Report of Geotechnical Exploration and Slope Stability Evaluation

Ash Pond / Stilling Pond Complex
Gallatin Fossil Plant
Gallatin, Tennessee

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Prepared for:
Tennessee Valley Authority
Chattanooga, Tennessee

May 27, 2010

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Mr. Michael S. Turnbow
Tennessee Valley Authority
1101 Market Street, LP 2G-C
Chattanooga, Tennessee 37402

Re: Report of Geotechnical Exploration and Slope Stability Evaluation
Ash Pond / Stilling Pond Complex
Gallatin Fossil Plant
Gallatin, Tennessee

Dear Mr. Turnbow:

As requested, Stantec Consulting Services Inc. (Stantec) has completed our Geotechnical Exploration and Slope Stability Evaluation for the Ash Pond / Stilling Pond Complex at the Gallatin Fossil Plant. The report documents the subsurface conditions, results of laboratory testing, findings from the historical document reviews, results of our analyses and evaluation, and recommendations for the facility. These services were performed under Engineering Service Request ESR/TAO 894 in accordance with the terms and provisions established in our System-Wide Services Agreement dated December 22, 2008.

Stantec appreciates the opportunity to provide engineering services for this project. If you have any questions, or if we may be of further assistance, feel free to contact our office.

Sincerely,

STANTEC CONSULTING SERVICES INC.

Paul Cooper

Paul J. Cooper, PE
Project Engineer

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5/27/10

/day

Enclosures:

Report of Geotechnical Exploration and Slope Stability Evaluation

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Executive Summary

Stantec Consulting Services Inc. (Stantec) has completed the Geotechnical Exploration and Slope Stability Evaluation at Gallatin Fossil Plant's ash pond and stilling pond complex. This study was performed to evaluate slope stability and seepage for the existing conditions.

Background Information

The ash pond complex encompasses approximately 476 acres and consists of Bottom Ash Pond A (248 acres), Fly Ash Pond E (167 acres) and Stilling Ponds B, C and D (61 acres). The main ash disposal pond at Gallatin was initially commissioned in 1970. It covered both areas now known as Ash Ponds A and E. Ash Pond A was later formed by constructing a bottom ash divider dike in the mid-1980s to separate the bottom ash area (Ash Pond A) from the fly ash area (Ash Pond E). The stilling pond system is situated to the north of both Ash Ponds A and E. The overall constructed height of the dike system now varies from approximately 10 to 30 feet. Dike slopes are approximately 2.5H:1V to 3H:1V, or flatter, except for the divider dike which separates Ash Pond A from the stilling ponds where dike slopes are steeper (approximately 1.5H:IV).

Historical geotechnical issues include mid-1970's sinkhole activity along the south side of Ash Pond A and the north side of Ash Pond E. These sinkholes were reportedly repaired by excavating and capping. In addition, sinkhole repairs were also made during the recent 2006 expansion of Ash Pond E. The documents reviewed do not indicate a history of slope instability or seepage. In addition, signs of slope instability have not been observed in the field by Stantec throughout the course of this work. Minor seepage was observed at a few locations during this study.

Currently, URS Corporation is conducting a siting study for a new CCP landfill for future dry disposal of fly ash, bottom ash, and potentially gypsum. TVA plans for all the CCP ponds at Gallatin to be closed eventually. A phased closure approach will likely be implemented.

Scope of Geotechnical Exploration

This study began with a review of TVA-provided historical information along with site inspections. A geotechnical exploration program was then developed and executed. The exploration consisted of drilling soil test/sample borings at 34 locations. Piezometers were installed at 12 locations. Drilling locations were positioned along 14 cross-sections around the pond complex. The laboratory testing program included moisture content, classification, permeability and shear strength testing to establish key index properties and strength parameters.

Results of Exploration and Engineering Analyses

The results from the geotechnical exploration indicate that the dike systems consist of a mixture of clay and bottom ash. Pond capacities have been expanded in the past by raising or constructing dikes over sluiced ash. The dikes are underlain by native clays and then by limestone bedrock.

Following the drilling and laboratory testing program, slope stability and seepage analyses were performed to quantify factors of safety for current conditions. The dikes were assessed under static, long-term, steady state conditions since they have been in their current configuration for a long time. The analysis focused on eight cross-sections that were selected to represent typical conditions around the pond complex.

To evaluate the seepage conditions within the dikes, a finite element model was developed for each of the eight cross-sections. To judge whether or not a tendency for piping is possible, factors of safety can be calculated using the vertical exit gradients as predicted by the seepage models. For Gallatin's pond complex, the highest vertical exit gradients where minimum factors of safety against piping occur are located at points along the dike toes or just beyond. The minimum factors of safety values are all greater than or equal to three. Based on the U.S. Army Corps of Engineers (USACE) design criteria for dams, Stantec recommends a value of three as a minimum target factor of safety against piping. Hence, on the eight cross sections modeled, the recommended target factor of safety for piping at the critical seepage exit points is met or exceeded.

The slope stability of the Gallatin pond dikes was also evaluated. Factors of safety for slope stability were computed using Spencer's method of analysis, circular and non-circular slip surfaces, and search routines that help to identify the critical (minimum factor of safety) failure surface. The slope stability models were evaluated using pore pressures predicted from the seepage models. The results of the steady-state seepage and long-term slope stability analysis demonstrate that the factors of safety range from approximately 1.1 to greater than 1.5. TVA has adopted a minimum target factor of safety of 1.5 against slope stability based on USACE criteria. The results indicate that four cross-sections (Sections F, H, J, and K) have safety factors less than the target. For Sections H, J and K, the deficient areas are located along the north face of the divider dike that separates Pond A from the adjacent stilling ponds. The low factors of safety are a result of the side slopes being relatively steep along this divider dike (mostly 1.5H:1V). The corresponding failure circles are positioned more toward the face of the dike slope and are not far-reaching into the dike. Hence, the failure circles are considered to be more representative of maintenance-type sloughs and not global failures. For Section F (which is located along the north side of Pond E), the deficient area/failure surface is located at the immediate dike toe area just above the stilling ponds, and is also considered to be representative of maintenance-type sloughing. Factors of safety for deep seated global-type failure surfaces meet or exceed the recommended target value for each section analyzed.

In conclusion, the engineering analyses performed indicates that the divider dike between Ash Pond A and the adjacent stilling ponds, and the toe of the Pond E north dike exhibit deficient factors of safety against maintenance-type sloughing/slope stability. Stantec recommends that TVA undertake mitigation efforts to improve long-term stability conditions for this divider dike. Improvements could be incorporated into upcoming design of pond modifications/closure, or a separate interim mitigation program could be implemented, depending on timing and as decided by TVA.

Report of Geotechnical Exploration and Slope Stability Evaluation

Ash Pond / Stilling Pond Complex
Gallatin Fossil Plant
Gallatin, Tennessee

1. Introduction

In January 2009 the Tennessee Valley Authority (TVA) requested that Stantec Consulting Services Inc. (Stantec) conduct assessments of its coal combustion product (CCP) disposal facilities at eleven active and one closed fossil plants. The plants are located in the states of Kentucky, Tennessee and Alabama. The assessments were performed for the purpose of determining whether unstable conditions are present that could possibly cause a release of CCP's into the environment.

Stantec's scope of services for the assessments was developed within the framework of current dam safety practice and was performed in phases. Stantec generally used U.S. Army Corps of Engineers (USACE) practices and procedures as a guide for this program. Phase 1 included review of available documentation, site reconnaissance, field measurements and providing recommendations for interim corrective measures, improvements, and further engineering studies. The Report of Phase 1 Facility Assessment for Coal Combustion Product Impoundments and Disposal Facilities for the Tennessee plants was completed on June 24, 2009. The conclusions and recommendations for the Ash Pond/Stilling Pond complex (Ash Ponds A and E, Stilling Ponds B, C and D) at the Gallatin Fossil plant (GAF) are included in the Phase 1 report. In addition to issues that require maintenance-type remedial activities, the Phase 1 recommendations included conducting a Phase 2 geotechnical exploration to evaluate slope stability and seepage for the pond complex. As a result, the following geotechnical evaluation was authorized by TVA under Engineering Services Request ESR/TAO 894. This report documents the scope and results of the study and contains Stantec's conclusions and recommendations concerning slope stability and seepage for the Ash Pond complex at GAF.

2. Site Description and Geology

2.1. Location and Description

The Gallatin Fossil Plant is located in Gallatin, Sumner County, Tennessee along the north bank of the Cumberland River (Old Hickory Lake) encompassing the Odom's Bend peninsula approximately 30 miles northeast of Nashville. The ash pond/stilling pond complex is situated approximately 5,000 feet north of the plant's powerhouse. This disposal area is bordered by the plant access road to the east, railroad tracks to the north, and the Cumberland River to the west. The complex encompasses approximately 476 acres and consists of Bottom Ash Pond A (248 acres), Fly Ash Pond E (167 acres), and Stilling Ponds B, C and D (61 acres). Figure 2.1 on the following page provides a plan view of the Gallatin pond complex.

Gallatin Fossil Plant
Gallatin, Tennessee

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Figure 2.1. Gallatin Ponds Overview

The main ash pond at Gallatin was initially commissioned in 1970. It covered both areas now known as Ash Ponds A and E. Ash Pond A was formed by constructing a bottom ash divider dike in the mid-1980s to separate the bottom ash area (Ash Pond A) from the fly ash area (Ash Pond E). That divider dike was raised in the late 1980's for additional storage. The raised dike was constructed inwardly over sluiced ash. The divider dike is estimated to now be about 20 to 25 feet tall (estimated from old drawings). Approximately 45,000 tons of bottom ash is sluiced to Pond A annually. The outlet for Pond A is through three 48-inch RCP riser pipe/weirs that discharge through three 30-inch RCP sections into the adjacent Stilling Pond B. The outlet pipes are submerged.

As mentioned above, Ash Pond E was formed when the main pond system was divided by constructing a bottom ash divider dike in mid-1980s. The initial area of Pond E was formed by constructing a series of "saddle" dikes where lower ground elevations existed. In 2006, Pond E was expanded by constructing a new raised perimeter dike. The new perimeter dike was constructed over old saddle dikes, and inwardly over sluiced fly ash. Approximately 185,000 tons of fly ash is sluiced to Pond E annually. The outlet for Pond E is through two 48-inch RCP riser pipe/weirs that discharge through two 30-inch pipe sections into adjacent Stilling Pond C.

The stilling pond system is situated to the north of both Ash Ponds A and E. Stilling Ponds B, C and D are essentially all part of the same pond. Each designated area is separated by narrower pond sections/channels, but all areas are hydraulically connected and are at the same pool elevation. Pond B receives decant water from Ash Pond A, and flows to Pond C. Pond C receives decant water from Pond E and flows into Pond D. The stilling pond outlet is located at the west end of Pond D. The outlet consists of four 48-inch RCP riser/weir sections that discharge though four 36-inch RCP sections into an adjacent small discharge pool. From here, water discharges through four 36-inch corrugated metal pipes into adjacent Old Hickory Lake. The Pond D area and outlet were initially commissioned in 1970 when the main ash pond area (formerly Disposal Area 3) was placed into operation. Pond B and C areas to the east were formed when the divider dike construction extended to the north to separate Ash Ponds A and E. The entire stilling pond area is naturally low-lying, and only two short saddle dike sections exist. One is at the outlet area of Pond D, and one is to the north of the Pond C area. The pool elevation is about 11 to 12 feet lower than adjacent Ash Pond A, and about 7 to 8 feet lower than adjacent Ash Pond E.

Currently, URS Corporation is conducting a siting study for a new CCP landfill for future dry disposal of fly ash, bottom ash and potentially gypsum. TVA plans for all the CCP ponds at Gallatin to be closed eventually. A phased closure approach will likely be implemented.

2.2. Geology

The Gallatin Fossil Plant is located in the northern portion of central Tennessee along the north bank of the Cumberland River (Old Hickory Lake), encompassing the Odom's Bend peninsula. The geologic mapping reviewed (Geologic Map of the Laguardo Quadrangle, Tennessee, Tennessee Department of Conservation, Division of Geology, 1964) depicts soil deposits consisting of alluvial clay, silt and very fine sand across large portions of the site. The mapping indicates that the thickness of the alluvium is highly variable, but may be as much as 70 feet including terrace deposits. The remaining areas are underlain by residual clays resulting from the in-place weathering of the parent Ordovician age limestone formations. The alluvial deposits are mapped primarily at lower site elevations along the power plant area and only extend into the extreme south end of the ash pond complex. Thus, the majority of the pond complex is underlain by residual clays.

The geologic mapping also indicates that the bedrock beneath the soil deposits consists of the Bigby-Cannon Limestone, Hermitage Formation, Carters Limestone, and Lebanon Limestone in general order of descending lithology. The Bigby-Cannon Limestone is only mapped in the higher elevations of the site above approximate El. 540 feet. The unit is described as consisting of medium to coarse grained limestone with phosphate pellets to a dark gray to brown-black microcrystalline limestone to a cryptocrystalline dove colored limestone. The Hermitage formation is primarily mapped within the interior of the peninsula between approximate El. 510 feet and El. 540 feet. The Hermitage Formation consists of silty, nodular to laminated, argillaceous limestone with fossiliferous and phosphatic zones and may contain calcarenite (i.e., sandstone derived from the erosion of older limestone). Residuum formed by the solution weathering of the Hermitage Formation is typically a sandy to silty lean clay generally underlain by a zone of extensively weathered parent rock including "floating" boulders in the soil overburden, as well as pinnacles and slots in the bedrock mass filled with soft, wet unconsolidated clay soils. The Carters Limestone is mapped between approximate elevations El. 445 feet and El. 510 feet and consists of a densely crystalline limestone with thin shale partings. In general, the Lebanon Limestone is mapped below El. 445 feet and is a thin bedded, fossiliferous limestone with thin calcareous shale partings. Based on the mapping and elevation ranges listed above, the ash pond complex at GAF is primarily influenced by the Carters and Lebanon Limestone formations.

The USGS topographic mapping depicts a few enclosed drainage basins indicative of karst activity within the vicinity of the plant. Correlation of the locations of these features with the geologic mapping suggests this karst activity is associated with the upper portions of the Carters Limestone near the contact with the overlying Hermitage Formation. Sinkholes, irregular bedrock surfaces, clay-filled vertical crevices/slots, and varying degrees of solutioning/weathering can occur with karstic bedrock formations.

3. Review of Available Information

3.1. General

During the Phase 1 Facility Assessment, Stantec's engineers reviewed documents provided by TVA pertaining to the ash ponds and stilling ponds at GAF. The main objective of the document review was to develop a historical knowledge base of the pond complex. The documents reviewed included record drawings, cross-sections of dikes, old contour maps, annual dike stability reports and old geotechnical reports. The information gained was also used to supplement the information obtained during Stantec's geotechnical exploration. A complete listing of the reviewed documents is included in the Phase 1 report.

Of particular interest and use in this study are the following documents and drawings:

- <u>Gallatin Steam Plant, Ash Disposal Area 3, Deflector and Divider Dikes, SME-SOI-88-017</u>, by Singleton Materials Engineering Laboratory, September 8, 1988.

- <u>Report of Geotechnical Exploration, Ash Disposal Area and Potential On-site and Off-site Borrow Areas, Gallatin Fossil Plant, Gallatin, Tennessee</u>, by MACTEC Engineering and Consulting, Inc., October 14, 2004.

- Gallatin Fossil Plant, Ash Disposal Study, Phase 1 Report, Revision 0, by Worley Parsons Resources and Energy, May 15, 2006.
- Gallatin Steam Plant – Ash Disposal Area – Soils Exploration, Memorandum from F.P. Lacy to J.C. McGraw, September 24, 1969.
- Gallatin Fossil Plant Ash Disposal Ponds Dike Stability Analyses, TVA in-house analysis, May 13, 2005.
- Geology of the Gallatin Steam Plant Site, by Charles P. Bensiger, TVA Division of Water Control Planning, Geologic Branch, June, 1953.
- Results of TVA in-house static slope stability analysis for raising of Pond A divider dike, 1988.
- TVA Drawing Numbers 10W271, 306 to 320, 410, 411, 415, 416, 506 to 510, 10N240, 10N243, 10N267, 10N272, 10N273-01 to 03, 10N274, 10N278.
- TVA Annual Inspection Reports, 1967 to 1989, 1993 to 2004, and 2007 to 2008.

It should be noted that the 2004 MACTEC geotechnical report was useful in offering comparisons to Stantec's current subsurface and laboratory testing data. It contains the results of sol test borings, cone penetrometer tests, and laboratory tests that were conducted to support the 2006 expansion of Ash Pond E. In general, the data presented in that report offers a good comparison to the current Stantec data, and Stantec reviewed and considered this data when selecting paramaters for seepage and slope stability analysis. Further commentary relative to the MACTEC data is offered at various locations within this report, where applicable. In addition, a copy of the report is provided in Appendix G for reference.

3.2. Site History

Construction began at the Gallatin Fossil Plant in 1953 and was completed in 1959. Gallatin currently contains four coal-fired generating units and burns approximately 12,350 tons of coal per day.

Initially, ash materials at Gallatin were placed into a disposal area just southwest of the powerhouse along the river. This area was in operation until usage was discontinued in 1970. The facility had four cells, referred to as A, B, C and D. Ash was sluiced to the cells. In 1967, two slides occurred along exterior dikes adjacent to cells A and C. These two cells were drained and abandoned, but Cell B (middle cell) remained in operation until 1970 when disposal shifted to what was then called Area 3 (now known as Ponds A and E). Cell B contained water until it was drained in 1973. Over time, vegetation developed in the abandoned cells, and the slide areas were monitored. Stormwater continued to collect in Cell B where a skimmer was left in place to prevent loss of ash through the outlet pipe. In 1985, new slides began to develop and in 1986 the entire perimeter dike length was reconstructed and flattened to 2H:1V. In 1995 a formal closure plan was developed, submitted to TDEC and was approved in 1997. The closure construction work was completed in 1998. GAF personnel are required to monitor toe seepage areas on a quarterly basis to comply with the TDEC-approved closure plan.

The next disposal area at Gallatin was initially known as Disposal Area 3 and was commissioned in 1970. It covered both areas now known as Ash Ponds A and E. In general, this entire area is naturally low-lying and only saddle dikes were needed in a few cases to form the disposal area. The original outlet area was also constructed at that time, which is still in operation today within Stilling Pond D.

In the mid-1980's, Ash Ponds A and E were formed by constructing a bottom ash divider dike extending to the east to separate the bottom ash area (Ash Pond A) from the fly ash area (Ash Pond E). This construction also resulted in the formation of the stilling pond complex to the north (Ponds B, C and D). That divider dike was raised in the late 1980's for additional storage. In 2006, Pond E was expanded by constructing a new higher perimeter dike. The expansion was constructed over known sinkholes, which were reportedly mitigated. Also, the new dike was constructed over the old original saddle dikes, and inwardly over sluiced fly ash. Currently, the pool elevation of Pond A is about 11 to12 feet higher than adjacent Stilling Pond B, and the pool elevation for Pond E is about 7 to 8 feet higher than adjacent Stilling Pond C. Approximately 45,000 tons of bottom ash is sluiced to Pond A and approximately 185,000 tons of fly ash is sluiced to Pond E annually.

3.3. Historical Geotechnical Issues

As discussed in Section 3.1, the Phase 1 work included review of historical documents. Primary issues listed in the documents for the pond complex are discussed below.

3.3.1. Seepage and Slope Stability

The documents reviewed for Ash Pond A, Ash Pond E and the stilling ponds do not indicate a history of slope instability or seepage. In addition, signs of slope instability have not been observed in the field by Stantec. However, there were a few minor areas of seepage that have been discovered throughout the course of this work. Figure 3.1 presents a plan view of these seepage locations at Gallatin. The seepage is described below:

Seep 1 – Small red-water seep discovered by Stantec in January 2009 just above pool level of stilling pond and to the east of Pond A outlet system. No change observed in appearance throughout course of this work. Minimal to no flow observed. No piping.

Seep 2 – Red-water seeps discovered by Stantec in January 2009 along toe of saddle dike at Stilling Pond C. No significant change observed in appearance throughout course of this work. Minimal to no flow observed. No piping.

Seep 3 – Small red-water seep discovered by TVA personnel in March 2010 just above the south dike toe at Pond E. Size is approximately 5 feet by 20 feet strip. Very small flow observed. No change observed in appearance throughout course of this work. No piping.

Seep 4 – Small seep discovered by TVA personnel in March 2010 just above west dike toe at Pond E. Size is approximately 5 feet by 20 feet strip. Wet/soft ground observed with no flow and no piping. No change observed in appearance throughout course of this work.

Possible Seep 5 – This possible seepage area is located just beyond the west Pond E dike toe area adjacent to the pool level of Old Hickory Lake. This could be remaining wet areas from recent high pool events of Old Hickory Lake, and needs further observations with time and during drier weather to reach conclusions.

Gallatin Fossil Plant
Gallatin, Tennessee

Stantec

Figure 3.1. Gallatin Seepage Locations

Possible Seep 6 – This small possible seepage area is located at the northwest dike toe of Pond A. It was discovered in February by TVA. It also had some minor flow that was noted by Stantec on May 3, 2010 just after the very heavy rain event that occurred May 1 and 2, 2010. The dike crest in this area tends to pool water during rain, and this area could be a result of stormwater infiltration into the dike that is slowly exiting at the dike toe below. Further observations with time and during drier weather will be needed to reach conclusions.

Possible Seep 7 – This possible seepage area is located just west of Seep 3 at the south dike toe of Pond E. It was discovered by Stantec on May 3, 2010 just after the very heavy rain event that occurred May 1 and 2, 2010. The area exhibited very low flow. Because it was discovered just after the heavy rains, this area could be a result of stormwater infiltration into the dike that is slowly exiting at the dike toe below. Further observations with time and during drier weather will be needed to reach conclusions.

3.3.2. Karst Activity

Documentation reviewed indicates that sinkhole activity has affected the ponds at Gallatin in the past. For example, the annual inspection reports indicate that pond seepage loss occurred through a sinkhole located on the north side of Ash Pond E in the early to mid 1970's. This sinkhole was reportedly repaired in 1977. The inspection reports also indicate that pond seepage loss occurred through a sinkhole on south side of Ash Pond A also during the early to mid 1970's. A circular dike was built to isolate and protect this sinkhole in 1979. In 1990, the circular dike was removed and the sinkhole was repaired reportedly by excavating and capping.

Last, the recent expansion for Pond E was constructed over known sinkholes, which were reportedly mitigated during construction. Approximately ten areas were mitigated. Mitigation activities were reported to include pumping the pond dry (with no backflow of water noted), followed by excavating the areas to expose bedrock and filling the crevices/sinkholes with shot rock and a compacted clay cap. It should be noted that the construction drawings for the Pond E expansion do show details relative to sinkhole repairs. In general, mitigation procedures specified the use of crushed stone filters, filter fabric, and compacted clay caps.

Recently, a small sinkhole appeared within the low lying area just north of the Pond C saddle dike. This occurred immediately following the major rain event of May 1 and 2, 2010. Other than this, Gallatin has not experienced any known additional karst-related problems within the ponds in recent years.

4. Scope of Exploration

The field portion of the geotechnical exploration was performed from July 29 through August 22, 2009. These services were performed in general accordance with various Corp of Engineers procedures, along with standard procedures for geotechnical engineering practice.

Stantec personnel advanced conventional sample borings at 34 locations using a combination of track-mounted and truck-mounted drill rigs. In general, the borings were positioned at dike crests and toes along 14 cross-sections. All borings were advanced to apparent bedrock, with four borings being advanced approximately 4 to 19 feet into bedrock using NQ-size (approximately two-inch diameter) rock coring equipment. The rock core borings were advanced to confirm bedrock depths. The locations of the borings are shown on the Boring Layout Plan in Appendix E. At completion of the drilling, TVA's survey crew located the borings and profiled the ground lines at the 14 cross-sections.

The subsurface exploration was performed using 3¼- and 4¼-inch (ID) hollow stem augers equipped with a carbide-tipped tooth bit. Standard Penetration Testing (SPT) was performed in all 34 of the conventional sample borings at continuous intervals. A standard penetration test consists of dropping a 140-pound hammer to drive a split-spoon sampler 18 inches. The consistency or relative density of soil is estimated by the number of blows it takes to drive the spoon the last 12 inches. This method is typically used to obtain soil samples, estimate the consistency or relative density of the soil, and also to estimate the vertical limits of the subsurface soil horizons. In addition, undisturbed samples (Shelby Tubes) were obtained in additional offset borings using a fixed head piston sampler. Tube samples were taken from selected depth intervals within the cohesive materials to provide samples for subsequent laboratory strength testing. After completion of the drilling and sampling procedures, the boreholes were checked for subsurface water and backfilled with cement-bentonite grout.

Stantec installed 12 piezometers within additional offset borings as a part of the stability evaluation to provide data on piezometric levels within the existing dikes and native foundation soils. Piezometer construction consisted of one-inch diameter Schedule 40 PVC well screen and riser pipe. The annular backfill consisted of a sand filter pack to some distance above the screened interval followed by a bentonite seal. After allowing the bentonite to hydrate, the remaining annulus was backfilled with cement-bentonite grout tremmied into place. Riser-type protective covers were set in concrete to protect the piezometers. These instruments are scheduled to be monitored by Stantec until June 2010.

An engineer/geologist was present with each drill crew throughout the drilling operations. The engineer/geologist directed the drill crews, logged the subsurface materials encountered during the exploration and collected samples. Particular attention was given to the material's color, texture, moisture content and consistency or relative density. The samples extracted from the borings were transported to Stantec laboratories for testing.

In the laboratory, standard penetration test (SPT) samples were subjected to natural moisture content determination in accordance with ASTM D 2216. Selected SPT samples and tube samples were subjected to soil classification tests that included Atterberg limits testing (ASTM D 4318), specific gravity tests (ASTM D 854) and sieve and hydrometer analyses (ASTM D 422). Select bulk samples were also collected and subjected to standard moisture-density (Proctor) testing (ASTM D 698). Undisturbed samples were extruded and subjected to unit weight determination, falling head permeability testing (ASTM D 5084) and consolidated undrained triaxial compression testing with pore pressure measurements (ASTM D 4767).

The results of the field and laboratory testing services were used to develop cross-sections for slope stability and seepage analysis. Based on the results of the field exploration and review of cross-section geometry, Stantec selected eight cross-sections to analyze.

5. Results of Geotechnical Exploration

5.1. Summary of Borings

Stantec developed a boring plan for the field exploration after a review of historical information and existing site conditions. TVA survey personnel established boring locations and elevations after drilling was completed. The boring layout plan is contained in Appendix E and boring logs are presented in Appendix A. A summary of the boring information is presented in Table 5.1 (all measurements are expressed in feet).

Table 5.1. Summary of Borings

Boring No.	Surface Elevation	Northing	Easting	Top of Rock** Depth	Top of Rock** Elevation	Boring Termination Depth	Bottom of Hole Elevation
STN-A-1	472.8	707019.68	1879799.57	30.5	422.3	30.5	422.3
STN-A-2	473.3	706994.16	1879810.94	42.1	431.2	42.1	431.2
STN-A-3*	472.9	707510.75	1880731.90	23.7	449.2	34.0	438.9
STN-A-4	473.8	707498.65	1880758.47	26.5	447.3	26.5	447.3
STN-A-4S	473.8	707498.65	1880758.47	---	---	26.0	447.8
STN-A-5	473.7	708368.74	1881417.01	23.2	450.5	23.2	450.5
STN-A-6	474.0	708353.42	1881433.71	31.4	442.6	31.4	442.6
STN-A-7	474.5	708921.58	1881894.55	42.1	432.4	42.1	432.4
STN-A-8	474.8	708907.06	1881914.61	25.5	449.3	28.5	446.3
STN-A-8S	474.8	708907.06	1881914.61	---	---	22.0	452.8
STN-A-9	472.4	709132.64	1882470.74	31.2	441.2	31.2	441.2
STN-A-9S	472.4	709132.64	1882470.74	---	---	25.0	447.4
STN-A-10*	474.1	709085.67	1882461.16	33.4	440.7	45.0	429.1
STN-C-1	462.0	707402.48	1879680.01	19.0	443.0	21.0	441.0
STN-D-1	460.8	707328.99	1877246.92	---	---	16.5	444.3
STN-D-1A	460.8	707328.99	1877246.92	21.0	439.8	21.0	439.8
STN-D-1B	460.8	707328.99	1877246.92	---	---	14.0	446.8
STN-D-1S	460.8	707328.99	1877246.92	---	---	17.0	443.8
STN-D-2	460.4	707245.18	1877237.96	15.9	444.5	15.9	444.5
STN-D-2S	460.4	707245.18	1877237.96	---	---	12.0	448.4
STN-E-1*	474.1	703045.88	1879000.10	36.0	438.1	55.0	419.1
STN-E-1S	474.1	703045.88	1879000.10	---	---	34.5	439.6
STN-E-2	475.7	703007.37	1879022.21	30.0	445.7	30.0	445.7
STN-E-3	459.6	702955.21	1879046.66	41.4	418.2	41.4	418.2
STN-E-4	474.3	702820.82	1878131.27	50.3	424.0	50.3	424.0
STN-E-4S	474.3	702820.82	1878131.27	---	---	42.0	432.3
STN-E-5	476.1	702788.65	1878111.48	50.3	425.8	50.3	425.8
STN-E-6	459.6	702733.38	1878070.14	28.0	431.6	28.0	431.6
STN-E-7	475.1	703843.80	1877971.87	65.0	410.1	65.0	410.1
STN-E-8	476.5	703835.47	1877934.64	63.9	412.6	63.9	412.6
STN-E-9	451.8	703753.39	1877876.25	45.9	405.9	45.9	405.9
STN-E-10	474.9	704870.32	1877862.37	28.6	446.3	29.1	445.8

Table 5.1. Summary of Borings

Boring No.	Surface Elevation	Northing	Easting	Top of Rock** Depth	Top of Rock** Elevation	Boring Termination Depth	Bottom of Hole Elevation
STN-E-10S	474.9	704870.32	1877862.37	---	---	27.0	447.9
STN-E-11	476.1	704863.36	1877828.40	40.5	435.6	40.5	435.6
STN-E-12	455.3	704854.47	1877754.46	28.3	427.0	28.3	427.0
STN-E-13	474.3	706353.41	1877474.21	37.1	437.2	37.1	437.2
STN-E-13S	474.3	706353.41	1877474.21	---	---	34.0	440.3
STN-E-14	477.0	706343.79	1877425.50	40.5	40.5	40.5	436.5
STN-E-14S	477.0	706343.79	1877425.50	---	---	7.0	470.0
STN-E-15	463.4	706458.09	1877364.00	27.0	436.4	27.0	436.4
STN-E-16	474.5	707101.38	1877842.04	59.0	415.5	59.0	415.5
STN-E-16S	474.5	707101.38	1877842.04	---	---	56.0	418.5
STN-E-17	475.4	707146.54	1877811.85	39.1	436.3	39.1	436.3
STN-E-18*	461.6	707190.77	1877765.92	36.1	425.5	40.0	421.6
STN-E-19	472.8	706774.43	1878687.08	44.7	428.1	44.7	428.1
STN-E-20	476.0	706856.53	1878704.54	25.8	450.2	28.5	447.5
STN-E-20S	476.0	706856.53	1878704.54	---	---	25.0	451.0
STN-E-21	461.6	706883.00	1878751.72	15.5	446.1	16.0	445.6
STN-E-21S	461.64	706883.00	1878751.72	---	---	15.0	461.6

* *Boring advanced into bedrock.*

** *Top of Rock, as used herein, refers to rock-like resistance to the advancement of the augers using a carbide-tipped-tooth bit. This may indicate the beginning of weathered bedrock, boulders, or rock remnants. An exact determination cannot be made without performing rock coring.*

5.2. Subsurface Conditions

5.2.1. Soil

Using the boring logs and laboratory tests from this geotechnical exploration, the boring information contained in previous geotechnical studies at the facility, TVA design drawings, old contour maps and other historical information, Stantec developed a general profile for each stability cross-section for the ash pond complex. The profiles depict five generalized material horizons that are described below. The stability sections contained in Appendix E show these layers in graphical manner. In addition, the graphical logs shown on the stability sections also depict the material Unified Soil Classification System (USCS) classifications based on laboratory tests and on visual observations.

The "Pond E Clay Dike" represents the new dike that was recently constructed in 2006 for the expansion of Pond E. It was constructed over sluiced ash in the south portion, over intervals of old saddle dikes and sluiced ash to the west, and over native materials in other cases. Its crest elevation is at approximate El. 475 to El. 476. Side slopes are typically at 3H:1V or flatter, except for the area represented by Section C where side slopes are approximately 2.5H:1V. The dike materials are primarily clay soils with USCS classifications of predominantly CL, with lesser instances of CH. Textural descriptions are gravelly lean clay with sand, sandy lean clay, lean clay with sand, silty clay, and fat clay with sand. The clays are moist in moisture content, mostly reddish to orange brown in color, with occasional brown and tan coloring. Based on SPT N-values and laboratory strength testing, the upper dike clays have strength consistencies ranging primarily from stiff to very stiff. It should be noted that there are portions of the new Pond E dike that was constructed using bottom ash. These zones are normally located in the lower portions of the new dike. For discussion purposes, this material is included in the following profile description for bottom ash fill.

"Bottom Ash Fill" is located within dikes at the following primary locations:

- Lower portions of the new Pond E dike that was constructed in 2006.

- Initial and raised dikes for the Pond A divider dike (entire dikes are constructed of bottom ash).

- Stilling Pond C saddle dike located at north side of Pond C (entire dike constructed of bottom ash).

Classification testing performed on selected bottom ash samples resulted in USCS classifications of SM and SW-SM with textural descriptions of silty sand, silty sand with gravel, and well-graded sand with silt and gravel. The ash materials are black in color and moist in moisture content. SPT N-values indicate primarily medium dense to dense relative densities, with some zones of loose and very dense relative densities.

The "Stilling Pond D Saddle Dike" represents a short, low height interval of dike that is located at the pond complex outlet area into Old Hickory Lake at the northwest portion of the reservation. Its crest is at approximate El. 462 feet, and it is less than 10 feet tall. The dike materials are primarily clay soils with a USCS classification of CL and a textural description of lean clay with sand. The clay is moist, reddish brown in color and stiff to very stiff in strength consistency.

Below the various dike materials, "Native Clay" was encountered extending downwardly to the apparent top of bedrock. As described in Section 2.2, the native clays beneath the pond complex are primarily residual in origin resulting from the in-place weathering of the parent limestone formations. The native clays have USCS classifications primarily of CL and CH, with textural descriptions of lean clay, sandy lean clay, sandy lean clay with gravel, fat clay and fat clay with sand. Grevel and chert zones are present in some cases. The clays are mostly brown, red-brown, yellow-brown or orange-brown in color, and moist in moisture content with some isolated wet zones. Based on SPT N-values and laboratory strength testing, the "Native Clay" has strength consistencies ranging mostly from medium to stiff, with lesser occurrences of soft and very stiff zones. The thicknesses of the native soils above bedrock across the pond complex range from as little as about one foot or less to as much as about 30 feet. Most thicknesses are from about 10 to 25 feet.

Hydraulically placed (sluiced) fly ash and bottom ash was also encountered in borings drilled through dikes that have been placed over sluiced ash. Where encountered, the thickness of the sluiced ash ranges from about 5 feet to as much as 25 feet, with most being from about 5 to 10 feet thick. Classification testing performed on selected samples of sluiced ash resulted in USCS classifications of SM for bottom ash and ML for fly ash, with corresponding textural descriptions of silty sand with gravel and silt, respectively. The ash materials are black in color and wet in moisture content. SPT N-values indicate loose to medium relative densities for the bottom ash, and typically very soft to soft strength consistencies for the fly ash.

The subsurface logs presented in Appendix A include more detailed descriptions of the materials encountered at the specific boring locations.

5.2.2. Bedrock

Elevations of apparent top of bedrock, as indicated by auger refusal, are variable across the site, ranging from a low of about El. 406 feet to a high of about El. 451 feet. The bedrock surface shows a general trend of being lower beneath the Pond E dikes to the west. The bedrock surface elevations are generally higher along the Pond A divider dike. In a few instances, irregularities in the bedrock surface were encountered over relatively short distances. These variations are typical for limestone bedrock formations where surface weathering and solutioning can create abrupt changes in the bedrock surface and pinnacles within the rock mass.

Rock coring was performed at four borings (STN-A-3, STN-A-10, STN-E-1 and STN-E-18) to confirm the presence of bedrock, and to gain general information on the underlying limestone. The rock cores were logged in terms of rock type, color, bedding characteristics, and other notable features. The limestone bedrock encountered correlates well with the limestone described within the geologic mapping. The rock core specimens are generally described as limestone, gray in color, thin bedded, and containing weathered and fractures zones. At boring STN-A-3, a six-foot thick zone of highly weathered rock/voids was encountered just below the rock surface, and instances of low core recoveries were encountered at other locations. These features are indicative of karst limestone where zones of voids, clay seams, and weathering will often be intermittently encountered between zones of more intact bedrock.

5.3. Phreatic Conditions

At select boring locations, piezometers were installed to measure pore water pressures. In general, initial piezometer readings were taken at approximate two week intervals, and then extended to monthly intervals. It is anticipated that Stantec will continue to take readings until June 2010. Refer to Appendix B for piezometer installation details and readings (up to most recent set of readings). Piezometer locations and tip elevations are summarized in Table 5.2 below.

Table 5.2. Summary of Piezometers

Boring No.	Concrete Pad Elevation (Feet)	Piezometer Tip Elevation (Feet)
STN-A-1	472.8	443.1 (Pond A native clay/initial bottom ash divider dike)
STN-A-5	473.7	452.3 (Pond A initial bottom ash dike)
STN-A-9S	472.4	448.4 (Pond A initial bottom ash divider dike)
STN-C-1	462.0	446.0 (Pond C Saddle Dike)
STN-D-1A	460.8	439.8 (Pond D native clay at outlet saddle dike)

Table 5.2. Summary of Piezometers

Boring No.	Concrete Pad Elevation (Feet)	Piezometer Tip Elevation (Feet)
STN-E-2	475.7	445.7 (Pond E native clay/sluiced ash)
STN-E-6	459.6	431.6 (Pond E native clay/sluiced ash)
STN-E-8	476.5	446.5 (Pond E native clay/1969 clay dike/sluiced ash)
STN-E-12	455.3	427.0 (Pond E native clay)
STN-E-14	477.0	437.0 (Pond E native clay)
STN-E-18	461.6	441.6 (sluiced ash/bottom ash dike)
STN-E-20	476.0	447.5 (sluiced ash/ash fill)

In general, the series of readings to date have shown that water levels have remained fairly consistent with only slight fluctuations being observed (usually only a few tenths of a foot to about one foot). These fluctuations are likely attributed to equalization of the water level within the piezometers over time. However, it should be noted that water levels can also fluctuate due to the seasons, precipitation events, and other factors.

6. Laboratory Testing

6.1. General

The results of laboratory testing performed are included within the appendices. ASTM testing specifications were observed. In particular, natural moisture content test results are shown on the attached boring logs in Appendix A and are also shown on the drafted stability sections in Appendix E. The results of the classification testing and shear strength testing performed on selected samples are included in Appendix C. The USCS classifications associated with each horizon are also discussed in Section 5.2.1 above, and are presented in Table 6.1. No further discussion relative to the results of moisture content and classification testing are provided in this section. The discussion that follows is limited to the laboratory testing associated with evaluation of the dike compaction characteristics and shear strengths of the cohesive soil horizons.

Table 6.1. Summary of ClassificationTesting

Sample Location	Sample Type	Soil Horizon	USCS Classification
STN-A-2, 35'-39.5'	SPT	Native Clay	CH
STN-A-3, 9'-13.5'	SPT	Pond A Bottom Ash Dike	SM
STN-A-7, 30'-34.5'	SPT	Native Clay	CL
STN-A-10, 15'-19.5'	SPT	Sluiced Ash	SM
STN-C-1, 3'-7.5'	SPT	Pond C Bottom Ash Saddle Dike	SW-SM
STN-D-2, 6'-10.5'	SPT	Pond D Clay Dike at Outlet	CL
STN-E-2, 4.5'-9.0'	SPT	Pond E Clay Dike	CL
STN-E-3, 4.5'-9.0'	SPT	Sluiced Ash	SM
STN-E-3, 25.5'-30'	SPT	Native Clay	CH
STN-E-4, 34.5'-39'	SPT	Sluiced Ash	ML
STN-E-8, 31.5'-33'	SPT	Native Clay	CL
STN-E-9, 34'-38.5'	SPT	Native Clay	CL
STN-E-11, 3'-7.5'	SPT	Pond E Clay Dike	CL
STN-E-13, 16.5'-21'	SPT	Native Clay	CH
STN-E-15, 11.5'-16'	SPT	Native Clay	CH
STN-E-16, 18'-22.5'	SPT	Bottom Ash	SM
STN-E-17, 4.5'-9'	SPT	Pond E Clay Dike	CL
STN-E-18, 22.5'-27'	SPT	Native Clay	CL
STN-E-20, 4.5'-9'	SPT	Pond E Clay Dike	CH
STN-A-6, 29.1'-29.5'	Tube	Native Clay	CH
STN-E-4S, 5'-5.5'	Tube	Pond E Clay Dike	CL
STN-E-8, 41.6'-42.1'	Tube	Native Clay	GC
STN-E-8, 50.2'-50.7'	Tube	Native Clay	CL
STN-E-9, 5.8'-6.3'	Tube	Native Clay	CL
STN-E-10S, 5.3'-5.8'	Tube	Pond E Clay Dike	CL
STN-E-12, 10.3'-10.8'	Tube	Native Clay	CL
STN-E-14S, 2.0'-2.5'	Tube	Pond E Clay Dike	CL
STN-E-16S, 5.6'-6.1'	Tube	Pond E Clay Dike	CH
STN-E-16S, 36.0'-36.5'	Tube	Native Clay	CL
STN-E-21S, 11.6'-12.1'	Tube	Native Clay	CL

6.2. Cohesive Soils/Undisturbed (Shelby) Tube Samples

The borings drilled for the GAF ash pond/stilling pond complex included three-inch diameter undisturbed (Shelby) tube sampling within cohesive soil horizons. Stantec's soils laboratory extruded the tubes and trimmed six-inch long specimens. Lab personnel determined visual classifications, unit weights (wet and dry), and natural moisture for each six-inch specimen prior to submitting a summary of the extruded specimens to a geotechnical engineer for assignment of lab testing. Select six-inch specimens extruded from Shelby tubes were then subjected to consolidated-undrained (CU) triaxial testing and permeability testing. The results of these tests are included in Appendix C and discussed below. Selected tube samples where triaxial and permeability testing were performed were also subjected to classification testing. These results are presented in Table 6.1 above.

6.2.1. Consolidated Undrained (CU) Triaxial Testing

Stantec performed CU triaxial testing with pore pressure measurements on selected six-inch long specimens extruded from three-inch diameter Shelby tubes obtained during drilling. CU testing provides indicators of effective-stress shear strength parameters for slope stability analyses. The results of the CU triaxial tests are presented on the stability sections in Appendix E, and are summarized in Table 6.2. The stress path envelopes derived from CU triaxial testing are also presented in Appendix C.

Table 6.2. Summary of Consolidated – Undrained Triaxial Testing

Boring No.	Sample Interval (feet)	Soil Horizon	CU Triaxial Strength	
			c' (psf)	ϕ' (degrees)
STN-D-1S	2.0 – 2.5 2.6 – 3.1 6.0 – 6.5	Pond D Clay Dike	940	23.3
STN-E-4S STN-E-8	5.0 – 5.5 5.4 – 5.9	Pond E Clay Dike	740	17.6
STN-E-8	41.0 – 41.5 41.6 – 42.1 45.2 – 45.7	Native Clay	360	26.6
STN-E-9	9.5 – 10.0 10.1 – 10.6 10.7 – 11.2	Native Clay	640	28.8
STN-E-10S	25.0 – 25.5 25.5 – 26.1 26.2 – 26.7	Native Clay	70	37.1
STN-E-13S	20.0 – 20.5 20.6 – 21.1 25.0 – 25.5	Native Clay	700	18.4
STN-E-14S	2.0 – 2.5 2.6 – 3.1 5.7 – 6.2	Pond E Clay Dike	480	21.5
STN-E-15	9.7 – 10.2 10.3 – 10.8 10.9 – 11.4	Native Clay	380	26.3
STN-E-16S	5.0 – 5.5 5.6 – 6.1 7.7 – 8.2	Pond E Clay Dike	340	22.0
STN-E-16S	33.0 – 33.5 33.6 – 34.1 34.2 – 34.7	Native Clay	160	34.3
STN-E-20S	4.0 – 4.5 6.0 – 6.5 6.6 – 7.1	Pond E Clay Dike	460	25.5
STN-E-21S	11.0 – 11.5 11.6 – 12.1 13.0 – 13.5	Native Clay	260	34.1

6.2.2. Permeability Testing

The following table summarizes the testing results from the falling head permeability testing. Permeability values are used in seepage analyses.

Table 6.3. Summary of Falling Head Permeability Testing

Boring No.	Sample Interval (feet)	Soil Horizon	Permeability (cm/sec)
STN-A-6	29.1 – 29.5	Native Clay	9.07e-08
STN-E-8	50.2 – 50.7	Native Clay	1.38e-08
STN-E-9	5.8 – 6.3	Native Clay	4.7e-08
STN-E-10S	5.3 – 5.8	Pond E Clay Dike	1.02e-07
STN-E-12	10.3 – 10.8	Native Clay	3.01e-07
STN-E-13S	25.6 – 26.1	Native Clay	2.32e-08
STN-E-15	5.7 – 6.2	Native Clay	1.36e-08
STN-E-16S	9.0 – 9.5	Pond E Clay Dike	1.27e-08
STN-E-16S	36.0 – 36.5	Native Clay	1.16e-08
STN-E-20S	23.0 – 23.5	Sluiced Ash	7.13e-06

6.3. Moisture-Density Relationships

Bag samples were obtained of materials associated with the dikes where clay materials were encountered, which is primarily along the new dike construction associated with Ash Pond E. The results of the standard moisture-density tests performed on these samples are summarized in Table 6.4.

Table 6.4. Standard Moisture-Density (Proctor) Test Results (Clay Dike Materials)

Sample Location	Sample Depth Interval (feet)	Dike Location	Maximum Dry Density (pcf)	Optimum Moisture Content (%)
STN-A-8	14.0 – 17.0	Pond A Bottom Ash Dike	107.4	13.2
STN-D-2	4.0 – 6.0	Pond D Dike	112.3	15.9
STN-E-8	3.0 – 5.0	Pond E Dike	116.7	14.3
STN-E-8	16.0 – 19.0	Pond E Dike	112.4	15.9
STN-E-14	5.0 – 8.0	Pond E Dike	106.2	19.0
STN-E-19	8.0 – 11.0	Pond E Dike	109.1	17.9

Following completion of the moisture-density testing, undisturbed samples taken within clay dike materials were extruded and unit weight and moisture content determinations were made in association with triaxial shear strength testing. The results of the unit weight and moisture content determinations for triaxial test samples are shown in Table 6.5. A comparison between the moisture-density test results and the unit weight determinations obtained from the undisturbed samples is also included. The comparison was made by using the moisture-density test results that were nearest to the undisturbed sample locations (and which also had like classifications) to estimate relative compaction.

Table 6.5. Comparison Between Undisturbed Sample Conditions and Moisture-Density Test Results (Clay Dike Materials)

Boring Location	Sample Depth Interval (feet)	Dike Location	Unit Weight Dry (pcf)	Moisture Content (%)	Maximum Dry Density (pcf)	Percent Maximum Dry Density (%)	Optimum Moisture Content (%)	Moisture Content Variation (%)
STN-D-1S	2.0 – 2.5	Pond D	103.2	21.5	112.3	92	15.9	+5.6
STN-D-1S	2.6 – 3.1	Pond D	106.4	18.1	112.3	95	15.9	+2.2
STN-D-1S	6.0 – 6.5	Pond D	97.5	25.5	112.3	87	15.9	+9.6
STN-E-4S	5.0 – 5.5	Pond E	102.3	19.5	112.4	91	15.9	+3.6
STN-E-8	5.4 – 5.9	Pond E	108.2	19.7	116.7	93	14.3	+5.4
STN-E-14S	2.0 – 2.5	Pond E	104.4	21.8	106.2	98	19.0	+2.8
STN-E-14S	2.6 – 3.1	Pond E	107.4	20.4	106.2	101	19.0	+1.4
STN-E-14S	5.7 – 6.2	Pond E	103.6	22.1	106.2	98	19.0	+3.1
STN-E-16S	5.0 – 5.5	Pond E	102.1	22.6	106.2	96	19.0	+3.6
STN-E-16S	5.6 – 6.1	Pond E	99.8	24.3	106.2	94	19.0	+5.3
STN-E-16S	7.7 – 8.2	Pond E	107.2	19.7	106.2	101	19.0	+0.7
STN-E-20S	4.0 – 4.5	Pond E	106.4	21.7	109.1	98	17.9	+3.8
STN-E-20S	6.0 – 6.5	Pond E	109.0	19.6	109.1	100	17.9	+1.7
STN-E-20S	6.6 – 7.1	Pond E	105.5	21.4	109.1	97	17.9	+3.5

The existing in-situ dry densities of the clay dike materials were determined to range from about 87 percent to 101 percent of the standard Proctor dry densities, with some being between about 90 and 95 percent. The trend of data indicates that some dike materials appear to have been compacted to densities a little lower than the typical earth dike target densities of 95 percent or greater. However, it should be noted that no construction documentation has been provided to confirm this comparison. The corresponding moisture values were mostly in the range of about 1 to 6 percent above the optimum moisture value.

6.4. Standard Penetration Test Samples

Recovered soil specimens from SPT sampling were subjected to natural moisture content determinations and select samples were combined for engineering classification testing. The engineering classification testing consisted of Atterberg limits, specific gravity, and sieve and hydrometer analyses. The results of the classification testing were used in conjunction with the N-values from SPT's to estimate soil strength of cohesionless materials based on published correlations of such data. The results of the moisture content tests are included on the boring logs and stability section drawings in Appendices A and E, respectively. The results of the engineering classifications are included on the drawings in Appendix E, and are summarized in Table 6.1.

7. Engineering Analysis

7.1. General

Geotechnical engineering analyses included evaluations of strength and permeability parameters, seepage analyses, and slope stability analyses. Prior to beginning the analyses, the geotechnical data and cross-sections were combined and the geometry of the existing dikes and soil horizons were approximated using current and historical information. Once the geometry of the sections was approximated, each section was reviewed and evaluated to determine the critical cross-section for analyses. Selection of critical sections was based on the steepness of slopes, heights of dikes, geometry of the sections, phreatic surface, seepage conditions, and subsurface conditions. Based on this evaluation, eight representative cross-sections were selected for analyses (Sections B, C, D, F, G, H, J and K). The locations of the sections are shown on the layout drawings presented in Appendix E. Results of the analyses and evaluations are summarized in the following paragraphs, and are shown on drawings/computer output provided in Appendices E and F.

It should be noted that construction records indicating the methods used to construct dikes, as-built dike configurations, etc. were not available for review. As a result, assumptions and generalizations in soil parameters and dike geometry were needed to construct the seepage and stability models.

7.2. Soil Horizons

Based on the results of the drilling, laboratory testing, historical documentation, and drawings, the materials encountered at the sections selected for seepage/stability analysis were divided into four primary soil layers. Refer to the stability sections in Appendix E for locations of the soil horizons. The soil horizons are briefly described as follows:

- *Pond E Clay Dike:* This represents the clay material used for dike construction associated with the 2006 expansion of Pond E. Current survey data shows that the crest of this dike is currently at approximate El. 475 to 476. Construction drawings specified that most side slopes were to be constructed at 3H:1V.

- *Bottom Ash Fill/Dikes:* This represents various areas where compacted bottom ash was used in dike construction. It is present at the lower portions of the new Pond E dike that was constructed in 2006, within the initial and raised dikes for the Pond A divider dike (entire dikes are constructed of bottom ash), and within the Stilling Pond C saddle dike located at north side of Stilling Pond C (entire dike constructed of bottom ash).

- *Native Clay:* This represents the layers of native lean and fat clay located beneath the dikes and ponds.

- *Hydraulically Placed (sluiced) Ash:* This represents sluiced bottom ash/fly ash that is contained by the dike systems.

Section 5.2.1 contains more detailed descriptions of the materials encountered within the dikes. Note that the “Stilling Pond D Saddle Dike” is not included in the above descriptions because it was not selected for analysis due to its very low height and flat slopes.

7.3. Seepage Analysis

7.3.1. SEEP/W Model

An analysis of steady state seepage through the Gallatin Pond dikes was performed to estimate the magnitude of seepage gradients (for the evaluation of potential piping) and pore water pressures within the soils (for the evaluation of slope stability). The numerical seepage models were developed using SEEP/W 2007 (Version 7.15), a finite element code tailored for modeling groundwater seepage in soil and rock. SEEP/W is distributed by GEO-SLOPE International, Ltd, of Calgary, Alberta, Canada (www.geo-slope.com).

SEEP/W uses soil properties, geometry, and boundary conditions provided by the user to compute the total hydraulic head at nodal points within the modeled cross-sections. Among other features, SEEP/W includes a graphical user interface, semi-automated mesh generation routines, iterative algorithms for solving unconfined flow problems, specialized boundary conditions (seepage faces, etc.), capabilities for steady-state or transient analyses, and features for visualizing model predictions. The code also includes material models that allow tracking both saturated and unsaturated flow, including the transition in seepage characteristics for soils that become saturated or unsaturated during the problem simulation.

Eight representative dike cross-sections were modeled with SEEP/W, and then were subsequently evaluated for slope stability (Section 7.4). For the numerical analysis, each cross-section was subdivided into a mesh of elements, consisting of first-order quadrilateral and triangular finite elements. For seepage problems, where the primary unknown (hydraulic head) is a scalar quantity, first-order elements provide for efficient, effective modeling. Given appropriate hydraulic conductivity properties and applied boundary conditions, the finite element method (as implemented in the SEEP/W code) was then used to simulate steady seepage across the mesh. The total hydraulic head is computed at each nodal location, from which pore water pressures and seepage gradients can be determined.

7.3.2. Boundary Conditions

Steady-state seepage was assumed for the analysis, with the static pool levels placed at approximate El. 469 feet for Pond E, El. 466 feet for Pond A, and El. 457 feet for the Stilling Ponds. For the left side of Sections B and C, the pool level for the Cumberland River was set at El. 445 feet, which is normal pool.

Boundary conditions for the SEEP/W analysis were assumed as follows. Along the vertical, interior edge of the model, the hydraulic head at each node was constant with depth and equal to the pool elevations of the ash ponds (El. 466 feet for Pond E, El. 469 feet for Pond A, and El. 457 feet for the Stilling Ponds). A total head equal to the pool levels was also applied to all submerged nodes along the ground surface of the interior side. Along the vertical, exterior edge of the model, the hydraulic head at each node was constant with depth and set equal to the corresponding stilling pond or Cumberland River, depending on cross section location. Other nodes along the ground surface were treated as potential seepage exits. At various steps in the computer analysis, if the software determines that water flows from the mesh at these nodes along the ground surface, SEEP/W assigned a head equal to the elevation of the node. This routine effectively models the seepage exit to the ground surface. The horizontal boundary at the base of the model (located within the bedrock) was modeled as a seepage barrier, with no vertical flow across the boundary nodes. Steady state seepage was assumed for the analysis.

7.3.3. Seepage Properties

For each modeled cross-section, a representative subsurface profile was compiled based on boring logs, available record drawings, and the known project history. Material properties were estimated based on available laboratory data, correlations with classification data, and on typical values for similar materials. For ash materials, Stantec also considered results of permeability tests presented in MACTEC's October 14, 2004 geotechnical report which presented permeability values of 8.55e-4 cm/s and 2.15 e-3 cm/s for bottom ash, and 2.78 e-5 cm/s for sluiced ash. Material properties used in the seepage analysis are summarized in Table 7.1.

Table 7.1. Material Properties for SEEP/W Analysis

Soil Horizon	Saturated k_v (cm/s)	Ratio k_h / k_v	Specific Gravity G_s	Void Ratio e	Volumetric Water Content		Basis
					Saturated (%)	Residual (%)	
Pond E Clay Dike	1.0e-7	1 to 5	2.70	0.61	25	3	Available Laboratory Data and Correlation w/ Typical Values
Bottom Ash Fill/Dikes	1.0e-3 to 1.0e-4	1 to 5	2.66	0.69 to 0.79	15	1	Available Laboratory Data, Correlation w/ Typical Values, MACTEC 2004 Report
Hydraulically Placed (Sluiced) Ash	1.0e-5	30	2.66	1.0	40	1	Available Laboratory Data, Correlation w/ Typical Values, MACTEC 2004 Report
Native Clay	1.0e-6 to 1.0e-7	10 to 20	2.70	0.62 to 0.68	40	2	Available Laboratory Data and Correlation w/ Typical Values
Limestone Bedrock	1.0e-3	10	2.60	0.14	15	1	Correlation w/ Typical Values

Note: SEEP/W requires input parameters k_h and ratio of k_v/k_h

Significant engineering judgment is needed to select appropriate hydraulic properties for earth/soil materials. Unlike other key properties, hydraulic conductivity can vary over several orders of magnitude for a range of soils, often with substantial anisotropy for seepage in horizontal versus vertical directions. Laboratory test samples often do not represent important variations within a larger soil deposit. For this analysis, an iterative process of parametric calibration (Section 7.3.4) was used to arrive at final estimates of the seepage properties. Results from trial simulations were compared to field data (measured piezometric levels) and the material parameters were then varied until the solutions reasonably matched the field data. The final set of parameters (Table 7.1) resulted in the comparisons presented in Section 7.3.4.

