
Material Description: Dark Gray CCR Material
USCS: ML **AASHTO:** A-4(6)
Tested by: D. Kopitsky **Checked by:** T. Landis

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	35.76	35.53	35.45			
Dry+Tare	30.55	30.26	29.84			
Tare	16.18	16.14	16.11			
# Blows	35	23	17			
Moisture	36.3	37.3	40.9			



Liquid Limit= 38
Plastic Limit= 29
Plasticity Index= 9
Natural Moisture= NR

Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	17.6	18.46			
Dry+Tare	16.04	16.85			
Tare	10.79	11.34			
Moisture	29.7	29.2			

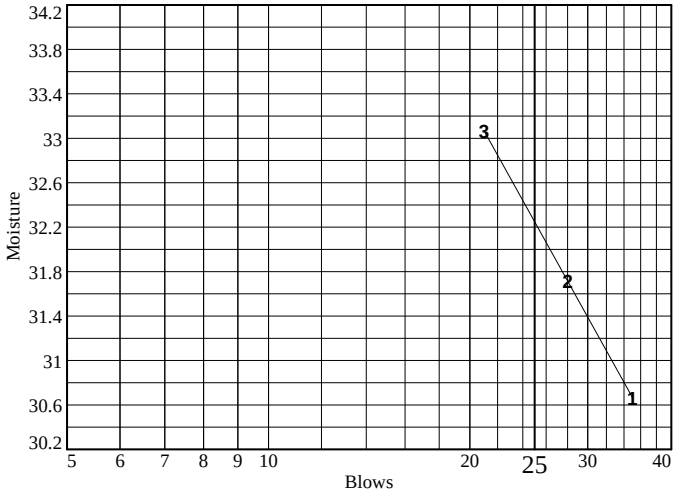
LIQUID AND PLASTIC LIMIT TEST DATA

5/27/2015

Client: Duke Energy
Project: Dan River Steam Station Ash Removal
Project Number: 7810140065
Location: B322
Depth: 18.5 - 20 **Sample Number:** SS-6
Material Description: Dark Gray-Brown & Black Sandy Lean Clay
USCS: CL **AASHTO:** A-4(5)
Tested by: D. Kopitsky **Checked by:** T. Landis

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	38.15	36.39	36.21			
Dry+Tare	32.98	31.55	31.23			
Tare	16.12	16.29	16.17			
# Blows	35	28	21			
Moisture	30.7	31.7	33.1			



Liquid Limit= 32
Plastic Limit= 22
Plasticity Index= 10
Natural Moisture= NR

Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	18.22	17.94			
Dry+Tare	17.03	16.68			
Tare	11.42	11			
Moisture	21.2	22.2			

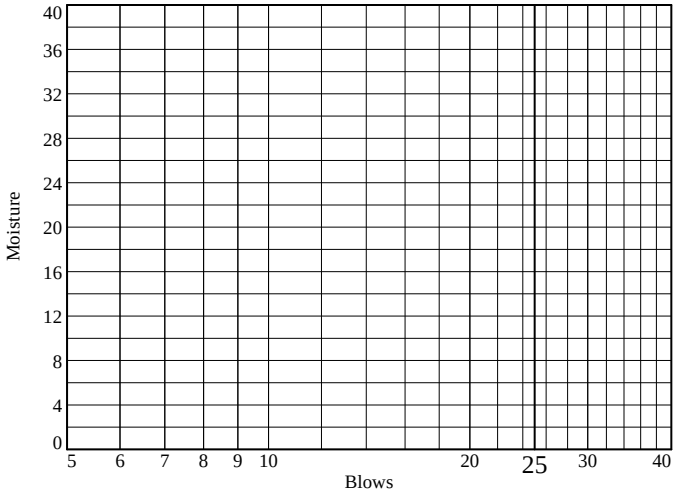
LIQUID AND PLASTIC LIMIT TEST DATA

5/27/2015

Client: Duke Energy
Project: Dan River Steam Station Ash Removal
Project Number: 7810140065
Location: B322
Depth: 68.5 - 70 **Sample Number:** SS-16
Material Description: Dark Gray CCR Material
USCS: ML **AASHTO:** A-4(0)
Tested by: D. Kopitsky **Checked by:** T. Landis

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare						
Dry+Tare						
Tare						
# Blows						
Moisture						

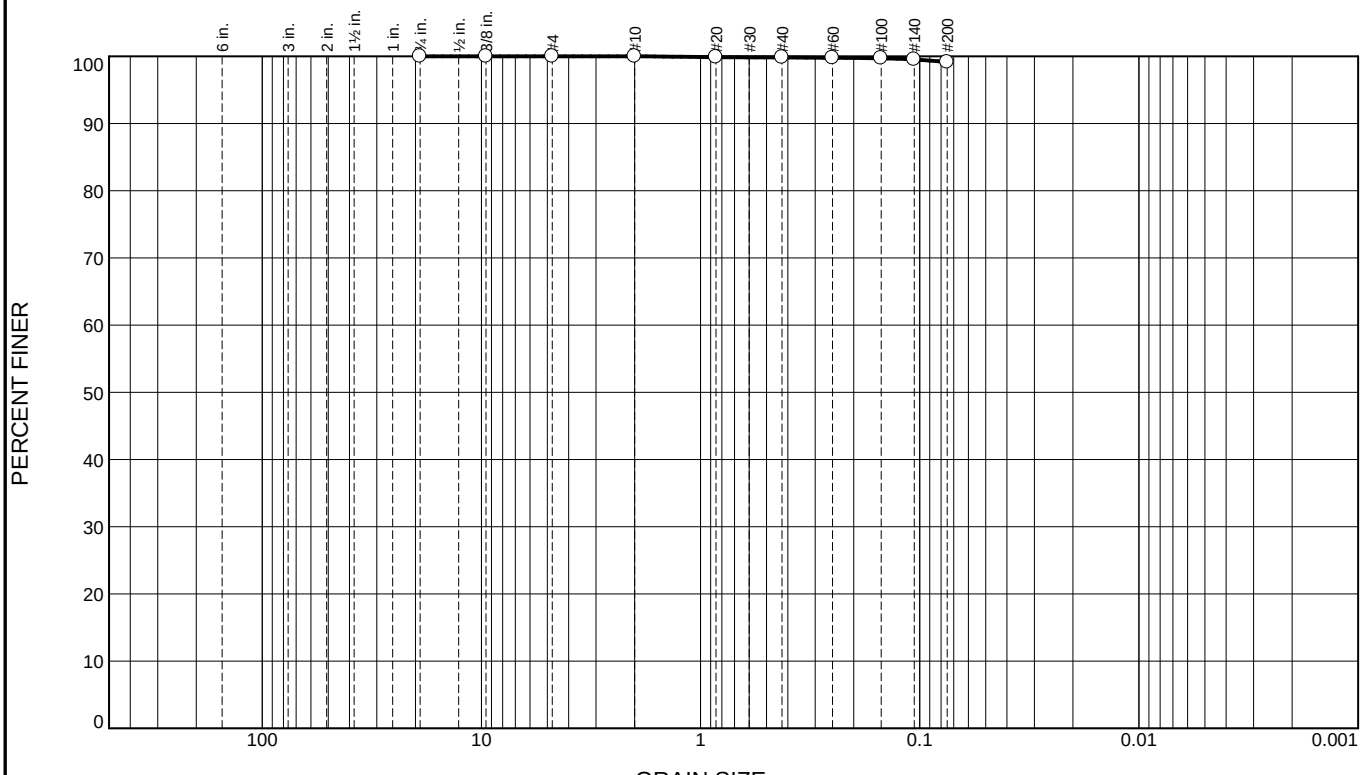


Liquid Limit= NV
Plastic Limit= NP
Plasticity Index= NP
Natural Moisture= NR

Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare					
Dry+Tare					
Tare					
Moisture					

Particle Size Analysis ASTM D422



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	0.2	0.7	99.1	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/4	100.0		
3/8	100.0		
#4	100.0		
#10	100.0		
#20	99.9		
#40	99.8		
#60	99.8		
#100	99.7		
#140	99.5		
#200	99.1		

* (no specification provided)

Soil Description

Dark Gray CCR Material

Atterberg Limits

PL= NP LL= NV PI= NP

Coefficients

D_{90}= D_{85}= D_{60}=
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= ML AASHTO= A-4(0)

Remarks

Ash from Ash Fill 1

Source of Sample: B322 **Depth:** 68.5 - 70
Sample Number: SS-16 **Date:** 12-12-14

amec

Client: Duke Energy
Project: Dan River Steam Station Ash Removal
Project No: 7810140065 **Figure**

Tested By: D. Kopitsky **Checked By:** T. Landis

GRAIN SIZE DISTRIBUTION TEST DATA

5/27/2015

Client: Duke Energy
Project: Dan River Steam Station Ash Removal
Project Number: 7810140065
Location: B322
Depth: 68.5 - 70 **Sample Number:** SS-16
Material Description: Dark Gray CCR Material
Date: 12-12-14 **PL:** NP **LL:** NV **PI:** NP
USCS Classification: ML **AASHTO Classification:** A-4(0)
Testing Remarks: Ash from Ash Fill 1
Tested by: D. Kopitsky **Checked by:** T. Landis

Sieve Test Data

Dry Sample and Tare (grams)	Tare (grams)	Cumulative Pan Tare Weight (grams)	Sieve Opening Size	Cumulative Weight Retained (grams)	Percent Finer
82.91	0.00	0.00	3/4	0.00	100.0
			3/8	0.00	100.0
			#4	0.00	100.0
			#10	0.00	100.0
			#20	0.11	99.9
			#40	0.15	99.8
			#60	0.19	99.8
			#100	0.25	99.7
			#140	0.39	99.5
			#200	0.72	99.1

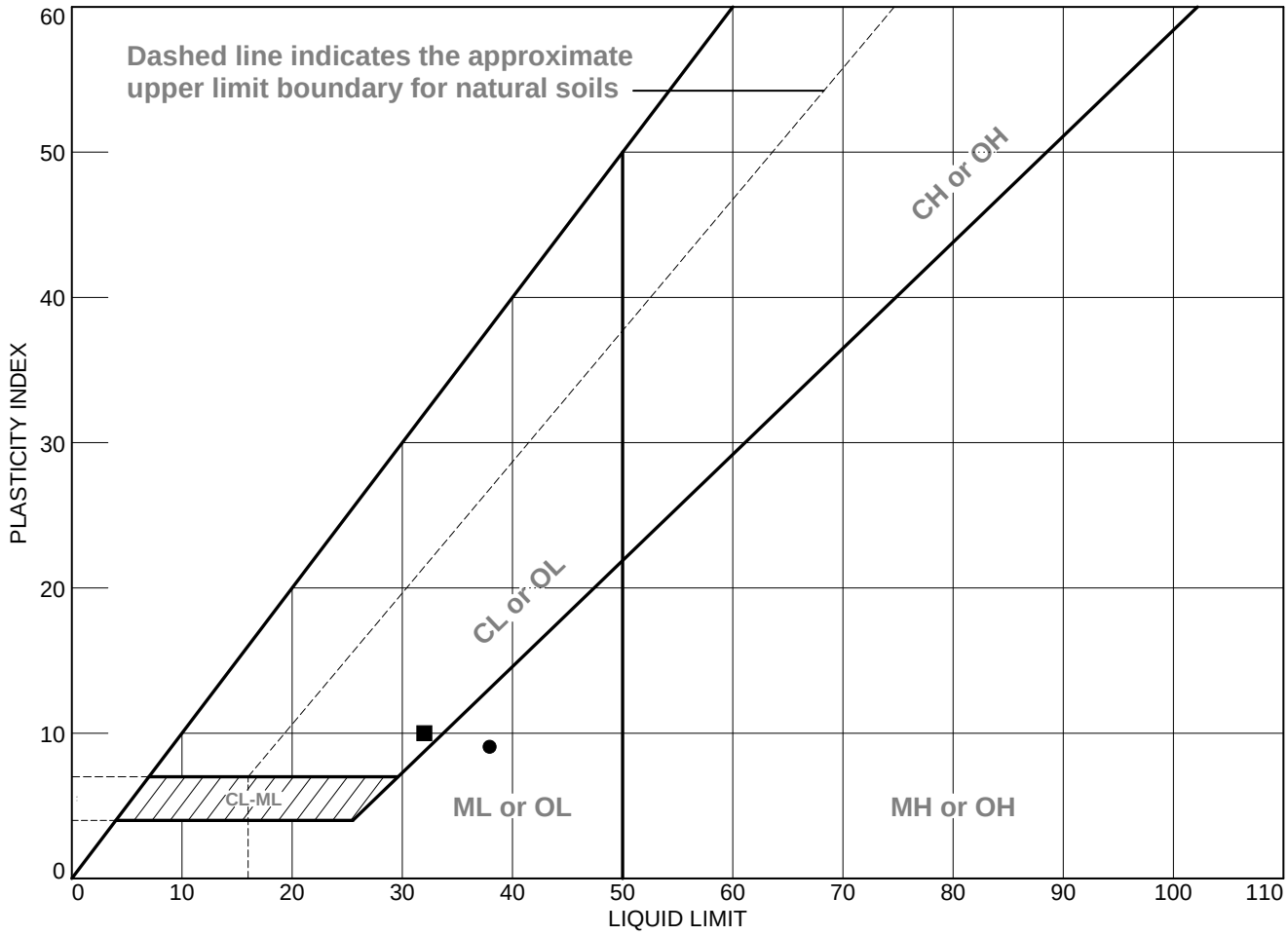
Fractional Components

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	0.0	0.0	0.0	0.0	0.2	0.7	0.9			99.1

D_5	D_{10}	D_{15}	D_{20}	D_{30}	D_{40}	D_{50}	D_{60}	D_{80}	D_{85}	D_{90}	D_{95}

Fineness Modulus
0.01

LIQUID AND PLASTIC LIMITS TEST REPORT



SOIL DATA

SYMBOL	SOURCE	SAMPLE NO.	DEPTH	NATURAL WATER CONTENT (%)	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	USCS
●	B322	B322	38.5 - 48.5	NR	29	38	9	ML
■	B322	SS-6	18.5 - 20	NR	22	32	10	CL
▲	B322	SS-16	68.5 - 70	NR	NP	NV	NP	ML

amec

Client: Duke Energy
Project: Dan River Steam Station Ash Removal

Project No.: 7810140065 **Figure**

Tested By: D. Kopitsky **Checked By:** T. Landis

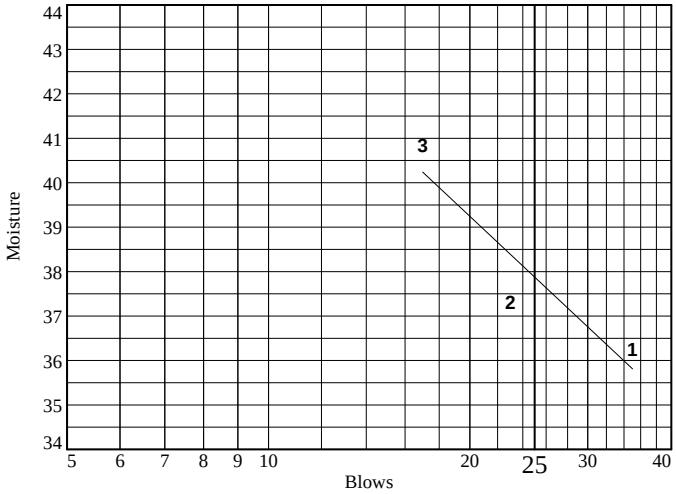
LIQUID AND PLASTIC LIMIT TEST DATA

5/27/2015

Client: Duke Energy
Project: Dan River Steam Station Ash Removal
Project Number: 7810140065
Location: B322
Depth: 38.5 - 48.5 **Sample Number:** B322
Material Description: Dark Gray CCR Material
USCS: ML **AASHTO:** A-4(6)
Tested by: D. Kopitsky **Checked by:** T. Landis

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	35.76	35.53	35.45			
Dry+Tare	30.55	30.26	29.84			
Tare	16.18	16.14	16.11			
# Blows	35	23	17			
Moisture	36.3	37.3	40.9			



Liquid Limit= 38
Plastic Limit= 29
Plasticity Index= 9
Natural Moisture= NR

Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	17.6	18.46			
Dry+Tare	16.04	16.85			
Tare	10.79	11.34			
Moisture	29.7	29.2			

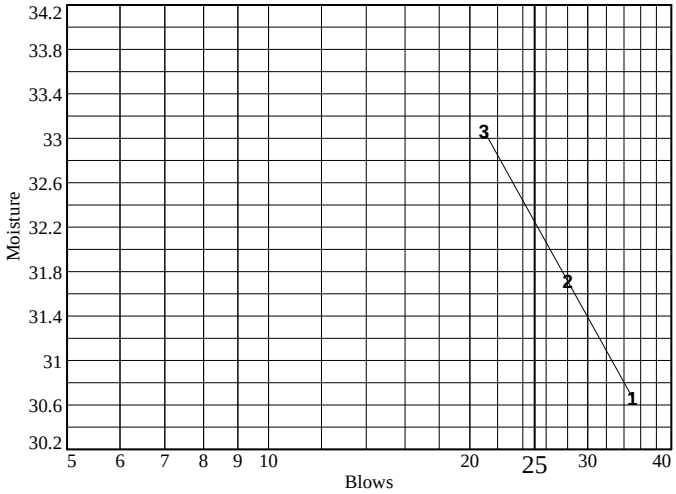
LIQUID AND PLASTIC LIMIT TEST DATA

5/27/2015

Client: Duke Energy
Project: Dan River Steam Station Ash Removal
Project Number: 7810140065
Location: B322
Depth: 18.5 - 20 **Sample Number:** SS-6
Material Description: Dark Gray-Brown & Black Sandy Lean Clay
USCS: CL **AASHTO:** A-4(5)
Tested by: D. Kopitsky **Checked by:** T. Landis

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	38.15	36.39	36.21			
Dry+Tare	32.98	31.55	31.23			
Tare	16.12	16.29	16.17			
# Blows	35	28	21			
Moisture	30.7	31.7	33.1			



Liquid Limit= 32
Plastic Limit= 22
Plasticity Index= 10
Natural Moisture= NR

Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	18.22	17.94			
Dry+Tare	17.03	16.68			
Tare	11.42	11			
Moisture	21.2	22.2			

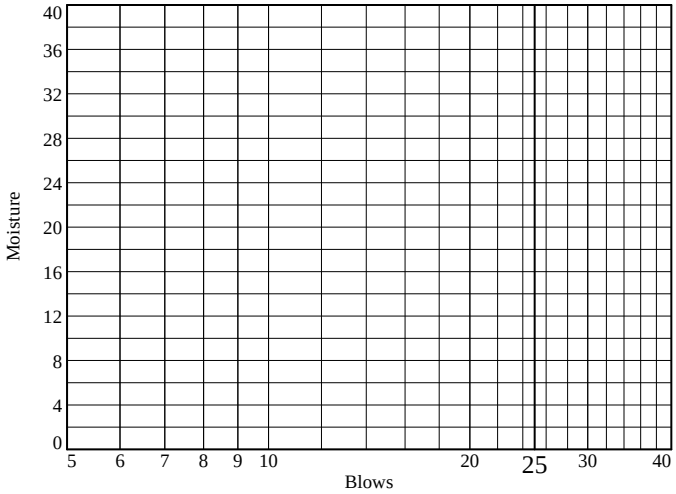
LIQUID AND PLASTIC LIMIT TEST DATA

5/27/2015

Client: Duke Energy
Project: Dan River Steam Station Ash Removal
Project Number: 7810140065
Location: B322
Depth: 68.5 - 70 **Sample Number:** SS-16
Material Description: Dark Gray CCR Material
USCS: ML **AASHTO:** A-4(0)
Tested by: D. Kopitsky **Checked by:** T. Landis

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare						
Dry+Tare						
Tare						
# Blows						
Moisture						

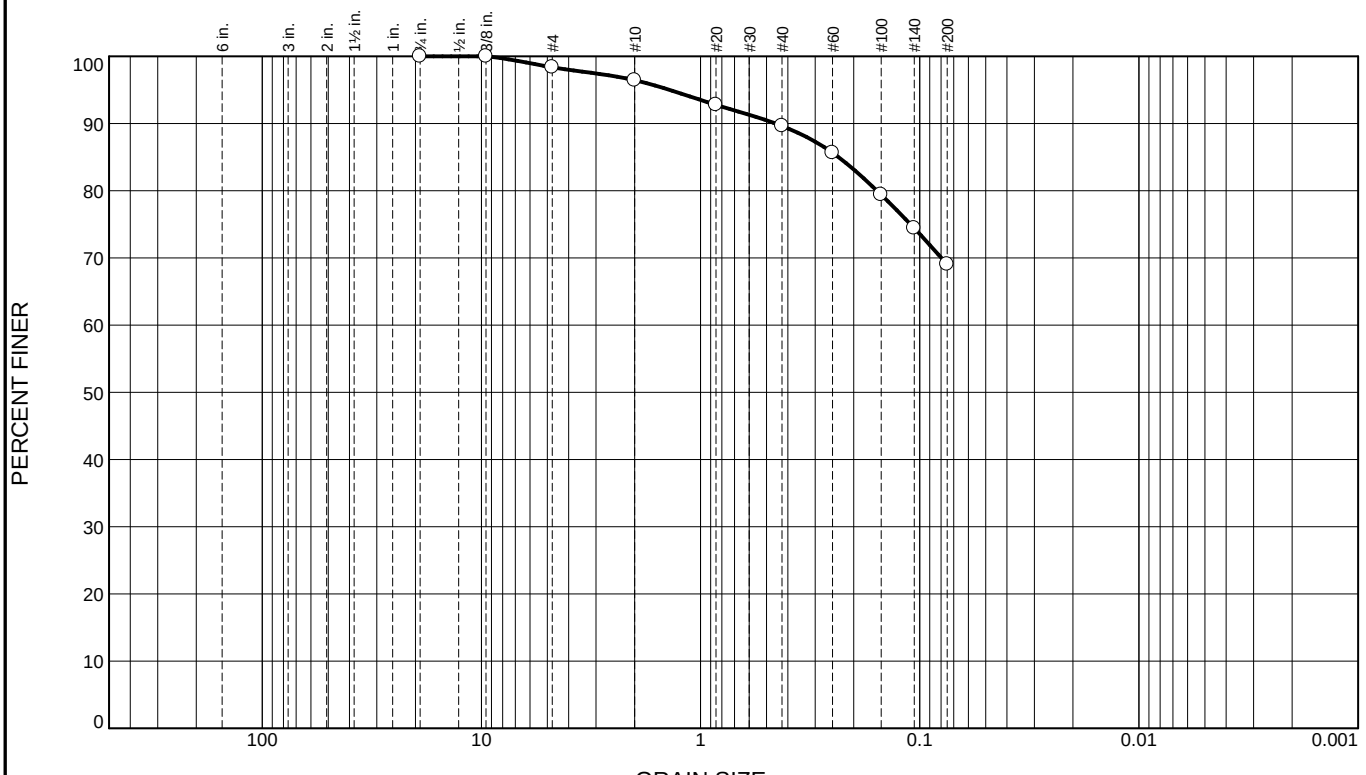


Liquid Limit= NV
Plastic Limit= NP
Plasticity Index= NP
Natural Moisture= NR

Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare					
Dry+Tare					
Tare					
Moisture					

Particle Size Analysis ASTM D422



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	1.6	2.0	6.8	20.5	69.1	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/4	100.0		
3/8	100.0		
#4	98.4		
#10	96.4		
#20	92.8		
#40	89.6		
#60	85.6		
#100	79.4		
#140	74.4		
#200	69.1		

* (no specification provided)

Soil Description

Dark Gray CCR Material

Atterberg Limits

PL= 29 LL= 38 PI= 9

Coefficients

D_{90}= 0.4558 D_{85}= 0.2350 D_{60}=
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= ML AASHTO= A-4(6)

Remarks

Ash from Ash Fill 2
Specific Gravity = 2.412

Source of Sample: B322 **Depth:** 38.5 - 48.5
Sample Number: B322 **Date:** 12-9-14

amec

Client: Duke Energy
Project: Dan River Steam Station Ash Removal
Project No: 7810140065 **Figure**

Tested By: D. Kopitsky **Checked By:** T. Landis

GRAIN SIZE DISTRIBUTION TEST DATA

5/27/2015

Client: Duke Energy
Project: Dan River Steam Station Ash Removal
Project Number: 7810140065
Location: B322
Depth: 38.5 - 48.5 **Sample Number:** B322
Material Description: Dark Gray CCR Material
Date: 12-9-14 **PL:** 29 **LL:** 38 **PI:** 9
USCS Classification: ML **AASHTO Classification:** A-4(6)
Testing Remarks: Ash from Ash Fill 2
Specific Gravity = 2.412
Tested by: D. Kopitsky **Checked by:** T. Landis

Sieve Test Data

Dry Sample and Tare (grams)	Tare (grams)	Cumulative Pan Tare Weight (grams)	Sieve Opening Size	Cumulative Weight Retained (grams)	Percent Finer
128.58	0.00	0.00	3/4	0.00	100.0
			3/8	0.00	100.0
			#4	2.10	98.4
			#10	4.58	96.4
			#20	9.30	92.8
			#40	13.34	89.6
			#60	18.46	85.6
			#100	26.50	79.4
			#140	32.89	74.4
			#200	39.79	69.1

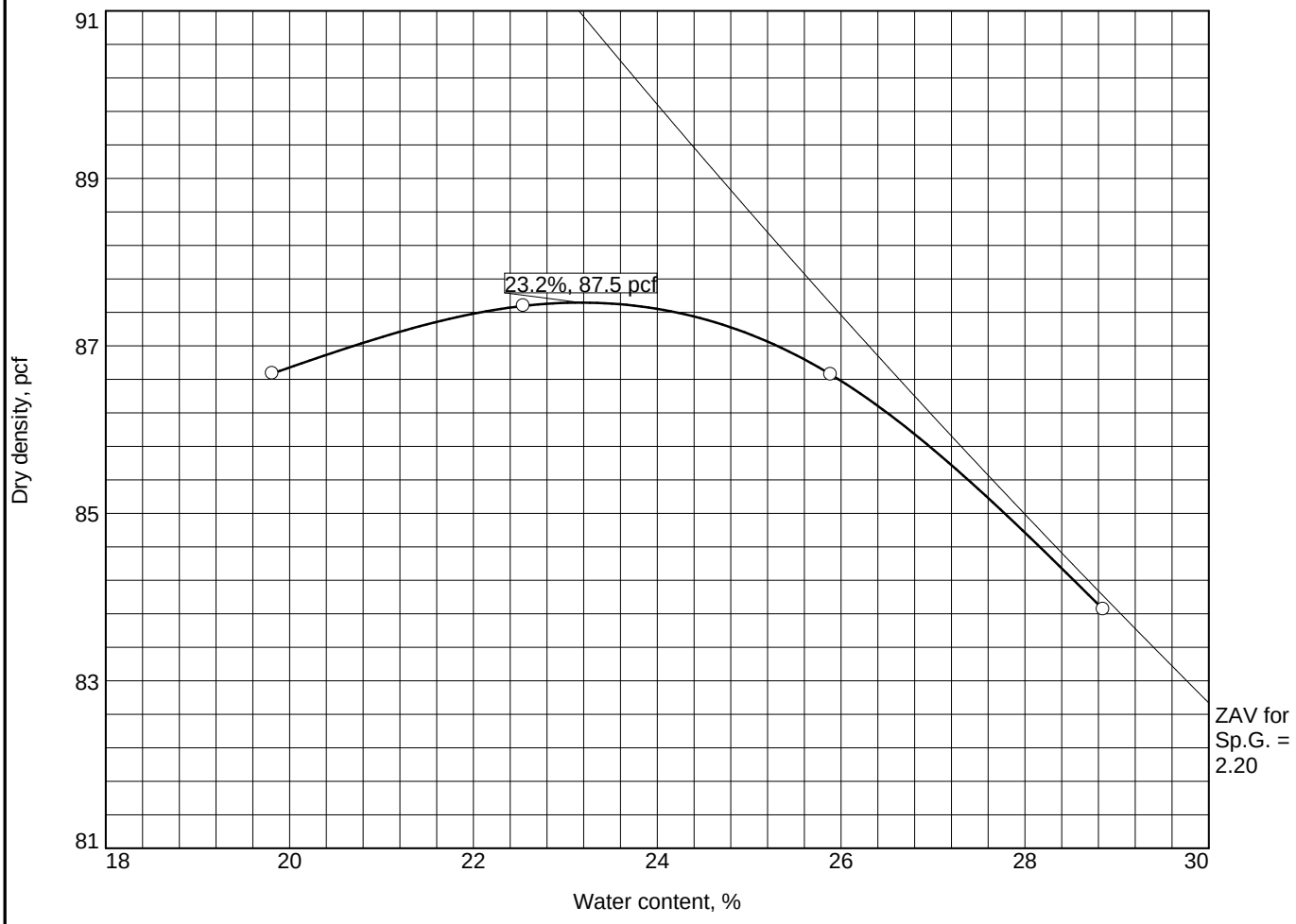
Fractional Components

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	0.0	1.6	1.6	2.0	6.8	20.5	29.3			69.1

D_5	D_{10}	D_{15}	D_{20}	D_{30}	D_{40}	D_{50}	D_{60}	D_{80}	D_{85}	D_{90}	D_{95}
								0.1569	0.2350	0.4558	1.3850

Fineness Modulus
0.52

COMPACTION TEST REPORT



Test specification: ASTM D 698-07 Method A Standard

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > #4	% < No.200
	USCS	AASHTO						
38.5 - 48.5	ML	A-4(6)	NR	2.412	38	9	1.6	69.1

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 87.5 pcf Optimum moisture = 23.2 %	Dark Gray CCR Material
Project No. 7810140065 **Client:** Duke Energy **Project:** Dan River Steam Station Ash Removal ○**Source of Sample:** B322 **Sample Number:** B322	**Remarks:** Ash from Ash Fill 2 Specific Gravity = 2.412
amec	**Figure**

Tested By: M. Hamilton **Checked By:** D. Kopitsky

MOISTURE DENSITY TEST DATA

5/27/2015

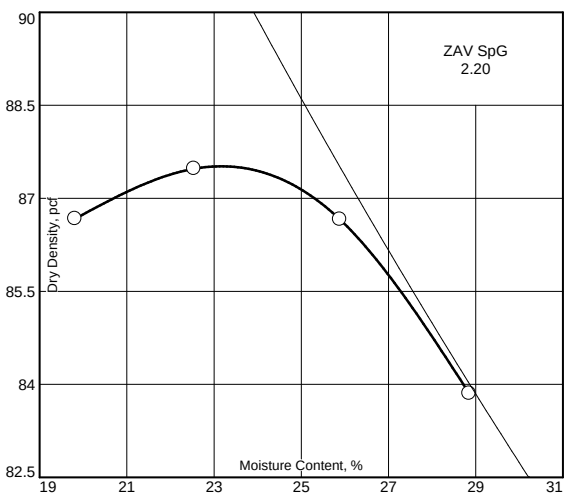
Client: Duke Energy
Project: Dan River Steam Station Ash Removal
Project Number: 7810140065
Location: B322
Depth: 38.5 - 48.5 **Sample Number:** B322
Description: Dark Gray CCR Material
USCS Classification: ML **AASHTO Classification:** A-4(6)
Natural Moisture: NR **Liquid Limit:** 38 **Plasticity Index:** 9
Testing Remarks: Ash from Ash Fill 2
Specific Gravity = 2.412
Tested by: M. Hamilton **Checked by:** D. Kopitsky
Percent passing #4 sieve: 98.4

Test Data and Results

Test Specification:

Type of Test: ASTM D 698-07 Method A Standard

Mold Dia: 4.00 **Hammer Wt.:** 5.5 lb. **Drop:** 12 in. **Layers:** three **Blows per Layer:** 25



Point No.	1	2	3	4
Wt. M+S	3651.2	3701.9	3730.5	3714.7
Wt. M	2082.7	2082.7	2082.7	2082.7
Wt. W+T	986.6	907.2	973.1	951.0
Wt. D+T	897.7	805.5	856.5	828.4
Tare	449.0	354.4	406.1	403.5
Moist.	19.8	22.5	25.9	28.9
Dry Den.	86.7	87.5	86.7	83.9

Test Results: **Max. Dry Den.=** 87.5 pcf **Opt. Moist.=** 23.2%

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SPECIFIC GRAVITY

ASTM D 854-10

Client	AMEC FOSTER WHEELER	Boring No.	B322
Client Reference	Dan River Steam Station Ash Removal	Depth (ft)	48.6-58.5
Project No.	2014-813-01	Sample No.	BULK
Lab ID	2014-813-01-02	Visual Description	**DARK GRAY ASH**
			(MInus No.4 sieve material, airdried)

Replicate Number	**1**	**2**
Pycnometer ID	R 445	R 446
Weight of Pycnometer + Soil + Water (gm)	699.16	712.93
Temperature, T (^{o}Celsius)	22.1	22.1
Weight of Pycnometer + Water (gm)	663.08	661.59
Tare Number	372	331
Weight of Tare + Dry Soil (gm)	167.85	192.02
Weight of Tare (gm)	103.83	100.97
Weight of Dry Soil (gm)	64.02	91.05
Specific Gravity of Soil @ T	2.292	2.293
Specific Gravity of Water @ T	0.9978	0.9978
Conversion Factor for Temperature T	0.9996	0.9996
Specific Gravity @ 20° Celsius	2.293	2.294

Average Specific Gravity @ 20° Celsius	2.29

Tested By *BW* *Date* *12/15/14* *Checked By* *GEM* *Date* *6/3/15*

DCN: CT-S5 Date: 03/24/05 Revision: 10R *T:\2014 PROJECTS\2014-813 AMEC - DAN RIVER STEAM\[2014-813-01-02 Specific Gravity Soils 1Ral..xls]Sheet1*

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ATTERBERG LIMITS

ASTM D 4318-10 / AASHTO T89-10

Client:	AMEC FOSTER WHEELER	Boring No.:	B322
Client Reference:	Dan River Steam Station Ash Removal	Depth (ft):	48.6-58.5
Project No.:	2014-813-01	Sample No.:	BULK **DARK**
Lab ID:	2014-813-01-02	Soil Description:	**GRAY SILT**

Note: The USCS symbol used with this test refers only to the minus No. 40 sieve material. See the "Sieve and Hydrometer Analysis" graph page for the complete material description. (Minus No. 40 sieve material, Airdried)

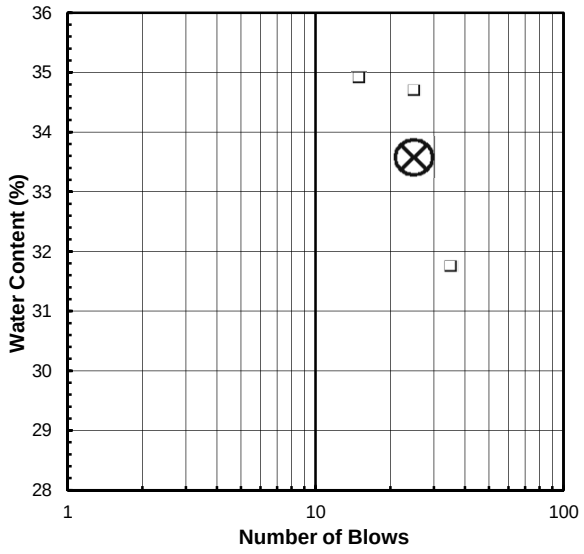
Liquid Limit Test	**1**	**2**	**3**	
Tare Number	X-9	R	C	**MULTIPOINT**
Wt. of Tare & Wet Sample (g)	27.03	27.47	27.59	
Wt. of Tare & Dry Sample (g)	24.30	24.31	24.41	
Wt. of Tare (g)	15.70	15.20	15.30	
Wt. of Water (g)	2.7	3.2	3.2	
Wt. of Dry Sample (g)	8.6	9.1	9.1	
Moisture Content (%)	**31.7**	**34.7**	**34.9**	
Number of Blows	**35**	**25**	**15**	

Plastic Limit Test	**1**	**2**	**Range**
Tare Number	1	3	
Wt. of Tare & Wet Sample (g)	22.22	22.38	
Wt. of Tare & Dry Sample (g)	20.68	20.75	
Wt. of Tare (g)	15.69	15.42	
Wt. of Water (g)	1.5	1.6	
Wt. of Dry Sample (g)	5.0	5.3	
Moisture Content (%)	**30.9**	**30.6**	**0.3**

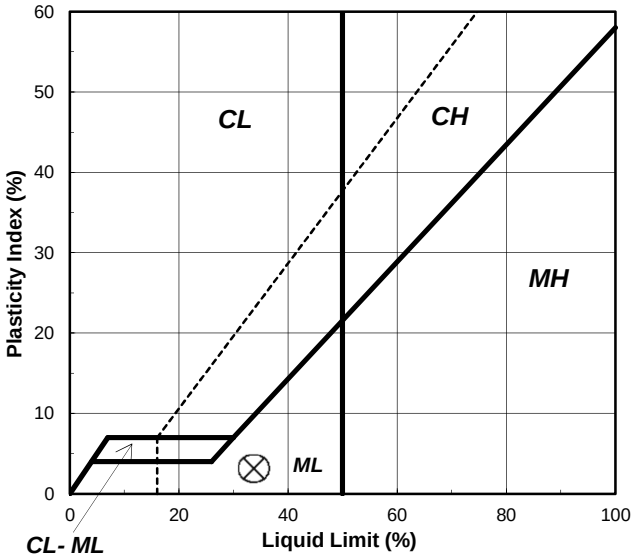
Note: The acceptable range of the two Moisture contents is ± 2.6

Test Results	
Liquid Limit (%)	**34**
Plastic Limit (%)	**31**
Plasticity Index (%)	**3**
USCS Symbol	**ML**

Flow Curve



Plasticity Chart



Tested By *BW* *Date* *12/15/14* *Checked By* *GEM* *Date* 6/3/15

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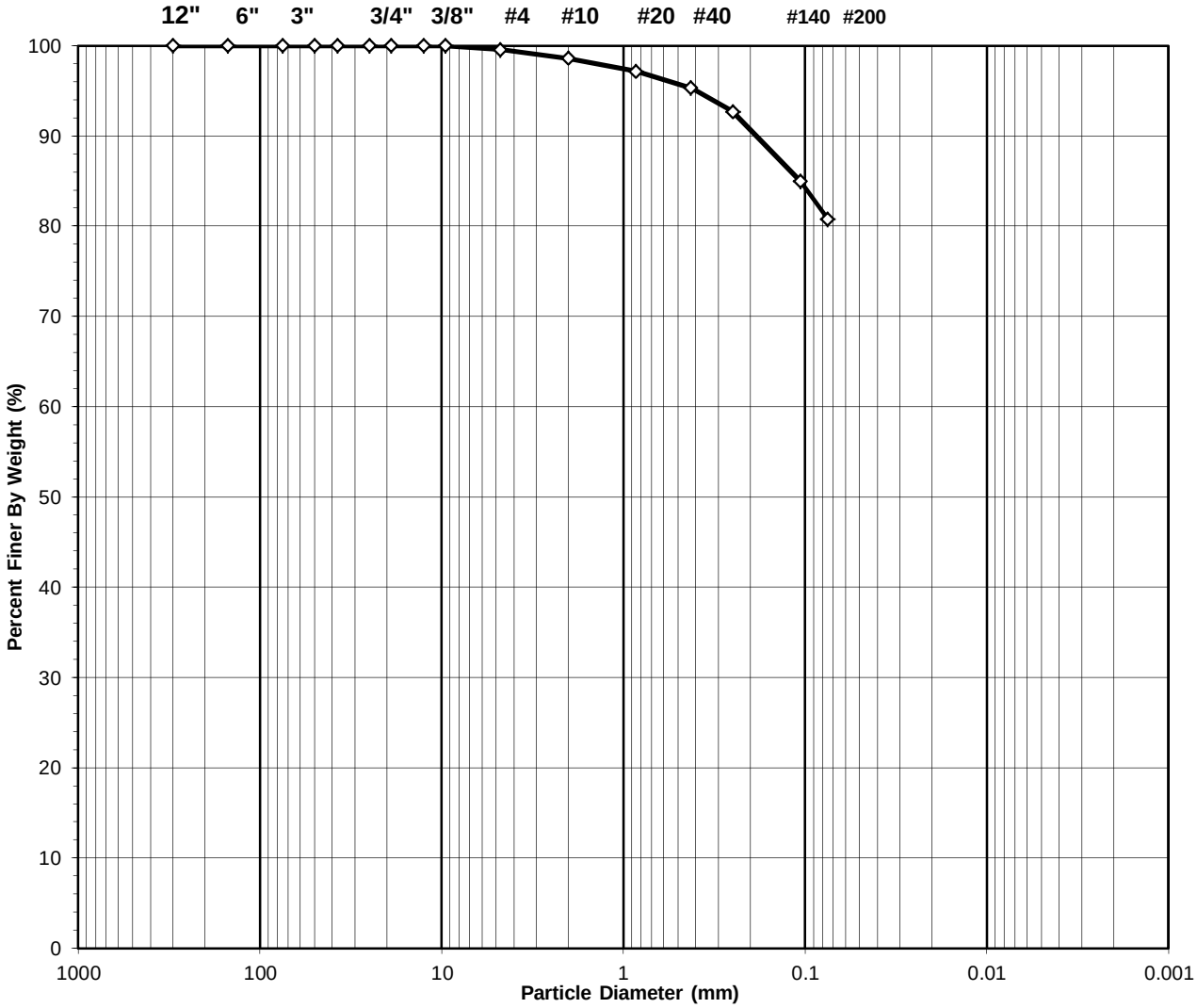
SIEVE ANALYSIS

ASTM D 422-63 (2007)

Client:	AMEC FOSTER WHEELER	Boring No.:	B322
Client Reference:	DAN RIVER Steam Station Ash Removal	Depth (ft):	48.6-58.5
Project No.:	2014-813-01	Sample No.:	BULK
Lab ID:	2014-813-01-02	Soil Color:	DARK GRAY

	SIEVE ANALYSIS		HYDROMETER
USCS	gravel	sand	silt and clay



USCS Symbol: ***ML, TESTED***

USCS Classification SILT WITH SAND

Tested By SFS Date 12/12/14 Checked By GEM Date 6/3/15

 DCN: CT-S3C DATE 3/20/13 REVISION: 3

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WASH SIEVE ANALYSIS

ASTM D 422-63 (2007)

Client:	AMEC FOSTER WHEELER	Boring No.:	B322
Client Reference:	DAN RIVER Steam Station Ash Removal	Depth (ft):	48.6-58.5
Project No.:	2014-813-01	Sample No.:	BULK
Lab ID:	2014-813-01-02	Soil Color:	DARK GRAY

Moisture Content of Passing 3/4" Sample		Water Content of Retained 3/4" Sample	
Tare No.	842	Tare No.	NA
Wt. of Tare & Wet Sample (g)	1243.40	Weight of Tare & Wet Sample (g)	NA
Wt. of Tare & Dry Sample (g)	999.93	Weight of Tare & Dry Sample (g)	NA
Weight of Tare (g)	256.05	Weight of Tare (g)	NA
Weight of Water (g)	243.47	Weight of Water (g)	NA
Weight of Dry Sample (g)	743.88	Weight of Dry Sample (g)	NA
Moisture Content (%)	**32.7**	**Moisture Content (%)**	**NA**

Wet Weight of -3/4" Sample (g)	NA	Weight of the Dry Sample (g)	743.88
Dry Weight of - 3/4" Sample (g)	142.9	Weight of - #200 Sample (g)	600.94
Wet Weight of +3/4" Sample (g	NA	Weight of + #200 Sample (g)	142.94
Dry Weight of + 3/4" Sample (g	0.00		
Total Dry Weight of Sample (g)	NA		

Sieve Size	Sieve Opening (mm)	Weight of Soil Retained (g)	Percent Retained (%)	Accumulated Percent Retained (%)	Percent Finer (%)	Accumulated Percent Finer (%)
12"	300	0.00	0.00	0.00	100.00	**100.00**
6"	150	0.00	0.00	0.00	100.00	**100.00**
3"	75	0.00	0.00	0.00	100.00	**100.00**
2"	50	0.00	0.00	0.00	100.00	**100.00**
1 1/2"	37.5	0.00	0.00	0.00	100.00	**100.00**
1"	25.0	0.00	0.00	0.00	100.00	**100.00**
3/4"	19.0	0.00	0.00	0.00	100.00	**100.00**
1/2"	12.50	0.00	0.00	0.00	100.00	**100.00**
3/8"	9.50	0.00	0.00	0.00	100.00	**100.00**
#4	4.75	3.41	0.46	0.46	99.54	**99.54**
#10	2.00	7.03	0.95	1.40	98.60	**98.60**
#20	0.850	10.84	1.46	2.86	97.14	**97.14**
#40	0.425	13.56	1.82	4.68	95.32	**95.32**
#60	0.250	19.73	2.65	7.34	92.66	**92.66**
#140	0.106	57.41	7.72	15.05	84.95	**84.95**
#200	0.075	30.96	4.16	19.22	80.78	**80.78**
Pan	-	600.94	80.78	100.00	-	**-**

Tested By SFS Date 12/12/14 Checked By GEM Date 6/3/15

DCN: CT-S3C DATE 3/20/13 REVISION: 3

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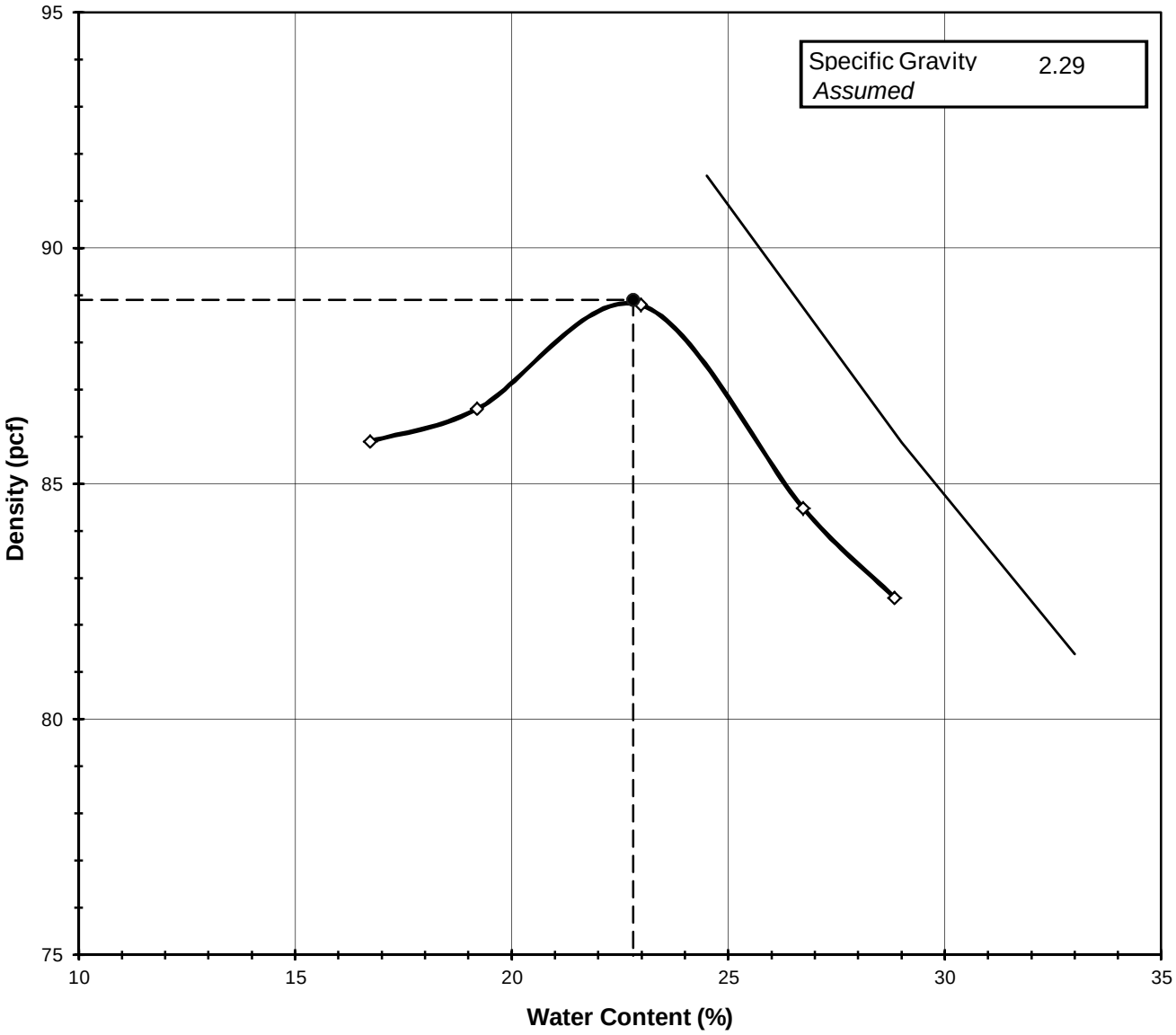
MOISTURE DENSITY RELATIONSHIP

ASTM D698-12

Client:	AMEC FOSTER WHEELER	Boring No.:	B322
Client Reference:	Dan River Steam Station Ash Removal	Depth (ft):	48.6-58.5
Project No.:	2014-813-01	Sample No.:	BULK
Lab ID:	2014-813-01-02	Test Method	**STANDARD**

Visual Description: DARK GRAY SILT WITH SAND

Optimum Water Content	**22.8**
Maximum Dry Density	**88.9**



Tested By *BW* *Date* *12/15/14* *Checked By* *GEM* *Date* 6/3/15

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MOISTURE - DENSITY RELATIONSHIP

ASTM D698-12

Client:	AMEC FOSTER WHEELER	Boring No.:	B322
Client Reference:	Dan River Steam Station Ash Removal	Depth (ft):	48.6-58.5
Project No.:	2014-813-01	Sample No.:	BULK
Lab ID:	2014-813-01-02		

Visual Description: DARK GRAY SILT WITH SAND

Total Weight of the Sample (g)	27800
As Received Water Content (%)	NA
Assumed Specific Gravity	2.29
Percent Retained on 3/4"	NA
Percent Retained on 3/8"	NA
Percent Retained on #4	NA
Oversize Material	Not included
Procedure Used	A

Test Type		**STANDARD**
Rammer Weight (lb)		5.5
Rammer Drop (in)		12
Rammer Type		MECHANICAL
Machine ID	R	174
Mold ID	R	461
Mold diameter		4"
Weight of the Mold (g)		4179
Volume of the Mold (cm^3)		937

Mold / Specimen

Point No.	**1**	**2**	**3**	**4**	**5**
Wt. of Mold & Wet Sample (g)	5684	5729	5819	5787	5777
Wt.of Mold (g)	4179	4179	4179	4179	4179
Wt. of Wet Sample (g)	1506	1550	1640	1608	1598
Mold Volume (cm^3)	937	937	937	937	937

Moisture Content / Density

Tare Number	368	399	305	866	307
Wt. of Tare & Wet Sample (g)	408.20	422.50	394.90	411.80	465.00
Wt. of Tare & Dry Sample (g)	365.60	368.40	336.90	343.20	385.50
Wt. of Tare (g)	110.90	86.70	84.50	86.60	109.90
Wt. of Water (g)	42.60	54.10	58.00	68.60	79.50
Wt. of Dry Sample (g)	254.70	281.70	252.40	256.60	275.60

Wet Density (g/cm^3)	1.61	1.65	1.75	1.72	1.71
Wet Density (pcf)	100.3	103.2	109.2	107.1	106.4
Moisture Content (%)	**16.7**	**19.2**	**23.0**	**26.7**	**28.8**
Dry Density (pcf)	**85.9**	**86.6**	**88.8**	**84.5**	**82.6**

Zero Air Voids

Moisture Content (%)	24.5	29.0	33.0
Dry Unit Weight (pcf)	91.5	85.9	81.4

Tested By *BW* *Date* *12/15/14* *Checked By* *GEM* *Date* 6/3/15

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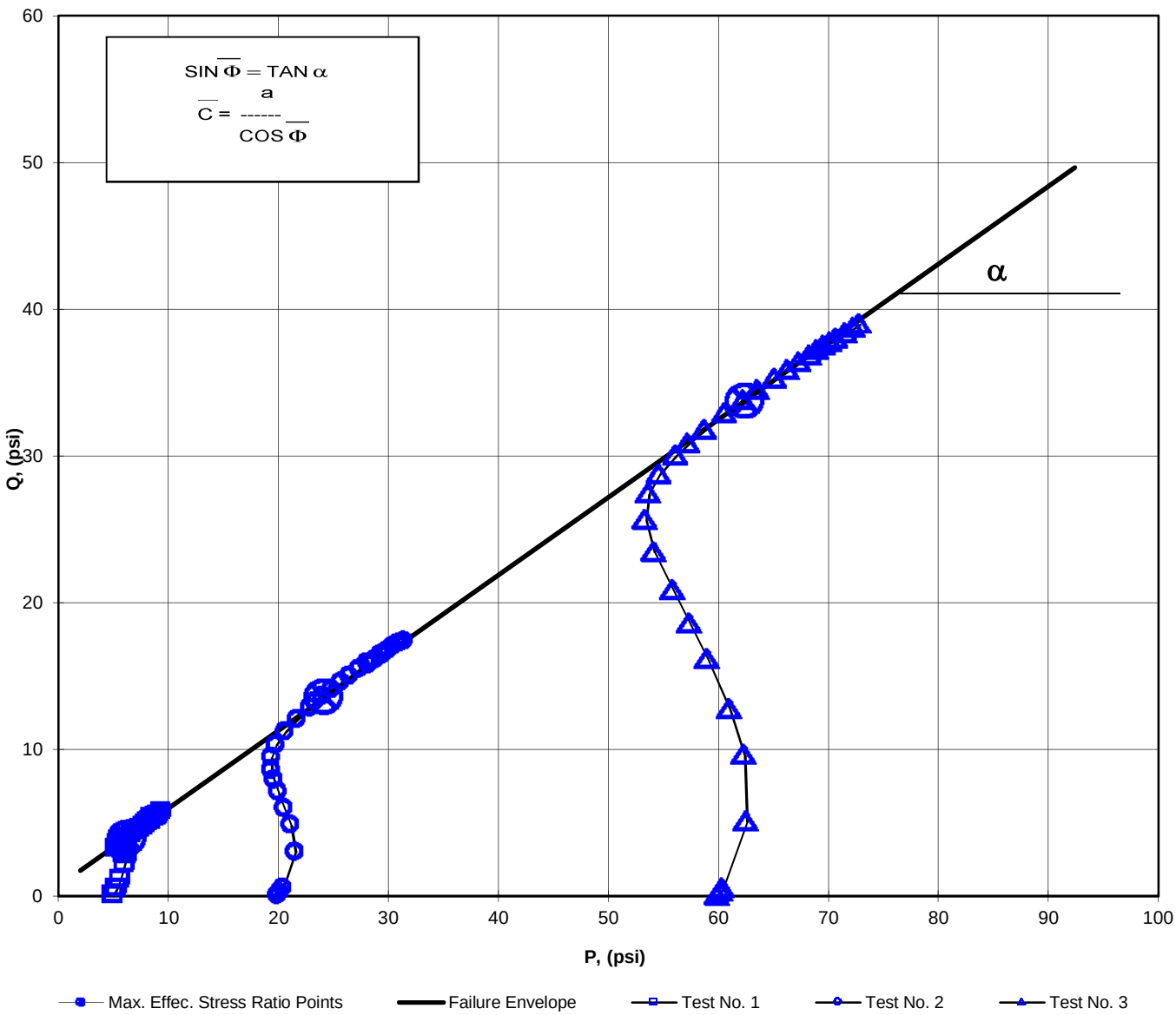
CONSOLIDATED UNDRAINED TRIAXIAL TEST
WITH PORE PRESSURE READINGS
ASTM D4767-11

Client:	AMEC FOSTER WHEELER	Boring No.:	B322
Client Reference:	Dan River Steam Station Ash Removal	Depth (ft):	48.6-58.5
Project No.:	2014-813-01	Sample No.:	BULK
Lab ID:	2014-813-01-02		

Consolidated Undrained Triaxial Test with Pore Pressure



a	=	**0.00**	$\overline{\mathbf{C}}$	=	**0.00**
α	=	**27.9**	$\overline{\Phi}$	=	**32.01**

Tested By: SFS Date: 12/16/14 Approved By: MPS Date: 6/3/15

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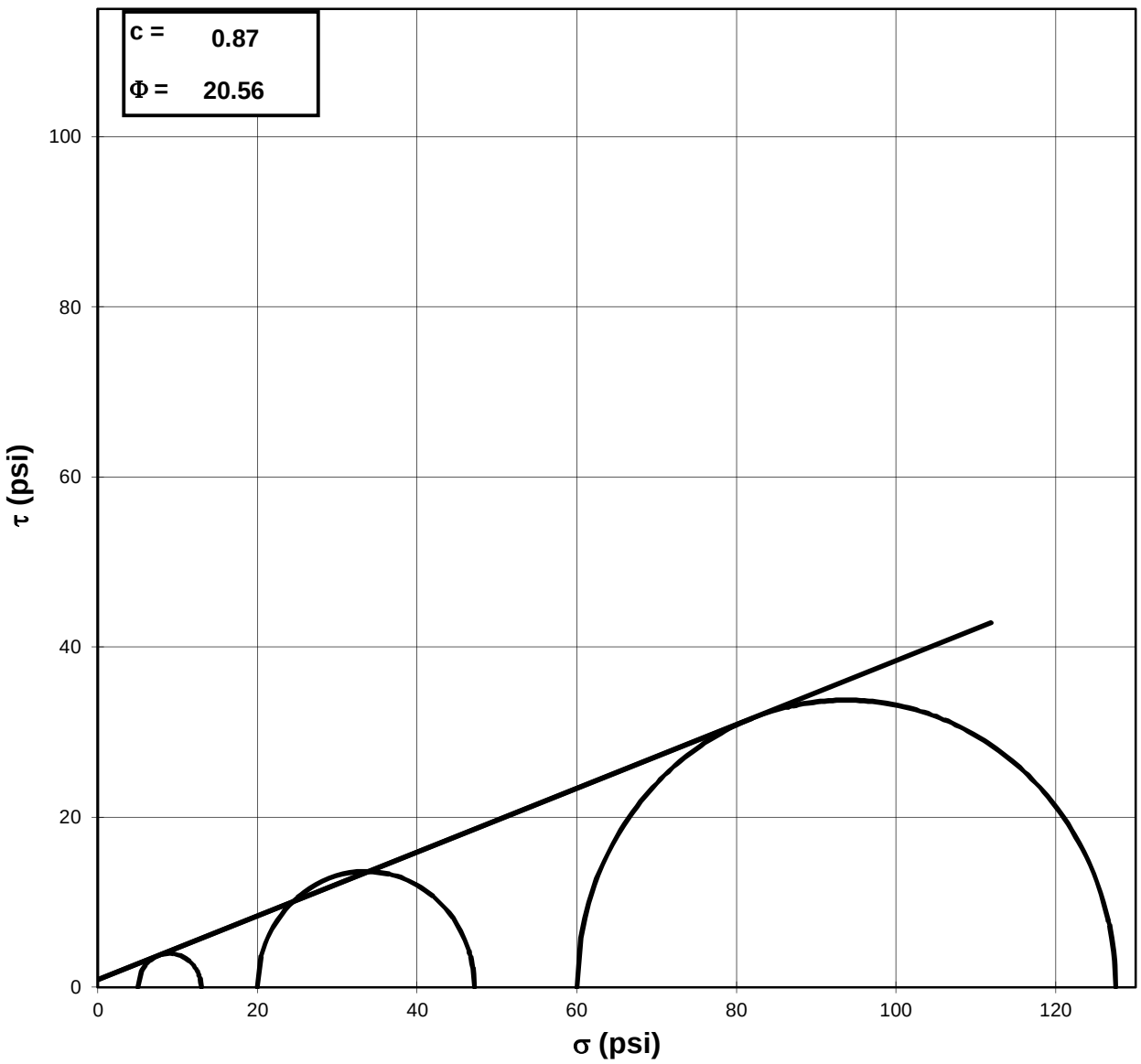
MOHR TOTAL STRENGTH ENVELOPE

ASTM D4767-11

Client:	AMEC FOSTER WHEELER	Boring No.:	B322
Client Reference:	Dan River Steam Station Ash Removal	Depth (ft):	48.6-58.5
Project No.:	2014-813-01	Sample No.:	BULK
Lab ID:	2014-813-01-02		
Visual Description:	DARK GRAY SILT WITH SAND (REMOLDED)		



Failure Based on Maximum Effective Principal Stress Ratio

NOTE: GRAPH NOT TO SCALE

Tested By: SFS *Date:* 12/16/14 *Approved By:* MPS *Date:* 6/3/15

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CONSOLIDATED UNDRAINED TRIAXIAL TEST
WITH PORE PRESSURE READINGS
ASTM D4767-11

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Client:	AMEC FOSTER WHEELER	Boring No.:	B322
Client Reference:	Dan River Steam Station Ash Removal	Depth (ft):	48.6-58.5
Project No.:	2014-813-01	Sample No.:	BULK
Lab ID:	2014-813-01-02		

Visual Description: DARK GRAY SILT WITH SAND (REMOLDED)

Stage No.	1
Test No.	1

PRESSURES (psi)

Cell Pressure (psi)	55.0
Back Pressure (psi)	50.0
Eff. Conf. Pressure (psi)	5.0
Pore Pressure Response (%)	96

MAXIMUM OBLIQUITY POINTS

$\overline{P}$	=	6.21
Q	=	3.97

INITIAL SAMPLE DIMENSIONS (in)

Length 1:	5.995	Diameter 1:	2.864
Length 2:	5.995	Diameter 2:	2.864
Length 3:	5.995	Diameter 3:	2.864
Avg. Length:	5.995	*Avg. Diam.:*	2.864

VOLUME CHANGE

Initial Burette Reading (ml)	24.0
Final Burette Reading (ml)	20.1
Final Change (ml)	3.9

Initial Dial Reading (mil)	87
Dial Reading After Saturation (mil)	88
Dial Reading After Consolidation (mil)	98

LOAD (LB)	DEFORMATION (IN)	PORE PRESSURE (PSI)
7.6	0.000	50.0
13.9	0.001	50.1
21.9	0.002	50.4
34.7	0.003	51.0
42.5	0.005	51.4
43.9	0.014	51.8
47.6	0.018	52.2
48.9	0.029	52.4
49.2	0.040	52.6
48.8	0.061	52.8
53.0	0.087	52.9
55.3	0.129	52.9
59.9	0.163	52.8
58.1	0.196	52.7
59.7	0.233	52.6
58.8	0.264	52.6
64.0	0.320	52.4
68.3	0.369	52.3
69.1	0.421	52.2
71.3	0.478	52.1
74.3	0.525	51.9
76.7	0.571	51.9
79.4	0.613	51.8
84.0	0.643	51.7
80.9	0.668	51.6
82.0	0.705	51.6
85.9	0.736	51.6
87.5	0.777	51.4
89.0	0.823	51.4
93.0	0.848	51.3
94.2	0.881	51.2

Tested By: SFS Date: 12/16/14 Input Checked By: MPS Date: 6/3/15

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CONSOLIDATED UNDRAINED TRIAXIAL TEST
WITH PORE PRESSURE READINGS
ASTM D4767-11

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Client:	AMEC FOSTER WHEELER	Boring No.:	B322
Client Reference:	Dan River Steam Station Ash Removal	Depth (ft):	48.6-58.5
Project No.:	2014-813-01	Sample No.:	BULK
Lab ID:	2014-813-01-02		

Visual Description: DARK GRAY SILT WITH SAND (REMOLDED)

Effective Confining Pressure (psi)	5.0	*Stage No.*	1
		Test No	1

INITIAL DIMENSIONS

Initial Sample Length (in)	6.00
Initial Sample Diameter (in)	2.86
Initial Sample Area (in^2)	6.44
Initial Sample Volume (in^3)	38.62

VOLUME CHANGE

Volume After Consolidation (in^3)	38.36
Length After Consolidation (in)	5.98
Area After Consolidation (in^2)	6.411

Strain (%)	Deviation Stress	ΔU	$\overline{\sigma}_1$	$\overline{\sigma}_3$	Effective Principle Stress Ratio	$\overline{A}$	$\overline{P}$	Q
0.02	0.98	0.12	5.86	4.9	1.200	0.13	5.37	0.49
0.03	2.22	0.42	6.81	4.6	1.484	0.20	5.70	1.11
0.04	4.21	1.04	8.18	4.0	2.062	0.26	6.07	2.11
0.09	5.43	1.44	9.00	3.6	2.520	0.28	6.28	2.71
0.24	5.64	1.79	8.86	3.2	2.750	0.33	6.04	2.82
0.31	6.22	2.17	9.05	2.8	3.191	0.36	5.94	3.11
0.49	6.40	2.37	9.04	2.6	3.422	0.39	5.84	3.20
0.67	6.44	2.63	8.82	2.4	3.704	0.43	5.60	3.22
1.02	6.35	2.82	8.53	2.2	3.901	0.46	5.36	3.17
1.46	6.97	2.92	9.06	2.1	4.342	0.44	5.57	3.48
2.15	7.27	2.86	9.42	2.2	4.376	0.41	5.79	3.63
2.72	7.94	2.77	10.18	2.2	4.537	0.36	6.21	3.97
3.27	7.62	2.75	9.88	2.3	4.370	0.38	6.07	3.81
3.89	7.80	2.63	10.18	2.4	4.284	0.35	6.28	3.90
4.42	7.62	2.58	10.05	2.4	4.138	0.35	6.24	3.81
5.35	8.31	2.45	10.87	2.6	4.251	0.31	6.71	4.16
6.17	8.88	2.31	11.58	2.7	4.293	0.27	7.14	4.44
7.04	8.91	2.18	11.74	2.8	4.152	0.26	7.28	4.45
7.99	9.14	2.09	12.06	2.9	4.128	0.24	7.49	4.57
8.77	9.48	1.93	12.56	3.1	4.081	0.21	7.82	4.74
9.55	9.74	1.87	12.88	3.1	4.107	0.20	8.01	4.87
10.24	10.05	1.80	13.25	3.2	4.134	0.19	8.23	5.02
10.74	10.63	1.75	13.89	3.3	4.257	0.17	8.58	5.31
11.17	10.16	1.64	13.52	3.4	4.015	0.17	8.45	5.08
11.79	10.22	1.64	13.60	3.4	4.030	0.17	8.49	5.11
12.31	10.71	1.56	14.16	3.4	4.106	0.15	8.80	5.36
12.99	10.83	1.45	14.39	3.6	4.046	0.14	8.97	5.42
13.76	10.94	1.36	14.59	3.6	4.000	0.13	9.12	5.47
14.17	11.42	1.28	15.15	3.7	4.066	0.12	9.44	5.71
14.73	11.51	1.23	15.29	3.8	4.047	0.11	9.53	5.75

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CONSOLIDATED UNDRAINED TRIAXIAL TEST WITH PORE PRESSURE READINGS

ASTM D4767-11

Client:	AMEC FOSTER WHEELER	Boring No.:	B322
Client Reference:	Dan River Steam Station Ash Removal	Depth (ft):	48.6-58.5
Project No.:	2014-813-01	Sample No.:	BULK
Lab ID:	2014-813-01-02		

Visual Description: DARK GRAY SILT WITH SAND (REMOLDED)

Stage No.	1
Test No.	2

PRESSURES (psi)

Cell Pressure (psi)	70.0
Back Pressure (psi)	50.0
Eff. Conf. Pressure (psi)	20.0
Pore Pressure Response (%)	98

MAXIMUM OBLIQUITY POINTS

$\overline{P}$	=	24.08
Q	=	13.60

INITIAL SAMPLE DIMENSIONS (in)

Length 1:	5.995	Diameter 1:	2.864
Length 2:	5.995	Diameter 2:	2.864
Length 3:	5.995	Diameter 3:	2.864
Avg. Length	5.995	*Avg. Diam.:*	2.864

VOLUME CHANGE

Initial Burette Reading (ml)	24.0
Final Burette Reading (ml)	13.6
Final Change (ml)	10.4

Initial Dial Reading (mil)	35
Dial Reading After Saturation (mil)	37
Dial Reading After Consolidation (mil)	69

LOAD (LB)	DEFORMATION (IN)	PORE PRESSURE (PSI)
10.0	0.000	50.0
12.5	0.001	50.0
16.1	0.003	50.0
47.5	0.006	51.4
71.2	0.011	53.6
85.8	0.017	55.3
100.4	0.026	57.1
110.7	0.035	58.2
120.0	0.046	59.1
131.3	0.067	60.0
143.1	0.097	60.4
155.3	0.131	60.4
167.1	0.167	60.2
179.0	0.208	59.9
185.4	0.238	59.8
191.6	0.278	59.5
199.7	0.333	59.2
208.5	0.393	58.7
215.6	0.437	58.4
224.7	0.495	58.0
232.3	0.539	57.7
232.2	0.584	57.4
238.6	0.628	57.2
245.0	0.657	57.0
246.6	0.687	56.8
252.4	0.716	56.6
257.6	0.745	56.5
262.6	0.790	56.2
265.5	0.835	55.9
268.3	0.865	55.8
275.0	0.893	55.6

Tested By: SFS Date: 12/16/14 Input Checked By: MPS Date: 6/3/15

DCN: CT-S28 DATE: 4/12/13 REVISION: 3

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CONSOLIDATED UNDRAINED TRIAXIAL TEST
WITH PORE PRESSURE READINGS
ASTM D4767-11

Client:	AMEC FOSTER WHEELER	Boring No.:	B322
Client Reference:	Dan River Steam Station Ash Removal	Depth (ft):	48.6-58.5
Project No.:	2014-813-01	Sample No.:	BULK
Lab ID:	2014-813-01-02		

Visual Description: DARK GRAY SILT WITH SAND (REMOLDED)

Effective Confining Pressure (psi)	20.0	*Stage No.*	1
		Test No	2

INITIAL DIMENSIONS

Initial Sample Length (in)	6.00
Initial Sample Diameter (in)	2.86
Initial Sample Area (in^2)	6.44
Initial Sample Volume (in^3)	38.62

VOLUME CHANGE

Volume After Consolidation (in^3)	37.95
Length After Consolidation (in)	5.96
Area After Consolidation (in^2)	6.366

Strain (%)	Deviation Stress	ΔU	$\overline{\sigma_1}$	$\overline{\sigma_3}$	Effective Principle Stress Ratio	$\overline{A}$	$\overline{P}$	Q
0.02	0.38	0.01	20.37	20.0	1.019	0.02	20.18	0.19
0.05	0.96	0.00	20.96	20.0	1.048	0.00	20.48	0.48
0.10	5.89	1.35	24.53	18.6	1.316	0.23	21.59	2.94
0.19	9.60	3.59	26.00	16.4	1.585	0.38	21.20	4.80
0.29	11.86	5.31	26.55	14.7	1.808	0.46	20.62	5.93
0.44	14.13	7.04	27.09	13.0	2.091	0.51	20.02	7.07
0.58	15.72	8.17	27.55	11.8	2.330	0.53	19.69	7.86
0.78	17.14	9.12	28.02	10.9	2.576	0.54	19.45	8.57
1.12	18.85	9.98	28.86	10.0	2.882	0.54	19.44	9.42
1.62	20.56	10.42	30.13	9.6	3.147	0.52	19.85	10.28
2.20	22.32	10.43	31.88	9.6	3.333	0.48	20.72	11.16
2.80	23.98	10.21	33.77	9.8	3.450	0.43	21.78	11.99
3.49	25.62	9.84	35.77	10.2	3.523	0.39	22.96	12.81
3.98	26.45	9.78	36.66	10.2	3.590	0.38	23.44	13.23
4.67	27.19	9.51	37.67	10.5	3.594	0.36	24.08	13.60
5.58	28.13	9.14	38.99	10.9	3.592	0.33	24.92	14.07
6.59	29.12	8.73	40.39	11.3	3.584	0.31	25.83	14.56
7.33	29.93	8.41	41.51	11.6	3.584	0.29	26.55	14.96
8.30	30.93	8.00	42.92	12.0	3.579	0.26	27.46	15.46
9.05	31.77	7.71	44.05	12.3	3.586	0.25	28.17	15.88
9.80	31.48	7.42	44.05	12.6	3.504	0.24	28.31	15.74
10.53	32.12	7.15	44.97	12.8	3.500	0.23	28.91	16.06
11.02	32.84	6.97	45.87	13.0	3.522	0.22	29.45	16.42
11.53	32.88	6.79	46.08	13.2	3.490	0.21	29.64	16.44
12.01	33.50	6.62	46.88	13.4	3.505	0.20	30.13	16.75
12.50	34.03	6.44	47.58	13.6	3.511	0.19	30.57	17.01
13.25	34.42	6.19	48.23	13.8	3.493	0.18	31.02	17.21
14.01	34.51	5.94	48.58	14.1	3.455	0.18	31.32	17.26
14.50	34.69	5.76	48.93	14.2	3.436	0.17	31.58	17.34
14.98	35.39	5.59	49.80	14.4	3.456	0.16	32.10	17.69

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CONSOLIDATED UNDRAINED TRIAXIAL TEST
WITH PORE PRESSURE READINGS
ASTM D4767-11

Client:	AMEC FOSTER WHEELER	Boring No.:	B322
Client Reference:	Dan River Steam Station Ash Removal	Depth (ft):	48.6-58.5
Project No.:	2014-813-01	Sample No.:	BULK
Lab ID:	2014-813-01-02		

Visual Description: DARK GRAY SILT WITH SAND (REMOLDED)

Stage No.	1
Test No.	3

PRESSURES (psi)

Cell Pressure (psi)	110.0
Back Pressure (psi)	50.0
Eff. Conf. Pressure (psi)	60.0
Pore Pressure Response (%)	98

MAXIMUM OBLIQUITY POINTS

$\overline{P}$	=	62.40
Q	=	33.75

INITIAL SAMPLE DIMENSIONS (in)

Length 1:	5.995	Diameter 1:	2.864
Length 2:	5.995	Diameter 2:	2.864
Length 3:	5.995	Diameter 3:	2.864
Avg. Length:	5.995	*Avg. Diam.:*	2.864

VOLUME CHANGE

Initial Burette Reading (ml)	24.0
Final Burette Reading (ml)	3.2
Final Change (ml)	20.8

Initial Dial Reading (mil)	122
Dial Reading After Saturation (mil)	123
Dial Reading After Consolidation (mil)	181

LOAD (LB)	DEFORMATION (IN)	PORE PRESSURE (PSI)
20.8	0.000	50.0
24.8	0.001	50.0
27.0	0.002	50.0
84.1	0.007	52.4
141.6	0.013	57.2
180.8	0.019	61.6
224.3	0.028	67.0
255.3	0.036	71.0
284.7	0.048	74.9
318.7	0.070	79.1
348.4	0.099	82.2
373.2	0.135	83.6
392.6	0.172	84.0
412.3	0.213	83.8
424.7	0.243	83.5
440.1	0.285	82.9
458.8	0.342	82.1
476.1	0.402	81.4
489.2	0.447	80.8
505.0	0.507	80.0
516.8	0.551	79.4
528.5	0.596	78.9
539.8	0.642	78.4
547.6	0.672	78.1
554.9	0.702	77.8
561.6	0.732	77.4
568.2	0.761	77.2
578.6	0.807	76.7
588.8	0.852	76.3
595.8	0.881	76.0
602.5	0.912	75.8

Tested By: SFS Date: 12/16/14 Input Checked By: MPS Date: 6/3/15

DCN: CT-S28 DATE: 4/12/13 REVISION: 3

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CONSOLIDATED UNDRAINED TRIAXIAL TEST
WITH PORE PRESSURE READINGS
ASTM D4767-11

Client:	AMEC FOSTER WHEELER	Boring No.:	B322
Client Reference:	Dan River Steam Station Ash Removal	Depth (ft):	48.6-58.5
Project No.:	2014-813-01	Sample No.:	BULK
Lab ID:	2014-813-01-02		

Visual Description: DARK GRAY SILT WITH SAND (REMOLDED)

Effective Confining Pressure (psi)	60.0	*Stage No.*	1
		Test No	3

INITIAL DIMENSIONS

Initial Sample Length (in)	6.00
Initial Sample Diameter (in)	2.86
Initial Sample Area (in^2)	6.44
Initial Sample Volume (in^3)	38.62

VOLUME CHANGE

Volume After Consolidation (in^3)	37.33
Length After Consolidation (in)	5.94
Area After Consolidation (in^2)	6.289

Strain (%)	Deviation Stress	ΔU	$\overline{\sigma}_1$	$\overline{\sigma}_3$	Effective Principle Stress Ratio	$\overline{A}$	$\overline{P}$	Q
0.02	0.64	0.03	60.64	60.0	1.011	0.04	60.32	0.32
0.04	0.99	0.03	60.99	60.0	1.016	0.03	60.49	0.49
0.12	10.05	2.41	67.66	57.6	1.174	0.24	62.64	5.02
0.22	19.16	7.19	72.00	52.8	1.363	0.38	62.42	9.58
0.32	25.36	11.58	73.81	48.4	1.524	0.47	61.12	12.68
0.47	32.20	17.02	75.21	43.0	1.749	0.54	59.11	16.10
0.61	37.05	21.04	76.03	39.0	1.951	0.58	57.51	18.53
0.82	41.61	24.88	76.76	35.1	2.184	0.61	55.95	20.81
1.17	46.82	29.16	77.68	30.9	2.517	0.64	54.27	23.41
1.67	51.21	32.17	79.06	27.9	2.839	0.64	53.46	25.61
2.28	54.75	33.66	81.12	26.4	3.076	0.63	53.74	27.37
2.89	57.40	34.01	83.41	26.0	3.207	0.60	54.71	28.70
3.60	60.00	33.81	86.21	26.2	3.289	0.58	56.21	30.00
4.09	61.59	33.48	88.13	26.5	3.321	0.55	57.34	30.80
4.80	63.47	32.93	90.57	27.1	3.343	0.53	58.83	31.74
5.76	65.63	32.16	93.49	27.9	3.356	0.50	60.68	32.82
6.77	67.50	31.38	96.15	28.6	3.356	0.47	62.40	33.75
7.53	68.86	30.79	98.10	29.2	3.355	0.46	63.67	34.43
8.53	70.42	30.00	100.44	30.0	3.345	0.43	65.23	35.21
9.29	71.54	29.43	102.13	30.6	3.339	0.42	66.36	35.77
10.05	72.62	28.91	103.74	31.1	3.334	0.41	67.43	36.31
10.81	73.60	28.41	105.21	31.6	3.328	0.39	68.41	36.80
11.32	74.28	28.08	106.22	31.9	3.326	0.39	69.08	37.14
11.82	74.88	27.78	107.12	32.2	3.323	0.38	69.68	37.44
12.33	75.39	27.46	107.95	32.6	3.315	0.37	70.26	37.70
12.83	75.88	27.18	108.72	32.8	3.310	0.37	70.78	37.94
13.59	76.64	26.73	109.94	33.3	3.302	0.36	71.62	38.32
14.35	77.35	26.32	111.06	33.7	3.295	0.35	72.38	38.68
14.85	77.85	26.05	111.82	34.0	3.291	0.34	72.90	38.92
15.36	78.28	25.80	112.51	34.2	3.287	0.34	73.37	39.14

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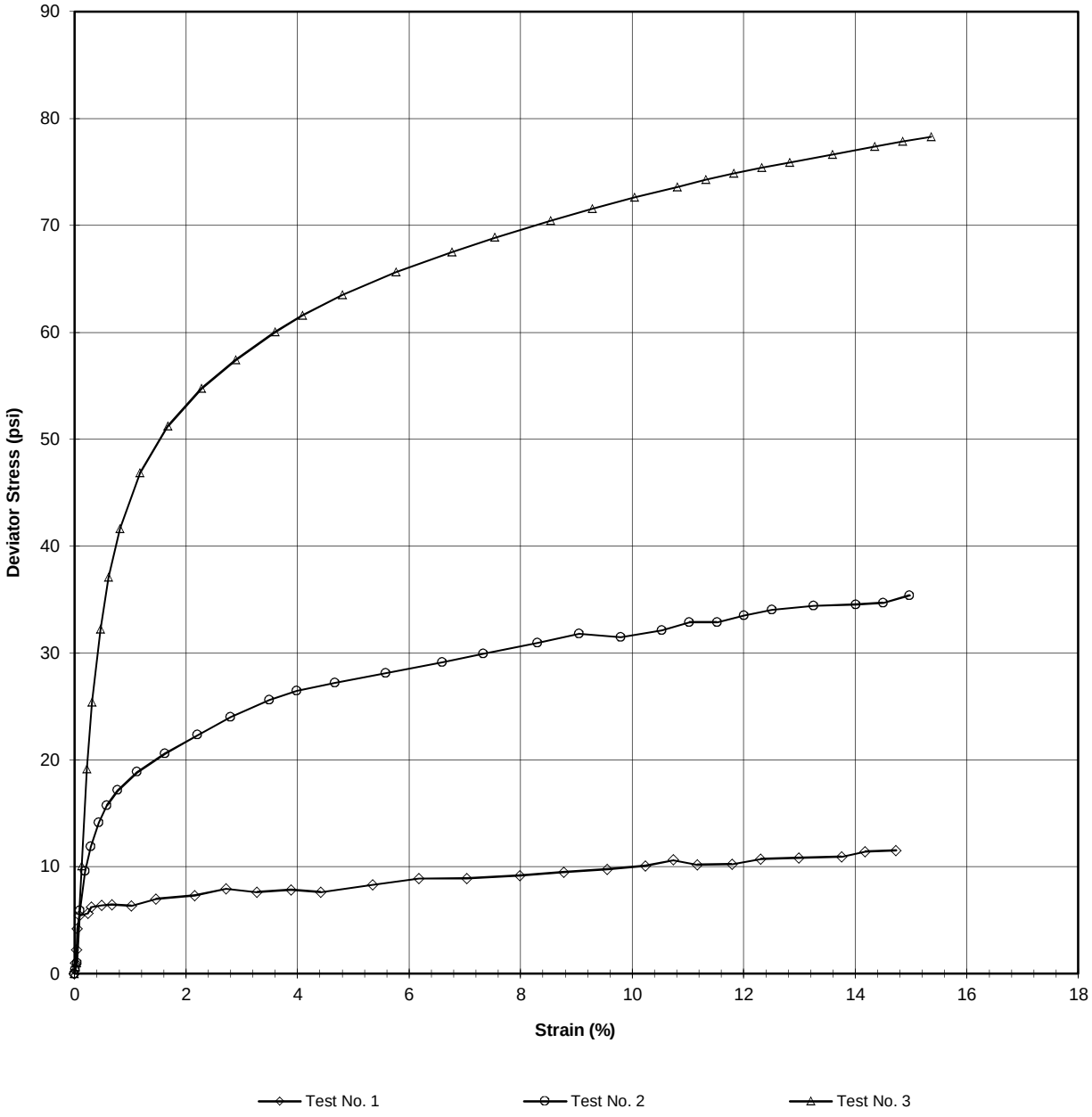
CONSOLIDATED UNDRAINED TRIAXIAL TEST
WITH PORE PRESSURE READINGS
ASTM D4767-11

Client:	AMEC FOSTER WHEELER	Boring No.:	B322
Client Reference:	Dan River Steam Station Ash Removal	Depth (ft):	48.6-58.5
Project No.:	2014-813-01	Sample No.:	BULK
Lab ID:	2014-813-01-02		
Visual Description:	DARK GRAY SILT WITH SAND		



Tested By: SFS Date: 12/16/14 Approved By: MPS Date: 6/3/15

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CONSOLIDATED UNDRAINED TRIAXIAL TEST
WITH PORE PRESSURE READINGS
ASTM D4767-11

Client:	AMEC FOSTER WHEELER		
Client Reference:	Dan River Steam Station Ash Removal		
Project No.:	2014-813-01		
Lab ID:	2014-813-01-02	Specific Gravity (Measured)	2.29

Visual Description: DARK GRAY SILT WITH SAND (REMOLDED)

SAMPLE CONDITION SUMMARY

Boring No.:	B322	B322	B322
Depth (ft):	48.6-58.5	48.6-58.5	48.6-58.5
Sample No.:	BULK	BULK	BULK
Test No.	T1	T2	T3
Deformation Rate (in/min)	0.002	0.002	0.002
Back Pressure (psi)	50.0	50.0	50.0
Consolidation Time (days)	1	1	1
Moisture Content (%) (INITIAL)	25.2	25.2	25.2
Total Unit Weight (pcf)	105.2	106.5	106.8
Dry Unit Weight (pcf)	84.0	85.1	85.3
Moisture Content (%) (FINAL)	31.2	29.7	28.6
Initial State Void Ratio,e	0.701	0.681	0.676
Void Ratio at Shear, e	0.690	0.652	0.620

Tested By: SFS Date: 12/16/14 Input Checked By: MPS Date: 6/3/15

DCN: CT-S28 DATE: 4/12/13 REVISION: 3

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CONSOLIDATED UNDRAINED TRIAXIAL TEST
WITH PORE PRESSURE READINGS

ASTM D4767-11

MOISTURE CONTENT

	T1	T2	T3
Tare Number	803	803	803
Weight of Tare & Wet Sample (g)	430.2	430.2	430.2
Weight of Tare & Dry Sample (g)	364.2	364.2	364.2
Weight of Tare (g)	102.78	102.78	102.78
Moisture Content (%) (INITIAL)	25.25	25.25	25.25
Tare Number	800	803	812
Weight of Tare & Wet Sample (g)	719.75	643.33	633.97
Weight of Tare & Dry Sample (g)	573.26	519.44	516.6
Weight of Tare (g)	103.96	102.89	106.5
Moisture Content (%) (FINAL)	31.21	29.74	28.62

UNIT WEIGHT

Weight of Tube & Wet Sample (g)	2620.8	2634.03	2637.04
Weight of Tube (g)	1554.07	1554.07	1554.07
Weight of Wet Sample (g)	1066.73	1079.96	1082.97
Length 1 (in)	5.995	5.995	5.995
Length 2 (in)	5.995	5.995	5.995
Length 3 (in)	5.995	5.995	5.995
Top Diameter (in)	2.864	2.864	2.864
Middle Diameter (in)	2.864	2.864	2.864
Bottom Diameter (in)	2.864	2.864	2.864
Average Length (in)	5.995	5.995	5.995
Average Area (in)	6.442	6.442	6.442
Sample Volume (cm^3)	632.89	632.89	632.89
Unit Wet Weight (g/cm^3)	1.69	1.71	1.71
Unit Wet Weight (pcf)	105.23	106.53	106.83
Unit Dry Weight (pcf)	84.01	85.06	85.29
Unit Dry Weight (g/cm^3)	1.35	1.36	1.37
Initial Burette Reading	**24**	**24**	**24**
Final Burette Reading	**20.1**	**13.6**	**3.2**
Initial Dial Reading	**87**	**35**	**122**
Dial Reading After Saturation	**88**	**37**	**123**
Dial Reading After Consolidation	**98**	**69**	**181**
Volume Change during Consolidation	3.9	10.4	20.8
Volume Change during Saturation	0.32	0.63	0.32
Volume at Shear (cm^3) *These	628.67	621.85	611.77
Volume of Solids (cm^3) measurements	371.92	376.54	377.58
Volume of Voids (cm^3) are all	256.75	245.32	234.19
Volume of Water (cm^3) at	265.86	256.45	247.47
Void Ratio, e shear	0.690	0.652	0.620

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CONSOLIDATED UNDRAINED TRIAXIAL TEST
WITH PORE PRESSURE READINGS
ASTM D4767-11

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Client:	AMEC FOSTER WHEELER	Boring No.:	B322
Client Reference:	Dan River Steam Station Ash Removal	Depth (ft):	48.6-58.5
Project No.:	2014-813-01	Sample No.:	BULK
Lab ID:	2014-813-01-02		

TEST 1 INITIAL

N/A

TEST 1 FINAL

TEST 2 INITIAL

N/A

TEST 2 FINAL

TEST 3 INITIAL

N/A

TEST 3 FINAL

Tested By *SFS* *Date* *12/16/14* *Approved By* MPS *Date* 6/3/15

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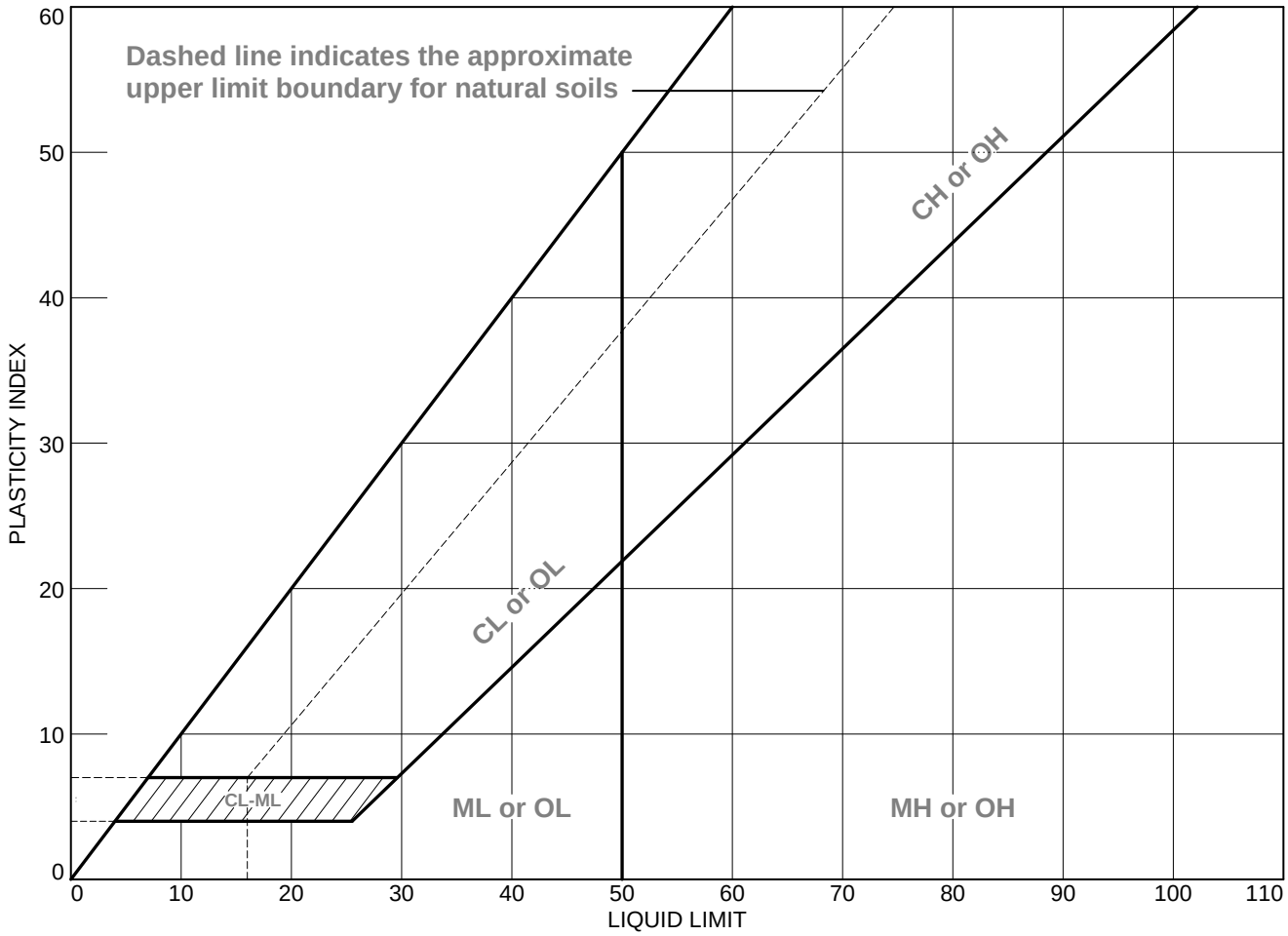
LIQUID AND PLASTIC LIMITS TEST REPORT



SOIL DATA

SYMBOL	SOURCE	SAMPLE NO.	DEPTH	NATURAL WATER CONTENT (%)	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	USCS
●	B324	Bulk	25 - 35	NR	NP	NV	NP	ML
■	B324		43.5 - 45	NR	NP	NV	NP	ML

Client: Duke Energy
Project: Dan River Steam Station Ash Removal
Project No.: 7810140065 **Figure**

Tested By: ○ D. Kopitsky ☐ M. Hamilton **Checked By:** T. Landis

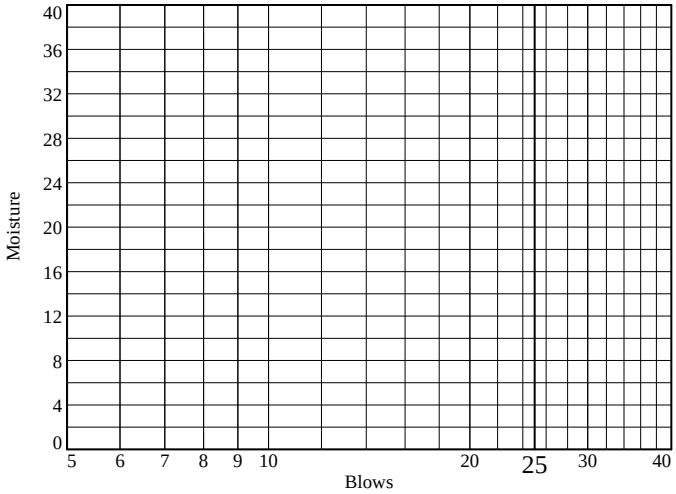
LIQUID AND PLASTIC LIMIT TEST DATA

5/27/2015

Client: Duke Energy
Project: Dan River Steam Station Ash Removal
Project Number: 7810140065
Location: B324
Depth: 25 - 35 **Sample Number:** Bulk
Material Description: Dark Gray CCR Material
USCS: ML **AASHTO:** A-4(0)
Tested by: D. Kopitsky **Checked by:** T. Landis

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare						
Dry+Tare						
Tare						
# Blows						
Moisture						



Liquid Limit= NV
Plastic Limit= NP
Plasticity Index= NP
Natural Moisture= NR

Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare					
Dry+Tare					
Tare					
Moisture					

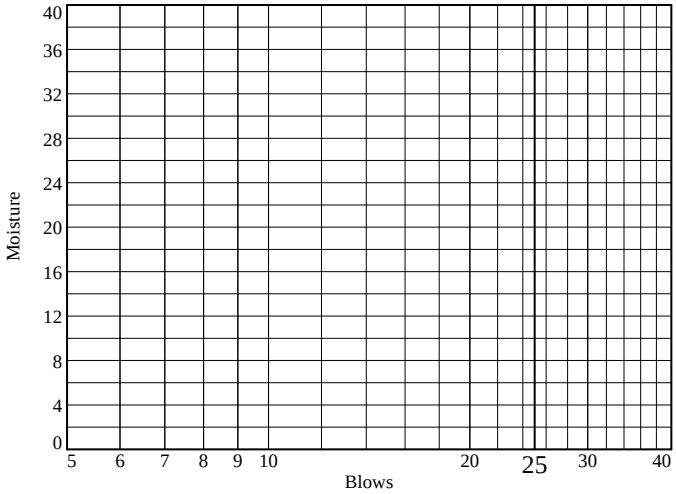
LIQUID AND PLASTIC LIMIT TEST DATA

5/27/2015

Client: Duke Energy
Project: Dan River Steam Station Ash Removal
Project Number: 7810140065
Location: B324
Depth: 43.5 - 45
Material Description: Dark Gray CCR Material
USCS: ML
AASHTO: A-4(0)
Tested by: M. Hamilton
Checked by: T. Landis

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare						
Dry+Tare						
Tare						
# Blows						
Moisture						

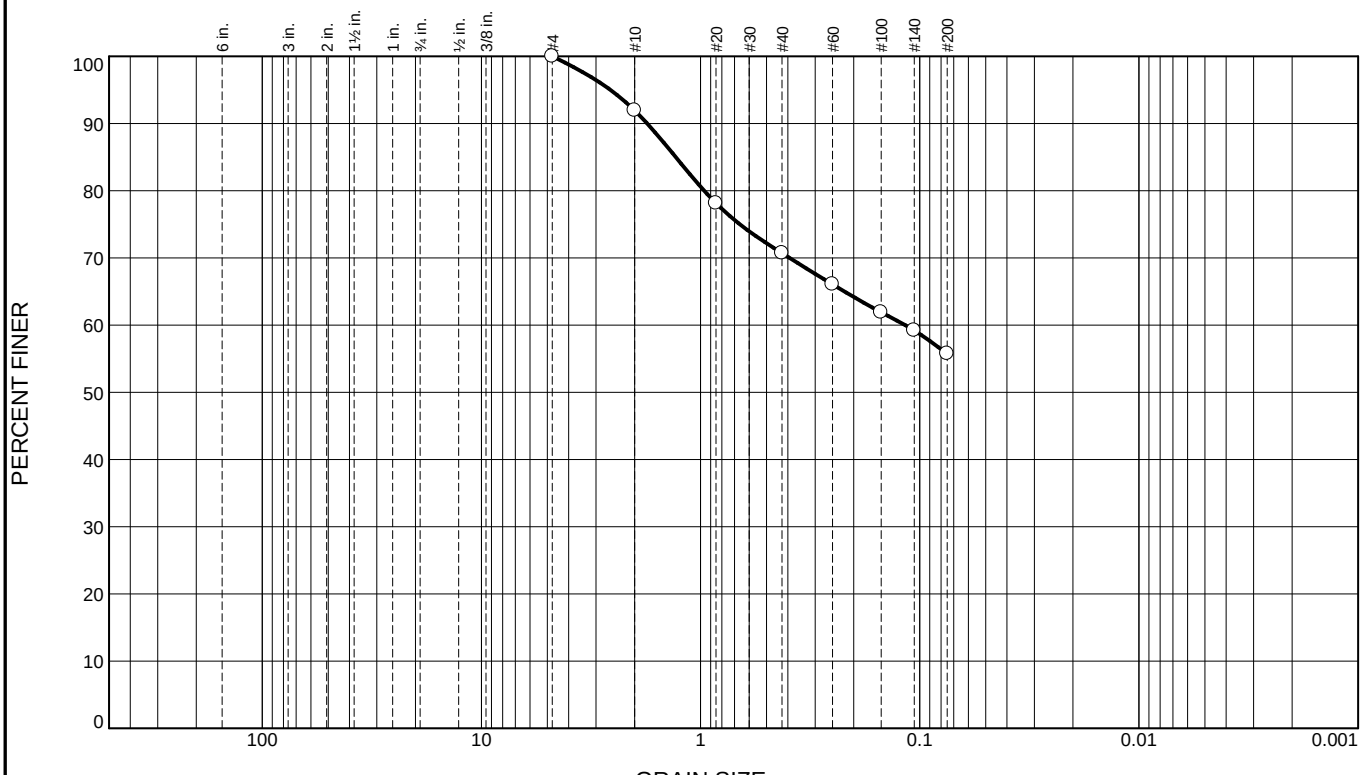


Liquid Limit= NV
Plastic Limit= NP
Plasticity Index= NP
Natural Moisture= NR

Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare					
Dry+Tare					
Tare					
Moisture					

Particle Size Analysis ASTM D422



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	8.1	21.2	15.0	55.7	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#10	91.9		
#20	78.1		
#40	70.7		
#60	66.1		
#100	61.9		
#140	59.2		
#200	55.7		

* (no specification provided)

Soil Description

Dark Gray CCR Material

Atterberg Limits

PL= NP LL= NV PI= NP

Coefficients

D_{90}= 1.7534 D_{85}= 1.2985 D_{60}= 0.1167
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= ML AASHTO= A-4(0)

Remarks

Ash from Ash Fill 1

Source of Sample: B324 **Depth:** 43.5 - 45

Date: 1-7-15

amec

Client: Duke Energy
Project: Dan River Steam Station Ash Removal
Project No: 7810140065 **Figure**

Tested By: M. Hamilton **Checked By:** T. Landis

GRAIN SIZE DISTRIBUTION TEST DATA

5/27/2015

Client: Duke Energy
Project: Dan River Steam Station Ash Removal
Project Number: 7810140065
Location: B324
Depth: 43.5 - 45
Material Description: Dark Gray CCR Material
Date: 1-7-15 **PL:** NP **LL:** NV **PI:** NP
USCS Classification: ML **AASHTO Classification:** A-4(0)
Testing Remarks: Ash from Ash Fill 1
Tested by: M. Hamilton **Checked by:** T. Landis

Sieve Test Data

Dry Sample and Tare (grams)	Tare (grams)	Cumulative Pan Tare Weight (grams)	Sieve Opening Size	Cumulative Weight Retained (grams)	Percent Finer
122.54	0.00	0.00	3/4		
			3/8		
			#4	0.00	100.0
			#10	9.88	91.9
			#20	26.80	78.1
			#40	35.90	70.7
			#60	41.60	66.1
			#100	46.68	61.9
			#140	50.00	59.2
			#200	54.23	55.7

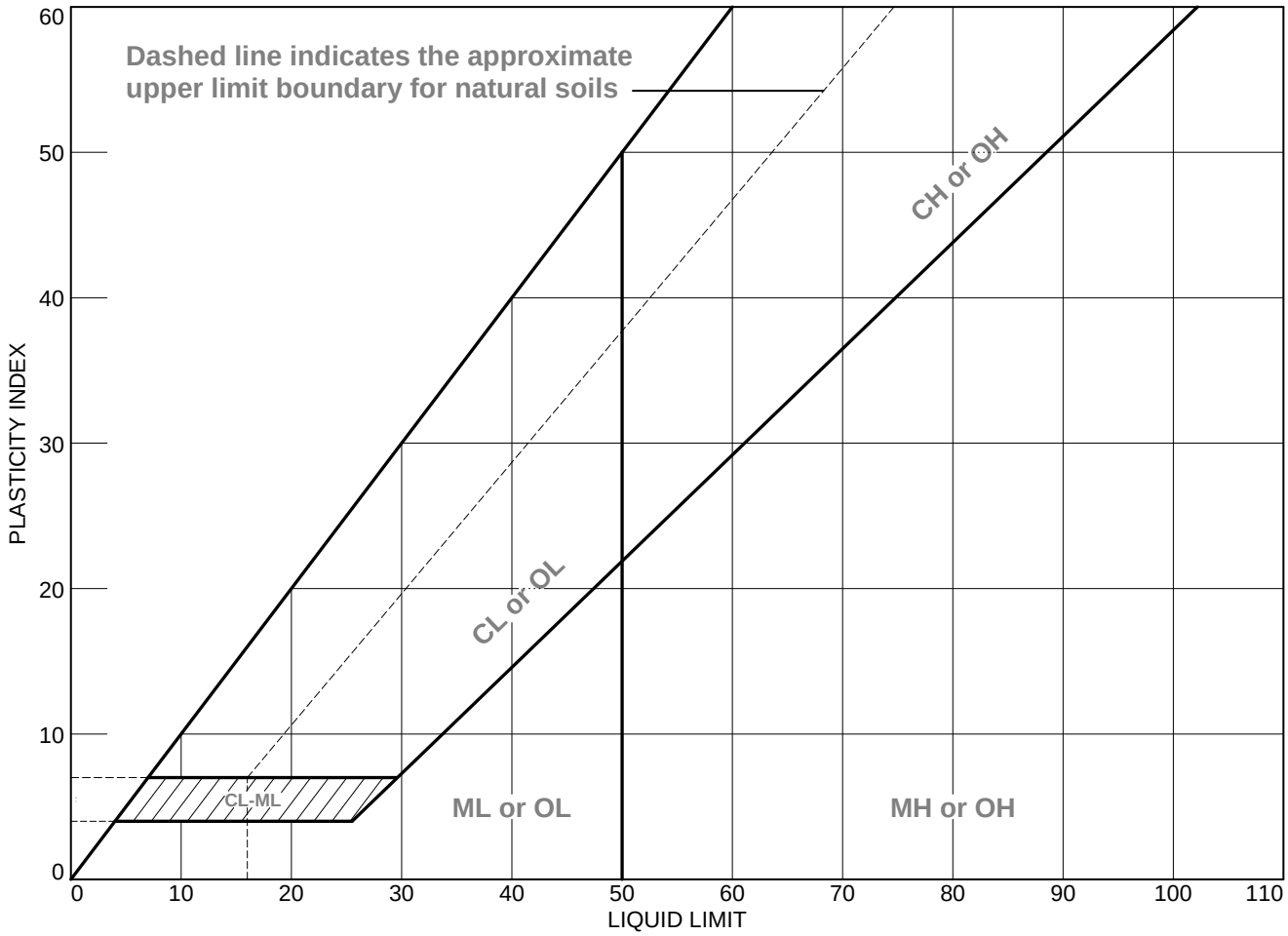
Fractional Components

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	0.0	0.0	0.0	8.1	21.2	15.0	44.3			55.7

D_5	D_{10}	D_{15}	D_{20}	D_{30}	D_{40}	D_{50}	D_{60}	D_{80}	D_{85}	D_{90}	D_{95}
							0.1167	0.9630	1.2985	1.7534	2.5806

Fineness Modulus
1.19

LIQUID AND PLASTIC LIMITS TEST REPORT



SOIL DATA

SYMBOL	SOURCE	SAMPLE NO.	DEPTH	NATURAL WATER CONTENT (%)	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	USCS
●	B324	Bulk	25 - 35	NR	NP	NV	NP	ML
■	B324		43.5 - 45	NR	NP	NV	NP	ML

Client: Duke Energy
Project: Dan River Steam Station Ash Removal
Project No.: 7810140065 **Figure**

Tested By: ○ D. Kopitsky ☐ M. Hamilton **Checked By:** T. Landis

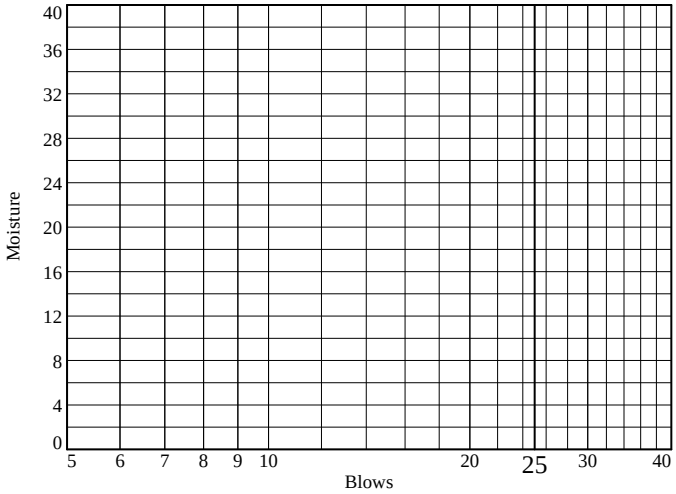
LIQUID AND PLASTIC LIMIT TEST DATA

5/27/2015

Client: Duke Energy
Project: Dan River Steam Station Ash Removal
Project Number: 7810140065
Location: B324
Depth: 25 - 35 **Sample Number:** Bulk
Material Description: Dark Gray CCR Material
USCS: ML **AASHTO:** A-4(0)
Tested by: D. Kopitsky **Checked by:** T. Landis

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare						
Dry+Tare						
Tare						
# Blows						
Moisture						



Liquid Limit= NV
Plastic Limit= NP
Plasticity Index= NP
Natural Moisture= NR

Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare					
Dry+Tare					
Tare					
Moisture					

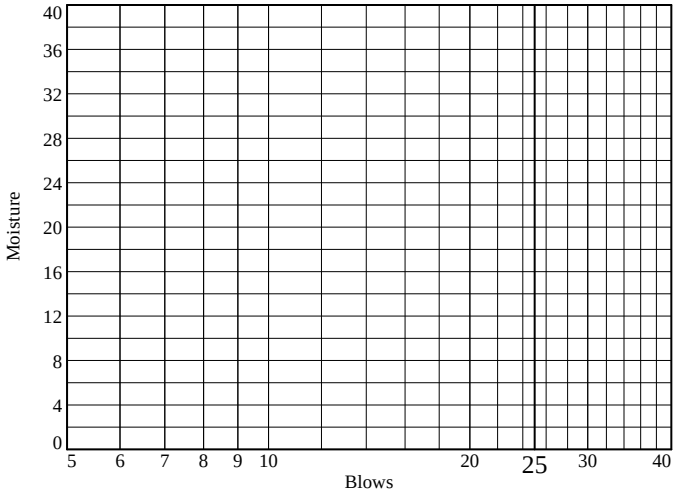
LIQUID AND PLASTIC LIMIT TEST DATA

5/27/2015

Client: Duke Energy
Project: Dan River Steam Station Ash Removal
Project Number: 7810140065
Location: B324
Depth: 43.5 - 45
Material Description: Dark Gray CCR Material
USCS: ML
AASHTO: A-4(0)
Tested by: M. Hamilton
Checked by: T. Landis

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare						
Dry+Tare						
Tare						
# Blows						
Moisture						

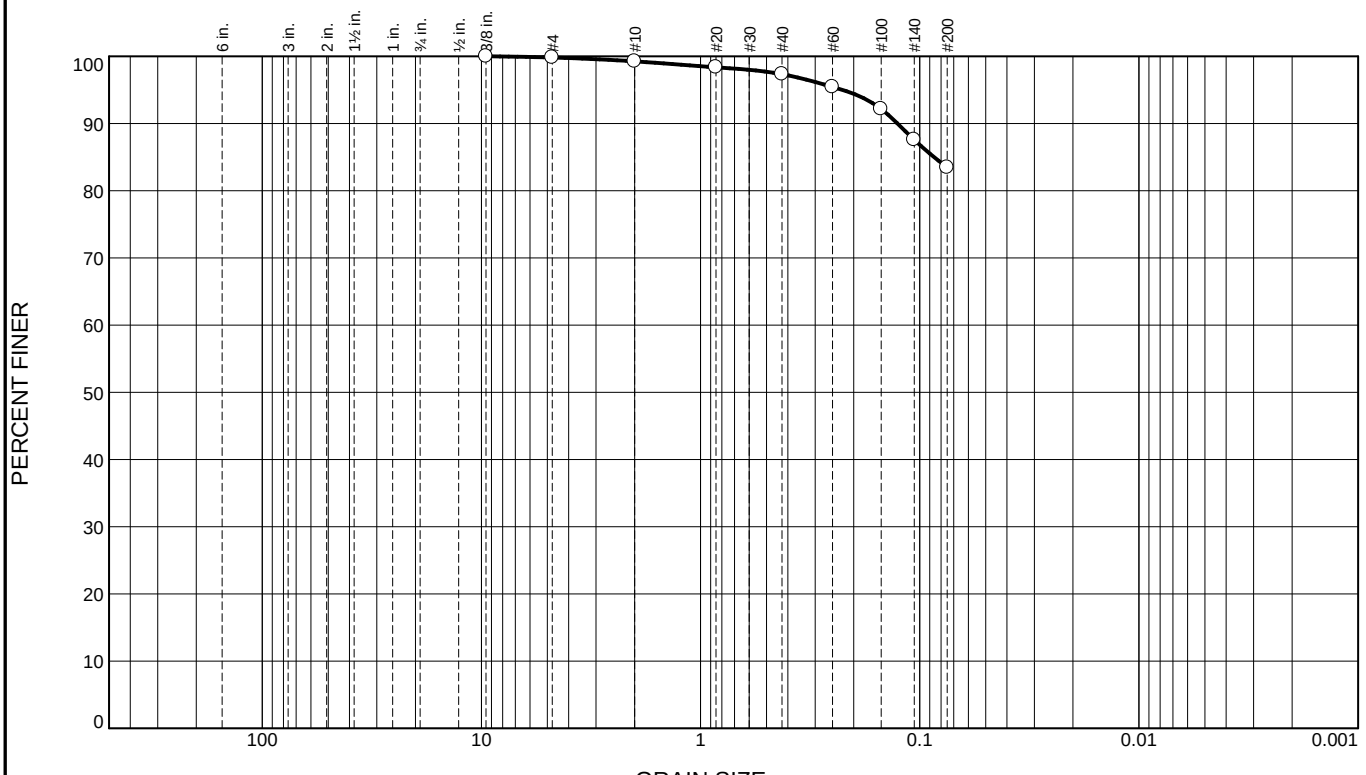


Liquid Limit= NV
Plastic Limit= NP
Plasticity Index= NP
Natural Moisture= NR

Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare					
Dry+Tare					
Tare					
Moisture					

Particle Size Analysis ASTM D422



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.2	0.6	1.9	13.8	83.5	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/8	100.0		
#4	99.8		
#10	99.2		
#20	98.4		
#40	97.3		
#60	95.4		
#100	92.2		
#140	87.6		
#200	83.5		

* (no specification provided)

Soil Description

Dark Gray CCR Material

Atterberg Limits

PL= NP LL= NV PI= NP

Coefficients

D_{90}= 0.1264 D_{85}= 0.0860 D_{60}=
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= ML AASHTO= A-4(0)

Remarks

Ash from Ash Fill 1
Specific Gravity = 2.226

Source of Sample: B324 **Depth:** 25 - 35
Sample Number: Bulk **Date:** 1-7-15

amec

Client: Duke Energy
Project: Dan River Steam Station Ash Removal
Project No: 7810140065 **Figure**

Tested By: M. Hamilton **Checked By:** T. Landis

GRAIN SIZE DISTRIBUTION TEST DATA

5/27/2015

Client: Duke Energy
Project: Dan River Steam Station Ash Removal
Project Number: 7810140065
Location: B324
Depth: 25 - 35 **Sample Number:** Bulk
Material Description: Dark Gray CCR Material
Date: 1-7-15 **PL:** NP **LL:** NV **PI:** NP
USCS Classification: ML **AASHTO Classification:** A-4(0)
Testing Remarks: Ash from Ash Fill 1
Specific Gravity = 2.226
Tested by: M. Hamilton **Checked by:** T. Landis

Sieve Test Data

Dry Sample and Tare (grams)	Tare (grams)	Cumulative Pan Tare Weight (grams)	Sieve Opening Size	Cumulative Weight Retained (grams)	Percent Finer
123.51	0.00	0.00	3/4		
			3/8	0.00	100.0
			#4	0.23	99.8
			#10	0.93	99.2
			#20	2.03	98.4
			#40	3.29	97.3
			#60	5.63	95.4
			#100	9.69	92.2
			#140	15.36	87.6
			#200	20.43	83.5

Fractional Components

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	0.0	0.2	0.2	0.6	1.9	13.8	16.3			83.5

D_5	D_{10}	D_{15}	D_{20}	D_{30}	D_{40}	D_{50}	D_{60}	D_{80}	D_{85}	D_{90}	D_{95}
									0.0860	0.1264	0.2253

Fineness Modulus
0.16

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SPECIFIC GRAVITY

ASTM D 854-10

Client	AMEC FOSTER WHEELER	Boring No.	B324
Client Reference	Dan River Steam Station Ash Removal	Depth (ft)	25-35
Project No.	2014-813-02	Sample No.	BULK
Lab ID	2014-813-02-01	Visual Description	**DARK GRAY ASH**
			(MInus No.4 sieve material, airdried)

Replicate Number	**1**	**2**
Pycnometer ID	R 445	R 446
Weight of Pycnometer + Soil + Water (gm)	691.25	689.34
Temperature, T (^{o}Celsius)	20.9	20.9
Weight of Pycnometer + Water (gm)	663.21	661.72
Tare Number	213	378
Weight of Tare + Dry Soil (gm)	165.23	155.4
Weight of Tare (gm)	114.25	105.3
Weight of Dry Soil (gm)	50.98	50.10
Specific Gravity of Soil @ T	2.222	2.229
Specific Gravity of Water @ T	0.9980	0.9980
Conversion Factor for Temperature T	0.9998	0.9998
Specific Gravity @ 20° Celsius	2.223	2.229

Average Specific Gravity @ 20° Celsius	2.23

Tested By *SFS* *Date* *1/12/15* *Checked By* *GEM* *Date* *6/315*

DCN: CT-S5 Date: 03/24/05 Revision: 10R *T:\Data Sheets\[Specific Gravity Soils 1Ral..xls]Sheet1*

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ATTERBERG LIMITS

ASTM D 4318-10 / AASHTO T89-10

Client:	AMEC FOSTER WHEELER	Boring No.:	B324
Client Reference:	Dan River Steam Station Ash Removal	Depth (ft):	25-35
Project No.:	2014-813-02	Sample No.:	BULK**DARK**
Lab ID:	2014-813-02-01	Soil Description:	**GRAY SILT**

Note: The* USCS *symbol used with this test refers only to the minus No. 40 sieve material. See the "Sieve and Hydrometer Analysis" graph page for the complete material description.

(Minus No. 40 sieve material, Airdried)

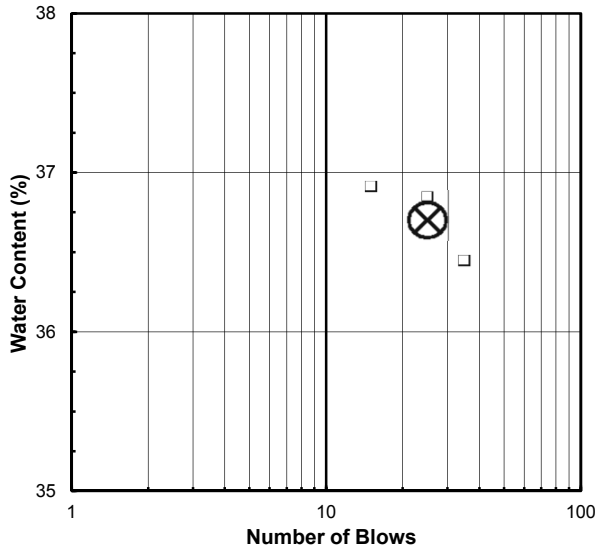
Liquid Limit Test	**1**	**2**	**3**	
Tare Number	5-M	E	W-2	**M U L T I P O I N T**
Wt. of Tare & Wet Sample (g)	24.85	26.74	26.85	
Wt. of Tare & Dry Sample (g)	22.39	23.66	23.89	
Wt. of Tare (g)	15.64	15.30	15.87	
Wt. of Water (g)	2.5	3.1	3.0	
Wt. of Dry Sample (g)	6.8	8.4	8.0	
Moisture Content (%)	**36.4**	**36.8**	**36.9**	
Number of Blows	**35**	**25**	**15**	

Plastic Limit Test	**1**	**2**	**Range**
Tare Number	A-L	T	
Wt. of Tare & Wet Sample (g)	22.62	22.43	
Wt. of Tare & Dry Sample (g)	20.82	20.70	
Wt. of Tare (g)	15.54	15.22	
Wt. of Water (g)	1.8	1.7	
Wt. of Dry Sample (g)	5.3	5.5	
Moisture Content (%)	**34.1**	**31.6**	**2.5**

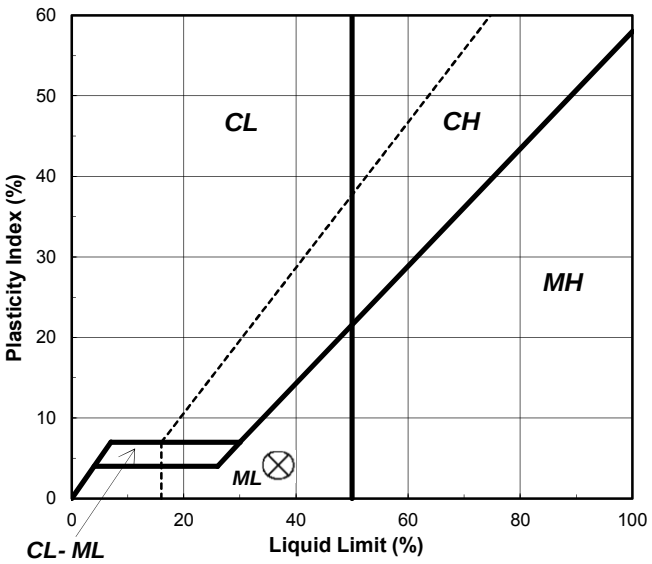
Note: The acceptable range of the two Moisture contents is ± 2.6

Test Results	
Liquid Limit (%)	**37**
Plastic Limit (%)	**33**
Plasticity Index (%)	**4**
USCS Symbol	**ML**

Flow Curve



Plasticity Chart



Tested By	*BW*	*Date*	*1/12/2015*	*Checked By*	*GEM*	*Date*	6/3/15

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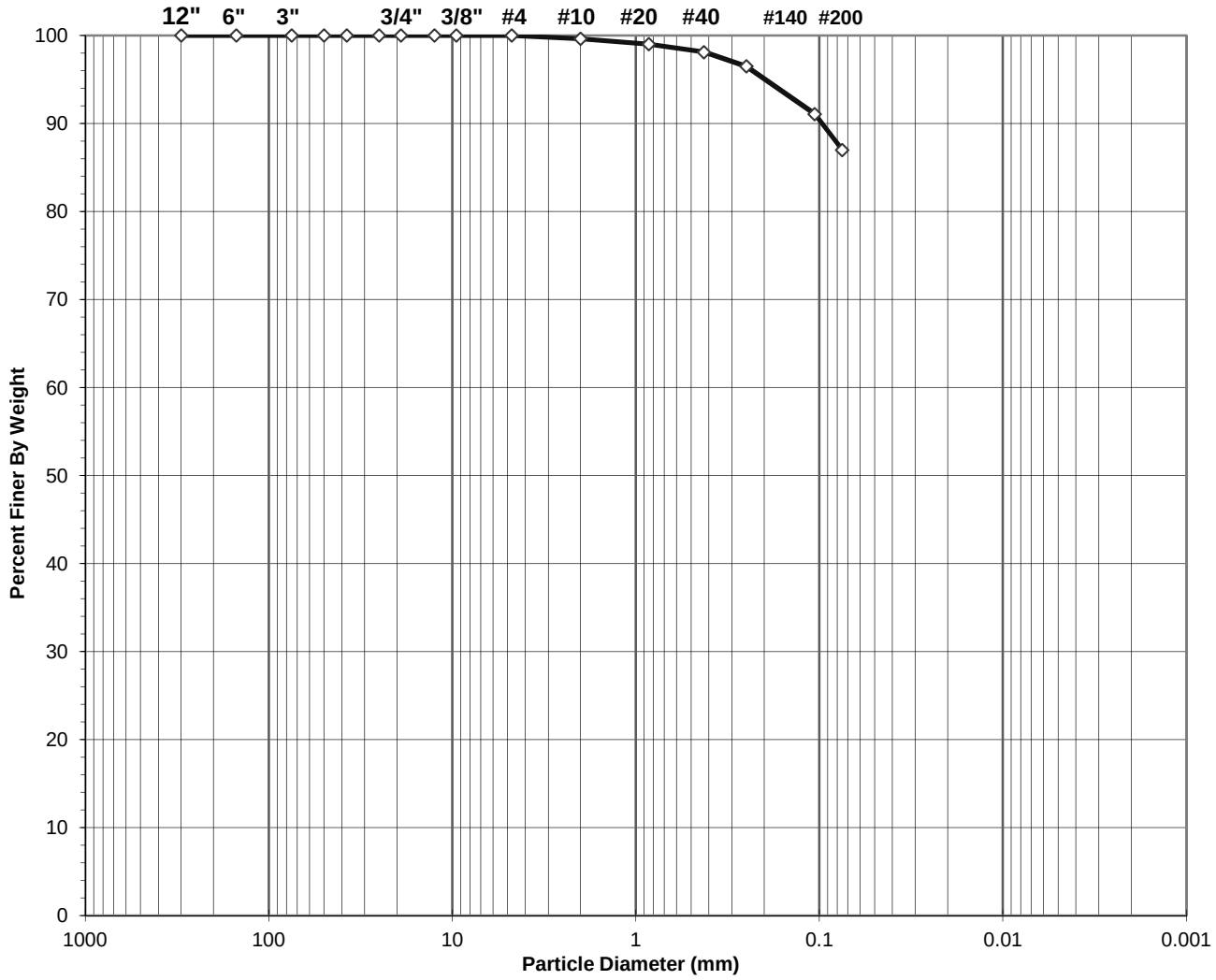
SIEVE ANALYSIS
ASTM D 422-63 (2007)

Client	AMEC FOSTER WHEELER	Boring No.	B324
Client Reference	Dan River Steam Station Ash Removal	Depth (ft)	25-35
Project No.	2014-813-02	Sample No.	BULK
Lab ID	2014-813-02-01	Soil Color	**DARK GRAY**

	SIEVE ANALYSIS		*HYDROMETER*
USCS	**gravel**	**sand**	**silt and clay**



USCS Symbol ***ML, TESTED***

USCS Classification SILT

Tested By BW Date 1/8/15 Checked By GEM Date 6/3/15

DCN: CT-S3C DATE 6-25-98 REVISION: 2 *T:\2014 PROJECTS\2014-813 AMEC - DAN RIVER STEAM\[2014-813-02-01 SIEVON REV 4.xls]Sheet1*

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WASH SIEVE ANALYSIS

ASTM D 422-63 (2007)

Client	AMEC FOSTER WHEELER	Boring No.	B324
Client Reference	Dan River Steam Station Ash Removal	Depth (ft)	25-35
Project No.	2014-813-02	Sample No.	BULK
Lab ID	2014-813-02-01	Soil Color	**DARK GRAY**

Moisture Content of Passing 3/4" Material		Water Content of Retained 3/4" Material	
Tare No.	838	Tare No.	NA
Wgt.Tare + Wet Specimen (gm)	610.93	Wgt.Tare + Wet Specimen (gm)	NA
Wgt.Tare + Dry Specimen (gm)	521.94	Wgt.Tare + Dry Specimen (gm)	NA
Weight of Tare (gm)	261.93	Weight of Tare (gm)	NA
Weight of Water (gm)	88.99	Weight of Water (gm)	NA
Weight of Dry Soil (gm)	260.01	Weight of Dry Soil (gm)	NA
Moisture Content (%)	**34.2**	**Moisture Content (%)**	**NA**

Wet Weight -3/4" Sample (gm)	NA	Weight of the Dry Specimen (gm)	260.01
Dry Weight - 3/4" Sample (gm)	33.8	Weight of minus #200 material (gm)	226.19
Wet Weight +3/4" Sample (gm)	NA	Weight of plus #200 material (gm)	33.82
Dry Weight + 3/4" Sample (gm)	0.00		
Total Dry Weight Sample (gm)	NA		

Sieve Size	Sieve Opening (mm)	Wgt.of Soil Retained (gm)	Percent Retained (%)	Accumulated Percent Retained (%)	Percent Finer (%)	**Accumulated Percent Finer (%)**
12"	300	0.00	0.0	0.0	100.0	**100.0**
6"	150	0.00	0.0	0.0	100.0	**100.0**
3"	75	0.00	0.0	0.0	100.0	**100.0**
2"	50	0.00	0.0	0.0	100.0	**100.0**
1 1/2"	37.5	0.00	0.0	0.0	100.0	**100.0**
1"	25.0	0.00	0.0	0.0	100.0	**100.0**
3/4"	19.0	0.00	0.0	0.0	100.0	**100.0**
1/2"	12.50	0.00	0.0	0.0	100.0	**100.0**
3/8"	9.50	0.00	0.0	0.0	100.0	**100.0**
#4	4.75	0.00	0.0	0.0	100.0	**100.0**
#10	2.00	0.95	0.4	0.4	99.6	**99.6**
#20	0.850	1.61	0.6	1.0	99.0	**99.0**
#40	0.425	2.32	0.9	1.9	98.1	**98.1**
#60	0.250	4.22	1.6	3.5	96.5	**96.5**
#140	0.106	14.10	5.4	8.9	91.1	**91.1**
#200	0.075	10.62	4.1	13.0	87.0	**87.0**
Pan	-	226.19	87.0	100.0	-	**-**

Tested By BW Date 1/8/15 Checked By GEM Date 6/3/15

DCN: CT-S3C DATE 6-25-98 REVISION: 2 *T:\2014 PROJECTS\2014-813 AMEC - DAN RIVER STEAM\[2014-813-02-01 SIEVON REV 4.xls]Sheet1*

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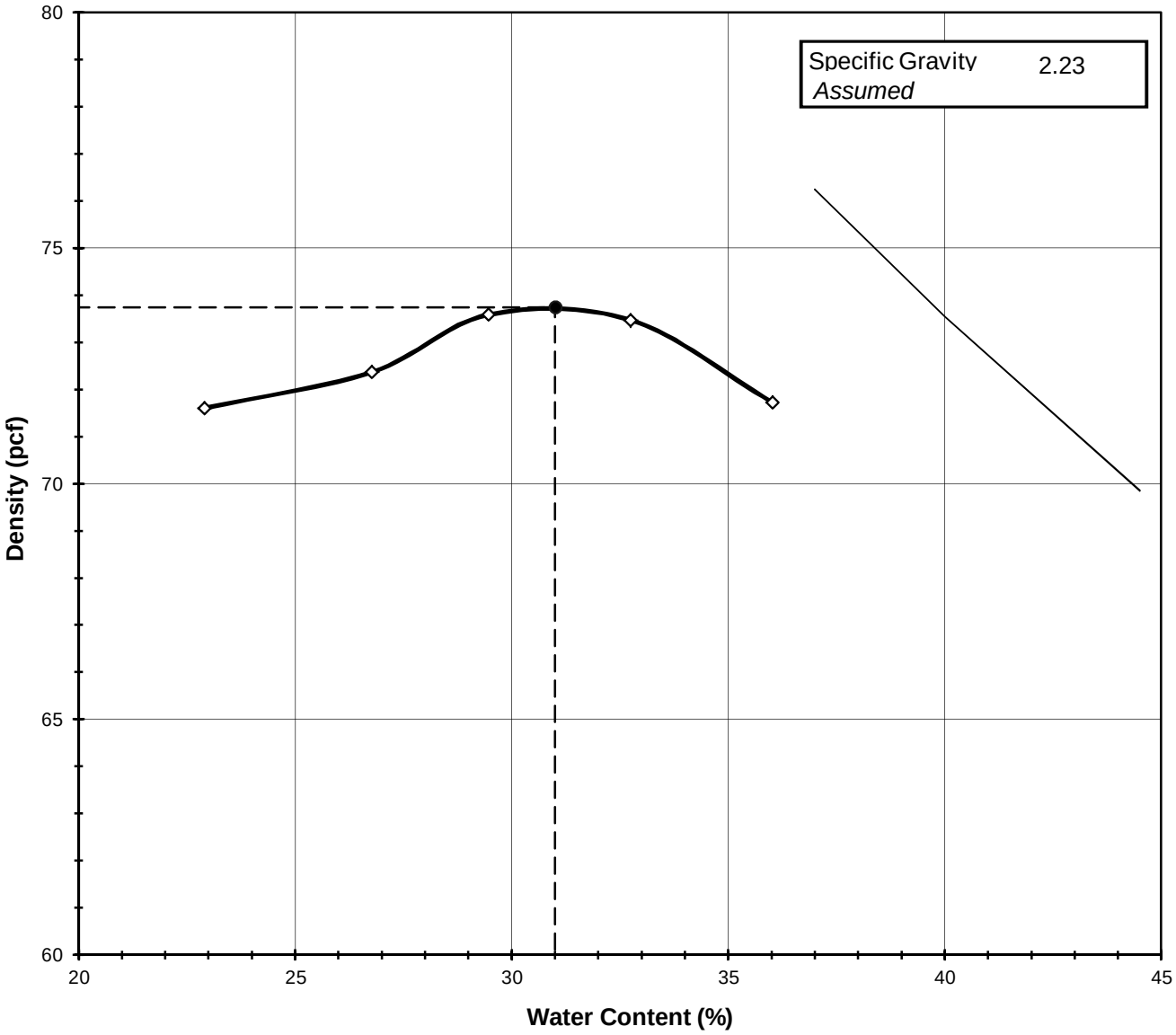
MOISTURE DENSITY RELATIONSHIP

ASTM D698-12

Client:	AMEC FOSTER WHEELER	Boring No.:	B324
Client Reference:	Dan River Steam Station Ash Removal	Depth (ft):	25-35
Project No.:	2014-813-02	Sample No.:	BULK
Lab ID:	2014-813-02-01	Test Method	**STANDARD**

Visual Description: DARK GRAY SILT

Optimum Water Content	**31.0**
Maximum Dry Density	**73.7**



Tested By *BW* *Date* *1/9/15* *Checked By* *GEM* *Date* 6/3/15

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MOISTURE - DENSITY RELATIONSHIP

ASTM D698-12

Client:	AMEC FOSTER WHEELER	Boring No.:	B324
Client Reference:	Dan River Steam Station Ash Removal	Depth (ft):	25-35
Project No.:	2014-813-02	Sample No.:	BULK
Lab ID:	2014-813-02-01		

Visual Description: DARK GRAY SILT

Total Weight of the Sample (g)	19700
As Received Water Content (%)	NA
Assumed Specific Gravity	2.23
Percent Retained on 3/4"	NA
Percent Retained on 3/8"	NA
Percent Retained on #4	NA
Oversize Material	Not included
Procedure Used	A

Test Type		**STANDARD**
Rammer Weight (lb)		5.5
Rammer Drop (in)		12
Rammer Type		MECHANICAL
Machine ID	R	174
Mold ID	R	461
Mold diameter		4"
Weight of the Mold (g)		4179
Volume of the Mold (cm^3)		937

Mold / Specimen

Point No.	**1**	**2**	**3**	**4**	**5**
Wt. of Mold & Wet Sample (g)	5500	5556	5609	5644	5644
Wt.of Mold (g)	4179	4179	4179	4179	4179
Wt. of Wet Sample (g)	1322	1378	1431	1465	1465
Mold Volume (cm^3)	937	937	937	937	937

Moisture Content / Density

Tare Number	817	822	821	824	815
Wt. of Tare & Wet Sample (g)	370.20	370.50	406.40	410.20	407.70
Wt. of Tare & Dry Sample (g)	326.60	321.60	344.00	342.80	336.20
Wt. of Tare (g)	136.30	138.90	132.20	137.00	137.70
Wt. of Water (g)	43.60	48.90	62.40	67.40	71.50
Wt. of Dry Sample (g)	190.30	182.70	211.80	205.80	198.50

Wet Density (g/cm^3)	1.41	1.47	1.53	1.56	1.56
Wet Density (pcf)	88.0	91.7	95.3	97.5	97.6
Moisture Content (%)	**22.9**	**26.8**	**29.5**	**32.8**	**36.0**
Dry Density (pcf)	**71.6**	**72.4**	**73.6**	**73.5**	**71.7**

Zero Air Voids

Moisture Content (%)	37.0	40.0	44.5
Dry Unit Weight (pcf)	76.2	73.5	69.8

Tested By *BW* *Date* *1/9/15* *Checked By* *GEM* *Date* 6/3/15

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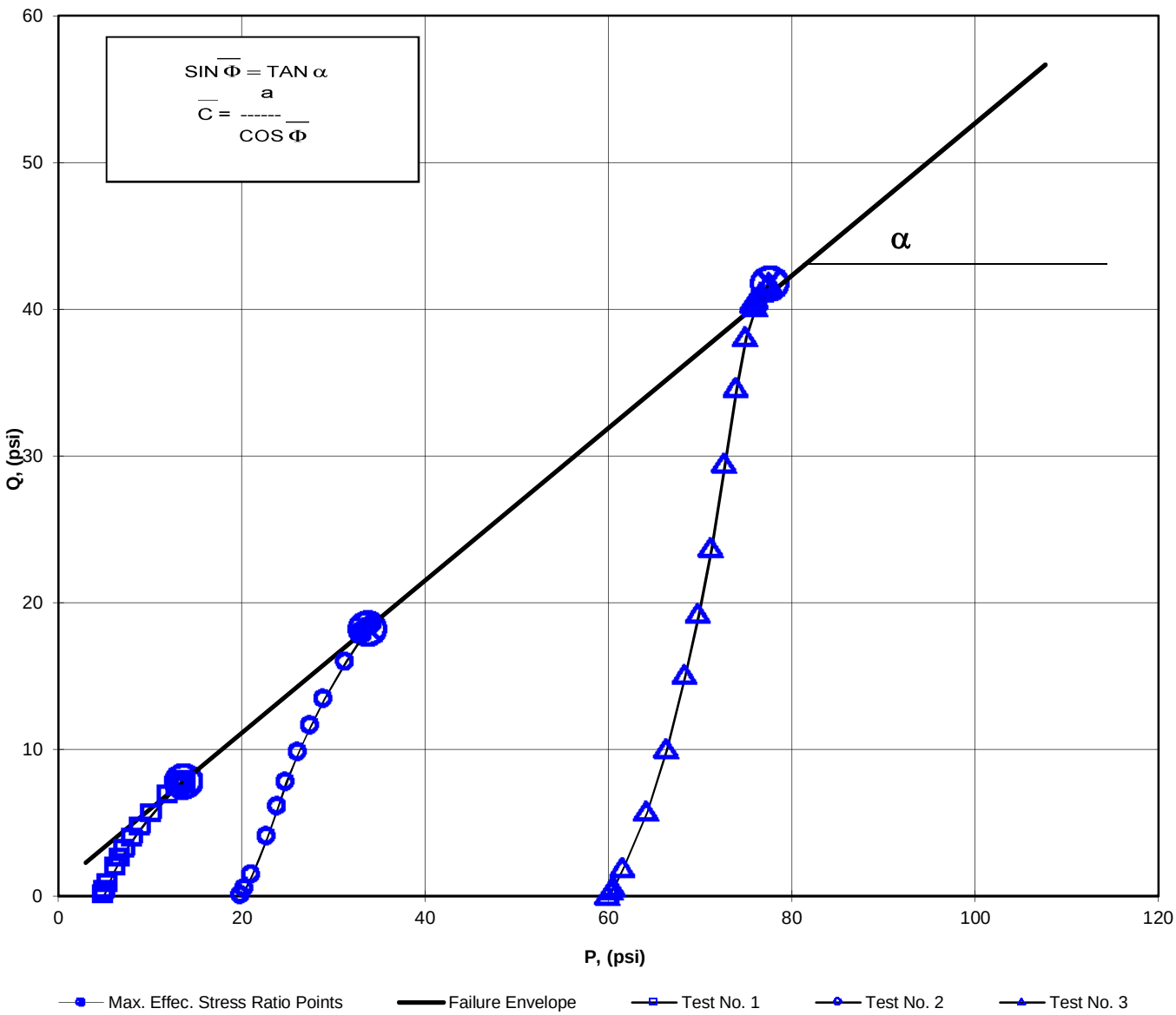
CONSOLIDATED UNDRAINED TRIAXIAL TEST
WITH PORE PRESSURE READINGS
ASTM D4767-11

Client:	AMEC FOSTER WHEELER	Boring No.:	B324
Client Reference:	Dan River Steam Station Ash Removal	Depth (ft):	25-35
Project No.:	2014-813-02	Sample No.:	BULK
Lab ID:	2014-813-02-01		

Consolidated Undrained Triaxial Test with Pore Pressure



a	=	**0.00**	**C̄**	=	**0.00**
α	=	**27.4**	**Φ̄**	=	**31.29**

Tested By: SFS Date: 1/13/15 Approved By: MPS Date: 6/3/15

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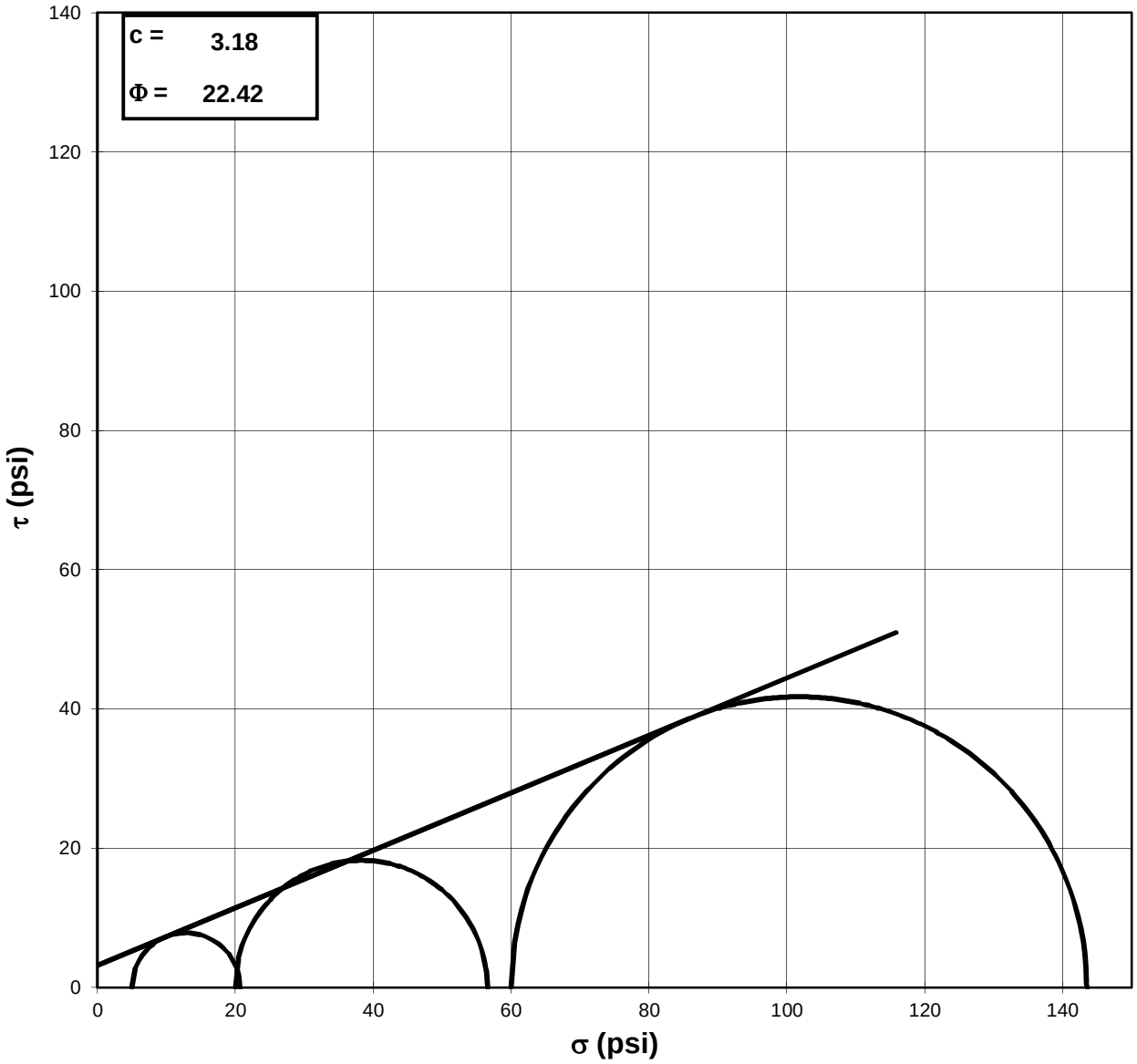
MOHR TOTAL STRENGTH ENVELOPE

ASTM D4767-11

Client:	AMEC FOSTER WHEELER	Boring No.:	B324
Client Reference:	Dan River Steam Station Ash Removal	Depth (ft):	25-35
Project No.:	2014-813-02	Sample No.:	BULK
Lab ID:	2014-813-02-01		
Visual Description:	DARK GRAY SILT (REMOLDED)		



Failure Based on Maximum Effective Principal Stress Ratio

NOTE: GRAPH NOT TO SCALE

Tested By: SFS *Date:* 1/13/15 *Approved By:* MPS *Date:* 6/3/15

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CONSOLIDATED UNDRAINED TRIAXIAL TEST
WITH PORE PRESSURE READINGS
ASTM D4767-11

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Client:	AMEC FOSTER WHEELER	Boring No.:	B324
Client Reference:	Dan River Steam Station Ash Removal	Depth (ft):	25-35
Project No.:	2014-813-02	Sample No.:	BULK
Lab ID:	2014-813-02-01		

Visual Description: DARK GRAY SILT (REMOLDED)

Stage No.	1
Test No.	1

PRESSURES (psi)

Cell Pressure (psi)	55.0
Back Pressure (psi)	50.0
Eff. Conf. Pressure (psi)	5.0
Pore Pressure Response (%)	92

MAXIMUM OBLIQUITY POINTS

$\overline{P}$	=	13.69
Q	=	7.84

INITIAL SAMPLE DIMENSIONS (in)

Length 1:	5.995	Diameter 1:	2.864
Length 2:	5.995	Diameter 2:	2.864
Length 3:	5.995	Diameter 3:	2.864
Avg. Length:	5.995	*Avg. Diam.:*	2.864

VOLUME CHANGE

Initial Burette Reading (ml)	24.0
Final Burette Reading (ml)	20.6
Final Change (ml)	3.4

Initial Dial Reading (mil)	70
Dial Reading After Saturation (mil)	80
Dial Reading After Consolidation (mil)	86

LOAD (LB)	DEFORMATION (IN)	PORE PRESSURE (PSI)
8.9	0.000	50.0
12.9	0.001	50.1
18.9	0.002	50.3
33.5	0.007	50.6
41.7	0.013	50.7
48.9	0.018	50.8
59.2	0.026	50.7
68.3	0.035	50.5
80.6	0.046	50.3
97.4	0.067	49.8
110.8	0.096	49.2
107.7	0.132	49.3
107.6	0.168	49.3
107.4	0.209	49.3
107.2	0.237	49.3
108.3	0.279	49.3
109.4	0.336	49.3
109.8	0.394	49.2
110.4	0.437	49.2
111.8	0.498	49.1
113.3	0.542	49.1
115.0	0.586	49.0
117.6	0.630	49.0
117.1	0.660	48.9
118.3	0.689	48.9
119.2	0.719	48.8
120.2	0.749	48.8
121.4	0.793	48.8
123.8	0.836	48.8
124.3	0.866	48.7
124.9	0.896	48.7

Tested By: SFS Date: 1/13/15 Input Checked By: GEM Date: 6/3/15

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WITH PORE PRESSURE READINGS
ASTM D4767-11

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Client:	AMEC FOSTER WHEELER	Boring No.:	B324
Client Reference:	Dan River Steam Station Ash Removal	Depth (ft):	25-35
Project No.:	2014-813-02	Sample No.:	BULK
Lab ID:	2014-813-02-01		

Visual Description: DARK GRAY SILT (REMOLDED)

Effective Confining Pressure (psi)	5.0	*Stage No.*	1
		Test No	1

INITIAL DIMENSIONS

Initial Sample Length (in)	6.00
Initial Sample Diameter (in)	2.86
Initial Sample Area (in^2)	6.44
Initial Sample Volume (in^3)	38.62

VOLUME CHANGE

Volume After Consolidation (in^3)	38.22
Length After Consolidation (in)	5.98
Area After Consolidation (in^2)	6.392

Strain (%)	Deviation Stress	ΔU	$\overline{\sigma}_1$	$\overline{\sigma}_3$	Effective Principle Stress Ratio	$\overline{A}$	$\overline{P}$	Q
0.01	0.62	0.11	5.52	4.9	1.127	0.19	5.21	0.31
0.03	1.55	0.28	6.28	4.7	1.329	0.20	5.50	0.78
0.12	3.84	0.59	8.26	4.4	1.870	0.17	6.34	1.92
0.21	5.11	0.73	9.38	4.3	2.196	0.16	6.83	2.56
0.30	6.23	0.76	10.48	4.2	2.469	0.13	7.36	3.12
0.44	7.83	0.69	12.14	4.3	2.813	0.10	8.23	3.91
0.58	9.23	0.53	13.70	4.5	3.065	0.06	9.09	4.62
0.78	11.12	0.26	15.86	4.7	3.345	0.03	10.30	5.56
1.12	13.68	-0.25	18.93	5.3	3.605	-0.02	12.09	6.84
1.61	15.68	-0.85	21.53	5.9	3.680	-0.06	13.69	7.84
2.20	15.11	-0.75	20.86	5.8	3.627	-0.05	13.31	7.55
2.80	15.01	-0.73	20.75	5.7	3.616	-0.05	13.24	7.50
3.49	14.87	-0.67	20.54	5.7	3.623	-0.05	13.11	7.44
3.97	14.76	-0.67	20.43	5.7	3.602	-0.05	13.05	7.38
4.67	14.81	-0.70	20.51	5.7	3.599	-0.05	13.11	7.41
5.62	14.84	-0.75	20.59	5.8	3.580	-0.05	13.17	7.42
6.59	14.74	-0.79	20.53	5.8	3.543	-0.06	13.16	7.37
7.31	14.71	-0.82	20.53	5.8	3.526	-0.06	13.18	7.35
8.33	14.75	-0.88	20.63	5.9	3.504	-0.07	13.26	7.37
9.06	14.85	-0.94	20.80	5.9	3.499	-0.07	13.37	7.43
9.80	14.96	-0.99	20.96	6.0	3.495	-0.07	13.48	7.48
10.53	15.21	-1.06	21.28	6.1	3.509	-0.08	13.67	7.61
11.03	15.05	-1.10	21.15	6.1	3.466	-0.08	13.63	7.52
11.53	15.13	-1.14	21.28	6.1	3.464	-0.08	13.71	7.57
12.02	15.18	-1.17	21.35	6.2	3.459	-0.08	13.76	7.59
12.52	15.23	-1.19	21.43	6.2	3.458	-0.09	13.81	7.62
13.27	15.26	-1.22	21.48	6.2	3.450	-0.09	13.85	7.63
13.99	15.45	-1.25	21.71	6.3	3.471	-0.09	13.98	7.73
14.48	15.44	-1.27	21.71	6.3	3.459	-0.09	13.99	7.72
14.99	15.42	-1.30	21.73	6.3	3.446	-0.09	14.01	7.71

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WITH PORE PRESSURE READINGS
ASTM D4767-11

Client:	AMEC FOSTER WHEELER	Boring No.:	B324
Client Reference:	Dan River Steam Station Ash Removal	Depth (ft):	25-35
Project No.:	2014-813-02	Sample No.:	BULK
Lab ID:	2014-813-02-01		

Visual Description: DARK GRAY SILT (REMOLDED)

Stage No.	1
Test No.	2

PRESSURES (psi)

Cell Pressure (psi)	70.0
Back Pressure (psi)	50.0
Eff. Conf. Pressure (psi)	20.0
Pore Pressure Response (%)	93

MAXIMUM OBLIQUITY POINTS

$\overline{P}$	=	33.77
Q	=	18.26

INITIAL SAMPLE DIMENSIONS (in)

Length 1:	5.995	Diameter 1:	2.864
Length 2:	5.995	Diameter 2:	2.864
Length 3:	5.995	Diameter 3:	2.864
Avg. Length	5.995	*Avg. Diam.:*	2.864

VOLUME CHANGE

Initial Burette Reading (ml)	24.0
Final Burette Reading (ml)	16.5
Final Change (ml)	7.5
Initial Dial Reading (mil)	113
Dial Reading After Saturation (mil)	120
Dial Reading After Consolidation (mil)	136

LOAD (LB)	DEFORMATION (IN)	PORE PRESSURE (PSI)
9.0	0.000	50.0
14.8	0.002	50.0
26.7	0.005	50.2
60.5	0.041	51.2
87.0	0.071	52.1
108.9	0.096	52.8
136.4	0.133	53.6
160.9	0.160	54.0
185.7	0.194	54.4
222.1	0.276	54.5
251.4	0.391	54.4
264.8	0.448	54.2
261.0	0.460	54.5
258.1	0.489	54.7
258.4	0.492	54.7
258.0	0.523	54.9
261.5	0.561	55.0
264.4	0.621	55.0
265.2	0.668	54.9
267.7	0.703	54.8
270.9	0.739	54.7
275.9	0.787	54.6
279.9	0.822	54.5
282.0	0.864	54.4
282.8	0.873	54.4
285.2	0.912	54.3

Tested By: SFS Date: 1/13/15 Input Checked By: GEM Date: 6/3/15

DCN: CT-S28 DATE: 4/12/13 REVISION: 3

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CONSOLIDATED UNDRAINED TRIAXIAL TEST
WITH PORE PRESSURE READINGS
ASTM D4767-11

Client:	AMEC FOSTER WHEELER	Boring No.:	B324
Client Reference:	Dan River Steam Station Ash Removal	Depth (ft):	25-35
Project No.:	2014-813-02	Sample No.:	BULK
Lab ID:	2014-813-02-01		

Visual Description: DARK GRAY SILT (REMOLDED)

Effective Confining Pressure (psi)	20.0	*Stage No.*	1
		Test No	2

INITIAL DIMENSIONS

Initial Sample Length (in)	6.00
Initial Sample Diameter (in)	2.86
Initial Sample Area (in^2)	6.44
Initial Sample Volume (in^3)	38.62

VOLUME CHANGE

Volume After Consolidation (in^3)	38.03
Length After Consolidation (in)	5.97
Area After Consolidation (in^2)	6.368

Strain (%)	Deviation Stress	ΔU	$\overline{\sigma}_1$	$\overline{\sigma}_3$	Effective Principle Stress Ratio	$\overline{A}$	$\overline{P}$	Q
0.03	0.91	0.06	20.87	20.0	1.046	0.07	20.41	0.46
0.09	2.77	0.27	22.52	19.7	1.140	0.10	21.13	1.39
0.69	8.03	1.21	26.84	18.8	1.427	0.16	22.83	4.02
1.19	12.11	2.10	30.03	17.9	1.676	0.19	23.97	6.05
1.61	15.44	2.82	32.64	17.2	1.898	0.20	24.92	7.72
2.23	19.56	3.59	35.99	16.4	2.190	0.20	26.21	9.78
2.68	23.22	4.06	39.17	16.0	2.455	0.19	27.56	11.61
3.24	26.85	4.44	42.42	15.6	2.724	0.18	29.00	13.43
4.61	31.92	4.56	47.38	15.5	3.065	0.15	31.42	15.96
6.55	35.58	4.46	51.14	15.6	3.287	0.13	33.35	17.79
7.51	37.15	4.20	52.97	15.8	3.348	0.12	34.39	18.57
7.70	36.53	4.52	52.03	15.5	3.357	0.13	33.77	18.26
8.18	35.92	4.71	51.22	15.3	3.347	0.14	33.26	17.96
8.23	35.94	4.76	51.19	15.3	3.356	0.14	33.22	17.97
8.76	35.68	4.90	50.80	15.1	3.361	0.15	32.96	17.84
9.39	35.92	5.02	50.92	15.0	3.396	0.15	32.96	17.96
10.39	35.95	4.98	50.99	15.0	3.390	0.15	33.01	17.97
11.19	35.73	4.95	50.80	15.1	3.372	0.15	32.93	17.87
11.78	35.84	4.85	51.01	15.2	3.364	0.15	33.09	17.92
12.38	36.03	4.74	51.31	15.3	3.358	0.14	33.30	18.02
13.18	36.38	4.60	51.80	15.4	3.360	0.14	33.61	18.19
13.76	36.70	4.52	52.19	15.5	3.368	0.13	33.84	18.35
14.46	36.67	4.38	52.31	15.6	3.346	0.13	33.97	18.34
14.62	36.71	4.37	52.35	15.6	3.346	0.13	34.00	18.35
15.27	36.75	4.29	52.48	15.7	3.338	0.13	34.10	18.38