The ratio of horizontal hydraulic conductivity (k_h) to vertical hydraulic conductivity (k_v) was estimated based on placement, depositional characteristics, and origin of the materials. An isotropic material would have $k_h/k_v = 1$, while deposits of horizontally layered soils will have much higher values. For this analysis, higher ranges of ratios were used for sluiced ash and native materials, whereas a lower range of ratios was assumed for compacted dike materials.

The governing equations in SEEP/W are formulated to consider seepage through unsaturated soils. In the simulations for this study, this formulation is used to locate the phreatic surface for unconfined seepage through the dike cross-sections. To represent the change in hydraulic conductivity due to de-saturation of each soil, SEEP/W implements a model based on two curves, a hydraulic conductivity function and a volumetric water content function. Three parameters are needed to define this behavior: the saturated hydraulic conductivity, saturated water content, and residual water content (water content of air dried soil). Of these, only the residual water contents were not previously estimated for each material. Values were estimated based on typical values for similar soils. The simulation results are not sensitive to the selection of these values.

7.3.4. Comparison to Field Observations

After the initial seepage parameters were estimated, results from the SEEP/W model were compared to pore water pressures actually measured in the 12 piezometers installed within the GAF pond complex. Nodes were placed in the model at the screened piezometer intervals so that the average head across these nodes could be compared to the corresponding piezometer reading. The material properties in each modeled cross-section were then varied until a reasonable match was obtained between the seepage predictions and field data. Specifically, the saturated hydraulic conductivity and the k_h/k_v ratios were adjusted (while still maintaining the parameters within expected ranges) to give model predictions as consistent as possible with field measurements and observations.

The comparison between the field piezometer measurements and final SEEP/W predictions show the predicted groundwater table ranging from about one-foot below to four feet above the readings obtained in the piezometers. Most differences are between about one-foot below to two feet above the actual readings. These differences are judged to be acceptable given the limited information available and unknown conditions between the modeled cross-sections and borings.

The results of the seepage models can also be compared to field observations of seepage. For the Gallatin ponds, minor seepage exists at or near the dike toes at only a few isolated areas. These observations correlate well with the seepage models which generally show the shape of the phreatic surface extending to or just below the dike toes.

In summary, the seepage models appear to give a reasonable prediction of the phreatic surface location when compared to field observations and piezometer measurements.

7.3.5. Critical Exit Gradients

Seepage forces, resulting from hydrodynamic drag on the soil particles, can destabilize earthen structures. Excessive hydraulic gradients near the ground surface can lead to the initiation of soil erosion and piping, which has caused numerous dam failures in the past.

Hydraulic gradients (computed where seepage exits at the ground surface) can be evaluated to understand the potential severity of this problem.

Where upward seepage through a uniform soil exits the ground surface, the factor of safety with respect to soil piping (FS_{piping}) is as defined below.

$$FS_{piping} = \frac{i_{crit}}{i} \qquad \textbf{Eqn. 7.1}$$

Where "i" is the vertical gradient in the soil at the exit point, the critical gradient (i_{crit}) is related to the submerged unit weight of the soil, and can be computed as:

$$i_{crit} = \frac{\gamma_{sub}}{\gamma_w} = \frac{G_s - 1}{1 + e} \qquad \textbf{Eqn. 7.2}$$

where γ_{sub} is the submerged unit weight of the soil, γw is the unit weight of water, Gs is the specific gravity of the soil particles and e is the void ratio. For nearly all soils, the critical gradient is between about 0.6 and 1.4, with a typical value near 1.

When FS_{piping} = 1, the effective stress is zero and the near-surface soils are subject to piping or heaving, but only for vertical seepage that actually exits to the ground surface. If the phreatic surface is buried, then the FS_{piping} will be greater than 1 even when $i = i_{crit}$.

7.3.6. Results of Seepage Analysis

Plots from the SEEP/W analyses of the eight cross-sections through the GAF pond dikes are presented in Appendix F. The plots show the finite element mesh, material zones and boundary conditions used in each analysis. The results are depicted in contour plots of total head, pore water pressure, and seepage gradients.

On each modeled cross-section, examination of the output (predicted phreatic surface and vertical gradients) can be made to look for areas where the potential for excessive vertical gradients might exist that could possibly initiate the erosion or piping of material. In general, areas of potential concern are where water seeps laterally out onto a sloping ground surface, or where vertical, upward seepage occurs at the ground surface. The potential for piping was evaluated using the factor of safety equation as defined in Section 7.3.5. First, contour plots of vertical gradient were examined to determine the general location of the maximum vertical exit gradient. On the modeled cross-sections, the maximum upward gradient occurs near or beyond the exterior toe of the dikes. For the factor of safety calculations, vertical gradients from these locations were then used along with the critical gradients determined from the soil properties.

The calculated factors of safety against piping are summarized in Table 7.2. They range from 3.0 to greater than 60, with one value being even greater (Section B) because a critical exit point was not predicted by the model. Stantec recommends a target factor of safety against piping of three, based on information contained in United States Army Corps of Engineers (USACE) manual EM 1110-2-1901. Hence, on all eight cross sections modeled, the recommended target factor of safety for piping at the critical seepage exit points is met or exceeded.

Table 7.2. Summary of Computed Exit Gradients and Minimum Factors of Safety against Piping

Cross Section*	Vertical Gradient (i_y) at Critical Exit Point	Location of Critical Exit Point	Material	Critical Gradient (i_{crit})	FS_{piping}
B	Critical Exit Point Not Identified by Model	N/A	N/A	N/A	>> 3
C	0.35	Dike Toe	Native Clay	1.05	3.0
D	0.29	Dike Toe	Native Clay	1.01	3.5
F	0.085	Dike Toe	Bottom Ash Dike	0.84	9.9
G	0.088	Dike Toe	Native Clay	1.01	11.4
H	0.0125	Dike Toe	Bottom Ash Dike	0.86	68.8
J	0.089	Dike Toe	Bottom Ash Dike	0.96	10.8
K	0.025	Dike Toe	Bottom Ash Dike	0.89	35.6

*Refer to Appendix E for locations of cross-sections.

7.4. Slope Stability Analyses

7.4.1. SLOPE/W Model

The stability of the GAF pond dikes was evaluated using limit equilibrium methods as implemented in the SLOPE/W software, which is available from GEO-SLOPE International, Ltd., of Calgary, Alberta, Canada (www.geo-slope.com). Analyses were completed for static, long-term conditions with steady-state seepage. SLOPE/W is a special-purpose computer code designed to analyze the stability of earth slopes using two-dimensional, limit equilibrium methods. With SLOPE/W, the distribution of pore water pressures within the earth mass can be mapped directly from a SEEP/W solution. In this study, steady-state pore pressures were obtained from the SEEP/W models described in Section 7.3.

7.4.2. Limit Equilibrium Methods in SLOPE/W

Limit equilibrium methods for evaluating slope stability consider the static equilibrium of a soil mass above a potential failure surface. For conventional, two-dimensional methods of analysis; the slide mass above an assumed failure surface is first divided into vertical slices, then stresses are evaluated along the sides and base of each slice. The factor of safety against a slope failure (FS_{slope}) is defined as:

$$FS_{slope} = \frac{\text{shear strength of soil}}{\text{shear stress required for equilibrium}} \qquad \textbf{Eqn. 7.3}$$

where the strengths and stresses are computed along a defined failure surface located at the base of the vertical slices. The shearing resistance along the potential slip surface is computed, with appropriate Mohr-Coulomb strength parameters, as a function of the total or effective normal stress.

Spencer's solution procedure (Spencer 1967; USACE 2003; Duncan and Wright 2005), which satisfies all of the conditions of equilibrium for each slice, was used in this study. Spencer's procedure computes FSslope for an assumed failure surface. A search must be made to find the critical slip surface corresponding to the lowest FSslope. Both circular and noncircular potential failure surfaces can be evaluated.

7.4.3. Analysis Approach

The slope stability analyses were performed using SLOPE/W 2007 on the exterior faces of the dikes. SLOPE/W incorporates various search routines to locate the critical slip surface. For the analyses presented here, the "Grid and Radius" method and the "Entrance and Exit" method were employed. Center points for the trial circles were confined to a specified range above the slope surface, while the trial radii were varied based on tangent horizontal lines within the soil. The minimum and maximum range for the center points and tangent lines were parametrically varied over a wide range to determine the likely solution region for the critical circle. In subsequent runs, the search was refined by narrowing the range and spacing for the candidate center points. The phreatic surface and distribution of pore water pressures obtained from the SEEP/W model were used in the analysis.

7.4.4. Selection of Shear Strength Parameters

The stability analyses presented in this report will focus only on static steady state seepage conditions (no earthquake or other dynamic loads). For these conditions, soil unit weights and drained strength parameters (c' and ϕ') are needed.

The drained shear strength parameters used for the clay dikes and clay foundation materials were derived using results of laboratory triaxial tests, along with consideration given to standard penetration test data, laboratory classification test data, Stantec's experience with similar materials, and historic data presented in MACTEC's 2004 geotechnical report.

For the "Pond E Clay Dike" and "Native Clay" horizons, representative strengths were selected using the methodology outlined in the US Army Corps of Engineers Engineer Manual EM 1110-2-1902 as a guide. Results of triaxial testing were evaluated and effective stress p' versus q scatter plots were prepared of all of the data points. The maximum effective principal stress ratio was used to determine failure criteria for selection of these values within Stantec's laboratory test results. Once the p' versus q plots were prepared, a failure envelope was then selected such that about two thirds of the plotted values were above the envelope. The p' versus q plots and selection of the failure envelope are shown for each horizon on the graphs presented in Appendix D. The strength parameters were rounded to the nearest degree with regards to ϕ'. The cohesion intercept point (c') was limited to a maximum of 200 pounds per square foot.

Shear strength parameters for "Bottom Ash Fill/Dikes" were estimated/selected primarily using charts published in Soil Mechanics Design Manual 7.1, Department of the Navy – Navy Facilities Engineering Command (NAVFAC 7.1) which correlates SPT N-values and material classifications with the angle of internal friction. Stantec also considered test results presented in MACTEC's 2004 report which measured angles of internal friction ranging rom 37 to 40 degrees for remolded bottom ash samples.

Shear strength parameters for sluiced ash were estimated/selected using NAVFAC 7.1 charts (where the lowest friction angle is 26 degrees for ML classifications), review of paramaters selected by Stantec at other fossil plants, and considering results of two triaxial test performed on undisturbed ash samples presented in MACTEC's 2004 report which measured friction angles of 24.4 and 35.5 degrees. As a result, Stantec slected an angle of internal friction of 26 degrees for sluiced ash.

The following table provides a summary of the effective stress shear strengths selected for use in the slope stability analyses.

Table 7.3. Selected Strength Parameters for Stability Analyses

Soil Horizon	Unit Weight (pcf)	Effective Stress Strength Parameters	
		c' (psf)	Ø' (degrees)
Pond E Clay Dike	125	200	22
Bottom Ash Fill/Dikes	100 to 105	0	30 to 34
Sluiced Ash	85	0	26
Native Clay	125	200	27

7.4.5. Results of Slope Stability Analysis

Using the strength parameters (c' and ϕ') listed in Table 7.3, in conjunction with the results of the seepage analyses, the existing dike configurations were analyzed at the eight selected cross-sections. Geo-Slope's Slope/W computer program was used for the analyses with pore pressures imported from the seepage analyses. Long term (effective stress) steady state seepage conditions were analyzed using Spencer's method. Analysis of circular failure surfaces with optimization was conducted. Noncircular failure surfaces were considered in one instance where a thin horizontal zone of weaker material is present (Section F).

The stability analyses focused on the potential for failure along the exterior dike faces. SLOPE/W failure surfaces from these analyses are presented on the drafted sheets in Appendix E. The results are summarized in Table 7.4 below.

Table 7.4. Summary of Minimum Computed Factors of Safety for Slope Stability

Cross-Section*	Minimum Non-Global FS	Minimum Global FS
B	Non-Issue (flat slopes)	1.5
C	Non-Issue (flat slopes)	1.6
D	Non-Issue (flat slopes)	2.0
F	1.1	2.0
G	1.5	2.2
H	1.4	1.5
J	1.2	1.5
K	1.2	1.5

*Refer to Appendix E for plan view of cross-section locations.

Based on discussions with TVA and to be in accordance with current prevailing geotechnical practice, a minimum target factor of safety of 1.5 was established for long term conditions using the guidelines presented in USACE Manual EM 1110-2-1902 “Slope Stability”.

The results of the slope stability analyses indicate that factors of safety against long-term slope stability for global (deep seated) failures are equal to or greater than the target value of 1.5. For non-global (shallow) surfaces, however, there are four of five cross sections where potential failure surfaces produced factors of safety less than the target of 1.5. These include Sections F, H, J, and K where factors of safety range from 1.1 to 1.4. Section F represents the immediate toe area along the north side of Pond E immediately above the stilling ponds; and Sections H, J, and K represents the divider dike that seperates Pond A from the adjacent stilling ponds where side slopes are relatively steep (mostly 1.5H:1V). The critical slip surfaces for each cross-section are depicted on the drawings in Appendix E.

8. Conclusions and Recommendations

The conclusions and recommendations that follow are based on Stantec’s understanding of the Gallatin ash pond/stilling pond complex, as outlined in this report, and on TVA’s plans for eventual closure. This understanding has been developed from review of historical information, discussions with TVA personnel, and from the results of this geotechnical exploration. In addition, Stantec understands that TVA has tasked URS Corporation with conducting a siting study for a new CCP landfill for future dry disposal of fly ash, bottom ash and potentially gypsum. Stantec also understands that URS will be performing closure design of the CCP ponds. A phased closure approach will likely be implemented.

8.1. The results of the seepage analyses were reviewed to identify conditions where seepage and possible piping may occur. Seepage outbreaks along the slopes can create the potential for the initiation of soil piping if excessive vertical gradients exist. The seepage analyses showed that maximum vertical exit gradients typically occur at or just beyond the dike toe areas, with corresponding factors of safety against piping being equal to or greater than the recommended target value of three in each case analyzed.

8.2. The results of the slope stability analyses indicate that factors of safety against long-term slope stability for global (deep seated) failures are equal to or greater than the target value of 1.5. For non-global (shallow) surfaces, however, there are four of five cross sections where potential failure surfaces produced factors of safety less than the target value of 1.5. These include Sections F, H, J, and K where factors of safety range from 1.1 to 1.4. Section F represents the immediate toe area along the north side of Pond E immediately above the stilling ponds; and Sections H, J, and K represent the divider dike that seperates Pond A from the adjacent stilling ponds where side slopes are relatively steep (mostly 1.5H:1V).

8.3. To improve long-term slope stability, it is recommended that TVA implement a mitigation design and construction program for the Bottom Ash Pond A divider dike and for the toe area along the north side of Pond E to improve factors of safety against non-global slope stability. These improvements could be incorporated into URS Corporation's design of pond closure, or a separate short-term interim mitigation program could be implemented, depending on timing and as decided by TVA. Final mitigation design should increase factors of safety to at least 1.5 for long term slope stability. It is envisioned that design features would include rock buttressing, slope flattening, or a combination of both.

8.4. It is recommended that URS Corporation's closure design include an instrumentation monitoring program (including calculation of "alert" piezometric levels which would result in slope stability factors of safety falling below 1.5). It is recommended that URS also consider additional exploration work for closure design to gain supplementary subsurface information relative to sluiced ash, specifically along the south side of Pond E where the existing dikes are constructed entirely over the ash.

8.5. It is recommended that TVA continue dike inspections/monitoring to look for changes or conditions that might affect dike integrity. Specific focus should be placed on continuing to monitor areas of known seepage to look for changed or worsened conditions. The frequency of inspections should be consistent with TVA's new programmatic inspection schedule.

8.6. The Gallatin ash pond and stilling pond complex is underlain by limestone bedrock that can be susceptible to solutioning and the development of karst features, such as voids, solution channels, and sinkholes in the soil overburden and/or the underlying bedrock. Construction and operation in such areas is always accompanied by risk that internal soil erosion and ground subsidence could affect constructed facilities. It is not possible to completely investigate a site or design a facility to eliminate karst-related problems. Stantec understands that URS may perform karst investigations as part of closure design activites.

9. Closure and Limitations of Study

9.1. The scope of this evaluation was limited to consider only the potential risks of the Gallatin Pond dikes due to excessive seepage and/or slope instability under long-term, steady-state seepage loading conditions. The stability analyses for this scope did not consider sesmic loading conditions or external rapid drawdown conditions (seismic slope stability is being evaluated under a separate study, and the maximum pool level of the adjacent Old Hickory Lake is just slightly below the lowest Pond E dike toe elevation such that rapid drawdown is a non-issue). In addition, this assessment did not consider potential failure modes related to spillway capacity and overtopping or seepage along penetrations through the embankments (including the buried spillway pipes).

9.2. These conclusions and recommendations are based on data and subsurface conditions from the borings advanced during this investigation using that degree of care and skill ordinarily exercised under similar circumstances by competent members of the engineering profession. No warranties can be made regarding the continuity of conditions between borings.

9.3. The boring logs and related information presented in this report depict approximate subsurface conditions only at the specific boring locations noted and at the time of drilling. Conditions at other locations may differ from those occurring at the boring locations. Also, the passage of time may result in a change in the subsurface conditions at the boring locations.

10. References

The following is a list of documents that were the main references for gaining historical information used to evaluate the pond complex at Gallatin and prepare this report:

- Gallatin Steam Plant, Ash Disposal Area 3, Deflector and Divider Dikes, SME-SOI-88-017, by Singleton Materials Engineering Laboratory, September 8, 1988.

- Report of Geotechnical Exploration, Ash Disposal Area and Potential On-site and Off-site Borrow Areas, Gallatin Fossil Plant, Gallatin, Tennessee, by MACTEC Engineering and Consulting, Inc., October 14, 2004.

- Gallatin Fossil Plant, Ash Disposal Study, Phase 1 Report, Revision 0, by Worley Parsons Resources and Energy, May 15, 2006.

- Gallatin Steam Plant – Ash Dispoal Area – Soils Exploration, Memorandum from F.P. Lacy to J.C. McGraw, September 24, 1969.

- Gallatin Fossil Plant Ash Disposal Ponds Dike Stability Analyses, TVA in-house analysis, May 13, 2005.

- Geology of the Gallatin Steam Plant Site, by Charles P. Bensiger, TVA Division of Water Control Planning, Geologic Branch, June, 1953.

- Results of TVA in-house static slope stability analysis for raising of Pond A divider dike, 1988.

- TVA Drawing Numbers 10W271, 306 to 320, 410, 411, 415, 416, 506 to 510, 10N240, 10N243, 10N267, 10N272, 10N273-01 to 03, 10N274, 10N278.

- TVA Annual Inspection Reports, 1967 to 1989, 1993 to 2004, and 2007 to 2008.

Additional reference documents:

- Slope Stability, Department of the Army, US Army Corps of Engineers, Engineering Manual EM 1110-2-1902, October 31, 2003.

- Seepage Analysis and Control for Dams, Department of the Army, US Army Corps of Engineers, Engineering Manual EM 1110-2-1901, April 30, 1993.

- Geotechnical Investigations, Department of the Army, US Army Corps of Engineers, Engineering Manual EM 1110-1-1804, January 1, 2001.

- GeoStudio, Computer Software. GEO-Slope International Ltd. Ver. 7.14, 2007.

- Soil Mechanics Design Manual 7.1, Department of the Navy – Navy Facilities Engineering Command, May 1982.

- Terzaghi, K., Peck, R.B., and Gholamreza, M., Soil Mechanics in Engineering Practice, 3rd Edition, New York, John Wiley and Sons, 1996.

Appendix A

Typed Boring Logs

Stantec

SUBSURFACE LOG

Project No.	175559018	Location	N 707019.68, E 1879799.57 (NAD27)
Project Name	Gallatin Fossil Plant - TVA	Boring No.	**STN-A-1** Total Depth 30.5 ft
Location	Sumner County, Tennessee	Surface Elevation	472.8 ft. (NGVD29)
Project Type	Geotechnical Exploration	Date Started	7/29/09 Completed 7/29/09
Supervisor	Paul Cooper Driller J. Wethington	Depth to Water	19.0 ft Date/Time 7/29/09
Logged By	Craig Millhollin	Automatic Hammer ☐ Safety Hammer ☒ Other ☐	

Lithology Elevation	Lithology Depth	Description	Overburden / Rock Core	Sample # / RQD	Depth / Run	Rec. Ft. / Rec. Ft.	Blows / Rec. %	Mois.Cont. % / Run Depth	Remarks
472.8'	0.0'	Top of Hole							
		BOTTOM ASH (Pond A dikes), black to gray, dry to wet, loose to very dense		SPT-1	0.0 - 1.5	1.1	5-7-12	11	Boring advanced with 3.25" hollow stem auger.
				SPT-2	1.5 - 3.0	1.2	13-15-25	10	
				SPT-3	3.0 - 4.5	1.5	15-31-35	10	
				SPT-4	4.5 - 6.0	1.3	35-41-55	13	Piezometer installed (see PZ detail sheet).
				SPT-5	6.0 - 6.5	0.5	50/0.5'	11	
				SPT-6	7.5 - 8.5	1.0	35-50/0.5'	13	
				SPT-7	9.0 - 9.5	0.5	50/0.5'	13	
				SPT-8	10.5 - 11.0	0.5	50/0.5'	8	
				SPT-9	12.0 - 12.5	0.2	50/0.5'	9	
				SPT-10	13.5 - 14.0	0.1	50/0.5'	12	
				SPT-11	15.0 - 16.5	1.2	19-14-19	17	
				SPT-12	16.5 - 18.0	1.1	10-8-10	13	
				SPT-13	18.0 - 19.5	1.3	6-8-9	13	
				SPT-14	19.5 - 21.0	1.0	4-4-9	16	
				SPT-15	21.0 - 22.5	1.0	2-2-3	14	
				SPT-16	22.5 - 24.0	1.5	3-4-4	16	
				SPT-17	24.0 - 25.5	1.5	5-4-6	16	
				SPT-18	25.5 - 27.0	1.5	12-6-4	14	Piezometer backfilled with sand, bentonite pellets, and bentonite grout from 0.0 to 25.5 ft.
445.1'	27.7'			SPT-19	27.0 - 28.5	1.5	1-2-3	34	
		FAT CLAY, gray to tan, wet, medium stiff		SPT-20	28.5 - 30.0	1.0	2-2-3	31	
442.3'	30.5'			SPT-21	30.0 - 30.5	0.5	50/0.5'	6	

Auger Refusal /
Bottom of Hole

Top of Rock = 30.5'
Elevation (442.3')

FMSM_LEGACY 175559018 BORINGS.GPJ FMSM.GDT 2/23/10

SUBSURFACE LOG

Project No.	175559018	Location	N 706994.16, E 1879810.94 (NAD27)
Project Name	Gallatin Fossil Plant - TVA	Boring No.	**STN-A-2** Total Depth 42.1 ft
Location	Sumner County, Tennessee	Surface Elevation	473.3 ft. (NGVD29)
Project Type	Geotechnical Exploration	Date Started	8/4/09 Completed 8/5/09
Supervisor	Paul Cooper Driller J. Wethington	Depth to Water	14.0 ft Date/Time 8/5/09
Logged By	Craig Millhollin	Automatic Hammer ☐	Safety Hammer ☒ Other ☐

Lithology			Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	
Elevation	Depth	Description	Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	Remarks
473.3'	0.0'	Top of Hole							
		BOTTOM ASH (Pond A Dike), black and gray, dry, medium dense, trace tan fine sand		SPT-1	0.0 - 1.5	1.2	6-7-10	1	Boring advanced with 3.25" hollow stem auger.
				SPT-2	1.5 - 3.0	1.5	9-11-15	9	
				SPT-3	3.0 - 4.5	1.1	6-6-7	10	
				SPT-4	4.5 - 6.0	1.3	10-5-6	21	
465.8'	7.5'			SPT-5	6.0 - 7.5	1.0	6-8-6	11	
464.3'	9.0'	FLY ASH, dark gray, moist, very stiff		SPT-6	7.5 - 9.0	1.5	6-8-14	54	
		BOTTOM ASH, black, moist to wet, loose to dense		SPT-7	9.0 - 10.5	1.4	8-18-23	--	
				SPT-8	10.5 - 12.0	1.5	20-27-18	11	
				SPT-9	12.0 - 13.5	1.1	8-13-8	19	
				SPT-10	13.5 - 15.0	12.0	8-7-8	20	
456.8'	16.5'			SPT-11	15.0 - 16.5	0.9	3-6-4	18	
		FLY ASH (sluiced), black, wet, very soft to medium stiff, trace fat clay		SPT-12	16.5 - 18.0	0.9	4-3-2	35	
				SPT-13	18.0 - 19.5	1.1	2-1-1	37	
				ST-1	19.5 - 21.5	0.0	0%	--	
				SPT-14	21.5 - 23.0	0.0	WOR-WOR-WOR	--	
448.0'	25.3'			SPT-15	23.0 - 24.5	0.6	WOR-WOR-WOR	26	
		BOTTOM ASH, black, wet, loose, some fly ash		SPT-16	24.5 - 26.0	0.7	2-2-2	17	
				SPT-17	26.0 - 27.5	1.5	3-3-3	21	
				SPT-18	27.5 - 29.0	0.8	5-3-3	18	
				SPT-19	29.0 - 30.5	1.0	2-2-2	12	

SUBSURFACE LOG

Project No.	175559018	Location	N 706994.16, E 1879810.94 (NAD27)
Project Name	Gallatin Fossil Plant - TVA	Boring No.	**STN-A-2** Total Depth 42.1 ft

Lithology		Description	Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	Remarks
Elevation	Depth		Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	
441.9'	31.4'			SPT-20	30.5 - 32.0	1.5	3-6-10	58	
		FAT CLAY with Sand, tan to brown, wet, stiff to very stiff, trace fine gravel		SPT-21	32.0 - 33.5	1.3	5-6-6	28	
				SPT-22	33.5 - 35.0	0.9	5-7-20	25	
				SPT-23	35.0 - 36.5	1.5	14-15-16	24	
				SPT-24	36.5 - 38.0	1.0	6-8-9	33	
				SPT-25	38.0 - 39.5	1.5	5-9-11	30	Boring backfilled with bentonite grout from 0.0 to 42.1 ft.
				SPT-26	39.5 - 41.0	1.5	2-6-6	27	
431.2'	42.1'			SPT-27	41.0 - 42.1	1.1	50/1.1'	26	
		Auger Refusal / Bottom of Hole Top of Rock = 42.1' Elevation (431.2')							

SUBSURFACE LOG

Stantec

Project No.	175559018	Location	N 707510.75, E 1880731.90 (NAD27)
Project Name	Gallatin Fossil Plant - TVA	Boring No.	**STN-A-3** Total Depth 34.0 ft
Location	Sumner County, Tennessee	Surface Elevation	472.9 ft. (NGVD29)
Project Type	Geotechnical Exploration	Date Started	8/5/09 Completed 8/5/09
Supervisor	Paul Cooper Driller S. Bradford	Depth to Water	16.3 ft Date/Time 8/5/09
Logged By	C. Wood	Automatic Hammer ☒ Safety Hammer ☐ Other ☐	

Lithology Elevation	Lithology Depth	Description	Overburden Sample # / Rock Core RQD	Depth / Run	Rec. Ft. / Rec. Ft.	Blows / Rec. %	Mois.Cont. % / Run Depth	Remarks
472.9'	0.0'	Top of Hole						
		BOTTOM ASH (Pond A Dikes), black to gray, dry to moist, loose to very dense	SPT-1	0.0 - 1.5	1.4	3-4-5	13	Boring advanced with 4.25" hollow stem auger.
			SPT-2	1.5 - 3.0	0.9	7-10-9	10	
			SPT-3	3.0 - 4.5	1.1	10-13-16	10	
			SPT-4	4.5 - 6.0	1.5	11-30-52	10	
			SPT-5	6.0 - 6.5	0.8	50/0.5'	11	
			SPT-6	7.5 - 9.0	1.5	16-36-49	11	
		-some fat clay at 9.0'	SPT-7	9.0 - 10.5	1.5	18-40-26	11	
			SPT-8	10.5 - 12.0	1.5	34-29-32	11	
			SPT-9	12.0 - 13.5	1.5	36-36-32	10	Bulk Sample #1 obtained from 12.5 to 22.5 ft.
			SPT-10	13.5 - 15.0	1.1	6-16-10	8	
			SPT-11	15.0 - 16.5	0.6	4-5-3	12	
			SPT-12	16.5 - 18.0	0.8	3-4-4	19	
			SPT-13	18.0 - 19.5	1.2	4-3-5	17	
			SPT-14	19.5 - 21.0	0.8	4-5-3	13	
			SPT-15	21.0 - 22.5	1.3	4-4-5	15	
449.2'	23.7'		SPT-16	22.5 - 23.7	1.2	5-16-50/0.2'	17	Began Core
448.9'	24.0'	Limestone, highly weathered (augered)	48%	2.5	2.0	80	26.5	
438.9'	34.0'	Limestone, light gray to light brown, microcrystalline to fine, hard, thin bedded, moderately weathered to highly weathered, many bedding zone fractures throughout	55%	7.5	7.0	93	34.0	Boring backfilled with bentonite grout from 0.0 to 34.0 ft.

Bottom of Hole

Base of Weathered Rock = 24.0'

Top of Rock = 23.7'
Elevation (449.2')

Stantec

SUBSURFACE LOG

Project No.	175559018	Location	N 707498.65, E 1880758.47 (NAD27)
Project Name	Gallatin Fossil Plant - TVA	Boring No.	**STN-A-4** Total Depth 26.5 ft
Location	Sumner County, Tennessee	Surface Elevation	473.8 ft. (NGVD29)
Project Type	Geotechnical Exploration	Date Started	8/5/09 Completed 8/5/09
Supervisor	Paul Cooper Driller S. Bradford	Depth to Water	12.0 ft Date/Time 8/5/09
Logged By	C. Wood	Automatic Hammer ☒	Safety Hammer ☐ Other ☐

Lithology Elevation	Lithology Depth	Description	Overburden / Rock Core Sample # / RQD	Depth / Run	Rec. Ft. / Rec. Ft.	Blows / Rec. %	Mois.Cont. % / Run Depth	Remarks
473.8'	0.0'	Top of Hole						
		BOTTOM ASH (Pond A Dike), black, moist to wet, loose to medium dense	SPT-1	0.0 - 1.5	1.4	2-4-6	10	Boring advanced with 4.25" hollow stem auger.
			SPT-2	1.5 - 3.0	0.6	6-6-7	12	
			SPT-3	3.0 - 4.5	0.5	5-7-6	11	
			SPT-4	4.5 - 6.0	1.5	7-11-21	11	
		-some fly ash from 6.0 to 7.2 ft.	SPT-5	6.0 - 7.5	1.0	32-28-22	22	
			SPT-6	7.5 - 9.0	1.0	15-10-10	18	
		-some fly ash from 9.7 to 10.5 ft.	SPT-7	9.0 - 10.5	1.3	9-6-3	14	
			SPT-8	10.5 - 12.0	1.1	5-5-3	16	
			SPT-9	12.0 - 13.5	0.9	3-3-8	22	
			SPT-10	13.5 - 15.0	1.0	3-3-5	24	
457.3'	16.5'		SPT-11	15.0 - 16.5	1.2	1-WOH-WOH	30	
		FLY ASH (sluiced), black, wet, very soft to stiff -some bottom ash from 18.3 to 19.5 ft.	SPT-12	16.5 - 18.0	1.5	1-2-3	40	
			SPT-13	18.0 - 19.5	1.5	6-7-6	35	
			SPT-14	19.5 - 21.0	1.3	2-2-2	33	
			SPT-15	21.0 - 22.5	1.0	WOH-WOH-WOH	21	
		-some bottom ash from 22.0 to 23.5 ft.	SPT-16	22.5 - 24.0	1.5	WOH-1-2	22	Boring backfilled with bentonite grout from 0.0 to 26.5 ft.
448.0'	25.8'		SPT-17	24.0 - 25.5	1.5	2-2-7	34	
447.3'	26.5'	LEAN CLAY, orange brown, wet, stiff, trace medium sand	SPT-18	25.5 - 26.5	1.4	17-50/0.5'	16	

Auger Refusal / Bottom of Hole

Top of Rock = 26.5'
Elevation (447.3')

FMSM_LEGACY 175559018 BORINGS.GPJ FMSM.GDT 2/23/10

2/23/10

Stantec

SUBSURFACE LOG

Project No.	175559018	Location	N 707498.65, E 1880758.47 (NAD27)
Project Name	Gallatin Fossil Plant - TVA	Boring No.	**STN-A-4S** Total Depth 26.0 ft
Location	Sumner County, Tennessee	Surface Elevation	473.8 ft. (NGVD29)
Project Type	Geotechnical Exploration	Date Started	8/5/09 Completed 8/5/09
Supervisor	Paul Cooper Driller S. Bradford	Depth to Water	N/A Date/Time N/A
Logged By	C. Wood	Automatic Hammer ☒ Safety Hammer ☐ Other ☐	

Lithology			Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	
Elevation	Depth	Description	Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	Remarks
473.8'	0.0'	Top of Hole							
		Refer to STN-A-4 for descriptions of overburden soils.							Boring advanced with 4.25" hollow stem auger.
				ST-1	6.0 - 8.0	0.5		10	
				ST-2	16.5 - 18.5	0.3		27	
				ST-3	20.0 - 22.0	0.0		--	
									Boring backfilled with bentonite grout from 0.0 to 26.0 ft.
				ST-4	23.5 - 25.5	0.2		29	
447.8'	26.0'								
		No Refusal / Bottom of Hole							

FMSM_LEGACY 175559018 BORINGS.GPJ FMSM.GDT 2/23/10

Stantec

SUBSURFACE LOG

Project No.	175559018	Location	N 708368.74, E 1881417.01 (NAD27)
Project Name	Gallatin Fossil Plant - TVA	Boring No.	**STN-A-5** Total Depth 23.2 ft
Location	Sumner County, Tennessee	Surface Elevation	473.7 ft. (NGVD29)
Project Type	Geotechnical Exploration	Date Started	7/29/09 Completed 7/29/09
Supervisor	Paul Cooper Driller J. Wethington	Depth to Water	16.5 ft Date/Time 7/29/09
Logged By	Craig Millhollin	Automatic Hammer ☐	Safety Hammer ☒ Other ☐

Lithology Elevation	Lithology Depth	Description	Overburden / Rock Core	Sample # / RQD	Depth / Run	Rec. Ft. / Rec. Ft.	Blows / Rec. %	Mois.Cont. % / Run Depth	Remarks
473.7'	0.0'	Top of Hole							
		BOTTOM ASH (Pond A Dikes), dark gray to black, moist to wet, medium dense to very dense		SPT-1	0.0 - 1.5	1.1	3-7-11	11	Boring advanced with 3.25" hollow stem auger.
				SPT-2	1.5 - 3.0	1.1	6-19-23	10	
				SPT-3	3.0 - 4.5	1.3	14-26-27	10	
				SPT-4	4.5 - 5.4	0.8	47-50/0.4'	10	Piezometer installed (see PZ detail sheet).
				SPT-5	6.0 - 6.3	0.2	50/0.3'	11	
				SPT-6	7.5 - 9.0	1.2	21-41-45	10	
				SPT-7	9.0 - 10.5	1.2	15-33-31	11	
				SPT-8	10.5 - 11.0	0.5	50/0.5'	12	
				SPT-9	12.0 - 12.5	0.2	50/0.5'	10	
				SPT-10	13.5 - 14.0	0.5	50/0.5'	10	
				SPT-11	15.0 - 15.5	0.5	50/0.5'	9	
				SPT-12	16.5 - 17.0	0.5	50/0.5'	12	
				SPT-13	18.0 - 19.5	1.3	30-39-33	11	Piezometer backfilled with sand, bentonite pellets, and bentonite grout from 0.0 to 23.2 ft.
				SPT-14	19.5 - 21.0	1.2	33-45-28	11	
				SPT-15	21.0 - 22.5	0.8	6-7-6	11	
				SPT-16	22.5 - 23.0	0.5	50/0.5'	15	
450.5'	23.2'			SPT-17	23.0 - 23.2	0.0	50/0.2'	--	

Auger Refusal /
Bottom of Hole

Top of Rock = 23.2'
Elevation (450.5')

FMSM_LEGACY 175559018 BORINGS.GPJ FMSM.GDT 2/23/10

Stantec

SUBSURFACE LOG

Project No.	175559018	Location	N 708353.42, E 1881433.71 (NAD27)
Project Name	Gallatin Fossil Plant - TVA	Boring No.	**STN-A-6** Total Depth 31.4 ft
Location	Sumner County, Tennessee	Surface Elevation	474.0 ft. (NGVD29)
Project Type	Geotechnical Exploration	Date Started	7/30/09 Completed 7/30/09
Supervisor	Paul Cooper Driller J. Wethington	Depth to Water	11.5 ft Date/Time 7/30/09
Logged By	Craig Millhollin	Automatic Hammer ☐	Safety Hammer ☒ Other ☐

Lithology Elevation	Depth	Description	Overburden / Rock Core Sample # / RQD	Depth / Run	Rec. Ft. / Rec. Ft.	Blows / Rec. %	Mois.Cont. % / Run Depth	Remarks
474.0'	0.0'	Top of Hole						
		BOTTOM ASH (Pond A Dike), light gray to black, moist to wet, medium dense to very dense	SPT-1	0.0 - 1.5	1.2	5-8-12	13	Boring advanced with 3.25" hollow stem auger.
			SPT-2	1.5 - 3.0	1.1	13-13-17	9	
			SPT-3	3.0 - 4.5	1.5	8-13-13	33	
			SPT-4	4.5 - 6.0	1.1	12-13-14	9	
			SPT-5	6.0 - 7.5	1.0	15-18-50	10	
			SPT-6	7.5 - 8.3	0.8	3-50/0.3'	11	
			SPT-7	9.0 - 10.5	1.1	2-12-15	17	
			SPT-8	10.5 - 12.0	1.5	12-20-17	15	
			SPT-9	12.0 - 13.5	1.1	15-44-31	15	
			SPT-10	13.5 - 15.0	1.2	17-13-18	16	
			SPT-11	15.0 - 16.5	1.0	7-8-9	14	
			SPT-12	16.5 - 18.0	1.2	9-12-15	14	
			SPT-13	18.0 - 19.5	1.5	15-15-9	8	
453.7'	20.3'		SPT-14	19.5 - 21.0	0.7	10-4-7	10	
452.5'	21.5'	FAT CLAY, gray to tan, wet, stiff, trace fine gravel	SPT-15	21.0 - 22.5	1.2	4-5-3	26	
		BOTTOM ASH, black, wet, medium dense	ST-1	22.5 - 24.5	0.7		21	
			SPT-16	24.5 - 26.0	1.3	8-10-4	10	
447.7'	26.3'	FAT CLAY, gray to tan, wet, soft to medium stiff	SPT-17	26.0 - 27.5	0.8	1-2-6	24	Boring backfilled with bentonite to 2.0' below grade.
			SPT-18	27.5 - 29.0	0.8	1-2-2	33	
			ST-2	29.0 - 31.0	1.3		32	
442.6'	31.4'		SPT-19	31.0 - 31.4	0.4	50/0.4'	33	

Auger Refusal /
Bottom of Hole

Top of Rock = 31.4'
Elevation (442.6')

FMSM_LEGACY 175559018 BORINGS.GPJ FMSM.GDT 2/23/10

Stantec

SUBSURFACE LOG

Project No.	175559018	Location	N 708921.58, E 1881894.55 (NAD27)
Project Name	Gallatin Fossil Plant - TVA	Boring No.	**STN-A-7** Total Depth 42.1 ft
Location	Sumner County, Tennessee	Surface Elevation	474.5 ft. (NGVD29)
Project Type	Geotechnical Exploration	Date Started	7/30/09 Completed 7/30/09
Supervisor	Paul Cooper Driller J. Wethington	Depth to Water	14.6 ft Date/Time 7/30/09
Logged By	Craig Millhollin	Automatic Hammer ☐ Safety Hammer ☒ Other ☐	

Lithology Elevation	Depth	Description	Overburden / Rock Core Sample # / RQD	Depth / Run	Rec. Ft. / Rec. Ft.	Blows / Rec. %	Mois.Cont. % / Run Depth	Remarks
474.5'	0.0'	Top of Hole						
		BOTTOM ASH (Pond A Dikes), light gray to black, moist to wet, loose to very dense	SPT-1	0.0 - 1.5	1.1	6-5-7	26	Boring advanced with 3.25" hollow stem auger.
			SPT-2	1.5 - 3.0	1.3	8-15-15	13	
		-clay fill layer between 3.0' to 3.8'	SPT-3	3.0 - 4.5	1.5	12-15-26	19	
			SPT-4	4.5 - 6.0	1.3	15-20-22	17	
			SPT-5	6.0 - 7.5	1.2	20-21-40	16	
			SPT-6	7.5 - 9.0	1.2	20-24-18	16	
			SPT-7	9.0 - 10.5	1.5	33-31-37	16	
			SPT-8	10.5 - 12.0	1.5	37-40-50	15	
			SPT-9	12.0 - 13.5	1.3	30-36-24	14	
			SPT-10	13.5 - 15.0	1.1	12-12-12	14	
			SPT-11	15.0 - 16.5	1.0	44-40-50	16	
			SPT-12	16.5 - 17.0	0.4	50/0.5'	16	
			SPT-13	18.0 - 19.5	1.0	7-7-10	15	
			SPT-14	19.5 - 21.0	1.2	3-5-6	14	
			SPT-15	21.0 - 22.5	1.5	3-4-4	15	
			SPT-16	22.5 - 24.0	1.5	3-4-4	13	
449.5'	25.0'		SPT-17	24.0 - 25.5	1.0	2-3-1	24	
		SANDY LEAN CLAY with Gravel, brown to tan, wet, medium to very stiff, trace fine gravel	SPT-18	25.5 - 27.0	0.9	2-3-2	25	
			SPT-19	27.0 - 28.5	1.2	3-5-5	25	
			SPT-20	28.5 - 30.0	1.0	3-5-7	25	

Project No.	175559018	Location	N 708921.58, E 1881894.55 (NAD27)
Project Name	Gallatin Fossil Plant - TVA	Boring No.	STN-A-7 Total Depth 42.1 ft

Lithology		Description	Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	Remarks
Elevation	Depth		Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	
		SANDY LEAN CLAY with Gravel, brown to tan, wet, medium to very stiff, trace fine gravel *(Continued)*		SPT-21	30.0 - 31.5	1.3	4-9-10	28	
				SPT-22	31.5 - 33.0	1.1	5-9-10	20	
				SPT-23	33.0 - 34.5	1.0	3-5-7	30	
				SPT-24	34.5 - 36.0	1.1	5-7-9	23	
				SPT-25	36.0 - 37.5	1.5	5-10-16	26	
				SPT-26	37.5 - 39.0	1.1	11-15-17	21	Boring backfilled with bentonite grout to 2.0' below grade.
				SPT-27	39.0 - 40.5	1.0	8-11-17	24	
432.4'	42.1'			SPT-28	40.5 - 42.0	1.5	6-9-11	25	

Auger Refusal /
Bottom of Hole

Top of Rock = 42.1'
Elevation (432.4')

Stantec

SUBSURFACE LOG

Project No.	175559018	Location	N 708907.06, E 1881914.61 (NAD27)
Project Name	Gallatin Fossil Plant - TVA	Boring No.	**STN-A-8** Total Depth 28.5 ft
Location	Sumner County, Tennessee	Surface Elevation	474.8 ft. (NGVD29)
Project Type	Geotechnical Exploration	Date Started	8/4/09 Completed 8/4/09
Supervisor	Paul Cooper Driller J. Wethington	Depth to Water	11.0 ft Date/Time 8/4/09
Logged By	Craig Millhollin	Automatic Hammer ☐	Safety Hammer ☒ Other ☐

Lithology		Description	Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	Remarks
Elevation	Depth		Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	
474.8'	0.0'	Top of Hole							
		BOTTOM ASH (Pond A Dike), light gray to black, moist to wet, very loose to medium dense		SPT-1	0.0 - 1.5	1.1	3-6-11	11	Boring advanced with 3.25" hollow stem auger.
				SPT-2	1.5 - 3.0	1.2	11-15-16	11	
				SPT-3	3.0 - 4.5	1.3	8-12-17	12	
				SPT-4	4.5 - 6.0	1.3	6-8-9	24	
				SPT-5	6.0 - 7.5	1.3	7-7-5	23	
				SPT-6	7.5 - 9.0	1.0	4-4-2	22	
				SPT-7	9.0 - 10.5	1.4	2-2-2	23	
				SPT-8	10.5 - 12.0	1.0	1-1-2	22	
				SPT-9	12.0 - 13.5	1.5	3-3-2	22	
				SPT-10	13.5 - 15.0	1.1	8-5-8	21	
				SPT-11	15.0 - 16.5	1.5	10-10-7	15	
457.8'	17.0'								
		FLY ASH (sluiced), black, wet, very soft to medium dense		SPT-12	16.5 - 18.0	1.0	2-3-3	15	
				SPT-13	18.0 - 19.5	1.5	2-2-2	17	
				SPT-14	19.5 - 21.0	1.0	1-2-2	17	
				SPT-15	21.0 - 22.5	0.6	2-1-2	11	
				SPT-16	22.5 - 24.0	0.9	2-2-3	21	
				SPT-17	24.0 - 25.5	1.3	2-3-9	16	Boring backfilled with bentonite grout from 0.0 to 28.5 ft.
449.3'	25.5'								
		LEAN CLAY with Gravel, brown to tan, wet, very stiff, some fine to coarse gravel		SPT-18	25.5 - 26.0	0.0	50/0.5'	--	
				SPT-19	27.0 - 27.3	0.3	50/0.3'	32	
446.3'	28.5'								
		Auger Refusal / Bottom of Hole Top of Rock = 25.5' Elevation (449.3')							

FMSM_LEGACY 175559018 BORINGS.GPJ FMSM.GDT 2/23/10

Project No.	175559018	Location	N 708907.06, E 1881914.61 (NAD27)
Project Name	Gallatin Fossil Plant - TVA	Boring No.	**STN-A-8S** Total Depth 22.0 ft
Location	Sumner County, Tennessee	Surface Elevation	474.8 ft. (NGVD29)
Project Type	Geotechnical Exploration	Date Started	8/4/09 Completed 8/4/09
Supervisor	Paul Cooper Driller J. Wethington	Depth to Water	11.0 ft Date/Time 8/4/09
Logged By	Craig Millhollin	Automatic Hammer ☐	Safety Hammer ☒ Other ☐

Lithology Elevation	Lithology Depth	Description	Overburden / Rock Core	Sample # / RQD	Depth / Run	Rec. Ft. / Rec. Ft.	Blows / Rec. %	Mois.Cont. % / Run Depth	Remarks
474.8'	0.0'	Top of Hole							
		Refer to STN-A-8 for descriptions of overburden soils.							Boring advanced with 3.25" hollow stem auger, offset 3.0 ft. west of STN-A-8.
									Bulk sample #1 obtained from 3.0 to 5.0 ft.
				ST-1	5.0 - 7.0	1.1		17	
				ST-2	10.0 - 12.0	0.0		--	
									Bulk sample #2 obtained from 14.0 to 17.0 ft.
				ST-3	15.0 - 17.0	1.0		26	
									Boring backfilled with bentonite grout from 0.0 to 22.0 ft.
452.8'	22.0'			ST-4	20.0 - 22.0	0.0		--	
		No Refusal / Bottom of Hole							

FMSM_LEGACY 175559018 BORINGS.GPJ FMSM.GDT 2/23/10

Stantec

SUBSURFACE LOG

Project No.	175559018	Location	N 709132.64, E 1882470.74 (NAD27)
Project Name	Gallatin Fossil Plant - TVA	Boring No.	**STN-A-9** Total Depth 31.2 ft
Location	Sumner County, Tennessee	Surface Elevation	472.4 ft. (NGVD29)
Project Type	Geotechnical Exploration	Date Started	7/31/09 Completed 7/31/09
Supervisor	Paul Cooper Driller J. Wethington	Depth to Water	11.0 ft Date/Time 7/31/09
Logged By	Craig Millhollin	Automatic Hammer ☐ Safety Hammer ☒ Other ☐	

Lithology: Elevation	Lithology: Depth	Description	Overburden / Rock Core	Sample # / RQD	Depth / Run	Rec. Ft. / Rec. Ft.	Blows / Rec. %	Mois.Cont. % / Run Depth	Remarks
472.4'	0.0'	Top of Hole							
		BOTTOM ASH (Pond A Dikes), light gray to black, moist to wet, loose to very dense		SPT-1	0.0 - 1.5	1.1	5-6-9	11	Boring advanced with 3.25" hollow stem auger.
				SPT-2	1.5 - 3.0	1.4	12-20-23	9	
				SPT-3	3.0 - 4.5	1.3	13-40-50	17	
				SPT-4	4.5 - 6.0	1.5	14-22-10	13	
				SPT-5	6.0 - 7.5	1.5	20-10-19	12	
				SPT-6	7.5 - 9.0	1.3	11-40-50	15	
				SPT-7	9.0 - 10.5	1.2	15-25-22	13	Bulk Sample #1 obtained from 9.0 to 12.0 ft.
				SPT-8	10.5 - 12.0	1.0	15-31-24	11	
				SPT-9	12.0 - 13.5	1.5	25-31-34	13	
				SPT-10	13.5 - 15.0	1.2	30-34-34	15	
				SPT-11	15.0 - 16.5	1.4	6-6-5	15	
				SPT-12	16.5 - 18.0	1.0	2-3-3	11	
				SPT-13	18.0 - 19.5	1.5	10-12-14	13	
				SPT-14	19.5 - 21.0	1.1	10-12-11	11	
				SPT-15	21.0 - 22.5	1.5	3-6-6	16	
				SPT-16	22.5 - 24.0	1.2	2-3-2	11	
447.7'	24.7'			SPT-17	24.0 - 25.5	0.8	4-9-14	25	
		FAT CLAY, brown to tan, wet, very stiff		SPT-18	25.5 - 27.0	1.2	10-11-7	27	
445.1'	27.3'			SPT-19	27.0 - 27.8	0.8	40-50/0.3'	27	Boring backfilled with bentonite grout from 0.0 to 31.2 ft.
444.6'	27.8'	LIMESTONE, gray, highly weathered (apparent floater)		SPT-20	27.8 - 29.0	1.0	13-10-18	29	
		FAT CLAY with Gravel, tan, wet, very stiff, fine to coarse gravel		SPT-21	29.0 - 29.8	0.8	18-50/0.3'	20	
				SPT-22	29.8 - 31.0	1.0	26-50-50/0.2'	36	
441.2'	31.2'			SPT-23	31.0 - 31.2	0.0	50/0.2'	--	

Auger Refusal / Bottom of Hole

Top of Rock = 31.2'
Elevation (441.2')

FMSM_LEGACY 175559018 BORINGS.GPJ FMSM.GDT 2/23/10

Stantec

SUBSURFACE LOG

Project No.	175559018	Location	N 709132.64, E 1882470.74 (NAD27)
Project Name	Gallatin Fossil Plant - TVA	Boring No.	**STN-A-9S** Total Depth 25.0 ft
Location	Sumner County, Tennessee	Surface Elevation	472.4 ft. (NGVD29)
Project Type	Geotechnical Exploration	Date Started	7/31/09 Completed 7/31/09
Supervisor	Paul Cooper Driller J. Wethington	Depth to Water	11.0 ft Date/Time 7/31/09
Logged By	Craig Millhollin	Automatic Hammer ☐ Safety Hammer ☒ Other ☐	

Lithology		Description	Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	Remarks
Elevation	Depth		Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	
472.4'	0.0'	Top of Hole							
		Refer to STN-A-9 for descriptions of overburden soils.							Boring advanced with 3.25" hollow stem auger, offset 3.0 ft. west of STN-A-9. Piezometer installed (see PZ detail sheet). Piezometer backfilled with sand, bentonite pellets, and benotnite grout from 0.0 to 25.0 ft.
447.4'	25.0'								
		No Refusal / Bottom of Hole							

FMSM_LEGACY 175559018 BORINGS.GPJ FMSM.GDT 2/23/10

Stantec

SUBSURFACE LOG

Project No. 175559018
Project Name Gallatin Fossil Plant - TVA
Location Sumner County, Tennessee
Project Type Geotechnical Exploration
Supervisor Paul Cooper Driller S. Bradford
Logged By C. Wood

Location N 709085.67, E 1882461.16 (NAD27)
Boring No. **STN-A-10** Total Depth 45.0 ft
Surface Elevation 474.1 ft. (NGVD29)
Date Started 8/4/09 Completed 8/4/09
Depth to Water 7.0 ft Date/Time 8/4/09
Automatic Hammer ☒ Safety Hammer ☐ Other ☐

Lithology: Elevation	Lithology: Depth	Description	Overburden / Rock Core	Sample # / RQD	Depth / Run	Rec. Ft. / Rec. Ft.	Blows / Rec. %	Mois.Cont. % / Run Depth	Remarks
474.1'	0.0'	Top of Hole							
		BOTTOM ASH (Pond A Dike), gray to black, moist to wet, very loose to medium dense		SPT-1	0.0 - 1.5	1.3	2-6-8	10	Boring advanced with 4.25" hollow stem auger.
				SPT-2	1.5 - 3.0	1.0	8-11-16	13	
				SPT-3	3.0 - 4.5	1.1	16-9-9	18	
				SPT-4	4.5 - 6.0	1.4	4-4-3	20	
				SPT-5	6.0 - 7.5	1.5	4-3-2	21	
				SPT-6	7.5 - 9.0	1.5	3-4-2	14	
		-with fly ash from 8.7' to 9.0'		SPT-7	9.0 - 10.5	1.4	1-1-WOH	26	
				SPT-8	10.5 - 12.0	1.0	1-1-WOH	22	
				SPT-9	12.0 - 13.5	1.1	3-4-5	19	
459.4'	14.7'			SPT-10	13.5 - 15.0	1.5	3-3-4	15	
		FLY ASH (sluiced), black, wet, very soft to stiff		SPT-11	15.0 - 16.5	0.8	2-3-1	19	
				SPT-12	16.5 - 18.0	0.7	1-1-1	17	
				SPT-13	18.0 - 19.5	0.7	1-1-1	21	
				SPT-14	19.5 - 21.0	1.5	1-WOH-WOH	18	
				SPT-15	21.0 - 22.5	0.6	1-2-1	16	
				SPT-16	22.5 - 24.0	0.8	1-1-1	21	
		-with bottom ash from 24.0' to 24.3'		SPT-17	24.0 - 25.5	1.4	1-1-4	21	
				SPT-18	25.5 - 27.0	0.3	WOH-WOH-WOH	21	
		-with bottom ash from 27.0' to 27.3'		SPT-19	27.0 - 28.5	1.5	1-3-5	29	
				SPT-20	28.5 - 30.0	1.5	5-11-8	26	

Project No.	175559018	Location	N 709085.67, E 1882461.16 (NAD27)
Project Name	Gallatin Fossil Plant - TVA	Boring No.	**STN-A-10** Total Depth 45.0 ft

Lithology Elevation	Lithology Depth	Description	Overburden / Rock Core	Sample # / RQD	Depth / Run	Rec. Ft. / Rec. Ft.	Blows / Rec. %	Mois.Cont. % / Run Depth	Remarks
442.7'	31.4'			SPT-21	30.0 - 31.5	1.5	9-13-11	21	
440.7'	33.4'	FAT CLAY, reddish brown, wet, very stiff, some fine gravel		SPT-22 SPT-23	31.5 - 33.0 33.0 - 33.4	1.4 0.4	11-11-9 50/0.4'	-- --	
439.1'	35.0'	Limestone, highly weathered (augered)							Began Core
429.1'	45.0'	Limestone, light gray to light brown, coarsely crystalline to medium, hard, thin bedded, moderately weathered to highly weathered, many bedding zone fractures throughout		16%	10.0	6.0	60	45.0	Void from approximately 41.0' to 42.5'. Boring backfilled with bentonite grout from 0.0 to 45.0 ft.

Bottom of Hole

Base of Weathered Rock = 35.0'

Top of Rock = 33.4'
Elevation (440.7')

FMSM_LEGACY 175559018 BORINGS.GPJ FMSM.GDT 2/23/10

SUBSURFACE LOG

Stantec

Project No.	175559018	Location	N 707402.48, E 1879680.01 (NAD27)
Project Name	Gallatin Fossil Plant - TVA	Boring No.	STN-C-1 Total Depth 21.0 ft
Location	Sumner County, Tennessee	Surface Elevation	462.0 ft. (NGVD29)
Project Type	Geotechnical Exploration	Date Started	8/4/09 Completed 8/4/09
Supervisor	Paul Cooper Driller J. Huntoon	Depth to Water	6.0 ft Date/Time 8/4/09
Logged By	D. Chapman	Automatic Hammer ☒	Safety Hammer ☐ Other ☐

Lithology Elevation	Lithology Depth	Description	Overburden / Rock Core	Sample # / RQD	Depth / Run	Rec. Ft. / Rec. Ft.	Blows / Rec. %	Mois.Cont. % / Run Depth	Remarks
462.0'	0.0'	Top of Hole							
		BOTTOM ASH (Pond C Dike), light gray to black, moist to wet, very loose to medium dense		SPT-1	0.0 - 1.5	1.5	4-5-6	11	Boring advanced with 3.25" hollow stem auger.
				SPT-2	1.5 - 3.0	1.5	11-15-14	14	
				SPT-3	3.0 - 4.5	1.5	8-13-10	8	
				SPT-4	4.5 - 6.0	1.5	6-9-12	9	Piezometer installed (see PZ detail sheet).
				SPT-5	6.0 - 7.5	1.2	9-13-11	15	
				SPT-6	7.5 - 9.0	0.8	8-9-6	13	
				SPT-7	9.0 - 10.5	0.2	2-1-2	7	Bulk Sample #1 obtained from 10.0 to 13.0 ft.
				SPT-8	10.5 - 12.0	0.8	3-5-6	16	
				SPT-9	12.0 - 13.5	0.8	2-4-6	13	
				SPT-10	13.5 - 15.0	0.5	3-3-4	18	
445.5'	16.5'			SPT-11	15.0 - 16.1	0.8	5-11-50/0.1'	13	Bulk Sample #2 obtained from 15.0 to 17.0 ft. Splitspoon refusal at 16.0 ft. due to apparent cobble/boulder.
443.0'	19.0'	FLY ASH, dark gray, wet, medium stiff		SPT-12	16.5 - 18.0	0.9	2-3-3	37	
				SPT-13	18.0 - 19.1	0.7	2-3-50/0.1'	40	
441.0'	21.0'	Shale, dark olive gray, highly weathered, moderately hard		SPT-14	19.5 - 19.9	0.1	50/0.4'	19	
		Auger Refusal / Bottom of Hole Top of Rock = 19.0' Elevation (443.0')							Piezometer backfilled with sand, bentonite pellets, and bentonite grout from 0.0 to 21.0 ft.

FMSM_LEGACY 175559018 BORINGS.GPJ FMSM.GDT 2/23/10

SUBSURFACE LOG

Project No.	175559018	Location	N 707328.99, E 1877246.92 (NAD27)
Project Name	Gallatin Fossil Plant - TVA	Boring No.	**STN-D-1** Total Depth 16.5 ft
Location	Sumner County, Tennessee	Surface Elevation	460.8 ft. (NGVD29)
Project Type	Geotechnical Exploration	Date Started	8/5/09 Completed 8/5/09
Supervisor	Paul Cooper Driller J. Huntoon	Depth to Water	N/A Date/Time N/A
Logged By	D. Chapman	Automatic Hammer ☒	Safety Hammer ☐ Other ☐

Lithology Elevation	Lithology Depth	Description	Overburden / Rock Core Sample # / RQD	Depth / Run	Rec. Ft. / Rec. Ft.	Blows / Rec. %	Mois.Cont. % / Run Depth	Remarks
460.8'	0.0'	Top of Hole						
460.3'	0.5'	GRAVEL Road Surface	SPT-1	0.0 - 1.5	1.5	7-6-5	19	Boring advanced with 4.25" hollow stem auger.
		LEAN CLAY, reddish brown, moist, stiff to very stiff	SPT-2	1.5 - 3.0	0.3	4-5-5	18	
			SPT-3	3.0 - 4.5	1.0	6-8-10	16	
			SPT-4	4.5 - 6.0	1.2	2-3-8	23	
		-trace coarse sand to fine gravel between 6.0' to 10.5'	SPT-5	6.0 - 7.5	1.3	2-3-6	21	
			SPT-6	7.5 - 9.0	1.0	3-5-7	23	
			SPT-7	9.0 - 10.5	1.0	4-5-7	23	
			SPT-8	10.5 - 12.0	0.8	3-3-17	22	Boring backfilled with bentonite grout from 0.0 to 16.5 ft.
			SPT-9	12.0 - 13.5	0.3	16-6-7	32	
			SPT-10	13.5 - 15.0	0.8	3-6-12	30	Refusal on apparent cobble/boulder.
444.3'	16.5'		SPT-11	15.0 - 16.5	0.7	2-6-6	26	

No Refusal /
Bottom of Hole

Stantec

SUBSURFACE LOG

Project No.	175559018	Location	N 707328.99, E 1877246.92 (NAD27)
Project Name	Gallatin Fossil Plant - TVA	Boring No.	**STN-D-1S** Total Depth 17.0 ft
Location	Sumner County, Tennessee	Surface Elevation	460.8 ft. (NGVD29)
Project Type	Geotechnical Exploration	Date Started	8/5/09 Completed 8/5/09
Supervisor	Paul Cooper Driller J. Huntoon	Depth to Water	N/A Date/Time N/A
Logged By	Craig Millhollin	Automatic Hammer ☒	Safety Hammer ☐ Other ☐

Lithology			Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	
Elevation	Depth	Description	Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	Remarks
460.8'	0.0'	Top of Hole							
		Refer to STN-D-1 and STN-D-1A for soil descriptions.		ST-1	2.0 - 4.0	1.5		15	Boring advanced with 4.25" hollow stem auger.
				ST-2	6.0 - 8.0	2.0		22	
				ST-3	10.0 - 12.0	1.5		24	
				ST-4	14.0 - 16.0	0.0		--	Shelby Tube opening and sidewalls buckled by apparent cobble/boulder.
443.8'	17.0'								

No Refusal /
Bottom of Hole

Top of Rock = 17.0'
Elevation (443.8')

Boring backfilled with bentonite grout from 0.0 to 17.0 ft.

FMSM_LEGACY 175559018 BORINGS.GPJ FMSM.GDT 2/23/10

Stantec

SUBSURFACE LOG

Project No.	175559018	Location	N 707328.99, E 1877246.92 (NAD27)
Project Name	Gallatin Fossil Plant - TVA	Boring No.	**STN-D-1A** Total Depth 21.0 ft
Location	Sumner County, Tennessee	Surface Elevation	460.8 ft. (NGVD29)
Project Type	Geotechnical Exploration	Date Started	8/5/09 Completed 8/5/09
Supervisor	Paul Cooper Driller J. Huntoon	Depth to Water	16.5 ft Date/Time 8/5/09
Logged By	D. Chapman	Automatic Hammer ☒	Safety Hammer ☐ Other ☐

Lithology Elevation	Lithology Depth	Description	Overburden / Rock Core Sample # / RQD	Depth / Run	Rec. Ft. / Rec. Ft.	Blows / Rec. %	Mois.Cont. % / Run Depth	Remarks
460.8'	0.0'	Top of Hole						
		Move to offset 5.0 ft. from Boring STN-D-1, auger down to 16.5 ft,, resume sampling. Refer to STN-D-1 for soil descriptions from 0.0 to 16.5 ft.						Boring advanced with 4.25" hollow stem auger. Piezometer installed (see PZ detail sheet).
444.3'	16.5'							
		LEAN CLAY, reddish brown, wet, very soft to soft, trace fine gravel	SPT-1	16.5 - 18.0	0.7	2-1-1	30	Piezometer backfilled with sand, bentonite pellets, and bentonite grout from 0.0 to 21.0 ft.
			SPT-2	18.0 - 19.5	1.1	1-2-2	29	
			SPT-3	19.5 - 21.0	1.0	2-2-5	27	
439.8'	21.0'		SPT-4	21.0 - 21.0	0.0	50/0.0'	--	
		Auger Refusal / Bottom of Hole Top of Rock = 21.0' Elevation (439.8')						

FMSM_LEGACY 175559018 BORINGS.GPJ FMSM.GDT 2/23/10

Stantec

SUBSURFACE LOG

Project No.	175559018	Location	N 707328.99, E 1877246.92 (NAD27)
Project Name	Gallatin Fossil Plant - TVA	Boring No.	**STN-D-1B** Total Depth 14.0 ft
Location	Sumner County, Tennessee	Surface Elevation	460.8 ft. (NGVD29)
Project Type	Geotechnical Exploration	Date Started	8/5/09 Completed 8/5/09
Supervisor	Paul Cooper Driller J. Huntoon	Depth to Water	N/A Date/Time N/A
Logged By	D. Chapman	Automatic Hammer ☒	Safety Hammer ☐ Other ☐

Lithology			Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	
Elevation	Depth	Description	Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	Remarks
460.8'	0.0'	Top of Hole							
		Moved to offset 5.0 ft. from Boring STN-D-1S. Attempted to obtain Shelby Tube sample from 18.0 to 20.0 ft. Auger refusal encountered at 14.0 ft.							Boring advanced with 4.25" hollow stem auger. Boring backfilled with benotnite grout from 0.0 to 14.0 ft.
446.8'	14.0'								

No Refusal /
Bottom of Hole

Top of Rock = 14.0'
Elevation (446.8')

FMSM_LEGACY 175559018 BORINGS.GPJ FMSM.GDT 2/23/10

SUBSURFACE LOG

Project No.	175559018	Location	N 707245.18, E 1877237.96 (NAD27)
Project Name	Gallatin Fossil Plant - TVA	Boring No.	**STN-D-2** Total Depth 15.9 ft
Location	Sumner County, Tennessee	Surface Elevation	460.4 ft. (NGVD29)
Project Type	Geotechnical Exploration	Date Started	8/7/09 Completed 8/7/09
Supervisor	Paul Cooper Driller J. Huntoon	Depth to Water	10.0 ft Date/Time 8/7/09
Logged By	Craig Millhollin	Automatic Hammer ☐ Safety Hammer ☒ Other ☐	

Lithology			Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	
Elevation	Depth	Description	Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	Remarks
460.4'	0.0'	Top of Hole							
		LEAN CLAY with Sand, reddish brown, moist to wet, stiff to very stiff		SPT-1	0.0 - 1.5	1.0	8-10-14	24	Boring advanced with 3.25" hollow stem auger.
				SPT-2	1.5 - 3.0	1.0	8-11-12	21	
				SPT-3	3.0 - 4.5	0.8	8-11-12	18	Bulk Sample #1 obtained from 4.0 to 6.0 ft.
				SPT-4	4.5 - 6.0	1.5	3-5-6	32	
				SPT-5	6.0 - 7.5	1.1	6-9-11	22	
				SPT-6	7.5 - 9.0	1.0	6-9-13	21	
				SPT-7	9.0 - 10.5	0.9	7-7-11	20	
				SPT-8	10.5 - 12.0	1.5	3-4-6	24	
				SPT-9	12.0 - 13.5	1.5	6-7-7	25	Boring backfilled with bentonite grout from 0.0 to 15.9 ft.
				SPT-10	13.5 - 15.0	1.2	6-9-12	23	
444.5'	15.9'			SPT-11	15.0 - 15.9	0.9	14-50/0.4'	28	

Auger Refusal /
Bottom of Hole

Top of Rock = 15.9'
Elevation (444.5')

FMSM_LEGACY 175559018 BORINGS.GPJ FMSM.GDT 2/23/10

Stantec

SUBSURFACE LOG

Project No.	175559018	Location	N 707245.18, E 1877237.96 (NAD27)
Project Name	Gallatin Fossil Plant - TVA	Boring No.	**STN-D-2S** Total Depth 12.0 ft
Location	Sumner County, Tennessee	Surface Elevation	460.4 ft. (NGVD29)
Project Type	Geotechnical Exploration	Date Started	8/7/09 Completed 8/7/09
Supervisor	Paul Cooper Driller J. Huntoon	Depth to Water	N/A Date/Time N/A
Logged By	Craig Millhollin	Automatic Hammer ☐ Safety Hammer ☒ Other ☐	

Lithology			Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	
Elevation	Depth	Description	Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	Remarks
460.4'	0.0'	Top of Hole							
		Refer to STN-D-2 for descriptions of overburden soils.							Boring advanced with 3.25" hollow stem auger.
				ST-1	4.0 - 6.0	1.7		18	
				ST-2	6.0 - 8.0	1.3		24	
									Boring backfilled with bentonite grout from 0.0 to 12.0 ft.
448.4'	12.0'			ST-3	10.0 - 12.0	0.0		--	

No Refusal /
Bottom of Hole

Top of Rock = 12.0'
Elevation (448.4')

FMSM_LEGACY 175559018 BORINGS.GPJ FMSM.GDT 2/23/10

SUBSURFACE LOG

Project No.	175559018	Location	N 703045.88, E 1879000.10 (NAD27)
Project Name	Gallatin Fossil Plant - TVA	Boring No.	**STN-E-1** Total Depth 55.0 ft
Location	Sumner County, Tennessee	Surface Elevation	474.1 ft. (NGVD29)
Project Type	Geotechnical Exploration	Date Started	8/6/09 Completed 8/6/09
Supervisor	Paul Cooper Driller S. Bradford	Depth to Water	18.0 ft Date/Time 8/6/09
Logged By	C. Wood	Automatic Hammer ☒	Safety Hammer ☐ Other ☐

Lithology Elevation	Lithology Depth	Description	Overburden / Rock Core	Sample # / RQD	Depth / Run	Rec. Ft. / Rec. Ft.	Blows / Rec. %	Mois.Cont. % / Run Depth	Remarks
474.1'	0.0'	Top of Hole							
473.8'	0.3'	BOTTOM ASH, road surface		SPT-1	0.0 - 1.5	1.2	3-3-10	15	Boring advanced with 4.25" hollow stem auger.
		SILTY CLAY (Pond E Dike), orange brown to grayish brown, moist, stiff to very stiff, trace fine sand to fine gravel, some bottom ash		SPT-2	1.5 - 3.0	0.8	10-12-11	15	
				SPT-3	3.0 - 4.5	0.4	7-7-8	11	
				SPT-4	4.5 - 6.0	0.8	8-12-14	7	
466.6'	7.5'			SPT-5	6.0 - 7.5	1.0	16-18-20	12	
		LEAN CLAY (Pond E Dike), brown and orange brown, moist, stiff to very stiff, trace fine gravel		SPT-6	7.5 - 9.0	1.2	18-19-20	14	
				SPT-7	9.0 - 10.5	1.2	5-11-12	12	
		-apparent cobble at 10.6'		SPT-8	10.5 - 12.0	0.5	40-26-20	10	
				SPT-9	12.0 - 13.5	0.8	7-7-8	20	
				SPT-10	13.5 - 15.0	1.0	7-8-8	30	
457.6'	16.5'	-with some bottom ash below 14.5'		SPT-11	15.0 - 16.5	0.7	7-8-4	16	
		BOTTOM ASH (sluiced), black, moist to wet, very loose to dense		SPT-12	16.5 - 18.0	1.2	20-22-16	17	
				SPT-13	18.0 - 19.5	1.4	8-8-7	21	
				SPT-14	19.5 - 21.0	1.2	6-5-8	20	
				SPT-15	21.0 - 22.5	0.9	5-8-11	18	
				SPT-16	22.5 - 24.0	1.3	7-7-7	17	
				SPT-17	24.0 - 25.5	1.0	6-8-7	17	
				SPT-18	25.5 - 27.0	1.0	6-2-1	18	
		-with some fly ash below 27.5'		SPT-19	27.0 - 28.5	1.5	1-2-2	18	
444.6'	29.5'			SPT-20	28.5 - 30.0	1.5	1-2-4	13	
		FAT CLAY, orange brown, wet, soft to stiff, trace medium sand to fine gravel		SPT-21	30.0 - 31.5	0.3	1-2-2	33	
				SPT-22	31.5 - 33.0	0.5	4-6-8	30	

Project No.	175559018	Location	N 703045.88, E 1879000.10 (NAD27)
Project Name	Gallatin Fossil Plant - TVA	Boring No.	**STN-E-1** Total Depth 55.0 ft

Lithology			Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	
Elevation	Depth	Description	Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	Remarks
		FAT CLAY, orange brown, wet, soft to stiff, trace medium sand to fine gravel *(Continued)*		SPT-23	33.0 - 34.5	0.4	4-6-7	30	
				SPT-24	34.5 - 36.0	1.3	12-17-20	32	
438.1'	36.0'								
437.8'	36.3'	Limestone, highly weathered (augered)		SPT-25	36.0 - 36.3	0.3	50/0.3'	16	Began Core
		Limestone, light gray to light brown, coarsely crystalline to fine, hard, thin bedded, weathered to highly weathered, many bedding zone fractures throughout		14%	10.7	2.2	21	47.0	Void from approximately 38.0 to 44.0 ft.
419.1'	55.0'			15%	8.0	2.9	36	55.0	Boring backfilled with bentonite grout from 0.0 to 55.0 ft.

Bottom of Hole

Base of Weathered Rock = 36.3'

Top of Rock = 36.0'
Elevation (438.1')

FMSM_LEGACY 175559018 BORINGS.GPJ FMSM.GDT 2/23/10

Stantec

SUBSURFACE LOG

Project No.	175559018	Location	N 703045.88, E 1879000.10 (NAD27)
Project Name	Gallatin Fossil Plant - TVA	Boring No.	**STN-E-1S** Total Depth 34.5 ft
Location	Sumner County, Tennessee	Surface Elevation	474.1 ft. (NGVD29)
Project Type	Geotechnical Exploration	Date Started	8/6/09 Completed 8/7/09
Supervisor	Paul Cooper Driller S. Bradford	Depth to Water	N/A Date/Time N/A
Logged By	C. Wood	Automatic Hammer ☐ Safety Hammer ☒ Other ☐	

Lithology			Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	
Elevation	Depth	Description	Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	Remarks
474.1'	0.0'	Top of Hole							
		Refer to STN-E-1 for descriptions of overburden soils.							Boring advanced with 4.25" hollow stem auger.
				ST-1	4.0 - 6.0	1.0		15	
				ST-2	8.0 - 10.0	0.8		10	
				ST-3	12.0 - 14.0	0.5		9	
				ST-4	20.0 - 22.0	0.7		19	
									Boring backfilled with bentonite grout from 0.0 to 34.5 ft.
				ST-5	32.0 - 34.0	0.0		--	
439.6'	34.5'								
		No Refusal / Bottom of Hole							

FMSM_LEGACY 175559018 BORINGS.GPJ FMSM.GDT 2/23/10

Stantec

SUBSURFACE LOG

Project No.	175559018	Location	N 703007.37, E 1879022.21 (NAD27)
Project Name	Gallatin Fossil Plant - TVA	Boring No.	**STN-E-2** Total Depth 30.0 ft
Location	Sumner County, Tennessee	Surface Elevation	475.7 ft. (NGVD29)
Project Type	Geotechnical Exploration	Date Started	8/8/09 Completed 8/10/09
Supervisor	Paul Cooper Driller J. Huntoon	Depth to Water	18.0 ft Date/Time 8/9/09
Logged By	D. Chapman	Automatic Hammer ☒	Safety Hammer ☐ Other ☐

Lithology Elevation	Lithology Depth	Description	Overburden / Rock Core	Sample # / RQD	Depth / Run	Rec. Ft. / Rec. Ft.	Blows / Rec. %	Mois.Cont. % / Run Depth	Remarks
475.7'	0.0'	Top of Hole							
475.3'	0.4'	BOTTOM ASH Road Surface		SPT-1	0.0 - 1.5	0.7	4-4-7	13	Boring advanced with 4.25" hollow stem auger.
		GRAVELLY LEAN CLAY with Sand (Pond E Dike), reddish brown and yellowish brown to brown, moist, medium to very stiff, silty		SPT-2	1.5 - 3.0	0.8	6-3-3	22	
				SPT-3	3.0 - 4.5	1.0	8-16-14	11	
				SPT-4	4.5 - 6.0	1.1	8-26-20	11	
				SPT-5	6.0 - 7.5	1.0	8-10-15	14	
				SPT-6	7.5 - 9.0	1.0	8-17-19	10	Bulk Sample #1 obtained from 8.0' to 11.0'.
				SPT-7	9.0 - 10.5	1.3	6-7-8	17	
463.7'	12.0'			SPT-8	10.5 - 12.0	0.9	6-7-13	13	
		BOTTOM ASH (sluiced), dark gray to black, moist to wet, very loose to dense, trace to some fly ash -some clay between 15.5' to 17.0'		SPT-9	12.0 - 13.5	1.0	11-13-15	--	Piezometer installed (see PZ detail sheet).
				SPT-10	13.5 - 15.0	1.3	5-6-7	26	
				SPT-11	15.0 - 16.5	1.0	2-3-5	17	
				SPT-12	16.5 - 18.0	0.9	8-13-22	19	
				SPT-13	18.0 - 19.5	1.1	19-8-8	27	
				SPT-14	19.5 - 21.0	1.1	18-9-9	19	
				SPT-15	21.0 - 22.5	0.8	5-7-5	17	
				SPT-16	22.5 - 24.0	0.7	2-5-5	34	
				SPT-17	24.0 - 25.5	0.8	2-4-4	17	
448.7'	27.0'			SPT-18	25.5 - 27.0	0.6	1-1-1	25	Piezometer backfilled with sand, bentonite pellets, and bentonite grout from 0.0 to 30.0 ft.
		SILTY CLAY, olive brown, wet, very soft		SPT-19	27.0 - 28.5	0.5	1-1-1	37	
				SPT-20	28.5 - 29.3	0.3	1-50/0.3'	27	
445.7'	30.0'			SPT-21	30.0 - 30.0	0.0	50/0.0'	--	

Auger Refusal /
Bottom of Hole

Top of Rock = 30.0'
Elevation (445.7')

FMSM_LEGACY 175559018 BORINGS.GPJ FMSM.GDT 2/23/10

Stantec

SUBSURFACE LOG

Project No.	175559018	Location	N 702955.21, E 1879046.66 (NAD27)
Project Name	Gallatin Fossil Plant - TVA	Boring No.	**STN-E-3** Total Depth 41.4 ft
Location	Sumner County, Tennessee	Surface Elevation	459.6 ft. (NGVD29)
Project Type	Geotechnical Exploration	Date Started	8/19/09 Completed 8/19/09
Supervisor	Paul Cooper Driller J. Bowerman	Depth to Water	7.5 ft Date/Time 8/19/09
Logged By	Scott Lange	Automatic Hammer ☒	Safety Hammer ☐ Other ☐

Lithology		Description	Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	Remarks
Elevation	Depth		Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	
459.6'	0.0'	Top of Hole							
		LEAN CLAY (Pond E Dike), brown, moist, stiff to very stiff, trace fine to coarse gravel and fly ash		SPT-1	0.0 - 1.5	0.5	6-6-6	8	Boring advanced with 4.25" hollow stem auger.
				SPT-2	1.5 - 3.0	0.3	4-4-4	5	
455.1'	4.5'			SPT-3	3.0 - 4.5	1.0	4-9-10	18	
		BOTTOM ASH (sluiced), black, moist to wet, very loose to medium dense, trace to some fly ash		SPT-4	4.5 - 6.0	1.0	7-9-8	15	
				SPT-5	6.0 - 7.5	1.0	4-5-4	16	
				SPT-6	7.5 - 9.0	1.0	2-1-1	19	
				SPT-7	9.0 - 10.5	0.3	1-1-2	31	
447.6'	12.0'			SPT-8	10.5 - 12.0	1.5	6-3-2	46	
		FAT CLAY with Sand, yellowish brown to orange brown, wet, soft to very stiff, trace fine gravel		SPT-9	12.0 - 13.5	1.5	1-2-4	26	
				SPT-10	13.5 - 15.0	1.0	4-5-6	30	
				SPT-11	15.0 - 16.5	1.0	2-5-7	24	
				SPT-12	16.5 - 18.0	1.5	3-6-9	25	
				SPT-13	18.0 - 19.5	1.3	2-7-7	24	
				SPT-14	19.5 - 21.0	1.3	3-7-9	26	
				SPT-15	21.0 - 22.5	1.5	5-8-8	21	
				SPT-16	22.5 - 24.0	1.0	4-8-7	23	
				SPT-17	24.0 - 25.5	1.3	2-6-8	23	
				SPT-18	25.5 - 27.0	1.5	5-7-10	23	
				SPT-19	27.0 - 28.5	1.5	3-4-5	24	
				SPT-20	28.5 - 30.0	1.3	3-4-5	20	

Project No.	175559018	Location	N 702955.21, E 1879046.66 (NAD27)		
Project Name	Gallatin Fossil Plant - TVA	Boring No.	**STN-E-3**	Total Depth	41.4 ft

Lithology: Elevation	Lithology: Depth	Description	Overburden / Rock Core	Sample # / RQD	Depth / Run	Rec. Ft. / Rec. Ft.	Blows / Rec. %	Mois.Cont. % / Run Depth	Remarks
		FAT CLAY with Sand, yellowish brown to orange brown, wet, soft to very stiff, trace fine gravel *(Continued)*		SPT-21	30.0 - 31.5	1.3	2-7-4	23	
				SPT-22	31.5 - 33.0	1.0	1-2-2	43	
				SPT-23	33.0 - 34.5	1.5	1-1-2	32	
				SPT-24	34.5 - 36.0	1.5	2-3-7	56	
				SPT-25	36.0 - 37.5	1.5	4-4-2	75	
				SPT-26	37.5 - 39.0	1.5	1-1-2	51	Boring backfilled with bentonite grout from 0.0 to 41.4 ft.
				SPT-27	39.0 - 40.5	1.5	3-2-11	34	
418.2'	41.4'			SPT-28	40.5 - 41.4	0.5	6-50/0.4'	55	

Auger Refusal /
Bottom of Hole

Top of Rock = 41.4'
Elevation (418.2')

FMSM_LEGACY 175559018 BORINGS.GPJ FMSM.GDT 2/23/10

Stantec

SUBSURFACE LOG

Project No.	175559018	Location	N 702820.82, E 1878131.27 (NAD27)
Project Name	Gallatin Fossil Plant - TVA	Boring No.	**STN-E-4** Total Depth 50.3 ft
Location	Sumner County, Tennessee	Surface Elevation	474.3 ft. (NGVD29)
Project Type	Geotechnical Exploration	Date Started	8/7/09 Completed 8/7/09
Supervisor	Paul Cooper Driller S. Bradford	Depth to Water	14.0 ft Date/Time 8/7/09
Logged By	C. Wood	Automatic Hammer ☒	Safety Hammer ☐ Other ☐

Lithology Elevation	Lithology Depth	Description	Overburden / Rock Core	Sample # / RQD	Depth / Run	Rec. Ft. / Rec. Ft.	Blows / Rec. %	Mois.Cont. % / Run Depth	Remarks
474.3'	0.0'	Top of Hole							
474.1'	0.2'	BOTTOM ASH Road Surface		SPT-1	0.0 - 1.5	1.0	4-4-3	18	Boring advanced with 4.25" hollow stem auger.
		LEAN CLAY (Pond E Dike), orange brown, moist, medium to very stiff, silty, trace fine sand and bottom ash		SPT-2	1.5 - 3.0	0.6	3-3-4	23	
				SPT-3	3.0 - 4.5	0.8	5-5-10	12	
				SPT-4	4.5 - 6.0	1.2	3-16-12	14	
				SPT-5	6.0 - 7.5	1.0	13-16-20	16	
				SPT-6	7.5 - 9.0	1.0	16-19-18	11	
464.3'	10.0'			SPT-7	9.0 - 10.5	1.5	20-16-24	18	
		BOTTOM ASH (Pond E Dike), black, moist to wet, medium dense to very dense, some fly ash		SPT-8	10.5 - 12.0	1.3	34-26-34	13	
				SPT-9	12.0 - 13.5	1.0	10-13-16	18	
459.0'	15.3'			SPT-10	13.5 - 15.0	1.2	13-13-8	28	
		FLY ASH (sluiced), dark gray and black, wet wet, very soft to medium stiff, some clay between 15.3' to 16.5'		SPT-11	15.0 - 16.5	1.4	4-1-WOH	62	
				SPT-12	16.5 - 18.0	0.8	2-WOH-WOH	31	
				SPT-13	18.0 - 19.5	1.2	WOH-WOH-1	35	
				SPT-14	19.5 - 21.0	0.2	2-1-WOH	32	
				SPT-15	21.0 - 22.5	1.2	1-2-3	35	
				SPT-16	22.5 - 24.0	1.3	1-2-1	39	
				SPT-17	24.0 - 25.5	0.0	1-1-1	--	
				SPT-18	25.5 - 27.0	0.0	1-1-1	--	
				SPT-19	27.0 - 28.5	0.0	1-1-WOH	--	
				SPT-20	28.5 - 30.0	0.0	WOH-WOH-WOH	--	
				SPT-21	30.0 - 31.5	0.8	WOH-WOH-WOH	36	
				SPT-22	31.5 - 33.0	0.6	WOH-WOH-WOH	29	
				SPT-23	33.0 - 34.5	0.5	WOH-WOH-WOH	29	
				SPT-24	34.5 - 36.0	1.2	WOH-WOH-WOH	29	
				SPT-25	36.0 - 37.5	1.0	WOH-WOH-WOH	34	
				SPT-26	37.5 - 39.0	1.0	WOH-WOH-2	32	
434.3'	40.0'			SPT-27	39.0 - 40.5	0.8	WOH-WOH-4	34	
		LEAN CLAY, dark gray to orange brown, wet, stiff to very stiff, silty, trace fine to medium sand		SPT-28	40.5 - 42.0	0.7	4-4-7	19	
				SPT-29	42.0 - 43.5	1.0	4-5-11	20	

FMSM_LEGACY 175559018 BORINGS.GPJ FMSM.GDT 2/23/10

Project No.	175559018	Location	N 702820.82, E 1878131.27 (NAD27)
Project Name	Gallatin Fossil Plant - TVA	Boring No.	**STN-E-4** Total Depth 50.3 ft

Lithology			Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	
Elevation	Depth	Description	Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	Remarks
		LEAN CLAY, dark gray to orange brown, wet, stiff to very stiff, silty, trace fine to medium sand *(Continued)*		SPT-30	43.5 - 45.0	1.4	4-5-10	20	Boring backfilled with bentonite grout from 0.0 to 50.3 ft.
				SPT-31	45.0 - 46.5	1.4	4-5-7	21	
				SPT-32	46.5 - 48.0	0.8	7-9-11	19	
				SPT-33	48.0 - 49.5	0.2	5-5-4	25	
424.0'	50.3'			SPT-34	49.5 - 50.3	0.8	4-50/0.3'	20	
		Auger Refusal / Bottom of Hole Top of Rock = 50.3' Elevation (424.0')							

FMSM_LEGACY 175559018 BORINGS.GPJ FMSM.GDT 2/23/10

SUBSURFACE LOG

Project No.	175559018	Location	N 702820.82, E 1878131.27 (NAD27)
Project Name	Gallatin Fossil Plant - TVA	Boring No.	**STN-E-4S** Total Depth 42.0 ft
Location	Sumner County, Tennessee	Surface Elevation	474.3 ft. (NGVD29)
Project Type	Geotechnical Exploration	Date Started	8/8/09 Completed 8/8/09
Supervisor	Paul Cooper Driller S. Bradford	Depth to Water	N/A Date/Time N/A
Logged By	C. Wood	Automatic Hammer ☒	Safety Hammer ☐ Other ☐

Lithology			Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	
Elevation	Depth	Description	Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	Remarks
474.3'	0.0'	Top of Hole							
		Refer to STN-E-4 for descriptions of overburden soils.							Boring advanced with 4.25" hollw stem auger.
				ST-1	5.0 - 7.0	0.8		20	
									Bulk sample #1 obtained from 12.5 to 15.0 ft.
				ST-3	15.0 - 17.0	0.4		22	
				ST-4	20.0 - 22.0	0.0		--	
				ST-5	35.0 - 37.0	0.0		--	
									Boring backfilled with bentonite grout from 0.0 to 42.0 ft.
432.3'	42.0'			ST-6	40.0 - 42.0	0.0		--	
		No Refusal / Bottom of Hole							

FMSM_LEGACY 175559018 BORINGS.GPJ FMSM.GDT 2/23/10

Project No.	175559018	Location	N 702788.65, E 1878111.48 (NAD27)
Project Name	Gallatin Fossil Plant - TVA	Boring No.	**STN-E-5** Total Depth 50.3 ft
Location	Sumner County, Tennessee	Surface Elevation	476.1 ft. (NGVD29)
Project Type	Geotechnical Exploration	Date Started	8/9/09 Completed 8/9/09
Supervisor	Paul Cooper Driller S. Bradford	Depth to Water	17.2 ft Date/Time 8/9/09
Logged By	C. Wood	Automatic Hammer ☒	Safety Hammer ☐ Other ☐

Lithology Elevation	Lithology Depth	Description
476.1'	0.0'	Top of Hole
472.4'	3.7'	BOTTOM ASH (Pond E Dike), black, moist, dense to very dense
464.1'	12.0'	LEAN CLAY (Pond E Dike), dark brown to grayish brown, moist, very stiff, silty, trace fine gravel -with bottom ash from 8.0 to 9.0 ft.
457.6'	18.5'	BOTTOM ASH (Pond E Dike), black, moist to wet, medium dense to dense
438.1'	38.0'	FLY ASH (sluiced), black, wet, very soft to soft
432.9'	43.2'	LEAN CLAY, orange brown, wet, medium stiff to stiff, trace fine gravel

Sample # / RQD	Depth / Run	Rec. Ft. / Rec. Ft.	Blows / Rec. %	Mois.Cont. % / Run Depth	Remarks
SPT-1	0.0 - 1.5	0.6	3-25-26	13	Boring advanced with 4.25" hollow stem auger.
SPT-2	1.5 - 3.0	0.8	26-27-19	22	
SPT-3	3.0 - 4.5	1.3	23-15-14	13	
SPT-4	4.5 - 6.0	0.7	9-11-11	13	
SPT-5	6.0 - 7.5	1.2	8-12-17	13	
SPT-6	7.5 - 9.0	1.3	12-19-19	9	
SPT-7	9.0 - 10.5	1.4	7-6-15	11	
SPT-8	10.5 - 12.0	1.0	12-17-17	17	
SPT-9	12.0 - 13.5	1.4	21-17-26	15	
SPT-10	13.5 - 15.0	1.4	26-29-31	21	
SPT-11	15.0 - 16.5	1.5	18-13-15	18	
SPT-12	16.5 - 18.0	1.0	14-6-4	22	
SPT-13	18.0 - 19.5	1.1	2-2-2	37	
SPT-14	19.5 - 21.0	1.3	1-WOH-1	35	
SPT-15	21.0 - 22.5	0.8	1-1-2	41	
SPT-16	22.5 - 24.0	1.2	1-1-1	32	
SPT-17	24.0 - 25.5	0.0	2-2-1	--	
SPT-18	25.5 - 27.0	0.2	4-2-1	25	
SPT-19	27.0 - 28.5	0.0	2-1-1	--	
SPT-20	28.5 - 30.0	0.0	1-1-1	--	
SPT-21	30.0 - 31.5	1.0	WOH-WOH-WOH	35	
SPT-22	31.5 - 33.0	1.2	WOH-WOH-WOH	29	
SPT-23	33.0 - 34.5	1.2	WOH-WOH-WOH	28	
SPT-24	34.5 - 36.0	1.0	WOH-WOH-WOH	36	
SPT-25	36.0 - 37.5	1.0	WOH-WOH-WOH	57	
SPT-26	37.5 - 39.0	1.3	WOH-3-3	22	
SPT-27	39.0 - 40.5	1.0	2-3-5	20	
SPT-28	40.5 - 42.0	1.0	4-5-7	22	
SPT-29	42.0 - 43.5	1.5	9-5-7	20	

FMSM_LEGACY 175559018 BORINGS.GPJ FMSM.GDT 2/23/10

Stantec

SUBSURFACE LOG

Project No.	175559018	Location	N 702788.65, E 1878111.48 (NAD27)
Project Name	Gallatin Fossil Plant - TVA	Boring No.	**STN-E-5** Total Depth 50.3 ft

Lithology			Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	
Elevation	Depth	Description	Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	Remarks
		FAT CLAY, orange brown, wet, stiff to very stiff, trace fine gravel *(Continued)*		SPT-30	43.5 - 45.0	1.4	6-8-7	19	Boring backfilled with bentonite grout from 0.0 to 50.3 ft.
				SPT-31	45.0 - 46.5	1.5	10-7-14	20	
				SPT-32	46.5 - 48.0	0.8	2-11-10	26	
				SPT-33	48.0 - 49.5	0.5	7-8-11	29	
425.8'	50.3'			SPT-34	49.5 - 50.3	0.8	24-50/0.3'	27	

Auger Refusal /
Bottom of Hole

Top of Rock = 50.3'
Elevation (425.8')

FMSM_LEGACY 175559018 BORINGS.GPJ FMSM.GDT 2/23/10

Stantec

SUBSURFACE LOG

Project No.	175559018	Location	N 702733.38, E 1878070.14 (NAD27)
Project Name	Gallatin Fossil Plant - TVA	Boring No.	**STN-E-6** Total Depth 28.0 ft
Location	Sumner County, Tennessee	Surface Elevation	459.6 ft. (NGVD29)
Project Type	Geotechnical Exploration	Date Started	8/10/09 Completed 8/10/09
Supervisor	Paul Cooper Driller J. Wethington	Depth to Water	3.5 ft Date/Time 8/10/09
Logged By	Craig Millhollin	Automatic Hammer ☐	Safety Hammer ☒ Other ☐

Lithology: Elevation	Lithology: Depth	Description	Overburden / Rock Core: Sample # / RQD	Depth / Run	Rec. Ft. / Rec. Ft.	Blows / Rec. %	Mois.Cont. % / Run Depth	Remarks
459.6'	0.0'	Top of Hole						
		FLY ASH (sluiced), dark gray, moist to wet, very soft to soft	SPT-1	0.0 - 1.5	1.5	4-2-2	24	Boring advanced with 3.25" hollow stem auger.
			SPT-2	1.5 - 3.0	0.8	2-2-2	49	
			SPT-3	3.0 - 4.5	1.5	2-1-2	36	
			SPT-4	4.5 - 6.0	1.5	2-1-1	41	Piezometer installed (see PZ detail sheet).
			SPT-5	6.0 - 7.5	0.2	1-WOH-WOH	18	
			SPT-6	7.5 - 9.0	1.0	2-1-1	29	
			SPT-7	9.0 - 10.5	0.7	WOH-WOH-WOH	31	
			SPT-8	10.5 - 12.0	0.0	WOH-WOH-WOH	--	
			SPT-9	12.0 - 13.5	0.7	WOH-WOH-WOH	32	
			SPT-10	13.5 - 15.0	1.0	WOH-WOH-WOH	38	
			SPT-11	15.0 - 16.5	1.5	WOH-WOH-WOH	29	
441.4'	18.2'		SPT-12	16.5 - 18.0	1.5	WOH-1-1	29	
		LEAN CLAY, reddish brown, wet, medium stiff to stiff, trace fine sand	SPT-13	18.0 - 19.5	1.2	2-5-9	46	
			SPT-14	19.5 - 21.0	0.9	3-4-6	19	
436.6'	23.0'		SPT-15	21.0 - 22.5	1.1	2-2-5	22	
		FAT CLAY, orange brown, wet, very stiff, trace fine gravel	SPT-16	22.5 - 24.0	1.0	4-10-15	32	
			SPT-17	24.0 - 25.5	0.7	7-10-11	23	Piezometer backfilled with sand, bentonite pellets, and bentonite grout from 0.0 to 28.0 ft.
			SPT-18	25.5 - 27.0	1.3	7-12-15	38	
431.6'	28.0'		SPT-19	27.0 - 28.0	1.0	15-50/0.5'	39	

Auger Refusal /
Bottom of Hole

Top of Rock = 28.0'
Elevation (431.6')

FMSM_LEGACY 175559018 BORINGS.GPJ FMSM.GDT 2/23/10

Project No.	175559018	Location	N 703843.80, E 1877971.87 (NAD27)
Project Name	Gallatin Fossil Plant - TVA	Boring No.	STN-E-7 Total Depth 65.0 ft
Location	Sumner County, Tennessee	Surface Elevation	475.1 ft. (NGVD29)
Project Type	Geotechnical Exploration	Date Started	8/8/09 Completed 8/8/09
Supervisor	Paul Cooper Driller S. Bradford	Depth to Water	18.5 ft Date/Time 8/8/09
Logged By	C. Wood	Automatic Hammer ☒	Safety Hammer ☐ Other ☐

Lithology Elevation	Depth	Description	Overburden Sample # / Rock Core RQD	Depth / Run	Rec. Ft. / Rec. Ft.	Blows / Rec. %	Mois.Cont. % / Run Depth	Remarks
475.1'	0.0'	Top of Hole						
		LEAN CLAY (Pond E Dike), brown, moist, stiff to very stiff, silty, trace fine sand to fine gravel	SPT-1	0.0 - 1.5	0.8	8-8-8	13	Boring advanced with 4.25" hollow stem auger.
			SPT-2	1.5 - 3.0	1.2	8-7-8	14	
			SPT-3	3.0 - 4.5	0.5	8-9-16	13	
			SPT-4	4.5 - 6.0	0.7	13-10-15	13	
			SPT-5	6.0 - 7.5	0.0	14-12-9	--	
			SPT-6	7.5 - 9.0	0.8	10-13-10	11	
			SPT-7	9.0 - 10.5	1.4	5-11-13	14	
			SPT-8	10.5 - 12.0	1.2	13-13-12	15	
461.4'	13.7'		SPT-9	12.0 - 13.5	1.0	13-14-17	16	
		BOTTOM ASH (Pond E Dike), black, moist to wet, very loose to dense	SPT-10	13.5 - 15.0	1.0	10-26-14	13	
			SPT-11	15.0 - 16.5	1.1	5-8-7	33	
		-some clay between 17.0' and 19.2'	SPT-12	16.5 - 18.0	1.5	3-2-2	36	
455.9'	19.2'		SPT-13	18.0 - 19.5	1.4	3-3-4	31	
		FLY ASH (sluiced), dark gray, wet, very soft to medium stiff	SPT-14	19.5 - 21.0	0.4	4-3-3	36	
			SPT-15	21.0 - 22.5	1.4	1-WOH-WOH	34	
451.1'	24.0'		SPT-16	22.5 - 24.0	1.5	WOH-WOH-1	39	
		LEAN CLAY, orange brown, moist, soft to stiff, trace fine sand	SPT-17	24.0 - 25.5	0.7	3-3-4	8	
			SPT-18	25.5 - 27.0	0.3	1-2-2	8	
			SPT-19	27.0 - 28.5	1.0	3-5-10	8	
			SPT-20	28.5 - 30.0	0.8	4-5-5	6	
			SPT-21	30.0 - 31.5	1.5	1-2-3	3	
442.1'	33.0'		SPT-22	31.5 - 33.0	1.4	2-2-3	3	
		SANDY LEAN CLAY, orange brown, moist to wet, medium to very stiff, trace fine gravel	SPT-23	33.0 - 34.5	1.5	2-3-4	7	
			SPT-24	34.5 - 36.0	0.8	2-2-3	6	
			SPT-25	36.0 - 37.5	1.5	4-4-5	6	
			SPT-26	37.5 - 39.0	1.4	2-3-4	5	
			SPT-27	39.0 - 40.5	1.3	WOH-2-4	3	
			SPT-28	40.5 - 42.0	1.0	4-8-10	5	
			SPT-29	42.0 - 43.5	0.8	4-7-8	8	

FMSM_LEGACY 175559018 BORINGS.GPJ FMSM.GDT 2/23/10

Project No.	175559018	Location	N 703843.80, E 1877971.87 (NAD27)		
Project Name	Gallatin Fossil Plant - TVA	Boring No.	**STN-E-7**	Total Depth	65.0 ft

Lithology		Description	Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	Remarks
Elevation	Depth		Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	
426.1'	49.0'	SANDY LEAN CLAY, orange brown, moist to wet, medium to very stiff, trace fine gravel *(Continued)*		SPT-30	43.5 - 45.0	0.6	3-4-4	5	
				SPT-31	45.0 - 46.5	1.0	3-5-10	4	
				SPT-32	46.5 - 48.0	0.3	5-5-10	4	
				SPT-33	48.0 - 49.5	0.7	5-10-10	5	
410.1'	65.0'	FAT CLAY, orange brown, moist, very soft to very stiff, trace fine sand to fine gravel		SPT-34	49.5 - 51.0	0.7	5-10-10	4	
				SPT-35	51.0 - 52.5	1.5	11-13-14	4	
				SPT-36	52.5 - 54.0	0.2	5-6-7	5	
				SPT-37	54.0 - 55.5	0.8	5-6-6	7	
				SPT-38	55.5 - 57.0	0.3	5-5-6	4	
				SPT-39	57.0 - 58.5	1.4	9-8-10	5	
				SPT-40	58.5 - 60.0	1.3	3-5-5	38	
				SPT-41	60.0 - 61.5	1.5	3-3-4	36	Boring backfilled with bentonite grout from 0.0 to 65.0 ft.
				SPT-42	61.5 - 63.0	1.2	2-1-1	42	
				SPT-43	63.0 - 64.5	0.8	3-2-1	44	
				SPT-44	64.5 - 65.0	0.5	WOH-50/0.0'	21	

Auger Refusal /
Bottom of Hole

Top of Rock = 65.0'
Elevation (410.1')

Project No.	175559018	Location	N 703835.47, E 1877934.64 (NAD27)
Project Name	Gallatin Fossil Plant - TVA	Boring No.	**STN-E-8** Total Depth 63.9 ft
Location	Sumner County, Tennessee	Surface Elevation	476.5 ft. (NGVD29)
Project Type	Geotechnical Exploration	Date Started	8/11/09 Completed 8/11/09
Supervisor	Paul Cooper Driller J. Wethington	Depth to Water	20.0 ft Date/Time 8/11/09
Logged By	Craig Millhollin	Automatic Hammer ☐ Safety Hammer ☒ Other ☐	

Lithology Elevation	Lithology Depth	Description	Overburden / Rock Core	Sample # / RQD	Depth / Run	Rec. Ft. / Rec. Ft.	Blows / Rec. %	Mois.Cont. % / Run Depth	Remarks
476.5'	0.0'	Top of Hole							
		LEAN CLAY (Pond E Dike), reddish brown to tan, moist, stiff to very stiff, trace fine gravel		SPT-1	0.0 - 0.5	0.5		17	
				SPT-2	0.5 - 2.0	1.1	4-5-7	17	Boring advanced with 3.25" hollow stem auger.
				SPT-3	2.0 - 3.5	1.5	12-17-27	18	Bulk Sample #1 obtained from 3.0 to 5.0 ft.
				SPT-4	3.5 - 5.0	1.5	6-9-10	14	
				ST-1	5.0 - 7.0	1.6		14	
				SPT-5	7.0 - 8.5	0.9	27-18-15	15	Piezometer installed (see PZ detail sheet).
				SPT-6	8.5 - 10.0	1.4	27-28-25	9	
				SPT-7	10.0 - 11.5	1.1	12-17-28	21	
				ST-2	11.5 - 13.5	1.3		16	
				SPT-8	13.5 - 15.0	1.5	8-9-12	18	
				SPT-9	15.0 - 16.5	0.8	11-14-15	23	Bulk Sample #2 obtained from 16.0 to 19.0 ft.
				SPT-10	16.5 - 18.0	1.0	11-12-15	20	
456.5'	20.0'			ST-3	18.0 - 20.0	2.0		46	
		FLY ASH (sluiced), gray to black, wet, medium stiff		SPT-11	20.0 - 21.5	1.5	1-3-2	31	
454.0'	22.5'			SPT-12	21.5 - 23.0	1.5	1-3-10	26	
		LEAN CLAY (Pond E Dike), reddish brown, wet, stiff to very stiff, trace to some fine gravel		SPT-13	23.0 - 24.5	1.0	5-9-9	22	Bulk Sample #3 obtained from 23.0 to 25.0 ft.
450.0'	26.5'			ST-4	24.5 - 26.5	1.0		20	
		SANDY LEAN CLAY, reddish brown, moist, medium to very stiff, trace to some fine gravel		SPT-14	26.5 - 28.0	1.0	40-37-12	10	
				SPT-15	28.0 - 29.5	0.8	12-6-6	17	
				ST-5	29.5 - 31.5	0.5		33	
				SPT-16	31.5 - 33.0	1.1	2-3-5	31	
				SPT-17	33.0 - 34.5	1.2	2-4-7	12	
				SPT-18	34.5 - 36.0	1.3	12-11-9	22	
				ST-6	36.0 - 38.0	0.0		--	
				SPT-19	38.0 - 39.5	1.2	6-5-6	22	

Project No.	175559018	Location	N 703835.47, E 1877934.64 (NAD27)
Project Name	Gallatin Fossil Plant - TVA	Boring No.	**STN-E-8** Total Depth 63.9 ft

Lithology			Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	
Elevation	Depth	Description	Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	Remarks
432.8'	43.7'	SANDY LEAN CLAY, reddish brown, moist, medium to very stiff, trace to some fine gravel *(Continued)*		SPT-20	39.5 - 41.0	1.1	4-5-6	22	
				ST-7	41.0 - 43.0	1.7		17	
				SPT-21	43.0 - 43.7	0.5	26-50/0.2'	23	
412.6'	63.9'	LEAN CLAY with Sand, reddish brown, moist to wet, stiff to very stiff, trace fine to medium sand		SPT-22	43.7 - 45.2	1.5	7-11-15	26	Piezometer backfilled with sand, bentonite pellets, and bentonite grout from 0.0 to 63.9 ft.
				ST-8	45.2 - 47.2	2.0		23	
				SPT-23	47.2 - 48.7	1.2	17-13-15	20	
				SPT-24	48.7 - 50.2	1.2	8-16-17	23	
				ST-9	50.2 - 52.2	1.8		24	
				SPT-25	52.2 - 53.7	0.9	13-17-16	28	
				SPT-26	53.7 - 55.2	1.2	16-16-17	36	
				ST-10	55.2 - 57.2	0.5		33	
				SPT-27	57.2 - 58.7	1.2	3-5-6	25	
				SPT-28	58.7 - 60.2	1.3	4-5-7	31	
				SPT-29	60.2 - 61.7	1.5	3-4-5	26	
				SPT-30	61.7 - 63.2	1.5	4-4-5	27	
				SPT-31	63.2 - 63.9	0.7	7-50/0.2'	28	

Auger Refusal /
Bottom of Hole

Top of Rock = 63.9'
Elevation (412.6')

FMSM_LEGACY 175559018 BORINGS.GPJ FMSM.GDT 5/14/10

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SUBSURFACE LOG

Project No.	175559018	Location	N 703753.39, E 1877876.25 (NAD27)
Project Name	Gallatin Fossil Plant - TVA	Boring No.	**STN-E-9** Total Depth 45.9 ft
Location	Sumner County, Tennessee	Surface Elevation	451.8 ft. (NGVD29)
Project Type	Geotechnical Exploration	Date Started	8/20/09 Completed 8/21/09
Supervisor	Paul Cooper Driller J. Bowerman	Depth to Water	8.0 ft Date/Time 8/20/09
Logged By	Scott Lange	Automatic Hammer ☒	Safety Hammer ☐ Other ☐

Lithology			Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	
Elevation	Depth	Description	Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	Remarks
451.8'	0.0'	Top of Hole							
		LEAN CLAY, reddish brown to brown, moist to wet, medium stiff to stiff, trace fine to medium sand		SPT-1	0.0 - 1.5	1.0	2-3-5	19	Boring advanced with 4.25" hollow stem auger.
				SPT-2	1.5 - 3.0	1.5	2-4-4	26	
				SPT-3	3.0 - 4.5	1.5	3-2-5	26	
				ST-1	4.5 - 6.5	2.0		19	
				SPT-4	6.5 - 8.0	1.3	3-6-6	23	
				SPT-5	8.0 - 9.5	1.5	3-5-8	24	
				ST-2	9.5 - 11.5	2.0		21	
				SPT-6	11.5 - 13.0	1.5	2-7-6	33	
437.3'	14.5'			SPT-7	13.0 - 14.5	1.5	2-6-7	25	
		LEAN CLAY with Sand, yellowish brown, moist, very soft to stiff, trace fine gravel		SPT-8	14.5 - 16.0	1.3	2-5-7	27	
				SPT-9	16.0 - 17.5	1.5	3-5-7	34	
				SPT-10	17.5 - 19.0	1.3	2-3-6	22	
				SPT-11	19.0 - 20.5	1.5	1-4-6	24	
				SPT-12	20.5 - 22.0	1.5	4-6-8	24	
				SPT-13	22.0 - 23.5	1.5	4-5-6	19	
				SPT-14	23.5 - 25.0	1.5	3-5-6	26	
				SPT-15	25.0 - 26.5	1.5	2-3-6	29	
				SPT-16	26.5 - 28.0	1.5	3-4-6	34	
				SPT-17	28.0 - 29.5	1.5	1-3-4	29	

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SUBSURFACE LOG

Project No.	175559018	Location	N 703753.39, E 1877876.25 (NAD27)
Project Name	Gallatin Fossil Plant - TVA	Boring No.	**STN-E-9** Total Depth 45.9 ft

Lithology			Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	
Elevation	Depth	Description	Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	Remarks
		LEAN CLAY with Sand, yellowish brown, moist, very soft to stiff, trace fine gravel *(Continued)*		SPT-18	29.5 - 31.0	1.5	1-3-4	27	
				SPT-19	31.0 - 32.5	1.5	1-1-2	30	
				SPT-20	32.5 - 34.0	1.5	1-3-4	25	
416.3'	35.5'			SPT-21	34.0 - 35.5	1.5	1-1-4	24	
		SANDY LEAN CLAY, brown and tan, moist to wet, very soft to medium stiff, trace fine gravel		SPT-22	35.5 - 37.0	1.5	1-1-4	29	
				SPT-23	37.0 - 38.5	1.5	1-1-1	29	
				SPT-24	38.5 - 40.0	1.5	1-1-1	26	
410.3'	41.5'			SPT-25	40.0 - 41.5	1.5	1-1-1	56	
		FAT CLAY, yellowish brown and grayish brown, moist to wet, very soft to medium stiff, trace fine gravel		SPT-26	41.5 - 43.0	1.5	1-WOH-1	43	Boring backfilled with bentonite grout from 0.0 to 45.9 ft.
				SPT-27	43.0 - 44.5	1.5	1-2-3	34	
405.9'	45.9'			SPT-28	44.5 - 45.9	1.4	WOH-2-50/0.4'	51	

Auger Refusal /
Bottom of Hole

Top of Rock = 45.9'
Elevation (405.9')

SUBSURFACE LOG

Project No.	175559018	Location	N 704870.32, E 1877862.37 (NAD27)
Project Name	Gallatin Fossil Plant - TVA	Boring No.	**STN-E-10** Total Depth 29.1 ft
Location	Sumner County, Tennessee	Surface Elevation	474.9 ft. (NGVD29)
Project Type	Geotechnical Exploration	Date Started	8/6/09 Completed 8/6/09
Supervisor	Paul Cooper Driller J. Huntoon	Depth to Water	13.5 ft Date/Time 8/6/09
Logged By	D. Chapman	Automatic Hammer ☒	Safety Hammer ☐ Other ☐

Lithology Elevation	Lithology Depth	Description	Overburden / Rock Core: Sample # / RQD	Depth / Run	Rec. Ft. / Rec. Ft.	Blows / Rec. %	Mois.Cont. % / Run Depth	Remarks
474.9'	0.0'	Top of Hole						
		LEAN CLAY with Sand (Pond E Dike), reddish brown, moist, stiff to very stiff, trace medium sand to fine gravel	SPT-1	0.0 - 1.5	1.0	2-4-7	19	Boring advanced with 4.25" hollow stem auger.
			SPT-2	1.5 - 3.0	0.9	10-13-14	8	
			SPT-3	3.0 - 4.5	0.8	8-9-10	22	
			SPT-4	4.5 - 6.0	1.0	7-8-10	16	
			SPT-5	6.0 - 7.5	0.8	3-7-12	25	
			SPT-6	7.5 - 9.0	1.5	3-7-13	24	
			SPT-7	9.0 - 10.5	1.3	6-6-7	20	
463.2'	11.7'		SPT-8	10.5 - 12.0	1.2	7-16-20	22	
		BOTTOM ASH (Pond E Dike), dark gray, moist to wet, medium dense to dense	SPT-9	12.0 - 13.5	1.5	7-25-21	11	
			SPT-10	13.5 - 15.0	1.1	8-13-27	17	
458.4'	16.5'		SPT-11	15.0 - 16.5	0.8	8-12-12	19	
		FLY ASH (sluiced), black, wet, very soft to soft	SPT-12	16.5 - 18.0	1.0	2-1-1	17	
			SPT-13	18.0 - 19.5	1.5	1-2-1	33	
453.9'	21.0'		SPT-14	19.5 - 21.0	1.5	1-1-1	48	
		LEAN CLAY, reddish brown to grayish brown, wet, very soft, trace fine to coarse gravel	SPT-15	21.0 - 22.5	1.5	1-1-1	28	
			SPT-16	22.5 - 24.0	1.1	1-1-1	24	
449.4'	25.5'		SPT-17	24.0 - 24.7	0.5	2-50/0.2'	25	Boring backfilled with bentonite grout from 0.0 to 29.1 ft.
		FAT CLAY, brown, moist, stiff to very stiff, trace medium sand	SPT-18	25.5 - 27.0	0.7	2-3-8	20	
446.3'	28.6'		SPT-19	27.0 - 28.5	0.8	2-15-16	27	
445.8'	29.1'	Limestone, highly weathered (augered)	SPT-20	28.5 - 28.6	0.1	50/0.1'	9	

Auger Refusal /
Bottom of Hole

Top of Rock = 28.6'
Elevation (446.3')

SUBSURFACE LOG

Project No.	175559018	Location	N 704870.32, E 1877862.37 (NAD27)
Project Name	Gallatin Fossil Plant - TVA	Boring No.	**STN-E-10S** Total Depth 27.0 ft
Location	Sumner County, Tennessee	Surface Elevation	474.9 ft. (NGVD29)
Project Type	Geotechnical Exploration	Date Started	8/6/09 Completed 8/6/09
Supervisor	Paul Cooper Driller J. Huntoon	Depth to Water	N/A Date/Time N/A
Logged By	D. Chapman	Automatic Hammer ☒	Safety Hammer ☐ Other ☐