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CONSOLIDATED UNDRAINED TRIAXIAL TEST
WITH PORE PRESSURE READINGS
ASTM D4767-11

Client:	AMEC FOSTER WHEELER	Boring No.:	B324
Client Reference:	Dan River Steam Station Ash Removal	Depth (ft):	25-35
Project No.:	2014-813-02	Sample No.:	BULK
Lab ID:	2014-813-02-01		

Visual Description: DARK GRAY SILT (REMOLDED)

Stage No.	1
Test No.	3

PRESSURES (psi)

Cell Pressure (psi)	110.0
Back Pressure (psi)	50.0
Eff. Conf. Pressure (psi)	60.0
Pore Pressure Response (%)	92

MAXIMUM OBLIQUITY POINTS

$\overline{P}$	=	77.68
Q	=	41.75

INITIAL SAMPLE DIMENSIONS (in)

Length 1:	5.995	Diameter 1:	2.864
Length 2:	5.995	Diameter 2:	2.864
Length 3:	5.995	Diameter 3:	2.864
Avg. Length:	5.995	*Avg. Diam.:*	2.864

VOLUME CHANGE

Initial Burette Reading (ml)	24.0
Final Burette Reading (ml)	10.8
Final Change (ml)	13.2

Initial Dial Reading (mil)	67
Dial Reading After Saturation (mil)	71
Dial Reading After Consolidation (mil)	107

LOAD (LB)	DEFORMATION (IN)	PORE PRESSURE (PSI)
14.8	0.000	50.0
18.9	0.001	50.0
21.9	0.002	50.0
38.8	0.008	50.2
87.5	0.013	51.5
142.1	0.019	53.6
206.2	0.027	56.6
259.8	0.036	59.3
317.9	0.048	62.5
392.4	0.069	66.7
460.8	0.098	70.6
508.5	0.134	73.0
538.2	0.169	74.0
560.1	0.211	74.2
566.3	0.241	74.1
561.8	0.283	74.4
562.2	0.341	74.5
565.5	0.401	74.6
569.6	0.446	74.6
576.3	0.505	74.6
580.5	0.551	74.6
584.4	0.595	74.6
590.4	0.641	74.6
594.2	0.670	74.6
598.2	0.701	74.6
602.3	0.730	74.5
604.5	0.760	74.6
609.4	0.805	74.6
611.5	0.850	74.5
615.3	0.881	74.5
619.0	0.911	74.5

Tested By: SFS Date: 1/13/15 Input Checked By: GEM Date: 6/3/15

DCN: CT-S28 DATE: 4/12/13 REVISION: 3

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CONSOLIDATED UNDRAINED TRIAXIAL TEST
WITH PORE PRESSURE READINGS
ASTM D4767-11

Client:	AMEC FOSTER WHEELER	Boring No.:	B324
Client Reference:	Dan River Steam Station Ash Removal	Depth (ft):	25-35
Project No.:	2014-813-02	Sample No.:	BULK
Lab ID:	2014-813-02-01		

Visual Description: DARK GRAY SILT (REMOLDED)

Effective Confining Pressure (psi)	60.0	*Stage No.*	1
		Test No	3

INITIAL DIMENSIONS

Initial Sample Length (in)	6.00
Initial Sample Diameter (in)	2.86
Initial Sample Area (in^2)	6.44
Initial Sample Volume (in^3)	38.62

VOLUME CHANGE

Volume After Consolidation (in^3)	37.74
Length After Consolidation (in)	5.96
Area After Consolidation (in^2)	6.337

Strain (%)	Deviation Stress	ΔU	$\overline{\sigma}_1$	$\overline{\sigma}_3$	Effective Principle Stress Ratio	$\overline{A}$	$\overline{P}$	Q
0.01	0.66	-0.05	60.71	60.1	1.011	-0.08	60.38	0.33
0.04	1.12	-0.03	61.15	60.0	1.019	-0.03	60.59	0.56
0.13	3.78	0.24	63.55	59.8	1.063	0.07	61.66	1.89
0.22	11.45	1.50	69.95	58.5	1.196	0.14	64.23	5.72
0.32	20.03	3.59	76.45	56.4	1.355	0.19	66.43	10.02
0.46	30.07	6.59	83.49	53.4	1.563	0.24	68.45	15.04
0.61	38.42	9.31	89.11	50.7	1.758	0.26	69.90	19.21
0.81	47.44	12.46	94.99	47.5	1.998	0.29	71.27	23.72
1.15	58.90	16.70	102.20	43.3	2.360	0.31	72.75	29.45
1.65	69.22	20.61	108.62	39.4	2.757	0.32	74.01	34.61
2.26	76.15	23.02	113.13	37.0	3.059	0.33	75.06	38.07
2.84	80.24	23.96	116.28	36.0	3.226	0.32	76.16	40.12
3.54	83.01	24.16	118.85	35.8	3.316	0.32	77.34	41.50
4.05	83.50	24.08	119.43	35.9	3.324	0.31	77.68	41.75
4.76	82.21	24.35	117.86	35.7	3.306	0.32	76.76	41.10
5.72	81.43	24.49	116.95	35.5	3.293	0.33	76.23	40.72
6.73	81.05	24.58	116.47	35.4	3.288	0.33	75.95	40.52
7.49	80.99	24.61	116.38	35.4	3.288	0.33	75.89	40.49
8.48	81.09	24.57	116.53	35.4	3.289	0.33	75.98	40.55
9.25	81.02	24.59	116.43	35.4	3.288	0.33	75.92	40.51
9.99	80.90	24.59	116.32	35.4	3.284	0.33	75.87	40.45
10.76	81.06	24.58	116.49	35.4	3.288	0.33	75.95	40.53
11.25	81.14	24.56	116.59	35.4	3.289	0.33	76.02	40.57
11.77	81.23	24.55	116.69	35.5	3.291	0.33	76.07	40.62
12.27	81.34	24.54	116.80	35.5	3.293	0.33	76.14	40.67
12.77	81.18	24.55	116.63	35.5	3.290	0.33	76.04	40.59
13.52	81.13	24.56	116.58	35.4	3.289	0.33	76.01	40.57
14.28	80.72	24.55	116.18	35.5	3.276	0.33	75.82	40.36
14.79	80.74	24.53	116.22	35.5	3.276	0.33	75.84	40.37
15.30	80.76	24.49	116.28	35.5	3.274	0.33	75.90	40.38

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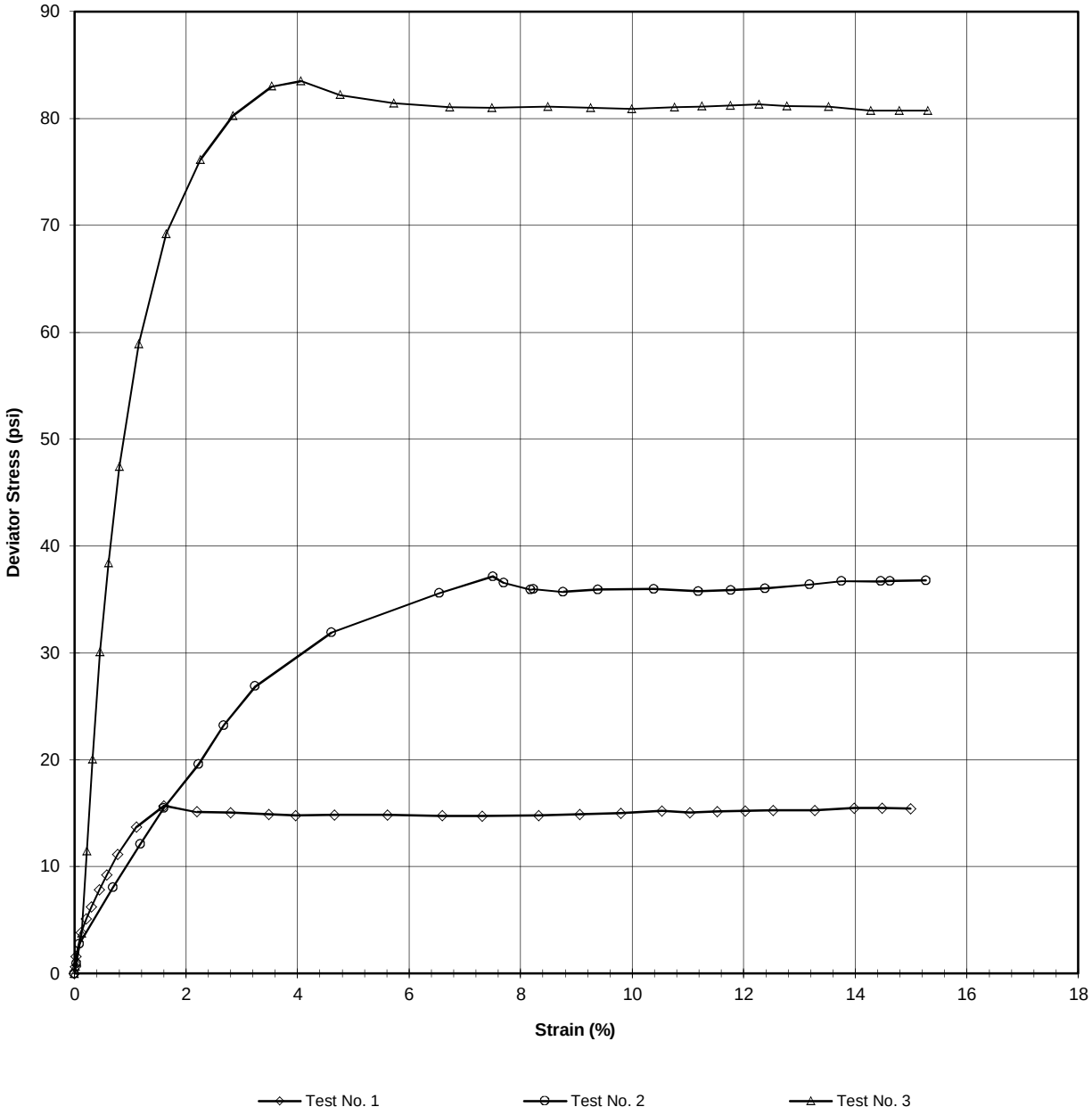
CONSOLIDATED UNDRAINED TRIAXIAL TEST
WITH PORE PRESSURE READINGS
ASTM D4767-11

Client:	AMEC FOSTER WHEELER	Boring No.:	B324
Client Reference:	Dan River Steam Station Ash Removal	Depth (ft):	25-35
Project No.:	2014-813-02	Sample No.:	BULK
Lab ID:	2014-813-02-01		
Visual Description:	DARK GRAY SILT		



Tested By: SFS Date: 1/13/15 Approved By: MPS Date: 6/3/15

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CONSOLIDATED UNDRAINED TRIAXIAL TEST
WITH PORE PRESSURE READINGS
ASTM D4767-11

Client:	AMEC FOSTER WHEELER		
Client Reference:	Dan River Steam Station Ash Removal		
Project No.:	2014-813-02		
Lab ID:	2014-813-02-01	Specific Gravity (Measured)	2.23

Visual Description: DARK GRAY SILT (REMOLDED)

SAMPLE CONDITION SUMMARY

Boring No.:	B324	B324	B324
Depth (ft):	25-35	25-35	25-35
Sample No.:	BULK	BULK	BULK
Test No.	T1	T2	T3
Deformation Rate (in/min)	0.002	0.002	0.002
Back Pressure (psi)	50.0	50.0	50.0
Consolidation Time (days)	1	1	1
Moisture Content (%) (INITIAL)	32.3	32.3	32.3
Total Unit Weight (pcf)	92.5	92.6	92.9
Dry Unit Weight (pcf)	69.9	70.0	70.3
Moisture Content (%) (FINAL)	42.9	41.7	40.9
Initial State Void Ratio,e	0.991	0.989	0.981
Void Ratio at Shear, e	0.971	0.958	0.936

Tested By: SFS Date: 1/13/15 Input Checked By: GEM Date: 6/3/15

DCN: CT-S28 DATE: 4/12/13 REVISION: 3

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CONSOLIDATED UNDRAINED TRIAXIAL TEST
WITH PORE PRESSURE READINGS

ASTM D4767-11

MOISTURE CONTENT

	T1	T2	T3
Tare Number	800	800	800
Weight of Tare & Wet Sample (g)	469.16	469.16	469.16
Weight of Tare & Dry Sample (g)	380.09	380.09	380.09
Weight of Tare (g)	103.92	103.92	103.92
Moisture Content (%) (INITIAL)	32.25	32.25	32.25
Tare Number	813	802	803
Weight of Tare & Wet Sample (g)	619.71	594	618.51
Weight of Tare & Dry Sample (g)	466.56	449.63	468.72
Weight of Tare (g)	109.5	103.52	102.16
Moisture Content (%) (FINAL)	42.89	41.71	40.86

UNIT WEIGHT

Weight of Tube & Wet Sample (g)	2491.26	2492.41	2496.09
Weight of Tube (g)	1554	1554	1554
Weight of Wet Sample (g)	937.26	938.41	942.09
Length 1 (in)	5.995	5.995	5.995
Length 2 (in)	5.995	5.995	5.995
Length 3 (in)	5.995	5.995	5.995
Top Diameter (in)	2.864	2.864	2.864
Middle Diameter (in)	2.864	2.864	2.864
Bottom Diameter (in)	2.864	2.864	2.864
Average Length (in)	5.995	5.995	5.995
Average Area (in)	6.442	6.442	6.442
Sample Volume (cm^3)	632.89	632.89	632.89
Unit Wet Weight (g/cm^3)	1.48	1.48	1.49
Unit Wet Weight (pcf)	92.45	92.57	92.93
Unit Dry Weight (pcf)	69.91	69.99	70.27
Unit Dry Weight (g/cm^3)	1.12	1.12	1.13
Initial Burette Reading	**24**	**24**	**24**
Final Burette Reading	**20.6**	**16.5**	**10.8**
Initial Dial Reading	**70**	**113**	**67**
Dial Reading After Saturation	**80**	**120**	**71**
Dial Reading After Consolidation	**86**	**136**	**107**
Volume Change during Consolidation	3.4	7.5	13.2
Volume Change during Saturation	3.17	2.22	1.27
Volume at Shear (cm^3) *These	626.32	623.17	618.42
Volume of Solids (cm^3) measurements	317.80	318.19	319.44
Volume of Voids (cm^3) are all	308.52	304.98	298.98
Volume of Water (cm^3) at	303.97	295.97	291.09
Void Ratio, e shear	0.971	0.958	0.936

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CONSOLIDATED UNDRAINED TRIAXIAL TEST
WITH PORE PRESSURE READINGS
ASTM D4767-11

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Client:	AMEC FOSTER WHEELER	Boring No.:	B324
Client Reference:	Dan River Steam Station Ash Removal	Depth (ft):	25-35
Project No.:	2014-813-02	Sample No.:	BULK
Lab ID:	2014-813-02-01		

TEST 1 INITIAL

N/A

TEST 1 FINAL

TEST 2 INITIAL

N/A

TEST 2 FINAL

TEST 3 INITIAL

N/A

TEST 3 FINAL

Tested By *SFS* *Date* *1/13/15* *Approved By* MPS *Date* 6/3/15

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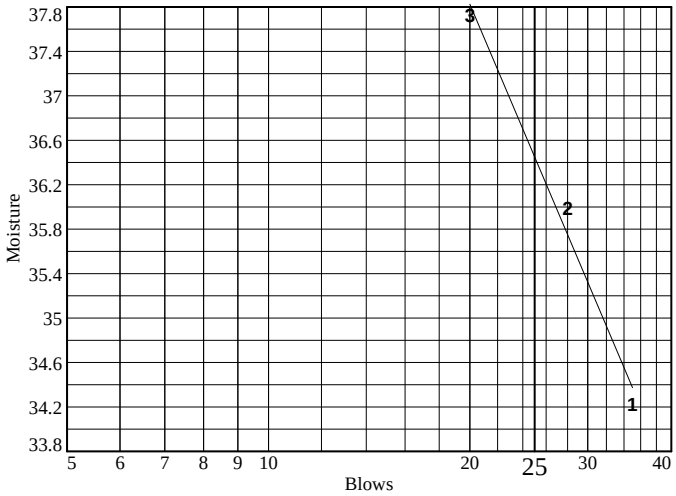
LIQUID AND PLASTIC LIMIT TEST DATA

5/26/2015

Client: Duke Energy
Project: Dan River Steam Station Ash Removal
Project Number: 7810140065
Location: B-451
Depth: 0 - 10' **Sample Number:** Bulk
Material Description: Yellow-Brown to Gray-Brown Sandy Lean Clay
USCS: CL **AASHTO:** A-6(8)
Tested by: A. Kottenstette **Checked by:** D. Kopitsky

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	25.65	21.76	23.65			
Dry+Tare	23.23	20.27	21.59			
Tare	16.16	16.13	16.13			
# Blows	35	28	20			
Moisture	34.2	36.0	37.7			



Liquid Limit= 36
Plastic Limit= 18
Plasticity Index= 18
Natural Moisture= 15.3
Liquidity Index= -0.1

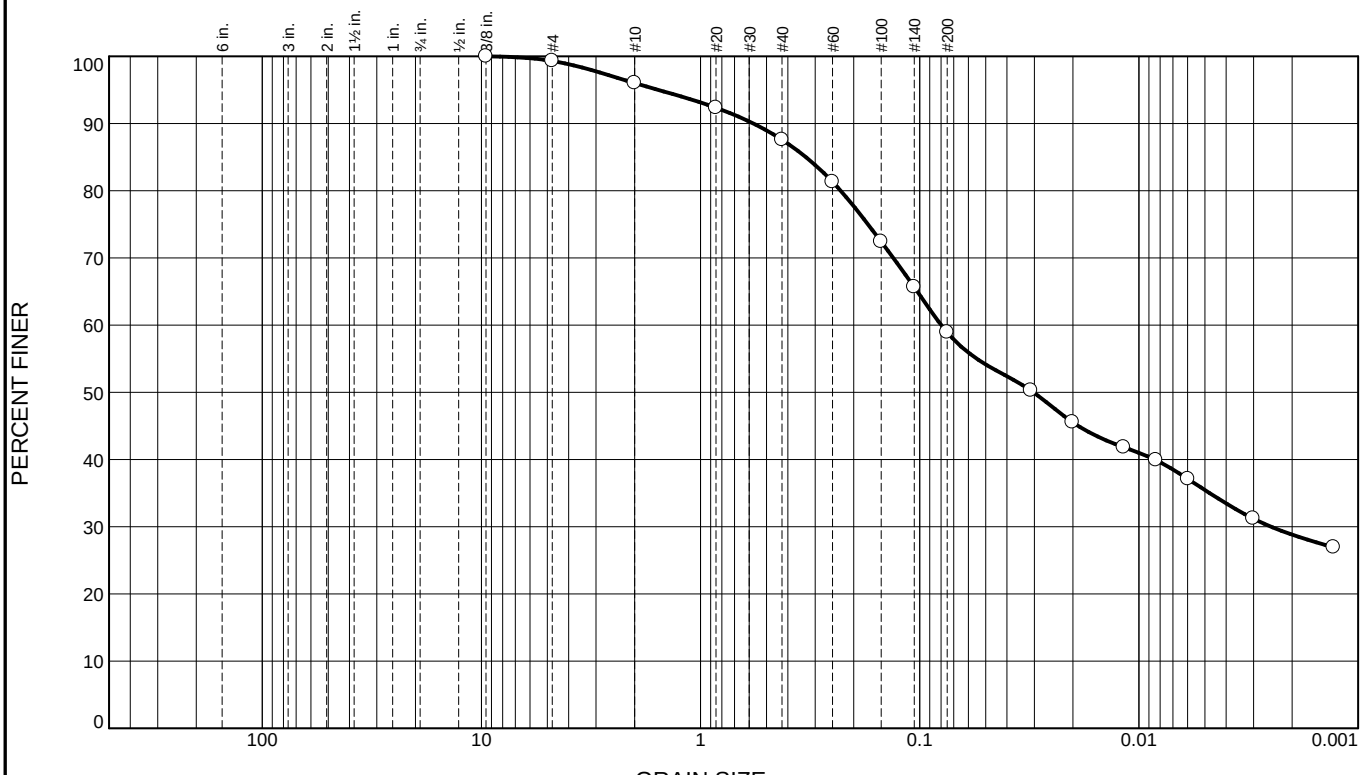
Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	16.91	16.84			
Dry+Tare	16.00	15.94			
Tare	10.87	10.79			
Moisture	17.7	17.5			

Natural Moisture Data

Wet+Tare	Dry+Tare	Tare	Moisture
172.03	155.93	50.52	15.3

Particle Size Analysis ASTM D422



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.7	3.3	8.4	28.7	23.4	35.5

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/8"	100.0		
#4	99.3		
#10	96.0		
#20	92.3		
#40	87.6		
#60	81.3		
#100	72.4		
#140	65.7		
#200	58.9		
0.0311 mm.	50.3		
0.0201 mm.	45.5		
0.0117 mm.	41.8		
0.0084 mm.	39.9		
0.0060 mm.	37.1		
0.0030 mm.	31.2		
0.0013 mm.	26.9		

* (no specification provided)

Soil Description

Yellow-Brown to Gray-Brown Sandy Lean Clay

Atterberg Limits

PL= 18 LL= 36 PI= 18

Coefficients

D_{90}= 0.5747 D_{85}= 0.3308 D_{60}= 0.0798
D_{50}= 0.0303 D_{30}= 0.0025 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= CL AASHTO= A-6(8)

Remarks

Moisture Content = 15.3%

Source of Sample: B-451 **Depth:** 0 - 10'
Sample Number: Bulk **Date:** 5-5-15

amec

Client: Duke Energy
Project: Dan River Steam Station Ash Removal
Project No: 7810140065 **Figure**

Tested By: D. Kopitsky **Checked By:** T. Landis

GRAIN SIZE DISTRIBUTION TEST DATA

5/26/2015

Client: Duke Energy
Project: Dan River Steam Station Ash Removal
Project Number: 7810140065
Location: B-451
Depth: 0 - 10' **Sample Number:** Bulk
Material Description: Yellow-Brown to Gray-Brown Sandy Lean Clay
Date: 5-5-15 **PL:** 18 **LL:** 36 **PI:** 18
USCS Classification: CL **AASHTO Classification:** A-6(8)
Testing Remarks: Moisture Content = 15.3%
Tested by: D. Kopitsky **Checked by:** T. Landis

Sieve Test Data

Dry Sample and Tare (grams)	Tare (grams)	Cumulative Pan Tare Weight (grams)	Sieve Opening Size	Cumulative Weight Retained (grams)	Percent Finer
318.27	0.00	0.00	3/4"		
			3/8"	0.00	100.0
			#4	2.21	99.3
			#10	12.69	96.0
51.21	0.00	0.00	#20	1.96	92.3
			#40	4.50	87.6
			#60	7.84	81.3
			#100	12.59	72.4
			#140	16.19	65.7
			#200	19.78	58.9

Hydrometer Test Data

Hydrometer test uses material passing #10
Percent passing #10 based upon complete sample = 96.0
Weight of hydrometer sample =53.21
Hygroscopic moisture correction:
Moist weight and tare = 30.27
Dry weight and tare = 29.74
Tare weight = 16.30
Hygroscopic moisture = 3.9%
Table of composite correction values:

Temp., deg. C:	14.0	24.0	40.0
Comp. corr.:	-5.0	-3.0	0.0

Meniscus correction only = 1.0
Specific gravity of solids = 2.65
Hydrometer type = 152H
Hydrometer effective depth equation: L = 16.294964 **-** 0.164 **x Rm**

Elapsed Time (min.)	Temp. (deg. C.)	Actual Reading	Corrected Reading	K	Rm	Eff. Depth	Diameter (mm.)	Percent Finer
2.00	23.0	30.0	26.8	0.0132	31.0	11.2	0.0311	50.3
5.00	22.9	27.5	24.3	0.0132	28.5	11.6	0.0201	45.5
15.00	23.0	25.5	22.3	0.0132	26.5	11.9	0.0117	41.8
30.00	22.9	24.5	21.3	0.0132	25.5	12.1	0.0084	39.9
60.00	22.9	23.0	19.8	0.0132	24.0	12.4	0.0060	37.1
250.00	22.2	20.0	16.6	0.0133	21.0	12.9	0.0030	31.2

Hydrometer Test Data (continued)

Elapsed Time (min.)	Temp. (deg. C.)	Actual Reading	Corrected Reading	K	Rm	Eff. Depth	Diameter (mm.)	Percent Finer
1440.00	20.8	18.0	14.4	0.0135	19.0	13.2	0.0013	26.9

Fractional Components

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	0.0	0.7	0.7	3.3	8.4	28.7	40.4	23.4	35.5	58.9

D_5	D_{10}	D_{15}	D_{20}	D_{30}	D_{40}	D_{50}	D_{60}	D_{80}	D_{85}	D_{90}	D_{95}
				0.0025	0.0085	0.0303	0.0798	0.2297	0.3308	0.5747	1.5609

Fineness Modulus
0.64

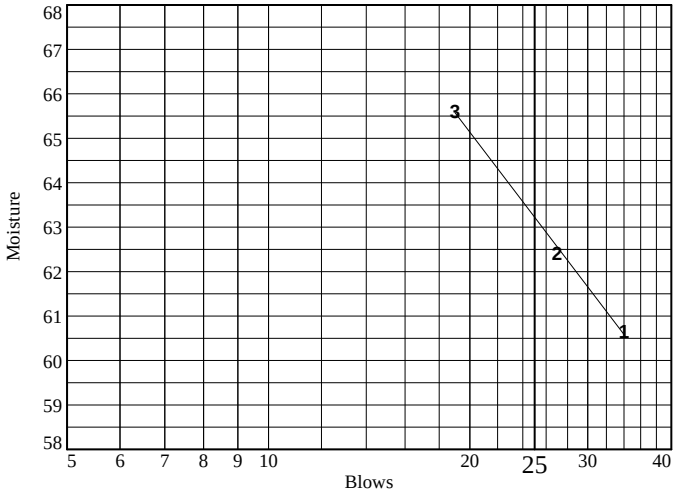
LIQUID AND PLASTIC LIMIT TEST DATA

5/26/2015

Client: Duke Energy
Project: Dan River Steam Station Ash Removal
Project Number: 7810140065
Location: B452
Depth: 0 - 10' (Bulk) **Sample Number:** Bulk
Material Description: Orange Fat Clay with Sand
USCS: CH **AASHTO:** A-7-6(34)
Tested by: D. Kopitsky **Checked by:** G. Williams

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	35.42	35.42	35.86			
Dry+Tare	28.28	28.04	28.07			
Tare	16.51	16.22	16.20			
# Blows	34	27	19			
Moisture	60.7	62.4	65.6			

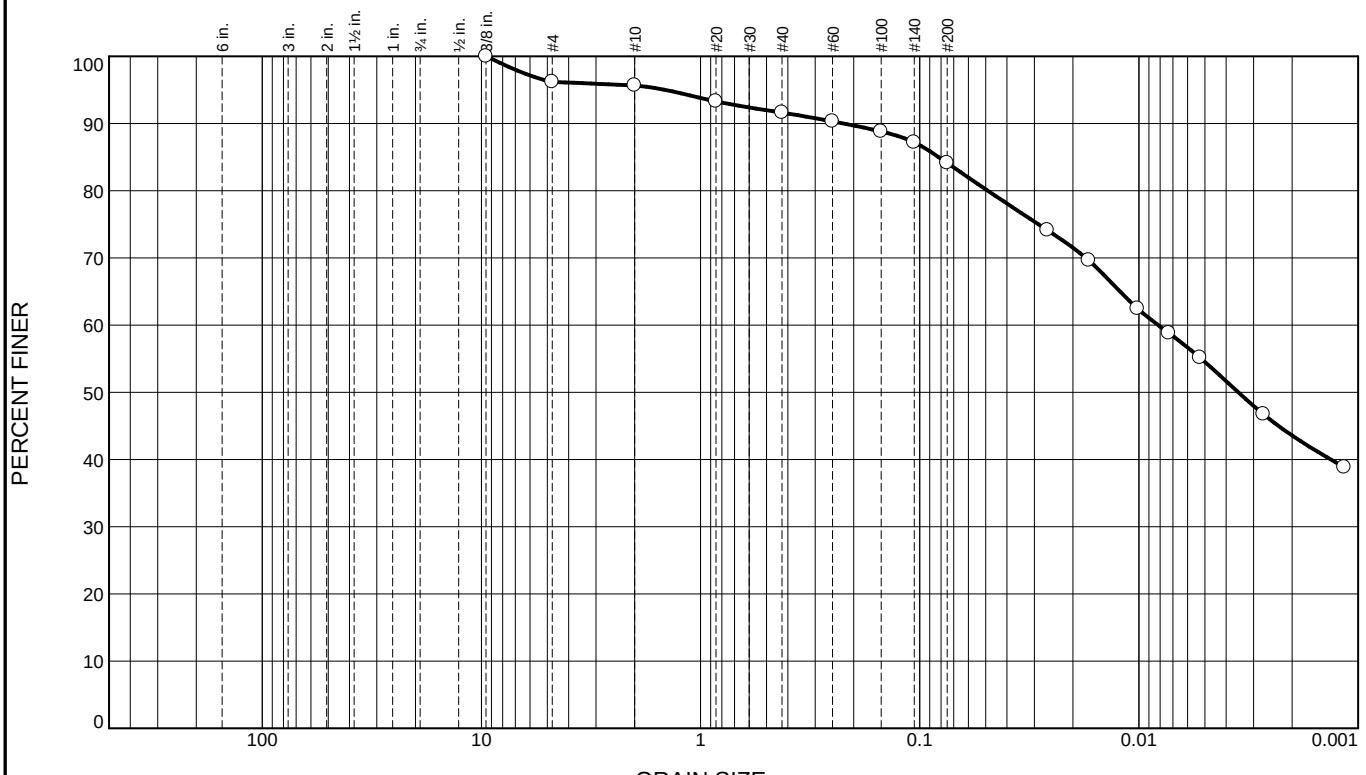


Liquid Limit= 63
Plastic Limit= 26
Plasticity Index= 37
Natural Moisture= 22.4
Liquidity Index= -0.1

Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	18.28	17.53			
Dry+Tare	16.87	16.20			
Tare	11.48	10.91			
Moisture	26.2	25.1			

Particle Size Analysis ASTM D422



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	3.8	0.5	4.1	7.5	29.6	54.5

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/8"	100.0		
#4	96.2		
#10	95.7		
#20	93.3		
#40	91.6		
#60	90.3		
#100	88.8		
#140	87.2		
#200	84.1		
0.0262 mm.	74.1		
0.0169 mm.	69.6		
0.0101 mm.	62.5		
0.0073 mm.	58.8		
0.0053 mm.	55.1		
0.0027 mm.	46.7		
0.0012 mm.	38.8		

* (no specification provided)

Soil Description

Orange Fat Clay with Sand

Atterberg Limits

PL= 26 LL= 63 PI= 37

Coefficients

D_{90}= 0.2226 D_{85}= 0.0820 D_{60}= 0.0082
D_{50}= 0.0035 D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= CH AASHTO= A-7-6(34)

Remarks

Moisture Content = 22.4%
Specific Gravity = 2.786

Source of Sample: B452 **Depth:** 0 - 10' (Bulk)
Sample Number: Bulk **Date:** 5-7-15

Client: Duke Energy
Project: Dan River Steam Station Ash Removal
Project No: 7810140065 **Figure**

Tested By: D. Kopitsky **Checked By:** T. Landis

GRAIN SIZE DISTRIBUTION TEST DATA

5/26/2015

Client: Duke Energy
Project: Dan River Steam Station Ash Removal
Project Number: 7810140065
Location: B452
Depth: 0 - 10' (Bulk) **Sample Number:** Bulk
Material Description: Orange Fat Clay with Sand
Date: 5-7-15 **PL:** 26 **LL:** 63 **PI:** 37
USCS Classification: CH **AASHTO Classification:** A-7-6(34)
Testing Remarks: Moisture Content = 22.4%
Specific Gravity = 2.786
Tested by: D. Kopitsky **Checked by:** T. Landis

Sieve Test Data

Dry Sample and Tare (grams)	Tare (grams)	Cumulative Pan Tare Weight (grams)	Sieve Opening Size	Cumulative Weight Retained (grams)	Percent Finer
321.69	0.00	0.00	3/4"		
			3/8"	0.00	100.0
			#4	12.24	96.2
			#10	13.98	95.7
52.11	0.00	0.00	#20	1.29	93.3
			#40	2.20	91.6
			#60	2.91	90.3
			#100	3.73	88.8
			#140	4.61	87.2
			#200	6.28	84.1

Hydrometer Test Data

Hydrometer test uses material passing #10
Percent passing #10 based upon complete sample = 95.7
Weight of hydrometer sample =53.31
Hygroscopic moisture correction:
Moist weight and tare = 30.21
Dry weight and tare = 29.89
Tare weight = 16.23
Hygroscopic moisture = 2.3%
Table of composite correction values:

Temp., deg. C:	14.0	24.0	40.0
Comp. corr.:	-5.0	-3.0	0.0

Meniscus correction only = 1.0
Specific gravity of solids = 2.786
Hydrometer type = 152H
Hydrometer effective depth equation: L = 16.294964 **-** 0.164 **x Rm**

Elapsed Time (min.)	Temp. (deg. C.)	Actual Reading	Corrected Reading	K	Rm	Eff. Depth	Diameter (mm.)	Percent Finer
2.00	24.3	44.5	41.6	0.0124	45.5	8.8	0.0262	74.1
5.00	24.2	42.0	39.0	0.0125	43.0	9.2	0.0169	69.6
15.00	24.1	38.0	35.0	0.0125	39.0	9.9	0.0101	62.5
30.00	23.9	36.0	33.0	0.0125	37.0	10.2	0.0073	58.8
60.00	23.6	34.0	30.9	0.0126	35.0	10.6	0.0053	55.1

Hydrometer Test Data (continued)

Elapsed Time (min.)	Temp. (deg. C.)	Actual Reading	Corrected Reading	K	Rm	Eff. Depth	Diameter (mm.)	Percent Finer
250.00	22.5	29.5	26.2	0.0127	30.5	11.3	0.0027	46.7
1440.00	22.9	25.0	21.8	0.0127	26.0	12.0	0.0012	38.8

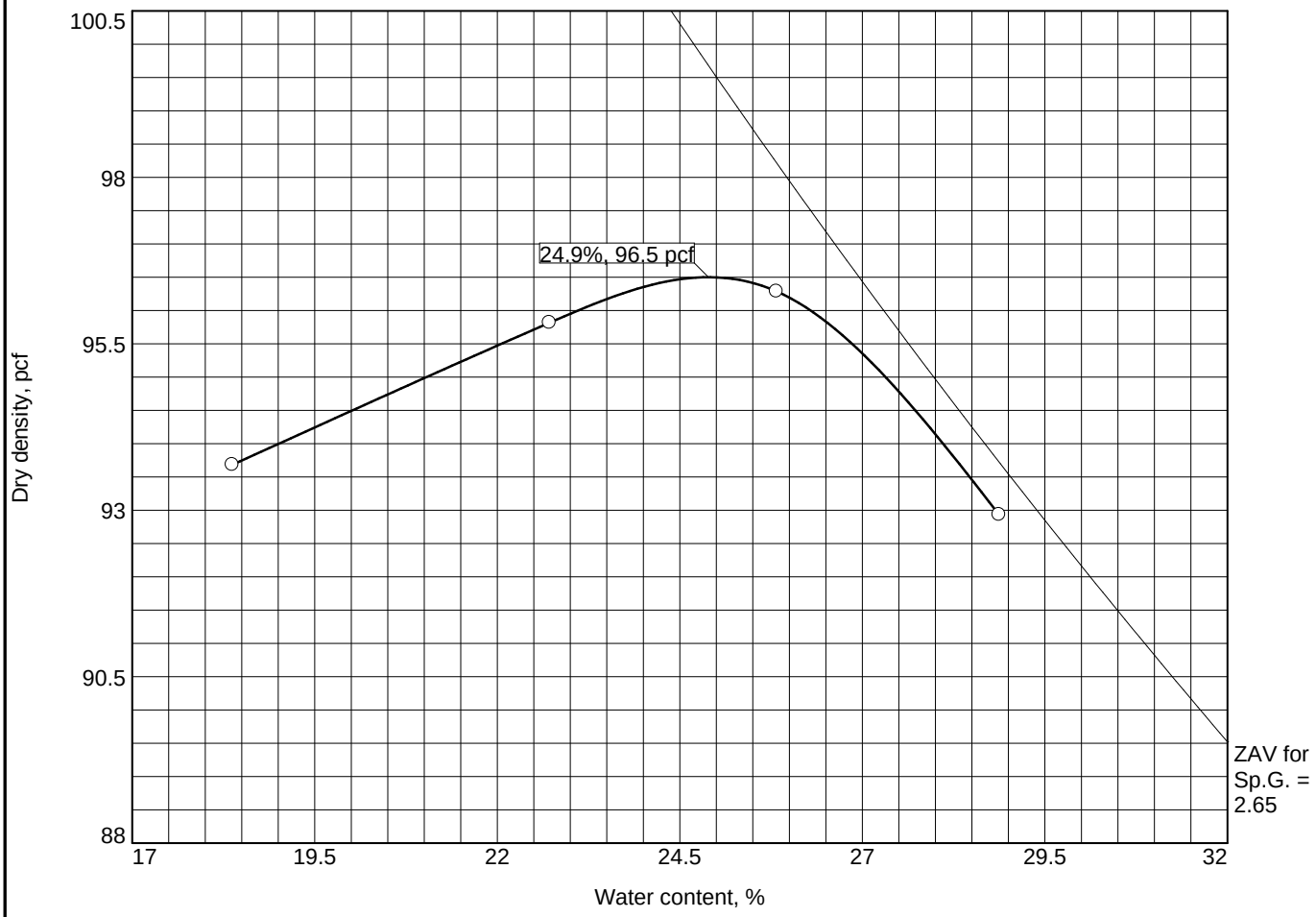
Fractional Components

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	0.0	3.8	3.8	0.5	4.1	7.5	12.1	29.6	54.5	84.1

D_5	D_{10}	D_{15}	D_{20}	D_{30}	D_{40}	D_{50}	D_{60}	D_{80}	D_{85}	D_{90}	D_{95}
					0.0013	0.0035	0.0082	0.0489	0.0820	0.2226	1.4551

Fineness Modulus
0.42

COMPACTION TEST REPORT



Test specification: ASTM D 698-07 Method A Standard

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > #4	% < No.200
	USCS	AASHTO						
0 - 10' (Bulk)	CH	A-7-6(34)	22.4	2.786	63	37	3.8	84.1

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 96.5 pcf Optimum moisture = 24.9 %	Orange Fat Clay with Sand
Project No. 7810140065 **Client:** Duke Energy **Project:** Dan River Steam Station Ash Removal ○**Source of Sample:** B452 **Sample Number:** Bulk	**Remarks:**
amec	**Figure**

Tested By: A. Kottenstette **Checked By:** G. Williams

MOISTURE DENSITY TEST DATA

5/26/2015

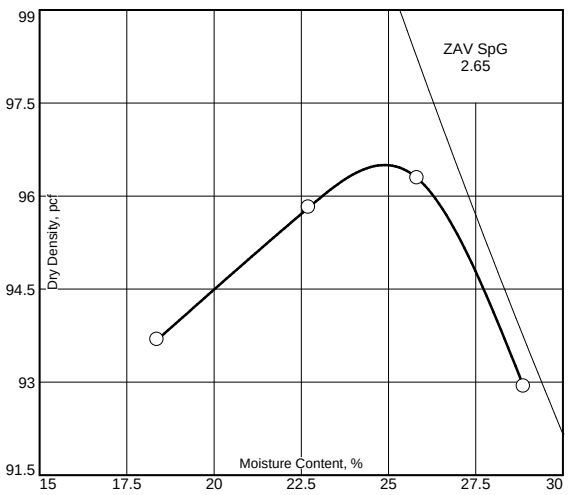
Client: Duke Energy
Project: Dan River Steam Station Ash Removal
Project Number: 7810140065
Location: B452
Depth: 0 - 10' (Bulk)
Sample Number: Bulk
Description: Orange Fat Clay with Sand
USCS Classification: CH
AASHTO Classification: A-7-6(34)
Natural Moisture: 22.4
Liquid Limit: 63
Plasticity Index: 37
Tested by: A. Kottenstette
Checked by: G. Williams
Percent passing #4 sieve: 96.2

Test Data and Results For Curve 1

Test Specification:

Type of Test: ASTM D 698-07 Method A Standard

Mold Dia: 4.00 **Hammer Wt.:** 5.5 lb. **Drop:** 12 in. **Layers:** three **Blows per Layer:** 25



Point No.	1	2	3	4	5
Wt. M+S	6124.0	6168.0	6189.0	6135.0	6034.0
Wt. M	4359.0	4359.0	4359.0	4359.0	4359.0
Wt. W+T	500.3	462.5	486.9	412.1	644.6
Wt. D+T	411.8	390.2	417.3	355.2	603.3
Tare	139.0	139.8	147.8	104.7	378.5
Moist.	32.4	28.9	25.8	22.7	18.4
Dry Den.	88.2	92.9	96.3	95.8	93.7

Test Results: **Max. Dry Den.=** 96.5 pcf **Opt. Moist.=** 24.9%

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ATTERBERG LIMITS

ASTM D 4318-10 / AASHTO T89-10

Client:	AMEC FOSTER WHEELER	Boring No.:	B-453
Client Reference:	Dan River Steam Station Ash Removal	Depth (ft):	0.0-10.0
Project No.:	2015-616-02	Sample No.:	BULK
Lab ID:	2015-616-02-04	Soil Description:	**YELLOW-BROWN FAT CLAY**

Note: The USCS symbol used with this test refers only to the minus No. 40 sieve material. See the "Sieve and Hydrometer Analysis" graph page for the complete material description.

(Minus No. 40 sieve material, Airdried)

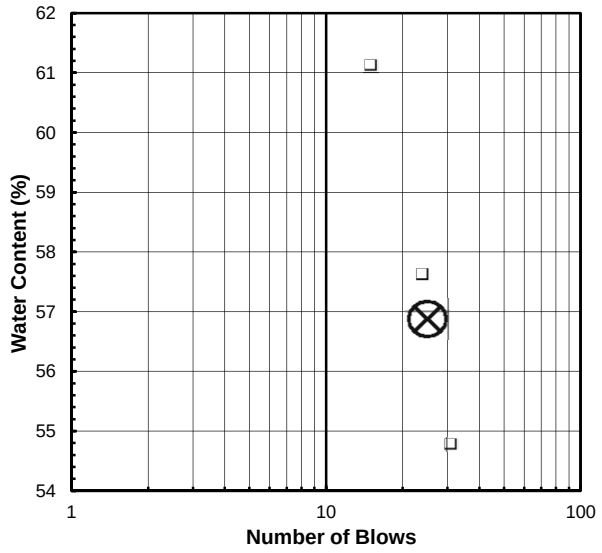
Liquid Limit Test	**1**	**2**	**3**	
Tare Number	S	A-P	B-B	**MULTIPOINT**
Wt. of Tare & Wet Sample (g)	25.28	25.66	27.21	
Wt. of Tare & Dry Sample (g)	21.72	21.99	22.81	
Wt. of Tare (g)	15.22	15.62	15.61	
Wt. of Water (g)	3.6	3.7	4.4	
Wt. of Dry Sample (g)	6.5	6.4	7.2	
Moisture Content (%)	**54.8**	**57.6**	**61.1**	
Number of Blows	**31**	**24**	**15**	

Plastic Limit Test	**1**	**2**	**Range**
Tare Number	B	F	
Wt. of Tare & Wet Sample (g)	22.07	22.20	
Wt. of Tare & Dry Sample (g)	20.59	20.62	
Wt. of Tare (g)	15.23	15.14	
Wt. of Water (g)	1.5	1.6	
Wt. of Dry Sample (g)	5.4	5.5	
Moisture Content (%)	**27.6**	**28.8**	**-1.2**

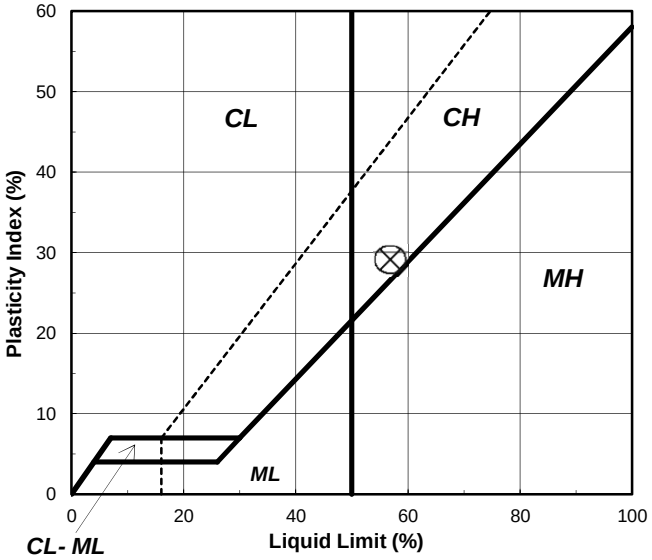
Note: The acceptable range of the two Moisture contents is ± 2.6

Test Results	
Liquid Limit (%)	**57**
Plastic Limit (%)	**28**
Plasticity Index (%)	**29**
USCS Symbol	**CH**

Flow Curve



Plasticity Chart



Tested By	*BW*	*Date*	*5/14/15*	*Checked By*	*SFS*	*Date*	6/4/15

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SIEVE AND HYDROMETER ANALYSIS
ASTM D 422-63 (2007)

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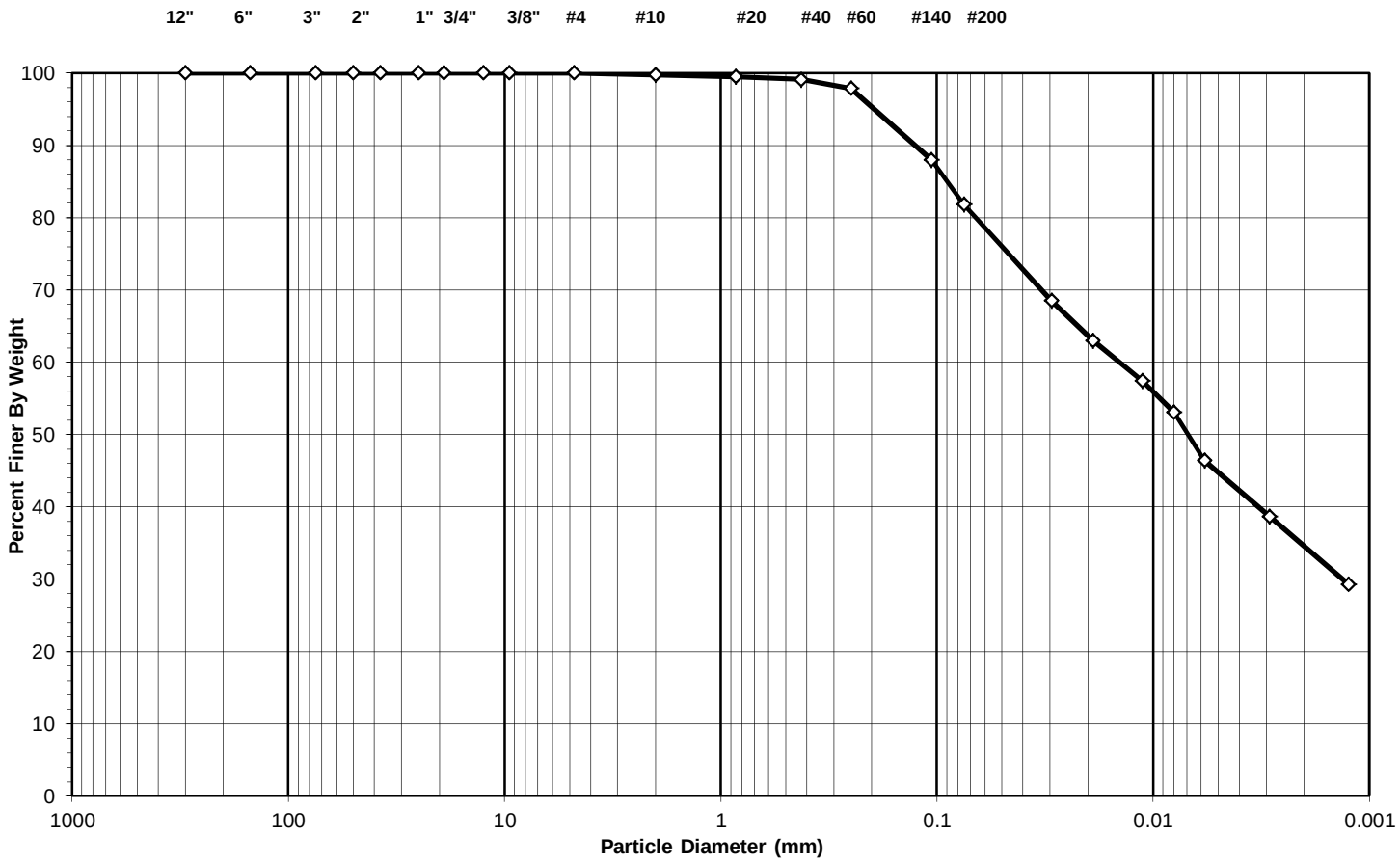
Client	AMEC FOSTER WHEELER	Boring No.	B-453
Client Reference	Dan River Steam Station Ash Removal	Depth (ft)	0.0-10.0
Project No.	2015-616-02	Sample No.	BULK
Lab ID	2015-616-02-04	Soil Color	**YELLOW-BROWN**

	SIEVE ANALYSIS			*HYDROMETER*	
USCS	**cobbles**	**gravel**	**sand**	**silt and clay fraction**	
USDA	**cobbles**	**gravel**	**sand**	**silt**	**clay**



USCS Summary

Sieve Sizes (mm)		**Percentage**
Greater Than #4	*Gravel*	0.00
#4 To #200	*Sand*	18.18
Finer Than #200	*Silt & Clay*	81.82

USCS Symbol ***CH, TESTED***

USCS Classification ***FAT CLAY WITH SAND***

DCN: CT-S3OR DATE: 7/26/13 REVISION: 8 *\\GTI-SRV-FS\PROJECTS\2015-616 AMEC - DAN RIVER\Results group 02 color change\[2015-616-02-04 COLOR CHG.SIEVEHYD10.xls]Sheet1*

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WASH SIEVE ANALYSIS

ASTM D 422-63 (2007)

Client	AMEC FOSTER WHEELER	Boring No.	B-453
Client Reference	Dan River Steam Station Ash Removal	Depth (ft)	0.0-10.0
Project No.	2015-616-02	Sample No.	BULK
Lab ID	2015-616-02-04	Soil Color	**YELLOW-BROWN**

Minus #10 for Hygroscopic Moisture Content		**Hydrometer Specimen Data**	
Tare No.	E-20	Air Dried - #10 Hydrometer Material (g)	50.02
Wgt.Tare + Wet Soil (g)	35.55	Corrected Dry Wt. of - #10 Material (g)	44.74
Wgt.Tare + Dry Soil (g)	34.12		
Weight of Tare (g)	22.00	Weight of - #200 Material (g)	36.70
Weight of Water (g)	1.43	Weight of - #10 ; + #200 Material (g)	8.04
Weight of Dry Soil (g)	12.12		
Moisture Content (%)	**11.8**	**J-FACTOR (%FINER THAN #10)**	**0.9975**
Soil Specimen Data			
Tare No.	151		
Wgt.Tare + Air Dry Soil (g)	718.71		
Weight of Tare (g)	240.69		
Air Dried Wgt. Total Sample (g)	478.02	Dry Weight of Material Retained on #10 (g)	1.07
Total Dry Sample Weight (g)	427.69	Corrected Dry Sample Wt - #10 (g)	426.62

Sieve Size	Sieve Opening (mm)	Wgt.of Soil Retained (gm)	Percent Retained (%)	Accumulated Percent Retained (%)	Percent Finer (%)	**Accumulated Percent Finer (%)**
12"	300	0.00	0.0	0.0	100.0	**100.0**
6"	150	0.00	0.0	0.0	100.0	**100.0**
3"	75	0.00	0.0	0.0	100.0	**100.0**
2"	50	0.00	0.0	0.0	100.0	**100.0**
1 1/2"	37.5	0.00	0.0	0.0	100.0	**100.0**
1"	25.0	0.00	0.0	0.0	100.0	**100.0**
3/4"	19.0	0.00	0.0	0.0	100.0	**100.0**
1/2"	12.5	0.00	0.0	0.0	100.0	**100.0**
3/8"	9.50	0.00	0.0	0.0	100.0	**100.0**
#4	4.75	0.00	0.0	0.0	100.0	**100.0**
#10	2.00	1.07	0.3	0.3	99.7	**99.7**
#20	0.85	0.11	0.2	0.2	99.8	**99.5**
#40	0.425	0.18	0.4	0.6	99.4	**99.1**
#60	0.250	0.55	1.2	1.9	98.1	**97.9**
#140	0.106	4.45	9.9	11.8	88.2	**88.0**
#200	0.075	2.75	6.1	18.0	82.0	**81.8**
Pan	-	36.70	82.0	100.0	-	**-**

Notes :

Tested By BT Date 5/14/15 Checked By GEM Date 6/4/15

DCN: CT-S3OR DATE: 7/26/13 REVISION: 8 *PROJECTS\2015-616 AMEC - DAN RIVER\Results group 02 color change\[2015-616-02-04 COLOR CHG.SIEVEHYD10.xls]Sheet1*

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HYDROMETER ANALYSIS

ASTM D 422-63 (2007)

Client	AMEC FOSTER WHEELER	Boring No.	B-453
Client Reference	Dan River Steam Station Ash Removal	Depth (ft)	0.0-10.0
Project No.	2015-616-02	Sample No.	BULK
Lab ID	2015-616-02-04	Soil Color	**YELLOW-BROWN**

Elapsed Time (min)	R Measured	Temp. (°C)	Composite Correction	R Corrected	N (%)	K Factor	Diameter (mm)	N' (%)
0	NA	NA	NA	NA	NA	NA	NA	NA
2	35.0	24	3.95	31.1	68.7	0.01282	0.0295	**68.5**
5	32.5	24	3.95	28.6	63.2	0.01282	0.0190	**63.0**
15	30.0	23.9	3.98	26.0	57.6	0.01284	0.0112	**57.4**
30	28.0	24	3.95	24.1	53.2	0.01282	0.0080	**53.1**
60	25.0	23.9	3.98	21.0	46.5	0.01284	0.0058	**46.4**
250	21.5	23.9	3.98	17.5	38.8	0.01284	0.0029	**38.7**
1440	17.5	23.1	4.23	13.3	29.4	0.01296	0.0013	**29.3**

Soil Specimen Data		**Other Corrections**		
Wgt. of Dry Material (g)	44.74	Hygroscopic Moisture Factor	0.894	
Weight of Deflocculant (g)	5.0	a - Factor	0.99	
		Percent Finer than # 10	99.75	
		Specific Gravity	2.70	Assumed

Notes:

Tested By SFS Date 5/15/15 Checked By GEM Date 6/4/15

DCN: CT-S3OR DATE: 7/26/13 REVISION: 58 *PROJECTS\2015-616 AMEC - DAN RIVER\Results group 02 color change\[2015-616-02-04 COLOR CHG.SIEVEHYD10.xls]Sheet1*

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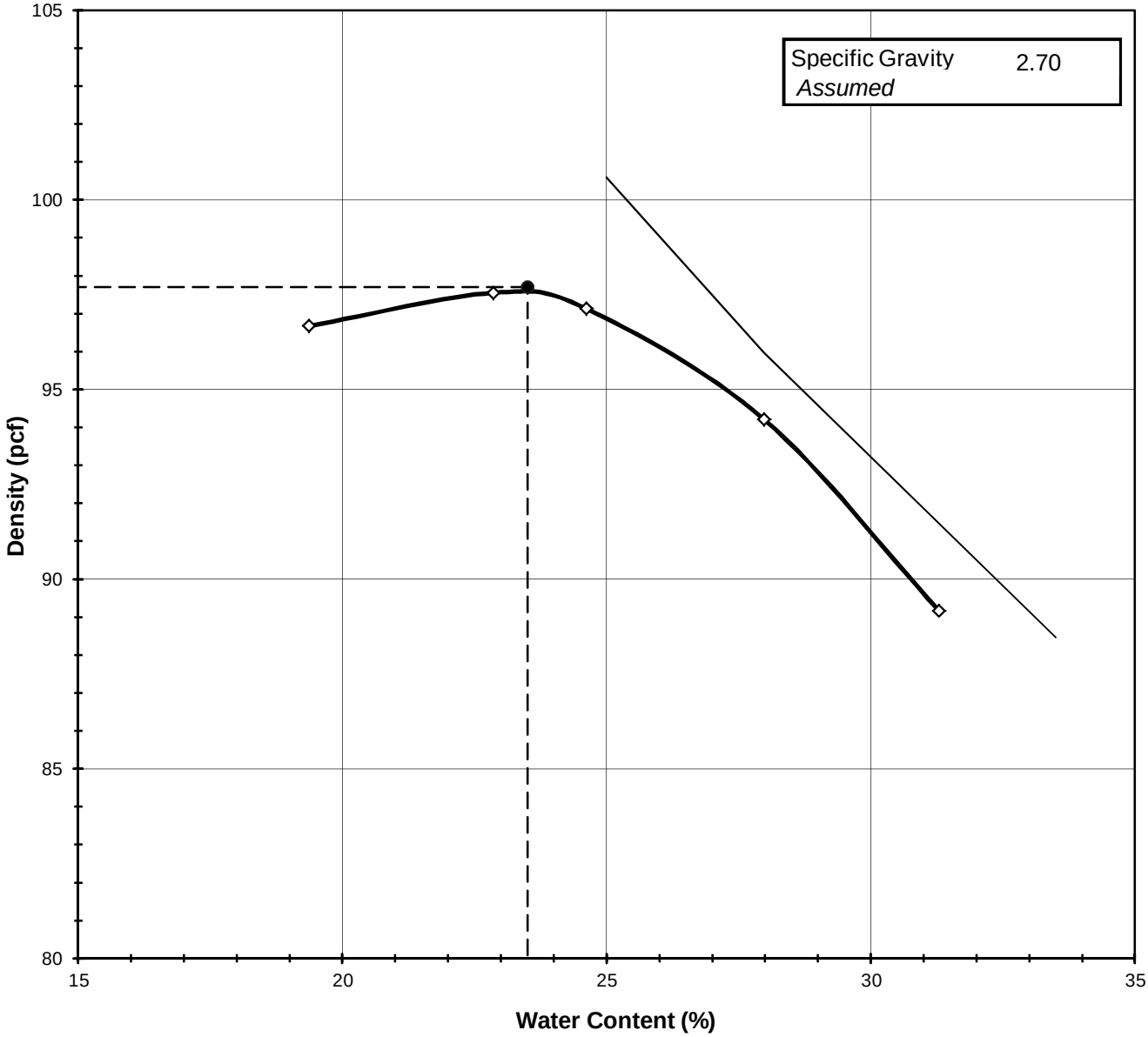
MOISTURE DENSITY RELATIONSHIP

ASTM D698-12

Client:	AMEC FOSTER WHEELER	Boring No.:	B-453
Client Reference:	Dan River Steam Station Ash Removal	Depth (ft):	0.0-10.0
Project No.:	2015-616-02	Sample No.:	BULK
Lab ID:	2015-616-02-04	Test Method	**STANDARD**

Visual Description: YELLOW-BROWN FAT CLAY WITH SAND

Optimum Water Content	**23.5**
Maximum Dry Density	**97.7**



Tested By *BT* *Date* *5/15/15* *Checked By* *SFS* *Date* 6/4/15

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MOISTURE - DENSITY RELATIONSHIP

ASTM D698-12

Client:	AMEC FOSTER WHEELER	Boring No.:	B-453
Client Reference:	Dan River Steam Station Ash Removal	Depth (ft):	0.0-10.0
Project No.:	2015-616-02	Sample No.:	BULK
Lab ID:	2015-616-02-04		

Visual Description: YELLOW-BROWN FAT CLAY WITH SAND

Total Weight of the Sample (g)	18000
As Received Water Content (%)	NA
Assumed Specific Gravity	2.70
Percent Retained on 3/4"	NA
Percent Retained on 3/8"	NA
Percent Retained on #4	NA
Oversize Material	Not included
Procedure Used	A

Test Type		**STANDARD**
Rammer Weight (lb)		5.5
Rammer Drop (in)		12
Rammer Type		MECHANICAL
Machine ID	R	174
Mold ID	R	461
Mold diameter		4"
Weight of the Mold (g)		4174
Volume of the Mold (cm^3)		942

Mold / Specimen

Point No.	**1**	**2**	**3**	**4**	**5**
Wt. of Mold & Wet Sample (g)	5916	5983	6001	5994	5941
Wt.of Mold (g)	4174	4174	4174	4174	4174
Wt. of Wet Sample (g)	1742	1809	1827	1820	1767
Mold Volume (cm^3)	942	942	942	942	942

Moisture Content / Density

Tare Number	303	317	300	305	368
Wt. of Tare & Wet Sample (g)	415.00	422.00	450.70	475.30	403.00
Wt. of Tare & Dry Sample (g)	361.30	359.10	383.50	389.90	333.40
Wt. of Tare (g)	84.10	83.90	110.50	84.70	111.00
Wt. of Water (g)	53.70	62.90	67.20	85.40	69.60
Wt. of Dry Sample (g)	277.20	275.20	273.00	305.20	222.40

Wet Density (g/cm^3)	1.85	1.92	1.94	1.93	1.88
Wet Density (pcf)	115.4	119.8	121.0	120.6	117.1
Moisture Content (%)	**19.4**	**22.9**	**24.6**	**28.0**	**31.3**
Dry Density (pcf)	**96.7**	**97.5**	**97.1**	**94.2**	**89.2**

Zero Air Voids

Moisture Content (%)	25.0	28.0	33.5
Dry Unit Weight (pcf)	100.6	96.0	88.5

Tested By *BT* *Date* *5/15/15* *Checked By* *SFS* *Date* 6/4/15

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FLEXIBLE WALL PERMEABILITY TEST

PERMOMETER METHOD

ASTM D 5084-10

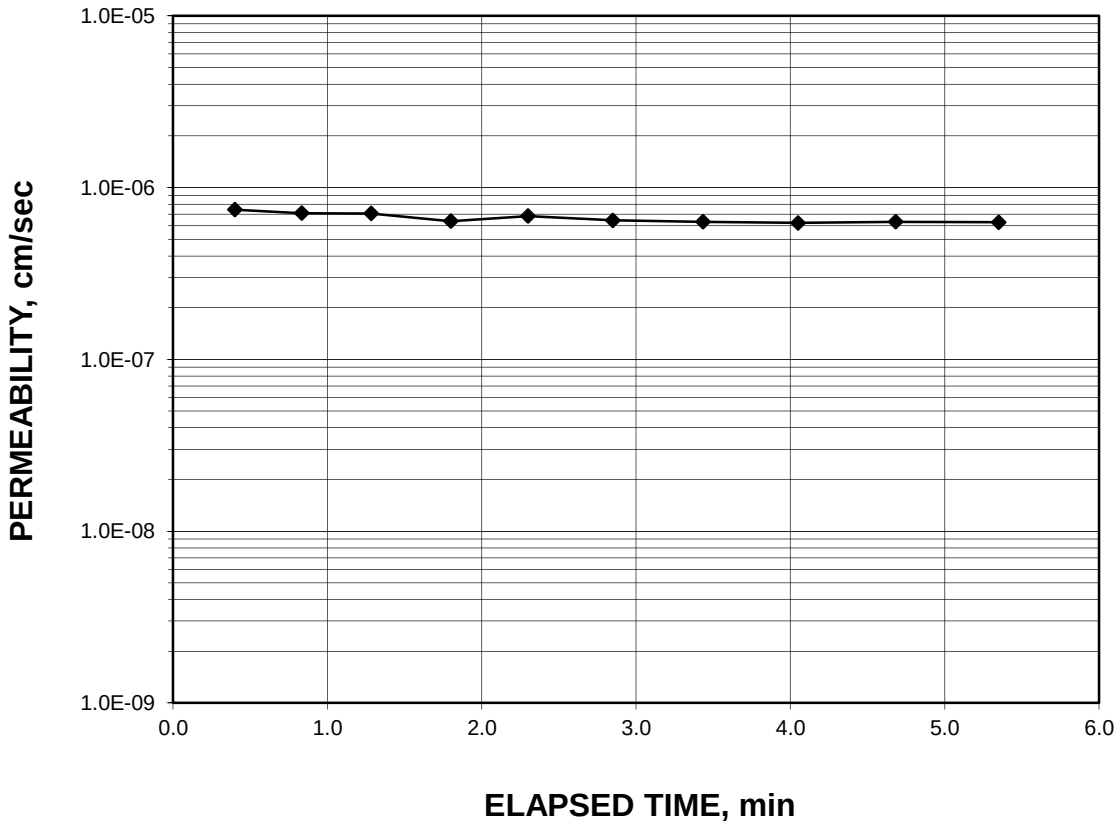
Client	AMEC FOSTER WHEELER	Boring No.	B-453
Client Project	Dan River Steam Station Ash Removal	Depth (ft.)	0.0-10.0
Project No.	2015-616-02	Sample No.	BULK
Lab ID No.	2015-616-02-04		

Visual Description: YELLOW-BROWN FAT CLAY WITH SAND

AVERAGE PERMEABILITY = 6.3E-07 cm/sec @ 20°C

AVERAGE PERMEABILITY = 6.3E-09 m/sec @ 20°C

PERMEABILITY vs. TIME



Tested By: SFS Date: 5/20/15 Checked By: GEM Date: 6/4/15

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FLEXIBLE WALL PERMEABILITY TEST

PERMOMETER METHOD

ASTM D 5084-10

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Client	AMEC FOSTER WHEELER	Boring No.	B-453
Client Project	Dan River Steam Station Ash Removal	Depth (ft.)	0.0-10.0
Project No.	2015-616-02	Sample No.	BULK
Lab ID No.	2015-616-02-04		

Specific Gravity	2.70	Assumed
Sample Condition		Remolded

Visual Description: YELLOW-BROWN FAT CLAY WITH SAND

MOISTURE CONTENT:	BEFORE TEST	AFTER TEST
Tare Number	806	807
Wt. of Tare & WS (gm.)	432.64	588.34
Wt. of Tare & DS (gm.)	365.05	470.96
Wt. of Tare (gm.)	100.62	103.43
Wt. of Water (gm.)	67.59	117.38
Wt. of DS (gm.)	264.43	367.53
Moisture Content (%)	**25.6**	**31.9**

SPECIMEN:	BEFORE TEST	AFTER TEST
Wt. of Tube & WS (gm.)	2433.08	NA
Wt. of Tube (gm.)	1632.10	NA
Wt. of WS (calc.) (gm.)	800.98	841.66
Length 1 (in.)	4.005	4.070
Length 2 (in.)	4.005	4.074
Length 3 (in.)	4.005	4.064
Top Diameter (in.)	2.867	2.894
Middle Diameter (in.)	2.867	2.871
Bottom Diameter (in.)	2.867	2.886
Average Length (in.)	4.01	4.07
Average Area (in.^{2})	6.46	6.53
Sample Volume (cm^3)	423.69	435.52
Unit Wet Wt. (gm./ cm^3)	1.890	1.933
Unit Wet Wt. (pcf)	118.0	120.6
Unit Dry Wt. (pcf)	94.0	91.4
Unit Dry Wt. (gm./ cm^3)	1.506	1.465
Void Ratio, e	0.793	0.843
Porosity, n	0.442	0.457
Pore Volume (cm^3)	187.4	199.2
Total Wt. Of Sample After Test		842.01

Tested By: SFS Date: 5/20/15 Checked By: GEM Date: 6/4/15

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FLEXIBLE WALL PERMEABILITY TEST
PERMOMETER METHOD

ASTM D 5084-10

Client	AMEC FOSTER WHEELER	Boring No.	B-453
Client Project	Dan River Steam Station Ash Removal	Depth (ft.)	0.0-10.0
Project No.	2015-616-02	Sample No.	BULK
Lab ID No.	2015-616-02-04		

Test Pressures		Final Sample Dimensions	
Cell Pressure(psi)	55.0	Sample Length (cm), L	10.34
Back Pressure(psi)	50.0	Sample Area (cm^2), A	42.14
Eff. Cons. Pressure(psi)	5.0	Pipette Area (cm^2), a_p	0.03142
Response (%)	100	Annulus Area (cm^2), a_a	0.76712
		Equilibrium Level (cm), R_{eq}	1

AVERAGE PERMEABILITY = 6.3E-07 cm/sec @ 20°C
AVERAGE PERMEABILITY = 6.3E-09 m/sec @ 20°C

DATE		TIME			ELAPSED TIME **t**	PIPETTE READI NG **R_p**	INCREMENT GRADIENT **i**	TEMP.	INCREMENTAL PERMEABILITY @ 20°C
(mm/dd/yy)	(hr)	(min)	(sec)	(min)	(min)	(cm)	(cm/cm)	(°C)	(cm/sec)
5/22/15	13	25	59	25.98	0.000	10.5	12.0	22.4	NA
5/22/15	13	26	23	26.38	0.400	10.2	11.6	22.4	7.5E-07
5/22/15	13	26	49	26.82	0.833	9.9	11.2	22.4	7.1E-07
5/22/15	13	27	16	27.27	1.283	9.6	10.9	22.4	7.1E-07
5/22/15	13	27	47	27.78	1.800	9.3	10.5	22.4	6.4E-07
5/22/15	13	28	17	28.28	2.300	9.0	10.1	22.4	6.8E-07
5/22/15	13	28	50	28.83	2.850	8.7	9.7	22.4	6.5E-07
5/22/15	13	29	25	29.42	3.433	8.4	9.4	22.4	6.3E-07
5/22/15	13	30	2	30.03	4.050	8.1	9.0	22.4	6.2E-07
5/22/15	13	30	40	30.67	4.683	7.8	8.6	22.4	6.3E-07
5/22/15	13	31	20	31.33	5.350	7.5	8.2	22.4	6.3E-07

Tested By: SFS Date: 5/20/15 Checked By: GEM Date: 6/4/15

DCN: CT-22A DATE: 2015-06-16 REVISION: 5 2015-616 AMEC DAN RIVER\Results group 02 color change\[2015-616-02-04 COLOR CHG Permometer.xls]Sheet1

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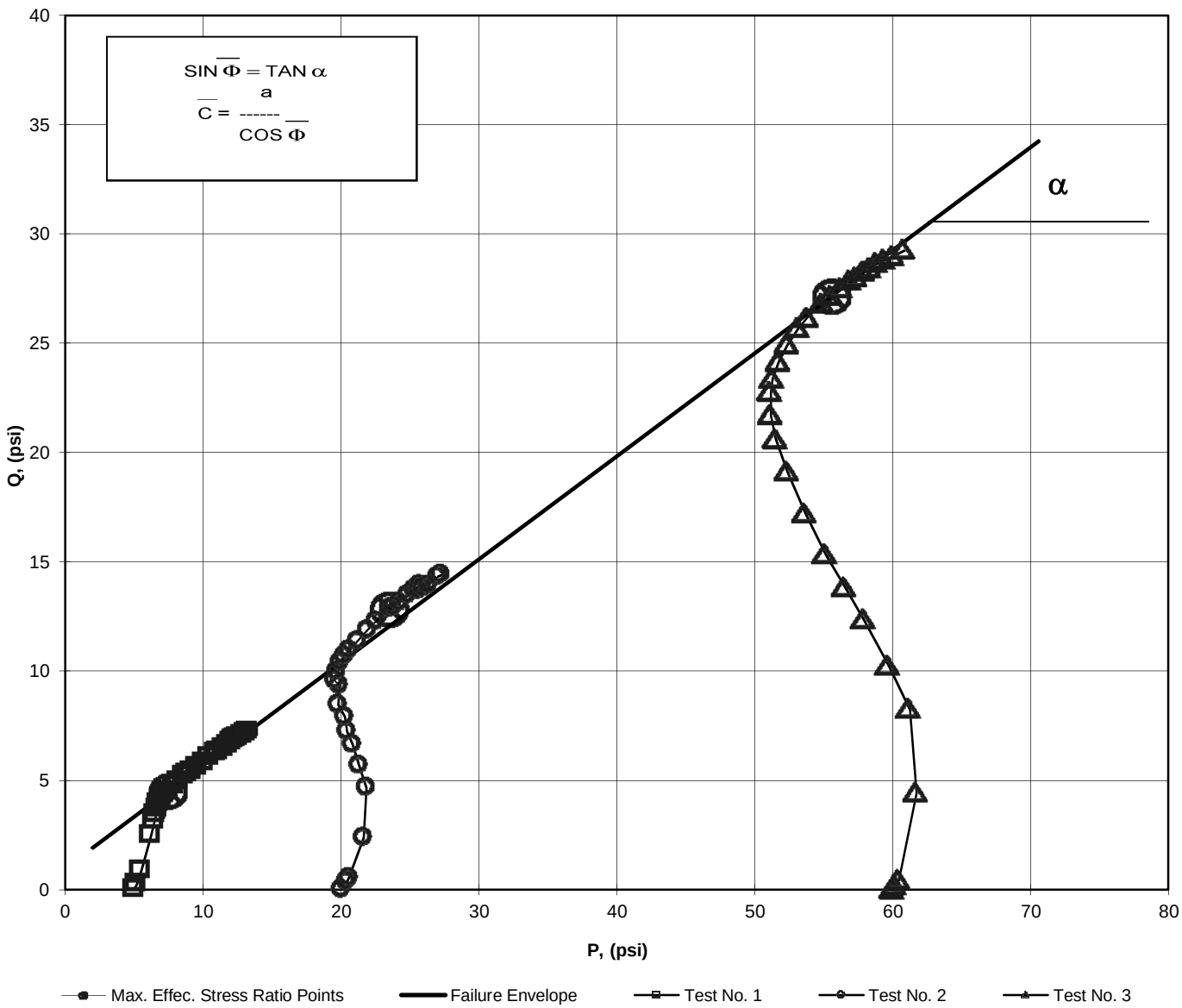
CONSOLIDATED UNDRAINED TRIAXIAL TEST
WITH PORE PRESSURE READINGS
ASTM D4767-11

Client:	Amec Foster Wheeler	Boring No.:	B-453
Client Reference:	Dan River Steam Station Ash Removal	Depth (ft):	0.0-10.0
Project No.:	2015-616-02	Sample No.:	BULK
Lab ID:	2015-616-02-04		

Consolidated Undrained Triaxial Test with Pore Pressure



a	=	**0.00**	$\overline{C}$	=	**0.00**
α	=	**25.2**	$\overline{\Phi}$	=	**28.10**

Tested By: SFS Date: 5/20/15 Approved By: MPS Date: 6/4/15

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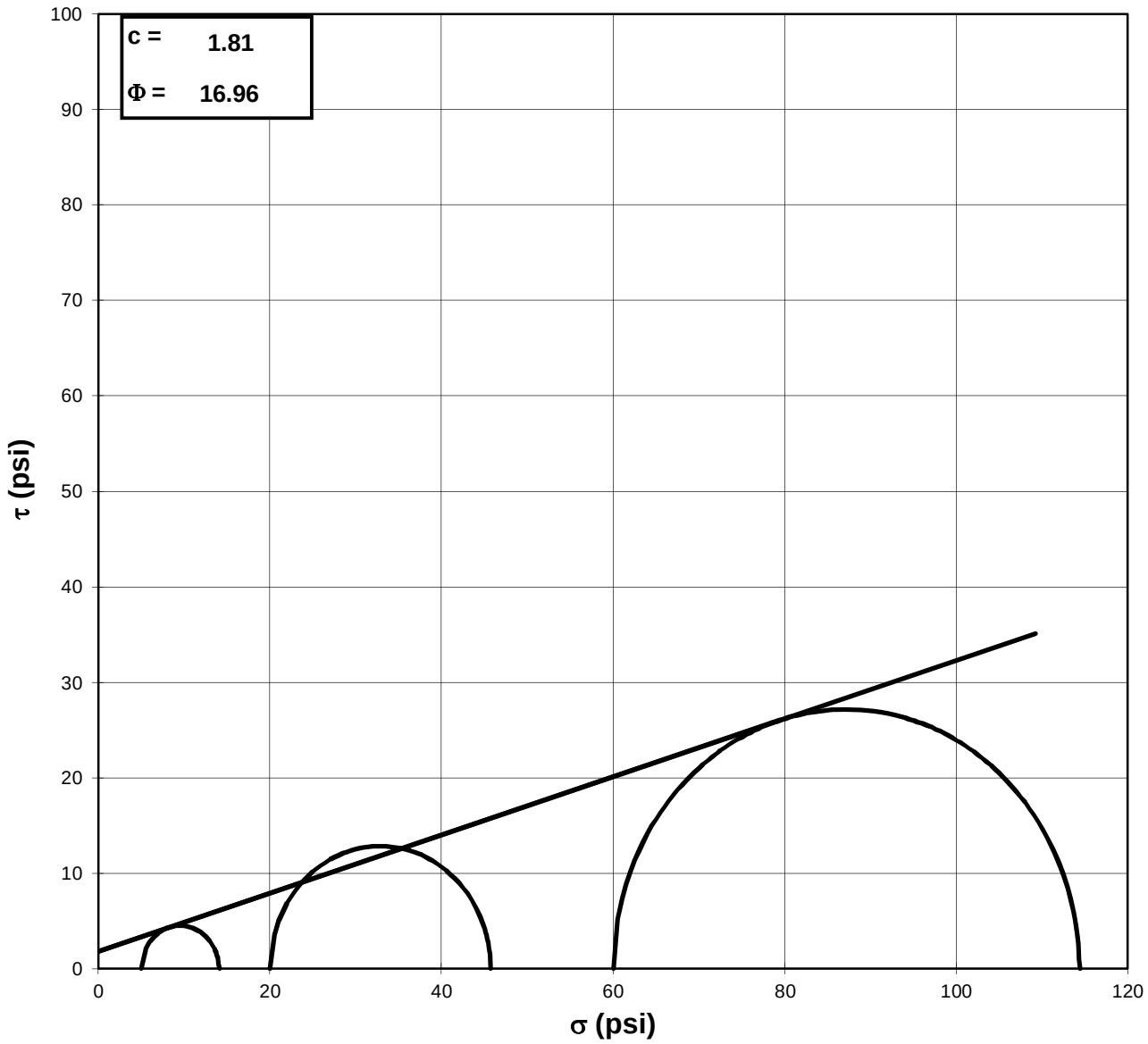
MOHR TOTAL STRENGTH ENVELOPE

ASTM D4767-11

Client:	Amec Foster Wheeler	Boring No.:	B-453
Client Reference:	Dan River Steam Station Ash Removal	Depth (ft):	0.0-10.0
Project No.:	2015-616-02	Sample No.:	BULK
Lab ID:	2015-616-02-04		
Visual Description:	YELLOW- BROWN FAT CLAY WITH SAND (REMOLDED)		



Failure Based on Maximum Effective Principal Stress Ratio

NOTE: GRAPH NOT TO SCALE

Tested By: SFS *Date:* 5/20/15 *Approved By:* MPS *Date:* 6/4/15

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CONSOLIDATED UNDRAINED TRIAXIAL TEST WITH PORE PRESSURE READINGS

ASTM D4767-11

Client:	Amec Foster Wheeler	Boring No.:	B-453
Client Reference:	Dan River Steam Station Ash Removal	Depth (ft):	0.0-10.0
Project No.:	2015-616-02	Sample No.:	BULK
Lab ID:	2015-616-02-04		

Visual Description: YELLOW- BROWN FAT CLAY WITH SAND (REMOLDED)

Stage No.	1
Test No.	1

PRESSURES (psi)

Cell Pressure (psi)	55.0
Back Pressure (psi)	50.0
Eff. Conf. Pressure (psi)	5.0
Pore Pressure Response (%)	97

MAXIMUM OBLIQUITY POINTS

$\overline{P}$	=	7.50
Q	=	4.51

INITIAL SAMPLE DIMENSIONS (in)

Length 1:	5.995	Diameter 1:	2.864
Length 2:	5.995	Diameter 2:	2.864
Length 3:	5.995	Diameter 3:	2.864
Avg. Length:	5.995	*Avg. Diam.:*	2.864

VOLUME CHANGE

Initial Burette Reading (ml)	24.0
Final Burette Reading (ml)	19.7
Final Change (ml)	4.3

Initial Dial Reading (mil)	27
Dial Reading After Saturation (mil)	27
Dial Reading After Consolidation (mil)	27

LOAD (LB)	DEFORMATION (IN)	PORE PRESSURE (PSI)
8.2	0.000	50.0
11.6	0.001	50.1
19.4	0.003	50.3
40.2	0.007	51.2
48.4	0.013	51.6
52.5	0.019	51.8
55.9	0.028	52.0
58.8	0.037	52.1
61.5	0.049	52.1
64.4	0.070	52.1
67.0	0.100	52.0
70.5	0.136	51.9
73.1	0.171	51.7
76.9	0.214	51.5
79.1	0.244	51.4
81.0	0.285	51.2
84.4	0.343	51.0
88.1	0.402	50.8
92.2	0.448	50.6
96.0	0.508	50.3
97.5	0.553	50.2
100.3	0.598	50.0
103.0	0.643	49.8
105.5	0.674	49.7
107.7	0.704	49.6
108.8	0.734	49.5
110.2	0.764	49.3
112.6	0.809	49.2
115.6	0.854	49.0
116.9	0.884	48.9
121.7	0.914	48.8

Tested By: SFS Date: 5/20/15 Input Checked By: GEM Date: 6/4/15

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CONSOLIDATED UNDRAINED TRIAXIAL TEST
WITH PORE PRESSURE READINGS
ASTM D4767-11

Client:	Amec Foster Wheeler	Boring No.:	B-453
Client Reference:	Dan River Steam Station Ash Removal	Depth (ft):	0.0-10.0
Project No.:	2015-616-02	Sample No.:	BULK
Lab ID:	2015-616-02-04		

Visual Description: YELLOW- BROWN FAT CLAY WITH SAND (REMOLDED)

Effective Confining Pressure (psi)	5.0	*Stage No.*	1
		Test No	1

INITIAL DIMENSIONS

Initial Sample Length (in)	6.00
Initial Sample Diameter (in)	2.86
Initial Sample Area (in^2)	6.44
Initial Sample Volume (in^3)	38.62

VOLUME CHANGE

Volume After Consolidation (in^3)	38.36
Length After Consolidation (in)	6.00
Area After Consolidation (in^2)	6.398

Strain (%)	Deviation Stress	ΔU	$\overline{\sigma}_1$	$\overline{\sigma}_3$	Effective Principle Stress Ratio	$\overline{A}$	$\overline{P}$	Q
0.02	0.53	0.10	5.47	4.9	1.107	0.19	5.20	0.26
0.05	1.74	0.37	6.40	4.7	1.373	0.22	5.53	0.87
0.11	4.99	1.28	8.74	3.8	2.331	0.26	6.25	2.50
0.22	6.27	1.68	9.62	3.4	2.872	0.28	6.49	3.14
0.31	6.89	1.86	10.06	3.2	3.176	0.28	6.62	3.45
0.46	7.42	2.03	10.42	3.0	3.471	0.28	6.71	3.71
0.61	7.86	2.11	10.78	2.9	3.686	0.28	6.86	3.93
0.81	8.26	2.15	11.15	2.9	3.863	0.27	7.02	4.13
1.17	8.67	2.15	11.56	2.9	4.004	0.26	7.23	4.34
1.66	9.03	2.05	12.01	3.0	4.027	0.23	7.50	4.51
2.27	9.51	1.89	12.66	3.1	4.026	0.20	7.90	4.76
2.86	9.85	1.71	13.18	3.3	3.962	0.18	8.25	4.93
3.56	10.35	1.53	13.85	3.5	3.959	0.15	8.68	5.18
4.06	10.63	1.42	14.25	3.6	3.940	0.14	8.93	5.32
4.76	10.83	1.25	14.61	3.8	3.862	0.12	9.20	5.41
5.72	11.22	1.03	15.22	4.0	3.802	0.09	9.61	5.61
6.71	11.64	0.79	15.88	4.2	3.747	0.07	10.06	5.82
7.47	12.15	0.61	16.57	4.4	3.746	0.05	10.50	6.07
8.47	12.55	0.36	17.23	4.7	3.687	0.03	10.95	6.28
9.23	12.67	0.19	17.51	4.8	3.618	0.02	11.17	6.33
9.98	12.96	0.01	17.98	5.0	3.579	0.00	11.50	6.48
10.73	13.23	-0.18	18.44	5.2	3.539	-0.01	11.82	6.61
11.24	13.49	-0.28	18.80	5.3	3.537	-0.02	12.06	6.74
11.74	13.72	-0.40	19.15	5.4	3.526	-0.03	12.29	6.86
12.24	13.79	-0.51	19.34	5.5	3.488	-0.04	12.44	6.90
12.74	13.90	-0.62	19.55	5.6	3.461	-0.05	12.60	6.95
13.49	14.11	-0.77	19.92	5.8	3.431	-0.06	12.86	7.06
14.24	14.39	-0.94	20.36	6.0	3.408	-0.07	13.17	7.19
14.75	14.48	-1.03	20.55	6.1	3.386	-0.07	13.31	7.24
15.25	15.02	-1.13	21.19	6.2	3.436	-0.08	13.68	7.51

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CONSOLIDATED UNDRAINED TRIAXIAL TEST WITH PORE PRESSURE READINGS

ASTM D4767-11

Client:	Amec Foster Wheeler	Boring No.:	B-453
Client Reference:	Dan River Steam Station Ash Removal	Depth (ft):	0.0-10.0
Project No.:	2015-616-02	Sample No.:	BULK
Lab ID:	2015-616-02-04		

Visual Description: YELLOW- BROWN FAT CLAY WITH SAND (REMOLDED)

Stage No.	1
Test No.	2

PRESSURES (psi)

Cell Pressure (psi)	70.0
Back Pressure (psi)	50.0
Eff. Conf. Pressure (psi)	20.0
Pore Pressure Response (%)	97

MAXIMUM OBLIQUITY POINTS

$\overline{P}$	=	23.50
Q	=	12.85

INITIAL SAMPLE DIMENSIONS (in)

Length 1:	5.995	Diameter 1:	2.864
Length 2:	5.995	Diameter 2:	2.864
Length 3:	5.995	Diameter 3:	2.864
Avg. Length	5.995	*Avg. Diam.:*	2.864

VOLUME CHANGE

Initial Burette Reading (ml)	48.0
Final Burette Reading (ml)	19.9
Final Change (ml)	28.1

Initial Dial Reading (mil)	114
Dial Reading After Saturation (mil)	114
Dial Reading After Consolidation (mil)	147

LOAD (LB)	DEFORMATION (IN)	PORE PRESSURE (PSI)
10.6	0.000	50.0
14.8	0.001	50.0
17.1	0.003	50.0
39.9	0.007	50.8
68.3	0.013	52.8
80.9	0.019	54.4
93.2	0.028	55.8
100.7	0.037	56.8
109.1	0.049	57.7
116.5	0.070	58.7
128.2	0.100	59.5
131.9	0.136	60.1
137.6	0.171	60.3
143.9	0.214	60.5
148.2	0.244	60.5
152.9	0.285	60.4
159.7	0.343	60.2
168.0	0.402	60.0
174.8	0.448	59.8
184.5	0.508	59.4
186.9	0.553	59.2
191.3	0.598	58.9
197.5	0.643	58.6
201.7	0.674	58.4
206.1	0.704	58.2
203.6	0.734	58.1
206.2	0.764	57.9
209.8	0.809	57.6
217.3	0.854	57.3
219.9	0.884	57.1
221.9	0.914	57.0

Tested By: SFS Date: 5/20/15 Input Checked By: GEM Date: 6/4/15

DCN: CT-S28 DATE: 4/12/13 REVISION: 3

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CONSOLIDATED UNDRAINED TRIAXIAL TEST
WITH PORE PRESSURE READINGS
ASTM D4767-11

Client:	Amec Foster Wheeler	Boring No.:	B-453
Client Reference:	Dan River Steam Station Ash Removal	Depth (ft):	0.0-10.0
Project No.:	2015-616-02	Sample No.:	BULK
Lab ID:	2015-616-02-04		

Visual Description: YELLOW- BROWN FAT CLAY WITH SAND (REMOLDED)

Effective Confining Pressure (psi)	20.0	*Stage No.*	1
		Test No	2

INITIAL DIMENSIONS

Initial Sample Length (in)	6.00
Initial Sample Diameter (in)	2.86
Initial Sample Area (in^2)	6.44
Initial Sample Volume (in^3)	38.62

VOLUME CHANGE

Volume After Consolidation (in^3)	36.91
Length After Consolidation (in)	5.96
Area After Consolidation (in^2)	6.190

Strain (%)	Deviation Stress	ΔU	$\overline{\sigma}_1$	$\overline{\sigma}_3$	Effective Principle Stress Ratio	$\overline{A}$	$\overline{P}$	Q
0.02	0.67	-0.03	20.74	20.1	1.034	-0.04	20.40	0.34
0.05	1.05	-0.03	21.12	20.1	1.052	-0.03	20.59	0.52
0.11	4.73	0.75	24.02	19.3	1.245	0.16	21.66	2.36
0.22	9.29	2.84	26.49	17.2	1.540	0.31	21.85	4.65
0.32	11.32	4.36	27.00	15.7	1.722	0.40	21.34	5.66
0.47	13.27	5.83	27.48	14.2	1.934	0.45	20.84	6.64
0.62	14.45	6.82	27.67	13.2	2.094	0.49	20.44	7.23
0.82	15.78	7.65	28.17	12.4	2.274	0.50	20.28	7.89
1.17	16.90	8.67	28.26	11.4	2.487	0.53	19.81	8.45
1.67	18.68	9.49	29.23	10.5	2.771	0.52	19.89	9.34
2.28	19.14	10.05	29.12	10.0	2.916	0.54	19.56	9.57
2.87	19.92	10.31	29.65	9.7	3.047	0.53	19.69	9.96
3.58	20.76	10.45	30.34	9.6	3.166	0.52	19.96	10.38
4.08	21.32	10.46	30.89	9.6	3.227	0.51	20.23	10.66
4.79	21.88	10.37	31.54	9.7	3.264	0.49	20.60	10.94
5.75	22.70	10.20	32.53	9.8	3.307	0.46	21.19	11.35
6.75	23.71	9.97	33.78	10.1	3.356	0.43	21.92	11.86
7.51	24.53	9.75	34.82	10.3	3.384	0.41	22.55	12.27
8.52	25.69	9.38	36.35	10.7	3.411	0.38	23.50	12.85
9.28	25.83	9.16	36.72	10.9	3.374	0.37	23.80	12.92
10.03	26.25	8.94	37.35	11.1	3.365	0.35	24.23	13.13
10.79	26.93	8.64	38.33	11.4	3.362	0.33	24.86	13.46
11.30	27.37	8.42	38.99	11.6	3.356	0.32	25.30	13.69
11.81	27.85	8.24	39.65	11.8	3.361	0.30	25.72	13.93
12.30	27.34	8.08	39.29	12.0	3.286	0.30	25.63	13.67
12.81	27.54	7.86	39.72	12.2	3.262	0.29	25.95	13.77
13.56	27.81	7.59	40.26	12.4	3.235	0.28	26.35	13.91
14.32	28.61	7.31	41.34	12.7	3.249	0.26	27.03	14.31
14.83	28.79	7.14	41.69	12.9	3.231	0.26	27.29	14.39
15.34	28.89	6.97	41.96	13.1	3.210	0.25	27.52	14.45

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CONSOLIDATED UNDRAINED TRIAXIAL TEST
WITH PORE PRESSURE READINGS
ASTM D4767-11

Client:	Amec Foster Wheeler	Boring No.:	B-453
Client Reference:	Dan River Steam Station Ash Removal	Depth (ft):	0.0-10.0
Project No.:	2015-616-02	Sample No.:	BULK
Lab ID:	2015-616-02-04		

Visual Description: YELLOW- BROWN FAT CLAY WITH SAND (REMOLDED)

Stage No.	1
Test No.	3

PRESSURES (psi)

Cell Pressure (psi)	110.1
Back Pressure (psi)	50.0
Eff. Conf. Pressure (psi)	60.0
Pore Pressure Response (%)	96

MAXIMUM OBLIQUITY POINTS

$\overline{P}$	=	55.58
Q	=	27.16

INITIAL SAMPLE DIMENSIONS (in)

Length 1:	5.995	Diameter 1:	2.864
Length 2:	5.995	Diameter 2:	2.864
Length 3:	5.995	Diameter 3:	2.864
Avg. Length:	5.995	*Avg. Diam.:*	2.864

VOLUME CHANGE

Initial Burette Reading (ml)	72.0
Final Burette Reading (ml)	21.7
Final Change (ml)	50.3

Initial Dial Reading (mil)	102
Dial Reading After Saturation (mil)	102
Dial Reading After Consolidation (mil)	206

LOAD (LB)	DEFORMATION (IN)	PORE PRESSURE (PSI)
14.8	0.000	50.0
16.7	0.000	50.0
19.9	0.002	50.0
68.2	0.007	52.7
114.4	0.012	57.0
138.6	0.017	60.5
164.3	0.025	64.4
182.3	0.033	67.3
201.0	0.044	70.2
224.5	0.063	73.5
249.0	0.091	76.8
268.8	0.125	79.1
284.0	0.159	80.6
299.1	0.199	81.6
307.9	0.228	82.1
320.0	0.267	82.4
333.0	0.320	82.6
345.8	0.379	82.6
354.9	0.422	82.4
366.9	0.478	81.9
374.5	0.521	81.6
381.8	0.565	81.3
389.3	0.607	80.9
393.4	0.636	80.7
399.2	0.664	80.4
403.5	0.693	80.1
408.8	0.721	79.9
414.2	0.765	79.4
420.2	0.808	79.0
428.6	0.864	78.5
434.9	0.907	78.0

Tested By: SFS Date: 5/20/15 Input Checked By: GEM Date: 6/4/15

DCN: CT-S28 DATE: 4/12/13 REVISION: 3

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CONSOLIDATED UNDRAINED TRIAXIAL TEST
WITH PORE PRESSURE READINGS
ASTM D4767-11

Client:	Amec Foster Wheeler	Boring No.:	B-453
Client Reference:	Dan River Steam Station Ash Removal	Depth (ft):	0.0-10.0
Project No.:	2015-616-02	Sample No.:	BULK
Lab ID:	2015-616-02-04		

Visual Description: YELLOW- BROWN FAT CLAY WITH SAND (REMOLDED)

Effective Confining Pressure (psi)	60.0	*Stage No.*	1
		Test No	3

INITIAL DIMENSIONS

Initial Sample Length (in)	6.00
Initial Sample Diameter (in)	2.86
Initial Sample Area (in^2)	6.44
Initial Sample Volume (in^3)	38.62

VOLUME CHANGE

Volume After Consolidation (in^3)	35.55
Length After Consolidation (in)	5.89
Area After Consolidation (in^2)	6.035

Strain (%)	Deviation Stress	ΔU	$\overline{\sigma}_1$	$\overline{\sigma}_3$	Effective Principle Stress Ratio	$\overline{A}$	$\overline{P}$	Q
0.00	0.31	0.00	60.34	60.0	1.005	-0.01	60.19	0.15
0.03	0.84	-0.01	60.89	60.0	1.014	-0.02	60.47	0.42
0.11	8.83	2.69	66.18	57.3	1.154	0.32	61.76	4.42
0.20	16.47	7.01	69.49	53.0	1.311	0.44	61.25	8.24
0.28	20.45	10.53	69.95	49.5	1.413	0.54	59.73	10.22
0.42	24.66	14.42	70.28	45.6	1.541	0.61	57.94	12.33
0.56	27.60	17.27	70.37	42.8	1.645	0.65	56.57	13.80
0.74	30.62	20.17	70.48	39.9	1.768	0.69	55.17	15.31
1.07	34.37	23.53	70.87	36.5	1.942	0.71	53.69	17.18
1.54	38.20	26.75	71.49	33.3	2.148	0.73	52.39	19.10
2.11	41.20	29.08	72.15	31.0	2.331	0.74	51.55	20.60
2.70	43.40	30.55	72.88	29.5	2.472	0.73	51.18	21.70
3.38	45.51	31.62	73.93	28.4	2.602	0.72	51.17	22.76
3.87	46.69	32.06	74.66	28.0	2.669	0.72	51.32	23.34
4.54	48.27	32.42	75.89	27.6	2.748	0.70	51.75	24.14
5.44	49.86	32.57	77.32	27.5	2.815	0.68	52.39	24.93
6.44	51.31	32.53	78.81	27.5	2.866	0.66	53.16	25.65
7.16	52.30	32.34	79.99	27.7	2.889	0.64	53.84	26.15
8.12	53.60	31.93	81.70	28.1	2.907	0.62	54.90	26.80
8.85	54.32	31.61	82.74	28.4	2.911	0.61	55.58	27.16
9.58	54.98	31.26	83.75	28.8	2.911	0.59	56.26	27.49
10.30	55.65	30.92	84.76	29.1	2.912	0.58	56.94	27.83
10.79	55.96	30.65	85.34	29.4	2.905	0.57	57.36	27.98
11.27	56.51	30.37	86.18	29.7	2.905	0.56	57.92	28.26
11.76	56.83	30.09	86.77	29.9	2.898	0.55	58.36	28.42
12.24	57.28	29.84	87.47	30.2	2.897	0.54	58.83	28.64
12.98	57.58	29.40	88.21	30.6	2.880	0.53	59.42	28.79
13.71	57.96	28.97	89.02	31.1	2.866	0.52	60.05	28.98
14.67	58.49	28.43	90.09	31.6	2.851	0.51	60.85	29.25
15.39	58.89	28.00	90.93	32.0	2.838	0.50	61.48	29.44

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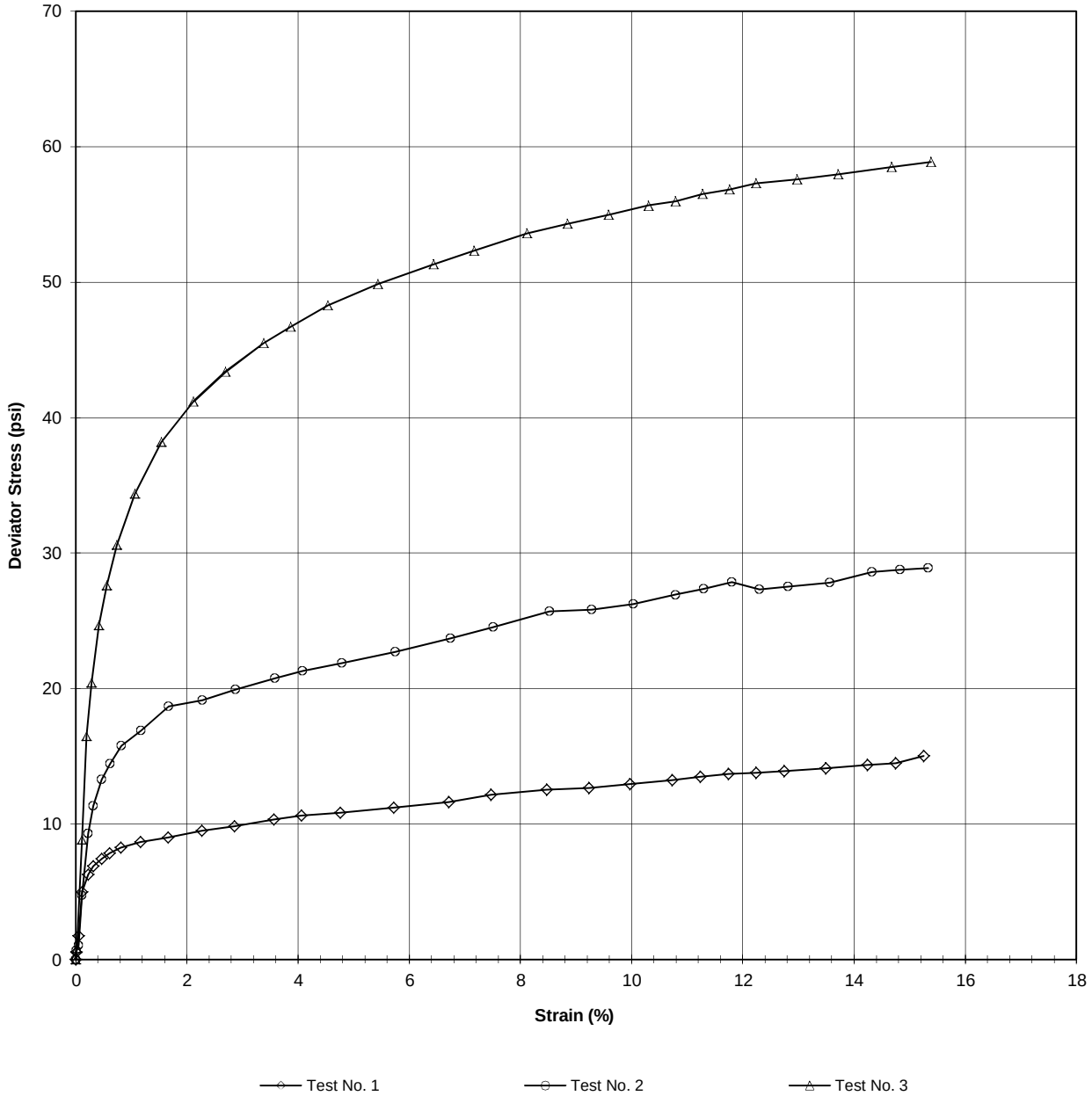
CONSOLIDATED UNDRAINED TRIAXIAL TEST
WITH PORE PRESSURE READINGS
ASTM D4767-11

Client:	Amec Foster Wheeler	Boring No.:	B-453
Client Reference:	Dan River Steam Station Ash Removal	Depth (ft):	0.0-10.0
Project No.:	2015-616-02	Sample No.:	BULK
Lab ID:	2015-616-02-04		
Visual Description:	YELLOW- BROWN FAT CLAY WITH SAND (REMOLDED)		



Tested By: SFS Date: 5/20/15 Approved By: MPS Date: 6/4/15

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CONSOLIDATED UNDRAINED TRIAXIAL TEST
WITH PORE PRESSURE READINGS
ASTM D4767-11

Client:	Amec Foster Wheeler		
Client Reference:	Dan River Steam Station Ash Removal		
Project No.:	2015-616-02		
Lab ID:	2015-616-02-04	Specific Gravity (assumed)	2.7

Visual Description: YELLOW- BROWN FAT CLAY WITH SAND (REMOLDED)

SAMPLE CONDITION SUMMARY

Boring No.:	B-453	B-453	B-453
Depth (ft):	0.0-10.0	0.0-10.0	0.0-10.0
Sample No.:	BULK	BULK	BULK
Test No.	T1	T2	T3
Deformation Rate (in/min)	0.0009	0.0009	0.0009
Back Pressure (psi)	50.0	50.0	50.0
Consolidation Time (days)	1	1	1
Moisture Content (%) (INITIAL)	25.5	25.4	25.6
Total Unit Weight (pcf)	117.2	117.4	118.7
Dry Unit Weight (pcf)	93.4	93.6	94.5
Moisture Content (%) (FINAL)	26.4	26.2	26.0
Initial State Void Ratio,e	0.804	0.800	0.783
Void Ratio at Shear, e	0.792	0.721	0.641

Tested By: SFS Date: 5/20/15 Input Checked By: GEM Date: 6/4/15

DCN: CT-S28 DATE: 4/12/13 REVISION: 3

CONSOLIDATED UNDRAINED TRIAXIAL TEST
WITH PORE PRESSURE READINGS

ASTM D4767-11

MOISTURE CONTENT

	T1	T2	T3
Tare Number	805	803	807
Weight of Tare & Wet Sample (g)	373.33	363.88	382.78
Weight of Tare & Dry Sample (g)	318.40	310.90	325.89
Weight of Tare (g)	102.83	102.22	103.44
Moisture Content (%) (INITIAL)	25.48	25.39	25.57
Tare Number	805	802	812
Weight of Tare & Wet Sample (g)	564.62	628.27	513.9
Weight of Tare & Dry Sample (g)	468.01	519.34	429.68
Weight of Tare (g)	102.73	103.32	105.99
Moisture Content (%) (FINAL)	26.45	26.18	26.02

UNIT WEIGHT

Weight of Tube & Wet Sample (g)	2742.01	2743.59	2757.15
Weight of Tube (g)	1553.64	1553.64	1553.64
Weight of Wet Sample (g)	1188.37	1189.95	1203.51
Length 1 (in)	5.995	5.995	5.995
Length 2 (in)	5.995	5.995	5.995
Length 3 (in)	5.995	5.995	5.995
Top Diameter (in)	2.864	2.864	2.864
Middle Diameter (in)	2.864	2.864	2.864
Bottom Diameter (in)	2.864	2.864	2.864
Average Length (in)	5.995	5.995	5.995
Average Area (in)	6.442	6.442	6.442
Sample Volume (cm^3)	632.89	632.89	632.89
Unit Wet Weight (g/cm^3)	1.88	1.88	1.90
Unit Wet Weight (pcf)	117.22	117.38	118.72
Unit Dry Weight (pcf)	93.42	93.61	94.54
Unit Dry Weight (g/cm^3)	1.50	1.50	1.51
Initial Burette Reading	**24**	**48**	**72**
Final Burette Reading	**19.7**	**19.9**	**21.7**
Initial Dial Reading	**27**	**114**	**102**
Dial Reading After Saturation	**27**	**114**	**102**
Dial Reading After Consolidation	**27**	**147**	**206**
Volume Change during Consolidation	4.3	28.1	50.3
Volume Change during Saturation	0.00	0.00	0.00
Volume at Shear (cm^3) *These	628.59	604.79	582.59
Volume of Solids (cm^3) measurements	350.75	351.49	354.96
Volume of Voids (cm^3) are all	277.84	253.30	227.62
Volume of Water (cm^3) at	250.47	248.49	249.36
Void Ratio, e shear	0.792	0.721	0.641

CONSOLIDATED UNDRAINED TRIAXIAL TEST
WITH PORE PRESSURE READINGS
ASTM D4767-11

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Client:	Amec Foster Wheeler	Boring No.:	B-453
Client Reference:	Dan River Steam Station Ash Removal	Depth (ft):	0.0-10.0
Project No.:	2015-616-02	Sample No.:	BULK
Lab ID:	2015-616-02-04		

TEST 1 INITIAL

N/A

TEST 1 FINAL

TEST 2 INITIAL

N/A

TEST 2 FINAL

TEST 3 INITIAL

N/A

TEST 3 FINAL

Tested By *SFS* *Date* *5/20/15* *Approved By* MPS *Date* 6/4/15

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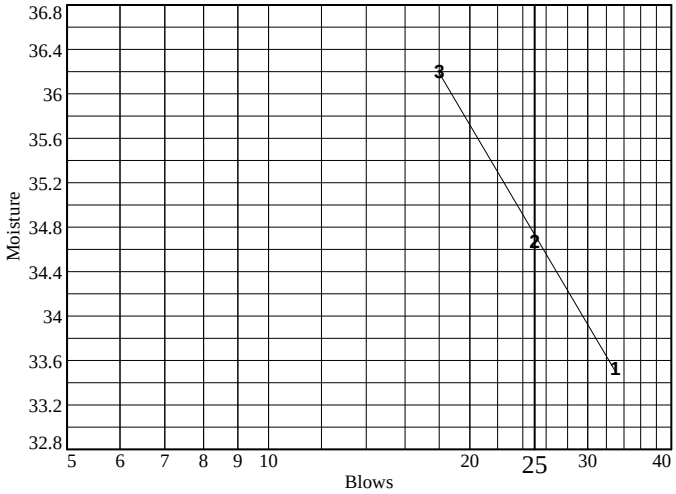
LIQUID AND PLASTIC LIMIT TEST DATA

5/26/2015

Client: Duke Energy
Project: Dan River Steam Station Ash Removal
Project Number: 7810140065
Location: B-455
Depth: 0 - 10' **Sample Number:** Bulk
Material Description: Light Brown to Brown Sandy Lean Clay
USCS: CL **AASHTO:** A-6(9)
Tested by: D. Kopitsky **Checked by:** G. Williams

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	34.11	34.12	34.76			
Dry+Tare	29.60	29.49	29.81			
Tare	16.15	16.14	16.14			
# Blows	33	25	18			
Moisture	33.5	34.7	36.2			



Liquid Limit= 35
Plastic Limit= 18
Plasticity Index= 17
Natural Moisture= 16.7
Liquidity Index= -0.1

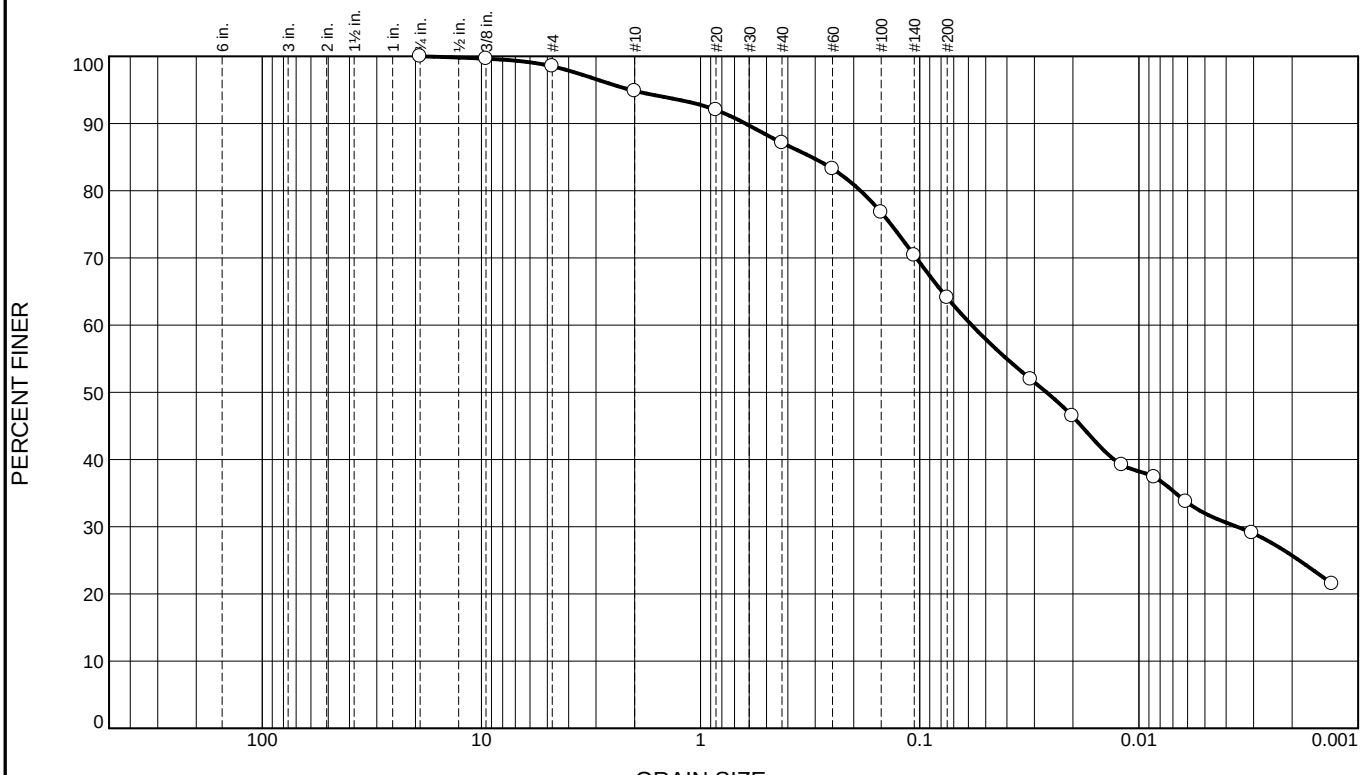
Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	18.20	17.46			
Dry+Tare	17.20	16.47			
Tare	11.56	10.85			
Moisture	17.7	17.6			

Natural Moisture Data

Wet+Tare	Dry+Tare	Tare	Moisture
173.36	155.76	50.22	16.7

Particle Size Analysis ASTM D422



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	1.5	3.6	7.8	23.0	32.1	32.0

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/4"	100.0		
3/8"	99.6		
#4	98.5		
#10	94.9		
#20	92.0		
#40	87.1		
#60	83.3		
#100	76.8		
#140	70.4		
#200	64.1		
0.0312 mm.	51.9		
0.0202 mm.	46.5		
0.0120 mm.	39.2		
0.0085 mm.	37.4		
0.0061 mm.	33.7		
0.0031 mm.	29.1		
0.0013 mm.	21.5		

* (no specification provided)

Soil Description

Light Brown to Brown Sandy Lean Clay

Atterberg Limits

PL= 18 LL= 35 PI= 17

Coefficients

D_{90}= 0.6249 D_{85}= 0.3113 D_{60}= 0.0580
D_{50}= 0.0264 D_{30}= 0.0036 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= CL AASHTO= A-6(9)

Remarks

Moisture Content = 16.7%

Source of Sample: B-455 **Depth:** 0 - 10'
Sample Number: Bulk **Date:** 5-6-15

amec

Client: Duke Energy
Project: Dan River Steam Station Ash Removal
Project No: 7810140065 **Figure**

Tested By: D. Kopitsky **Checked By:** T. Landis

GRAIN SIZE DISTRIBUTION TEST DATA

5/26/2015

Client: Duke Energy
Project: Dan River Steam Station Ash Removal
Project Number: 7810140065
Location: B-455
Depth: 0 - 10' **Sample Number:** Bulk
Material Description: Light Brown to Brown Sandy Lean Clay
Date: 5-6-15 **PL:** 18 **LL:** 35 **PI:** 17
USCS Classification: CL **AASHTO Classification:** A-6(9)
Testing Remarks: Moisture Content = 16.7%
Tested by: D. Kopitsky **Checked by:** T. Landis

Sieve Test Data

Dry Sample and Tare (grams)	Tare (grams)	Cumulative Pan Tare Weight (grams)	Sieve Opening Size	Cumulative Weight Retained (grams)	Percent Finer
320.32	0.00	0.00	3/4"	0.00	100.0
			3/8"	1.17	99.6
			#4	4.77	98.5
			#10	16.49	94.9
52.10	0.00	0.00	#20	1.56	92.0
			#40	4.25	87.1
			#60	6.37	83.3
			#100	9.93	76.8
			#140	13.44	70.4
			#200	16.90	64.1

Hydrometer Test Data

Hydrometer test uses material passing #10
Percent passing #10 based upon complete sample = 94.9
Weight of hydrometer sample =53.61
Hygroscopic moisture correction:
Moist weight and tare = 30.58
Dry weight and tare = 30.18
Tare weight = 16.23
Hygroscopic moisture = 2.9%
Table of composite correction values:

Temp., deg. C:	14.0	24.0	40.0
Comp. corr.:	-5.0	-3.0	0.0

Meniscus correction only = 1.0
Specific gravity of solids = 2.65
Hydrometer type = 152H
Hydrometer effective depth equation: L = 16.294964 **-** 0.164 **x Rm**

Elapsed Time (min.)	Temp. (deg. C.)	Actual Reading	Corrected Reading	K	Rm	Eff. Depth	Diameter (mm.)	Percent Finer
2.00	21.7	32.0	28.5	0.0134	33.0	10.9	0.0312	51.9
5.00	21.7	29.0	25.5	0.0134	30.0	11.4	0.0202	46.5
15.00	21.7	25.0	21.5	0.0134	26.0	12.0	0.0120	39.2
30.00	21.7	24.0	20.5	0.0134	25.0	12.2	0.0085	37.4
60.00	21.7	22.0	18.5	0.0134	23.0	12.5	0.0061	33.7
250.00	21.4	19.5	16.0	0.0134	20.5	12.9	0.0031	29.1

Hydrometer Test Data (continued)

Elapsed Time (min.)	Temp. (deg. C.)	Actual Reading	Corrected Reading	K	Rm	Eff. Depth	Diameter (mm.)	Percent Finer
1440.00	20.6	15.5	11.8	0.0135	16.5	13.6	0.0013	21.5

Fractional Components

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	0.0	1.5	1.5	3.6	7.8	23.0	34.4	32.1	32.0	64.1

D_5	D_{10}	D_{15}	D_{20}	D_{30}	D_{40}	D_{50}	D_{60}	D_{80}	D_{85}	D_{90}	D_{95}
				0.0036	0.0130	0.0264	0.0580	0.1863	0.3113	0.6249	2.0832

Fineness Modulus
0.62

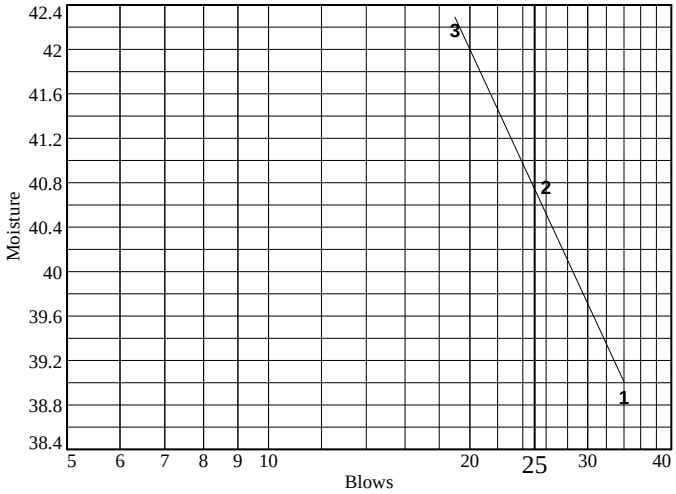
LIQUID AND PLASTIC LIMIT TEST DATA

5/26/2015

Client: Duke Energy
Project: Dan River Steam Station Ash Removal
Project Number: 7810140065
Location: B-458
Depth: 30 - 40'
Sample Number: Bulk
Material Description: Brown Lean Clay with Sand
USCS: CL
AASHTO: A-7-6(15)
Tested by: D. Kopitsky
Checked by: G. Williams

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	36.50	34.18	33.51			
Dry+Tare	30.82	28.95	28.36			
Tare	16.21	16.12	16.15			
# Blows	34	26	19			
Moisture	38.9	40.8	42.2			



Liquid Limit= 41
Plastic Limit= 19
Plasticity Index= 22
Natural Moisture= 24.4
Liquidity Index= 0.2

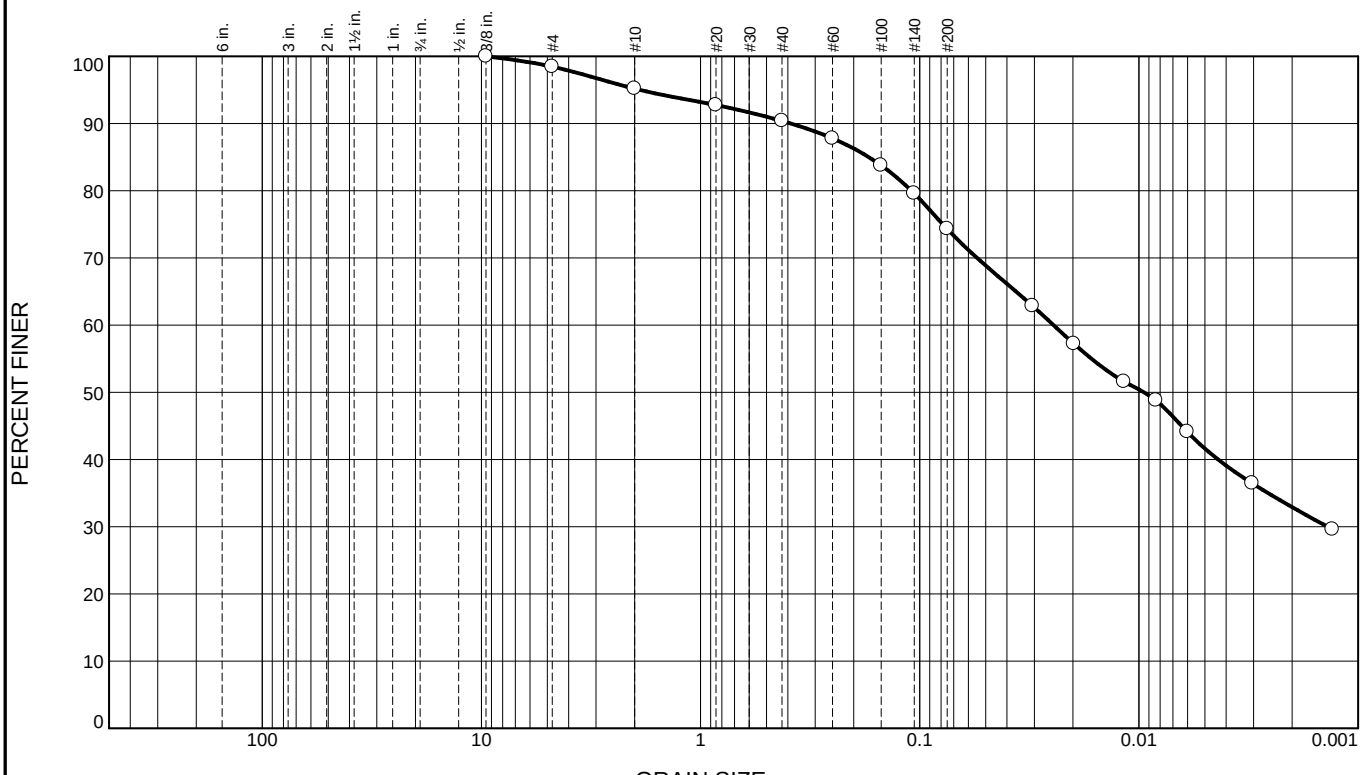
Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	17.91	17.59			
Dry+Tare	16.83	16.53			
Tare	11.14	10.77			
Moisture	19.0	18.4			

Natural Moisture Data

Wet+Tare	Dry+Tare	Tare	Moisture
163.40	141.22	50.44	24.4

Particle Size Analysis ASTM D422



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	1.5	3.3	4.8	16.1	32.7	41.6

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/8"	100.0		
#4	98.5		
#10	95.2		
#20	92.7		
#40	90.4		
#60	87.8		
#100	83.8		
#140	79.6		
#200	74.3		
0.0306 mm.	62.8		
0.0198 mm.	57.2		
0.0117 mm.	51.6		
0.0084 mm.	48.8		
0.0060 mm.	44.1		
0.0030 mm.	36.5		
0.0013 mm.	29.6		

* (no specification provided)

Soil Description

Brown Lean Clay with Sand

Atterberg Limits

PL= 19 LL= 41 PI= 22

Coefficients

D_{90}= 0.3882 D_{85}= 0.1710 D_{60}= 0.0245
D_{50}= 0.0095 D_{30}= 0.0014 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= CL AASHTO= A-7-6(15)

Remarks

Moisture Content = 24.4%
Specific Gravity = 2.588

Source of Sample: B-458 **Depth:** 30 - 40'
Sample Number: Bulk **Date:** 5-6-15

Client: Duke Energy
Project: Dan River Steam Station Ash Removal
Project No: 7810140065 **Figure**

Tested By: D. Kopitsky **Checked By:** T. Landis

GRAIN SIZE DISTRIBUTION TEST DATA

5/26/2015

Client: Duke Energy
Project: Dan River Steam Station Ash Removal
Project Number: 7810140065
Location: B-458
Depth: 30 - 40' **Sample Number:** Bulk
Material Description: Brown Lean Clay with Sand
Date: 5-6-15 **PL:** 19 **LL:** 41 **PI:** 22
USCS Classification: CL **AASHTO Classification:** A-7-6(15)
Testing Remarks: Moisture Content = 24.4%
Specific Gravity = 2.588
Tested by: D. Kopitsky **Checked by:** T. Landis

Sieve Test Data

Dry Sample and Tare (grams)	Tare (grams)	Cumulative Pan Tare Weight (grams)	Sieve Opening Size	Cumulative Weight Retained (grams)	Percent Finer
291.67	0.00	0.00	3/4"		
			3/8"	0.00	100.0
			#4	4.49	98.5
			#10	14.07	95.2
51.53	0.00	0.00	#20	1.32	92.7
			#40	2.60	90.4
			#60	4.00	87.8
			#100	6.18	83.8
			#140	8.44	79.6
			#200	11.30	74.3

Hydrometer Test Data

Hydrometer test uses material passing #10
Percent passing #10 based upon complete sample = 95.2
Weight of hydrometer sample =53.02
Hygroscopic moisture correction:
Moist weight and tare = 30.28
Dry weight and tare = 29.89
Tare weight = 16.25
Hygroscopic moisture = 2.9%
Table of composite correction values:

Temp., deg. C:	14.0	24.0	40.0
Comp. corr.:	-5.0	-3.0	0.0

Meniscus correction only = 1.0
Specific gravity of solids = 2.588
Hydrometer type = 152H
Hydrometer effective depth equation: L = 16.294964 **-** 0.164 **x Rm**

Elapsed Time (min.)	Temp. (deg. C.)	Actual Reading	Corrected Reading	K	Rm	Eff. Depth	Diameter (mm.)	Percent Finer
2.00	21.7	37.0	33.5	0.0136	38.0	10.1	0.0306	62.8
5.00	21.7	34.0	30.5	0.0136	35.0	10.6	0.0198	57.2
15.00	21.7	31.0	27.5	0.0136	32.0	11.0	0.0117	51.6
30.00	21.7	29.5	26.0	0.0136	30.5	11.3	0.0084	48.8
60.00	21.7	27.0	23.5	0.0136	28.0	11.7	0.0060	44.1

Hydrometer Test Data (continued)

Elapsed Time (min.)	Temp. (deg. C.)	Actual Reading	Corrected Reading	K	Rm	Eff. Depth	Diameter (mm.)	Percent Finer
250.00	21.3	23.0	19.5	0.0137	24.0	12.4	0.0030	36.5
1440.00	20.5	19.5	15.8	0.0138	20.5	12.9	0.0013	29.6

Fractional Components

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	0.0	1.5	1.5	3.3	4.8	16.1	24.2	32.7	41.6	74.3

D_5	D_{10}	D_{15}	D_{20}	D_{30}	D_{40}	D_{50}	D_{60}	D_{80}	D_{85}	D_{90}	D_{95}
				0.0014	0.0044	0.0095	0.0245	0.1092	0.1710	0.3882	1.8996

Fineness Modulus
0.48

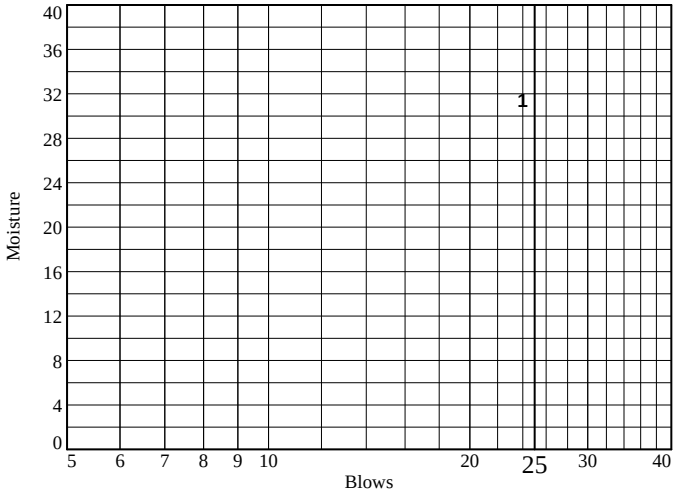
LIQUID AND PLASTIC LIMIT TEST DATA

5/26/2015

Client: Duke Energy
Project: Dan River Steam Station Ash Removal
Project Number: 7810140065
Location: B-459
Depth: 43.5 - 45'
Sample Number: SS-8
Material Description: Light Gray Sandy Lean Clay
USCS: CL
AASHTO: A-6(5)
Tested by: D. Kopitsky
Checked by: M. Hamilton

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	32.35	32.60				
Dry+Tare	28.49	38.66				
Tare	16.23	16.43				
# Blows	24	24				
Moisture	31.5					



Liquid Limit= 31
Plastic Limit= 17
Plasticity Index= 14
Natural Moisture= 14.5
Liquidity Index= -0.2

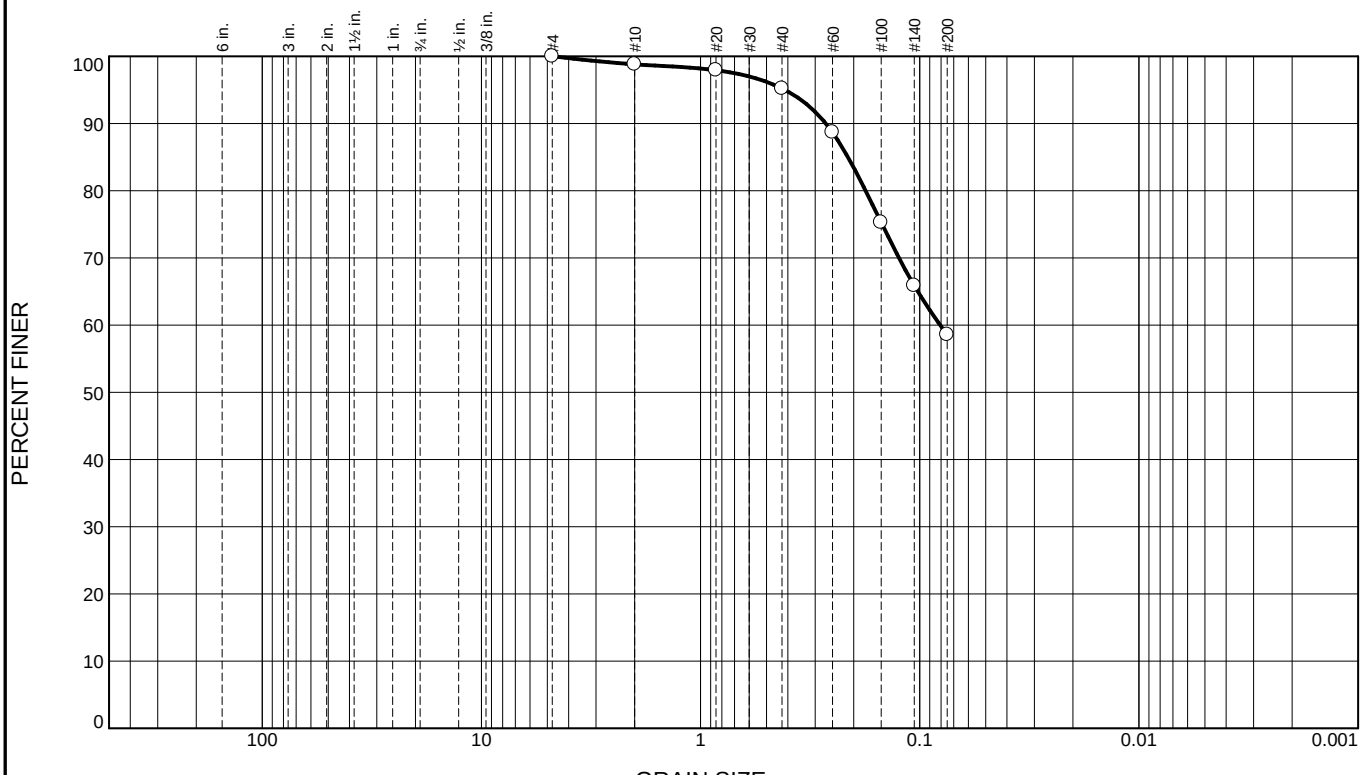
Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	17.89	18.20			
Dry+Tare	16.9	17.20			
Tare	11.13	11.43			
Moisture	17.2	17.3			

Natural Moisture Data

Wet+Tare	Dry+Tare	Tare	Moisture
262.61	250.53	167.22	14.5

Particle Size Analysis ASTM D422



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	1.2	3.6	36.6	58.6	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#10	98.8		
#20	97.9		
#40	95.2		
#60	88.7		
#100	75.3		
#140	65.9		
#200	58.6		

* (no specification provided)

Soil Description

Light Gray Sandy Lean Clay

Atterberg Limits

PL= 17 LL= 31 PI= 14

Coefficients

D_{90}= 0.2684 D_{85}= 0.2127 D_{60}= 0.0807
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= CL AASHTO= A-6(5)

Remarks

Moisture Content = 14.5%

Source of Sample: B-459 **Depth:** 43.5 - 45'
Sample Number: SS-8 **Date:** 5-18-15

amec

Client: Duke Energy
Project: Dan River Steam Station Ash Removal
Project No: 7810140065 **Figure**

Tested By: D. Kopitsky **Checked By:** G. Williams

GRAIN SIZE DISTRIBUTION TEST DATA

5/26/2015

Client: Duke Energy
Project: Dan River Steam Station Ash Removal
Project Number: 7810140065
Location: B-459
Depth: 43.5 - 45' **Sample Number:** SS-8
Material Description: Light Gray Sandy Lean Clay
Date: 5-18-15 **PL:** 17 **LL:** 31 **PI:** 14
USCS Classification: CL **AASHTO Classification:** A-6(5)
Testing Remarks: Moisture Content = 14.5%
Tested by: D. Kopitsky **Checked by:** G. Williams

Sieve Test Data

Dry Sample and Tare (grams)	Tare (grams)	Cumulative Pan Tare Weight (grams)	Sieve Opening Size	Cumulative Weight Retained (grams)	Percent Finer
250.53	167.22	0.00	3/4"		
			3/8"		
			#4	0.00	100.0
			#10	1.00	98.8
			#20	1.73	97.9
			#40	4.00	95.2
			#60	9.44	88.7
			#100	20.59	75.3
			#140	28.43	65.9
			#200	34.52	58.6

Fractional Components

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	0.0	0.0	0.0	1.2	3.6	36.6	41.4			58.6

D_5	D_{10}	D_{15}	D_{20}	D_{30}	D_{40}	D_{50}	D_{60}	D_{80}	D_{85}	D_{90}	D_{95}
							0.0807	0.1767	0.2127	0.2684	0.4133

Fineness Modulus
0.39

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ATTERBERG LIMITS

ASTM D 4318-10 / AASHTO T89-10

Client:	AMEC FOSTER WHEELER	Boring No.:	B-463
Client Reference:	Dan River Steam Station Ash Removal	Depth (ft):	0.0-10.0
Project No.:	2015-616-02	Sample No.:	BULK
Lab ID:	2015-616-02-05	Soil Description:	YELLOWRED TO REDBROWN LEAN CLAY

Note: The USCS symbol used with this test refers only to the minus No. 40 sieve material. See the "Sieve and Hydrometer Analysis" graph page for the complete material description.