Lithology			Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	
Elevation	Depth	Description	Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	Remarks
474.9'	0.0'	Top of Hole							
		Refer to STN-E-10 for descriptions of overburden soils.							Boring advanced with 4.25" hollow stem auger.
				ST-1	2.0 - 4.0	0.0		--	
				ST-2	5.0 - 7.0	2.0		18	
				ST-3	8.0 - 10.0	0.0		--	
				ST-4	17.0 - 19.0	1.5		54	
				ST-5	21.0 - 23.0	1.8		32	Boring backfilled with bentonite grout from 0.0 to 27.0 ft.
447.9'	27.0'			ST-6	25.0 - 27.0	2.0		26	
		No Refusal / Bottom of Hole							

FMSM_LEGACY 175559018 BORINGS.GPJ FMSM.GDT 2/23/10

Stantec

SUBSURFACE LOG

Project No.	175559018	Location	N 704863.37, E 1877828.40 (NAD27)
Project Name	Gallatin Fossil Plant - TVA	Boring No.	**STN-E-11** Total Depth 40.5 ft
Location	Sumner County, Tennessee	Surface Elevation	476.1 ft. (NGVD29)
Project Type	Geotechnical Exploration	Date Started	8/7/09 Completed 8/7/09
Supervisor	Paul Cooper Driller J. Huntoon	Depth to Water	30.0 ft Date/Time 8/7/09
Logged By	D. Chapman	Automatic Hammer ☒	Safety Hammer ☐ Other ☐

Lithology Elevation	Lithology Depth	Description	Overburden / Rock Core Sample # / RQD	Depth / Run	Rec. Ft. / Rec. Ft.	Blows / Rec. %	Mois.Cont. % / Run Depth	Remarks
476.1'	0.0'	Top of Hole						
		SANDY LEAN CLAY with Gravel (Pond E Dike), orange brown, moist, stiff to very stiff, trace medium sand to fine gravel	SPT-1	0.0 - 1.5	0.8	6-5-5	18	Boring advanced using 4.25" hollow stem auger.
			SPT-2	1.5 - 3.0	1.3	8-10-12	13	
			SPT-3	3.0 - 4.5	1.4	8-11-9	15	
			SPT-4	4.5 - 6.0	1.3	7-8-12	22	
			SPT-5	6.0 - 7.5	1.3	3-8-8	22	
			SPT-6	7.5 - 9.0	0.8	3-7-10	17	
			SPT-7	9.0 - 10.5	1.2	3-6-10	20	Bulk Sample #1 obtained from 9.0 to 12.0 ft.
			SPT-8	10.5 - 12.0	1.0	5-7-12	19	
463.1'	13.0'		SPT-9	12.0 - 13.5	1.3	5-13-18	21	
		BOTTOM ASH (Pond E Dike), dark gray, moist, dense	SPT-10	13.5 - 15.0	1.0	6-16-19	19	
459.6'	16.5'		SPT-11	15.0 - 16.5	0.4	50/0.4'	15	
		LEAN CLAY, brownish yellow to dark orange brown, moist to wet, medium stiff to stiff, trace fine gravel	SPT-12	16.5 - 18.0	1.5	4-5-5	18	
			SPT-13	18.0 - 19.5	0.7	4-4-5	18	
			SPT-14	19.5 - 21.0	1.0	3-4-5	16	
			SPT-15	21.0 - 22.5	0.8	3-3-4	19	
			SPT-16	22.5 - 24.0	1.0	4-6-5	26	
450.6'	25.5'		SPT-17	24.0 - 25.5	0.8	3-3-3	34	
		FAT CLAY, yellowish brown and orange brown, moist, medium to very stiff, trace medium sand	SPT-18	25.5 - 27.0	1.5	6-8-10	36	
			SPT-19	27.0 - 28.5	1.5	4-5-5	40	
			SPT-20	28.5 - 30.0	1.5	3-6-6	34	
			SPT-21	30.0 - 31.5	1.1	3-5-5	42	
			SPT-22	31.5 - 33.0	1.0	3-5-8	31	
			SPT-23	33.0 - 34.5	1.4	3-5-7	34	
			SPT-24	34.5 - 36.0	1.2	3-3-4	32	
			SPT-25	36.0 - 37.5	1.5	3-5-6	35	Boring backfilled with benotnite grout from 0.0 to 40.5 ft.
			SPT-26	37.5 - 39.0	1.5	4-7-10	39	
			SPT-27	39.0 - 40.5	1.5	3-2-2	29	
435.6'	40.5'		SPT-28	40.5 - 40.5	0.0	50/0.0'	--	
		Auger Refusal / Bottom of Hole Top of Rock = 40.5' Elevation (435.6')						

FMSM_LEGACY 175559018 BORINGS.GPJ FMSM.GDT 2/23/10

SUBSURFACE LOG

Project No.	175559018	Location	N 704854.47, E 1877754.46 (NAD27)
Project Name	Gallatin Fossil Plant - TVA	Boring No.	STN-E-12 Total Depth 28.3 ft
Location	Sumner County, Tennessee	Surface Elevation	455.3 ft. (NGVD29)
Project Type	Geotechnical Exploration	Date Started	8/21/09 Completed 8/22/09
Supervisor	Paul Cooper Driller J. Bowerman	Depth to Water	10.0 ft Date/Time 8/21/09
Logged By	Scott Lange	Automatic Hammer ☒	Safety Hammer ☐ Other ☐

Lithology			Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	
Elevation	Depth	Description	Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	Remarks
455.3'	0.0'	Top of Hole							
		LEAN CLAY, grayish brown, moist to wet, medium stiff		SPT-1	0.0 - 1.5	1.0	3-3-4	21	Boring advanced with 4.25" hollow stem auger.
				SPT-2	1.5 - 3.0	1.5	2-3-4	21	
				SPT-3	3.0 - 4.5	1.5	3-4-4	22	
448.8'	6.5'			ST-1	4.5 - 6.5	2.0		21	Piezometer installed (see PZ detail sheet).
		SANDY LEAN CLAY, yellowish brown mottled black, moist to wet, medium to very stiff, trace medium sand to fine gravel		SPT-4	6.5 - 8.0	1.0	5-7-10	24	
				SPT-5	8.0 - 9.5	1.3	6-9-12	24	
				ST-2	9.5 - 11.5	2.0		23	
				SPT-6	11.5 - 13.0	1.0	7-10-12	22	
				SPT-7	13.0 - 14.5	1.3	3-6-9	23	
				SPT-8	14.5 - 16.0	1.3	2-5-9	24	
				SPT-9	16.0 - 17.5	1.3	3-5-6	35	
				SPT-10	17.5 - 19.0	1.3	8-50/0.5'	37	Apparent cobble/boulder at 18.0 to 18.5 ft.
				SPT-11	19.0 - 20.5	1.0	2-3-5	34	
				SPT-12	20.5 - 22.0	1.5	3-3-4	30	
				SPT-13	22.0 - 23.5	0.0	6-7-6	--	
				SPT-14	23.5 - 25.0	1.3	4-4-4	32	Piezometer backfilled with sand, bentonite pellets, and bentonite grout from 0.0 to 28.3 ft.
				SPT-15	25.0 - 26.5	1.3	3-4-4	28	
				SPT-16	26.5 - 28.0	1.3	2-3-3	38	
427.0'	28.3'			SPT-17	28.0 - 28.3	0.3	50/0.3'	32	

Auger Refusal /
Bottom of Hole

Top of Rock = 28.3'
Elevation (427.0')

Stantec

SUBSURFACE LOG

Project No.	175559018	Location	N 706353.41, E 1877474.21 (NAD27)
Project Name	Gallatin Fossil Plant - TVA	Boring No.	**STN-E-13** Total Depth 37.1 ft
Location	Sumner County, Tennessee	Surface Elevation	474.3 ft. (NGVD29)
Project Type	Geotechnical Exploration	Date Started	8/6/09 Completed 8/6/09
Supervisor	Paul Cooper Driller J. Huntoon	Depth to Water	33.0 ft Date/Time 8/6/09
Logged By	D. Chapman	Automatic Hammer ☒	Safety Hammer ☐ Other ☐

Lithology Elevation	Lithology Depth	Description	Overburden / Rock Core Sample # / RQD	Depth / Run	Rec. Ft. / Rec. Ft.	Blows / Rec. %	Mois.Cont. % / Run Depth	Remarks
474.3'	0.0'	Top of Hole						
		FAT CLAY with Sand (Pond E Dike), reddish brown to yellowish brown, moist, soft to very stiff, trace fine gravel	SPT-1	0.0 - 1.5	0.3	3-2-2	19	Boring advanced with 4.25" hollow stem auger.
			SPT-2	1.5 - 3.0	1.5	15-12-18	14	
			SPT-3	3.0 - 4.5	1.0	14-39-17	16	
			SPT-4	4.5 - 6.0	0.3	5-7-9	21	
			SPT-5	6.0 - 7.5	1.2	5-6-11	20	
464.8'	9.5'		SPT-6	7.5 - 9.0	0.3	2-3-9	20	
		BOTTOM ASH (Pond E Dike), dark gray, moist, dense to very dense	SPT-7	9.0 - 10.5	1.0	9-13-21	13	Bulk Sample #1 obtained from 10.0 to 13.0 ft.
461.8'	12.5'		SPT-8	10.5 - 12.0	1.5	22-39-38	15	
		FAT CLAY, orange brown to yellowish brown, moist to wet, very soft to very stiff, trace fine gravel	SPT-9	12.0 - 13.5	1.3	8-23-30	16	
			SPT-10	13.5 - 15.0	1.0	9-5-5	21	
			SPT-11	15.0 - 16.5	1.0	6-6-7	22	
			SPT-12	16.5 - 18.0	1.2	2-4-7	33	
			SPT-13	18.0 - 19.5	1.5	2-3-8	32	
			SPT-14	19.5 - 21.0	1.3	3-6-7	28	
			SPT-15	21.0 - 22.5	1.5	4-5-10	24	Bulk Sample #2 obtained from 22.0 to 25.0 ft.
			SPT-16	22.5 - 24.0	1.4	4-5-11	31	
			SPT-17	24.0 - 25.5	1.1	2-3-10	28	
			SPT-18	25.5 - 27.0	1.5	3-4-5	32	
			SPT-19	27.0 - 28.5	0.9	2-3-6	29	
			SPT-20	28.5 - 30.0	1.2	2-2-5	24	
			SPT-21	30.0 - 31.5	1.5	2-2-5	42	
			SPT-22	31.5 - 33.0	0.4	3-9-50/0.3'	24	
			SPT-23	33.0 - 34.5	0.1	50/0.2'	9	Boring backfilled with bentonite grout from 0.0 to 37.1 ft.
			SPT-24	34.5 - 36.0	1.1	1-1-1	35	
437.2'	37.1'		SPT-25	36.0 - 36.6	0.1	7-50/0.1'	13	
		Auger Refusal / Bottom of Hole Top of Rock = 37.1' Elevation (437.2')						

FMSM_LEGACY 175559018 BORINGS.GPJ FMSM.GDT 2/23/10

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SUBSURFACE LOG

Project No.	175559018	Location	N 706353.41, E 1877474.21 (NAD27)
Project Name	Gallatin Fossil Plant - TVA	Boring No.	**STN-E-13S** Total Depth 34.0 ft
Location	Sumner County, Tennessee	Surface Elevation	474.3 ft. (NGVD29)
Project Type	Geotechnical Exploration	Date Started	8/6/09 Completed 8/6/09
Supervisor	Paul Cooper Driller J. Huntoon	Depth to Water	N/A Date/Time N/A
Logged By	D. Chapman	Automatic Hammer ☒	Safety Hammer ☐ Other ☐

Lithology		Description	Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	Remarks
Elevation	Depth		Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	
474.3'	0.0'	Top of Hole							
		Refer to STN-E-13 for descriptions of overburden soils.							Boring advanced with 4.25" hollow stem auger.
				ST-1	2.0 - 4.0	0.0		--	
				ST-2	5.0 - 7.0	1.5		17	
				ST-3	10.0 - 12.0	0.0		--	
				ST-4	15.0 - 17.0	1.5		31	
				ST-5	20.0 - 22.0	2.0		31	
				ST-6	25.0 - 27.0	2.0		26	
				ST-7	30.0 - 32.0	1.5		34	Boring backfilled with bentonite grout from 0.0 to 34.0 ft.
440.3'	34.0'								
		Auger Refusal / Bottom of Hole Top of Rock = 34.0' Elevation (440.3')							

FMSM_LEGACY 175559018 BORINGS.GPJ FMSM.GDT 2/23/10

SUBSURFACE LOG

Project No.	175559018	Location	N 706343.79, E 1877425.50 (NAD27)
Project Name	Gallatin Fossil Plant - TVA	Boring No.	**STN-E-14** Total Depth 40.5 ft
Location	Sumner County, Tennessee	Surface Elevation	477.0 ft. (NGVD29)
Project Type	Geotechnical Exploration	Date Started	8/7/09 Completed 8/7/09
Supervisor	Paul Cooper Driller J. Huntoon	Depth to Water	39.0 ft Date/Time 8/7/09
Logged By	D. Chapman	Automatic Hammer ☒	Safety Hammer ☐ Other ☐

Lithology Elevation	Depth	Description	Overburden Sample # / Rock Core RQD	Depth / Run	Rec. Ft. / Rec. Ft.	Blows / Rec. %	Mois.Cont. % / Run Depth	Remarks
477.0'	0.0'	Top of Hole						
		LEAN CLAY with Sand (Pond E Dike), orange brown, moist, stiff to very stiff, trace medium sand to fine gravel	SPT-1	0.0 - 1.5	1.5	4-6-5	22	Boring advanced with 4.25" hollow stem auger.
			SPT-2	1.5 - 3.0	1.0	4-7-8	16	
			SPT-3	3.0 - 4.5	0.8	8-8-11	20	
			SPT-4	4.5 - 6.0	0.8	3-5-5	17	Bulk Sample #1 obtained from 5.0 to 8.0 ft.
			SPT-5	6.0 - 7.5	1.5	2-4-6	18	
			SPT-6	7.5 - 9.0	1.3	3-5-6	24	
			SPT-7	9.0 - 10.5	1.4	2-4-5	20	Piezometer installed (see PZ detail sheet).
466.0'	11.0'	BOTTOM ASH (Pond E Dike), black, moist, medium dense to dense	SPT-8	10.5 - 12.0	1.3	17-21-19	13	
464.0'	13.0'		SPT-9	12.0 - 13.5	1.2	8-10-13	16	
		FAT CLAY with Sand, orange brown to yellowish brown, moist to wet, soft to very stiff, trace fine gravel	SPT-10	13.5 - 15.0	1.5	4-3-5	20	
			SPT-11	15.0 - 16.5	0.9	3-3-4	18	
			SPT-12	16.5 - 18.0	0.8	4-6-8	19	
			SPT-13	18.0 - 19.5	1.0	4-5-10	22	
			SPT-14	19.5 - 21.0	1.0	4-7-12	22	
			SPT-15	21.0 - 22.5	1.5	6-7-5	20	
			SPT-16	22.5 - 24.0	1.3	2-3-8	22	Bulk Sample #2 obtained from 23.0 to 26.0 ft.
			SPT-17	24.0 - 25.5	1.5	4-5-8	26	
			SPT-18	25.5 - 27.0	1.5	4-6-7	25	
			SPT-19	27.0 - 28.5	0.5	2-4-7	24	
			SPT-20	28.5 - 30.0	1.5	2-4-9	25	
			SPT-21	30.0 - 31.5	1.5	2-4-10	26	
			SPT-22	31.5 - 33.0	1.4	3-3-8	25	
			SPT-23	33.0 - 34.5	1.5	5-8-8	29	
			SPT-24	34.5 - 36.0	1.2	2-4-10	27	
			SPT-25	36.0 - 37.5	1.5	6-4-4	22	Piezometer backfilled with sand, bentonite pellets, and bentonite grout from 0.0 to 40.5 ft.
			SPT-26	37.5 - 39.0	1.5	1-2-2	17	
436.5'	40.5'		SPT-27	39.0 - 40.5	0.7	1-1-33	30	

Auger Refusal /
Bottom of Hole

Top of Rock = 40.5'
Elevation (436.5')

SUBSURFACE LOG

Project No.	175559018	Location	N 706343.79, E 1877425.50 (NAD27)
Project Name	Gallatin Fossil Plant - TVA	Boring No.	**STN-E-14S** Total Depth 7.0 ft
Location	Sumner County, Tennessee	Surface Elevation	477.0 ft. (NGVD29)
Project Type	Geotechnical Exploration	Date Started	8/8/09 Completed 8/8/09
Supervisor	Paul Cooper Driller J. Huntoon	Depth to Water	N/A Date/Time N/A
Logged By	D. Chapman	Automatic Hammer ☒	Safety Hammer ☐ Other ☐

Lithology		Description	Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	Remarks
Elevation	Depth		Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	
477.0'	0.0'	Top of Hole							
		Refer to STN-E-14 for descriptions of overburden soils.		ST-1	2.0 - 4.0	2.0		18	Boring advanced with 4.25" hollow stem auger. Boring backfilled with auger cuttings.
470.0'	7.0'			ST-2	5.0 - 7.0	2.0		18	
		No Refusal / Bottom of Hole							

FMSM_LEGACY 175559018 BORINGS.GPJ FMSM.GDT 2/23/10

Stantec

SUBSURFACE LOG

Project No.	175559018	Location	N 706458.09, E 1877364.00 (NAD27)
Project Name	Gallatin Fossil Plant - TVA	Boring No.	**STN-E-15** Total Depth 27.0 ft
Location	Sumner County, Tennessee	Surface Elevation	463.4 ft. (NGVD29)
Project Type	Geotechnical Exploration	Date Started	8/22/09 Completed 8/22/09
Supervisor	Paul Cooper Driller J. Bowerman	Depth to Water	25.0 ft Date/Time 8/22/09
Logged By	Scott Lange	Automatic Hammer ☒	Safety Hammer ☐ Other ☐

Lithology			Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	
Elevation	Depth	Description	Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	Remarks
463.4'	0.0'	Top of Hole							
		LEAN CLAY, orange brown, moist, stiff to very stiff, silty, trace fine gravel		SPT-1	0.0 - 1.5	1.0	4-5-7	18	Boring advanced with 4.25" hollow stem auger.
				SPT-2	1.5 - 3.0	1.0	5-5-5	18	
				SPT-3	3.0 - 4.5	0.5	7-7-9	18	
456.9'	6.5'			ST-1	4.5 - 6.5	2.0		24	
		FAT CLAY with Sand, orange brown and yellowish brown, moist to wet, soft to stiff, trace fine gravel		SPT-4	6.5 - 8.0	1.3	4-5-7	25	
				SPT-5	8.0 - 9.5	1.3	3-5-7	25	
				ST-2	9.5 - 11.5	2.0		23	
				SPT-6	11.5 - 13.0	1.3	5-6-8	16	
				SPT-7	13.0 - 14.5	1.5	5-6-8	27	
				SPT-8	14.5 - 16.0	1.3	2-4-6	32	
				SPT-9	16.0 - 17.5	1.3	3-4-6	29	
				SPT-10	17.5 - 19.0	1.0	1-4-6	30	
				SPT-11	19.0 - 20.5	1.0	3-6-7	22	
				SPT-12	20.5 - 22.0	1.0	3-4-4	26	
				SPT-13	22.0 - 23.5	1.0	2-4-4	29	Boring backfilled with bentonite grout from 0.0 to 27.0 ft.
				SPT-14	23.5 - 25.0	0.5	1-1-3	30	
				SPT-15	25.0 - 26.5	1.0	1-2-3	33	
436.4'	27.0'			SPT-16	26.5 - 27.0	0.5	50/0.5'	15	
		Auger Refusal / Bottom of Hole Top of Rock = 27.0' Elevation (436.4')							

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SUBSURFACE LOG

Project No.	175559018	Location	N 707101.38, E 1877842.04 (NAD27)
Project Name	Gallatin Fossil Plant - TVA	Boring No.	**STN-E-16** Total Depth 59.0 ft
Location	Sumner County, Tennessee	Surface Elevation	474.5 ft. (NGVD29)
Project Type	Geotechnical Exploration	Date Started	8/8/09 Completed 8/8/09
Supervisor	Paul Cooper Driller J. Huntoon	Depth to Water	23.0 ft Date/Time 8/8/09
Logged By	D. Chapman	Automatic Hammer ☒	Safety Hammer ☐ Other ☐

Lithology Elevation	Lithology Depth	Description	Overburden / Rock Core	Sample # / RQD	Depth / Run	Rec. Ft. / Rec. Ft.	Blows / Rec. %	Mois.Cont. % / Run Depth	Remarks
474.5'	0.0'	Top of Hole							
		BOTTOM ASH (Pond E Dike), dark gray, moist, medium dense to very dense		SPT-1	0.0 - 1.5	1.3	8-11-14	16	Boring advanced with 4.25" hollow stem auger.
				SPT-2	1.5 - 3.0	1.5	24-34-38	23	
470.5'	4.0'			SPT-3	3.0 - 4.5	1.3	17-21-18	21	
		FAT CLAY (Pond E Dike), orange brown, moist, stiff to very stiff, trace fine to medium sand		SPT-4	4.5 - 6.0	0.6	3-7-8	16	
				SPT-5	6.0 - 7.5	1.2	7-12-9	19	
				SPT-6	7.5 - 9.0	1.3	5-5-5	18	
				SPT-7	9.0 - 10.5	1.1	3-4-10	20	Bulk Sample #1 obtained from 10.0 to 13.0 ft.
463.5'	11.0'			SPT-8	10.5 - 12.0	1.0	8-31-34	13	
		BOTTOM ASH, dark gray, moist to wet, medium dense to very dense, some fly ash between 15.0 ft. to 24.0 ft.		SPT-9	12.0 - 13.5	1.2	13-18-21	14	
				SPT-10	13.5 - 15.0	1.1	19-15-13	14	
				SPT-11	15.0 - 16.5	0.6	13-21-22	31	
				SPT-12	16.5 - 18.0	0.7	9-11-12	29	
				SPT-13	18.0 - 19.5	1.0	7-9-8	33	
				SPT-14	19.5 - 21.0	0.8	5-11-16	38	
				SPT-15	21.0 - 22.5	1.0	8-11-15	30	
				SPT-16	22.5 - 24.0	0.9	7-11-13	34	
				SPT-17	24.0 - 25.5	1.2	7-9-9	22	Bulk Sample #2 obtained from 24.0 to 27.0 ft.
				SPT-18	25.5 - 27.0	1.1	4-8-11	22	
446.0'	28.5'			SPT-19	27.0 - 28.5	1.2	8-3-1	22	
		LEAN CLAY and FLY ASH, dark gray and orange brown, wet, very soft		SPT-20	28.5 - 30.0	0.2	WOH-WOH-1	42	
				SPT-21	30.0 - 31.5	0.9	WOH-WOH-WOH	41	
441.5'	33.0'			SPT-22	31.5 - 33.0	1.3	1-1-1	28	
		FAT CLAY, yellowish brown to reddish brown, wet, very soft to very stiff, trace medium sand to fine gravel		SPT-23	33.0 - 34.5	1.3	1-2-2	22	
				SPT-24	34.5 - 36.0	0.8	WOH-WOH-WOH	22	
				SPT-25	36.0 - 37.5	1.2	1-1-2	24	
				SPT-26	37.5 - 39.0	0.8	1-3-4	24	
				SPT-27	39.0 - 40.5	1.0	1-4-7	20	
				SPT-28	40.5 - 42.0	0.9	5-6-8	22	
				SPT-29	42.0 - 43.5	1.4	1-1-1	22	

FMSM_LEGACY 175559018 BORINGS.GPJ FMSM.GDT 2/23/10

Project No.	175559018	Location	N 707101.38, E 1877842.04 (NAD27)
Project Name	Gallatin Fossil Plant - TVA	Boring No.	STN-E-16 Total Depth 59.0 ft

Lithology			Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	
Elevation	Depth	Description	Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	Remarks
		FAT CLAY, yellowish brown to reddish brown, wet, very soft to very stiff, trace medium sand to fine gravel *(Continued)*		SPT-30	43.5 - 45.0	0.3	3-3-4	25	
				SPT-31	45.0 - 46.5	1.0	3-4-6	27	
				SPT-32	46.5 - 48.0	1.5	5-5-4	25	
				SPT-33	48.0 - 49.5	1.1	6-7-12	29	
				SPT-34	49.5 - 51.0	1.0	4-6-10	28	
				SPT-35	51.0 - 52.5	1.2	3-3-4	28	
				SPT-36	52.5 - 54.0	1.0	4-5-6	32	
				SPT-37	54.0 - 55.5	1.0	1-1-2	34	Boring backfilled with bentonite grout from 0.0 to 59.0 ft.
				SPT-38	55.5 - 57.0	1.5	1-2-2	31	
				SPT-39	57.0 - 58.0	0.5	3-50/0.5'	38	
415.5'	59.0'								

Auger Refusal /
Bottom of Hole

Top of Rock = 59.0'
Elevation (415.5')

SUBSURFACE LOG

Project No.	175559018	Location	N 707101.38, E 1877842.04 (NAD27)
Project Name	Gallatin Fossil Plant - TVA	Boring No.	STN-E-16S Total Depth 56.0 ft
Location	Sumner County, Tennessee	Surface Elevation	474.5 ft. (NGVD29)
Project Type	Geotechnical Exploration	Date Started	8/8/09 Completed 8/9/09
Supervisor	Paul Cooper Driller J. Huntoon	Depth to Water	N/A Date/Time N/A
Logged By	D. Chapman	Automatic Hammer ☒	Safety Hammer ☐ Other ☐

Lithology			Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	
Elevation	Depth	Description	Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	Remarks
474.5'	0.0'	Top of Hole							
		Refer to STN-E-16 for descriptions of overburden soils.							Boring advanced with 4.25" hollow stem auger.
				ST-1	5.0 - 7.0	1.5		30	
				ST-2	7.0 - 9.0	1.0		28	
				ST-3	9.0 - 11.0	2.0		21	
				ST-4	29.0 - 31.0	0.0		--	
				ST-5	31.0 - 33.0	1.3		23	
				ST-6	33.0 - 35.0	2.0		24	
				ST-7	36.0 - 38.0	2.0		25	
				ST-8	40.0 - 42.0	2.0		23	

FMSM_LEGACY 175559018 BORINGS.GPJ FMSM.GDT 2/23/10

Project No.	175559018	Location	N 707101.38, E 1877842.04 (NAD27)
Project Name	Gallatin Fossil Plant - TVA	Boring No.	STN-E-16S Total Depth 56.0 ft

Lithology			Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	
Elevation	Depth	Description	Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	Remarks
		Refer to STN-E-16 for descriptions of overburden soils. *(Continued)*		ST-9	44.0 - 46.0	2.0		23	
				ST-10	48.0 - 50.0	2.0		23	
				ST-11	52.0 - 54.0	2.0		24	Boring backfilled with bentonite grout from 0.0 to 56.0 ft.
418.5'	56.0'			ST-12	54.0 - 56.0	2.0		30	
		No Refusal / Bottom of Hole							

FMSM_LEGACY 175559018 BORINGS.GPJ FMSM.GDT 2/23/10

Stantec

SUBSURFACE LOG

Project No.	175559018	Location	N 707146.54, E 1877811.85 (NAD27)
Project Name	Gallatin Fossil Plant - TVA	Boring No.	**STN-E-17** Total Depth 39.1 ft
Location	Sumner County, Tennessee	Surface Elevation	475.4 ft. (NGVD29)
Project Type	Geotechnical Exploration	Date Started	8/9/09 Completed 8/9/09
Supervisor	Paul Cooper Driller J. Huntoon	Depth to Water	19.5 ft Date/Time 8/9/09
Logged By	D. Chapman	Automatic Hammer ☒	Safety Hammer ☐ Other ☐

Lithology			Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	
Elevation	Depth	Description	Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	Remarks
475.4'	0.0'	Top of Hole							
474.9'	0.5'	LEAN CLAY, reddish brown, moist, stiff		SPT-1	0.0 - 1.5	1.3	4-6-6	20	Boring advanced with 4.25" hollow stem auger.
				SPT-2	1.5 - 3.0	1.0	6-7-10	20	
471.9'	3.5'	BOTTOM ASH (Pond E Dike), dark gray, moist, medium dense		SPT-3	3.0 - 4.5	1.1	4-5-6	26	
		LEAN CLAY with Sand (Pond E Dike), reddish brown, moist, stiff to very stiff		SPT-4	4.5 - 6.0	1.2	7-8-11	20	
				SPT-5	6.0 - 7.5	1.0	3-8-8	20	
				SPT-6	7.5 - 9.0	1.4	5-8-13	20	
465.6'	9.8'			SPT-7	9.0 - 10.5	1.3	5-12-18	17	Bulk Sample #1 obtained from 10.0 to 13.0 ft.
		BOTTOM ASH, dark gray, moist to wet, loose to dense		SPT-8	10.5 - 12.0	1.3	7-17-19	15	
				SPT-9	12.0 - 13.5	1.1	6-13-15	15	
				SPT-10	13.5 - 15.0	1.3	6-16-17	17	
				SPT-11	15.0 - 16.5	1.4	7-17-15	25	
				SPT-12	16.5 - 18.0	1.0	5-12-13	33	
				SPT-13	18.0 - 19.5	1.2	3-5-9	40	
				SPT-14	19.5 - 21.0	0.9	7-9-12	28	
				SPT-15	21.0 - 22.5	1.0	7-12-12	28	
				SPT-16	22.5 - 24.0	0.8	3-7-7	25	
				SPT-17	24.0 - 25.5	1.2	6-6-13	21	Bulk Sample #2 obtained from 25.0 to 27.0 ft.
				SPT-18	25.5 - 27.0	1.0	8-9-10	25	
				SPT-19	27.0 - 28.5	1.9	4-9-9	19	
		-some fly ash below 28.0'		SPT-20	28.5 - 30.0	0.5	1-4-5	25	
443.9'	31.5'			SPT-21	30.0 - 31.5	1.3	4-6-6	22	
		LEAN CLAY and FLY ASH, orange brown and dark gray, wet, very soft to soft		SPT-22	31.5 - 33.0	1.0	2-1-1	38	
440.9'	34.5'			SPT-23	33.0 - 34.5	1.1	2-2-2	28	
		FAT CLAY, orange brown, wet, stiff, trace medium sand to fine gravel		SPT-24	34.5 - 36.0	1.2	3-5-6	28	Boring backfilled with bentonite grout from 0.0 to 39.1 ft.
				SPT-25	36.0 - 37.5	0.9	3-4-12	32	
				SPT-26	37.5 - 39.0	0.8	3-50/0.2'	33	
436.3'	39.1'			SPT-27	39.0 - 39.1	0.0	50/0.1'	--	
		Auger Refusal / Bottom of Hole Top of Rock = 39.1' Elevation (436.3')							

FMSM_LEGACY 175559018 BORINGS.GPJ FMSM.GDT 2/23/10

Stantec

SUBSURFACE LOG

Project No.	175559018	Location	N 707190.77, E 1877765.92 (NAD27)
Project Name	Gallatin Fossil Plant - TVA	Boring No.	**STN-E-18** Total Depth 40.0 ft
Location	Sumner County, Tennessee	Surface Elevation	461.6 ft. (NGVD29)
Project Type	Geotechnical Exploration	Date Started	8/10/09 Completed 8/10/09
Supervisor	Paul Cooper Driller S. Bradford	Depth to Water	6.5 ft Date/Time 8/10/09
Logged By	C. Wood	Automatic Hammer ☒	Safety Hammer ☐ Other ☐

Lithology Elevation	Lithology Depth	Description	Overburden / Rock Core	Sample # / RQD	Depth / Run	Rec. Ft. / Rec. Ft.	Blows / Rec. %	Mois.Cont. % / Run Depth	Remarks
461.6'	0.0'	Top of Hole							
		BOTTOM ASH (Stilling Pond Dike), dark brown to black, moist to wet, very loose to very dense		SPT-1	0.0 - 1.5	0.8	8-13-15	8	Boring advanced with 4.25" hollow stem auger.
				SPT-2	1.5 - 3.0	0.9	31-52-41	11	
				SPT-3	3.0 - 4.5	1.0	29-23-14	10	
				SPT-4	4.5 - 6.0	1.0	5-6-6	13	Piezometer installed (see PZ detail sheet).
				SPT-5	6.0 - 7.5	0.8	5-6-7	11	
				SPT-6	7.5 - 9.0	0.9	4-4-4	11	
				SPT-7	9.0 - 10.5	0.7	3-3-3	12	
				SPT-8	10.5 - 12.0	0.6	2-3-2	10	
				SPT-9	12.0 - 13.5	0.6	3-2-3	8	
				SPT-10	13.5 - 15.0	1.0	3-2-2	11	
				SPT-11	15.0 - 16.5	1.1	1-2-2	12	
				SPT-12	16.5 - 18.0	0.8	2-2-2	11	
442.6'	19.0'			SPT-13	18.0 - 19.5	0.8	1-1-2	33	
		LEAN CLAY and FLY ASH, dark gray, wet, soft		SPT-14	19.5 - 21.0	0.2	1-1-2	31	
439.6'	22.0'			SPT-15	21.0 - 22.5	0.9	1-1-3	22	
		LEAN CLAY, orange brown, wet, medium to very stiff, silty, trace fine sand to fine gravel		SPT-16	22.5 - 24.0	0.3	2-2-3	23	
				SPT-17	24.0 - 25.5	1.5	2-3-3	25	
				SPT-18	25.5 - 27.0	1.2	2-3-3	24	
				SPT-19	27.0 - 28.5	0.8	2-4-5	25	
				SPT-20	28.5 - 30.0	1.0	5-8-10	26	

Project No.	175559018	Location	N 707190.77, E 1877765.92 (NAD27)		
Project Name	Gallatin Fossil Plant - TVA	Boring No.	**STN-E-18**	Total Depth	40.0 ft

Lithology			Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	
Elevation	Depth	Description	Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	Remarks
		LEAN CLAY, orange brown, wet, medium to very stiff, silty, trace fine sand to fine gravel *(Continued)*		SPT-21	30.0 - 31.5	1.5	5-6-7	25	
				SPT-22	31.5 - 33.0	1.5	5-6-8	27	
				SPT-23	33.0 - 34.5	1.0	6-9-10	29	
				SPT-24	34.5 - 36.0	1.5	5-6-7	27	
425.5'	36.1'			SPT-25	36.0 - 36.1	0.1	50/0.1'	27	Began Core
421.6'	40.0'	Limestone, light gray to light brown, coarsely crystalline to medium, hard, thin bedded, some bedding zone fractures		49%	3.9	3.0	77	40.0	Piezometer backfilled with sand, bentonite pellets, and bentonite grout from 0.0 to 40.0 ft.

Bottom of Hole

Top of Rock = 36.1'
Elevation (425.5')

Stantec

SUBSURFACE LOG

Project No.	175559018	Location	N 706774.43, E 1878687.08 (NAD27)
Project Name	Gallatin Fossil Plant - TVA	Boring No.	**STN-E-19** Total Depth 44.7 ft
Location	Sumner County, Tennessee	Surface Elevation	472.8 ft. (NGVD29)
Project Type	Geotechnical Exploration	Date Started	8/6/09 Completed 8/6/09
Supervisor	Paul Cooper Driller J. Wethington	Depth to Water	14.0 ft Date/Time 8/6/09
Logged By	Craig Millhollin	Automatic Hammer ☐	Safety Hammer ☒ Other ☐

Lithology		Description	Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	Remarks
Elevation	Depth		Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	
472.8'	0.0'	Top of Hole							
		BOTTOM ASH (Pond E Dike), light gray, dry, dense to very dense		SPT-1	0.0 - 1.5	1.2	7-15-16	19	Boring advanced with 3.25" hollow stem auger.
				SPT-2	1.5 - 3.0	1.2	15-24-43	22	
469.3'	3.5'			SPT-3	3.0 - 4.5	1.3	7-7-10	19	
		FAT CLAY with Sand (Pond E Dike), tan and orange brown, moist, very stiff, trace fine gravel		SPT-4	4.5 - 6.0	1.3	5-7-10	20	
				SPT-5	6.0 - 7.5	1.1	7-20-24	28	
				SPT-6	7.5 - 9.0	1.0	8-15-24	19	Bulk Sample #1 obtained from 8.0 to 11.0 ft.
463.1'	9.7'			SPT-7	9.0 - 10.5	1.5	9-23-40	17	
		BOTTOM ASH, gray, moist, medium to very dense, some fly ash		SPT-8	10.5 - 12.0	1.2	18-40-34	19	
				SPT-9	12.0 - 13.5	1.0	30-42-50	14	Bulk Sample #2 obtained from 13.0 to 14.0 ft.
		-Apparent cobble/boulder from 13.5' to 14.0'.		SPT-10	13.5 - 14.0	0.2	50/0.5'	15	
				SPT-11	14.0 - 15.5	1.3	13-12-18	27	
				SPT-12	15.5 - 17.0	1.4	13-18-16	22	
454.3'	18.5'			SPT-13	17.0 - 18.5	1.3	13-16-14	26	
		FLY ASH, black, wet, medium stiff, some bottom ash below 21'		SPT-14	18.5 - 20.0	1.4	4-2-5	30	
				SPT-15	20.0 - 21.5	1.4	4-2-6	35	
				SPT-16	21.5 - 23.0	1.0	2-3-3	30	
				SPT-17	23.0 - 24.5	1.2	4-3-2	33	
447.3'	25.5'			SPT-18	24.5 - 26.0	1.5	4-3-2	37	
		FAT CLAY, reddish brown, wet, soft to very stiff, trace medium sand to fine gravel		SPT-19	26.0 - 27.5	1.5	1-1-2	22	
				SPT-20	27.5 - 29.0	1.0	1-1-2	22	
				SPT-21	29.0 - 30.5	1.2	1-1-2	20	

FMSM_LEGACY 175559018 BORINGS.GPJ FMSM.GDT 2/23/10

Project No.	175559018	Location	N 706774.43, E 1878687.08 (NAD27)		
Project Name	Gallatin Fossil Plant - TVA	Boring No.	**STN-E-19**	Total Depth	44.7 ft

Lithology		Description	Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	Remarks
Elevation	Depth		Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	
		FAT CLAY, reddish brown, wet, soft to very stiff, trace medium sand to fine gravel *(Continued)*		SPT-22	30.5 - 32.0	1.0	2-2-3	20	
				SPT-23	32.0 - 33.5	1.3	3-4-5	26	
				SPT-24	33.5 - 35.0	1.5	3-6-6	29	
				SPT-25	35.0 - 36.5	1.0	6-10-8	33	
				SPT-26	36.5 - 38.0	1.5	6-12-18	24	
				SPT-27	38.0 - 39.5	1.5	3-5-8	25	
				SPT-28	39.5 - 41.0	1.2	5-8-10	25	
				SPT-29	41.0 - 42.5	1.5	4-8-10	32	
				SPT-30	42.5 - 44.0	1.3	8-11-15	28	Boring backfilled with bentonite grout from 0.0 to 44.7 ft.
428.1'	44.7'			SPT-31	44.0 - 44.5	0.5	50/0.5'	34	

Auger Refusal /
Bottom of Hole

Top of Rock = 44.7'
Elevation (428.1')

FMSM_LEGACY 175559018 BORINGS.GPJ FMSM.GDT 2/23/10

Stantec

SUBSURFACE LOG

Project No.	175559018	Location	N 706856.53, E 1878704.54 (NAD27)
Project Name	Gallatin Fossil Plant - TVA	Boring No.	**STN-E-20** Total Depth 28.5 ft
Location	Sumner County, Tennessee	Surface Elevation	476.0 ft. (NGVD29)
Project Type	Geotechnical Exploration	Date Started	8/10/09 Completed 8/10/09
Supervisor	Paul Cooper Driller J. Huntoon	Depth to Water	15.0 ft Date/Time 8/10/09
Logged By	D. Chapman	Automatic Hammer ☒	Safety Hammer ☐ Other ☐

Lithology Elevation	Lithology Depth	Description	Overburden / Rock Core: Sample # / RQD	Depth / Run	Rec. Ft. / Rec. Ft.	Blows / Rec. %	Mois.Cont. % / Run Depth	Remarks
476.0'	0.0'	Top of Hole						
472.3'	3.7'	BOTTOM ASH (Pond E Dike), dark gray, moist, medium dense to dense	SPT-1	0.0 - 1.5	0.8	6-8-8	9	Boring advanced with 4.25" hollow stem auger.
			SPT-2	1.5 - 3.0	1.0	8-17-18	16	
466.0'	10.0'	FAT CLAY with Sand (Pond E Dike), orange brown, moist, meduim stiff to stiff, trace fine gravel	SPT-3	3.0 - 4.5	1.2	15-16-8	27	Piezometer installed (see PZ detail sheet).
			SPT-4	4.5 - 6.0	0.5	5-5-6	22	
			SPT-5	6.0 - 7.5	1.0	3-6-6	28	Bulk Sample #1 obtained from 7.0 to 10.0 ft.
			SPT-6	7.5 - 9.0	0.9	2-3-5	22	
			SPT-7	9.0 - 10.5	1.2	2-7-4	22	
455.0'	21.0'	BOTTOM ASH, dark gray to black, moist to wet, medium dense to dense	SPT-8	10.5 - 12.0	1.1	15-23-24	14	
			SPT-9	12.0 - 13.5	1.0	10-22-19	11	
			SPT-10	13.5 - 15.0	0.7	10-13-21	14	
			SPT-11	15.0 - 16.5	1.1	7-13-14	28	
		-some fly ash below 16.0'	SPT-12	16.5 - 18.0	0.9	9-8-8	13	
			SPT-13	18.0 - 19.5	0.7	3-9-14	31	Bulk Sample #2 obtained from 19.0 to 21.0 ft.
			SPT-14	19.5 - 21.0	1.1	7-8-9	21	
450.5'	25.5'	FLY ASH (sluiced), dark gray, wet, very soft	SPT-15	21.0 - 22.5	1.0	1-1-1	36	
			SPT-16	22.5 - 24.0	0.0	WOH-WOH-WOH	--	
			SPT-17	24.0 - 25.5	0.0	WOH-WOH-WOH	--	Piezometer backfilled with sand, bentonite pellets, and bentonite grout from 0.0 to 28.5 ft.
450.2'	25.8'		SPT-18	25.5 - 25.8	0.3	50/0.3'	26	
447.5'	28.5'	SANDY FAT CLAY, reddish brown, wet, very soft, some fine to coarse gravel	SPT-19	27.0 - 27.0	0.0	50/0.0'	--	
			SPT-20	28.5 - 28.5	0.0	50/0.0'	--	
		Limestone, highly weathered (augered)						
		Auger Refusal / Bottom of Hole						
		Top of Rock = 25.8' Elevation (450.2')						

FMSM_LEGACY 175559018 BORINGS.GPJ FMSM.GDT 2/23/10

Stantec

SUBSURFACE LOG

Project No.	175559018	Location	N 706856.53, E 1878704.54 (NAD27)
Project Name	Gallatin Fossil Plant - TVA	Boring No.	**STN-E-20S** Total Depth 25.0 ft
Location	Sumner County, Tennessee	Surface Elevation	476.0 ft. (NGVD29)
Project Type	Geotechnical Exploration	Date Started	8/10/09 Completed 8/10/09
Supervisor	Paul Cooper Driller J. Huntoon	Depth to Water	N/A Date/Time N/A
Logged By	D. Chapman	Automatic Hammer ☒	Safety Hammer ☐ Other ☐

Lithology		Description	Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	Remarks
Elevation	Depth		Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	
476.0'	0.0'	Top of Hole							
		Refer to STN-E-20 for descriptions of overburden soils.							Boring advanced with 4.25" hollow stem auger.
				ST-1	4.0 - 6.0	1.5		22	
				ST-2	6.0 - 8.0	2.0		24	
				ST-3	21.0 - 23.0	0.0		--	Boring backfilled with bentonite grout from 0.0 to 25.0 ft.
451.0'	25.0'			ST-4	23.0 - 25.0	2.0		37	
		No Refusal / Bottom of Hole							

FMSM_LEGACY 175559018 BORINGS.GPJ FMSM.GDT 2/23/10

SUBSURFACE LOG

Project No.	175559018	Location	N 706883.00, E 1878751.72 (NAD27)
Project Name	Gallatin Fossil Plant - TVA	Boring No.	STN-E-21 Total Depth 16.0 ft
Location	Sumner County, Tennessee	Surface Elevation	461.6 ft. (NGVD29)
Project Type	Geotechnical Exploration	Date Started	8/5/09 Completed 8/5/09
Supervisor	Paul Cooper Driller J. Wethington	Depth to Water	5.0 ft Date/Time 8/5/09
Logged By	Craig Millhollin	Automatic Hammer ☐ Safety Hammer ☒ Other ☐	

Lithology Elevation	Lithology Depth	Description	Overburden Sample # / Rock Core RQD	Depth / Run	Rec. Ft. / Rec. Ft.	Blows / Rec. %	Mois.Cont. % / Run Depth	Remarks
461.6'	0.0'	Top of Hole						
		SANDY LEAN CLAY (Pond E Dike), reddish brown to dark gray, moist, very stiff, trace fine gravel and some bottom ash	SPT-1	0.0 - 1.5	1.5	10-24-50	17	Boring advanced with 3.25" hollow stem auger.
			SPT-2	1.5 - 3.0	1.2	11-15-10	12	
			SPT-3	3.0 - 4.5	0.9	15-18-12	17	
456.6'	5.0'							
		BOTTOM ASH, black, wet, loose to medium dense, trace clay seams and some fly ash	SPT-4	4.5 - 6.0	0.1	4-5-5	19	
			SPT-5	6.0 - 7.5	0.5	5-9-7	18	
			SPT-6	7.5 - 9.0	1.5	6-5-3	18	
452.0'	9.6'							
		LEAN CLAY with Sand, reddish brown to tan, wet, soft to very stiff, trace fine gravel	SPT-7	9.0 - 10.5	1.1	3-2-3	23	
			SPT-8	10.5 - 12.0	1.2	1-1-2	27	
			SPT-9	12.0 - 13.5	1.3	6-6-7	27	Boring backfilled with bentonite grout fro 0.0 to 16.0 ft.
			SPT-10	13.5 - 15.0	1.3	9-12-13	27	
445.6'	16.0'		SPT-11	15.0 - 16.0	1.0	15-50/0.5'	24	

Auger Refusal /
Bottom of Hole

Top of Rock = 15.5'
Elevation (446.1')

FMSM_LEGACY 175559018 BORINGS.GPJ FMSM.GDT 5/14/10

SUBSURFACE LOG

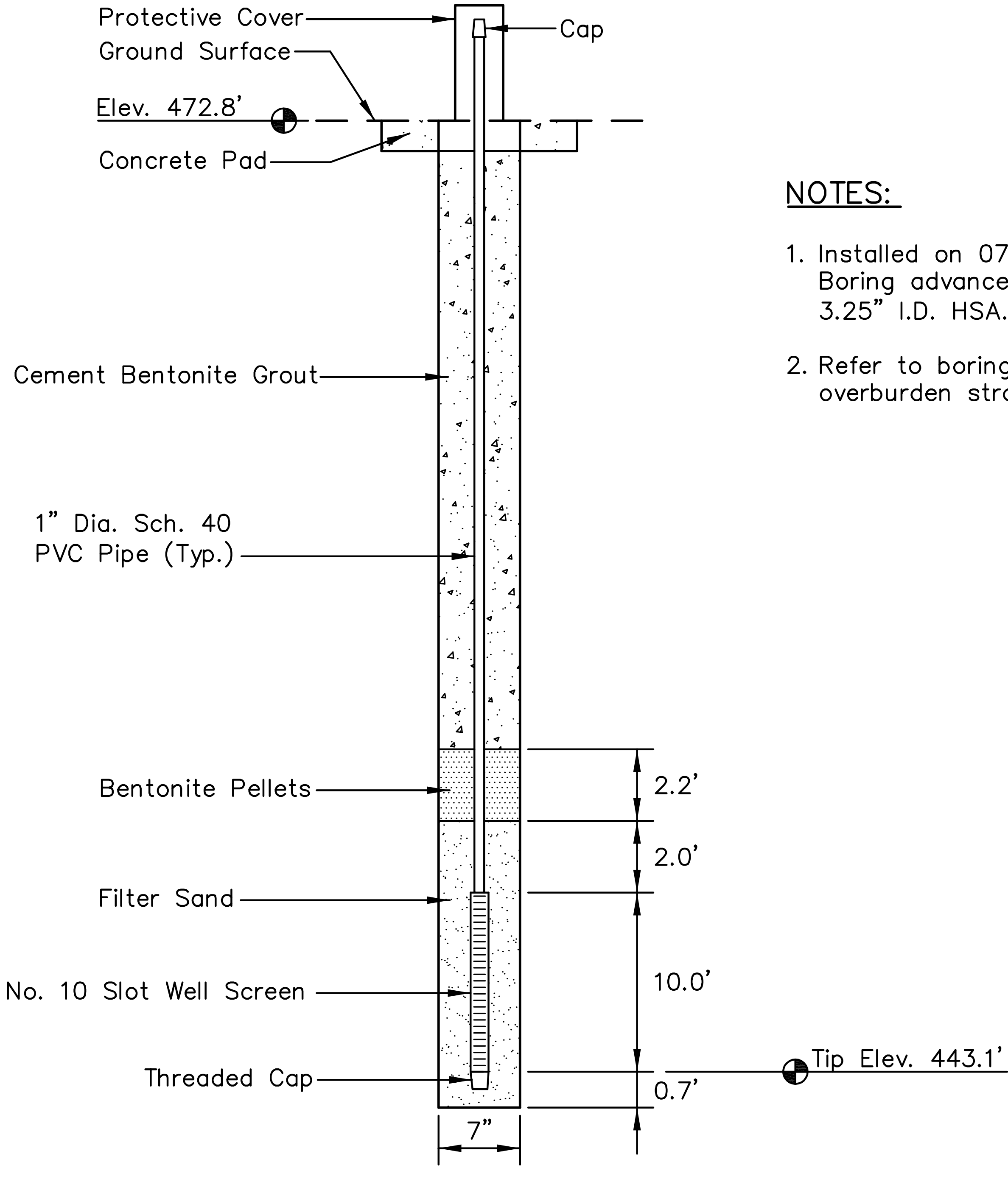
Project No.	175559018	Location	N 706883.00, E 1878751.72 (NAD27)
Project Name	Gallatin Fossil Plant - TVA	Boring No.	**STN-E-21S** Total Depth 15.0 ft
Location	Sumner County, Tennessee	Surface Elevation	461.6 ft. (NGVD29)
Project Type	Geotechnical Exploration	Date Started	8/5/09 Completed 8/5/09
Supervisor	Paul Cooper Driller J. Wethington	Depth to Water	N/A Date/Time N/A
Logged By	Craig Millhollin	Automatic Hammer ☐	Safety Hammer ☒ Other ☐

Lithology			Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	
Elevation	Depth	Description	Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	Remarks
461.6'	0.0'	Top of Hole							
		Refer to STN-E-21 for descriptions of overburden soils.							Boring advanced with 3.25" hollow stem auger.
				ST-1	5.0 - 7.0	1.0		22	
				ST-2	7.0 - 9.0	0.0		--	
				ST-3	9.0 - 11.0	0.0		--	
				ST-4	11.0 - 13.0	2.0		24	Boring backfilled with bentonite grout from 0.0 to 15.0 ft.
446.6'	15.0'			ST-5	13.0 - 15.0	1.3		33	
		No Refusal / Bottom of Hole							

FMSM_LEGACY 175559018 BORINGS.GPJ FMSM.GDT 2/23/10

Appendix B

Piezometer Installation Details and Readings



NOTES:

1. Installed on 07/29/09. Boring advanced with 3.25" I.D. HSA.
2. Refer to boring log for overburden stratigraphy.

PLOT DATE: 12/18/2009 USER: PETTY, RICHARD
V:\1755\ACTIVE\175559018\GEOTECHNICAL\DRAWING\PZ_DETAILS\59018PZ-A-1.DWG

LOCATION

Northing: 707019.68
Easting: 1879799.57
Ground Elevation: 472.8

Locations to be provided by TVA, Power Systems Operations, Surveying and Project Services.
Horizontal Datum: NAD 27
Vertical Datum: NGVD29

STN-A-1
PIEZOMETER INSTALLATION DETAIL
GALLATIN FOSSIL PLANT
ASH POND / STILLING POND COMPLEX

Stantec

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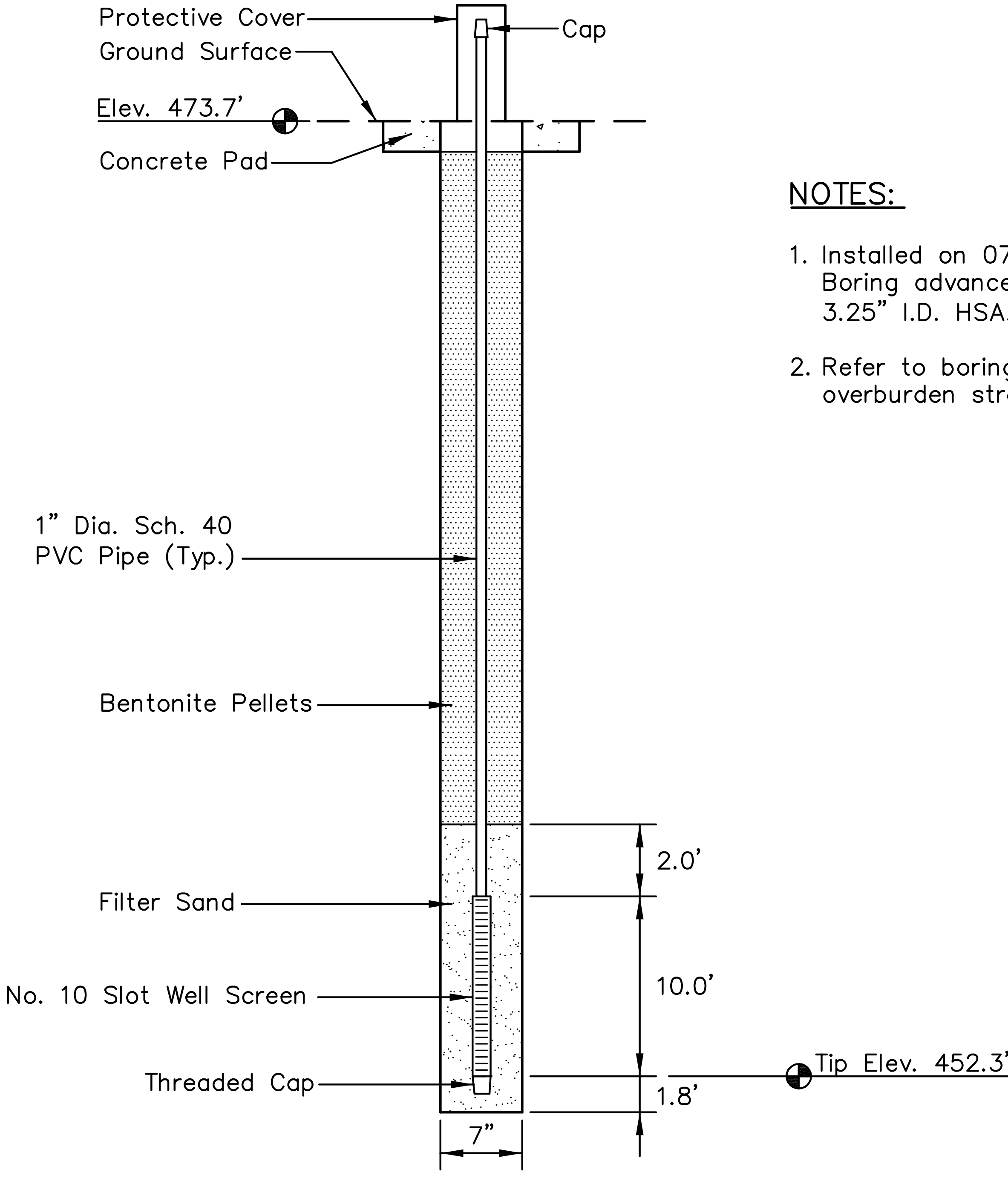
DRAWN BY	RRP	DATE	SEPT., 2009	REVISED		SHEET
CHECKED BY	PJC	PROJ. NO.	175559018	1.	3.	1 OF 12
CHECKED BY	RLR	SCALE	NTS	2.	4.	