(Minus No. 40 sieve material, Airdried)

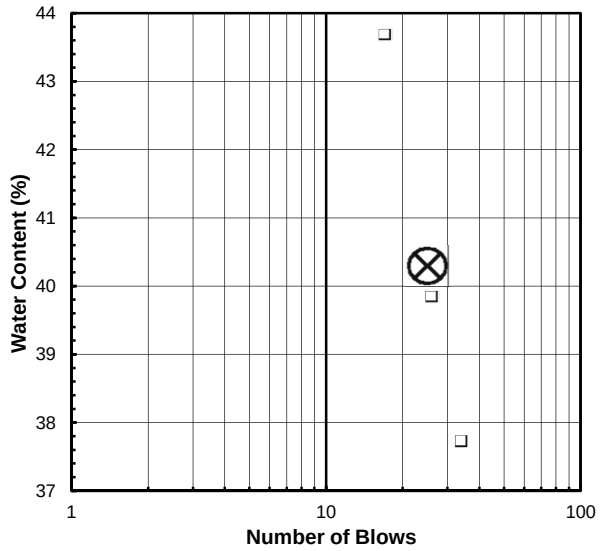
Liquid Limit Test	**1**	**2**	**3**	
Tare Number	2M	M	A-N	**MULTIPOINT**
Wt. of Tare & Wet Sample (g)	25.31	25.09	26.24	
Wt. of Tare & Dry Sample (g)	22.67	22.27	22.96	
Wt. of Tare (g)	15.67	15.19	15.45	
Wt. of Water (g)	2.6	2.8	3.3	
Wt. of Dry Sample (g)	7.0	7.1	7.5	
Moisture Content (%)	**37.7**	**39.8**	**43.7**	
Number of Blows	**34**	**26**	**17**	

Plastic Limit Test	**1**	**2**	**Range**
Tare Number	3M	Y-3	
Wt. of Tare & Wet Sample (g)	22.22	22.40	
Wt. of Tare & Dry Sample (g)	20.89	21.05	
Wt. of Tare (g)	15.58	15.64	
Wt. of Water (g)	1.3	1.4	
Wt. of Dry Sample (g)	5.3	5.4	
Moisture Content (%)	**25.0**	**25.0**	**0.1**

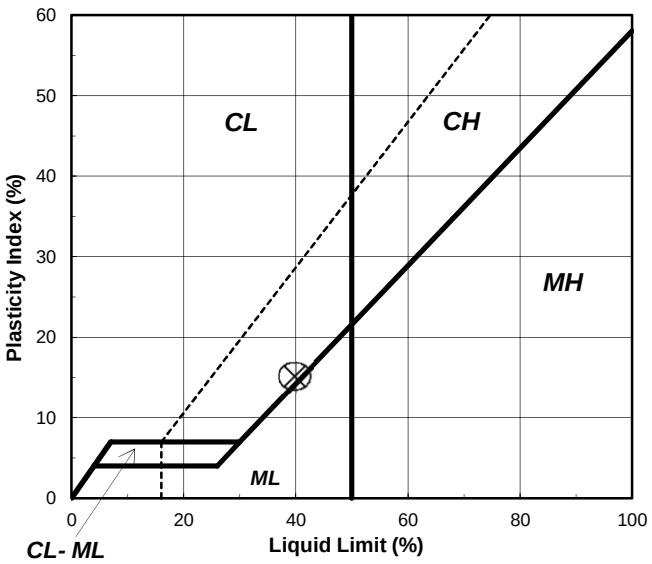
Note: The acceptable range of the two Moisture contents is ± 2.6

Test Results	
Liquid Limit (%)	**40**
Plastic Limit (%)	**25**
Plasticity Index (%)	**15**
USCS Symbol	**CL**

Flow Curve



Plasticity Chart



Tested By	*BW*	*Date*	*5/14/15*	*Checked By*	*SFS*	*Date*	6/4/15

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SIEVE AND HYDROMETER ANALYSIS
ASTM D 422-63 (2007)

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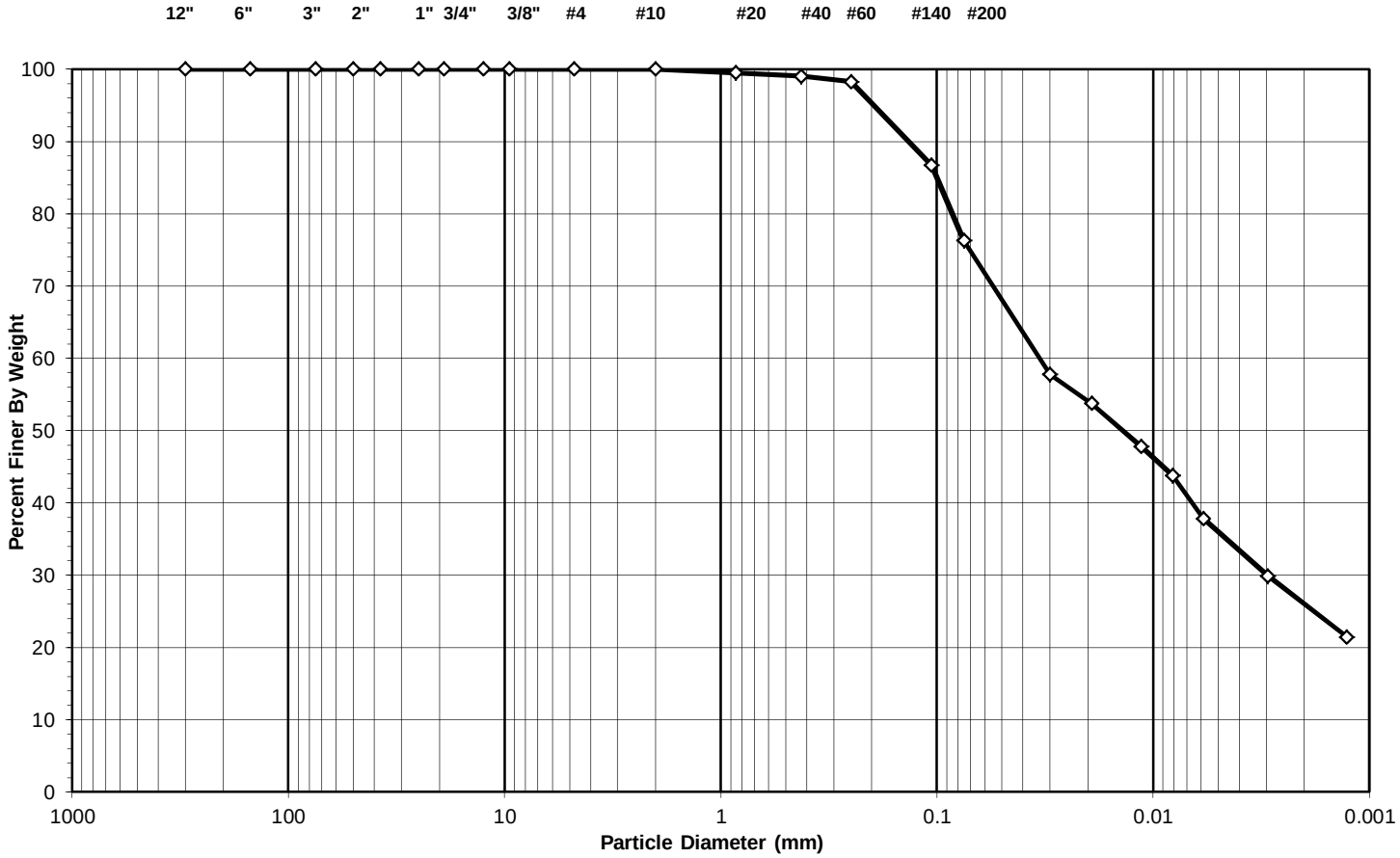
Client	AMEC FOSTER WHEELER	Boring No.	B-463
Client Reference	Dan River Steam Station Ash Removal	Depth (ft)	0.0-10.0
Project No.	2015-616-02	Sample No.	BULK
Lab ID	2015-616-02-05	Soil Color	**YELLOW RED TO RED BROWN**

	SIEVE ANALYSIS			*HYDROMETER*	
USCS	**cobbles**	**gravel**	**sand**	**silt and clay fraction**	
USDA	**cobbles**	**gravel**	**sand**	**silt**	**clay**



USCS Summary

Sieve Sizes (mm)		**Percentage**
Greater Than #4	*Gravel*	0.00
#4 To #200	*Sand*	23.74
Finer Than #200	*Silt & Clay*	76.26

USCS Symbol ***CL, TESTED***

USCS Classification ***LEAN CLAY WITH SAND***

DCN: CT-S3OR DATE: 7/26/13 REVISION: 8 *J:\PROJECTS\2015-616 AMEC - DAN RIVER\Results group 02 color change\[2015-616-02-05 COLOR CHG.SIEVEHYD10.xls]Sheet1*

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WASH SIEVE ANALYSIS

ASTM D 422-63 (2007)

Client	AMEC FOSTER WHEELER	Boring No.	B-463
Client Reference	Dan River Steam Station Ash Removal	Depth (ft)	0.0-10.0
Project No.	2015-616-02	Sample No.	BULK
Lab ID	2015-616-02-05	Soil Color	**YELLOW RED TO RED BROWN**

Minus #10 for Hygroscopic Moisture Content		**Hydrometer Specimen Data**	
Tare No.	E-20	Air Dried - #10 Hydrometer Material (g)	50.03
Wgt.Tare + Wet Soil (g)	32.85	Corrected Dry Wt. of - #10 Material (g)	49.75
Wgt.Tare + Dry Soil (g)	32.79		
Weight of Tare (g)	22.01	Weight of - #200 Material (g)	37.94
Weight of Water (g)	0.06	Weight of - #10 ; + #200 Material (g)	11.81
Weight of Dry Soil (g)	10.78		
Moisture Content (%)	**0.6**	**J-FACTOR (%FINER THAN #10)**	**1.0000**
		Soil Specimen Data	
Tare No.	303		
Wgt.Tare + Air Dry Soil (g)	403.53		
Weight of Tare (g)	110.58		
Air Dried Wgt. Total Sample (g)	292.95	Dry Weight of Material Retained on #10 (g)	0.00
Total Dry Sample Weight (g)	291.33	Corrected Dry Sample Wt - #10 (g)	291.33

Sieve Size	Sieve Opening (mm)	Wgt.of Soil Retained (gm)	Percent Retained (%)	Accumulated Percent Retained (%)	Percent Finer (%)	**Accumulated Percent Finer (%)**
12"	300	0.00	0.0	0.0	100.0	**100.0**
6"	150	0.00	0.0	0.0	100.0	**100.0**
3"	75	0.00	0.0	0.0	100.0	**100.0**
2"	50	0.00	0.0	0.0	100.0	**100.0**
1 1/2"	37.5	0.00	0.0	0.0	100.0	**100.0**
1"	25.0	0.00	0.0	0.0	100.0	**100.0**
3/4"	19.0	0.00	0.0	0.0	100.0	**100.0**
1/2"	12.5	0.00	0.0	0.0	100.0	**100.0**
3/8"	9.50	0.00	0.0	0.0	100.0	**100.0**
#4	4.75	0.00	0.0	0.0	100.0	**100.0**
#10	2.00	0.00	0.0	0.0	100.0	**100.0**
#20	0.85	0.24	0.5	0.5	99.5	**99.5**
#40	0.425	0.24	0.5	1.0	99.0	**99.0**
#60	0.250	0.39	0.8	1.7	98.3	**98.3**
#140	0.106	5.74	11.5	13.3	86.7	**86.7**
#200	0.075	5.20	10.5	23.7	76.3	**76.3**
Pan	-	37.94	76.3	100.0	-	**-**

Notes :

Tested By BT Date 5/13/15 Checked By GEM Date 6/4/15

DCN: CT-S3OR DATE: 7/26/13 REVISION: 8 *PROJECTS\2015-616 AMEC - DAN RIVER\Results group 02 color change\[2015-616-02-05 COLOR CHG.SIEVEHYD10.xls]Sheet1*

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HYDROMETER ANALYSIS

ASTM D 422-63 (2007)

Client	AMEC FOSTER WHEELER	Boring No.	B-463
Client Reference	Dan River Steam Station Ash Removal	Depth (ft)	0.0-10.0
Project No.	2015-616-02	Sample No.	BULK
Lab ID	2015-616-02-05	Soil Color	**YELLOW RED TO RED BROWN**

Elapsed Time (min)	R Measured	Temp. (°C)	Composite Correction	R Corrected	N (%)	K Factor	Diameter (mm)	N' (%)
0	NA	NA	NA	NA	NA	NA	NA	NA
2	33.0	23.9	3.98	29.0	57.7	0.01284	0.0300	**57.7**
5	31.0	23.9	3.98	27.0	53.8	0.01284	0.0192	**53.8**
15	28.0	23.9	3.98	24.0	47.8	0.01284	0.0113	**47.8**
30	26.0	23.9	3.98	22.0	43.8	0.01284	0.0081	**43.8**
60	23.0	23.9	3.98	19.0	37.8	0.01284	0.0059	**37.8**
250	19.0	23.9	3.98	15.0	29.9	0.01284	0.0029	**29.9**
1440	15.0	23.1	4.23	10.8	21.4	0.01296	0.0013	**21.4**

Soil Specimen Data		**Other Corrections**		
Wgt. of Dry Material (g)	49.75	Hygroscopic Moisture Factor	0.994	
Weight of Deflocculant (g)	5.0	a - Factor	0.99	
		Percent Finer than # 10	100.00	
		Specific Gravity	2.70	Assumed

Notes:

Tested By SFS Date 5/15/15 Checked By GEM Date 6/4/15

DCN: CT-S3OR DATE: 7/26/13 REVISION: 8 *PROJECTS\2015-616 AMEC - DAN RIVER\Results group 02 color change\[2015-616-02-05 COLOR CHG.SIEVEHYD10.xls]Sheet1*

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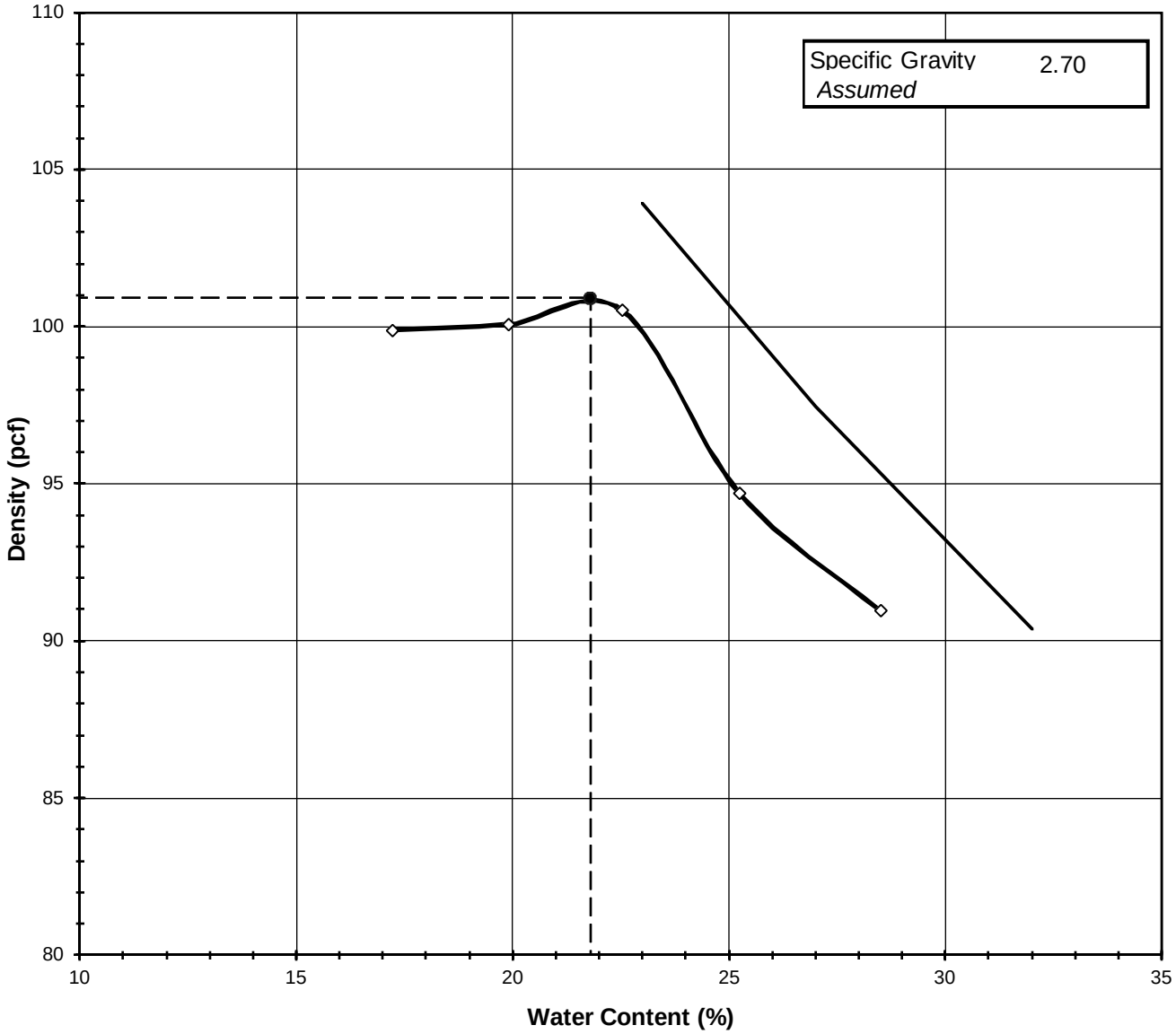
MOISTURE DENSITY RELATIONSHIP

ASTM D698-12

Client:	Amec Foster Wheeler	Boring No.:	B-463
Client Reference:	Dan River Steam Station Ash Removal	Depth (ft):	0.0-10.0
Project No.:	2015-616-02	Sample No.:	BULK
Lab ID:	2015-616-02-05	Test Method	**STANDARD**

Visual Description: YELLOW RED TO RED BROWN LEAN CLAY WITH SAND

Optimum Water Content	**21.8**
Maximum Dry Density	**100.9**



Tested By *BT* *Date* *5/8/15* *Checked By* *SFS* *Date* 6/4/15

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MOISTURE - DENSITY RELATIONSHIP

ASTM D698-12

Client:	Amec Foster Wheeler	Boring No.:	B-463
Client Reference:	Dan River Steam Station Ash Removal	Depth (ft):	0.0-10.0
Project No.:	2015-616-02	Sample No.:	BULK
Lab ID:	2015-616-02-05		

Visual Description: YELLOW RED TO RED BROWN LEAN CLAY WITH SAND

Total Weight of the Sample (g)	18400
As Received Water Content (%)	NA
Assumed Specific Gravity	2.70
Percent Retained on 3/4"	NA
Percent Retained on 3/8"	NA
Percent Retained on #4	NA
Oversize Material	Not included
Procedure Used	A

Test Type		**STANDARD**
Rammer Weight (lb)		5.5
Rammer Drop (in)		12
Rammer Type		MECHANICAL
Machine ID	R	174
Mold ID	R	461
Mold diameter		4"
Weight of the Mold (g)		4174
Volume of the Mold (cm^3)		942

Mold / Specimen

Point No.	**1**	**2**	**3**	**4**	**5**
Wt. of Mold & Wet Sample (g)	5941	5985	6033	5964	5938
Wt.of Mold (g)	4174	4174	4174	4174	4174
Wt. of Wet Sample (g)	1767	1811	1859	1790	1764
Mold Volume (cm^3)	942	942	942	942	942

Moisture Content / Density

Tare Number	839	314	312	837	840
Wt. of Tare & Wet Sample (g)	608.90	405.50	419.00	683.00	651.00
Wt. of Tare & Dry Sample (g)	557.40	352.20	357.40	597.90	564.90
Wt. of Tare (g)	258.20	84.40	84.10	260.90	262.80
Wt. of Water (g)	51.50	53.30	61.60	85.10	86.10
Wt. of Dry Sample (g)	299.20	267.80	273.30	337.00	302.10

Wet Density (g/cm^3)	1.88	1.92	1.97	1.90	1.87
Wet Density (pcf)	117.1	120.0	123.2	118.6	116.9
Moisture Content (%)	**17.2**	**19.9**	**22.5**	**25.3**	**28.5**
Dry Density (pcf)	**99.9**	**100.1**	**100.5**	**94.7**	**90.9**

Zero Air Voids

Moisture Content (%)	23.0	27.0	32.0
Dry Unit Weight (pcf)	103.9	97.4	90.4

Tested By *BT* *Date* *5/8/15* *Checked By* *SFS* *Date* 6/4/15

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FLEXIBLE WALL PERMEABILITY TEST

PERMOMETER METHOD

ASTM D 5084-10

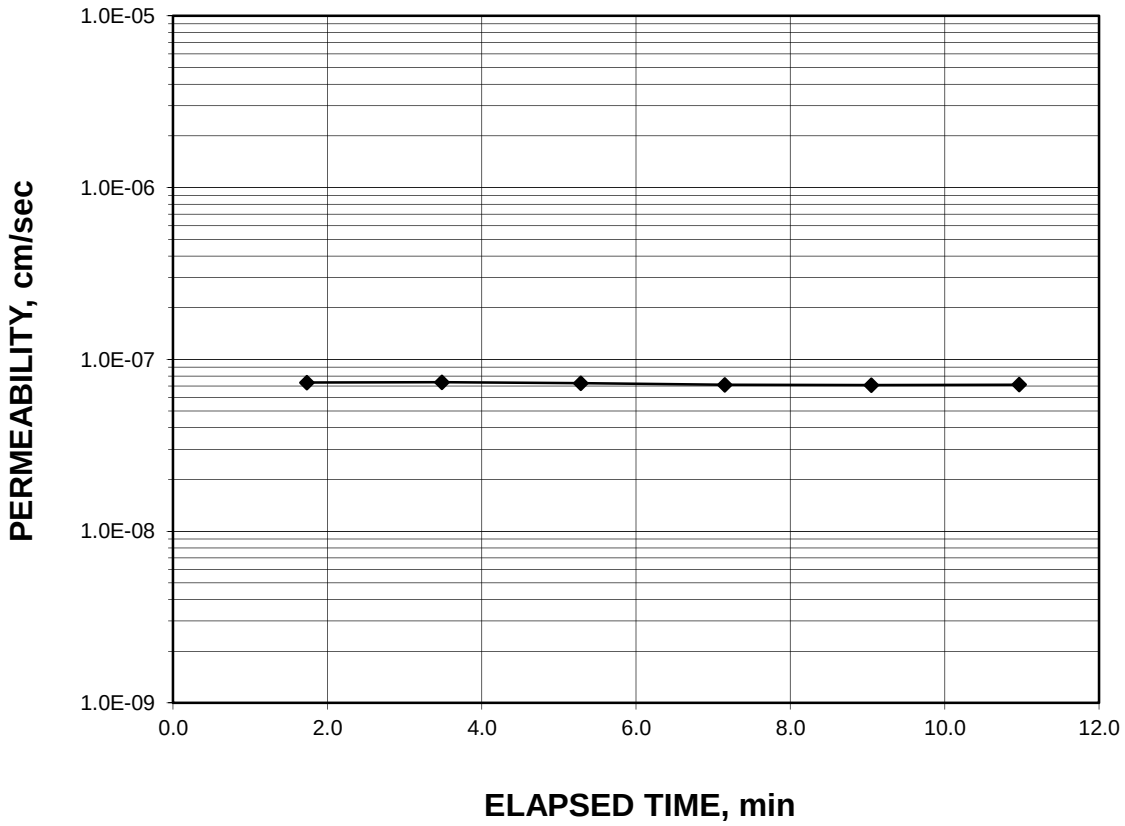
Client	Amec Foster Wheeler	Boring No.	B-463
Client Project	Dan River Steam Station Ash Removal	Depth (ft.)	0.0-10.0
Project No.	2015-616-02	Sample No.	BULK
Lab ID No.	2015-616-02-05		

Visual Description: YELLOW RED TO RED BROWNLEAN CLAY WITH SAND

AVERAGE PERMEABILITY = 7.1E-08 cm/sec @ 20°C

AVERAGE PERMEABILITY = 7.1E-10 m/sec @ 20°C

PERMEABILITY vs. TIME



Tested By: SFS Date: 5/14/15 Checked By: GEM Date: 6/4/15

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FLEXIBLE WALL PERMEABILITY TEST

PERMOMETER METHOD

ASTM D 5084-10

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Client	Amec Foster Wheeler	Boring No.	B-463
Client Project	Dan River Steam Station Ash Removal	Depth (ft.)	0.0-10.0
Project No.	2015-616-02	Sample No.	BULK
Lab ID No.	2015-616-02-05		

Specific Gravity	2.70	Assumed
Sample Condition		Remolded

Visual Description: YELLOW RED TO RED BROWNLEAN CLAY WITH SAND

MOISTURE CONTENT:	BEFORE TEST	AFTER TEST
Tare Number	802	814
Wt. of Tare & WS (gm.)	390.10	566.14
Wt. of Tare & DS (gm.)	331.80	471.82
Wt. of Tare (gm.)	103.38	109.74
Wt. of Water (gm.)	58.30	94.32
Wt. of DS (gm.)	228.42	362.08
Moisture Content (%)	**25.5**	**26.0**

SPECIMEN:	BEFORE TEST	AFTER TEST
Wt. of Tube & WS (gm.)	2465.10	NA
Wt. of Tube (gm.)	1632.10	NA
Wt. of WS (calc.) (gm.)	833.00	836.49
Length 1 (in.)	4.005	3.941
Length 2 (in.)	4.005	3.957
Length 3 (in.)	4.005	3.964
Top Diameter (in.)	2.867	2.865
Middle Diameter (in.)	2.867	2.863
Bottom Diameter (in.)	2.867	2.862
Average Length (in.)	4.01	3.95
Average Area (in.^{2})	6.46	6.44
Sample Volume (cm^3)	423.69	417.23
Unit Wet Wt. (gm./ cm^3)	1.966	2.005
Unit Wet Wt. (pcf)	122.7	125.1
Unit Dry Wt. (pcf)	97.8	99.3
Unit Dry Wt. (gm./ cm^3)	1.566	1.591
Void Ratio, e	0.724	0.698
Porosity, n	0.420	0.411
Pore Volume (cm^3)	177.9	171.4
Total Wt. Of Sample After Test		838.48

Tested By: SFS Date: 5/14/15 Checked By: GEM Date: 6/4/15

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FLEXIBLE WALL PERMEABILITY TEST
PERMOMETER METHOD

ASTM D 5084-10

Client	Amec Foster Wheeler	Boring No.	B-463
Client Project	Dan River Steam Station Ash Removal	Depth (ft.)	0.0-10.0
Project No.	2015-616-02	Sample No.	BULK
Lab ID No.	2015-616-02-05		

Test Pressures		Final Sample Dimensions	
Cell Pressure(psi)	55.0	Sample Length (cm), L	10.04
Back Pressure(psi)	50.0	Sample Area (cm^2), A	41.54
Eff. Cons. Pressure(psi)	5.0	Pipette Area (cm^2), a_p	0.03142
Response (%)	97	Annulus Area (cm^2), a_a	0.76712
		Equilibrium Level (cm), R_{eq}	1

AVERAGE PERMEABILITY = 7.1E-08 cm/sec @ 20°C
AVERAGE PERMEABILITY = 7.1E-10 m/sec @ 20°C

DATE	TIME				ELAPSED TIME t	PIPETTE READI NG R_p	INCREMENT GRADIENT i	TEMP.	INCREMENTAL PERMEABILITY @ 20°C
(mm/dd/yy)	(hr)	(min)	(sec)	(min)	(min)	(cm)	(cm/cm)	(°C)	(cm/sec)
5/18/15	11	4	28	4.47	0.000	8.2	9.4	22.7	NA
5/18/15	11	6	12	6.20	1.733	8.1	9.2	22.7	7.3E-08
5/18/15	11	7	57	7.95	3.483	8.0	9.1	22.7	7.4E-08
5/18/15	11	9	45	9.75	5.283	7.9	9.0	22.7	7.3E-08
5/18/15	11	11	37	11.62	7.150	7.8	8.8	22.7	7.1E-08
5/18/15	11	13	31	13.52	9.050	7.7	8.7	22.7	7.1E-08
5/18/15	11	15	26	15.43	10.967	7.6	8.6	22.7	7.1E-08

Tested By: SFS Date: 5/14/15 Checked By: GEM Date: 6/4/15

DCN: CT-22A DATE: 2015-06-16 REVISION: 5 2015-616 ASH DAN RIVER\Results group 02 color change\[2015-616-02-05COLOR CHG. Permometer.xls]Sheet1

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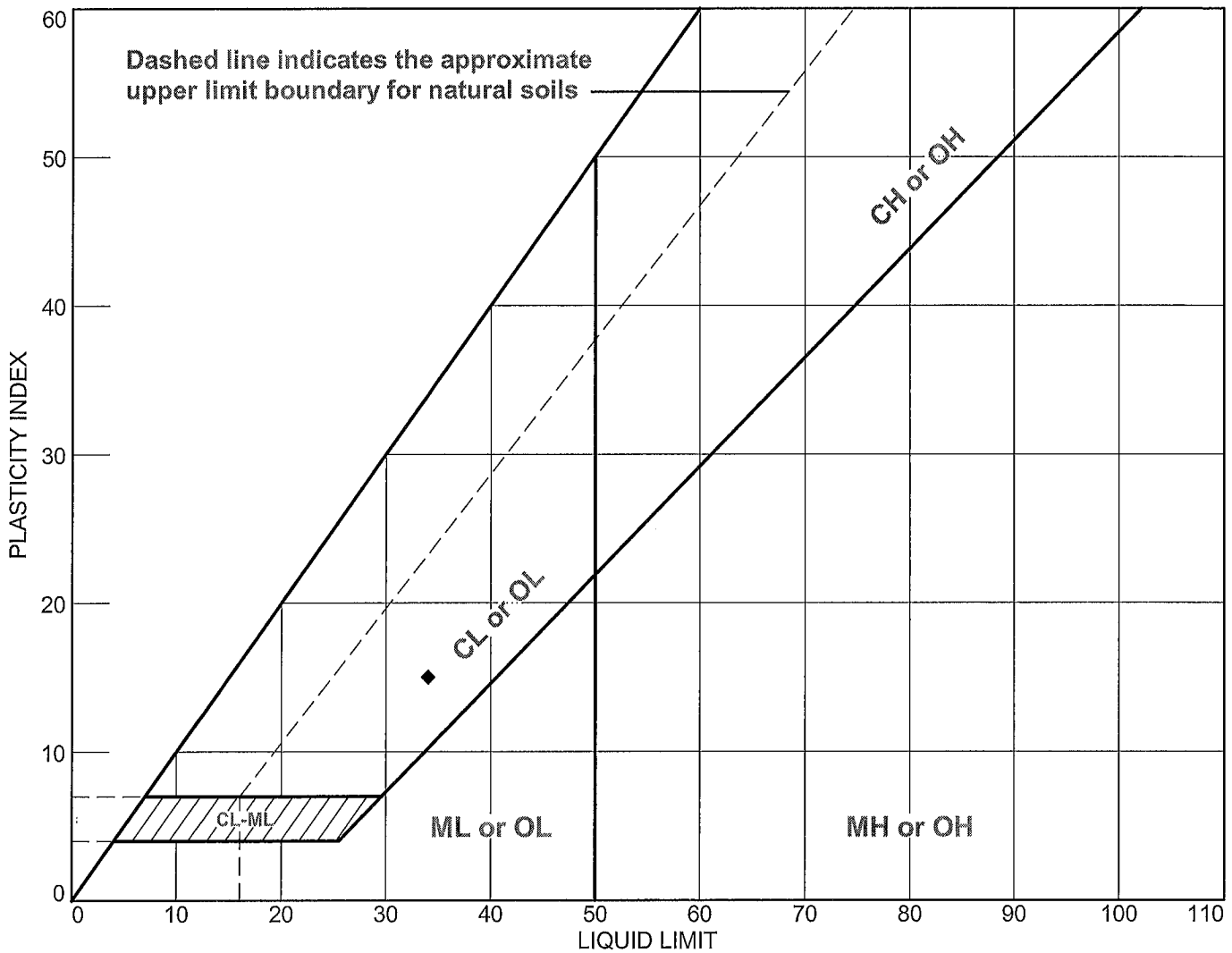
LIQUID AND PLASTIC LIMITS TEST REPORT



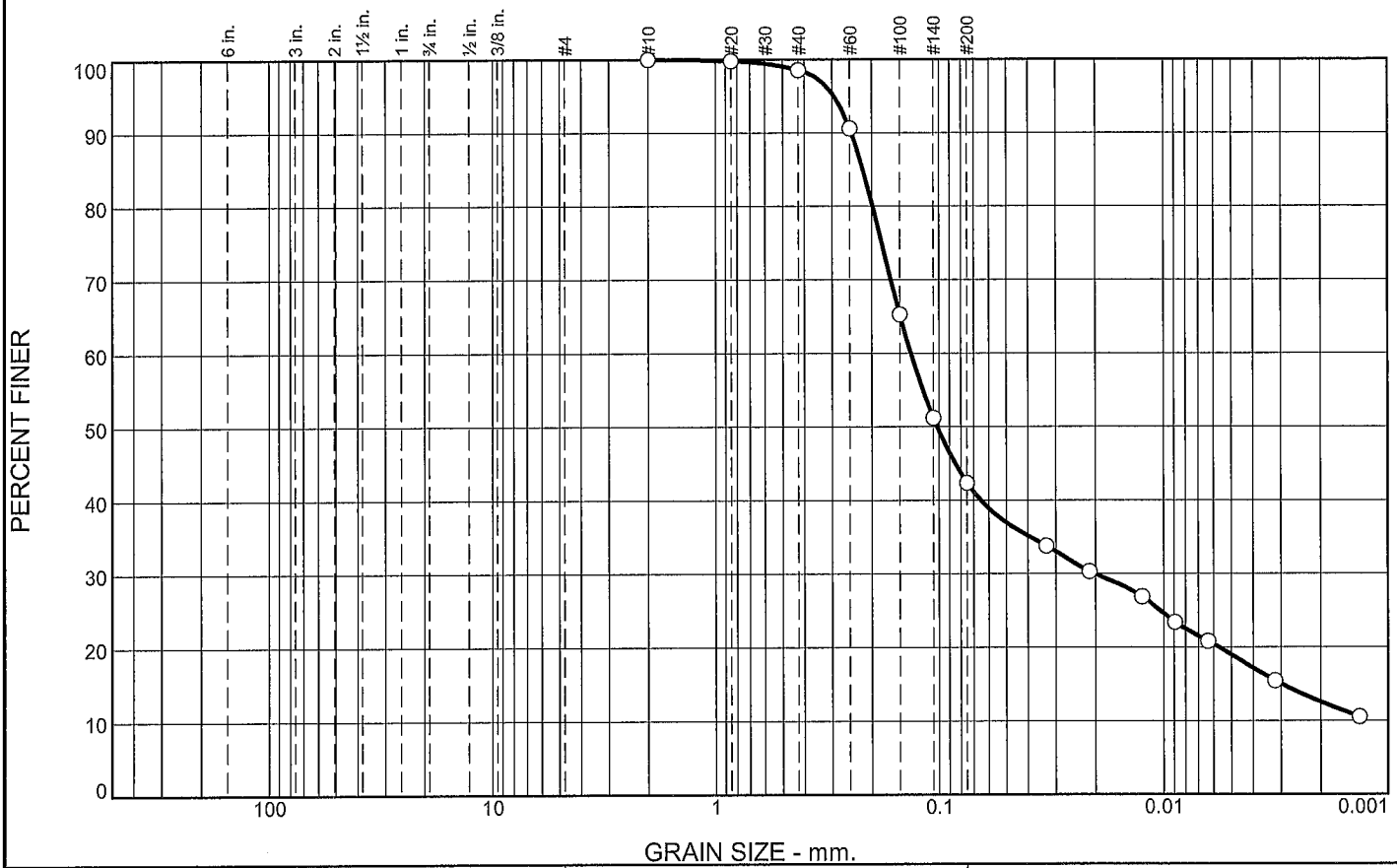
SOIL DATA								
SYMBOL	SOURCE	SAMPLE NO.	DEPTH	NATURAL WATER CONTENT (%)	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	USCS
●	OW-401S	SS-5	23.5-25'		NP	NV	NP	SM
■	OW-403S	SS-7/SS-8	33.5-40'		NP	NV	NP	ML
▲	OW-404S	SS-6	28.5-30'		NP	NV	NP	SM
◆	OW-405S	SS-11/SS-12	53.5-60'		19	34	15	CL
▼	OW-406S	SS-3	13.5-15'		NP	NV	NP	SM

amec

Client: Duke Energy
Project: Dan River Steam Station Ash Removal
Project No.: 7810140065 **Figure**

Tested By: A Kottenstette **Checked By:** D Kopitsky

Particle Size Analysis ASTM D422



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	1.5	56.1	23.4	19.0

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#10	100.0		
#20	99.8		
#40	98.5		
#60	90.6		
#100	65.3		
#140	51.2		
#200	42.4		
0.0331 mm.	33.8		
0.0213 mm.	30.3		
0.0124 mm.	26.9		
0.0089 mm.	23.4		
0.0064 mm.	20.8		
0.0032 mm.	15.4		
0.0013 mm.	10.5		

* (no specification provided)

Soil Description

Gray Silty Sand

Atterberg Limits

PL= NP LL= NV PI= NP

Coefficients

D_{90}= 0.2458 D_{85}= 0.2187 D_{60}= 0.1338
D_{50}= 0.1020 D_{30}= 0.0202 D_{15}= 0.0030
D_{10}= C_u= C_c=

Classification

USCS= SM AASHTO= A-4(0)

Remarks

Source of Sample: OW-401S **Depth:** 23.5-25'
Sample Number: SS-5 **Date:** 6-2-15

amec

Client: Duke Energy
Project: Dan River Steam Station Ash Removal
Project No: 7810140065 **Figure**

Tested By: D Kopitsky **Checked By:** M Hamilton

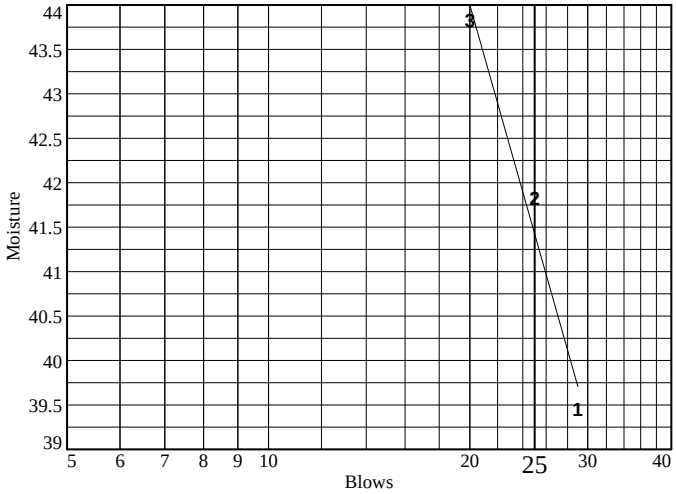
LIQUID AND PLASTIC LIMIT TEST DATA

5/26/2015

Client: Duke Energy
Project: Dan River Steam Station Ash Removal
Project Number: 7810140065
Location: OW-401D
Depth: 15 - 25'
Sample Number: Bulk
Material Description: Gray Sandy Lean Clay
USCS: CL
AASHTO: A-7-6(13)
Tested by: A. Kottenstette
Checked by: D. Kopitsky

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	24.05	25.62	26.70			
Dry+Tare	21.84	22.83	23.50			
Tare	16.24	16.16	16.20			
# Blows	29	25	20			
Moisture	39.5	41.8	43.8			



Liquid Limit= 41
Plastic Limit= 19
Plasticity Index= 22
Natural Moisture= 14.9
Liquidity Index= -0.2

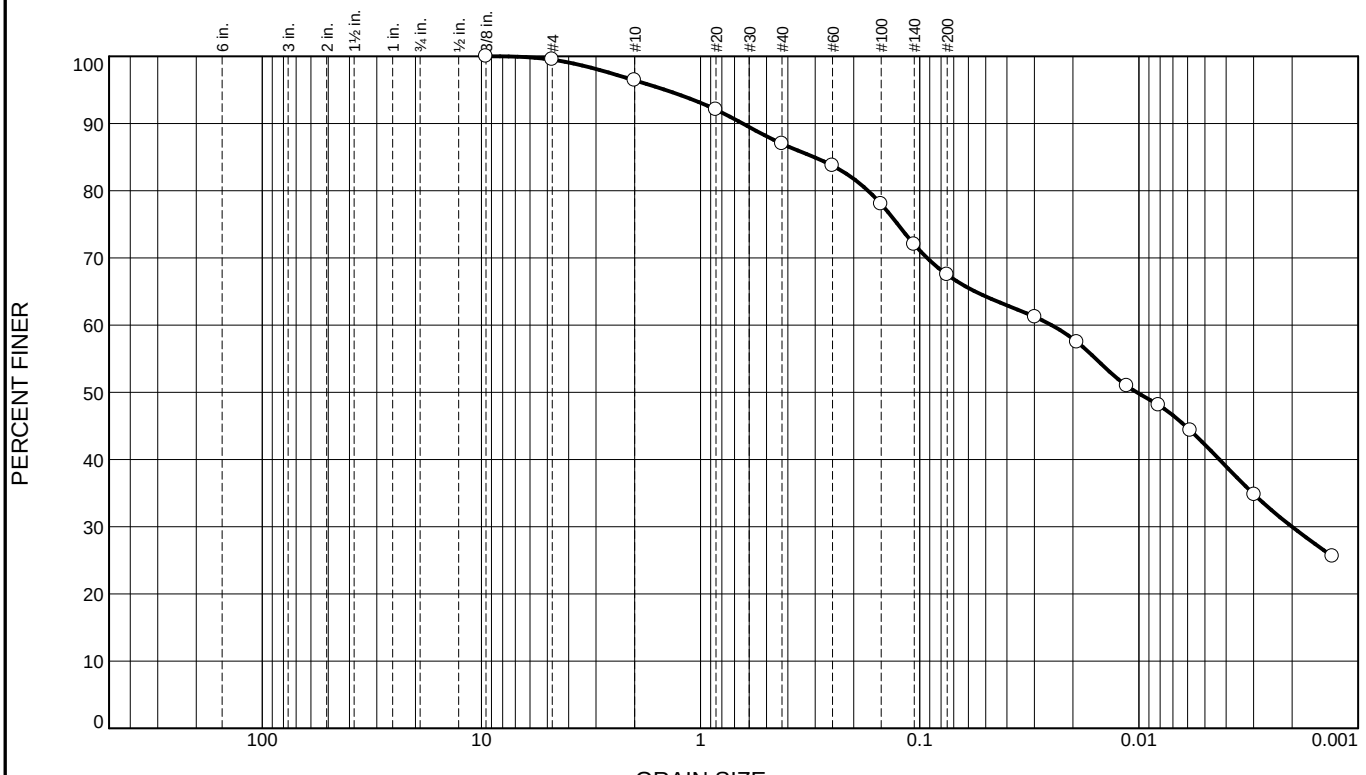
Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	17.17	17.05			
Dry+Tare	16.23	16.05			
Tare	11.13	10.71			
Moisture	18.4	18.7			

Natural Moisture Data

Wet+Tare	Dry+Tare	Tare	Moisture
174.80	158.65	50.06	14.9

Particle Size Analysis ASTM D422



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.5	3.1	9.4	19.5	25.3	42.2

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/8"	100.0		
#4	99.5		
#10	96.4		
#20	92.0		
#40	87.0		
#60	83.7		
#100	78.0		
#140	72.0		
#200	67.5		
0.0298 mm.	61.2		
0.0191 mm.	57.5		
0.0113 mm.	50.9		
0.0081 mm.	48.1		
0.0058 mm.	44.3		
0.0030 mm.	34.8		
0.0013 mm.	25.6		

* (no specification provided)

Soil Description

Gray Sandy Lean Clay

Atterberg Limits

PL= 19 LL= 41 PI= 22

Coefficients

D_{90}= 0.6433 D_{85}= 0.3036 D_{60}= 0.0251
D_{50}= 0.0102 D_{30}= 0.0020 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= CL AASHTO= A-7-6(13)

Remarks

Moisture Content = 14.9%

Source of Sample: OW-401D **Depth:** 15 - 25'
Sample Number: Bulk **Date:** 5-5-15

amec

Client: Duke Energy
Project: Dan River Steam Station Ash Removal
Project No: 7810140065 **Figure**

Tested By: D. Kopitsky **Checked By:** T. Landis

GRAIN SIZE DISTRIBUTION TEST DATA

5/26/2015

Client: Duke Energy
Project: Dan River Steam Station Ash Removal
Project Number: 7810140065
Location: OW-401D
Depth: 15 - 25' **Sample Number:** Bulk
Material Description: Gray Sandy Lean Clay
Date: 5-5-15 **PL:** 19 **LL:** 41 **PI:** 22
USCS Classification: CL **AASHTO Classification:** A-7-6(13)
Testing Remarks: Moisture Content = 14.9%
Tested by: D. Kopitsky **Checked by:** T. Landis

Sieve Test Data

Dry Sample and Tare (grams)	Tare (grams)	Cumulative Pan Tare Weight (grams)	Sieve Opening Size	Cumulative Weight Retained (grams)	Percent Finer
325.90	0.00	0.00	3/4"		
			3/8"	0.00	100.0
			#4	1.63	99.5
			#10	11.68	96.4
51.65	0.00	0.00	#20	2.34	92.0
			#40	5.06	87.0
			#60	6.80	83.7
			#100	9.86	78.0
			#140	13.08	72.0
			#200	15.49	67.5

Hydrometer Test Data

Hydrometer test uses material passing #10
Percent passing #10 based upon complete sample = 96.4
Weight of hydrometer sample =53.04
Hygroscopic moisture correction:
Moist weight and tare = 30.23
Dry weight and tare = 29.86
Tare weight = 16.21
Hygroscopic moisture = 2.7%
Table of composite correction values:

Temp., deg. C:	14.0	24.0	40.0
Comp. corr.:	-5.0	-3.0	0.0

Meniscus correction only = 1.0
Specific gravity of solids = 2.65
Hydrometer type = 152H
Hydrometer effective depth equation: L = 16.294964 **-** 0.164 **x Rm**

Elapsed Time (min.)	Temp. (deg. C.)	Actual Reading	Corrected Reading	K	Rm	Eff. Depth	Diameter (mm.)	Percent Finer
2.00	22.9	36.0	32.8	0.0132	37.0	10.2	0.0298	61.2
5.00	22.9	34.0	30.8	0.0132	35.0	10.6	0.0191	57.5
15.00	22.9	30.5	27.3	0.0132	31.5	11.1	0.0113	50.9
30.00	22.8	29.0	25.8	0.0132	30.0	11.4	0.0081	48.1
60.00	22.7	27.0	23.7	0.0132	28.0	11.7	0.0058	44.3
250.00	22.1	22.0	18.6	0.0133	23.0	12.5	0.0030	34.8

Hydrometer Test Data (continued)

Elapsed Time (min.)	Temp. (deg. C.)	Actual Reading	Corrected Reading	K	Rm	Eff. Depth	Diameter (mm.)	Percent Finer
1440.00	20.0	17.5	13.7	0.0136	18.5	13.3	0.0013	25.6

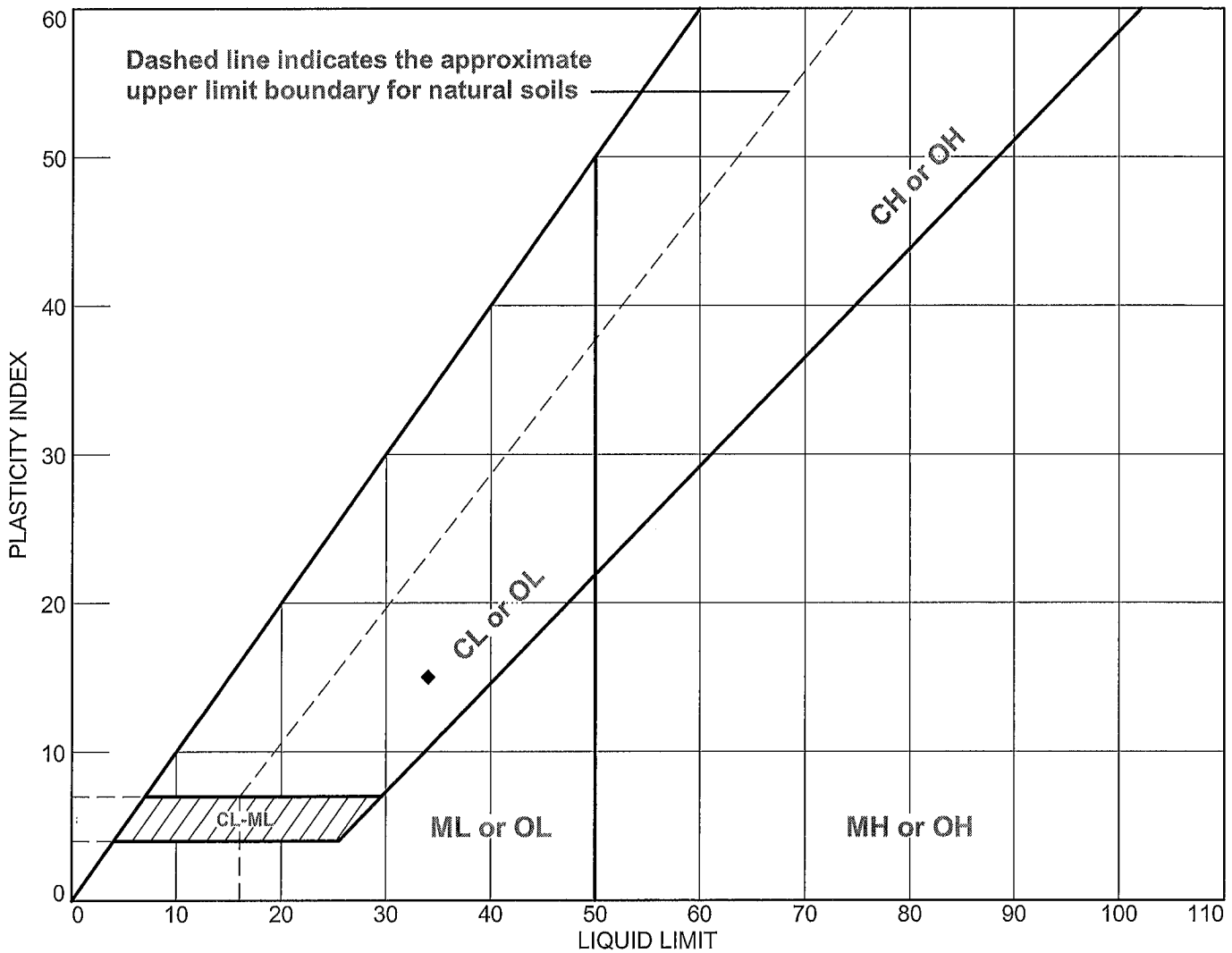
Fractional Components

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	0.0	0.5	0.5	3.1	9.4	19.5	32.0	25.3	42.2	67.5

D_5	D_{10}	D_{15}	D_{20}	D_{30}	D_{40}	D_{50}	D_{60}	D_{80}	D_{85}	D_{90}	D_{95}
				0.0020	0.0043	0.0102	0.0251	0.1721	0.3036	0.6433	1.4503

Fineness Modulus
0.57

LIQUID AND PLASTIC LIMITS TEST REPORT



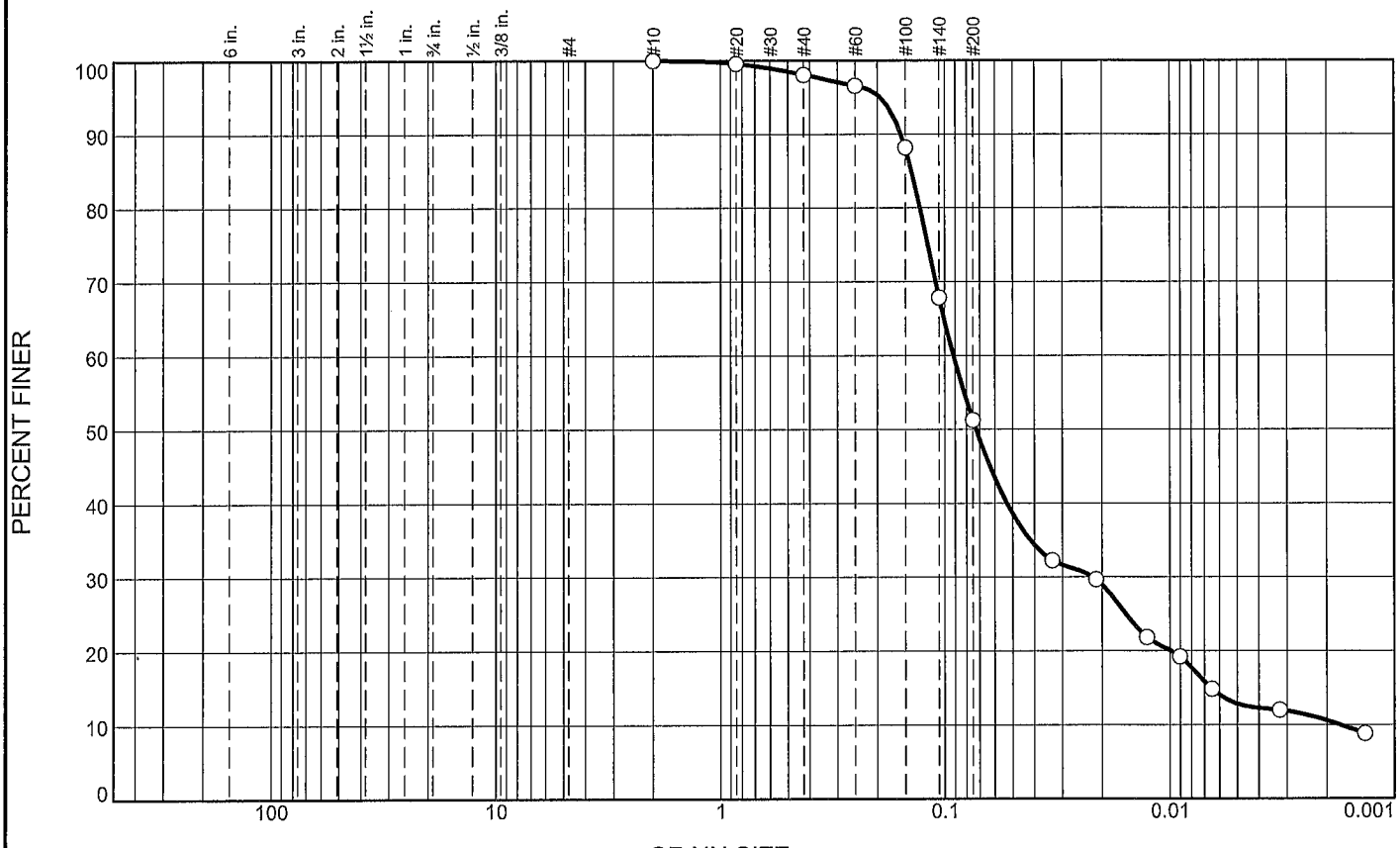
SOIL DATA								
SYMBOL	SOURCE	SAMPLE NO.	DEPTH	NATURAL WATER CONTENT (%)	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	USCS
●	OW-401S	SS-5	23.5-25'		NP	NV	NP	SM
■	OW-403S	SS-7/SS-8	33.5-40'		NP	NV	NP	ML
▲	OW-404S	SS-6	28.5-30'		NP	NV	NP	SM
◆	OW-405S	SS-11/SS-12	53.5-60'		19	34	15	CL
▼	OW-406S	SS-3	13.5-15'		NP	NV	NP	SM

amec

Client: Duke Energy
Project: Dan River Steam Station Ash Removal
Project No.: 7810140065 **Figure**

Tested By: A Kottenstette **Checked By:** D Kopitsky

Particle Size Analysis ASTM D422



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	1.9	46.8	38.5	12.8

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#10	100.0		
#20	99.6		
#40	98.1		
#60	96.6		
#100	88.2		
#140	67.9		
#200	51.3		
0.0333 mm.	32.3		
0.0212 mm.	29.7		
0.0126 mm.	21.8		
0.0090 mm.	19.2		
0.0065 mm.	14.8		
0.0032 mm.	12.0		
0.0013 mm.	8.8		

* (no specification provided)

Soil Description

Yellow-Brown Sandy Silt

Atterberg Limits

PL= NP LL= NV PI= NP

Coefficients

D_{90}= 0.1569 D_{85}= 0.1406 D_{60}= 0.0916
D_{50}= 0.0726 D_{30}= 0.0220 D_{15}= 0.0066
D_{10}= 0.0017 C_u= 52.45 C_c= 3.03

Classification

USCS= ML AASHTO= A-4(0)

Remarks

Source of Sample: OW-403S **Depth:** 33.5-40'
Sample Number: SS-7/SS-8 **Date:** 6-2-15

amec

Client: Duke Energy
Project: Dan River Steam Station Ash Removal
Project No: 7810140065 **Figure**

Tested By: D Kopitsky **Checked By:** M Hamilton

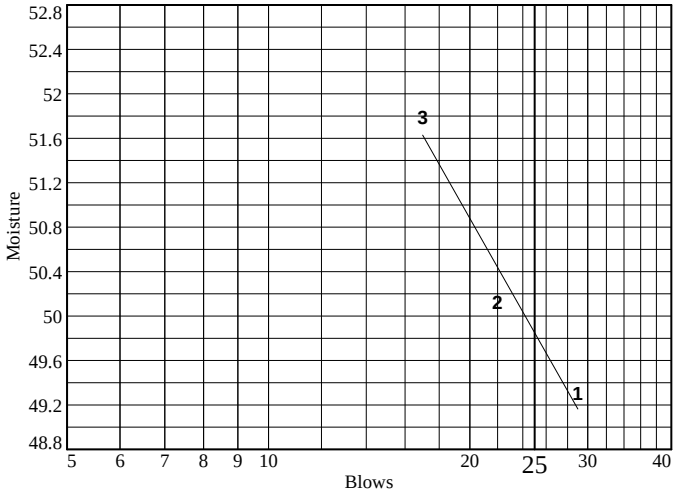
LIQUID AND PLASTIC LIMIT TEST DATA

5/26/2015

Client: Duke Energy
Project: Dan River Steam Station Ash Removal
Project Number: 7810140065
Location: OW-403D
Depth: 20 - 30' **Sample Number:** Bulk
Material Description: Light Brown to Red-Yellow Fat Clay with Sand
USCS: CH **AASHTO:** A-7-6(21)
Tested by: D. Kopitsky **Checked by:** M. Hamilton

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	33.65	33.91	34.41			
Dry+Tare	27.9	27.99	28.19			
Tare	16.24	16.18	16.18			
# Blows	29	22	17			
Moisture	49.3	50.1	51.8			

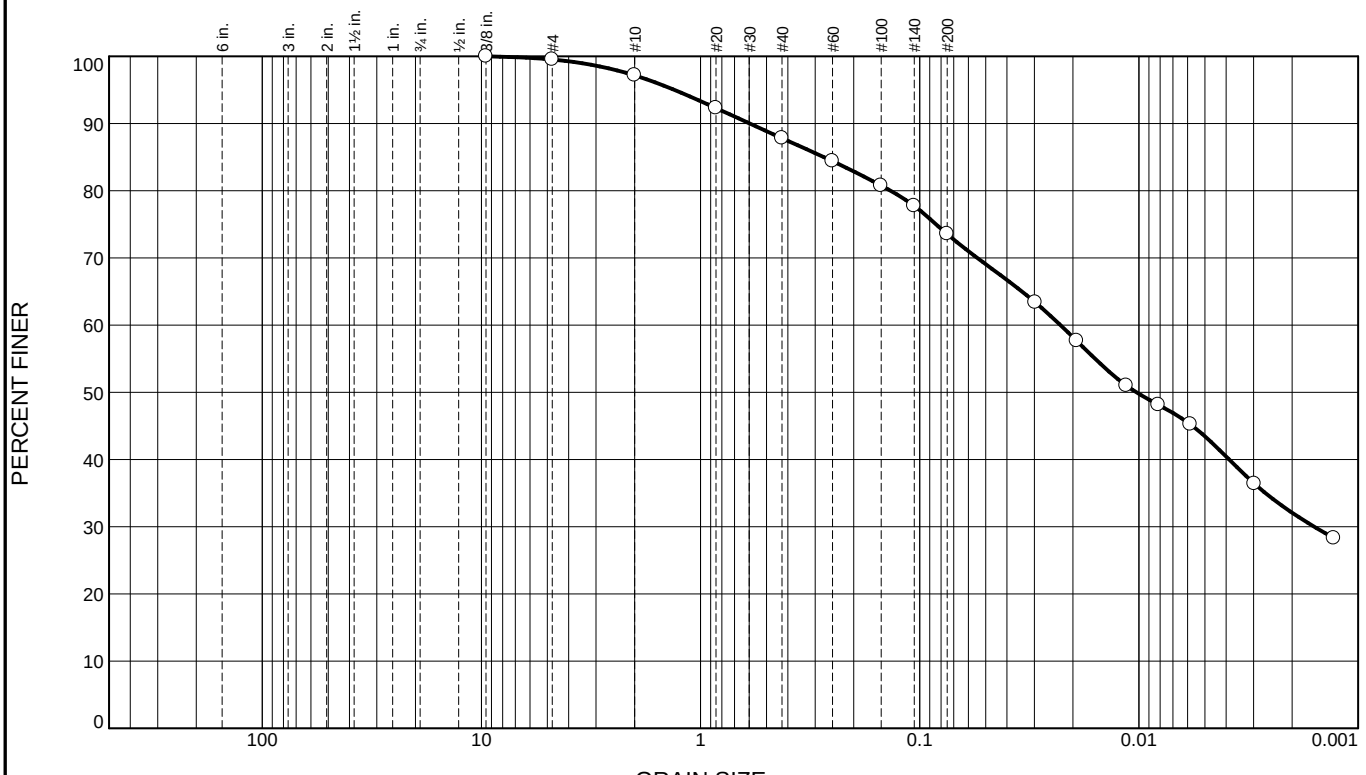


Liquid Limit= 50
Plastic Limit= 21
Plasticity Index= 29

Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	17.34	17.43			
Dry+Tare	16.2	16.27			
Tare	10.87	10.87			
Moisture	21.4	21.5			

Particle Size Analysis ASTM D422



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.5	2.3	9.4	14.2	30.2	43.4

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/8"	100.0		
#4	99.5		
#10	97.2		
#20	92.3		
#40	87.8		
#60	84.4		
#100	80.8		
#140	77.7		
#200	73.6		
0.0297 mm.	63.4		
0.0192 mm.	57.7		
0.0114 mm.	51.0		
0.0081 mm.	48.1		
0.0058 mm.	45.2		
0.0030 mm.	36.4		
0.0013 mm.	28.3		

* (no specification provided)

Soil Description

Light Brown to Red-Yellow Fat Clay with Sand

Atterberg Limits

PL= 21 LL= 50 PI= 29

Coefficients

D_{90}= 0.5974 D_{85}= 0.2740 D_{60}= 0.0228
D_{50}= 0.0103 D_{30}= 0.0016 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= CH AASHTO= A-7-6(21)

Remarks

Moisture Content = 16.3%

Source of Sample: OW-403D **Depth:** 20 - 30'
Sample Number: Bulk **Date:** 5-5-15

Client: Duke Energy
Project: Dan River Steam Station Ash Removal
Project No: 7810140065 **Figure**

Tested By: D. Kopitsky **Checked By:** T. Landis

GRAIN SIZE DISTRIBUTION TEST DATA

5/26/2015

Client: Duke Energy
Project: Dan River Steam Station Ash Removal
Project Number: 7810140065
Location: OW-403D
Depth: 20 - 30' **Sample Number:** Bulk
Material Description: Light Brown to Red-Yellow Fat Clay with Sand
Date: 5-5-15 **PL:** 21 **LL:** 50 **PI:** 29
USCS Classification: CH **AASHTO Classification:** A-7-6(21)
Testing Remarks: Moisture Content = 16.3%
Tested by: D. Kopitsky **Checked by:** T. Landis

Sieve Test Data

Dry Sample and Tare (grams)	Tare (grams)	Cumulative Pan Tare Weight (grams)	Sieve Opening Size	Cumulative Weight Retained (grams)	Percent Finer
317.86	0.00	0.00	3/4"		
			3/8"	0.00	100.0
			#4	1.53	99.5
			#10	9.02	97.2
50.99	0.00	0.00	#20	2.56	92.3
			#40	4.91	87.8
			#60	6.70	84.4
			#100	8.61	80.8
			#140	10.20	77.7
			#200	12.39	73.6

Hydrometer Test Data

Hydrometer test uses material passing #10
Percent passing #10 based upon complete sample = 97.2
Weight of hydrometer sample =53.90
Hygroscopic moisture correction:
Moist weight and tare = 30.88
Dry weight and tare = 30.09
Tare weight = 16.22
Hygroscopic moisture = 5.7%
Table of composite correction values:

Temp., deg. C:	14.0	24.0	40.0
Comp. corr.:	-5.0	-3.0	0.0

Meniscus correction only = 1.0
Specific gravity of solids = 2.65
Hydrometer type = 152H
Hydrometer effective depth equation: L = 16.294964 **-** 0.164 **x Rm**

Elapsed Time (min.)	Temp. (deg. C.)	Actual Reading	Corrected Reading	K	Rm	Eff. Depth	Diameter (mm.)	Percent Finer
2.00	22.8	36.5	33.3	0.0132	37.5	10.1	0.0297	63.4
5.00	22.8	33.5	30.3	0.0132	34.5	10.6	0.0192	57.7
15.00	22.8	30.0	26.8	0.0132	31.0	11.2	0.0114	51.0
30.00	22.8	28.5	25.3	0.0132	29.5	11.5	0.0081	48.1
60.00	22.7	27.0	23.7	0.0132	28.0	11.7	0.0058	45.2
250.00	22.0	22.5	19.1	0.0133	23.5	12.4	0.0030	36.4

Hydrometer Test Data (continued)

Elapsed Time (min.)	Temp. (deg. C.)	Actual Reading	Corrected Reading	K	Rm	Eff. Depth	Diameter (mm.)	Percent Finer
1440.00	20.7	18.5	14.8	0.0135	19.5	13.1	0.0013	28.3

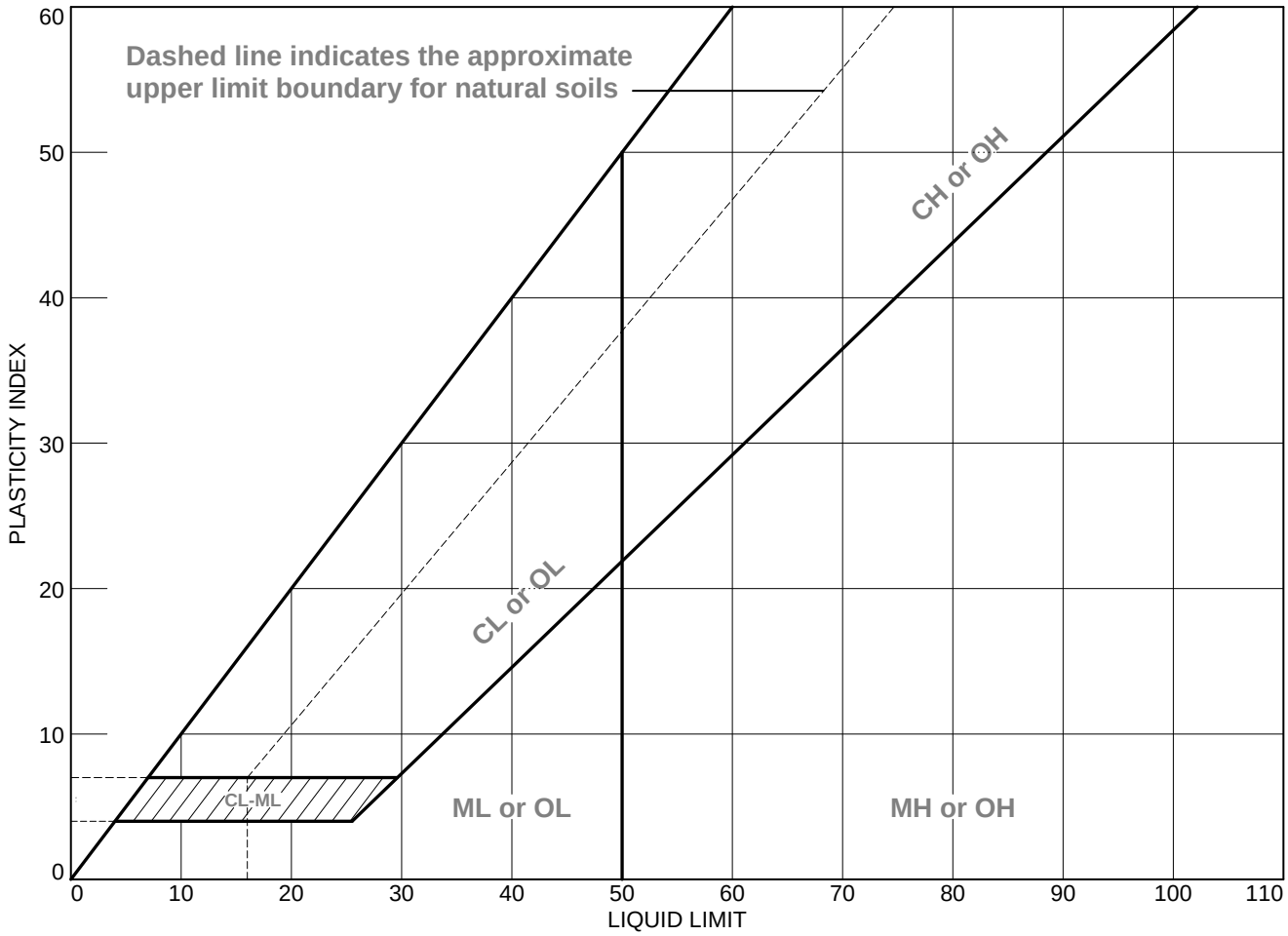
Fractional Components

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	0.0	0.5	0.5	2.3	9.4	14.2	25.9	30.2	43.4	73.6

D_5	D_{10}	D_{15}	D_{20}	D_{30}	D_{40}	D_{50}	D_{60}	D_{80}	D_{85}	D_{90}	D_{95}
				0.0016	0.0039	0.0103	0.0228	0.1361	0.2740	0.5974	1.3167

Fineness Modulus
0.52

LIQUID AND PLASTIC LIMITS TEST REPORT



SOIL DATA

SYMBOL	SOURCE	SAMPLE NO.	DEPTH	NATURAL WATER CONTENT (%)	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	USCS
●	OW-404D	SS-6	28.5-30'		NP	NV	NP	SM

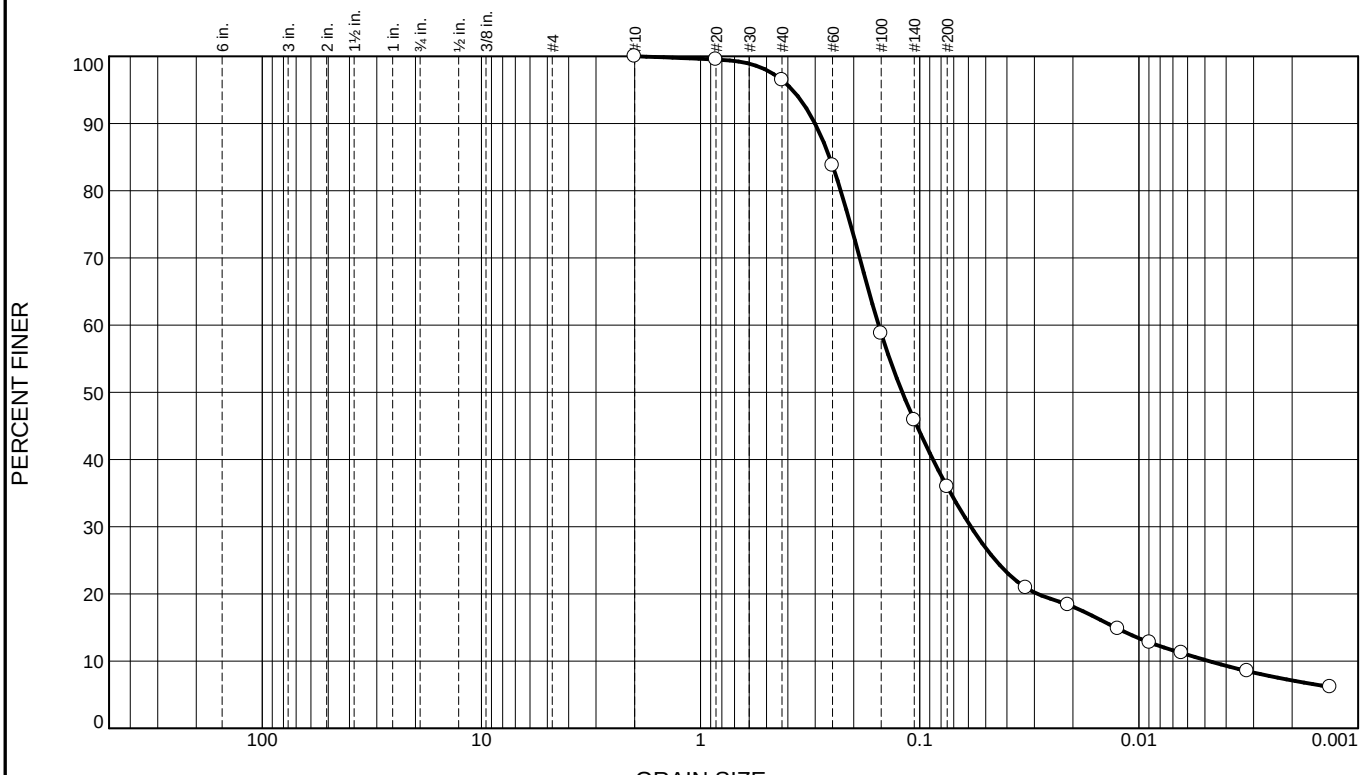
amec foster wheeler

Client: Duke Energy
Project: Dan River Steam Station Ash Removal

Project No.: 7810140065 **Figure**

Tested By: A Kottenstette **Checked By:** D Kopitsky

Particle Size Analysis ASTM D422



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	3.5	60.5	25.8	10.2

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#10	100.0		
#20	99.5		
#40	96.5		
#60	83.8		
#100	58.8		
#140	45.9		
#200	36.0		
0.0328 mm.	20.9		
0.0211 mm.	18.4		
0.0125 mm.	14.8		
0.0089 mm.	12.8		
0.0064 mm.	11.2		
0.0032 mm.	8.5		
0.0013 mm.	6.1		

* (no specification provided)

Soil Description

Dark Gray-Brown Silty Sand

Atterberg Limits

PL= NP LL= NV PI= NP

Coefficients

D_{90}= 0.3006 D_{85}= 0.2580 D_{60}= 0.1541
D_{50}= 0.1201 D_{30}= 0.0585 D_{15}= 0.0128
D_{10}= 0.0048 C_u= 32.22 C_c= 4.64

Classification

USCS= SM AASHTO= A-4(0)

Remarks

Source of Sample: OW-404D **Depth:** 28.5-30'
Sample Number: SS-6 **Date:** 6-2-15

amec foster wheeler

Client: Duke Energy
Project: Dan River Steam Station Ash Removal
Project No: 7810140065 **Figure**

Tested By: D Kopitsky **Checked By:** M Hamilton

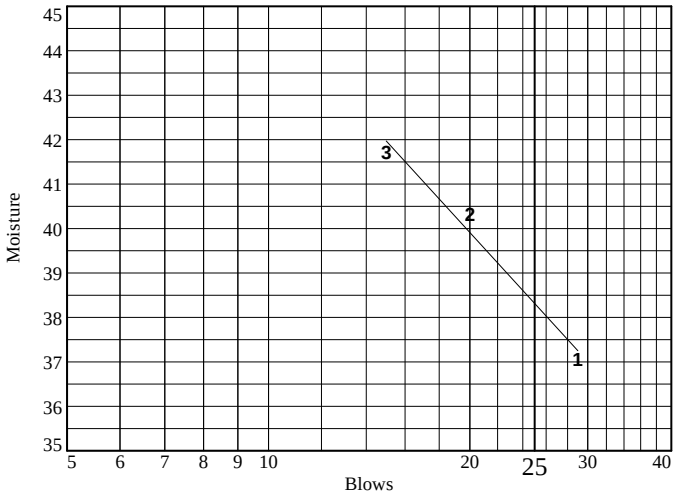
LIQUID AND PLASTIC LIMIT TEST DATA

5/26/2015

Client: Duke Energy
Project: Dan River Steam Station Ash Removal
Project Number: 7810140065
Location: OW-405S
Depth: 13.5 - 15' **Sample Number:** SS-3
Material Description: Brown-Yellow Silty Sand
USCS: SM **AASHTO:** A-6(2)

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	32.92	33.2	34.42			
Dry+Tare	28.38	28.29	29.15			
Tare	16.13	16.12	16.52			
# Blows	29	20	15			
Moisture	37.1	40.3	41.7			

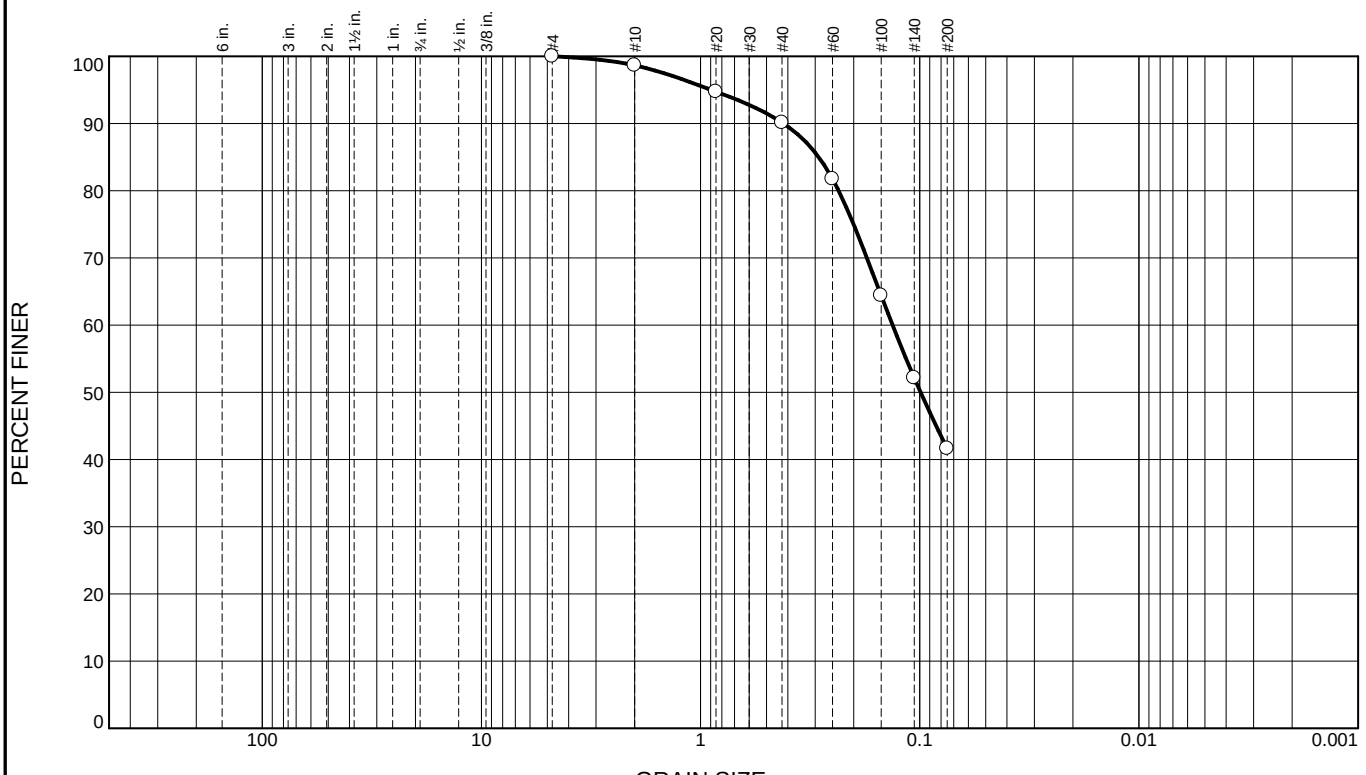


Liquid Limit= 38
Plastic Limit= 27
Plasticity Index= 11

Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	17.13	17.23			
Dry+Tare	15.73	15.85			
Tare	10.62	10.78			
Moisture	27.4	27.2			

Particle Size Analysis ASTM D422



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	1.3	8.6	48.5	41.6	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#10	98.7		
#20	94.7		
#40	90.1		
#60	81.7		
#100	64.4		
#140	52.1		
#200	41.6		

* (no specification provided)

Soil Description

Brown-Yellow Silty Sand

Atterberg Limits

PL= 27 LL= 38 PI= 11

Coefficients

D_{90}= 0.4191 D_{85}= 0.2891 D_{60}= 0.1330
D_{50}= 0.0991 D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= SM AASHTO= A-6(2)

Remarks

Moisture Content = 14.0%

Source of Sample: OW-405S **Depth:** 13.5 - 15'
Sample Number: SS-3 **Date:** 5-15-15

amec

Client: Duke Energy
Project: Dan River Steam Station Ash Removal
Project No: 7810140065 **Figure**

Tested By: A. Kottenstette **Checked By:** D. Kopitsky

GRAIN SIZE DISTRIBUTION TEST DATA

5/26/2015

Client: Duke Energy
Project: Dan River Steam Station Ash Removal
Project Number: 7810140065
Location: OW-405S
Depth: 13.5 - 15' **Sample Number:** SS-3
Material Description: Brown-Yellow Silty Sand
Date: 5-15-15 **PL:** 27 **LL:** 38 **PI:** 11
USCS Classification: SM **AASHTO Classification:** A-6(2)
Testing Remarks: Moisture Content = 14.0%
Tested by: A. Kottenstette **Checked by:** D. Kopitsky

Sieve Test Data

Dry Sample and Tare (grams)	Tare (grams)	Cumulative Pan Tare Weight (grams)	Sieve Opening Size	Cumulative Weight Retained (grams)	Percent Finer
354.83	269.32	0.00	3/4"		
			3/8"		
			#4	0.00	100.0
			#10	1.15	98.7
			#20	4.51	94.7
			#40	8.44	90.1
			#60	15.61	81.7
			#100	30.44	64.4
			#140	40.92	52.1
			#200	49.92	41.6

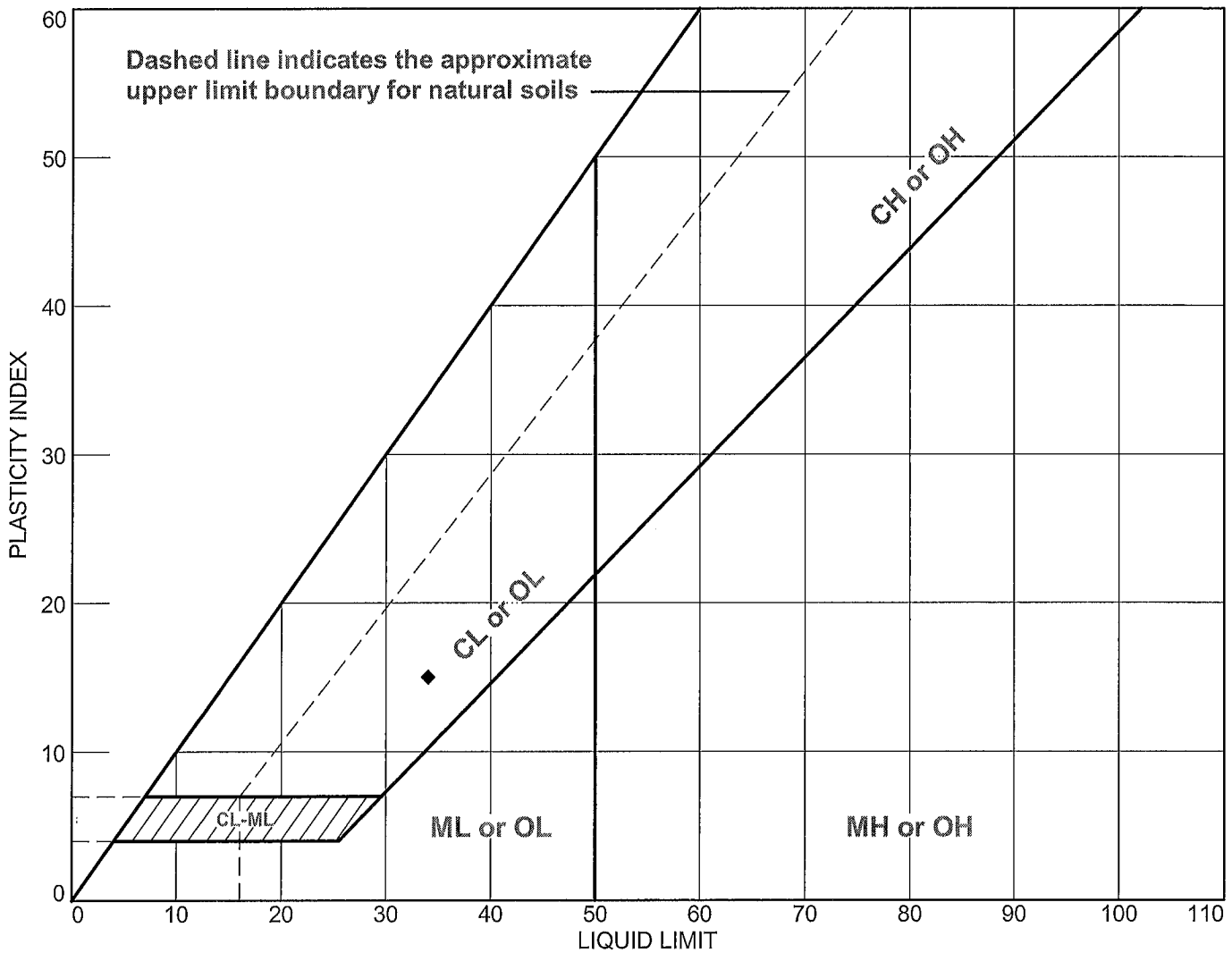
Fractional Components

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	0.0	0.0	0.0	1.3	8.6	48.5	58.4			41.6

D_5	D_{10}	D_{15}	D_{20}	D_{30}	D_{40}	D_{50}	D_{60}	D_{80}	D_{85}	D_{90}	D_{95}
						0.0991	0.1330	0.2346	0.2891	0.4191	0.8949

Fineness Modulus
0.62

LIQUID AND PLASTIC LIMITS TEST REPORT



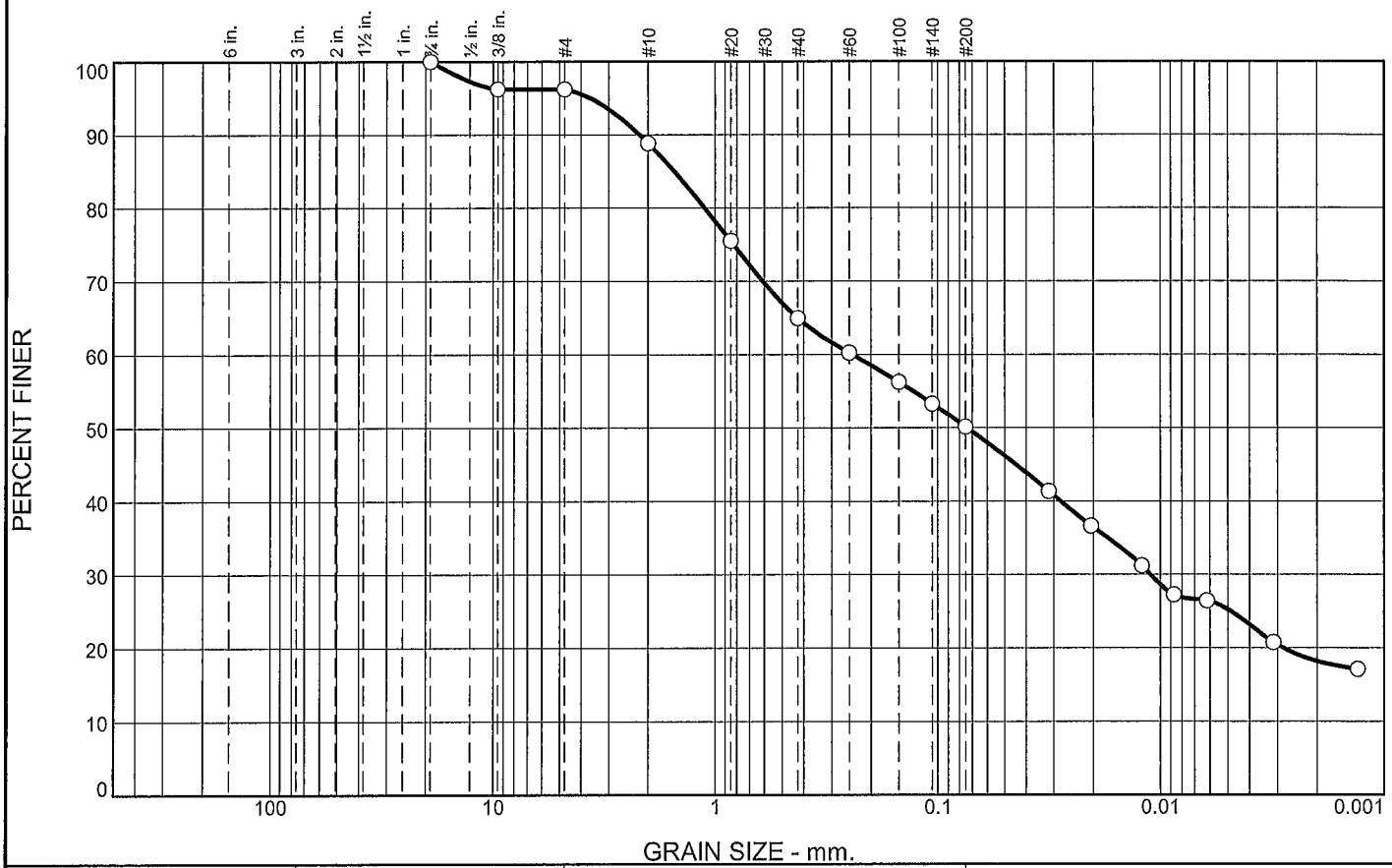
SOIL DATA								
SYMBOL	SOURCE	SAMPLE NO.	DEPTH	NATURAL WATER CONTENT (%)	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	USCS
●	OW-401S	SS-5	23.5-25'		NP	NV	NP	SM
■	OW-403S	SS-7/SS-8	33.5-40'		NP	NV	NP	ML
▲	OW-404S	SS-6	28.5-30'		NP	NV	NP	SM
◆	OW-405S	SS-11/SS-12	53.5-60'		19	34	15	CL
▼	OW-406S	SS-3	13.5-15'		NP	NV	NP	SM

amec

Client: Duke Energy
Project: Dan River Steam Station Ash Removal
Project No.: 7810140065 **Figure**

Tested By: A Kottenstette **Checked By:** D Kopitsky

Particle Size Analysis ASTM D422



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	3.8	7.4	23.8	14.9	24.8	25.3

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/4"	100.0		
3/8"	96.2		
#4	96.2		
#10	88.8		
#20	75.5		
#40	65.0		
#60	60.2		
#100	56.2		
#140	53.3		
#200	50.1		
0.0316 mm.	41.4		
0.0204 mm.	36.7		
0.0121 mm.	31.2		
0.0087 mm.	27.2		
0.0062 mm.	26.5		
0.0031 mm.	20.8		
0.0013 mm.	17.1		

* (no specification provided)

Soil Description

Brown-Yellow Sandy Lean Clay

Atterberg Limits

PL= 19 LL= 34 PI= 15

Coefficients

D_{90}= 2.1860 D_{85}= 1.5275 D_{60}= 0.2424
D_{50}= 0.0740 D_{30}= 0.0111 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= CL AASHTO= A-6(4)

Remarks

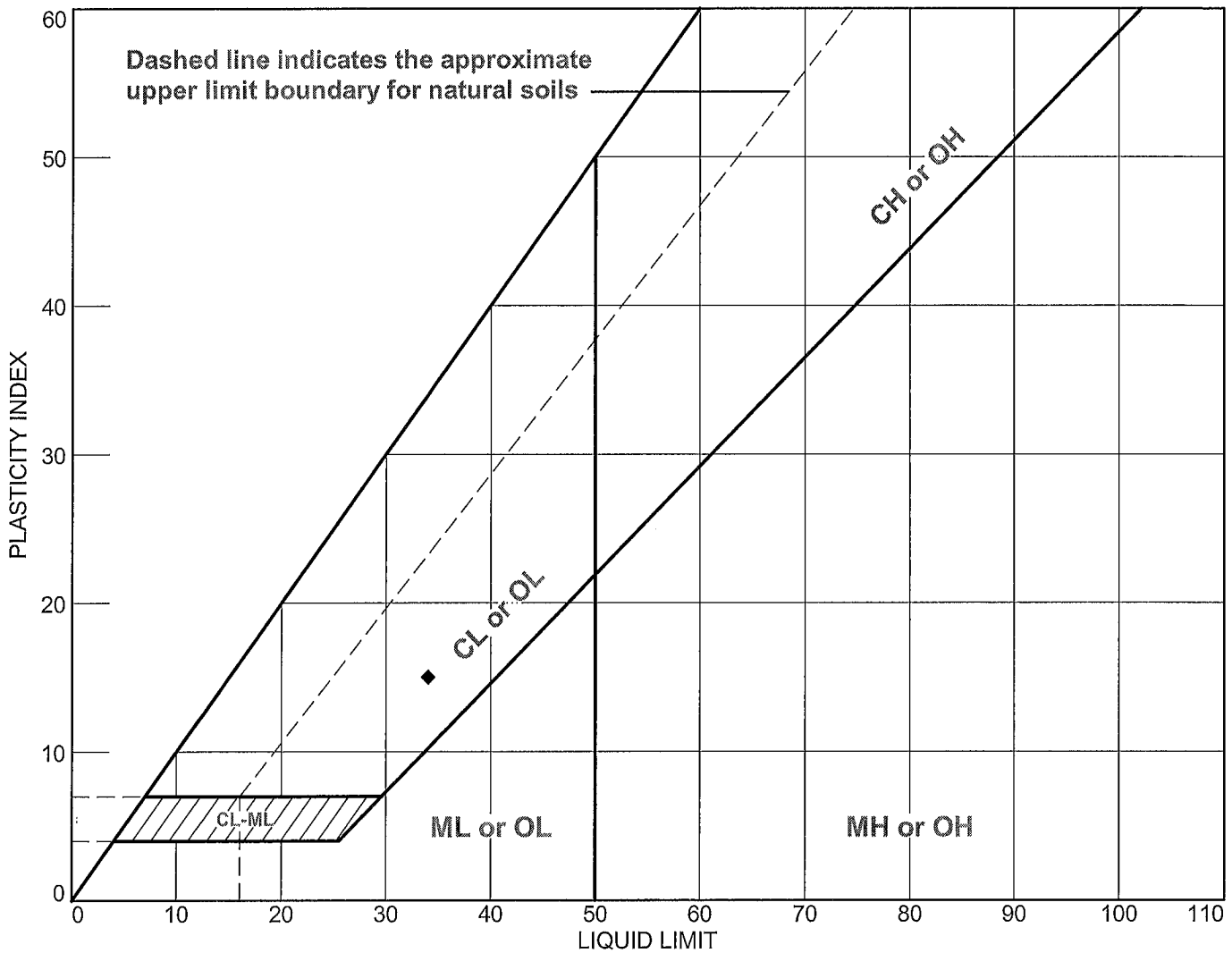
Source of Sample: OW-405S **Depth:** 53.5-60'
Sample Number: SS-11/SS-12 **Date:** 6-2-15

amec

Client: Duke Energy
Project: Dan River Steam Station Ash Removal
Project No: 7810140065 **Figure**

Tested By: D Kopitsky **Checked By:** M Hamilton

LIQUID AND PLASTIC LIMITS TEST REPORT



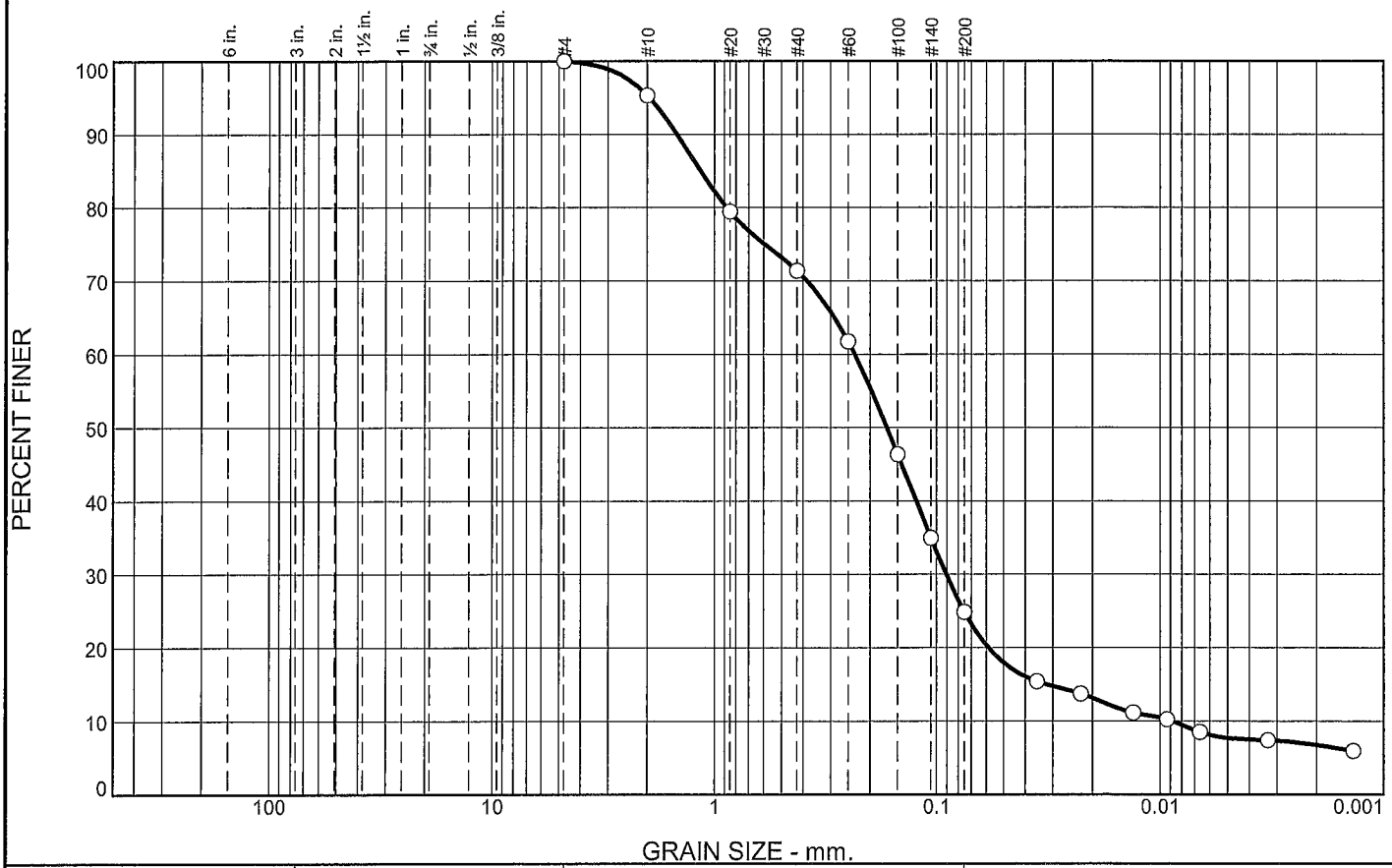
SOIL DATA								
SYMBOL	SOURCE	SAMPLE NO.	DEPTH	NATURAL WATER CONTENT (%)	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	USCS
●	OW-401S	SS-5	23.5-25'		NP	NV	NP	SM
■	OW-403S	SS-7/SS-8	33.5-40'		NP	NV	NP	ML
▲	OW-404S	SS-6	28.5-30'		NP	NV	NP	SM
◆	OW-405S	SS-11/SS-12	53.5-60'		19	34	15	CL
▼	OW-406S	SS-3	13.5-15'		NP	NV	NP	SM

amec

Client: Duke Energy
Project: Dan River Steam Station Ash Removal
Project No.: 7810140065 **Figure**

Tested By: A Kottenstette **Checked By:** D Kopitsky

Particle Size Analysis ASTM D422



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	4.7	23.9	46.6	17.1	7.7

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#10	95.3		
#20	79.4		
#40	71.4		
#60	61.7		
#100	46.4		
#140	35.0		
#200	24.8		
0.0354 mm.	15.4		
0.0225 mm.	13.7		
0.0131 mm.	11.1		
0.0093 mm.	10.2		
0.0066 mm.	8.5		
0.0033 mm.	7.4		
0.0014 mm.	6.0		

* (no specification provided)

Soil Description

Brown Silty Sand

Atterberg Limits

PL= NP LL= NV PI= NP

Coefficients

D_{90}= 1.4697 D_{85}= 1.1497 D_{60}= 0.2338
D_{50}= 0.1676 D_{30}= 0.0905 D_{15}= 0.0322
D_{10}= 0.0088 C_u= 26.50 C_c= 3.97

Classification

USCS= SM AASHTO= A-2-4(0)

Remarks

Source of Sample: OW-406S **Depth:** 13.5-15'
Sample Number: SS-3 **Date:** 6-2-15

amec

Client: Duke Energy
Project: Dan River Steam Station Ash Removal
Project No: 7810140065 **Figure**

Tested By: D Kopitsky **Checked By:** G Williams

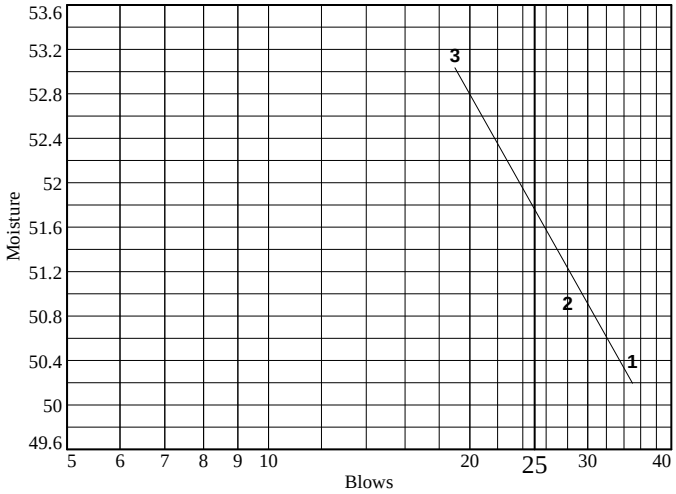
LIQUID AND PLASTIC LIMIT TEST DATA

5/26/2015

Client: Duke Energy
Project: Dan River Steam Station Ash Removal
Project Number: 7810140065
Location: OW-406D
Depth: 5 - 15'
Sample Number: Bulk
Material Description: Gray-Brown Sandy Fat Clay
USCS: CH
AASHTO: A-7-6(12)
Tested by: D. Kopitsky
Checked by: M. Hamilton

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	35.27	34.22	34.53			
Dry+Tare	28.88	28.12	28.2			
Tare	16.2	16.14	16.29			
# Blows	35	28	19			
Moisture	50.4	50.9	53.1			



Liquid Limit= 52
Plastic Limit= 19
Plasticity Index= 33
Natural Moisture= 24.2
Liquidity Index= 0.2

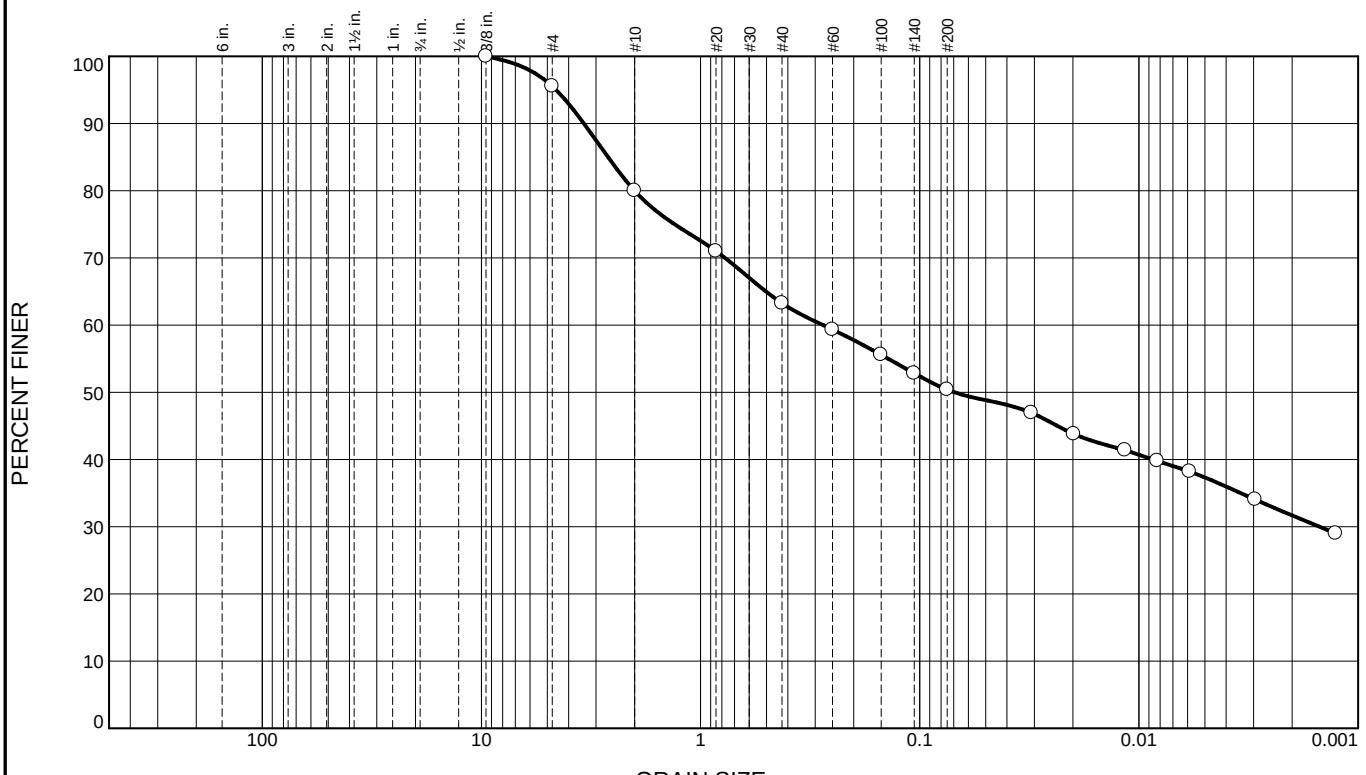
Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	18.12	18.19			
Dry+Tare	17.07	17.08			
Tare	11.55	11.49			
Moisture	19.0	19.9			

Natural Moisture Data

Wet+Tare	Dry+Tare	Tare	Moisture
169.98	146.53	49.6	24.2

Particle Size Analysis ASTM D422



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	4.5	15.5	16.7	12.9	13.1	37.3

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/8"	100.0		
#4	95.5		
#10	80.0		
#20	71.0		
#40	63.3		
#60	59.3		
#100	55.6		
#140	52.8		
#200	50.4		
0.0309 mm.	46.9		
0.0198 mm.	43.8		
0.0116 mm.	41.4		
0.0082 mm.	39.8		
0.0059 mm.	38.2		
0.0029 mm.	34.0		
0.0013 mm.	29.0		

* (no specification provided)

Soil Description

Gray-Brown Sandy Fat Clay

Atterberg Limits

PL= 19 LL= 52 PI= 33

Coefficients

D_{90}= 3.4077 D_{85}= 2.6450 D_{60}= 0.2762
D_{50}= 0.0694 D_{30}= 0.0015 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= CH AASHTO= A-7-6(12)

Remarks

Moisture Content = 24.2%

Source of Sample: OW-406D **Depth:** 5 - 15'
Sample Number: Bulk **Date:** 5-6-15

Client: Duke Energy
Project: Dan River Steam Station Ash Removal
Project No: 7810140065 **Figure**

Tested By: D. Kopitsky **Checked By:** T. Landis

GRAIN SIZE DISTRIBUTION TEST DATA

5/26/2015

Client: Duke Energy
Project: Dan River Steam Station Ash Removal
Project Number: 7810140065
Location: OW-406D
Depth: 5 - 15' **Sample Number:** Bulk
Material Description: Gray-Brown Sandy Fat Clay
Date: 5-6-15 **PL:** 19 **LL:** 52 **PI:** 33
USCS Classification: CH **AASHTO Classification:** A-7-6(12)
Testing Remarks: Moisture Content = 24.2%
Tested by: D. Kopitsky **Checked by:** T. Landis

Sieve Test Data

Dry Sample and Tare (grams)	Tare (grams)	Cumulative Pan Tare Weight (grams)	Sieve Opening Size	Cumulative Weight Retained (grams)	Percent Finer
304.20	0.00	0.00	3/4"		
			3/8"	0.00	100.0
			#4	13.56	95.5
			#10	60.88	80.0
50.39	0.00	0.00	#20	5.66	71.0
			#40	10.54	63.3
			#60	13.01	59.3
			#100	15.38	55.6
			#140	17.11	52.8
			#200	18.64	50.4

Hydrometer Test Data

Hydrometer test uses material passing #10
Percent passing #10 based upon complete sample = 80.0
Weight of hydrometer sample =53.31
Hygroscopic moisture correction:
Moist weight and tare = 30.08
Dry weight and tare = 29.32
Tare weight = 16.23
Hygroscopic moisture = 5.8%
Table of composite correction values:

Temp., deg. C:	14.0	24.0	40.0
Comp. corr.:	-5.0	-3.0	0.0

Meniscus correction only = 1.0
Specific gravity of solids = 2.65
Hydrometer type = 152H
Hydrometer effective depth equation: L = 16.294964 **-** 0.164 **x Rm**

Elapsed Time (min.)	Temp. (deg. C.)	Actual Reading	Corrected Reading	K	Rm	Eff. Depth	Diameter (mm.)	Percent Finer
2.00	21.8	33.0	29.6	0.0133	34.0	10.7	0.0309	46.9
5.00	21.9	31.0	27.6	0.0133	32.0	11.0	0.0198	43.8
15.00	21.8	29.5	26.1	0.0133	30.5	11.3	0.0116	41.4
30.00	21.8	28.5	25.1	0.0133	29.5	11.5	0.0082	39.8
60.00	21.8	27.5	24.1	0.0133	28.5	11.6	0.0059	38.2
250.00	21.2	25.0	21.4	0.0134	26.0	12.0	0.0029	34.0

Hydrometer Test Data (continued)

Elapsed Time (min.)	Temp. (deg. C.)	Actual Reading	Corrected Reading	K	Rm	Eff. Depth	Diameter (mm.)	Percent Finer
1440.00	20.4	22.0	18.3	0.0136	23.0	12.5	0.0013	29.0

Fractional Components

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	0.0	4.5	4.5	15.5	16.7	12.9	45.1	13.1	37.3	50.4

D_5	D_{10}	D_{15}	D_{20}	D_{30}	D_{40}	D_{50}	D_{60}	D_{80}	D_{85}	D_{90}	D_{95}
				0.0015	0.0086	0.0694	0.2762	2.0017	2.6450	3.4077	4.5642

Fineness Modulus
1.64

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SPECIFIC GRAVITY

ASTM D 854-10

Client	AMEC FOSTER WHEELER	Boring No.	OW-406D
Client Reference	Dan River Steam Station Ash Removal	Depth (ft)	2.0-4.0
Project No.	2015-616-02	Sample No.	UD
Lab ID	2015-616-02-01	Visual Description	**GRAY-BROWN**

(MInus No.4 sieve material, airdried)

Replicate Number	**1**	**2**
Pycnometer ID	R 344	R 345
Weight of Pycnometer + Soil + Water (gm)	697.76	698.25
Temperature, T (^{o}Celsius)	23.8	23.6
Weight of Pycnometer + Water (gm)	667.91	668.20
Tare Number	344	345
Weight of Tare + Dry Soil (gm)	217.56	218.16
Weight of Tare (gm)	169.96	170.43
Weight of Dry Soil (gm)	47.60	47.73
Specific Gravity of Soil @ T	2.682	2.700
Specific Gravity of Water @ T	0.9974	0.9974
Conversion Factor for Temperature T	0.9992	0.9992
Specific Gravity @ 20° Celsius	2.684	2.702

Average Specific Gravity @ 20° Celsius	2.69

Tested By *BW* *Date* *5/8/15* *Checked By* *SFS* *Date* *6/4/15*

DCN: CT-S5 Date: 03/24/05 Revision: 10R *Z:\2015 PROJECTS\2015-616 AMEC - DAN RIVER\[2015-616-02-01 Specific Gravity Soils 1Ral..xls]Sheet1*

UNIT WEIGHT WITH POROSITY

ASTM D2937-10

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Client	AMEC FOSTER WHEELER	Boring No.	OW-406D
Client Project	Dan River Steam Station Ash Removal	Depth (ft.)	2.0-4.0
Project No.	2015-616-02	Sample No.	UD
Lab ID No.	2015-616-02-01		

Specific Gravity 2.69 Measured

Visual Description: GRAY-BROWN SANDY ELASTIC SILT

MOISTURE CONTENT:

	814
Tare Number	298.13
Wt. of Tare & WS (gm.)	253.25
Wt. of Tare & DS (gm.)	109.77
Wt. of Tare (gm.)	44.88
Wt. of Water (gm.)	143.48
Wt. of DS (gm.)	
	31.3
Moisture Content (%)	

SPECIMEN: Undisturbed

Wt. of Mold/Tube & WS (gm.)	1208.68
Wt. of Mold/Tube (gm.)	0.00
Wt. of WS (gm.)	1208.68
Length 1 (in.)	6.140
Length 2 (in.)	6.164
Length 3 (in.)	6.122
Top Diameter (in.)	2.848
Middle Diameter (in.)	2.849
Bottom Diameter (in.)	2.839
Average Length (in.)	6.14
Average Area (in.^{2})	6.36
Sample Volume (cm^3)	639.98
Unit Wet Wt. (gm./ cm^3)	1.89
Unit Wet Wt. (pcf)	117.9
Unit Dry Wt. (pcf)	89.8
Unit Dry Wt. (gm./ cm^3)	1.44
Void Ratio, e	0.87
Porosity, n	**0.47**
Pore Volume (cm^3)	297.7

Tested By: SFS Date: 4/30/15 Checked By: GEM Date: 6/4/15

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ATTERBERG LIMITS

ASTM D 4318-10 / AASHTO T89-10

Client:	AMEC FOSTER WHEELER	Boring No.:	OW-406D
Client Reference:	Dan River Steam Station Ash Removal	Depth (ft):	2.0-4.0
Project No.:	2015-616-02	Sample No.:	UD
Lab ID:	2015-616-02-01	Soil Description:	**GRAY BROWN ELASTIC SILT** (Minus No. 40 sieve material, Airdried)

Note: The USCS symbol used with this test refers only to the minus No. 40 sieve material. See the "Sieve and Hydrometer Analysis" graph page for the complete material description.

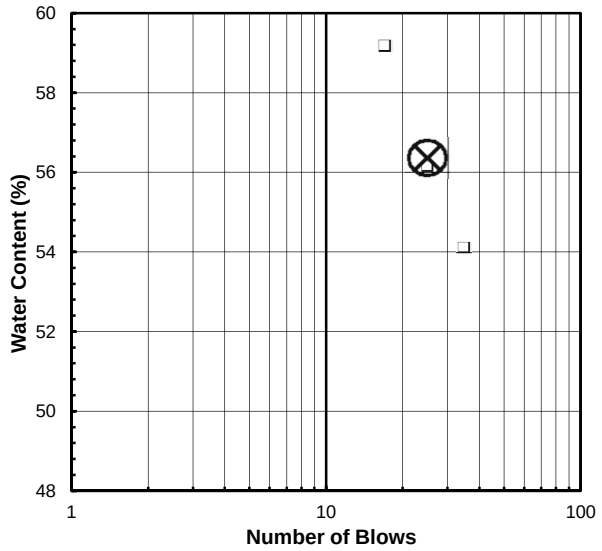
Liquid Limit Test	**1**	**2**	**3**	
				M
Tare Number	2M	M	A-N	**U**
Wt. of Tare & Wet Sample (g)	27.49	27.28	27.95	**L**
Wt. of Tare & Dry Sample (g)	23.34	22.93	23.30	**T**
Wt. of Tare (g)	15.67	15.18	15.44	**I**
Wt. of Water (g)	4.2	4.4	4.7	**P**
Wt. of Dry Sample (g)	7.7	7.8	7.9	**O**
				I
Moisture Content (%)	**54.1**	**56.1**	**59.2**	**N**
Number of Blows	**35**	**25**	**17**	**T**

Plastic Limit Test	**1**	**2**	**Range**
Tare Number	Y-3	3M	
Wt. of Tare & Wet Sample (g)	22.17	22.33	
Wt. of Tare & Dry Sample (g)	20.67	20.76	
Wt. of Tare (g)	15.63	15.59	
Wt. of Water (g)	1.5	1.6	
Wt. of Dry Sample (g)	5.0	5.2	
Moisture Content (%)	**29.8**	**30.4**	**-0.6**

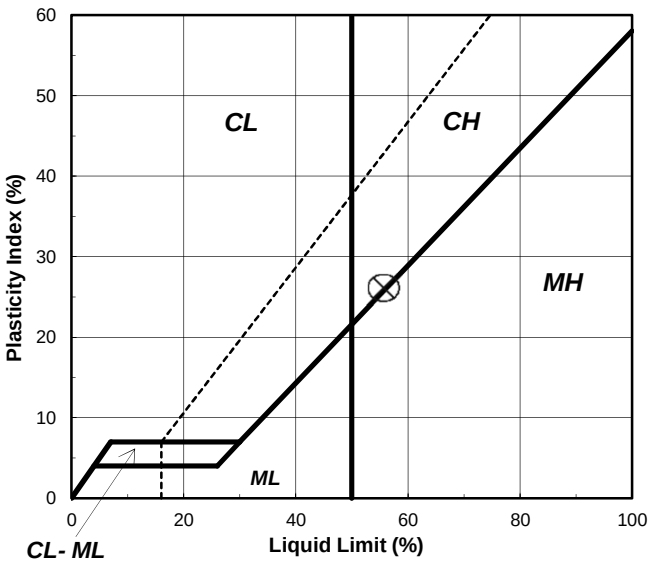
Note: The acceptable range of the two Moisture contents is ± 2.6

Test Results	
Liquid Limit (%)	**56**
Plastic Limit (%)	**30**
Plasticity Index (%)	**26**
USCS Symbol	**MH**

Flow Curve



Plasticity Chart



Tested By	*BW*	*Date*	*5/12/15*	*Checked By*	*GEM*	*Date*	6/4/15

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SIEVE AND HYDROMETER ANALYSIS
ASTM D 422-63 (2007)

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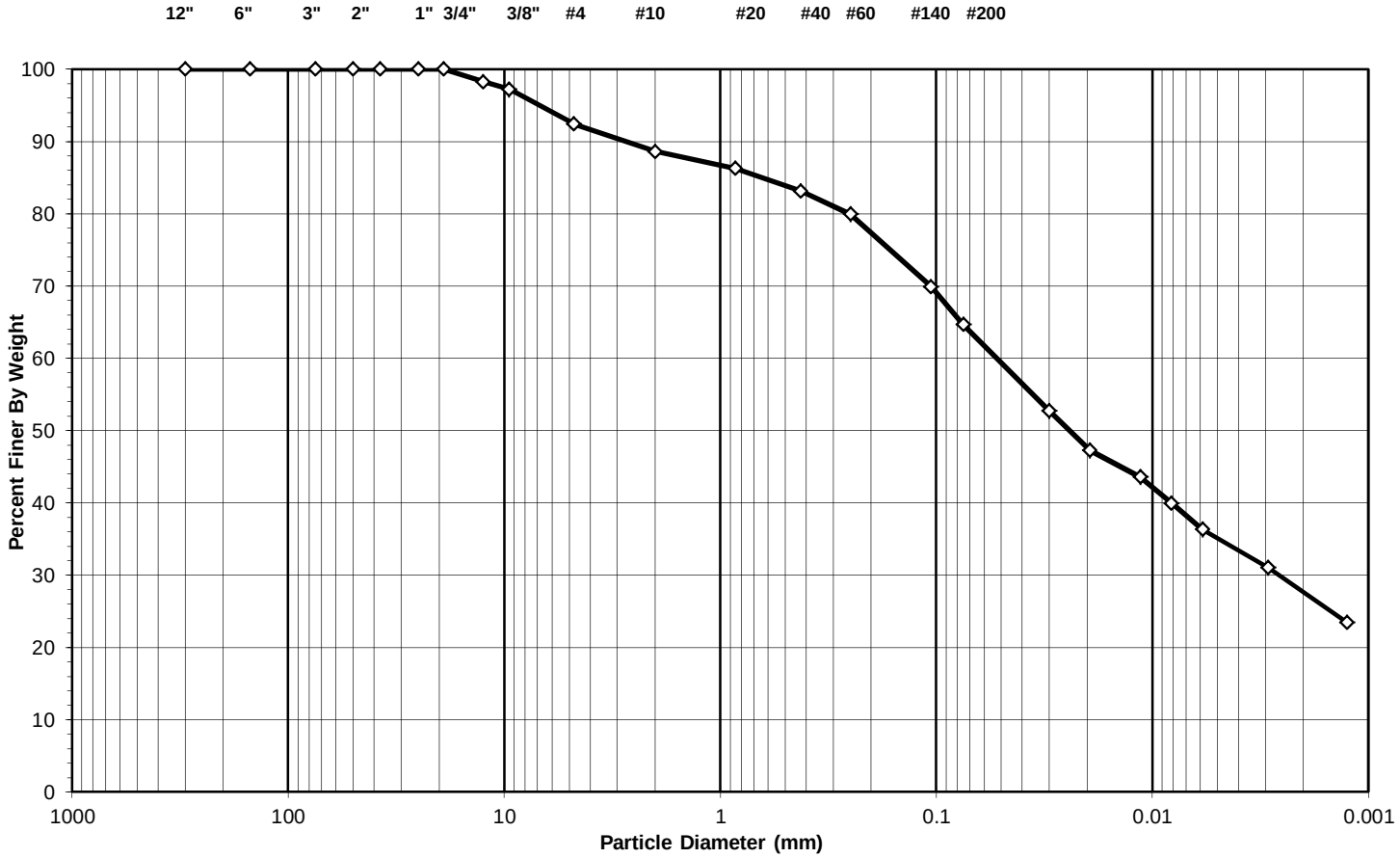
Client	AMEC FOSTER WHEELER	Boring No.	OW-406D
Client Reference	Dan River Steam Station Ash Removal	Depth (ft)	2.0-4.0
Project No.	2015-616-02	Sample No.	UD
Lab ID	2015-616-02-01	Soil Color	**GRAY BROWN**

	SIEVE ANALYSIS			*HYDROMETER*	
USCS	**cobbles**	**gravel**	**sand**	**silt and clay fraction**	
USDA	**cobbles**	**gravel**	**sand**	**silt**	**clay**



USCS Summary

Sieve Sizes (mm)		**Percentage**
Greater Than #4	*Gravel*	7.59
#4 To #200	*Sand*	27.72
Finer Than #200	*Silt & Clay*	64.69

USCS Symbol ***MH, TESTED***

USCS Classification ***SANDY ELASTIC SILT***

DCN: CT-S3OR DATE: 7/26/13 REVISION: 8 *T:\2015 PROJECTS\2015-616 AMEC - DAN RIVER\616-02 pics\[2015-616-02-01 COLOR CHG SIEVEHYD10.xls]Sheet1*

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WASH SIEVE ANALYSIS

ASTM D 422-63 (2007)

Client	AMEC FOSTER WHEELER	Boring No.	OW-406D
Client Reference	Dan River Steam Station Ash Removal	Depth (ft)	2.0-4.0
Project No.	2015-616-02	Sample No.	UD
Lab ID	2015-616-02-01	Soil Color	**GRAY BROWN**

Minus #10 for Hygroscopic Moisture Content		**Hydrometer Specimen Data**	
Tare No.	M-1	Air Dried - #10 Hydrometer Material (g)	50.00
Wgt.Tare + Wet Soil (g)	27.02	Corrected Dry Wt. of - #10 Material (g)	48.37
Wgt.Tare + Dry Soil (g)	26.66		
Weight of Tare (g)	15.97	Weight of - #200 Material (g)	35.30
Weight of Water (g)	0.36	Weight of - #10 ; + #200 Material (g)	13.07
Weight of Dry Soil (g)	10.69		
Moisture Content (%)	**3.4**	**J-FACTOR (%FINER THAN #10)**	**0.8864**
Soil Specimen Data			
Tare No.	158		
Wgt.Tare + Air Dry Soil (g)	716.87		
Weight of Tare (g)	238.75		
Air Dried Wgt. Total Sample (g)	478.12	Dry Weight of Material Retained on #10 (g)	52.75
Total Dry Sample Weight (g)	464.26	Corrected Dry Sample Wt - #10 (g)	411.51

Sieve Size	Sieve Opening (mm)	Wgt.of Soil Retained (gm)	Percent Retained (%)	Accumulated Percent Retained (%)	Percent Finer (%)	**Accumulated Percent Finer (%)**
12"	300	0.00	0.0	0.0	100.0	**100.0**
6"	150	0.00	0.0	0.0	100.0	**100.0**
3"	75	0.00	0.0	0.0	100.0	**100.0**
2"	50	0.00	0.0	0.0	100.0	**100.0**
1 1/2"	37.5	0.00	0.0	0.0	100.0	**100.0**
1"	25.0	0.00	0.0	0.0	100.0	**100.0**
3/4"	19.0	0.00	0.0	0.0	100.0	**100.0**
1/2"	12.5	8.00	1.7	1.7	98.3	**98.3**
3/8"	9.50	4.90	1.1	2.8	97.2	**97.2**
#4	4.75	22.34	4.8	7.6	92.4	**92.4**
#10	2.00	17.51	3.8	11.4	88.6	**88.6**
#20	0.85	1.29	2.7	2.7	97.3	**86.3**
#40	0.425	1.70	3.5	6.2	93.8	**83.2**
#60	0.250	1.76	3.6	9.8	90.2	**79.9**
#140	0.106	5.46	11.3	21.1	78.9	**69.9**
#200	0.075	2.86	5.9	27.0	73.0	**64.7**
Pan	-	35.30	73.0	100.0	-	**-**

Notes :

Tested By BT Date 5/8/15 Checked By GEM Date 6/4/15

DCN: CT-S3OR DATE: 7/26/13 REVISION: 8

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HYDROMETER ANALYSIS

ASTM D 422-63 (2007)

Client	AMEC FOSTER WHEELER	Boring No.	OW-406D
Client Reference	Dan River Steam Station Ash Removal	Depth (ft)	2.0-4.0
Project No.	2015-616-02	Sample No.	UD
Lab ID	2015-616-02-01	Soil Color	**GRAY BROWN**

Elapsed Time (min)	R Measured	Temp. (°C)	Composite Correction	R Corrected	N (%)	K Factor	Diameter (mm)	N' (%)
0	NA	NA	NA	NA	NA	NA	NA	NA
2	33.0	23.9	3.98	29.0	59.5	0.01288	0.0300	**52.8**
5	30.0	23.8	4.01	26.0	53.3	0.01289	0.0194	**47.2**
15	28.0	23.8	4.01	24.0	49.2	0.01289	0.0114	**43.6**
30	26.0	23.8	4.01	22.0	45.1	0.01289	0.0082	**40.0**
60	24.0	23.8	4.01	20.0	41.0	0.01289	0.0059	**36.3**
250	21.0	24.1	3.92	17.1	35.0	0.01285	0.0029	**31.0**
1440	17.0	23.5	4.10	12.9	26.4	0.01294	0.0013	**23.4**

Soil Specimen Data		**Other Corrections**		
Wgt. of Dry Material (g)	48.37	Hygroscopic Moisture Factor	0.967	
Weight of Deflocculant (g)	5.0			
		a - Factor	0.992	
		Percent Finer than # 10	88.64	
		Specific Gravity	2.69	Measured

Notes:

Tested By BW Date 5/6/15 Checked By GEM Date 6/4/15

DCN: CT-S3OR DATE: 7/26/13 REVISION: 8 *T:\2015 PROJECTS\2015-616 AMEC - DAN RIVER\616-02 pics\[2015-616-02-01 COLOR CHG SIEVEHYD10.xls]Sheet1*

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FLEXIBLE WALL PERMEABILITY TEST

PERMOMETER METHOD

ASTM D 5084-10

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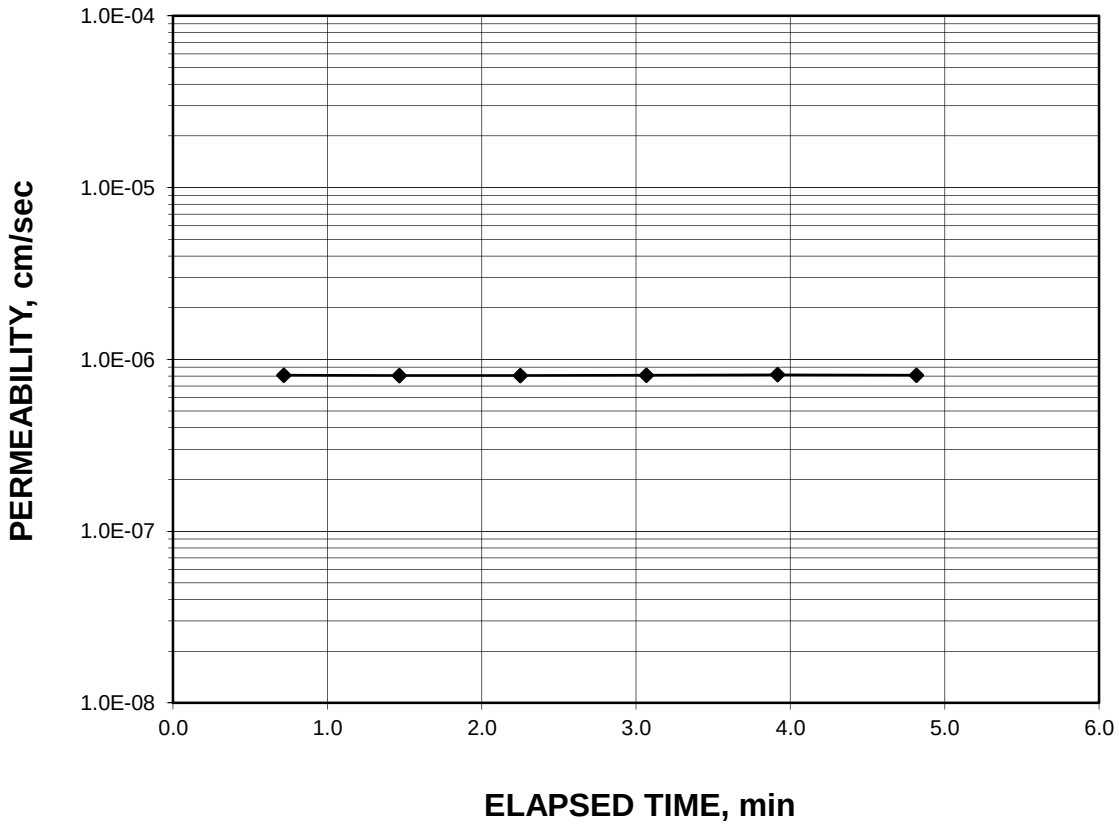
Client	AMEC FOSTER WHEELER	Boring No.	OW-406D
Client Project	Dan River Steam Station Ash Removal	Depth (ft.)	3.2-3.7
Project No.	2015-616-02	Sample No.	UD
Lab ID No.	2015-616-02-01		

Visual Description: GRAY-BROWN SANDY ELASTIC CLAY

AVERAGE PERMEABILITY = 8.1E-07 cm/sec @ 20°C

AVERAGE PERMEABILITY = 8.1E-09 m/sec @ 20°C

PERMEABILITY vs. TIME



Tested By: SFS Date: 4/30/15 Checked By: GEM Date: 6/4/15

DCN: CT-22A DATE:2-2-10 REVISION: 5T:\2015 PROJECTS\2015-616 AMEC - DAN RIVER\[2015-616-02-01 Permometer.xls]Sheet1

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FLEXIBLE WALL PERMEABILITY TEST

PERMOMETER METHOD

ASTM D 5084-10

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Client	AMEC FOSTER WHEELER	Boring No.	OW-406D
Client Project	Dan River Steam Station Ash Removal	Depth (ft.)	3.2-3.7
Project No.	2015-616-02	Sample No.	UD
Lab ID No.	2015-616-02-01		

Specific Gravity	2.69	Measured
Sample Condition		Undisturbed

Visual Description: GRAY-BROWN SANDY ELASTIC CLAY

MOISTURE CONTENT:	BEFORE TEST	AFTER TEST
Tare Number	814	814
Wt. of Tare & WS (gm.)	298.13	598.93
Wt. of Tare & DS (gm.)	253.25	477.44
Wt. of Tare (gm.)	109.97	109.78
Wt. of Water (gm.)	44.88	121.49
Wt. of DS (gm.)	143.28	367.66
Moisture Content (%)	**31.3**	**33.0**

SPECIMEN:	BEFORE TEST	AFTER TEST
Wt. of Tube & WS (gm.)	1208.68	NA
Wt. of Tube (gm.)	0.00	NA
Wt. of WS (calc.) (gm.)	1208.68	1224.52
Length 1 (in.)	6.140	6.097
Length 2 (in.)	6.164	6.097
Length 3 (in.)	6.122	6.097
Top Diameter (in.)	2.848	2.845
Middle Diameter (in.)	2.849	2.845
Bottom Diameter (in.)	2.839	2.845
Average Length (in.)	6.14	6.10
Average Area (in.^{2})	6.36	6.36
Sample Volume (cm^3)	639.98	635.14
Unit Wet Wt. (gm./ cm^3)	1.889	1.928
Unit Wet Wt. (pcf)	117.9	120.3
Unit Dry Wt. (pcf)	89.8	90.5
Unit Dry Wt. (gm./ cm^3)	1.438	1.449
Void Ratio, e	0.870	0.856
Porosity, n	0.465	0.461
Pore Volume (cm^3)	297.8	293.0
Total Wt. Of Sample After Test		1222.88

Tested By: SFS Date: 4/30/15 Checked By: GEM Date: 6/4/15

DCN: CT-22A DATE:2-2-10 REVISION: 5 T:\2015 PROJECTS\2015-616 AMEC - DAN RIVER\[2015-616-02-01 Permometer.xls]Sheet1

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FLEXIBLE WALL PERMEABILITY TEST
PERMOMETER METHOD

ASTM D 5084-10

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Client	AMEC FOSTER WHEELER	Boring No.	OW-406D
Client Project	Dan River Steam Station Ash Removal	Depth (ft.)	3.2-3.7
Project No.	2015-616-02	Sample No.	UD
Lab ID No.	2015-616-02-01		

Test Pressures		Final Sample Dimensions	
Cell Pressure(psi)	55.0	Sample Length (cm), L	15.49
Back Pressure(psi)	50.0	Sample Area (cm^2), A	41.01
Eff. Cons. Pressure(psi)	5.0	Pipette Area (cm^2), a_p	0.03142
Response (%)	98	Annulus Area (cm^2), a_a	0.76712
		Equilibrium Level (cm), R_{eq}	1

AVERAGE PERMEABILITY = 8.1E-07 cm/sec @ 20°C
AVERAGE PERMEABILITY = 8.1E-09 m/sec @ 20°C

DATE	TIME				ELAPSED TIME **t**	PIPETTE READI NG **R_p**	INCREMENT GRADIENT **i**	TEMP.	INCREMENTAL PERMEABILITY @ 20°C
(mm/dd/yy)	(hr)	(min)	(sec)	(min)	(min)	(cm)	(cm/cm)	(°C)	(cm/sec)
5/5/15	13	10	38	10.63	0.000	8.5	6.3	22.7	NA
5/5/15	13	11	21	11.35	0.717	8.2	6.1	22.7	8.1E-07
5/5/15	13	12	6	12.10	1.467	7.9	5.8	22.7	8.1E-07
5/5/15	13	12	53	12.88	2.250	7.6	5.6	22.7	8.1E-07
5/5/15	13	13	42	13.70	3.067	7.3	5.3	22.7	8.1E-07
5/5/15	13	14	33	14.55	3.917	7.0	5.1	22.7	8.1E-07
5/5/15	13	15	27	15.45	4.817	6.7	4.8	22.7	8.1E-07

Tested By: SFS Date: 4/30/15 Checked By: GEM Date: 6/4/15

DCN: CT-22A DATE:2-2-10 REVISION: 5 T:\2015 PROJECTS\2015-616 AMEC - DAN RIVER\[2015-616-02-01 Permometer.xls]Sheet1

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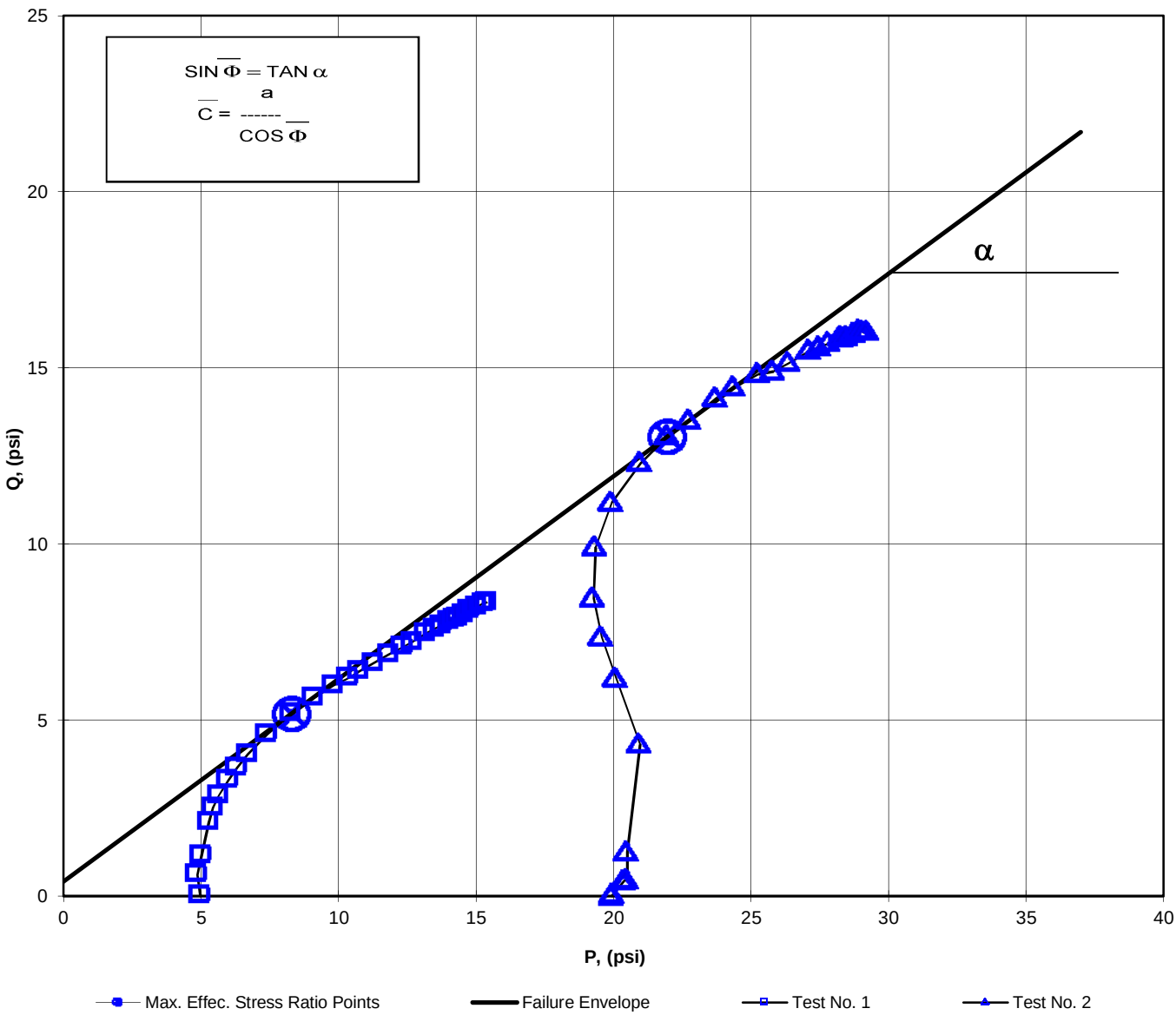
CONSOLIDATED UNDRAINED TRIAXIAL TEST
WITH PORE PRESSURE READINGS
ASTM D4767-11

Client:	Amec Foster Wheeler	Boring No.:	OW-406D
Client Reference:	Dan River Steam Station Ash Removal	Depth (ft):	2.7-3.7
Project No.:	2015-616-02	Sample No.:	UD
Lab ID:	2015-616-02-01		

Consolidated Undrained Triaxial Test with Pore Pressure



a	=	**0.42**	$\overline{\mathbf{C}}$	=	**0.51**
α	=	**29.9**	$\overline{\Phi}$	=	**35.10**

Tested By: SFS Date: 4/30/15 Approved By: MPS Date: 6/4/15

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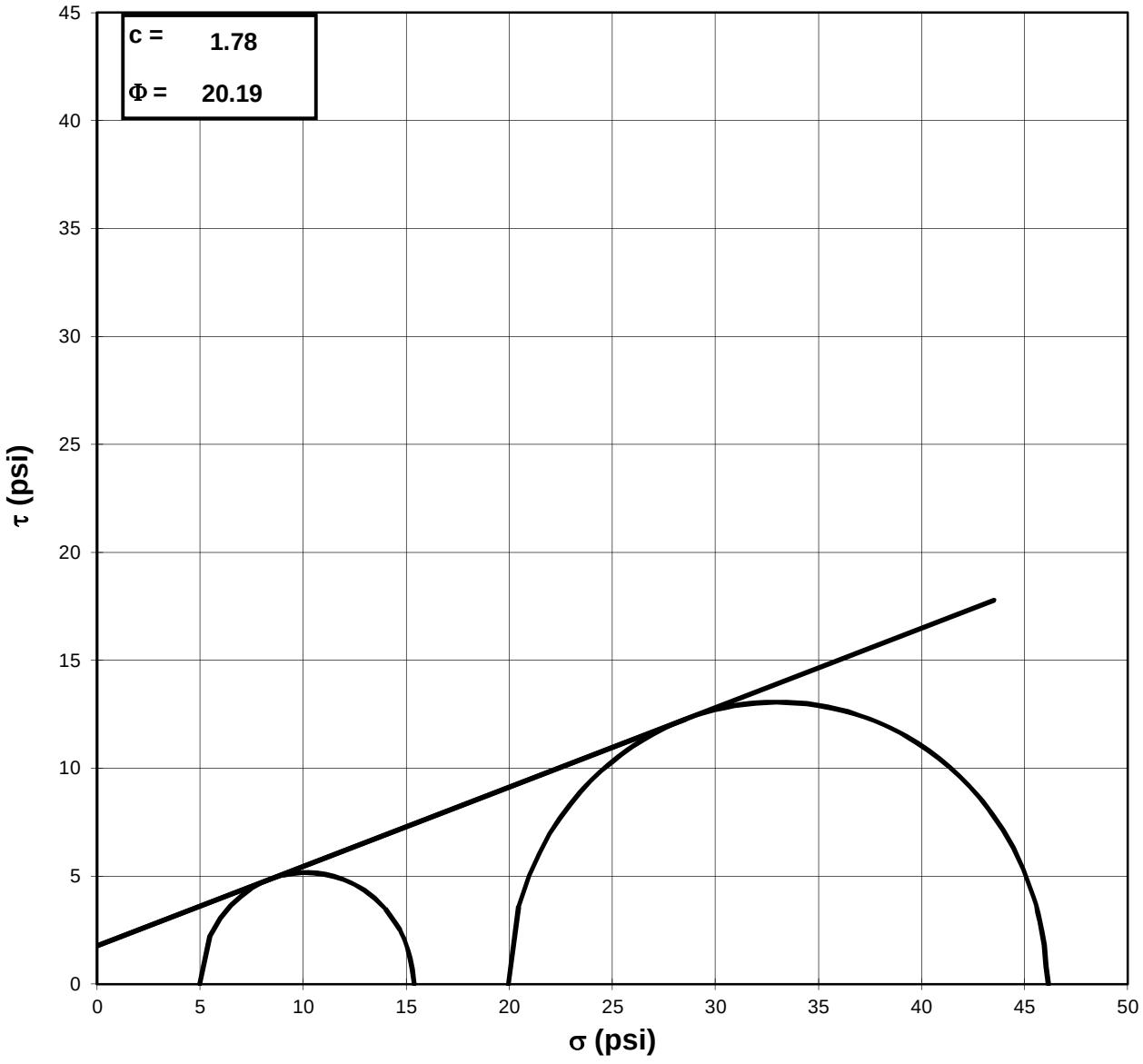
MOHR TOTAL STRENGTH ENVELOPE

ASTM D4767-11

Client:	Amec Foster Wheeler	Boring No.:	OW-406D
Client Reference:	Dan River Steam Station Ash Removal	Depth (ft):	2.7-3.7
Project No.:	2015-616-02	Sample No.:	UD
Lab ID:	2015-616-02-01		
Visual Description:	GRAY-BROWN SANDY ELASTIC SILT (UNDISTURBED)		



Failure Based on Maximum Effective Principal Stress Ratio

NOTE: GRAPH NOT TO SCALE

Tested By: SFS *Date:* 4/30/15 *Approved By:* MPS *Date:* 6/4/15

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CONSOLIDATED UNDRAINED TRIAXIAL TEST WITH PORE PRESSURE READINGS

ASTM D4767-11

Client:	Amec Foster Wheeler	Boring No.:	OW-406D
Client Reference:	Dan River Steam Station Ash Removal	Depth (ft):	3.2-3.7
Project No.:	2015-616-02	Sample No.:	UD
Lab ID:	2015-616-02-01		

Visual Description: GRAY-BROWN SANDY ELASTIC SILT (UNDISTURBED)

Stage No.	1
Test No.	1

PRESSURES (psi)

Cell Pressure (psi)	55.0
Back Pressure (psi)	50.0
Eff. Conf. Pressure (psi)	5.0
Pore Pressure Response (%)	98

MAXIMUM OBLIQUITY POINTS

$\overline{P}$	=	8.27
Q	=	5.17

INITIAL SAMPLE DIMENSIONS (in)

Length 1:	6.140	Diameter 1:	2.848
Length 2:	6.164	Diameter 2:	2.849
Length 3:	6.122	Diameter 3:	2.839
Avg. Length:	6.142	*Avg. Diam.:*	2.845

VOLUME CHANGE

Initial Burette Reading (ml)	24.0
Final Burette Reading (ml)	17.4
Final Change (ml)	6.6

Initial Dial Reading (mil)	58
Dial Reading After Saturation (mil)	81
Dial Reading After Consolidation (mil)	103

LOAD (LB)	DEFORMATION (IN)	PORE PRESSURE (PSI)
9.9	0.000	50.0
17.5	0.000	50.7
24.5	0.002	51.1
36.1	0.008	51.8
41.5	0.013	52.1
45.8	0.020	52.2
51.3	0.029	52.3
55.8	0.038	52.3
60.8	0.051	52.3
68.2	0.072	52.2
75.9	0.102	51.9
81.9	0.138	51.5
87.1	0.176	51.2
90.3	0.218	50.8
93.1	0.249	50.6
97.0	0.292	50.4
101.2	0.349	50.0
104.9	0.411	49.7
107.6	0.456	49.5
111.9	0.518	49.3
114.7	0.563	49.1
116.9	0.609	48.9
119.3	0.655	48.8
121.1	0.686	48.7
122.0	0.716	48.6
124.0	0.746	48.4
126.4	0.777	48.3
128.9	0.822	48.2
131.4	0.868	48.1
132.5	0.899	48.0
134.1	0.930	47.9

Tested By: SFS Date: 4/30/15 Input Checked By: GEM Date: 6/4/15

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WITH PORE PRESSURE READINGS
ASTM D4767-11

Client:	Amec Foster Wheeler	Boring No.:	OW-406D
Client Reference:	Dan River Steam Station Ash Removal	Depth (ft):	3.2-3.7
Project No.:	2015-616-02	Sample No.:	UD
Lab ID:	2015-616-02-01		

Visual Description: GRAY-BROWN SANDY ELASTIC SILT (UNDISTURBED)

Effective Confining Pressure (psi)	5.0	*Stage No.*	1
		Test No	1

INITIAL DIMENSIONS

Initial Sample Length (in)	6.14
Initial Sample Diameter (in)	2.85
Initial Sample Area (in^2)	6.36
Initial Sample Volume (in^3)	39.05

VOLUME CHANGE

Volume After Consolidation (in^3)	38.21
Length After Consolidation (in)	6.10
Area After Consolidation (in^2)	6.267

Strain (%)	Deviation Stress	ΔU	$\overline{\sigma}_1$	$\overline{\sigma}_3$	Effective Principle Stress Ratio	$\overline{A}$	$\overline{P}$	Q
0.01	1.20	0.73	5.46	4.3	1.282	0.62	4.86	0.60
0.04	2.32	1.12	6.19	3.9	1.599	0.49	5.03	1.16
0.14	4.18	1.79	7.37	3.2	2.308	0.44	5.28	2.09
0.22	5.03	2.05	7.96	2.9	2.711	0.42	5.45	2.51
0.33	5.71	2.19	8.51	2.8	3.039	0.39	5.65	2.85
0.47	6.57	2.29	9.27	2.7	3.434	0.36	5.98	3.28
0.63	7.28	2.32	9.95	2.7	3.731	0.33	6.31	3.64
0.83	8.05	2.31	10.73	2.7	4.003	0.29	6.71	4.03
1.18	9.19	2.19	11.99	2.8	4.282	0.24	7.40	4.60
1.67	10.35	1.89	13.44	3.1	4.344	0.19	8.27	5.17
2.27	11.23	1.51	14.70	3.5	4.229	0.14	9.09	5.61
2.88	11.95	1.16	15.78	3.8	4.121	0.10	9.81	5.98
3.57	12.37	0.81	16.55	4.2	3.962	0.07	10.36	6.19
4.08	12.74	0.60	17.12	4.4	3.907	0.05	10.75	6.37
4.79	13.23	0.34	17.87	4.6	3.846	0.03	11.26	6.61
5.73	13.73	0.01	18.71	5.0	3.756	0.00	11.84	6.86
6.74	14.14	-0.29	19.41	5.3	3.682	-0.02	12.34	7.07
7.48	14.41	-0.49	19.89	5.5	3.632	-0.03	12.68	7.21
8.49	14.88	-0.75	20.62	5.7	3.597	-0.05	13.17	7.44
9.24	15.17	-0.92	21.08	5.9	3.569	-0.06	13.49	7.59
9.99	15.37	-1.09	21.45	6.1	3.529	-0.07	13.76	7.68
10.74	15.58	-1.25	21.82	6.2	3.496	-0.08	14.03	7.79
11.24	15.74	-1.36	22.09	6.3	3.479	-0.09	14.22	7.87
11.74	15.79	-1.47	22.24	6.5	3.447	-0.09	14.34	7.89
12.24	15.98	-1.57	22.53	6.6	3.437	-0.10	14.54	7.99
12.74	16.22	-1.67	22.88	6.7	3.436	-0.11	14.77	8.11
13.49	16.43	-1.82	23.23	6.8	3.413	-0.11	15.02	8.21
14.24	16.62	-1.97	23.57	7.0	3.390	-0.12	15.26	8.31
14.74	16.67	-2.06	23.72	7.0	3.365	-0.13	15.39	8.34
15.25	16.80	-2.16	23.94	7.1	3.350	-0.13	15.54	8.40

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CONSOLIDATED UNDRAINED TRIAXIAL TEST
WITH PORE PRESSURE READINGS
ASTM D4767-11

Client:	Amec Foster Wheeler	Boring No.:	OW-406D
Client Reference:	Dan River Steam Station Ash Removal	Depth (ft):	2.7-3.2
Project No.:	2015-616-02	Sample No.:	UD
Lab ID:	2015-616-02-01		

Visual Description: GRAY-BROWN SANDY ELASTIC SILT (UNDISTURBED)

Stage No.	1
Test No.	2

PRESSURES (psi)

Cell Pressure (psi)	70.0
Back Pressure (psi)	50.0
Eff. Conf. Pressure (psi)	20.0
Pore Pressure Response (%)	100

MAXIMUM OBLIQUITY POINTS

$\overline{P}$	=	21.99
Q	=	13.06

INITIAL SAMPLE DIMENSIONS (in)

Length 1:	5.838	Diameter 1:	2.849
Length 2:	5.852	Diameter 2:	2.843
Length 3:	5.843	Diameter 3:	2.852
Avg. Length:	5.844	*Avg. Diam.:*	2.848

VOLUME CHANGE

Initial Burette Reading (ml)	24.0
Final Burette Reading (ml)	8.0
Final Change (ml)	16.0

Initial Dial Reading (mil)	70
Dial Reading After Saturation (mil)	112
Dial Reading After Consolidation (mil)	164

LOAD (LB)	DEFORMATION (IN)	PORE PRESSURE (PSI)
9.3	0.000	50.0
9.9	0.000	50.0
14.6	0.002	50.0
15.0	0.008	49.9
24.7	0.013	50.7
62.6	0.020	53.3
86.0	0.029	56.1
100.7	0.038	57.8
114.5	0.051	59.2
133.0	0.072	60.5
149.6	0.102	61.2
164.6	0.138	61.3
175.5	0.176	61.1
182.5	0.218	60.7
191.5	0.249	60.4
197.0	0.292	60.0
203.8	0.349	59.5
207.1	0.411	59.1
211.9	0.456	58.7
219.1	0.518	58.3
222.3	0.563	58.1
225.8	0.609	57.8
230.3	0.655	57.6
230.9	0.686	57.5
232.9	0.716	57.4
235.5	0.746	57.2
238.3	0.777	57.1
239.8	0.822	56.9
241.9	0.868	56.7

Tested By: SFS Date: 4/30/15 Input Checked By: GEM Date: 6/4/15

DCN: CT-S28 DATE: 4/12/13 REVISION: 3

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CONSOLIDATED UNDRAINED TRIAXIAL TEST
WITH PORE PRESSURE READINGS
ASTM D4767-11

Client:	Amec Foster Wheeler	Boring No.:	OW-406D
Client Reference:	Dan River Steam Station Ash Removal	Depth (ft):	2.7-3.2
Project No.:	2015-616-02	Sample No.:	UD
Lab ID:	2015-616-02-01		

Visual Description: GRAY-BROWN SANDY ELASTIC SILT (UNDISTURBED)

Effective Confining Pressure (psi)	20.0	*Stage No.*	1
		Test No	2

INITIAL DIMENSIONS

Initial Sample Length (in)	5.84
Initial Sample Diameter (in)	2.85
Initial Sample Area (in^2)	6.37
Initial Sample Volume (in^3)	37.23

VOLUME CHANGE

Volume After Consolidation (in^3)	35.45
Length After Consolidation (in)	5.75
Area After Consolidation (in^2)	6.165

Strain (%)	Deviation Stress	ΔU	$\overline{\sigma}_1$	$\overline{\sigma}_3$	Effective Principle Stress Ratio	$\overline{A}$	$\overline{P}$	Q
0.01	0.08	0.02	20.02	19.9	1.004	0.23	19.98	0.04
0.04	0.85	-0.01	20.82	20.0	1.043	-0.01	20.39	0.43
0.14	0.91	-0.10	20.97	20.1	1.045	-0.11	20.51	0.46
0.23	2.49	0.69	21.76	19.3	1.129	0.28	20.51	1.25
0.35	8.61	3.29	25.27	16.7	1.516	0.38	20.97	4.30
0.50	12.37	6.04	26.29	13.9	1.889	0.49	20.11	6.19
0.67	14.72	7.75	26.93	12.2	2.205	0.53	19.57	7.36
0.88	16.91	9.13	27.73	10.8	2.562	0.54	19.28	8.45
1.25	19.81	10.51	29.26	9.5	3.096	0.53	19.36	9.91
1.77	22.35	11.20	31.11	8.8	3.551	0.50	19.94	11.18
2.41	24.58	11.25	33.28	8.7	3.825	0.46	20.99	12.29
3.06	26.13	11.03	35.05	8.9	3.927	0.42	21.99	13.06
3.78	27.02	10.70	36.28	9.3	3.920	0.40	22.77	13.51
4.32	28.27	10.35	37.88	9.6	3.943	0.37	23.74	14.14
5.08	28.89	10.01	38.84	9.9	3.904	0.35	24.39	14.45
6.08	29.63	9.50	40.09	10.5	3.834	0.32	25.27	14.82
7.14	29.78	9.03	40.71	10.9	3.726	0.30	25.82	14.89
7.94	30.25	8.70	41.50	11.3	3.688	0.29	26.38	15.13
9.00	30.96	8.31	42.61	11.6	3.658	0.27	27.13	15.48
9.80	31.16	8.03	43.09	11.9	3.613	0.26	27.51	15.58
10.59	31.39	7.81	43.54	12.1	3.585	0.25	27.84	15.70
11.39	31.75	7.54	44.16	12.4	3.558	0.24	28.29	15.88
11.92	31.65	7.45	44.16	12.5	3.531	0.24	28.33	15.83
12.45	31.74	7.33	44.37	12.6	3.515	0.23	28.50	15.87
12.97	31.92	7.17	44.71	12.8	3.496	0.22	28.75	15.96
13.51	32.12	7.06	45.02	12.9	3.490	0.22	28.96	16.06
14.30	32.04	6.89	45.10	13.1	3.453	0.22	29.08	16.02
15.10	32.03	6.72	45.27	13.2	3.419	0.21	29.26	16.02

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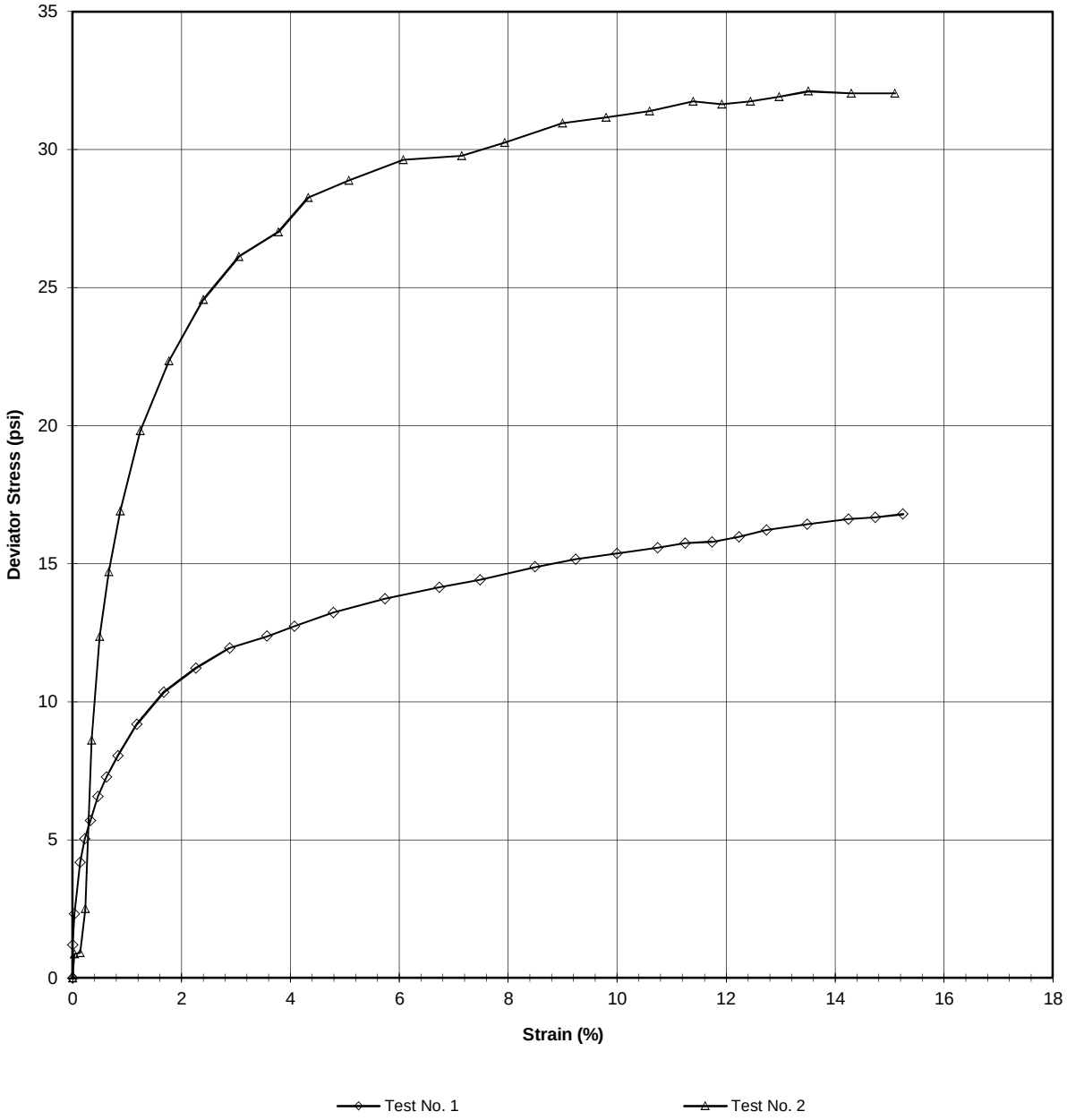
CONSOLIDATED UNDRAINED TRIAXIAL TEST
WITH PORE PRESSURE READINGS
ASTM D4767-11

Client:	Amec Foster Wheeler	Boring No.:	OW-406D
Client Reference:	Dan River Steam Station Ash Removal	Depth (ft):	2.7-3.7
Project No.:	2015-616-02	Sample No.:	UD
Lab ID:	2015-616-02-01		
Visual Description:	GRAY-BROWN SANDY ELASTIC SILT		



Tested By: SFS Date: 4/30/15 Approved By: MPS Date: 6/4/15

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CONSOLIDATED UNDRAINED TRIAXIAL TEST
WITH PORE PRESSURE READINGS
ASTM D4767-11

Client:	Amec Foster Wheeler		
Client Reference:	Dan River Steam Station Ash Removal		
Project No.:	2015-616-02		
Lab ID:	2015-616-02-01	Specific Gravity (Measured)	2.69

Visual Description: GRAY-BROWN SANDY ELASTIC SILT (UNDISTURBED)

SAMPLE CONDITION SUMMARY

Boring No.:	OW-406D	OW-406D
Depth (ft):	3.2-3.7	2.7-3.2
Sample No.:	UD	UD
Test No.	T1	T2
Deformation Rate (in/min)	0.001	0.001
Back Pressure (psi)	50.0	50.0
Consolidation Time (days)	1	1
Moisture Content (%) (INITIAL)	31.3	29.5
Total Unit Weight (pcf)	117.9	120.9
Dry Unit Weight (pcf)	89.8	93.4
Moisture Content (%) (FINAL)	33.0	27.8
Initial State Void Ratio,e	0.870	0.798
Void Ratio at Shear, e	0.830	0.713

Tested By: SFS Date: 4/30/15 Input Checked By: GEM Date: 6/4/15

DCN: CT-S28 DATE: 4/12/13 REVISION: 3

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CONSOLIDATED UNDRAINED TRIAXIAL TEST
WITH PORE PRESSURE READINGS

ASTM D4767-11

MOISTURE CONTENT

	T1	T2
Tare Number	814	828
Weight of Tare & Wet Sample (g)	298.13	253
Weight of Tare & Dry Sample (g)	253.25	226.6
Weight of Tare (g)	109.77	137.07
Moisture Content (%) (INITIAL)	31.28	29.49
Tare Number	814	805
Weight of Tare & Wet Sample (g)	598.93	724.94
Weight of Tare & Dry Sample (g)	477.44	589.72
Weight of Tare (g)	109.78	102.78
Moisture Content (%) (FINAL)	33.04	27.77

UNIT WEIGHT

Weight of Tube & Wet Sample (g)		1208.68	1181.6
Weight of Tube (g)		0	0
Weight of Wet Sample (g)		1208.68	1181.6
Length 1 (in)		6.14	5.838
Length 2 (in)		6.164	5.852
Length 3 (in)		6.122	5.843
Top Diameter (in)		2.848	2.849
Middle Diameter (in)		2.849	2.843
Bottom Diameter (in)		2.839	2.852
Average Length (in)		6.142	5.844333
Average Area (in)		6.359	6.370
Sample Volume (cm^3)		639.98	610.11
Unit Wet Weight (g/cm^3)		1.89	1.94
Unit Wet Weight (pcf)		117.91	120.91
Unit Dry Weight (pcf)		89.81	93.37
Unit Dry Weight (g/cm^3)		1.44	1.50
Initial Burette Reading		**24**	**24**
Final Burette Reading		**17.4**	**8**
Initial Dial Reading		**58**	**70**
Dial Reading After Saturation		**81**	**112**
Dial Reading After Consolidation		**103**	**164**
Volume Change during Consolidation		6.6	16
Volume Change during Saturation		7.19	13.15
Volume at Shear (cm^3)	*These	626.19	580.95
Volume of Solids (cm^3)	measurements	342.26	339.23
Volume of Voids (cm^3)	are all	283.93	241.73
Volume of Water (cm^3)	at	304.23	253.40
Void Ratio, e	shear	0.830	0.713

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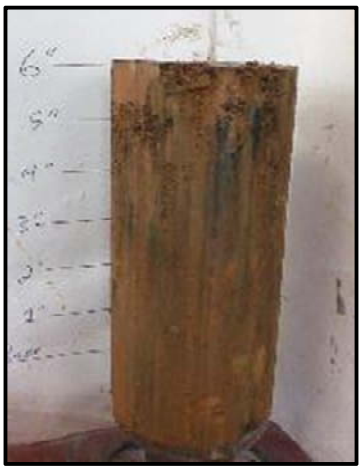
Client:	Amec Foster Wheeler	Boring No.:	OW-406D
Client Reference:	Dan River Steam Station Ash Removal	Depth (ft):	2.7-3.7
Project No.:	2015-616-02	Sample No.:	UD
Lab ID:	2015-616-02-01		

TEST 1 INITIAL



TEST 1 FINAL

TEST 2 INITIAL

TEST 2 FINAL

Tested By	*SFS*	*Date*	*4/30/15*	*Approved By*	MPS	*Date*	6/4/15

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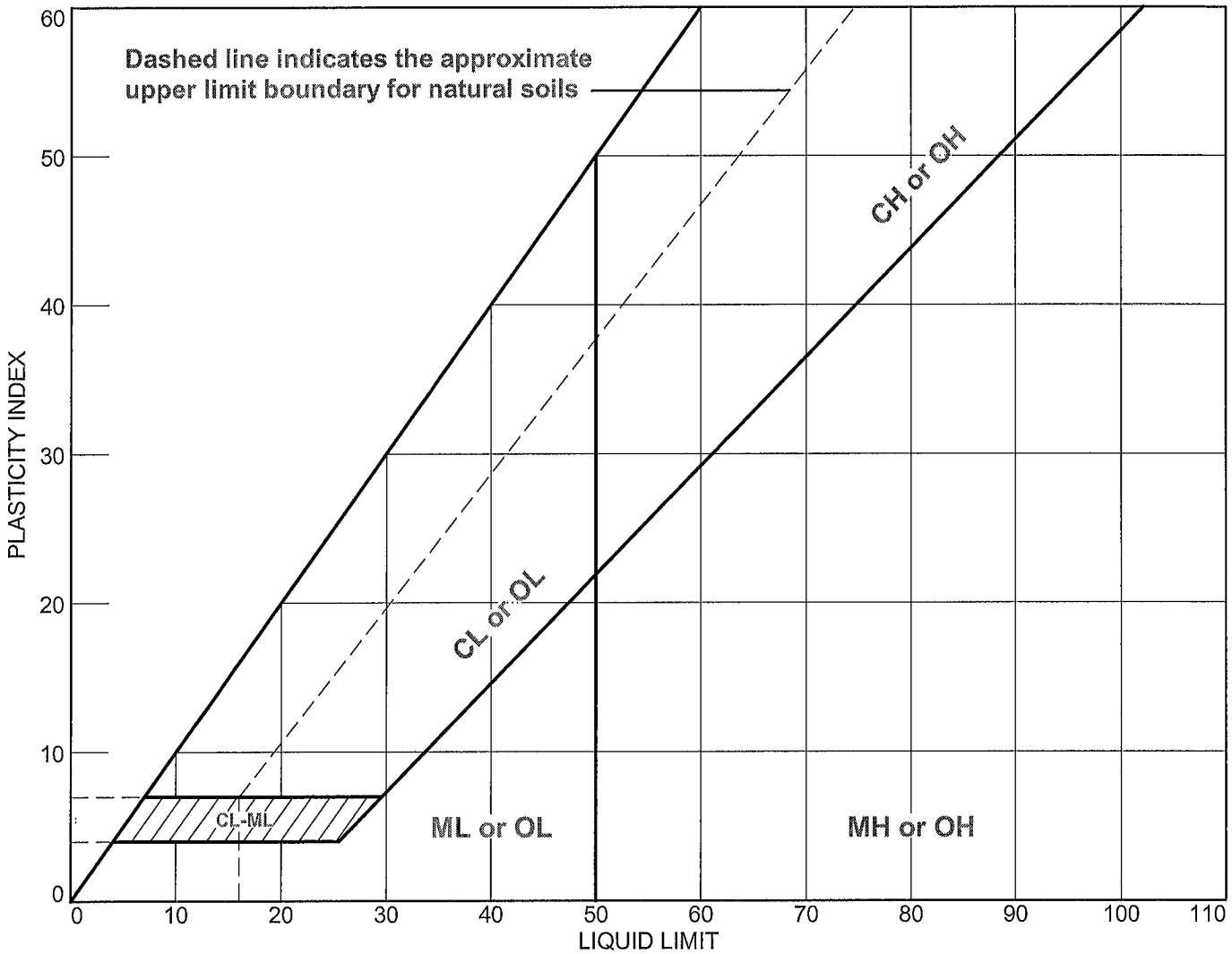
LIQUID AND PLASTIC LIMITS TEST REPORT



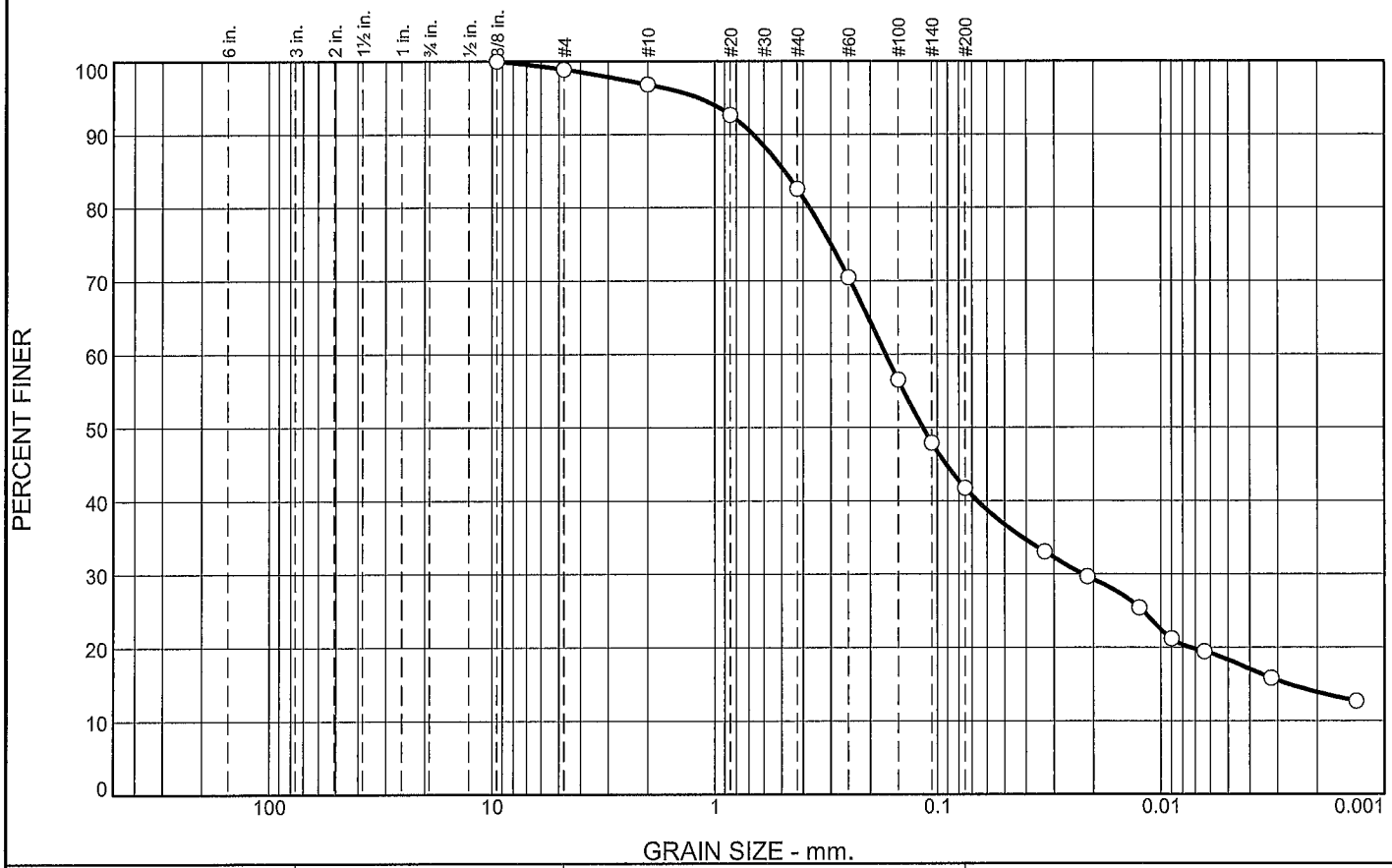
SOIL DATA								
SYMBOL	SOURCE	SAMPLE NO.	DEPTH	NATURAL WATER CONTENT (%)	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	USCS
●	OW-407S	SS-11	53.5-55'		NP	NV	NP	SM
■	OW-409S	SS-2/SS-3	9.8-15'		NP	NV	NP	SM
▲	OW-410S	SS-9	43.5-45'		NP	NV	NP	SM
◆	OW-411S	SS-12	58.5-60'		NP	NV	NP	SM
▼	OW-412S	SS-9	43.5-45'		NP	NV	NP	SM

amec

Client: Duke Energy
Project: Dan River Steam Station Ash Removal
Project No.: 7810140065 **Figure**

Tested By: A Kottenstette **Checked By:** D Kopitsky

Particle Size Analysis ASTM D422



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	1.1	2.1	14.2	40.9	23.4	18.3

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/8"	100.0		
#4	98.9		
#10	96.8		
#20	92.7		
#40	82.6		
#60	70.5		
#100	56.5		
#140	47.9		
#200	41.7		
0.0331 mm.	33.1		
0.0213 mm.	29.7		
0.0125 mm.	25.4		
0.0090 mm.	21.2		
0.0064 mm.	19.5		
0.0032 mm.	15.8		
0.0013 mm.	12.7		

* (no specification provided)

Soil Description

Brown Silty Sand

Atterberg Limits

PL= NP LL= NV PI= NP

Coefficients

D_{90}= 0.6706 D_{85}= 0.4849 D_{60}= 0.1704
D_{50}= 0.1163 D_{30}= 0.0223 D_{15}= 0.0027
D_{10}= C_u= C_c=

Classification

USCS= SM AASHTO= A-4(0)

Remarks

Source of Sample: OW-407S **Depth:** 53.5-55'
Sample Number: SS-11 **Date:** 6-2-15

amec

Client: Duke Energy
Project: Dan River Steam Station Ash Removal
Project No: 7810140065 **Figure**

Tested By: D Kopitsky **Checked By:** M Hamilton

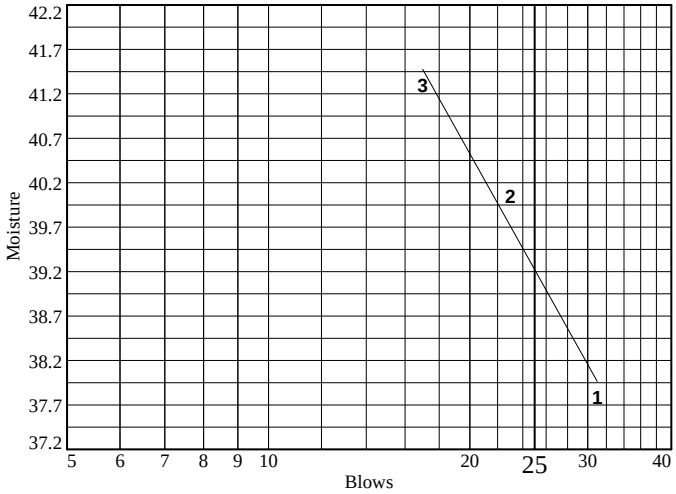
LIQUID AND PLASTIC LIMIT TEST DATA

5/26/2015

Client: Duke Energy
Project: Dan River Steam Station Ash Removal
Project Number: 7810140065
Location: OW-407S
Depth: 45 - 55' **Sample Number:** Bulk
Material Description: Yellow-Brown & Gray Lean Clay with Sand
USCS: CL **AASHTO:** A-6(12)
Tested by: D. Kopitsky **Checked by:** G. Williams

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	35.15	35.67	34.97			
Dry+Tare	29.95	30.11	29.46			
Tare	16.19	16.23	16.12			
# Blows	31	23	17			
Moisture	37.8	40.1	41.3			



Liquid Limit= 39
Plastic Limit= 21
Plasticity Index= 18
Natural Moisture= 42.1
Liquidity Index= 1.2

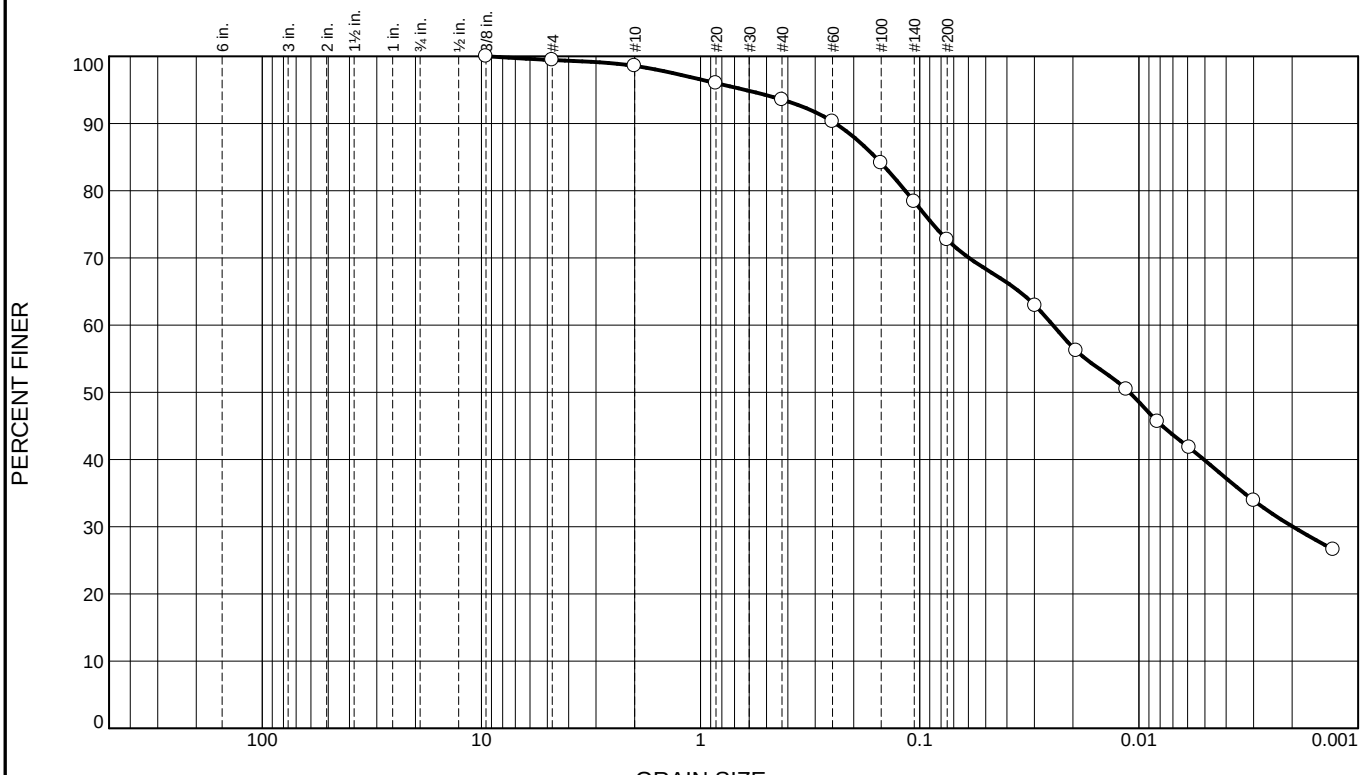
Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	17.63	17.45			
Dry+Tare	16.46	16.28			
Tare	10.94	10.74			
Moisture	21.2	21.1			

Natural Moisture Data

Wet+Tare	Dry+Tare	Tare	Moisture
160.18	127.47	49.76	42.1

Particle Size Analysis ASTM D422



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.6	0.8	5.1	20.8	32.8	39.9

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/8"	100.0		
#4	99.4		
#10	98.6		
#20	96.0		
#40	93.5		
#60	90.3		
#100	84.1		
#140	78.4		
#200	72.7		
0.0297 mm.	62.9		
0.0193 mm.	56.2		
0.0114 mm.	50.4		
0.0082 mm.	45.6		
0.0059 mm.	41.8		
0.0030 mm.	33.9		
0.0013 mm.	26.6		

* (no specification provided)

Soil Description

Yellow-Brown & Gray Lean Clay with Sand

Atterberg Limits

PL= 21 LL= 39 PI= 18

Coefficients

D_{90}= 0.2424 D_{85}= 0.1594 D_{60}= 0.0247
D_{50}= 0.0110 D_{30}= 0.0020 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= CL AASHTO= A-6(12)

Remarks

Moisture Content = 42.1%

Source of Sample: OW-407S **Depth:** 45 - 55'
Sample Number: Bulk **Date:** 5-5-15

amec

Client: Duke Energy
Project: Dan River Steam Station Ash Removal
Project No: 7810140065 **Figure**

Tested By: D. Kopitsky **Checked By:** T. Landis

GRAIN SIZE DISTRIBUTION TEST DATA

5/26/2015

Client: Duke Energy
Project: Dan River Steam Station Ash Removal
Project Number: 7810140065
Location: OW-407S
Depth: 45 - 55' **Sample Number:** Bulk
Material Description: Yellow-Brown & Gray Lean Clay with Sand
Date: 5-5-15 **PL:** 21 **LL:** 39 **PI:** 18
USCS Classification: CL **AASHTO Classification:** A-6(12)
Testing Remarks: Moisture Content = 42.1%
Tested by: D. Kopitsky **Checked by:** T. Landis

Sieve Test Data

Dry Sample and Tare (grams)	Tare (grams)	Cumulative Pan Tare Weight (grams)	Sieve Opening Size	Cumulative Weight Retained (grams)	Percent Finer
285.78	0.00	0.00	3/4"		
			3/8"	0.00	100.0
			#4	1.59	99.4
			#10	4.09	98.6
51.38	0.00	0.00	#20	1.34	96.0
			#40	2.62	93.5
			#60	4.32	90.3
			#100	7.54	84.1
			#140	10.53	78.4
			#200	13.48	72.7

Hydrometer Test Data

Hydrometer test uses material passing #10
Percent passing #10 based upon complete sample = 98.6
Weight of hydrometer sample =53.64
Hygroscopic moisture correction:
Moist weight and tare = 30.46
Dry weight and tare = 29.86
Tare weight = 16.13
Hygroscopic moisture = 4.4%
Table of composite correction values:

Temp., deg. C:	14.0	24.0	40.0
Comp. corr.:	-5.0	-3.0	0.0

Meniscus correction only = 1.0
Specific gravity of solids = 2.65
Hydrometer type = 152H
Hydrometer effective depth equation: L = 16.294964 **-** 0.164 **x Rm**

Elapsed Time (min.)	Temp. (deg. C.)	Actual Reading	Corrected Reading	K	Rm	Eff. Depth	Diameter (mm.)	Percent Finer
2.00	23.0	36.0	32.8	0.0132	37.0	10.2	0.0297	62.9
5.00	23.0	32.5	29.3	0.0132	33.5	10.8	0.0193	56.2
15.00	23.0	29.5	26.3	0.0132	30.5	11.3	0.0114	50.4
30.00	23.0	27.0	23.8	0.0132	28.0	11.7	0.0082	45.6
60.00	22.9	25.0	21.8	0.0132	26.0	12.0	0.0059	41.8
250.00	22.3	21.0	17.7	0.0133	22.0	12.7	0.0030	33.9

Hydrometer Test Data (continued)

Elapsed Time (min.)	Temp. (deg. C.)	Actual Reading	Corrected Reading	K	Rm	Eff. Depth	Diameter (mm.)	Percent Finer
1440.00	20.8	17.5	13.9	0.0135	18.5	13.3	0.0013	26.6

Fractional Components

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	0.0	0.6	0.6	0.8	5.1	20.8	26.7	32.8	39.9	72.7

D_5	D_{10}	D_{15}	D_{20}	D_{30}	D_{40}	D_{50}	D_{60}	D_{80}	D_{85}	D_{90}	D_{95}
				0.0020	0.0051	0.0110	0.0247	0.1165	0.1594	0.2424	0.6272

Fineness Modulus
0.34

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SPECIFIC GRAVITY

ASTM D 854-10

Client	Amec Foster Wheeler	Boring No.	OW-407D
Client Reference	Dan River Steam Station Ash Removal	Depth (ft)	43.5-45.5
Project No.	2015-616-02	Sample No.	UD
Lab ID	2015-616-02-02	Visual Description	YELLOW BROWN & GRAY
		(MInus No.4 sieve material, airdried)	**SANDY LEAN CLAY**

Replicate Number		**1**		**2**
Pycnometer ID	R	447	R	448
Weight of Pycnometer + Soil + Water (gm)		705.07		707.35
Temperature, T (^{o}Celsius)		23.1		23.2
Weight of Pycnometer + Water (gm)		659.32		661.93
Tare Number		447		448
Weight of Tare + Dry Soil (gm)		234.96		236.86
Weight of Tare (gm)		161.34		163.84
Weight of Dry Soil (gm)		73.62		73.02
Specific Gravity of Soil @ T		2.641		2.646
Specific Gravity of Water @ T		0.9975		0.9975
Conversion Factor for Temperature T		0.9993		0.9993
Specific Gravity @ 20° Celsius		2.643		2.648

Average Specific Gravity @ 20° Celsius	2.65

Tested By *SFS* *Date* *5/15/15* *Checked By* *GEM* *Date* *6/4/15*

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ATTERBERG LIMITS

ASTM D 4318-10 / AASHTO T89-10

Client:	AMEC FOSTER WHEELER	Boring No.:	OW-407D
Client Reference:	Dan River Steam Station Ash Removal	Depth (ft):	43.5-45.5
Project No.:	2015-616-02	Sample No.:	UD
Lab ID:	2015-616-02-02	Soil Description:	YELLOW BROWN & GRAY LEAN CLAY

Note: The USCS symbol used with this test refers only to the minus No. 40 sieve material. See the "Sieve and Hydrometer Analysis" graph page for the complete material description.