NOTES:

1. Installed on 07/29/09. Boring advanced with 3.25" I.D. HSA.
2. Refer to boring log for overburden stratigraphy.

LOCATION

Northing: 708368.74
Easting: 1881417.01
Ground Elevation: 473.7

Locations to be provided by TVA, Power Systems Operations, Surveying and Project Services.
Horizontal Datum: NAD 27
Vertical Datum: NGVD29

STN-A-5
PIEZOMETER INSTALLATION DETAIL
GALLATIN FOSSIL PLANT
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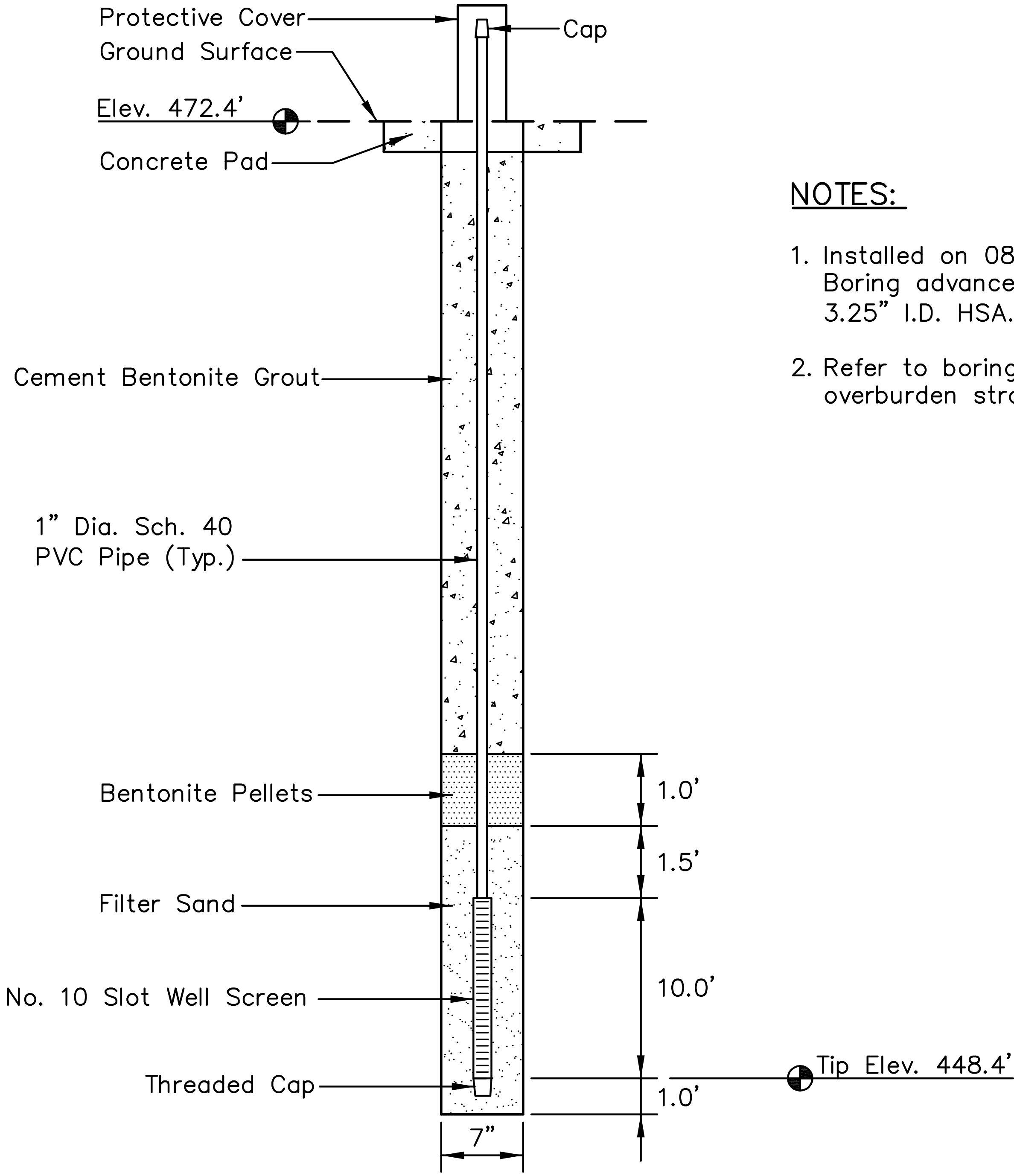
CHECKED BY	PJC	PROJ. NO.	175559018	1.	3.	2 OF 12
CHECKED BY	RLR	SCALE	NTS	2.	4.	



NOTES:

1. Installed on 08/03/09. Boring advanced with 3.25" I.D. HSA.
2. Refer to boring log for overburden stratigraphy.

PLOT DATE: 12/18/2009 USER: PETTY, RICHARD
V:\1755\ACTIVE\175559018\GEOTECHNICAL\DRAWING\PZ_DETAILS\59018PZ-A-9S.DWG

LOCATION

Northing: 709132.64
Easting: 1882470.74
Ground Elevation: 472.4

Locations to be provided by TVA, Power Systems Operations, Surveying and Project Services.
Horizontal Datum: NAD 27
Vertical Datum: NGVD29

STN-A-9S
PIEZOMETER INSTALLATION DETAIL
GALLATIN FOSSIL PLANT
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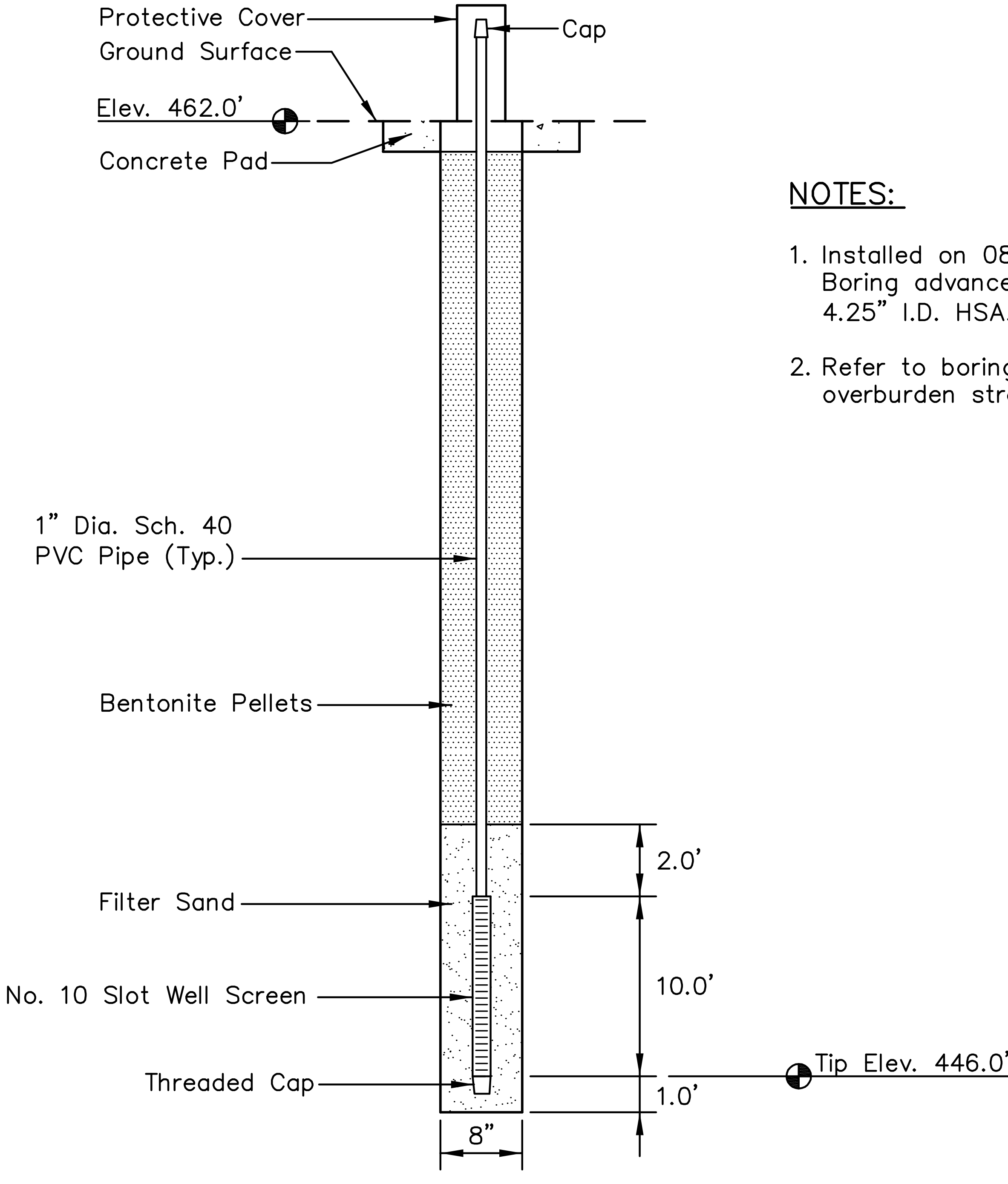
CHECKED BY	PJC	PROJ. NO.	175559018	1.	3.	3 OF 12
CHECKED BY	RLR	SCALE	NTS	2.	4.	



NOTES:

1. Installed on 08/04/09. Boring advanced with 4.25" I.D. HSA.
2. Refer to boring log for overburden stratigraphy.

PLOT DATE: 12/18/2009 USER: PETTY, RICHARD
V:\1755\ACTIVE\175559018\GEOTECHNICAL\DRAWING\PZ_DETAILS\59018PZ-C-1.DWG

LOCATION

Northing: 707402.48
Easting: 1879680.01
Ground Elevation: 462.0

Locations to be provided by TVA, Power Systems Operations, Surveying and Project Services.
Horizontal Datum: NAD 27
Vertical Datum: NGVD29

STN-C-1
PIEZOMETER INSTALLATION DETAIL
GALLATIN FOSSIL PLANT
ASH POND / STILLING POND COMPLEX

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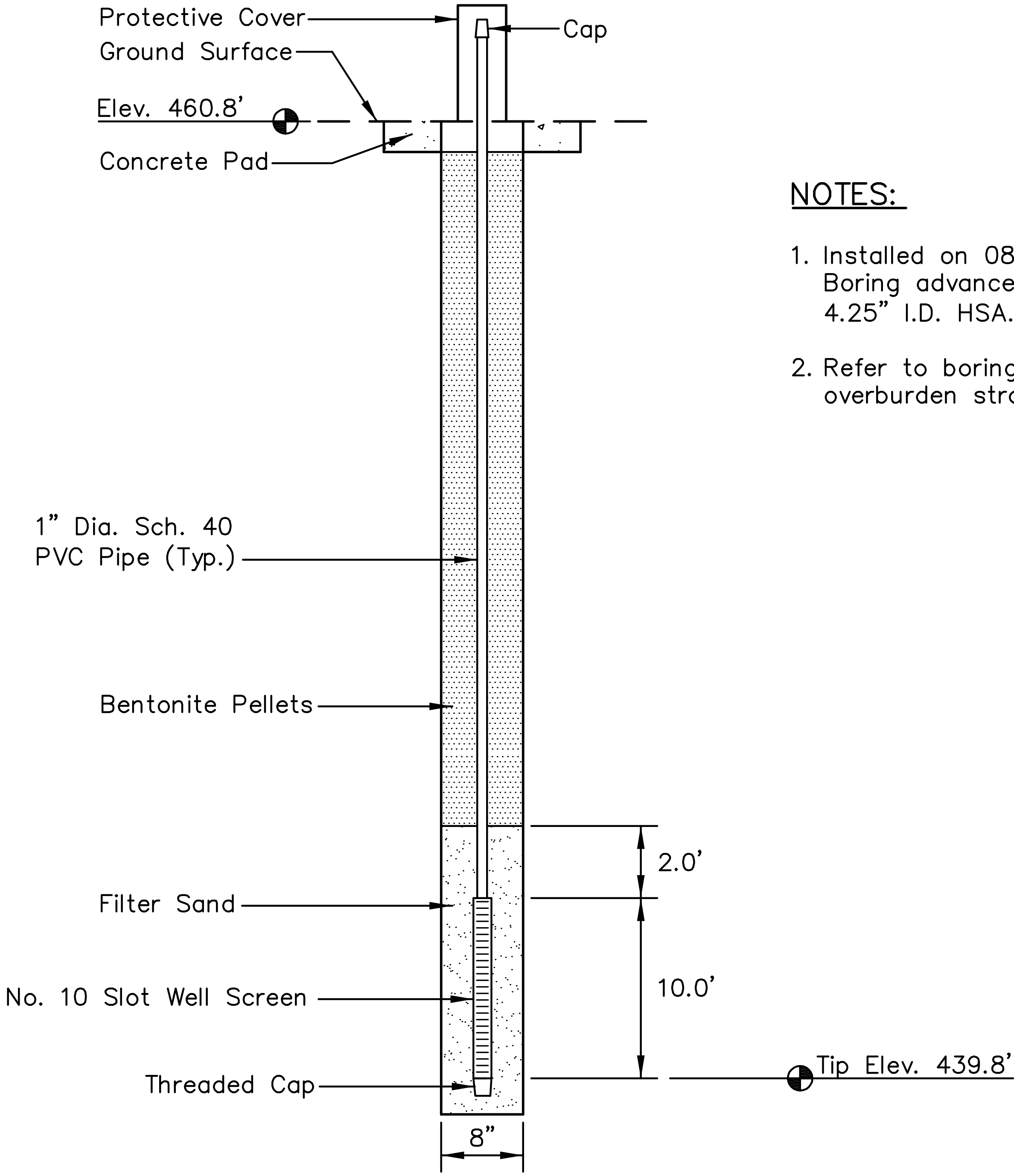
CHECKED BY	PJC	PROJ. NO.	175559018	1.	3.	4 OF 12	
CHECKED BY	RLR	SCALE	NTS	2.	4.		



NOTES:

1. Installed on 08/05/09. Boring advanced with 4.25" I.D. HSA.

2. Refer to boring log for overburden stratigraphy.

LOCATION

Northing: 707328.99
Easting: 1877246.92
Ground Elevation: 460.8

Locations to be provided by TVA, Power Systems Operations, Surveying and Project Services.
Horizontal Datum: NAD 27
Vertical Datum: NGVD29

STN-D-1A
PIEZOMETER INSTALLATION DETAIL
GALLATIN FOSSIL PLANT
ASH POND / STILLING POND COMPLEX

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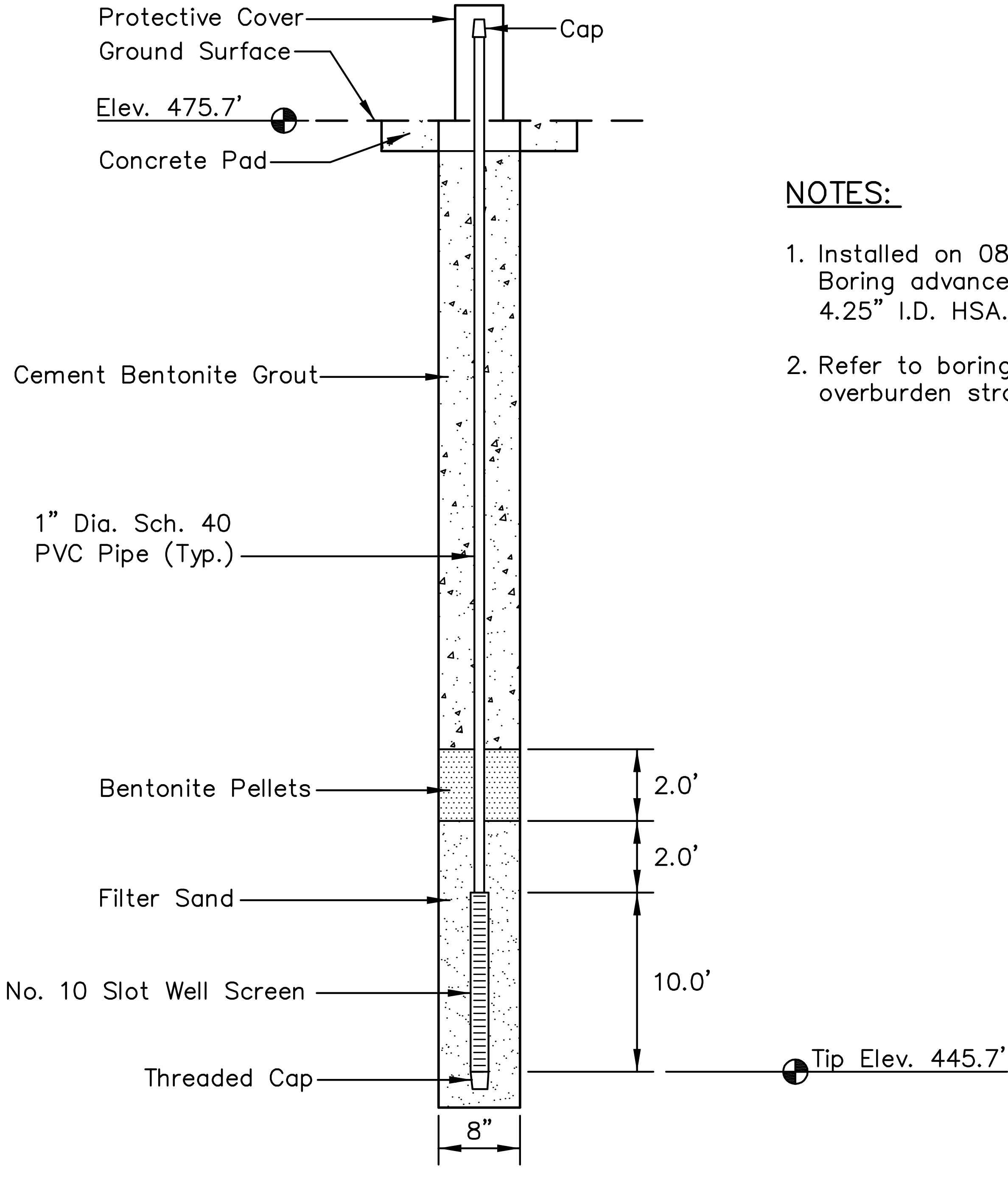
DRAWN BY	RRP	DATE	SEPT., 2009	REVISED		SHEET	
CHECKED BY	PJC	PROJ. NO.	175559018	1.	3.	5 OF 12	
CHECKED BY	RLR	SCALE	NTS	2.	4.		



NOTES:

1. Installed on 08/10/09. Boring advanced with 4.25" I.D. HSA.
2. Refer to boring log for overburden stratigraphy.

LOCATION

Northing: 703007.37
Easting: 1879022.21
Ground Elevation: 475.7

Locations to be provided by TVA,
Power Systems Operations,
Surveying and Project Services.
Horizontal Datum: NAD 27
Vertical Datum: NGVD29

PLOT DATE: 12/18/2009 USER: PETTY, RICHARD
V:\1755\ACTIVE\175559018\GEOTECHNICAL\DRAWING\PZ_DETAILS\59018PZ-E-2.DWG

STN-E-2
PIEZOMETER INSTALLATION DETAIL
GALLATIN FOSSIL PLANT
ASH POND / STILLING POND COMPLEX

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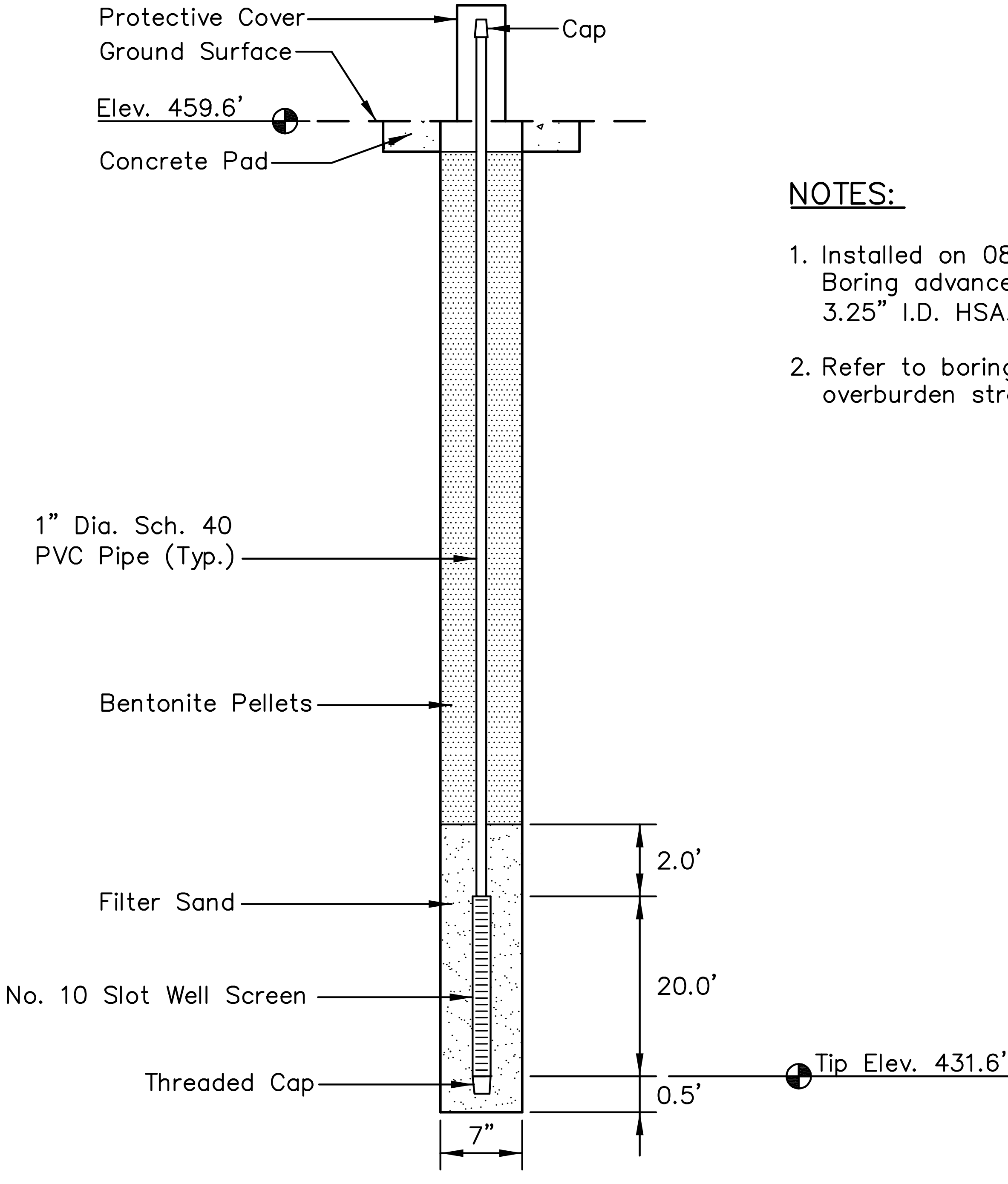
				REVISED		SHEET
DRAWN BY	RRP	DATE	SEPT., 2009			
CHECKED BY	PJC	PROJ. NO.	175559018	1.	3.	6 OF 12
CHECKED BY	RLR	SCALE	NTS	2.	4.	



NOTES:

1. Installed on 08/10/09. Boring advanced with 3.25" I.D. HSA.
2. Refer to boring log for overburden stratigraphy.

LOCATION

Northing: 702733.38
Easting: 1878070.14
Ground Elevation: 459.6

Locations to be provided by TVA, Power Systems Operations, Surveying and Project Services.
Horizontal Datum: NAD 27
Vertical Datum: NGVD29

STN-E-6
PIEZOMETER INSTALLATION DETAIL
GALLATIN FOSSIL PLANT
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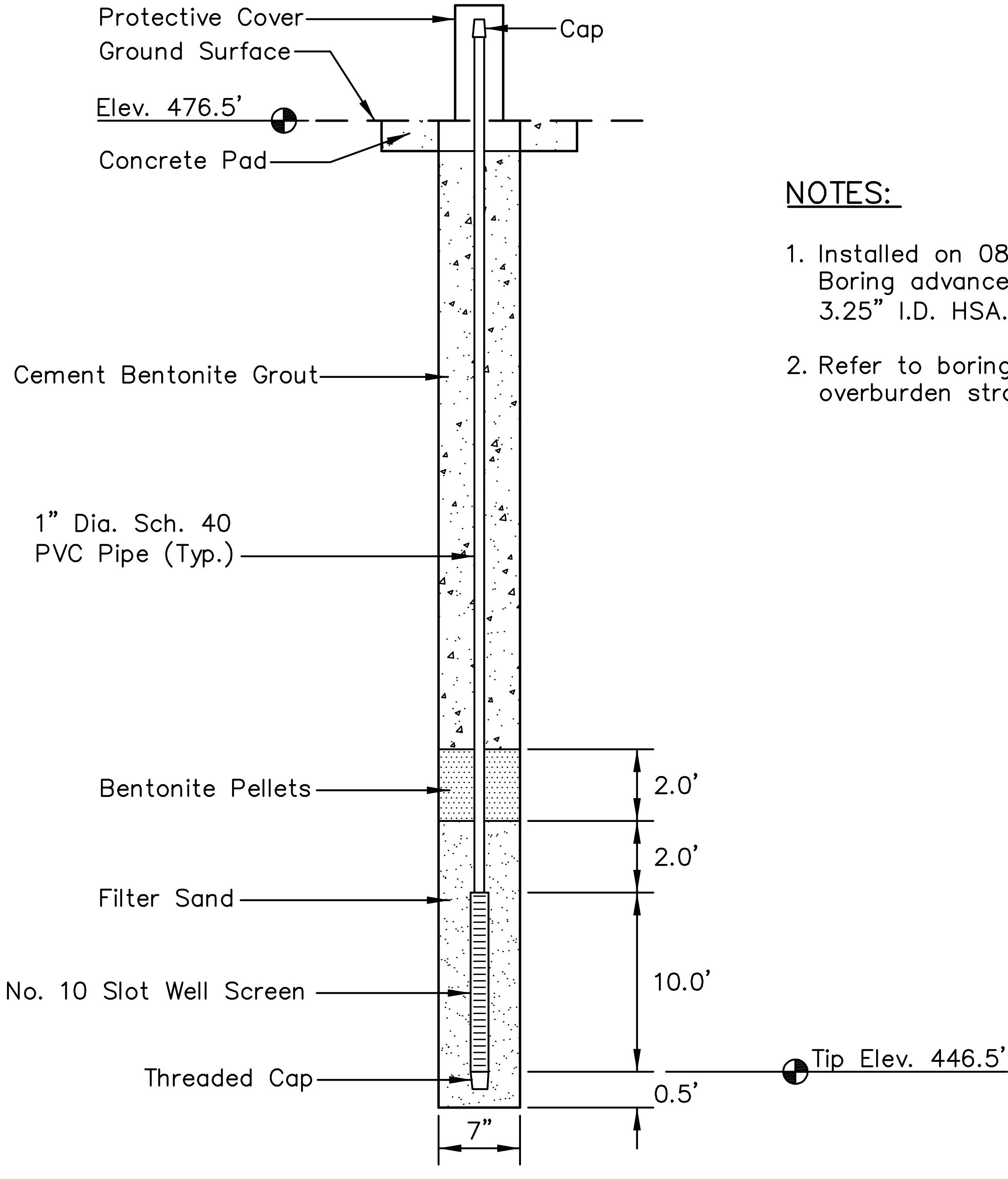
DRAWN BY	RRP	DATE	SEPT., 2009			
CHECKED BY	PJC	PROJ. NO.	175559018	1.	3.	7 OF 12
CHECKED BY	RLR	SCALE	NTS	2.	4.	

PLOT DATE: 12/18/2009 USER: PETTY, RICHARD
V:\1755\ACTIVE\175559018\GEOTECHNICAL\DRAWING\PZ_DETAILS\59018PZ-E-6.DWG



NOTES:

1. Installed on 08/11/09. Boring advanced with 3.25" I.D. HSA.
2. Refer to boring log for overburden stratigraphy.

LOCATION

Northing: 703835.47
Easting: 1877934.64
Ground Elevation: 476.5

Locations to be provided by TVA, Power Systems Operations, Surveying and Project Services.
Horizontal Datum: NAD 27
Vertical Datum: NGVD29

STN-E-8S
PIEZOMETER INSTALLATION DETAIL
GALLATIN FOSSIL PLANT
ASH POND / STILLING POND COMPLEX

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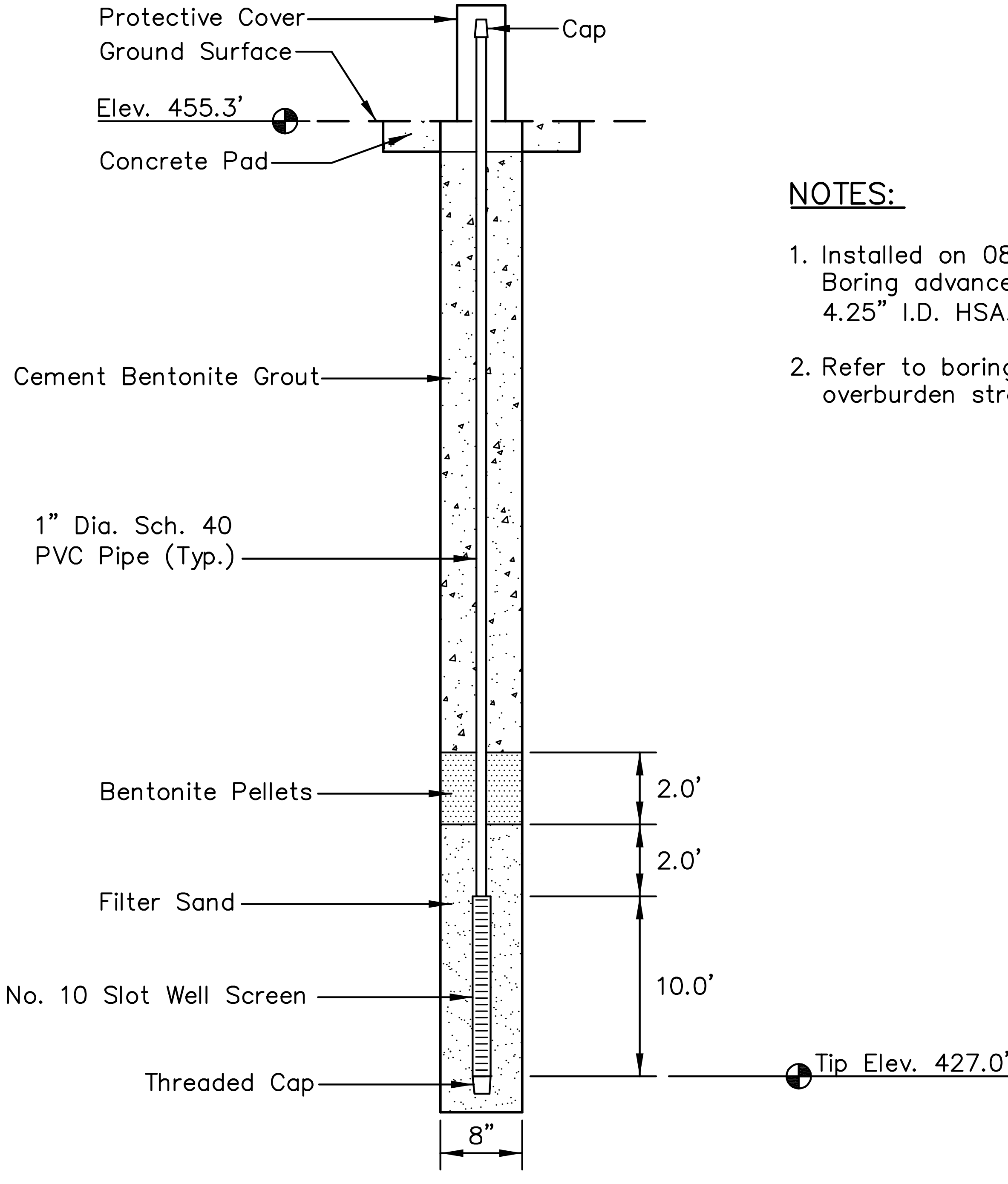
CHECKED BY	PJC	PROJ. NO.	175559018	1.	3.	8 OF 12
CHECKED BY	RLR	SCALE	NTS	2.	4.	



NOTES:

1. Installed on 08/22/09. Boring advanced with 4.25" I.D. HSA.
2. Refer to boring log for overburden stratigraphy.

LOCATION

Northing: 704854.47
Easting: 1877754.46
Ground Elevation: 455.3

Locations to be provided by TVA, Power Systems Operations, Surveying and Project Services.
Horizontal Datum: NAD 27
Vertical Datum: NGVD29

STN-E-12
PIEZOMETER INSTALLATION DETAIL
GALLATIN FOSSIL PLANT
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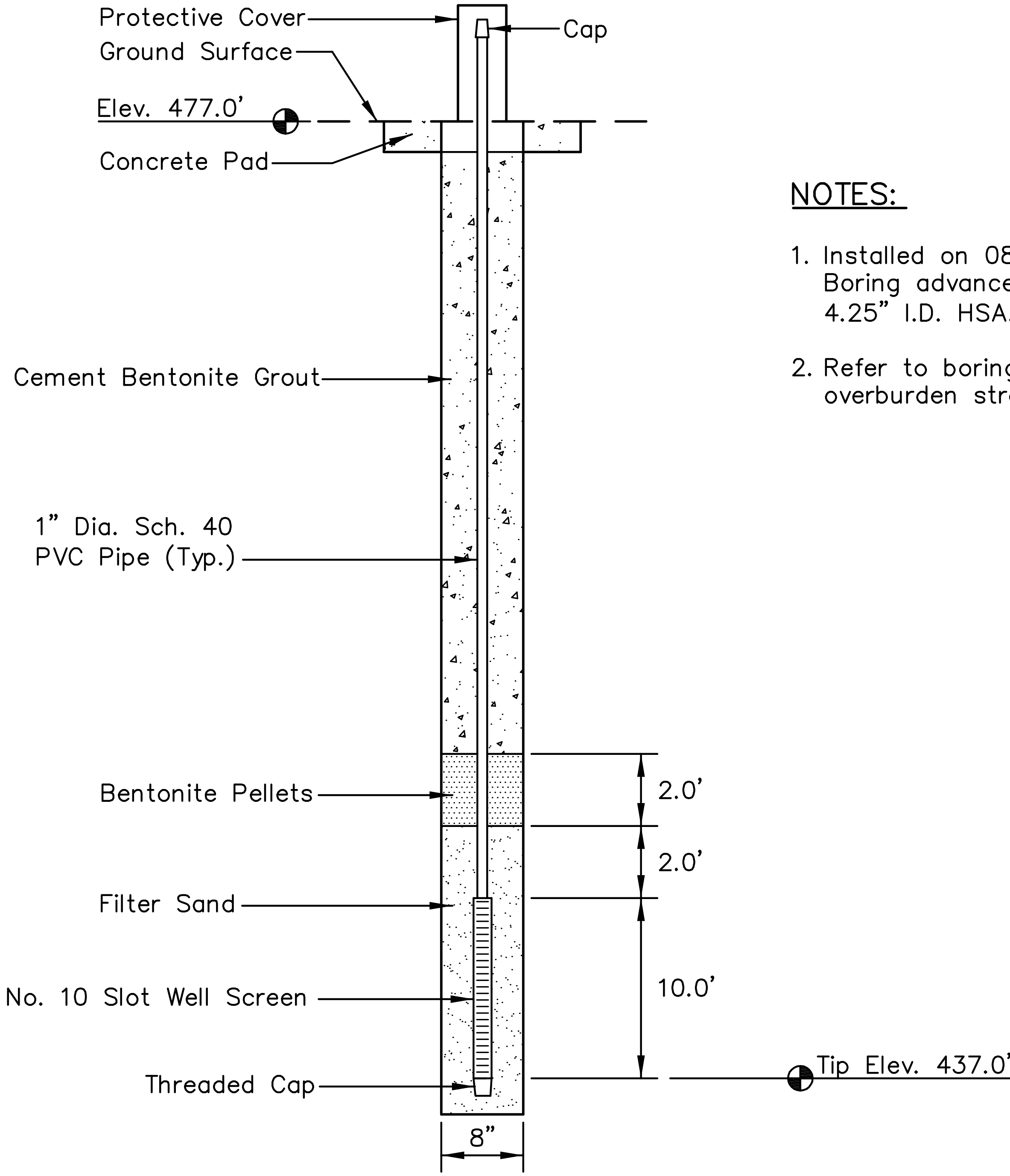
DRAWN BY	RRP	DATE SEPT., 2009	REVISED		SHEET
CHECKED BY	PJC	PROJ. NO. 175559018	1.	3.	9 OF 12
CHECKED BY	RLR	SCALE NTS	2.	4.	



NOTES:

1. Installed on 08/07/09. Boring advanced with 4.25" I.D. HSA.
2. Refer to boring log for overburden stratigraphy.

LOCATION

Northing: 706343.79
Easting: 1877425.50
Ground Elevation: 477.0

Locations to be provided by TVA, Power Systems Operations, Surveying and Project Services.
Horizontal Datum: NAD 27
Vertical Datum: NGVD29

STN-E-14
PIEZOMETER INSTALLATION DETAIL
GALLATIN FOSSIL PLANT
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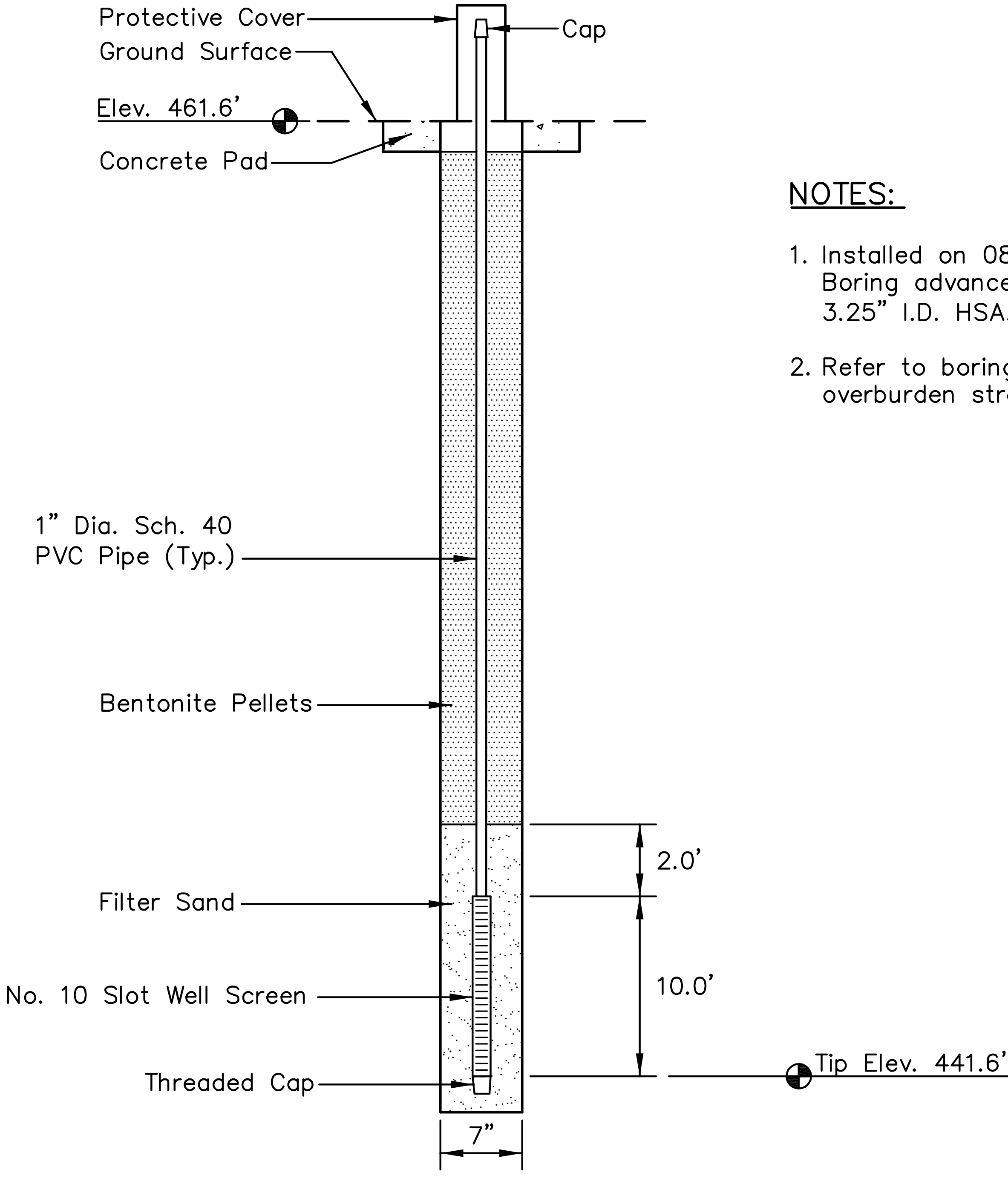
CHECKED BY	PJC	PROJ. NO.	175559018	1.	3.	10 OF 12
CHECKED BY	RLR	SCALE	NTS	2.	4.	



NOTES:

1. Installed on 08/10/09. Boring advanced with 3.25" I.D. HSA.
2. Refer to boring log for overburden stratigraphy.

LOCATION

Northing: 707190.77
Easting: 1877765.92
Ground Elevation: 461.6

Locations to be provided by TVA, Power Systems Operations, Surveying and Project Services.
Horizontal Datum: NAD 27
Vertical Datum: NGVD29

STN-E-18
PIEZOMETER INSTALLATION DETAIL
GALLATIN FOSSIL PLANT
ASH POND / STILLING POND COMPLEX

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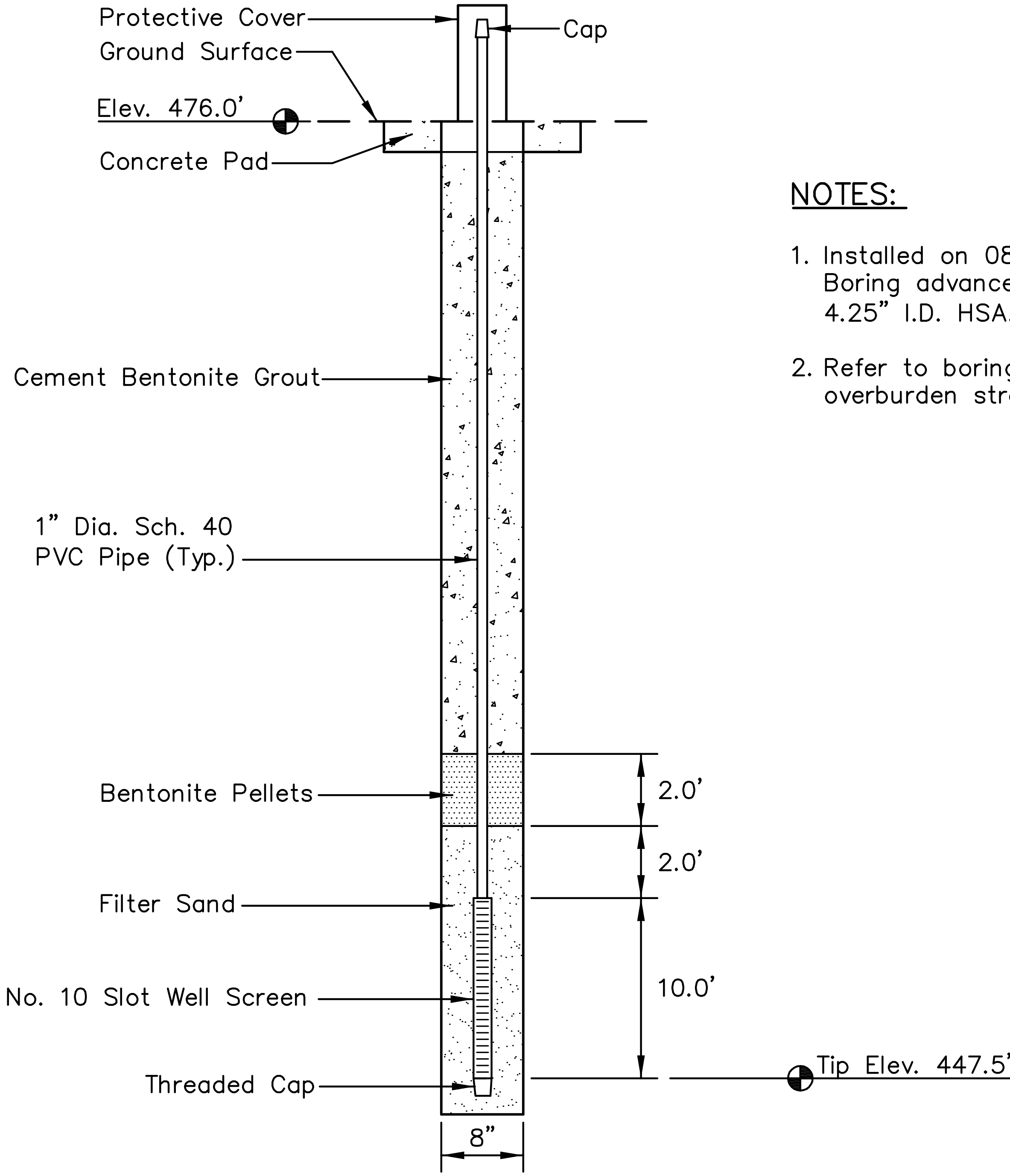
CHECKED BY	PJC	PROJ. NO.	175559018	1.	3.	11 OF 12
CHECKED BY	RLR	SCALE	NTS	2.	4.	



NOTES:

1. Installed on 08/10/09. Boring advanced with 4.25" I.D. HSA.
2. Refer to boring log for overburden stratigraphy.

LOCATION

Northing: 706856.53
Easting: 1878704.54
Ground Elevation: 476.0

Locations to be provided by TVA, Power Systems Operations, Surveying and Project Services.
Horizontal Datum: NAD 27
Vertical Datum: NGVD29

STN-E-20
PIEZOMETER INSTALLATION DETAIL
GALLATIN FOSSIL PLANT
ASH POND / STILLING POND COMPLEX

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DRAWN BY	RRP	DATE	SEPT., 2009			
CHECKED BY	PJC	PROJ. NO.	175559018	1.	3.	12 OF 12
CHECKED BY	RLR	SCALE	NTS	2.	4.	

PIEZOMETER SUMMARY REPORT
Gallatin Fossil Plant
1499 Steam Plant Rd
Gallatin,TN
175559018

	9/18/2009				9/25/2009			
Location	**Surface Elevation (ft)**	**Stickup (ft)**	**Depth Measurement(ft)**	**Water Elevation (ft)**	**Surface Elevation (ft)**	**Stickup (ft)**	**Depth Measurement(ft)**	**Water Elevation (ft)**
STN-A-1	472.8	3.0	18.1	457.7	472.8	3.0	18.1	457.7
STN-A-5	473.7	2.9	16.4	460.2	473.7	2.9	16.8	459.8
STN-A-9	472.4	3.0	10.8	464.5	472.4	3.0	10.9	464.5
STN-C-1	462.0	2.8	9.2	455.6	462.0	2.8	9.2	455.6
STN-D-1	460.8	2.8	15.4	448.2	460.8	2.8	16.4	447.2
STN-E-2	475.7	2.5	17.4	460.8	475.7	2.5	17.3	460.9
STN-E-6	459.6	3.3	5.5	457.4	459.6	3.3	5.7	457.2
STN-E-8	476.5	2.2	17.1	461.6	476.5	2.2	17.0	461.6
STN-E-12	455.3	2.9	2.3	455.9	455.3	2.9	1.9	456.3
STN-E-14	477.0	2.0	20.6	458.3	477.0	2.0	31.9	447.0
STN-E-18	461.6	2.8	8.0	456.4	461.6	2.8	8.1	456.4
STN-E-20	476.0	2.0	20.2	457.8	476.0	2.0	20.4	457.5

PIEZOMETER SUMMARY REPORT
Gallatin Fossil Plant
1499 Steam Plant Rd
Gallatin,TN
175559018

	10/2/2009				10/16/2009			
Location	**Surface Elevation (ft)**	**Stickup (ft)**	**Depth Measurement(ft)**	**Water Elevation (ft)**	**Surface Elevation (ft)**	**Stickup (ft)**	**Depth Measurement(ft)**	**Water Elevation (ft)**
STN-A-1	472.8	3.0	18.4	457.4	472.8	3.0	18.3	457.5
STN-A-5	473.7	2.9	17.1	459.5	473.7	2.9	17.0	459.6
STN-A-9	472.4	3.0	11.2	464.2	472.4	3.0	11.2	464.2
STN-C-1	462.0	2.8	9.5	455.4	462.0	2.8	9.4	455.4
STN-D-1	460.8	2.8	17.1	446.5	460.8	2.8	15.2	448.4
STN-E-2	475.7	2.5	17.5	460.7	475.7	2.5	17.3	460.9
STN-E-6	459.6	3.3	6.1	456.8	459.6	3.3	5.4	457.5
STN-E-8	476.5	2.2	17.1	461.6	476.5	2.2	17.0	461.7
STN-E-12	455.3	2.9	2.6	455.5	455.3	2.9	1.7	456.4
STN-E-14	477.0	2.0	32.1	446.8	477.0	2.0	30.4	448.5
STN-E-18	461.6	2.8	8.3	456.2	461.6	2.8	8.2	456.3
STN-E-20	476.0	2.0	20.6	457.3	476.0	2.0	20.4	457.6

PIEZOMETER SUMMARY REPORT
Gallatin Fossil Plant
1499 Steam Plant Rd
Gallatin,TN
175559018

	10/30/2009				11/19/2009			
Location	**Surface Elevation (ft)**	**Stickup (ft)**	**Depth Measurement(ft)**	**Water Elevation (ft)**	**Surface Elevation (ft)**	**Stickup (ft)**	**Depth Measurement(ft)**	**Water Elevation (ft)**
STN-A-1	472.8	3.0	18.5	457.3	472.8	3.0	18.7	457.1
STN-A-5	473.7	2.9	17.5	459.1	473.7	2.9	17.6	459.0
STN-A-9	472.4	3.0	11.6	463.8	472.4	3.0	11.5	463.9
STN-C-1	462.0	2.8	9.7	455.2	462.0	2.8	9.8	455.0
STN-D-1	460.8	2.8	17.1	446.5	460.8	2.8	19.2	444.4
STN-E-2	475.7	2.5	17.5	460.7	475.7	2.5	17.4	460.8
STN-E-6	459.6	3.3	6.1	456.8	459.6	3.3	7.1	455.7
STN-E-8	476.5	2.2	17.1	461.6	476.5	2.2	17.4	461.3
STN-E-12	455.3	2.9	2.4	455.7	455.3	2.9	3.5	454.7
STN-E-14	477.0	2.0	32.2	446.8	477.0	2.0	33.7	445.3
STN-E-18	461.6	2.8	8.3	456.1	461.6	2.8	8.4	456.1
STN-E-20	476.0	2.0	20.8	457.2	476.0	2.0	21.1	456.9

PIEZOMETER SUMMARY REPORT
Gallatin Fossil Plant
1499 Steam Plant Rd
Gallatin,TN
175559018

	12/14/2009				1/15/2010			
Location	Surface Elevation (ft)	Stickup (ft)	Depth Measurement(ft)	Water Elevation (ft)	Surface Elevation (ft)	Stickup (ft)	Depth Measurement (ft)	Water Elevation (ft)
STN-A-1	472.8	3.0	18.5	457.3	472.8	3.0	18.8	457.0
STN-A-5	473.7	2.9	17.7	459.0	473.7	2.9	18.0	458.6
STN-A-9	472.4	3.0	11.6	463.8	472.4	3.0	12.1	463.2
STN-C-1	462.0	2.8	9.7	455.2	462.0	2.8	9.9	454.9
STN-D-1	460.8	2.8	16.7	446.9	460.8	2.8	17.6	445.9
STN-E-2	475.7	2.5	17.2	461.0	475.7	2.5	17.9	460.3
STN-E-6	459.6	3.3	5.7	457.2	459.6	3.3	6.5	456.4
STN-E-8	476.5	2.2	17.0	461.6	476.5	2.2	17.6	461.1
STN-E-12	455.3	2.9	2.2	456.0	455.3	2.9	3.0	455.2
STN-E-14	477.0	2.0	32.0	446.9	477.0	2.0	32.8	446.1
STN-E-18	461.6	2.8	8.3	456.2	461.6	2.8	8.4	456.0
STN-E-20	476.0	2.0	20.8	457.2	476.0	2.0	21.4	456.6

PIEZOMETER SUMMARY REPORT
Gallatin Fossil Plant
1499 Steam Plant Rd
Gallatin,TN
175559018

	2/10/2010				3/18/2010			
Location	Surface Elevation (ft)	Stickup (ft)	Depth Measurement(ft)	Water Elevation (ft)	Surface Elevation (ft)	Stickup (ft)	Depth Measurement(ft)	Water Elevation (ft)
STN-A-1	472.8	3.0	18.4	457.4	472.8	3.0	18.7	457.1
STN-A-5	473.7	2.9	17.5	459.1	473.7	2.9	17.6	459.0
STN-A-9	472.4	3.0	11.8	463.5	472.4	3.0	11.8	463.5
STN-C-1	462.0	2.8	9.5	455.3	462.0	2.8	9.6	455.2
STN-D-1	460.8	2.8	15.6	448.0	460.8	2.8	17.0	446.6
STN-E-2	475.7	2.5	17.4	460.8	475.7	2.5	17.6	460.6
STN-E-6	459.6	3.3	5.6	457.3	459.6	3.3	6.6	456.3
STN-E-8	476.5	2.2	17.4	461.3	476.5	2.2	17.3	461.3
STN-E-12	455.3	2.9	1.5*	456.7	455.3	2.9	2.4	455.8
STN-E-14	477.0	2.0	31.1	447.8	477.0	2.0	32.3	446.7
STN-E-18	461.6	2.8	8.1	456.3	461.6	2.8	8.3	456.1
STN-E-20	476.0	2.0	20.7	457.3	476.0	2.0	21.2	456.8

*Frozen

PIEZOMETER SUMMARY REPORT
Gallatin Fossil Plant
1499 Steam Plant Rd
Gallatin,TN
175559018

	4/7/2010			
Location	**Surface Elevation (ft)**	**Stickup (ft)**	**Depth Measurement(ft)**	**Water Elevation (ft)**
STN-A-1	472.8	3.0	18.7	457.1
STN-A-5	473.7	2.9	17.3	459.3
STN-A-9	472.4	3.0	11.5	463.8
STN-C-1	462.0	2.8	9.5	455.3
STN-D-1	460.8	2.8	17.3	446.3
STN-E-2	475.7	2.5	17.5	460.7
STN-E-6	459.6	3.3	6.9	456.0
STN-E-8	476.5	2.2	17.3	461.3
STN-E-12	455.3	2.9	2.9	455.3
STN-E-14	477.0	2.0	32.5	446.4
STN-E-18	461.6	2.8	8.3	456.1
STN-E-20	476.0	2.0	21.1	456.9

Appendix C

Laboratory Test Results

Stantec

Summary of Soil Tests

Project Name	Gallatin Fossil Plant (GAF) - Ash Ponds	Project Number	175559018
Source	STN-A-2, 35.0'-36.5', 36.5'-38.0', 38.0'-39.5'	Lab ID	107
County	Sumner	Date Received	10-9-09
Sample Type	SPT Comp	Date Reported	10-26-09

Test Results

Natural Moisture Content

Test Not Performed

Moisture Content (%): N/A

Particle Size Analysis

Preparation Method: ASTM D 421
Gradation Method: ASTM D 422
Hydrometer Method: ASTM D 422

Particle Size		%
Sieve Size	(mm)	Passing
3"	75	
2"	50	
1 1/2"	37.5	
1"	25	
3/4"	19	100.0
3/8"	9.5	98.6
No. 4	4.75	97.8
No. 10	2	90.2
No. 40	0.425	84.7
No. 200	0.075	80.1
	0.02	64.7
	0.005	49.0
	0.002	42.2
estimated	0.001	39.4

Plus 3 in. material, not included: 0 (%)

Range	ASTM (%)	AASHTO (%)
Gravel	2.2	9.8
Coarse Sand	7.6	5.5
Medium Sand	5.5	---
Fine Sand	4.6	4.6
Silt	31.1	37.9
Clay	49.0	42.2

Atterberg Limits

Test Method: ASTM D 4318 Method A
Prepared: Dry

Liquid Limit: 53
Plastic Limit: 18
Plasticity Index: 35
Activity Index: 0.83

Moisture-Density Relationship

Test Not Performed

Maximum Dry Density (lb/ft^3): N/A
Maximum Dry Density (kg/m^3): N/A
Optimum Moisture Content (%): N/A
Over Size Correction %: N/A

California Bearing Ratio

Test Not Performed

Bearing Ratio (%): N/A
Compacted Dry Density (lb/ft^3): N/A
Compacted Moisture Content (%): N/A

Specific Gravity

Test Method: ASTM D 854
Prepared: Dry

Particle Size: No. 10
Specific Gravity at 20° Celsius: 2.71

Classification

Unified Group Symbol: CH
Group Name: Fat clay with sand

AASHTO Classification: A-7-6 (28)

Comments:

Particle-Size Analysis of Soils
ASTM D 422

Project Name	Gallatin Fossil Plant (GAF) - Ash Ponds	Project Number	175559018
Source	STN-A-2, 35.0'-36.5', 36.5'-38.0', 38.0'-39.5'	Lab ID	107

Sieve analysis for the Portion Coarser than the No. 10 Sieve

Test Method: ASTM D 422
Prepared using: ASTM D 421

Particle Shape: Rounded
Particle Hardness: Hard and Durable

Tested By: JMB
Test Date: 10-13-2009
Date Received 10-09-2009

Maximum Particle size: 3/4" Sieve

Sieve Size	% Passing
3"	
2"	
1 1/2"	
1"	
3/4"	100.0
3/8"	98.6
No. 4	97.8
No. 10	90.2

Analysis for the portion Finer than the No. 10 Sieve

Analysis Based on: Total Sample

Specific Gravity 2.71

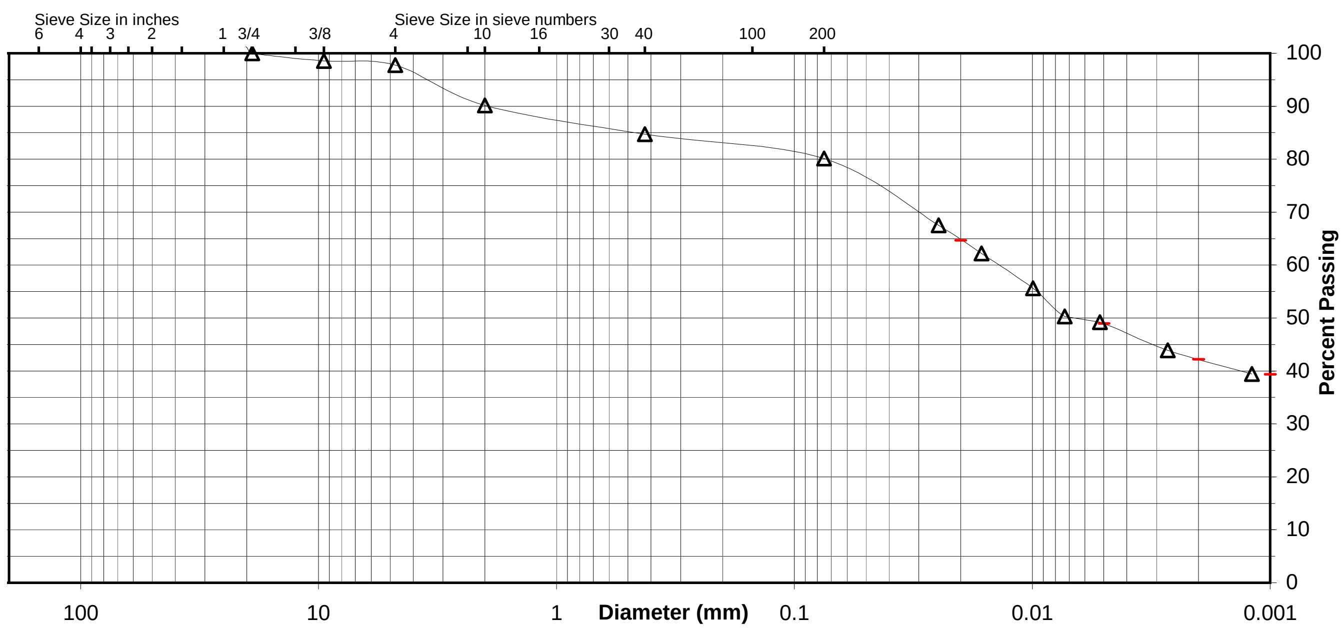
Dispersed using: Apparatus A - Mechanical, for 1 minute

No. 40	84.7
No. 200	80.1
0.02 mm	64.7
0.005 mm	49.0
0.002 mm	42.2
0.001 mm	39.4

Particle Size Distribution

ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay
	0.0	2.2	7.6	5.5	4.6	31.1	49.0

AASHTO	Gravel	Coarse Sand	Fine Sand	Silt	Clay
	9.8	5.5	4.6	37.9	42.2



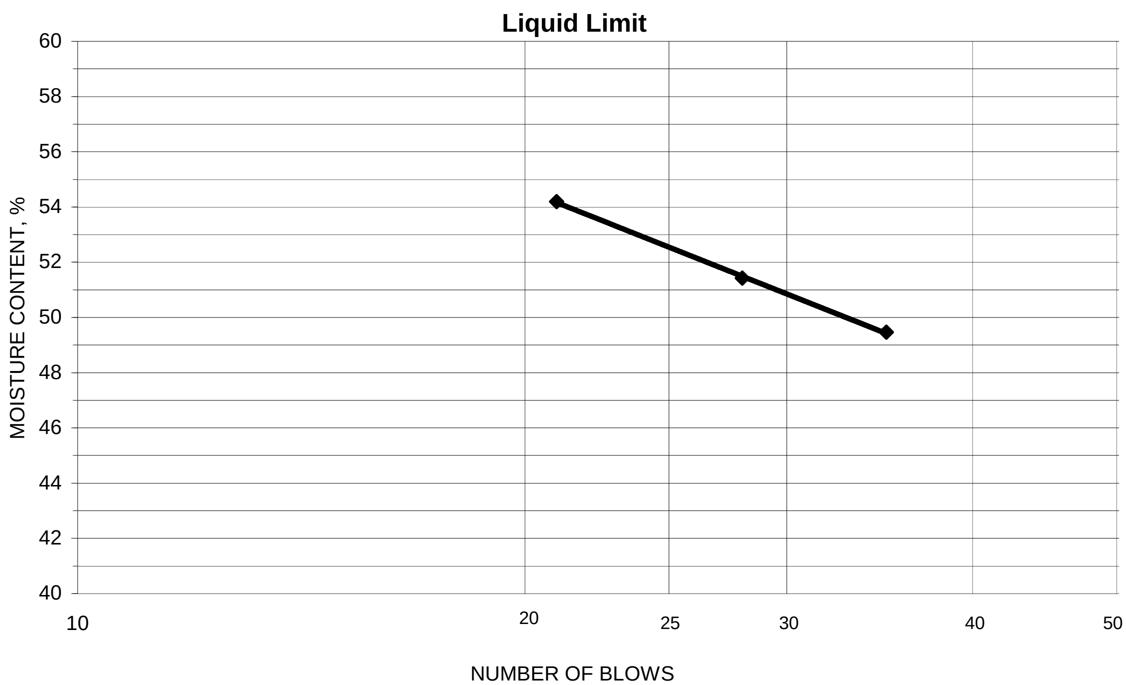
Comments

Reviewed By RHB

ATTERBERG LIMITS

Project	Gallatin Fossil Plant (GAF) - Ash Ponds	Project No.	175559018
Source	STN-A-2, 35.0'-36.5', 36.5'-38.0', 38.0'-39.5'	Lab ID	107
		% + No. 40	15
Tested By	KDK	Test Method	ASTM D 4318 Method A
Date Received	10-09-2009		
Test Date	10-15-2009	Prepared	Dry

Wet Soil and Tare Mass (g)	Dry Soil and Tare Mass (g)	Tare Mass (g)	Number of Blows	Water Content (%)	Liquid Limit
15.47	11.79	4.35	35	49.5	
16.05	12.07	4.33	28	51.4	
15.91	11.84	4.33	21	54.2	53



PLASTIC LIMIT AND PLASTICITY INDEX

Wet Soil and Tare Mass (g)	Dry Soil and Tare Mass (g)	Tare Mass (g)	Water Content (%)	Plastic Limit	Plasticity Index
10.43	9.51	4.32	17.7	18	35
10.51	9.58	4.34	17.7		

Remarks:

Reviewed By RHB

Stantec

Summary of Soil Tests

Project Name	Gallatin Fossil Plant (GAF) - Ash Ponds	Project Number	175559018
Source	STN-A-3, 9.0'-10.5', 10.5'-12.0', 12.0'-13.5'	Lab ID	119
County	Sumner	Date Received	10-9-09
Sample Type	SPT Comp	Date Reported	10-26-09

Test Results

Natural Moisture Content
Test Not Performed
Moisture Content (%): N/A

Particle Size Analysis
Preparation Method: ASTM D 421
Gradation Method: ASTM D 422
Hydrometer Method: ASTM D 422

Particle Size		%
Sieve Size	(mm)	Passing
3"	75	
2"	50	
1 1/2"	37.5	
1"	25	
3/4"	19	100.0
3/8"	9.5	86.9
No. 4	4.75	73.4
No. 10	2	52.7
No. 40	0.425	30.8
No. 200	0.075	13.6
	0.02	4.2
	0.005	2.2
	0.002	1.6
estimated	0.001	1.4

Plus 3 in. material, not included: 0 (%)

Range	ASTM (%)	AASHTO (%)
Gravel	26.6	47.3
Coarse Sand	20.7	21.9
Medium Sand	21.9	---
Fine Sand	17.2	17.2
Silt	11.4	12.0
Clay	2.2	1.6

Atterberg Limits
Test Method: ASTM D 4318 Method A
Prepared: Dry
Liquid Limit: ---
Plastic Limit: Non Plastic
Plasticity Index: ---
Activity Index: N/A

Moisture-Density Relationship
Test Not Performed
Maximum Dry Density (lb/ft^3): N/A
Maximum Dry Density (kg/m^3): N/A
Optimum Moisture Content (%): N/A
Over Size Correction %: N/A

California Bearing Ratio
Test Not Performed
Bearing Ratio (%): N/A
Compacted Dry Density (lb/ft^3): N/A
Compacted Moisture Content (%): N/A

Specific Gravity
Test Method: ASTM D 854
Prepared: Dry
Particle Size: No. 10
Specific Gravity at 20° Celsius: 2.70

Classification
Unified Group Symbol: SM
Group Name: Silty sand with gravel
AASHTO Classification: A-1-b (0)

Comments:

Particle-Size Analysis of Soils
ASTM D 422

Project Name	Gallatin Fossil Plant (GAF) - Ash Ponds	Project Number	175559018
Source	STN-A-3, 9.0'-10.5', 10.5'-12.0', 12.0'-13.5'	Lab ID	119

Sieve analysis for the Portion Coarser than the No. 10 Sieve

Test Method: ASTM D 422
Prepared using: ASTM D 421

Particle Shape: Rounded
Particle Hardness: Hard and Durable

Tested By: JMB
Test Date: 10-14-2009
Date Received 10-09-2009

Maximum Particle size: 3/4" Sieve

Sieve Size	% Passing
3"	
2"	
1 1/2"	
1"	
3/4"	100.0
3/8"	86.9
No. 4	73.4
No. 10	52.7

Analysis for the portion Finer than the No. 10 Sieve

Analysis Based on: Total Sample

Specific Gravity 2.7

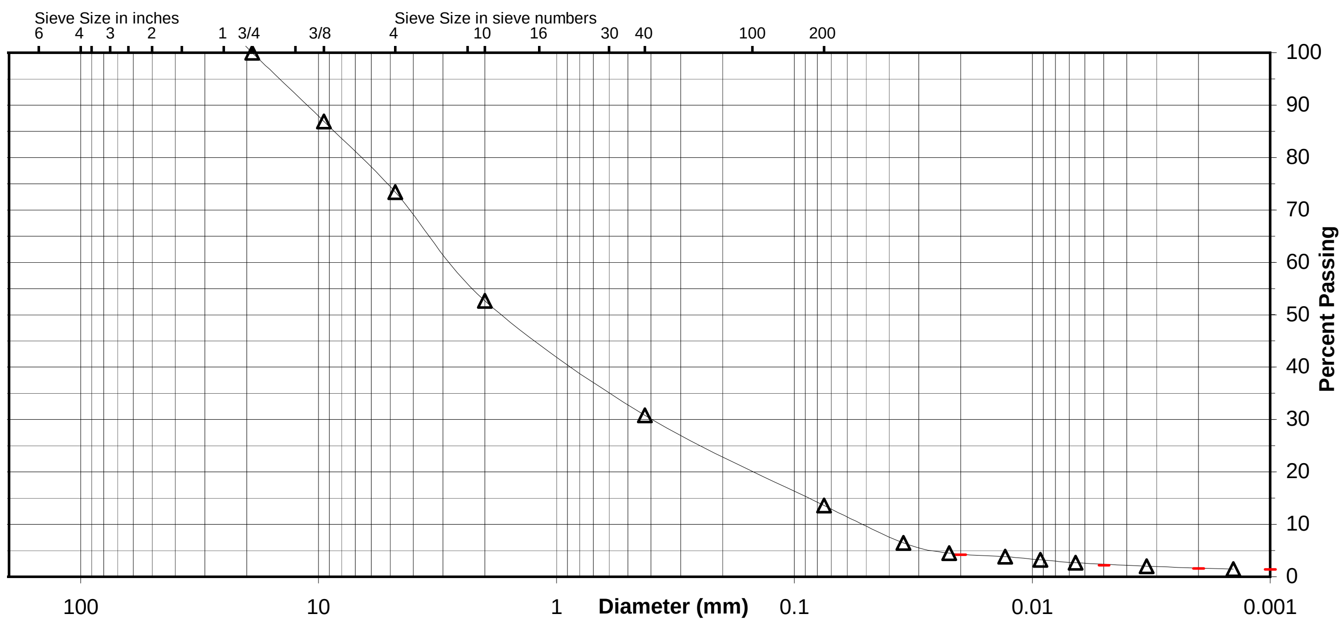
Dispersed using: Apparatus A - Mechanical, for 1 minute

Sieve Size	% Passing
No. 40	30.8
No. 200	13.6
0.02 mm	4.2
0.005 mm	2.2
0.002 mm	1.6
0.001 mm	1.4

Particle Size Distribution

ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay
	0.0	26.6	20.7	21.9	17.2	11.4	2.2

AASHTO	Gravel	Coarse Sand	Fine Sand	Silt	Clay
	47.3	21.9	17.2	12.0	1.6



Comments

Reviewed By RHB

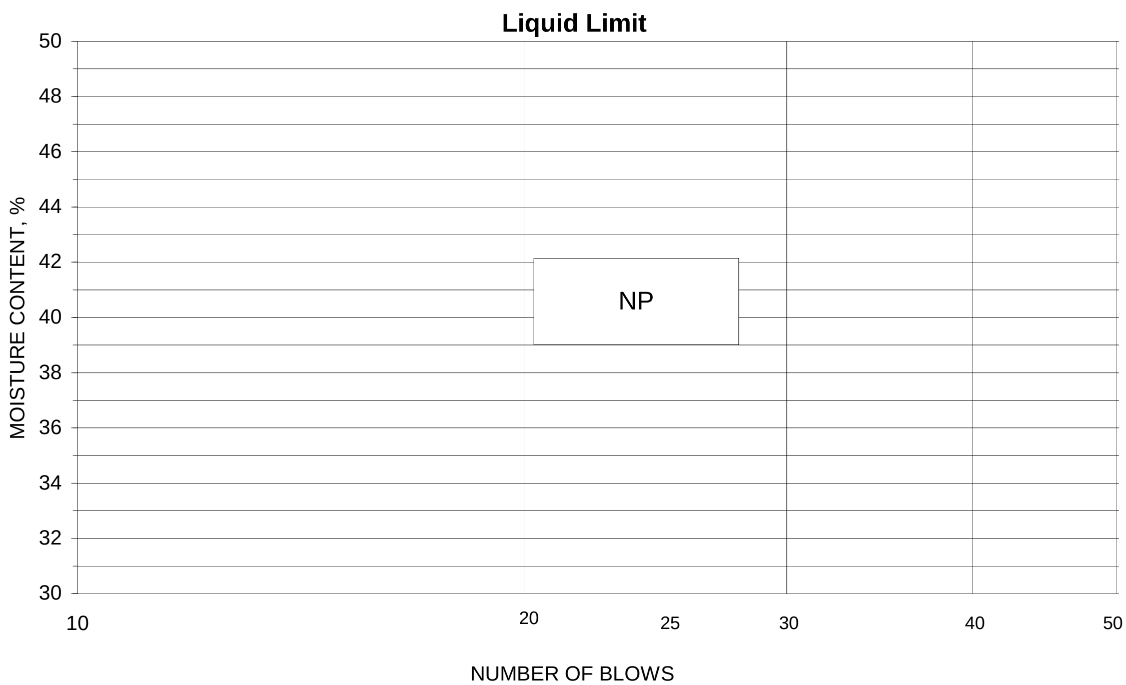
Stantec

ATTERBERG LIMITS

Project	Gallatin Fossil Plant (GAF) - Ash Ponds	Project No.	175559018
Source	STN-A-3, 9.0'-10.5', 10.5'-12.0', 12.0'-13.5'	Lab ID	119
		% + No. 40	69

Tested By	RHB	Test Method	ASTM D 4318 Method A	Date Received	10-09-2009
Test Date	10-23-2009	Prepared	Dry		

Wet Soil and Tare Mass (g)	Dry Soil and Tare Mass (g)	Tare Mass (g)	Number of Blows	Water Content (%)	Liquid Limit



PLASTIC LIMIT AND PLASTICITY INDEX

Wet Soil and Tare Mass (g)	Dry Soil and Tare Mass (g)	Tare Mass (g)	Water Content (%)	Plastic Limit	Plasticity Index

Remarks:

Reviewed By RHB

Stantec

Summary of Soil Tests

Project Name	Gallatin Fossil Plant (GAF) - Ash Ponds	Project Number	175559018
Source	STN-A-7, 30.0'-31.5', 31.5'-33.0', 33.0'-34.5'	Lab ID	204
County	Sumner	Date Received	10-9-09
Sample Type	SPT Comp	Date Reported	10-26-09

Test Results

Natural Moisture Content

Test Not Performed

Moisture Content (%): N/A

Particle Size Analysis

Preparation Method: ASTM D 421

Gradation Method: ASTM D 422

Hydrometer Method: ASTM D 422

Particle Size		%
Sieve Size	(mm)	Passing
3"	75	
2"	50	
1 1/2"	37.5	
1"	25	100.0
3/4"	19	95.5
3/8"	9.5	90.7
No. 4	4.75	84.8
No. 10	2	75.9
No. 40	0.425	69.4
No. 200	0.075	61.8
	0.02	46.5
	0.005	33.0
	0.002	26.8
estimated	0.001	24.4

Plus 3 in. material, not included: 0 (%)

Range	ASTM (%)	AASHTO (%)
Gravel	15.2	24.1
Coarse Sand	8.9	6.5
Medium Sand	6.5	---
Fine Sand	7.6	7.6
Silt	28.8	35.0
Clay	33.0	26.8

Atterberg Limits

Test Method: ASTM D 4318 Method A

Prepared: Dry

Liquid Limit: 43

Plastic Limit: 16

Plasticity Index: 27

Activity Index: 1.00

Moisture-Density Relationship

Test Not Performed

Maximum Dry Density (lb/ft^3): N/A

Maximum Dry Density (kg/m^3): N/A

Optimum Moisture Content (%): N/A

Over Size Correction %: N/A

California Bearing Ratio

Test Not Performed

Bearing Ratio (%): N/A

Compacted Dry Density (lb/ft^3): N/A

Compacted Moisture Content (%): N/A

Specific Gravity

Test Method: ASTM D 854

Prepared: Dry

Particle Size: No. 10

Specific Gravity at 20° Celsius: 2.69

Classification

Unified Group Symbol: CL

Group Name: Sandy lean clay with gravel

AASHTO Classification: A-7-6 (14)

Comments:

Particle-Size Analysis of Soils

ASTM D 422

Project Name	Gallatin Fossil Plant (GAF) - Ash Ponds	Project Number	175559018
Source	STN-A-7, 30.0'-31.5', 31.5'-33.0', 33.0'-34.5'	Lab ID	204

Sieve analysis for the Portion Coarser than the No. 10 Sieve

Test Method: ASTM D 422

Prepared using: ASTM D 421

Particle Shape: Angular

Particle Hardness: Hard and Durable

Tested By: CLH

Test Date: 10-14-2009

Date Received 10-09-2009

Maximum Particle size: 1" Sieve

Sieve Size	% Passing
3"	
2"	
1 1/2"	
1"	100.0
3/4"	95.5
3/8"	90.7
No. 4	84.8
No. 10	75.9

Analysis for the portion Finer than the No. 10 Sieve

Analysis Based on: Total Sample

Specific Gravity 2.69

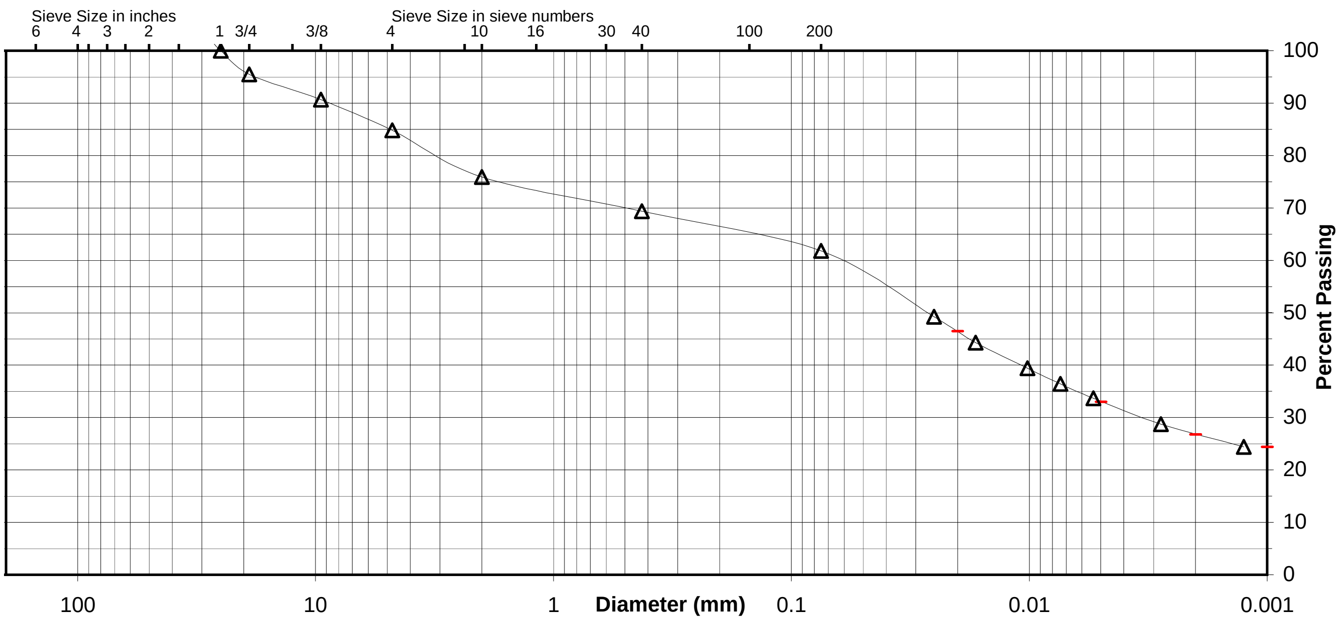
Dispersed using: Apparatus A - Mechanical, for 1 minute

No. 40	69.4
No. 200	61.8
0.02 mm	46.5
0.005 mm	33.0
0.002 mm	26.8
0.001 mm	24.4

Particle Size Distribution

ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay
	4.5	10.7	8.9	6.5	7.6	28.8	33.0

AASHTO	Gravel	Coarse Sand	Fine Sand	Silt	Clay
	24.1	6.5	7.6	35.0	26.8



Comments

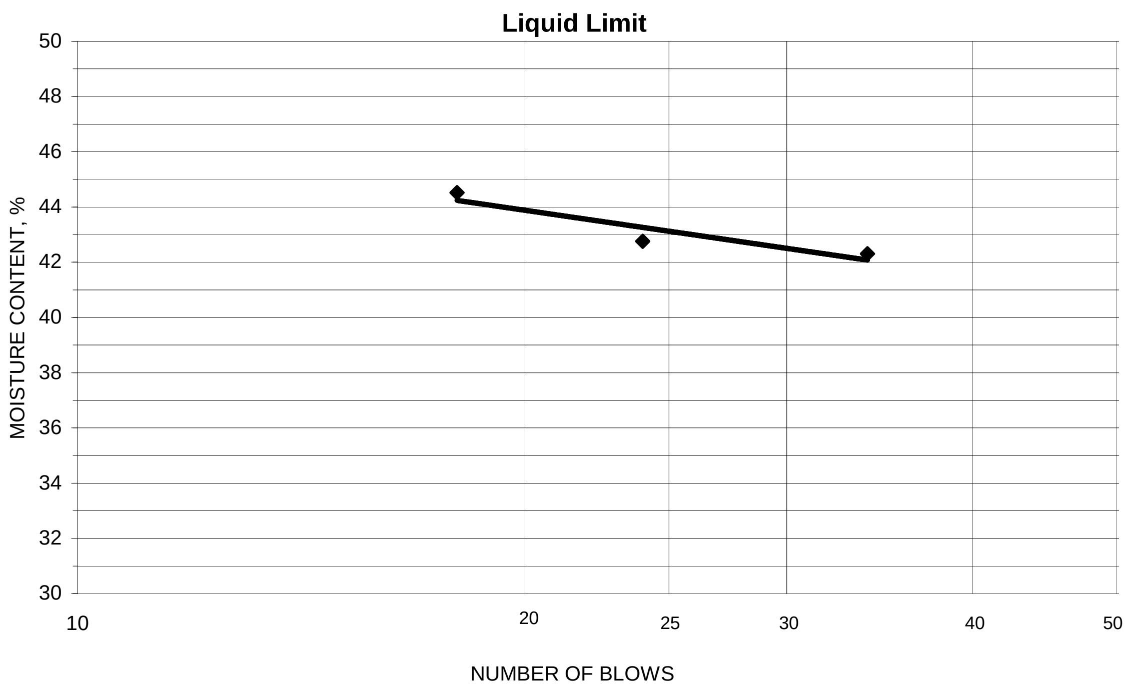
Reviewed By RHB

Stantec

ATTERBERG LIMITS

Project	Gallatin Fossil Plant (GAF) - Ash Ponds	Project No.	175559018
Source	STN-A-7, 30.0'-31.5', 31.5'-33.0', 33.0'-34.5'	Lab ID	204
		% + No. 40	31
Tested By	KDK	Test Method	ASTM D 4318 Method A
Date Received	10-09-2009		
Test Date	10-15-2009	Prepared	Dry

Wet Soil and Tare Mass (g)	Dry Soil and Tare Mass (g)	Tare Mass (g)	Number of Blows	Water Content (%)	Liquid Limit
14.35	11.38	4.36	34	42.3	43
16.05	12.54	4.33	24	42.8	
15.38	11.97	4.31	18	44.5	



PLASTIC LIMIT AND PLASTICITY INDEX

Wet Soil and Tare Mass (g)	Dry Soil and Tare Mass (g)	Tare Mass (g)	Water Content (%)	Plastic Limit	Plasticity Index
11.44	10.45	4.33	16.2	16	27
12.71	11.52	4.30	16.5		

Remarks:

Reviewed By RHB

Summary of Soil Tests

Project Name	Gallatin Fossil Plant (GAF) - Ash Ponds	Project Number	175559018
Source	STN-A-10, 15.0'-16.5', 16.5'-18.0', 18.0'-19.5'	Lab ID	265
County	Sumner	Date Received	10-9-09
Sample Type	SPT Comp	Date Reported	10-26-09

Test Results

Natural Moisture Content

Test Not Performed

Moisture Content (%): N/A

Particle Size Analysis

Preparation Method: ASTM D 421

Gradation Method: ASTM D 422

Hydrometer Method: ASTM D 422

Particle Size		%
Sieve Size	(mm)	Passing
3"	75	
2"	50	
1 1/2"	37.5	
1"	25	
3/4"	19	100.0
3/8"	9.5	95.0
No. 4	4.75	86.0
No. 10	2	71.3
No. 40	0.425	52.6
No. 200	0.075	35.1
	0.02	22.1
	0.005	13.2
	0.002	9.4
estimated	0.001	7.9

Plus 3 in. material, not included: 0 (%)

Range	ASTM (%)	AASHTO (%)
Gravel	14.0	28.7
Coarse Sand	14.7	18.7
Medium Sand	18.7	---
Fine Sand	17.5	17.5
Silt	21.9	25.7
Clay	13.2	9.4

Atterberg Limits

Test Method: ASTM D 4318 Method A

Prepared: Dry

Liquid Limit: ---

Plastic Limit: Non Plastic

Plasticity Index: ---

Activity Index: N/A

Moisture-Density Relationship

Test Not Performed

Maximum Dry Density (lb/ft^3): N/A

Maximum Dry Density (kg/m^3): N/A

Optimum Moisture Content (%): N/A

Over Size Correction %: N/A

California Bearing Ratio

Test Not Performed

Bearing Ratio (%): N/A

Compacted Dry Density (lb/ft^3): N/A

Compacted Moisture Content (%): N/A

Specific Gravity

Test Method: ASTM D 854

Prepared: Dry

Particle Size: No. 10

Specific Gravity at 20° Celsius: 2.70

Classification

Unified Group Symbol: SM

Group Name: Silty sand

AASHTO Classification: A-2-4 (0)

Comments:

Stantec

Particle-Size Analysis of Soils
ASTM D 422

Project Name	Gallatin Fossil Plant (GAF) - Ash Ponds	Project Number	175559018
Source	STN-A-10, 15.0'-16.5', 16.5'-18.0', 18.0'-19.5'	Lab ID	265

Sieve analysis for the Portion Coarser than the No. 10 Sieve

Test Method: ASTM D 422
Prepared using: ASTM D 421

Particle Shape: Angular
Particle Hardness: Hard and Durable

Tested By: KDK
Test Date: 10-13-2009
Date Received 10-09-2009

Maximum Particle size: 3/4" Sieve

Sieve Size	% Passing
3"	
2"	
1 1/2"	
1"	
3/4"	100.0
3/8"	95.0
No. 4	86.0
No. 10	71.3

Analysis for the portion Finer than the No. 10 Sieve

Analysis Based on: Total Sample

Specific Gravity 2.7

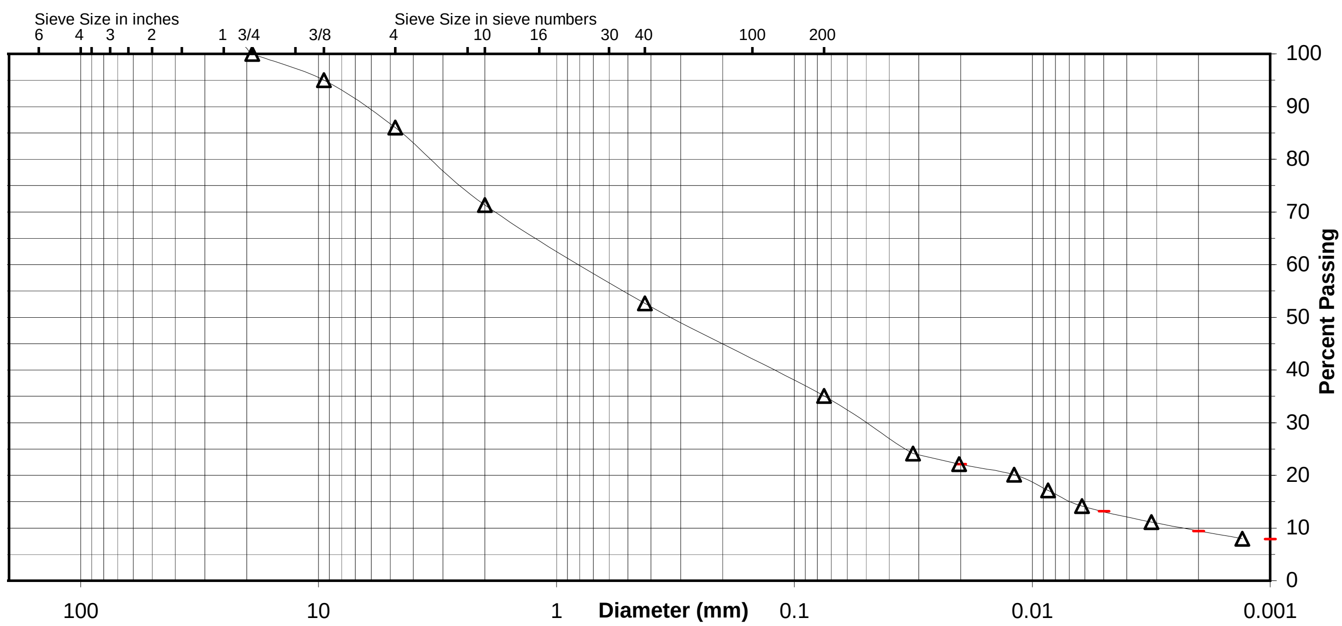
Dispersed using: Apparatus A - Mechanical, for 1 minute

No. 40	52.6
No. 200	35.1
0.02 mm	22.1
0.005 mm	13.2
0.002 mm	9.4
0.001 mm	7.9

Particle Size Distribution

ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay
	0.0	14.0	14.7	18.7	17.5	21.9	13.2

AASHTO	Gravel	Coarse Sand	Fine Sand	Silt	Clay
	28.7	18.7	17.5	25.7	9.4



Comments

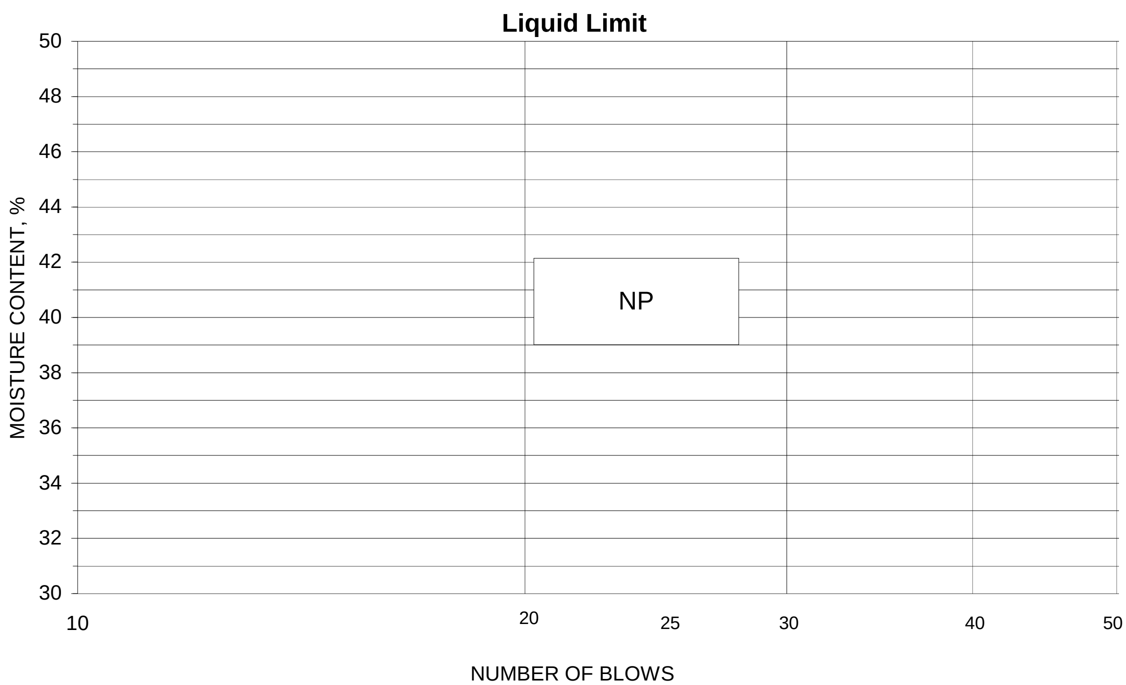
Reviewed By RHB

Stantec

ATTERBERG LIMITS

Project	Gallatin Fossil Plant (GAF) - Ash Ponds	Project No.	175559018
Source	STN-A-10, 15.0'-16.5', 16.5'-18.0', 18.0'-19.5'	Lab ID	265
		% + No. 40	47
Tested By	RHB	Test Method	ASTM D 4318 Method A
Date Received	10-09-2009		
Test Date	10-26-2009	Prepared	Dry

Wet Soil and Tare Mass (g)	Dry Soil and Tare Mass (g)	Tare Mass (g)	Number of Blows	Water Content (%)	Liquid Limit



PLASTIC LIMIT AND PLASTICITY INDEX

Wet Soil and Tare Mass (g)	Dry Soil and Tare Mass (g)	Tare Mass (g)	Water Content (%)	Plastic Limit	Plasticity Index

Remarks:

Reviewed By RHB

Stantec

Summary of Soil Tests

Project Name: Gallatin Fossil Plant (GAF) - Ash Ponds
Project Number: 175559018
Source: STN-C-1, 3.0'-4.5', 4.5'-6.0', 6.0'-7.5'
Lab ID: 281

County: Sumner
Date Received: 10-9-09
Sample Type: SPT Comp
Date Reported: 10-28-09

Test Results

Natural Moisture Content
Test Not Performed
Moisture Content (%): N/A

Particle Size Analysis
Preparation Method: ASTM D 421
Gradation Method: ASTM D 422
Hydrometer Method: ASTM D 422

Particle Size		%
Sieve Size	(mm)	Passing
3"	75	
2"	50	
1 1/2"	37.5	
1"	25	100.0
3/4"	19	97.0
3/8"	9.5	81.9
No. 4	4.75	65.2
No. 10	2	45.0
No. 40	0.425	21.5
No. 200	0.075	5.2
	0.02	2.4
	0.005	1.4
	0.002	1.1
estimated	0.001	0.9

Plus 3 in. material, not included: 0 (%)

Range	ASTM (%)	AASHTO (%)
Gravel	34.8	55.0
Coarse Sand	20.2	23.5
Medium Sand	23.5	---
Fine Sand	16.3	16.3
Silt	3.8	4.1
Clay	1.4	1.1

Atterberg Limits
Test Method: ASTM D 4318 Method A
Prepared: Dry
Liquid Limit: ---
Plastic Limit: Non Plastic
Plasticity Index: ---
Activity Index: N/A

Moisture-Density Relationship
Test Not Performed
Maximum Dry Density (lb/ft^3): N/A
Maximum Dry Density (kg/m^3): N/A
Optimum Moisture Content (%): N/A
Over Size Correction %: N/A

California Bearing Ratio
Test Not Performed
Bearing Ratio (%): N/A
Compacted Dry Density (lb/ft^3): N/A
Compacted Moisture Content (%): N/A

Specific Gravity
Test Method: ASTM D 854
Prepared: Dry
Particle Size: No. 10
Specific Gravity at 20° Celsius: 2.71

Classification
Unified Group Symbol: SW-SM
Group Name: Well-graded sand with silt and gravel
AASHTO Classification: A-1-a (1)

Comments:

Stantec

Particle-Size Analysis of Soils
ASTM D 422

Project Name: Gallatin Fossil Plant (GAF) - Ash Ponds
Project Number: 175559018
Source: STN-C-1, 3.0'-4.5', 4.5'-6.0', 6.0'-7.5'
Lab ID: 281

Sieve analysis for the Portion Coarser than the No. 10 Sieve

Test Method: ASTM D 422
Prepared using: ASTM D 421

Particle Shape: Angular
Particle Hardness: Hard and Durable

Tested By: CLH
Test Date: 10-20-2009
Date Received: 10-09-2009

Maximum Particle size: 1" Sieve

Sieve Size	% Passing
3"	
2"	
1 1/2"	
1"	100.0
3/4"	97.0
3/8"	81.9
No. 4	65.2
No. 10	45.0

Analysis for the portion Finer than the No. 10 Sieve

Analysis Based on: Total Sample

Specific Gravity: 2.71

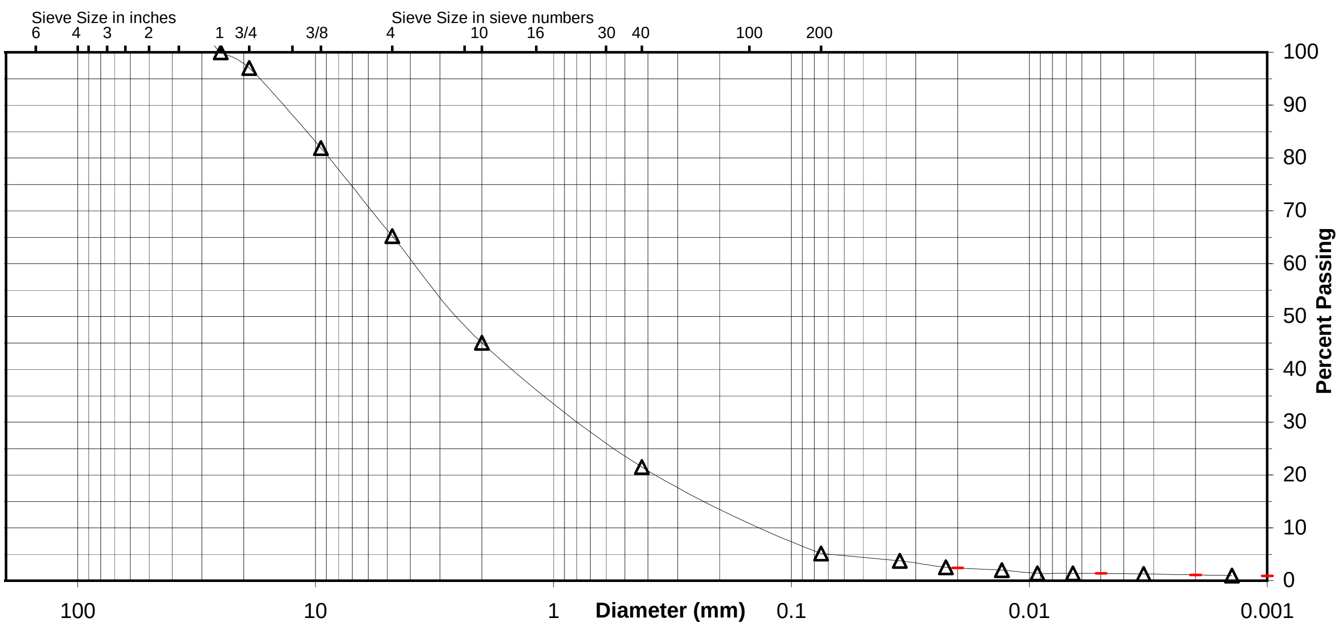
Dispersed using: Apparatus A - Mechanical, for 1 minute

No. 40	21.5
No. 200	5.2
0.02 mm	2.4
0.005 mm	1.4
0.002 mm	1.1
0.001 mm	0.9

Particle Size Distribution

ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay
	3.0	31.8	20.2	23.5	16.3	3.8	1.4

AASHTO	Gravel	Coarse Sand	Fine Sand	Silt	Clay
	55.0	23.5	16.3	4.1	1.1



Comments

Reviewed By RHB

Stantec

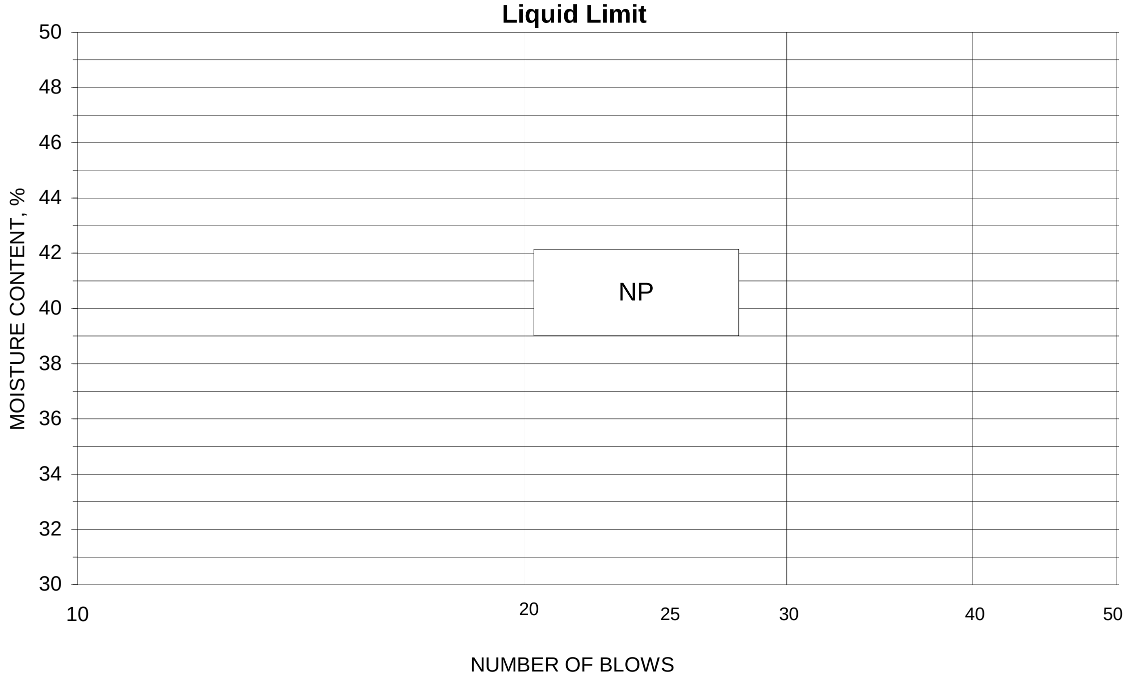
ATTERBERG LIMITS

Project	Gallatin Fossil Plant (GAF) - Ash Ponds	Project No.	175559018
Source	STN-C-1, 3.0'-4.5', 4.5'-6.0', 6.0'-7.5'	Lab ID	281
		% + No. 40	79

Tested By	RHB	Test Method	ASTM D 4318 Method A	Date Received	10-09-2009
Test Date	10-26-2009	Prepared	Dry		

Wet Soil and Tare Mass (g)	Dry Soil and Tare Mass (g)	Tare Mass (g)	Number of Blows	Water Content (%)	Liquid Limit

Liquid Limit



PLASTIC LIMIT AND PLASTICITY INDEX

Wet Soil and Tare Mass (g)	Dry Soil and Tare Mass (g)	Tare Mass (g)	Water Content (%)	Plastic Limit	Plasticity Index

Remarks:

Reviewed By RHB

Stantec

Summary of Soil Tests

Project Name	Gallatin Fossil Plant (GAF) - Ash Ponds	Project Number	175559018
Source	STN-D-2, 6.0'-7.5', 7.5'-9.0', 9.0'-10.5'	Lab ID	309
County	Sumner	Date Received	10-9-09
Sample Type	SPT Comp	Date Reported	10-28-09

Test Results

Natural Moisture Content

Test Not Performed

Moisture Content (%): N/A

Particle Size Analysis

Preparation Method: ASTM D 421

Gradation Method: ASTM D 422

Hydrometer Method: ASTM D 422

Particle Size		%
Sieve Size	(mm)	Passing
3"	75	
2"	50	
1 1/2"	37.5	
1"	25	
3/4"	19	100.0
3/8"	9.5	97.4
No. 4	4.75	94.4
No. 10	2	90.8
No. 40	0.425	85.3
No. 200	0.075	76.9
	0.02	59.4
	0.005	38.8
	0.002	32.2
estimated	0.001	29.8

Plus 3 in. material, not included: 0 (%)

Range	ASTM (%)	AASHTO (%)
Gravel	5.6	9.2
Coarse Sand	3.6	5.5
Medium Sand	5.5	---
Fine Sand	8.4	8.4
Silt	38.1	44.7
Clay	38.8	32.2

Atterberg Limits

Test Method: ASTM D 4318 Method A

Prepared: Dry

Liquid Limit: 41

Plastic Limit: 15

Plasticity Index: 26

Activity Index: 0.81

Moisture-Density Relationship

Test Not Performed

Maximum Dry Density (lb/ft^3): N/A

Maximum Dry Density (kg/m^3): N/A

Optimum Moisture Content (%): N/A

Over Size Correction %: N/A

California Bearing Ratio

Test Not Performed

Bearing Ratio (%): N/A

Compacted Dry Density (lb/ft^3): N/A

Compacted Moisture Content (%): N/A

Specific Gravity

Test Method: ASTM D 854

Prepared: Dry

Particle Size: No. 10

Specific Gravity at 20° Celsius: 2.71

Classification

Unified Group Symbol: CL

Group Name: Lean clay with sand

AASHTO Classification: A-7-6 (19)

Comments:

Particle-Size Analysis of Soils
ASTM D 422

Project Name	Gallatin Fossil Plant (GAF) - Ash Ponds	Project Number	175559018
Source	STN-D-2, 6.0'-7.5', 7.5'-9.0', 9.0'-10.5'	Lab ID	309

Sieve analysis for the Portion Coarser than the No. 10 Sieve

Test Method: ASTM D 422
Prepared using: ASTM D 421

Particle Shape: Angular
Particle Hardness: Weathered and Friable

Tested By: CLH
Test Date: 10-20-2009
Date Received 10-09-2009

Maximum Particle size: 3/4" Sieve

Sieve Size	% Passing
3"	
2"	
1 1/2"	
1"	
3/4"	100.0
3/8"	97.4
No. 4	94.4
No. 10	90.8

Analysis for the portion Finer than the No. 10 Sieve

Analysis Based on: Total Sample

Specific Gravity 2.71

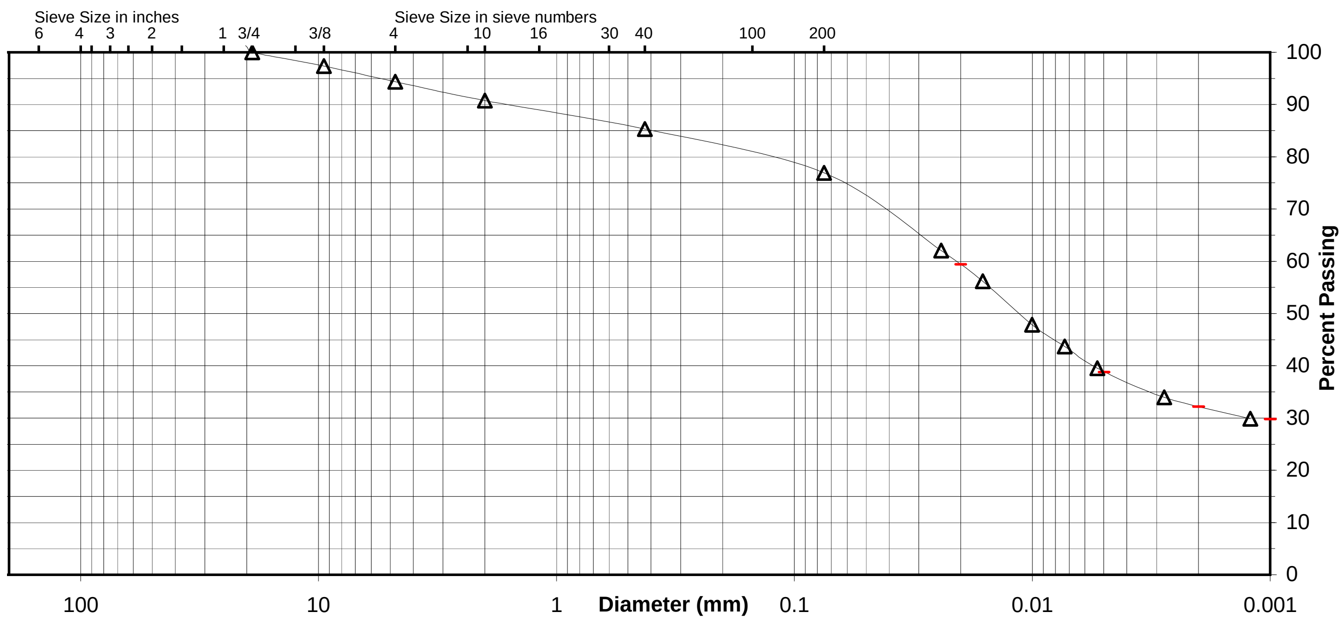
Dispersed using: Apparatus A - Mechanical, for 1 minute

No. 40	85.3
No. 200	76.9
0.02 mm	59.4
0.005 mm	38.8
0.002 mm	32.2
0.001 mm	29.8

Particle Size Distribution

ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay
	0.0	5.6	3.6	5.5	8.4	38.1	38.8

AASHTO	Gravel	Coarse Sand	Fine Sand	Silt	Clay
	9.2	5.5	8.4	44.7	32.2



Comments

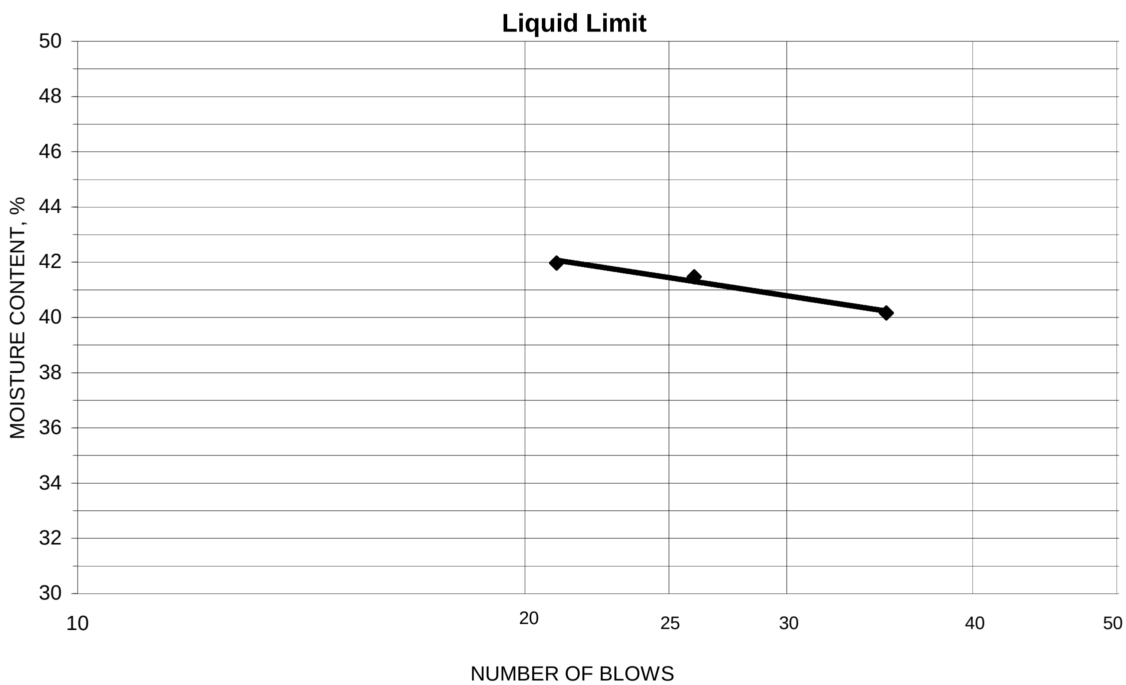
Reviewed By RHB

Stantec

ATTERBERG LIMITS

Project	Gallatin Fossil Plant (GAF) - Ash Ponds	Project No.	175559018
Source	STN-D-2, 6.0'-7.5', 7.5'-9.0', 9.0'-10.5'	Lab ID	309
		% + No. 40	15
Tested By	Need! Input-Limit Test Method ASTM D 4318 Method A	Date Received	10-09-2009
Test Date	Need! Input-Limit Prepared Dry		

Wet Soil and Tare Mass (g)	Dry Soil and Tare Mass (g)	Tare Mass (g)	Number of Blows	Water Content (%)	Liquid Limit
15.05	11.99	4.37	35	40.2	41
14.88	11.79	4.34	26	41.5	
14.88	11.77	4.36	21	42.0	



PLASTIC LIMIT AND PLASTICITY INDEX

Wet Soil and Tare Mass (g)	Dry Soil and Tare Mass (g)	Tare Mass (g)	Water Content (%)	Plastic Limit	Plasticity Index
11.44	10.46	4.34	16.0	15	26
11.74	10.80	4.38	14.6		

Remarks:

Reviewed By RHB

Summary of Soil Tests

Project Name: Gallatin Fossil Plant (GAF) - Ash Ponds
Project Number: 175559018
Source: STN-E-2, 4.5'-6.0', 6.0'-7.5', 7.5'-9.0'
Lab ID: 345

County: Sumner
Date Received: 10-9-09
Sample Type: SPT Comp
Date Reported: 10-26-09

Test Results

Natural Moisture Content

Test Not Performed

Moisture Content (%): N/A

Particle Size Analysis

Preparation Method: ASTM D 421
Gradation Method: ASTM D 422
Hydrometer Method: ASTM D 422

Particle Size		%
Sieve Size	(mm)	Passing
3"	75	
2"	50	
1 1/2"	37.5	100.0
1"	25	90.9
3/4"	19	90.9
3/8"	9.5	84.0
No. 4	4.75	77.2
No. 10	2	69.5
No. 40	0.425	62.7
No. 200	0.075	55.8
	0.02	39.2
	0.005	26.8
	0.002	20.6
estimated	0.001	17.6

Plus 3 in. material, not included: 0 (%)

Range	ASTM (%)	AASHTO (%)
Gravel	22.8	30.5
Coarse Sand	7.7	6.8
Medium Sand	6.8	---
Fine Sand	6.9	6.9
Silt	29.0	35.2
Clay	26.8	20.6

Atterberg Limits

Test Method: ASTM D 4318 Method A
Prepared: Dry

Liquid Limit: 33
Plastic Limit: 16
Plasticity Index: 17
Activity Index: 0.81

Moisture-Density Relationship

Test Not Performed

Maximum Dry Density (lb/ft^3): N/A
Maximum Dry Density (kg/m^3): N/A
Optimum Moisture Content (%): N/A
Over Size Correction %: N/A

California Bearing Ratio

Test Not Performed

Bearing Ratio (%): N/A
Compacted Dry Density (lb/ft^3): N/A
Compacted Moisture Content (%): N/A

Specific Gravity

Test Method: ASTM D 854
Prepared: Dry

Particle Size: No. 10
Specific Gravity at 20° Celsius: 2.71

Classification

Unified Group Symbol: CL
Group Name: Gravelly lean clay with sand

AASHTO Classification: A-6 (6)

Comments:

Stantec

Particle-Size Analysis of Soils

ASTM D 422

Project Name	Gallatin Fossil Plant (GAF) - Ash Ponds	Project Number	175559018
Source	STN-E-2, 4.5'-6.0', 6.0'-7.5', 7.5'-9.0'	Lab ID	345

Sieve analysis for the Portion Coarser than the No. 10 Sieve

Test Method: ASTM D 422
Prepared using: ASTM D 421

Particle Shape: Rounded and Angular
Particle Hardness: Hard and Durable

Tested By: KDK
Test Date: 10-20-2009
Date Received 10-09-2009

Maximum Particle size: 1 1/2" Sieve

Sieve Size	% Passing
3"	
2"	
1 1/2"	100.0
1"	90.9
3/4"	90.9
3/8"	84.0
No. 4	77.2
No. 10	69.5

Analysis for the portion Finer than the No. 10 Sieve

Analysis Based on: Total Sample

Specific Gravity 2.71

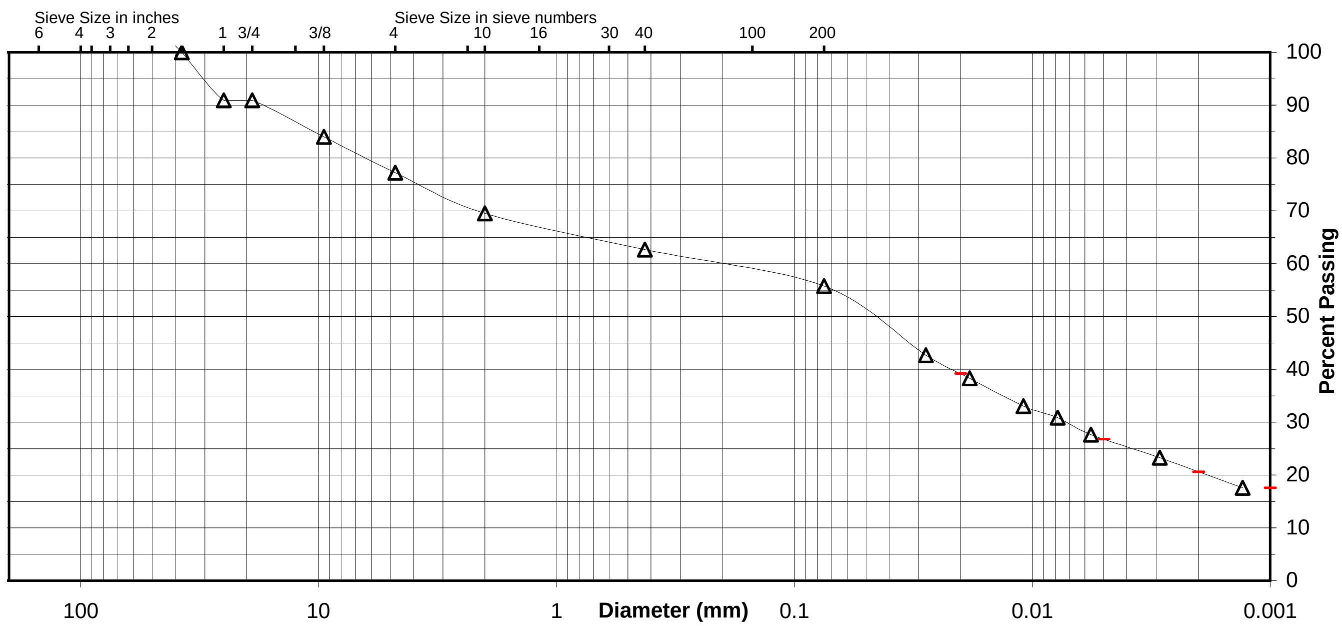
Dispersed using: Apparatus A - Mechanical, for 1 minute

No. 40	62.7
No. 200	55.8
0.02 mm	39.2
0.005 mm	26.8
0.002 mm	20.6
0.001 mm	17.6

Particle Size Distribution

ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay
	9.1	13.7	7.7	6.8	6.9	29.0	26.8

AASHTO	Gravel	Coarse Sand	Fine Sand	Silt	Clay
	30.5	6.8	6.9	35.2	20.6



Comments

Reviewed By RHB

File: frm_175559018_sum_345 Sheet: Hydro-Report
Preparation Date: 1998
Revision Date: 1-2008

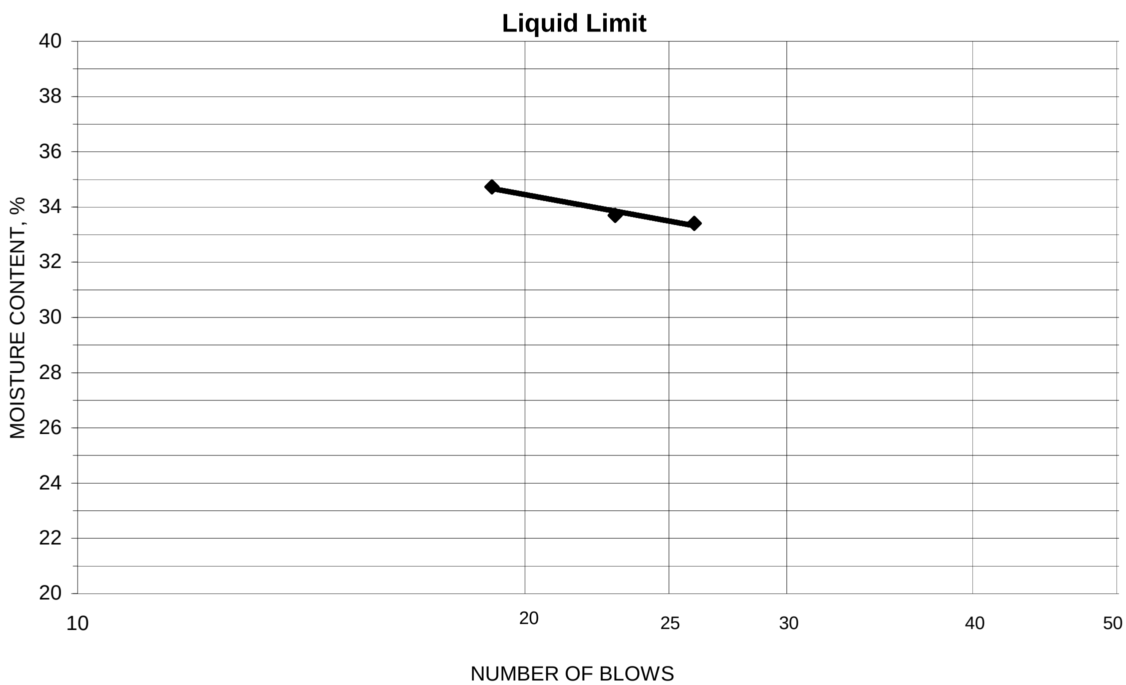
Stantec Consulting Services Inc.