(Minus No. 40 sieve material, Airdried)

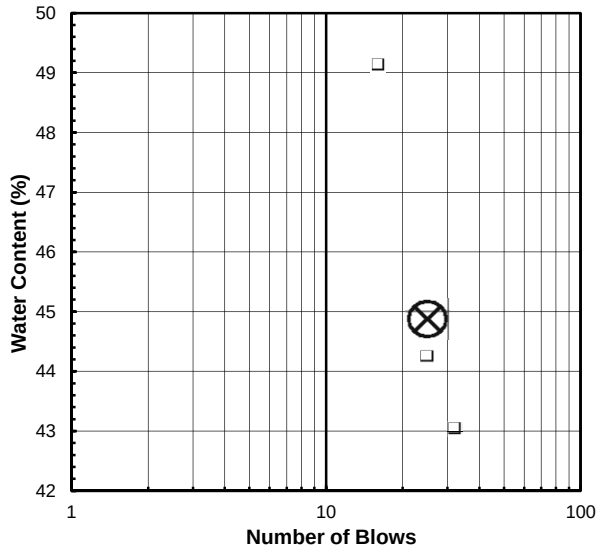
Liquid Limit Test	**1**	**2**	**3**	
Tare Number	T	W-2	U	**MULTIPOINT**
Wt. of Tare & Wet Sample (g)	26.44	27.12	27.98	
Wt. of Tare & Dry Sample (g)	23.07	23.66	23.77	
Wt. of Tare (g)	15.24	15.84	15.20	
Wt. of Water (g)	3.4	3.5	4.2	
Wt. of Dry Sample (g)	7.8	7.8	8.6	
Moisture Content (%)	**43.0**	**44.2**	**49.1**	
Number of Blows	**32**	**25**	**16**	

Plastic Limit Test	**1**	**2**	**Range**
Tare Number	3	Q	
Wt. of Tare & Wet Sample (g)	22.36	22.38	
Wt. of Tare & Dry Sample (g)	20.94	20.91	
Wt. of Tare (g)	15.43	15.18	
Wt. of Water (g)	1.4	1.5	
Wt. of Dry Sample (g)	5.5	5.7	
Moisture Content (%)	**25.8**	**25.7**	**0.1**

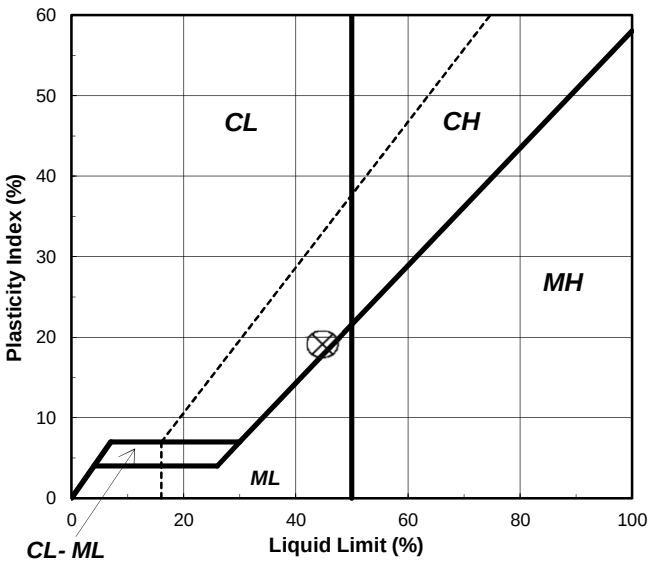
Note: The acceptable range of the two Moisture contents is ± 2.6

Test Results	
Liquid Limit (%)	**45**
Plastic Limit (%)	**26**
Plasticity Index (%)	**19**
USCS Symbol	**CL**

Flow Curve



Plasticity Chart



Tested By	*BW*	*Date*	*5/14/15*	*Checked By*	*SFS*	*Date*	6/4/15

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SIEVE AND HYDROMETER ANALYSIS
ASTM D 422-63 (2007)

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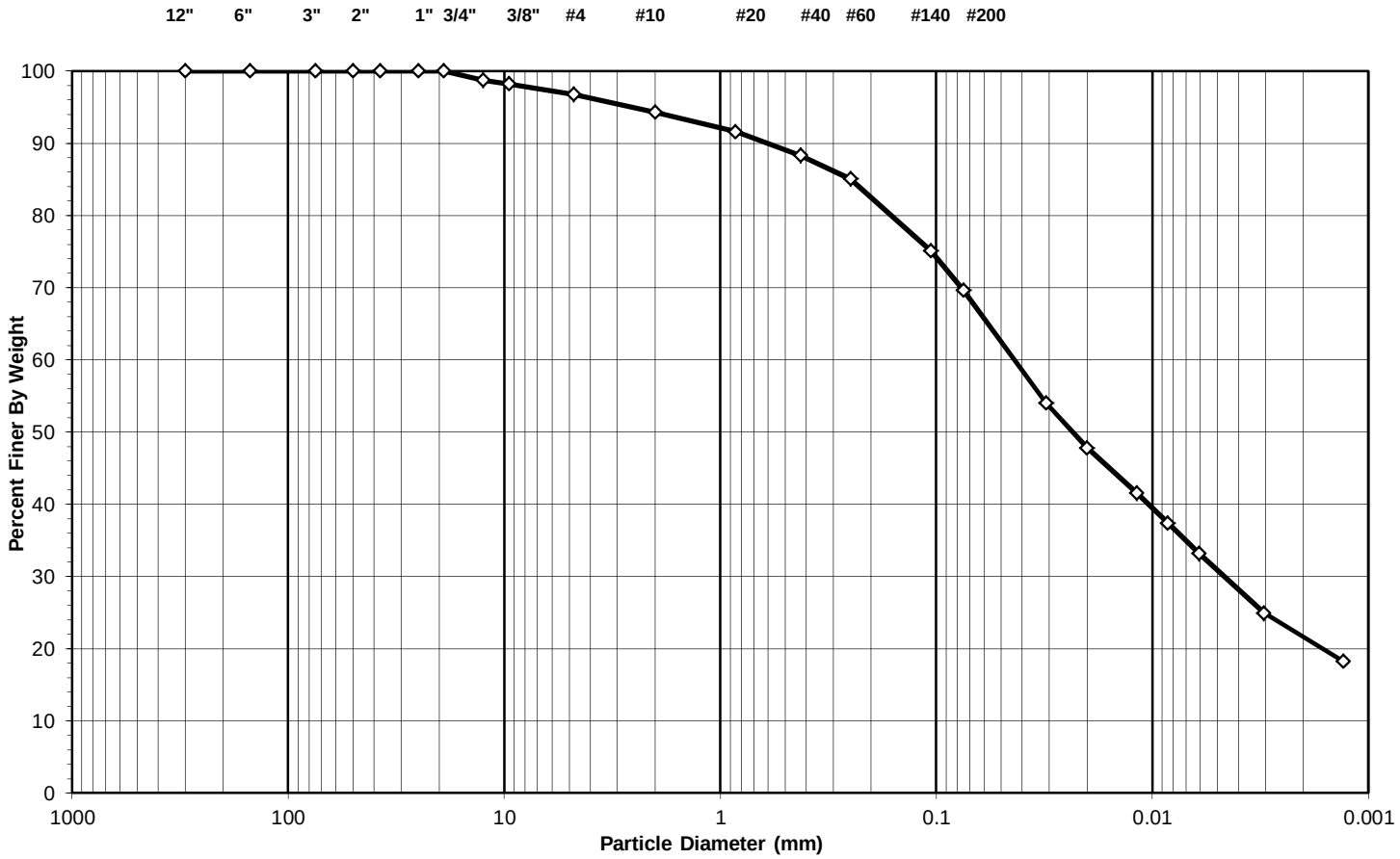
Client	Amec Foster Wheeler	Boring No.	OW-407D
Client Reference	Dan River Steam Station Ash Removal	Depth (ft)	43.5-45.5
Project No.	2015-616-02	Sample No.	UD
Lab ID	2015-616-02-02	Soil Color	**YELLOW BROWN & GRAY**

	SIEVE ANALYSIS			*HYDROMETER*	
USCS	**cobbles**	**gravel**	**sand**	**silt and clay fraction**	
USDA	**cobbles**	**gravel**	**sand**	**silt**	**clay**



USCS Summary

Sieve Sizes (mm)		**Percentage**
Greater Than #4	*Gravel*	3.21
#4 To #200	*Sand*	27.10
Finer Than #200	*Silt & Clay*	69.68

USCS Symbol ***CL, TESTED***

USCS Classification ***SANDY LEAN CLAY***

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WASH SIEVE ANALYSIS

ASTM D 422-63 (2007)

Client	Amec Foster Wheeler	Boring No.	OW-407D
Client Reference	Dan River Steam Station Ash Removal	Depth (ft)	43.5-45.5
Project No.	2015-616-02	Sample No.	UD
Lab ID	2015-616-02-02	Soil Color	**YELLOW BROWN & GRAY**

Minus #10 for Hygroscopic Moisture Content		**Hydrometer Specimen Data**	
Tare No.	M-1	Air Dried - #10 Hydrometer Material (g)	50.00
Wgt.Tare + Wet Soil (g)	30.01	Corrected Dry Wt. of - #10 Material (g)	45.33
Wgt.Tare + Dry Soil (g)	28.70		
Weight of Tare (g)	15.97	Weight of - #200 Material (g)	33.50
Weight of Water (g)	1.31	Weight of - #10 ; + #200 Material (g)	11.83
Weight of Dry Soil (g)	12.73		
Moisture Content (%)	**10.3**	**J-FACTOR (%FINER THAN #10)**	**0.9429**
Soil Specimen Data			
Tare No.	153		
Wgt.Tare + Air Dry Soil (g)	942.26		
Weight of Tare (g)	240.86		
Air Dried Wgt. Total Sample (g)	701.40	Dry Weight of Material Retained on #10 (g)	36.53
Total Dry Sample Weight (g)	639.36	Corrected Dry Sample Wt - #10 (g)	602.83

Sieve Size	Sieve Opening (mm)	Wgt.of Soil Retained (gm)	Percent Retained (%)	Accumulated Percent Retained (%)	Percent Finer (%)	**Accumulated Percent Finer (%)**
12"	300	0.00	0.0	0.0	100.0	**100.0**
6"	150	0.00	0.0	0.0	100.0	**100.0**
3"	75	0.00	0.0	0.0	100.0	**100.0**
2"	50	0.00	0.0	0.0	100.0	**100.0**
1 1/2"	37.5	0.00	0.0	0.0	100.0	**100.0**
1"	25.0	0.00	0.0	0.0	100.0	**100.0**
3/4"	19.0	0.00	0.0	0.0	100.0	**100.0**
1/2"	12.5	8.19	1.3	1.3	98.7	**98.7**
3/8"	9.50	3.21	0.5	1.8	98.2	**98.2**
#4	4.75	9.14	1.4	3.2	96.8	**96.8**
#10	2.00	15.99	2.5	5.7	94.3	**94.3**
#20	0.85	1.29	2.8	2.8	97.2	**91.6**
#40	0.425	1.59	3.5	6.4	93.6	**88.3**
#60	0.250	1.54	3.4	9.7	90.3	**85.1**
#140	0.106	4.82	10.6	20.4	79.6	**75.1**
#200	0.075	2.59	5.7	26.1	73.9	**69.7**
Pan	-	33.50	73.9	100.0	-	**-**

Notes :

Tested By BW Date 5/15/15 Checked By SFS Date 6/4/15

DCN: CT-S3OR DATE: 7/26/13 REVISION 8 *ECTS\2015-616 AMEC - DAN RIVER\Results group 01 with color changes\[2015-616-02-02 COLOR CHG SIEVEHYD10.xls]Sheet1*

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HYDROMETER ANALYSIS

ASTM D 422-63 (2007)

Client	Amec Foster Wheeler	Boring No.	OW-407D
Client Reference	Dan River Steam Station Ash Removal	Depth (ft)	43.5-45.5
Project No.	2015-616-02	Sample No.	UD
Lab ID	2015-616-02-02	Soil Color	**YELLOW BROWN & GRAY**

Elapsed Time (min)	R Measured	Temp. (°C)	Composite Correction	R Corrected	N (%)	K Factor	Diameter (mm)	N' (%)
0	NA	NA	NA	NA	NA	NA	NA	NA
2	30.0	23.8	4.01	26.0	57.3	0.01305	0.0311	**54.1**
5	27.0	23.8	4.01	23.0	50.7	0.01305	0.0201	**47.8**
15	24.0	23.8	4.01	20.0	44.1	0.01305	0.0118	**41.6**
30	22.0	23.8	4.01	18.0	39.7	0.01305	0.0085	**37.4**
60	20.0	23.7	4.04	16.0	35.2	0.01306	0.0061	**33.2**
250	16.0	23.8	4.01	12.0	26.4	0.01305	0.0031	**24.9**
1440	13.0	23.1	4.23	8.8	19.3	0.01315	0.0013	**18.2**

Soil Specimen Data		**Other Corrections**		
Wgt. of Dry Material (g)	45.33	Hygroscopic Moisture Factor	0.907	
Weight of Deflocculant (g)	5.0	a - Factor	1	
		Percent Finer than # 10	94.29	
		Specific Gravity	2.65	Measured

Notes:

Tested By BW Date 5/13/15 Checked By SFS Date 6/4/15

DCN: CT-S3OR DATE: 7/26/13 REVISION: 8 *\PROJECTS\2015-616 AMEC - DAN RIVER\Results group 01 with color changes\[2015-616-02-02 COLOR CHG SIEVEHYD10.xls]Sheet1*

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FLEXIBLE WALL PERMEABILITY TEST

PERMOMETER METHOD

ASTM D 5084-10

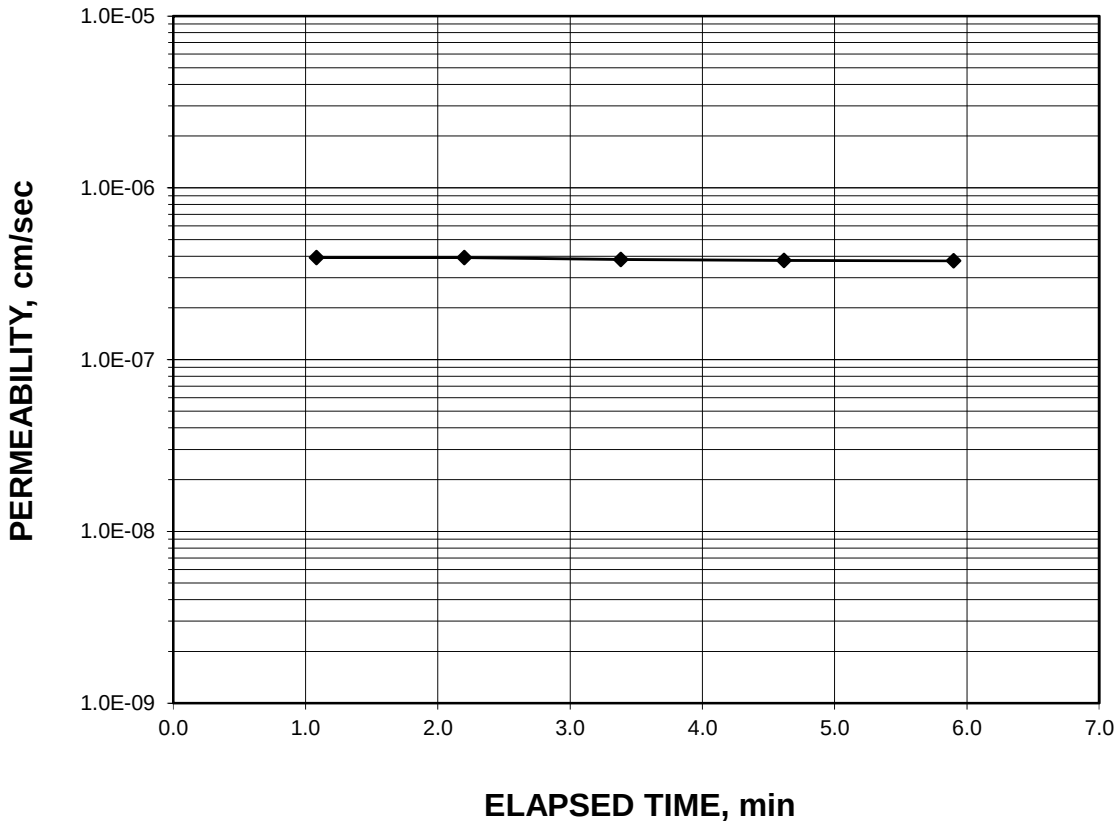
Client	AMEC FOSTER WHEELER	Boring No.	OW-407D
Client Project	Dan River Steam Station Ash Remo	Depth (ft.)	44.8-45.3
Project No.	2015-616-02	Sample No.	UD
Lab ID No.	2015-616-02-02		

Visual Description: YELLOW BROWN AND GRAY SANDY LEAN CLAY

AVERAGE PERMEABILITY = 3.8E-07 cm/sec @ 20°C

AVERAGE PERMEABILITY = 3.8E-09 m/sec @ 20°C

PERMEABILITY vs. TIME



Tested By: SFS Date: 4/30/15 Checked By: GEM Date: 6/4/15

DCN: CT-22A DATE:2-2-10 REVISION: 5Z:\2015 PROJECTS\2015-616 AMEC - DAN RIVER\[2015-616-02-02 Permometer.xls]Sheet1

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FLEXIBLE WALL PERMEABILITY TEST

PERMOMETER METHOD

ASTM D 5084-10

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Client	AMEC FOSTER WHEELER	Boring No.	OW-407D
Client Project	Dan River Steam Station Ash Removal	Depth (ft.)	44.8-45.3
Project No.	2015-616-02	Sample No.	UD
Lab ID No.	2015-616-02-02		

Specific Gravity	2.65	Measured
Sample Condition		Undisturbed

Visual Description: YELLOW BROWN AND GRAY SANDY

LEAN CLAY

MOISTURE CONTENT:	BEFORE TEST	AFTER TEST
Tare Number	812	811
Wt. of Tare & WS (gm.)	335.16	788.51
Wt. of Tare & DS (gm.)	289.50	645.77
Wt. of Tare (gm.)	106.00	101.14
Wt. of Water (gm.)	45.66	142.74
Wt. of DS (gm.)	183.50	544.63
Moisture Content (%)	**24.9**	**26.2**

SPECIMEN:	BEFORE TEST	AFTER TEST
Wt. of Tube & WS (gm.)	1258.68	NA
Wt. of Tube (gm.)	0.00	NA
Wt. of WS (calc.) (gm.)	1258.68	1272.04
Length 1 (in.)	6.250	6.199
Length 2 (in.)	6.244	6.199
Length 3 (in.)	6.189	6.199
Top Diameter (in.)	2.847	2.849
Middle Diameter (in.)	2.850	2.849
Bottom Diameter (in.)	2.849	2.849
Average Length (in.)	6.23	6.20
Average Area (in.^{2})	6.37	6.37
Sample Volume (cm^3)	650.43	647.59
Unit Wet Wt. (gm./ cm^3)	1.935	1.964
Unit Wet Wt. (pcf)	120.8	122.6
Unit Dry Wt. (pcf)	96.7	97.2
Unit Dry Wt. (gm./ cm^3)	1.550	1.556
Void Ratio, e	0.710	0.703
Porosity, n	0.415	0.413
Pore Volume (cm^3)	270.1	267.3
Total Wt. Of Sample After Test		1242.20

Tested By: SFS Date: 4/30/15 Checked By: GEM Date: 6/4/15

DCN: CT-22A DATE:2-2-10 REVISION: 5 Z:\2015 PROJECTS\2015-616 AMEC - DAN RIVER\[2015-616-02-02 Permometer.xls]Sheet1

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FLEXIBLE WALL PERMEABILITY TEST
PERMOMETER METHOD

ASTM D 5084-10

Client	AMEC FOSTER WHEELER	Boring No.	OW-407D
Client Project	Dan River Steam Station Ash Removal	Depth (ft.)	44.8-45.3
Project No.	2015-616-02	Sample No.	UD
Lab ID No.	2015-616-02-02		

Test Pressures		Final Sample Dimensions	
Cell Pressure(psi)	55.0	Sample Length (cm), L	15.75
Back Pressure(psi)	50.0	Sample Area (cm^2), A	41.13
Eff. Cons. Pressure(psi)	5.0	Pipette Area (cm^2), a_p	0.03142
Response (%)	100	Annulus Area (cm^2), a_a	0.76712
		Equilibrium Level (cm), R_{eq}	1

AVERAGE PERMEABILITY = 3.8E-07 cm/sec @ 20°C
AVERAGE PERMEABILITY = 3.8E-09 m/sec @ 20°C

DATE		TIME			ELAPSED TIME **t**	PIPETTE READI NG **R_p**	INCREMENT GRADIENT **i**	TEMP.	INCREMENTAL PERMEABILITY @ 20°C
(mm/dd/yy)	(hr)	(min)	(sec)	(min)	(min)	(cm)	(cm/cm)	(°C)	(cm/sec)
5/7/15	11	59	52	59.87	0.000	7.9	5.7	22.5	NA
5/7/15	12	0	57	0.95	1.083	7.7	5.6	22.5	3.9E-07
5/7/15	12	2	4	2.07	2.200	7.5	5.4	22.5	3.9E-07
5/7/15	12	3	15	3.25	3.383	7.3	5.2	22.5	3.8E-07
5/7/15	12	4	29	4.48	4.617	7.1	5.1	22.5	3.8E-07
5/7/15	12	5	46	5.77	5.900	6.9	4.9	22.5	3.8E-07

Tested By: SFS Date: 4/30/15 Checked By: GEM Date: 6/4/15

DCN: CT-22A DATE:2-2-10 REVISION: 5 Z:\2015 PROJECTS\2015-616 AMEC - DAN RIVER\[2015-616-02-02 Permometer.xls]Sheet1

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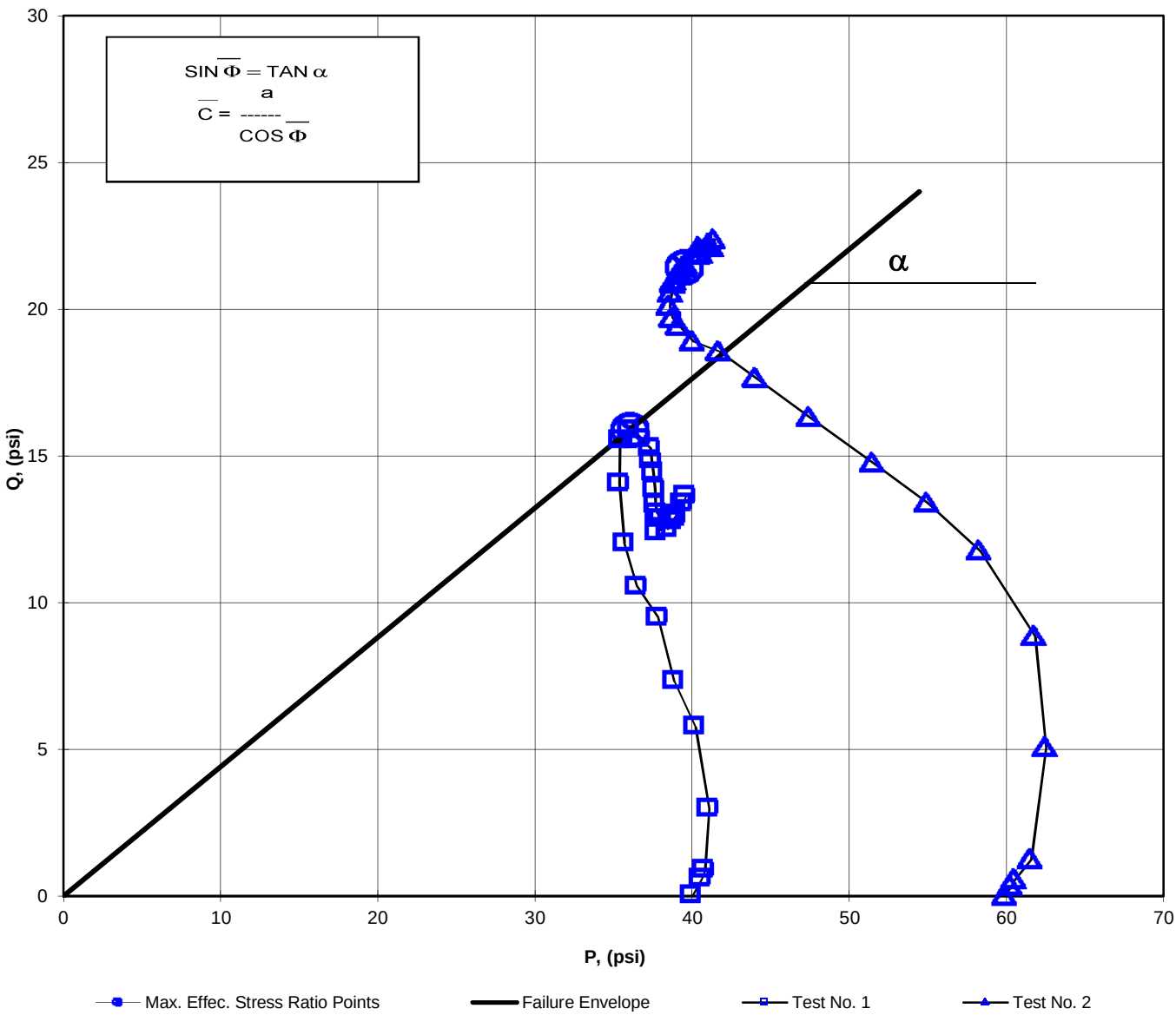
CONSOLIDATED UNDRAINED TRIAXIAL TEST
WITH PORE PRESSURE READINGS
ASTM D4767-11

Client:	Amec Foster Wheeler	Boring No.:	OW-407D
Client Reference:	Dan River Steam Station Ash Removal	Depth (ft):	44.3-45.3
Project No.:	2015-616-02	Sample No.:	UD
Lab ID:	2015-616-02-02		

Consolidated Undrained Triaxial Test with Pore Pressure



a	=	**0.00**	$\overline{\mathbf{C}}$	=	**0.00**
α	=	**23.8**	$\overline{\Phi}$	=	**26.15**

Tested By: SFS Date: 4/30/15 Approved By: MPS Date: 6/4/15

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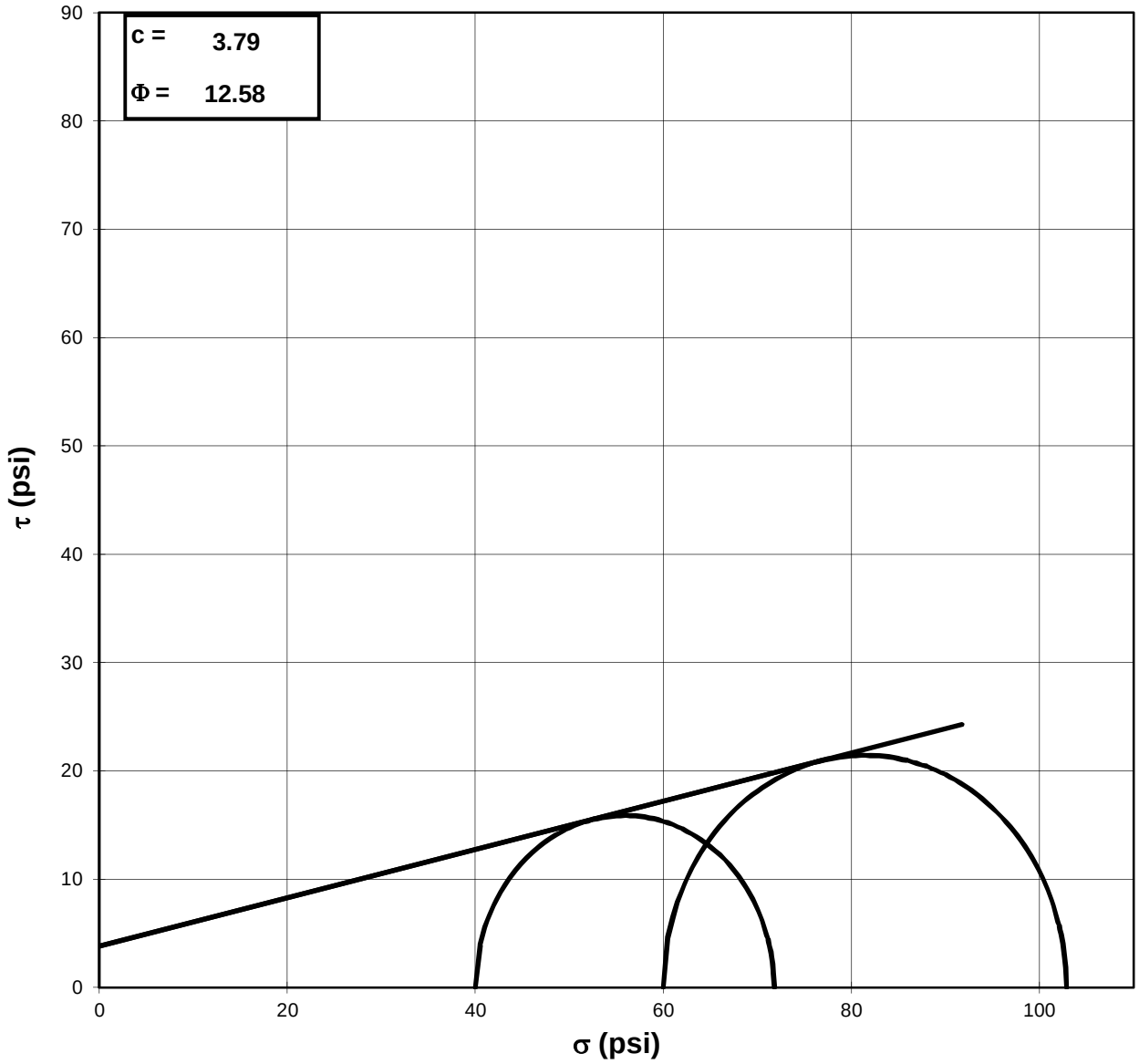
MOHR TOTAL STRENGTH ENVELOPE

ASTM D4767-11

Client:	Amec Foster Wheeler	Boring No.:	OW-407D
Client Reference:	Dan River Steam Station Ash Removal	Depth (ft):	44.3-45.3
Project No.:	2015-616-02	Sample No.:	UD
Lab ID:	2015-616-02-02		
Visual Description:	YELLOW BROWN & GRAY SANDY LEAN CLAY (UNDISTURBED)		



Failure Based on Maximum Effective Principal Stress Ratio

NOTE: GRAPH NOT TO SCALE

Tested By: SFS *Date:* 4/30/15 *Approved By:* MPS *Date:* 6/4/15

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CONSOLIDATED UNDRAINED TRIAXIAL TEST
WITH PORE PRESSURE READINGS
ASTM D4767-11

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Client:	Amec Foster Wheeler	Boring No.:	OW-407D
Client Reference:	Dan River Steam Station Ash Removal	Depth (ft):	44.8-45.3
Project No.:	2015-616-02	Sample No.:	UD
Lab ID:	2015-616-02-02		

Visual Description: YELLOW BROWN & GRAY SANDY LEAN CLAY (UNDISTURBED)

Stage No.	1
Test No.	1

PRESSURES (psi)

Cell Pressure (psi)	90.0
Back Pressure (psi)	50.0
Eff. Conf. Pressure (psi)	40.0
Pore Pressure Response (%)	100

MAXIMUM OBLIQUITY POINTS

$\overline{P}$	=	36.02
Q	=	15.88

INITIAL SAMPLE DIMENSIONS (in)

Length 1:	6.250	Diameter 1:	2.847
Length 2:	6.244	Diameter 2:	2.850
Length 3:	6.189	Diameter 3:	2.849
Avg. Length:	6.228	*Avg. Diam.:*	2.849

VOLUME CHANGE

Initial Burette Reading (ml)	48.0
Final Burette Reading (ml)	23.5
Final Change (ml)	24.5

Initial Dial Reading (mil)	30
Dial Reading After Saturation (mil)	33
Dial Reading After Consolidation (mil)	161

LOAD (LB)	DEFORMATION (IN)	PORE PRESSURE (PSI)
15.5	0.000	50.0
22.5	0.002	49.9
26.3	0.003	50.0
52.7	0.009	51.9
87.6	0.015	55.5
107.3	0.021	58.4
134.8	0.030	61.6
148.4	0.039	64.0
167.2	0.051	66.3
193.3	0.072	68.7
213.1	0.102	70.1
218.7	0.138	69.8
216.2	0.174	68.8
213.5	0.216	67.9
208.9	0.246	67.4
204.9	0.288	66.8
199.5	0.345	66.2
194.0	0.405	65.6
191.8	0.450	65.2
191.0	0.510	64.9
192.1	0.555	64.7
187.3	0.600	64.6
194.1	0.645	64.1
195.5	0.675	64.1
192.5	0.705	64.0
197.0	0.735	64.0
201.3	0.765	64.0
201.6	0.810	63.9
209.9	0.855	63.9
214.9	0.885	64.0
213.2	0.915	64.0

Tested By: SFS Date: 4/30/15 Input Checked By: GEM Date: 6/4/15

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WITH PORE PRESSURE READINGS
ASTM D4767-11

Client:	Amec Foster Wheeler	Boring No.:	OW-407D
Client Reference:	Dan River Steam Station Ash Removal	Depth (ft):	44.8-45.3
Project No.:	2015-616-02	Sample No.:	UD
Lab ID:	2015-616-02-02		

Visual Description: YELLOW BROWN & GRAY SANDY LEAN CLAY (UNDISTURBED)

Effective Confining Pressure (psi)	40.0	*Stage No.*	1
		Test No	1

INITIAL DIMENSIONS

Initial Sample Length (in)	6.23
Initial Sample Diameter (in)	2.85
Initial Sample Area (in^2)	6.37
Initial Sample Volume (in^3)	39.69

VOLUME CHANGE

Volume After Consolidation (in^3)	38.14
Length After Consolidation (in)	6.10
Area After Consolidation (in^2)	6.256

Strain (%)	Deviation Stress	ΔU	$\overline{\sigma}_1$	$\overline{\sigma}_3$	Effective Principle Stress Ratio	$\overline{A}$	$\overline{P}$	Q
0.02	1.13	-0.04	41.18	40.1	1.028	-0.03	40.62	0.56
0.05	1.73	0.05	41.70	40.0	1.043	0.03	40.83	0.87
0.15	5.94	1.88	44.07	38.1	1.156	0.32	41.10	2.97
0.25	11.50	5.52	45.99	34.5	1.333	0.48	40.24	5.75
0.34	14.62	8.44	46.20	31.6	1.463	0.58	38.89	7.31
0.49	18.98	11.65	47.35	28.4	1.669	0.61	37.86	9.49
0.64	21.11	14.04	47.09	26.0	1.813	0.66	36.53	10.56
0.84	24.05	16.32	47.74	23.7	2.015	0.68	35.72	12.02
1.18	28.10	18.68	49.43	21.3	2.317	0.66	35.39	14.05
1.67	31.07	20.12	50.96	19.9	2.562	0.65	35.43	15.54
2.26	31.75	19.87	51.90	20.1	2.576	0.63	36.02	15.88
2.85	31.17	18.87	52.31	21.1	2.474	0.61	36.73	15.58
3.54	30.54	17.92	52.63	22.1	2.382	0.59	37.37	15.27
4.03	29.68	17.40	52.29	22.6	2.312	0.59	37.45	14.84
4.72	28.85	16.87	51.98	23.1	2.247	0.58	37.56	14.42
5.66	27.76	16.25	51.52	23.8	2.168	0.59	37.64	13.88
6.64	26.64	15.65	51.01	24.4	2.093	0.59	37.69	13.32
7.38	26.11	15.26	50.86	24.8	2.055	0.58	37.81	13.05
8.37	25.72	14.95	50.78	25.1	2.026	0.58	37.92	12.86
9.10	25.67	14.76	50.92	25.2	2.017	0.58	38.09	12.84
9.84	24.77	14.64	50.14	25.4	1.976	0.59	37.76	12.39
10.58	25.54	14.14	51.41	25.9	1.987	0.55	38.64	12.77
11.07	25.59	14.10	51.50	25.9	1.988	0.55	38.71	12.79
11.56	25.03	14.05	50.99	26.0	1.964	0.56	38.48	12.51
12.06	25.52	14.03	51.51	26.0	1.982	0.55	38.75	12.76
12.55	25.98	13.98	52.01	26.0	1.998	0.54	39.02	12.99
13.29	25.80	13.96	51.86	26.1	1.990	0.54	38.96	12.90
14.02	26.73	13.96	52.78	26.1	2.026	0.52	39.42	13.36
14.52	27.26	14.01	53.26	26.0	2.048	0.51	39.63	13.63
15.01	26.86	14.07	52.80	25.9	2.036	0.52	39.37	13.43

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CONSOLIDATED UNDRAINED TRIAXIAL TEST
WITH PORE PRESSURE READINGS
ASTM D4767-11

Client:	Amec Foster Wheeler	Boring No.:	OW-407D
Client Reference:	Dan River Steam Station Ash Removal	Depth (ft):	44.3-44.8
Project No.:	2015-616-02	Sample No.:	UD
Lab ID:	2015-616-02-02		

Visual Description: YELLOW BROWN & GRAY SANDY LEAN CLAY (UNDISTURBED)

Stage No.	1
Test No.	2

PRESSURES (psi)

Cell Pressure (psi)	110.0
Back Pressure (psi)	50.0
Eff. Conf. Pressure (psi)	60.0
Pore Pressure Response (%)	99

MAXIMUM OBLIQUITY POINTS

$\overline{P}$	=	39.48
Q	=	21.44

INITIAL SAMPLE DIMENSIONS (in)

Length 1:	5.776	Diameter 1:	2.813
Length 2:	5.774	Diameter 2:	2.805
Length 3:	5.808	Diameter 3:	2.813
Avg. Length:	5.786	*Avg. Diam.:*	2.810

VOLUME CHANGE

Initial Burette Reading (ml)	96.0
Final Burette Reading (ml)	34.6
Final Change (ml)	61.4

Initial Dial Reading (mil)	160
Dial Reading After Saturation (mil)	191
Dial Reading After Consolidation (mil)	443

LOAD (LB)	DEFORMATION (IN)	PORE PRESSURE (PSI)
13.5	0.000	50.0
17.4	0.000	50.0
20.1	0.002	50.0
27.9	0.012	49.7
71.8	0.016	52.5
115.3	0.020	57.0
149.0	0.026	63.4
167.9	0.033	68.4
184.1	0.042	73.2
202.6	0.057	78.8
219.0	0.079	83.6
230.5	0.105	86.8
235.6	0.131	88.8
243.3	0.163	90.2
247.3	0.184	90.9
253.5	0.215	91.5
260.2	0.247	91.8
265.5	0.276	92.0
267.3	0.299	92.1
269.6	0.328	92.1
272.7	0.350	92.0
275.5	0.371	92.0
278.4	0.393	92.0
282.0	0.447	91.8
292.6	0.506	91.6
292.5	0.557	91.4
296.1	0.617	91.3
303.6	0.669	91.1
309.3	0.728	90.9
308.7	0.779	90.8
306.6	0.830	90.6

Tested By: SFS Date: 4/30/15 Input Checked By: GEM Date: 6/4/15

DCN: CT-S28 DATE: 4/12/13 REVISION: 3

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CONSOLIDATED UNDRAINED TRIAXIAL TEST
WITH PORE PRESSURE READINGS
ASTM D4767-11

Client:	Amec Foster Wheeler	Boring No.:	OW-407D
Client Reference:	Dan River Steam Station Ash Removal	Depth (ft):	44.3-44.8
Project No.:	2015-616-02	Sample No.:	UD
Lab ID:	2015-616-02-02		

Visual Description: YELLOW BROWN & GRAY SANDY LEAN CLAY (UNDISTURBED)

Effective Confining Pressure (psi)	60.0	*Stage No.*	1
		Test No	2

INITIAL DIMENSIONS

Initial Sample Length (in)	5.79
Initial Sample Diameter (in)	2.81
Initial Sample Area (in^2)	6.20
Initial Sample Volume (in^3)	35.89

VOLUME CHANGE

Volume After Consolidation (in^3)	31.57
Length After Consolidation (in)	5.50
Area After Consolidation (in^2)	5.736

Strain (%)	Deviation Stress	ΔU	$\overline{\sigma}_1$	$\overline{\sigma}_3$	Effective Principle Stress Ratio	$\overline{A}$	$\overline{P}$	Q
0.00	0.67	-0.01	60.67	60.0	1.011	-0.02	60.33	0.34
0.03	1.15	-0.01	61.15	60.0	1.019	-0.01	60.58	0.58
0.22	2.50	-0.35	62.84	60.3	1.041	-0.14	61.59	1.25
0.29	10.13	2.50	67.61	57.5	1.176	0.25	62.55	5.06
0.37	17.68	6.98	70.68	53.0	1.333	0.40	61.84	8.84
0.48	23.50	13.41	70.08	46.6	1.505	0.58	58.33	11.75
0.60	26.76	18.35	68.40	41.6	1.643	0.69	55.02	13.38
0.76	29.52	23.20	66.30	36.8	1.802	0.79	51.54	14.76
1.04	32.62	28.76	63.84	31.2	2.045	0.89	47.53	16.31
1.43	35.31	33.56	61.74	26.4	2.336	0.96	44.08	17.65
1.91	37.11	36.80	60.29	23.2	2.601	1.00	41.74	18.56
2.39	37.80	38.79	58.99	21.2	2.784	1.04	40.09	18.90
2.95	38.87	40.21	58.64	19.8	2.965	1.04	39.21	19.43
3.34	39.40	40.90	58.48	19.1	3.065	1.05	38.78	19.70
3.92	40.20	41.49	58.70	18.5	3.173	1.04	38.60	20.10
4.48	41.07	41.82	59.23	18.2	3.262	1.03	38.70	20.54
5.02	41.72	41.98	59.72	18.0	3.318	1.02	38.86	20.86
5.43	41.84	42.04	59.78	17.9	3.331	1.02	38.86	20.92
5.97	41.98	42.04	59.92	17.9	3.339	1.01	38.93	20.99
6.36	42.30	42.01	60.27	18.0	3.354	1.00	39.12	21.15
6.75	42.59	41.99	60.58	18.0	3.366	1.00	39.29	21.29
7.13	42.88	41.95	60.92	18.0	3.377	0.99	39.48	21.44
8.12	43.00	41.81	61.18	18.2	3.366	0.98	39.68	21.50
9.20	44.18	41.59	62.58	18.4	3.401	0.95	40.49	22.09
10.13	43.70	41.42	62.27	18.6	3.354	0.96	40.42	21.85
11.21	43.74	41.24	62.49	18.7	3.334	0.95	40.61	21.87
12.15	44.43	41.07	63.35	18.9	3.349	0.93	41.14	22.22
13.22	44.74	40.90	63.82	19.1	3.345	0.92	41.45	22.37
14.16	44.17	40.76	63.40	19.2	3.297	0.93	41.32	22.09
15.08	43.38	40.59	62.77	19.4	3.237	0.95	41.08	21.69

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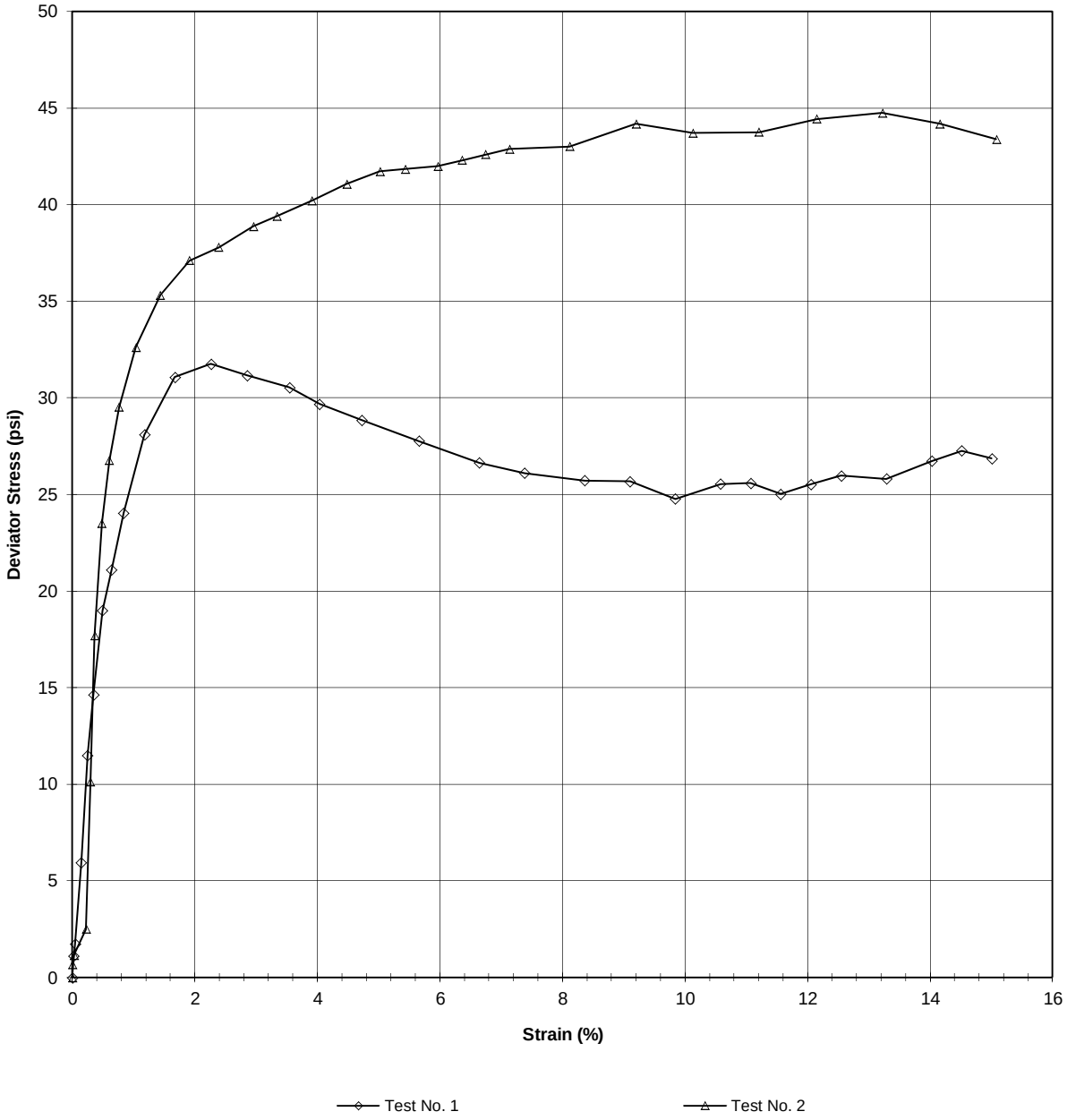
CONSOLIDATED UNDRAINED TRIAXIAL TEST
WITH PORE PRESSURE READINGS
ASTM D4767-11

Client:	Amec Foster Wheeler	Boring No.:	OW-407D
Client Reference:	Dan River Steam Station Ash Removal	Depth (ft):	44.3-45.3
Project No.:	2015-616-02	Sample No.:	UD
Lab ID:	2015-616-02-02		
Visual Description:	YELLOW BROWN & GRAY SANDY LEAN CLAY		



Tested By: SFS Date: 4/30/15 Approved By: MPS Date: 6/4/15

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CONSOLIDATED UNDRAINED TRIAXIAL TEST
WITH PORE PRESSURE READINGS
ASTM D4767-11

Client:	Amec Foster Wheeler		
Client Reference:	Dan River Steam Station Ash Removal		
Project No.:	2015-616-02		
Lab ID:	2015-616-02-02	Specific Gravity (Measured)	2.65

Visual Description: YELLOW BROWN & GRAY SANDY LEAN CLAY (UNDISTURBED)

SAMPLE CONDITION SUMMARY

Boring No.:	OW-407D	OW-407D
Depth (ft):	44.8-45.3	44.3-44.8
Sample No.:	UD	UD
Test No.	T1	T2
Deformation Rate (in/min)	0.0003	0.0003
Back Pressure (psi)	50.0	50.0
Consolidation Time (days)	1	1
Moisture Content (%) (INITIAL)	24.9	24.9
Total Unit Weight (pcf)	120.8	123.6
Dry Unit Weight (pcf)	96.7	99.0
Moisture Content (%) (FINAL)	26.2	22.9
Initial State Void Ratio,e	0.710	0.671
Void Ratio at Shear, e	0.643	0.470

Tested By: SFS Date: 4/30/15 Input Checked By: GEM Date: 6/4/15

DCN: CT-S28 DATE: 4/12/13 REVISION: 3

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WITH PORE PRESSURE READINGS

ASTM D4767-11

MOISTURE CONTENT

	T1	T2
Tare Number	812	812
Weight of Tare & Wet Sample (g)	335.16	335.16
Weight of Tare & Dry Sample (g)	289.5	289.5
Weight of Tare (g)	106	106
Moisture Content (%) (INITIAL)	24.88	24.88
Tare Number	811	813
Weight of Tare & Wet Sample (g)	788.51	682.75
Weight of Tare & Dry Sample (g)	645.77	575.93
Weight of Tare (g)	101.14	109.46
Moisture Content (%) (FINAL)	26.21	22.90

UNIT WEIGHT

Weight of Tube & Wet Sample (g)		1258.68	1164.86
Weight of Tube (g)		0	0
Weight of Wet Sample (g)		1258.68	1164.86
Length 1 (in)		6.25	5.776
Length 2 (in)		6.244	5.774
Length 3 (in)		6.189	5.808
Top Diameter (in)		2.847	2.813
Middle Diameter (in)		2.85	2.805
Bottom Diameter (in)		2.849	2.813
Average Length (in)		6.227667	5.786
Average Area (in)		6.373	6.203
Sample Volume (cm^3)		650.43	588.15
Unit Wet Weight (g/cm^3)		1.94	1.98
Unit Wet Weight (pcf)		120.81	123.65
Unit Dry Weight (pcf)		96.74	99.01
Unit Dry Weight (g/cm^3)		1.55	1.59
Initial Burette Reading		**48**	**96**
Final Burette Reading		**23.5**	**34.6**
Initial Dial Reading		**30**	**160**
Dial Reading After Saturation		**33**	**191**
Dial Reading After Consolidation		**161**	**443**
Volume Change during Consolidation		24.5	61.4
Volume Change during Saturation		0.94	9.45
Volume at Shear (cm^3)	*These	624.99	517.29
Volume of Solids (cm^3)	measurements	380.34	351.99
Volume of Voids (cm^3)	are all	244.65	165.31
Volume of Water (cm^3)	at	264.15	213.60
Void Ratio, e	shear	0.643	0.470

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CONSOLIDATED UNDRAINED TRIAXIAL TEST
WITH PORE PRESSURE READINGS
ASTM D4767-11

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Client:	Amec Foster Wheeler	Boring No.:	OW-407D
Client Reference:	Dan River Steam Station Ash Removal	Depth (ft):	44.3-45.3
Project No.:	2015-616-02	Sample No.:	UD
Lab ID:	2015-616-02-02		

TEST 1 INITIAL

TEST 1 FINAL

TEST 2 INITIAL

TEST 2 FINAL

Tested By	*SFS*	*Date*	*4/30/15*	*Approved By*	MPS	*Date*	6/4/15

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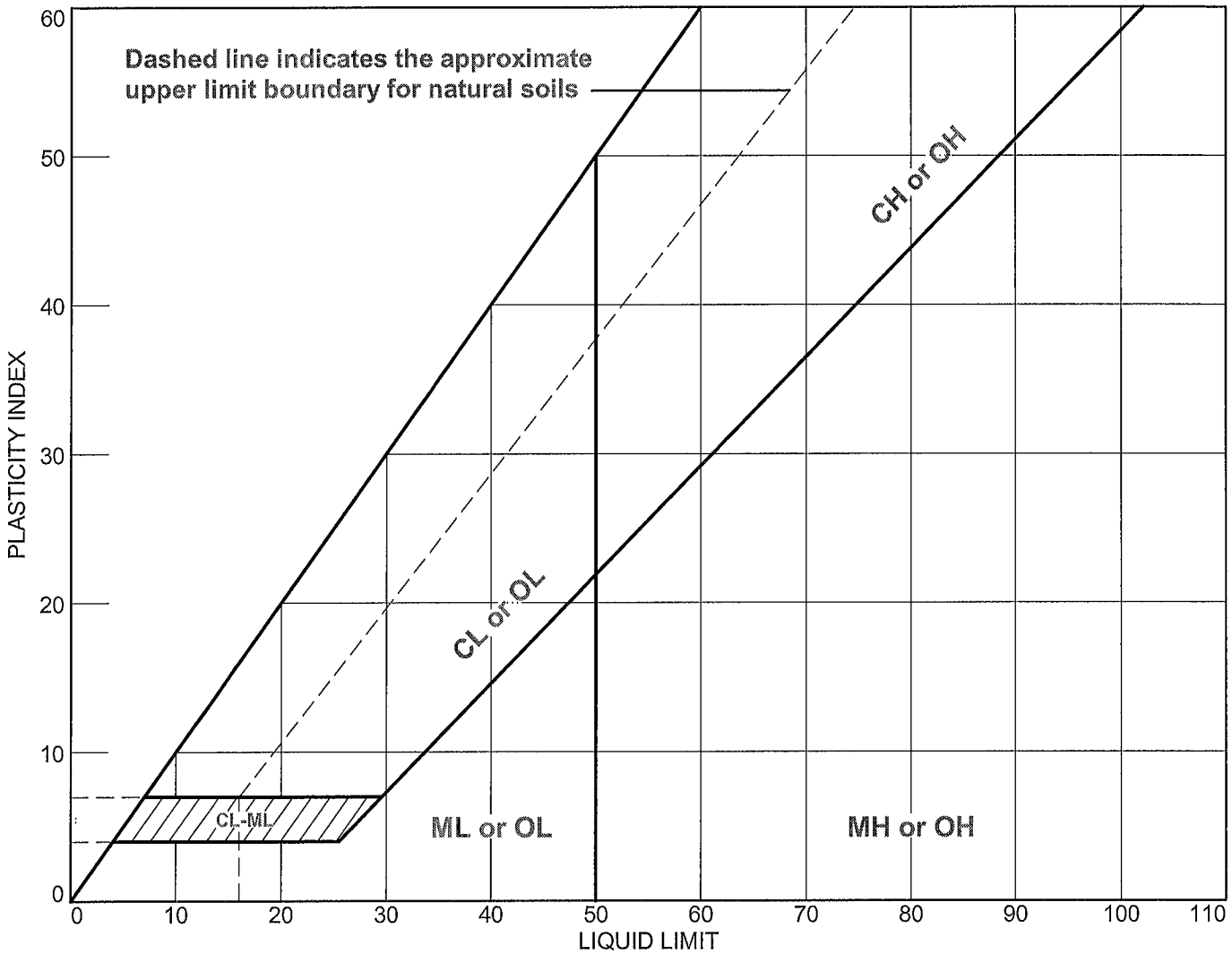
LIQUID AND PLASTIC LIMITS TEST REPORT



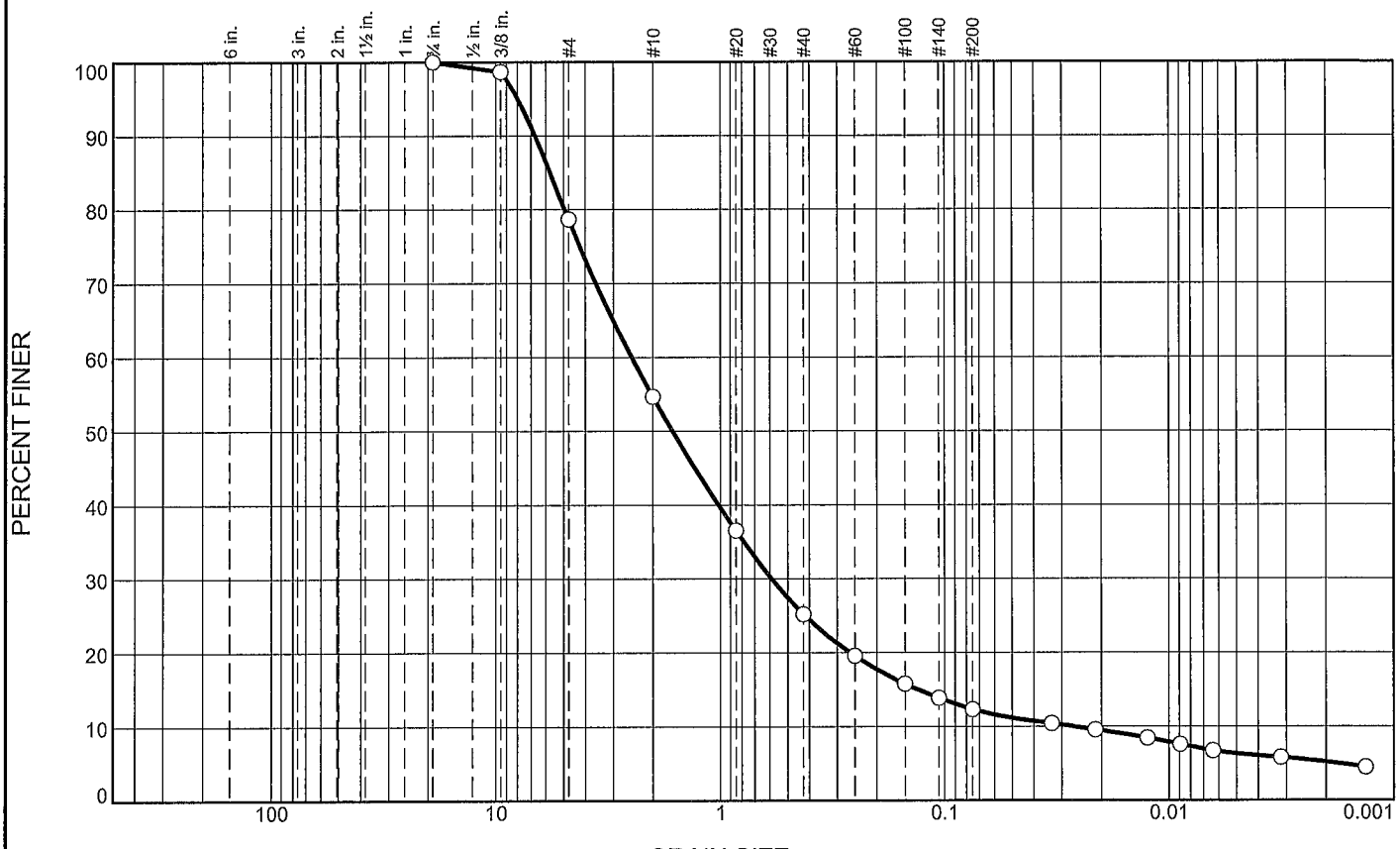
SOIL DATA								
SYMBOL	SOURCE	SAMPLE NO.	DEPTH	NATURAL WATER CONTENT (%)	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	USCS
●	OW-407S	SS-11	53.5-55'		NP	NV	NP	SM
■	OW-409S	SS-2/SS-3	9.8-15'		NP	NV	NP	SM
▲	OW-410S	SS-9	43.5-45'		NP	NV	NP	SM
◆	OW-411S	SS-12	58.5-60'		NP	NV	NP	SM
▼	OW-412S	SS-9	43.5-45'		NP	NV	NP	SM

amec

Client: Duke Energy
Project: Dan River Steam Station Ash Removal
Project No.: 7810140065 **Figure**

Tested By: A Kottenstette **Checked By:** D Kopitsky

Particle Size Analysis ASTM D422



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	21.3	24.0	29.5	12.9	6.0	6.3

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/4"	100.0		
3/8"	98.7		
#4	78.7		
#10	54.7		
#20	36.5		
#40	25.2		
#60	19.6		
#100	15.8		
#140	13.9		
#200	12.3		
0.0333 mm.	10.4		
0.0213 mm.	9.6		
0.0125 mm.	8.4		
0.0089 mm.	7.6		
0.0064 mm.	6.7		
0.0032 mm.	5.8		
0.0013 mm.	4.5		

* (no specification provided)

Soil Description

Dark Gray Silty Sand with Gravel

Atterberg Limits

PL= NP LL= NV PI= NP

Coefficients

D_{90}= 6.6996 D_{85}= 5.7422 D_{60}= 2.4848
D_{50}= 1.6355 D_{30}= 0.5870 D_{15}= 0.1315
D_{10}= 0.0267 C_u= 92.96 C_c= 5.19

Classification

USCS= SM AASHTO= A-1-b

Remarks

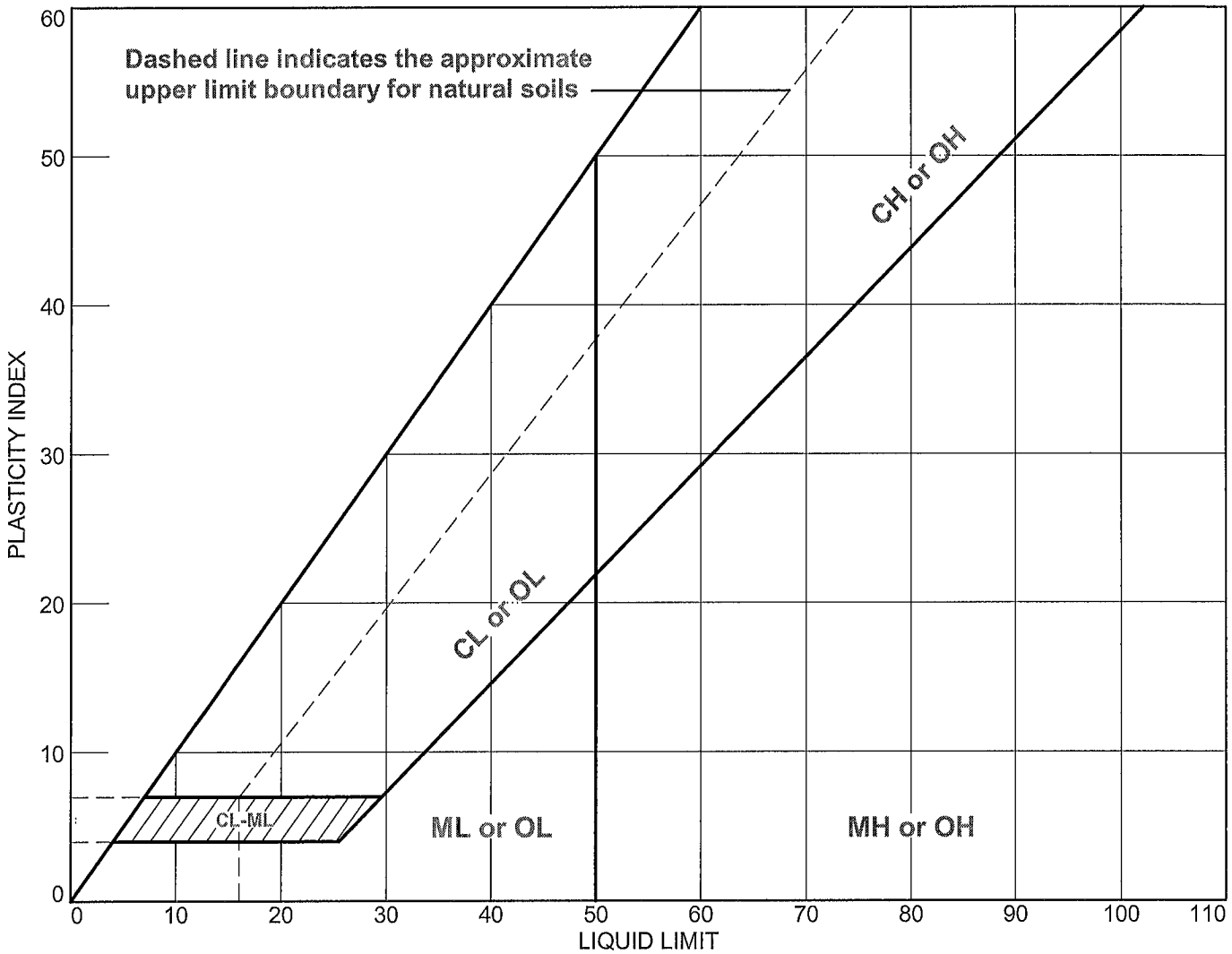
Source of Sample: OW-409S **Depth:** 9.8-15'
Sample Number: SS-2/SS-3 **Date:** 6-2-15

amec

Client: Duke Energy
Project: Dan River Steam Station Ash Removal
Project No: 7810140065 **Figure**

Tested By: D Kopitsky **Checked By:** M Hamilton

LIQUID AND PLASTIC LIMITS TEST REPORT



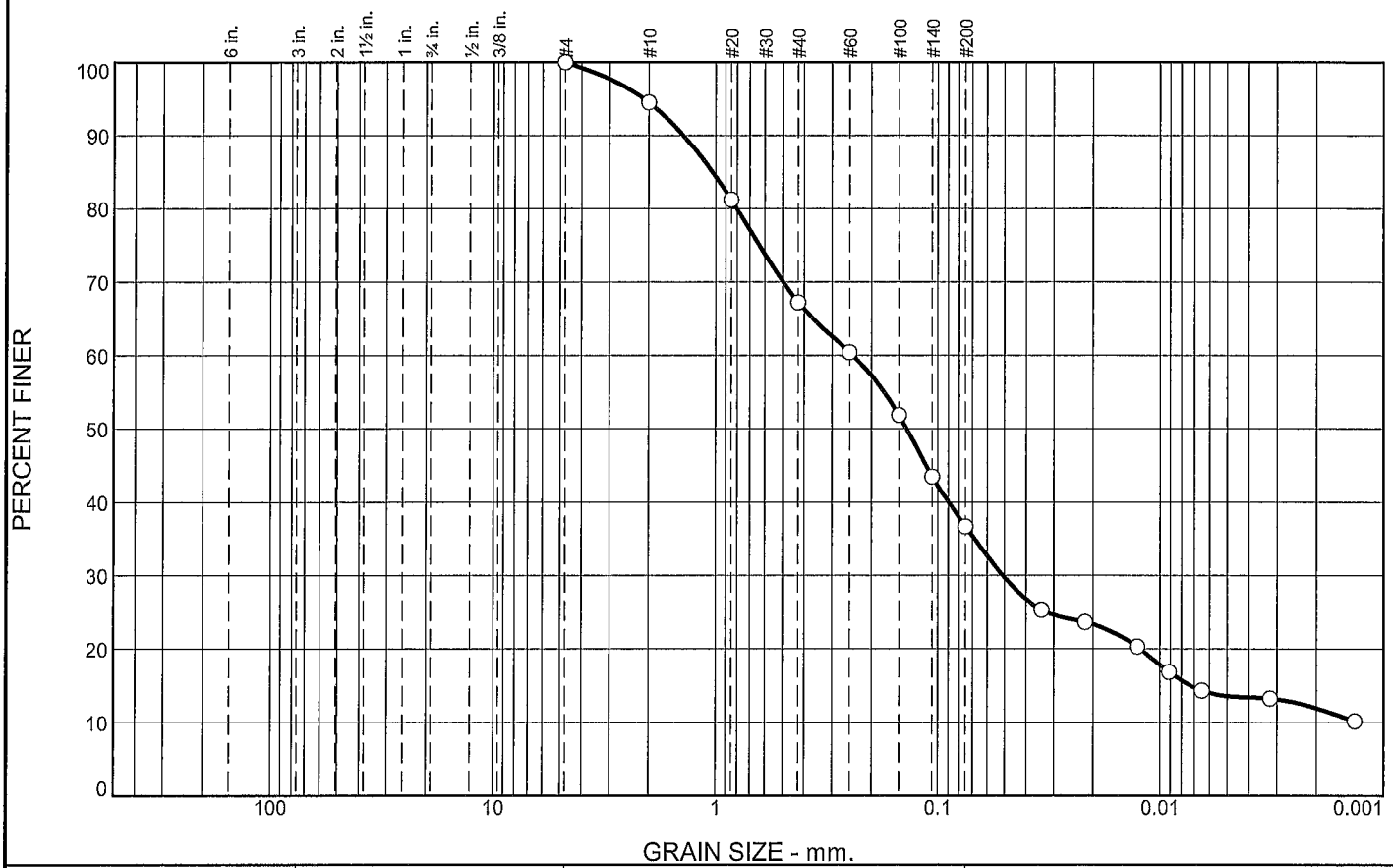
SOIL DATA								
SYMBOL	SOURCE	SAMPLE NO.	DEPTH	NATURAL WATER CONTENT (%)	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	USCS
●	OW-407S	SS-11	53.5-55'		NP	NV	NP	SM
■	OW-409S	SS-2/SS-3	9.8-15'		NP	NV	NP	SM
▲	OW-410S	SS-9	43.5-45'		NP	NV	NP	SM
◆	OW-411S	SS-12	58.5-60'		NP	NV	NP	SM
▼	OW-412S	SS-9	43.5-45'		NP	NV	NP	SM

amec

Client: Duke Energy
Project: Dan River Steam Station Ash Removal
Project No.: 7810140065 **Figure**

Tested By: A Kottenstette **Checked By:** D Kopitsky

Particle Size Analysis ASTM D422



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	5.5	27.3	30.5	23.1	13.6

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#10	94.5		
#20	81.2		
#40	67.2		
#60	60.4		
#100	51.9		
#140	43.5		
#200	36.7		
0.0341 mm.	25.3		
0.0217 mm.	23.6		
0.0127 mm.	20.3		
0.0091 mm.	16.9		
0.0065 mm.	14.3		
0.0032 mm.	13.2		
0.0013 mm.	10.2		

* (no specification provided)

Soil Description

Yellow Silty Sand

Atterberg Limits

PL= NP LL= NV PI= NP

Coefficients

D_{90}= 1.3972 D_{85}= 1.0336 D_{60}= 0.2422
D_{50}= 0.1385 D_{30}= 0.0509 D_{15}= 0.0073
D_{10}= C_u= C_c=

Classification

USCS= SM AASHTO= A-4(0)

Remarks

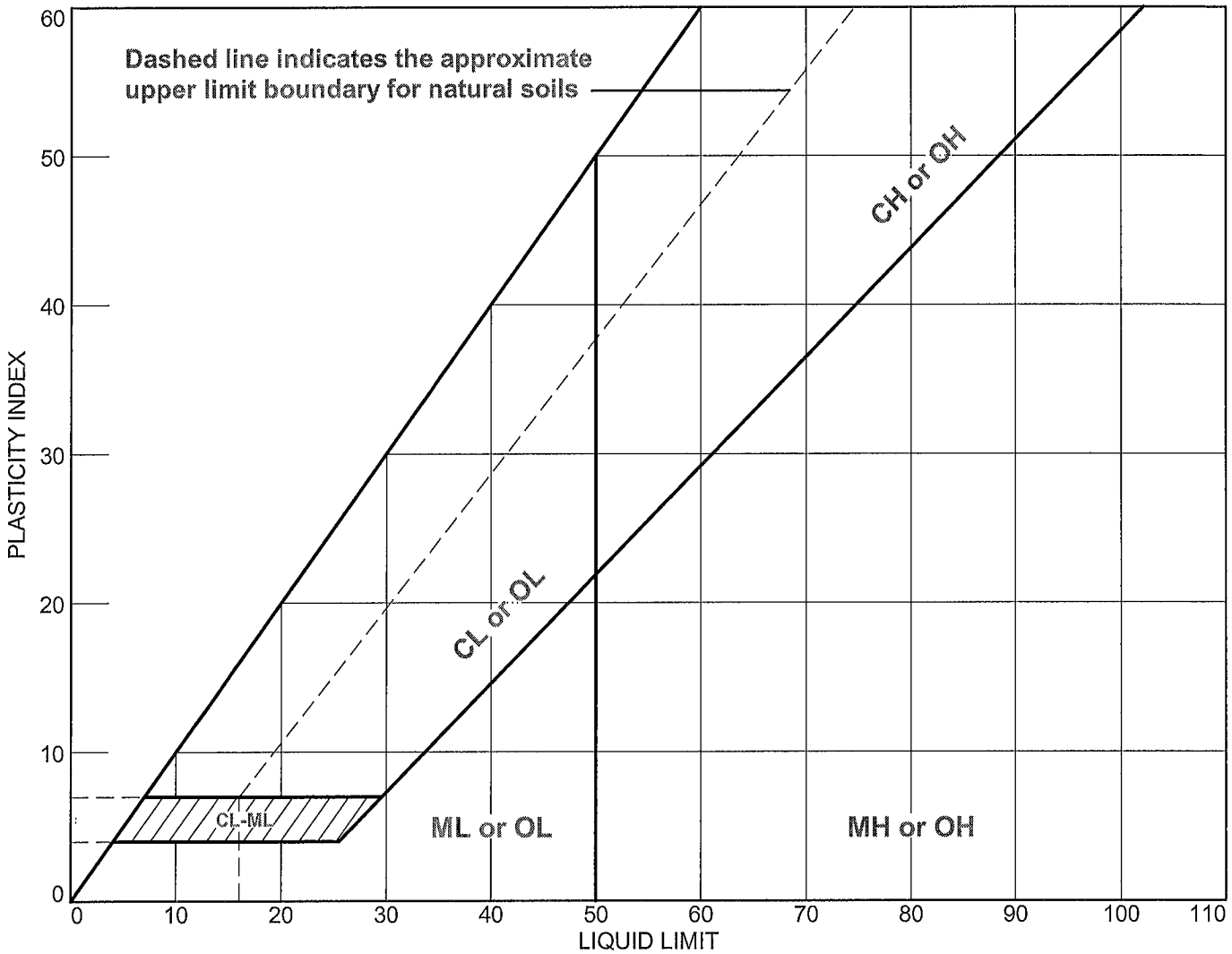
Source of Sample: OW-410S **Depth:** 43.5-45'
Sample Number: SS-9 **Date:** 6-2-15

amec

Client: Duke Energy
Project: Dan River Steam Station Ash Removal
Project No: 7810140065 **Figure**

Tested By: D Kopitsky **Checked By:** M Hamilton

LIQUID AND PLASTIC LIMITS TEST REPORT



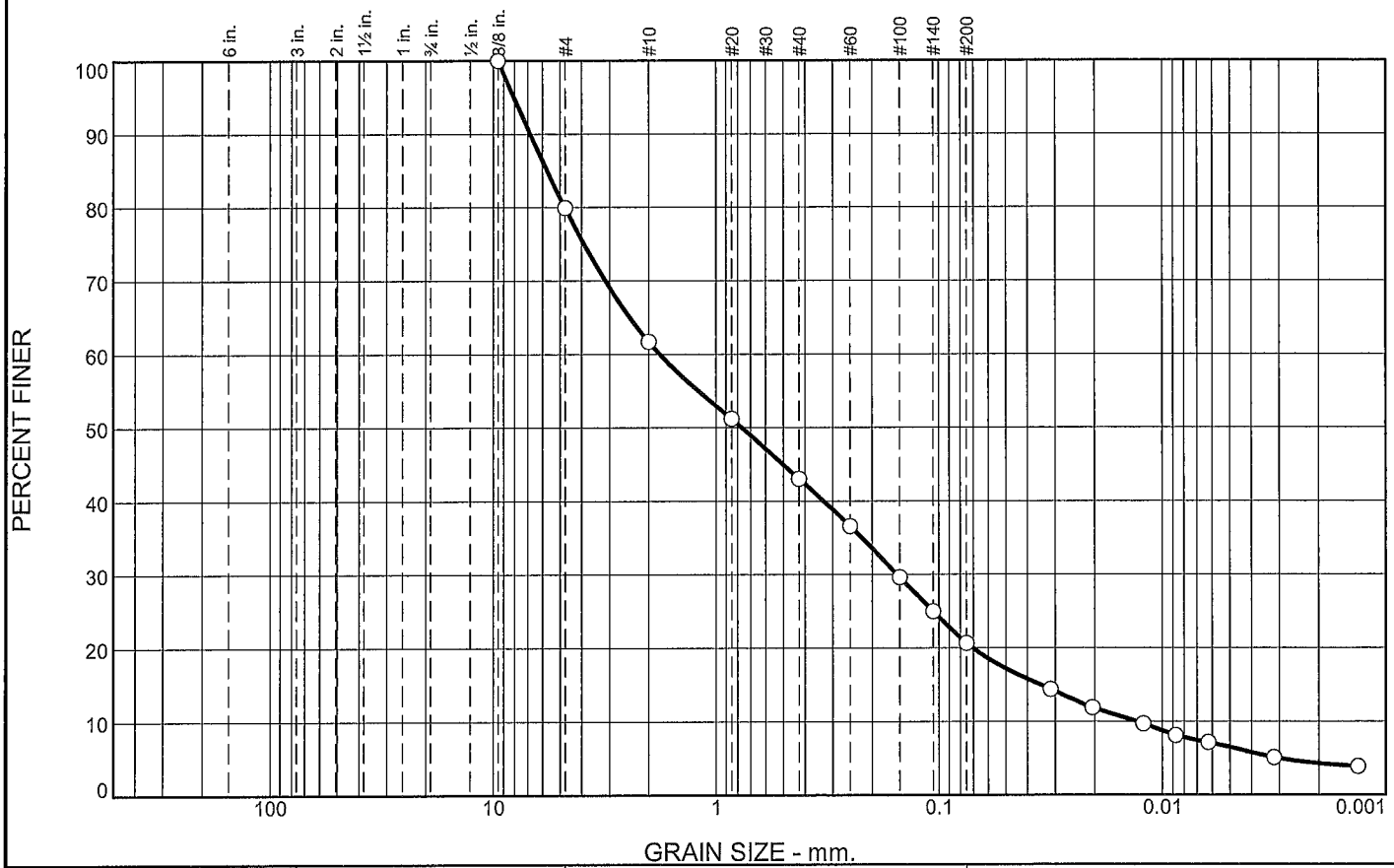
SOIL DATA								
SYMBOL	SOURCE	SAMPLE NO.	DEPTH	NATURAL WATER CONTENT (%)	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	USCS
●	OW-407S	SS-11	53.5-55'		NP	NV	NP	SM
■	OW-409S	SS-2/SS-3	9.8-15'		NP	NV	NP	SM
▲	OW-410S	SS-9	43.5-45'		NP	NV	NP	SM
◆	OW-411S	SS-12	58.5-60'		NP	NV	NP	SM
▼	OW-412S	SS-9	43.5-45'		NP	NV	NP	SM

amec

Client: Duke Energy
Project: Dan River Steam Station Ash Removal
Project No.: 7810140065 **Figure**

Tested By: A Kottenstette **Checked By:** D Kopitsky

Particle Size Analysis ASTM D422



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	20.1	18.2	18.7	22.3	14.2	6.5

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/8"	100.0		
#4	79.9		
#10	61.7		
#20	51.2		
#40	43.0		
#60	36.6		
#100	29.6		
#140	25.0		
#200	20.7		
0.0315 mm.	14.4		
0.0205 mm.	11.9		
0.0121 mm.	9.7		
0.0087 mm.	8.1		
0.0062 mm.	7.1		
0.0032 mm.	5.1		
0.0013 mm.	3.9		

* (no specification provided)

Soil Description

Gray Silty Sand with Gravel

Atterberg Limits

PL= NP LL= NV PI= NP

Coefficients

D_{90}= 6.8145 D_{85}= 5.7249 D_{60}= 1.7849
D_{50}= 0.7651 D_{30}= 0.1539 D_{15}= 0.0350
D_{10}= 0.0130 C_u= 137.61 C_c= 1.02

Classification

USCS= SM AASHTO= A-1-b

Remarks

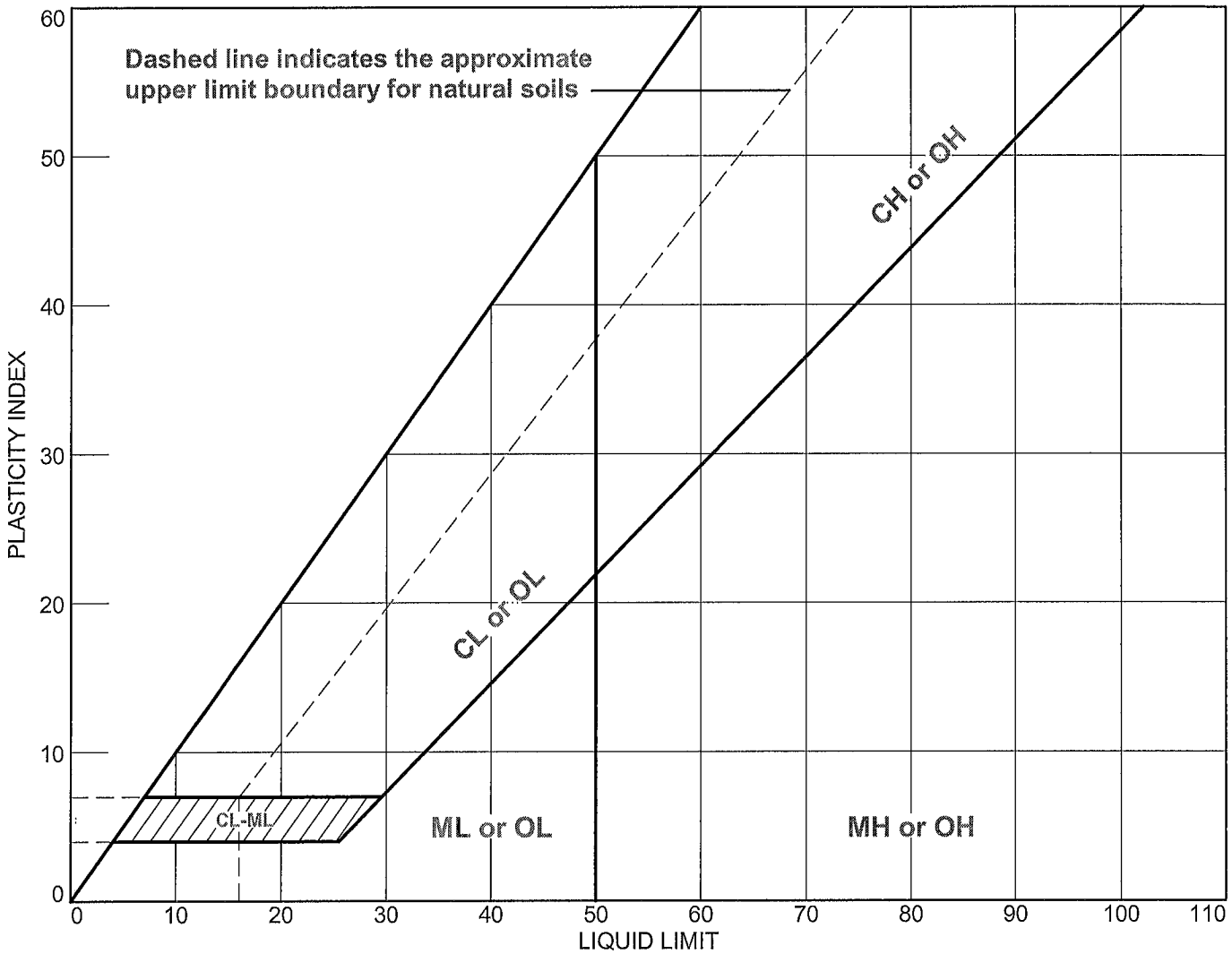
Source of Sample: OW-411S **Depth:** 58.5-60'
Sample Number: SS-12 **Date:** 6-3-15

amec

Client: Duke Energy
Project: Dan River Steam Station Ash Removal
Project No: 7810140065 **Figure**

Tested By: D Kopitsky **Checked By:** M Hamilton

LIQUID AND PLASTIC LIMITS TEST REPORT



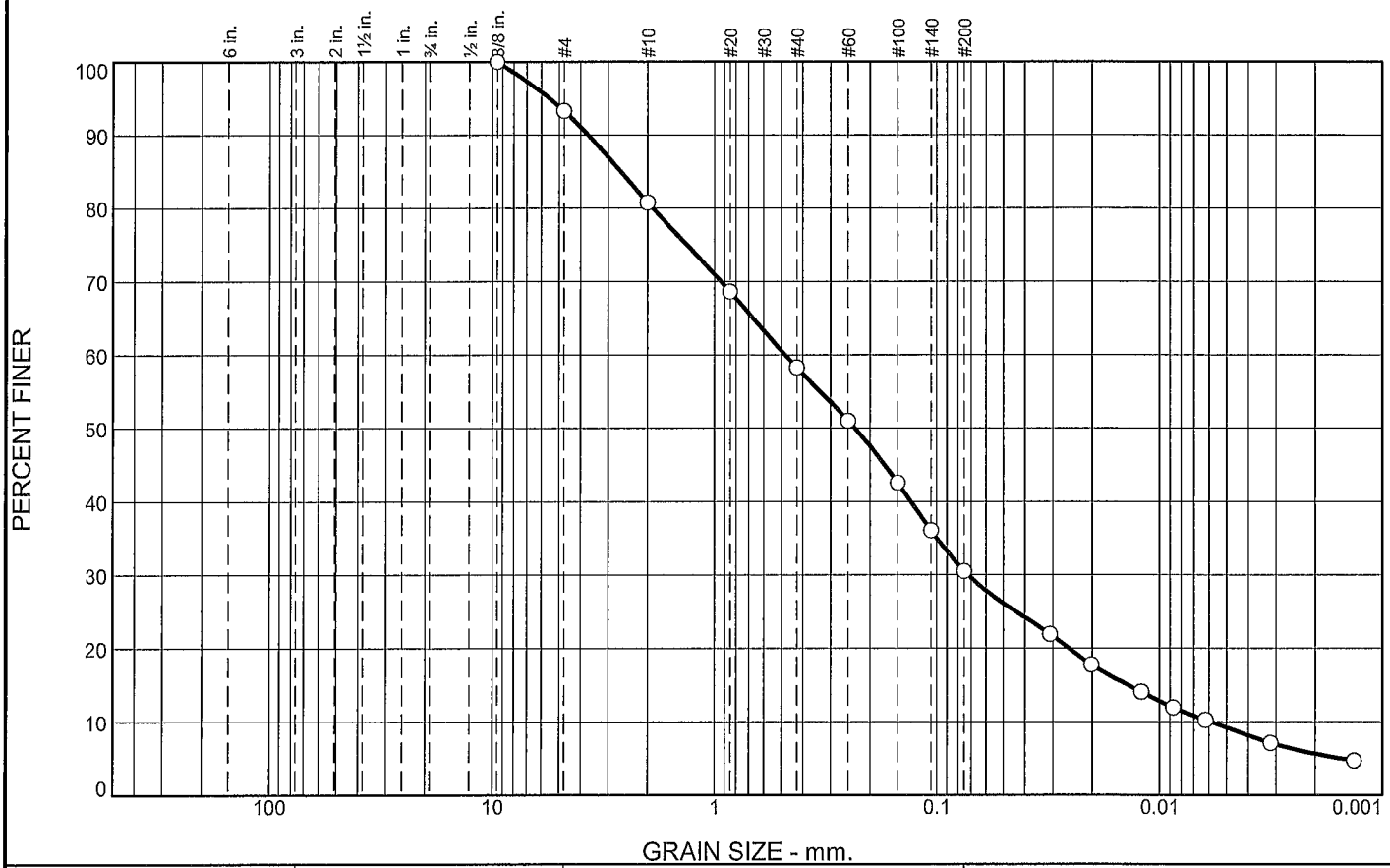
SOIL DATA								
SYMBOL	SOURCE	SAMPLE NO.	DEPTH	NATURAL WATER CONTENT (%)	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	USCS
●	OW-407S	SS-11	53.5-55'		NP	NV	NP	SM
■	OW-409S	SS-2/SS-3	9.8-15'		NP	NV	NP	SM
▲	OW-410S	SS-9	43.5-45'		NP	NV	NP	SM
◆	OW-411S	SS-12	58.5-60'		NP	NV	NP	SM
▼	OW-412S	SS-9	43.5-45'		NP	NV	NP	SM

amec

Client: Duke Energy
Project: Dan River Steam Station Ash Removal
Project No.: 7810140065 **Figure**

Tested By: A Kottenstette **Checked By:** D Kopitsky

Particle Size Analysis ASTM D422



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	6.7	12.5	22.6	27.7	21.3	9.2

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/8"	100.0		
#4	93.3		
#10	80.8		
#20	68.6		
#40	58.2		
#60	51.0		
#100	42.6		
#140	36.1		
#200	30.5		
0.0309 mm.	21.9		
0.0202 mm.	17.8		
0.0120 mm.	14.0		
0.0087 mm.	11.9		
0.0062 mm.	10.3		
0.0032 mm.	7.1		
0.0013 mm.	4.7		

* (no specification provided)

Soil Description

Brown-Yellow Silty Sand

Atterberg Limits

PL= NP LL= NV PI= NP

Coefficients

D_{90}= 3.6898 D_{85}= 2.6365 D_{60}= 0.4802
D_{50}= 0.2334 D_{30}= 0.0720 D_{15}= 0.0139
D_{10}= 0.0059 C_u= 81.50 C_c= 1.83

Classification

USCS= SM AASHTO= A-2-4(0)

Remarks

Source of Sample: OW-412S **Depth:** 43.5-45'
Sample Number: SS-9 **Date:** 6-3-15

amec

Client: Duke Energy
Project: Dan River Steam Station Ash Removal
Project No: 7810140065 **Figure**

Tested By: D Kopitsky **Checked By:** M Hamilton

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ATTERBERG LIMITS

ASTM D 4318-10 / AASHTO T89-10

Client:	AMEC FOSTER WHEELER	Boring No.:	OW-412S
Client Reference:	Dan River Steam Station Ash Removal	Depth (ft):	10.0-20.0
Project No.:	2015-616-02	Sample No.:	BULK
Lab ID:	2015-616-02-06	Soil Description:	YELLOW & YELLOW BROWN LEAN CLAY

Note: The USCS symbol used with this test refers only to the minus No. 40 sieve material. See the "Sieve and Hydrometer Analysis" graph page for the complete material description.

(Minus No. 40 sieve material, Airdried)

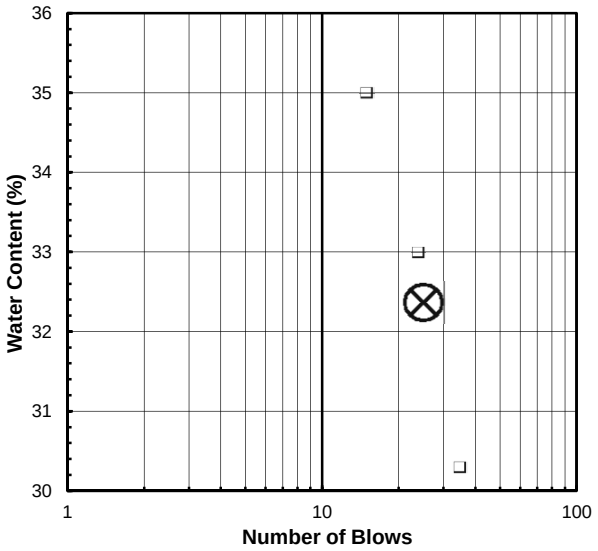
Liquid Limit Test	**1**	**2**	**3**	
Tare Number	B-B	F	B	**MULTIPOINT**
Wt. of Tare & Wet Sample (g)	29.16	26.71	26.88	
Wt. of Tare & Dry Sample (g)	26.01	23.84	23.86	
Wt. of Tare (g)	15.61	15.14	15.23	
Wt. of Water (g)	3.2	2.9	3.0	
Wt. of Dry Sample (g)	10.4	8.7	8.6	
Moisture Content (%)	**30.3**	**33.0**	**35.0**	
Number of Blows	**35**	**24**	**15**	

Plastic Limit Test	**1**	**2**	**Range**
Tare Number	S	A-P	
Wt. of Tare & Wet Sample (g)	22.50	22.42	
Wt. of Tare & Dry Sample (g)	21.42	21.39	
Wt. of Tare (g)	15.23	15.62	
Wt. of Water (g)	1.1	1.0	
Wt. of Dry Sample (g)	6.2	5.8	
Moisture Content (%)	**17.4**	**17.9**	**-0.4**

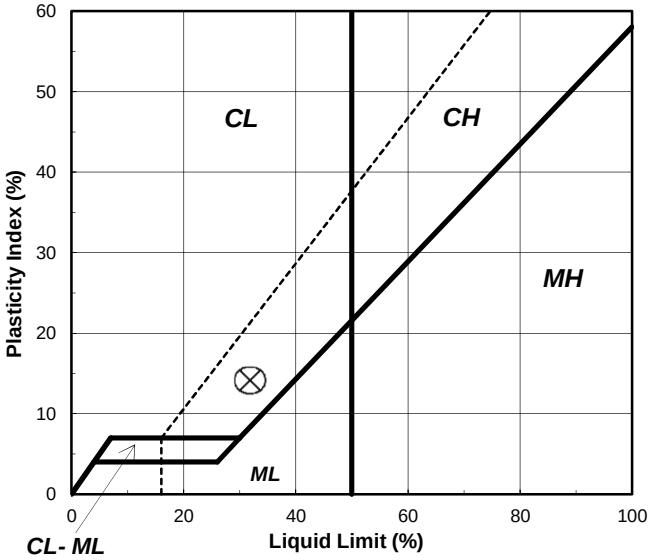
Note: The acceptable range of the two Moisture contents is ± 2.6

Test Results	
Liquid Limit (%)	**32**
Plastic Limit (%)	**18**
Plasticity Index (%)	**14**
USCS Symbol	**CL**

Flow Curve



Plasticity Chart



Tested By	*BW*	*Date*	*5/12/15*	*Checked By*	*GEM*	*Date*	6/4/15

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SIEVE AND HYDROMETER ANALYSIS
ASTM D 422-63 (2007)

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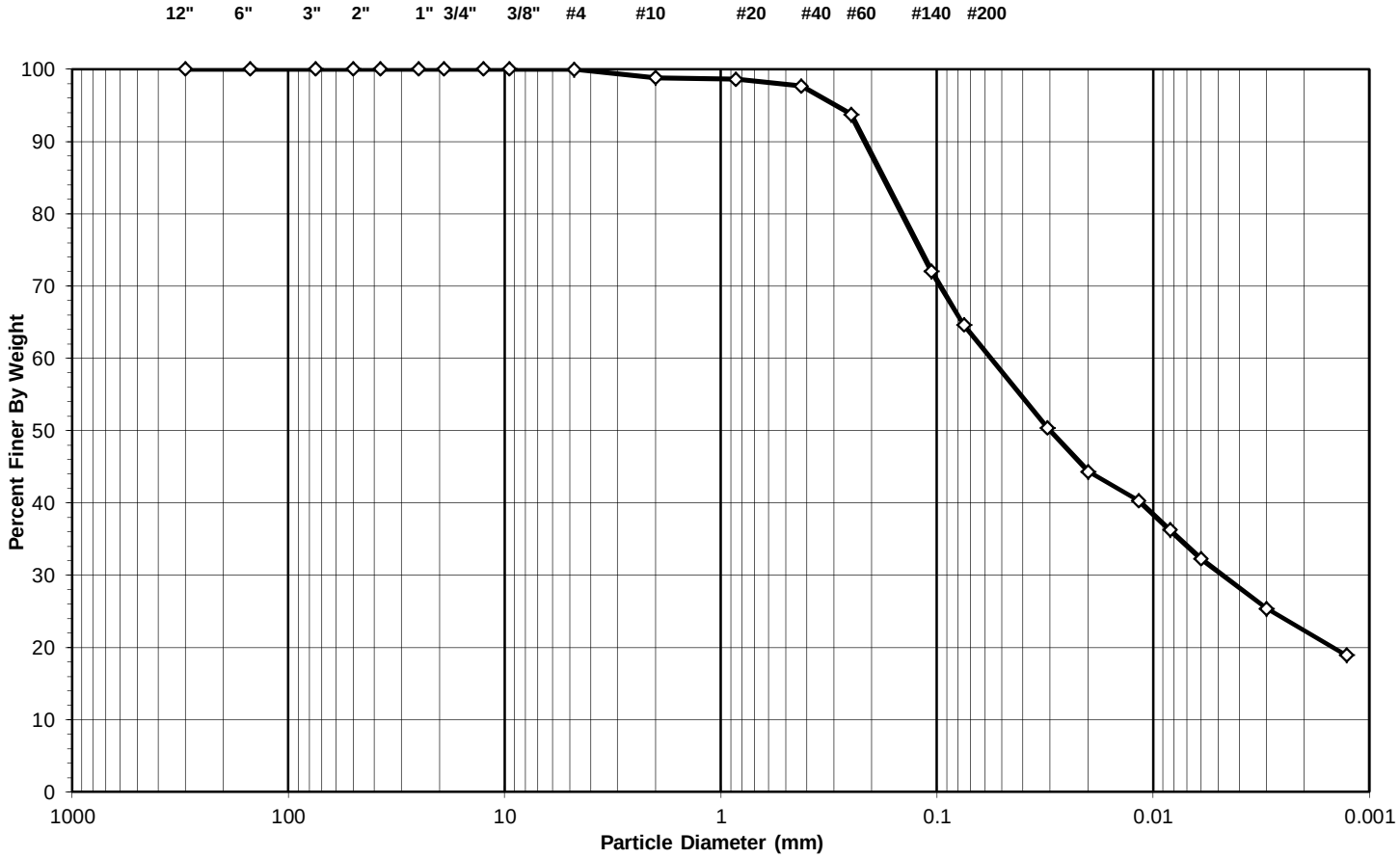
Client	AMEC FOSTER WHEELER	Boring No.	OW-412S
Client Reference	Dan River Steam Station Ash Removal	Depth (ft)	10.0-20.0
Project No.	2015-616-02	Sample No.	BULK
Lab ID	2015-616-02-06	Soil Color	**YELLOW & YELLOW BROWN**

	SIEVE ANALYSIS			*HYDROMETER*	
USCS	**cobbles**	**gravel**	**sand**	**silt and clay fraction**	
USDA	**cobbles**	**gravel**	**sand**	**silt**	**clay**



USCS Summary

Sieve Sizes (mm)		**Percentage**
Greater Than #4	*Gravel*	0.04
#4 To #200	*Sand*	35.37
Finer Than #200	*Silt & Clay*	64.60

USCS Symbol ***CL, TESTED***

USCS Classification ***SANDY LEAN CLAY***

DCN: CT-S3OR DATE: 7/26/13 REVISION: 8 *J:\PROJECTS\2015-616 AMEC - DAN RIVER\Results group 02 color change\[2015-616-02-06 CHG COLOR SIEVEHYD10.xls]Sheet1*

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WASH SIEVE ANALYSIS

ASTM D 422-63 (2007)

Client	AMEC FOSTER WHEELER	Boring No.	OW-412S
Client Reference	Dan River Steam Station Ash Removal	Depth (ft)	10.0-20.0
Project No.	2015-616-02	Sample No.	BULK
Lab ID	2015-616-02-06	Soil Color	**YELLOW & YELLOW BROWN**

Minus #10 for Hygroscopic Moisture Content		**Hydrometer Specimen Data**	
Tare No.	E-20	Air Dried - #10 Hydrometer Material (g)	50.00
Wgt.Tare + Wet Soil (g)	36.00	Corrected Dry Wt. of - #10 Material (g)	48.54
Wgt.Tare + Dry Soil (g)	35.59		
Weight of Tare (g)	21.99	Weight of - #200 Material (g)	31.73
Weight of Water (g)	0.41	Weight of - #10 ; + #200 Material (g)	16.81
Weight of Dry Soil (g)	13.60		
Moisture Content (%)	**3.0**	**J-FACTOR (%FINER THAN #10)**	**0.9882**
Soil Specimen Data			
Tare No.	160		
Wgt.Tare + Air Dry Soil (g)	809.02		
Weight of Tare (g)	239.31		
Air Dried Wgt. Total Sample (g)	569.71	Dry Weight of Material Retained on #10 (g)	6.51
Total Dry Sample Weight (g)	553.23	Corrected Dry Sample Wt - #10 (g)	546.72

Sieve Size	Sieve Opening (mm)	Wgt.of Soil Retained (gm)	Percent Retained (%)	Accumulated Percent Retained (%)	Percent Finer (%)	**Accumulated Percent Finer (%)**
12"	300	0.00	0.0	0.0	100.0	**100.0**
6"	150	0.00	0.0	0.0	100.0	**100.0**
3"	75	0.00	0.0	0.0	100.0	**100.0**
2"	50	0.00	0.0	0.0	100.0	**100.0**
1 1/2"	37.5	0.00	0.0	0.0	100.0	**100.0**
1"	25.0	0.00	0.0	0.0	100.0	**100.0**
3/4"	19.0	0.00	0.0	0.0	100.0	**100.0**
1/2"	12.5	0.00	0.0	0.0	100.0	**100.0**
3/8"	9.50	0.00	0.0	0.0	100.0	**100.0**
#4	4.75	0.20	0.0	0.0	100.0	**100.0**
#10	2.00	6.31	1.1	1.2	98.8	**98.8**
#20	0.85	0.10	0.2	0.2	99.8	**98.6**
#40	0.425	0.47	1.0	1.2	98.8	**97.7**
#60	0.250	1.93	4.0	5.2	94.8	**93.7**
#140	0.106	10.67	22.0	27.1	72.9	**72.0**
#200	0.075	3.64	7.5	34.6	65.4	**64.6**
Pan	-	31.73	65.4	100.0	-	**-**

Notes :

Tested By BW Date 5/6/15 Checked By GEM Date 6/4/15

DCN: CT-S3OR DATE: 7/26/13 REVISION: 8 *PROJECTS\2015-616 AMEC - DAN RIVER\Results group 02 color change\[2015-616-02-06 CHG COLOR SIEVEHYD10.xls]Sheet1*

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HYDROMETER ANALYSIS

ASTM D 422-63 (2007)

Client	AMEC FOSTER WHEELER	Boring No.	OW-412S
Client Reference	Dan River Steam Station Ash Removal	Depth (ft)	10.0-20.0
Project No.	2015-616-02	Sample No.	BULK
Lab ID	2015-616-02-06	Soil Color	**YELLOW & YELLOW BROWN**

Elapsed Time (min)	R Measured	Temp. (°C)	Composite Correction	R Corrected	N (%)	K Factor	Diameter (mm)	N' (%)
0	NA	NA	NA	NA	NA	NA	NA	NA
2	29.0	23.8	4.01	25.0	51.0	0.01285	0.0309	**50.4**
5	26.0	23.8	4.01	22.0	44.8	0.01285	0.0199	**44.3**
15	24.0	23.8	4.01	20.0	40.8	0.01285	0.0117	**40.3**
30	22.0	23.8	4.01	18.0	36.7	0.01285	0.0084	**36.3**
60	20.0	23.8	4.01	16.0	32.6	0.01285	0.0060	**32.2**
250	16.5	24.1	3.92	12.6	25.7	0.01281	0.0030	**25.4**
1440	13.5	23.5	4.10	9.4	19.2	0.01290	0.0013	**18.9**

Soil Specimen Data		**Other Corrections**		
Wgt. of Dry Material (g)	48.54	Hygroscopic Moisture Factor	0.971	
Weight of Deflocculant (g)	5.0	a - Factor	0.99	
		Percent Finer than # 10	98.82	
		Specific Gravity	2.70	Assumed

Notes:

Tested By	BW	Date	5/6/15	Checked By	GEM	Date	6/4/15

DCN: CT-S3OR DATE: 7/26/13 REVISION: 8 *PROJECTS\2015-616 AMEC - DAN RIVER\Results group 02 color change\[2015-616-02-06 CHG COLOR SIEVEHYD10.xls]Sheet1*

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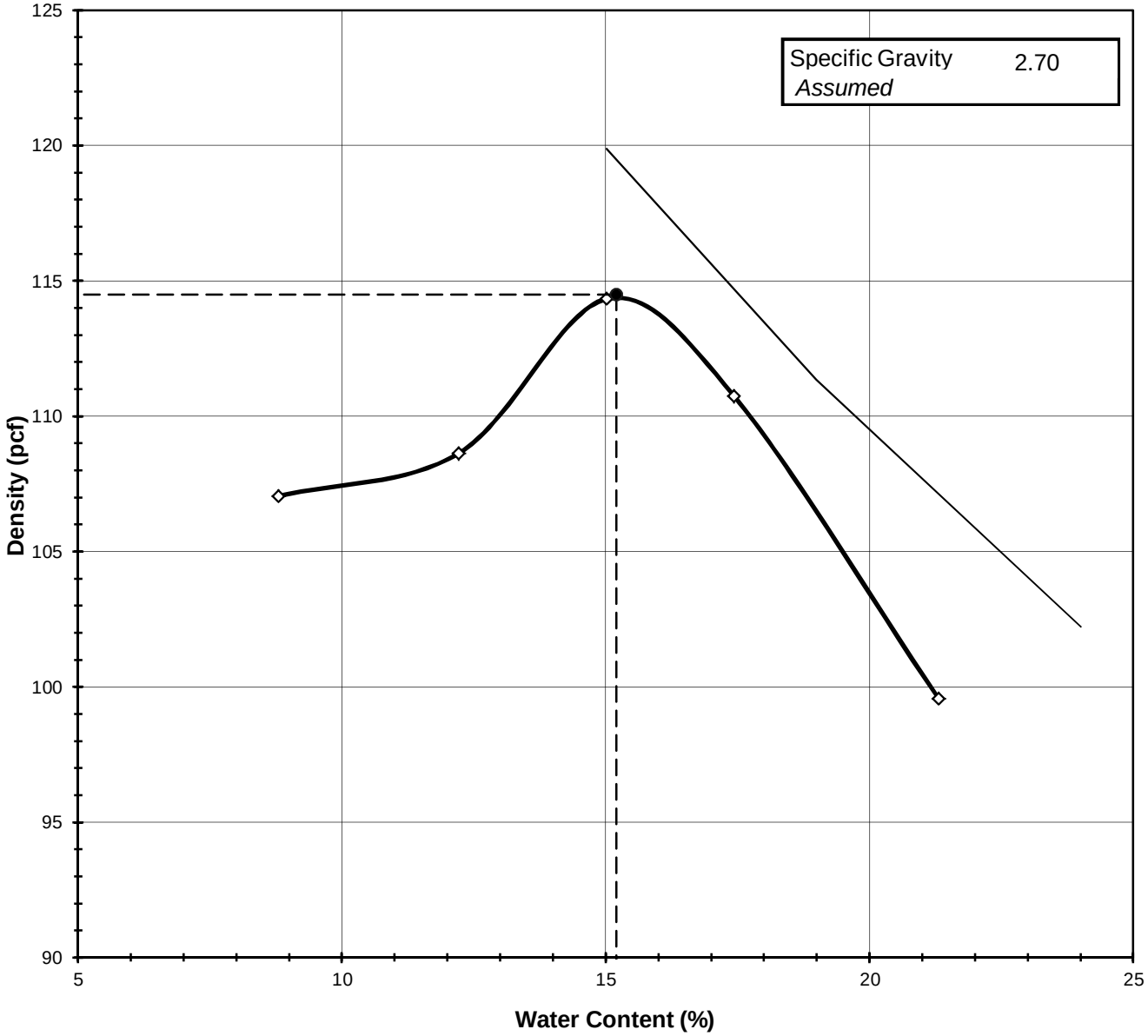
MOISTURE DENSITY RELATIONSHIP

ASTM D698-12

Client:	Amec Foster Wheeler	Boring No.:	OW-412S
Client Reference:	Dan River Steam Statin Ash Removal	Depth (ft):	10.0-20.0
Project No.:	2015-616-02	Sample No.:	BULK
Lab ID:	2015-616-02-06	Test Method	**STANDARD**

Visual Description: YELLOW & YELLOW BROWN SANDY LEAN CLAY

Optimum Water Content	**15.2**
Maximum Dry Density	**114.5**



Tested By *BT* *Date* *5/5/15* *Checked By* *SFS* *Date* 6/4/15

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MOISTURE - DENSITY RELATIONSHIP

ASTM D698-12

Client:	Amec Foster Wheeler	Boring No.:	OW-412S
Client Reference:	Dan River Steam Statin Ash Removal	Depth (ft):	10.0-20.0
Project No.:	2015-616-02	Sample No.:	BULK
Lab ID:	2015-616-02-06		

Visual Description: YELLOW & YELLOW BROWN SANDY LEAN CLAY

Total Weight of the Sample (g)	23600
As Received Water Content (%)	12.8
Assumed Specific Gravity	2.70
Percent Retained on 3/4"	NA
Percent Retained on 3/8"	NA
Percent Retained on #4	NA
Oversize Material	Not included
Procedure Used	A

Test Type		**STANDARD**
Rammer Weight (lb)		5.5
Rammer Drop (in)		12
Rammer Type		MECHANICAL
Machine ID	R	174
Mold ID	R	461
Mold diameter		4"
Weight of the Mold (g)		4173
Volume of the Mold (cm^3)		942

Mold / Specimen

Point No.	**1**	**2**	**3**	**4**	**5**
Wt. of Mold & Wet Sample (g)	5931	6013	6158	6136	5996
Wt.of Mold (g)	4173	4173	4173	4173	4173
Wt. of Wet Sample (g)	1758	1840	1985	1963	1823
Mold Volume (cm^3)	942	942	942	942	942

Moisture Content / Density

Tare Number	307	310	314	317	312
Wt. of Tare & Wet Sample (g)	655.30	658.40	386.00	573.00	449.50
Wt. of Tare & Dry Sample (g)	611.20	598.70	346.60	500.40	385.30
Wt. of Tare (g)	110.00	110.00	84.30	84.00	84.10
Wt. of Water (g)	44.10	59.70	39.40	72.60	64.20
Wt. of Dry Sample (g)	501.20	488.70	262.30	416.40	301.20

Wet Density (g/cm^3)	1.87	1.95	2.11	2.08	1.94
Wet Density (pcf)	116.5	121.9	131.5	130.0	120.8
Moisture Content (%)	**8.8**	**12.2**	**15.0**	**17.4**	**21.3**
Dry Density (pcf)	**107.0**	**108.6**	**114.3**	**110.7**	**99.6**

Zero Air Voids

Moisture Content (%)	15.0	19.0	24.0
Dry Unit Weight (pcf)	119.9	111.4	102.2

Tested By *BT* *Date* *5/5/15* *Checked By* *SFS* *Date* 6/4/15

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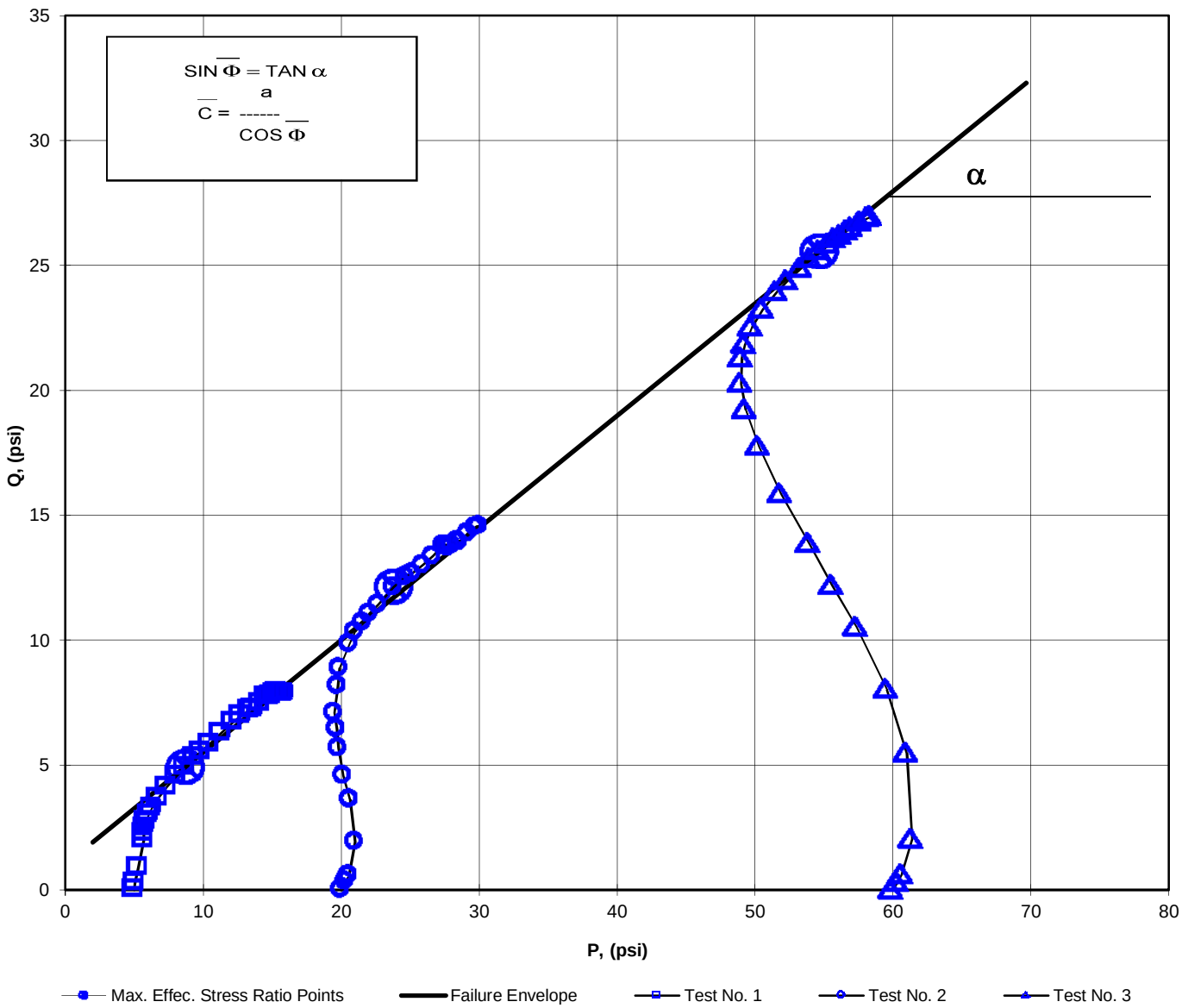
CONSOLIDATED UNDRAINED TRIAXIAL TEST
WITH PORE PRESSURE READINGS
ASTM D4767-11

Client:	Amec Foster Wheeler	Boring No.:	OW-412S
Client Reference:	Dan River Steam Station Ash Removal	Depth (ft):	10.0-20.0
Project No.:	2015-616-02	Sample No.:	BULK
Lab ID:	2015-616-02-06		

Consolidated Undrained Triaxial Test with Pore Pressure



a	=	**0.00**	$\overline{\mathbf{C}}$	=	**0.00**
α	=	**24.2**	$\overline{\mathbf{\Phi}}$	=	**26.68**

page 2 of 12 DCN: CT-S28 DATE: 4/12/13 REVISION: 3

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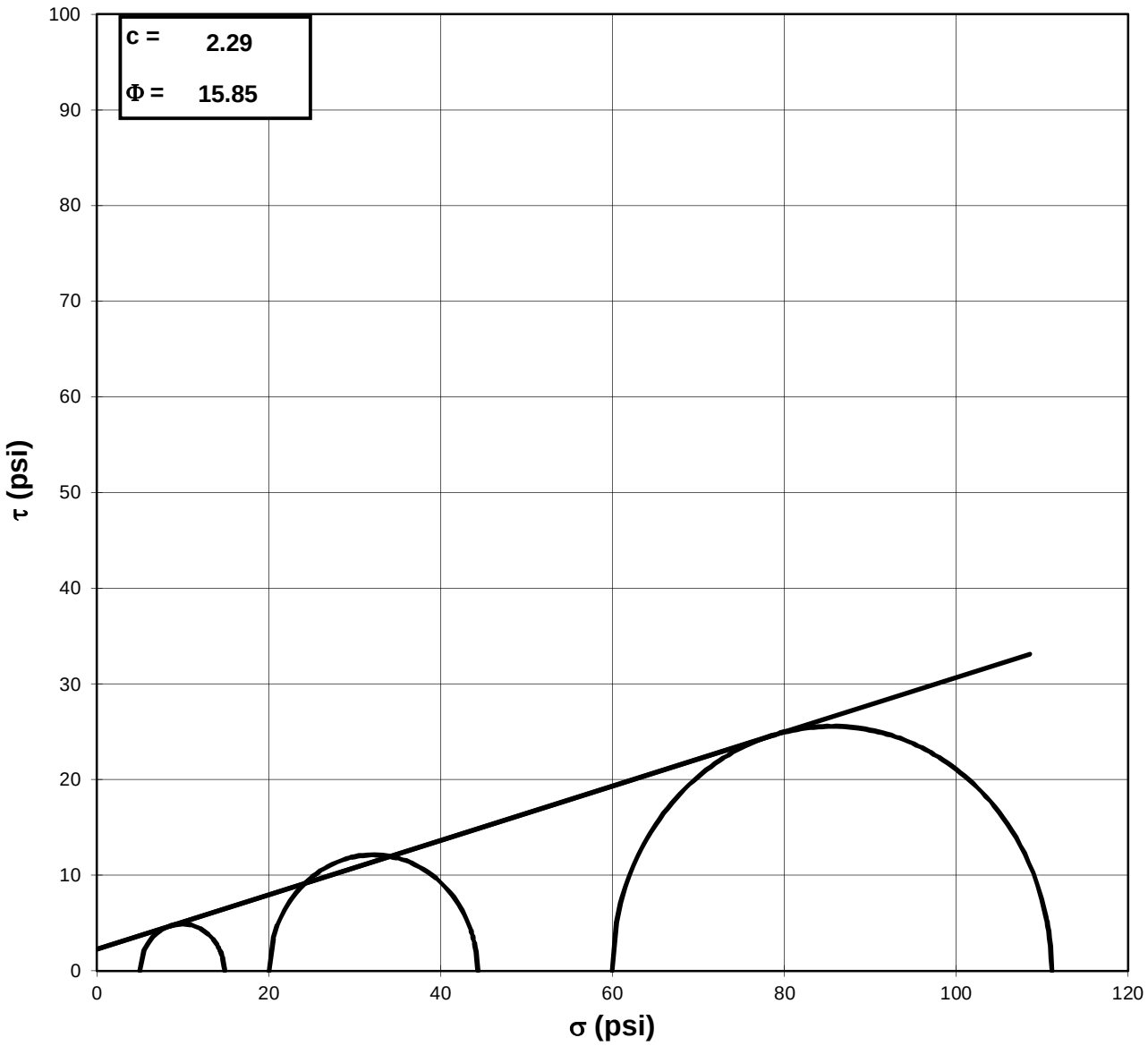
MOHR TOTAL STRENGTH ENVELOPE

ASTM D4767-11

Client:	Amec Foster Wheeler	Boring No.:	OW-412S
Client Reference:	Dan River Steam Station Ash Removal	Depth (ft):	10.0-20.0
Project No.:	2015-616-02	Sample No.:	BULK
Lab ID:	2015-616-02-06		
Visual Description:	YELLOW & YELLOW BROWN CLAY (REMOLDED)		



Failure Based on Maximum Effective Principal Stress Ratio

NOTE: GRAPH NOT TO SCALE

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CONSOLIDATED UNDRAINED TRIAXIAL TEST WITH PORE PRESSURE READINGS

ASTM D4767-11

Client:	Amec Foster Wheeler	Boring No.:	OW-412S
Client Reference:	Dan River Steam Station Ash Removal	Depth (ft):	10.0-20.0
Project No.:	2015-616-02	Sample No.:	BULK
Lab ID:	2015-616-02-06		

Visual Description: YELLOW & YELLOW BROWN CLAY (REMOLDED)

Stage No.	1
Test No.	1

PRESSURES (psi)

Cell Pressure (psi)	55.0
Back Pressure (psi)	50.0
Eff. Conf. Pressure (psi)	5.0
Pore Pressure Response (%)	97

MAXIMUM OBLIQUITY POINTS

$\overline{P}$	=	8.68
Q	=	4.91

INITIAL SAMPLE DIMENSIONS (in)

Length 1:	5.995	Diameter 1:	2.864
Length 2:	5.995	Diameter 2:	2.864
Length 3:	5.995	Diameter 3:	2.864
Avg. Length:	5.995	*Avg. Diam.:*	2.864

VOLUME CHANGE

Initial Burette Reading (ml)	24.0
Final Burette Reading (ml)	12.9
Final Change (ml)	11.1

Initial Dial Reading (mil)	130
Dial Reading After Saturation (mil)	130
Dial Reading After Consolidation (mil)	152

LOAD (LB)	DEFORMATION (IN)	PORE PRESSURE (PSI)
7.6	0.000	50.0
11.1	0.001	50.2
18.9	0.002	50.6
32.8	0.007	51.3
36.5	0.014	51.6
39.3	0.020	51.7
42.9	0.029	51.9
46.0	0.037	51.9
49.6	0.050	52.0
54.7	0.070	51.9
61.0	0.100	51.7
66.8	0.136	51.5
71.8	0.172	51.2
77.3	0.215	50.9
81.0	0.245	50.7
85.7	0.287	50.4
92.4	0.344	49.9
99.0	0.404	49.5
103.4	0.449	49.2
107.5	0.508	48.8
108.9	0.555	48.6
113.3	0.598	48.3
117.6	0.644	48.1
118.5	0.674	47.9
119.8	0.704	47.8
121.8	0.735	47.6
122.9	0.765	47.5
123.5	0.809	47.3
124.4	0.855	47.1
125.1	0.885	47.0
126.7	0.915	46.8

Tested By: SFS Date: 5/12/15 Input Checked By: GEM Date: 6/415

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CONSOLIDATED UNDRAINED TRIAXIAL TEST
WITH PORE PRESSURE READINGS
ASTM D4767-11

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Client:	Amec Foster Wheeler	Boring No.:	OW-412S
Client Reference:	Dan River Steam Station Ash Removal	Depth (ft):	10.0-20.0
Project No.:	2015-616-02	Sample No.:	BULK
Lab ID:	2015-616-02-06		

Visual Description: YELLOW & YELLOW BROWN CLAY (REMOLDED)

Effective Confining Pressure (psi)	5.0	*Stage No.*	1
		Test No	1

INITIAL DIMENSIONS

Initial Sample Length (in)	6.00
Initial Sample Diameter (in)	2.86
Initial Sample Area (in^2)	6.44
Initial Sample Volume (in^3)	38.62

VOLUME CHANGE

Volume After Consolidation (in^3)	37.94
Length After Consolidation (in)	5.97
Area After Consolidation (in^2)	6.353

Strain (%)	Deviation Stress	ΔU	$\overline{\sigma}_1$	$\overline{\sigma}_3$	Effective Principle Stress Ratio	$\overline{A}$	$\overline{P}$	Q
0.02	0.56	0.21	5.34	4.8	1.116	0.40	5.06	0.28
0.03	1.79	0.60	6.18	4.4	1.406	0.34	5.29	0.89
0.12	3.97	1.30	7.67	3.7	2.075	0.34	5.68	1.99
0.23	4.54	1.58	7.95	3.4	2.328	0.36	5.68	2.27
0.33	4.98	1.75	8.22	3.2	2.533	0.36	5.73	2.49
0.49	5.53	1.89	8.64	3.1	2.779	0.35	5.87	2.77
0.62	6.01	1.95	9.06	3.0	2.973	0.33	6.05	3.01
0.83	6.57	1.96	9.60	3.0	3.166	0.31	6.31	3.28
1.17	7.33	1.91	10.41	3.1	3.379	0.27	6.75	3.66
1.68	8.27	1.75	11.51	3.2	3.546	0.22	7.38	4.13
2.28	9.11	1.49	12.62	3.5	3.600	0.17	8.06	4.56
2.89	9.82	1.22	13.59	3.8	3.603	0.13	8.68	4.91
3.60	10.59	0.91	14.68	4.1	3.591	0.09	9.38	5.29
4.10	11.08	0.68	15.40	4.3	3.570	0.06	9.86	5.54
4.80	11.71	0.36	16.34	4.6	3.527	0.03	10.48	5.85
5.76	12.58	-0.07	17.64	5.1	3.485	-0.01	11.35	6.29
6.76	13.42	-0.49	18.90	5.5	3.448	-0.04	12.19	6.71
7.51	13.96	-0.79	19.74	5.8	3.412	-0.06	12.77	6.98
8.51	14.39	-1.18	20.56	6.2	3.332	-0.08	13.37	7.19
9.29	14.47	-1.44	20.90	6.4	3.251	-0.10	13.67	7.24
10.02	14.97	-1.68	21.65	6.7	3.244	-0.12	14.16	7.49
10.78	15.46	-1.91	22.37	6.9	3.238	-0.13	14.64	7.73
11.28	15.49	-2.06	22.55	7.1	3.194	-0.14	14.80	7.74
11.79	15.58	-2.20	22.78	7.2	3.164	-0.15	14.99	7.79
12.30	15.77	-2.35	23.11	7.3	3.147	-0.15	15.23	7.88
12.80	15.83	-2.49	23.32	7.5	3.114	-0.16	15.41	7.92
13.55	15.78	-2.70	23.47	7.7	3.050	-0.18	15.58	7.89
14.32	15.76	-2.91	23.67	7.9	2.994	-0.19	15.79	7.88
14.81	15.76	-3.03	23.78	8.0	2.964	-0.20	15.90	7.88
15.32	15.88	-3.15	24.03	8.1	2.949	-0.20	16.09	7.94

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CONSOLIDATED UNDRAINED TRIAXIAL TEST WITH PORE PRESSURE READINGS

ASTM D4767-11

Client:	Amec Foster Wheeler	Boring No.:	OW-412S
Client Reference:	Dan River Steam Station Ash Removal	Depth (ft):	10.0-20.0
Project No.:	2015-616-02	Sample No.:	BULK
Lab ID:	2015-616-02-06		

Visual Description: YELLOW & YELLOW BROWN CLAY (REMOLDED)

Stage No.	1
Test No.	2

PRESSURES (psi)

Cell Pressure (psi)	70.0
Back Pressure (psi)	50.0
Eff. Conf. Pressure (psi)	20.0
Pore Pressure Response (%)	98

MAXIMUM OBLIQUITY POINTS

$\overline{P}$	=	23.83
Q	=	12.13

INITIAL SAMPLE DIMENSIONS (in)

Length 1:	5.995	Diameter 1:	2.864
Length 2:	5.995	Diameter 2:	2.864
Length 3:	5.995	Diameter 3:	2.864
Avg. Length	5.995	*Avg. Diam.:*	2.864

VOLUME CHANGE

Initial Burette Reading (ml)	24.0
Final Burette Reading (ml)	6.7
Final Change (ml)	17.3
Initial Dial Reading (mil)	120
Dial Reading After Saturation (mil)	120
Dial Reading After Consolidation (mil)	193

LOAD (LB)	DEFORMATION (IN)	PORE PRESSURE (PSI)
8.5	0.000	50.0
12.8	0.008	50.0
15.9	0.005	50.0
32.9	0.001	50.9
54.7	0.012	53.0
66.8	0.017	54.4
80.9	0.028	55.9
90.9	0.032	56.8
99.2	0.044	57.6
113.4	0.070	58.4
123.3	0.099	59.0
136.6	0.143	59.3
143.5	0.169	59.3
149.6	0.212	59.2
155.2	0.251	59.0
161.0	0.292	58.8
172.1	0.348	58.3
179.2	0.399	57.9
182.7	0.450	57.5
190.0	0.532	57.1
195.8	0.560	56.7
203.0	0.588	56.4
204.8	0.636	56.1
204.3	0.659	55.9
206.8	0.689	55.8
210.5	0.720	55.6
211.1	0.749	55.4
217.6	0.788	55.1
223.2	0.834	54.8
225.4	0.872	54.6
224.2	0.901	54.4

Tested By: SFS Date: 5/12/15 Input Checked By: GEM Date: 6/4/15

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CONSOLIDATED UNDRAINED TRIAXIAL TEST
WITH PORE PRESSURE READINGS
ASTM D4767-11

Client:	Amec Foster Wheeler	Boring No.:	OW-412S
Client Reference:	Dan River Steam Station Ash Removal	Depth (ft):	10.0-20.0
Project No.:	2015-616-02	Sample No.:	BULK
Lab ID:	2015-616-02-06		

Visual Description: YELLOW & YELLOW BROWN CLAY (REMOLDED)

Effective Confining Pressure (psi)	20.0	*Stage No.*	1
		Test No	2

INITIAL DIMENSIONS

Initial Sample Length (in)	6.00
Initial Sample Diameter (in)	2.86
Initial Sample Area (in^2)	6.44
Initial Sample Volume (in^3)	38.62

VOLUME CHANGE

Volume After Consolidation (in^3)	37.57
Length After Consolidation (in)	5.92
Area After Consolidation (in^2)	6.343

Strain (%)	Deviation Stress	ΔU	$\overline{\sigma}_1$	$\overline{\sigma}_3$	Effective Principle Stress Ratio	$\overline{A}$	$\overline{P}$	Q
0.13	0.67	0.02	20.68	20.0	1.033	0.03	20.35	0.33
0.08	1.16	0.04	21.16	20.0	1.058	0.03	20.58	0.58
0.02	3.84	0.95	22.92	19.1	1.201	0.25	21.01	1.92
0.21	7.26	3.00	24.29	17.0	1.426	0.42	20.66	3.63
0.29	9.16	4.45	24.75	15.6	1.588	0.50	20.16	4.58
0.47	11.35	5.88	25.51	14.2	1.802	0.53	19.83	5.68
0.55	12.91	6.78	26.17	13.3	1.974	0.54	19.71	6.46
0.74	14.18	7.61	26.61	12.4	2.141	0.55	19.52	7.09
1.18	16.33	8.44	27.93	11.6	2.408	0.53	19.77	8.17
1.67	17.78	9.01	28.81	11.0	2.613	0.52	19.92	8.89
2.41	19.70	9.27	30.47	10.8	2.831	0.48	20.61	9.85
2.86	20.67	9.34	31.36	10.7	2.932	0.46	21.03	10.33
3.57	21.45	9.19	32.29	10.8	2.978	0.44	21.57	10.72
4.24	22.15	9.03	33.15	11.0	3.013	0.42	22.07	11.07
4.94	22.85	8.77	34.11	11.3	3.029	0.39	22.69	11.42
5.87	24.27	8.34	35.97	11.7	3.074	0.35	23.83	12.13
6.73	25.10	7.90	37.23	12.1	3.068	0.32	24.68	12.55
7.59	25.37	7.54	37.87	12.5	3.030	0.30	25.18	12.69
8.99	26.03	7.12	38.95	12.9	3.015	0.28	25.94	13.02
9.45	26.73	6.75	40.02	13.3	3.012	0.26	26.65	13.37
9.93	27.61	6.41	41.24	13.6	3.026	0.24	27.43	13.80
10.75	27.61	6.10	41.55	13.9	2.982	0.23	27.74	13.81
11.12	27.42	5.95	41.51	14.1	2.947	0.22	27.80	13.71
11.64	27.61	5.77	41.87	14.3	2.936	0.21	28.07	13.81
12.15	27.97	5.56	42.45	14.5	2.932	0.20	28.47	13.99
12.65	27.89	5.39	42.54	14.6	2.904	0.20	28.59	13.95
13.31	28.57	5.10	43.50	14.9	2.913	0.18	29.22	14.28
14.08	29.07	4.79	44.32	15.2	2.907	0.17	29.78	14.54
14.72	29.16	4.59	44.61	15.5	2.887	0.16	30.03	14.58
15.22	28.82	4.42	44.43	15.6	2.846	0.16	30.02	14.41

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CONSOLIDATED UNDRAINED TRIAXIAL TEST
WITH PORE PRESSURE READINGS
ASTM D4767-11

Client:	Amec Foster Wheeler	Boring No.:	OW-412S
Client Reference:	Dan River Steam Station Ash Removal	Depth (ft):	10.0-20.0
Project No.:	2015-616-02	Sample No.:	BULK
Lab ID:	2015-616-02-06		

Visual Description: YELLOW & YELLOW BROWN CLAY (REMOLDED)

Stage No.	1
Test No.	3

PRESSURES (psi)

Cell Pressure (psi)	110.0
Back Pressure (psi)	50.0
Eff. Conf. Pressure (psi)	60.0
Pore Pressure Response (%)	97

MAXIMUM OBLIQUITY POINTS

$\overline{P}$	=	54.69
Q	=	25.57

INITIAL SAMPLE DIMENSIONS (in)

Length 1:	5.995	Diameter 1:	2.864
Length 2:	5.995	Diameter 2:	2.864
Length 3:	5.995	Diameter 3:	2.864
Avg. Length:	5.995	*Avg. Diam.:*	2.864

VOLUME CHANGE

Initial Burette Reading (ml)	48.0
Final Burette Reading (ml)	0.7
Final Change (ml)	47.3

Initial Dial Reading (mil)	98
Dial Reading After Saturation (mil)	98
Dial Reading After Consolidation (mil)	227

LOAD (LB)	DEFORMATION (IN)	PORE PRESSURE (PSI)
14.2	0.000	50.0
17.7	0.000	49.9
21.9	0.001	49.9
39.0	0.007	50.6
81.2	0.013	54.5
112.2	0.019	58.4
142.9	0.027	63.1
163.3	0.036	66.5
184.3	0.048	69.9
209.5	0.069	73.9
234.1	0.099	77.4
253.9	0.135	79.9
268.3	0.170	81.2
282.9	0.211	82.2
291.6	0.241	82.5
302.3	0.283	82.7
314.7	0.340	82.6
327.1	0.400	82.3
335.4	0.444	82.0
345.7	0.506	81.5
353.6	0.551	81.2
360.9	0.595	80.9
367.4	0.638	80.5
372.3	0.670	80.2
376.4	0.701	80.0
381.3	0.731	79.7
384.8	0.760	79.4
391.6	0.803	79.1
397.0	0.849	78.7
400.2	0.879	78.5
403.7	0.909	78.3

Tested By: SFS Date: 5/12/15 Input Checked By: GEM Date: 6/4/15

DCN: CT-S28 DATE: 4/12/13 REVISION: 3

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CONSOLIDATED UNDRAINED TRIAXIAL TEST
WITH PORE PRESSURE READINGS
ASTM D4767-11

Client:	Amec Foster Wheeler	Boring No.:	OW-412S
Client Reference:	Dan River Steam Station Ash Removal	Depth (ft):	10.0-20.0
Project No.:	2015-616-02	Sample No.:	BULK
Lab ID:	2015-616-02-06		

Visual Description: YELLOW & YELLOW BROWN CLAY (REMOLDED)

Effective Confining Pressure (psi)	60.0	*Stage No.*	1
		Test No	3

INITIAL DIMENSIONS

Initial Sample Length (in)	6.00
Initial Sample Diameter (in)	2.86
Initial Sample Area (in^2)	6.44
Initial Sample Volume (in^3)	38.62

VOLUME CHANGE

Volume After Consolidation (in^3)	35.73
Length After Consolidation (in)	5.87
Area After Consolidation (in^2)	6.092

Strain (%)	Deviation Stress	ΔU	$\overline{\sigma}_1$	$\overline{\sigma}_3$	Effective Principle Stress Ratio	$\overline{A}$	$\overline{P}$	Q
0.00	0.57	-0.08	60.61	60.0	1.010	-0.14	60.32	0.29
0.03	1.26	-0.08	61.30	60.0	1.021	-0.07	60.67	0.63
0.12	4.06	0.60	63.42	59.4	1.068	0.15	61.39	2.03
0.22	10.97	4.43	66.50	55.5	1.198	0.42	61.01	5.48
0.32	16.03	8.39	67.60	51.6	1.311	0.54	59.59	8.02
0.46	21.03	13.09	67.91	46.9	1.449	0.64	57.39	10.52
0.61	24.33	16.51	67.78	43.4	1.560	0.70	55.61	12.17
0.81	27.69	19.88	67.77	40.1	1.691	0.74	53.92	13.85
1.18	31.67	23.89	67.74	36.1	1.878	0.78	51.91	15.84
1.69	35.49	27.41	68.04	32.6	2.090	0.80	50.30	17.74
2.30	38.44	29.83	68.57	30.1	2.276	0.80	49.35	19.22
2.89	40.50	31.20	69.26	28.8	2.408	0.79	49.01	20.25
3.59	42.53	32.16	70.33	27.8	2.530	0.78	49.07	21.26
4.10	43.67	32.50	71.14	27.5	2.590	0.77	49.30	21.84
4.82	45.02	32.69	72.28	27.3	2.651	0.75	49.78	22.51
5.79	46.47	32.61	73.82	27.4	2.699	0.72	50.59	23.24
6.82	47.86	32.32	75.50	27.6	2.732	0.70	51.57	23.93
7.57	48.74	31.97	76.73	28.0	2.741	0.68	52.36	24.37
8.62	49.73	31.47	78.21	28.5	2.746	0.65	53.35	24.86
9.39	50.48	31.18	79.27	28.8	2.754	0.64	54.02	25.24
10.14	51.13	30.84	80.25	29.1	2.756	0.62	54.69	25.57
10.88	51.66	30.45	81.18	29.5	2.750	0.61	55.35	25.83
11.42	52.07	30.20	81.83	29.8	2.750	0.60	55.80	26.04
11.95	52.35	29.93	82.38	30.0	2.744	0.59	56.20	26.18
12.46	52.75	29.66	83.05	30.3	2.741	0.58	56.68	26.37
12.95	52.96	29.40	83.52	30.6	2.733	0.57	57.04	26.48
13.70	53.47	29.05	84.38	30.9	2.730	0.56	57.64	26.73
14.47	53.75	28.67	85.04	31.3	2.718	0.55	58.16	26.87
14.99	53.86	28.46	85.36	31.5	2.710	0.54	58.43	26.93
15.50	54.02	28.26	85.72	31.7	2.704	0.54	58.71	27.01

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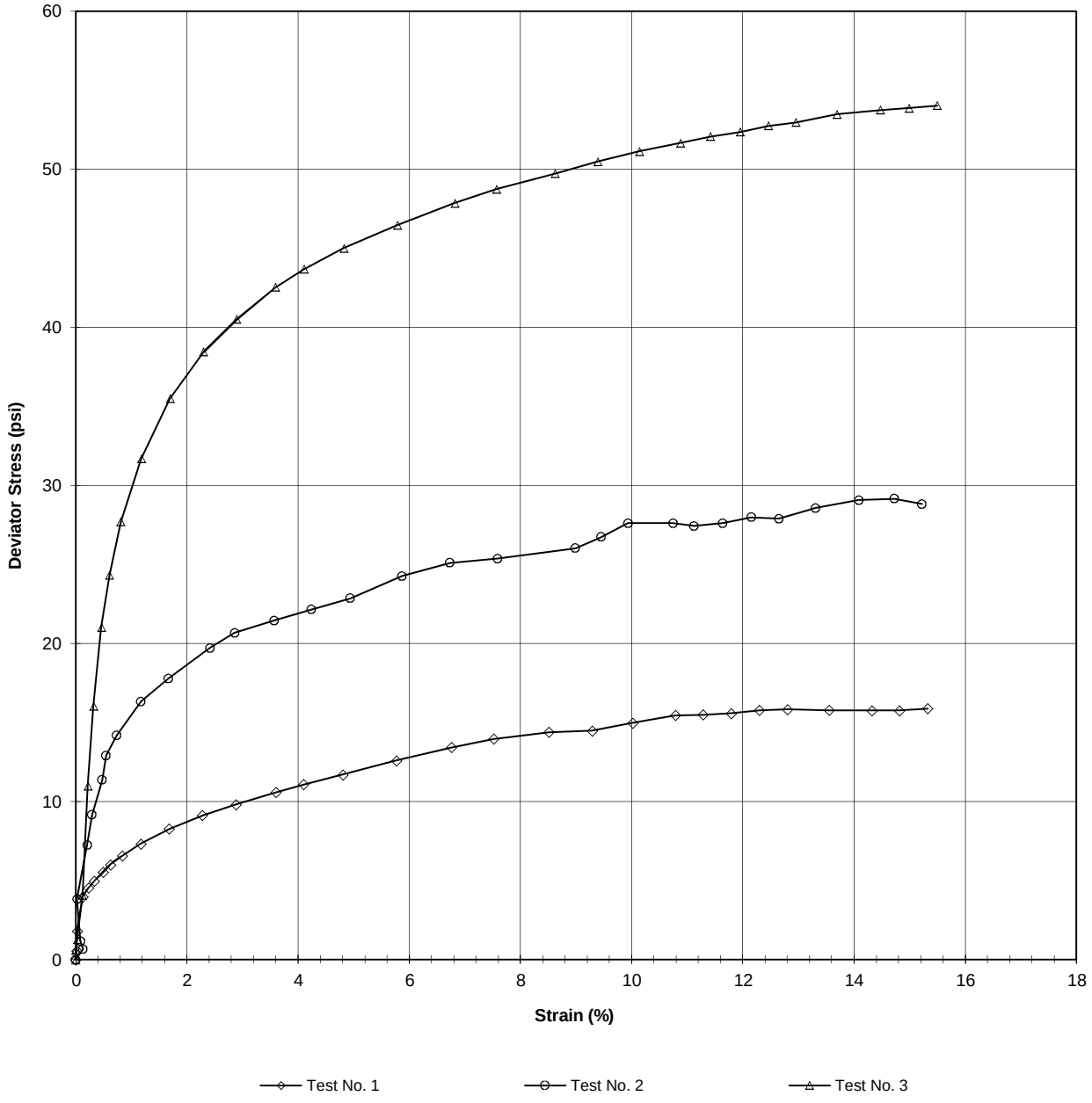
CONSOLIDATED UNDRAINED TRIAXIAL TEST
WITH PORE PRESSURE READINGS
ASTM D4767-11

Client:	Amec Foster Wheeler	Boring No.:	OW-412S
Client Reference:	Dan River Steam Station Ash Removal	Depth (ft):	10.0-20.0
Project No.:	2015-616-02	Sample No.:	BULK
Lab ID:	2015-616-02-06		
Visual Description:	YELLOW & YELLOW BROWN CLAY		



Tested By: SFS Date: 5/12/15 Approved By: MPS Date: 6/4/15

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CONSOLIDATED UNDRAINED TRIAXIAL TEST
WITH PORE PRESSURE READINGS
ASTM D4767-11

Client:	Amec Foster Wheeler		
Client Reference:	Dan River Steam Station Ash Removal		
Project No.:	2015-616-02		
Lab ID:	2015-616-02-06	Specific Gravity (assumed)	2.7

Visual Description: YELLOW & YELLOW BROWN CLAY (REMOLDED)

SAMPLE CONDITION SUMMARY

Boring No.:	OW-412S	OW-412S	OW-412S
Depth (ft):	10.0-20.0	10.0-20.0	10.0-20.0
Sample No.:	BULK	BULK	BULK
Test No.	T1	T2	T3
Deformation Rate (in/min)	0.0005	0.0005	0.0005
Back Pressure (psi)	50.0	50.0	50.0
Consolidation Time (days)	1	1	1
Moisture Content (%) (INITIAL)	18.6	18.7	18.8
Total Unit Weight (pcf)	126.9	127.1	127.9
Dry Unit Weight (pcf)	107.0	107.0	107.7
Moisture Content (%) (FINAL)	21.1	19.7	17.8
Initial State Void Ratio,e	0.575	0.575	0.565
Void Ratio at Shear, e	0.548	0.532	0.448

Tested By: SFS Date: 5/12/15 Input Checked By: GEM Date: 6/4/15

DCN: CT-S28 DATE: 4/12/13 REVISION: 3

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CONSOLIDATED UNDRAINED TRIAXIAL TEST
WITH PORE PRESSURE READINGS

ASTM D4767-11

MOISTURE CONTENT

	T1	T2	T3
Tare Number	805	810	814
Weight of Tare & Wet Sample (g)	358.8	380.49	402.17
Weight of Tare & Dry Sample (g)	318.57	337.27	355.96
Weight of Tare (g)	102.76	106.26	109.75
Moisture Content (%) (INITIAL)	18.64	18.71	18.77
Tare Number	810	809	805
Weight of Tare & Wet Sample (g)	867.9	781.68	792.78
Weight of Tare & Dry Sample (g)	736.38	671.09	688.66
Weight of Tare (g)	112.76	108.79	102.77
Moisture Content (%) (FINAL)	21.09	19.67	17.77

UNIT WEIGHT

Weight of Tube & Wet Sample (g)	2840.52	2841.69	2850.19
Weight of Tube (g)	1553.64	1553.64	1553.64
Weight of Wet Sample (g)	1286.88	1288.05	1296.55
Length 1 (in)	5.995	5.995	5.995
Length 2 (in)	5.995	5.995	5.995
Length 3 (in)	5.995	5.995	5.995
Top Diameter (in)	2.864	2.864	2.864
Middle Diameter (in)	2.864	2.864	2.864
Bottom Diameter (in)	2.864	2.864	2.864
Average Length (in)	5.995	5.995	5.995
Average Area (in)	6.442	6.442	6.442
Sample Volume (cm^3)	632.89	632.89	632.89
Unit Wet Weight (g/cm^3)	2.03	2.04	2.05
Unit Wet Weight (pcf)	126.94	127.06	127.90
Unit Dry Weight (pcf)	107.00	107.03	107.68
Unit Dry Weight (g/cm^3)	1.71	1.71	1.73
Initial Burette Reading	**24**	**24**	**48**
Final Burette Reading	**12.9**	**6.7**	**0.7**
Initial Dial Reading	**130**	**120**	**98**
Dial Reading After Saturation	**130**	**120**	**98**
Dial Reading After Consolidation	**152**	**193**	**227**
Volume Change during Consolidation	11.1	17.3	47.3
Volume Change during Saturation	0.00	0.00	0.00
Volume at Shear (cm^3) *These	621.79	615.59	585.59
Volume of Solids (cm^3) measurements	401.73	401.87	404.32
Volume of Voids (cm^3) are all	220.05	213.72	181.27
Volume of Water (cm^3) at	228.76	213.40	194.00
Void Ratio, e shear	0.548	0.532	0.448

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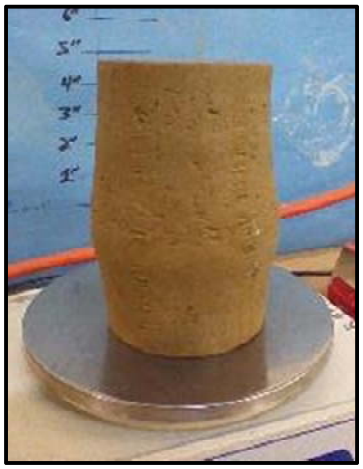
CONSOLIDATED UNDRAINED TRIAXIAL TEST
WITH PORE PRESSURE READINGS
ASTM D4767-11

Client:	Amec Foster Wheeler	Boring No.:	OW-412S
Client Reference:	Dan River Steam Station Ash Removal	Depth (ft):	10.0-20.0
Project No.:	2015-616-02	Sample No.:	BULK
Lab ID:	2015-616-02-06		

TEST 1 INITIAL

N/A

TEST 1 FINAL



TEST 2 INITIAL

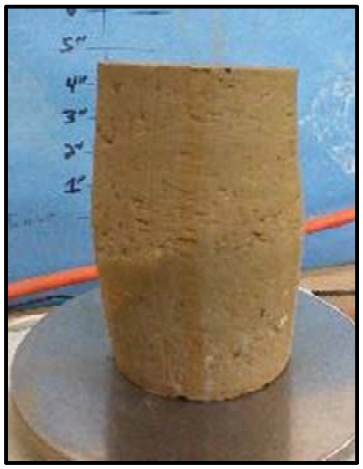
N/A

TEST 2 FINAL

TEST 3 INITIAL

N/A

TEST 3 FINAL



Tested By *SFS* *Date* *5/12/15* *Approved By* MPS *Date* 6/4/15

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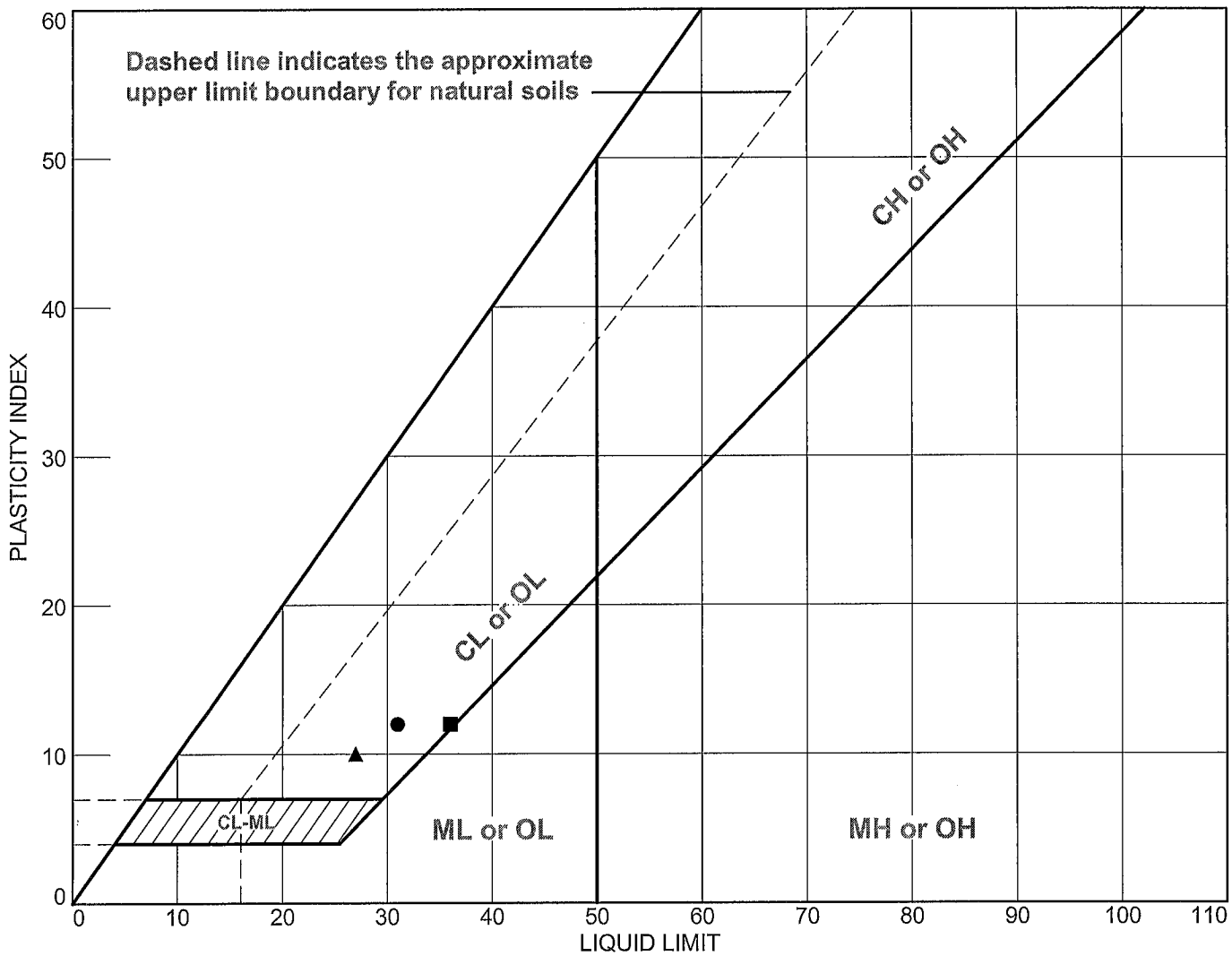
LIQUID AND PLASTIC LIMITS TEST REPORT



SOIL DATA

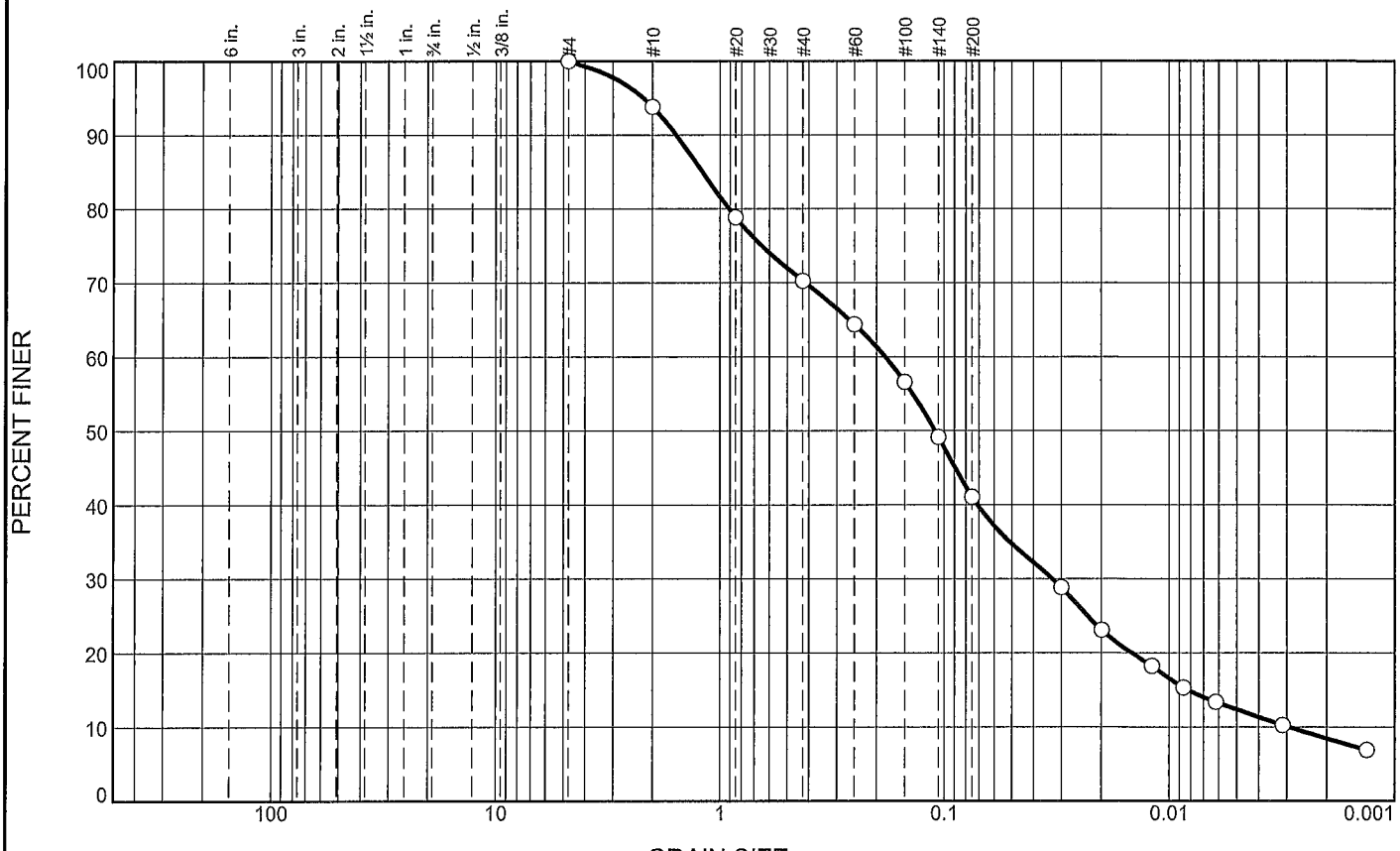
SYMBOL	SOURCE	SAMPLE NO.	DEPTH	NATURAL WATER CONTENT (%)	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	USCS
●	OW-413S	SS-4	18.5-20'		19	31	12	SC
■	OW-415S	SS-3	13.5-15'		24	36	12	SC
▲	OW-416S	SS-5	23.5-25'		17	27	10	SC
◆	OW-417S	SS-5/SS-6	23.5-30'		19	31	12	SC
▼	OW-419S	SS-4	18.5-20'		NP	NV	NP	SM

amec

Client: Duke Energy
Project: Dan River Steam Station Ash Removal
Project No.: 7810140065 **Figure**

Tested By: A Kottenstette **Checked By:** D Kopitsky

Particle Size Analysis ASTM D422



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	6.2	23.5	29.2	28.8	12.3

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#10	93.8		
#20	78.9		
#40	70.3		
#60	64.4		
#100	56.6		
#140	49.2		
#200	41.1		
0.0301 mm.	28.9		
0.0199 mm.	23.1		
0.0119 mm.	18.2		
0.0086 mm.	15.3		
0.0062 mm.	13.4		
0.0031 mm.	10.2		
0.0013 mm.	6.9		

* (no specification provided)

Soil Description

Yellow-Brown Clayey Sand

Atterberg Limits

PL= 19 LL= 31 PI= 12

Coefficients

D_{90}= 1.5670 D_{85}= 1.1960 D_{60}= 0.1829
D_{50}= 0.1098 D_{30}= 0.0329 D_{15}= 0.0083
D_{10}= 0.0030 C_u= 61.97 C_c= 2.00

Classification

USCS= SC AASHTO= A-6(1)

Remarks

Source of Sample: OW-413S **Depth:** 18.5-20'
Sample Number: SS-4 **Date:** 6-3-15

amec

Client: Duke Energy
Project: Dan River Steam Station Ash Removal
Project No: 7810140065 **Figure**

Tested By: D Kopitsky **Checked By:** M Hamilton

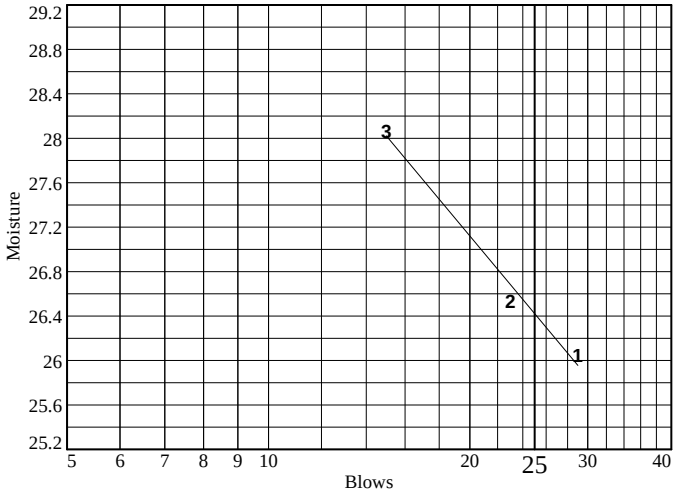
LIQUID AND PLASTIC LIMIT TEST DATA

5/26/2015

Client: Duke Energy
Project: Dan River Steam Station Ash Removal
Project Number: 7810140065
Location: OW-413S
Depth: 3.5 - 13.5'
Sample Number: Bulk
Material Description: Yellow Sandy Lean Clay
USCS: CL
AASHTO: A-6(4)
Tested by: D. Kopitsky
Checked by: G. Williams

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	37.57	38.36	37.46			
Dry+Tare	33.16	33.71	32.80			
Tare	16.23	16.19	16.20			
# Blows	29	23	15			
Moisture	26.0	26.5	28.1			



Liquid Limit= 26
Plastic Limit= 13
Plasticity Index= 13
Natural Moisture= 5.9
Liquidity Index= -0.5

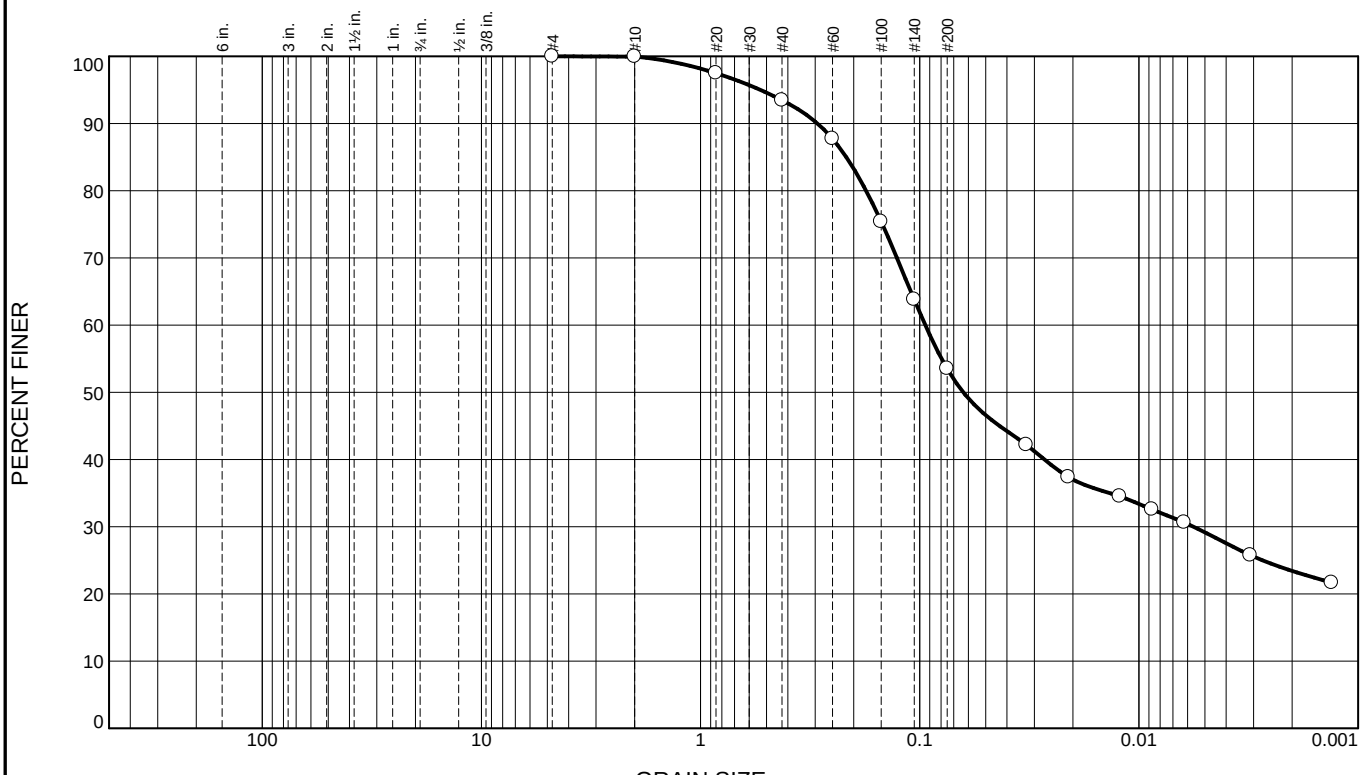
Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	18.28	17.49			
Dry+Tare	17.49	16.76			
Tare	11.43	10.98			
Moisture	13.0	12.6			

Natural Moisture Data

Wet+Tare	Dry+Tare	Tare	Moisture
168.96	162.34	50.71	5.9

Particle Size Analysis ASTM D422



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.1	6.5	39.9	24.3	29.2

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#10	99.9		
#20	97.5		
#40	93.4		
#60	87.7		
#100	75.4		
#140	63.8		
#200	53.5		
0.0326 mm.	42.2		
0.0210 mm.	37.4		
0.0122 mm.	34.5		
0.0087 mm.	32.6		
0.0062 mm.	30.6		
0.0031 mm.	25.8		
0.0013 mm.	21.7		

* (no specification provided)

Soil Description

Yellow Sandy Lean Clay

Atterberg Limits

PL= 13 LL= 26 PI= 13

Coefficients

D_{90}= 0.2929 D_{85}= 0.2165 D_{60}= 0.0944
D_{50}= 0.0633 D_{30}= 0.0056 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= CL AASHTO= A-6(4)

Remarks

Moisture Content = 5.9%

Source of Sample: OW-413S **Depth:** 3.5 - 13.5'
Sample Number: Bulk **Date:** 5-6-15

Client: Duke Energy
Project: Dan River Steam Station Ash Removal
Project No: 7810140065 **Figure**

Tested By: D. Kopitsky **Checked By:** T. Landis

GRAIN SIZE DISTRIBUTION TEST DATA

5/26/2015

Client: Duke Energy
Project: Dan River Steam Station Ash Removal
Project Number: 7810140065
Location: OW-413S
Depth: 3.5 - 13.5' **Sample Number:** Bulk
Material Description: Yellow Sandy Lean Clay
Date: 5-6-15 **PL:** 13 **LL:** 26 **PI:** 13
USCS Classification: CL **AASHTO Classification:** A-6(4)
Testing Remarks: Moisture Content = 5.9%
Tested by: D. Kopitsky **Checked by:** T. Landis

Sieve Test Data

Dry Sample and Tare (grams)	Tare (grams)	Cumulative Pan Tare Weight (grams)	Sieve Opening Size	Cumulative Weight Retained (grams)	Percent Finer
335.52	0.00	0.00	3/4"		
			3/8"		
			#4	0.00	100.0
			#10	0.17	99.9
52.28	0.00	0.00	#20	1.29	97.5
			#40	3.40	93.4
			#60	6.40	87.7
			#100	12.84	75.4
			#140	18.91	63.8
			#200	24.29	53.5

Hydrometer Test Data

Hydrometer test uses material passing #10
Percent passing #10 based upon complete sample = 99.9
Weight of hydrometer sample =53.27
Hygroscopic moisture correction:
Moist weight and tare = 30.31
Dry weight and tare = 30.05
Tare weight = 16.17
Hygroscopic moisture = 1.9%
Table of composite correction values:

Temp., deg. C:	14.0	24.0	40.0
Comp. corr.:	-5.0	-3.0	0.0

Meniscus correction only = 1.0
Specific gravity of solids = 2.65
Hydrometer type = 152H
Hydrometer effective depth equation: L = 16.294964 **-** 0.164 **x Rm**

Elapsed Time (min.)	Temp. (deg. C.)	Actual Reading	Corrected Reading	K	Rm	Eff. Depth	Diameter (mm.)	Percent Finer
2.00	21.8	25.5	22.1	0.0133	26.5	11.9	0.0326	42.2
5.00	21.8	23.0	19.6	0.0133	24.0	12.4	0.0210	37.4
15.00	21.8	21.5	18.1	0.0133	22.5	12.6	0.0122	34.5
30.00	21.7	20.5	17.0	0.0134	21.5	12.8	0.0087	32.6
60.00	21.6	19.5	16.0	0.0134	20.5	12.9	0.0062	30.6
250.00	21.4	17.0	13.5	0.0134	18.0	13.3	0.0031	25.8

Hydrometer Test Data (continued)

Elapsed Time (min.)	Temp. (deg. C.)	Actual Reading	Corrected Reading	K	Rm	Eff. Depth	Diameter (mm.)	Percent Finer
1440.00	20.7	15.0	11.3	0.0135	16.0	13.7	0.0013	21.7

Fractional Components

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	0.0	0.0	0.0	0.1	6.5	39.9	46.5	24.3	29.2	53.5

D_5	D_{10}	D_{15}	D_{20}	D_{30}	D_{40}	D_{50}	D_{60}	D_{80}	D_{85}	D_{90}	D_{95}
				0.0056	0.0270	0.0633	0.0944	0.1757	0.2165	0.2929	0.5344

Fineness Modulus
0.40

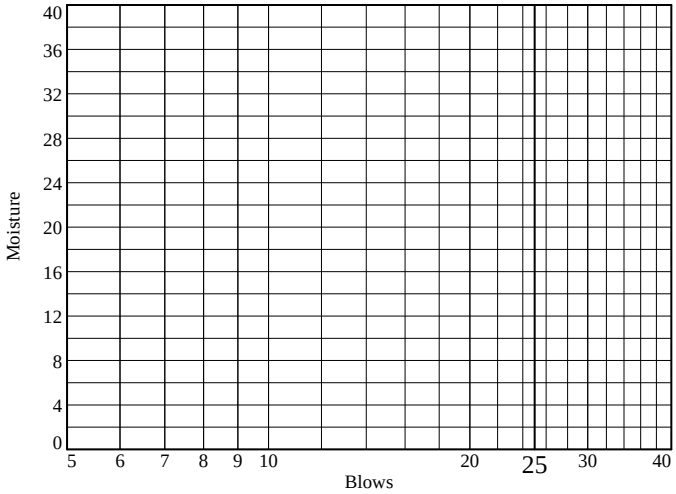
LIQUID AND PLASTIC LIMIT TEST DATA

5/26/2015

Client: Duke Energy
Project: Dan River Steam Station Ash Removal
Project Number: 7810140065
Location: OW-414S
Depth: 23.5 - 25'
Sample Number: SS-5
Material Description: Silty Sand
USCS: SM
AASHTO: A-4(0)
Tested by: D. Kopitsky
Checked by: T. Landis

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare						
Dry+Tare						
Tare						
# Blows						
Moisture						



Liquid Limit= NV
Plastic Limit= NP
Plasticity Index= NP
Natural Moisture= 10.6

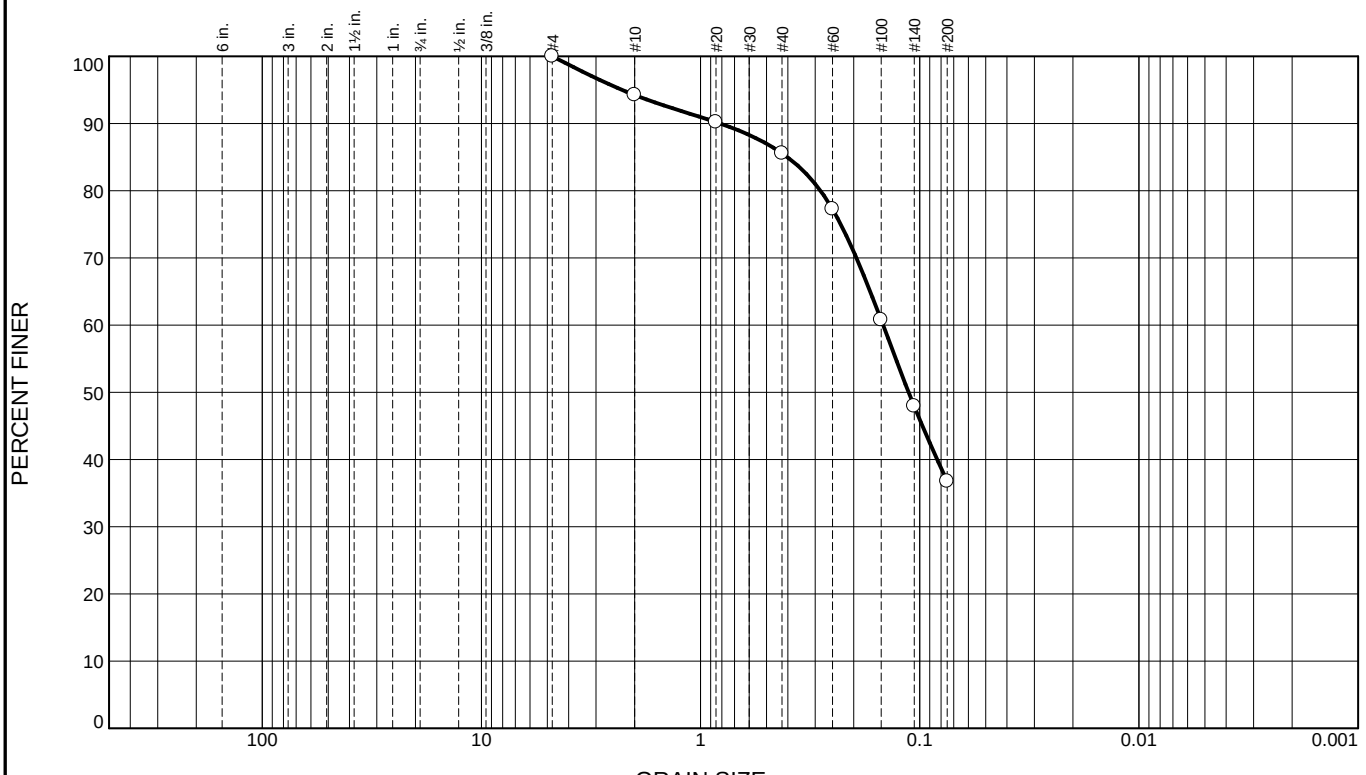
Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare					
Dry+Tare					
Tare					
Moisture					

Natural Moisture Data

Wet+Tare	Dry+Tare	Tare	Moisture
347.94	338.01	244.72	10.6

Particle Size Analysis ASTM D422



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	5.8	8.6	48.8	36.8	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#10	94.2		
#20	90.2		
#40	85.6		
#60	77.2		
#100	60.8		
#140	47.9		
#200	36.8		

* (no specification provided)

Soil Description

Silty Sand

Atterberg Limits

PL= NP LL= NV PI= NP

Coefficients

D_{90}= 0.8169 D_{85}= 0.4025 D_{60}= 0.1470
D_{50}= 0.1124 D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= SM AASHTO= A-4(0)

Remarks

Moisture Content = 10.6%

Source of Sample: OW-414S **Depth:** 23.5 - 25'
Sample Number: SS-5 **Date:** 5-15-15

amec

Client: Duke Energy
Project: Dan River Steam Station Ash Removal
Project No: 7810140065 **Figure**

Tested By: A. Kottenstette **Checked By:** D. Kopitsky

GRAIN SIZE DISTRIBUTION TEST DATA

5/26/2015

Client: Duke Energy
Project: Dan River Steam Station Ash Removal
Project Number: 7810140065
Location: OW-414S
Depth: 23.5 - 25'
Sample Number: SS-5
Material Description: Silty Sand
Date: 5-15-15 **PL:** NP **LL:** NV **PI:** NP
USCS Classification: SM
AASHTO Classification: A-4(0)
Testing Remarks: Moisture Content = 10.6%
Tested by: A. Kottenstette
Checked by: D. Kopitsky

Sieve Test Data

Dry Sample and Tare (grams)	Tare (grams)	Cumulative Pan Tare Weight (grams)	Sieve Opening Size	Cumulative Weight Retained (grams)	Percent Finer
338.01	244.72	0.00	3/4"		
			3/8"		
			#4	0.00	100.0
			#10	5.38	94.2
			#20	9.15	90.2
			#40	13.48	85.6
			#60	21.23	77.2
			#100	36.60	60.8
			#140	48.59	47.9
			#200	59.00	36.8

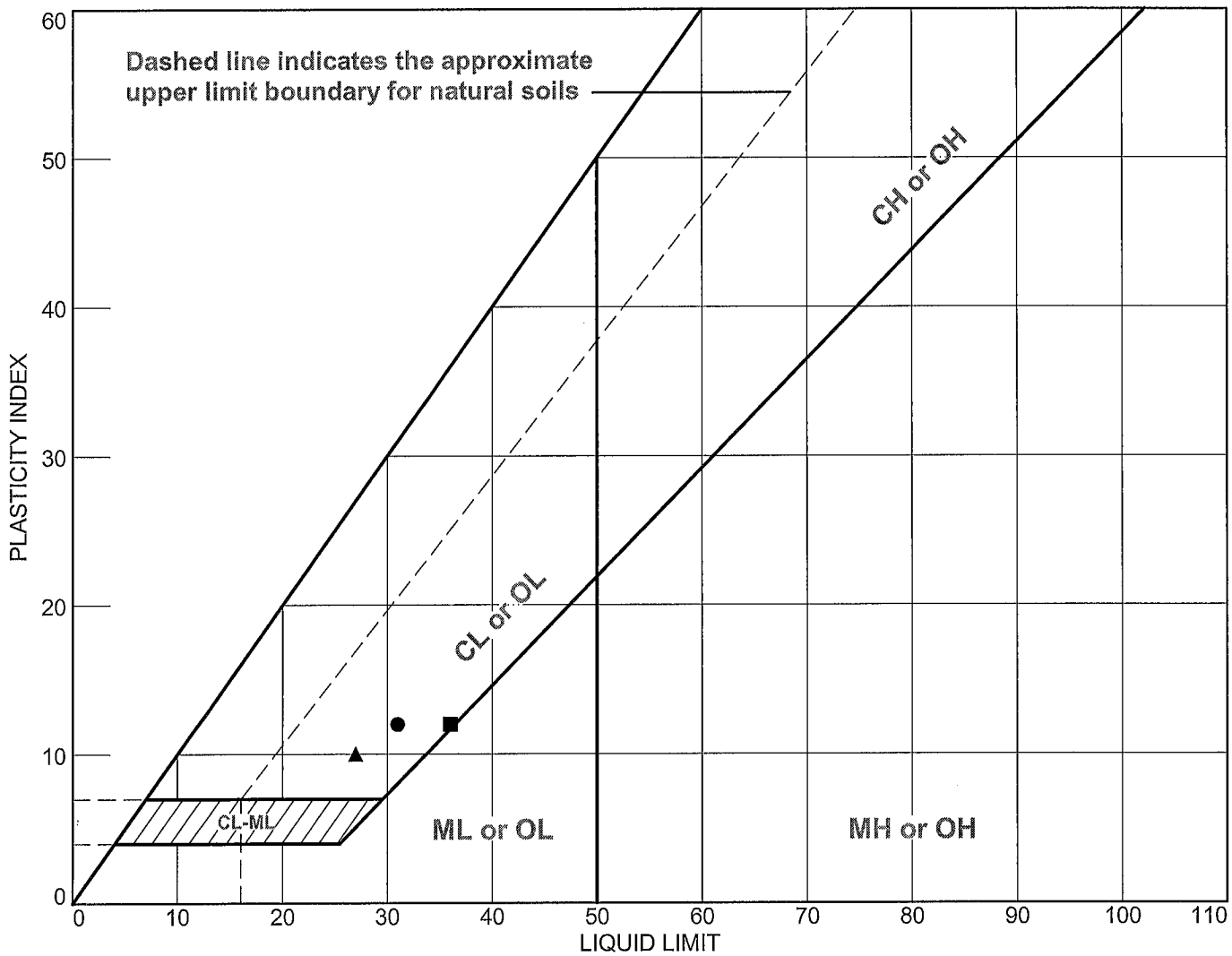
Fractional Components

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	0.0	0.0	0.0	5.8	8.6	48.8	63.2			36.8

D_5	D_{10}	D_{15}	D_{20}	D_{30}	D_{40}	D_{50}	D_{60}	D_{80}	D_{85}	D_{90}	D_{95}
					0.0833	0.1124	0.1470	0.2838	0.4025	0.8169	2.2838

Fineness Modulus
0.83

LIQUID AND PLASTIC LIMITS TEST REPORT



SOIL DATA

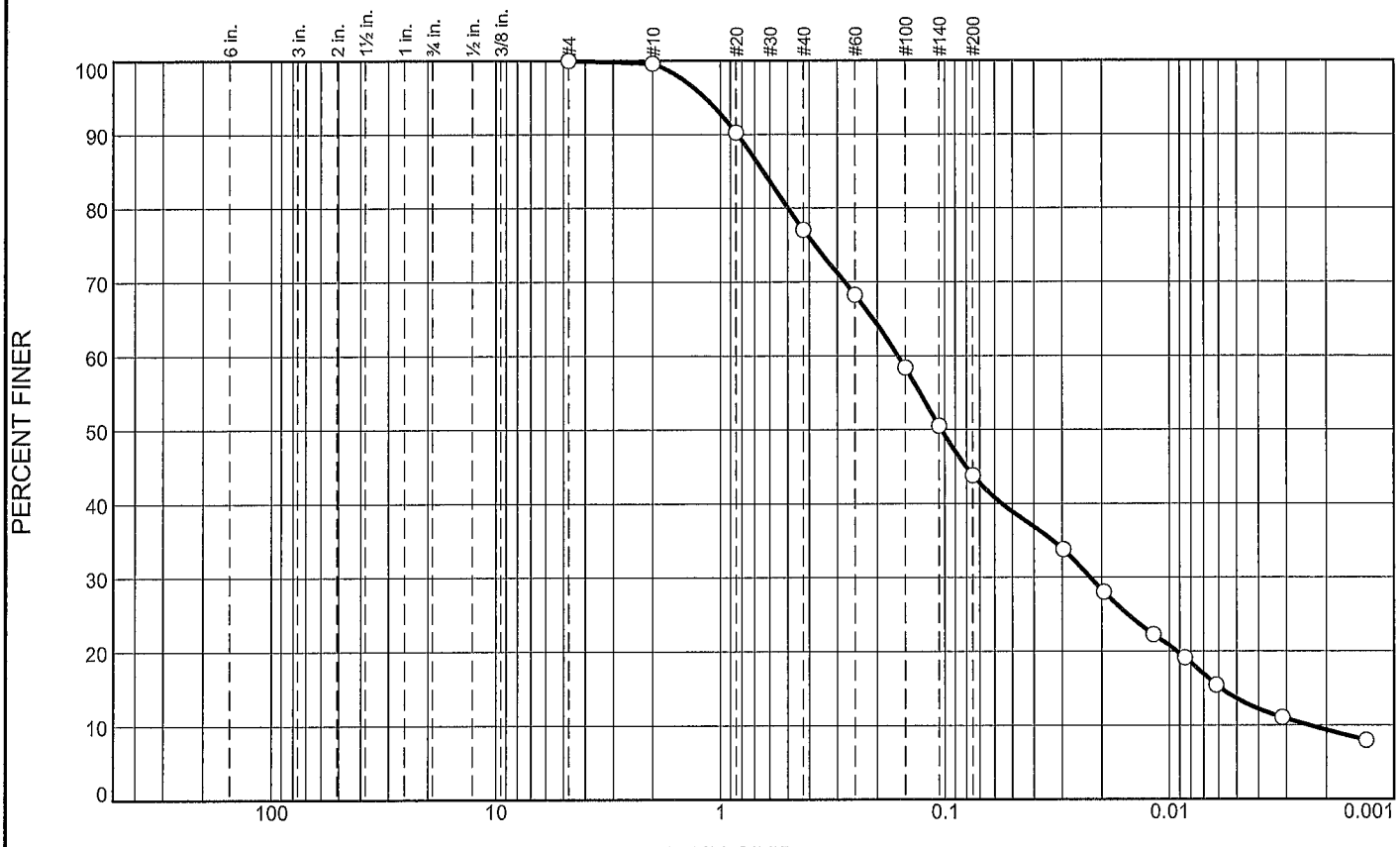
SYMBOL	SOURCE	SAMPLE NO.	DEPTH	NATURAL WATER CONTENT (%)	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	USCS
●	OW-413S	SS-4	18.5-20'		19	31	12	SC
■	OW-415S	SS-3	13.5-15'		24	36	12	SC
▲	OW-416S	SS-5	23.5-25'		17	27	10	SC
◆	OW-417S	SS-5/SS-6	23.5-30'		19	31	12	SC
▼	OW-419S	SS-4	18.5-20'		NP	NV	NP	SM

amec

Client: Duke Energy
Project: Dan River Steam Station Ash Removal
Project No.: 7810140065 **Figure**

Tested By: A Kottenstette **Checked By:** D Kopitsky

Particle Size Analysis ASTM D422



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.4	22.6	33.2	30.2	13.6

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#10	99.6		
#20	90.3		
#40	77.0		
#60	68.3		
#100	58.4		
#140	50.5		
#200	43.8		
0.0297 mm.	33.8		
0.0196 mm.	28.1		
0.0118 mm.	22.3		
0.0085 mm.	19.1		
0.0062 mm.	15.5		
0.0031 mm.	11.1		
0.0013 mm.	8.0		

* (no specification provided)

Soil Description

Yellow-Tan Clayey Sand

Atterberg Limits

PL= 24 LL= 36 PI= 12

Coefficients

D_{90}= 0.8372 D_{85}= 0.6413 D_{60}= 0.1617
D_{50}= 0.1036 D_{30}= 0.0225 D_{15}= 0.0059
D_{10}= 0.0024 C_u= 67.48 C_c= 1.31

Classification

USCS= SC AASHTO= A-6(2)

Remarks

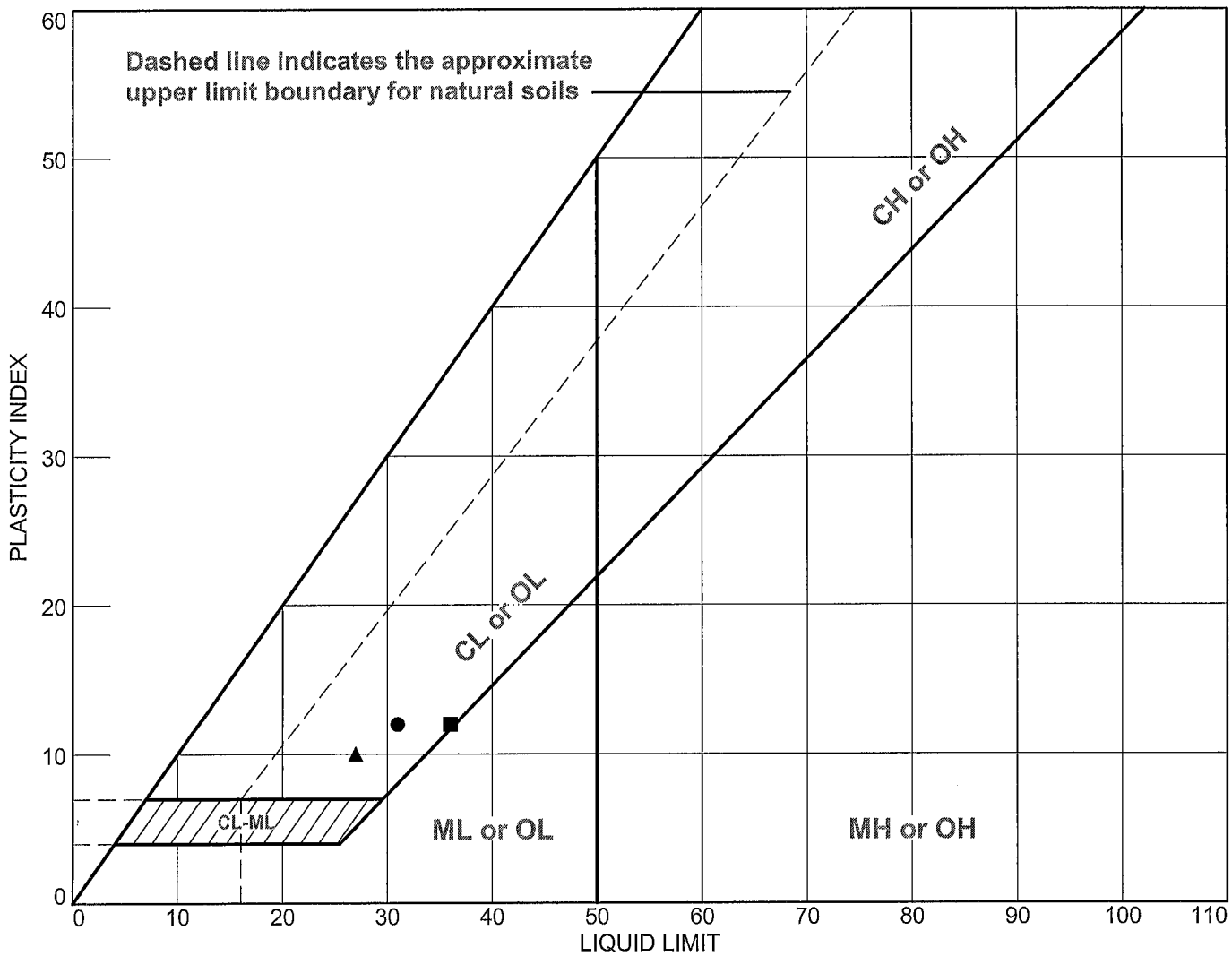
Source of Sample: OW-415S **Depth:** 13.5-15'
Sample Number: SS-3 **Date:** 6-3-15D

amec

Client: Duke Energy
Project: Dan River Steam Station Ash Removal
Project No: 7810140065 **Figure**

Tested By: D Kopitsky **Checked By:** M Hamilton

LIQUID AND PLASTIC LIMITS TEST REPORT



SOIL DATA

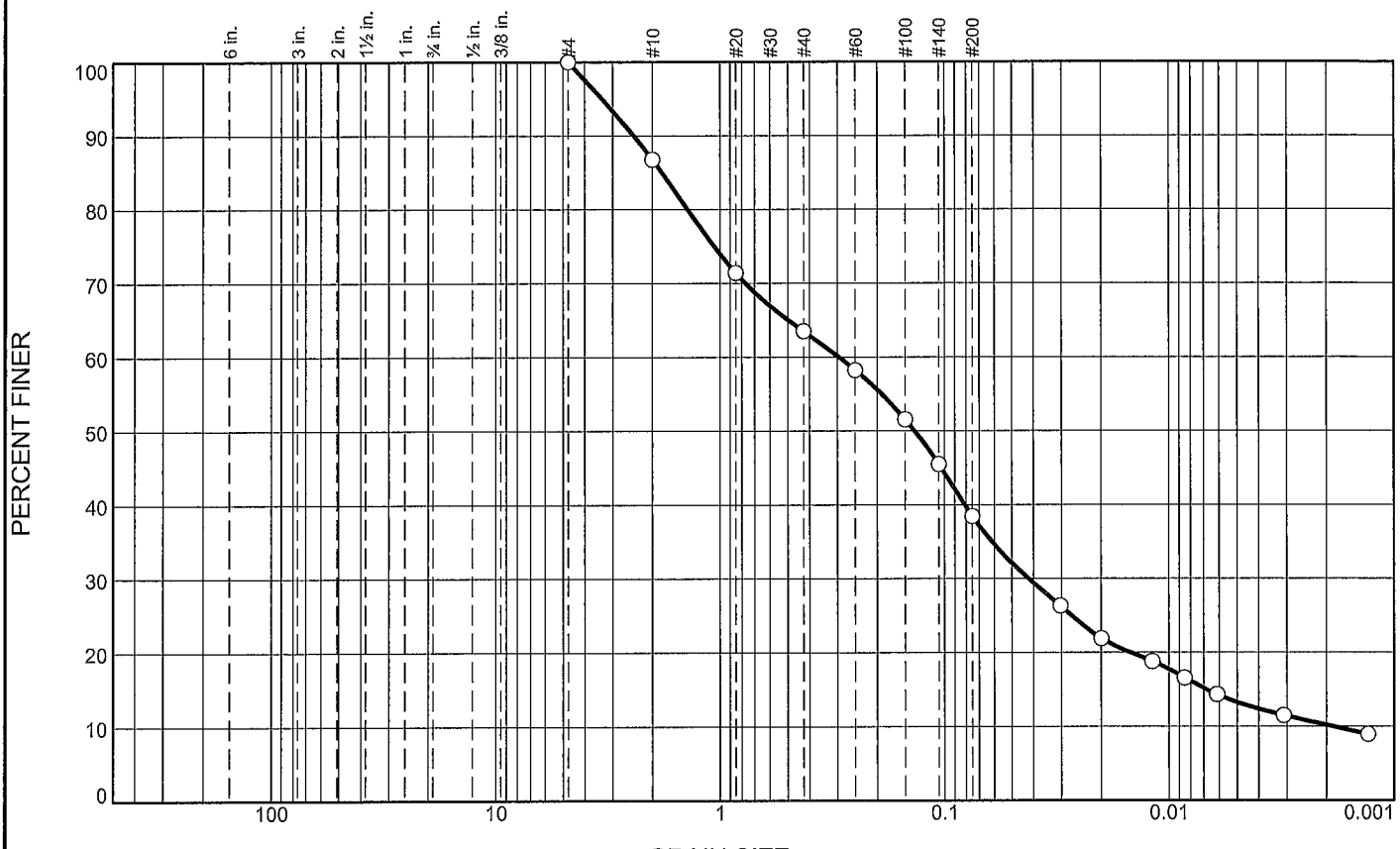
SYMBOL	SOURCE	SAMPLE NO.	DEPTH	NATURAL WATER CONTENT (%)	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	USCS
●	OW-413S	SS-4	18.5-20'		19	31	12	SC
■	OW-415S	SS-3	13.5-15'		24	36	12	SC
▲	OW-416S	SS-5	23.5-25'		17	27	10	SC
◆	OW-417S	SS-5/SS-6	23.5-30'		19	31	12	SC
▼	OW-419S	SS-4	18.5-20'		NP	NV	NP	SM

amec

Client: Duke Energy
Project: Dan River Steam Station Ash Removal
Project No.: 7810140065 **Figure**

Tested By: A Kottenstette **Checked By:** D Kopitsky

Particle Size Analysis ASTM D422



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	13.2	23.3	25.1	25.1	13.3

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#10	86.8		
#20	71.4		
#40	63.5		
#60	58.2		
#100	51.6		
#140	45.5		
#200	38.4		
0.0304 mm.	26.3		
0.0200 mm.	21.9		
0.0118 mm.	18.8		
0.0085 mm.	16.6		
0.0061 mm.	14.3		
0.0031 mm.	11.5		
0.0013 mm.	8.9		

* (no specification provided)

Soil Description

Yellow-Tan Clayey Sand

Atterberg Limits

PL= 17 LL= 27 PI= 10

Coefficients

D_{90}= 2.4196 D_{85}= 1.8125 D_{60}= 0.2956
D_{50}= 0.1360 D_{30}= 0.0421 D_{15}= 0.0068
D_{10}= 0.0019 C_u= 157.21 C_c= 3.19

Classification

USCS= SC AASHTO= A-4(0)

Remarks

Source of Sample: OW-416S **Depth:** 23.5-25'
Sample Number: SS-5 **Date:** 6-3-15

amec

Client: Duke Energy
Project: Dan River Steam Station Ash Removal
Project No: 7810140065 **Figure**

Tested By: D Kopitsky **Checked By:** M Hamilton

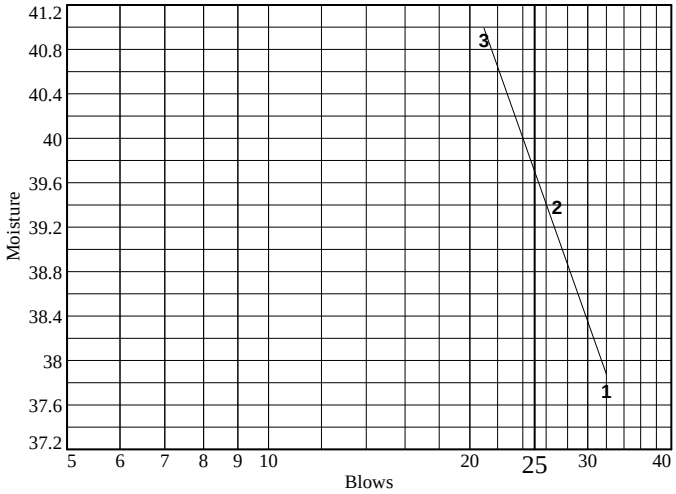
LIQUID AND PLASTIC LIMIT TEST DATA

5/26/2015

Client: Duke Energy
Project: Dan River Steam Station Ash Removal
Project Number: 7810140065
Location: OW-416D
Depth: 0 - 10'
Sample Number: Bulk
Material Description: Yellow Sandy Lean Clay
USCS: CL
AASHTO: A-6(11)
Tested by: A. Kottenstette
Checked by: T. Landis

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	25.32	25.11	25.70			
Dry+Tare	22.83	22.68	22.94			
Tare	16.23	16.51	16.19			
# Blows	32	27	21			
Moisture	37.7	39.4	40.9			



Liquid Limit= 40
Plastic Limit= 21
Plasticity Index= 19
Natural Moisture= 20.0
Liquidity Index= -0.1

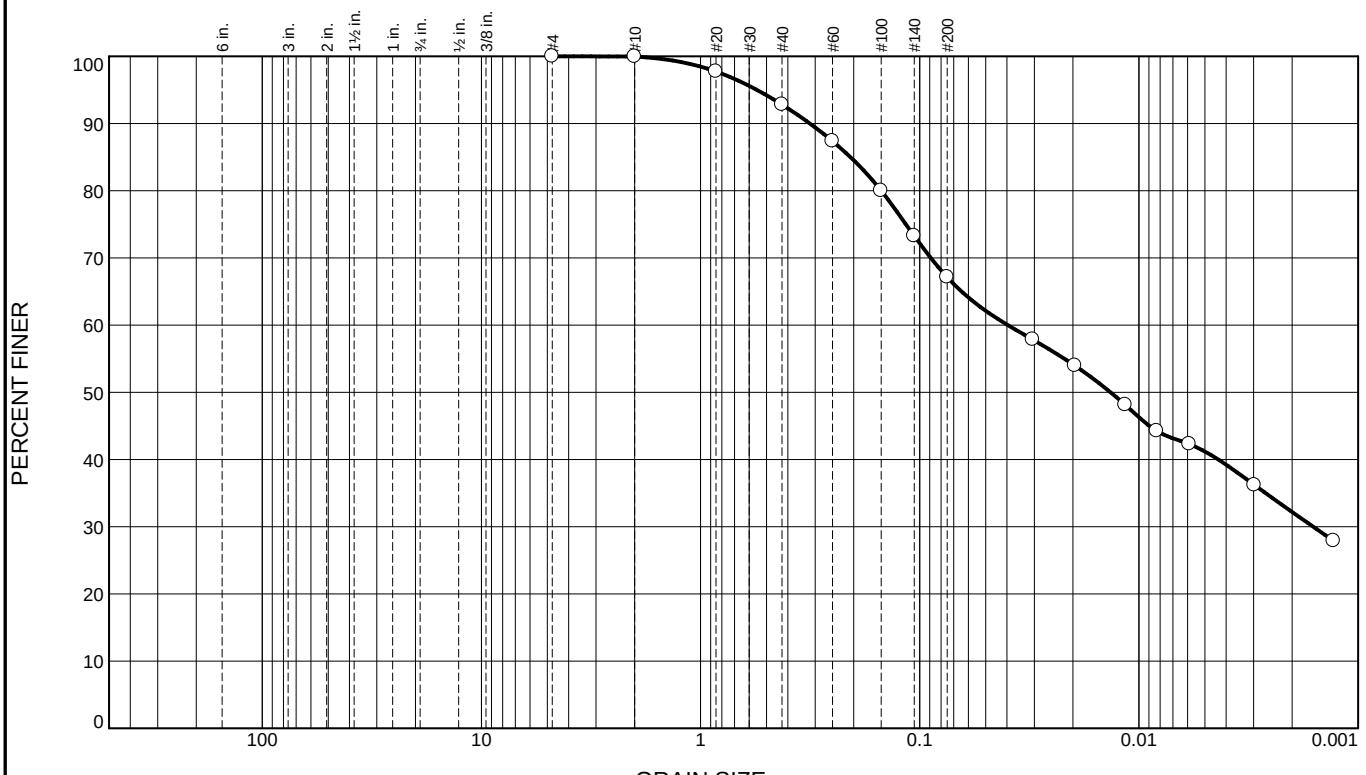
Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	16.90	17.87			
Dry+Tare	15.81	16.77			
Tare	10.72	11.50			
Moisture	21.4	20.9			

Natural Moisture Data

Wet+Tare	Dry+Tare	Tare	Moisture
178.38	157.10	50.66	20.0

Particle Size Analysis ASTM D422



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	7.2	25.7	25.9	41.2

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#10	100.0		
#20	97.7		
#40	92.8		
#60	87.4		
#100	80.0		
#140	73.3		
#200	67.1		
0.0305 mm.	57.8		
0.0196 mm.	54.0		
0.0116 mm.	48.1		
0.0083 mm.	44.2		
0.0059 mm.	42.3		
0.0030 mm.	36.2		
0.0013 mm.	27.9		

* (no specification provided)

Soil Description

Yellow Sandy Lean Clay

Atterberg Limits

PL= 21 LL= 40 PI= 19

Coefficients

D_{90}= 0.3173 D_{85}= 0.2071 D_{60}= 0.0397
D_{50}= 0.0135 D_{30}= 0.0016 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= CL AASHTO= A-6(11)

Remarks

Moisture Content = 20.0%

Source of Sample: OW-416D **Depth:** 0 - 10'
Sample Number: Bulk **Date:** 5-8-15

amec

Client: Duke Energy
Project: Dan River Steam Station Ash Removal
Project No: 7810140065 **Figure**

Tested By: D. Kopitsky **Checked By:** T. Landis

GRAIN SIZE DISTRIBUTION TEST DATA

5/26/2015

Client: Duke Energy
Project: Dan River Steam Station Ash Removal
Project Number: 7810140065
Location: OW-416D
Depth: 0 - 10' **Sample Number:** Bulk
Material Description: Yellow Sandy Lean Clay
Date: 5-8-15 **PL:** 21 **LL:** 40 **PI:** 19
USCS Classification: CL **AASHTO Classification:** A-6(11)
Testing Remarks: Moisture Content = 20.0%
Tested by: D. Kopitsky **Checked by:** T. Landis

Sieve Test Data

Dry Sample and Tare (grams)	Tare (grams)	Cumulative Pan Tare Weight (grams)	Sieve Opening Size	Cumulative Weight Retained (grams)	Percent Finer
307.54	0.00	0.00	3/4"		
			3/8"		
			#4	0.00	100.0
			#10	0.10	100.0
51.48	0.00	0.00	#20	1.15	97.7
			#40	3.69	92.8
			#60	6.49	87.4
			#100	10.28	80.0
			#140	13.75	73.3
			#200	16.91	67.1

Hydrometer Test Data

Hydrometer test uses material passing #10
Percent passing #10 based upon complete sample = 100.0
Weight of hydrometer sample =54.62
Hygroscopic moisture correction:
Moist weight and tare = 30.80
Dry weight and tare = 29.96
Tare weight = 16.22
Hygroscopic moisture = 6.1%
Table of composite correction values:

Temp., deg. C:	14.0	24.0	40.0
Comp. corr.:	-5.0	-3.0	0.0

Meniscus correction only = 1.0
Specific gravity of solids = 2.65
Hydrometer type = 152H
Hydrometer effective depth equation: L = 16.294964 **-** 0.164 **x Rm**

Elapsed Time (min.)	Temp. (deg. C.)	Actual Reading	Corrected Reading	K	Rm	Eff. Depth	Diameter (mm.)	Percent Finer
2.00	22.9	33.0	29.8	0.0132	34.0	10.7	0.0305	57.8
5.00	22.9	31.0	27.8	0.0132	32.0	11.0	0.0196	54.0
15.00	22.9	28.0	24.8	0.0132	29.0	11.5	0.0116	48.1
30.00	22.9	26.0	22.8	0.0132	27.0	11.9	0.0083	44.2
60.00	22.9	25.0	21.8	0.0132	26.0	12.0	0.0059	42.3
250.00	22.2	22.0	18.6	0.0133	23.0	12.5	0.0030	36.2

Hydrometer Test Data (continued)

Elapsed Time (min.)	Temp. (deg. C.)	Actual Reading	Corrected Reading	K	Rm	Eff. Depth	Diameter (mm.)	Percent Finer
1440.00	20.8	18.0	14.4	0.0135	19.0	13.2	0.0013	27.9

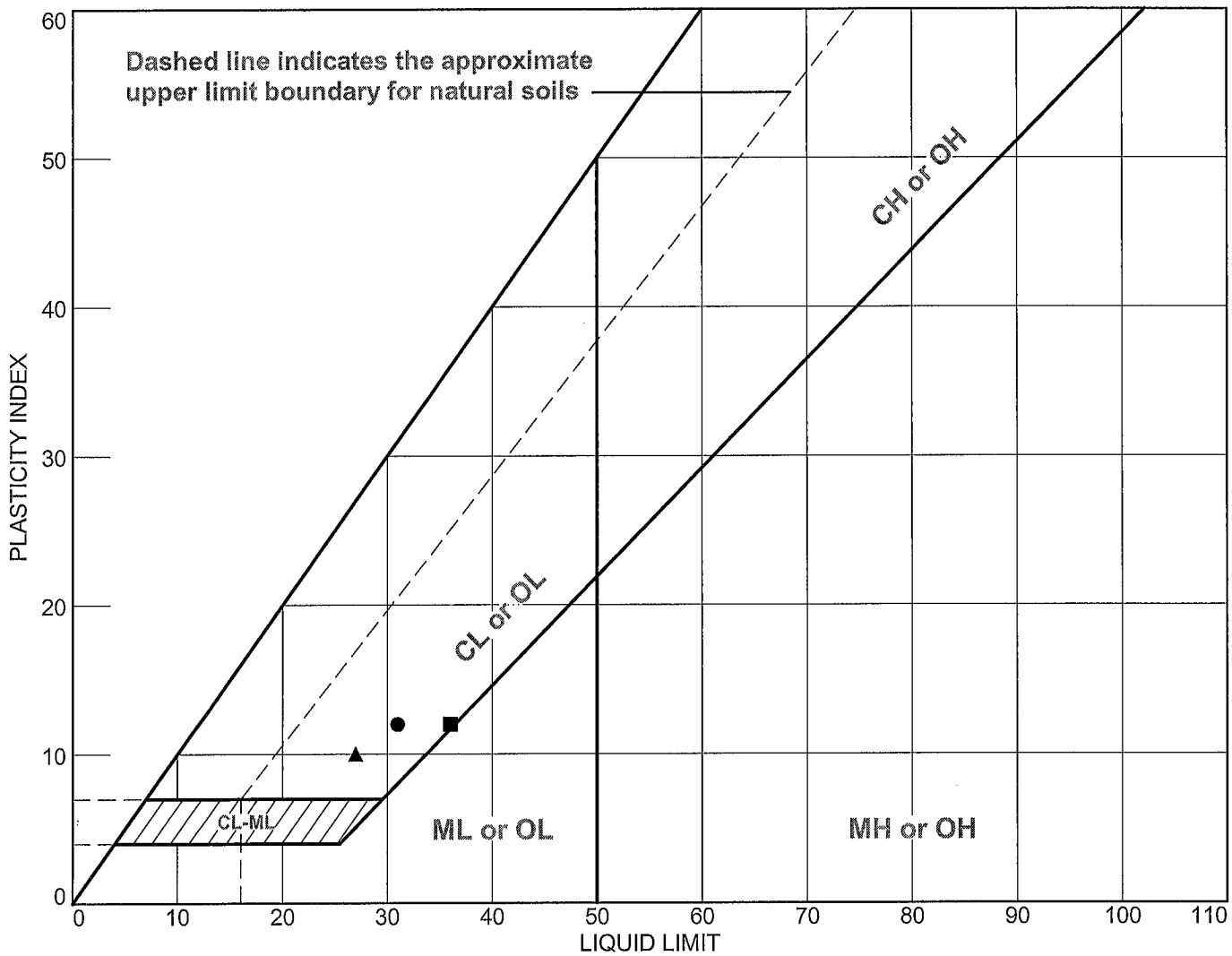
Fractional Components

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	0.0	0.0	0.0	0.0	7.2	25.7	32.9	25.9	41.2	67.1

D_5	D_{10}	D_{15}	D_{20}	D_{30}	D_{40}	D_{50}	D_{60}	D_{80}	D_{85}	D_{90}	D_{95}
				0.0016	0.0043	0.0135	0.0397	0.1500	0.2071	0.3173	0.5539

Fineness Modulus
0.36

LIQUID AND PLASTIC LIMITS TEST REPORT



SOIL DATA

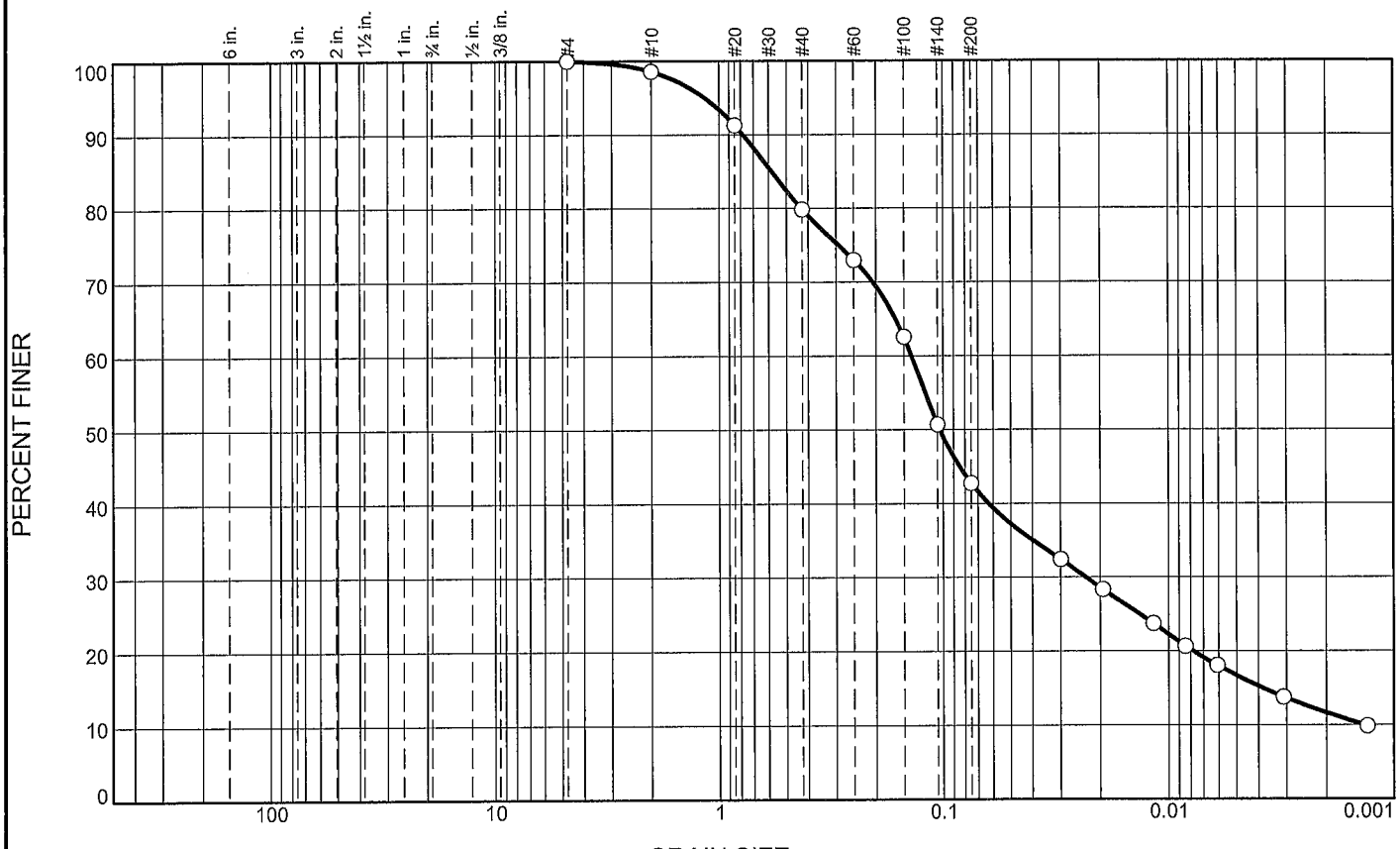
SYMBOL	SOURCE	SAMPLE NO.	DEPTH	NATURAL WATER CONTENT (%)	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	USCS
●	OW-413S	SS-4	18.5-20'		19	31	12	SC
■	OW-415S	SS-3	13.5-15'		24	36	12	SC
▲	OW-416S	SS-5	23.5-25'		17	27	10	SC
◆	OW-417S	SS-5/SS-6	23.5-30'		19	31	12	SC
▼	OW-419S	SS-4	18.5-20'		NP	NV	NP	SM

amec

Client: Duke Energy
Project: Dan River Steam Station Ash Removal
Project No.: 7810140065 **Figure**

Tested By: A Kottenstette **Checked By:** D Kopitsky

Particle Size Analysis ASTM D422



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	1.4	18.7	37.2	26.0	16.7

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#10	98.6		
#20	91.3		
#40	79.9		
#60	73.0		
#100	62.6		
#140	50.7		
#200	42.7		
0.0299 mm.	32.4		
0.0195 mm.	28.3		
0.0117 mm.	23.7		
0.0084 mm.	20.7		
0.0061 mm.	18.0		
0.0031 mm.	13.8		
0.0013 mm.	9.8		

* (no specification provided)

Soil Description

Yellow-Tan Clayey Sand

Atterberg Limits

PL= 19 LL= 31 PI= 12

Coefficients

D_{90}= 0.7797 D_{85}= 0.5802 D_{60}= 0.1387
D_{50}= 0.1035 D_{30}= 0.0232 D_{15}= 0.0038
D_{10}= 0.0014 C_u= 102.06 C_c= 2.86

Classification

USCS= SC AASHTO= A-6(2)

Remarks

Source of Sample: OW-417S **Depth:** 23.5-30'
Sample Number: SS-5/SS-6 **Date:** 6-3-15

amec

Client: Duke Energy
Project: Dan River Steam Station Ash Removal
Project No: 7810140065 **Figure**

Tested By: D Kopitsky **Checked By:** M Hamilton

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SPECIFIC GRAVITY

ASTM D 854-10

Client	Amec Foster Wheeler	Boring No.	OW-417D
Client Reference	Dan River Steam Station Ash Removal	Depth (ft)	2.0-4.0
Project No.	2015-616-02	Sample No.	UD
Lab ID	2015-616-02-03	Visual Description	LIGHT BROWN ELASTIC
		(MInus No.4 sieve material, airdried)	**SILT WITH SAND**

Replicate Number	**1**	**2**
Pycnometer ID	R 345	R 344
Weight of Pycnometer + Soil + Water (gm)	698.11	695.65
Temperature, T (^{o}Celsius)	24.7	24.5
Weight of Pycnometer + Water (gm)	668.06	667.82
Tare Number	2	12
Weight of Tare + Dry Soil (gm)	359.65	354.21
Weight of Tare (gm)	313.64	311.47
Weight of Dry Soil (gm)	46.01	42.74
Specific Gravity of Soil @ T	2.883	2.866
Specific Gravity of Water @ T	0.9972	0.9972
Conversion Factor for Temperature T	0.9989	0.9990
Specific Gravity @ 20° Celsius	2.886	2.869

Average Specific Gravity @ 20° Celsius	2.88

Tested By SFS *Date* 5/12/15 *Checked By* GEM *Date* 6/4/15

DCN: CT-S5 Date: 03/24/05 Revision: 10R *T:\2015 PROJECTS\2015-616 AMEC - DAN RIVER\[2015-616-02-03 Specific Gravity Soils 1Ral..xls]Sheet1*

UNIT WEIGHT WITH POROSITY

ASTM D2937-10

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Client	AMEC FOSTER WHEELER	Boring No.	OW-417D
Client Project	Dan River Steam Station Ash Removal	Depth (ft.)	2.0-4.0
Project No.	2015-616-02	Sample No.	UD
Lab ID No.	2015-616-02-03		

Specific Gravity 2.88 Measured

Visual Description: LIGHT BROWN ELASTIC SILT WITH SAND

MOISTURE CONTENT:

	810
Tare Number	374.94
Wt. of Tare & WS (gm.)	320.11
Wt. of Tare & DS (gm.)	112.89
Wt. of Tare (gm.)	54.83
Wt. of Water (gm.)	207.22
Wt. of DS (gm.)	
	26.5
Moisture Content (%)	

SPECIMEN: Undisturbed

Wt. of Mold/Tube & WS (gm.)	1342.37
Wt. of Mold/Tube (gm.)	0.00
Wt. of WS (gm.)	1342.37
Length 1 (in.)	6.114
Length 2 (in.)	6.112
Length 3 (in.)	6.136
Top Diameter (in.)	2.863
Middle Diameter (in.)	2.870
Bottom Diameter (in.)	2.865
Average Length (in.)	6.12
Average Area (in.^{2})	6.45
Sample Volume (cm^3)	647.06
Unit Wet Wt. (gm./ cm^3)	2.07
Unit Wet Wt. (pcf)	129.5
Unit Dry Wt. (pcf)	102.4
Unit Dry Wt. (gm./ cm^3)	1.64
Void Ratio, e	0.76
Porosity, n	**0.43**
Pore Volume (cm^3)	278.5

Tested By: SFS Date: 5/7/15 Checked By: GEM Date: 6/4/15

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ATTERBERG LIMITS

ASTM D 4318-10 / AASHTO T89-10

Client:	AMEC FOSTER WHEELER	Boring No.:	OW-417D
Client Reference:	Dan River Steam Station Ash Removal	Depth (ft):	2.0-4.0
Project No.:	2015-616-02	Sample No.:	UD
Lab ID:	2015-616-02-03	Soil Description:	**LIGHTBROWN ELASTIC SILT**

Note: The USCS symbol used with this test refers only to the minus No. 40 sieve material. See the "Sieve and Hydrometer Analysis" graph page for the complete material description. (Minus No. 40 sieve material, Airdried)

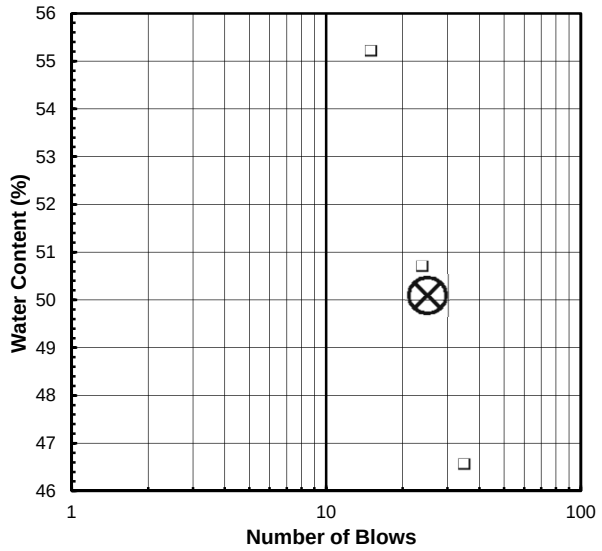
Liquid Limit Test	**1**	**2**	**3**	
Tare Number	A-T	A-K	A-H	**M U L T I P O I N T**
Wt. of Tare & Wet Sample (g)	25.18	25.30	25.88	
Wt. of Tare & Dry Sample (g)	22.15	22.03	22.22	
Wt. of Tare (g)	15.64	15.58	15.59	
Wt. of Water (g)	3.0	3.3	3.7	
Wt. of Dry Sample (g)	6.5	6.5	6.6	
Moisture Content (%)	**46.5**	**50.7**	**55.2**	
Number of Blows	**35**	**24**	**15**	

Plastic Limit Test	**1**	**2**	**Range**
Tare Number	B4	V-2	
Wt. of Tare & Wet Sample (g)	22.59	22.37	
Wt. of Tare & Dry Sample (g)	20.98	20.88	
Wt. of Tare (g)	15.46	15.68	
Wt. of Water (g)	1.6	1.5	
Wt. of Dry Sample (g)	5.5	5.2	
Moisture Content (%)	**29.2**	**28.7**	**0.5**

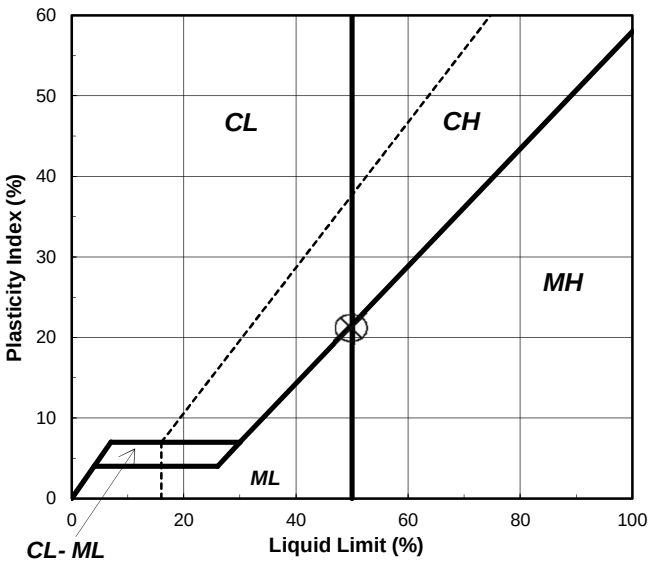
Note: The acceptable range of the two Moisture contents is ± 2.6

Test Results	
Liquid Limit (%)	**50**
Plastic Limit (%)	**29**
Plasticity Index (%)	**21**
USCS Symbol	**MH**

Flow Curve



Plasticity Chart



Tested By	*BW*	*Date*	*5/14/15*	*Checked By*	*SFS*	*Date*	6/415

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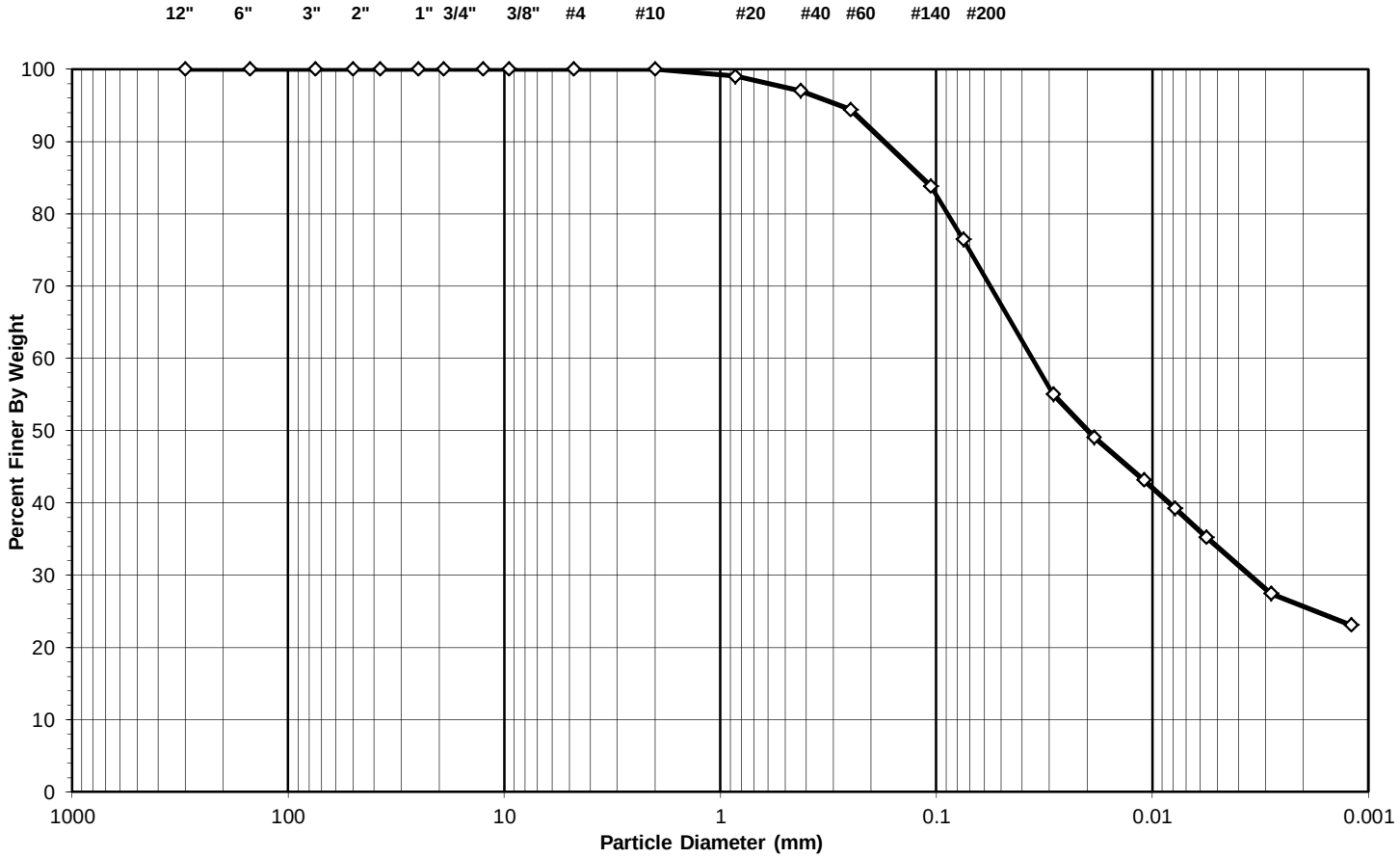
SIEVE AND HYDROMETER ANALYSIS
ASTM D 422-63 (2007)

Client	Amec Foster Wheeler	Boring No.	OW-417D
Client Reference	Dan River Steam Station Ash Removal	Depth (ft)	2.0-4.0
Project No.	2015-616-02	Sample No.	UD
Lab ID	2015-616-02-03	Soil Color	**LIGHT BROWN**

	SIEVE ANALYSIS			*HYDROMETER*	
USCS	**cobbles**	**gravel**	**sand**	**silt and clay fraction**	
USDA	**cobbles**	**gravel**	**sand**	**silt**	**clay**



USCS Summary

Sieve Sizes (mm)		**Percentage**
Greater Than #4	*Gravel*	0.00
#4 To #200	*Sand*	23.55
Finer Than #200	*Silt & Clay*	76.45

USCS Symbol ***MH, TESTED***

USCS Classification ***ELASTIC SILT WITH SAND***

DCN: CT-S3OR DATE: 7/26/13 REVISION: 8 *PROJECTS\2015-616 AMEC - DAN RIVER\Results group 02 color change\[2015-616-02-03 COLOR CHG SIEVEHYD10.xls]Sheet1*

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WASH SIEVE ANALYSIS

ASTM D 422-63 (2007)

Client	Amec Foster Wheeler	Boring No.	OW-417D
Client Reference	Dan River Steam Station Ash Removal	Depth (ft)	2.0-4.0
Project No.	2015-616-02	Sample No.	UD
Lab ID	2015-616-02-03	Soil Color	**LIGHT BROWN**

Minus #10 for Hygroscopic Moisture Content		**Hydrometer Specimen Data**	
Tare No.	R-1	Air Dried - #10 Hydrometer Material (g)	50.00
Wgt.Tare + Wet Soil (g)	33.02	Corrected Dry Wt. of - #10 Material (g)	48.58
Wgt.Tare + Dry Soil (g)	32.71		
Weight of Tare (g)	22.11	Weight of - #200 Material (g)	37.14
Weight of Water (g)	0.31	Weight of - #10 ; + #200 Material (g)	11.44
Weight of Dry Soil (g)	10.60		
Moisture Content (%)	**2.9**	**J-FACTOR (%FINER THAN #10)**	**1.0000**
Soil Specimen Data			
Tare No.	152		
Wgt.Tare + Air Dry Soil (g)	486.56		
Weight of Tare (g)	239.20		
Air Dried Wgt. Total Sample (g)	247.36	Dry Weight of Material Retained on #10 (g)	0.01
Total Dry Sample Weight (g)	240.33	Corrected Dry Sample Wt - #10 (g)	240.32

Sieve Size	Sieve Opening (mm)	Wgt.of Soil Retained (gm)	Percent Retained (%)	Accumulated Percent Retained (%)	Percent Finer (%)	**Accumulated Percent Finer (%)**
12"	300	0.00	0.0	0.0	100.0	**100.0**
6"	150	0.00	0.0	0.0	100.0	**100.0**
3"	75	0.00	0.0	0.0	100.0	**100.0**
2"	50	0.00	0.0	0.0	100.0	**100.0**
1 1/2"	37.5	0.00	0.0	0.0	100.0	**100.0**
1"	25.0	0.00	0.0	0.0	100.0	**100.0**
3/4"	19.0	0.00	0.0	0.0	100.0	**100.0**
1/2"	12.5	0.00	0.0	0.0	100.0	**100.0**
3/8"	9.50	0.00	0.0	0.0	100.0	**100.0**
#4	4.75	0.00	0.0	0.0	100.0	**100.0**
#10	2.00	0.01	0.0	0.0	100.0	**100.0**
#20	0.85	0.47	1.0	1.0	99.0	**99.0**
#40	0.425	0.98	2.0	3.0	97.0	**97.0**
#60	0.250	1.26	2.6	5.6	94.4	**94.4**
#140	0.106	5.17	10.6	16.2	83.8	**83.8**
#200	0.075	3.56	7.3	23.5	76.5	**76.4**
Pan	-	37.14	76.5	100.0	-	**-**

Notes :

Tested By BW Date 5/15/15 Checked By SFS Date 6/4/15

DCN: CT-S3OR DATE: 7/26/13 REVISION: 8 *PROJECTS\2015-616 AMEC - DAN RIVER\Results group 02 color change\[2015-616-02-03 COLOR CHG SIEVEHYD10.xls]Sheet1*

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HYDROMETER ANALYSIS

ASTM D 422-63 (2007)

Client	Amec Foster Wheeler	Boring No.	OW-417D
Client Reference	Dan River Steam Station Ash Removal	Depth (ft)	2.0-4.0
Project No.	2015-616-02	Sample No.	UD
Lab ID	2015-616-02-03	Soil Color	**LIGHT BROWN**

Elapsed Time (min)	R Measured	Temp. (°C)	Composite Correction	R Corrected	N (%)	K Factor	Diameter (mm)	N' (%)
0	NA	NA	NA	NA	NA	NA	NA	NA
2	32.0	23.9	3.98	28.0	55.0	0.01221	0.0287	**55.0**
5	29.0	23.8	4.01	25.0	49.1	0.01222	0.0186	**49.1**
15	26.0	23.8	4.01	22.0	43.2	0.01222	0.0109	**43.2**
30	24.0	23.8	4.01	20.0	39.3	0.01222	0.0078	**39.3**
60	22.0	23.7	4.04	18.0	35.3	0.01224	0.0056	**35.3**
250	18.0	23.8	4.01	14.0	27.5	0.01222	0.0028	**27.5**
1440	16.0	23.1	4.23	11.8	23.1	0.01232	0.0012	**23.1**

Soil Specimen Data		**Other Corrections**		
Wgt. of Dry Material (g)	48.58	Hygroscopic Moisture Factor	0.972	
Weight of Deflocculant (g)	5.0	a - Factor	0.954	
		Percent Finer than # 10	100.00	
		Specific Gravity	2.88	Measured

Notes:

Tested By BW Date 5/13/15 Checked By SFS Date 6/4/15

DCN: CT-S3OR DATE: 7/26/13 REVISION: 8 *PROJECTS\2015-616 AMEC - DAN RIVER\Results group 02 color change\[2015-616-02-03 COLOR CHG SIEVEHYD10.xls]Sheet1*

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FLEXIBLE WALL PERMEABILITY TEST

PERMOMETER METHOD

ASTM D 5084-10

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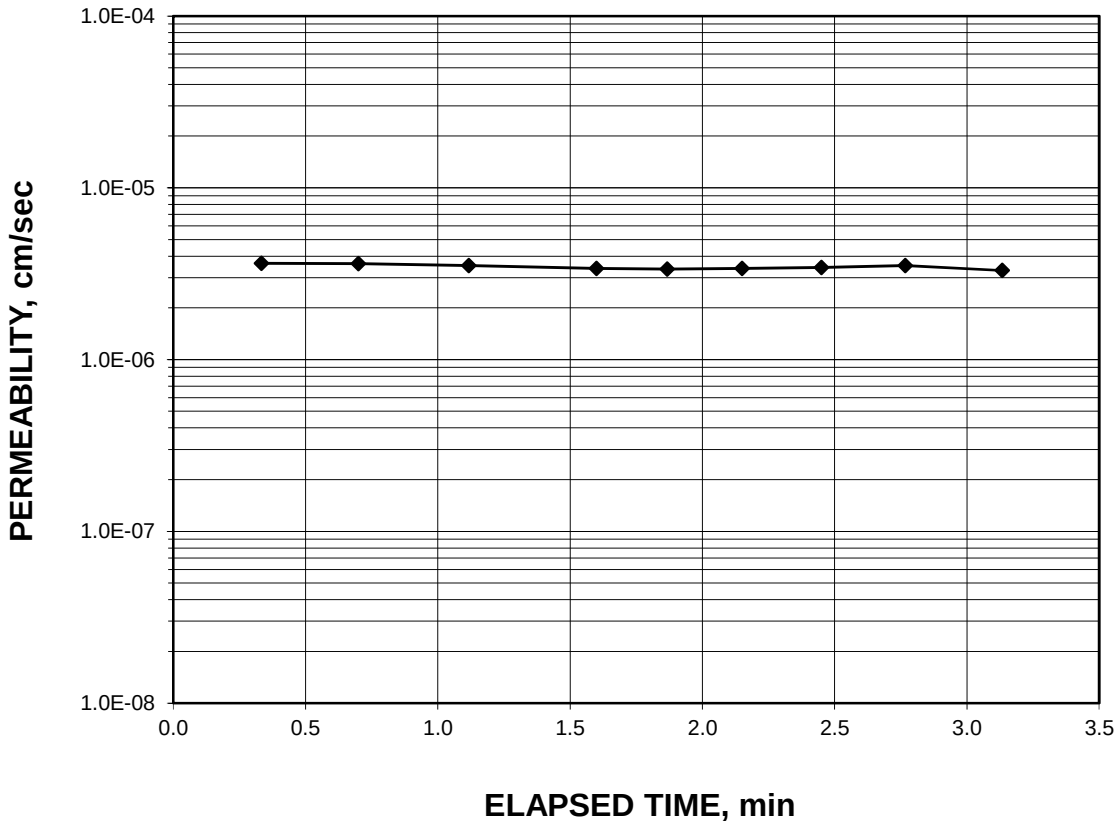
Client	Amec Foster Wheeler	Boring No.	OW-417D
Client Project	Dan River Steam Station Ash Remo	Depth (ft.)	3.3-3.8
Project No.	2015-616-02	Sample No.	UD
Lab ID No.	2015-616-02-03		

Visual Description: LIGHT BROWN ELASTIC SILT WITH SAND

AVERAGE PERMEABILITY = 3.4E-06 cm/sec @ 20°C

AVERAGE PERMEABILITY = 3.4E-08 m/sec @ 20°C

PERMEABILITY vs. TIME



Tested By: SFS Date: 5/7/15 Checked By: GEM Date: 6/4/15

DCN: CT-22A DATE:2-2-10 REVISION: 5Z:\2015 PROJECTS\2015-616 AMEC - DAN RIVER\[2015-616-02-03 Permometer.xls]Sheet1

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FLEXIBLE WALL PERMEABILITY TEST

PERMOMETER METHOD

ASTM D 5084-10

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Client	Amec Foster Wheeler	Boring No.	OW-417D
Client Project	Dan River Steam Station Ash Removal	Depth (ft.)	3.3-3.8
Project No.	2015-616-02	Sample No.	UD
Lab ID No.	2015-616-02-03		

Specific Gravity	2.88	Measured
Sample Condition		Undisturbed

Visual Description: LIGHT BROWN ELASTIC SILT WITH SAND

MOISTURE CONTENT:	BEFORE TEST	AFTER TEST
Tare Number	810	813
Wt. of Tare & WS (gm.)	374.94	461.92
Wt. of Tare & DS (gm.)	320.11	398.78
Wt. of Tare (gm.)	112.89	109.41
Wt. of Water (gm.)	54.83	63.14
Wt. of DS (gm.)	207.22	289.37
Moisture Content (%)	**26.5**	**21.8**

SPECIMEN:	BEFORE TEST	AFTER TEST
Wt. of Tube & WS (gm.)	1342.37	NA
Wt. of Tube (gm.)	0.00	NA
Wt. of WS (calc.) (gm.)	1342.37	1293.12
Length 1 (in.)	6.114	6.111
Length 2 (in.)	6.112	6.111
Length 3 (in.)	6.136	6.111
Top Diameter (in.)	2.863	2.866
Middle Diameter (in.)	2.870	2.866
Bottom Diameter (in.)	2.865	2.866
Average Length (in.)	6.12	6.11
Average Area (in.^{2})	6.45	6.45
Sample Volume (cm^3)	647.06	646.03
Unit Wet Wt. (gm./ cm^3)	2.075	2.002
Unit Wet Wt. (pcf)	129.5	124.9
Unit Dry Wt. (pcf)	102.4	102.6
Unit Dry Wt. (gm./ cm^3)	1.641	1.643
Void Ratio, e	0.756	0.753
Porosity, n	0.430	0.429
Pore Volume (cm^3)	278.5	277.5
Total Wt. Of Sample After Test		1351.31

Tested By: SFS Date: 5/7/15 Checked By: GEM Date: 6/4/15

DCN: CT-22A DATE:2-2-10 REVISION: 5 Z:\2015 PROJECTS\2015-616 AMEC - DAN RIVER\[2015-616-02-03 Permometer.xls]Sheet1

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FLEXIBLE WALL PERMEABILITY TEST
PERMOMETER METHOD

ASTM D 5084-10

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Client	Amec Foster Wheeler	Boring No.	OW-417D
Client Project	Dan River Steam Station Ash Removal	Depth (ft.)	3.3-3.8
Project No.	2015-616-02	Sample No.	UD
Lab ID No.	2015-616-02-03		

Test Pressures		Final Sample Dimensions	
Cell Pressure(psi)	55.0	Sample Length (cm), L	15.52
Back Pressure(psi)	50.0	Sample Area (cm^2), A	41.62
Eff. Cons. Pressure(psi)	5.0	Pipette Area (cm^2), a_p	0.03142
Response (%)	100	Annulus Area (cm^2), a_a	0.76712
		Equilibrium Level (cm), R_{eq}	1

AVERAGE PERMEABILITY = 3.4E-06 cm/sec @ 20°C
AVERAGE PERMEABILITY = 3.4E-08 m/sec @ 20°C

DATE			TIME		ELAPSED TIME t	PIPETTE READI NG R_p	INCREMENT GRADIENT i	TEMP.	INCREMENTAL PERMEABILITY @ 20°C
(mm/dd/yy)	(hr)	(min)	(sec)	(min)	(min)	(cm)	(cm/cm)	(°C)	(cm/sec)
5/11/15	13	42	45	42.75	0.000	13.0	10.1	23.0	NA
5/11/15	13	43	5	43.08	0.333	12.0	9.3	23.0	3.6E-06
5/11/15	13	43	27	43.45	0.700	11.0	8.4	23.0	3.6E-06
5/11/15	13	43	52	43.87	1.117	10.0	7.6	23.0	3.5E-06
5/11/15	13	44	21	44.35	1.600	9.0	6.7	23.0	3.4E-06
5/11/15	13	44	37	44.62	1.867	8.5	6.3	23.0	3.4E-06
5/11/15	13	44	54	44.90	2.150	8.0	5.9	23.0	3.4E-06
5/11/15	13	45	12	45.20	2.450	7.5	5.5	23.0	3.4E-06
5/11/15	13	45	31	45.52	2.767	7.0	5.0	23.0	3.5E-06
5/11/15	13	45	53	45.88	3.133	6.5	4.6	23.0	3.3E-06

Tested By: SFS Date: 5/7/15 Checked By: GEM Date: 6/4/15

DCN: CT-22A DATE:2-2-10 REVISION: 5 Z:\2015 PROJECTS\2015-616 AMEC - DAN RIVER\[2015-616-02-03 Permometer.xls]Sheet1

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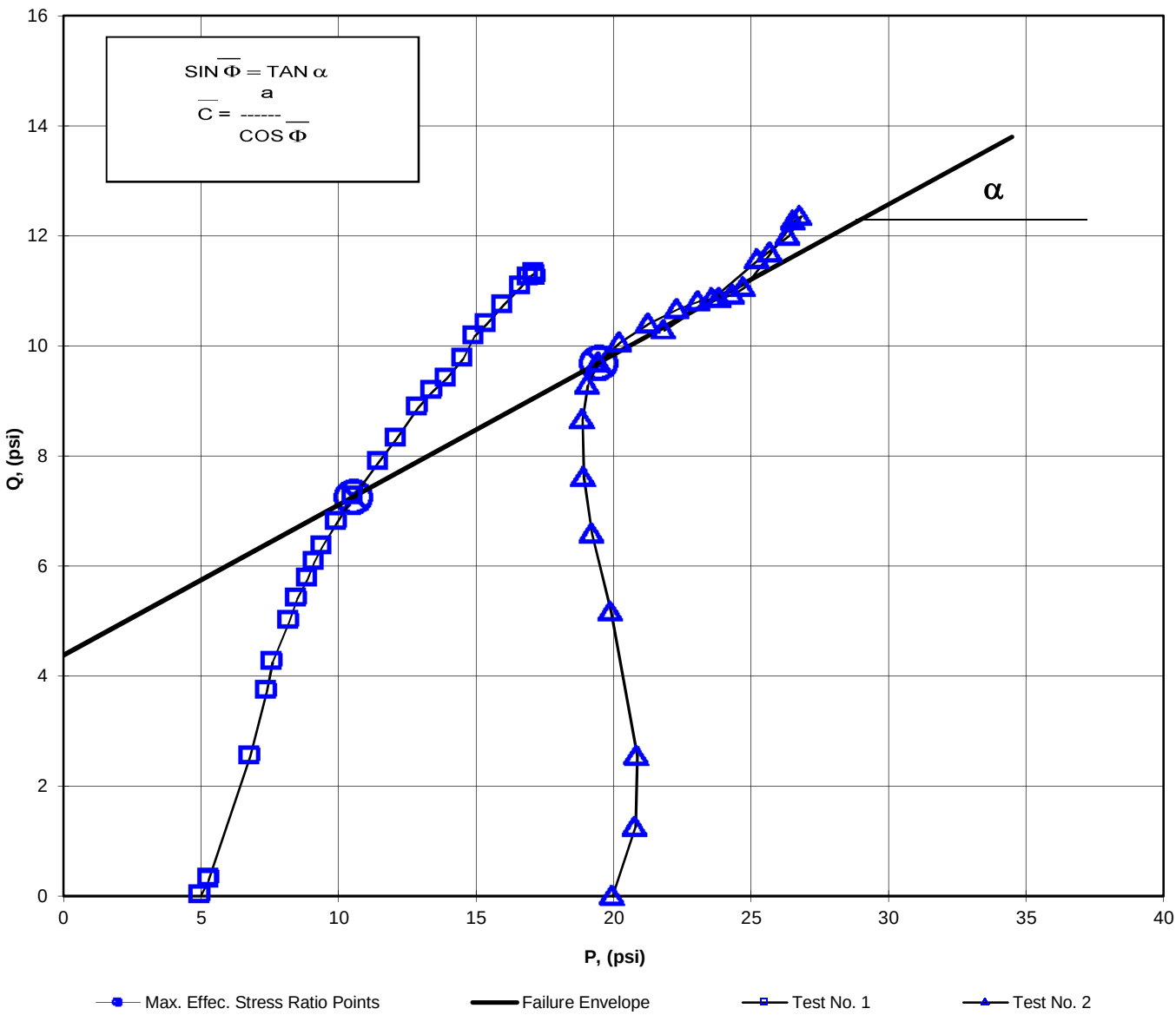
CONSOLIDATED UNDRAINED TRIAXIAL TEST
WITH PORE PRESSURE READINGS
ASTM D4767-11

Client:	Amec Foster Wheeler	Boring No.:	OW-417D
Client Reference:	Dan River Steam Station Ash Removal	Depth (ft):	2.8-3.8
Project No.:	2015-616-02	Sample No.:	UD
Lab ID:	2015-616-02-03		

Consolidated Undrained Triaxial Test with Pore Pressure



a	=	**4.38**	$\overline{C}$	=	**4.55**
α	=	**15.3**	$\overline{\Phi}$	=	**15.85**

Tested By: SFS Date: 5/7/15 Approved By: MPS Date: 5/18/15

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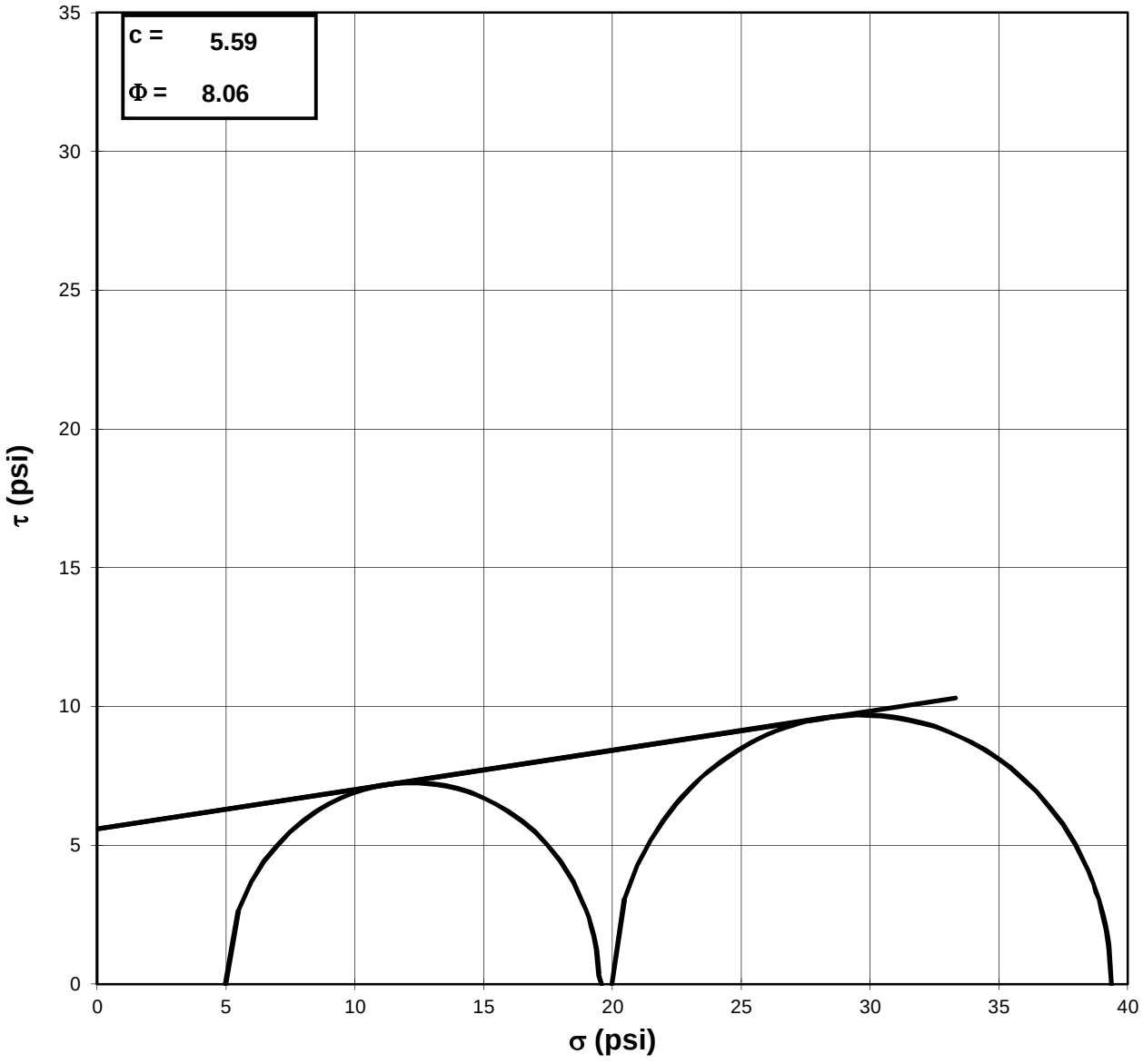
MOHR TOTAL STRENGTH ENVELOPE

ASTM D4767-11

Client:	Amec Foster Wheeler	Boring No.:	OW-417D
Client Reference:	Dan River Steam Station Ash Removal	Depth (ft):	2.8-3.8
Project No.:	2015-616-02	Sample No.:	UD
Lab ID:	2015-616-02-03		
Visual Description:	ORANGE ELASTIC SILT WITH SAND (UNDISTURBED)		



Failure Based on Maximum Effective Principal Stress Ratio

NOTE: GRAPH NOT TO SCALE

Tested By: SFS *Date:* 5/7/15 *Approved By:* MPS *Date:* 5/18/15

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CONSOLIDATED UNDRAINED TRIAXIAL TEST
WITH PORE PRESSURE READINGS
ASTM D4767-11

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Client:	Amec Foster Wheeler	Boring No.:	OW-417D
Client Reference:	Dan River Steam Station Ash Removal	Depth (ft):	2.8-3.3
Project No.:	2015-616-02	Sample No.:	UD
Lab ID:	2015-616-02-03		

Visual Description: ORANGE ELASTIC SILT WITH SAND (UNDISTURBED)

Stage No.	1
Test No.	1

PRESSURES (psi)

Cell Pressure (psi)	55.0
Back Pressure (psi)	50.0
Eff. Conf. Pressure (psi)	5.0
Pore Pressure Response (%)	99

MAXIMUM OBLIQUITY POINTS

$\overline{P}$	=	10.53
Q	=	7.25

INITIAL SAMPLE DIMENSIONS (in)

Length 1:	5.825	Diameter 1:	2.861
Length 2:	5.776	Diameter 2:	2.834
Length 3:	5.824	Diameter 3:	2.842
Avg. Length:	5.808	*Avg. Diam.:*	2.846

VOLUME CHANGE

Initial Burette Reading (ml)	24.0
Final Burette Reading (ml)	18.8
Final Change (ml)	5.2

Initial Dial Reading (mil)	33
Dial Reading After Saturation (mil)	41
Dial Reading After Consolidation (mil)	51

LOAD (LB)	DEFORMATION (IN)	PORE PRESSURE (PSI)
11.9	0.000	50.0
15.5	0.002	50.0
15.8	0.003	50.0
43.9	0.009	50.7
58.9	0.015	51.3
65.7	0.021	51.6
75.1	0.030	51.8
80.3	0.039	51.9
85.0	0.051	51.9
89.3	0.072	51.9
93.2	0.102	51.9
99.5	0.138	51.8
106.1	0.174	51.7
115.1	0.216	51.4
121.2	0.246	51.2
129.5	0.288	51.0
134.7	0.345	50.7
139.2	0.405	50.5
145.2	0.450	50.2
152.3	0.510	50.2
156.6	0.555	50.0
162.7	0.600	49.7
168.8	0.645	49.4
172.1	0.675	49.3
174.2	0.705	49.2
174.0	0.735	49.1

Tested By: SFS Date: 5/7/15 Input Checked By: GEM Date: 5/18/15

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CONSOLIDATED UNDRAINED TRIAXIAL TEST
WITH PORE PRESSURE READINGS
ASTM D4767-11

Client:	Amec Foster Wheeler	Boring No.:	OW-417D
Client Reference:	Dan River Steam Station Ash Removal	Depth (ft):	2.8-3.3
Project No.:	2015-616-02	Sample No.:	UD
Lab ID:	2015-616-02-03		

Visual Description: ORANGE ELASTIC SILT WITH SAND (UNDISTURBED)

Effective Confining Pressure (psi)	5.0	*Stage No.*	1
		Test No	1

INITIAL DIMENSIONS

Initial Sample Length (in)	5.81
Initial Sample Diameter (in)	2.85
Initial Sample Area (in^2)	6.36
Initial Sample Volume (in^3)	36.94

VOLUME CHANGE

Volume After Consolidation (in^3)	36.47
Length After Consolidation (in)	5.79
Area After Consolidation (in^2)	6.299

Strain (%)	Deviation Stress	ΔU	$\overline{\sigma}_1$	$\overline{\sigma}_3$	Effective Principle Stress Ratio	$\overline{A}$	$\overline{P}$	Q
0.03	0.57	-0.01	5.57	5.0	1.115	-0.02	5.29	0.29
0.05	0.62	-0.01	5.62	5.0	1.125	-0.02	5.31	0.31
0.16	5.08	0.73	9.33	4.3	2.194	0.15	6.79	2.54
0.26	7.44	1.31	11.12	3.7	3.022	0.18	7.40	3.72
0.36	8.51	1.63	11.87	3.4	3.538	0.19	7.61	4.26
0.52	9.98	1.76	13.21	3.2	4.091	0.18	8.22	4.99
0.67	10.79	1.88	13.89	3.1	4.473	0.18	8.50	5.39
0.88	11.50	1.86	14.63	3.1	4.678	0.16	8.88	5.75
1.24	12.14	1.94	15.20	3.1	4.977	0.16	9.12	6.07
1.76	12.69	1.93	15.74	3.1	5.149	0.15	9.40	6.34
2.38	13.57	1.83	16.73	3.2	5.298	0.14	9.95	6.79
3.01	14.51	1.71	17.79	3.3	5.425	0.12	10.53	7.25
3.73	15.78	1.41	19.36	3.6	5.404	0.09	11.47	7.89
4.25	16.62	1.18	20.42	3.8	5.365	0.07	12.12	8.31
4.97	17.74	0.96	21.78	4.0	5.402	0.05	12.90	8.87
5.96	18.33	0.72	22.60	4.3	5.298	0.04	13.43	9.17
6.99	18.80	0.45	23.34	4.5	5.143	0.02	13.94	9.40
7.77	19.53	0.22	24.30	4.8	5.096	0.01	14.53	9.76
8.81	20.34	0.20	25.12	4.8	5.249	0.01	14.96	10.17
9.58	20.78	-0.02	25.79	5.0	5.148	0.00	15.40	10.39
10.36	21.47	-0.27	26.72	5.3	5.084	-0.01	15.99	10.73
11.14	22.14	-0.59	27.71	5.6	4.970	-0.03	16.65	11.07
11.66	22.47	-0.70	28.16	5.7	4.952	-0.03	16.92	11.24
12.18	22.64	-0.84	28.47	5.8	4.882	-0.04	17.15	11.32
12.69	22.48	-0.96	28.43	5.9	4.779	-0.04	17.19	11.24

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CONSOLIDATED UNDRAINED TRIAXIAL TEST
WITH PORE PRESSURE READINGS
ASTM D4767-11

Client:	Amec Foster Wheeler	Boring No.:	OW-417D
Client Reference:	Dan River Steam Station Ash Removal	Depth (ft):	3.3-3.8
Project No.:	2015-616-02	Sample No.:	UD
Lab ID:	2015-616-02-03		

Visual Description: ORANGE ELASTIC SILT WITH SAND (UNDISTURBED)

Stage No.	1
Test No.	2

PRESSURES (psi)

Cell Pressure (psi)	70.0
Back Pressure (psi)	50.0
Eff. Conf. Pressure (psi)	20.0
Pore Pressure Response (%)	100

MAXIMUM OBLIQUITY POINTS

$\overline{P}$	=	19.48
Q	=	9.70

INITIAL SAMPLE DIMENSIONS (in)

Length 1:	6.114	Diameter 1:	2.863
Length 2:	6.112	Diameter 2:	2.870
Length 3:	6.136	Diameter 3:	2.865
Avg. Length:	6.121	*Avg. Diam.:*	2.866

VOLUME CHANGE

Initial Burette Reading (ml)	24.0
Final Burette Reading (ml)	14.4
Final Change (ml)	9.6

Initial Dial Reading (mil)	102
Dial Reading After Saturation (mil)	108
Dial Reading After Consolidation (mil)	155

LOAD (LB)	DEFORMATION (IN)	PORE PRESSURE (PSI)
6.7	0.000	50.0
22.6	0.000	50.4
39.2	0.002	51.7
72.7	0.008	55.2
91.1	0.013	57.3
104.2	0.019	58.7
117.8	0.028	59.7
126.1	0.037	60.2
131.6	0.049	60.2
136.8	0.071	59.8
141.9	0.102	59.1
146.2	0.138	58.3
148.9	0.175	57.7
150.7	0.218	57.0
152.3	0.248	56.5
155.2	0.291	56.3
165.3	0.349	55.9
174.9	0.411	55.7
177.4	0.456	55.5
174.3	0.517	55.6
169.6	0.563	56.3
160.9	0.610	57.2
154.0	0.655	58.4

Tested By: SFS Date: 5/7/15 Input Checked By: GEM Date: 5/18/15

DCN: CT-S28 DATE: 4/12/13 REVISION: 3

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CONSOLIDATED UNDRAINED TRIAXIAL TEST
WITH PORE PRESSURE READINGS
ASTM D4767-11

Client:	Amec Foster Wheeler	Boring No.:	OW-417D
Client Reference:	Dan River Steam Station Ash Removal	Depth (ft):	3.3-3.8
Project No.:	2015-616-02	Sample No.:	UD
Lab ID:	2015-616-02-03		

Visual Description: ORANGE ELASTIC SILT WITH SAND (UNDISTURBED)

Effective Confining Pressure (psi)	20.0	*Stage No.*	1
		Test No	2

INITIAL DIMENSIONS

Initial Sample Length (in)	6.12
Initial Sample Diameter (in)	2.87
Initial Sample Area (in^2)	6.45
Initial Sample Volume (in^3)	39.49

VOLUME CHANGE

Volume After Consolidation (in^3)	38.78
Length After Consolidation (in)	6.07
Area After Consolidation (in^2)	6.392

Strain (%)	Deviation Stress	ΔU	$\overline{\sigma}_1$	$\overline{\sigma}_3$	Effective Principle Stress Ratio	$\overline{A}$	$\overline{P}$	Q
0.01	2.50	0.41	22.06	19.6	1.128	0.17	20.81	1.25
0.03	5.09	1.66	23.40	18.3	1.278	0.33	20.86	2.54
0.13	10.31	5.22	25.07	14.8	1.699	0.51	19.91	5.16
0.22	13.17	7.34	25.82	12.6	2.042	0.56	19.23	6.59
0.32	15.22	8.66	26.53	11.3	2.345	0.57	18.92	7.61
0.46	17.30	9.75	27.53	10.2	2.691	0.56	18.88	8.65
0.60	18.57	10.18	28.36	9.8	2.896	0.55	19.08	9.28
0.81	19.40	10.20	29.18	9.8	2.983	0.53	19.48	9.70
1.17	20.12	9.80	30.30	10.2	2.976	0.49	20.24	10.06
1.67	20.80	9.09	31.69	10.9	2.909	0.44	21.29	10.40
2.28	21.34	8.30	33.02	11.7	2.827	0.39	22.35	10.67
2.88	21.61	7.67	33.93	12.3	2.756	0.35	23.12	10.81
3.59	21.73	6.96	34.75	13.0	2.669	0.32	23.89	10.87
4.09	21.86	6.55	35.29	13.4	2.627	0.30	24.36	10.93
4.80	22.12	6.26	35.83	13.7	2.613	0.28	24.77	11.06
5.76	23.39	5.94	37.43	14.0	2.667	0.25	25.73	11.70
6.77	24.53	5.65	38.86	14.3	2.712	0.23	26.59	12.27
7.52	24.70	5.49	39.18	14.5	2.705	0.22	26.83	12.35
8.52	24.00	5.59	38.39	14.4	2.668	0.23	26.39	12.00
9.28	23.12	6.26	36.84	13.7	2.684	0.27	25.28	11.56
10.05	21.71	7.22	34.47	12.8	2.701	0.33	23.62	10.85
10.80	20.56	8.40	32.14	11.6	2.776	0.41	21.86	10.28

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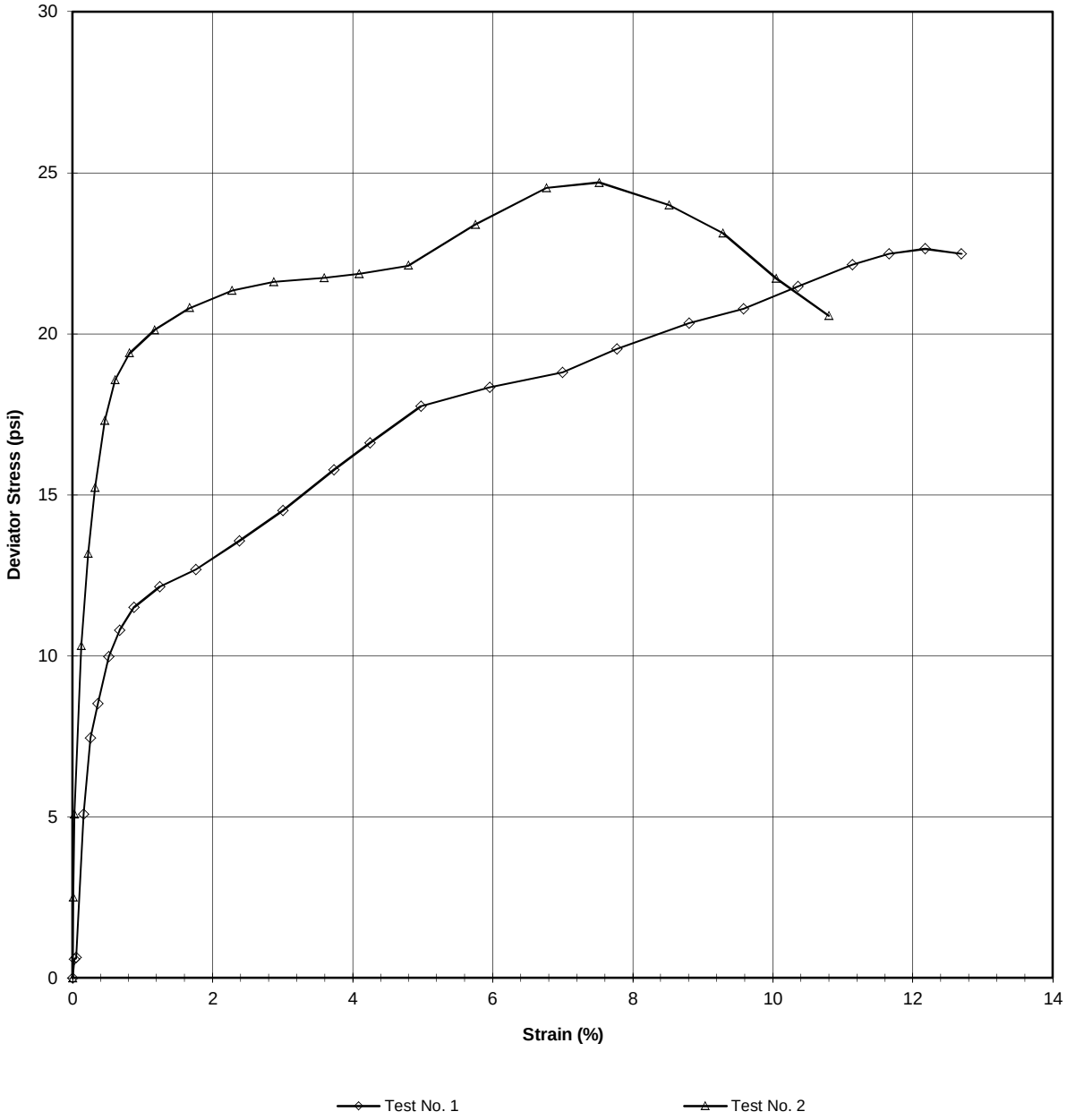
CONSOLIDATED UNDRAINED TRIAXIAL TEST
WITH PORE PRESSURE READINGS
ASTM D4767-11

Client:	Amec Foster Wheeler	Boring No.:	OW-417D
Client Reference:	Dan River Steam Station Ash Removal	Depth (ft):	2.8-3.8
Project No.:	2015-616-02	Sample No.:	UD
Lab ID:	2015-616-02-03		
Visual Description:	ORANGE ELASTIC SILT WITH SAND (UNDISTURBED)		



Tested By: SFS Date: 5/7/15 Approved By: MPS Date: 5/18/15

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CONSOLIDATED UNDRAINED TRIAXIAL TEST
WITH PORE PRESSURE READINGS
ASTM D4767-11

Client:	Amec Foster Wheeler		
Client Reference:	Dan River Steam Station Ash Removal		
Project No.:	2015-616-02		
Lab ID:	2015-616-02-03	Specific Gravity (Measured)	2.88

Visual Description: ORANGE ELASTIC SILT WITH SAND (UNDISTURBED)

SAMPLE CONDITION SUMMARY

Boring No.:	OW-417D	OW-417D
Depth (ft):	2.8-3.3	3.3-3.8
Sample No.:	UD	UD
Test No.	T1	T2
Deformation Rate (in/min)	0.0003	0.0003
Back Pressure (psi)	50.0	50.0
Consolidation Time (days)	1	1
Moisture Content (%) (INITIAL)	32.8	26.5
Total Unit Weight (pcf)	122.2	129.5
Dry Unit Weight (pcf)	92.1	102.4
Moisture Content (%) (FINAL)	22.9	21.8
Initial State Void Ratio,e	0.952	0.755
Void Ratio at Shear, e	0.928	0.724

Tested By: SFS Date: 5/7/15 Input Checked By: GEM Date: 5/18/15

DCN: CT-S28 DATE: 4/12/13 REVISION: 3

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CONSOLIDATED UNDRAINED TRIAXIAL TEST
WITH PORE PRESSURE READINGS

ASTM D4767-11

MOISTURE CONTENT

	T1	T2
Tare Number	803	810
Weight of Tare & Wet Sample (g)	248.17	374.94
Weight of Tare & Dry Sample (g)	212.19	320.11
Weight of Tare (g)	102.35	112.89
Moisture Content (%) (INITIAL)	32.76	26.46
Tare Number	806	813
Weight of Tare & Wet Sample (g)	535.17	461.92
Weight of Tare & Dry Sample (g)	454.09	398.78
Weight of Tare (g)	100.62	109.41
Moisture Content (%) (FINAL)	22.94	21.82

UNIT WEIGHT

Weight of Tube & Wet Sample (g)		1185.32	1342.37
Weight of Tube (g)		0	0
Weight of Wet Sample (g)		1185.32	1342.37
Length 1 (in)		5.825	6.114
Length 2 (in)		5.776	6.112
Length 3 (in)		5.824	6.136
Top Diameter (in)		2.861	2.863
Middle Diameter (in)		2.834	2.87
Bottom Diameter (in)		2.842	2.865
Average Length (in)		5.808333	6.120667
Average Area (in)		6.360	6.451
Sample Volume (cm^3)		605.36	647.06
Unit Wet Weight (g/cm^3)		1.96	2.07
Unit Wet Weight (pcf)		122.24	129.52
Unit Dry Weight (pcf)		92.08	102.42
Unit Dry Weight (g/cm^3)		1.48	1.64
Initial Burette Reading		**24**	**24**
Final Burette Reading		**18.8**	**14.4**
Initial Dial Reading		**33**	**102**
Dial Reading After Saturation		**41**	**108**
Dial Reading After Consolidation		**51**	**155**
Volume Change during Consolidation		5.2	9.6
Volume Change during Saturation		2.50	1.90
Volume at Shear (cm^3)	*These	597.65	635.55
Volume of Solids (cm^3)	measurements	310.02	368.58
Volume of Voids (cm^3)	are all	287.64	266.98
Volume of Water (cm^3)	at	204.80	231.62
Void Ratio, e	shear	0.928	0.724

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CONSOLIDATED UNDRAINED TRIAXIAL TEST
WITH PORE PRESSURE READINGS
ASTM D4767-11

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geotechnical & geosynthetic testing

Client:	Amec Foster Wheeler	Boring No.:	OW-417D
Client Reference:	Dan River Steam Station Ash Removal	Depth (ft):	2.8-3.8
Project No.:	2015-616-02	Sample No.:	UD
Lab ID:	2015-616-02-03		

TEST 1 INITIAL

TEST 1 FINAL

TEST 2 INITIAL

TEST 2 FINAL

Tested By SFS *Date* 5/7/15 *Approved By* MPS *Date* 5/18/15

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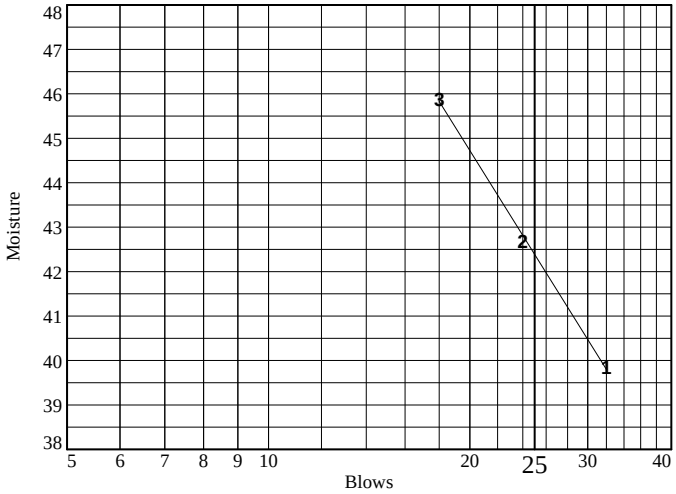
LIQUID AND PLASTIC LIMIT TEST DATA

5/26/2015

Client: Duke Energy
Project: Dan River Steam Station Ash Removal
Project Number: 7810140065
Location: OW-417D
Depth: 10 - 20'
Sample Number: Bulk
Material Description: Brown-Yellow Sandy Lean Clay
USCS: CL
AASHTO: A-7-6(11)
Tested by: D. Kopitsky
Checked by: G. Williams

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	35.59	36.47	33.81			
Dry+Tare	30.09	30.41	28.29			
Tare	16.29	16.22	16.26			
# Blows	32	24	18			
Moisture	39.9	42.7	45.9			



Liquid Limit= 42
Plastic Limit= 20
Plasticity Index= 22
Natural Moisture= 15.8
Liquidity Index= -0.2

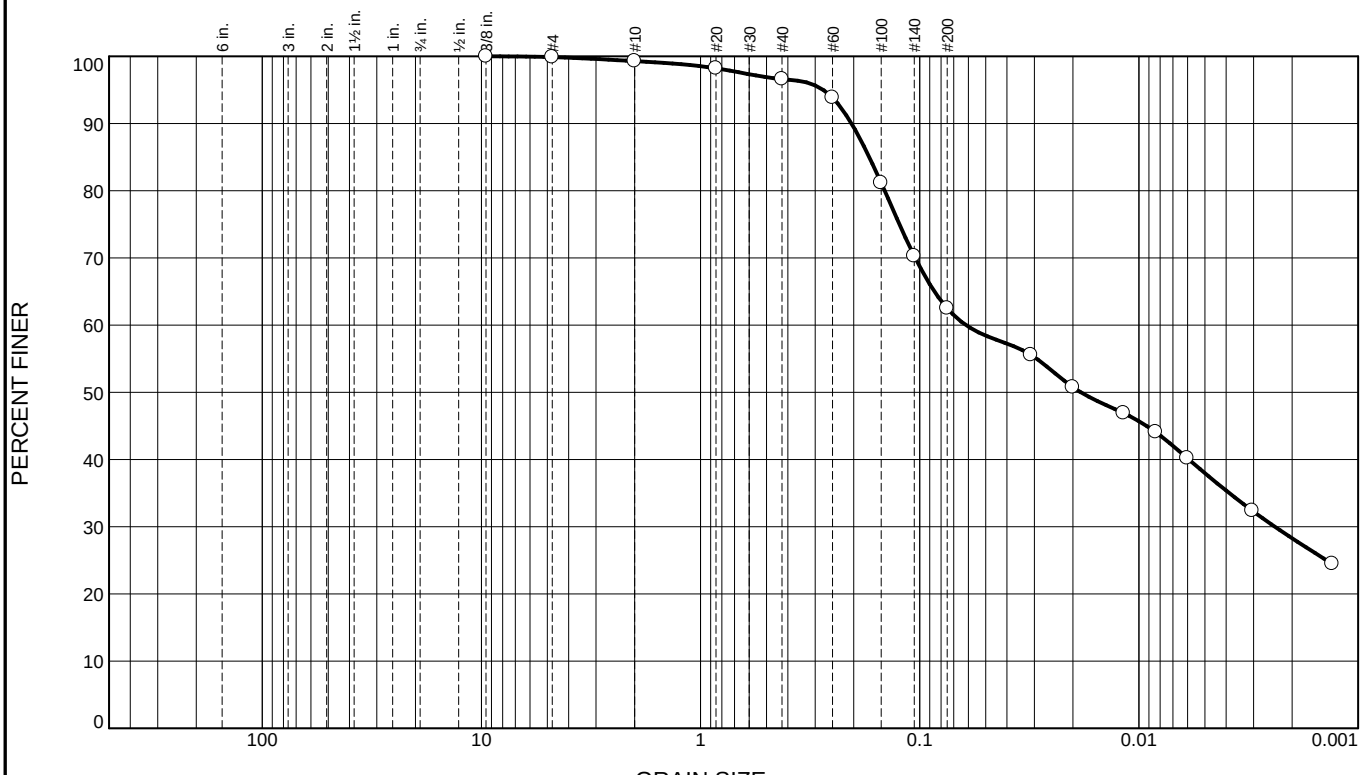
Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	17.36	17.57			
Dry+Tare	16.27	16.47			
Tare	10.87	10.98			
Moisture	20.2	20.0			

Natural Moisture Data

Wet+Tare	Dry+Tare	Tare	Moisture
160.40	145.48	50.76	15.8

Particle Size Analysis ASTM D422



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.1	0.6	2.7	34.1	24.5	38.0

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/8"	100.0		
#4	99.9		
#10	99.3		
#20	98.2		
#40	96.6		
#60	93.8		
#100	81.2		
#140	70.3		
#200	62.5		
0.0311 mm.	55.6		
0.0200 mm.	50.8		
0.0117 mm.	46.9		
0.0084 mm.	44.1		
0.0060 mm.	40.2		
0.0030 mm.	32.4		
0.0013 mm.	24.5		

* (no specification provided)

Soil Description

Brown-Yellow Sandy Lean Clay

Atterberg Limits

PL= 20 LL= 42 PI= 22

Coefficients

D_{90}= 0.2049 D_{85}= 0.1700 D_{60}= 0.0615
D_{50}= 0.0184 D_{30}= 0.0024 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= CL AASHTO= A-7-6(11)

Remarks

Moisture Content = 15.8%

Source of Sample: OW-417D **Depth:** 10 - 20'
Sample Number: Bulk **Date:** 5-11-15

amec

Client: Duke Energy
Project: Dan River Steam Station Ash Removal
Project No: 7810140065 **Figure**

Tested By: D. Kopitsky **Checked By:** T. Landis

GRAIN SIZE DISTRIBUTION TEST DATA

5/26/2015

Client: Duke Energy
Project: Dan River Steam Station Ash Removal
Project Number: 7810140065
Location: OW-417D
Depth: 10 - 20' **Sample Number:** Bulk
Material Description: Brown-Yellow Sandy Lean Clay
Date: 5-11-15 **PL:** 20 **LL:** 42 **PI:** 22
USCS Classification: CL **AASHTO Classification:** A-7-6(11)
Testing Remarks: Moisture Content = 15.8%
Tested by: D. Kopitsky **Checked by:** T. Landis

Sieve Test Data

Dry Sample and Tare (grams)	Tare (grams)	Cumulative Pan Tare Weight (grams)	Sieve Opening Size	Cumulative Weight Retained (grams)	Percent Finer
315.00	0.00	0.00	3/4"		
			3/8"	0.00	100.0
			#4	0.41	99.9
			#10	2.27	99.3
51.84	0.00	0.00	#20	0.56	98.2
			#40	1.40	96.6
			#60	2.84	93.8
			#100	9.46	81.2
			#140	15.14	70.3
			#200	19.20	62.5

Hydrometer Test Data

Hydrometer test uses material passing #10
Percent passing #10 based upon complete sample = 99.3
Weight of hydrometer sample =53.03
Hygroscopic moisture correction:
Moist weight and tare = 30.26
Dry weight and tare = 29.95
Tare weight = 16.18
Hygroscopic moisture = 2.3%
Table of composite correction values:

Temp., deg. C:	14.0	24.0	40.0
Comp. corr.:	-5.0	-3.0	0.0

Meniscus correction only = 1.0
Specific gravity of solids = 2.65
Hydrometer type = 152H
Hydrometer effective depth equation: L = 16.294964 **-** 0.164 **x Rm**

Elapsed Time (min.)	Temp. (deg. C.)	Actual Reading	Corrected Reading	K	Rm	Eff. Depth	Diameter (mm.)	Percent Finer
2.00	21.6	32.5	29.0	0.0134	33.5	10.8	0.0311	55.6
5.00	21.6	30.0	26.5	0.0134	31.0	11.2	0.0200	50.8
15.00	21.5	28.0	24.5	0.0134	29.0	11.5	0.0117	46.9
30.00	21.6	26.5	23.0	0.0134	27.5	11.8	0.0084	44.1
60.00	21.5	24.5	21.0	0.0134	25.5	12.1	0.0060	40.2
250.00	21.1	20.5	16.9	0.0135	21.5	12.8	0.0030	32.4

Hydrometer Test Data (continued)

Elapsed Time (min.)	Temp. (deg. C.)	Actual Reading	Corrected Reading	K	Rm	Eff. Depth	Diameter (mm.)	Percent Finer
1440.00	20.4	16.5	12.8	0.0136	17.5	13.4	0.0013	24.5

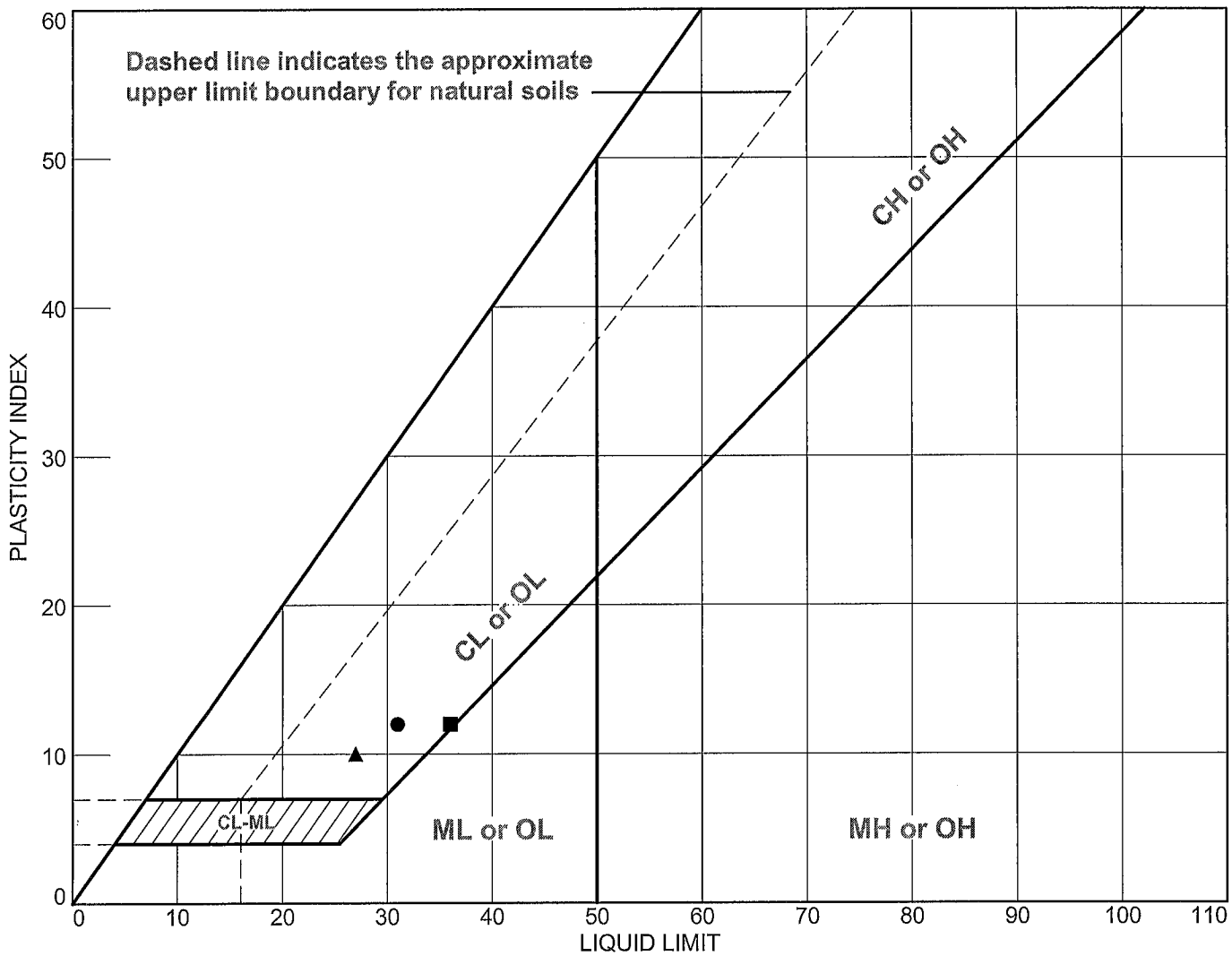
Fractional Components

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	0.0	0.1	0.1	0.6	2.7	34.1	37.4	24.5	38.0	62.5

D_5	D_{10}	D_{15}	D_{20}	D_{30}	D_{40}	D_{50}	D_{60}	D_{80}	D_{85}	D_{90}	D_{95}
				0.0024	0.0059	0.0184	0.0615	0.1446	0.1700	0.2049	0.2756

Fineness Modulus
0.28

LIQUID AND PLASTIC LIMITS TEST REPORT



SOIL DATA

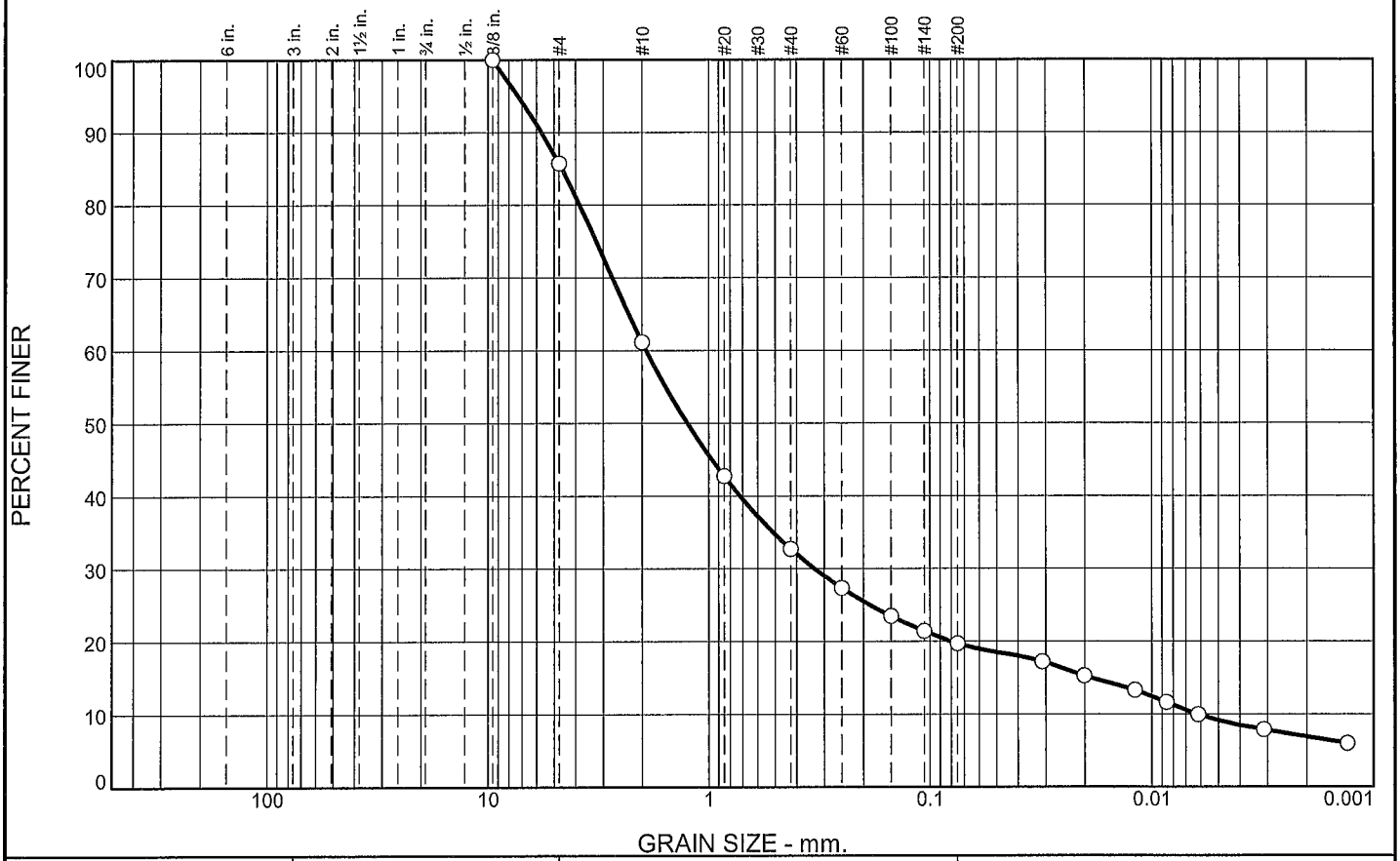
SYMBOL	SOURCE	SAMPLE NO.	DEPTH	NATURAL WATER CONTENT (%)	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	USCS
●	OW-413S	SS-4	18.5-20'		19	31	12	SC
■	OW-415S	SS-3	13.5-15'		24	36	12	SC
▲	OW-416S	SS-5	23.5-25'		17	27	10	SC
◆	OW-417S	SS-5/SS-6	23.5-30'		19	31	12	SC
▼	OW-419S	SS-4	18.5-20'		NP	NV	NP	SM

amec

Client: Duke Energy
Project: Dan River Steam Station Ash Removal
Project No.: 7810140065 **Figure**

Tested By: A Kottenstette **Checked By:** D Kopitsky

Particle Size Analysis ASTM D422



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	14.3	24.6	28.4	13.0	10.6	9.1

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/8"	100.0		
#4	85.7		
#10	61.1		
#20	42.7		
#40	32.7		
#60	27.4		
#100	23.5		
#140	21.4		
#200	19.7		
0.0311 mm.	17.2		
0.0201 mm.	15.3		
0.0119 mm.	13.3		
0.0086 mm.	11.6		
0.0062 mm.	10.0		
0.0031 mm.	7.9		
0.0013 mm.	6.0		

* (no specification provided)

Soil Description

Tan-Gray Silty Sand

Atterberg Limits

PL= NP LL= NV PI= NP

Coefficients

D_{90}= 5.6999 D_{85}= 4.6136 D_{60}= 1.9156
D_{50}= 1.2489 D_{30}= 0.3317 D_{15}= 0.0189
D_{10}= 0.0062 C_u= 307.48 C_c= 9.22

Classification

USCS= SM AASHTO= A-1-b

Remarks

Source of Sample: OW-419S **Depth:** 18.5-20'
Sample Number: SS-4 **Date:** 6-3-15

amec

Client: Duke Energy
Project: Dan River Steam Station Ash Removal
Project No: 7810140065 **Figure**

Tested By: D Kopitsky **Checked By:** M Hamilton

APPENDIX V

Estimated Long-Term Seasonal High Groundwater Calculations and Hydrographs

ESTIMATED LONG-TERM SEASONAL HIGH GROUNDWATER

Dan River Landfill

Amec Foster Wheeler Project No: 7810-14-0065

WELL ID		Column ID>>	A	B	C	D	E	F	G	H
		GROUND ELEVATION	HIGHEST RECORDED WATER LEVEL		NUMBER OF DATA POINTS	MEAN WATER LEVEL		STANDARD DEVIATION	CALCULATED LTSH WATER LEVEL[1] (D + 2F)	
		(ft-MSL)	(ft-MSL)	(ft-bgs)		(ft-MSL)	(ft-bgs)		(ft-MSL)	(ft-bgs)
Duke Energy Voluntary & Compliance Wells	MW-12	590.71	577.80	12.91	18	573.30	17.41	2.09	**577.48**	13.23
	MW-20S	559.71	560.89	-1.18	28	557.26	2.45	1.44	**560.14**	-0.43

WELL ID		Column ID>>	A	B	C	D	E	F	G	H	I	J	K	L	M	N
		GROUND ELEVATION	Correlation Equation with Historic Well MW-12 y = mx + b			NUMBER OF DATA POINTS	ESTIMATED LTSH WATER LEVEL[2] (AB + C)		HIGHEST RECORDED WATER LEVEL		LOWEST RECORDED WATER LEVEL		FLUX (G - I)	MODIFICATION FACTOR[3]	ESTIMATED LTSH WATER LEVEL[4] (E + L)	
		(ft-MSL)	m	x	b		(ft-MSL)	(ft-bgs)	(ft-MSL)	(ft-bgs)	(ft-MSL)	(ft-bgs)	(ft)	(ft)	(ft-MSL)	(ft-bgs)
Amec Foster Wheeler 2013 Assessment Wells	OW-301D	589.80	0.6093	577.80	234.46	7	586.51	3.29	584.65	5.15	581.54	8.26	3.11	0.31	**586.82**	2.98
	OW-302D	584.23	0.1042	577.80	489.93	7	550.14	34.09	549.75	34.48	549.16	35.07	0.59	0.06	**550.20**	34.03
	OW-303D	647.87	0.4424	577.80	317.59	7	573.21	74.66	571.84	76.03	569.81	78.06	2.03	0.20	**573.41**	74.46
	OW-304D	559.88	0.5759	577.80	220.72	7	553.48	6.40	551.84	8.04	549.35	10.53	2.49	0.25	**553.72**	6.16
Amec Foster Wheeler 2015 Hydro Study Wells	OW-401S	581.76	1.0096	577.80	-5.84	6	577.51	4.25	574.41	7.35	569.99	11.77	4.42	0.44	**577.95**	3.81
	OW-403S	606.15	1.2618	577.80	-151.16	6	577.91	28.24	574.26	31.89	568.8	37.35	5.46	0.55	**578.45**	27.70
	OW-404S	586.61	1.2962	577.80	-175.31	6	573.63	12.98	569.89	16.72	564.39	22.22	5.50	0.55	**574.18**	12.43
	OW-405S	588.15	0.3129	577.80	359.11	6	539.90	48.25	538.94	49.21	537.08	51.07	1.86	0.19	**540.09**	48.06
	OW-406S	567.55	0.4792	577.80	290.68	6	567.56	-0.01	566.19	1.36	563.93	3.62	2.26	0.23	**567.79**	-0.24
	OW-407S	618.41	0.4252	577.80	326.58	6	572.26	46.15	570.74	47.67	568.88	49.53	1.86	0.19	**572.45**	45.96
	OW-409S	551.56	0.3946	577.80	328.03	6	556.03	-4.47	554.85	-3.29	553	-1.44	1.85	0.19	**556.21**	-4.65
	OW-410S	593.62	0.3807	577.80	339.15	6	559.12	34.50	557.75	35.87	556.16	37.46	1.59	0.16	**559.28**	34.34
	OW-411S	593.51	0.3258	577.80	366.68	6	554.93	38.58	553.73	39.78	552.22	41.29	1.51	0.15	**555.08**	38.43
	OW-412S	579.54	0.1163	577.80	482.81	6	550.01	29.53	549.63	29.91	548.83	30.71	0.80	0.08	**550.09**	29.45
	OW-413S	562.09	0.5588	577.80	229.27	6	552.14	9.95	550.54	11.55	548.09	14.00	2.45	0.25	**552.39**	9.70
	OW-414S	557.23	0.3662	577.80	327.65	6	539.24	17.99	537.95	19.28	536.3	20.93	1.65	0.17	**539.41**	17.82
	OW-415S	559.00	0.5457	577.80	234.38	6	549.69	9.31	547.84	11.16	545.6	13.40	2.24	0.22	**549.91**	9.09
	OW-416S	557.90	0.3296	577.80	347.07	6	537.51	20.39	536.47	21.43	534.95	22.95	1.52	0.15	**537.66**	20.24
	OW-417S	594.15	0.6938	577.80	175.13	6	576.01	18.14	574.21	19.94	571.08	23.07	3.13	0.31	**576.32**	17.83
	OW-419S	588.92	0.7341	577.80	147.61	6	571.77	17.15	569.59	19.33	566.15	22.77	3.44	0.34	**572.12**	16.80

Notes

(ft-MSL)	Feet Relative to Mean Sea Level
(ft-bgs)	Feet Below Ground Surface
LTSH	Long-Term Seasonal High
1	Calculated Long-Term Seasonal High for wells in which water levels were measured over a period of 12 months or more and represent adequate seasonal fluctuations
2	Estimated long-term seasonal high groundwater elevations for wells with less than 12 months of water level data using respective well's correlation equation with historic well MW-12 only; See correlation graphs included in Appendix V for source of slope (m) and y-intercept (b) values
3	A modification factor of 10% of water level flux at each well has been included in respective well's estimated long-term seasonal high groundwater elevation
4	Estimated long-term seasonal high groundwater elevations for wells with less than 12 months of water level data using respective well's correlation equation with historic well MW-12 and a flux-based modification factor

Negative water level in ft-bgs denotes water level in feet above ground surface

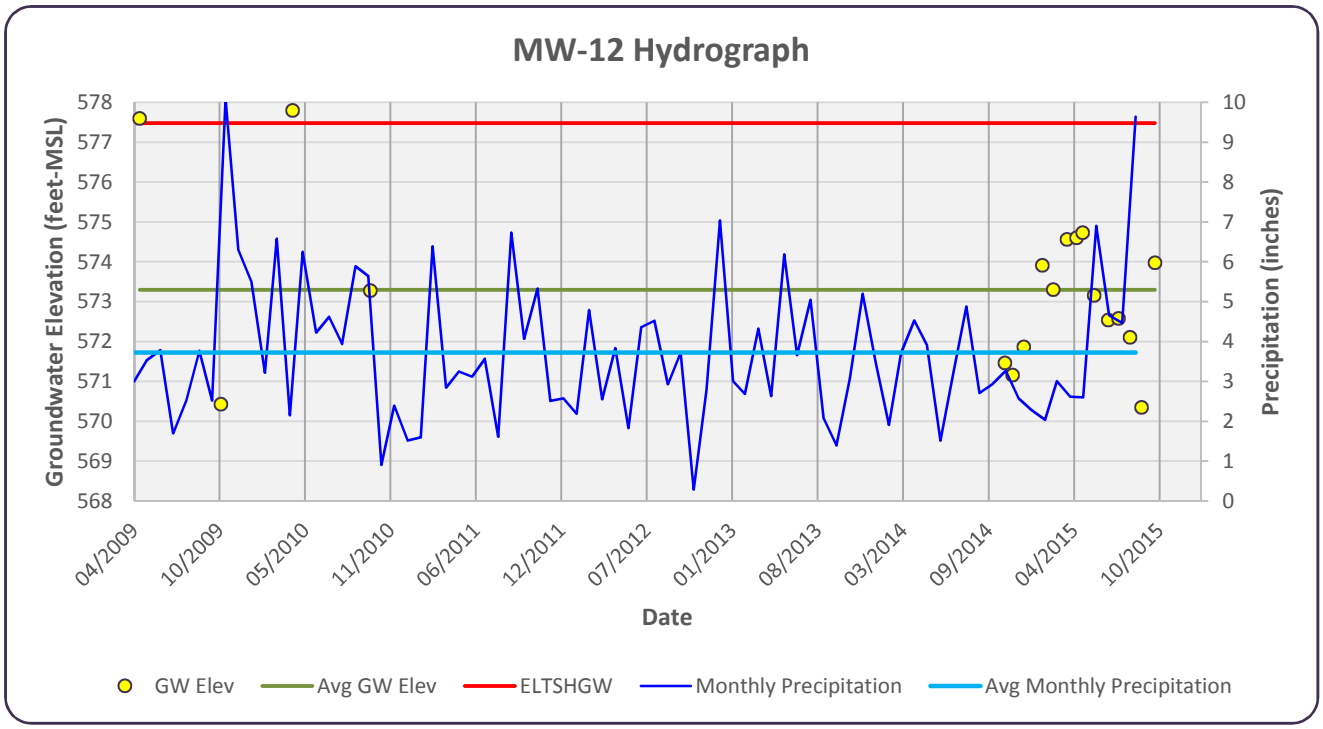
Well locations not listed were not included in the estimated long-term seasonal high groundwater calculation due to either limited number of water level measurements available (less than 6 months), and/or the well is a deeper aquifer well, and/or the well was screened in ash fill material

HYDROGRAPHS

SELECT DUKE ENERGY COMPLIANCE WELLS

Dan River Landfill

Amec Foster Wheeler Project No. 7810-14-0065



Highest Recorded Groundwater Elevation: 577.80 ft-MSL on April 7, 2010

Lowest Recorded Groundwater Elevation: 570.35 ft-MSL on September 15, 2015

Difference: 7.45 feet

ELTSHGW: 577.48 ft-MSL

Notes:

Precipitation data obtained from the State Climate Office of North Carolina CRONOS database, Station No. 317202 in Reidsville, Rockingham County, North Carolina. The Reidsville station was selected for use instead of the spatially closer Eden, North Carolina Station due reading cessation in April 2014 of the Eden Station (Station No. 312631).

Groundwater elevations displayed were collected by Duke Energy personnel prior to October 2014 and on January 5, 2015 and May 5, 2015. Other groundwater elevations displayed were collected by Amec Foster Wheeler personnel.