Laboratory Document
Prepared By: MW
Approved BY: TLK

ATTERBERG LIMITS

Project	Gallatin Fossil Plant (GAF) - Ash Ponds	Project No.	175559018
Source	STN-E-2, 4.5'-6.0', 6.0'-7.5', 7.5'-9.0'	Lab ID	345
		% + No. 40	37
Tested By	KDK	Test Method	ASTM D 4318 Method A
Date Received	10-09-2009		
Test Date	10-21-2009	Prepared	Dry

Wet Soil and Tare Mass (g)	Dry Soil and Tare Mass (g)	Tare Mass (g)	Number of Blows	Water Content (%)	Liquid Limit
16.46	13.40	4.32	23	33.7	33
15.59	12.77	4.33	26	33.4	
15.68	12.77	4.39	19	34.7	



PLASTIC LIMIT AND PLASTICITY INDEX

Wet Soil and Tare Mass (g)	Dry Soil and Tare Mass (g)	Tare Mass (g)	Water Content (%)	Plastic Limit	Plasticity Index
11.07	10.16	4.33	15.6	16	17
11.79	10.76	4.33	16.0		

Remarks:

Reviewed By RHB

Stantec

Summary of Soil Tests

Project Name: Gallatin Fossil Plant (GAF) - Ash Ponds
Project Number: 175559018
Source: STN-E-3, 4.5'-6.0', 6.0'-7.5', 7.5'-9.0'
Lab ID: 367

County: Sumner
Date Received: 10-9-09
Sample Type: SPT Comp
Date Reported: 10-26-09

Test Results

Natural Moisture Content

Test Not Performed

Moisture Content (%): N/A

Particle Size Analysis

Preparation Method: ASTM D 421
Gradation Method: ASTM D 422
Hydrometer Method: ASTM D 422

Particle Size		%
Sieve Size	(mm)	Passing
3"	75	
2"	50	
1 1/2"	37.5	
1"	25	
3/4"	19	100.0
3/8"	9.5	95.5
No. 4	4.75	84.1
No. 10	2	67.3
No. 40	0.425	44.7
No. 200	0.075	27.7
	0.02	12.1
	0.005	3.4
	0.002	1.8
estimated	0.001	1.0

Plus 3 in. material, not included: 0 (%)

Range	ASTM (%)	AASHTO (%)
Gravel	15.9	32.7
Coarse Sand	16.8	22.6
Medium Sand	22.6	---
Fine Sand	17.0	17.0
Silt	24.3	25.9
Clay	3.4	1.8

Atterberg Limits

Test Method: ASTM D 4318 Method A
Prepared: Dry

Liquid Limit: ---
Plastic Limit: Non Plastic
Plasticity Index: ---
Activity Index: N/A

Moisture-Density Relationship

Test Not Performed

Maximum Dry Density (lb/ft^3): N/A
Maximum Dry Density (kg/m^3): N/A
Optimum Moisture Content (%): N/A
Over Size Correction %: N/A

California Bearing Ratio

Test Not Performed

Bearing Ratio (%): N/A
Compacted Dry Density (lb/ft^3): N/A
Compacted Moisture Content (%): N/A

Specific Gravity

Test Method: ASTM D 854
Prepared: Dry

Particle Size: No. 10
Specific Gravity at 20° Celsius: 2.66

Classification

Unified Group Symbol: SM
Group Name: Silty sand with gravel

AASHTO Classification: A-2-4 (0)

Comments:

Particle-Size Analysis of Soils
ASTM D 422

Project Name: Gallatin Fossil Plant (GAF) - Ash Ponds
Source: STN-E-3, 4.5'-6.0', 6.0'-7.5', 7.5'-9.0'

Project Number: 175559018
Lab ID: 367

Sieve analysis for the Portion Coarser than the No. 10 Sieve

Test Method: ASTM D 422
Prepared using: ASTM D 421

Particle Shape: Angular
Particle Hardness: Hard and Durable

Tested By: CLH
Test Date: 10-20-2009
Date Received: 10-09-2009

Maximum Particle size: 3/4" Sieve

Sieve Size	% Passing
3"	
2"	
1 1/2"	
1"	
3/4"	100.0
3/8"	95.5
No. 4	84.1
No. 10	67.3

Analysis for the portion Finer than the No. 10 Sieve

Analysis Based on: Total Sample

Specific Gravity: 2.66

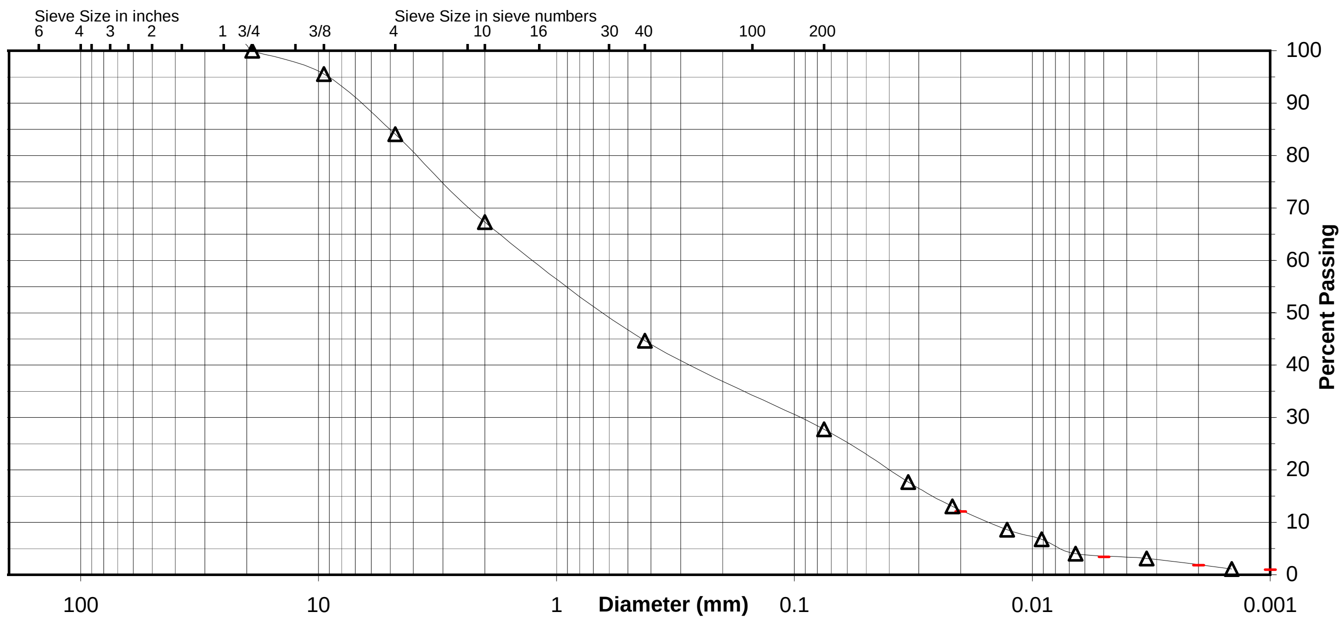
Dispersed using: Apparatus A - Mechanical, for 1 minute

No. 40	44.7
No. 200	27.7
0.02 mm	12.1
0.005 mm	3.4
0.002 mm	1.8
0.001 mm	1.0

Particle Size Distribution

ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay
	0.0	15.9	16.8	22.6	17.0	24.3	3.4

AASHTO	Gravel	Coarse Sand	Fine Sand	Silt	Clay
	32.7	22.6	17.0	25.9	1.8



Comments

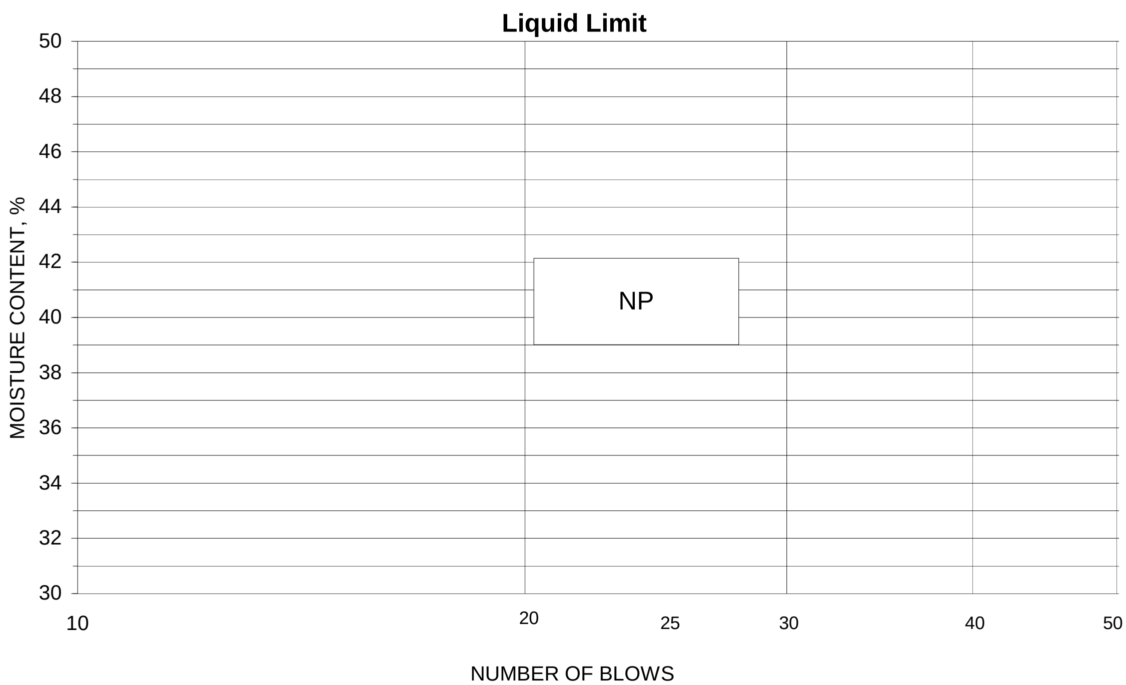
Reviewed By RHB

Stantec

ATTERBERG LIMITS

Project	Gallatin Fossil Plant (GAF) - Ash Ponds	Project No.	175559018
Source	STN-E-3, 4.5'-6.0', 6.0'-7.5', 7.5'-9.0'	Lab ID	367
		% + No. 40	55
Tested By	RHB	Test Method	ASTM D 4318 Method A
Date Received	10-09-2009		
Test Date	10-26-2009	Prepared	Dry

Wet Soil and Tare Mass (g)	Dry Soil and Tare Mass (g)	Tare Mass (g)	Number of Blows	Water Content (%)	Liquid Limit



PLASTIC LIMIT AND PLASTICITY INDEX

Wet Soil and Tare Mass (g)	Dry Soil and Tare Mass (g)	Tare Mass (g)	Water Content (%)	Plastic Limit	Plasticity Index

Remarks:

Reviewed By RHB

Summary of Soil Tests

Project Name	Gallatin Fossil Plant (GAF) - Ash Ponds	Project Number	175559018
Source	STN-E-3, 25.5'-27.0', 27.0'-28.5', 28.5'-30.0'	Lab ID	382
County	Sumner	Date Received	10-9-09
Sample Type	SPT Comp	Date Reported	10-26-09

Test Results

Natural Moisture Content

Test Not Performed

Moisture Content (%): N/A

Particle Size Analysis

Preparation Method: ASTM D 421

Gradation Method: ASTM D 422

Hydrometer Method: ASTM D 422

Particle Size		%
Sieve Size	(mm)	Passing
3"	75	
2"	50	
1 1/2"	37.5	
1"	25	
3/4"	19	100.0
3/8"	9.5	96.8
No. 4	4.75	93.7
No. 10	2	91.0
No. 40	0.425	86.1
No. 200	0.075	76.2
	0.02	57.6
	0.005	46.8
	0.002	41.8
estimated	0.001	38.6

Plus 3 in. material, not included: 0 (%)

Range	ASTM (%)	AASHTO (%)
Gravel	6.3	9.0
Coarse Sand	2.7	4.9
Medium Sand	4.9	---
Fine Sand	9.9	9.9
Silt	29.4	34.4
Clay	46.8	41.8

Atterberg Limits

Test Method: ASTM D 4318 Method A

Prepared: Dry

Liquid Limit: 54

Plastic Limit: 18

Plasticity Index: 36

Activity Index: 0.86

Moisture-Density Relationship

Test Not Performed

Maximum Dry Density (lb/ft^3): N/A

Maximum Dry Density (kg/m^3): N/A

Optimum Moisture Content (%): N/A

Over Size Correction %: N/A

California Bearing Ratio

Test Not Performed

Bearing Ratio (%): N/A

Compacted Dry Density (lb/ft^3): N/A

Compacted Moisture Content (%): N/A

Specific Gravity

Test Method: ASTM D 854

Prepared: Dry

Particle Size: No. 10

Specific Gravity at 20° Celsius: 2.71

Classification

Unified Group Symbol: CH

Group Name: Fat clay with sand

AASHTO Classification: A-7-6 (27)

Comments:

Particle-Size Analysis of Soils
ASTM D 422

Project Name	Gallatin Fossil Plant (GAF) - Ash Ponds	Project Number	175559018
Source	STN-E-3, 25.5'-27.0', 27.0'-28.5', 28.5'-30.0'	Lab ID	382

Sieve analysis for the Portion Coarser than the No. 10 Sieve

Test Method: ASTM D 422
Prepared using: ASTM D 421

Particle Shape: Rounded
Particle Hardness: Hard and Durable

Tested By: SW
Test Date: 10-20-2009
Date Received 10-09-2009

Maximum Particle size: 3/4" Sieve

Sieve Size	% Passing
3"	
2"	
1 1/2"	
1"	
3/4"	100.0
3/8"	96.8
No. 4	93.7
No. 10	91.0

Analysis for the portion Finer than the No. 10 Sieve

Analysis Based on: Total Sample

Specific Gravity 2.71

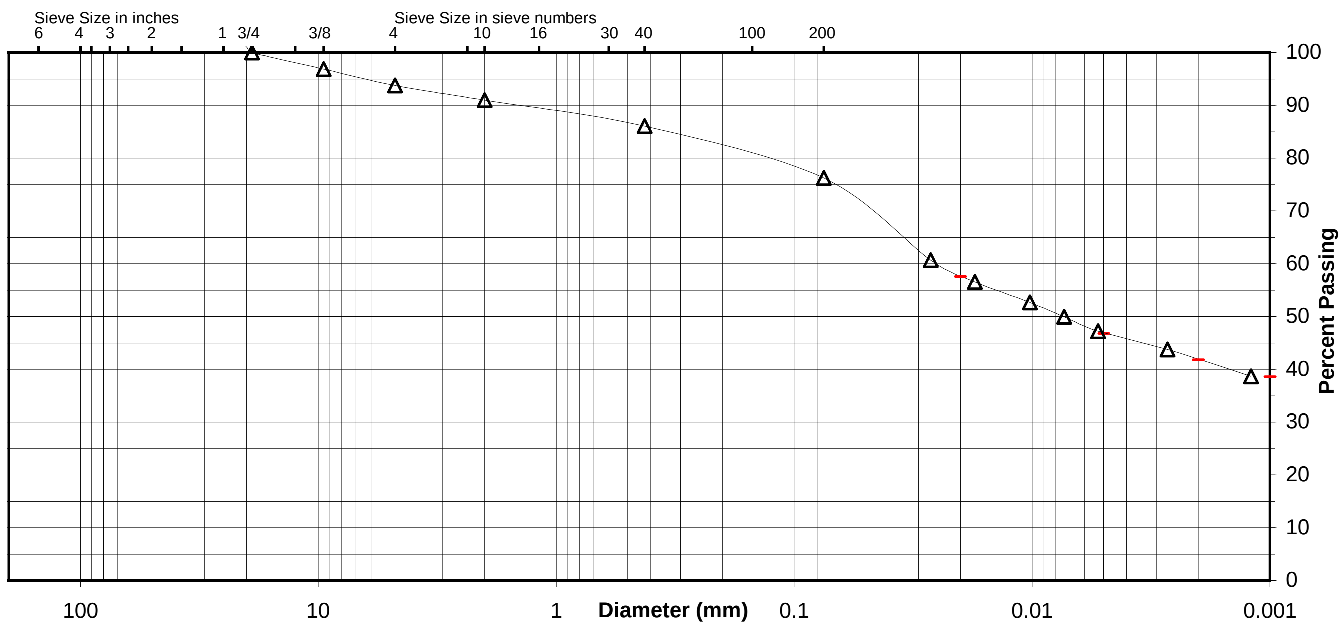
Dispersed using: Apparatus A - Mechanical, for 1 minute

No. 40	86.1
No. 200	76.2
0.02 mm	57.6
0.005 mm	46.8
0.002 mm	41.8
0.001 mm	38.6

Particle Size Distribution

ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay
	0.0	6.3	2.7	4.9	9.9	29.4	46.8

AASHTO	Gravel	Coarse Sand	Fine Sand	Silt	Clay
	9.0	4.9	9.9	34.4	41.8



Comments

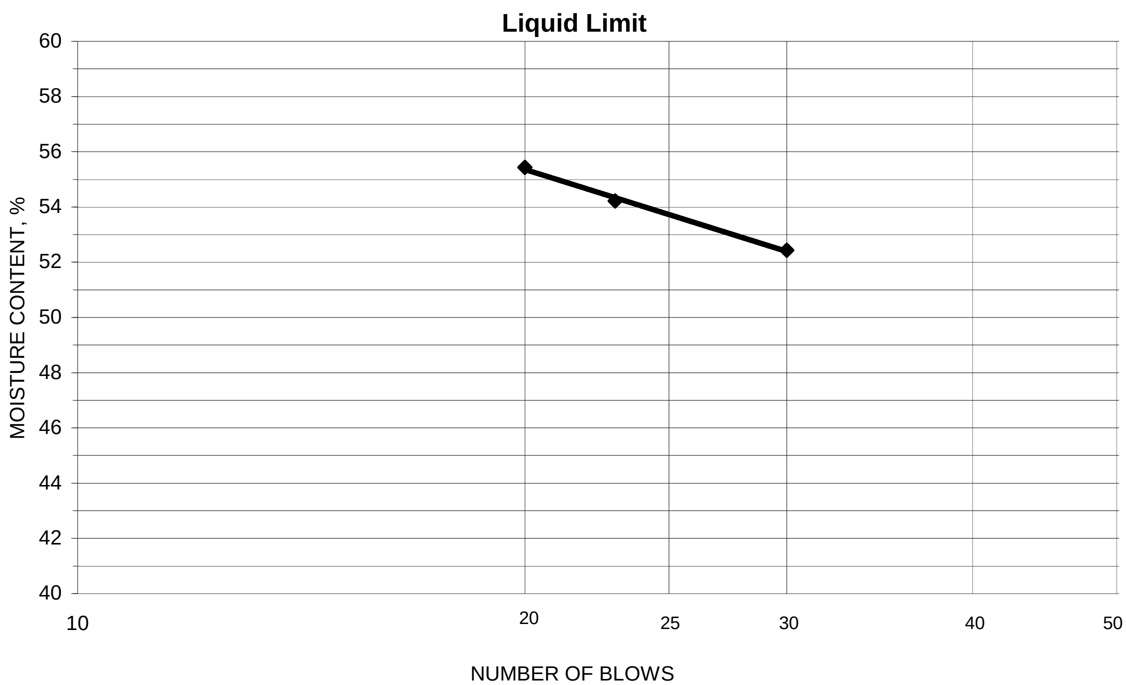
Reviewed By RHB

Stantec

ATTERBERG LIMITS

Project	Gallatin Fossil Plant (GAF) - Ash Ponds	Project No.	175559018
Source	STN-E-3, 25.5'-27.0', 27.0'-28.5', 28.5'-30.0'	Lab ID	382
		% + No. 40	14
Tested By	KDK	Test Method	ASTM D 4318 Method A
Date Received	10-09-2009		
Test Date	10-22-2009	Prepared	Dry

Wet Soil and Tare Mass (g)	Dry Soil and Tare Mass (g)	Tare Mass (g)	Number of Blows	Water Content (%)	Liquid Limit
14.38	10.93	4.35	30	52.4	54
13.27	10.12	4.31	23	54.2	
13.04	9.93	4.32	20	55.4	



PLASTIC LIMIT AND PLASTICITY INDEX

Wet Soil and Tare Mass (g)	Dry Soil and Tare Mass (g)	Tare Mass (g)	Water Content (%)	Plastic Limit	Plasticity Index
11.08	10.06	4.35	17.9	18	36
11.59	10.50	4.35	17.7		

Remarks:

Reviewed By RHB

Stantec

Summary of Soil Tests

Project Name: Gallatin Fossil Plant (GAF) - Ash Ponds
Project Number: 175559018
Source: STN-E-4, 34.5'-36.0', 36.0'-37.5', 37.5'-39.0'
Lab ID: 417

County: Sumner
Date Received: 10-9-09
Sample Type: SPT Comp
Date Reported: 10-23-09

Test Results

Natural Moisture Content
Test Not Performed
Moisture Content (%): N/A

Particle Size Analysis
Preparation Method: ASTM D 421
Gradation Method: ASTM D 422
Hydrometer Method: ASTM D 422

Particle Size		%
Sieve Size	(mm)	Passing
3"	75	
2"	50	
1 1/2"	37.5	
1"	25	
3/4"	19	
3/8"	9.5	100.0
No. 4	4.75	99.6
No. 10	2	99.2
No. 40	0.425	98.3
No. 200	0.075	91.6
	0.02	65.4
	0.005	22.8
	0.002	10.4
estimated	0.001	8.2

Plus 3 in. material, not included: 0 (%)

Range	ASTM (%)	AASHTO (%)
Gravel	0.4	0.8
Coarse Sand	0.4	0.9
Medium Sand	0.9	---
Fine Sand	6.7	6.7
Silt	68.8	81.2
Clay	22.8	10.4

Atterberg Limits
Test Method: ASTM D 4318 Method A
Prepared: Dry
Liquid Limit: ---
Plastic Limit: Non Plastic
Plasticity Index: ---
Activity Index: N/A

Moisture-Density Relationship
Test Not Performed
Maximum Dry Density (lb/ft^3): N/A
Maximum Dry Density (kg/m^3): N/A
Optimum Moisture Content (%): N/A
Over Size Correction %: N/A

California Bearing Ratio
Test Not Performed
Bearing Ratio (%): N/A
Compacted Dry Density (lb/ft^3): N/A
Compacted Moisture Content (%): N/A

Specific Gravity
Test Method: ASTM D 854
Prepared: Dry
Particle Size: No. 10
Specific Gravity at 20° Celsius: 2.66

Classification
Unified Group Symbol: ML
Group Name: Silt

AASHTO Classification: A-4 (0)

Comments:

Stantec

Particle-Size Analysis of Soils
ASTM D 422

Project Name	Gallatin Fossil Plant (GAF) - Ash Ponds	Project Number	175559018
Source	STN-E-4, 34.5'-36.0', 36.0'-37.5', 37.5'-39.0'	Lab ID	417

Sieve analysis for the Portion Coarser than the No. 10 Sieve

Test Method: ASTM D 422
Prepared using: ASTM D 421

Particle Shape: Angular
Particle Hardness: Hard and Durable

Tested By: CLH
Test Date: 10-23-2009
Date Received 10-09-2009

Maximum Particle size: 3/8" Sieve

Sieve Size	% Passing
3"	
2"	
1 1/2"	
1"	
3/4"	
3/8"	100.0
No. 4	99.6
No. 10	99.2

Analysis for the portion Finer than the No. 10 Sieve

Analysis Based on: Total Sample

Specific Gravity 2.66

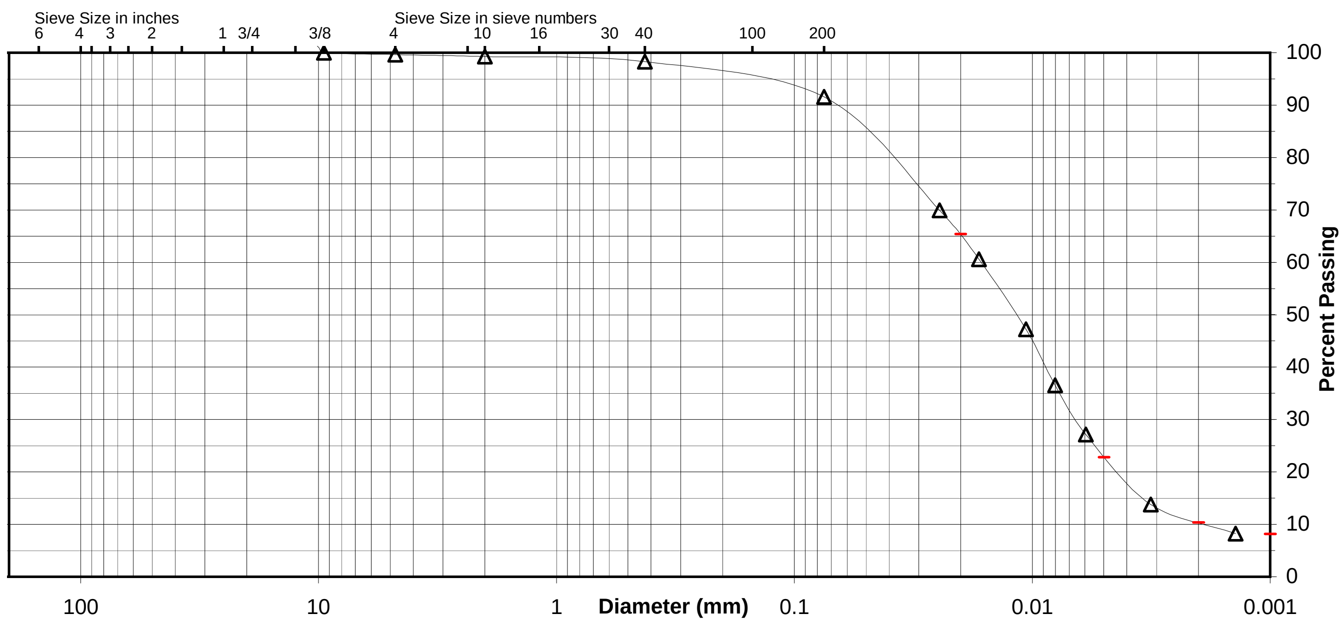
Dispersed using: Apparatus A - Mechanical, for 1 minute

No. 40	98.3
No. 200	91.6
0.02 mm	65.4
0.005 mm	22.8
0.002 mm	10.4
0.001 mm	8.2

Particle Size Distribution

ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay
	0.0	0.4	0.4	0.9	6.7	68.8	22.8

AASHTO	Gravel	Coarse Sand	Fine Sand	Silt	Clay
	0.8	0.9	6.7	81.2	10.4



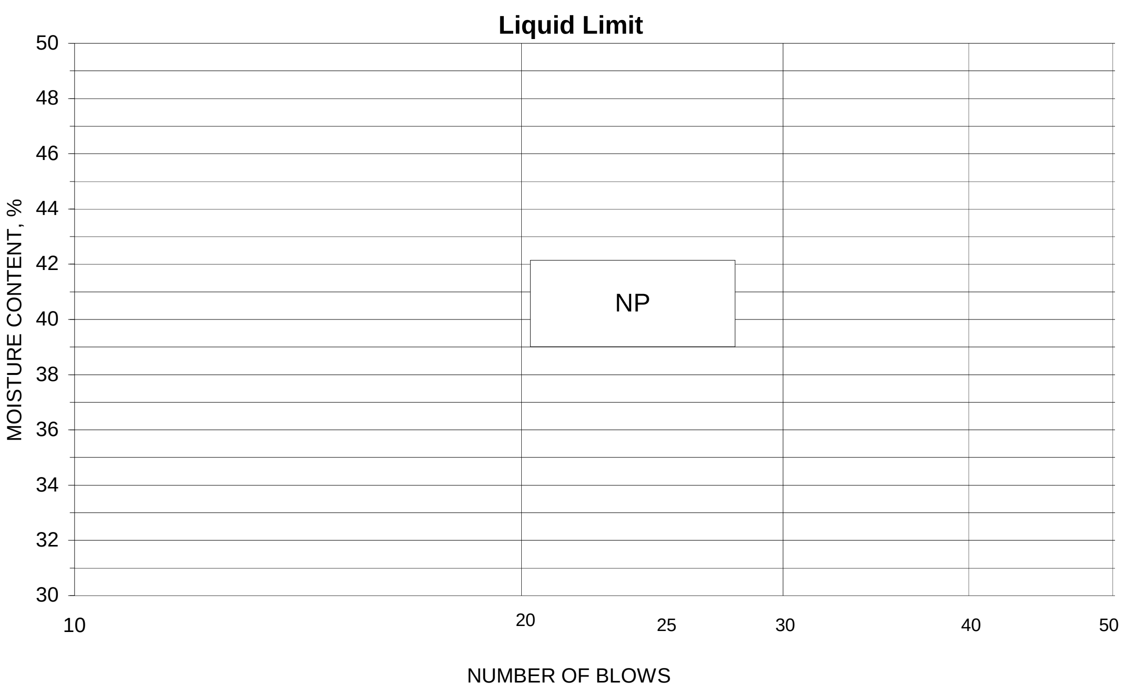
Comments

Reviewed By RHB

ATTERBERG LIMITS

Project	Gallatin Fossil Plant (GAF) - Ash Ponds	Project No.	175559018
Source	STN-E-4, 34.5'-36.0', 36.0'-37.5', 37.5'-39.0'	Lab ID	417
		% + No. 40	2
Tested By	KDK	Test Method	ASTM D 4318 Method A
Date Received	10-09-2009		
Test Date	10-26-2009	Prepared	Dry

Wet Soil and Tare Mass (g)	Dry Soil and Tare Mass (g)	Tare Mass (g)	Number of Blows	Water Content (%)	Liquid Limit



PLASTIC LIMIT AND PLASTICITY INDEX

Wet Soil and Tare Mass (g)	Dry Soil and Tare Mass (g)	Tare Mass (g)	Water Content (%)	Plastic Limit	Plasticity Index

Remarks:

Reviewed By RHB

Stantec

Summary of Soil Tests

Project Name	Gallatin Fossil Plant (GAF) - Ash Ponds	Project Number	175559018
Source	STN-E-8, 31.5'-33.0'	Lab ID	542
County	Sumner	Date Received	10-9-09
Sample Type	SPT Comp	Date Reported	11-11-09

Test Results

Natural Moisture Content
Test Method: ASTM D 2216
Moisture Content (%): 31.0

Particle Size Analysis
Preparation Method: ASTM D 421
Gradation Method: ASTM D 422
Hydrometer Method: ASTM D 422

Particle Size		%
Sieve Size	(mm)	Passing
3"	75	
2"	50	
1 1/2"	37.5	
1"	25	
3/4"	19	
3/8"	9.5	100.0
No. 4	4.75	99.9
No. 10	2	99.8
No. 40	0.425	98.6
No. 200	0.075	50.6
	0.02	35.8
	0.005	27.2
	0.002	23.7
estimated	0.001	23.1

Plus 3 in. material, not included: 0 (%)

	ASTM	AASHTO
Range	(%)	(%)
Gravel	0.1	0.2
Coarse Sand	0.1	1.2
Medium Sand	1.2	---
Fine Sand	48.0	48.0
Silt	23.4	26.9
Clay	27.2	23.7

Atterberg Limits
Test Method: ASTM D 4318 Method A
Prepared: Dry
Liquid Limit: 25
Plastic Limit: 13
Plasticity Index: 12
Activity Index: 0.50

Moisture-Density Relationship
Test Not Performed
Maximum Dry Density (lb/ft^3): N/A
Maximum Dry Density (kg/m^3): N/A
Optimum Moisture Content (%): N/A
Over Size Correction %: N/A

California Bearing Ratio
Test Not Performed
Bearing Ratio (%): N/A
Compacted Dry Density (lb/ft^3): N/A
Compacted Moisture Content (%): N/A

Specific Gravity
Test Method: ASTM D 854
Prepared: Dry
Particle Size: No. 10
Specific Gravity at 20° Celsius: 2.70

Classification
Unified Group Symbol: CL
Group Name: Sandy lean clay

AASHTO Classification: A-6 (3)

Comments:

Stantec

Particle-Size Analysis of Soils
ASTM D 422

Project Name: Gallatin Fossil Plant (GAF) - Ash Ponds
Project Number: 175559018
Source: STN-E-8, 31.5'-33.0'
Lab ID: 542

Sieve analysis for the Portion Coarser than the No. 10 Sieve

Test Method: ASTM D 422
Prepared using: ASTM D 421

Particle Shape: Angular
Particle Hardness: Hard and Durable

Tested By: CLH
Test Date: 11-02-2009
Date Received: 10-09-2009

Maximum Particle size: 3/8" Sieve

Sieve Size	% Passing
3"	
2"	
1 1/2"	
1"	
3/4"	
3/8"	100.0
No. 4	99.9
No. 10	99.8

Analysis for the portion Finer than the No. 10 Sieve

Analysis Based on: Total Sample

Specific Gravity: 2.7

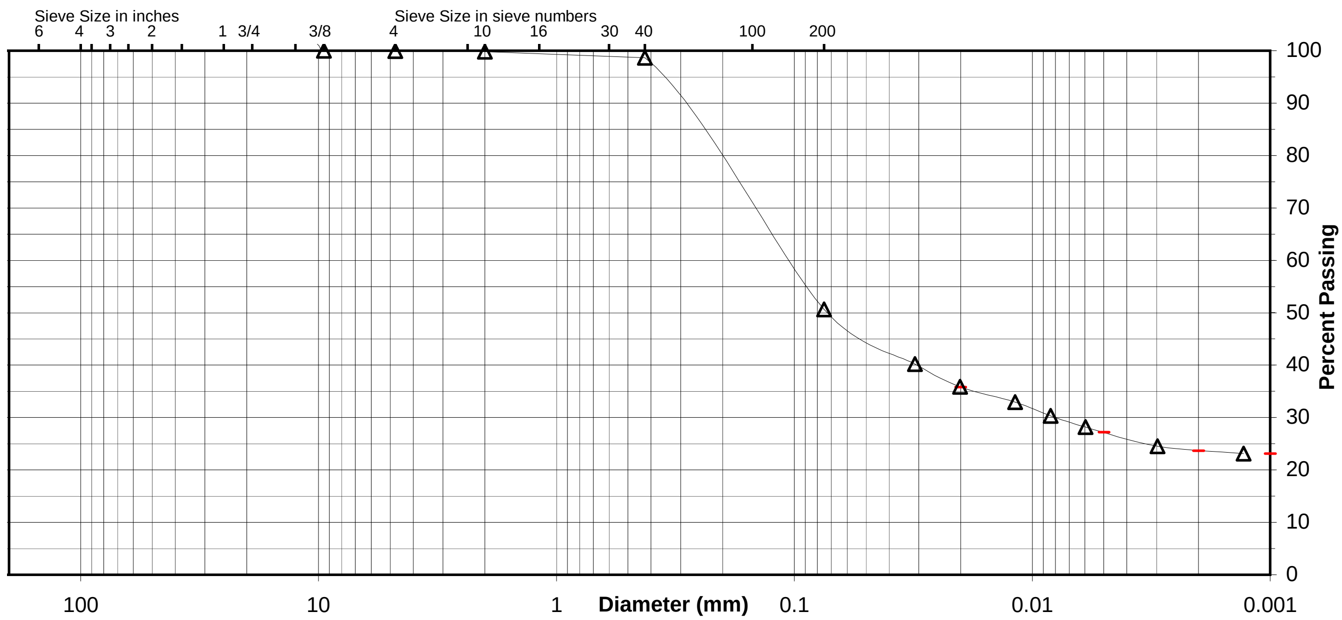
Dispersed using: Apparatus A - Mechanical, for 1 minute

No. 40	98.6
No. 200	50.6
0.02 mm	35.8
0.005 mm	27.2
0.002 mm	23.7
0.001 mm	23.1

Particle Size Distribution

ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay
	0.0	0.1	0.1	1.2	48.0	23.4	27.2

AASHTO	Gravel	Coarse Sand	Fine Sand	Silt	Clay
	0.2	1.2	48.0	26.9	23.7



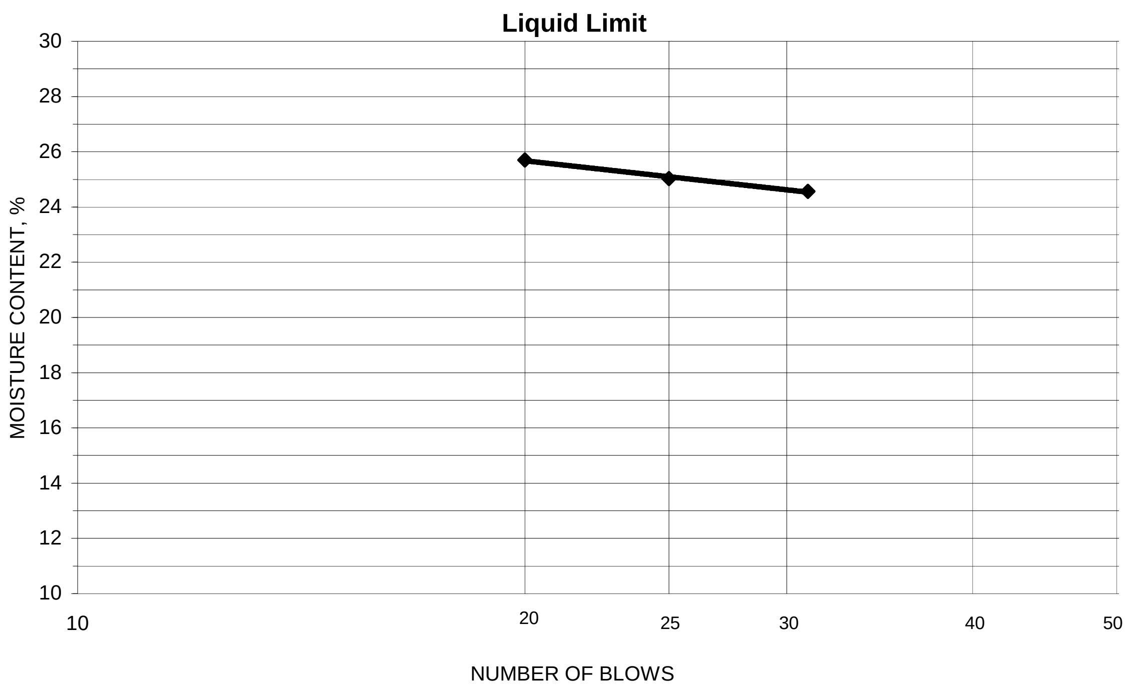
Comments

Reviewed By RHB

ATTERBERG LIMITS

Project	Gallatin Fossil Plant (GAF) - Ash Ponds	Project No.	175559018
Source	STN-E-8, 31.5'-33.0'	Lab ID	542
		% + No. 40	1
Tested By	JMB/KDK	Test Method	ASTM D 4318 Method A
Date Received	10-09-2009		
Test Date	11-04-2009	Prepared	Dry

Wet Soil and Tare Mass (g)	Dry Soil and Tare Mass (g)	Tare Mass (g)	Number of Blows	Water Content (%)	Liquid Limit
15.24	13.10	4.39	31	24.6	25
14.27	12.27	4.28	25	25.0	
15.91	13.54	4.32	20	25.7	



PLASTIC LIMIT AND PLASTICITY INDEX

Wet Soil and Tare Mass (g)	Dry Soil and Tare Mass (g)	Tare Mass (g)	Water Content (%)	Plastic Limit	Plasticity Index
9.44	8.85	4.35	13.1	13	12
9.30	8.71	4.28	13.3		

Remarks:

Reviewed By RHB

Stantec

Summary of Soil Tests

Project Name: Gallatin Fossil Plant (GAF) - Ash Ponds
Project Number: 175559018
Source: STN-E-9, 34.0'-35.5', 35.5'-37.0', 37.0'-38.5'
Lab ID: 578

County: Sumner
Date Received: 10-9-09
Sample Type: SPT Comp
Date Reported: 11-10-09

Test Results

Natural Moisture Content

Test Not Performed
Moisture Content (%): N/A

Particle Size Analysis

Preparation Method: ASTM D 421
Gradation Method: ASTM D 422
Hydrometer Method: ASTM D 422

Particle Size		%
Sieve Size	(mm)	Passing
3"	75	
2"	50	
1 1/2"	37.5	
1"	25	
3/4"	19	100.0
3/8"	9.5	97.2
No. 4	4.75	94.5
No. 10	2	92.4
No. 40	0.425	89.9
No. 200	0.075	62.1
	0.02	42.5
	0.005	32.1
	0.002	26.0
estimated	0.001	23.6

Plus 3 in. material, not included: 0 (%)

Range	ASTM (%)	AASHTO (%)
Gravel	5.5	7.6
Coarse Sand	2.1	2.5
Medium Sand	2.5	---
Fine Sand	27.8	27.8
Silt	30.0	36.1
Clay	32.1	26.0

Atterberg Limits

Test Method: ASTM D 4318 Method A
Prepared: Dry
Liquid Limit: 34
Plastic Limit: 15
Plasticity Index: 19
Activity Index: 0.73

Moisture-Density Relationship

Test Not Performed
Maximum Dry Density (lb/ft^3): N/A
Maximum Dry Density (kg/m^3): N/A
Optimum Moisture Content (%): N/A
Over Size Correction %: N/A

California Bearing Ratio

Test Not Performed
Bearing Ratio (%): N/A
Compacted Dry Density (lb/ft^3): N/A
Compacted Moisture Content (%): N/A

Specific Gravity

Test Method: ASTM D 854
Prepared: Dry
Particle Size: No. 10
Specific Gravity at 20° Celsius: 2.72

Classification

Unified Group Symbol: CL
Group Name: Sandy lean clay

AASHTO Classification: A-6 (9)

Comments:

Particle-Size Analysis of Soils
ASTM D 422

Project Name: Gallatin Fossil Plant (GAF) - Ash Ponds
Project Number: 175559018
Source: STN-E-9, 34.0'-35.5', 35.5'-37.0', 37.0'-38.5'
Lab ID: 578

Sieve analysis for the Portion Coarser than the No. 10 Sieve

Test Method: ASTM D 422
Prepared using: ASTM D 421

Particle Shape: Angular
Particle Hardness: Hard and Durable

Tested By: CLH
Test Date: 10-28-2009
Date Received: 10-09-2009

Maximum Particle size: 3/4" Sieve

Sieve Size	% Passing
3"	
2"	
1 1/2"	
1"	
3/4"	100.0
3/8"	97.2
No. 4	94.5
No. 10	92.4

Analysis for the portion Finer than the No. 10 Sieve

Analysis Based on: Total Sample

Specific Gravity: 2.72

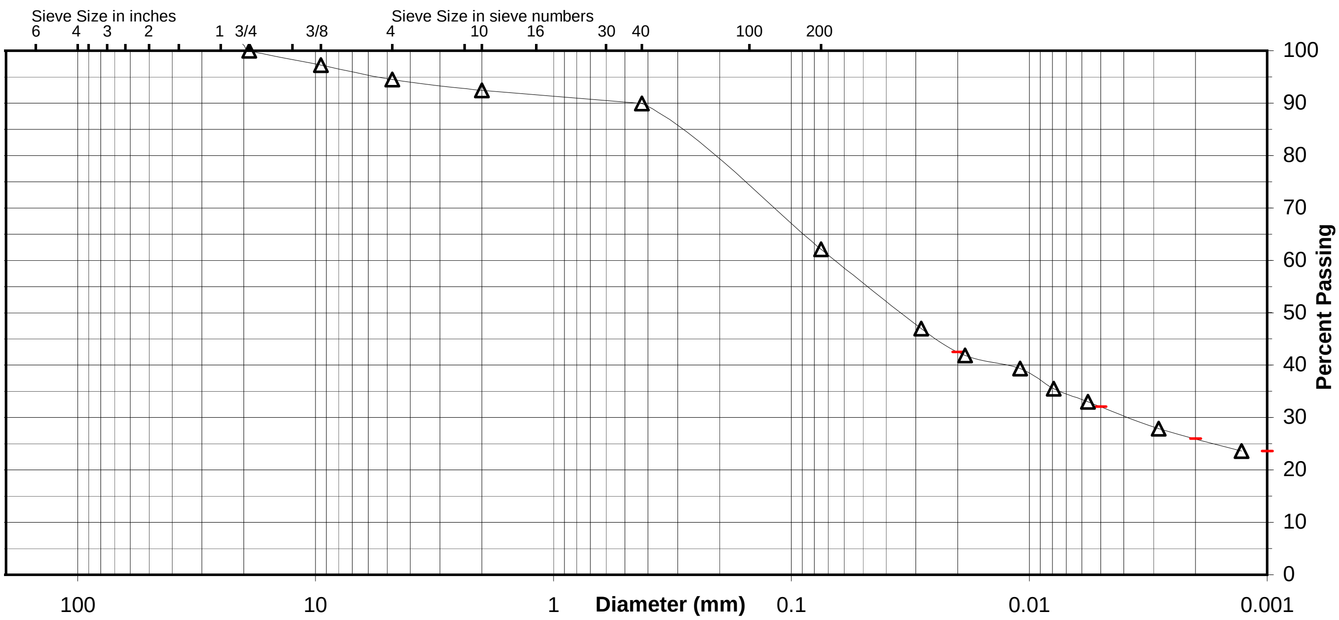
Dispersed using: Apparatus A - Mechanical, for 1 minute

Sieve Size	% Passing
No. 40	89.9
No. 200	62.1
0.02 mm	42.5
0.005 mm	32.1
0.002 mm	26.0
0.001 mm	23.6

Particle Size Distribution

ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay
	0.0	5.5	2.1	2.5	27.8	30.0	32.1

AASHTO	Gravel	Coarse Sand	Fine Sand	Silt	Clay
	7.6	2.5	27.8	36.1	26.0



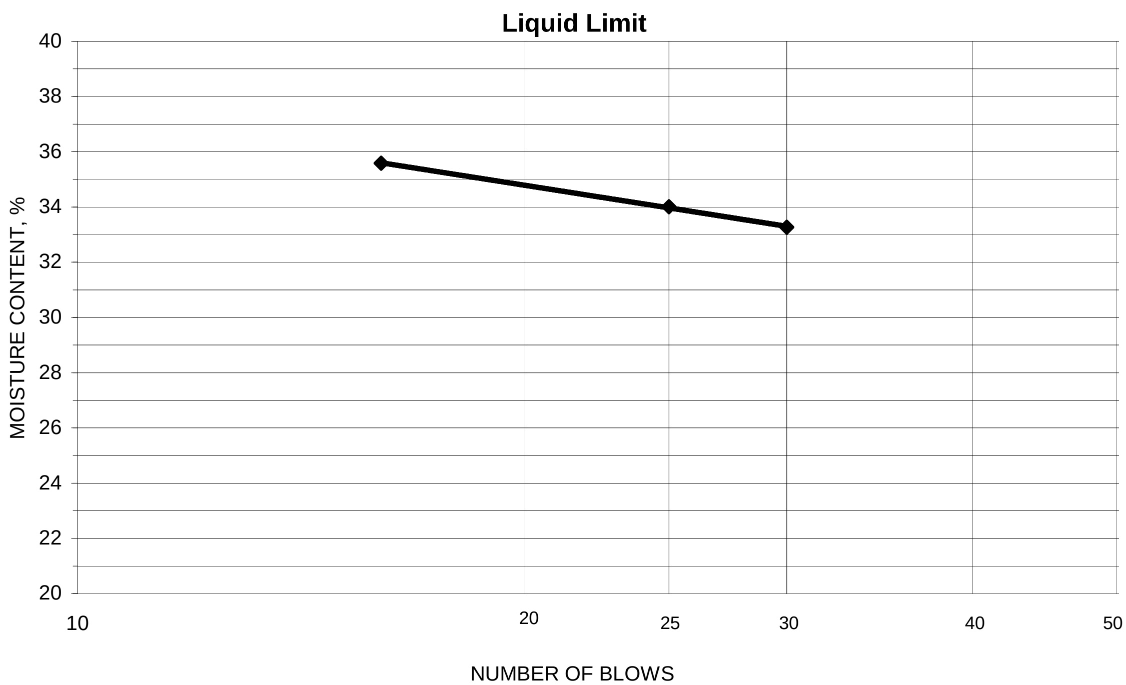
Comments

Reviewed By RHB

ATTERBERG LIMITS

Project	Gallatin Fossil Plant (GAF) - Ash Ponds	Project No.	175559018
Source	STN-E-9, 34.0'-35.5', 35.5'-37.0', 37.0'-38.5'	Lab ID	578
		% + No. 40	10
Tested By	JMB	Test Method	ASTM D 4318 Method A
Date Received	10-09-2009		
Test Date		Prepared	Dry

Wet Soil and Tare Mass (g)	Dry Soil and Tare Mass (g)	Tare Mass (g)	Number of Blows	Water Content (%)	Liquid Limit
11.44	9.67	4.35	30	33.3	
12.91	10.73	4.32	25	34.0	
12.16	10.11	4.35	16	35.6	34



PLASTIC LIMIT AND PLASTICITY INDEX

Wet Soil and Tare Mass (g)	Dry Soil and Tare Mass (g)	Tare Mass (g)	Water Content (%)	Plastic Limit	Plasticity Index
12.87	11.76	4.34	15.0	15	19
9.77	9.07	4.37	14.9		

Remarks:

Reviewed By RHB

Stantec

Summary of Soil Tests

Project Name: Gallatin Fossil Plant (GAF) - Ash Ponds
Project Number: 175559018
Source: STN-E-11, 3.0'-4.5', 4.5'-6.0', 6.0'-7.5'
Lab ID: 609

County: Sumner
Date Received: 10-9-09
Sample Type: SPT Comp
Date Reported: 11-11-09

Test Results

Natural Moisture Content

Test Not Performed

Moisture Content (%): N/A

Particle Size Analysis

Preparation Method: ASTM D 421
Gradation Method: ASTM D 422
Hydrometer Method: ASTM D 422

Particle Size		%
Sieve Size	(mm)	Passing
3"	75	
2"	50	
1 1/2"	37.5	
1"	25	
3/4"	19	100.0
3/8"	9.5	90.0
No. 4	4.75	84.5
No. 10	2	79.5
No. 40	0.425	72.9
No. 200	0.075	60.8
	0.02	45.4
	0.005	36.0
	0.002	30.7
estimated	0.001	28.5

Plus 3 in. material, not included: 0 (%)

Range	ASTM (%)	AASHTO (%)
Gravel	15.5	20.5
Coarse Sand	5.0	6.6
Medium Sand	6.6	---
Fine Sand	12.1	12.1
Silt	24.8	30.1
Clay	36.0	30.7

Atterberg Limits

Test Method: ASTM D 4318 Method A
Prepared: Dry

Liquid Limit: 45
Plastic Limit: 18
Plasticity Index: 27
Activity Index: 0.87

Moisture-Density Relationship

Test Not Performed

Maximum Dry Density (lb/ft^3): N/A
Maximum Dry Density (kg/m^3): N/A
Optimum Moisture Content (%): N/A
Over Size Correction %: N/A

California Bearing Ratio

Test Not Performed

Bearing Ratio (%): N/A
Compacted Dry Density (lb/ft^3): N/A
Compacted Moisture Content (%): N/A

Specific Gravity

Test Method: ASTM D 854
Prepared: Dry

Particle Size: No. 10
Specific Gravity at 20° Celsius: 2.69

Classification

Unified Group Symbol: CL
Group Name: Sandy lean clay with gravel

AASHTO Classification: A-7-6 (14)

Comments:

Particle-Size Analysis of Soils
ASTM D 422

Project Name	Gallatin Fossil Plant (GAF) - Ash Ponds	Project Number	175559018
Source	STN-E-11, 3.0'-4.5', 4.5'-6.0', 6.0'-7.5'	Lab ID	609

Sieve analysis for the Portion Coarser than the No. 10 Sieve

Test Method: ASTM D 422
Prepared using: ASTM D 421

Particle Shape: Angular
Particle Hardness: Hard and Durable

Tested By: CLH
Test Date: 10-30-2009
Date Received 10-09-2009

Maximum Particle size: 3/4" Sieve

Sieve Size	% Passing
3"	
2"	
1 1/2"	
1"	
3/4"	100.0
3/8"	90.0
No. 4	84.5
No. 10	79.5