See Table in Appendix V for complete ELTSHGW calculations

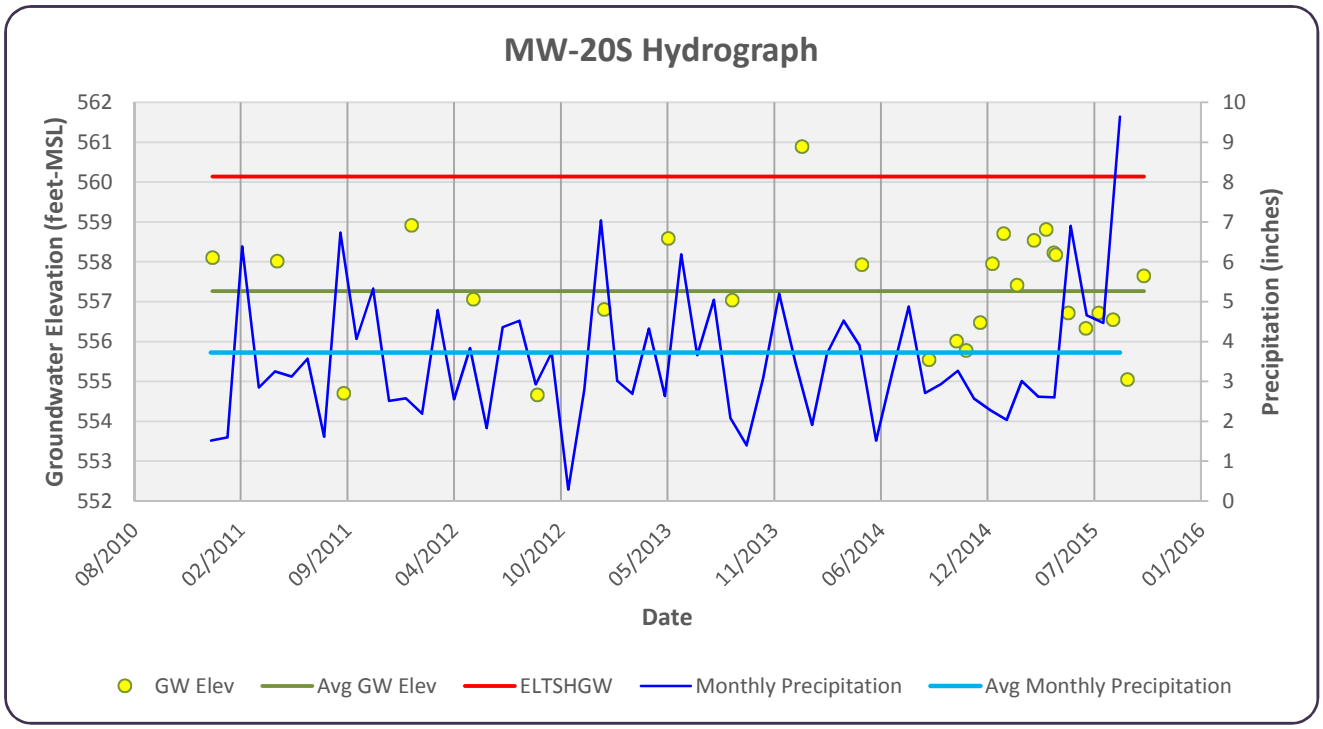
GW Elev = groundwater elevation
ft-MSL = feet relative to mean sea level
Avg = average
ELTSHGW = estimated long-term seasonal high groundwater

HYDROGRAPHS

SELECT DUKE ENERGY COMPLIANCE WELLS

Dan River Landfill

Amec Foster Wheeler Project No. 7810-14-0065



Highest Recorded Groundwater Elevation: 560.89 ft-MSL on January 13, 2014

Lowest Recorded Groundwater Elevation: 554.66 ft-MSL on September 4, 2012

Difference: 6.23 feet

ELTSHGW: 560.14 ft-MSL

Notes:

Precipitation data obtained from the State Climate Office of North Carolina CRONOS database, Station No. 317202 in Reidsville, Rockingham County, North Carolina. The Reidsville station was selected for use instead of the spatially closer Eden, North Carolina Station due reading cessation in April 2014 of the Eden Station (Station No. 312631).

Groundwater elevations displayed were collected by Duke Energy personnel prior to October 2014 and on January 5, 2015 and May 5, 2015. Other groundwater elevations displayed were collected by Amec Foster Wheeler personnel.

See Table in Appendix V for complete ELTSHGW calculations

GW Elev = groundwater elevation
ft-MSL = feet relative to mean sea level
Avg = average
ELTSHGW = estimated long-term seasonal high groundwater

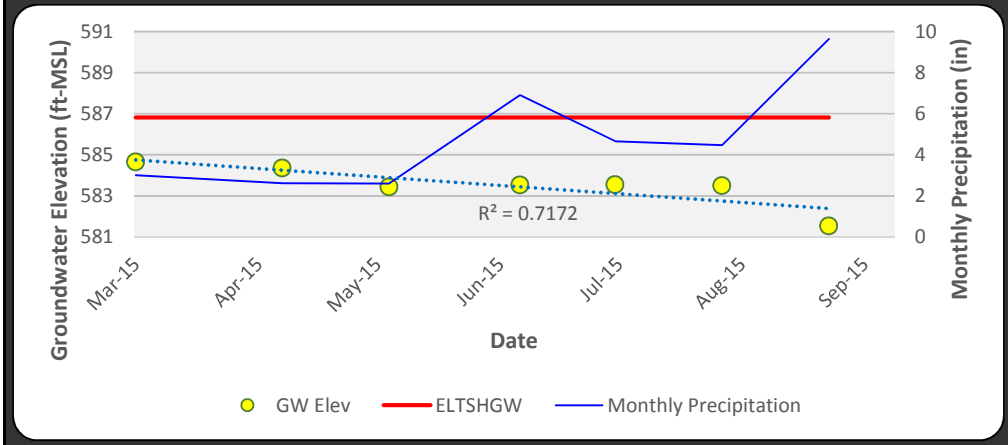
HYDROGRAPHS

AMEC FOSTER WHEELER HISTORIC OBSERVATION WELLS

Dan River Landfill

Amec Foster Wheeler Project No. 7810-14-0065

OW-301D



- **Predominant Hydrostratigraphic Units in Saturated Screen Interval:**

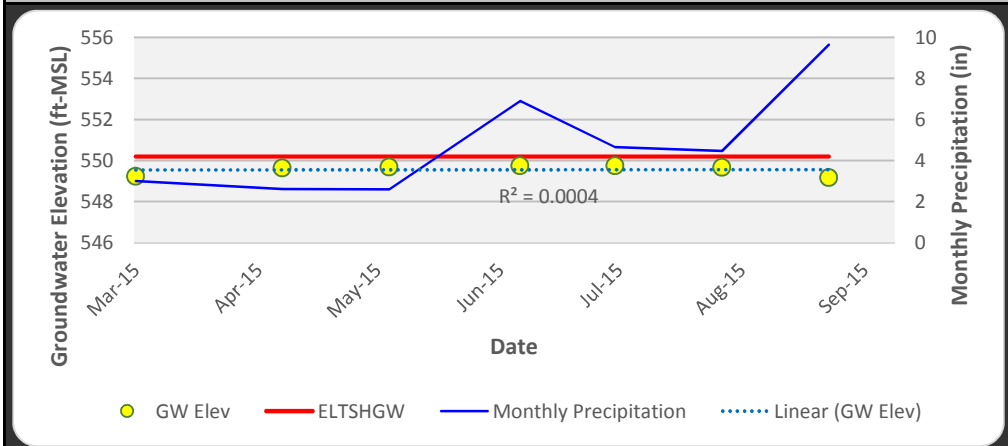
  Partially Weathered Rock (PWR)

- **Modification Factor:** 0.31 feet
- **ELTSH Groundwater Elev:** **586.82 ft-MSL**

Trend Line

ELTSHGW

OW-302D



- **Predominant Hydrostratigraphic Units in Saturated Screen Interval:**

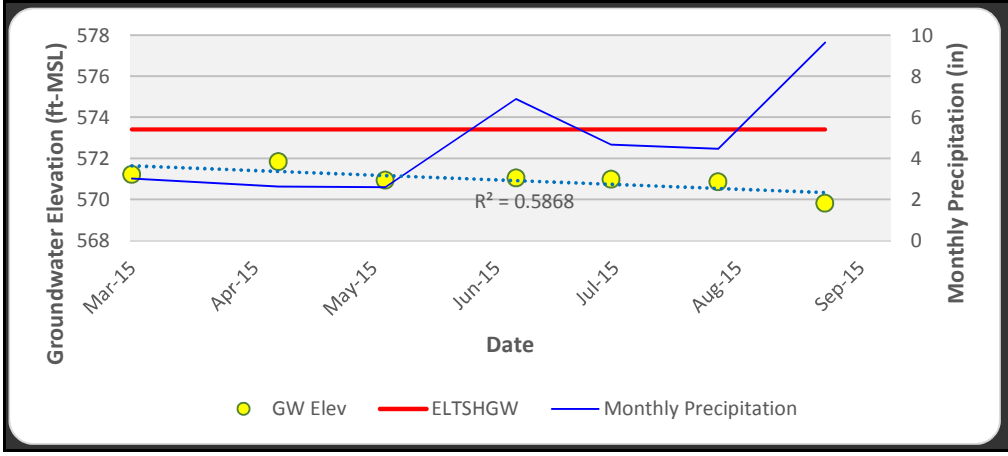
  Partially Weathered Rock (PWR)

- **Modification Factor:** 0.06 feet
- **ELTSH Groundwater Elev:** **550.20 ft-MSL**

Trend Line

ELTSH

OW-303D



- **Predominant Hydrostratigraphic Units in Saturated Screen Interval:**

  Saprolite

- **Modification Factor:** 0.20 feet
- **ELTSH Groundwater Elev:** **573.41 ft-MSL**

Trend Line

ELTSH

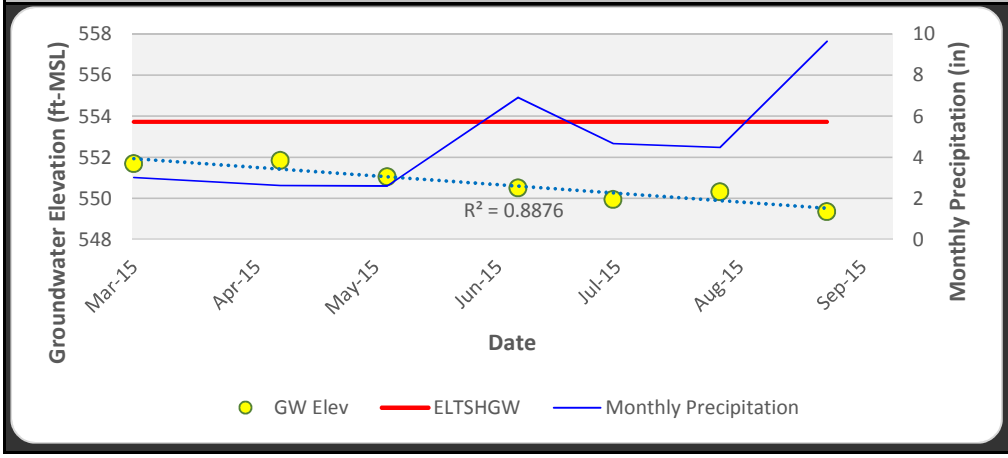
HYDROGRAPHS

AMEC FOSTER WHEELER HISTORIC OBSERVATION WELLS

Dan River Landfill

Amec Foster Wheeler Project No. 7810-14-0065

OW-304D



- **Predominant Hydrostratigraphic Units in Saturated Screen Interval:**

  Saprolite

- **Modification Factor:**

  0.25 feet

- **ELTSH Groundwater Elev:**

  553.72 ft-MSL

Trend Line

ELTSH

Notes:

ft-MSL = feet relative to mean sea level

in = inches

ELTSHGW = Estimated Long-Term Seasonal High Groundwater

GW Elev = groundwater elevation

ELTSHGW not calculated for wells with less than 6 months of water level measurements, and/or for deeper well of nested pair, and/or well screened in ash fill

Precipitation data obtained from the State Climate Office of North Carolina CRONOS database, Station No. 317202 in Reidsville, Rockingham County, North Carolina. The Reidsville station was selected for use instead of the spatially closer Eden, North Carolina Station due reading cessation in April 2014 of the Eden Station (Station No. 312631).

See Table in Appendix V for Modification Factor determinations and ELTSHGW calculations

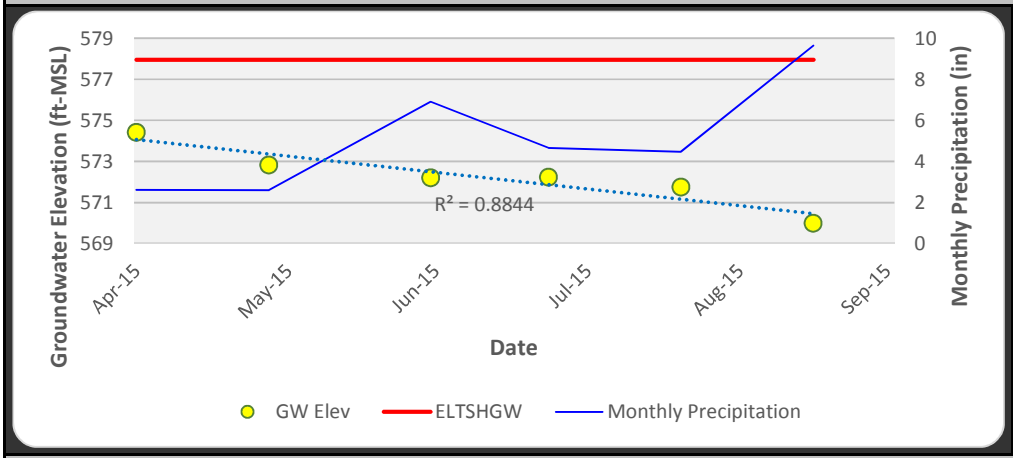
HYDROGRAPHS

AMEC FOSTER WHEELER HYDROGEOLOGIC STUDY OBSERVATION WELLS

Dan River Landfill

Amec Foster Wheeler Project No. 7810-14-0065

OW-401S



- **Predominant Hydrostratigraphic Units in Saturated Screen Interval:**

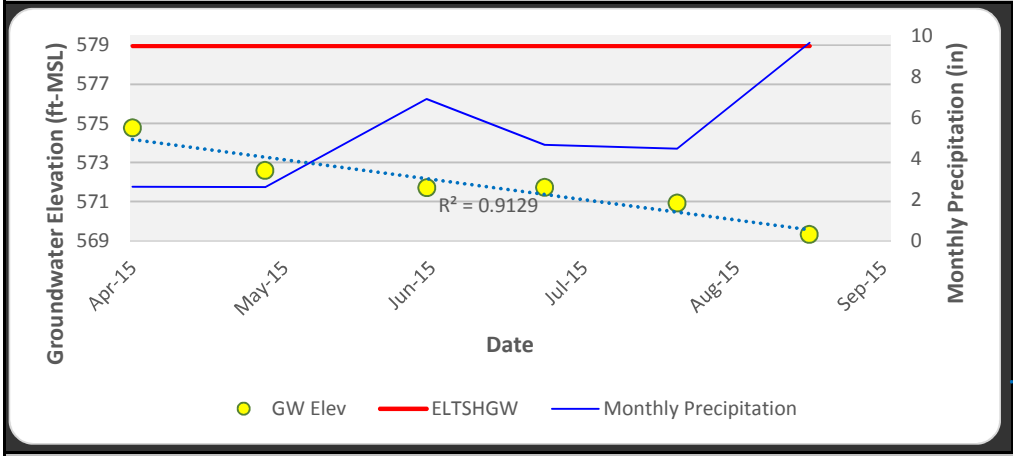
  Partially Weathered Rock (PWR)

- **Modification Factor:** 0.44 feet
- **ELTSH Groundwater Elev:** **577.95 ft-MSL**

Trend Line

ELTSH

OW-403S



- **Predominant Hydrostratigraphic Units in Saturated Screen Interval:**

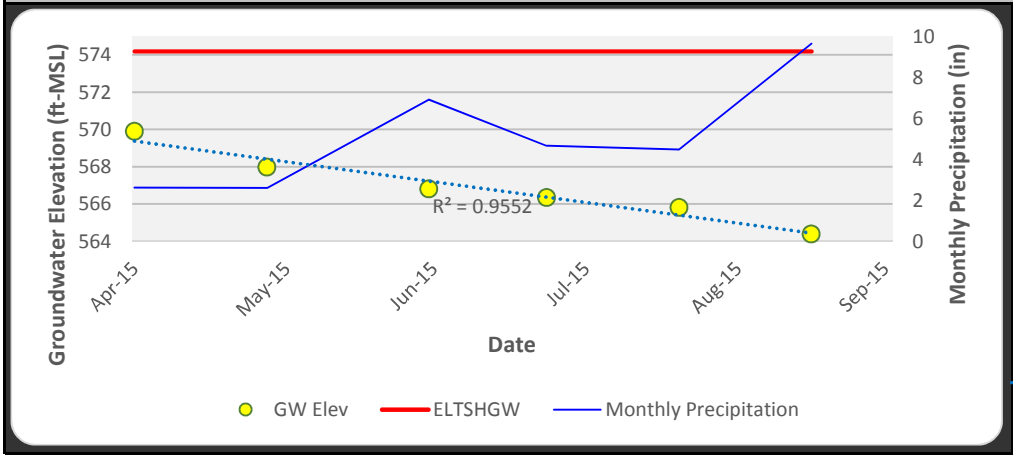
  Partially Weathered Rock (PWR)

- **Modification Factor:** 0.55 feet
- **ELTSH Groundwater Elev:** **578.45 ft-MSL**

Trend Line

ELTSH

OW-404S



- **Predominant Hydrostratigraphic Units in Saturated Screen Interval:**

  Partially Weathered Rock (PWR)

- **Modification Factor:** 0.55 feet
- **ELTSH Groundwater Elev:** **574.18 ft-MSL**

Trend Line

ELTSH

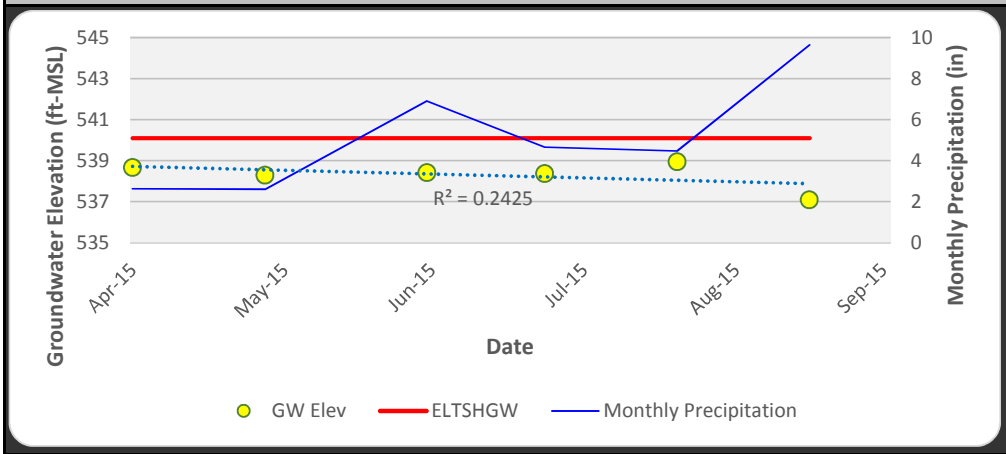
HYDROGRAPHS

AMEC FOSTER WHEELER HYDROGEOLOGIC STUDY OBSERVATION WELLS

Dan River Landfill

Amec Foster Wheeler Project No. 7810-14-0065

OW-405S



- **Predominant Hydrostratigraphic Units in Saturated Screen Interval:**

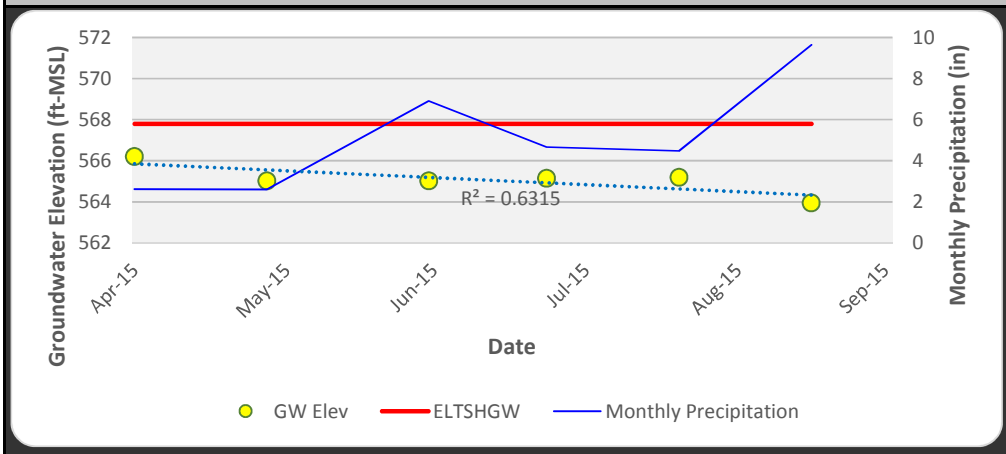
  Partially Weathered Rock (PWR)

- **Modification Factor:** 0.19 feet
- **ELTSH Groundwater Elev:** **540.09 ft-MSL**

Trend Line

ELTSH

OW-406S



- **Predominant Hydrostratigraphic Units in Saturated Screen Interval:**

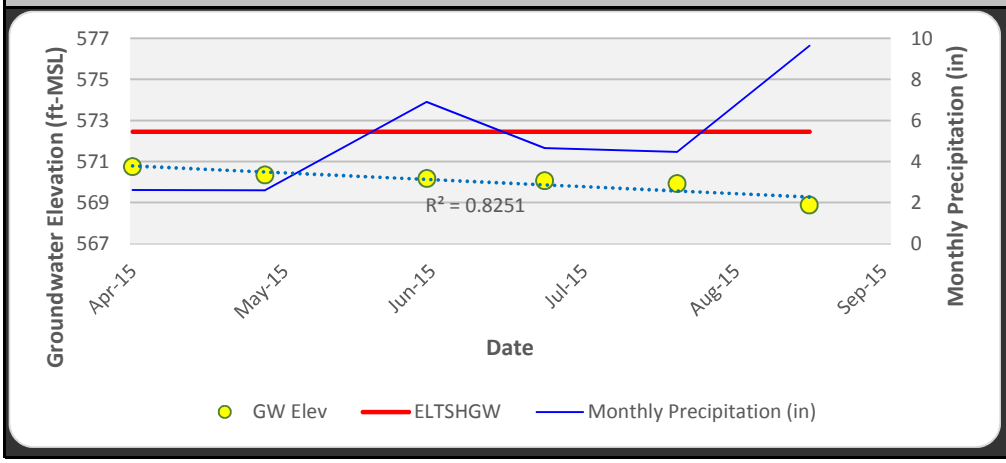
  Partially Weathered Rock (PWR)

- **Modification Factor:** 0.23 feet
- **ELTSH Groundwater Elev:** **567.79 ft-MSL**

Trend Line

ELTSH

OW-407S



- **Predominant Hydrostratigraphic Units in Saturated Screen Interval:**

  Saprolite

- **Modification Factor:** 0.19 feet
- **ELTSH Groundwater Elev:** **572.45 ft-MSL**

Trend Line

ELTSH

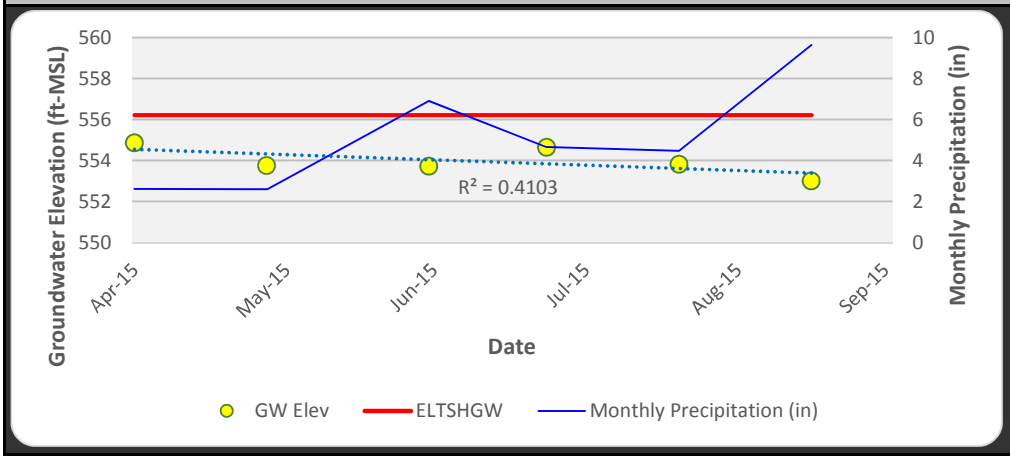
HYDROGRAPHS

AMEC FOSTER WHEELER HYDROGEOLOGIC STUDY OBSERVATION WELLS

Dan River Landfill

Amec Foster Wheeler Project No. 7810-14-0065

OW-409S



- **Predominant Hydrostratigraphic Units in Saturated Screen Interval:**

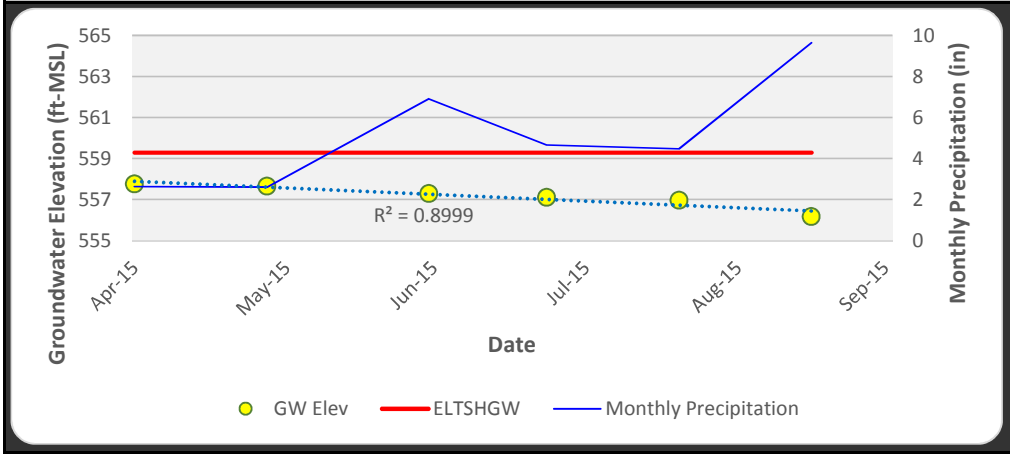
  Partially Weathered Rock (PWR)

- **Modification Factor:** 0.19 feet
- **ELTSH Groundwater Elev:** **556.21 ft-MSL**

Trend Line

ELTSH

OW-410S



- **Predominant Hydrostratigraphic Units in Saturated Screen Interval:**

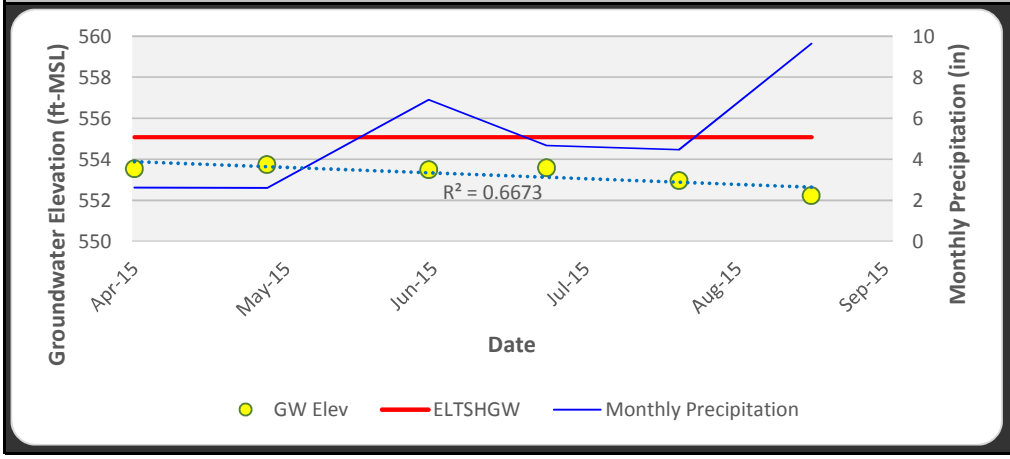
  Partially Weathered Rock (PWR)

- **Modification Factor:** 0.38 feet
- **ELTSH Groundwater Elev:** **559.28 ft-MSL**

Trend Line

ELTSH

OW-411S



- **Predominant Hydrostratigraphic Units in Saturated Screen Interval:**

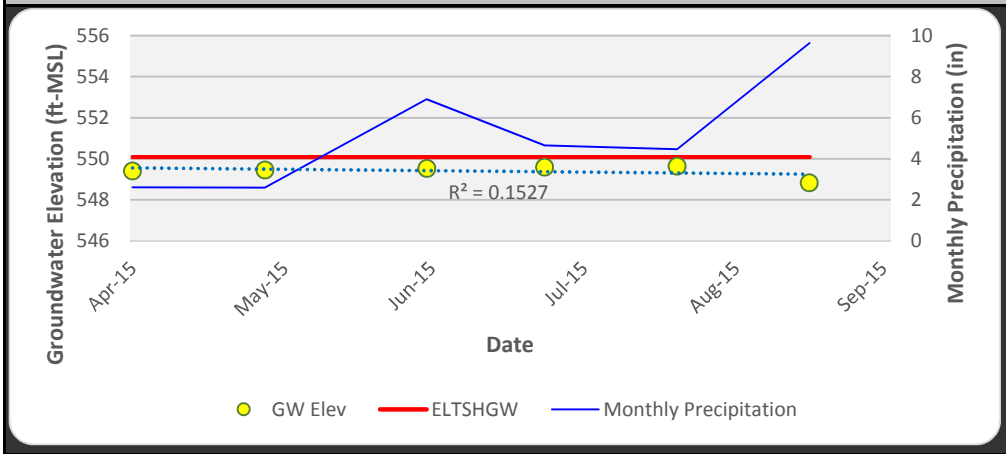
  Partially Weathered Rock (PWR)

- **Modification Factor:** 0.15 feet
- **ELTSH Groundwater Elev:** **555.08 ft-MSL**

Trend Line

ELTSH

OW-412S



- **Predominant Hydrostratigraphic Units in Saturated Screen Interval:**

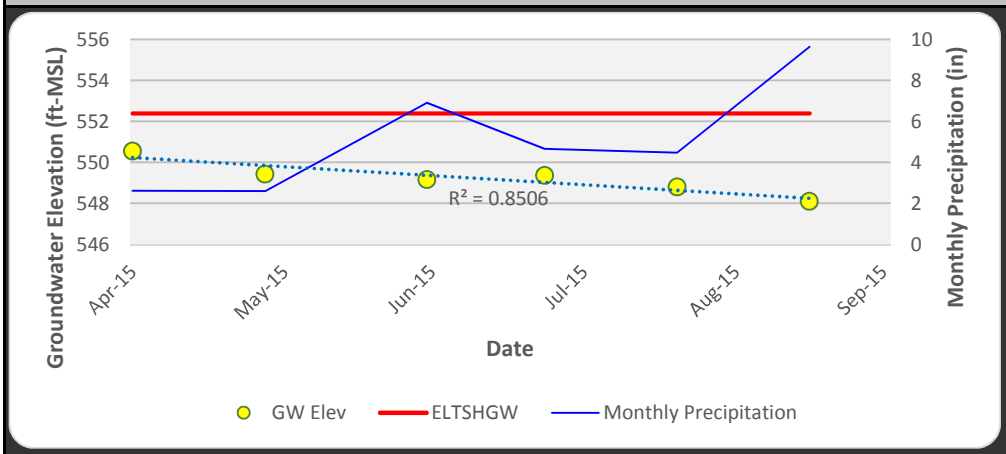
  Partially Weathered Rock (PWR)

- **Modification Factor:** 0.08 feet
- **ELTSH Groundwater Elev:** **550.09 ft-MSL**

Trend Line

ELTSH

OW-413S



- **Predominant Hydrostratigraphic Units in Saturated Screen Interval:**

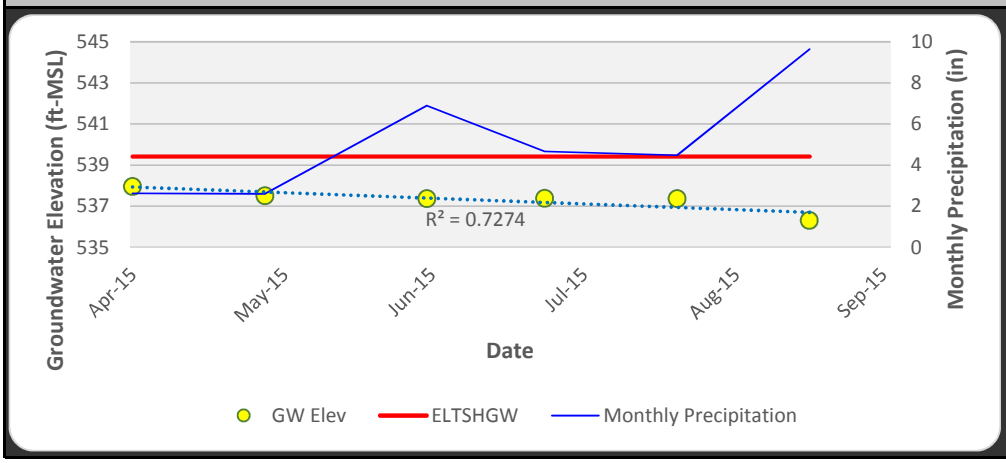
  Partially Weathered Rock (PWR)

- **Modification Factor:** 0.25 feet
- **ELTSH Groundwater Elev:** **552.39 ft-MSL**

Trend Line

ELTSH

OW-414S



- **Predominant Hydrostratigraphic Units in Saturated Screen Interval:**

  Partially Weathered Rock (PWR)

- **Modification Factor:** 0.17 feet
- **ELTSH Groundwater Elev:** **539.41 ft-MSL**

Trend Line

ELTSH

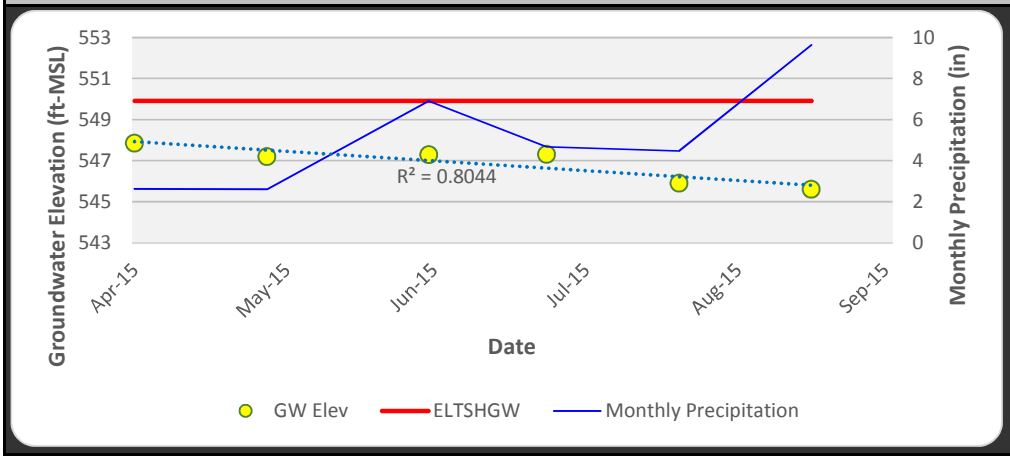
HYDROGRAPHS

AMEC FOSTER WHEELER HYDROGEOLOGIC STUDY OBSERVATION WELLS

Dan River Landfill

Amec Foster Wheeler Project No. 7810-14-0065

OW-415S



- **Predominant Hydrostratigraphic Units in Saturated Screen Interval:**

  Saprolite

- **Modification Factor:**

  0.22 feet

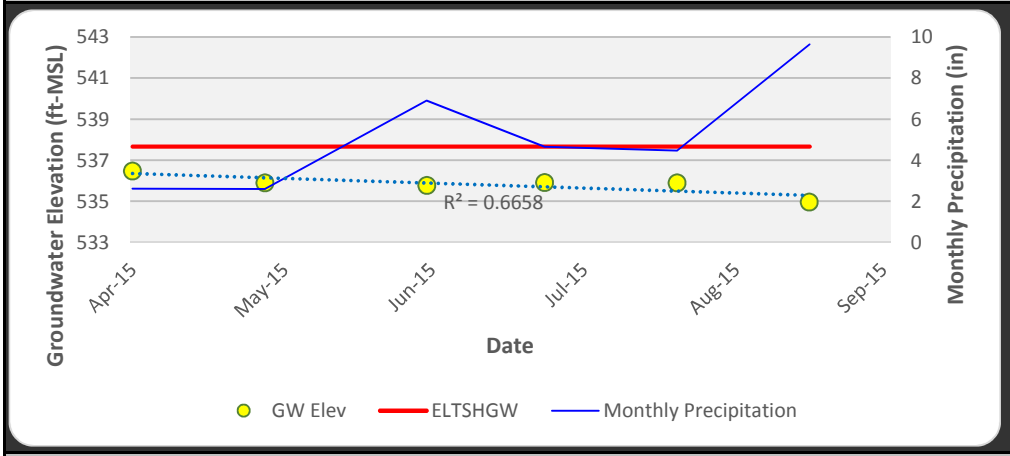
- **ELTSH Groundwater Elev:**

  549.91 ft-MSL

Trend Line

ELTSH

OW-416S



- **Predominant Hydrostratigraphic Units in Saturated Screen Interval:**

  Partially Weathered Rock (PWR)

- **Modification Factor:**

  0.15 feet

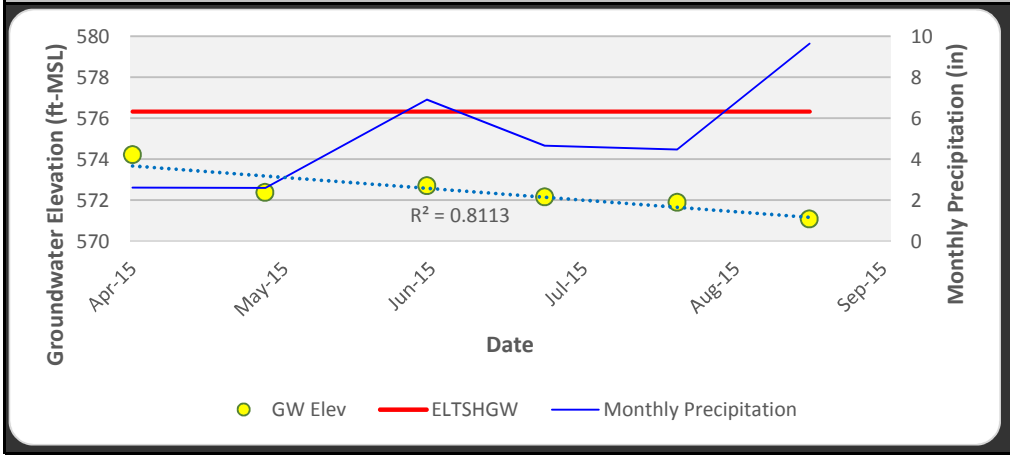
- **ELTSH Groundwater Elev:**

  537.66 ft-MSL

Trend Line

ELTSH

OW-417S



- **Predominant Hydrostratigraphic Units in Saturated Screen Interval:**

  Saprolite

- **Modification Factor:**

  0.31 feet

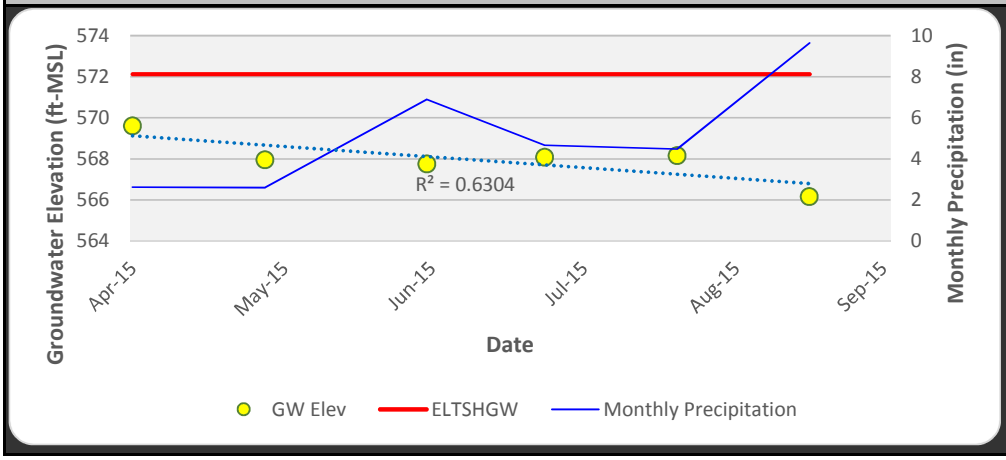
- **ELTSH Groundwater Elev:**

  576.32 ft-MSL

Trend Line

ELTSH

OW-419S



- **Predominant Hydrostratigraphic Units in Saturated Screen Interval:**

  Partially Weathered Rock (PWR)

- **Modification Factor:** 0.34 feet
- **ELTSH Groundwater Elev:** **572.12 ft-MSL**

Trend Line

ELTSH

Notes:

ft-MSL = feet relative to mean sea level

in = inches

ELTSHGW = Estimated Long-Term Seasonal High Groundwater

Elev = elevation

ELTSHGW not calculated for wells with less than 6 months of water level measurements, and/or for deeper well of nested pair, and/or well screened in ash fill

Precipitation data obtained from the State Climate Office of North Carolina CRONOS database, Station No. 317202 in Reidsville, Rockingham County, North Carolina. The Reidsville station was selected for use instead of the spatially closer Eden, North Carolina Station due reading cessation in April 2014 of the Eden Station (Station No. 312631).

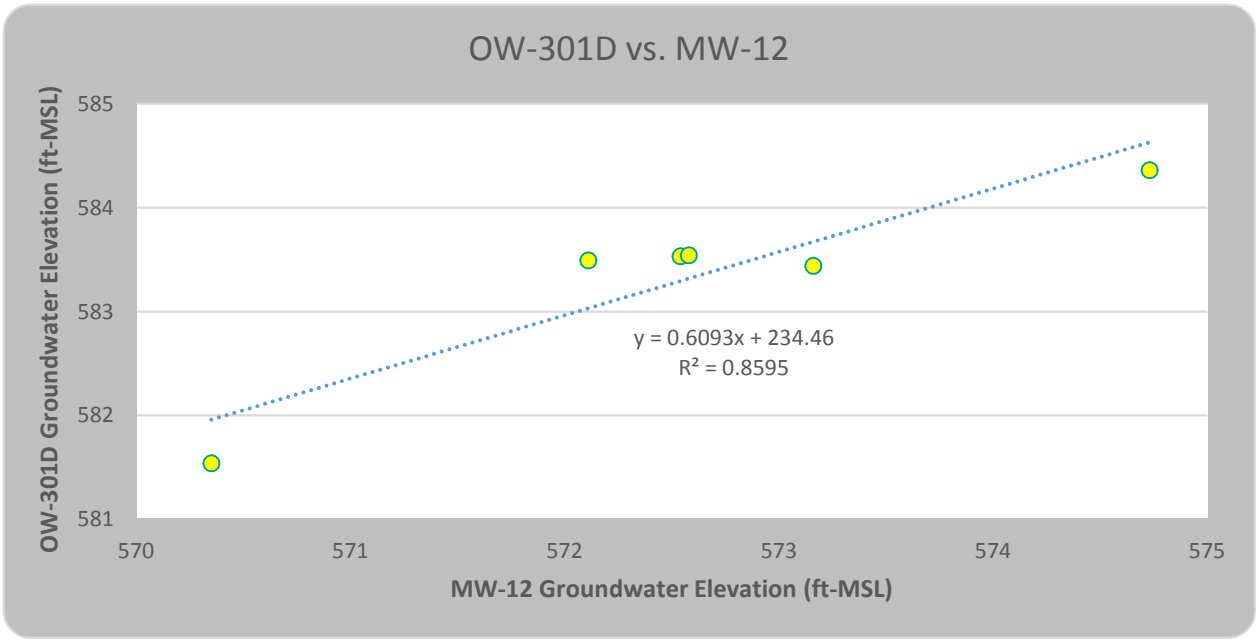
See Table in Appendix V for Modification Factor determinations and ELTSHGW calculations

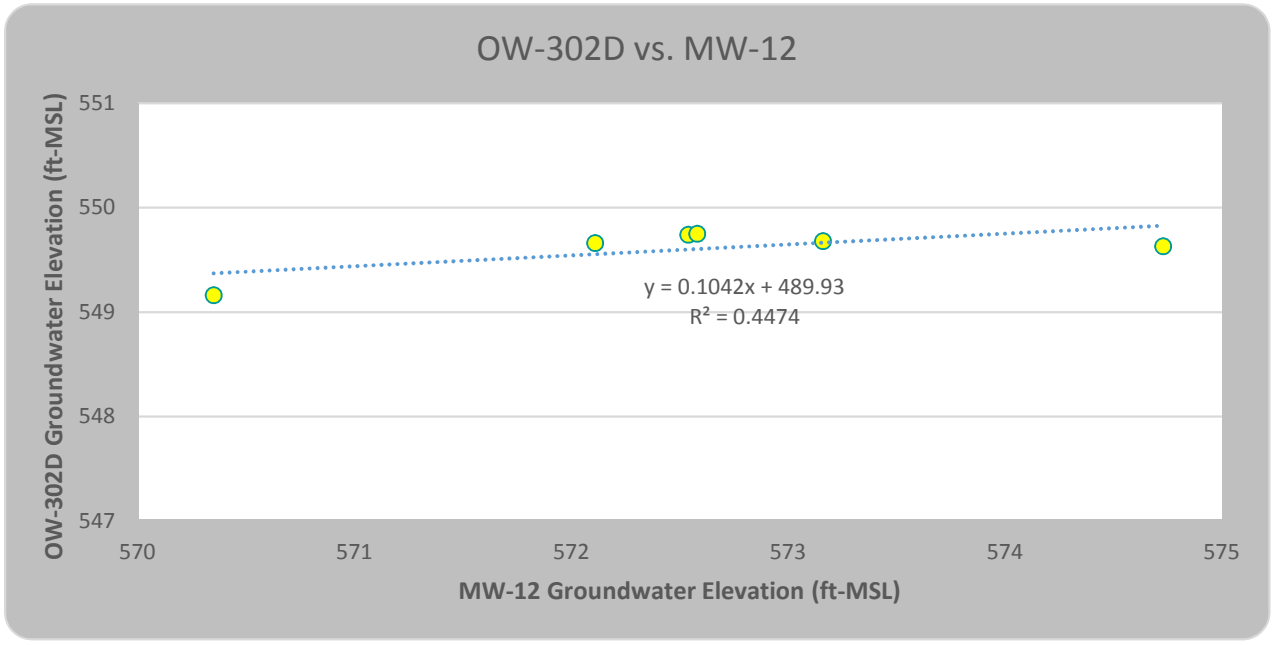
HISTORIC WELL (MW-12) CORRELATION GRAPHS

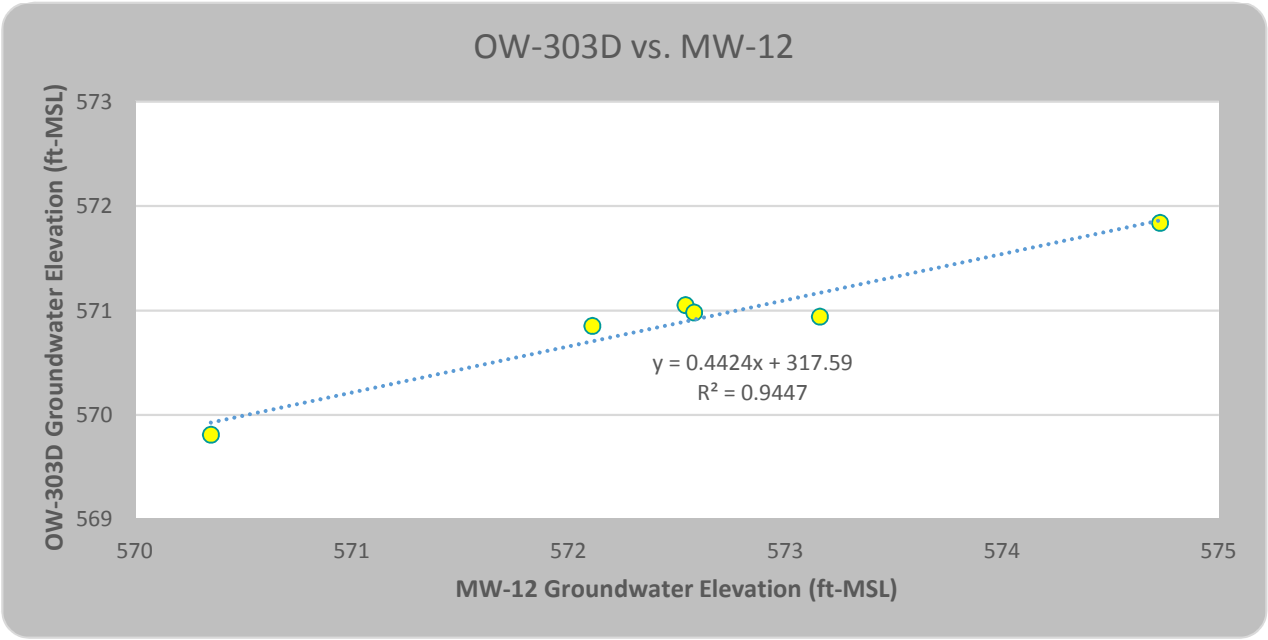
AMEC FOSTER WHEELER HISTORIC OBSERVATION WELLS

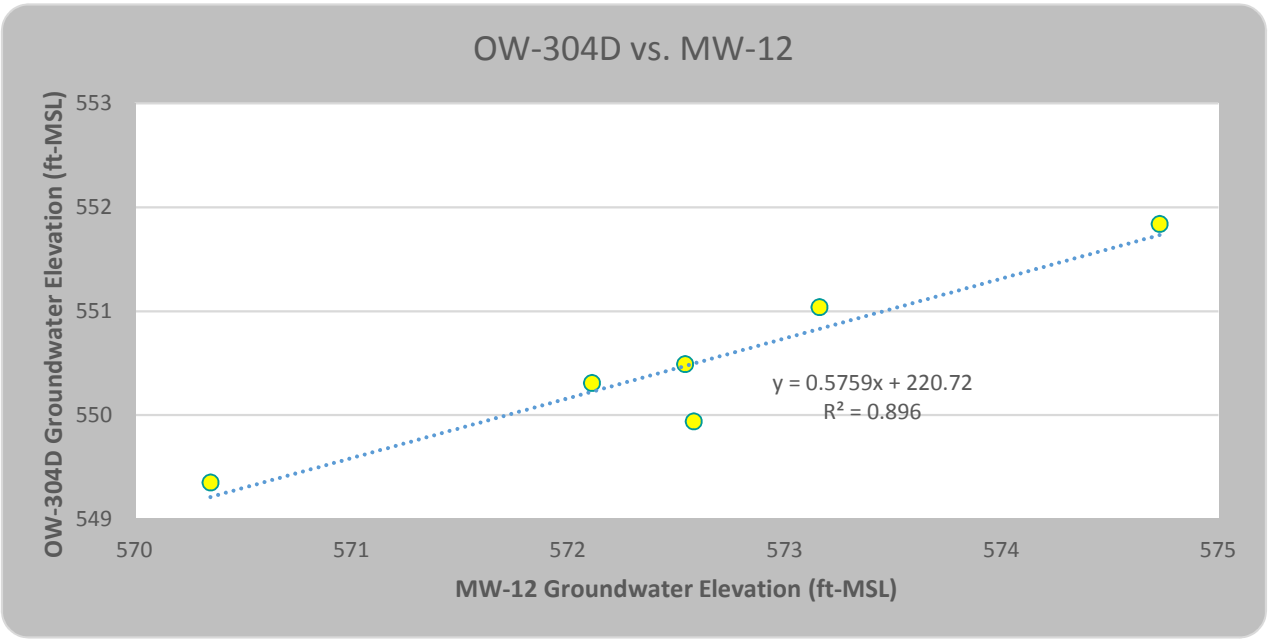
Dan River Landfill

Amec Foster Wheeler Project No. 7810-14-0065









Notes:

ft-MSL = feet relative to mean sea level

MW-12 correlations not considered for well with less than 6 months of water level measurements, and/or for deeper well of nested pair, and/or well screened in ash fill

Correlation graphs based on monthly water level measurements recorded from April 2015 through September 2015.

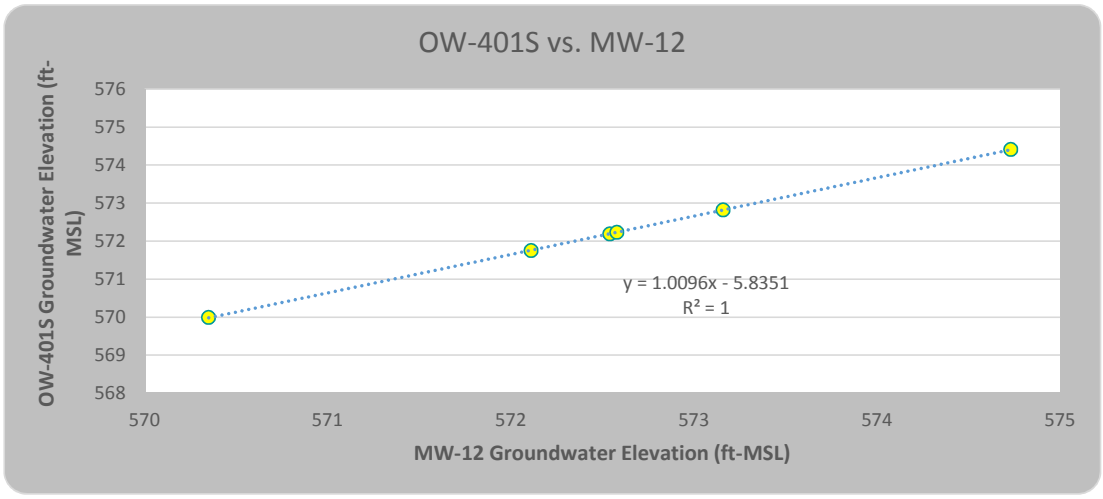
See Table in Appendix V for a summary of correlation values used in estimated seasonal high groundwater calculations

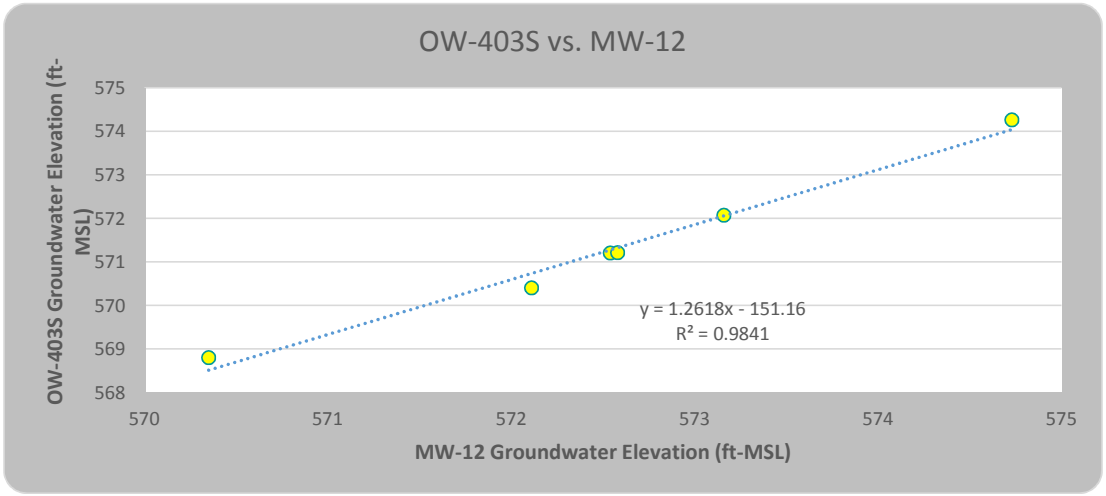
HISTORIC WELL (MW-12) CORRELATION GRAPHS

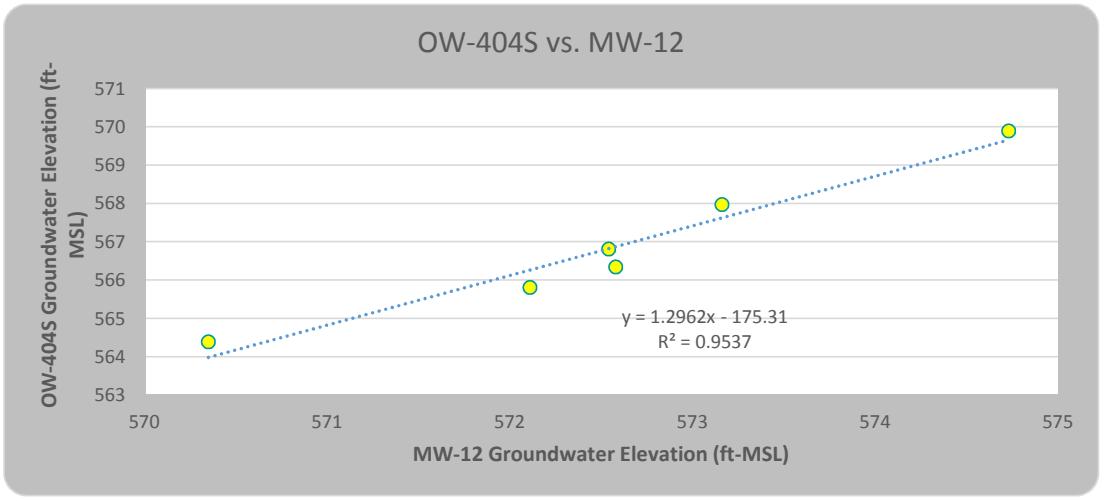
AMEC FOSTER WHEELER HYDROGEOLOGIC STUDY OBSERVATION WELLS

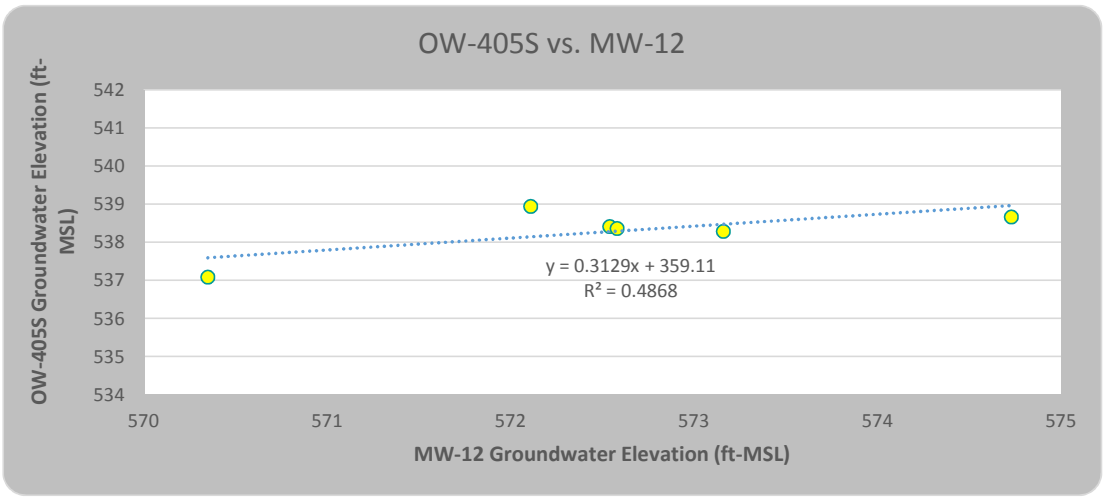
Dan River Landfill

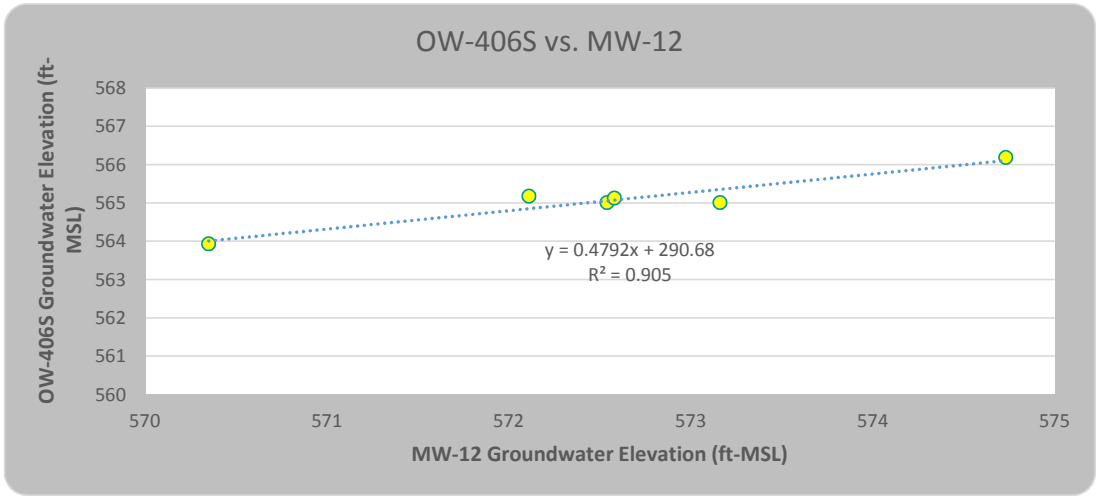
Amec Foster Wheeler Project No. 7810-14-0065

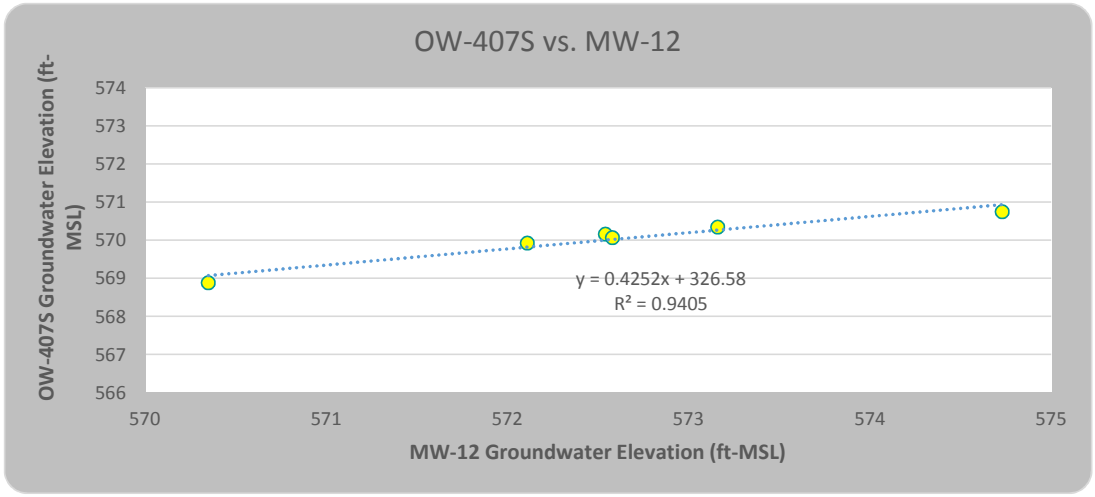


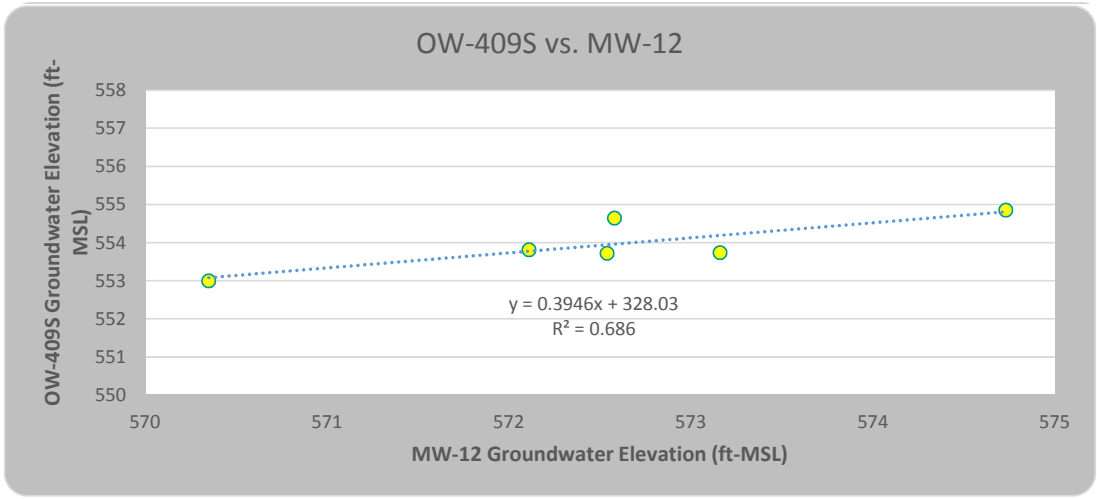


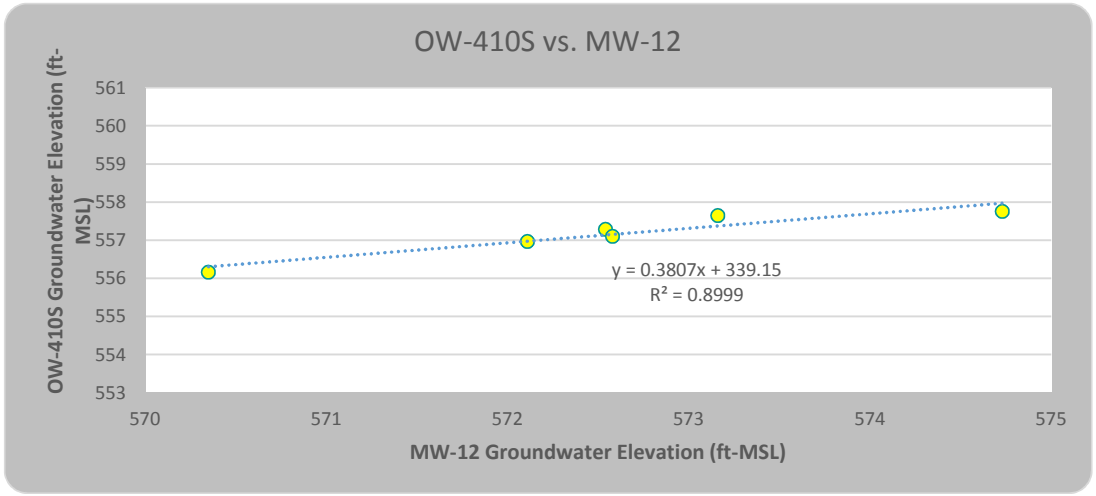


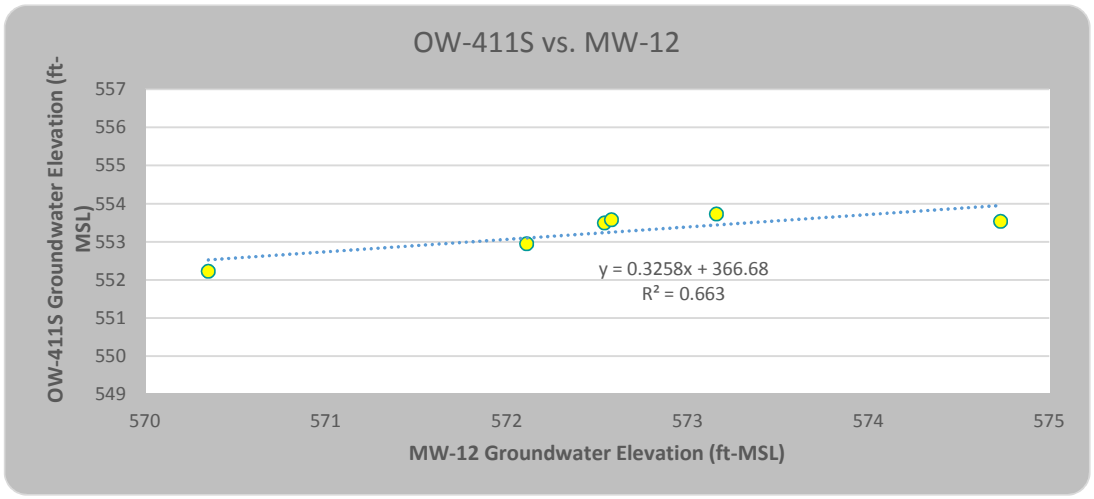

OW-405S vs. MW-12
OW-405S Groundwater Elevation (ft-MSL)
542
541
540
539
538
537
536
535
534
y = 0.3129x + 359.11
R² = 0.4868
570
571
572
573
574
575
MW-12 Groundwater Elevation (ft-MSL)

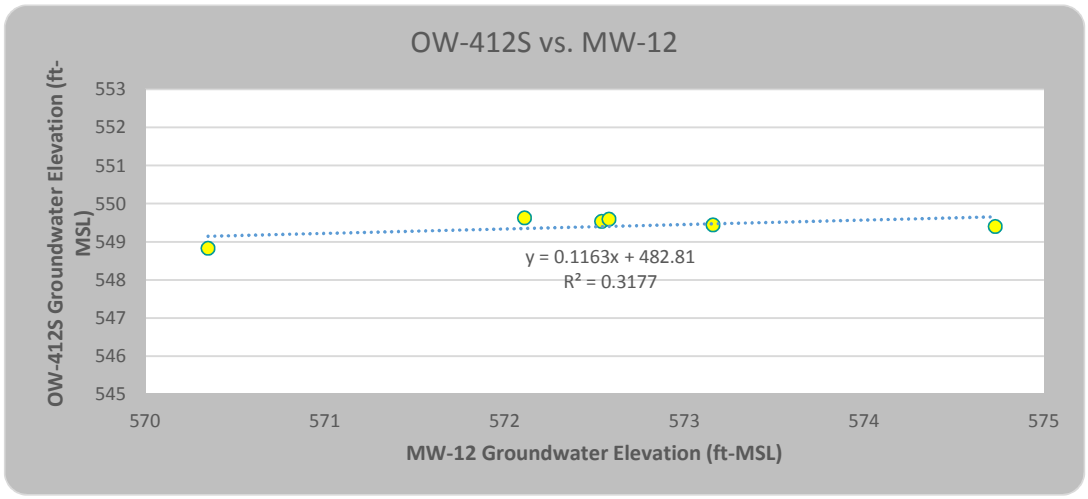

OW-406S vs. MW-12
OW-406S Groundwater Elevation (ft-MSL)
568
567
566
565
564
563
562
561
560
y = 0.4792x + 290.68
R² = 0.905
570
571
572
573
574
575
MW-12 Groundwater Elevation (ft-MSL)

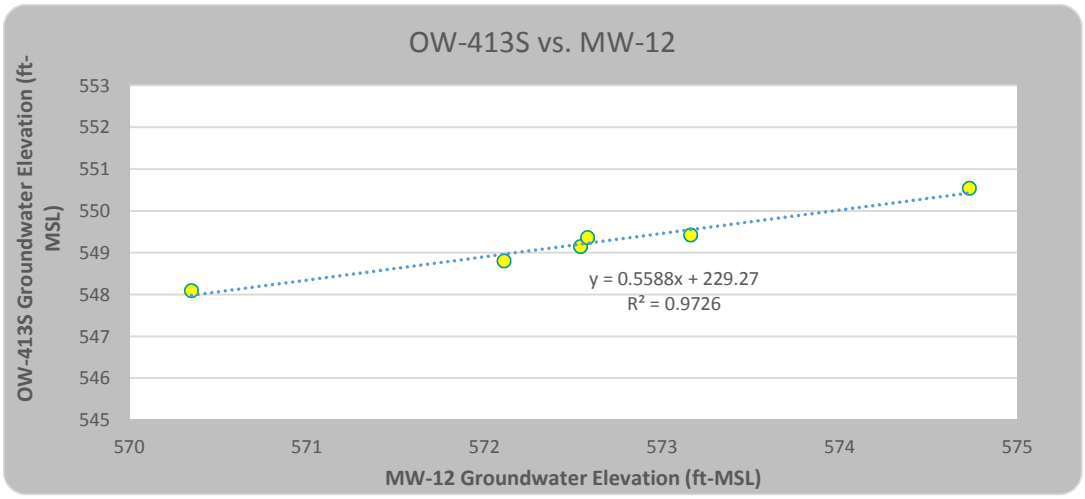

OW-407S vs. MW-12
OW-407S Groundwater Elevation (ft-MSL)
574
573
572
571
570
569
568
567
566
y = 0.4252x + 326.58
R² = 0.9405
570
571
572
573
574
575
MW-12 Groundwater Elevation (ft-MSL)

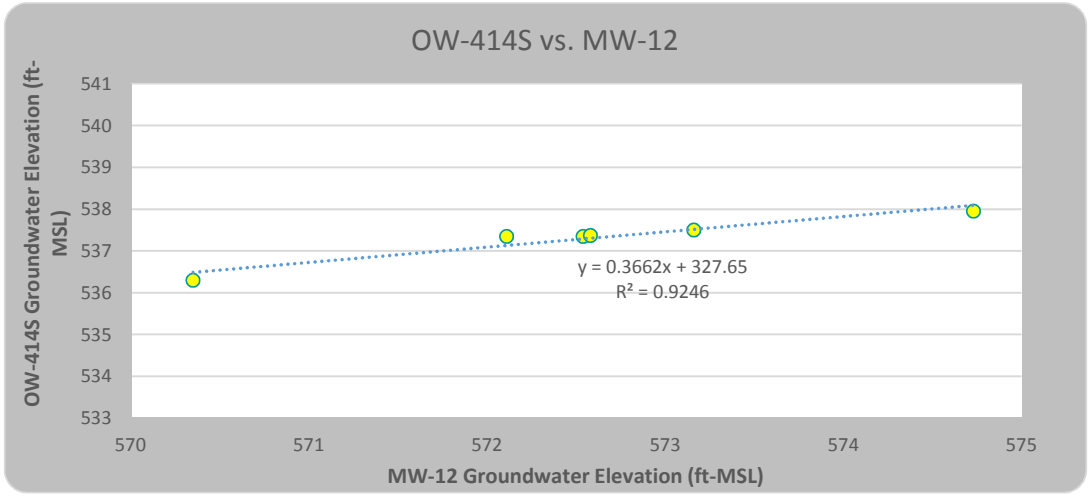

OW-409S vs. MW-12
OW-409S Groundwater Elevation (ft-MSL)
558
557
556
555
554
553
552
551
550
570
571
572
573
574
575
MW-12 Groundwater Elevation (ft-MSL)
y = 0.3946x + 328.03
R² = 0.686

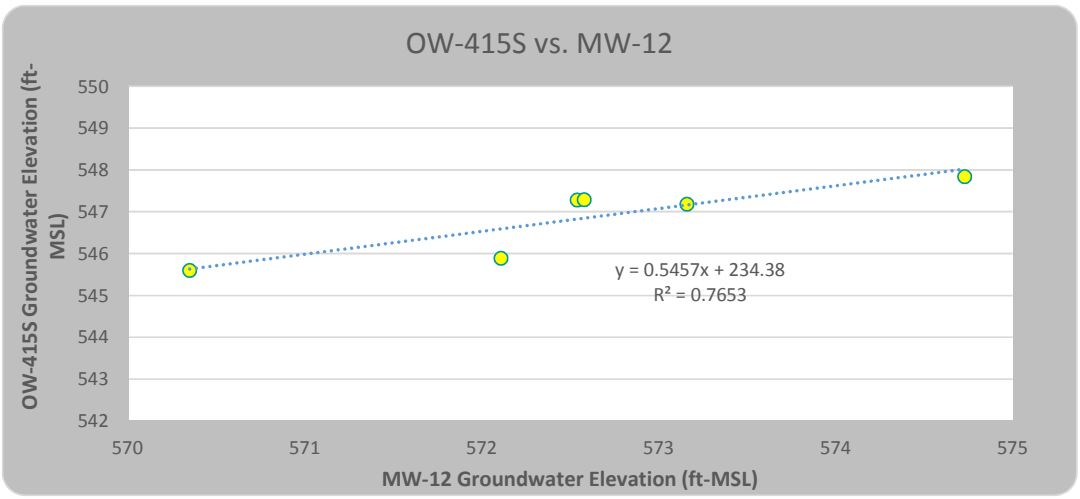

OW-410S vs. MW-12
OW-410S Groundwater Elevation (ft-MSL)
561
560
559
558
557
556
555
554
553
570
571
572
573
574
575
MW-12 Groundwater Elevation (ft-MSL)
y = 0.3807x + 339.15
R² = 0.8999

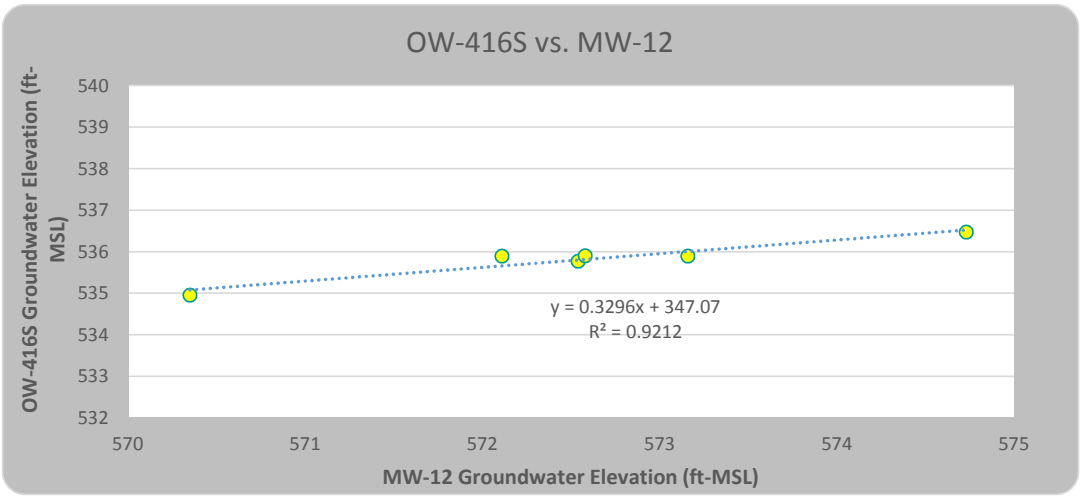

OW-411S vs. MW-12
OW-411S Groundwater Elevation (ft-MSL)
557
556
555
554
553
552
551
550
549
570
571
572
573
574
575
MW-12 Groundwater Elevation (ft-MSL)
y = 0.3258x + 366.68
R² = 0.663

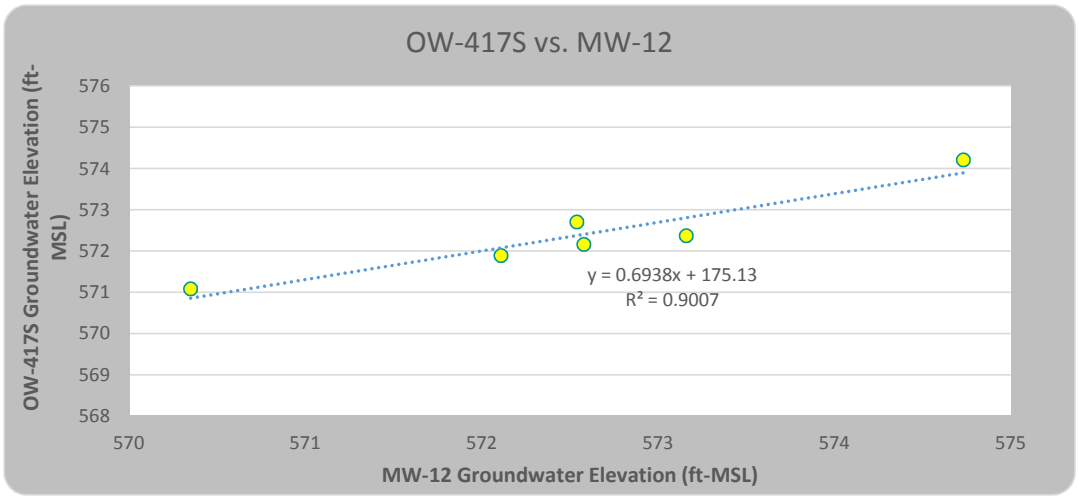

OW-412S vs. MW-12
OW-412S Groundwater Elevation (ft-MSL)
553
552
551
550
549
548
547
546
545
570
571
572
573
574
575
MW-12 Groundwater Elevation (ft-MSL)
y = 0.1163x + 482.81
R² = 0.3177

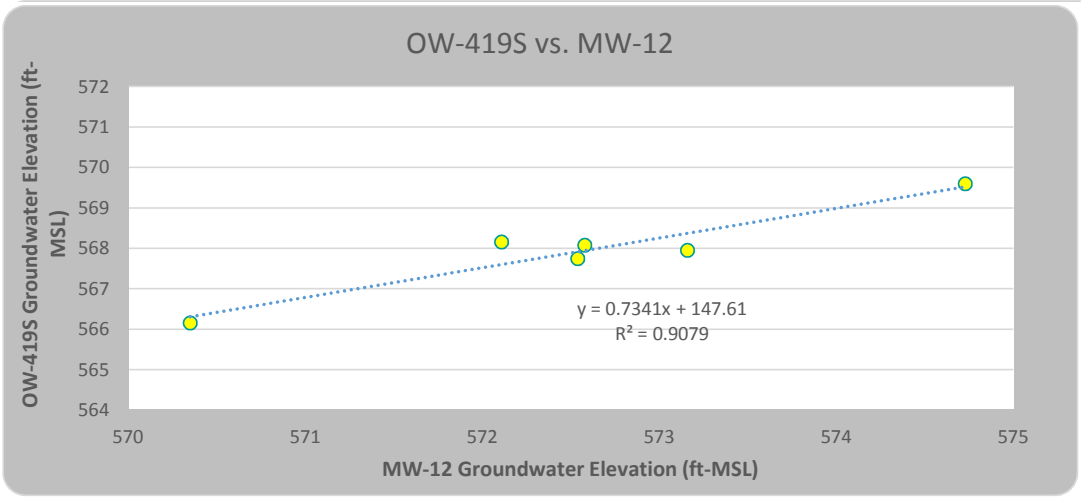

OW-413S vs. MW-12
OW-413S Groundwater Elevation (ft-MSL)
553
552
551
550
549
548
547
546
545
570
571
572
573
574
575
MW-12 Groundwater Elevation (ft-MSL)
y = 0.5588x + 229.27
R² = 0.9726


OW-414S vs. MW-12
OW-414S Groundwater Elevation (ft-MSL)
541
540
539
538
537
536
535
534
533
570
571
572
573
574
575
MW-12 Groundwater Elevation (ft-MSL)
y = 0.3662x + 327.65
R² = 0.9246


OW-415S vs. MW-12
OW-415S Groundwater Elevation (ft-MSL)
550
549
548
547
546
545
544
543
542
570
571
572
573
574
575
MW-12 Groundwater Elevation (ft-MSL)
y = 0.5457x + 234.38
R² = 0.7653


OW-416S vs. MW-12
OW-416S Groundwater Elevation (ft-MSL)
540
539
538
537
536
535
534
533
532
570
571
572
573
574
575
MW-12 Groundwater Elevation (ft-MSL)
y = 0.3296x + 347.07
R² = 0.9212


OW-417S vs. MW-12
OW-417S Groundwater Elevation (ft-MSL)
576
575
574
573
572
571
570
569
568
570
571
572
573
574
575
MW-12 Groundwater Elevation (ft-MSL)
y = 0.6938x + 175.13
R² = 0.9007



Notes:

ft-MSL = feet relative to mean sea level

MW-12 correlations not considered for well with less than 6 months of water level measurements, and/or for deeper well of nested pair, and/or well screened in ash fill

Correlation graphs based on monthly water level measurements recorded from April 2015 through September 2015.

See Table in Appendix V for a summary of correlation values used in estimated seasonal high groundwater calculations

APPENDIX VI

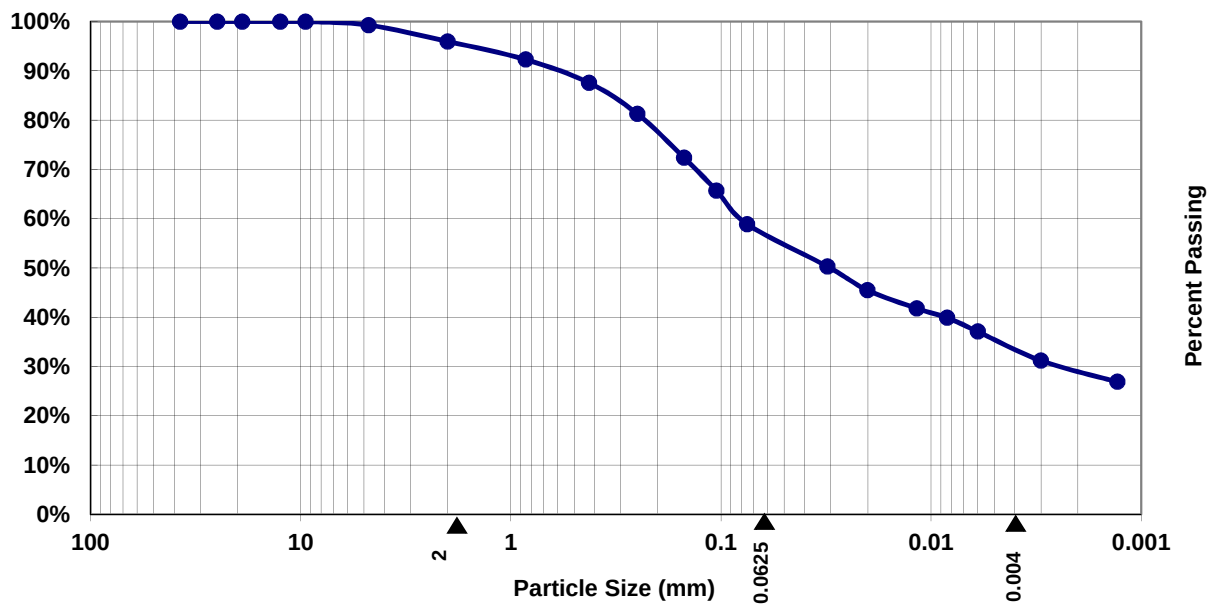
Porosity Calculations

PARTICLE SIZE ANALYSIS OF SOILS
FOR USE IN FETTER AND BEAR DIAGRAMS

Boring/Well No:	B-451	**Sample No:**	Bulk	**Depth:**	0 to 10 ft bgs

Sample Description: Yellow-Brown to Gray-Brown Sandy Lean Clay (CL)

Hydrostratigraphic Unit: Residuum/Saprolite



	> 2 mm	2 mm - 0.0625 mm	0.0625 mm - 0.004 mm	<0.004 mm
From Graph:	% Gravel 4.0%	% Sand 39.1%	% Silt 23.8%	% Clay 33.2%
Adjusted for Calculations	**0%**	**41%**	**25%**	**35%**

Notes:

Grain size distribution taken from grain size with hydrometer data located in Appendix IV.
Gravel, sand, silt and clay sizes based on Wentworth Scale.

Amec Foster Wheeler Project:
Dan River Landfill

Amec Foster Wheeler Project No:
7810-14-0065

FETTER AND BEAR DIAGRAMS

Amec Foster Wheer Project: Dan River Landfill

Amec Foster Wheeler Project No: 7810-14-0065

Boring/Well ID:	B-451
Sample Depth:	0 to 10 ft bgs
% Sand	41%
% Silt	25%
% Clay	35%

***ESTIMATED SPECIFIC YIELD:**

4%

*While it is recognized that specific yield and effective porosity are not synonymous, in practice, they may be estimated to be approximately equal in value.

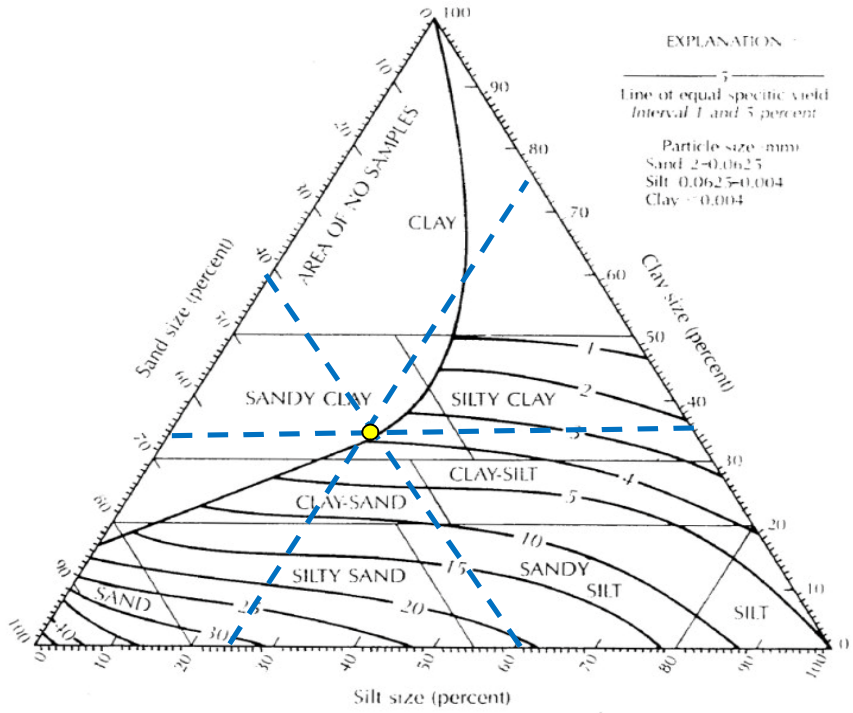
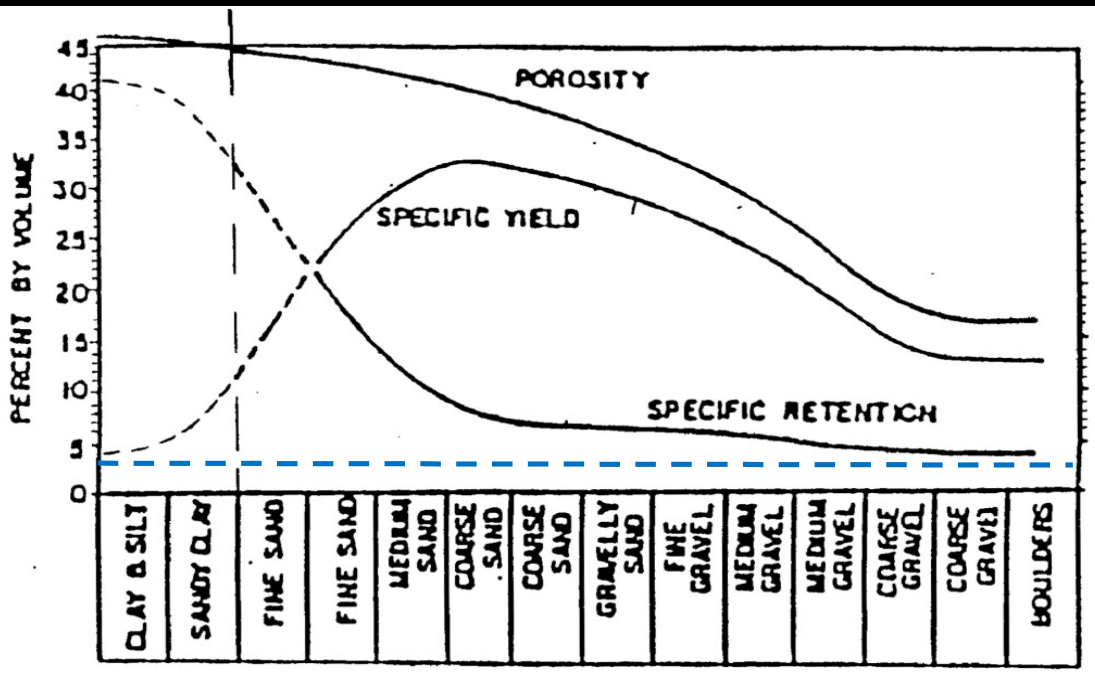


FIGURE 4.11 Textural classification triangle for unconsolidated materials showing the relation between particle size and specific yield. Source: A. I. Johnson, U.S. Geological Survey Water-Supply Paper 1662-D, 1967.



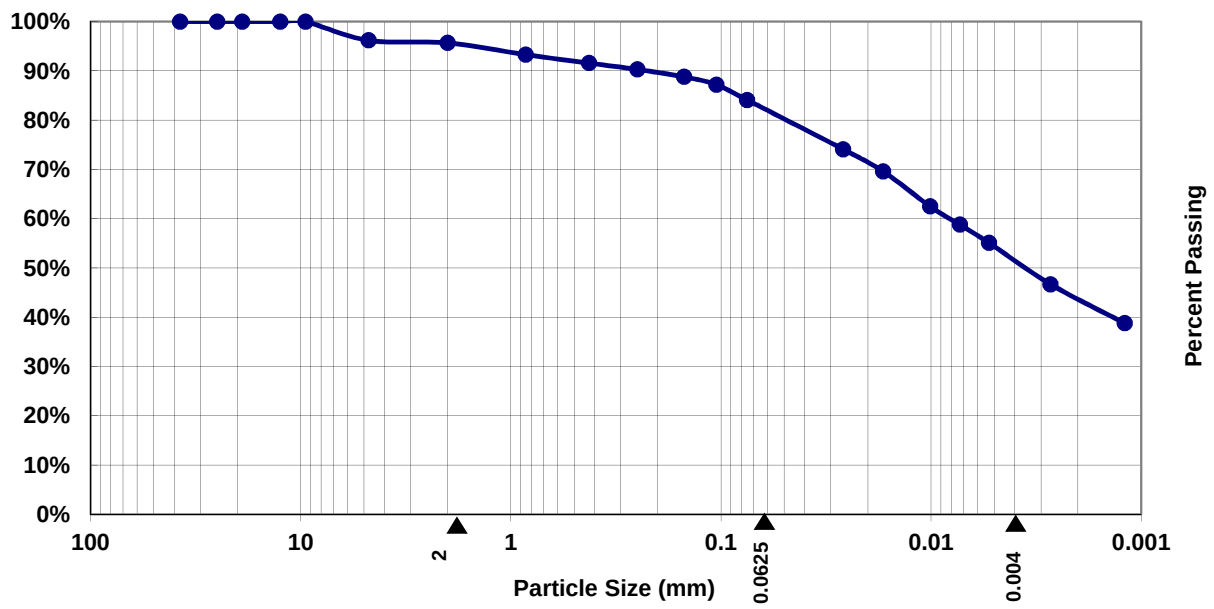
VARIATION OF POROSITY, SPECIFIC YIELD, AND SPECIFIC RETENTION WITH GRAIN SIZE (AFTER BEAR, 1972)

****ESTIMATED TOTAL POROSITY:** **47%**

**Estimated Based on Table of Selected Values of Porosity, Specific Yield, and Specific Retention, USGS Water Supply Paper 2220.

PARTICLE SIZE ANALYSIS OF SOILS
FOR USE IN FETTER AND BEAR DIAGRAMS

Boring/Well No:	B-452	**Sample No:**	Bulk	**Depth:**	0 to 10 ft bgs
Sample Description:		Orange Fat Clay with Sand (CH)			
Hydrostratigraphic Unit:		Residuum/Partially Weathered Rock (PWR)			



	> 2 mm	2 mm - 0.0625 mm	0.0625 mm - 0.004 mm	<0.004 mm
From Graph:	% Gravel 4.3%	% Sand 13.6%	% Silt 31.2%	% Clay 50.9%
Adjusted for Calculations	**0%**	**14%**	**33%**	**53%**

Notes:

Grain size distribution taken from grain size with hydrometer data located in Appendix IV.
Gravel, sand, silt and clay sizes based on Wentworth Scale.

Amec Foster Wheeler Project:
Dan River Landfill

Amec Foster Wheeler Project No:
7810-14-0065

FETTER AND BEAR DIAGRAMS

Amec Foster Wheer Project: Dan River Landfill

Amec Foster Wheeler Project No: 7810-14-0065

Boring/Well ID:	B-452
Sample Depth:	0 to 10 ft bgs
% Sand	14%
% Silt	33%
% Clay	53%

***ESTIMATED SPECIFIC YIELD:**

0.5%

*While it is recognized that specific yield and effective porosity are not synonymous, in practice, they may be estimated to be approximately equal in value.

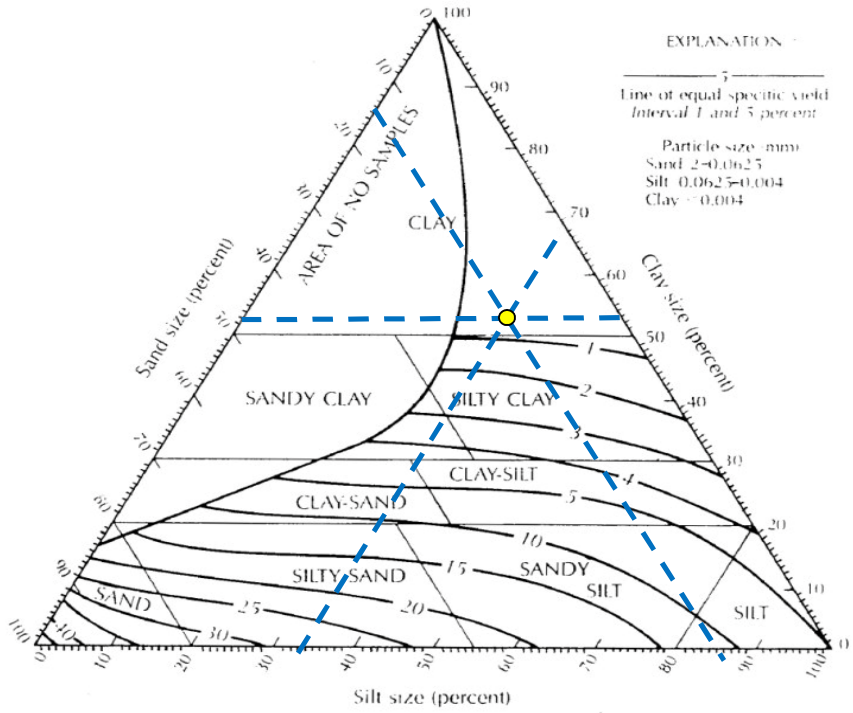
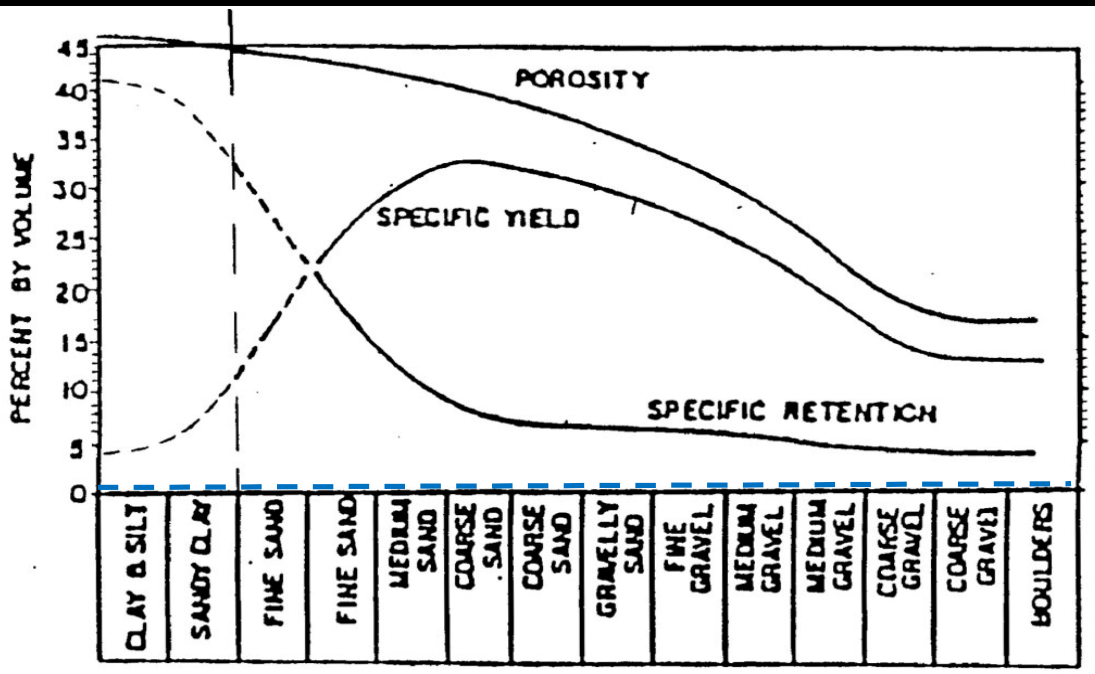


FIGURE 4.11 Textural classification triangle for unconsolidated materials showing the relation between particle size and specific yield. Source: A. I. Johnson, U.S. Geological Survey Water-Supply Paper 1662-D, 1967.



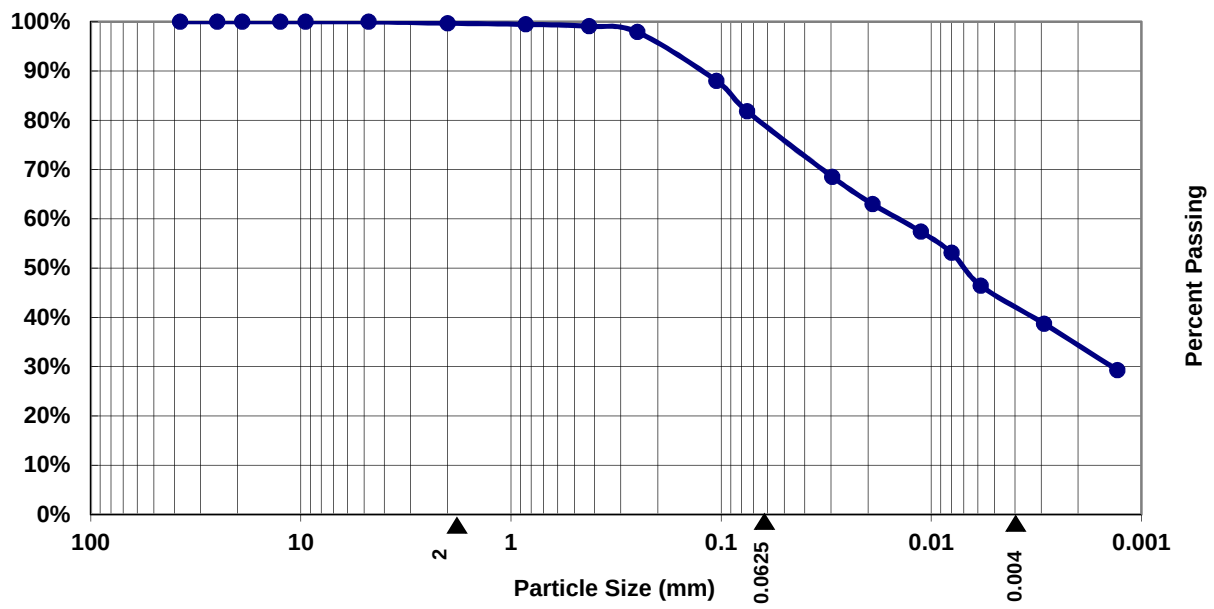
VARIATION OF POROSITY, SPECIFIC YIELD, AND SPECIFIC RETENTION WITH GRAIN SIZE (AFTER BEAR, 1972)

****ESTIMATED TOTAL POROSITY:** **50%**

**Estimated Based on Table of Selected Values of Porosity, Specific Yield, and Specific Retention, USGS Water Supply Paper 2220.

PARTICLE SIZE ANALYSIS OF SOILS
FOR USE IN FETTER AND BEAR DIAGRAMS

Boring/Well No:	B-453	**Sample No:**	Bulk	**Depth:**	0 to 10 ft bgs
Sample Description:		Yellow-Brown Fat Clay with Sand (CH)			
Hydrostratigraphic Unit:		Residuum			



	> 2 mm	2 mm - 0.0625 mm	0.0625 mm - 0.004 mm	<0.004 mm
From Graph:	% Gravel 0.3%	% Sand 20.8%	% Silt 38.0%	% Clay 40.9%
Adjusted for Calculations	**0%**	**21%**	**38%**	**41%**

Notes:

Grain size distribution taken from grain size with hydrometer data located in Appendix IV.
Gravel, sand, silt and clay sizes based on Wentworth Scale.

Amec Foster Wheeler Project:
Dan River Landfill

Amec Foster Wheeler Project No:
7810-14-0065

FETTER AND BEAR DIAGRAMS

Amec Foster Wheer Project: Dan River Landfill

Amec Foster Wheeler Project No: 7810-14-0065

Boring/Well ID:	B-453
Sample Depth:	0 to 10 ft bgs
% Sand	21%
% Silt	38%
% Clay	41%

***ESTIMATED SPECIFIC YIELD:**

2.5%

*While it is recognized that specific yield and effective porosity are not synonymous, in practice, they may be estimated to be approximately equal in value.

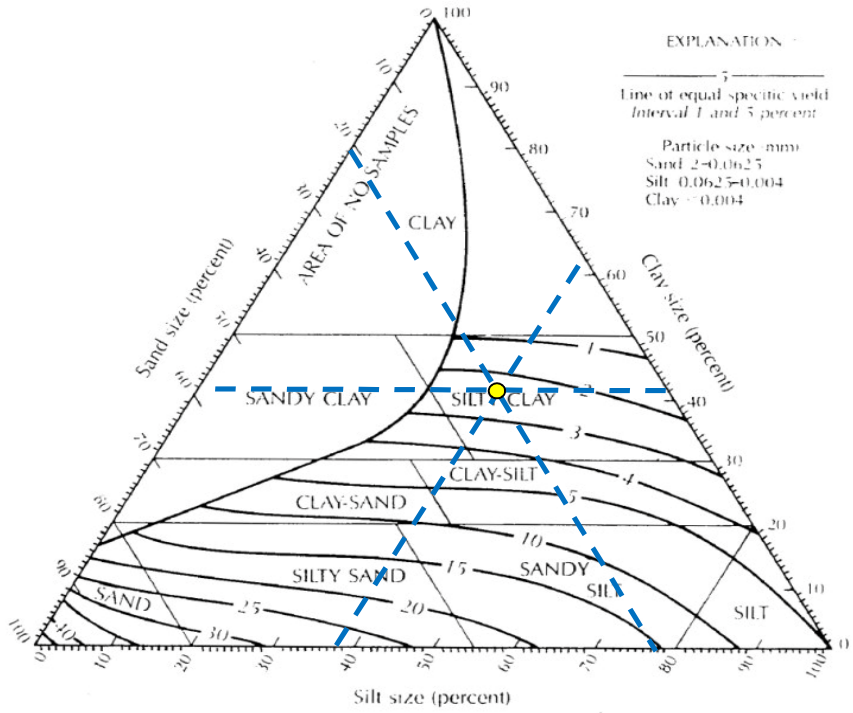
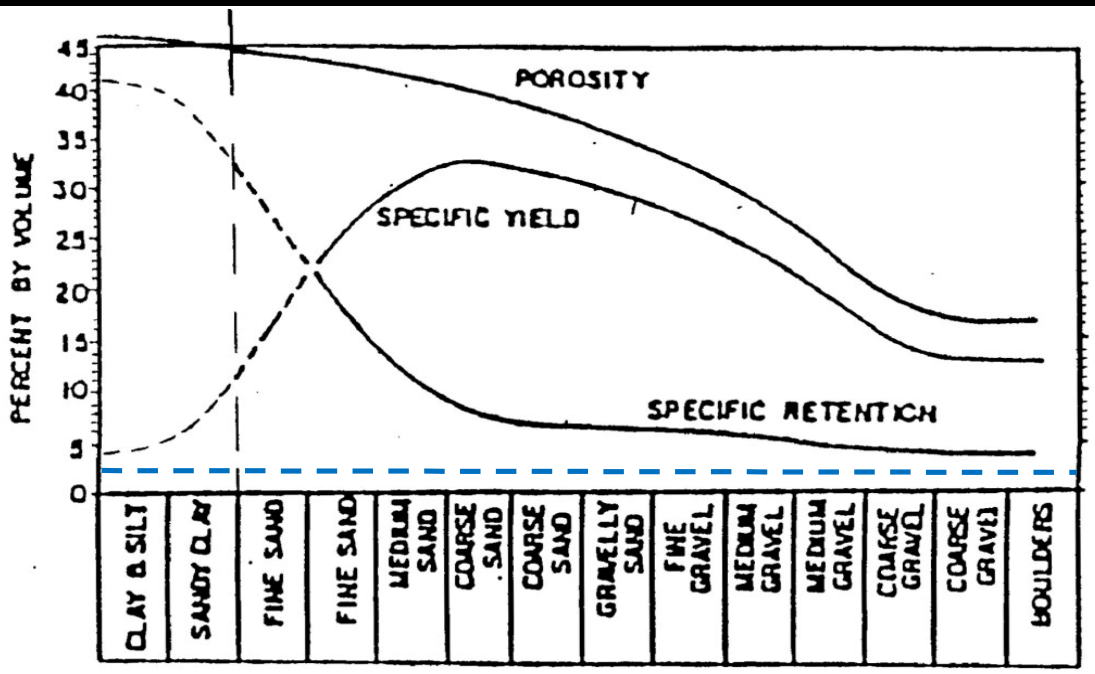


FIGURE 4.11 Textural classification triangle for unconsolidated materials showing the relation between particle size and specific yield. Source: A. I. Johnson, U.S. Geological Survey Water-Supply Paper 1662-D, 1967.



VARIATION OF POROSITY, SPECIFIC YIELD, AND SPECIFIC RETENTION WITH GRAIN SIZE (AFTER BEAR, 1972)

****ESTIMATED TOTAL POROSITY:** **48%**

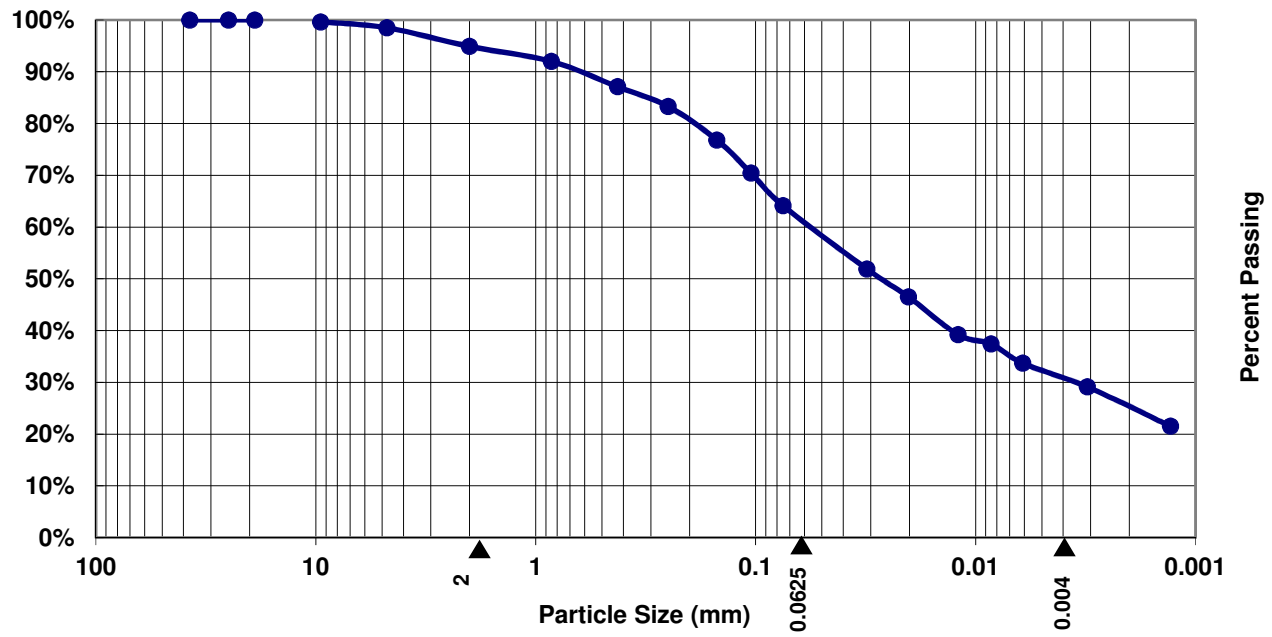
**Estimated Based on Table of Selected Values of Porosity, Specific Yield, and Specific Retention, USGS Water Supply Paper 2220.

PARTICLE SIZE ANALYSIS OF SOILS
FOR USE IN FETTER AND BEAR DIAGRAMS

Boring/Well No:	B-455	**Sample No:**	Bulk	**Depth:**	0 to 10 ft bgs

Sample Description: Light Brown to Brown Sandy Lean Clay (CL)

Hydrostratigraphic Unit: Residuum/Partially Weathered Rock (PWR)



	> 2 mm	2 mm - 0.0625 mm	0.0625 mm - 0.004 mm	<0.004 mm
From Graph:	% Gravel 5.1%	% Sand 33.6%	% Silt 30.8%	% Clay 30.5%
Adjusted for Calculations	**0%**	**35%**	**32%**	**32%**

Notes:

Grain size distribution taken from grain size with hydrometer data located in Appendix IV.
Gravel, sand, silt and clay sizes based on Wentworth Scale.

Amec Foster Wheeler Project:
Dan River Landfill

Amec Foster Wheeler Project No:
7810-14-0065

amec foster wheeler

FETTER AND BEAR DIAGRAMS

Amec Foster Wheer Project: Dan River Landfill

Amec Foster Wheeler Project No: 7810-14-0065

Boring/Well ID:	B-455
Sample Depth:	0 to 10 ft bgs
% Sand	35%
% Silt	32%
% Clay	32%
***ESTIMATED SPECIFIC YIELD:**	
4%	

*While it is recognized that specific yield and effective porosity are not synonymous, in practice, they may be estimated to be approximately equal in value.

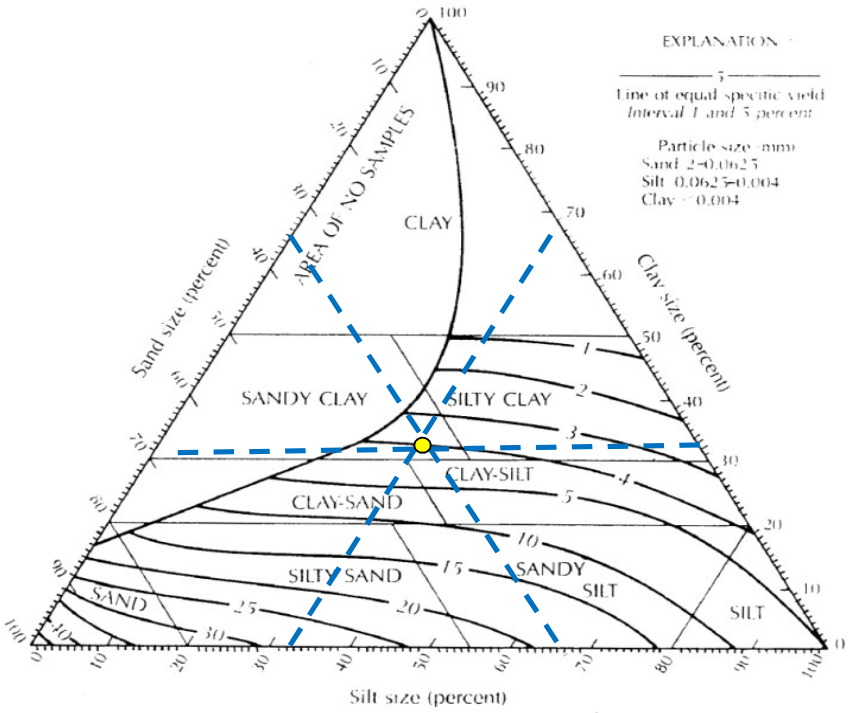
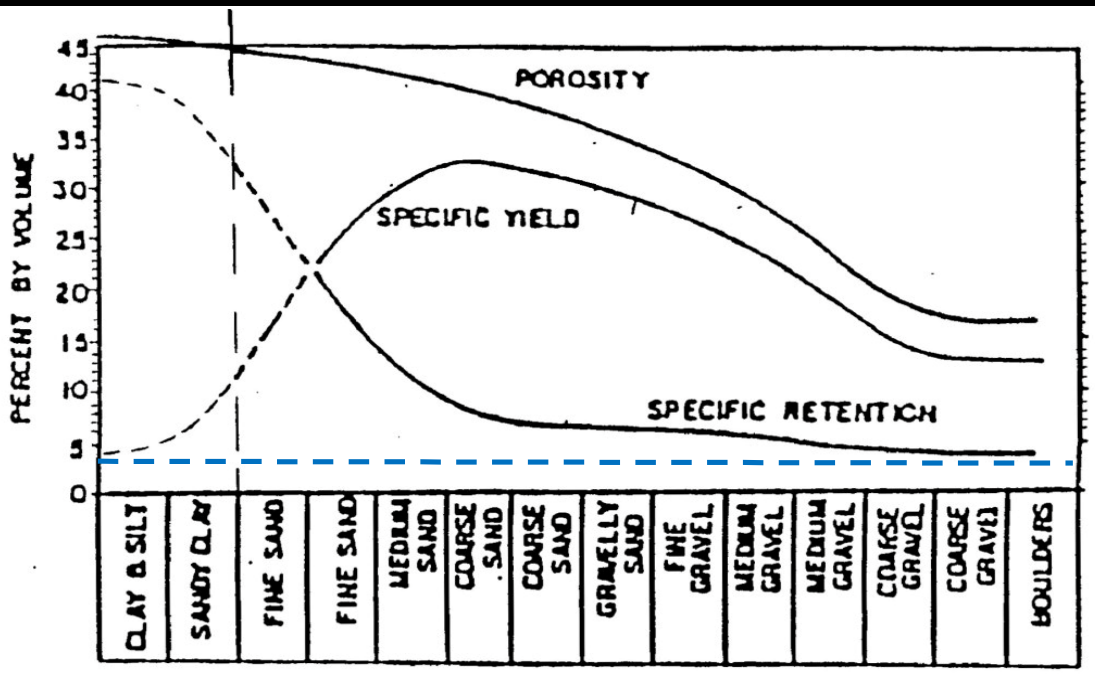


FIGURE 4.11 Textural classification triangle for unconsolidated materials showing the relation between particle size and specific yield. Source: A. I. Johnson, U.S. Geological Survey Water-Supply Paper 1662-D, 1967.



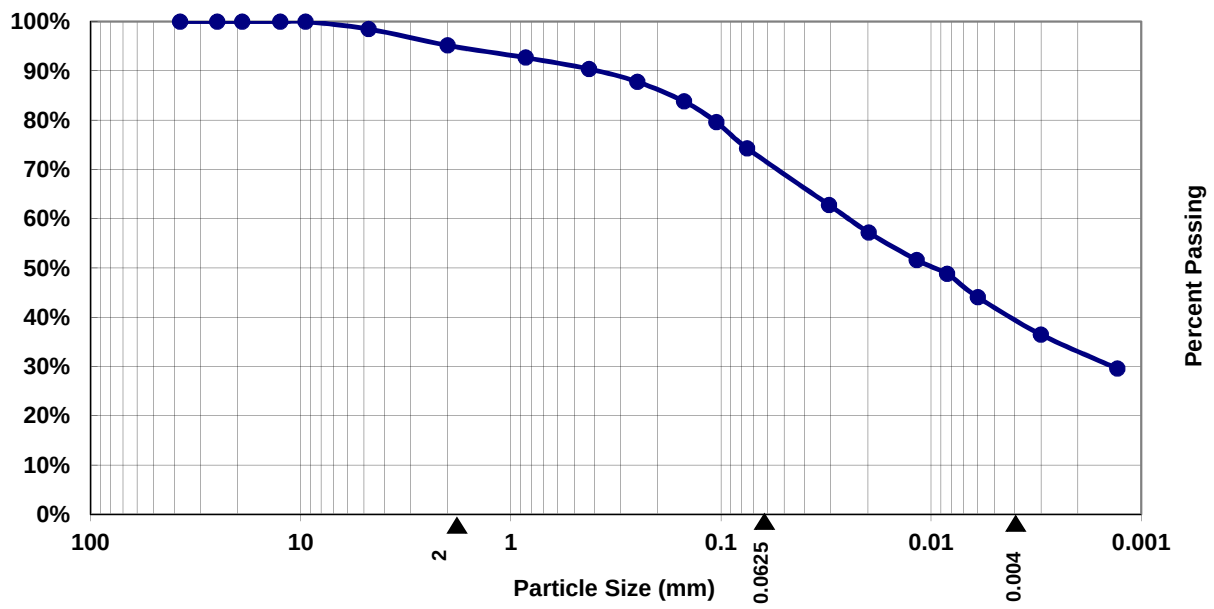
VARIATION OF POROSITY, SPECIFIC YIELD, AND SPECIFIC RETENTION WITH GRAIN SIZE (AFTER BEAR, 1972)

****ESTIMATED TOTAL POROSITY:** **47%**

**Estimated Based on Table of Selected Values of Porosity, Specific Yield, and Specific Retention, USGS Water Supply Paper 2220.

PARTICLE SIZE ANALYSIS OF SOILS
FOR USE IN FETTER AND BEAR DIAGRAMS

Boring/Well No:	B-458	**Sample No:**	Bulk	**Depth:**	30 to 40 ft bgs
Sample Description:		Brown Lean Clay with Sand (CL)			
Hydrostratigraphic Unit:		Partially Weathered Rock (PWR)			



	> 2 mm	2 mm - 0.0625 mm	0.0625 mm - 0.004 mm	<0.004 mm
From Graph:	% Gravel 4.8%	% Sand 23.5%	% Silt 32.7%	% Clay 39.0%
Adjusted for Calculations	**0%**	**25%**	**34%**	**41%**

Notes:

Grain size distribution taken from grain size with hydrometer data located in Appendix IV.
Gravel, sand, silt and clay sizes based on Wentworth Scale.

Amec Foster Wheeler Project:
Dan River Landfill

Amec Foster Wheeler Project No:
7810-14-0065

FETTER AND BEAR DIAGRAMS

Amec Foster Wheer Project: Dan River Landfill

Amec Foster Wheeler Project No: 7810-14-0065

Boring/Well ID:	B-458
Sample Depth:	30 to 40 ft bgs
% Sand	25%
% Silt	34%
% Clay	41%

***ESTIMATED SPECIFIC YIELD:**

2.5%

*While it is recognized that specific yield and effective porosity are not synonymous, in practice, they may be estimated to be approximately equal in value.

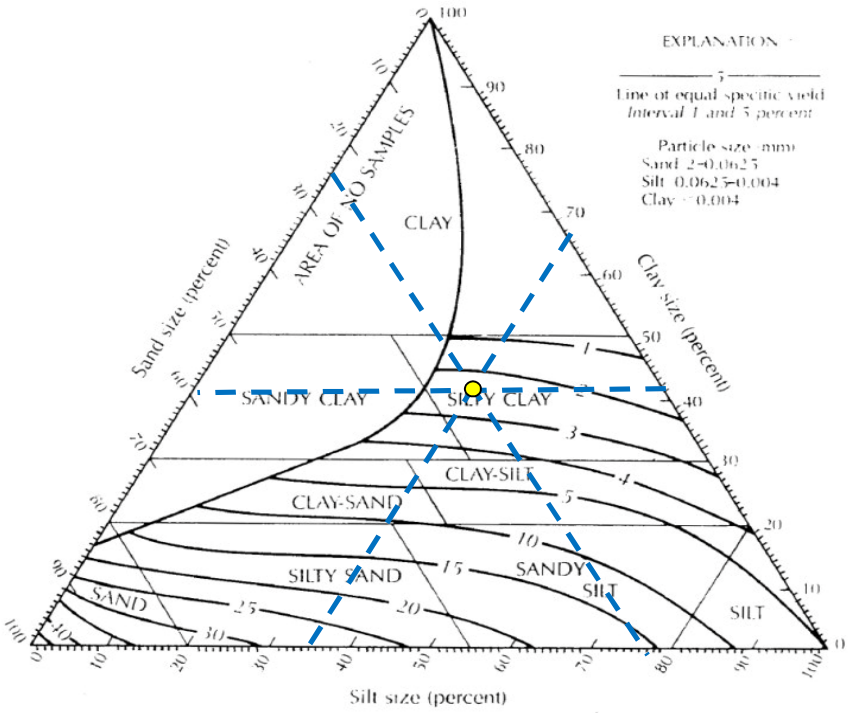
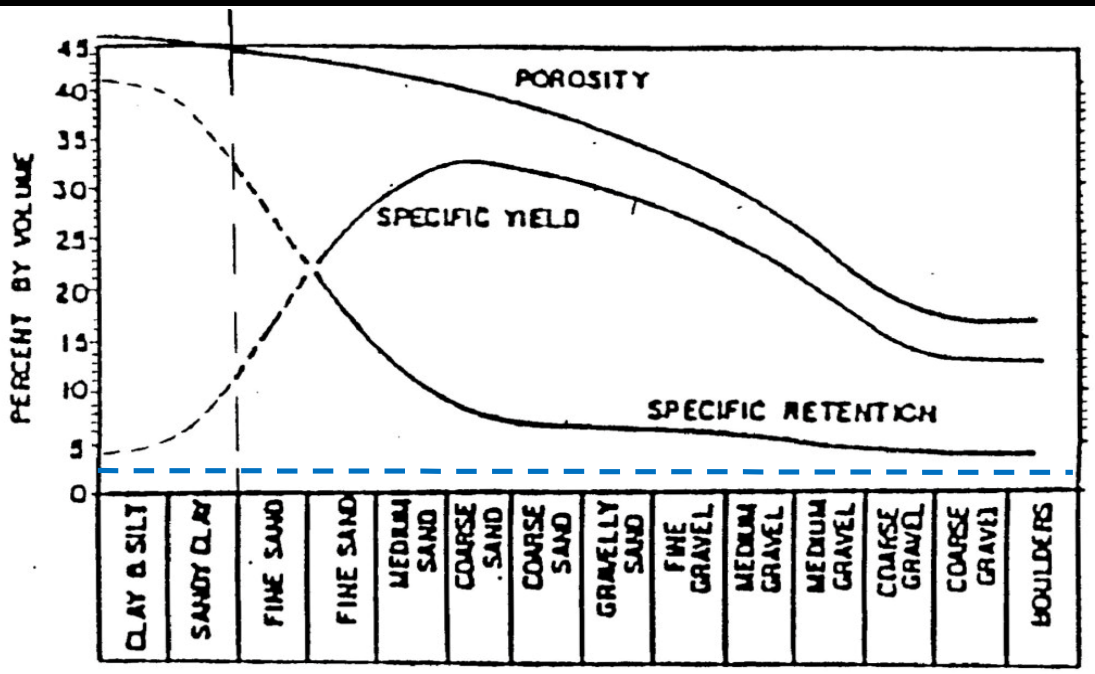


FIGURE 4.11 Textural classification triangle for unconsolidated materials showing the relation between particle size and specific yield. Source: A. I. Johnson, U.S. Geological Survey Water-Supply Paper 1662-D, 1967.



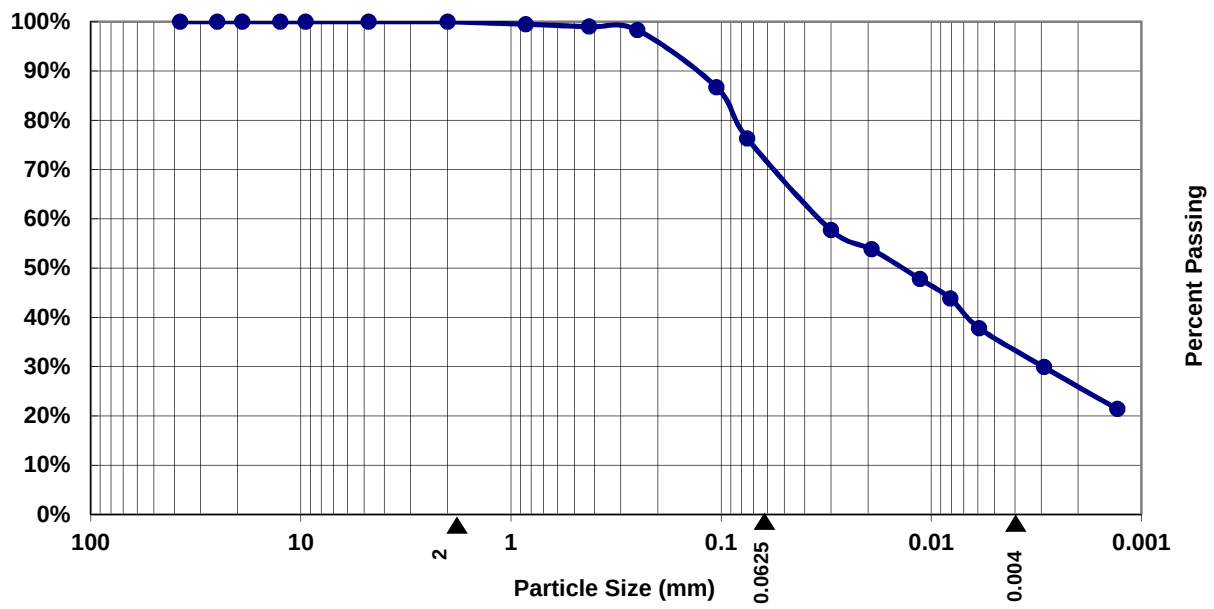
VARIATION OF POROSITY, SPECIFIC YIELD, AND SPECIFIC RETENTION WITH GRAIN SIZE (AFTER BEAR, 1972)

****ESTIMATED TOTAL POROSITY:** **48%**

**Estimated Based on Table of Selected Values of Porosity, Specific Yield, and Specific Retention, USGS Water Supply Paper 2220.

PARTICLE SIZE ANALYSIS OF SOILS
FOR USE IN FETTER AND BEAR DIAGRAMS

Boring/Well No:	B-463	**Sample No:**	Bulk	**Depth:**	0 to 10 ft bgs
Sample Description:	Yellow-Red to Red-Brown Lean Clay with Sand (CL)				
Hydrostratigraphic Unit:	Residuum				



	> 2 mm	2 mm - 0.0625 mm	0.0625 mm - 0.004 mm	<0.004 mm
From Graph:	% Gravel 0.0%	% Sand 27.8%	% Silt 39.5%	% Clay 32.6%
Adjusted for Calculations	**0%**	**28%**	**40%**	**33%**

Notes:

Grain size distribution taken from grain size with hydrometer data located in Appendix IV.
Gravel, sand, silt and clay sizes based on Wentworth Scale.

Amec Foster Wheeler Project:
Dan River Landfill

Amec Foster Wheeler Project No:
7810-14-0065

FETTER AND BEAR DIAGRAMS

Amec Foster Wheer Project: Dan River Landfill

Amec Foster Wheeler Project No: 7810-14-0065

Boring/Well ID:	B-463
Sample Depth:	0 to 10 ft bgs
% Sand	28%
% Silt	40%
% Clay	33%
***ESTIMATED SPECIFIC YIELD:**	
4%	

*While it is recognized that specific yield and effective porosity are not synonymous, in practice, they may be estimated to be approximately equal in value.

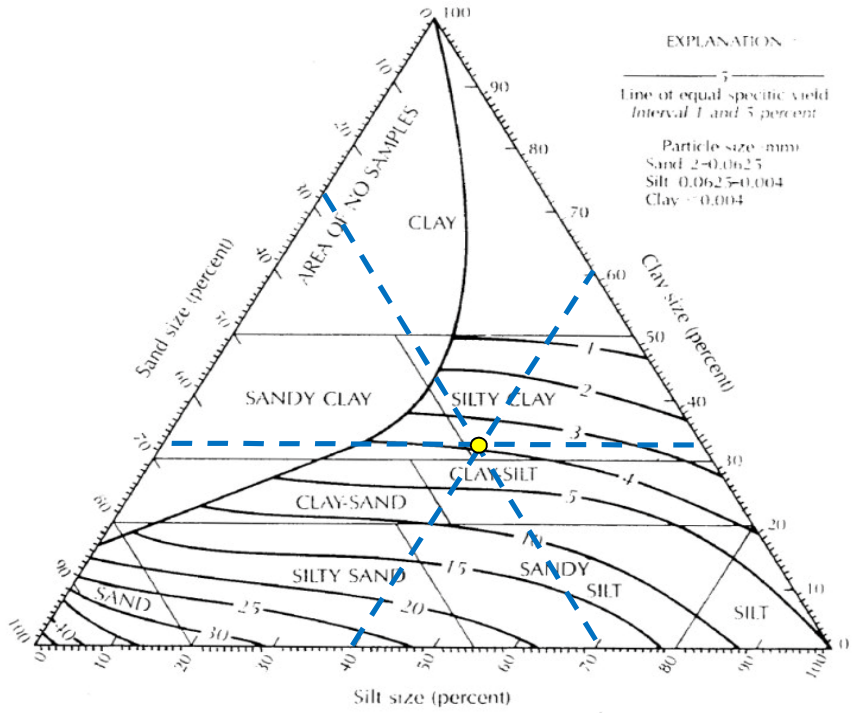
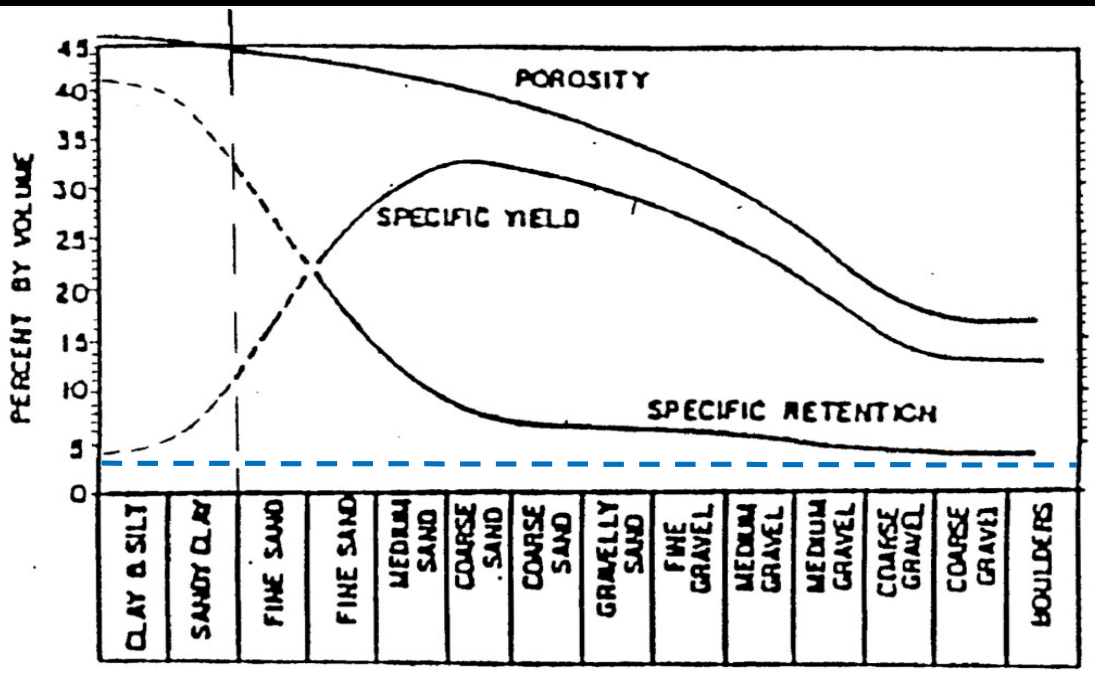


FIGURE 4.11 Textural classification triangle for unconsolidated materials showing the relation between particle size and specific yield. Source: A. I. Johnson, U.S. Geological Survey Water-Supply Paper 1662-D, 1967.



VARIATION OF POROSITY, SPECIFIC YIELD, AND SPECIFIC RETENTION WITH GRAIN SIZE (AFTER BEAR, 1972)

****ESTIMATED TOTAL POROSITY:** **47%**

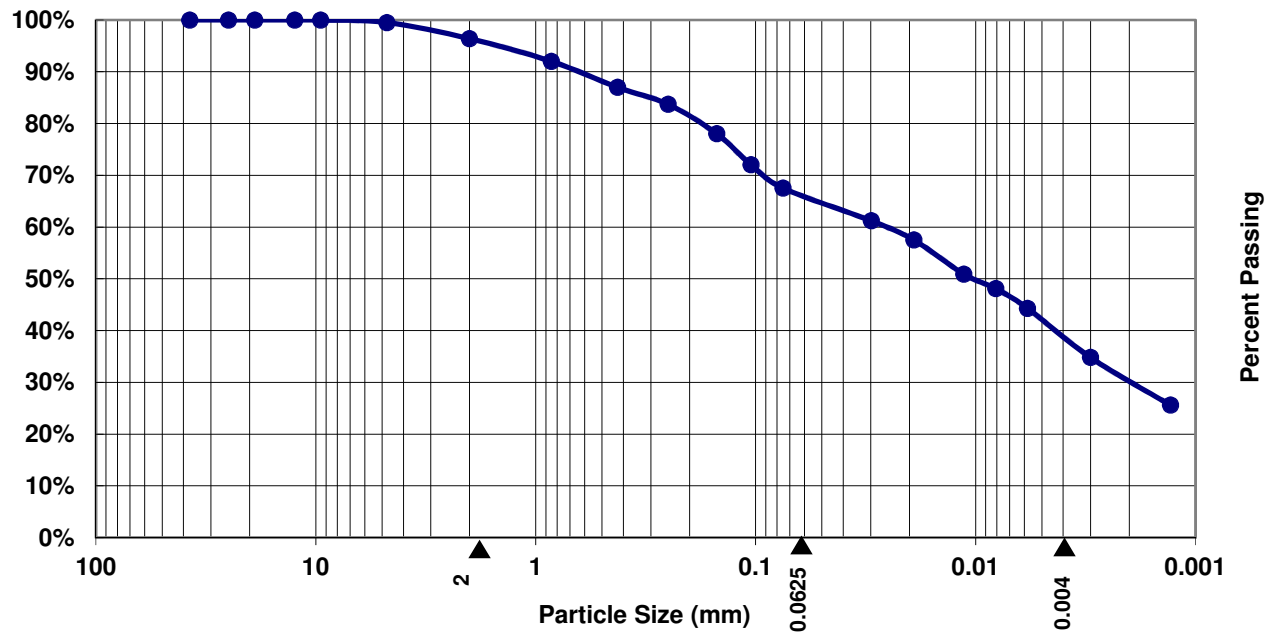
**Estimated Based on Table of Selected Values of Porosity, Specific Yield, and Specific Retention, USGS Water Supply Paper 2220.

PARTICLE SIZE ANALYSIS OF SOILS
FOR USE IN FETTER AND BEAR DIAGRAMS

Boring/Well No:	OW-401D	**Sample No:**	Bulk	**Depth:**	15 to 25 ft bgs

Sample Description: Gray Sandy Lean Clay (CL)

Hydrostratigraphic Unit: Partially Weathered Rock (PWR) / Saprolite



	> 2 mm	2 mm - 0.0625 mm	0.0625 mm - 0.004 mm	<0.004 mm
From Graph:	% Gravel 3.6%	% Sand 30.3%	% Silt 27.9%	% Clay 38.2%
Adjusted for Calculations	**0%**	**31%**	**29%**	**40%**

Notes:

Grain size distribution taken from grain size with hydrometer data located in Appendix IV.
Gravel, sand, silt and clay sizes based on Wentworth Scale.

Amec Foster Wheeler Project:
Dan River Landfill

Amec Foster Wheeler Project No:
7810-14-0065

amec foster wheeler

FETTER AND BEAR DIAGRAMS

Amec Foster Wheer Project: Dan River Landfill

Amec Foster Wheeler Project No: 7810-14-0065

Boring/Well ID:	OW-401D
Sample Depth:	15 to 25 ft bgs
% Sand	31%
% Silt	29%
% Clay	40%

***ESTIMATED SPECIFIC YIELD:**

3%

*While it is recognized that specific yield and effective porosity are not synonymous, in practice, they may be estimated to be approximately equal in value.

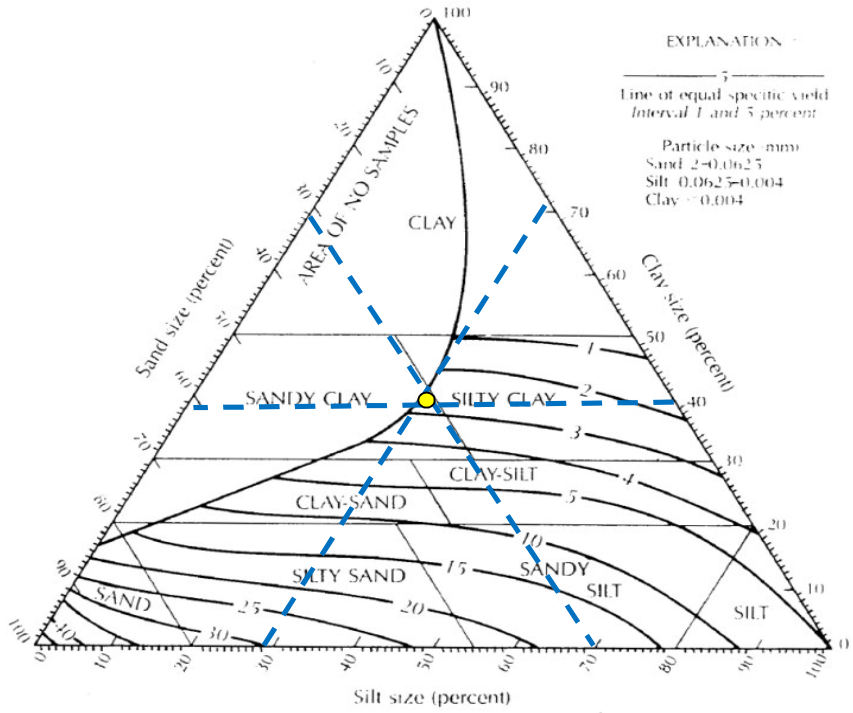
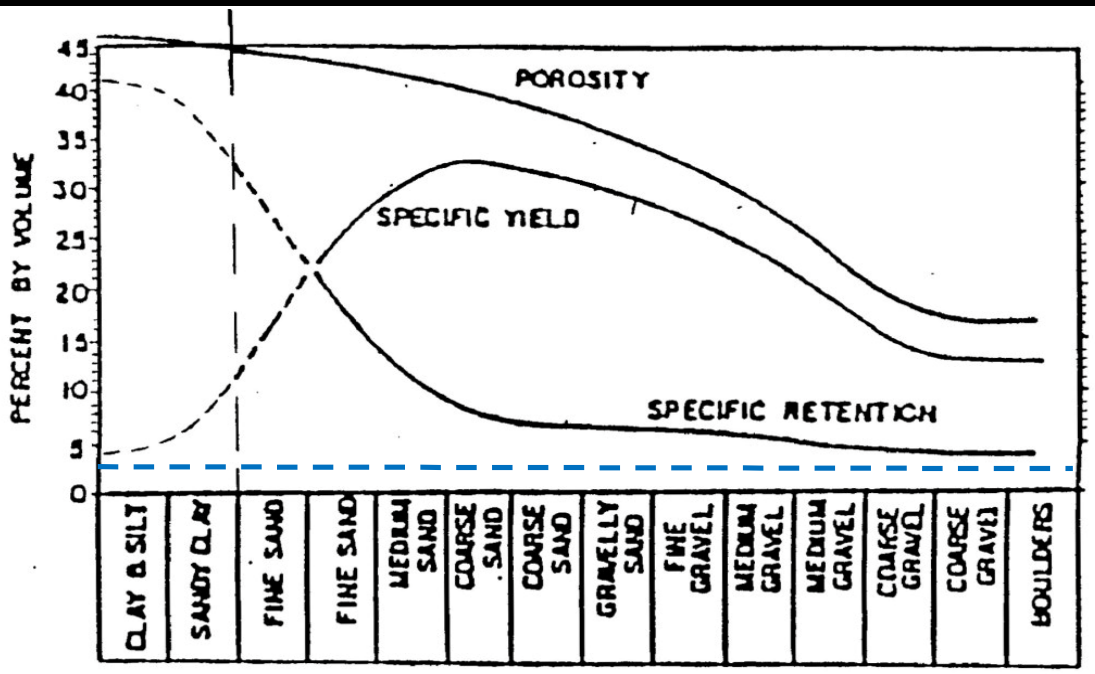


FIGURE 4.11 Textural classification triangle for unconsolidated materials showing the relation between particle size and specific yield. Source: A. I. Johnson, U.S. Geological Survey Water-Supply Paper 1662-D, 1967.



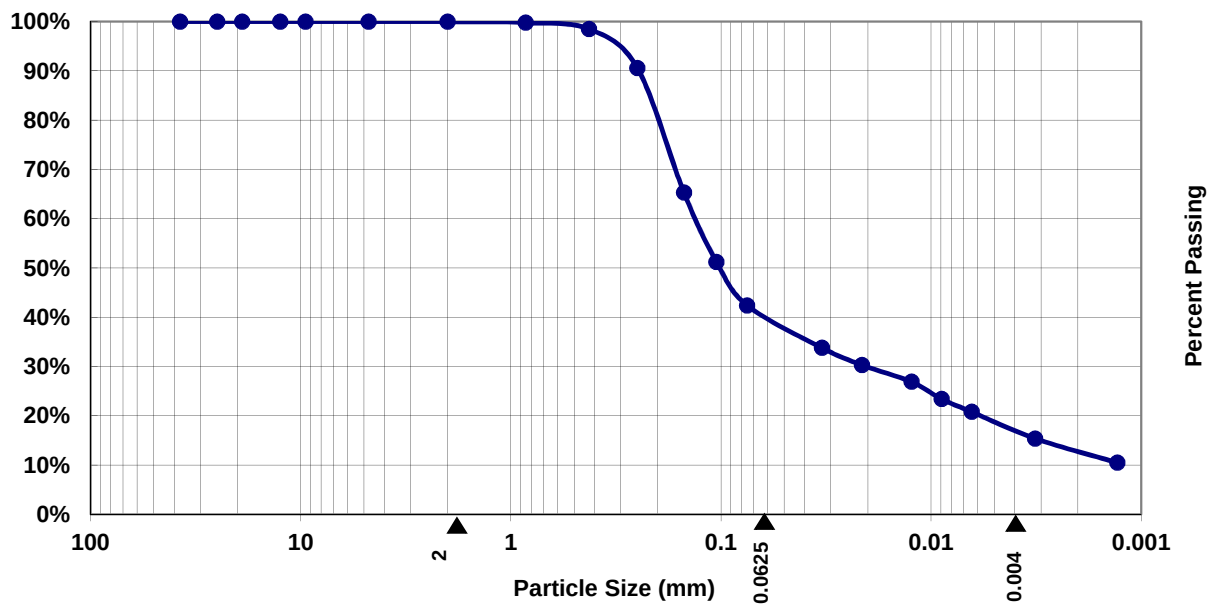
VARIATION OF POROSITY, SPECIFIC YIELD, AND SPECIFIC RETENTION WITH GRAIN SIZE (AFTER BEAR, 1972)

****ESTIMATED TOTAL POROSITY:** **48%**

**Estimated Based on Table of Selected Values of Porosity, Specific Yield, and Specific Retention, USGS Water Supply Paper 2220.

PARTICLE SIZE ANALYSIS OF SOILS
FOR USE IN FETTER AND BEAR DIAGRAMS

Boring/Well No:	OW-401S	**Sample No:**	SS-5	**Depth:**	23.5 to 25 ft bgs
Sample Description:		Gray Silty Sand (SM)			
Hydrostratigraphic Unit:		Partially Weathered Rock (PWR)			



	> 2 mm	2 mm - 0.0625 mm	0.0625 mm - 0.004 mm	<0.004 mm
From Graph:	% Gravel 0.0%	% Sand 59.7%	% Silt 23.6%	% Clay 16.8%
Adjusted for Calculations	**0%**	**60%**	**24%**	**17%**

Notes:

Grain size distribution taken from grain size with hydrometer data located in Appendix IV.
Gravel, sand, silt and clay sizes based on Wentworth Scale.

Amec Foster Wheeler Project: Dan River Landfill	
Amec Foster Wheeler Project No: 7810-14-0065	

FETTER AND BEAR DIAGRAMS

Amec Foster Wheer Project: Dan River Landfill

Amec Foster Wheeler Project No: 7810-14-0065

Boring/Well ID:	OW-401S
Sample Depth:	23.5 to 25 ft bgs
% Sand	60%
% Silt	24%
% Clay	17%
***ESTIMATED SPECIFIC YIELD:**	
14%	

*While it is recognized that specific yield and effective porosity are not synonymous, in practice, they may be estimated to be approximately equal in value.

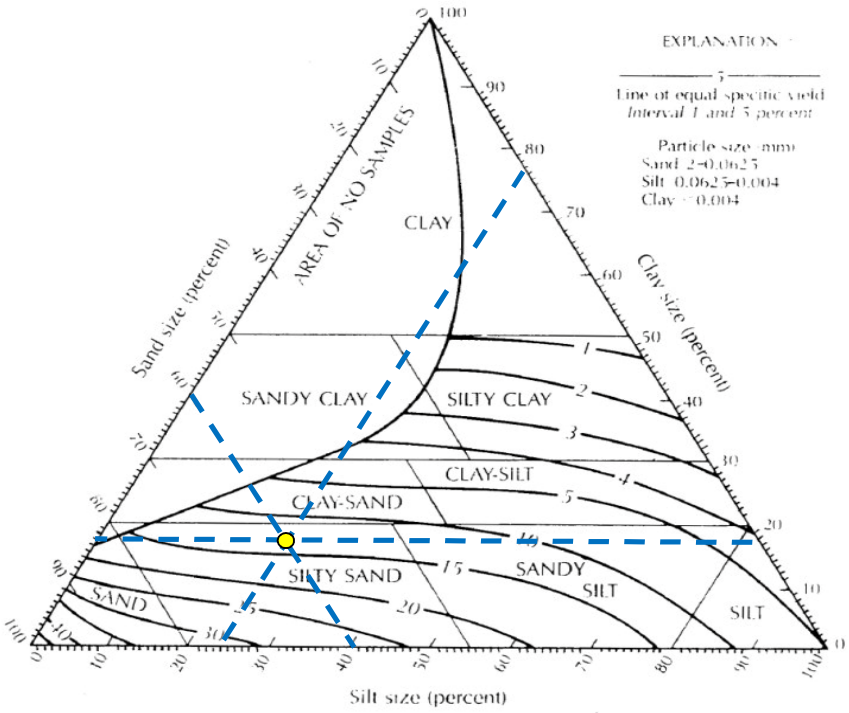
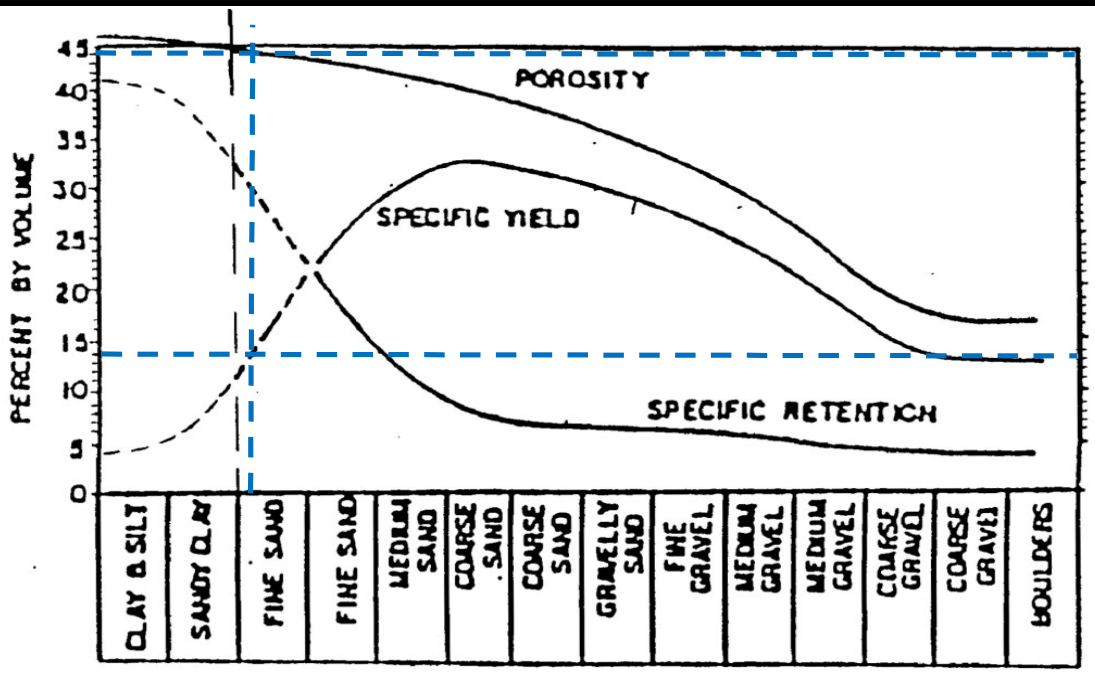


FIGURE 4.11 Textural classification triangle for unconsolidated materials showing the relation between particle size and specific yield. Source: A. I. Johnson, U.S. Geological Survey Water-Supply Paper 1662-D, 1967.



VARIATION OF POROSITY, SPECIFIC YIELD, AND SPECIFIC RETENTION WITH GRAIN SIZE (AFTER BEAR, 1972)

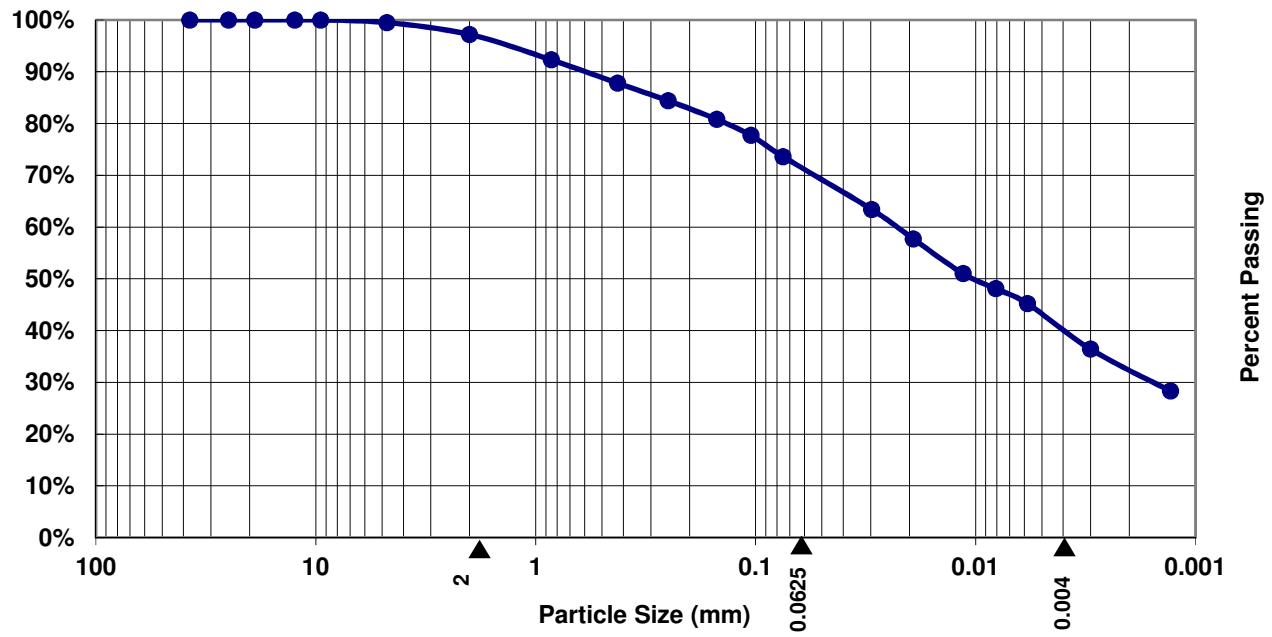
ESTIMATED TOTAL POROSITY: **44%**

PARTICLE SIZE ANALYSIS OF SOILS
FOR USE IN FETTER AND BEAR DIAGRAMS

Boring/Well No:	OW-403D	**Sample No:**	Bulk	**Depth:**	20 to 30 ft bgs

Sample Description: Light Brown to Red-Yellow, Fat Clay with Sand (CH)

Hydrostratigraphic Unit: Saprolite/Partially Weathered Rock (PWR)



	> 2 mm	2 mm - 0.0625 mm	0.0625 mm - 0.004 mm	<0.004 mm
From Graph:	% Gravel 2.8%	% Sand 25.9%	% Silt 31.8%	% Clay 39.5%
Adjusted for Calculations	**0%**	**27%**	**33%**	**41%**

Notes:

Grain size distribution taken from grain size with hydrometer data located in Appendix IV.
Gravel, sand, silt and clay sizes based on Wentworth Scale.

Amec Foster Wheeler Project:
Dan River Landfill

Amec Foster Wheeler Project No:
7810-14-0065

amec foster wheeler

FETTER AND BEAR DIAGRAMS

Amec Foster Wheer Project: Dan River Landfill

Amec Foster Wheeler Project No: 7810-14-0065

Boring/Well ID:	OW-403D
Sample Depth:	20 to 30 ft bgs
% Sand	27%
% Silt	33%
% Clay	41%
***ESTIMATED SPECIFIC YIELD:**	
2.5%	

*While it is recognized that specific yield and effective porosity are not synonymous, in practice, they may be estimated to be approximately equal in value.

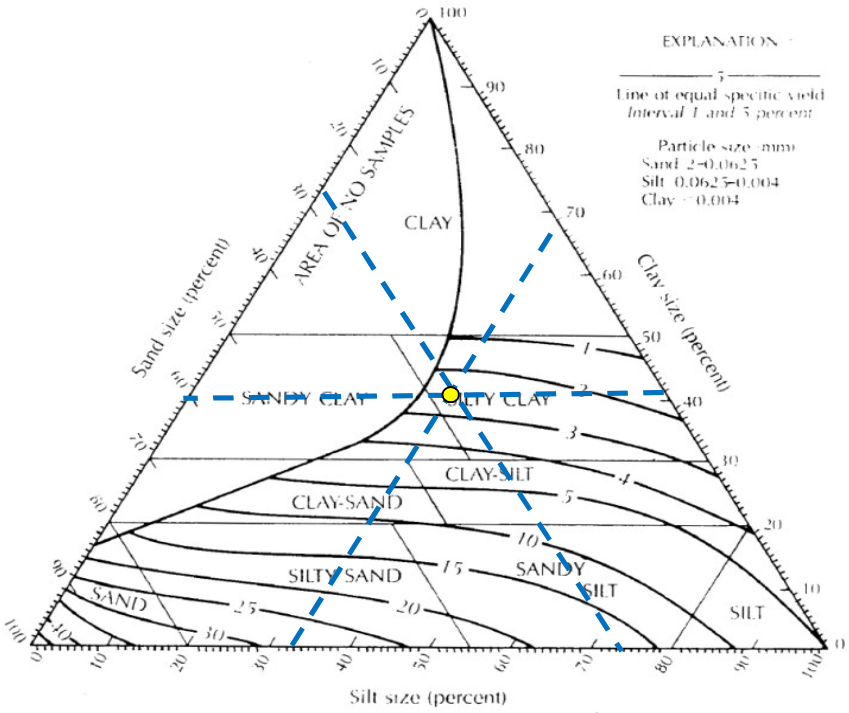
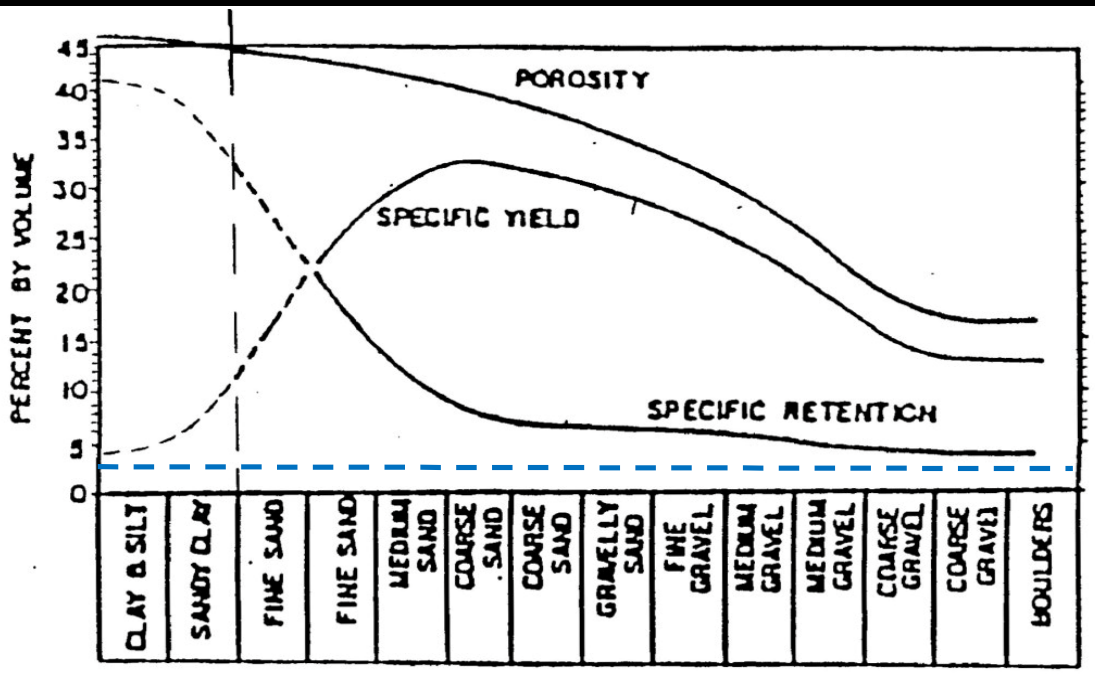


FIGURE 4.11 Textural classification triangle for unconsolidated materials showing the relation between particle size and specific yield. Source: A. I. Johnson, U.S. Geological Survey Water-Supply Paper 1662-D, 1967.



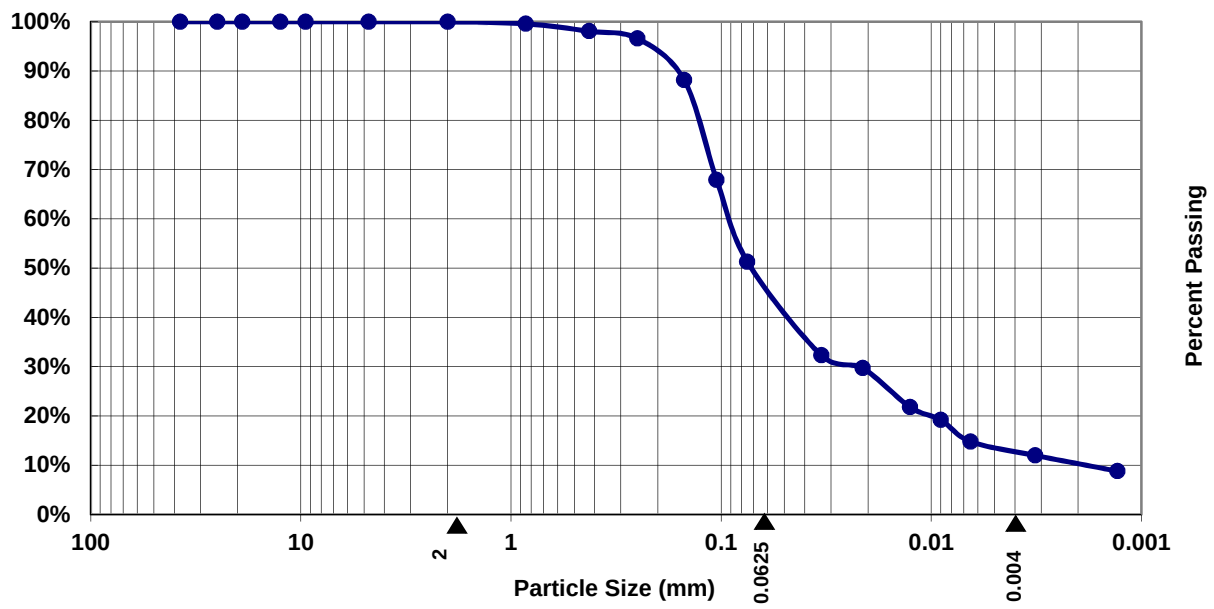
VARIATION OF POROSITY, SPECIFIC YIELD, AND SPECIFIC RETENTION WITH GRAIN SIZE (AFTER BEAR, 1972)

****ESTIMATED TOTAL POROSITY:** **48%**

**Estimated Based on Table of Selected Values of Porosity, Specific Yield, and Specific Retention, USGS Water Supply Paper 2220.

PARTICLE SIZE ANALYSIS OF SOILS
FOR USE IN FETTER AND BEAR DIAGRAMS

Boring/Well No:	OW-403S	**Sample No:**	SS-7/SS-8	**Depth:**	33.5 to 40 ft bgs
Sample Description:	Yellow-Brown Sandy Silt (ML)				
Hydrostratigraphic Unit:	Partially Weathered Rock (PWR)				



	> 2 mm	2 mm - 0.0625 mm	0.0625 mm - 0.004 mm	<0.004 mm
From Graph:	% Gravel 0.0%	% Sand 53.3%	% Silt 34.1%	% Clay 12.7%
Adjusted for Calculations	**0%**	**53%**	**34%**	**13%**

Notes:

Grain size distribution taken from grain size with hydrometer data located in Appendix IV.
Gravel, sand, silt and clay sizes based on Wentworth Scale.

Amec Foster Wheeler Project:
Dan River Landfill

Amec Foster Wheeler Project No:
7810-14-0065

FETTER AND BEAR DIAGRAMS

Amec Foster Wheer Project: Dan River Landfill

Amec Foster Wheeler Project No: 7810-14-0065

Boring/Well ID:	OW-403S
Sample Depth:	33.5 to 40 ft bgs
% Sand	53%
% Silt	34%
% Clay	13%
***ESTIMATED SPECIFIC YIELD:**	
16%	

*While it is recognized that specific yield and effective porosity are not synonymous, in practice, they may be estimated to be approximately equal in value.

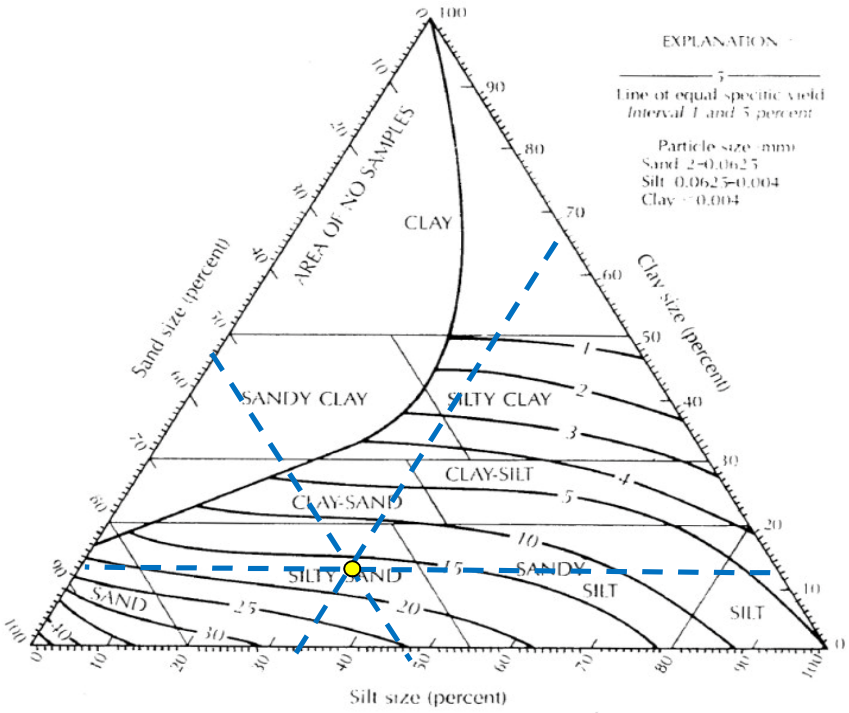
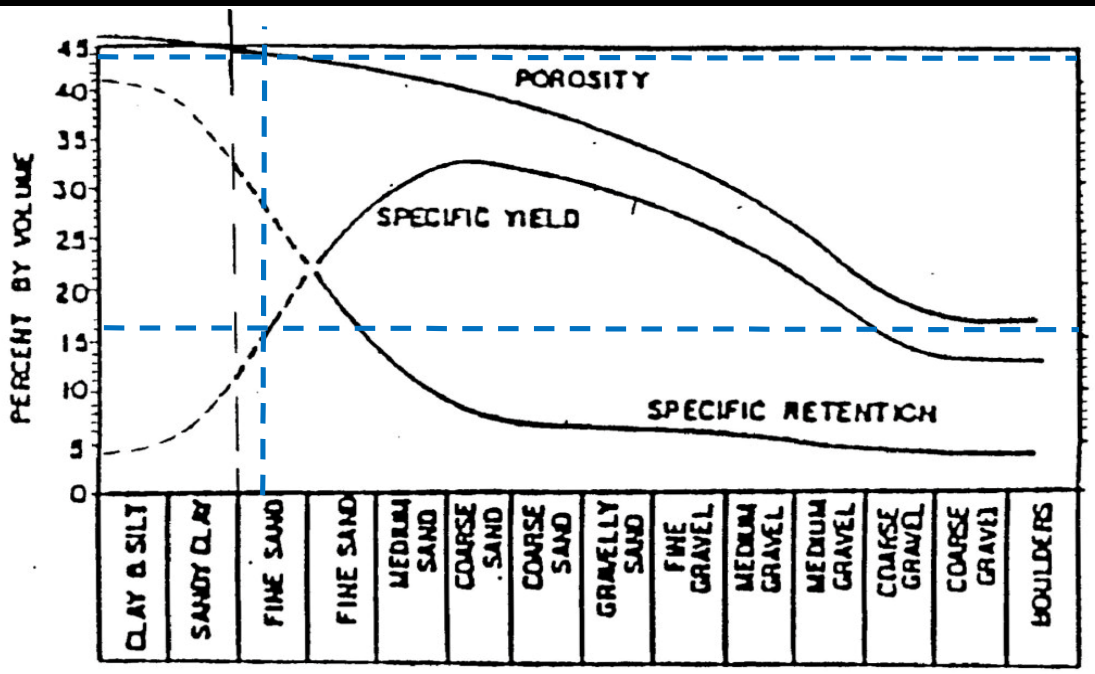


FIGURE 4.11 Textural classification triangle for unconsolidated materials showing the relation between particle size and specific yield. Source: A. I. Johnson, U.S. Geological Survey Water-Supply Paper 1662-D, 1967.



VARIATION OF POROSITY, SPECIFIC YIELD, AND SPECIFIC RETENTION WITH GRAIN SIZE (AFTER BEAR, 1972)

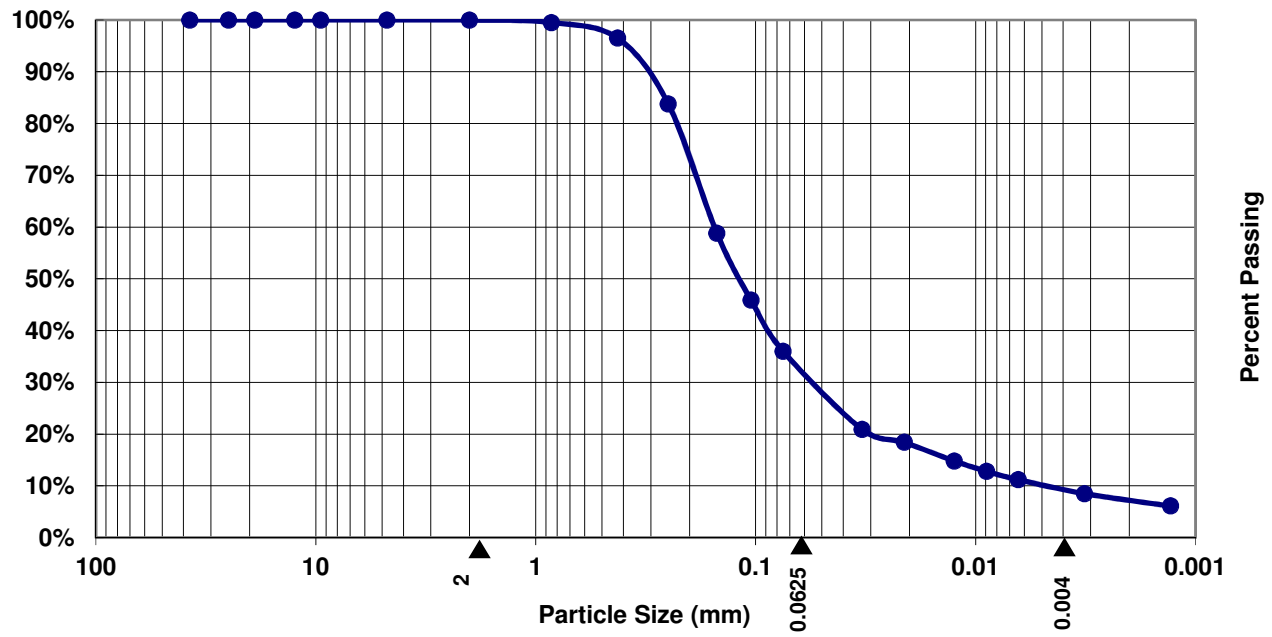
ESTIMATED TOTAL POROSITY: **44%**

PARTICLE SIZE ANALYSIS OF SOILS
FOR USE IN FETTER AND BEAR DIAGRAMS

Boring/Well No:	OW-404D	**Sample No:**	SS-6	**Depth:**	28.5 to 30 ft bgs

Sample Description: Dark Gray-Brown Silty Sand (SM)

Hydrostratigraphic Unit: Partially Weathered Rock (PWR)



	> 2 mm	2 mm - 0.0625 mm	0.0625 mm - 0.004 mm	<0.004 mm
From Graph:	% Gravel 0.0%	% Sand 67.6%	% Silt 23.2%	% Clay 9.2%
Adjusted for Calculations	**0%**	**68%**	**23%**	**9%**

Notes:

Grain size distribution taken from grain size with hydrometer data located in Appendix IV.
Gravel, sand, silt and clay sizes based on Wentworth Scale.

Amec Foster Wheeler Project:
Dan River Landfill

Amec Foster Wheeler Project No:
7810-14-0065

amec foster wheeler

FETTER AND BEAR DIAGRAMS

Amec Foster Wheer Project: Dan River Landfill

Amec Foster Wheeler Project No: 7810-14-0065

Boring/Well ID:	OW-404D
Sample Depth:	28.5 to 30 ft bgs
% Sand	68%
% Silt	23%
% Clay	9%
***ESTIMATED SPECIFIC YIELD:**	
22%	

*While it is recognized that specific yield and effective porosity are not synonymous, in practice, they may be estimated to be approximately equal in value.

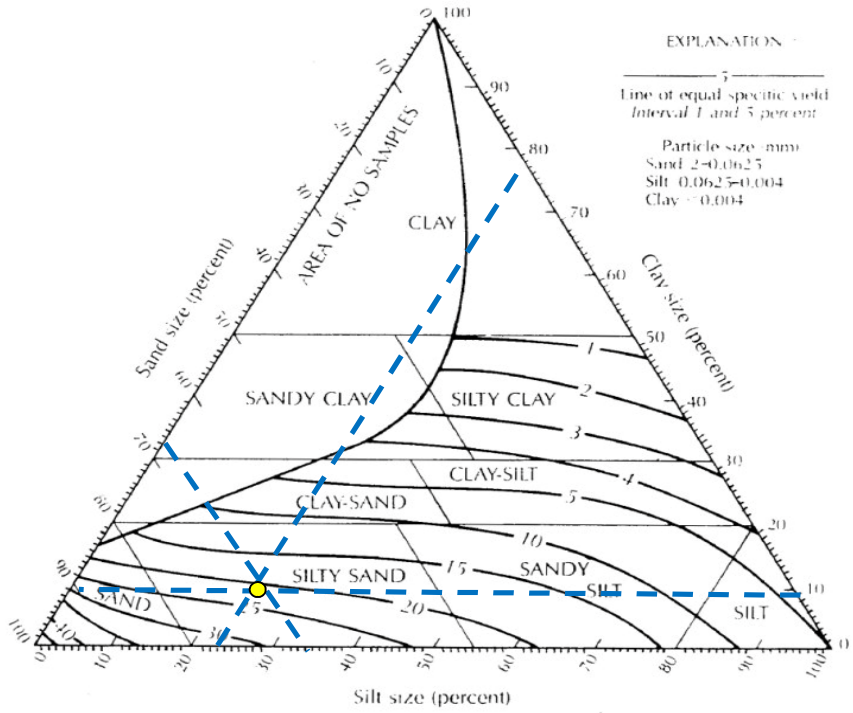
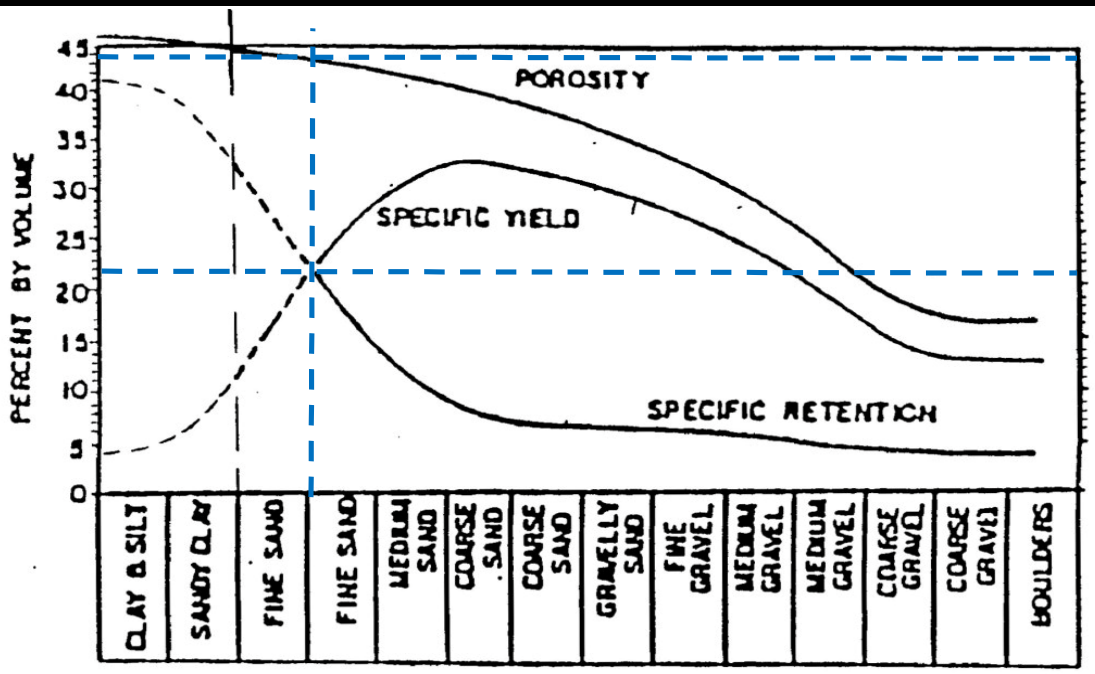


FIGURE 4.11 Textural classification triangle for unconsolidated materials showing the relation between particle size and specific yield. Source: A. I. Johnson, U.S. Geological Survey Water-Supply Paper 1662-D, 1967.

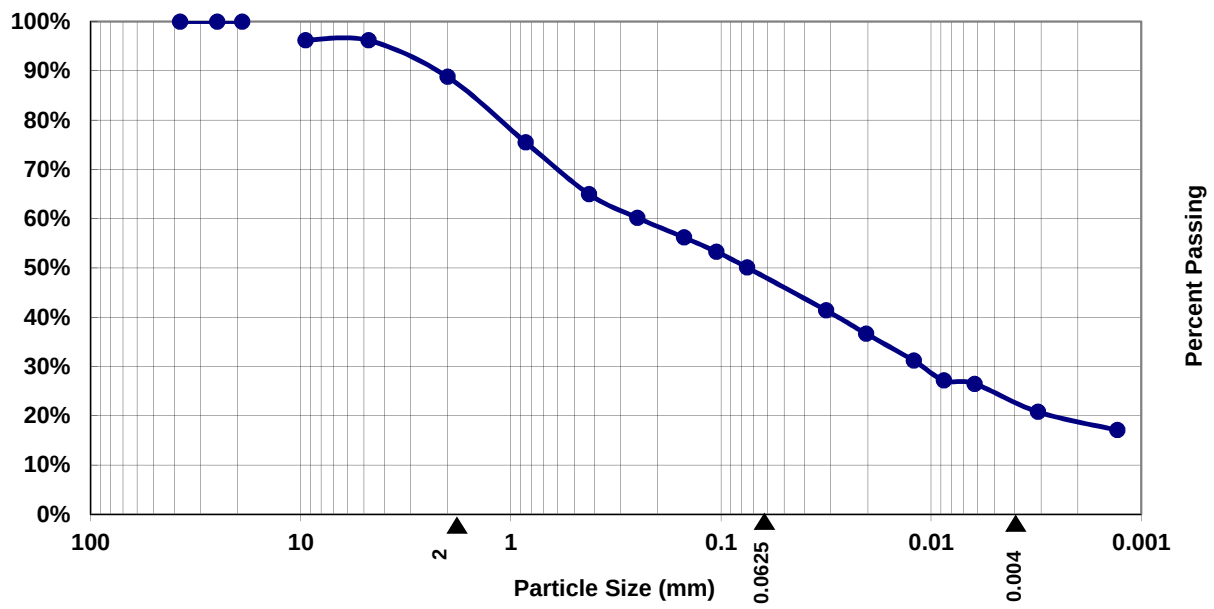


VARIATION OF POROSITY, SPECIFIC YIELD, AND SPECIFIC RETENTION WITH GRAIN SIZE (AFTER BEAR, 1972)

ESTIMATED TOTAL POROSITY: **44%**

PARTICLE SIZE ANALYSIS OF SOILS
FOR USE IN FETTER AND BEAR DIAGRAMS

Boring/Well No:	OW-405S	**Sample No:**	SS-11/SS-12	**Depth:**	53.5 to 60 ft bgs
Sample Description:	Brown-Yellow Sandy Lean Clay (CL)				
Hydrostratigraphic Unit:	Partially Weathered Rock (PWR)				



	> 2 mm	2 mm - 0.0625 mm	0.0625 mm - 0.004 mm	<0.004 mm
From Graph:	% Gravel 11.2%	% Sand 40.7%	% Silt 25.6%	% Clay 22.5%
Adjusted for Calculations	**0%**	**46%**	**29%**	**25%**

Notes:

Grain size distribution taken from grain size with hydrometer data located in Appendix IV.
Gravel, sand, silt and clay sizes based on Wentworth Scale.

Amec Foster Wheeler Project:
Dan River Landfill

Amec Foster Wheeler Project No:
7810-14-0065

FETTER AND BEAR DIAGRAMS

Amec Foster Wheer Project: Dan River Landfill

Amec Foster Wheeler Project No: 7810-14-0065

Boring/Well ID:	OW-405S
Sample Depth:	53.5 to 60 ft bgs
% Sand	46%
% Silt	29%
% Clay	25%
***ESTIMATED SPECIFIC YIELD:**	
5%	

*While it is recognized that specific yield and effective porosity are not synonymous, in practice, they may be estimated to be approximately equal in value.

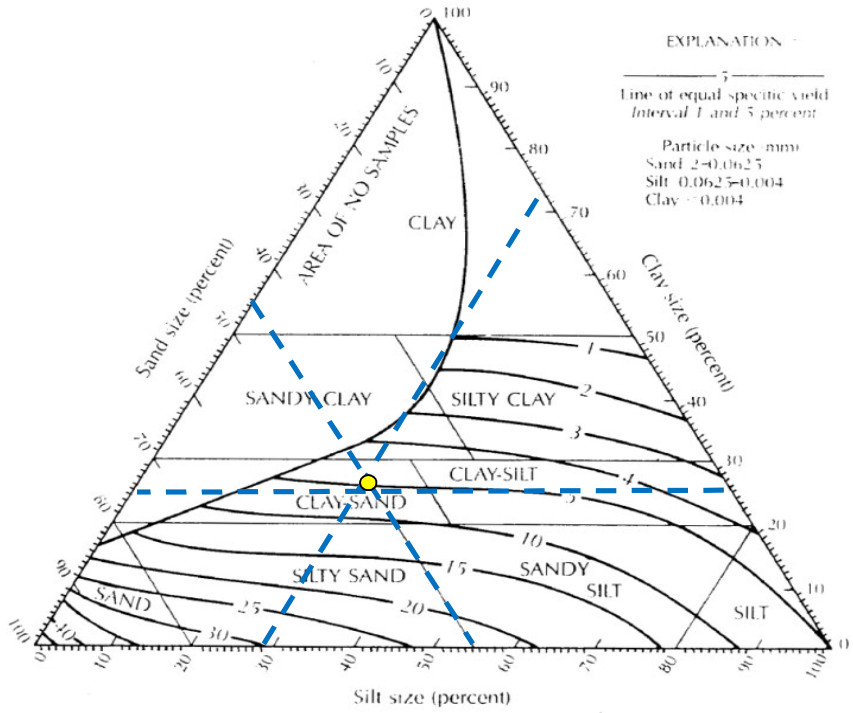
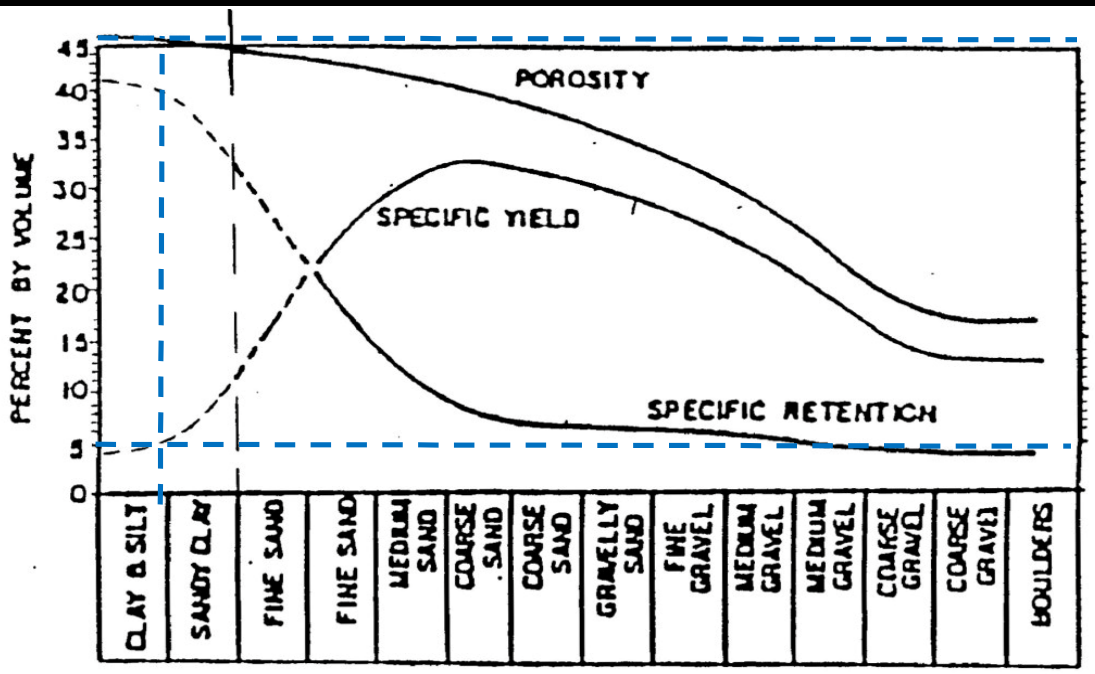


FIGURE 4.11 Textural classification triangle for unconsolidated materials showing the relation between particle size and specific yield. Source: A. I. Johnson, U.S. Geological Survey Water-Supply Paper 1662-D, 1967.

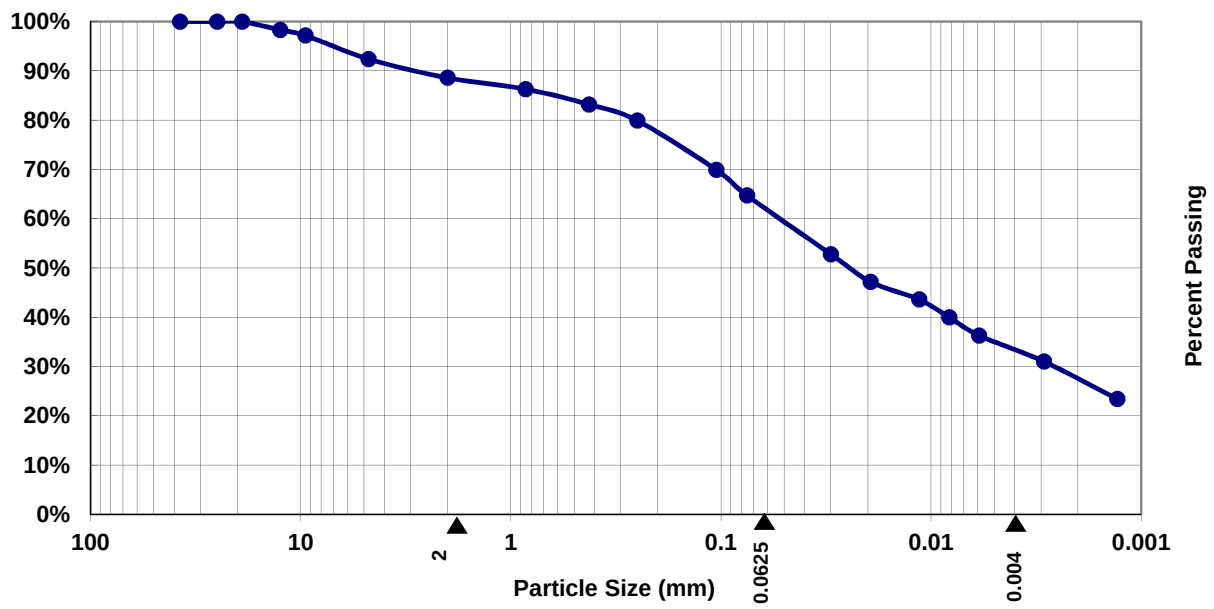


VARIATION OF POROSITY, SPECIFIC YIELD, AND SPECIFIC RETENTION WITH GRAIN SIZE (AFTER BEAR, 1972)

ESTIMATED TOTAL POROSITY: **46%**

PARTICLE SIZE ANALYSIS OF SOILS
FOR USE IN FETTER AND BEAR DIAGRAMS

Boring/Well No:	OW-406D	**Sample No:**	UD-1	**Depth:**	2 to 4 ft bgs
Sample Description:		Gray-Brown Sandy Elastic Silt (MH)			
Hydrostratigraphic Unit:		Alluvium			



	> 2 mm	2 mm - 0.0625 mm	0.0625 mm - 0.004 mm	<0.004 mm
From Graph:	% Gravel 11.4%	% Sand 26.5%	% Silt 28.8%	% Clay 33.2%
Adjusted for Calculations	**0%**	**30%**	**33%**	**38%**

Notes:

Grain size distribution taken from grain size with hydrometer data located in Appendix IV.
Gravel, sand, silt and clay sizes based on Wentworth Scale.

Amec Foster Wheeler Project:
Dan River Landfill

Amec Foster Wheeler Project No:
7810-14-0065

FETTER AND BEAR DIAGRAMS

Amec Foster Wheer Project: Dan River Landfill

Amec Foster Wheeler Project No: 7810-14-0065

Boring/Well ID:	OW-406D
Sample Depth:	2 to 4 ft bgs
% Sand	30%
% Silt	33%
% Clay	38%

***ESTIMATED SPECIFIC YIELD:**

3%

*While it is recognized that specific yield and effective porosity are not synonymous, in practice, they may be estimated to be approximately equal in value.

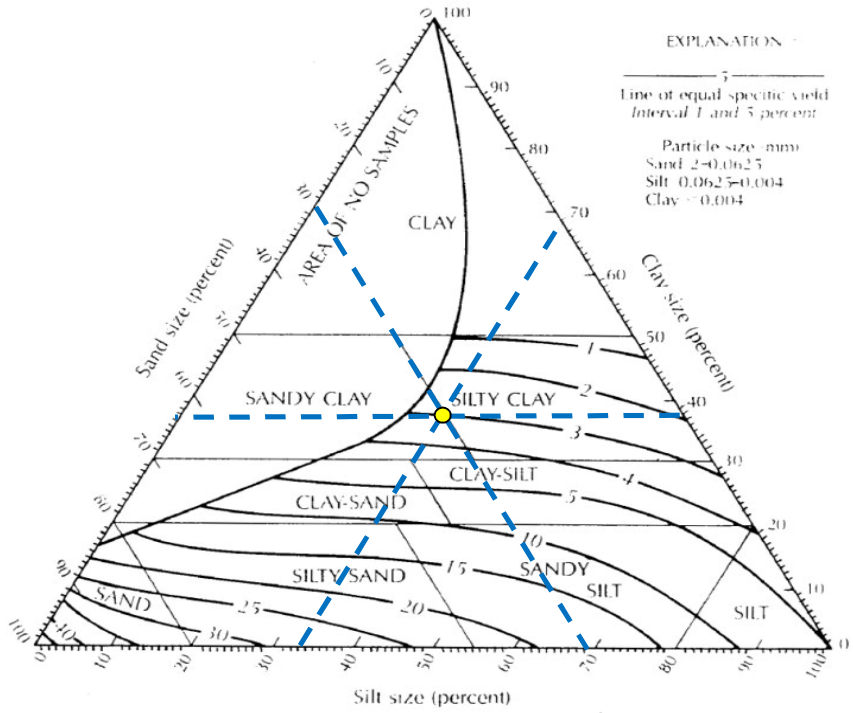
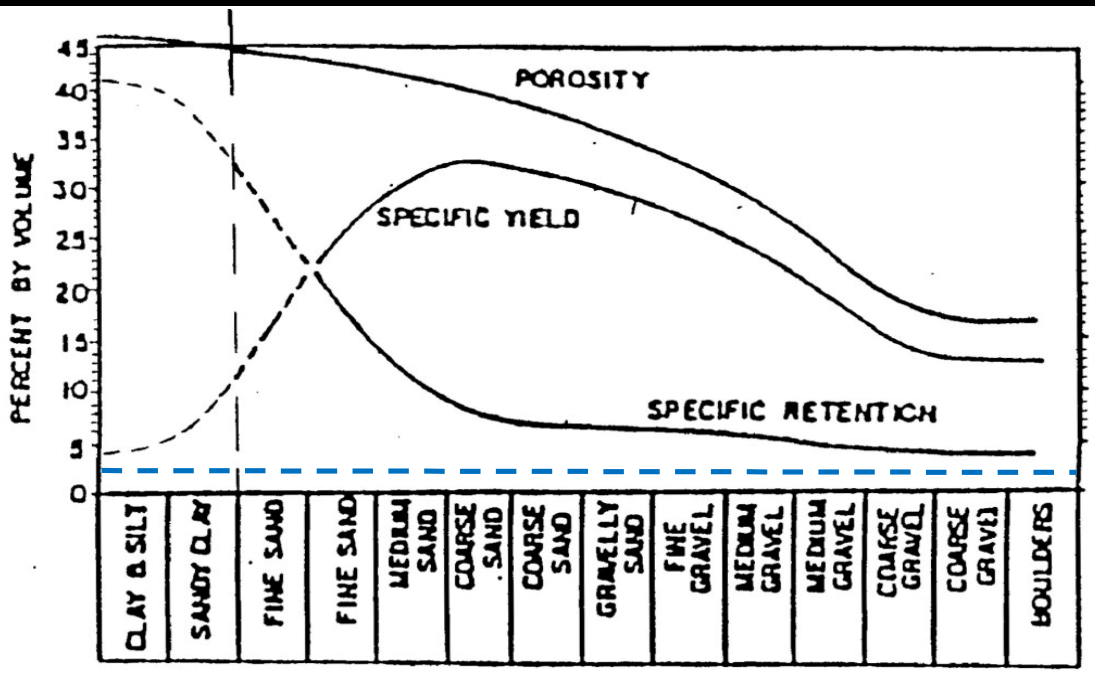


FIGURE 4.11 Textural classification triangle for unconsolidated materials showing the relation between particle size and specific yield. Source: A. I. Johnson, U.S. Geological Survey Water-Supply Paper 1662-D, 1967.



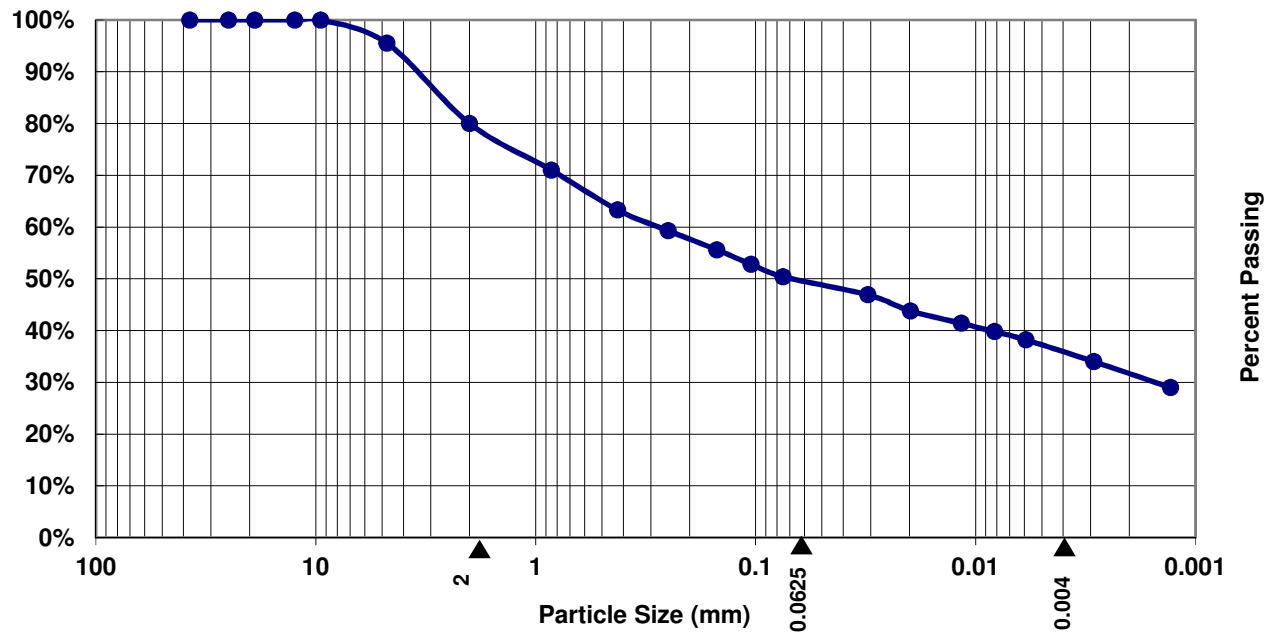
VARIATION OF POROSITY, SPECIFIC YIELD, AND SPECIFIC RETENTION WITH GRAIN SIZE (AFTER BEAR, 1972)

****ESTIMATED TOTAL POROSITY:** **48%**

**Estimated Based on Table of Selected Values of Porosity, Specific Yield, and Specific Retention, USGS Water Supply Paper 2220.

PARTICLE SIZE ANALYSIS OF SOILS
FOR USE IN FETTER AND BEAR DIAGRAMS

Boring/Well No:	OW-406D	**Sample No:**	Bulk	**Depth:**	5 to 15 ft bgs
Sample Description:	Gray-Brown, Sandy Fat Clay (CH)				
Hydrostratigraphic Unit:	Saprolite/Partially Weathered Rock (PWR)				



	> 2 mm	2 mm - 0.0625 mm	0.0625 mm - 0.004 mm	<0.004 mm
From Graph:	% Gravel 20.0%	% Sand 30.4%	% Silt 14.1%	% Clay 35.5%
Adjusted for Calculations	**0%**	**38%**	**18%**	**44%**

Notes:

Grain size distribution taken from grain size with hydrometer data located in Appendix IV.
Gravel, sand, silt and clay sizes based on Wentworth Scale.

Amec Foster Wheeler Project:
Dan River Landfill

Amec Foster Wheeler Project No:
7810-14-0065

amec foster wheeler

FETTER AND BEAR DIAGRAMS

Amec Foster Wheer Project: Dan River Landfill

Amec Foster Wheeler Project No: 7810-14-0065

Boring/Well ID:	OW-406D
Sample Depth:	5 to 15 ft bgs
% Sand	38%
% Silt	18%
% Clay	44%

***ESTIMATED SPECIFIC YIELD:**

2%

*While it is recognized that specific yield and effective porosity are not synonymous, in practice, they may be estimated to be approximately equal in value.

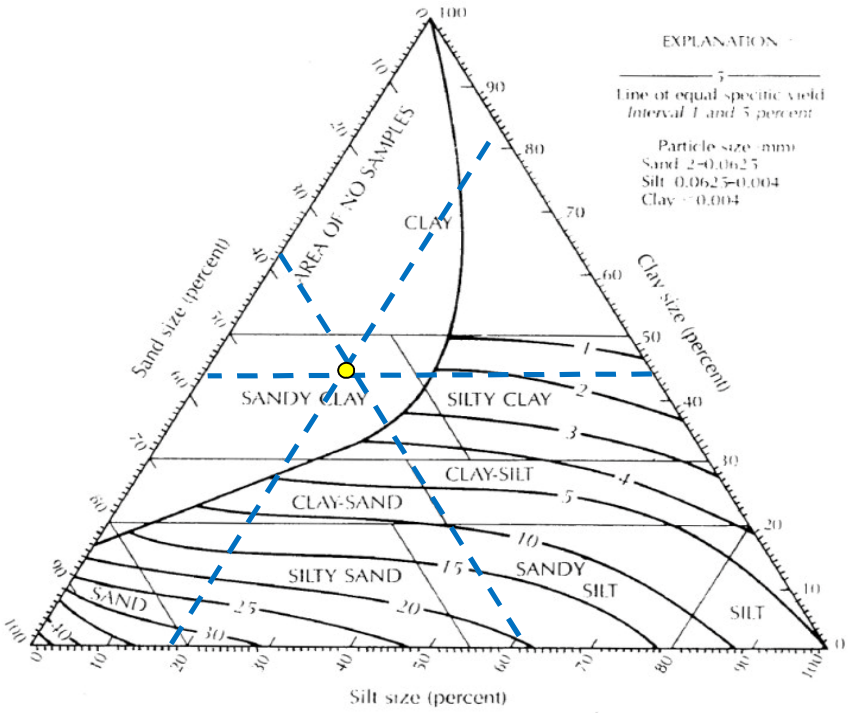
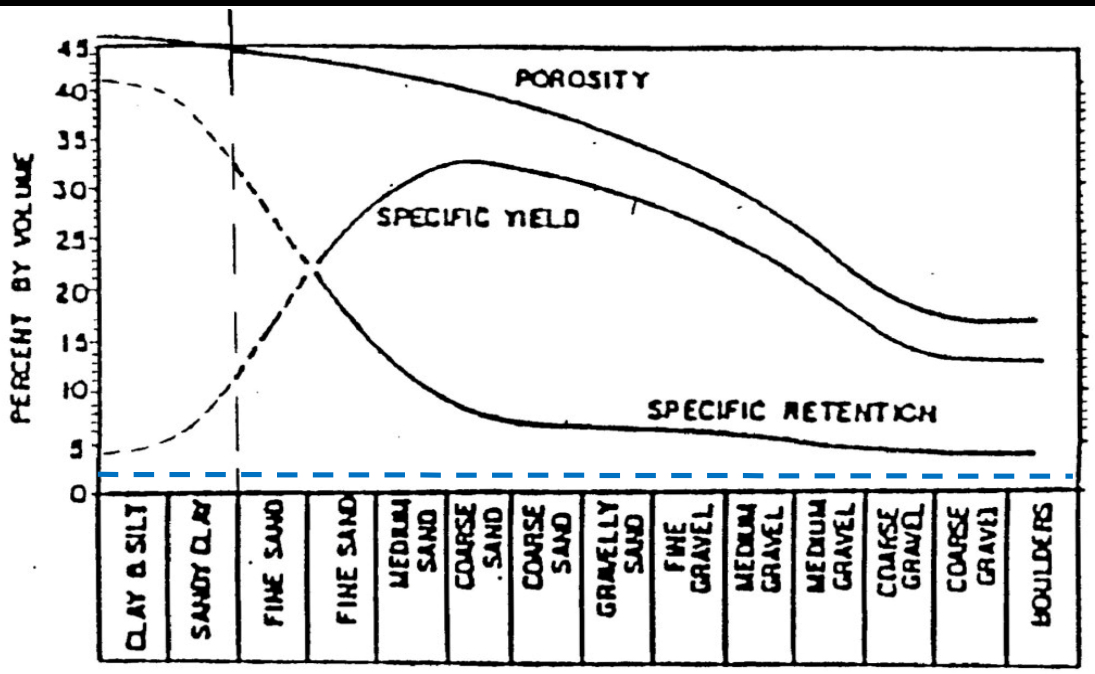


FIGURE 4.11 Textural classification triangle for unconsolidated materials showing the relation between particle size and specific yield. Source: A. I. Johnson, U.S. Geological Survey Water-Supply Paper 1662-D, 1967.



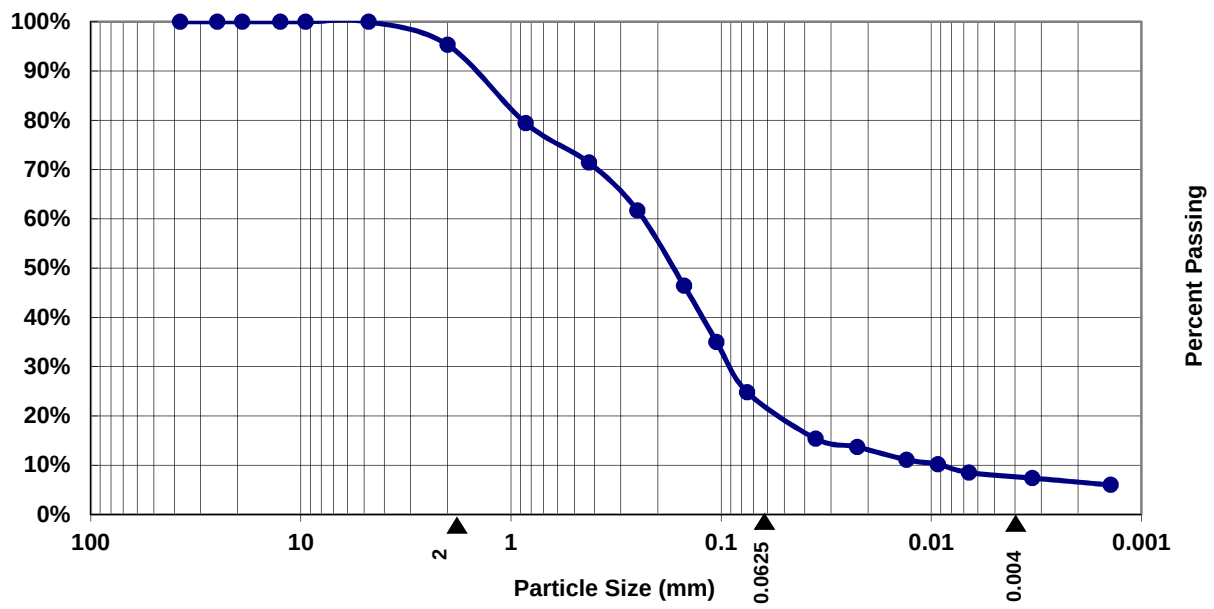
VARIATION OF POROSITY, SPECIFIC YIELD, AND SPECIFIC RETENTION WITH GRAIN SIZE (AFTER BEAR, 1972)

****ESTIMATED TOTAL POROSITY:** **49%**

**Estimated Based on Table of Selected Values of Porosity, Specific Yield, and Specific Retention, USGS Water Supply Paper 2220.

PARTICLE SIZE ANALYSIS OF SOILS
FOR USE IN FETTER AND BEAR DIAGRAMS

Boring/Well No:	OW-406S	**Sample No:**	SS-3	**Depth:**	13.5 to 15 ft bgs
Sample Description:		Brown Silty Sand (SM)			
Hydrostratigraphic Unit:		Partially Weathered Rock (PWR)			



	> 2 mm	2 mm - 0.0625 mm	0.0625 mm - 0.004 mm	<0.004 mm
From Graph:	% Gravel 4.7%	% Sand 72.9%	% Silt 14.8%	% Clay 7.6%
Adjusted for Calculations	**0%**	**76%**	**16%**	**8%**

Notes:

Grain size distribution taken from grain size with hydrometer data located in Appendix IV.
Gravel, sand, silt and clay sizes based on Wentworth Scale.

Amec Foster Wheeler Project:
Dan River Landfill

Amec Foster Wheeler Project No:
7810-14-0065

FETTER AND BEAR DIAGRAMS

Amec Foster Wheer Project: Dan River Landfill

Amec Foster Wheeler Project No: 7810-14-0065

Boring/Well ID:	OW-406S
Sample Depth:	13.5 to 15 ft bgs
% Sand	76%
% Silt	16%
% Clay	8%
***ESTIMATED SPECIFIC YIELD:**	
24%	

*While it is recognized that specific yield and effective porosity are not synonymous, in practice, they may be estimated to be approximately equal in value.

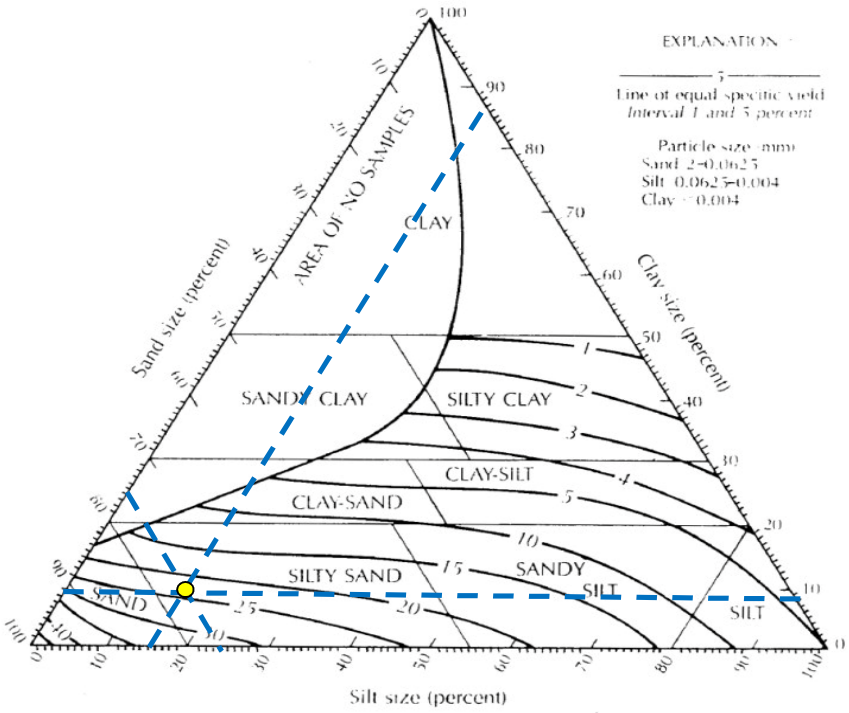
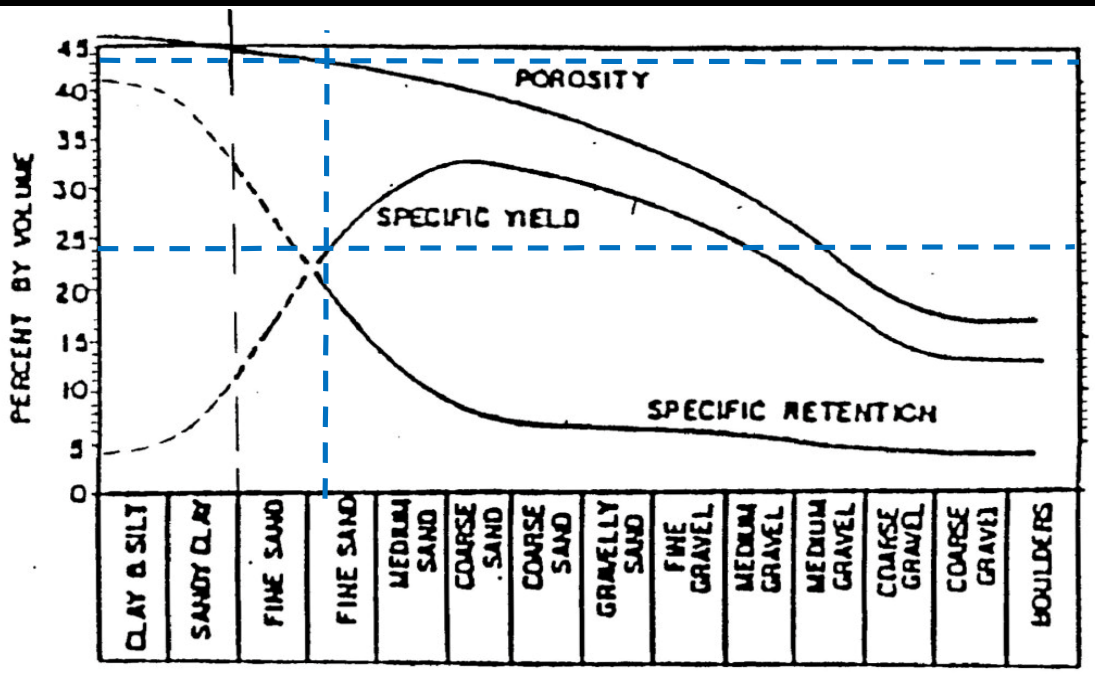


FIGURE 4.11 Textural classification triangle for unconsolidated materials showing the relation between particle size and specific yield. Source: A. I. Johnson, U.S. Geological Survey Water-Supply Paper 1662-D, 1967.

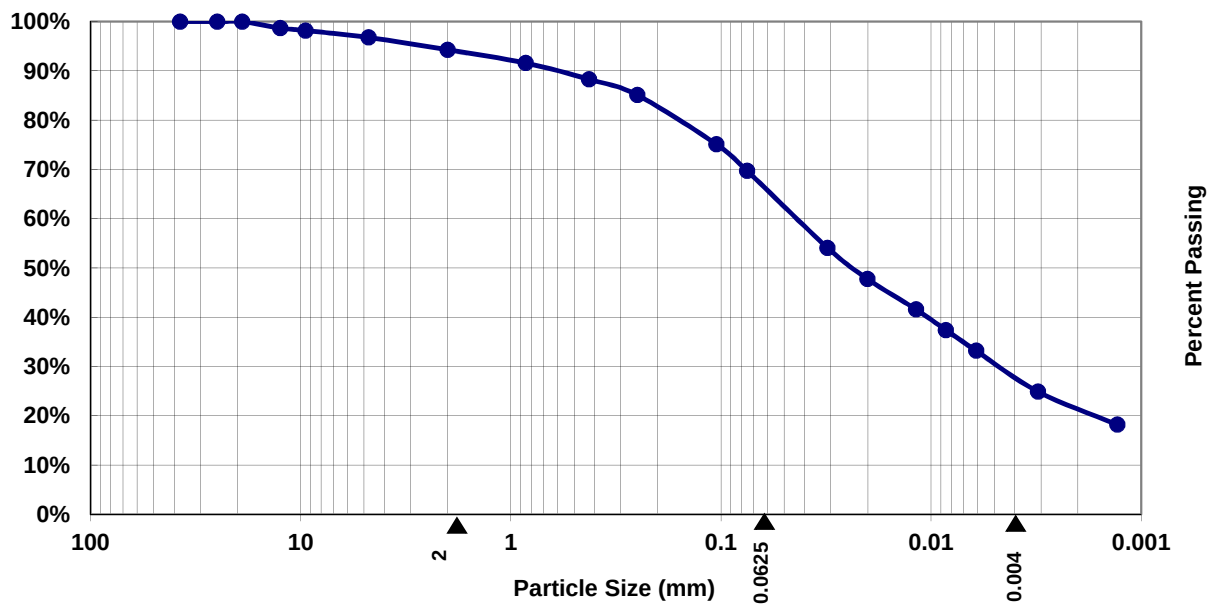


VARIATION OF POROSITY, SPECIFIC YIELD, AND SPECIFIC RETENTION WITH GRAIN SIZE (AFTER BEAR, 1972)

ESTIMATED TOTAL POROSITY: **43%**

PARTICLE SIZE ANALYSIS OF SOILS
FOR USE IN FETTER AND BEAR DIAGRAMS

Boring/Well No:	OW-407D	**Sample No:**	UD-1	**Depth:**	43.5 to 45.5 ft bgs
Sample Description:	Yellow-Brown and Gray, Sandy Lean Clay (CL)				
Hydrostratigraphic Unit:	Saprolite				



	> 2 mm	2 mm - 0.0625 mm	0.0625 mm - 0.004 mm	<0.004 mm
From Graph:	% Gravel 5.7%	% Sand 28.2%	% Silt 36.6%	% Clay 29.5%
Adjusted for Calculations	**0%**	**30%**	**39%**	**31%**

Notes:

Grain size distribution taken from grain size with hydrometer data located in Appendix IV.
Gravel, sand, silt and clay sizes based on Wentworth Scale.

Amec Foster Wheeler Project:
Dan River Landfill

Amec Foster Wheeler Project No:
7810-14-0065

FETTER AND BEAR DIAGRAMS

Amec Foster Wheer Project: Dan River Landfill

Amec Foster Wheeler Project No: 7810-14-0065

Boring/Well ID:	OW-407D
Sample Depth:	43.5 to 45.5 ft bgs
% Sand	30%
% Silt	39%
% Clay	31%
***ESTIMATED SPECIFIC YIELD:**	
4%	

*While it is recognized that specific yield and effective porosity are not synonymous, in practice, they may be estimated to be approximately equal in value.

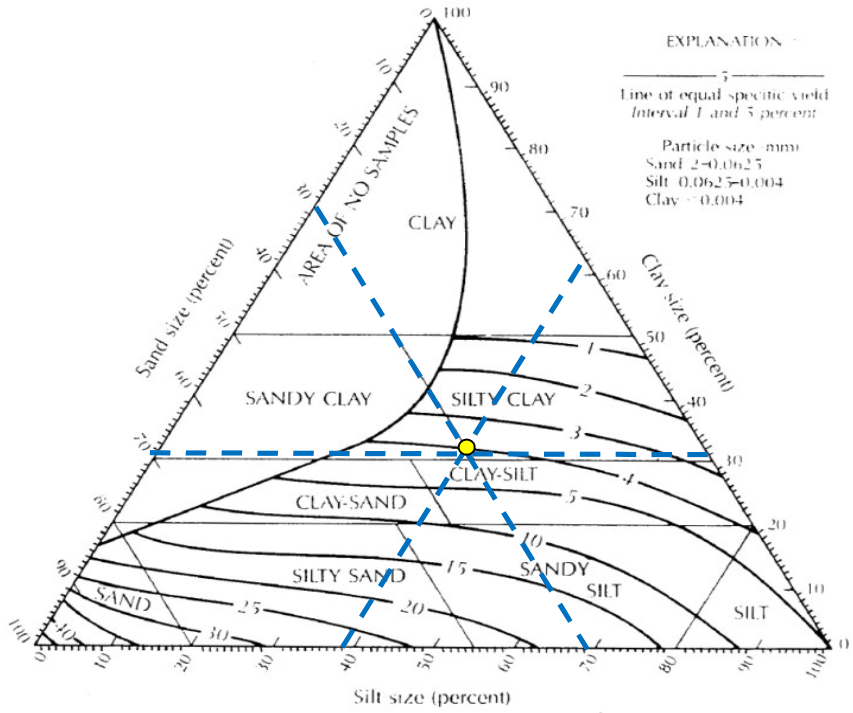
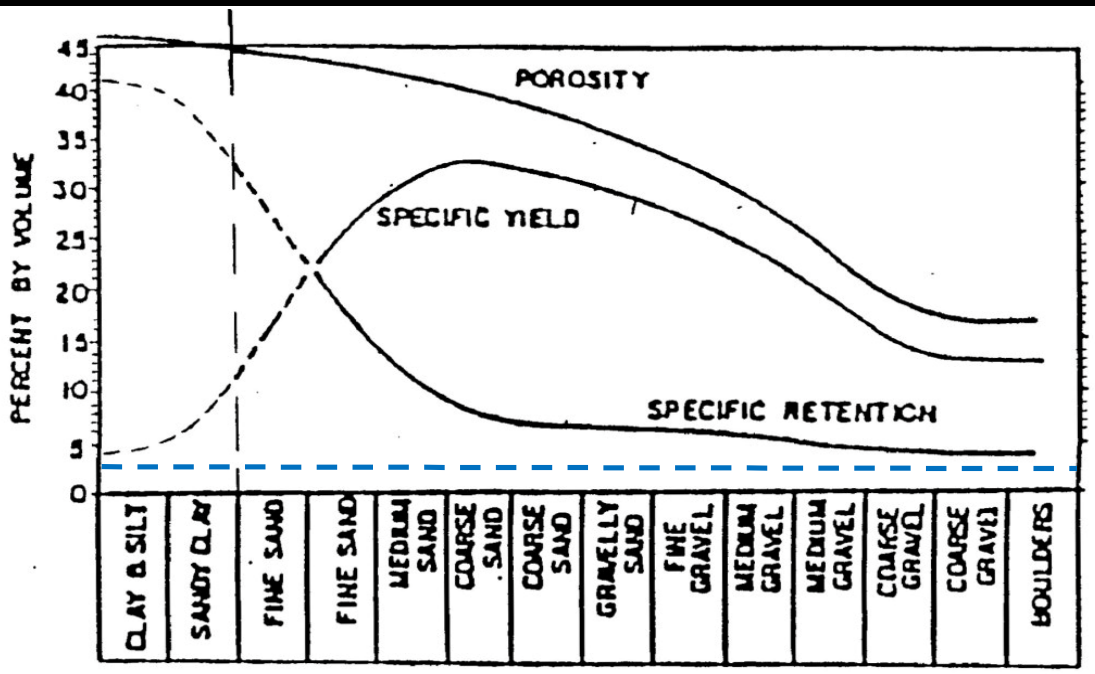


FIGURE 4.11 Textural classification triangle for unconsolidated materials showing the relation between particle size and specific yield. Source: A. I. Johnson, U.S. Geological Survey Water-Supply Paper 1662-D, 1967.



VARIATION OF POROSITY, SPECIFIC YIELD, AND SPECIFIC RETENTION WITH GRAIN SIZE (AFTER BEAR, 1972)

****ESTIMATED TOTAL POROSITY:** **47%**

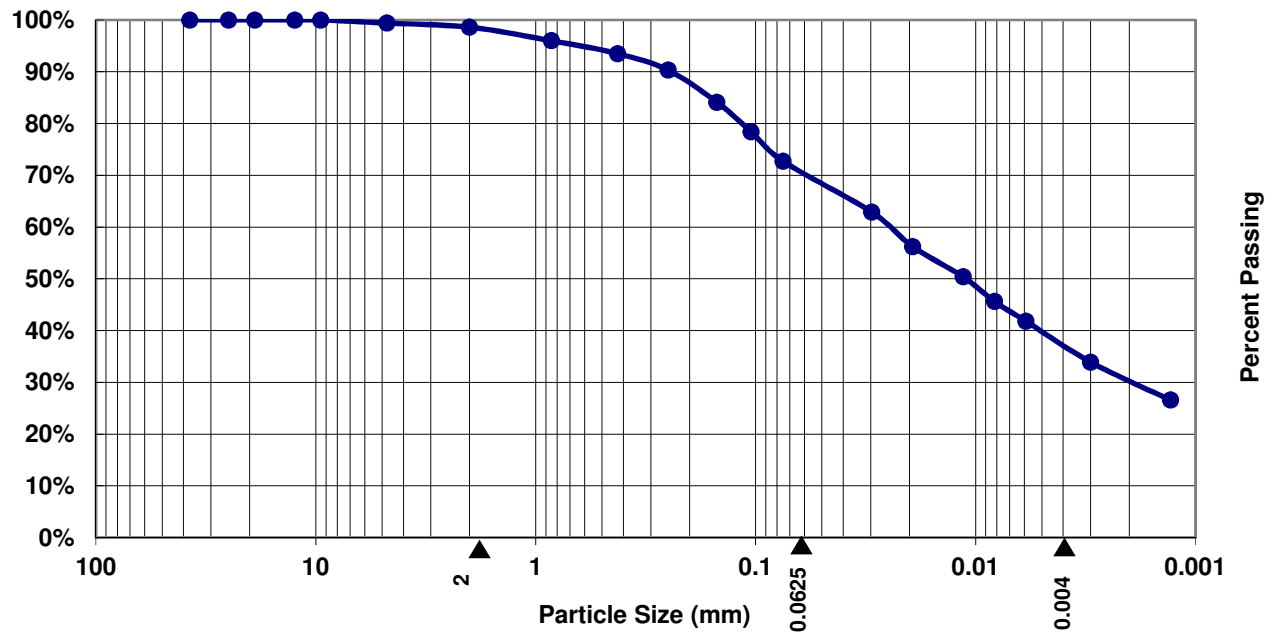
**Estimated Based on Table of Selected Values of Porosity, Specific Yield, and Specific Retention, USGS Water Supply Paper 2220.

PARTICLE SIZE ANALYSIS OF SOILS
FOR USE IN FETTER AND BEAR DIAGRAMS

Boring/Well No:	OW-407S	**Sample No:**	Bulk	**Depth:**	45 to 55 ft bgs

Sample Description: Yellow-Brown and Gray, Lean Clay with Sand (CL)

Hydrostratigraphic Unit: Saprolite



	> 2 mm	2 mm - 0.0625 mm	0.0625 mm - 0.004 mm	<0.004 mm
From Graph:	% Gravel 1.4%	% Sand 28.1%	% Silt 33.9%	% Clay 36.6%
Adjusted for Calculations	**0%**	**28%**	**34%**	**37%**

Notes:

Grain size distribution taken from grain size with hydrometer data located in Appendix IV.
Gravel, sand, silt and clay sizes based on Wentworth Scale.

Amec Foster Wheeler Project:
Dan River Landfill

Amec Foster Wheeler Project No:
7810-14-0065

amec foster wheeler

FETTER AND BEAR DIAGRAMS

Amec Foster Wheer Project: Dan River Landfill

Amec Foster Wheeler Project No: 7810-14-0065

Boring/Well ID:	OW-407S
Sample Depth:	45 to 55 ft bgs
% Sand	28%
% Silt	34%
% Clay	37%
***ESTIMATED SPECIFIC YIELD:**	
3%	

*While it is recognized that specific yield and effective porosity are not synonymous, in practice, they may be estimated to be approximately equal in value.

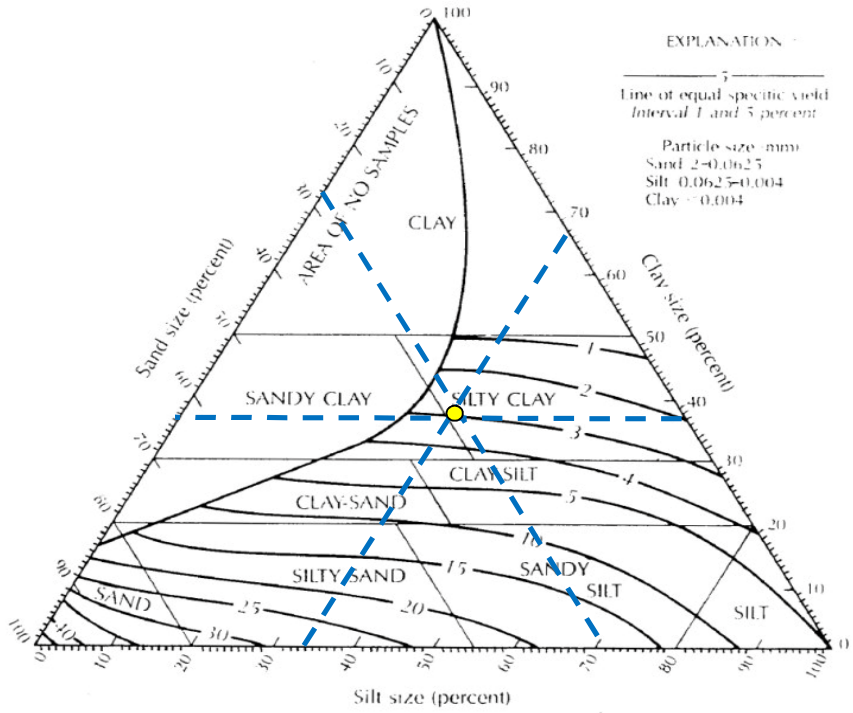
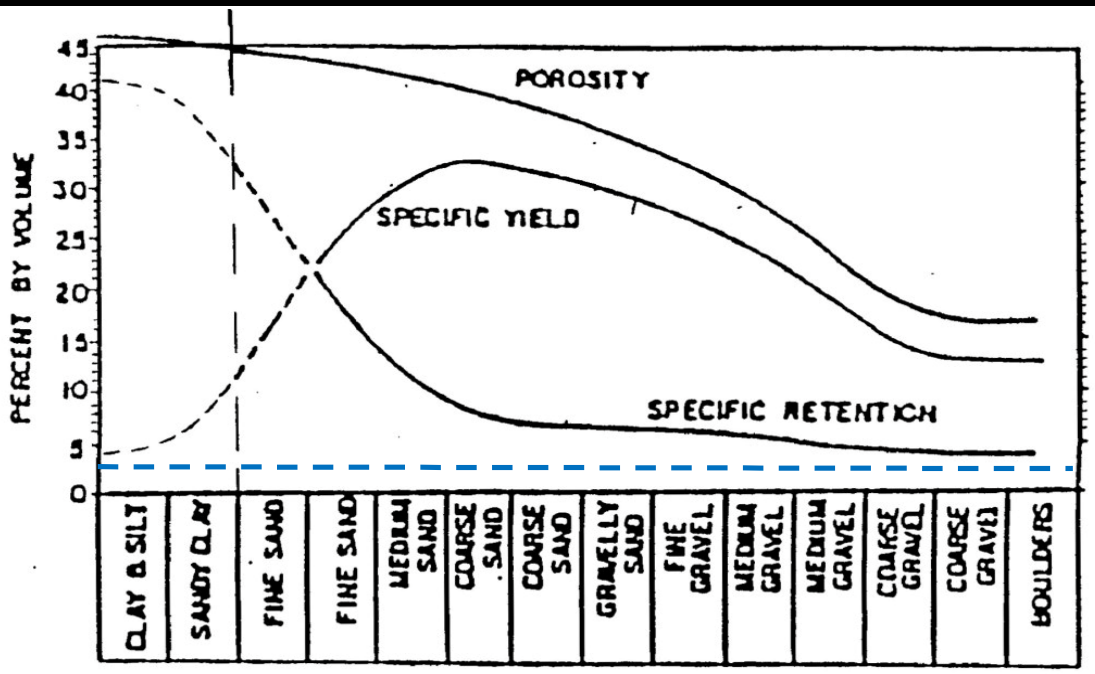


FIGURE 4.11 Textural classification triangle for unconsolidated materials showing the relation between particle size and specific yield. Source: A. I. Johnson, U.S. Geological Survey Water-Supply Paper 1662-D, 1967.



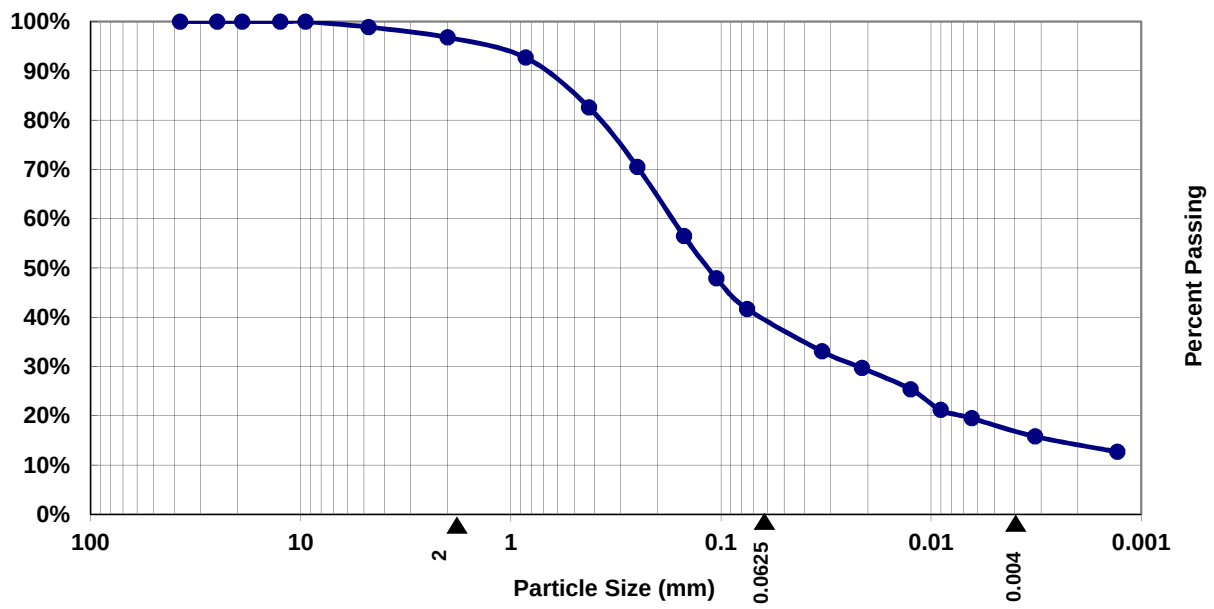
VARIATION OF POROSITY, SPECIFIC YIELD, AND SPECIFIC RETENTION WITH GRAIN SIZE (AFTER BEAR, 1972)

****ESTIMATED TOTAL POROSITY:** **48%**

**Estimated Based on Table of Selected Values of Porosity, Specific Yield, and Specific Retention, USGS Water Supply Paper 2220.

PARTICLE SIZE ANALYSIS OF SOILS
FOR USE IN FETTER AND BEAR DIAGRAMS

Boring/Well No:	OW-407S	**Sample No:**	SS-11	**Depth:**	53.5 to 55 ft bgs
Sample Description:		Brown Silty Sand (SM)			
Hydrostratigraphic Unit:		Saprolite			



	> 2 mm	2 mm - 0.0625 mm	0.0625 mm - 0.004 mm	<0.004 mm
From Graph:	% Gravel 3.2%	% Sand 57.2%	% Silt 22.9%	% Clay 16.7%
Adjusted for Calculations	**0%**	**59%**	**24%**	**17%**

Notes:

Grain size distribution taken from grain size with hydrometer data located in Appendix IV.
Gravel, sand, silt and clay sizes based on Wentworth Scale.

Amec Foster Wheeler Project:
Dan River Landfill

Amec Foster Wheeler Project No:
7810-14-0065

FETTER AND BEAR DIAGRAMS

Amec Foster Wheer Project: Dan River Landfill

Amec Foster Wheeler Project No: 7810-14-0065

Boring/Well ID:	OW-407S
Sample Depth:	53.5 to 55 ft bgs
% Sand	59%
% Silt	24%
% Clay	17%
***ESTIMATED SPECIFIC YIELD:**	
14%	

*While it is recognized that specific yield and effective porosity are not synonymous, in practice, they may be estimated to be approximately equal in value.

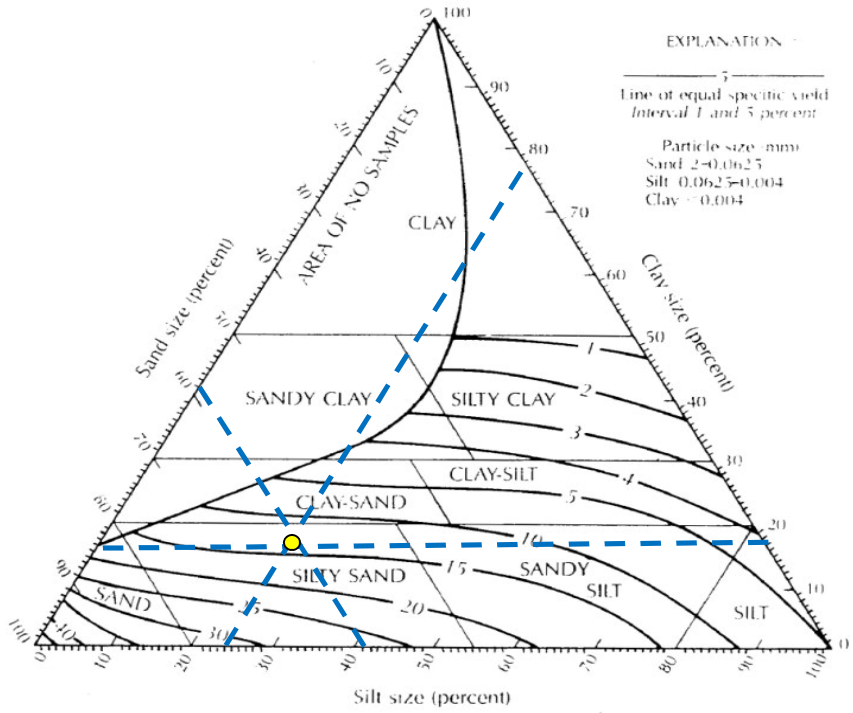
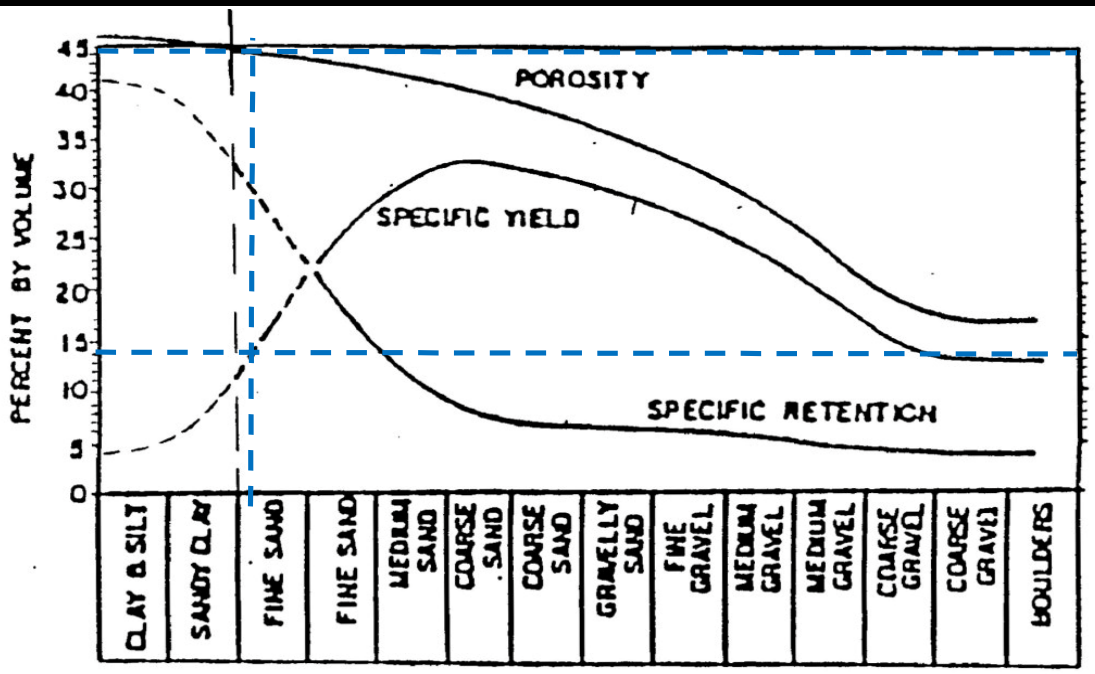


FIGURE 4.11 Textural classification triangle for unconsolidated materials showing the relation between particle size and specific yield. Source: A. I. Johnson, U.S. Geological Survey Water-Supply Paper 1662-D, 1967.

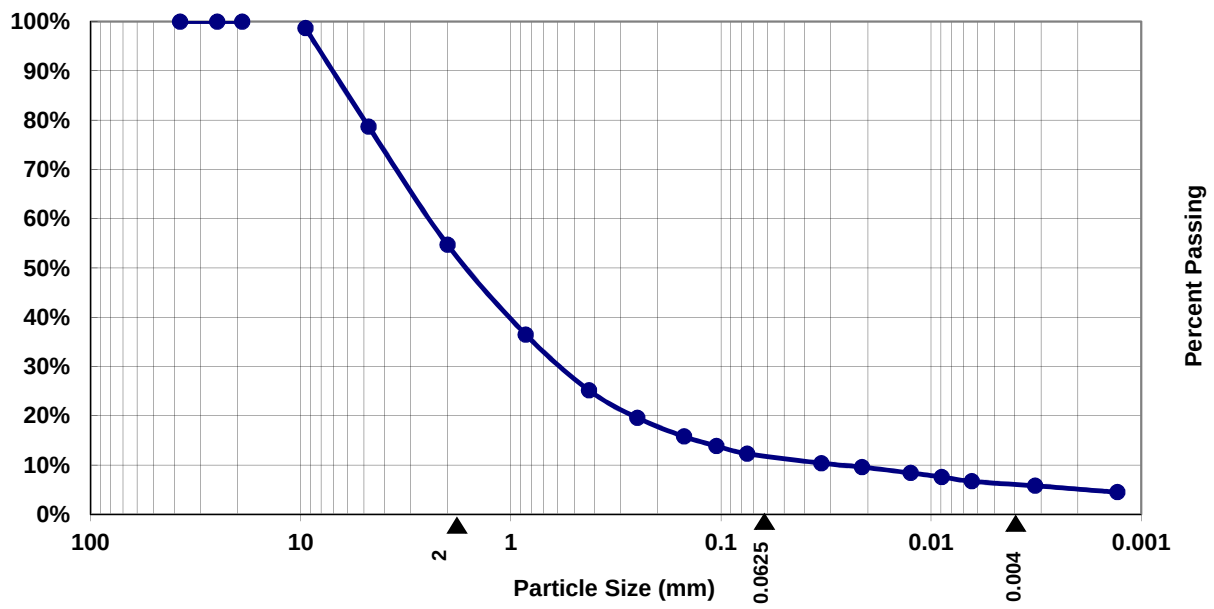


VARIATION OF POROSITY, SPECIFIC YIELD, AND SPECIFIC RETENTION WITH GRAIN SIZE (AFTER BEAR, 1972)

ESTIMATED TOTAL POROSITY: **44%**

PARTICLE SIZE ANALYSIS OF SOILS
FOR USE IN FETTER AND BEAR DIAGRAMS

Boring/Well No:	OW-409S	**Sample No:**	SS-2/SS-3	**Depth:**	9.8 to 15 ft bgs
Sample Description:	Dark Gray Silty Sand with Gravel (SM)				
Hydrostratigraphic Unit:	Partially Weathered Rock (PWR)				



	> 2 mm	2 mm - 0.0625 mm	0.0625 mm - 0.004 mm	<0.004 mm
From Graph:	% Gravel 45.3%	% Sand 42.9%	% Silt 5.8%	% Clay 6.0%
Adjusted for Calculations	**0%**	**78%**	**11%**	**11%**

Notes:

Grain size distribution taken from grain size with hydrometer data located in Appendix IV.
Gravel, sand, silt and clay sizes based on Wentworth Scale.

Amec Foster Wheeler Project:
Dan River Landfill

Amec Foster Wheeler Project No:
7810-14-0065

FETTER AND BEAR DIAGRAMS

Amec Foster Wheer Project: Dan River Landfill

Amec Foster Wheeler Project No: 7810-14-0065

Boring/Well ID:	OW-409S
Sample Depth:	9.8 to 15 ft bgs
% Sand	78%
% Silt	11%
% Clay	11%

***ESTIMATED SPECIFIC YIELD:**

20%

*While it is recognized that specific yield and effective porosity are not synonymous, in practice, they may be estimated to be approximately equal in value.

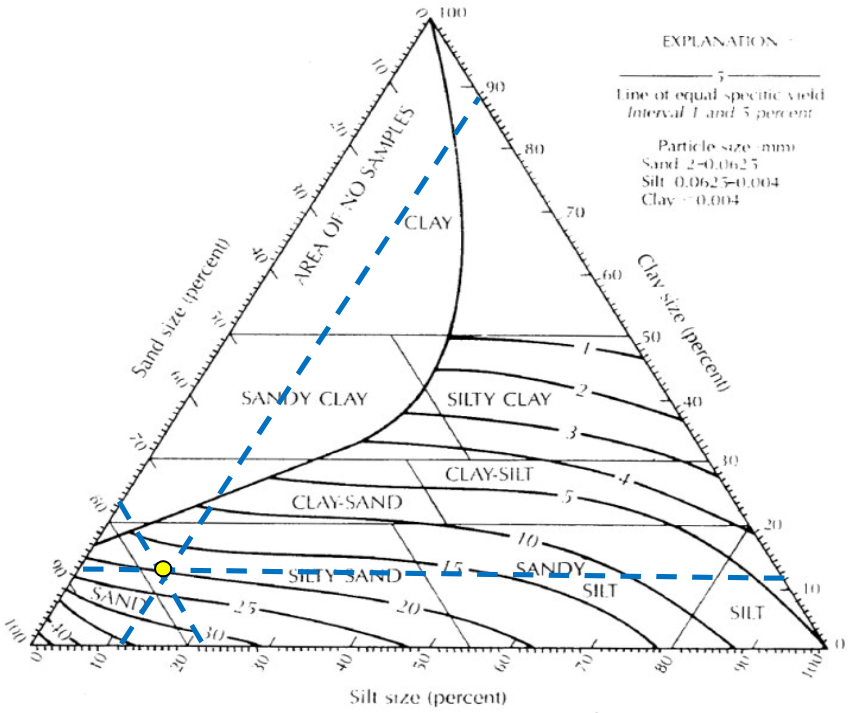
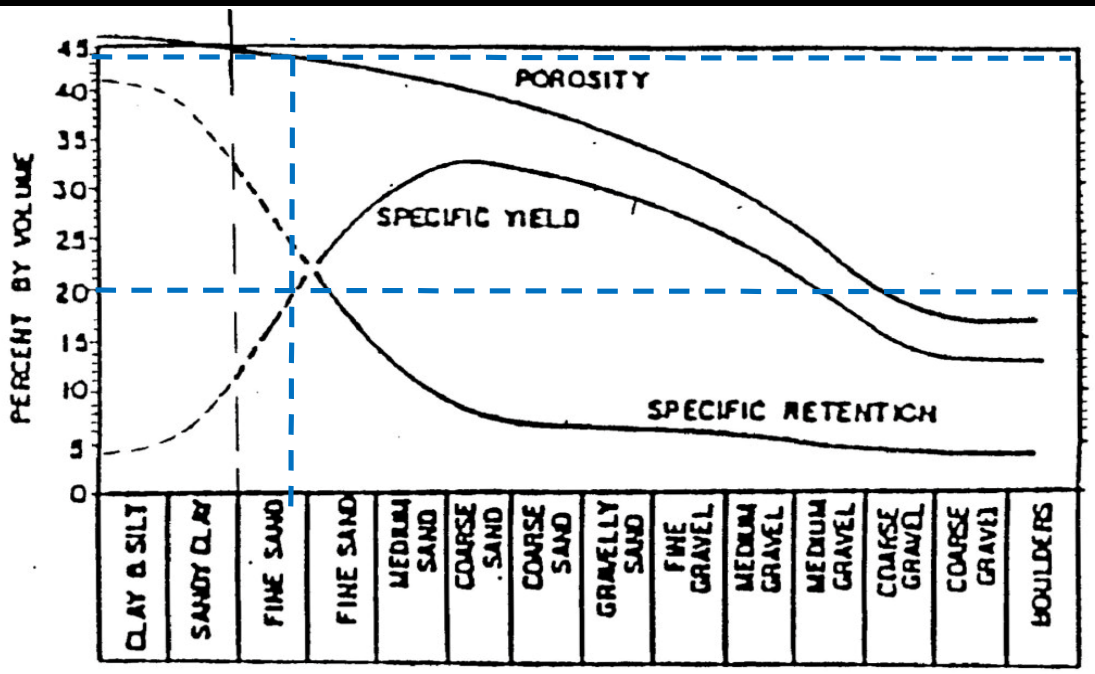


FIGURE 4.11 Textural classification triangle for unconsolidated materials showing the relation between particle size and specific yield. Source: A. I. Johnson, U.S. Geological Survey Water-Supply Paper 1662-D, 1967.

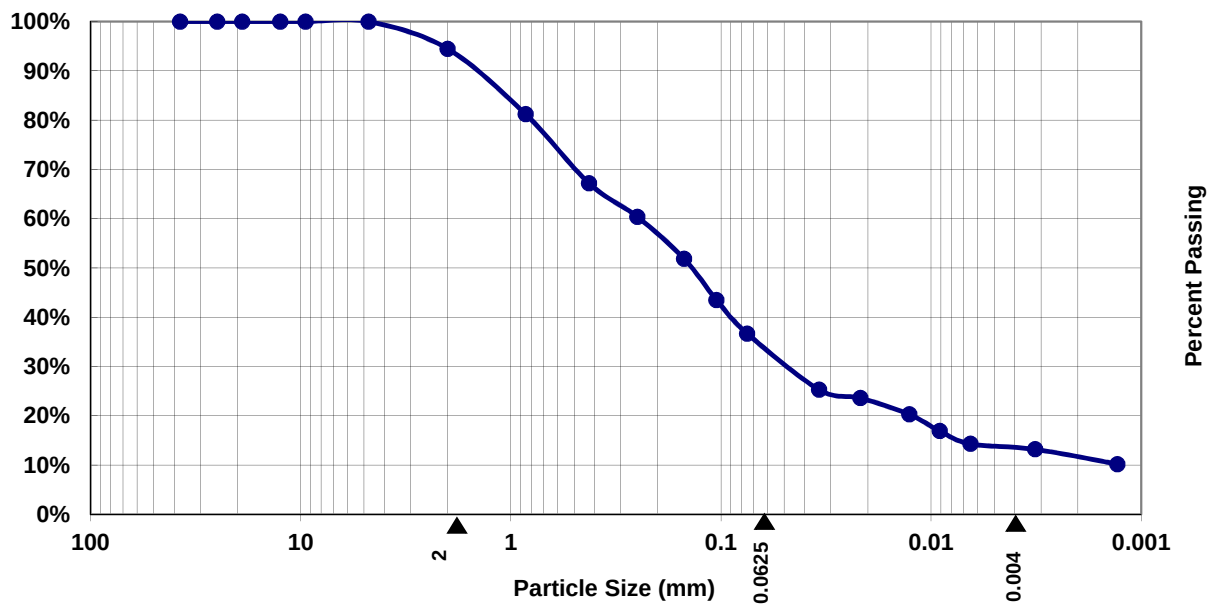


VARIATION OF POROSITY, SPECIFIC YIELD, AND SPECIFIC RETENTION WITH GRAIN SIZE (AFTER BEAR, 1972)

ESTIMATED TOTAL POROSITY: **44%**

PARTICLE SIZE ANALYSIS OF SOILS
FOR USE IN FETTER AND BEAR DIAGRAMS

Boring/Well No:	OW-410S	**Sample No:**	SS-9	**Depth:**	43.5 to 45 ft bgs
Sample Description:		Yellow Silty Sand (SM)			
Hydrostratigraphic Unit:		Partially Weathered Rock (PWR)			



	> 2 mm	2 mm - 0.0625 mm	0.0625 mm - 0.004 mm	<0.004 mm
From Graph:	% Gravel 5.5%	% Sand 60.6%	% Silt 20.4%	% Clay 13.5%
Adjusted for Calculations	**0%**	**64%**	**22%**	**14%**

Notes:

Grain size distribution taken from grain size with hydrometer data located in Appendix IV.
Gravel, sand, silt and clay sizes based on Wentworth Scale.

Amec Foster Wheeler Project:
Dan River Landfill

Amec Foster Wheeler Project No:
7810-14-0065

FETTER AND BEAR DIAGRAMS

Amec Foster Wheer Project: Dan River Landfill

Amec Foster Wheeler Project No: 7810-14-0065

Boring/Well ID:	OW-410S
Sample Depth:	43.5 to 45 ft bgs
% Sand	64%
% Silt	22%
% Clay	14%
***ESTIMATED SPECIFIC YIELD:**	
16%	

*While it is recognized that specific yield and effective porosity are not synonymous, in practice, they may be estimated to be approximately equal in value.

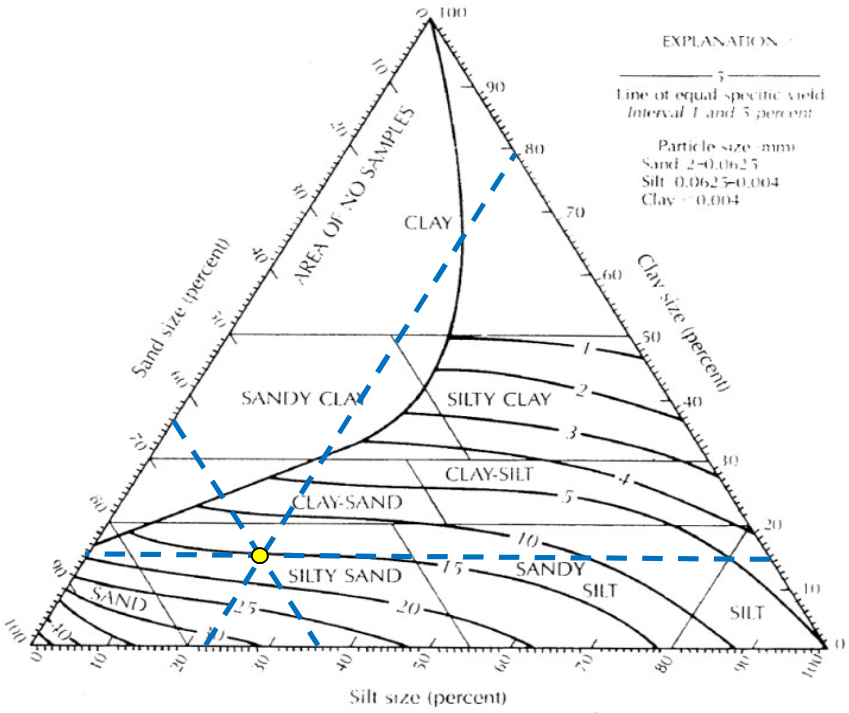
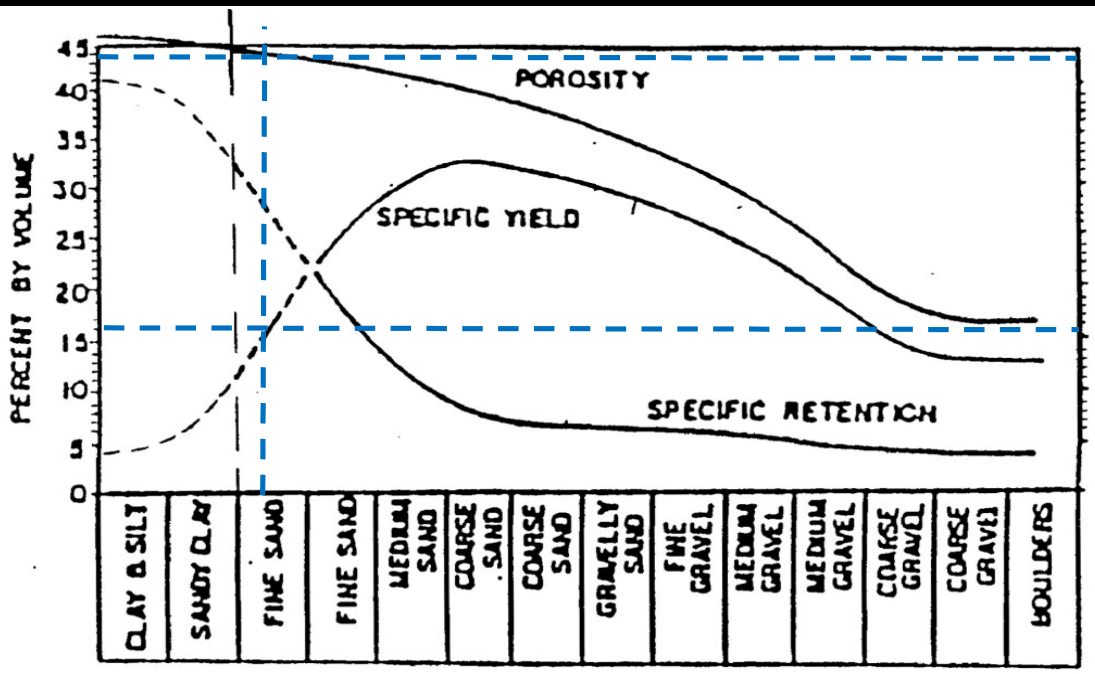


FIGURE 4.11 Textural classification triangle for unconsolidated materials showing the relation between particle size and specific yield. Source: A. I. Johnson, U.S. Geological Survey Water-Supply Paper 1662-D, 1967.

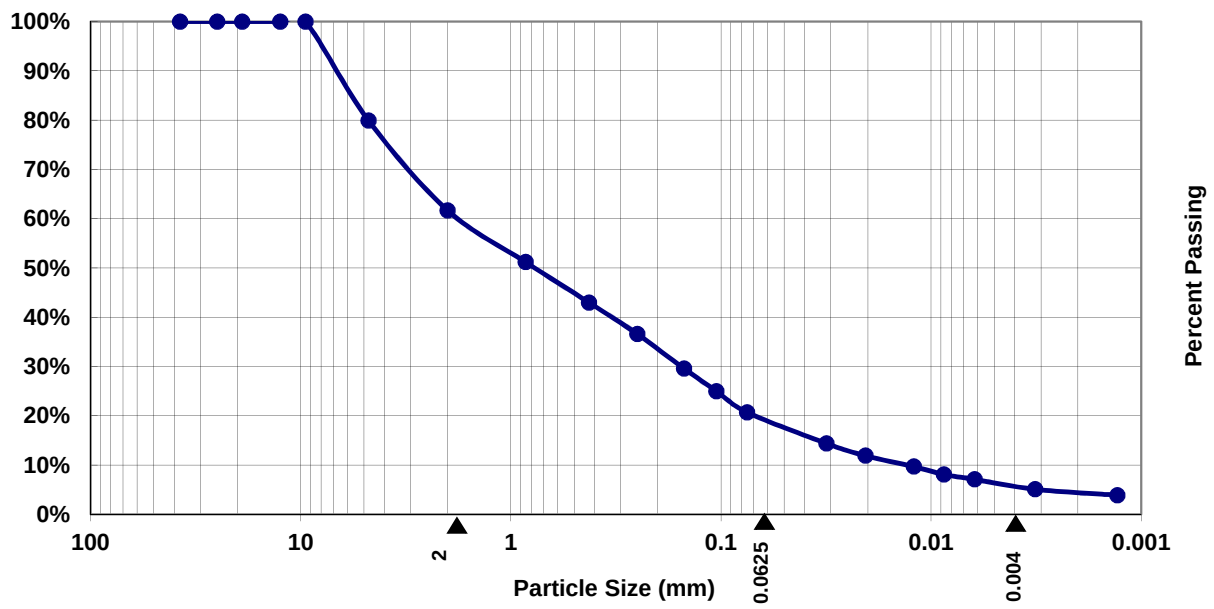


VARIATION OF POROSITY, SPECIFIC YIELD, AND SPECIFIC RETENTION WITH GRAIN SIZE (AFTER BEAR, 1972)

ESTIMATED TOTAL POROSITY: **44%**

PARTICLE SIZE ANALYSIS OF SOILS
FOR USE IN FETTER AND BEAR DIAGRAMS

Boring/Well No:	OW-411S	**Sample No:**	SS-12	**Depth:**	58.5 to 60 ft bgs
Sample Description:	Gray Silty Sand with Gravel (SM)				
Hydrostratigraphic Unit:	Saprolite				



	> 2 mm	2 mm - 0.0625 mm	0.0625 mm - 0.004 mm	<0.004 mm
From Graph:	% Gravel 38.3%	% Sand 42.4%	% Silt 13.6%	% Clay 5.6%
Adjusted for Calculations	**0%**	**69%**	**22%**	**9%**

Notes:

Grain size distribution taken from grain size with hydrometer data located in Appendix IV.
Gravel, sand, silt and clay sizes based on Wentworth Scale.

Amec Foster Wheeler Project:
Dan River Landfill

Amec Foster Wheeler Project No:
7810-14-0065

FETTER AND BEAR DIAGRAMS

Amec Foster Wheer Project: Dan River Landfill

Amec Foster Wheeler Project No: 7810-14-0065

Boring/Well ID:	OW-411S
Sample Depth:	58.5 to 60 ft bgs
% Sand	69%
% Silt	22%
% Clay	9%
***ESTIMATED SPECIFIC YIELD:**	
23%	

*While it is recognized that specific yield and effective porosity are not synonymous, in practice, they may be estimated to be approximately equal in value.

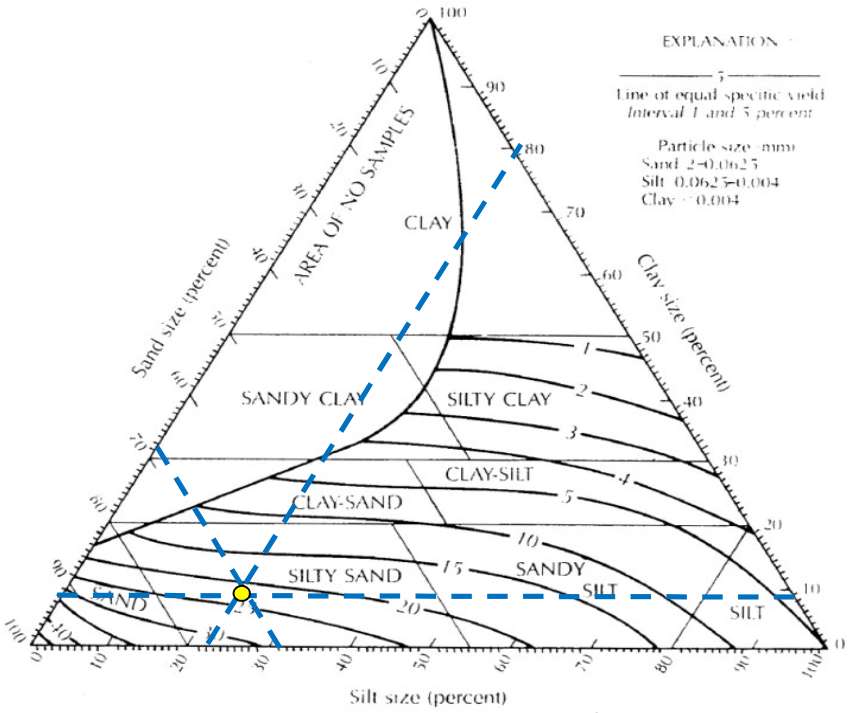
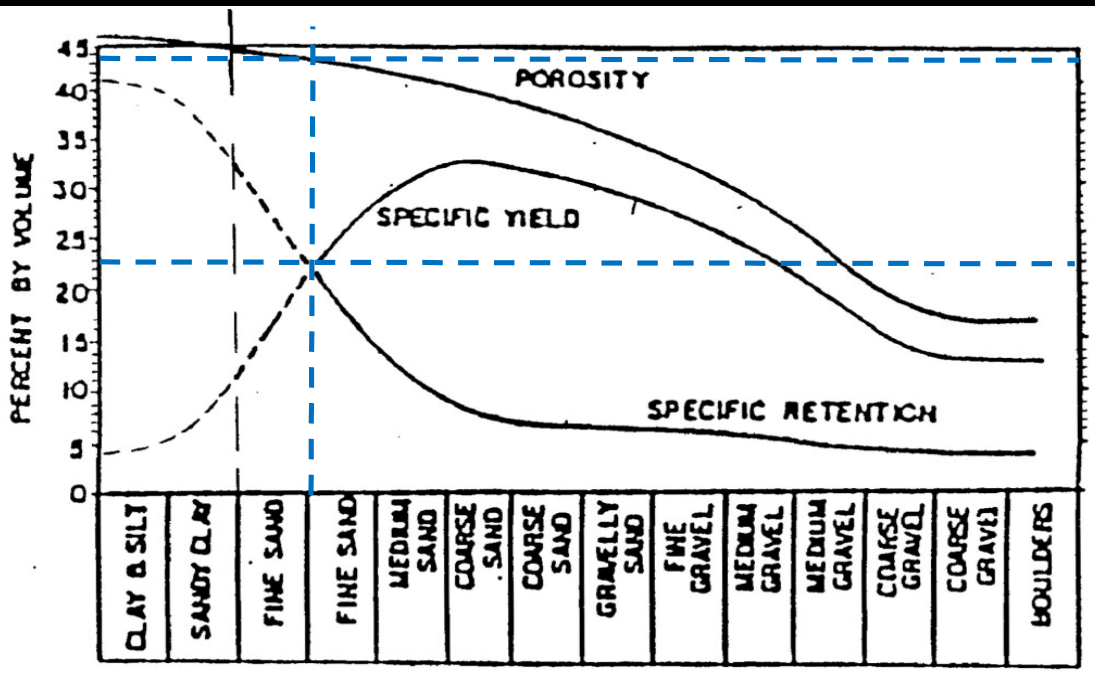


FIGURE 4.11 Textural classification triangle for unconsolidated materials showing the relation between particle size and specific yield. Source: A. I. Johnson, U.S. Geological Survey Water-Supply Paper 1662-D, 1967.



VARIATION OF POROSITY, SPECIFIC YIELD, AND SPECIFIC RETENTION WITH GRAIN SIZE (AFTER BEAR, 1972)

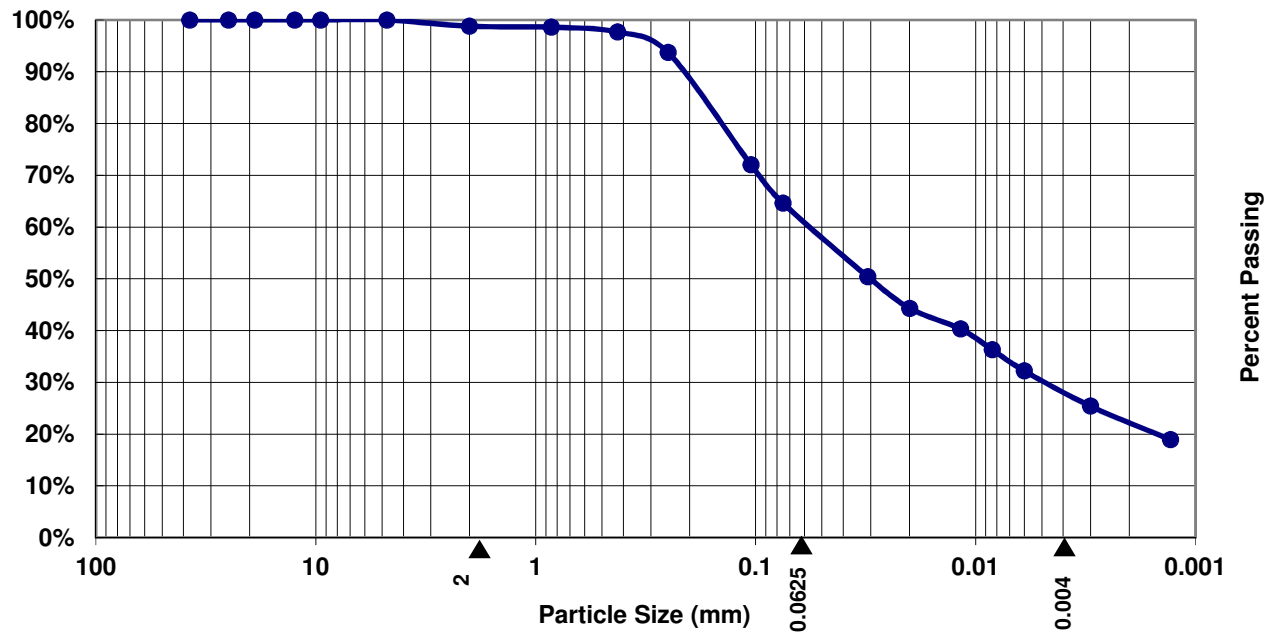
ESTIMATED TOTAL POROSITY: **43%**

PARTICLE SIZE ANALYSIS OF SOILS
FOR USE IN FETTER AND BEAR DIAGRAMS

Boring/Well No:	OW-412S	**Sample No:**	Bulk	**Depth:**	10 to 20 ft bgs

Sample Description: Yellow and Yellow-Brown, Sandy Lean Clay (CL)

Hydrostratigraphic Unit: Fill/Residuum



	> 2 mm	2 mm - 0.0625 mm	0.0625 mm - 0.004 mm	<0.004 mm
From Graph:	% Gravel 1.2%	% Sand 37.4%	% Silt 32.6%	% Clay 28.8%
Adjusted for Calculations	**0%**	**38%**	**33%**	**29%**

Notes:

Grain size distribution taken from grain size with hydrometer data located in Appendix IV.
Gravel, sand, silt and clay sizes based on Wentworth Scale.

Amec Foster Wheeler Project:
Dan River Landfill

Amec Foster Wheeler Project No:
7810-14-0065

amec foster wheeler

FETTER AND BEAR DIAGRAMS

Amec Foster Wheer Project: Dan River Landfill

Amec Foster Wheeler Project No: 7810-14-0065

Boring/Well ID:	OW-412S
Sample Depth:	10 to 20 ft bgs
% Sand	38%
% Silt	33%
% Clay	29%

***ESTIMATED SPECIFIC YIELD:**

4.5%

*While it is recognized that specific yield and effective porosity are not synonymous, in practice, they may be estimated to be approximately equal in value.

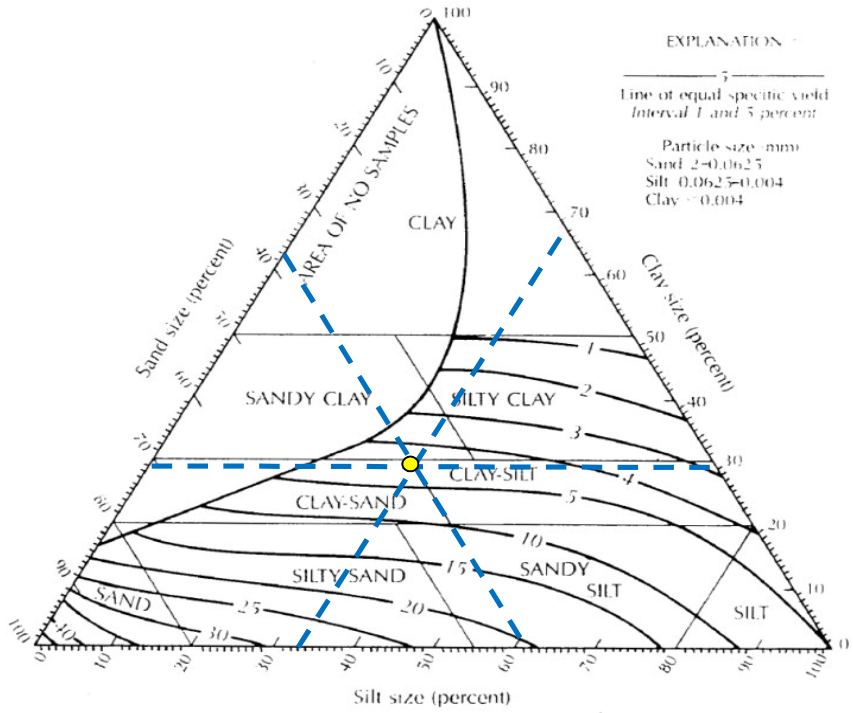
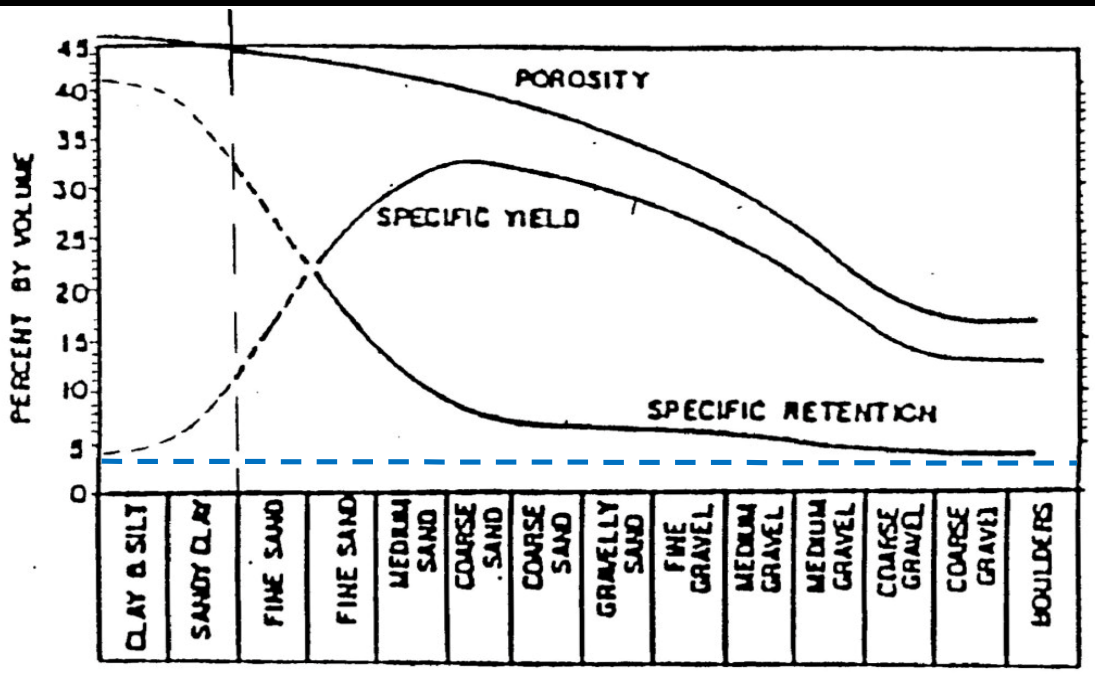


FIGURE 4.11 Textural classification triangle for unconsolidated materials showing the relation between particle size and specific yield. Source: A. I. Johnson, U.S. Geological Survey Water-Supply Paper 1662-D, 1967.



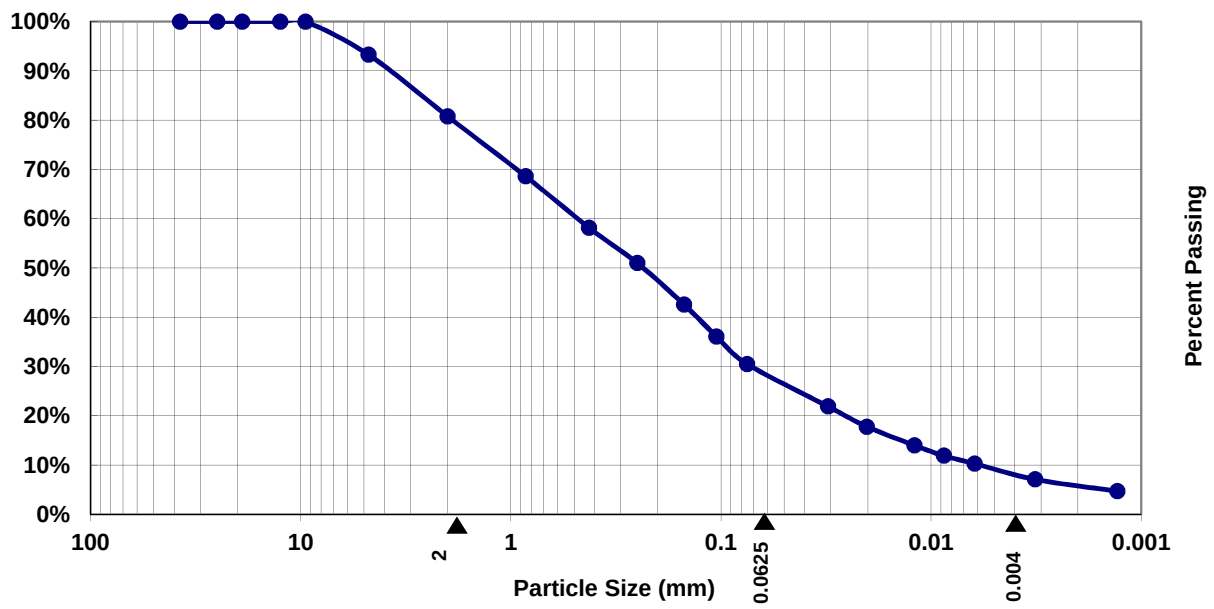
VARIATION OF POROSITY, SPECIFIC YIELD, AND SPECIFIC RETENTION WITH GRAIN SIZE (AFTER BEAR, 1972)

****ESTIMATED TOTAL POROSITY:** **46%**

**Estimated Based on Table of Selected Values of Porosity, Specific Yield, and Specific Retention, USGS Water Supply Paper 2220.

PARTICLE SIZE ANALYSIS OF SOILS
FOR USE IN FETTER AND BEAR DIAGRAMS

Boring/Well No:	OW-412S	**Sample No:**	SS-9	**Depth:**	43.5 to 45 ft bgs
Sample Description:	Brown-Yellow Silty Sand (SM)				
Hydrostratigraphic Unit:	Saprolite				



	> 2 mm	2 mm - 0.0625 mm	0.0625 mm - 0.004 mm	<0.004 mm
From Graph:	% Gravel 19.2%	% Sand 52.3%	% Silt 20.6%	% Clay 8.0%
Adjusted for Calculations	**0%**	**65%**	**25%**	**10%**

Notes:

Grain size distribution taken from grain size with hydrometer data located in Appendix IV.
Gravel, sand, silt and clay sizes based on Wentworth Scale.

Amec Foster Wheeler Project:
Dan River Landfill

Amec Foster Wheeler Project No:
7810-14-0065

FETTER AND BEAR DIAGRAMS

Amec Foster Wheer Project: Dan River Landfill

Amec Foster Wheeler Project No: 7810-14-0065

Boring/Well ID:	OW-412S
Sample Depth:	43.5 to 45 ft bgs
% Sand	65%
% Silt	25%
% Clay	10%
***ESTIMATED SPECIFIC YIELD:**	
19%	

*While it is recognized that specific yield and effective porosity are not synonymous, in practice, they may be estimated to be approximately equal in value.

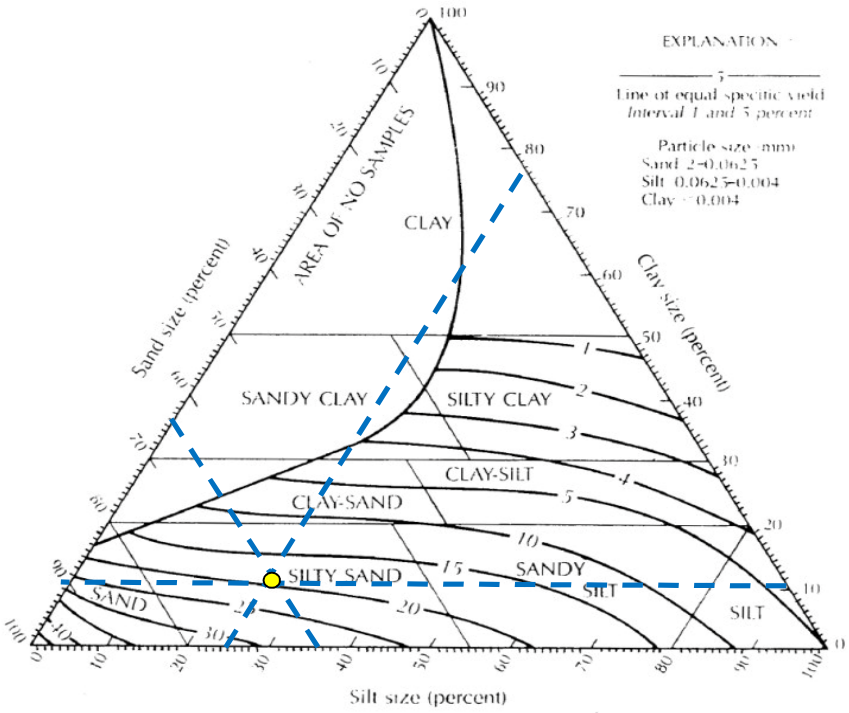
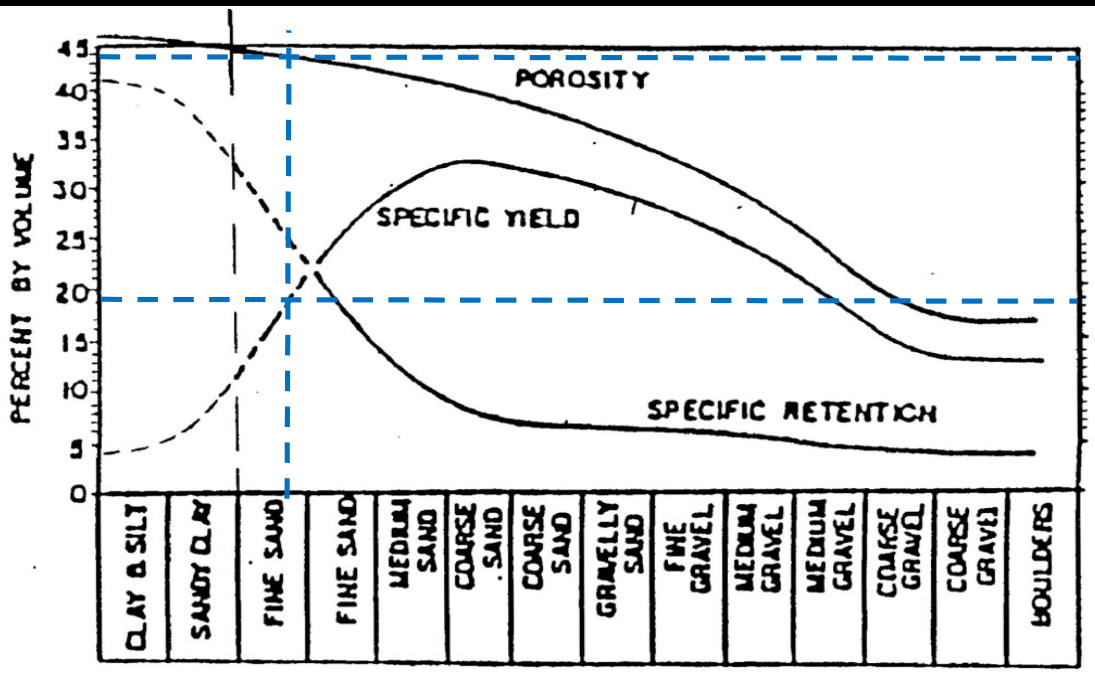


FIGURE 4.11 Textural classification triangle for unconsolidated materials showing the relation between particle size and specific yield. Source: A. I. Johnson, U.S. Geological Survey Water-Supply Paper 1662-D, 1967.



VARIATION OF POROSITY, SPECIFIC YIELD, AND SPECIFIC RETENTION WITH GRAIN SIZE (AFTER BEAR, 1972)

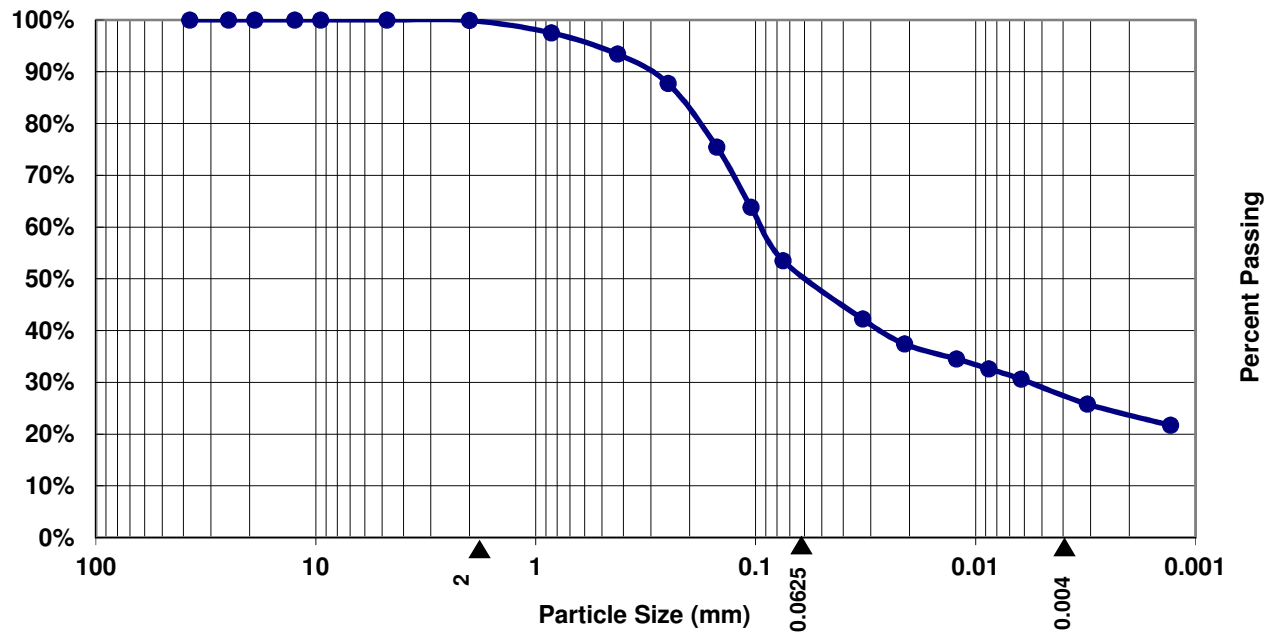
ESTIMATED TOTAL POROSITY: **44%**

PARTICLE SIZE ANALYSIS OF SOILS
FOR USE IN FETTER AND BEAR DIAGRAMS

Boring/Well No:	OW-413S	**Sample No:**	Bulk	**Depth:**	3.5 to 13.5 ft bgs

Sample Description: Yellow, Sandy Lean Clay (CL)

Hydrostratigraphic Unit: Saprolite



	> 2 mm	2 mm - 0.0625 mm	0.0625 mm - 0.004 mm	<0.004 mm
From Graph:	% Gravel 0.1%	% Sand 49.1%	% Silt 23.6%	% Clay 27.2%
Adjusted for Calculations	**0%**	**49%**	**24%**	**27%**

Notes:

Grain size distribution taken from grain size with hydrometer data located in Appendix IV.
Gravel, sand, silt and clay sizes based on Wentworth Scale.

Amec Foster Wheeler Project:
Dan River Landfill

Amec Foster Wheeler Project No:
7810-14-0065

amec foster wheeler

FETTER AND BEAR DIAGRAMS

Amec Foster Wheer Project: Dan River Landfill

Amec Foster Wheeler Project No: 7810-14-0065

Boring/Well ID:	OW-413S
Sample Depth:	3.5 to 13.5 ft bgs
% Sand	49%
% Silt	24%
% Clay	27%

***ESTIMATED SPECIFIC YIELD:**

5%

*While it is recognized that specific yield and effective porosity are not synonymous, in practice, they may be estimated to be approximately equal in value.

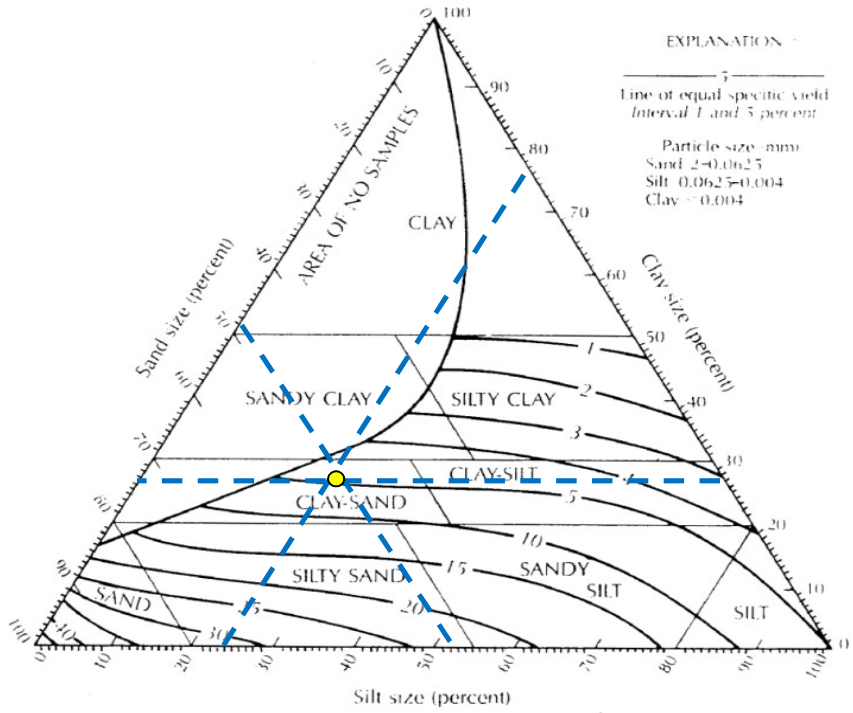
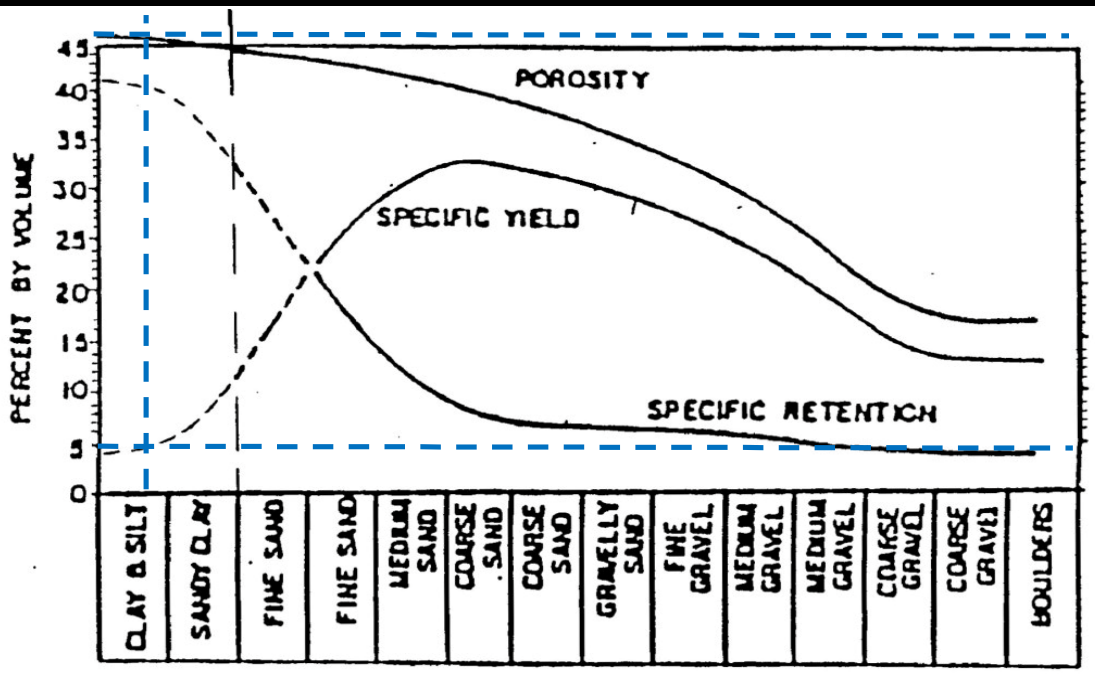


FIGURE 4.11 Textural classification triangle for unconsolidated materials showing the relation between particle size and specific yield. Source: A. I. Johnson, U.S. Geological Survey Water-Supply Paper 1662-D, 1967.

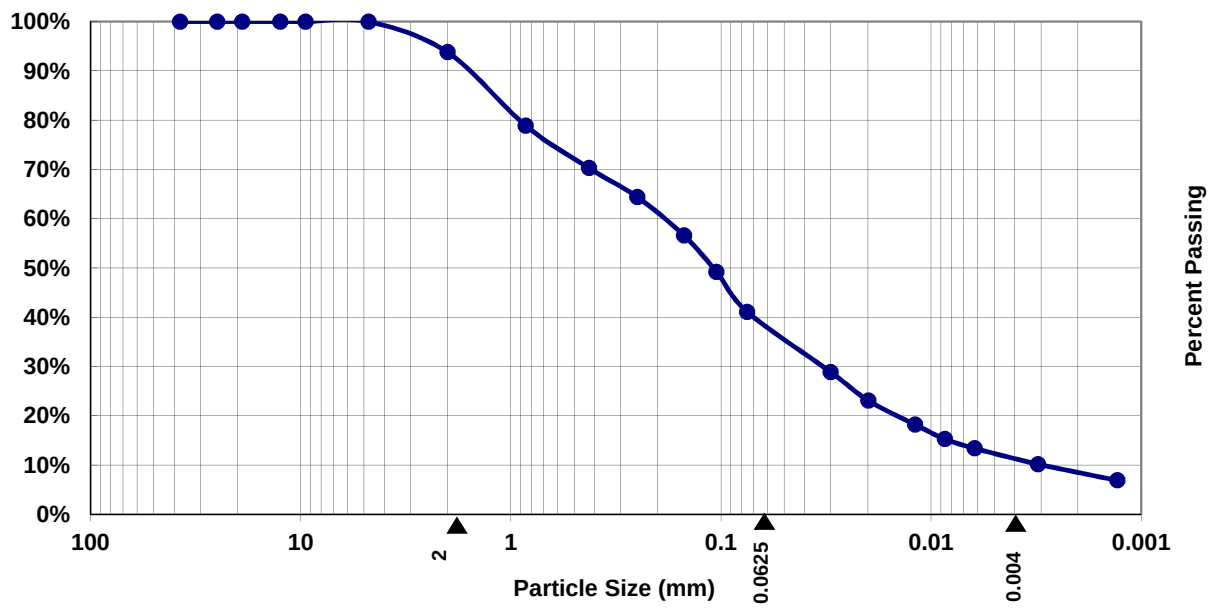


VARIATION OF POROSITY, SPECIFIC YIELD, AND SPECIFIC RETENTION WITH GRAIN SIZE (AFTER BEAR, 1972)

ESTIMATED TOTAL POROSITY: **46%**

PARTICLE SIZE ANALYSIS OF SOILS
FOR USE IN FETTER AND BEAR DIAGRAMS

Boring/Well No:	OW-413S	**Sample No:**	SS-4	**Depth:**	18.5 to 20 ft bgs
Sample Description:		Yellow-Brown Clayey Sand (SC)			
Hydrostratigraphic Unit:		Partially Weathered Rock (PWR)			



	> 2 mm	2 mm - 0.0625 mm	0.0625 mm - 0.004 mm	<0.004 mm
From Graph:	% Gravel 6.2%	% Sand 55.4%	% Silt 27.3%	% Clay 11.1%
Adjusted for Calculations	**0%**	**59%**	**29%**	**12%**

Notes:

Grain size distribution taken from grain size with hydrometer data located in Appendix IV.
Gravel, sand, silt and clay sizes based on Wentworth Scale.

Amec Foster Wheeler Project:
Dan River Landfill

Amec Foster Wheeler Project No:
7810-14-0065

FETTER AND BEAR DIAGRAMS

Amec Foster Wheer Project: Dan River Landfill

Amec Foster Wheeler Project No: 7810-14-0065

Boring/Well ID:	OW-413S
Sample Depth:	18.5 to 20 ft bgs
% Sand	59%
% Silt	29%
% Clay	12%
***ESTIMATED SPECIFIC YIELD:**	
17%	

*While it is recognized that specific yield and effective porosity are not synonymous, in practice, they may be estimated to be approximately equal in value.

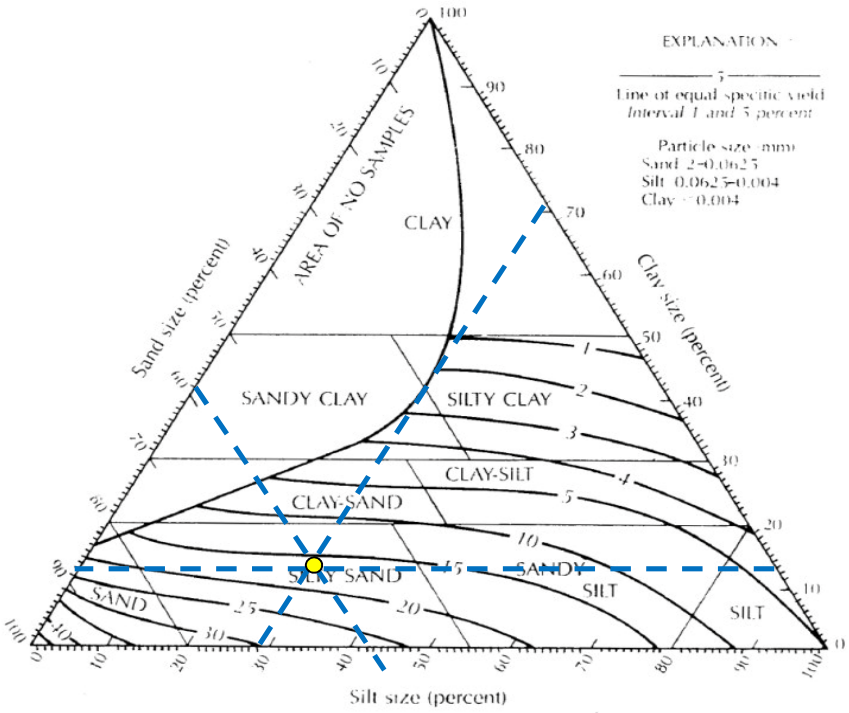
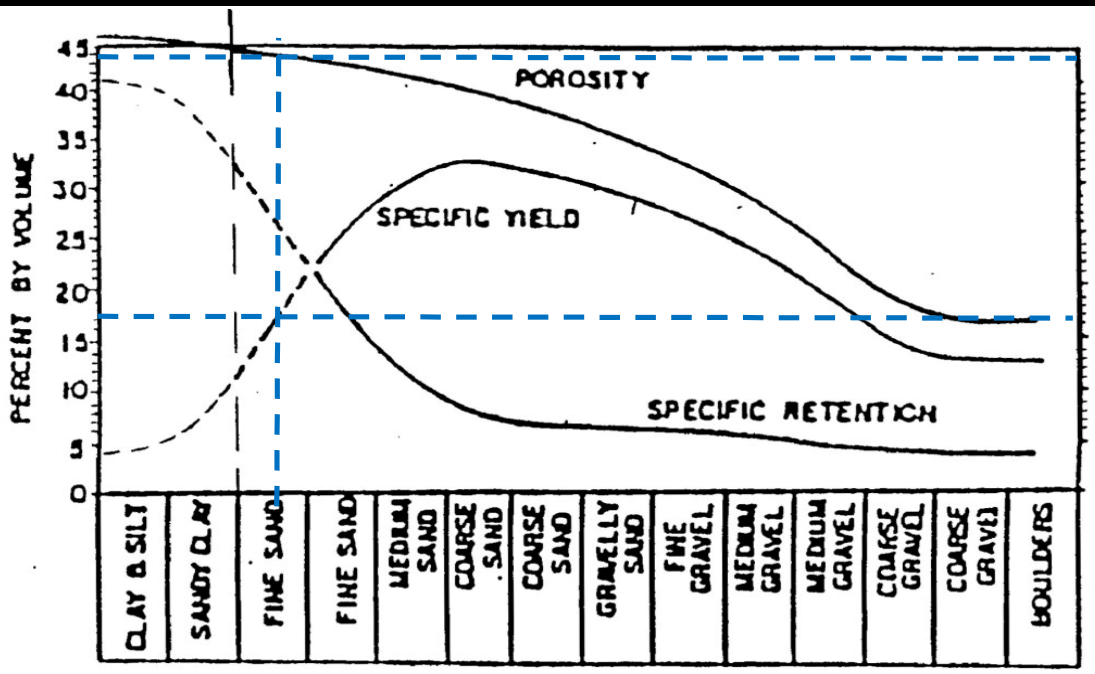


FIGURE 4.11 Textural classification triangle for unconsolidated materials showing the relation between particle size and specific yield. Source: A. I. Johnson, U.S. Geological Survey Water-Supply Paper 1662-D, 1967.

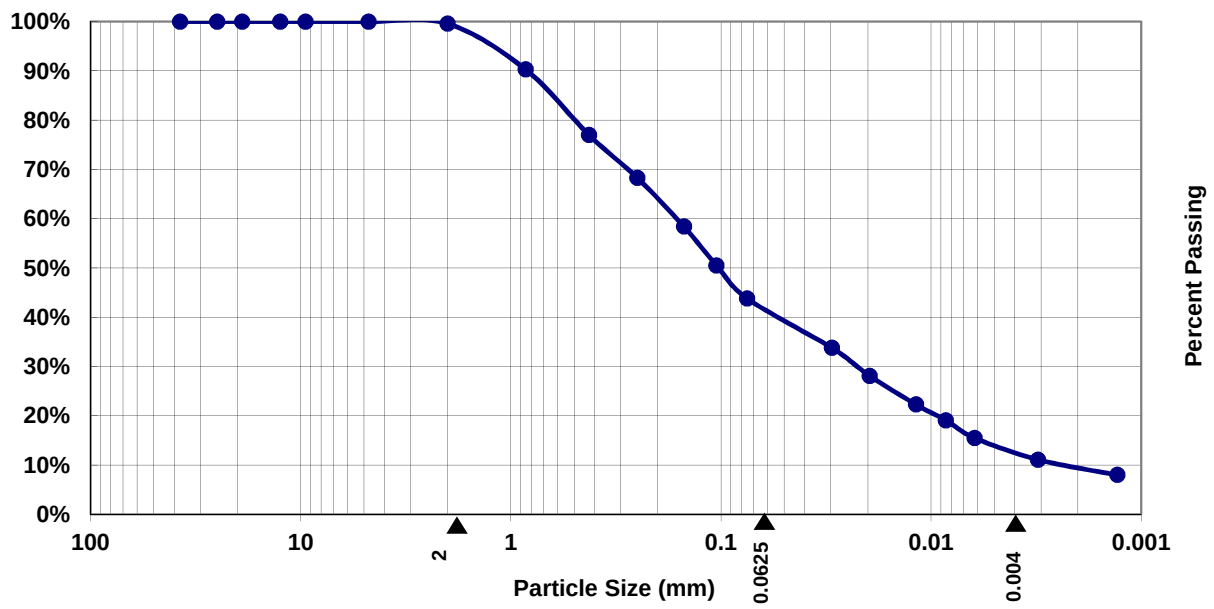


VARIATION OF POROSITY, SPECIFIC YIELD, AND SPECIFIC RETENTION WITH GRAIN SIZE (AFTER BEAR, 1972)

ESTIMATED TOTAL POROSITY: **44%**

PARTICLE SIZE ANALYSIS OF SOILS
FOR USE IN FETTER AND BEAR DIAGRAMS

Boring/Well No:	OW-415S	**Sample No:**	SS-3	**Depth:**	13.5 to 15 ft bgs
Sample Description:		Yellow-Tan Clayey Sand (SC)			
Hydrostratigraphic Unit:		Saprolite			



	> 2 mm	2 mm - 0.0625 mm	0.0625 mm - 0.004 mm	<0.004 mm
From Graph:	% Gravel 0.4%	% Sand 58.0%	% Silt 29.2%	% Clay 12.4%
Adjusted for Calculations	**0%**	**58%**	**29%**	**12%**

Notes:

Grain size distribution taken from grain size with hydrometer data located in Appendix IV.
Gravel, sand, silt and clay sizes based on Wentworth Scale.

Amec Foster Wheeler Project:
Dan River Landfill

Amec Foster Wheeler Project No:
7810-14-0065

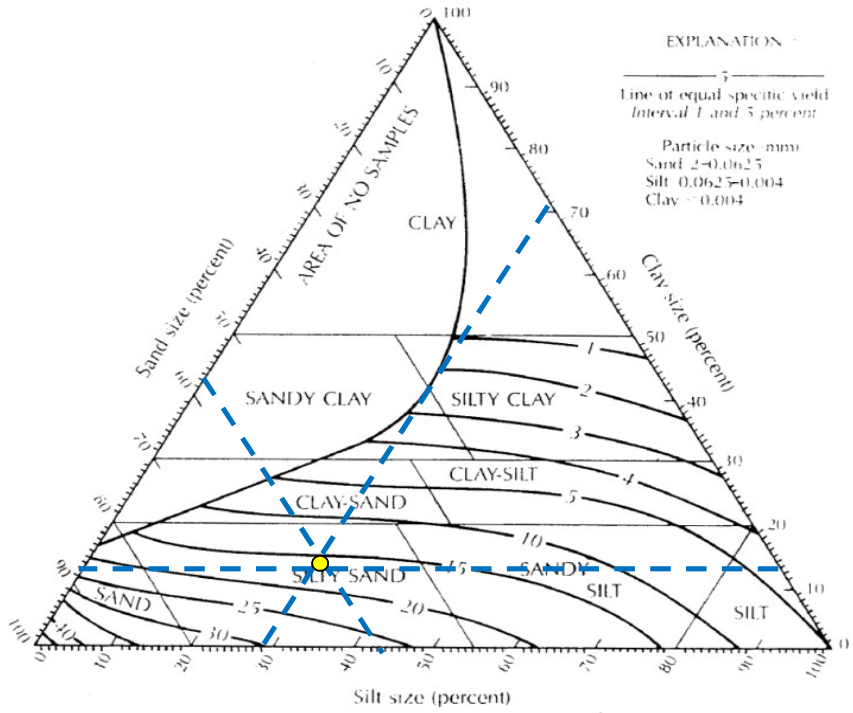
FETTER AND BEAR DIAGRAMS

Amec Foster Wheer Project: Dan River Landfill

Amec Foster Wheeler Project No: 7810-14-0065

Boring/Well ID:	OW-415S
Sample Depth:	13.5 to 15 ft bgs
% Sand	58%
% Silt	29%
% Clay	12%
***ESTIMATED SPECIFIC YIELD:**	
16%	

*While it is recognized that specific yield and effective porosity are not synonymous, in practice, they may be estimated to be approximately equal in value.



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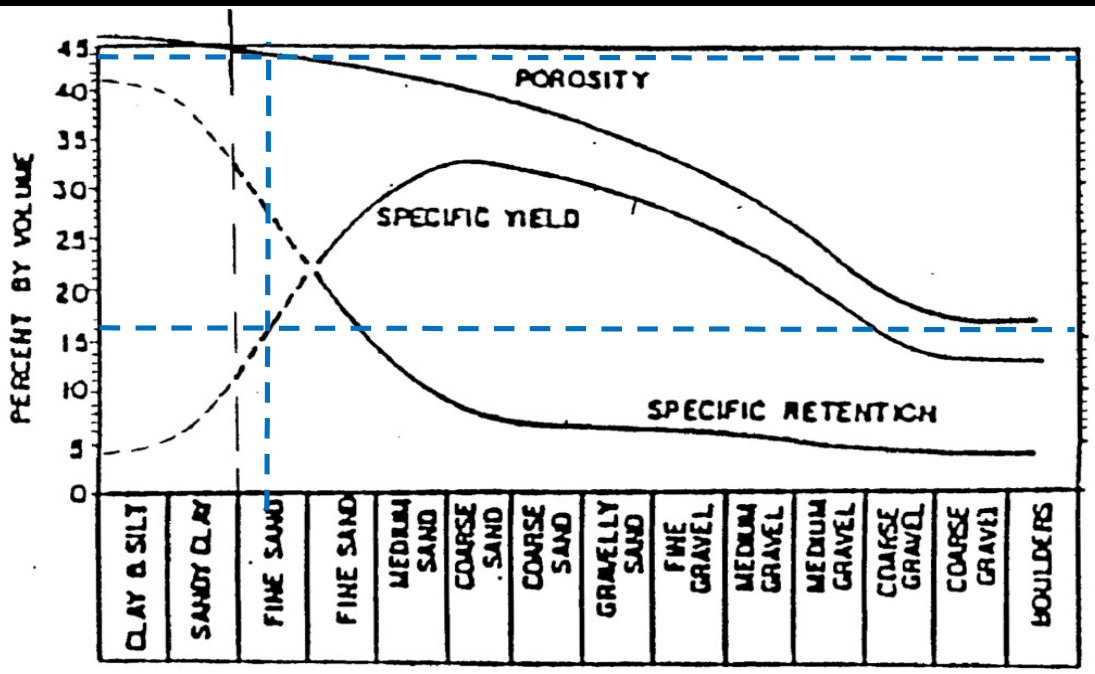
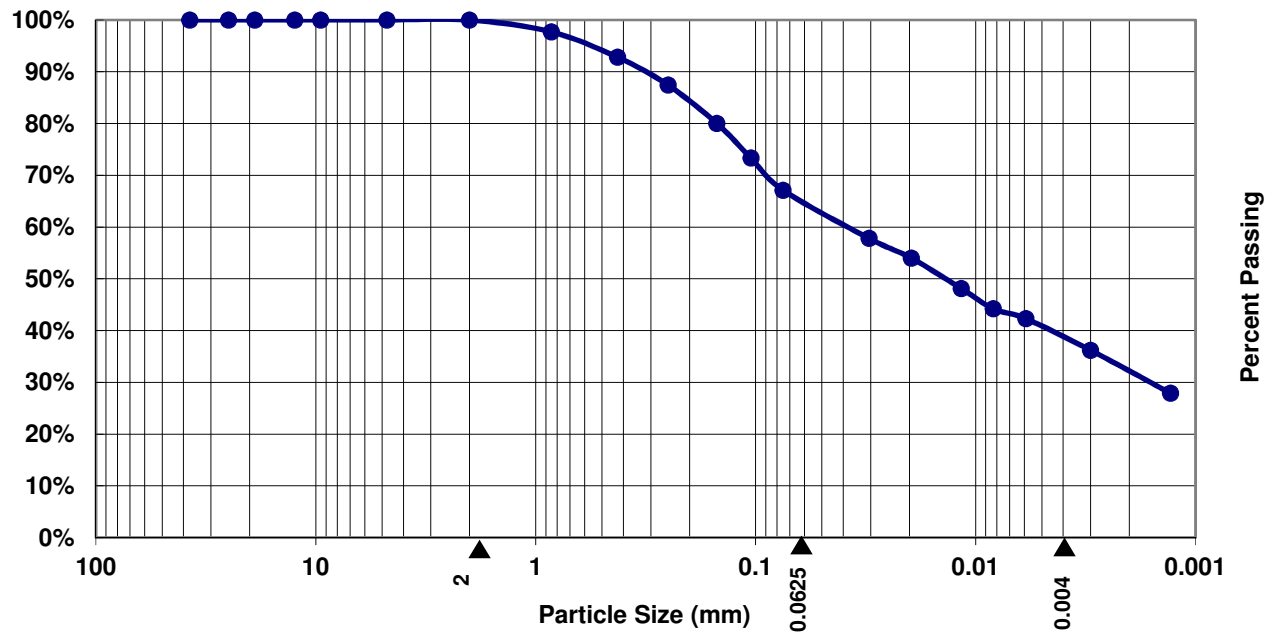


VARIATION OF POROSITY, SPECIFIC YIELD, AND SPECIFIC RETENTION WITH GRAIN SIZE (AFTER BEAR, 1972)

ESTIMATED TOTAL POROSITY: **44%**

PARTICLE SIZE ANALYSIS OF SOILS
FOR USE IN FETTER AND BEAR DIAGRAMS

Boring/Well No:	OW-416D	**Sample No:**	Bulk	**Depth:**	0 to 10 ft bgs
Sample Description:	Yellow Sandy Lean Clay (CL)				
Hydrostratigraphic Unit:	Fill/Saprolite				



	> 2 mm	2 mm - 0.0625 mm	0.0625 mm - 0.004 mm	<0.004 mm
From Graph:	% Gravel 0.0%	% Sand 35.0%	% Silt 26.7%	% Clay 38.3%
Adjusted for Calculations	**0%**	**35%**	**27%**	**38%**

Notes:

Grain size distribution taken from grain size with hydrometer data located in Appendix IV.
Gravel, sand, silt and clay sizes based on Wentworth Scale.

Amec Foster Wheeler Project:
Dan River Landfill

Amec Foster Wheeler Project No:
7810-14-0065

amec foster wheeler

FETTER AND BEAR DIAGRAMS

Amec Foster Wheer Project: Dan River Landfill

Amec Foster Wheeler Project No: 7810-14-0065

Boring/Well ID:	OW-416D
Sample Depth:	0 to 10 ft bgs
% Sand	35%
% Silt	27%
% Clay	38%

***ESTIMATED SPECIFIC YIELD:**

3%

*While it is recognized that specific yield and effective porosity are not synonymous, in practice, they may be estimated to be approximately equal in value.

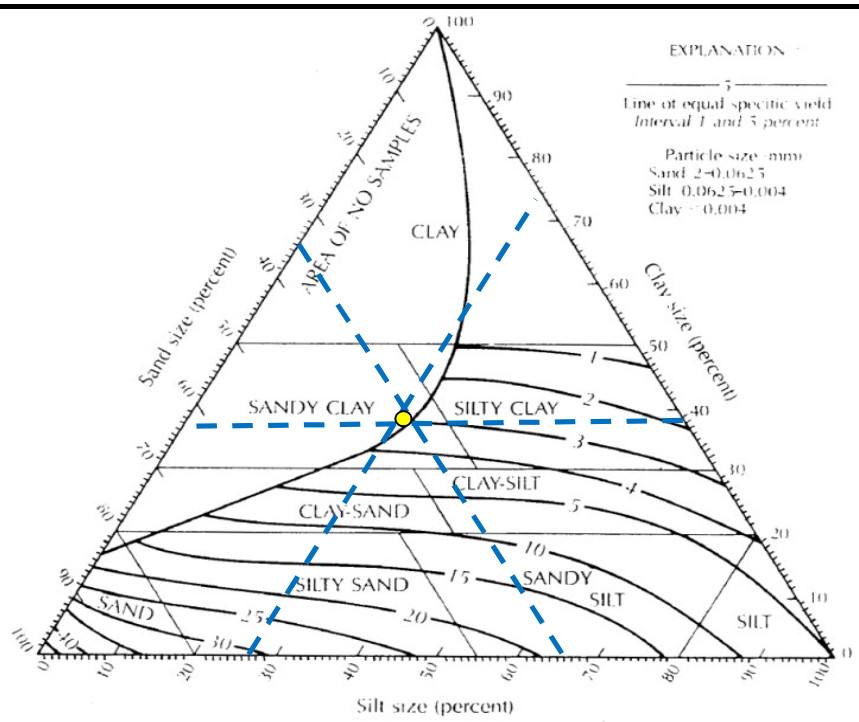
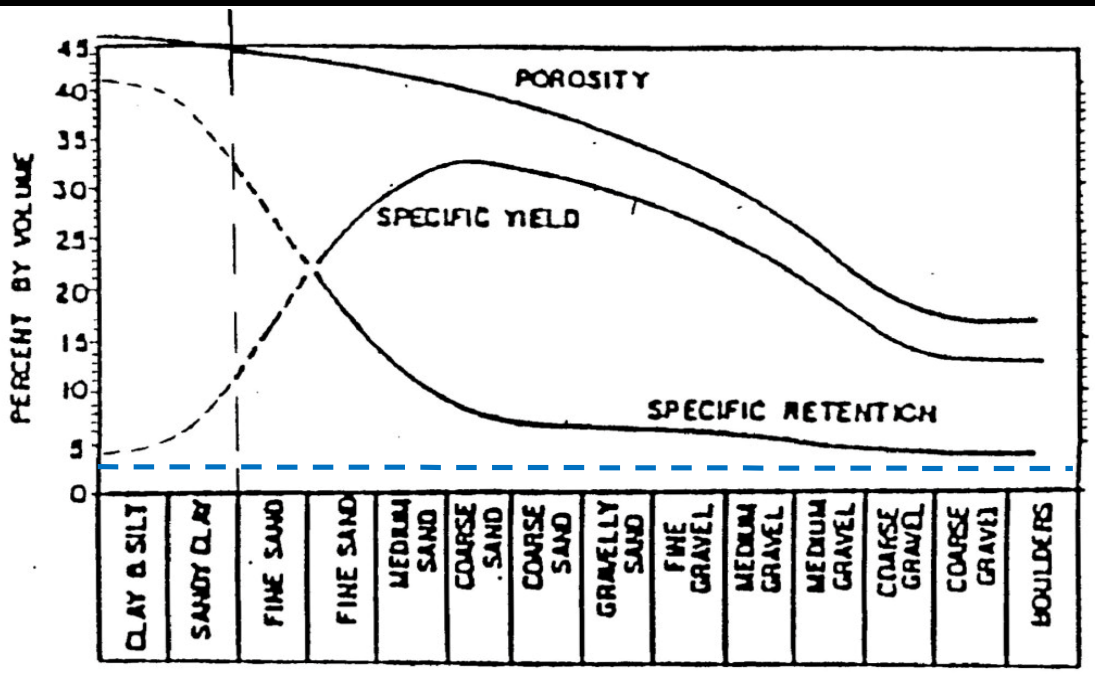


FIGURE 4.11 Textural classification triangle for unconsolidated materials showing the relation between particle size and specific yield. Source: A. I. Johnson, U.S. Geological Survey Water-Supply Paper 1662-D, 1967.



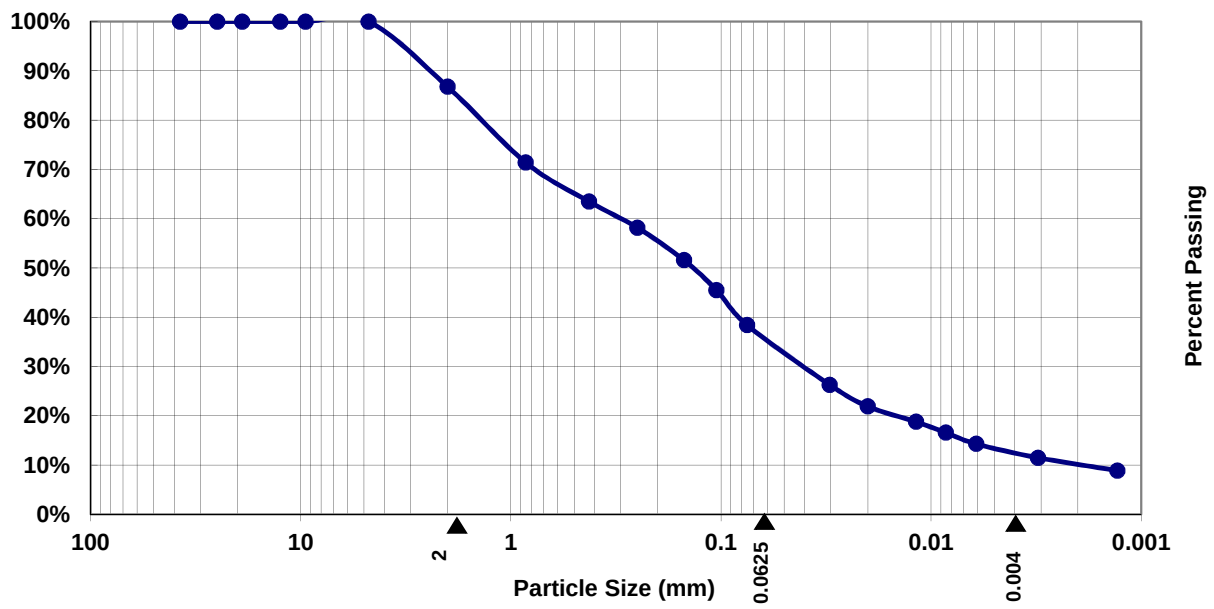
VARIATION OF POROSITY, SPECIFIC YIELD, AND SPECIFIC RETENTION WITH GRAIN SIZE (AFTER BEAR, 1972)

****ESTIMATED TOTAL POROSITY:** **48%**

**Estimated Based on Table of Selected Values of Porosity, Specific Yield, and Specific Retention, USGS Water Supply Paper 2220.

PARTICLE SIZE ANALYSIS OF SOILS
FOR USE IN FETTER AND BEAR DIAGRAMS

Boring/Well No:	OW-416S	**Sample No:**	SS-5	**Depth:**	23.5 to 25 ft bgs
Sample Description:		Yellow-Tan Clayey Sand (SC)			
Hydrostratigraphic Unit:		Partially Weathered Rock (PWR)			



	> 2 mm	2 mm - 0.0625 mm	0.0625 mm - 0.004 mm	<0.004 mm
From Graph:	% Gravel 13.2%	% Sand 51.1%	% Silt 23.3%	% Clay 12.3%
Adjusted for Calculations	**0%**	**59%**	**27%**	**14%**

Notes:

Grain size distribution taken from grain size with hydrometer data located in Appendix IV.
Gravel, sand, silt and clay sizes based on Wentworth Scale.

Amec Foster Wheeler Project:
Dan River Landfill

Amec Foster Wheeler Project No:
7810-14-0065

FETTER AND BEAR DIAGRAMS

Amec Foster Wheer Project: Dan River Landfill

Amec Foster Wheeler Project No: 7810-14-0065

Boring/Well ID:	OW-416S
Sample Depth:	23.5 to 25 ft bgs
% Sand	59%
% Silt	27%
% Clay	14%
***ESTIMATED SPECIFIC YIELD:**	
16%	

*While it is recognized that specific yield and effective porosity are not synonymous, in practice, they may be estimated to be approximately equal in value.

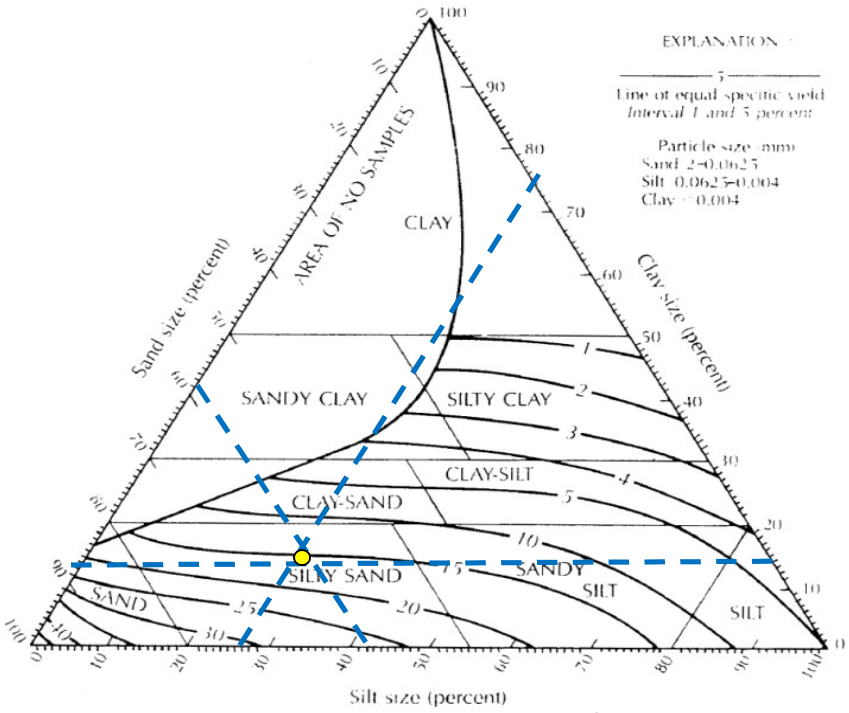
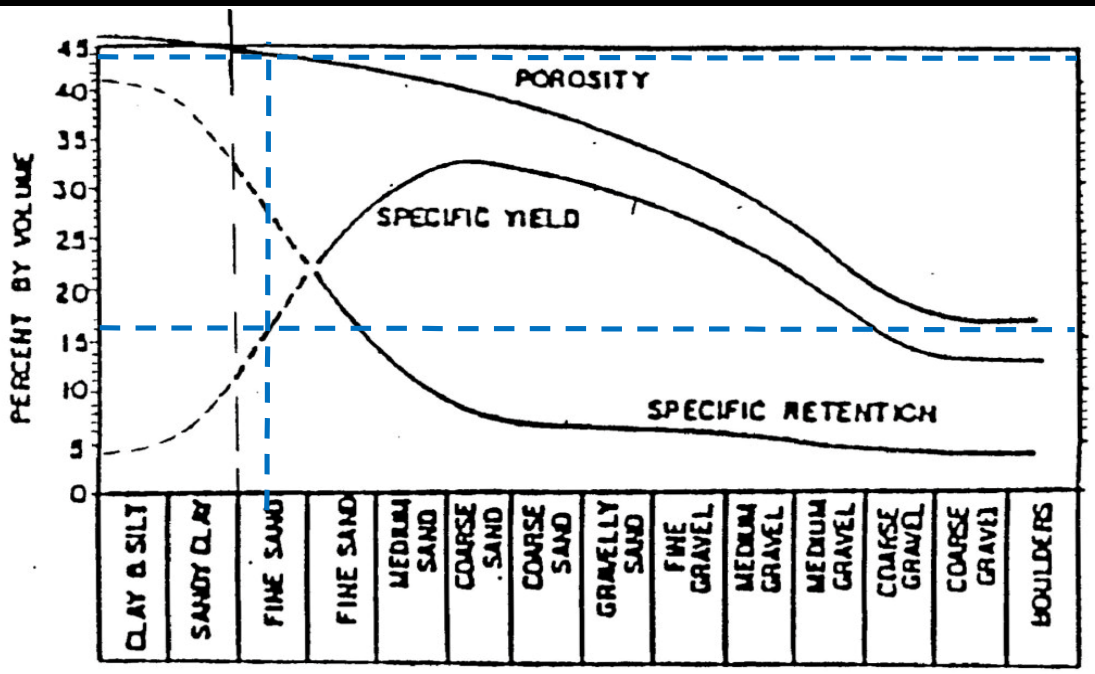


FIGURE 4.11 Textural classification triangle for unconsolidated materials showing the relation between particle size and specific yield. Source: A. I. Johnson, U.S. Geological Survey Water-Supply Paper 1662-D, 1967.

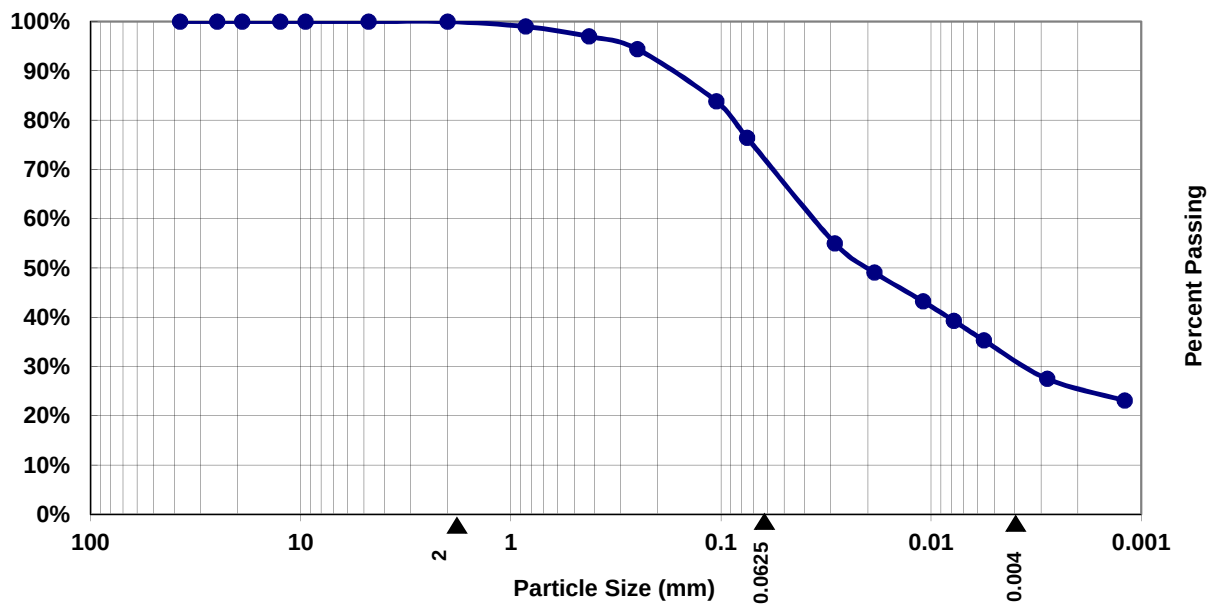


VARIATION OF POROSITY, SPECIFIC YIELD, AND SPECIFIC RETENTION WITH GRAIN SIZE (AFTER BEAR, 1972)

ESTIMATED TOTAL POROSITY: **44%**

PARTICLE SIZE ANALYSIS OF SOILS
FOR USE IN FETTER AND BEAR DIAGRAMS

Boring/Well No:	OW-417D	**Sample No:**	UD-1	**Depth:**	2 to 4 ft bgs
Sample Description:	Light Brown, Elastic Silt with Sand (MH)				
Hydrostratigraphic Unit:	Saprolite				



	> 2 mm	2 mm - 0.0625 mm	0.0625 mm - 0.004 mm	<0.004 mm
From Graph:	% Gravel 0.0%	% Sand 28.2%	% Silt 39.4%	% Clay 32.4%
Adjusted for Calculations	**0%**	**28%**	**39%**	**32%**

Notes:

Grain size distribution taken from grain size with hydrometer data located in Appendix IV.
Gravel, sand, silt and clay sizes based on Wentworth Scale.

Amec Foster Wheeler Project:
Dan River Landfill

Amec Foster Wheeler Project No:
7810-14-0065

FETTER AND BEAR DIAGRAMS

Amec Foster Wheer Project: Dan River Landfill

Amec Foster Wheeler Project No: 7810-14-0065

Boring/Well ID:	OW-417D
Sample Depth:	2 to 4 ft bgs
% Sand	28%
% Silt	39%
% Clay	32%
***ESTIMATED SPECIFIC YIELD:**	
4%	

*While it is recognized that specific yield and effective porosity are not synonymous, in practice, they may be estimated to be approximately equal in value.

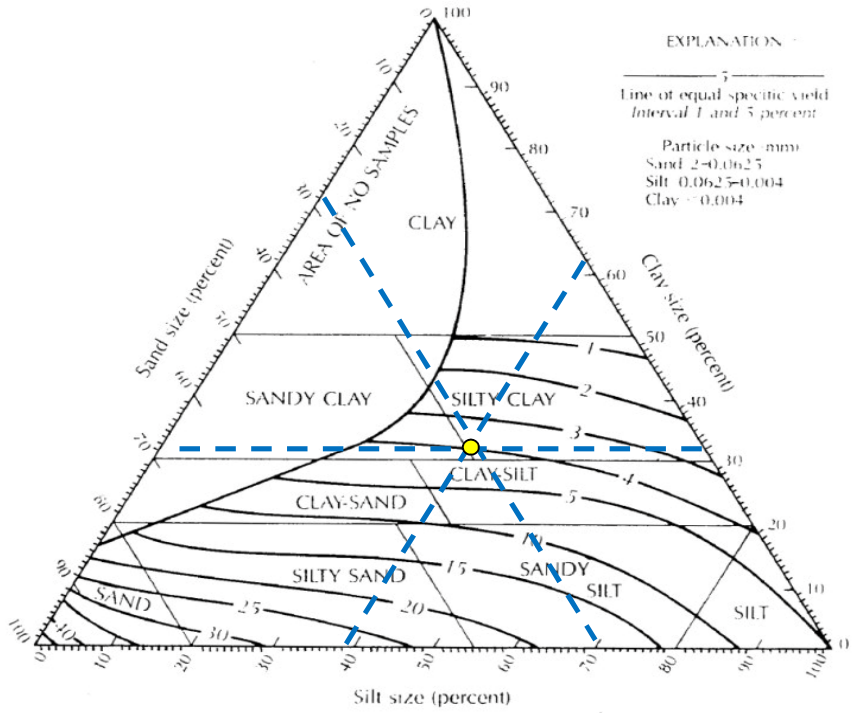
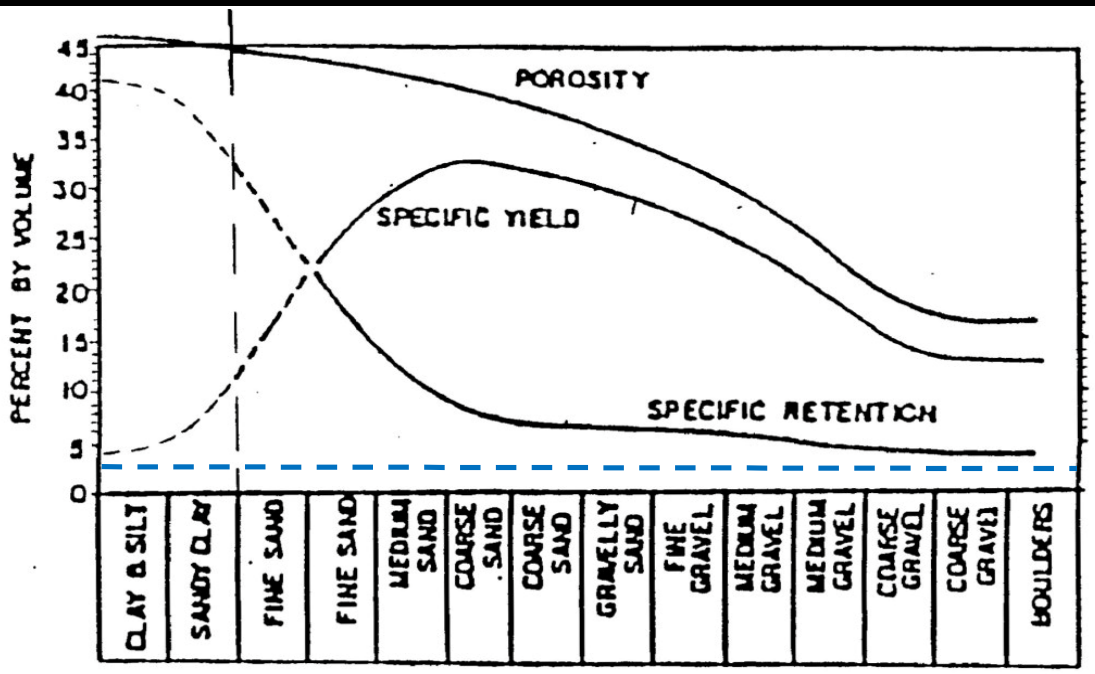


FIGURE 4.11 Textural classification triangle for unconsolidated materials showing the relation between particle size and specific yield. Source: A. I. Johnson, U.S. Geological Survey Water-Supply Paper 1662-D, 1967.



VARIATION OF POROSITY, SPECIFIC YIELD, AND SPECIFIC RETENTION WITH GRAIN SIZE (AFTER BEAR, 1972)

****ESTIMATED TOTAL POROSITY:** **47%**

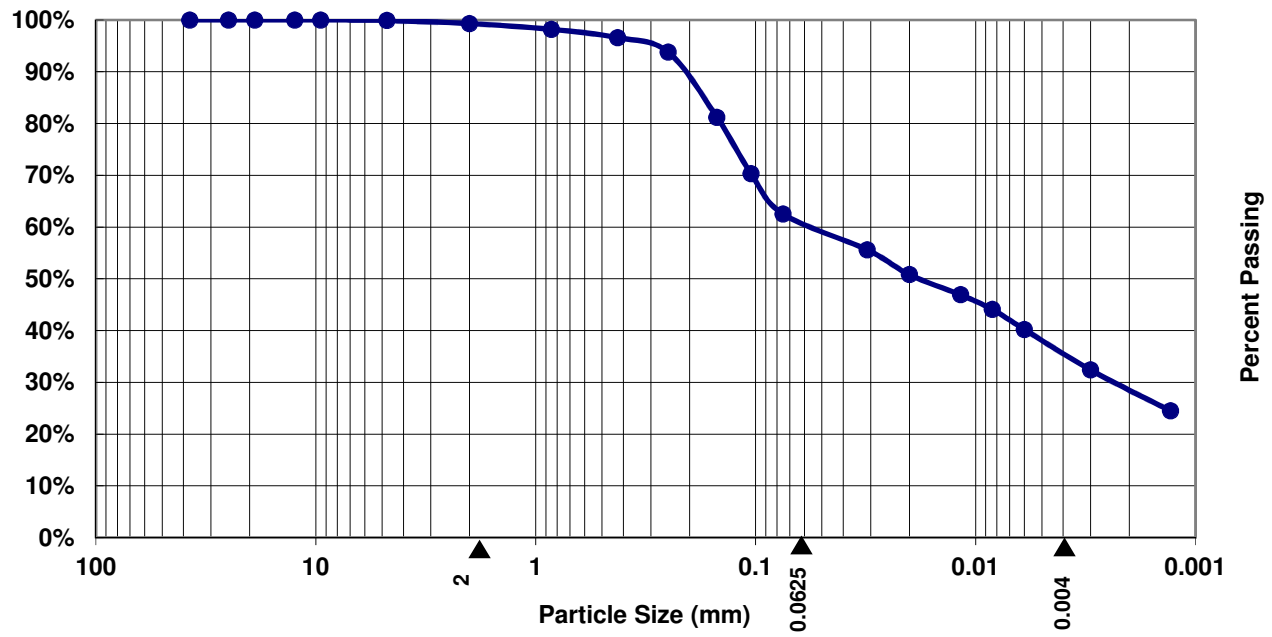
**Estimated Based on Table of Selected Values of Porosity, Specific Yield, and Specific Retention, USGS Water Supply Paper 2220.

PARTICLE SIZE ANALYSIS OF SOILS
FOR USE IN FETTER AND BEAR DIAGRAMS

Boring/Well No:	OW-417D	**Sample No:**	Bulk	**Depth:**	10 to 20 ft bgs

Sample Description: Yellow Sandy Lean Clay (CL)

Hydrostratigraphic Unit: Partially Weathered Rock (PWR) / Saprolite



	> 2 mm	2 mm - 0.0625 mm	0.0625 mm - 0.004 mm	<0.004 mm
From Graph:	% Gravel 0.7%	% Sand 38.4%	% Silt 25.9%	% Clay 35.0%
Adjusted for Calculations	**0%**	**39%**	**26%**	**35%**

Notes:

Grain size distribution taken from grain size with hydrometer data located in Appendix IV.
Gravel, sand, silt and clay sizes based on Wentworth Scale.

Amec Foster Wheeler Project:
Dan River Landfill

Amec Foster Wheeler Project No:
7810-14-0065

amec foster wheeler

FETTER AND BEAR DIAGRAMS

Amec Foster Wheer Project: Dan River Landfill

Amec Foster Wheeler Project No: 7810-14-0065

Boring/Well ID:	OW-417D
Sample Depth:	10 to 20 ft bgs
% Sand	39%
% Silt	26%
% Clay	35%
***ESTIMATED SPECIFIC YIELD:**	
4%	

*While it is recognized that specific yield and effective porosity are not synonymous, in practice, they may be estimated to be approximately equal in value.

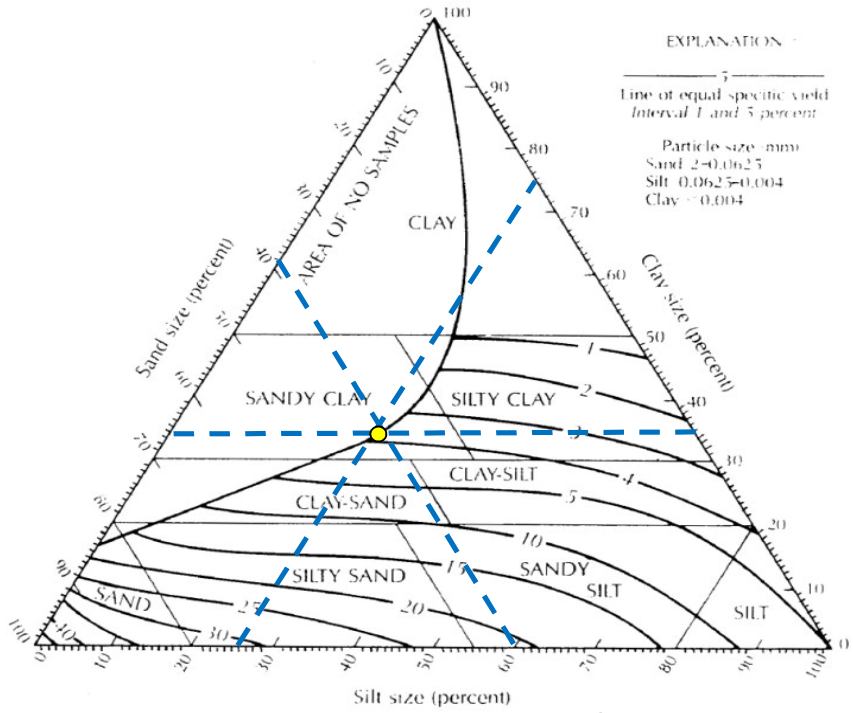
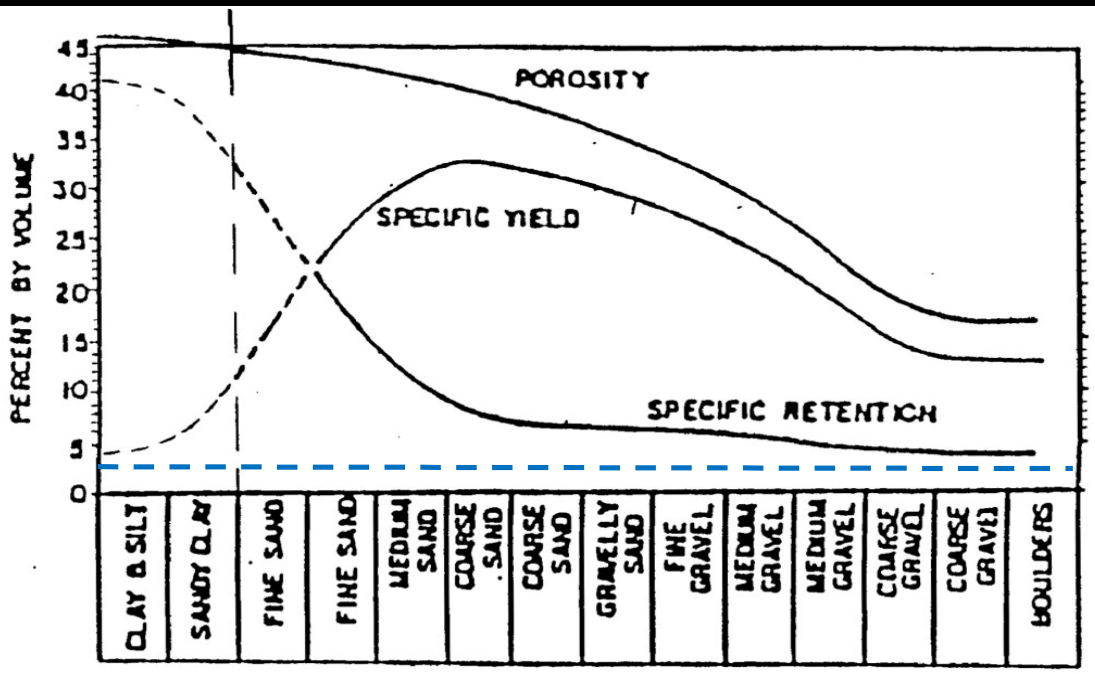


FIGURE 4.11 Textural classification triangle for unconsolidated materials showing the relation between particle size and specific yield. Source: A. I. Johnson, U.S. Geological Survey Water-Supply Paper 1662-D, 1967.



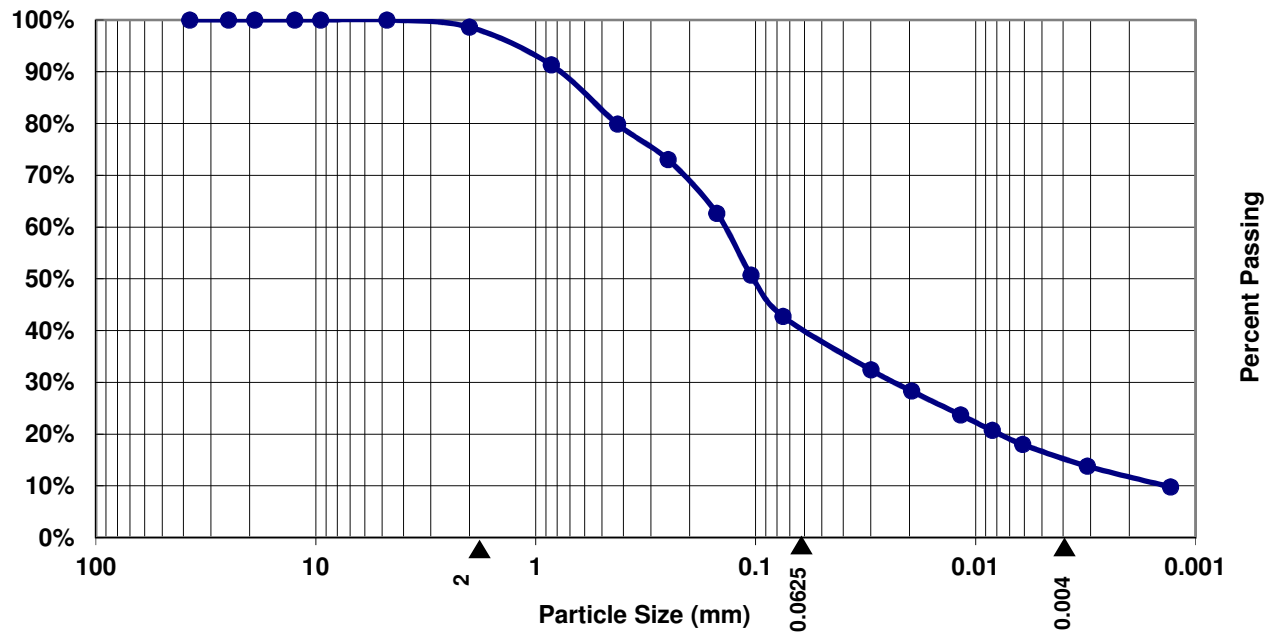
VARIATION OF POROSITY, SPECIFIC YIELD, AND SPECIFIC RETENTION WITH GRAIN SIZE (AFTER BEAR, 1972)

****ESTIMATED TOTAL POROSITY:** **47%**

**Estimated Based on Table of Selected Values of Porosity, Specific Yield, and Specific Retention, USGS Water Supply Paper 2220.

PARTICLE SIZE ANALYSIS OF SOILS
FOR USE IN FETTER AND BEAR DIAGRAMS

Boring/Well No:	OW-417S	**Sample No:**	SS-5/SS-6	**Depth:**	23.5 to 30 ft bgs
Sample Description:	Yellow-Tan Clayey Sand (SC)				
Hydrostratigraphic Unit:	Saprolite/Partially Weathered Rock (PWR)				



	> 2 mm	2 mm - 0.0625 mm	0.0625 mm - 0.004 mm	<0.004 mm
From Graph:	% Gravel 1.4%	% Sand 58.2%	% Silt 25.4%	% Clay 15.1%
Adjusted for Calculations	**0%**	**59%**	**26%**	**15%**

Notes:

Grain size distribution taken from grain size with hydrometer data located in Appendix IV.
Gravel, sand, silt and clay sizes based on Wentworth Scale.

Amec Foster Wheeler Project:
Dan River Landfill

Amec Foster Wheeler Project No:
7810-14-0065

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FETTER AND BEAR DIAGRAMS

Amec Foster Wheer Project: Dan River Landfill

Amec Foster Wheeler Project No: 7810-14-0065

Boring/Well ID:	OW-417S
Sample Depth:	23.5 to 30 ft bgs
% Sand	59%
% Silt	26%
% Clay	15%
***ESTIMATED SPECIFIC YIELD:**	
15%	

*While it is recognized that specific yield and effective porosity are not synonymous, in practice, they may be estimated to be approximately equal in value.

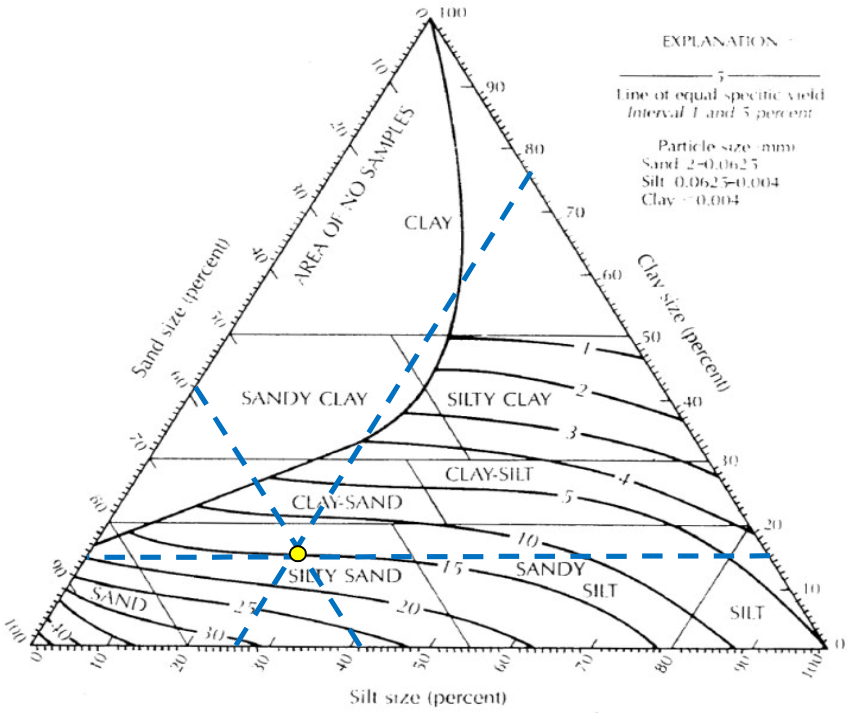
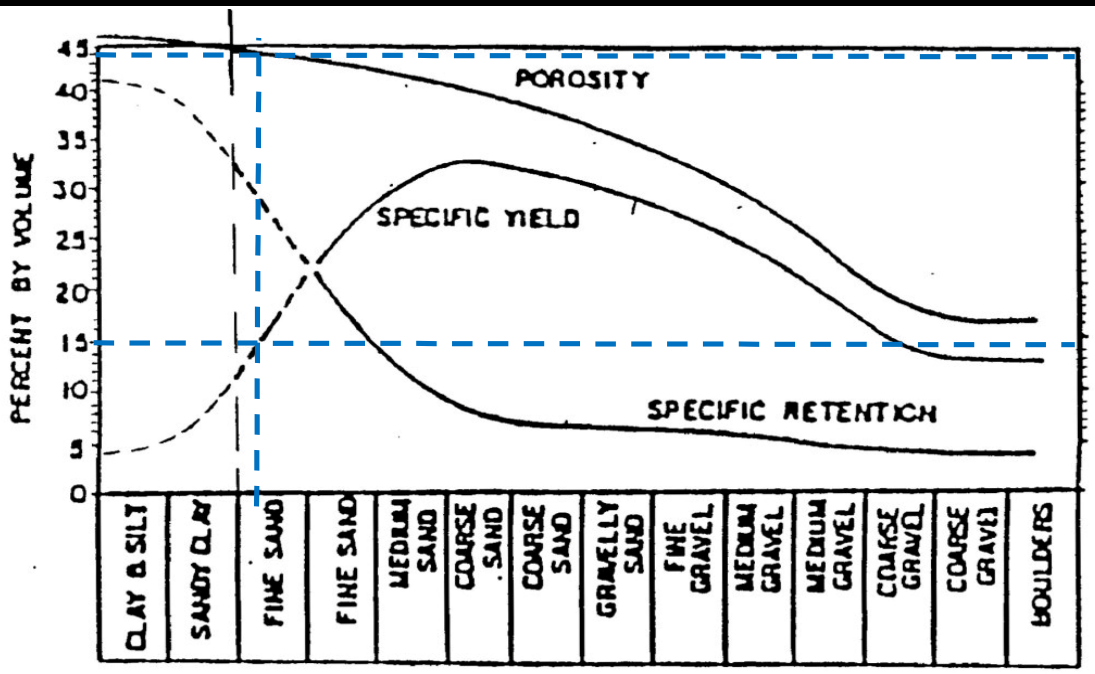


FIGURE 4.11 Textural classification triangle for unconsolidated materials showing the relation between particle size and specific yield. Source: A. I. Johnson, U.S. Geological Survey Water-Supply Paper 1662-D, 1967.

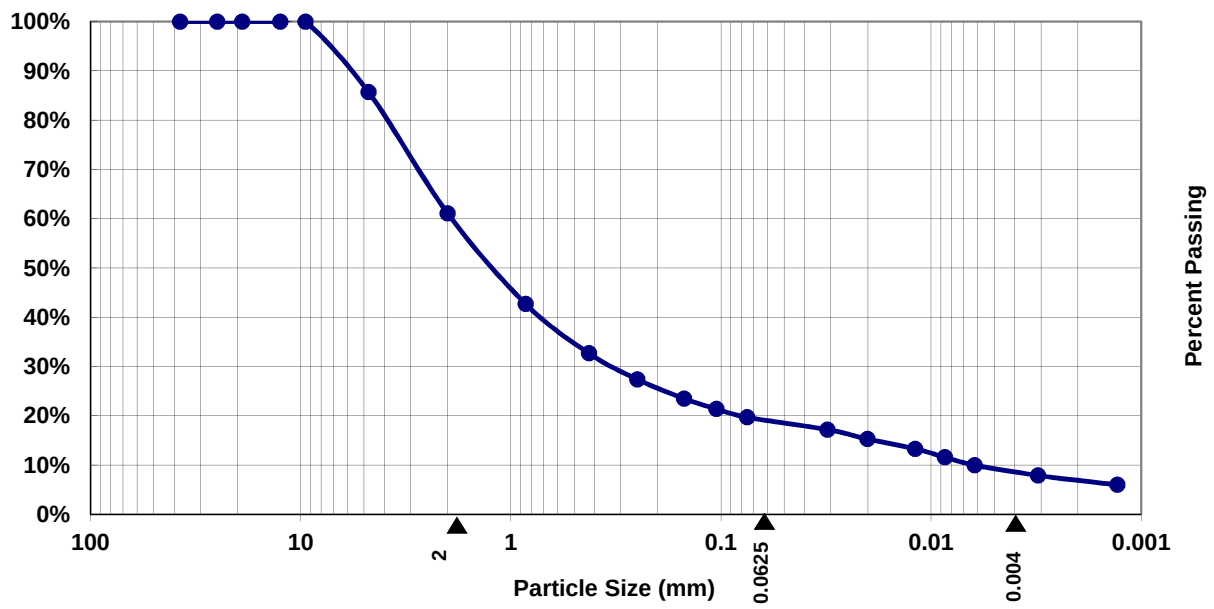


VARIATION OF POROSITY, SPECIFIC YIELD, AND SPECIFIC RETENTION WITH GRAIN SIZE (AFTER BEAR, 1972)

ESTIMATED TOTAL POROSITY: **44%**

PARTICLE SIZE ANALYSIS OF SOILS
FOR USE IN FETTER AND BEAR DIAGRAMS

Boring/Well No:	OW-419S	**Sample No:**	SS-4	**Depth:**	18.5 to 20 ft bgs
Sample Description:		Tan-Gray Silty Sand (SM)			
Hydrostratigraphic Unit:		Partially Weathered Rock (PWR)			



	> 2 mm	2 mm - 0.0625 mm	0.0625 mm - 0.004 mm	<0.004 mm
From Graph:	% Gravel 38.9%	% Sand 42.0%	% Silt 10.6%	% Clay 8.5%
Adjusted for Calculations	**0%**	**69%**	**17%**	**14%**

Notes:

Grain size distribution taken from grain size with hydrometer data located in Appendix IV.
Gravel, sand, silt and clay sizes based on Wentworth Scale.

Amec Foster Wheeler Project:
Dan River Landfill

Amec Foster Wheeler Project No:
7810-14-0065

FETTER AND BEAR DIAGRAMS

Amec Foster Wheer Project: Dan River Landfill

Amec Foster Wheeler Project No: 7810-14-0065

Boring/Well ID:	OW-419S
Sample Depth:	18.5 to 20 ft bgs
% Sand	69%
% Silt	17%
% Clay	14%
***ESTIMATED SPECIFIC YIELD:**	
17%	

*While it is recognized that specific yield and effective porosity are not synonymous, in practice, they may be estimated to be approximately equal in value.

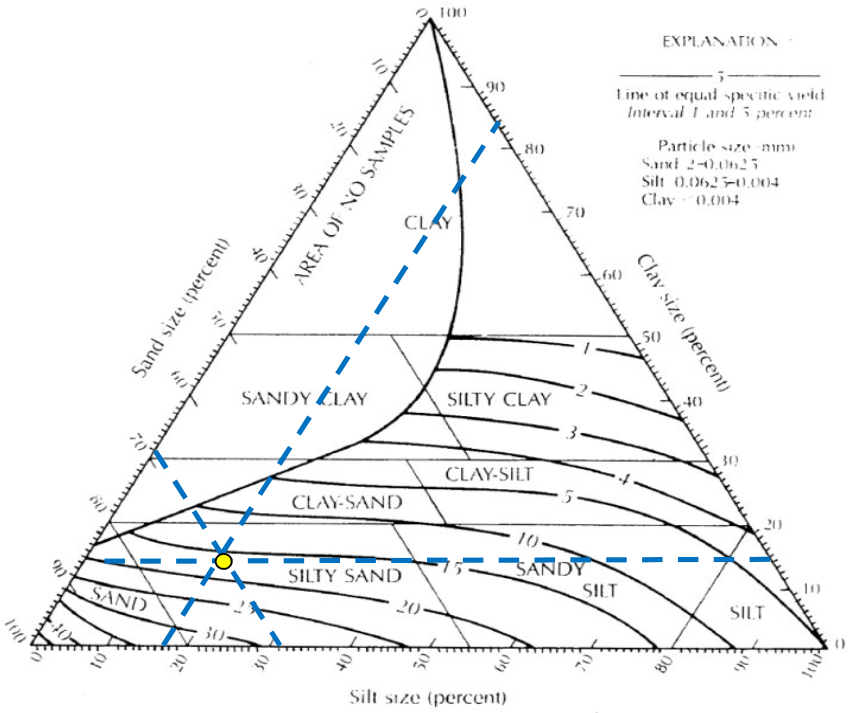
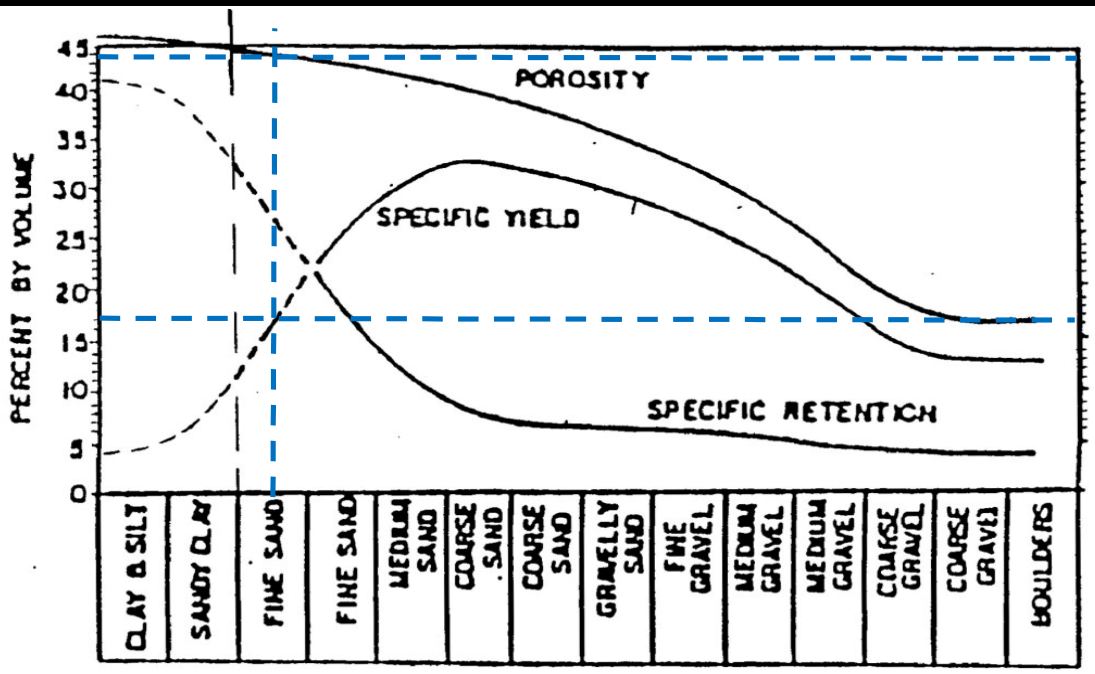


FIGURE 4.11 Textural classification triangle for unconsolidated materials showing the relation between particle size and specific yield. Source: A. I. Johnson, U.S. Geological Survey Water-Supply Paper 1662-D, 1967.



VARIATION OF POROSITY, SPECIFIC YIELD, AND SPECIFIC RETENTION WITH GRAIN SIZE (AFTER BEAR, 1972)

ESTIMATED TOTAL POROSITY: **44%**

APPENDIX VII

Horizontal and Vertical Gradient Calculations

GROUNDWATER HORIZONTAL GRADIENT CALCULATIONS

Dan River Landfill

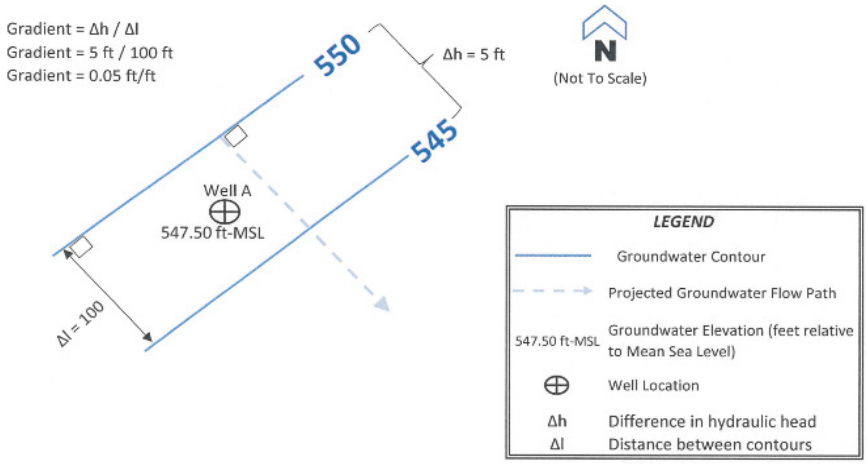
Amec Foster Wheeler Job No: 7810-14-0065

FORMULA

Horizontal hydraulic gradients are based on a change in hydraulic head (Δh) over a measured distance (Δl).

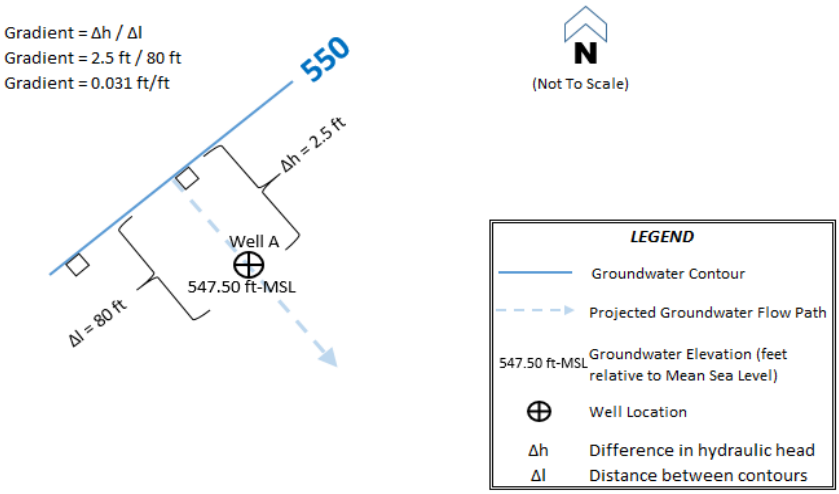
For wells located between two groundwater contours, the gradient is calculated by taking the change in head (the difference in elevation between the upgradient and downgradient groundwater contours) and dividing by the distance between the groundwater contours following a projected flow path through the well location. Projected flow paths are perpendicular to the upgradient groundwater contour and bisect the well being calculated, but may not be a straight line.

CALCULATION



For wells that are not located between two groundwater contours, the gradient is calculated by taking the change in head (the difference between an upgradient or downgradient groundwater contour and the groundwater elevation at the well location) and dividing by the distance between the groundwater contour and the well location following a projected groundwater flow path through the well location.

CALCULATION



GROUNDWATER HORIZONTAL GRADIENT CALCULATIONS

Dan River Landfill

Amec Foster Wheeler Job No: 7810-14-0065

Well ID	Δh	Δl	Δh / Δl
MW-12	5.35	210	0.025
MW-20S	4.95	110	0.045
OW-301D	6.54	85	0.077
OW-302D	5	55	0.091
OW-303D	5	60	0.083
OW-304D	5	60	0.083
OW-305S	10	250	0.040
OW-306S	*Well Abandoned*		
OW-306D	*Well Abandoned*		
OW-320D	*Well Damaged*		
OW-321D	*Dry*		
OW-401S	4.99	270	0.018
OW-403S	5	75	0.067
OW-404S	5	85	0.059
OW-405S	7.92	60	0.132
OW-406S	5	170	0.029
OW-407S	5	120	0.042
OW-409S	7	70	0.100
OW-410S	5	100	0.050
OW-411S	5	155	0.032
OW-412S	6.17	180	0.034
OW-413S	6.91	150	0.046
OW-414S	8.7	160	0.054
OW-415S	5	200	0.025
OW-416S	5.05	80	0.063
OW-417S	*Not Calculated (outlier location)*		
OW-419S	1.15	35	0.033

Maximum Value	0.02
Minimum Value	0.13
Average Value	0.06

Notes:

Δh	Change in Head
Δl	Change in Horizontal Distance
Δh / Δl	Horizontal Hydraulic Gradient

Horizontal gradients were calculated from wells acting as "shallow" water table wells, not "deep" wells

Horizontal gradients were calculated using the September 15, 2015 groundwater surface (Drawing 4)

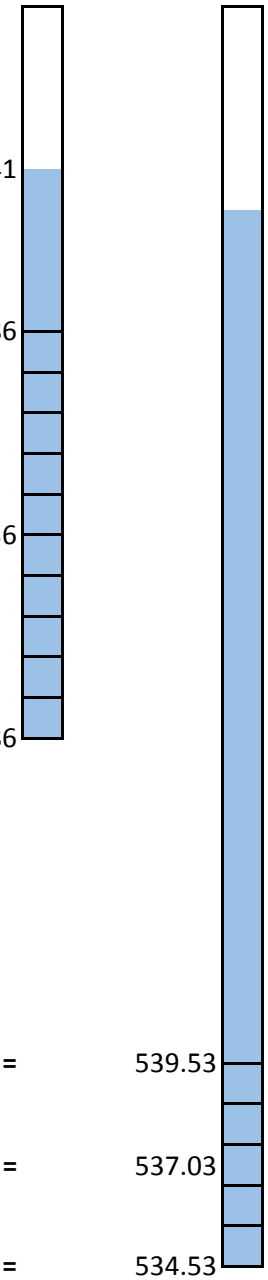
VERTICAL GRADIENT CALCULATIONS

Dan River Landfill

Amec Foster Wheeler Project No: 7810-14-0065

	OW-401S	OW-401D
Ground Surface Elevation (ft-MSL) =	581.76	581.23
Water Level Measurement (ft-bgs) =	7.35	6.88
Groundwater Elevation =	574.41	574.35 = Groundwater Elevation
Top of Screen Elevation =	567.86	
Mid-Point of Saturated Screen Elevation =	560.36	
Bottom of Screen Elevation =	552.86	
Top of Screen Elevation =		539.53
Mid-Point of Saturated Screen Elevation =		537.03
Bottom of Screen Elevation =		534.53

Date of Water Level: April 30, 2015



WATER LEVEL DELTA =	0.06	FT.
SCREEN DELTA =	23.33	FT.
VERTICAL GRADIENT =	0.0026	FEET/FOOT

DOWNWARD

ft-MSL=feet relative to Mean Sea Level
ft-bgs=feet below ground surface

Not To Scale

VERTICAL GRADIENT CALCULATIONS

Dan River Landfill

Amec Foster Wheeler Project No: 7810-14-0065

	OW-401S	OW-401D
Ground Surface Elevation (ft-MSL) =	581.76	581.23
Water Level Measurement (ft-bgs) =	8.94	8.45
Groundwater Elevation =	572.82	572.78 = Groundwater Elevation
Top of Screen Elevation =	567.86	
Mid-Point of Saturated Screen Elevation =	560.36	
Bottom of Screen Elevation =	552.86	
Top of Screen Elevation =		539.53
Mid-Point of Saturated Screen Elevation =		537.03
Bottom of Screen Elevation =		534.53

Date of Water Level: May 27, 2015

WATER LEVEL DELTA =	0.04	FT.
SCREEN DELTA =	23.33	FT.
VERTICAL GRADIENT =	0.0017	FEET/FOOT

DOWNWARD

ft-MSL=feet relative to Mean Sea Level
ft-bgs=feet below ground surface

Not To Scale

VERTICAL GRADIENT CALCULATIONS

Dan River Landfill

Amec Foster Wheeler Project No: 7810-14-0065

	OW-401S	OW-401D
Ground Surface Elevation (ft-MSL) =	581.76	581.23
Water Level Measurement (ft-bgs) =	11.77	11.29
Groundwater Elevation =	569.99	569.94 = Groundwater Elevation
Top of Screen Elevation =	567.86	
Mid-Point of Saturated Screen Elevation =	560.36	
Bottom of Screen Elevation =	552.86	
Top of Screen Elevation =		539.53
Mid-Point of Saturated Screen Elevation =		537.03
Bottom of Screen Elevation =		534.53

Date of Water Level: September 15, 2015

WATER LEVEL DELTA =	0.05	FT.
SCREEN DELTA =	23.33	FT.
VERTICAL GRADIENT =	0.0021	FEET/FOOT

DOWNWARD

ft-MSL=feet relative to Mean Sea Level
ft-bgs=feet below ground surface

Not To Scale

VERTICAL GRADIENT CALCULATIONS

Dan River Landfill

Amec Foster Wheeler Project No: 7810-14-0065

	OW-403S	OW-403D
Ground Surface Elevation (ft-MSL) =	606.15	606.24
Water Level Measurement (ft-bgs) =	31.89	32.43
Groundwater Elevation =	574.26	573.81 = Groundwater Elevation
Top of Screen Elevation =	571.45	
Mid-Point of Saturated Screen Elevation =	563.95	
Bottom of Screen Elevation =	556.45	
Top of Screen Elevation =		544.04
Mid-Point of Saturated Screen Elevation =		541.54
Bottom of Screen Elevation =		539.04

Date of Water Level: April 30, 2015

WATER LEVEL DELTA =	0.46	FT.
SCREEN DELTA =	22.42	FT.
VERTICAL GRADIENT =	0.0203	FEET/FOOT

DOWNWARD

ft-MSL=feet relative to Mean Sea Level
ft-bgs=feet below ground surface

Not To Scale

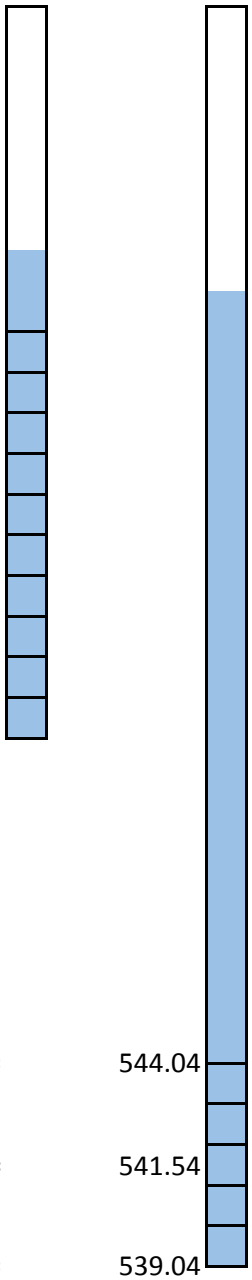
VERTICAL GRADIENT CALCULATIONS

Dan River Landfill

Amec Foster Wheeler Project No: 7810-14-0065

	OW-403S	OW-403D
Ground Surface Elevation (ft-MSL) =	606.15	606.24
Water Level Measurement (ft-bgs) =	34.08	34.58
Groundwater Elevation =	572.07	571.66 = Groundwater Elevation
Top of Screen Elevation =	571.45	
Mid-Point of Saturated Screen Elevation =	563.95	
Bottom of Screen Elevation =	556.45	
Top of Screen Elevation =		544.04
Mid-Point of Saturated Screen Elevation =		541.54
Bottom of Screen Elevation =		539.04

Date of Water Level: May 27, 2015



WATER LEVEL DELTA =	0.42	FT.
SCREEN DELTA =	22.42	FT.
VERTICAL GRADIENT =	0.0185	FEET/FOOT

DOWNWARD

ft-MSL=feet relative to Mean Sea Level
ft-bgs=feet below ground surface

Not To Scale

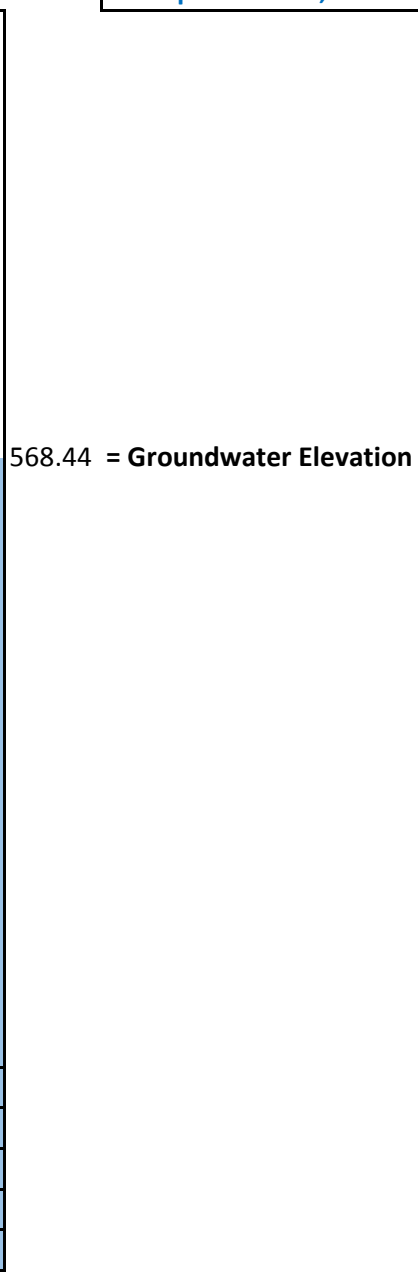
VERTICAL GRADIENT CALCULATIONS

Dan River Landfill

Amec Foster Wheeler Project No: 7810-14-0065

	OW-403S	OW-403D
Ground Surface Elevation (ft-MSL) =	606.15	606.24
Water Level Measurement (ft-bgs) =	37.35	37.80
Top of Screen Elevation =	571.45	
Groundwater Elevation =	568.80	
Mid-Point of Saturated Screen Elevation =	562.63	
Bottom of Screen Elevation =	556.45	
Top of Screen Elevation =		544.04
Mid-Point of Saturated Screen Elevation =		541.54
Bottom of Screen Elevation =		539.04

Date of Water Level: September 15, 2015



WATER LEVEL DELTA =	0.37	FT.
SCREEN DELTA =	21.09	FT.
VERTICAL GRADIENT =	0.0173	FEET/FOOT

DOWNWARD

ft-MSL=feet relative to Mean Sea Level
ft-bgs=feet below ground surface

Not To Scale

VERTICAL GRADIENT CALCULATIONS

Dan River Landfill

Amec Foster Wheeler Project No: 7810-14-0065

	OW-405S	OW-405D
Ground Surface Elevation (ft-MSL) =	588.15	589.01
Water Level Measurement (ft-bgs) =	49.49	49.34
Top of Screen Elevation =	540.45	
Groundwater Elevation =	538.66	539.67 = Groundwater Elevation
Mid-Point of Saturated Screen Elevation =	532.05	
Bottom of Screen Elevation =	525.45	
Top of Screen Elevation =		515.31
Mid-Point of Saturated Screen Elevation =		512.81
Bottom of Screen Elevation =		510.31

Date of Water Level: April 30, 2015

WATER LEVEL DELTA =	-1.01	FT.
SCREEN DELTA =	19.24	FT.
VERTICAL GRADIENT =	-0.0526	FEET/FOOT

UPWARD

ft-MSL=feet relative to Mean Sea Level
ft-bgs=feet below ground surface

Not To Scale

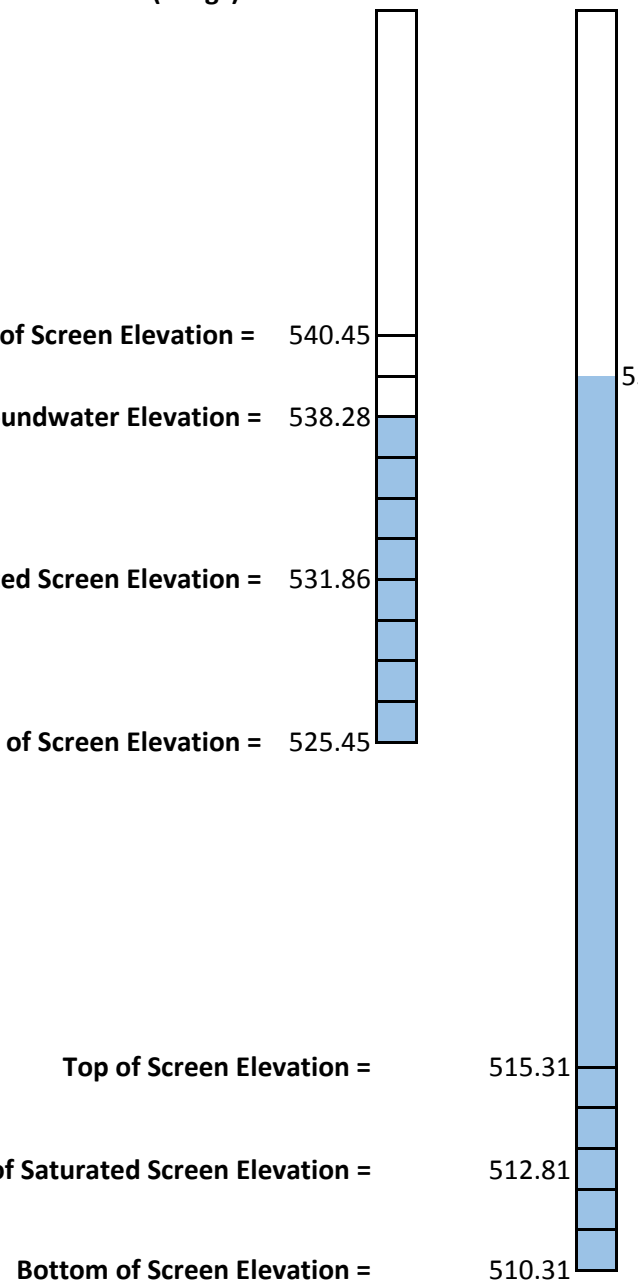
VERTICAL GRADIENT CALCULATIONS

Dan River Landfill

Amec Foster Wheeler Project No: 7810-14-0065

	OW-405S	OW-405D
Ground Surface Elevation (ft-MSL) =	588.15	589.01
Water Level Measurement (ft-bgs) =	49.87	49.76
Top of Screen Elevation =	540.45	
Groundwater Elevation =	538.28	539.25 = Groundwater Elevation
Mid-Point of Saturated Screen Elevation =	531.86	
Bottom of Screen Elevation =	525.45	
Top of Screen Elevation =		515.31
Mid-Point of Saturated Screen Elevation =		512.81
Bottom of Screen Elevation =		510.31

Date of Water Level: May 27, 2015



WATER LEVEL DELTA =	-0.97	FT.
SCREEN DELTA =	19.05	FT.
VERTICAL GRADIENT =	-0.0511	FEET/FOOT

UPWARD

ft-MSL=feet relative to Mean Sea Level
ft-bgs=feet below ground surface

Not To Scale

VERTICAL GRADIENT CALCULATIONS

Dan River Landfill

Amec Foster Wheeler Project No: 7810-14-0065

	OW-405S	OW-405D
Ground Surface Elevation (ft-MSL) =	588.15	589.01
Water Level Measurement (ft-bgs) =	51.07	51.00
Top of Screen Elevation =	540.45	
Groundwater Elevation =	537.08	
Mid-Point of Saturated Screen Elevation =	531.26	
Bottom of Screen Elevation =	525.45	
Top of Screen Elevation =		515.31
Mid-Point of Saturated Screen Elevation =		512.81
Bottom of Screen Elevation =		510.31

538.01 = Groundwater Elevation

Date of Water Level:
September 15, 2015

WATER LEVEL DELTA =	-0.93	FT.
SCREEN DELTA =	18.45	FT.
VERTICAL GRADIENT =	-0.0506	FEET/FOOT

UPWARD

ft-MSL=feet relative to Mean Sea Level
ft-bgs=feet below ground surface

Not To Scale

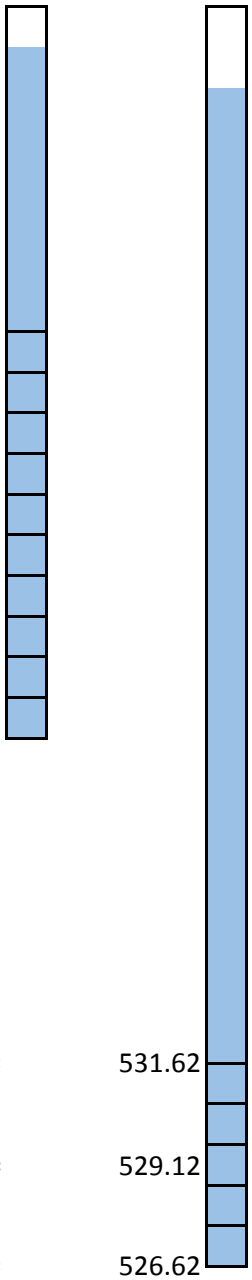
VERTICAL GRADIENT CALCULATIONS

Dan River Landfill

Amec Foster Wheeler Project No: 7810-14-0065

	OW-406S	OW-406D
Ground Surface Elevation (ft-MSL) =	567.55	567.62
Water Level Measurement (ft-bgs) =	1.36	1.49
Groundwater Elevation =	566.19	566.13 = Groundwater Elevation
Top of Screen Elevation =	556.85	
Mid-Point of Saturated Screen Elevation =	549.35	
Bottom of Screen Elevation =	541.85	
Top of Screen Elevation =		531.62
Mid-Point of Saturated Screen Elevation =		529.12
Bottom of Screen Elevation =		526.62

Date of Water Level: April 30, 2015



WATER LEVEL DELTA =	0.05	FT.
SCREEN DELTA =	20.23	FT.
VERTICAL GRADIENT =	0.0027	FEET/FOOT

DOWNWARD

ft-MSL=feet relative to Mean Sea Level
ft-bgs=feet below ground surface

Not To Scale

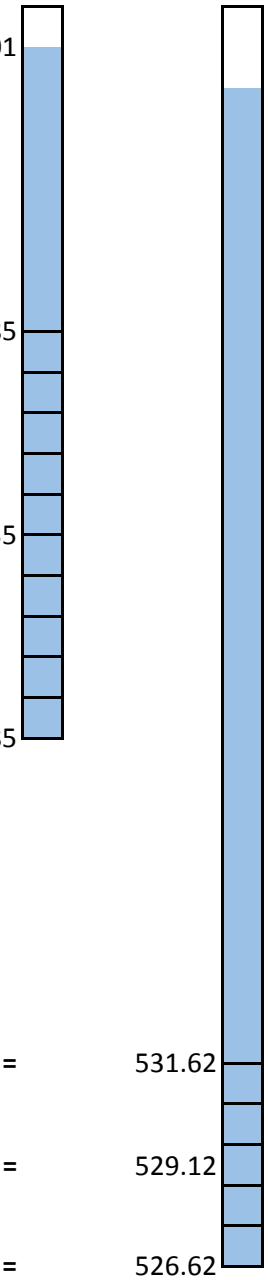
VERTICAL GRADIENT CALCULATIONS

Dan River Landfill

Amec Foster Wheeler Project No: 7810-14-0065

	OW-406S	OW-406D
Ground Surface Elevation (ft-MSL) =	567.55	567.62
Water Level Measurement (ft-bgs) =	2.54	2.69
Groundwater Elevation =	565.01	564.93 = Groundwater Elevation
Top of Screen Elevation =	556.85	
Mid-Point of Saturated Screen Elevation =	549.35	
Bottom of Screen Elevation =	541.85	
Top of Screen Elevation =		531.62
Mid-Point of Saturated Screen Elevation =		529.12
Bottom of Screen Elevation =		526.62

Date of Water Level: May 27, 2015



WATER LEVEL DELTA =	0.07	FT.
SCREEN DELTA =	20.23	FT.
VERTICAL GRADIENT =	0.0037	FEET/FOOT

DOWNWARD

ft-MSL=feet relative to Mean Sea Level
ft-bgs=feet below ground surface

Not To Scale

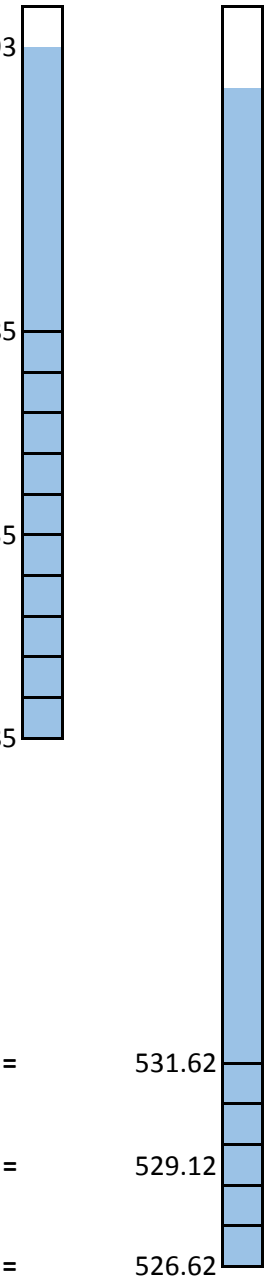
VERTICAL GRADIENT CALCULATIONS

Dan River Landfill

Amec Foster Wheeler Project No: 7810-14-0065

	OW-406S	OW-406D
Ground Surface Elevation (ft-MSL) =	567.55	567.62
Water Level Measurement (ft-bgs) =	3.62	3.80
Groundwater Elevation =	563.93	563.82 = Groundwater Elevation
Top of Screen Elevation =	556.85	
Mid-Point of Saturated Screen Elevation =	549.35	
Bottom of Screen Elevation =	541.85	
Top of Screen Elevation =		531.62
Mid-Point of Saturated Screen Elevation =		529.12
Bottom of Screen Elevation =		526.62

Date of Water Level: September 15, 2015



WATER LEVEL DELTA =	0.10	FT.
SCREEN DELTA =	20.23	FT.
VERTICAL GRADIENT =	0.0051	FEET/FOOT

DOWNWARD

ft-MSL=feet relative to Mean Sea Level
ft-bgs=feet below ground surface

Not to Scale

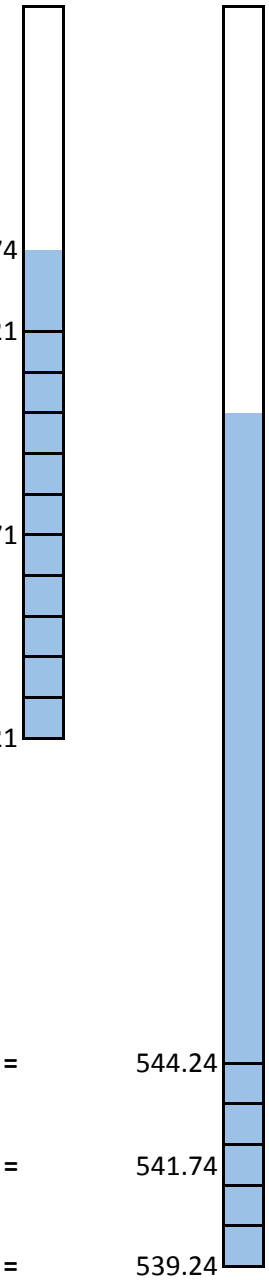
VERTICAL GRADIENT CALCULATIONS

Dan River Landfill

Amec Foster Wheeler Project No: 7810-14-0065

	OW-407S	OW-407D
Ground Surface Elevation (ft-MSL) =	618.41	618.24
Water Level Measurement (ft-bgs) =	47.67	49.57
Groundwater Elevation =	570.74	568.67 = Groundwater Elevation
Top of Screen Elevation =	570.21	
Mid-Point of Saturated Screen Elevation =	562.71	
Bottom of Screen Elevation =	555.21	
Top of Screen Elevation =		544.24
Mid-Point of Saturated Screen Elevation =		541.74
Bottom of Screen Elevation =		539.24

Date of Water Level: April 30, 2015



WATER LEVEL DELTA =	2.06	FT.
SCREEN DELTA =	20.97	FT.
VERTICAL GRADIENT =	0.0984	FEET/FOOT

DOWNWARD

ft-MSL=feet relative to Mean Sea Level
ft-bgs=feet below ground surface

Not To Scale

VERTICAL GRADIENT CALCULATIONS

Dan River Landfill

Amec Foster Wheeler Project No: 7810-14-0065

	OW-407S	OW-407D
Ground Surface Elevation (ft-MSL) =	618.41	618.24
Water Level Measurement (ft-bgs) =	48.07	50.67
Groundwater Elevation =	570.34	
Top of Screen Elevation =	570.21	
Mid-Point of Saturated Screen Elevation =	562.71	
Bottom of Screen Elevation =	555.21	
Groundwater Elevation =		567.57
Top of Screen Elevation =		544.24
Mid-Point of Saturated Screen Elevation =		541.74
Bottom of Screen Elevation =		539.24

Date of Water Level: May 27, 2015

WATER LEVEL DELTA =	2.76	FT.
SCREEN DELTA =	20.97	FT.
VERTICAL GRADIENT =	0.1318	FEET/FOOT

DOWNWARD

ft-MSL=feet relative to Mean Sea Level
ft-bgs=feet below ground surface

Not To Scale

VERTICAL GRADIENT CALCULATIONS

Dan River Landfill

Amec Foster Wheeler Project No: 7810-14-0065

	OW-407S	OW-407D
Ground Surface Elevation (ft-MSL) =	618.41	618.24
Water Level Measurement (ft-bgs) =	49.53	52.37
Top of Screen Elevation =	570.21	
Groundwater Elevation =	568.88	565.87 = Groundwater Elevation
Mid-Point of Saturated Screen Elevation =	562.04	
Bottom of Screen Elevation =	555.21	
Top of Screen Elevation =		544.24
Mid-Point of Saturated Screen Elevation =		541.74
Bottom of Screen Elevation =		539.24

Date of Water Level: September 15, 2015

WATER LEVEL DELTA =	3.00	FT.
SCREEN DELTA =	20.30	FT.
VERTICAL GRADIENT =	0.1479	FEET/FOOT

DOWNWARD

ft-MSL=feet relative to Mean Sea Level
ft-bgs=feet below ground surface

Not To Scale

VERTICAL GRADIENT CALCULATIONS

Dan River Landfill

Amec Foster Wheeler Project No: 7810-14-0065

	OW-409S	OW-409D
Ground Surface Elevation (ft-MSL) =	551.56	551.83
Water Level Measurement (ft-ags) =	3.19	3.11
Groundwater Elevation =	554.75	554.94 = Groundwater Elevation
Top of Screen Elevation =	546.56	
Mid-Point of Saturated Screen Elevation =	542.06	
Bottom of Screen Elevation =	537.56	
Top of Screen Elevation =		529.83
Mid-Point of Saturated Screen Elevation =		527.33
Bottom of Screen Elevation =		524.83

Date of Water Level: May 8, 2015

WATER LEVEL DELTA =	-0.18	FT.
SCREEN DELTA =	14.73	FT.
VERTICAL GRADIENT =	-0.0124	FEET/FOOT

UPWARD

ft-MSL=feet relative to Mean Sea Level
ft-ags=feet above ground surface

Not To Scale

VERTICAL GRADIENT CALCULATIONS

Dan River Landfill

Amec Foster Wheeler Project No: 7810-14-0065

	OW-409S	OW-409D
Ground Surface Elevation (ft-MSL) =	551.56	551.83
Water Level Measurement (ft-ags) =	2.18	2.27
Groundwater Elevation =	553.74	554.10 = Groundwater Elevation
Top of Screen Elevation =	546.56	
Mid-Point of Saturated Screen Elevation =	542.06	
Bottom of Screen Elevation =	537.56	
Top of Screen Elevation =		529.83
Mid-Point of Saturated Screen Elevation =		527.33
Bottom of Screen Elevation =		524.83

Date of Water Level: May 27, 2015

WATER LEVEL DELTA =	-0.35	FT.
SCREEN DELTA =	14.73	FT.
VERTICAL GRADIENT =	-0.0240	FEET/FOOT

UPWARD

ft-MSL=feet relative to Mean Sea Level
ft-ags=feet above ground surface

Not To Scale

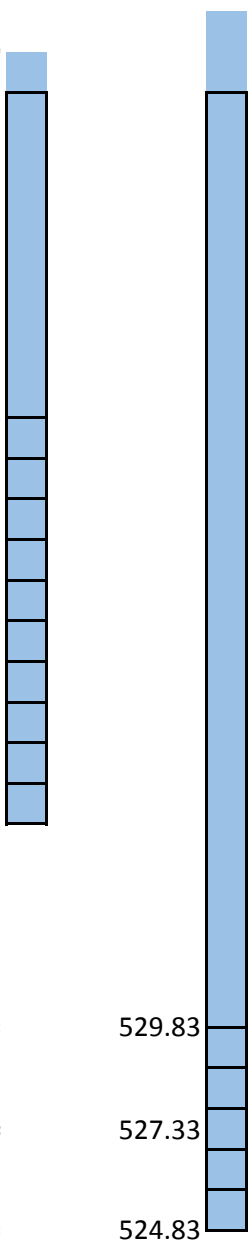
VERTICAL GRADIENT CALCULATIONS

Dan River Landfill

Amec Foster Wheeler Project No: 7810-14-0065

	OW-409S	OW-409D
Ground Surface Elevation (ft-MSL) =	551.56	551.83
Water Level Measurement (ft-ags) =	1.44	2.31
Groundwater Elevation =	553.00	554.14 = Groundwater Elevation
Top of Screen Elevation =	546.56	
Mid-Point of Saturated Screen Elevation =	542.06	
Bottom of Screen Elevation =	537.56	
Top of Screen Elevation =		529.83
Mid-Point of Saturated Screen Elevation =		527.33
Bottom of Screen Elevation =		524.83

Date of Water Level: September 15, 2015



WATER LEVEL DELTA =	-1.13	FT.
SCREEN DELTA =	14.73	FT.
VERTICAL GRADIENT =	-0.0769	FEET/FOOT

UPWARD

ft-MSL=feet relative to Mean Sea Level
ft-ags=feet above ground surface

Not To Scale

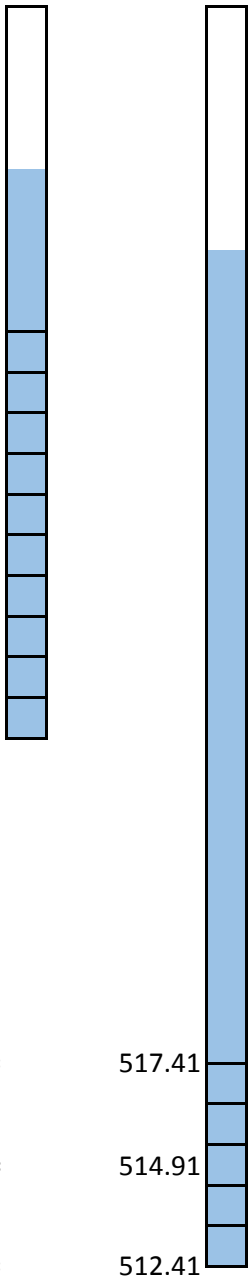
VERTICAL GRADIENT CALCULATIONS

Dan River Landfill

Amec Foster Wheeler Project No: 7810-14-0065

	OW-411S	OW-411D
Ground Surface Elevation (ft-MSL) =	593.51	593.41
Water Level Measurement (ft-bgs) =	39.98	42.99
Groundwater Elevation =	553.53	550.42 = Groundwater Elevation
Top of Screen Elevation =	542.81	
Mid-Point of Saturated Screen Elevation =	535.31	
Bottom of Screen Elevation =	527.81	
Top of Screen Elevation =		517.41
Mid-Point of Saturated Screen Elevation =		514.91
Bottom of Screen Elevation =		512.41

Date of Water Level:
April 27-28, 2015



WATER LEVEL DELTA =	3.10	FT.
SCREEN DELTA =	20.40	FT.
VERTICAL GRADIENT =	0.1522	FEET/FOOT

DOWNWARD

ft-MSL=feet relative to Mean Sea Level
ft-bgs=feet below ground surface

Not To Scale

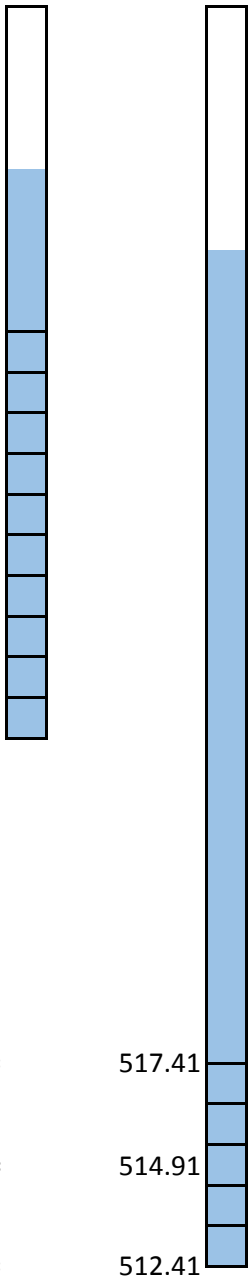
VERTICAL GRADIENT CALCULATIONS

Dan River Landfill

Amec Foster Wheeler Project No: 7810-14-0065

	OW-411S	OW-411D
Ground Surface Elevation (ft-MSL) =	593.51	593.41
Water Level Measurement (ft-bgs) =	39.78	43.68
Groundwater Elevation =	553.73	549.73 = Groundwater Elevation
Top of Screen Elevation =	542.81	
Mid-Point of Saturated Screen Elevation =	535.31	
Bottom of Screen Elevation =	527.81	
Top of Screen Elevation =		517.41
Mid-Point of Saturated Screen Elevation =		514.91
Bottom of Screen Elevation =		512.41

Date of Water Level: May 27, 2015



WATER LEVEL DELTA =	3.99	FT.
SCREEN DELTA =	20.40	FT.
VERTICAL GRADIENT =	0.1958	FEET/FOOT

DOWNWARD

ft-MSL=feet relative to Mean Sea Level
ft-bgs=feet below ground surface

Not To Scale

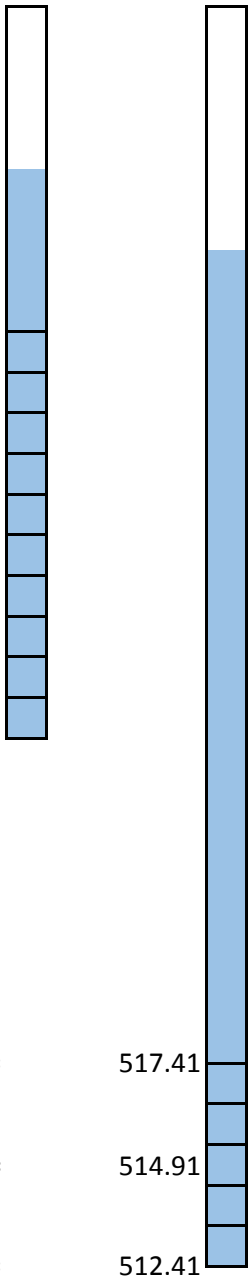
VERTICAL GRADIENT CALCULATIONS

Dan River Landfill

Amec Foster Wheeler Project No: 7810-14-0065

	OW-411S	OW-411D
Ground Surface Elevation (ft-MSL) =	593.51	593.41
Water Level Measurement (ft-bgs) =	41.29	45.41
Groundwater Elevation =	552.22	548.00 = Groundwater Elevation
Top of Screen Elevation =	542.81	517.41
Mid-Point of Saturated Screen Elevation =	535.31	514.91
Bottom of Screen Elevation =	527.81	512.41

Date of Water Level: September 15, 2015



WATER LEVEL DELTA =	4.21	FT.
SCREEN DELTA =	20.40	FT.
VERTICAL GRADIENT =	0.2066	FEET/FOOT

DOWNWARD

ft-MSL=feet relative to Mean Sea Level
ft-bgs=feet below ground surface

Not To Scale

VERTICAL GRADIENT CALCULATIONS

Dan River Landfill

Amec Foster Wheeler Project No: 7810-14-0065

	OW-414S	OW-414D
Ground Surface Elevation (ft-MSL) =	557.23	557.53
Water Level Measurement (ft-bgs) =	19.28	19.82
Top of Screen Elevation =	543.03	
Groundwater Elevation =	537.95	537.71 = Groundwater Elevation
Mid-Point of Saturated Screen Elevation =	532.99	
Bottom of Screen Elevation =	528.03	
Top of Screen Elevation =		525.83
Mid-Point of Saturated Screen Elevation =		523.33
Bottom of Screen Elevation =		520.83

Date of Water Level:
April 29-30, 2015

WATER LEVEL DELTA =	0.23	FT.
SCREEN DELTA =	9.66	FT.
VERTICAL GRADIENT =	0.0243	FEET/FOOT

DOWNWARD

ft-MSL=feet relative to Mean Sea Level
ft-bgs=feet below ground surface

Not To Scale

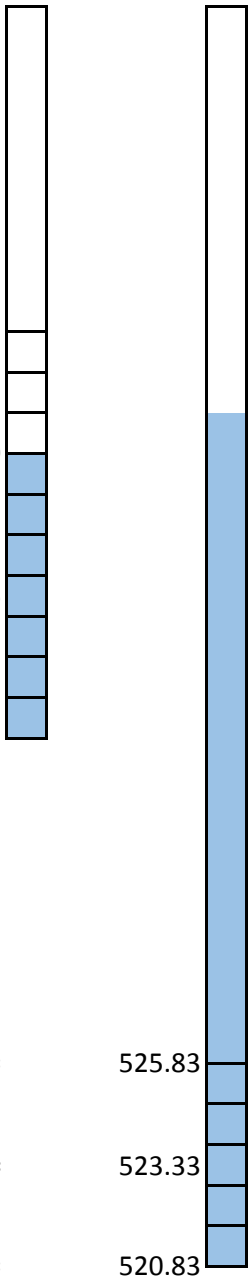
VERTICAL GRADIENT CALCULATIONS

Dan River Landfill

Amec Foster Wheeler Project No: 7810-14-0065

	OW-414S	OW-414D
Ground Surface Elevation (ft-MSL) =	557.23	557.53
Water Level Measurement (ft-bgs) =	19.73	19.83
Top of Screen Elevation =	543.03	
Groundwater Elevation =	537.50	
Mid-Point of Saturated Screen Elevation =	532.76	
Bottom of Screen Elevation =	528.03	
Top of Screen Elevation =		525.83
Mid-Point of Saturated Screen Elevation =		523.33
Bottom of Screen Elevation =		520.83

Date of Water Level: May 27, 2015



537.70 = Groundwater Elevation

WATER LEVEL DELTA =	-0.21	FT.
SCREEN DELTA =	9.43	FT.
VERTICAL GRADIENT =	-0.0217	FEET/FOOT

UPWARD

ft-MSL=feet relative to Mean Sea Level
ft-bgs=feet below ground surface

Not To Scale

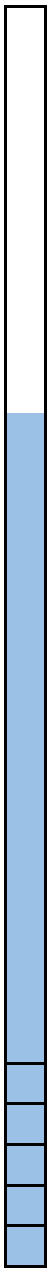
VERTICAL GRADIENT CALCULATIONS

Dan River Landfill

Amec Foster Wheeler Project No: 7810-14-0065

	OW-414S	OW-414D
Ground Surface Elevation (ft-MSL) =	557.23	557.53
Water Level Measurement (ft-bgs) =	20.93	21.19
Top of Screen Elevation =	543.03	
Groundwater Elevation =	536.30	
Mid-Point of Saturated Screen Elevation =	532.16	
Bottom of Screen Elevation =	528.03	
Top of Screen Elevation =		525.83
Mid-Point of Saturated Screen Elevation =		523.33
Bottom of Screen Elevation =		520.83

Date of Water Level: September 15, 2015



536.34 = Groundwater Elevation

WATER LEVEL DELTA =	-0.04	FT.
SCREEN DELTA =	8.83	FT.
VERTICAL GRADIENT =	-0.0051	FEET/FOOT

UPWARD

ft-MSL=feet relative to Mean Sea Level
ft-bgs=feet below ground surface

Not To Scale

VERTICAL GRADIENT CALCULATIONS

Dan River Landfill

Amec Foster Wheeler Project No: 7810-14-0065

	OW-415S	OW-415D
Ground Surface Elevation (ft-MSL) =	559.00	558.86
Water Level Measurement (ft-bgs) =	11.16	13.79
Top of Screen Elevation =	551.30	
Groundwater Elevation =	547.84	545.07 = Groundwater Elevation
Mid-Point of Saturated Screen Elevation =	544.57	
Bottom of Screen Elevation =	541.30	
Top of Screen Elevation =		522.16
Mid-Point of Saturated Screen Elevation =		519.66
Bottom of Screen Elevation =		517.16

Date of Water Level: April 30, 2015

WATER LEVEL DELTA =	2.77	FT.
SCREEN DELTA =	24.91	FT.
VERTICAL GRADIENT =	0.1112	FEET/FOOT

DOWNWARD

ft-MSL=feet relative to Mean Sea Level
ft-bgs=feet below ground surface

Not To Scale

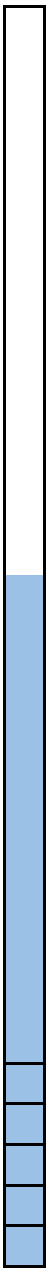
VERTICAL GRADIENT CALCULATIONS

Dan River Landfill

Amec Foster Wheeler Project No: 7810-14-0065

	OW-415S	OW-415D
Ground Surface Elevation (ft-MSL) =	559.00	558.86
Water Level Measurement (ft-bgs) =	11.82	13.89
Top of Screen Elevation =	551.30	
Groundwater Elevation =	547.18	
Mid-Point of Saturated Screen Elevation =	544.24	
Bottom of Screen Elevation =	541.30	
Top of Screen Elevation =		522.16
Mid-Point of Saturated Screen Elevation =		519.66
Bottom of Screen Elevation =		517.16

Date of Water Level: May 27, 2015



544.97 = Groundwater Elevation

WATER LEVEL DELTA =	2.21	FT.
SCREEN DELTA =	24.58	FT.
VERTICAL GRADIENT =	0.0899	FEET/FOOT

DOWNWARD

ft-MSL=feet relative to Mean Sea Level
ft-bgs=feet below ground surface

Not To Scale

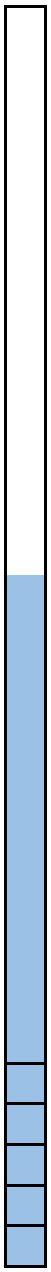
VERTICAL GRADIENT CALCULATIONS

Dan River Landfill

Amec Foster Wheeler Project No: 7810-14-0065

	OW-415S	OW-415D
Ground Surface Elevation (ft-MSL) =	559.00	558.86
Water Level Measurement (ft-bgs) =	13.40	15.31
Top of Screen Elevation =	551.30	
Groundwater Elevation =	545.60	
Mid-Point of Saturated Screen Elevation =	543.45	
Bottom of Screen Elevation =	541.30	
Top of Screen Elevation =		522.16
Mid-Point of Saturated Screen Elevation =		519.66
Bottom of Screen Elevation =		517.16

Date of Water Level: September 15, 2015



543.55 = Groundwater Elevation

WATER LEVEL DELTA =	2.05	FT.
SCREEN DELTA =	23.79	FT.
VERTICAL GRADIENT =	0.0861	FEET/FOOT

DOWNWARD

ft-MSL=feet relative to Mean Sea Level
ft-bgs=feet below ground surface

Not To Scale

VERTICAL GRADIENT CALCULATIONS

Dan River Landfill

Amec Foster Wheeler Project No: 7810-14-0065

	OW-416S	OW-416D
Ground Surface Elevation (ft-MSL) =	557.90	558.21
Water Level Measurement (ft-bgs) =	21.43	25.06
Top of Screen Elevation =	539.20	
Groundwater Elevation =	536.47	
Mid-Point of Saturated Screen Elevation =	532.84	
Bottom of Screen Elevation =	529.20	
		533.15 = Groundwater Elevation
Top of Screen Elevation =		518.51
Mid-Point of Saturated Screen Elevation =		516.01
Bottom of Screen Elevation =		513.51

Date of Water Level: April 29, 2015

WATER LEVEL DELTA =	3.32	FT.
SCREEN DELTA =	16.83	FT.
VERTICAL GRADIENT =	0.1973	FEET/FOOT

DOWNWARD

ft-MSL=feet relative to Mean Sea Level
ft-bgs=feet below ground surface

Not To Scale

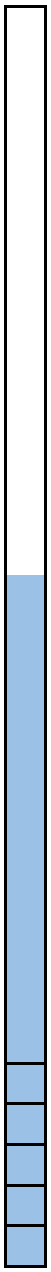
VERTICAL GRADIENT CALCULATIONS

Dan River Landfill

Amec Foster Wheeler Project No: 7810-14-0065

	OW-416S	OW-416D
Ground Surface Elevation (ft-MSL) =	557.90	558.21
Water Level Measurement (ft-bgs) =	22.01	25.40
Top of Screen Elevation =	539.20	
Groundwater Elevation =	535.89	
Mid-Point of Saturated Screen Elevation =	532.55	
Bottom of Screen Elevation =	529.20	
Top of Screen Elevation =		518.51
Mid-Point of Saturated Screen Elevation =		516.01
Bottom of Screen Elevation =		513.51

Date of Water Level: May 27, 2015



532.81 = Groundwater Elevation

WATER LEVEL DELTA =	3.08	FT.
SCREEN DELTA =	16.54	FT.
VERTICAL GRADIENT =	0.1863	FEET/FOOT

DOWNWARD

ft-MSL=feet relative to Mean Sea Level
ft-bgs=feet below ground surface

Not To Scale

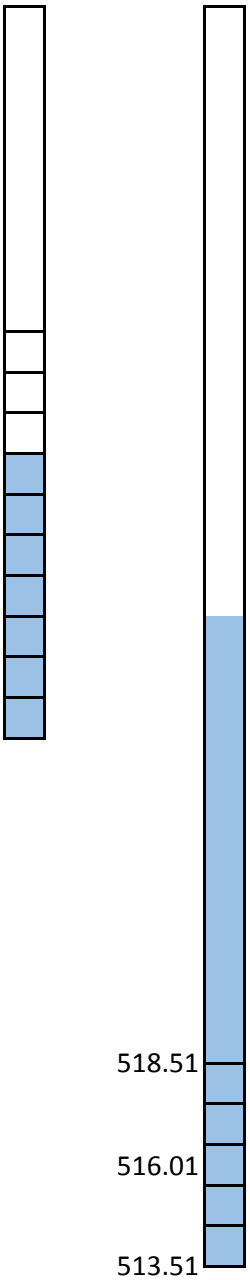
VERTICAL GRADIENT CALCULATIONS

Dan River Landfill

Amec Foster Wheeler Project No: 7810-14-0065

	OW-416S	OW-416D
Ground Surface Elevation (ft-MSL) =	557.90	558.21
Water Level Measurement (ft-bgs) =	22.95	26.34
Top of Screen Elevation =	539.20	
Groundwater Elevation =	534.95	
Mid-Point of Saturated Screen Elevation =	532.08	
Bottom of Screen Elevation =	529.20	
Top of Screen Elevation =		518.51
Mid-Point of Saturated Screen Elevation =		516.01
Bottom of Screen Elevation =		513.51

Date of Water Level: September 15, 2015



531.87 = Groundwater Elevation

WATER LEVEL DELTA =	3.08	FT.
SCREEN DELTA =	16.07	FT.
VERTICAL GRADIENT =	0.1917	FEET/FOOT

DOWNWARD

ft-MSL=feet relative to Mean Sea Level
ft-bgs=feet below ground surface

Not To Scale

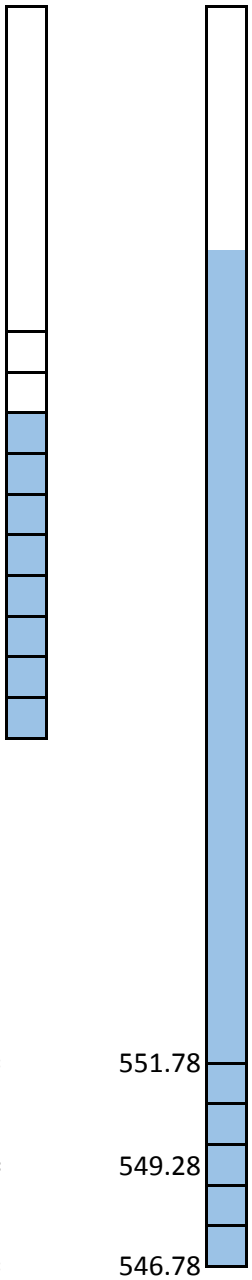
VERTICAL GRADIENT CALCULATIONS

Dan River Landfill

Amec Foster Wheeler Project No: 7810-14-0065

	OW-417S	OW-417D
Ground Surface Elevation (ft-MSL) =	594.15	594.18
Water Level Measurement (ft-bgs) =	19.94	15.90
Top of Screen Elevation =	575.45	
Groundwater Elevation =	574.21	
Mid-Point of Saturated Screen Elevation =	567.21	
Bottom of Screen Elevation =	560.21	
Top of Screen Elevation =		551.78
Mid-Point of Saturated Screen Elevation =		549.28
Bottom of Screen Elevation =		546.78

Date of Water Level: April 30, 2015



WATER LEVEL DELTA =	-4.06	FT.
SCREEN DELTA =	17.93	FT.
VERTICAL GRADIENT =	-0.2264	FEET/FOOT

UPWARD

ft-MSL=feet relative to Mean Sea Level
ft-bgs=feet below ground surface

Not To Scale

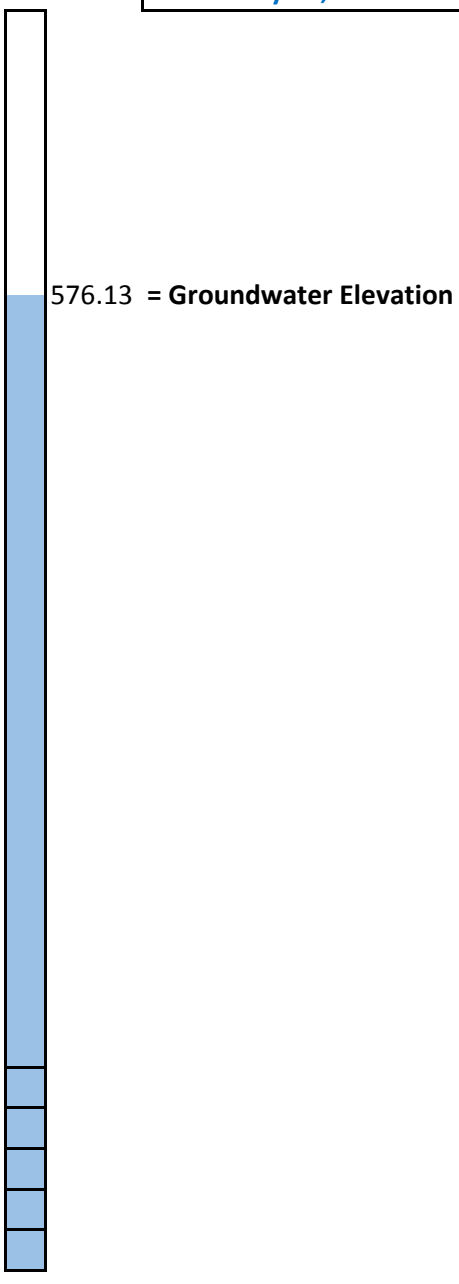
VERTICAL GRADIENT CALCULATIONS

Dan River Landfill

Amec Foster Wheeler Project No: 7810-14-0065

	OW-417S	OW-417D
Ground Surface Elevation (ft-MSL) =	594.15	594.18
Water Level Measurement (ft-bgs) =	21.78	18.05
Top of Screen Elevation =	575.45	
Groundwater Elevation =	572.37	
Mid-Point of Saturated Screen Elevation =	566.29	
Bottom of Screen Elevation =	560.21	
Top of Screen Elevation =		551.78
Mid-Point of Saturated Screen Elevation =		549.28
Bottom of Screen Elevation =		546.78

Date of Water Level: May 27, 2015



WATER LEVEL DELTA =	-3.75	FT.
SCREEN DELTA =	17.01	FT.
VERTICAL GRADIENT =	-0.2205	FEET/FOOT

UPWARD

ft-MSL=feet relative to Mean Sea Level
ft-bgs=feet below ground surface

Not To Scale

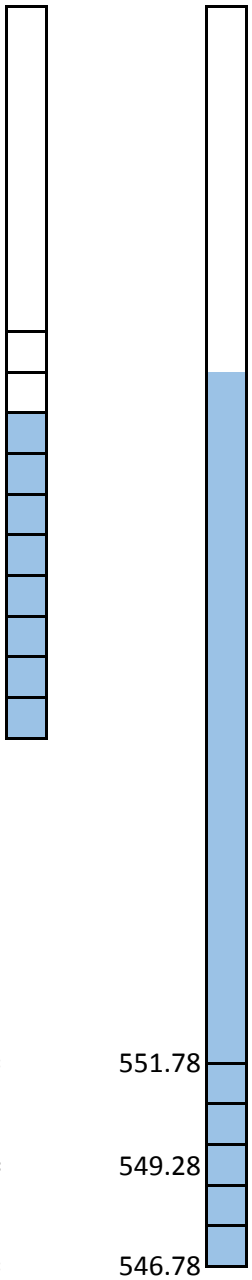
VERTICAL GRADIENT CALCULATIONS

Dan River Landfill

Amec Foster Wheeler Project No: 7810-14-0065

	OW-417S	OW-417D
Ground Surface Elevation (ft-MSL) =	594.15	594.18
Water Level Measurement (ft-bgs) =	23.07	19.17
Top of Screen Elevation =	575.45	
Groundwater Elevation =	571.08	575.01 = Groundwater Elevation
Mid-Point of Saturated Screen Elevation =	565.65	
Bottom of Screen Elevation =	560.21	
Top of Screen Elevation =		551.78
Mid-Point of Saturated Screen Elevation =		549.28
Bottom of Screen Elevation =		546.78

Date of Water Level: September 15, 2015



WATER LEVEL DELTA =	-3.92	FT.
SCREEN DELTA =	16.37	FT.
VERTICAL GRADIENT =	-0.2395	FEET/FOOT

UPWARD

ft-MSL=feet relative to Mean Sea Level
ft-bgs=feet below ground surface

Not To Scale

VERTICAL GRADIENT CALCULATIONS

Dan River Landfill

Amec Foster Wheeler Project No: 7810-14-0065

	OW-412S	AS-6D
Ground Surface Elevation (ft-MSL) =	579.54	584.28
Water Level Measurement (ft-bgs) =	30.71	34.28
Groundwater Elevation =	548.83	550.00 = Groundwater Elevation
Top of Screen Elevation =	536.84	
Mid-Point of Saturated Screen Elevation =	529.34	
Bottom of Screen Elevation =	521.84	
Top of Screen Elevation =		528.28
Mid-Point of Saturated Screen Elevation =		525.78
Bottom of Screen Elevation =		523.28

Date of Water Level: September 15, 2015

WATER LEVEL DELTA =	-1.17	FT.
SCREEN DELTA =	3.56	FT.
VERTICAL GRADIENT =	-0.3287	FEET/FOOT

UPWARD

ft-MSL=feet relative to Mean Sea Level
ft-bgs=feet below ground surface

Not To Scale

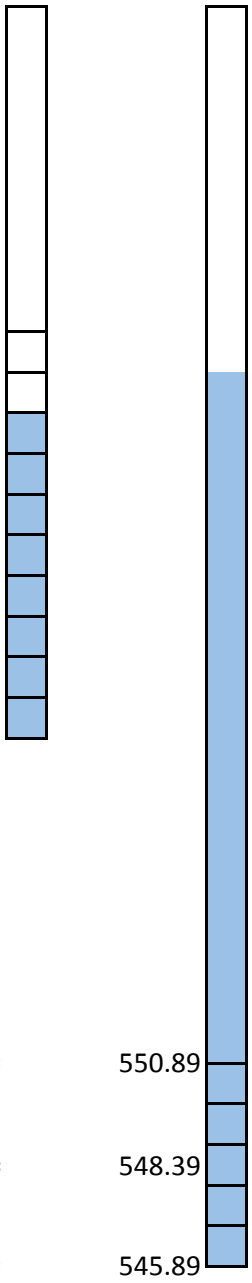
VERTICAL GRADIENT CALCULATIONS

Dan River Landfill

Amec Foster Wheeler Project No: 7810-14-0065

	OW-419S	AS-10D
Ground Surface Elevation (ft-MSL) =	588.92	588.89
Water Level Measurement (ft-bgs) =	22.77	21.00
Top of Screen Elevation =	573.05	
Groundwater Elevation =	566.15	
Mid-Point of Saturated Screen Elevation =	562.19	
Bottom of Screen Elevation =	558.22	
Top of Screen Elevation =		550.89
Mid-Point of Saturated Screen Elevation =		548.39
Bottom of Screen Elevation =		545.89

Date of Water Level: September 15, 2015



567.89 = Groundwater Elevation

WATER LEVEL DELTA =	-1.74	FT.
SCREEN DELTA =	13.80	FT.
VERTICAL GRADIENT =	-0.1261	FEET/FOOT

UPWARD

ft-MSL=feet relative to Mean Sea Level
ft-bgs=feet below ground surface

Not To Scale

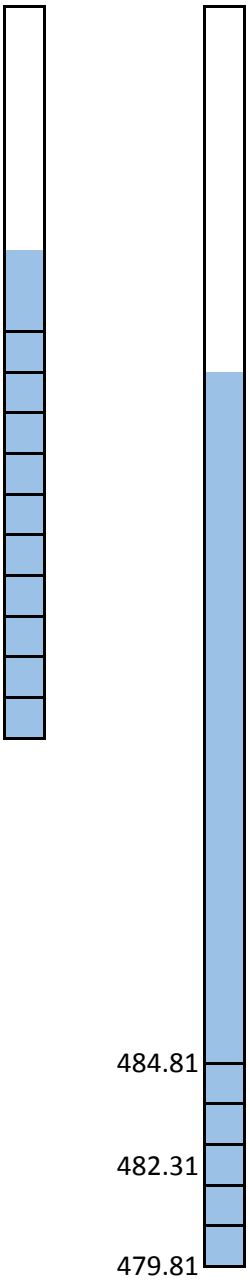
VERTICAL GRADIENT CALCULATIONS

Dan River Landfill

Amec Foster Wheeler Project No: 7810-14-0065

	GWA-1S	GWA-1D
Ground Surface Elevation (ft-MSL) =	598.83	598.81
Water Level Measurement (ft-bgs) =	28.23	30.05
Groundwater Elevation =	570.60	568.76 = Groundwater Elevation
Top of Screen Elevation =	568.83	484.81
Mid-Point of Saturated Screen Elevation =	561.33	482.31
Bottom of Screen Elevation =	553.83	479.81

Date of Water Level: September 15, 2015



WATER LEVEL DELTA =	1.84	FT.
SCREEN DELTA =	79.02	FT.
VERTICAL GRADIENT =	0.0233	FEET/FOOT

DOWNWARD

ft-MSL=feet relative to Mean Sea Level
ft-bgs=feet below ground surface

Not To Scale

VERTICAL GRADIENT CALCULATIONS

Dan River Landfill

Amec Foster Wheeler Project No: 7810-14-0065

	GWA-2S	GWA-2D
Ground Surface Elevation (ft-MSL) =	584.97	585.05
Water Level Measurement (ft-bgs) =	23.28	26.87
Top of Screen Elevation =	568.97	
Groundwater Elevation =	561.69	
Mid-Point of Saturated Screen Elevation =	557.83	
Bottom of Screen Elevation =	553.97	
		558.18 = Groundwater Elevation
Top of Screen Elevation =		529.05
Mid-Point of Saturated Screen Elevation =		526.55
Bottom of Screen Elevation =		524.05

Date of Water Level: September 15, 2015

WATER LEVEL DELTA =	3.51	FT.
SCREEN DELTA =	31.28	FT.
VERTICAL GRADIENT =	0.1122	FEET/FOOT

DOWNWARD

ft-MSL=feet relative to Mean Sea Level
ft-bgs=feet below ground surface

Not To Scale

VERTICAL GRADIENT CALCULATIONS

Dan River Landfill

Amec Foster Wheeler Project No: 7810-14-0065

	GWA-3S	GWA-3D
Ground Surface Elevation (ft-MSL) =	571.41	571.48
Water Level Measurement (ft-bgs) =	19.38	22.71
Top of Screen Elevation =	557.61	
Groundwater Elevation =	552.03	
Mid-Point of Saturated Screen Elevation =	549.82	
Bottom of Screen Elevation =	547.61	
		548.77 = Groundwater Elevation
Top of Screen Elevation =		537.48
Mid-Point of Saturated Screen Elevation =		534.98
Bottom of Screen Elevation =		532.48

Date of Water Level: September 15, 2015

WATER LEVEL DELTA =	3.26	FT.
SCREEN DELTA =	14.84	FT.
VERTICAL GRADIENT =	0.2197	FEET/FOOT

DOWNWARD

ft-MSL=feet relative to Mean Sea Level
ft-bgs=feet below ground surface

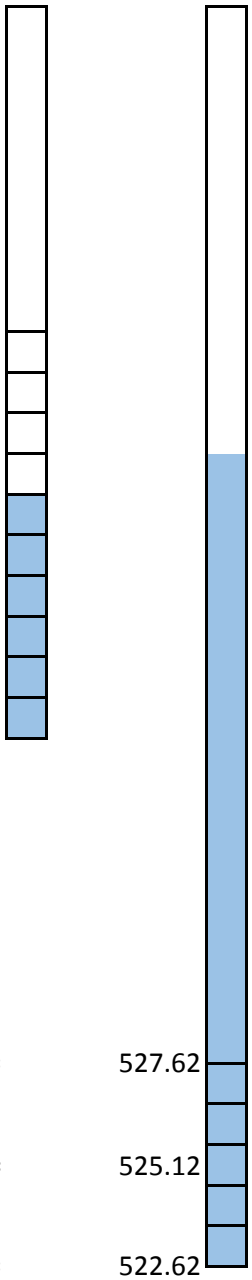
Not To Scale

VERTICAL GRADIENT CALCULATIONS

Dan River Landfill

Amec Foster Wheeler Project No: 7810-14-0065

	GWA-11S	GWA-11D
Ground Surface Elevation (ft-MSL) =	557.55	557.12
Water Level Measurement (ft-bgs) =	17.80	17.27
Top of Screen Elevation =	547.55	
Groundwater Elevation =	539.75	
Mid-Point of Saturated Screen Elevation =	536.15	
Bottom of Screen Elevation =	532.55	
Top of Screen Elevation =		527.62
Mid-Point of Saturated Screen Elevation =		525.12
Bottom of Screen Elevation =		522.62



539.85 = Groundwater Elevation

Date of Water Level:
September 15, 2015

WATER LEVEL DELTA =	-0.10	FT.
SCREEN DELTA =	11.03	FT.
VERTICAL GRADIENT =	-0.0091	FEET/FOOT

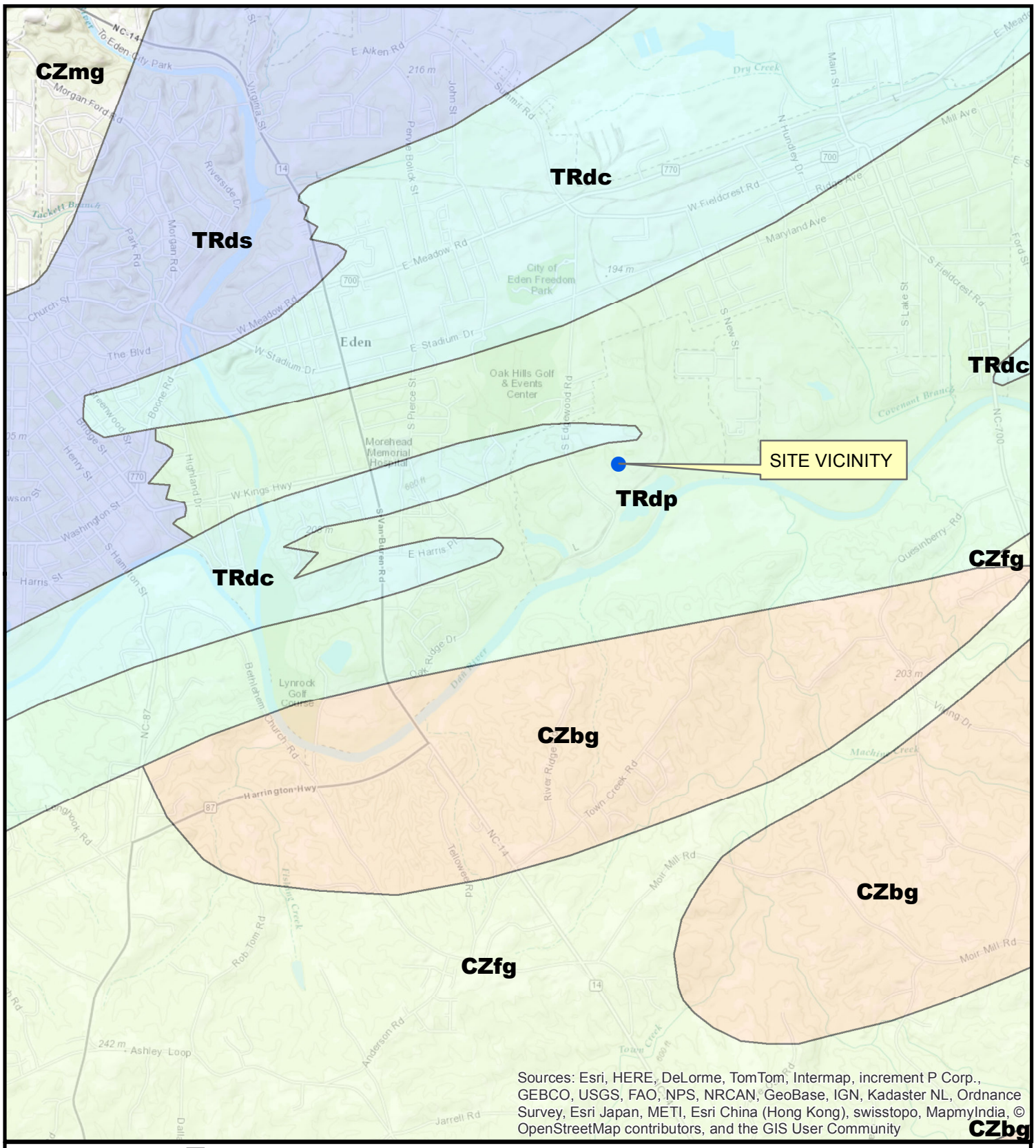
UPWARD

ft-MSL=feet relative to Mean Sea Level
ft-bgs=feet below ground surface

Not To Scale

APPENDIX VIII

Geologic Mapping and Lineament Survey



Dan River proposed landfill site vicinity

- CZam- Amphibolite
- CZbg- Biotite Gneiss
- CZfg- Felsic Gneiss
- TRdc- Mudstone
- TRdp- Sandstone
- TRds- Conglomerate

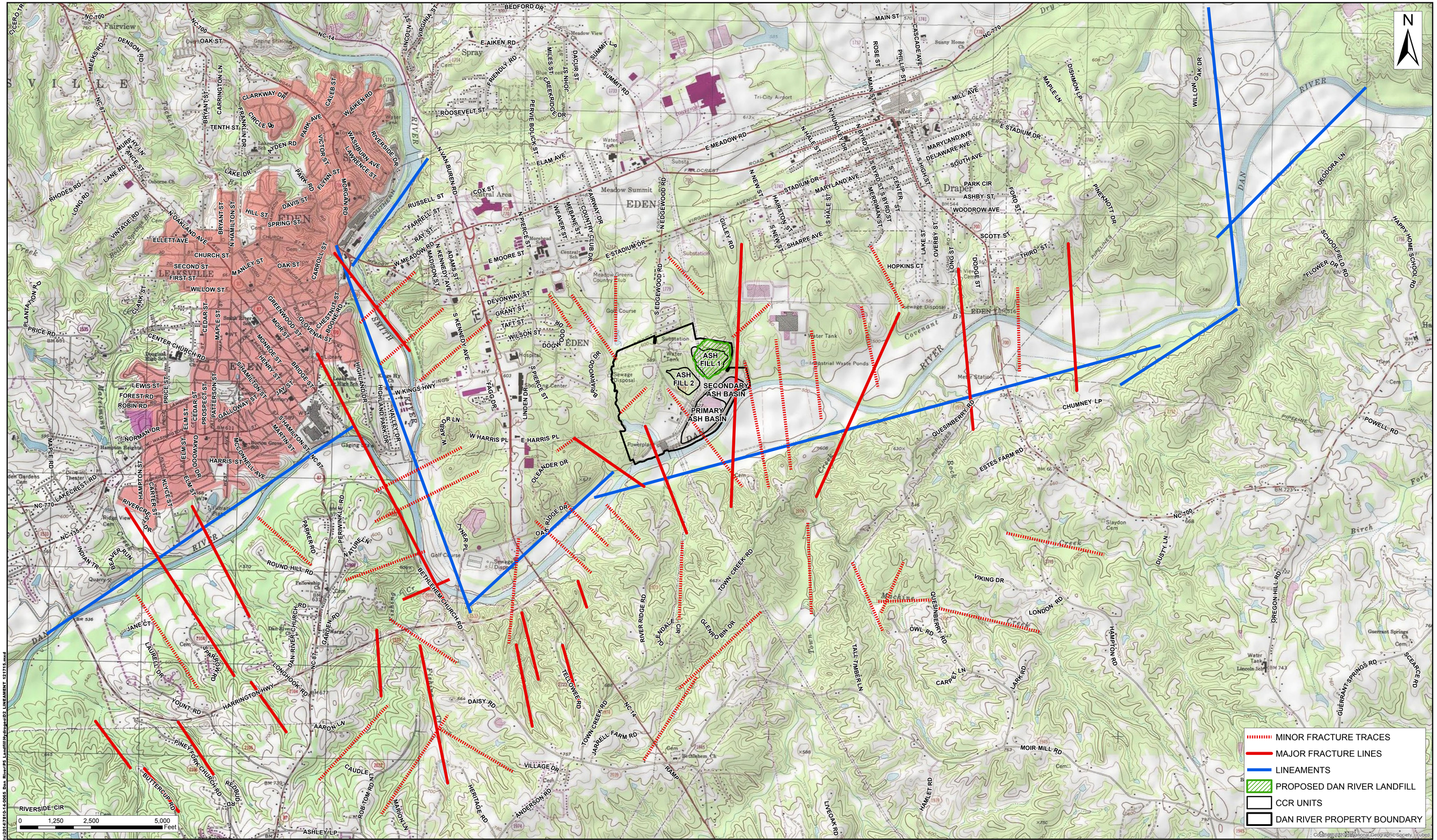
0 2,350 4,700 9,400 Feet

N

amec foster wheeler

GEOLOGIC MAP
DAN RIVER PROPOSED ON-SITE LANDFILL
ROCKINGHAM COUNTY, NORTH CAROLINA

PREPARED BY	DATE	CHECKED BY	DATE	JOB NUMBER	FIGURE
MP	6/1/15	CWM	6/1/15	7810-14-0065	1



PRELIMINARY
NOT FOR CONSTRUCTION

REV	D	M	Y	ISSUE/REVISION DESCRIPTION	ENG.	APPR.
1	18	12	2015	UPDATE REPORT	CWM	JAB
0	15	7	2015	INITIAL SUBMITTAL	CWM	JAB

CLIENT LOGO: DUKE ENERGY.

CLIENT:
DUKE ENERGY CAROLINAS
ROCKINGHAM COUNTY, NC

Amec Foster Wheeler Environment & Infrastructure, Inc.
2801 YORKMONT ROAD, SUITE 100
CHARLOTTE, NC 28208
TEL: (704)357-8600 FAX: (704) 357-8638
LICENSURE: NC ENG: F-1253 NC GEOLOGY: C-247

amec foster wheeler

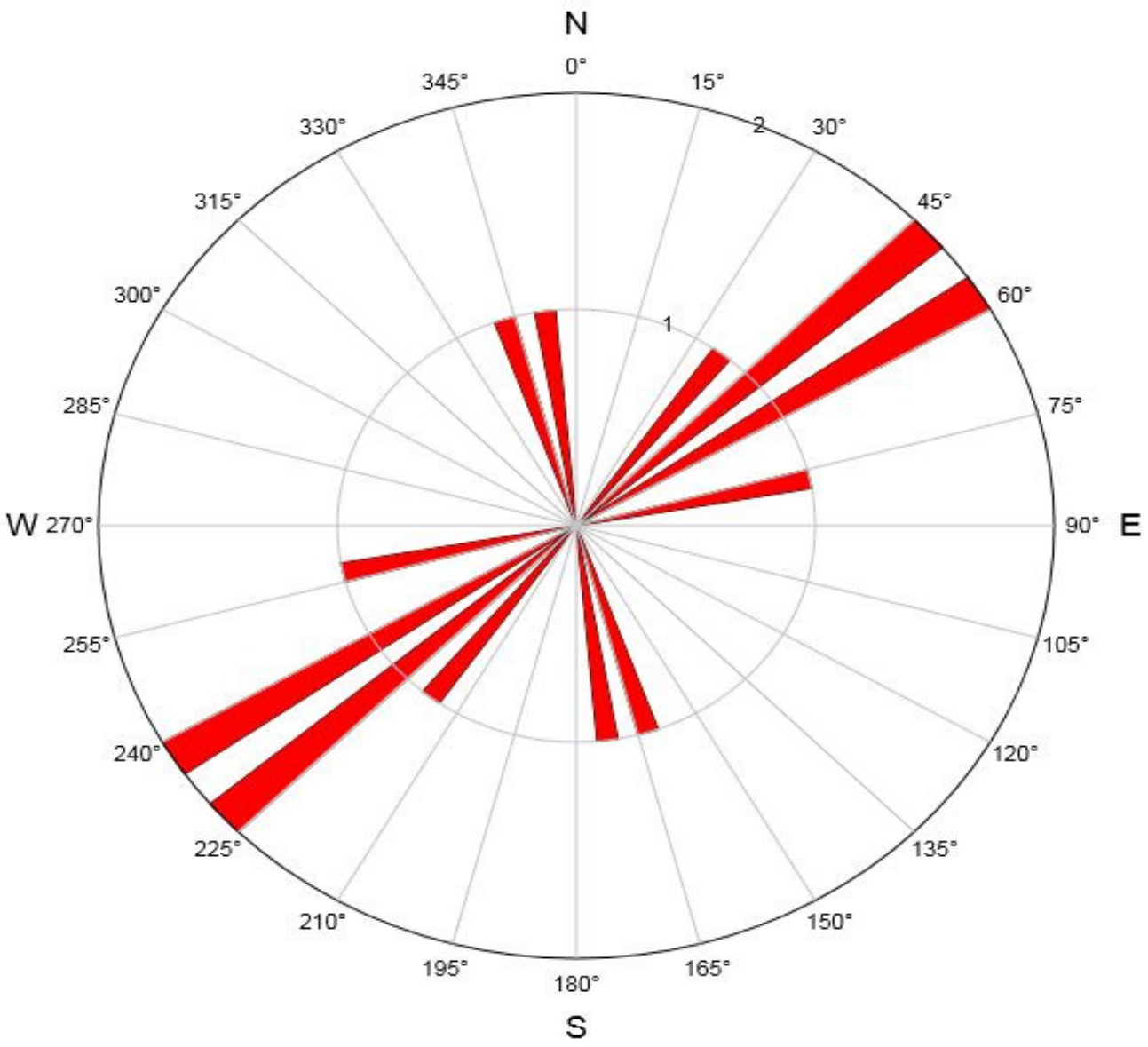
DATUM:	
PROJECTION:	
DRAWN BY:	JMS
REVIEWED BY:	CWM
SCALE:	AS SHOWN

DAN RIVER LANDFILL
HYDROGEOLOGIC STUDY

LINEAMENT SURVEY

PROJECT NO:	7810-14-0065
REVISION NO:	1
DATE:	12/18/2015
FIGURE NO.	2

Document Path: F:\AMEC Projects\2014\7810-14-0065 Dan River\PE Landfill\Hydrogeo\02_LINEAMENT 121715.mxd

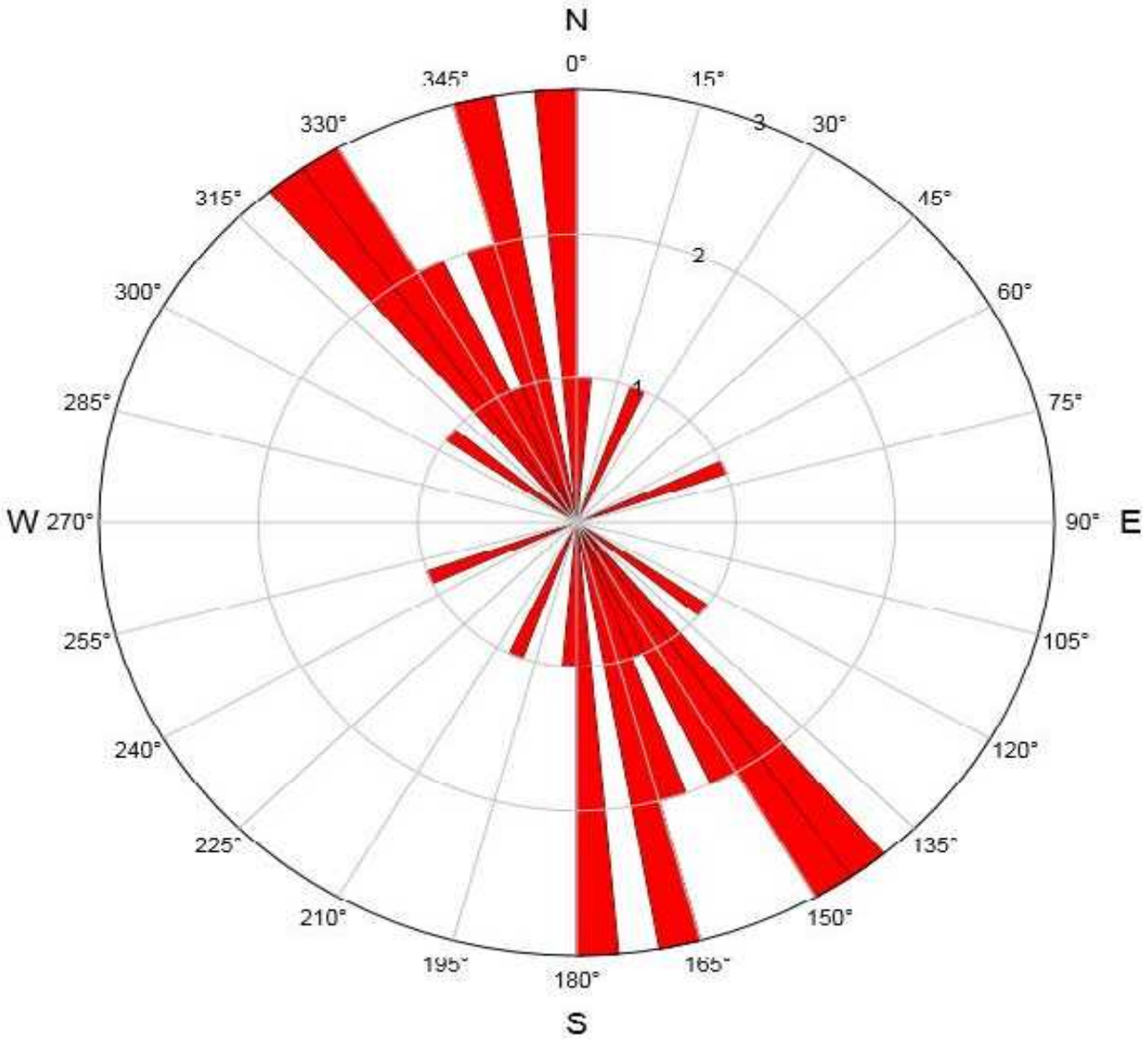


N = 8

Primary Trend: Northeast / Southwest
Secondary Trend: North-Northwest / South-Southeast

Note:
Above rose diagram generated using GeoRose 0.4.3 Software by Yong Technology, Inc. and respective lineament set depicted on Figure 2 in Appendix VIII.

Scale:	As Shown	amec foster wheeler	**FRACTURE TRACE ANALYSIS - ROSE DIAGRAM**	**FIGURE NO.**
Date	7/15/2015		**MAJOR FAULTS/JOINTS/STRATA CHANGES - COMPRESSION**	
Drawn By:	ADK		DAN RIVER LANDFILL	**3**
Project No:	7810.14.0065		EDEN, NORTH CAROLINA	

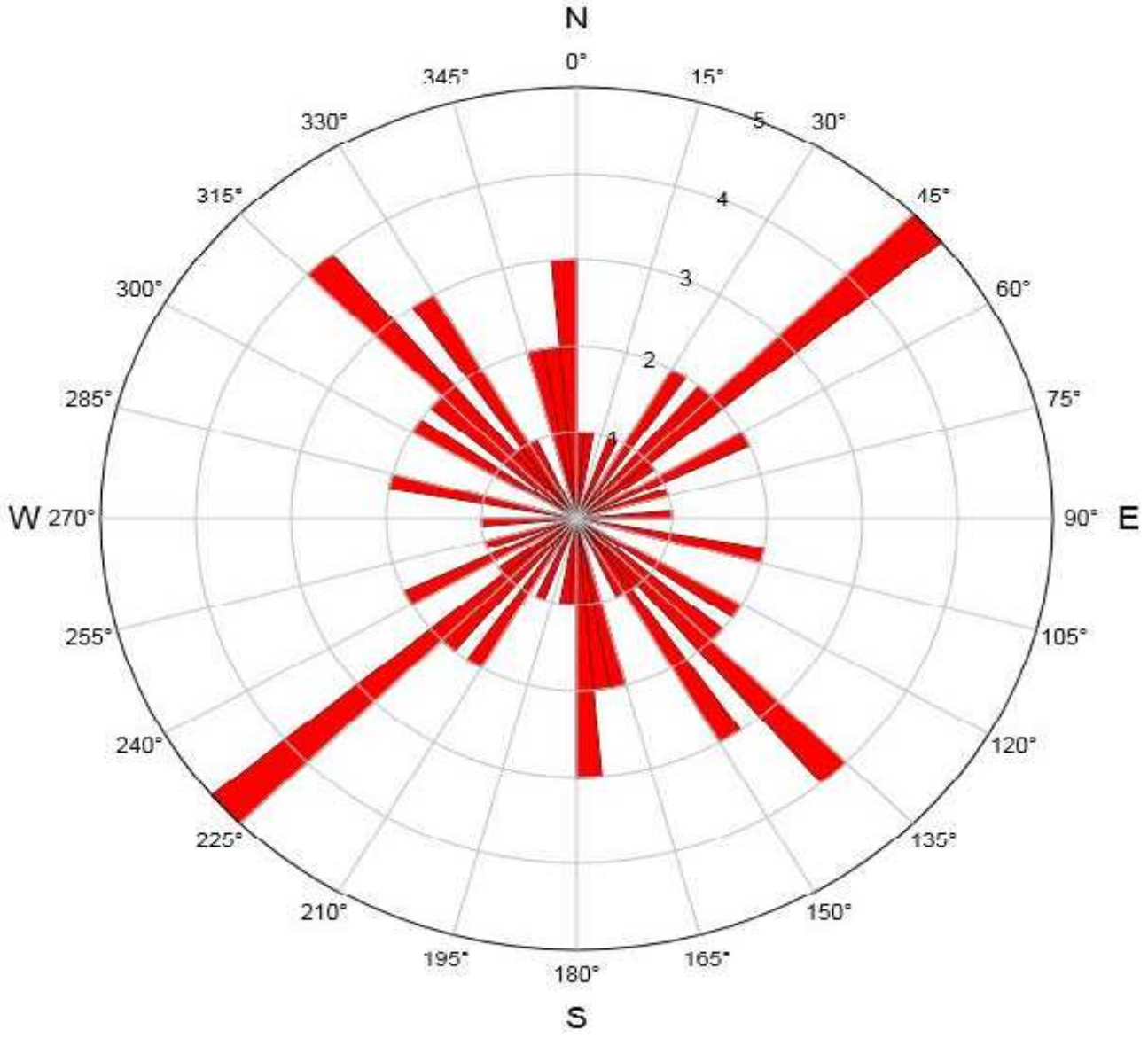


N = 20

Primary Trend: North-Northwest / South-Southeast
Secondary Trend: None

Note:
Above rose diagram generated using GeoRose 0.4.3 Software by Yong Technology, Inc. and respective lineament set depicted on Figure 2 in Appendix VIII.

Scale:	As Shown		**FRACTURE TRACE ANALYSIS - ROSE DIAGRAM**	**FIGURE NO.**
Date	7/15/2015		**MAJOR FRACTURE TRACE - DILATATIONAL**	
Drawn By:	ADK	amec foster wheeler	DAN RIVER LANDFILL	**4**
Project No:	7810.14.0065		EDEN, NORTH CAROLINA	



N = 39

Primary Trend: Northeast / Southwest
Secondary Trend: North-Northwest / South-Southeast

Note:
Above rose diagram generated using GeoRose 0.4.3 Software by Yong Technology, Inc. and respective lineament set depicted on Figure 2 in Appendix VIII.

Scale:	As Shown		**FRACTURE TRACE ANALYSIS - ROSE DIAGRAM**	**FIGURE NO.**
Date	7/15/2015		**MINOR FRACTURE TRACE - DILATATIONAL**	
Drawn By:	ADK	amec foster wheeler	DAN RIVER LANDFILL	**5**
Project No:	7810.14.0065		EDEN, NORTH CAROLINA	

APPENDIX IX

Geophysical Survey Report

Geo Solutions Ltd.

July 13, 2015

Ms. Courtney W. Murphy, P.G.
Senior Geologist
Amec Foster Wheeler
Environment & Infrastructure
2801 Yorkmont Road, Suite 100
Charlotte, NC 28208 USA

Dear Ms. Murphy:

Geo Solutions Limited, Inc. (Geo Solutions) is pleased to submit the results of geophysical services at one Duke Energy coal ash disposal facilities located at Eden, North Carolina. The three facilities are located in Figure 1, presented below:

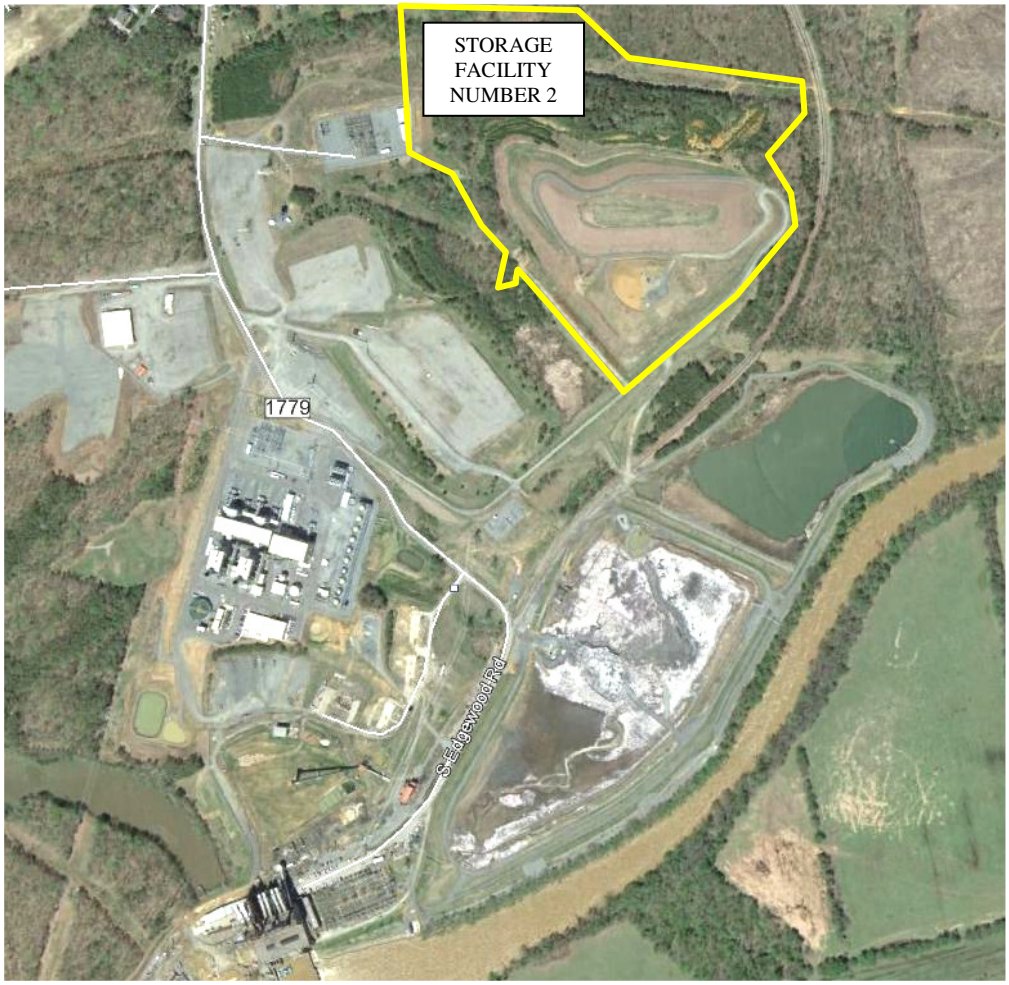


Figure 1. Location of the magnetic site evaluation area (outlined in yellow).

Background

AMEC FOSTER WHEELER (AMEC) is assisting in the design of remediation facilities at the Duke Energy Dan River Power Plant, Eden, North Carolina. As part of this process AMEC contracted Geo Solutions to complete a geophysical evaluation at a coal ash storage facility. This program involved the evaluation of the Coal Ash Facility Number 2 for the presence or absence of potential diabase dike geologic structures which are known to be present in similar Triassic Basin geologic settings.

Field Activities - Dike Evaluation

Geo Solutions was asked to conduct a geophysical evaluation of the area surrounding the coal ash storage facility Number 2. The purpose of this evaluation was to locate, if present, potential diabase dike structures. Diabase dikes are geologic structures that typically are nearly vertical mafic igneous structures that appear linear in geologic maps. Geologic maps from this area indicate no diabase structures were present. However, geologic mapping of this area has not been completed in sufficient detail to identify small diabase dikes that could have an impact on site remediation planning. Diabase dikes can be identified in the field through the identification of diabase boulders (float) or through the use of a sensitive magnetometer to identify magnetic anomalies associated with the placement of the iron enriched igneous rock.

Geo Solutions identified numerous boulders (float) at the site. However examination of the boulders indicated no presence of diabase rock material. The boulders appeared to be either riprap rock brought onto the site or typical Triassic Rocks based on the description from USGS geologic maps. Two geologic formations are identified to be present within the evaluation area (Figure 2):

1. Cow Branch Formation – represented by mudstone with minor sandstone, gray, laterally-continuous bedding is reported in the northern most section of the site and intertongues with Pine Hall formation to the south.

2. Pine Hall Formation - represented by a yellowish orange to brown sandstone, mudstone, and conglomerate. The weathered color of this formation resembles the outer weathered surface of diabase rock. However the diabase rock can be distinguished by its dark gray to black interior color.

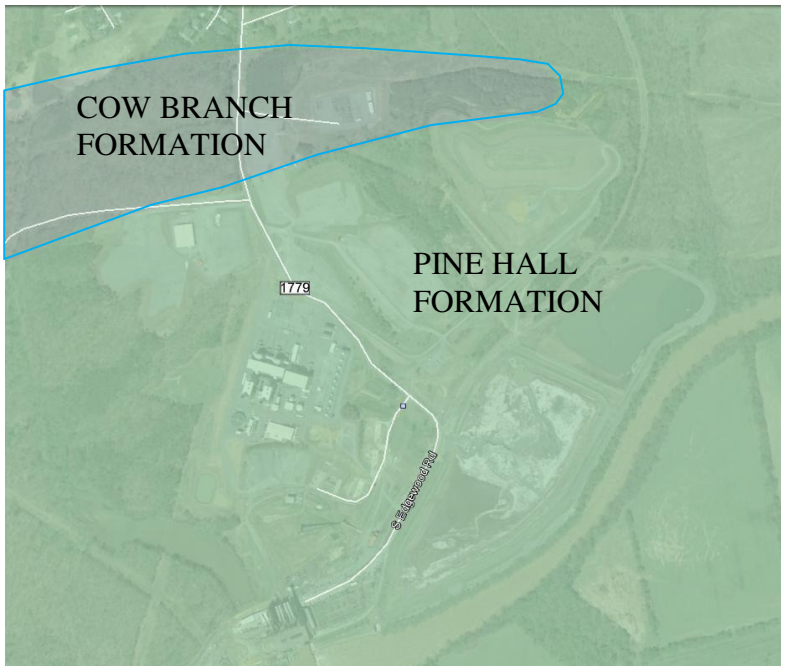


Figure 2. General geology of the site identifying the distribution of the two identified rock formations (The North Carolina Dept. of Environment, Health, and Natural Resources, Division of Land Resources, NC Geological Survey, in cooperation with the NC Center for Geographic Information and Analysis, 1998, Geology - North Carolina (1:250,000), coverage data file geol250, http://mrdata.usgs.gov/geology/state/sgmc-unit.php?unit=NCTRdp;9).

Magnetic Evaluation

Geo Solutions completed an exploratory level magnetic evaluation using a Geometrics G-859 portable magnetometer equipped with a GPS satellite locating system. The magnetometer was attached to plastic sled and pulled behind a Polaris Ranger ATV. The Geometrics Magnetometer utilized at Cesium Vapor detector with a collection rate of 2 samples per second. The spacing of the magnetic data collection is a function of sampling frequency and rate of travel. In general a field measurement of the strength of the earth's total magnetic field was made every meter of travel. This is considered high resolution magnetic survey spacing.

On March 23, 2015 Geo Solutions traversed portions of the existing coal ash stack and areas surrounding the stack. During completion of the evaluation Geo Solutions noted the presence of numerous metal objects that would interfere with the results of the survey but can, upon examination, be distinguished from natural responses produced by typical diabase dike structures. These metal interferences include: vehicles, drill rigs, fences and metal culverts, and metal surface debris.

Following the completion of data collection Geo Solutions downloaded the magnetic data from the magnetometer using a publicly available software program called MagMapper 2000. This program combines the GPS coordinates with the magnetometer readings and produces a simple data spreadsheet that is converted into a Golden Software compatible format for use in a mapping program called "Surfer". From the Surfer program a color contour map was produced to show the spatial changes in the earth's magnetic field along with the location of the magnetic profile lines (Figure 4). The known surface

interferences are noted on this map. Indication of potential dike structures would be exhibited as linear magnetic highs that would extend for thousands of feet across the map. Based on the map results no magnetic features matching the expected magnetic results produced by a diabase dike were present.

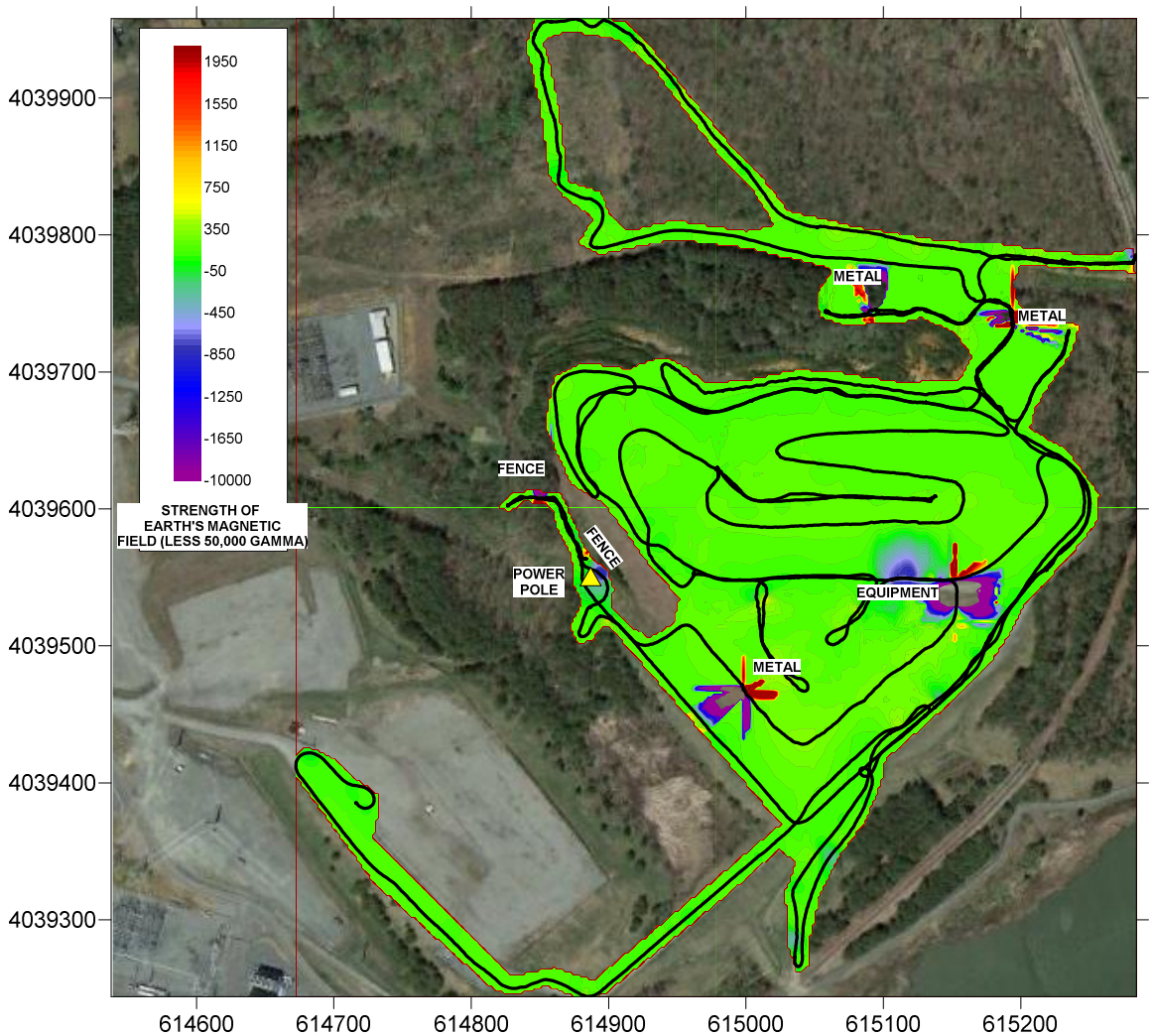


Figure 4. Result of total field magnetic evaluation at coal ash storage facility. The black line represents location of data collection points. The magnetic values presented are reduced by background values (approximately 50,000 gamma). Large magnetic excursions as illustrated by magenta and red hues are the results of iron bearing metal objects. No linear magnetic anomalies typical of the presence of diabase dikes were observed.

Conclusions

Geo Solutions has completed geophysical evaluations of coal ash storage facilities Number 2. Based on the results of this evaluation we have concluded the following:

1. A magnetic evaluation of the earth's magnetic field in the area of the Number 2 coal ash storage facility indicates that no diabase dikes are present.

2. Surface metal interference did not impact the conclusions of this dike investigation.

Please give a call should you have any questions concerning the results of this investigation.

Very truly yours,

GEO SOLUTIONS LIMITED, INC.

Ronald A. Crowson
President