Analysis for the portion Finer than the No. 10 Sieve

Analysis Based on: Total Sample

Specific Gravity 2.69

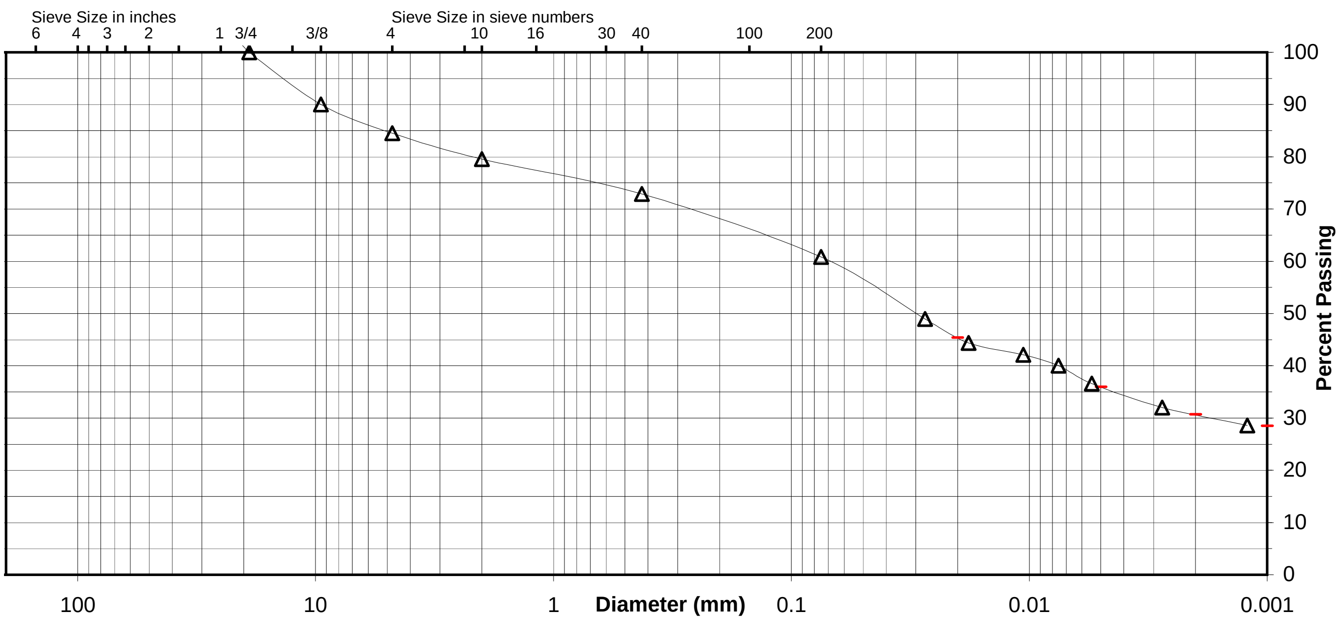
Dispersed using: Apparatus A - Mechanical, for 1 minute

No. 40	72.9
No. 200	60.8
0.02 mm	45.4
0.005 mm	36.0
0.002 mm	30.7
0.001 mm	28.5

Particle Size Distribution

ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay
	0.0	15.5	5.0	6.6	12.1	24.8	36.0

AASHTO	Gravel	Coarse Sand	Fine Sand	Silt	Clay
	20.5	6.6	12.1	30.1	30.7



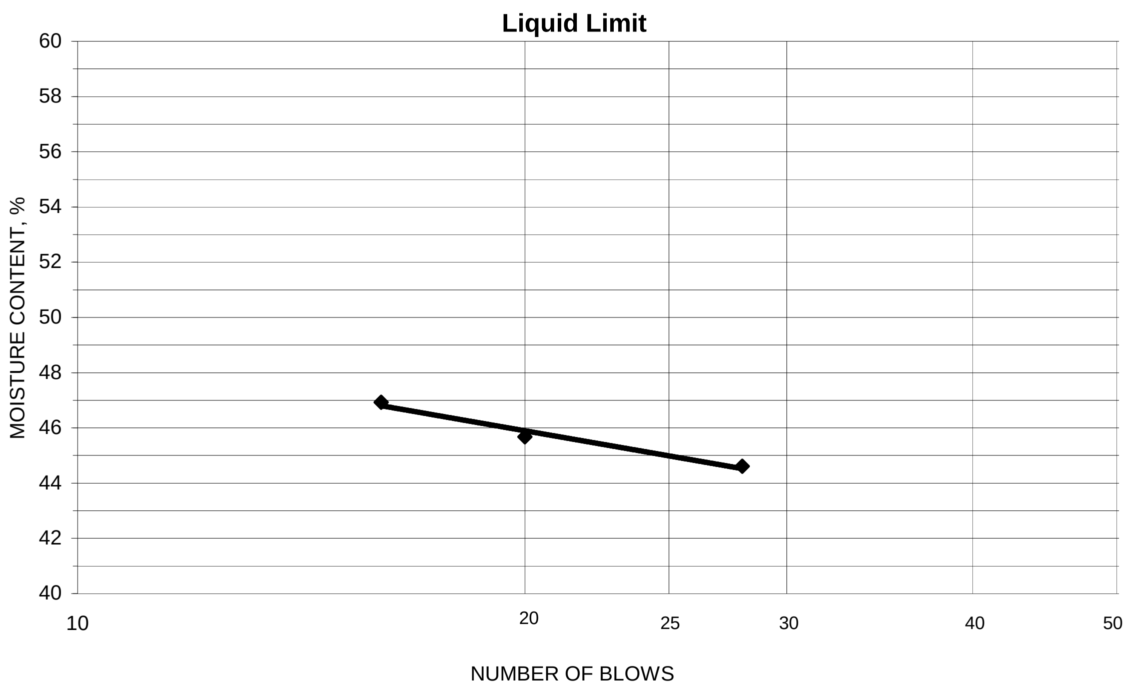
Comments

Reviewed By RHB

ATTERBERG LIMITS

Project	Gallatin Fossil Plant (GAF) - Ash Ponds	Project No.	175559018
Source	STN-E-11, 3.0'-4.5', 4.5'-6.0', 6.0'-7.5'	Lab ID	609
		% + No. 40	27
Tested By	JMB	Test Method	ASTM D 4318 Method A
Date Received	10-09-2009		
Test Date	11-02-2009	Prepared	Dry

Wet Soil and Tare Mass (g)	Dry Soil and Tare Mass (g)	Tare Mass (g)	Number of Blows	Water Content (%)	Liquid Limit
11.04	8.97	4.33	28	44.6	45
10.75	8.74	4.34	20	45.7	
10.56	8.57	4.33	16	46.9	



PLASTIC LIMIT AND PLASTICITY INDEX

Wet Soil and Tare Mass (g)	Dry Soil and Tare Mass (g)	Tare Mass (g)	Water Content (%)	Plastic Limit	Plasticity Index
10.51	9.57	4.34	18.0	18	27
10.42	9.49	4.33	18.0		

Remarks:

Reviewed By RHB

Stantec

Summary of Soil Tests

Project Name: Gallatin Fossil Plant (GAF) - Ash Ponds
Project Number: 175559018
Source: STN-E-13, 16.5'-18.0', 18.0'-19.5', 19.5'-21.0'
Lab ID: 664

County: Sumner
Date Received: 10-9-09
Sample Type: SPT Comp
Date Reported: 11-6-09

Test Results

Natural Moisture Content

Test Not Performed

Moisture Content (%): N/A

Particle Size Analysis

Preparation Method: ASTM D 421
Gradation Method: ASTM D 422
Hydrometer Method: ASTM D 422

Particle Size		%
Sieve Size	(mm)	Passing
3"	75	
2"	50	
1 1/2"	37.5	
1"	25	
3/4"	19	100.0
3/8"	9.5	97.2
No. 4	4.75	96.5
No. 10	2	96.0
No. 40	0.425	93.8
No. 200	0.075	90.8
	0.02	86.2
	0.005	79.2
	0.002	66.5
estimated	0.001	58.4

Plus 3 in. material, not included: 0 (%)

Range	ASTM (%)	AASHTO (%)
Gravel	3.5	4.0
Coarse Sand	0.5	2.2
Medium Sand	2.2	---
Fine Sand	3.0	3.0
Silt	11.6	24.3
Clay	79.2	66.5

Atterberg Limits

Test Method: ASTM D 4318 Method A
Prepared: Dry

Liquid Limit: 77
Plastic Limit: 26
Plasticity Index: 51
Activity Index: 0.77

Moisture-Density Relationship

Test Not Performed

Maximum Dry Density (lb/ft^3): N/A
Maximum Dry Density (kg/m^3): N/A
Optimum Moisture Content (%): N/A
Over Size Correction %: N/A

California Bearing Ratio

Test Not Performed

Bearing Ratio (%): N/A
Compacted Dry Density (lb/ft^3): N/A
Compacted Moisture Content (%): N/A

Specific Gravity

Test Method: ASTM D 854
Prepared: Dry

Particle Size: No. 10
Specific Gravity at 20° Celsius: 2.70

Classification

Unified Group Symbol: CH
Group Name: Fat clay

AASHTO Classification: A-7-6 (53)

Comments:

Particle-Size Analysis of Soils
ASTM D 422

Project Name	Gallatin Fossil Plant (GAF) - Ash Ponds	Project Number	175559018
Source	STN-E-13, 16.5'-18.0', 18.0'-19.5', 19.5'-21.0'	Lab ID	664

Sieve analysis for the Portion Coarser than the No. 10 Sieve

Test Method: ASTM D 422
Prepared using: ASTM D 421

Particle Shape: Angular
Particle Hardness: Hard and Durable

Tested By: CLH
Test Date: 10-28-2009
Date Received 10-09-2009

Maximum Particle size: 3/4" Sieve

Sieve Size	% Passing
3"	
2"	
1 1/2"	
1"	
3/4"	100.0
3/8"	97.2
No. 4	96.5
No. 10	96.0

Analysis for the portion Finer than the No. 10 Sieve

Analysis Based on: Total Sample

Specific Gravity 2.7

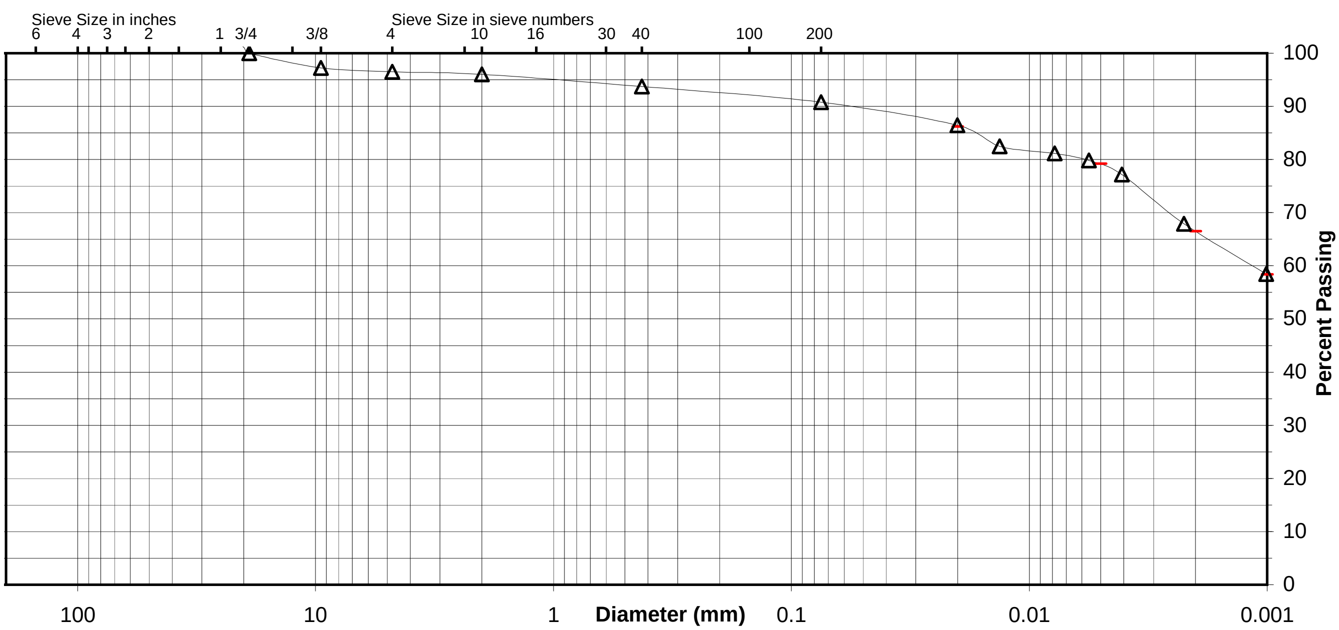
Dispersed using: Apparatus A - Mechanical, for 1 minute

No. 40	93.8
No. 200	90.8
0.02 mm	86.2
0.005 mm	79.2
0.002 mm	66.5
0.001 mm	58.4

Particle Size Distribution

ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay
	0.0	3.5	0.5	2.2	3.0	11.6	79.2

AASHTO	Gravel	Coarse Sand	Fine Sand	Silt	Clay
	4.0	2.2	3.0	24.3	66.5



Comments

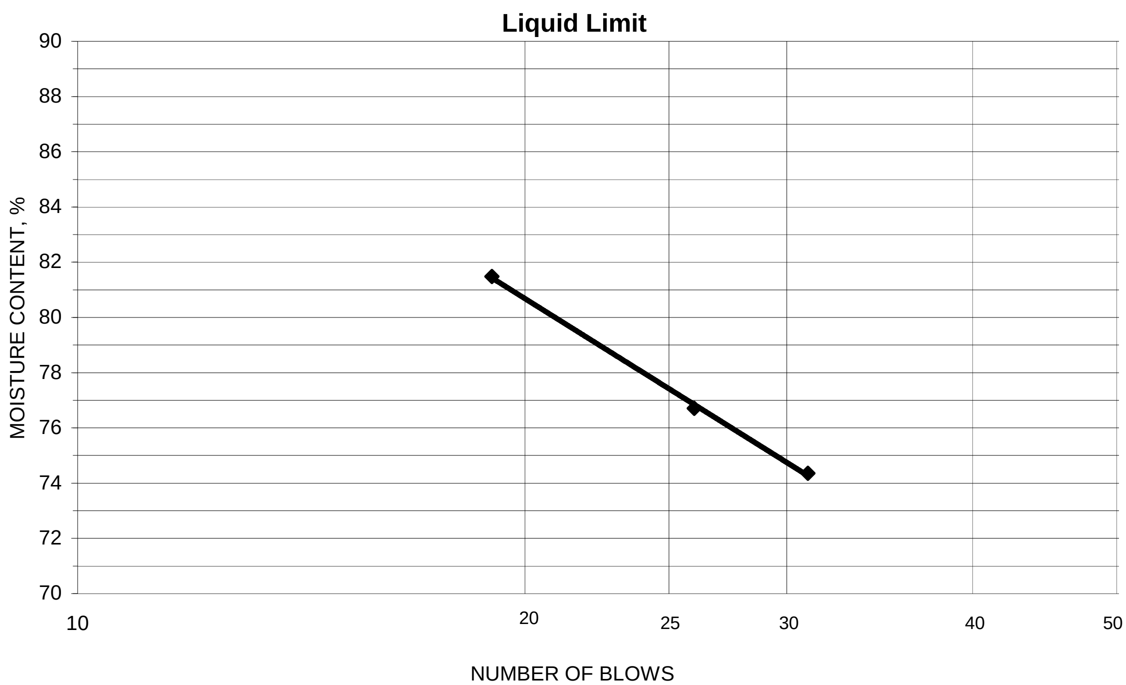
Reviewed By RHB

ATTERBERG LIMITS

Stantec

Project	Gallatin Fossil Plant (GAF) - Ash Ponds	Project No.	175559018
Source	STN-E-13, 16.5'-18.0', 18.0'-19.5', 19.5'-21.0'	Lab ID	664
		% + No. 40	6
Tested By	KDK	Test Method	ASTM D 4318 Method A
Date Received	10-09-2009		
Test Date	10-29-2009	Prepared	Dry

Wet Soil and Tare Mass (g)	Dry Soil and Tare Mass (g)	Tare Mass (g)	Number of Blows	Water Content (%)	Liquid Limit
12.18	8.66	4.34	19	81.5	
13.13	9.31	4.33	26	76.7	
11.84	8.65	4.36	31	74.4	77



PLASTIC LIMIT AND PLASTICITY INDEX

Wet Soil and Tare Mass (g)	Dry Soil and Tare Mass (g)	Tare Mass (g)	Water Content (%)	Plastic Limit	Plasticity Index
10.38	9.12	4.36	26.5	26	51
10.69	9.40	4.34	25.5		

Remarks:

Reviewed By RHB

Stantec

Summary of Soil Tests

Project Name: Gallatin Fossil Plant (GAF) - Ash Ponds
Project Number: 175559018
Source: STN-E-15, 11.5'-13.0', 13.0'-14.5', 14.5'-16.0'
Lab ID: 711

County: Sumner
Date Received: 10-9-09
Sample Type: SPT Comp
Date Reported: 11-4-09

Test Results

Natural Moisture Content

Test Not Performed
Moisture Content (%): N/A

Particle Size Analysis

Preparation Method: ASTM D 421
Gradation Method: ASTM D 422
Hydrometer Method: ASTM D 422

Particle Size		%
Sieve Size	(mm)	Passing
3"	75	
2"	50	
1 1/2"	37.5	
1"	25	
3/4"	19	100.0
3/8"	9.5	96.4
No. 4	4.75	93.9
No. 10	2	92.7
No. 40	0.425	90.4
No. 200	0.075	81.2
	0.02	73.5
	0.005	63.6
	0.002	56.3
estimated	0.001	51.1

Plus 3 in. material, not included: 0 (%)

	ASTM	AASHTO
Range	(%)	(%)
Gravel	6.1	7.3
Coarse Sand	1.2	2.3
Medium Sand	2.3	---
Fine Sand	9.2	9.2
Silt	17.6	24.9
Clay	63.6	56.3

Atterberg Limits

Test Method: ASTM D 4318 Method A
Prepared: Dry
Liquid Limit: 65
Plastic Limit: 20
Plasticity Index: 45
Activity Index: 0.80

Moisture-Density Relationship

Test Not Performed
Maximum Dry Density (lb/ft^3): N/A
Maximum Dry Density (kg/m^3): N/A
Optimum Moisture Content (%): N/A
Over Size Correction %: N/A

California Bearing Ratio

Test Not Performed
Bearing Ratio (%): N/A
Compacted Dry Density (lb/ft^3): N/A
Compacted Moisture Content (%): N/A

Specific Gravity

Test Method: ASTM D 854
Prepared: Dry
Particle Size: No. 10
Specific Gravity at 20° Celsius: 2.70

Classification

Unified Group Symbol: CH
Group Name: Fat clay with sand

AASHTO Classification: A-7-6 (38)

Comments:

Stantec

Particle-Size Analysis of Soils
ASTM D 422

Project Name	Gallatin Fossil Plant (GAF) - Ash Ponds	Project Number	175559018
Source	STN-E-15, 11.5'-13.0', 13.0'-14.5', 14.5'-16.0'	Lab ID	711

Sieve analysis for the Portion Coarser than the No. 10 Sieve

Test Method: ASTM D 422
Prepared using: ASTM D 421

Particle Shape: Angular
Particle Hardness: Hard and Durable

Tested By: CLH
Test Date: 10-28-2009
Date Received 10-09-2009

Maximum Particle size: 3/4" Sieve

Sieve Size	% Passing
3"	
2"	
1 1/2"	
1"	
3/4"	100.0
3/8"	96.4
No. 4	93.9
No. 10	92.7

Analysis for the portion Finer than the No. 10 Sieve

Analysis Based on: Total Sample

Specific Gravity 2.7

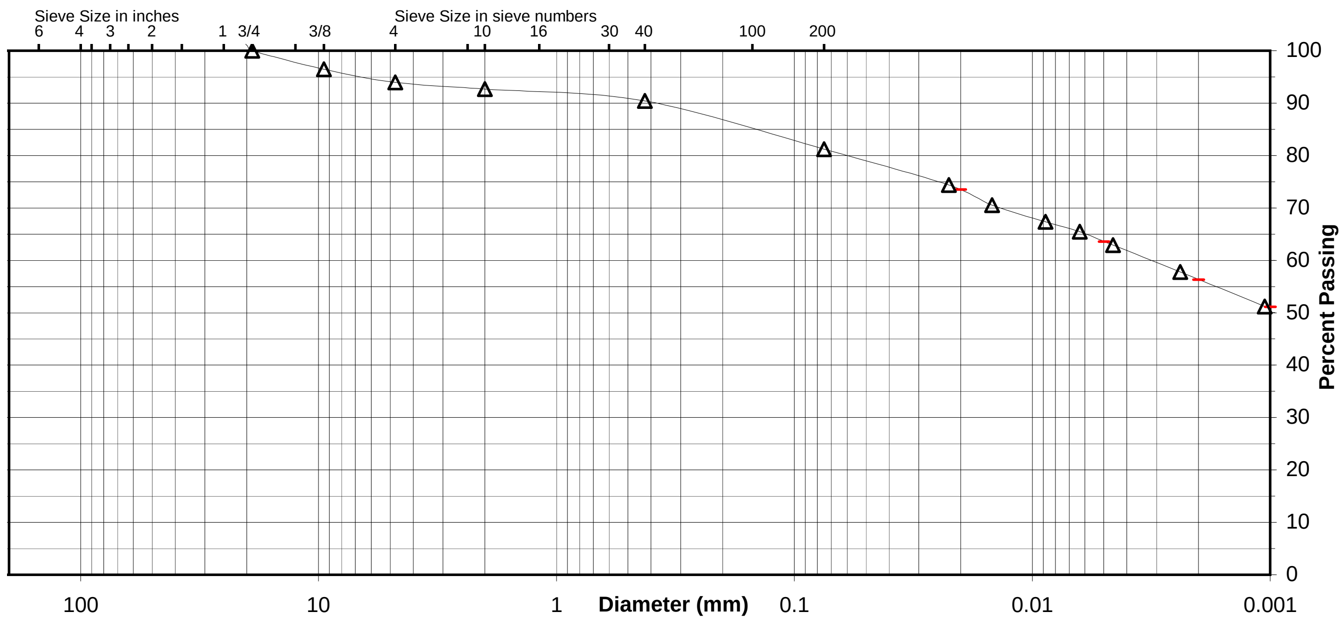
Dispersed using: Apparatus A - Mechanical, for 1 minute

No. 40	90.4
No. 200	81.2
0.02 mm	73.5
0.005 mm	63.6
0.002 mm	56.3
0.001 mm	51.1

Particle Size Distribution

ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay
	0.0	6.1	1.2	2.3	9.2	17.6	63.6

AASHTO	Gravel	Coarse Sand	Fine Sand	Silt	Clay
	7.3	2.3	9.2	24.9	56.3



Comments

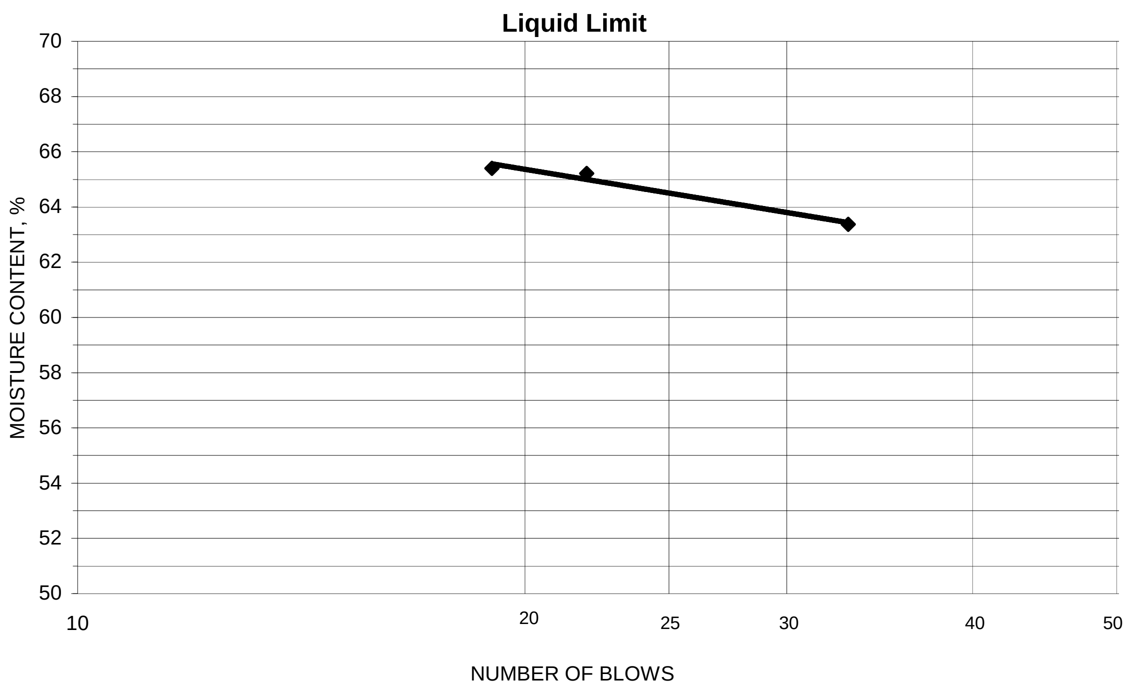
Reviewed By RHB

Stantec

ATTERBERG LIMITS

Project	Gallatin Fossil Plant (GAF) - Ash Ponds	Project No.	175559018
Source	STN-E-15, 11.5'-13.0', 13.0'-14.5', 14.5'-16.0'	Lab ID	711
		% + No. 40	10
Tested By	KDK	Test Method	ASTM D 4318 Method A
Date Received	10-09-2009		
Test Date	11-02-2009	Prepared	Dry

Wet Soil and Tare Mass (g)	Dry Soil and Tare Mass (g)	Tare Mass (g)	Number of Blows	Water Content (%)	Liquid Limit
13.39	9.86	4.29	33	63.4	
13.45	9.85	4.33	22	65.2	
12.60	9.33	4.33	19	65.4	65



PLASTIC LIMIT AND PLASTICITY INDEX

Wet Soil and Tare Mass (g)	Dry Soil and Tare Mass (g)	Tare Mass (g)	Water Content (%)	Plastic Limit	Plasticity Index
10.45	9.44	4.35	19.8	20	45
8.91	8.17	4.36	19.4		

Remarks:

Reviewed By RHB

Stantec

Summary of Soil Tests

Project Name: Gallatin Fossil Plant (GAF) - Ash Ponds
Project Number: 175559018
Source: STN-E-16, 18.0'-19.5', 19.5'-21.0', 21.0'-22.5'
Lab ID: 735

County: Sumner
Date Received: 10-9-09
Sample Type: SPT Comp
Date Reported: 11-4-09

Test Results

Natural Moisture Content

Test Not Performed

Moisture Content (%): N/A

Particle Size Analysis

Preparation Method: ASTM D 421
Gradation Method: ASTM D 422
Hydrometer Method: ASTM D 422

Particle Size		%
Sieve Size	(mm)	Passing
3"	75	
2"	50	
1 1/2"	37.5	
1"	25	
3/4"	19	100.0
3/8"	9.5	97.7
No. 4	4.75	92.3
No. 10	2	83.5
No. 40	0.425	67.0
No. 200	0.075	35.4
	0.02	11.5
	0.005	4.2
	0.002	2.4
estimated	0.001	1.9

Plus 3 in. material, not included: 0 (%)

	ASTM	AASHTO
Range	(%)	(%)
Gravel	7.7	16.5
Coarse Sand	8.8	16.5
Medium Sand	16.5	---
Fine Sand	31.6	31.6
Silt	31.2	33.0
Clay	4.2	2.4

Atterberg Limits

Test Method: ASTM D 4318 Method A
Prepared: Dry

Liquid Limit: ---
Plastic Limit: Non Plastic
Plasticity Index: ---
Activity Index: N/A

Moisture-Density Relationship

Test Not Performed

Maximum Dry Density (lb/ft^3): N/A
Maximum Dry Density (kg/m^3): N/A
Optimum Moisture Content (%): N/A
Over Size Correction %: N/A

California Bearing Ratio

Test Not Performed

Bearing Ratio (%): N/A
Compacted Dry Density (lb/ft^3): N/A
Compacted Moisture Content (%): N/A

Specific Gravity

Test Method: ASTM D 854
Prepared: Dry

Particle Size: No. 10
Specific Gravity at 20° Celsius: 2.51

Classification

Unified Group Symbol: SM
Group Name: Silty sand

AASHTO Classification: A-2-4 (0)

Comments:

Particle-Size Analysis of Soils
ASTM D 422

Project Name	Gallatin Fossil Plant (GAF) - Ash Ponds	Project Number	175559018
Source	STN-E-16, 18.0'-19.5', 19.5'-21.0', 21.0'-22.5'	Lab ID	735

Sieve analysis for the Portion Coarser than the No. 10 Sieve

Test Method: ASTM D 422
Prepared using: ASTM D 421

Particle Shape: Angular
Particle Hardness: Hard and Durable

Tested By: CLH
Test Date: 10-28-2009
Date Received 10-09-2009

Maximum Particle size: 3/4" Sieve

Sieve Size	% Passing
3"	
2"	
1 1/2"	
1"	
3/4"	100.0
3/8"	97.7
No. 4	92.3
No. 10	83.5

Analysis for the portion Finer than the No. 10 Sieve

Analysis Based on: Total Sample

Specific Gravity 2.51

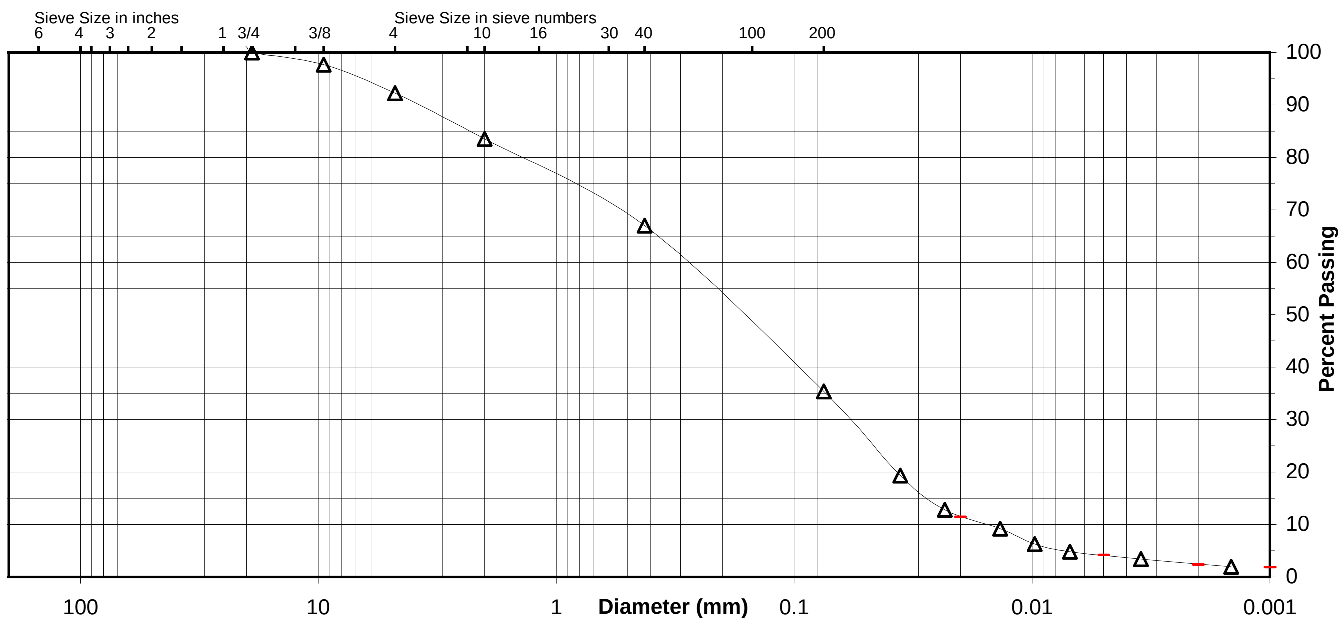
Dispersed using: Apparatus A - Mechanical, for 1 minute

No. 40	67.0
No. 200	35.4
0.02 mm	11.5
0.005 mm	4.2
0.002 mm	2.4
0.001 mm	1.9

Particle Size Distribution

ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay
	0.0	7.7	8.8	16.5	31.6	31.2	4.2

AASHTO	Gravel	Coarse Sand	Fine Sand	Silt	Clay
	16.5	16.5	31.6	33.0	2.4



Comments

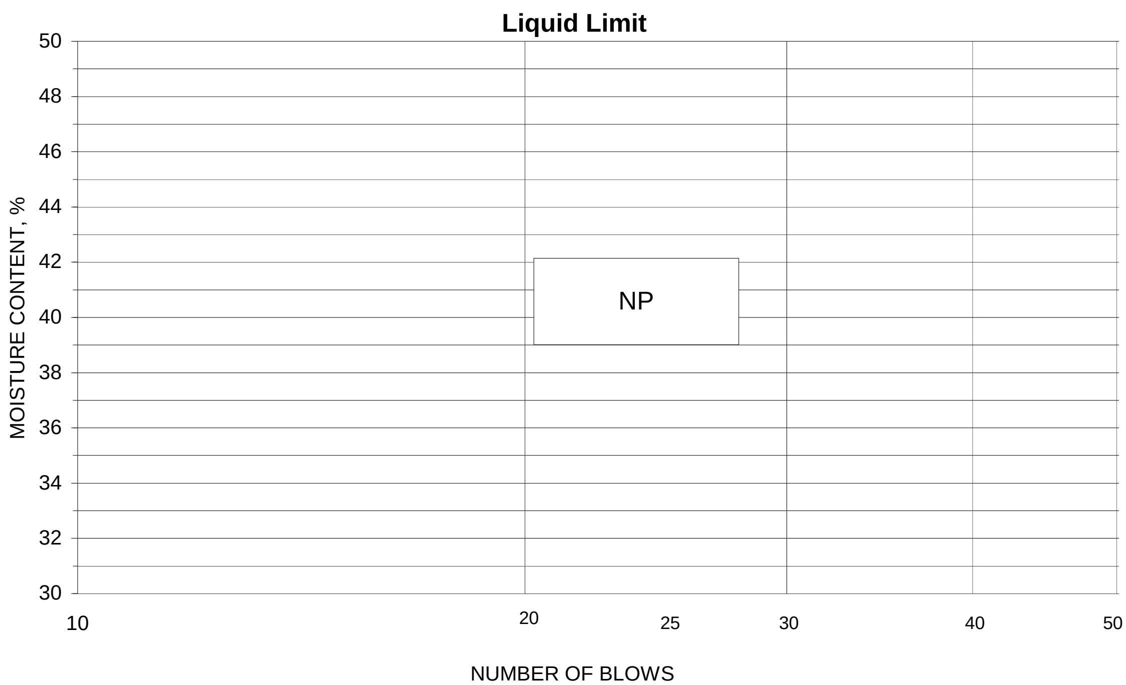
Reviewed By RHB

ATTERBERG LIMITS

Stantec

Project	Gallatin Fossil Plant (GAF) - Ash Ponds	Project No.	175559018
Source	STN-E-16, 18.0'-19.5', 19.5'-21.0', 21.0'-22.5'	Lab ID	735
		% + No. 40	33
Tested By	CLH	Test Method	ASTM D 4318 Method A
Date Received	10-09-2009		
Test Date	10-25-2009	Prepared	Dry

Wet Soil and Tare Mass (g)	Dry Soil and Tare Mass (g)	Tare Mass (g)	Number of Blows	Water Content (%)	Liquid Limit



PLASTIC LIMIT AND PLASTICITY INDEX

Wet Soil and Tare Mass (g)	Dry Soil and Tare Mass (g)	Tare Mass (g)	Water Content (%)	Plastic Limit	Plasticity Index

Remarks:

Reviewed By RHB

Stantec

Summary of Soil Tests

Project Name: Gallatin Fossil Plant (GAF) - Ash Ponds
Project Number: 175559018
Source: STN-E-17, 4.5'-6.0', 6.0'-7.5', 7.5'-9.0'
Lab ID: 766

County: Sumner
Date Received: 10-9-09
Sample Type: SPT Comp
Date Reported: 11-4-09

Test Results

Natural Moisture Content

Test Not Performed

Moisture Content (%): N/A

Particle Size Analysis

Preparation Method: ASTM D 421
Gradation Method: ASTM D 422
Hydrometer Method: ASTM D 422

Particle Size		%
Sieve Size	(mm)	Passing
3"	75	
2"	50	
1 1/2"	37.5	
1"	25	
3/4"	19	
3/8"	9.5	100.0
No. 4	4.75	99.6
No. 10	2	98.4
No. 40	0.425	96.2
No. 200	0.075	83.6
	0.02	66.1
	0.005	52.3
	0.002	45.2
estimated	0.001	42.7

Plus 3 in. material, not included: 0 (%)

Range	ASTM (%)	AASHTO (%)
Gravel	0.4	1.6
Coarse Sand	1.2	2.2
Medium Sand	2.2	---
Fine Sand	12.6	12.6
Silt	31.3	38.4
Clay	52.3	45.2

Atterberg Limits

Test Method: ASTM D 4318 Method A
Prepared: Dry

Liquid Limit: 47
Plastic Limit: 19
Plasticity Index: 28
Activity Index: 0.62

Moisture-Density Relationship

Test Not Performed

Maximum Dry Density (lb/ft^3): N/A
Maximum Dry Density (kg/m^3): N/A
Optimum Moisture Content (%): N/A
Over Size Correction %: N/A

California Bearing Ratio

Test Not Performed

Bearing Ratio (%): N/A
Compacted Dry Density (lb/ft^3): N/A
Compacted Moisture Content (%): N/A

Specific Gravity

Test Method: ASTM D 854
Prepared: Dry

Particle Size: No. 10
Specific Gravity at 20° Celsius: 2.70

Classification

Unified Group Symbol: CL
Group Name: Lean clay with sand

AASHTO Classification: A-7-6 (24)

Comments:

Particle-Size Analysis of Soils
ASTM D 422

Stantec

Project Name	Gallatin Fossil Plant (GAF) - Ash Ponds	Project Number	175559018
Source	STN-E-17, 4.5'-6.0', 6.0'-7.5', 7.5'-9.0'	Lab ID	766

Sieve analysis for the Portion Coarser than the No. 10 Sieve

Test Method: ASTM D 422
Prepared using: ASTM D 421

Particle Shape: Angular
Particle Hardness: Hard and Durable

Tested By: CLH
Test Date: 10-26-2009
Date Received 10-09-2009

Maximum Particle size: 3/8" Sieve

Sieve Size	% Passing
3"	
2"	
1 1/2"	
1"	
3/4"	
3/8"	100.0
No. 4	99.6
No. 10	98.4

Analysis for the portion Finer than the No. 10 Sieve

Analysis Based on: Total Sample

Specific Gravity 2.7

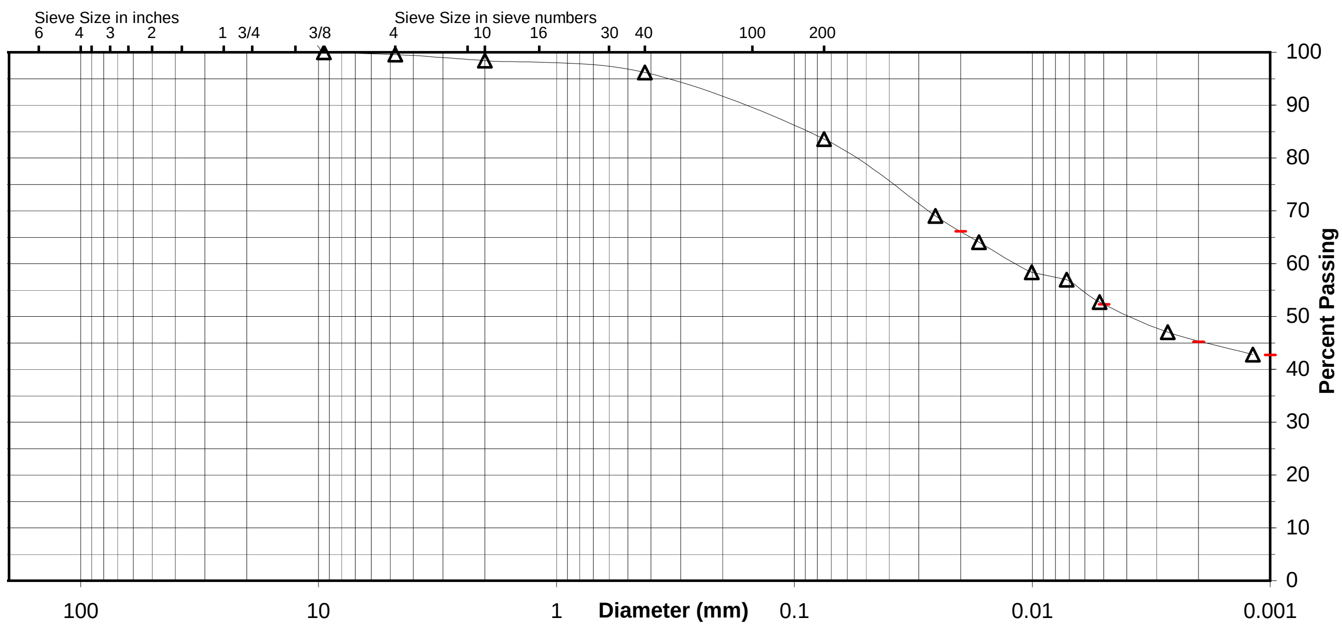
Dispersed using: Apparatus A - Mechanical, for 1 minute

No. 40	96.2
No. 200	83.6
0.02 mm	66.1
0.005 mm	52.3
0.002 mm	45.2
0.001 mm	42.7

Particle Size Distribution

ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay
	0.0	0.4	1.2	2.2	12.6	31.3	52.3

AASHTO	Gravel	Coarse Sand	Fine Sand	Silt	Clay
	1.6	2.2	12.6	38.4	45.2



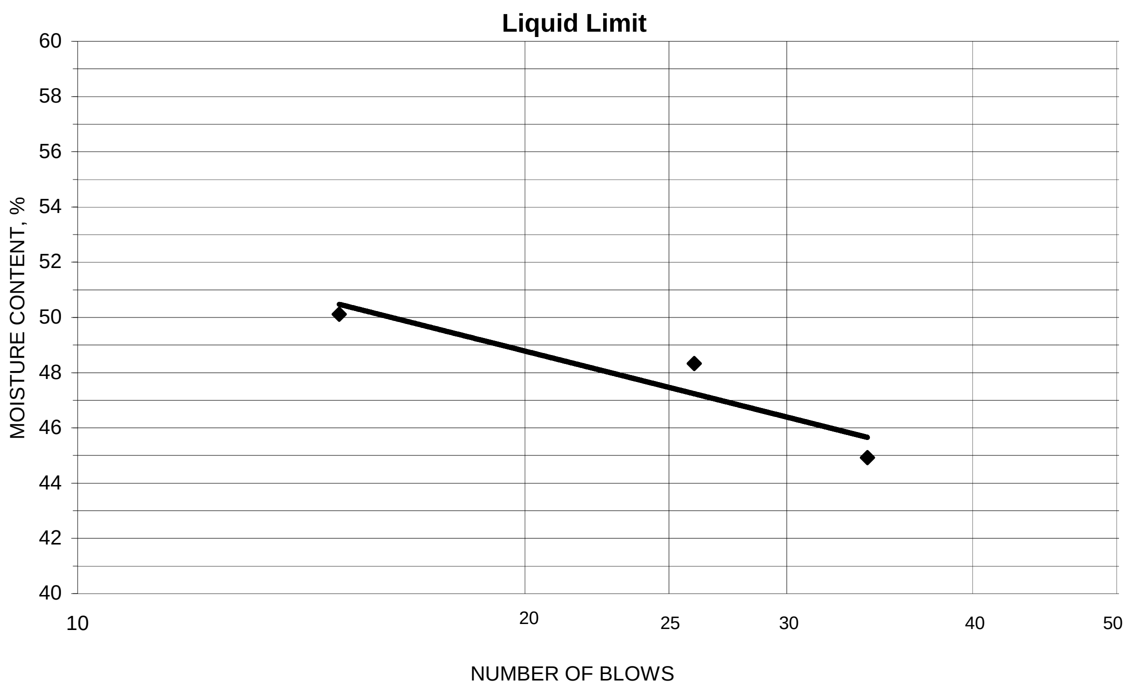
Comments

Reviewed By RHB

ATTERBERG LIMITS

Project	Gallatin Fossil Plant (GAF) - Ash Ponds	Project No.	175559018
Source	STN-E-17, 4.5'-6.0', 6.0'-7.5', 7.5'-9.0'	Lab ID	766
		% + No. 40	4
Tested By	JMB	Test Method	ASTM D 4318 Method A
Date Received	10-09-2009		
Test Date	11-02-2009	Prepared	Dry

Wet Soil and Tare Mass (g)	Dry Soil and Tare Mass (g)	Tare Mass (g)	Number of Blows	Water Content (%)	Liquid Limit
10.07	8.30	4.36	34	44.9	47
14.06	10.88	4.30	26	48.3	
10.78	8.65	4.40	15	50.1	



PLASTIC LIMIT AND PLASTICITY INDEX

Wet Soil and Tare Mass (g)	Dry Soil and Tare Mass (g)	Tare Mass (g)	Water Content (%)	Plastic Limit	Plasticity Index
10.41	9.45	4.33	18.8	19	28
9.21	8.45	4.33	18.4		

Remarks:

Reviewed By RHB

Stantec

Summary of Soil Tests

Project Name	Gallatin Fossil Plant (GAF) - Ash Ponds	Project Number	175559018
Source	STN-E-18, 22.5'-24.0', 24.0'-25.5', 25.5'-27.0'	Lab ID	806
County	Sumner	Date Received	10-9-09
Sample Type	SPT Comp	Date Reported	10-28-09

Test Results

Natural Moisture Content

Test Not Performed

Moisture Content (%): N/A

Particle Size Analysis

Preparation Method: ASTM D 421

Gradation Method: ASTM D 422

Hydrometer Method: ASTM D 422

Particle Size		%
Sieve Size	(mm)	Passing
3"	75	
2"	50	
1 1/2"	37.5	
1"	25	
3/4"	19	100.0
3/8"	9.5	96.5
No. 4	4.75	96.4
No. 10	2	96.0
No. 40	0.425	92.8
No. 200	0.075	85.5
	0.02	61.7
	0.005	38.8
	0.002	30.7
estimated	0.001	27.8

Plus 3 in. material, not included: 0 (%)

Range	ASTM (%)	AASHTO (%)
Gravel	3.6	4.0
Coarse Sand	0.4	3.2
Medium Sand	3.2	---
Fine Sand	7.3	7.3
Silt	46.7	54.8
Clay	38.8	30.7

Atterberg Limits

Test Method: ASTM D 4318 Method A

Prepared: Dry

Liquid Limit: 34

Plastic Limit: 14

Plasticity Index: 20

Activity Index: 0.65

Moisture-Density Relationship

Test Not Performed

Maximum Dry Density (lb/ft^3): N/A

Maximum Dry Density (kg/m^3): N/A

Optimum Moisture Content (%): N/A

Over Size Correction %: N/A

California Bearing Ratio

Test Not Performed

Bearing Ratio (%): N/A

Compacted Dry Density (lb/ft^3): N/A

Compacted Moisture Content (%): N/A

Specific Gravity

Test Method: ASTM D 854

Prepared: Dry

Particle Size: No. 10

Specific Gravity at 20° Celsius: 2.69

Classification

Unified Group Symbol: CL

Group Name: Lean clay

AASHTO Classification: A-6 (16)

Comments:

Stantec

Particle-Size Analysis of Soils

ASTM D 422

Project Name	Gallatin Fossil Plant (GAF) - Ash Ponds	Project Number	175559018
Source	STN-E-18, 22.5'-24.0', 24.0'-25.5', 25.5'-27.0'	Lab ID	806

Sieve analysis for the Portion Coarser than the No. 10 Sieve

Test Method: ASTM D 422
Prepared using: ASTM D 421

Particle Shape: Angular
Particle Hardness: Hard and Durable

Tested By: CLH
Test Date: 10-23-2009
Date Received 10-09-2009

Maximum Particle size: 3/4" Sieve

Sieve Size	% Passing
3"	
2"	
1 1/2"	
1"	
3/4"	100.0
3/8"	96.5
No. 4	96.4
No. 10	96.0

Analysis for the portion Finer than the No. 10 Sieve

Analysis Based on: Total Sample

Specific Gravity 2.69

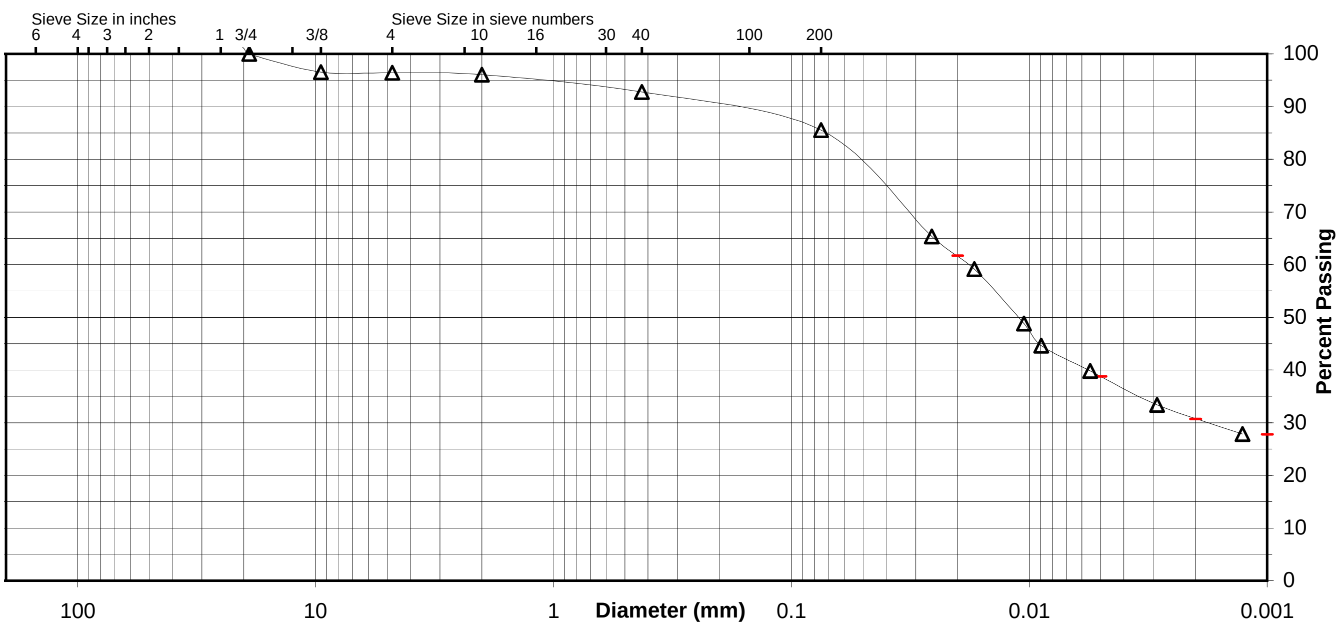
Dispersed using: Apparatus A - Mechanical, for 1 minute

No. 40	92.8
No. 200	85.5
0.02 mm	61.7
0.005 mm	38.8
0.002 mm	30.7
0.001 mm	27.8

Particle Size Distribution

ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay
	0.0	3.6	0.4	3.2	7.3	46.7	38.8

AASHTO	Gravel	Coarse Sand	Fine Sand	Silt	Clay
	4.0	3.2	7.3	54.8	30.7



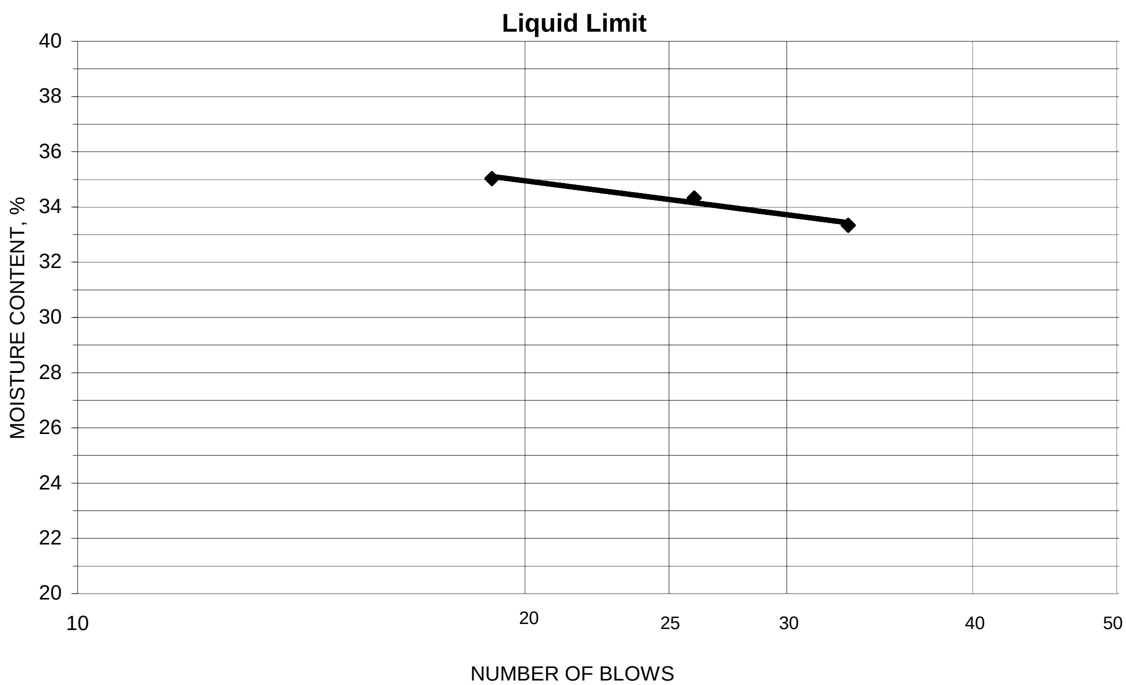
Comments

Reviewed By RHB

ATTERBERG LIMITS

Project	Gallatin Fossil Plant (GAF) - Ash Ponds	Project No.	175559018
Source	STN-E-18, 22.5'-24.0', 24.0'-25.5', 25.5'-27.0'	Lab ID	806
		% + No. 40	7
Tested By	KDK	Test Method	ASTM D 4318 Method A
Date Received	10-09-2009		
Test Date	10-26-2009	Prepared	Dry

Wet Soil and Tare Mass (g)	Dry Soil and Tare Mass (g)	Tare Mass (g)	Number of Blows	Water Content (%)	Liquid Limit
15.00	12.35	4.40	33	33.3	
15.16	12.39	4.32	26	34.3	
15.21	12.39	4.34	19	35.0	34



PLASTIC LIMIT AND PLASTICITY INDEX

Wet Soil and Tare Mass (g)	Dry Soil and Tare Mass (g)	Tare Mass (g)	Water Content (%)	Plastic Limit	Plasticity Index
11.95	11.02	4.32	13.9	14	20
10.84	10.07	4.33	13.4		

Remarks:

Reviewed By RHB

Stantec

Summary of Soil Tests

Project Name	Gallatin Fossil Plant (GAF) - Ash Ponds	Project Number	175559018
Source	STN-E-20, 4.5'-6.0', 6.0'-7.5', 7.5'-9.0'	Lab ID	851
County	Sumner	Date Received	10-9-09
Sample Type	SPT Comp	Date Reported	11-10-09

Test Results

Natural Moisture Content

Test Not Performed

Moisture Content (%): N/A

Particle Size Analysis

Preparation Method: ASTM D 421
Gradation Method: ASTM D 422
Hydrometer Method: ASTM D 422

Particle Size		%
Sieve Size	(mm)	Passing
3"	75	
2"	50	
1 1/2"	37.5	
1"	25	
3/4"	19	100.0
3/8"	9.5	94.0
No. 4	4.75	91.6
No. 10	2	89.9
No. 40	0.425	86.5
No. 200	0.075	70.9
	0.02	58.8
	0.005	49.6
	0.002	43.6
estimated	0.001	42.1

Plus 3 in. material, not included: 0 (%)

	ASTM	AASHTO
Range	(%)	(%)
Gravel	8.4	10.1
Coarse Sand	1.7	3.4
Medium Sand	3.4	---
Fine Sand	15.6	15.6
Silt	21.3	27.3
Clay	49.6	43.6

Atterberg Limits

Test Method: ASTM D 4318 Method A
Prepared: Dry

Liquid Limit: 54
Plastic Limit: 18
Plasticity Index: 36
Activity Index: 0.82

Moisture-Density Relationship

Test Not Performed

Maximum Dry Density (lb/ft^3): N/A
Maximum Dry Density (kg/m^3): N/A
Optimum Moisture Content (%): N/A
Over Size Correction %: N/A

California Bearing Ratio

Test Not Performed

Bearing Ratio (%): N/A
Compacted Dry Density (lb/ft^3): N/A
Compacted Moisture Content (%): N/A

Specific Gravity

Test Method: ASTM D 854
Prepared: Dry

Particle Size: No. 10
Specific Gravity at 20° Celsius: 2.66

Classification

Unified Group Symbol: CH
Group Name: Fat clay with sand

AASHTO Classification: A-7-6 (24)

Comments:

Particle-Size Analysis of Soils
ASTM D 422

Project Name: Gallatin Fossil Plant (GAF) - Ash Ponds
Source: STN-E-20, 4.5'-6.0', 6.0'-7.5', 7.5'-9.0'

Project Number: 175559018
Lab ID: 851

Sieve analysis for the Portion Coarser than the No. 10 Sieve

Test Method: ASTM D 422
Prepared using: ASTM D 421

Particle Shape: Angular
Particle Hardness: Hard and Durable

Tested By: CLH
Test Date: 10-29-2009
Date Received: 10-09-2009

Maximum Particle size: 3/4" Sieve

Sieve Size	% Passing
3"	
2"	
1 1/2"	
1"	
3/4"	100.0
3/8"	94.0
No. 4	91.6
No. 10	89.9

Analysis for the portion Finer than the No. 10 Sieve

Analysis Based on: Total Sample

Specific Gravity: 2.66

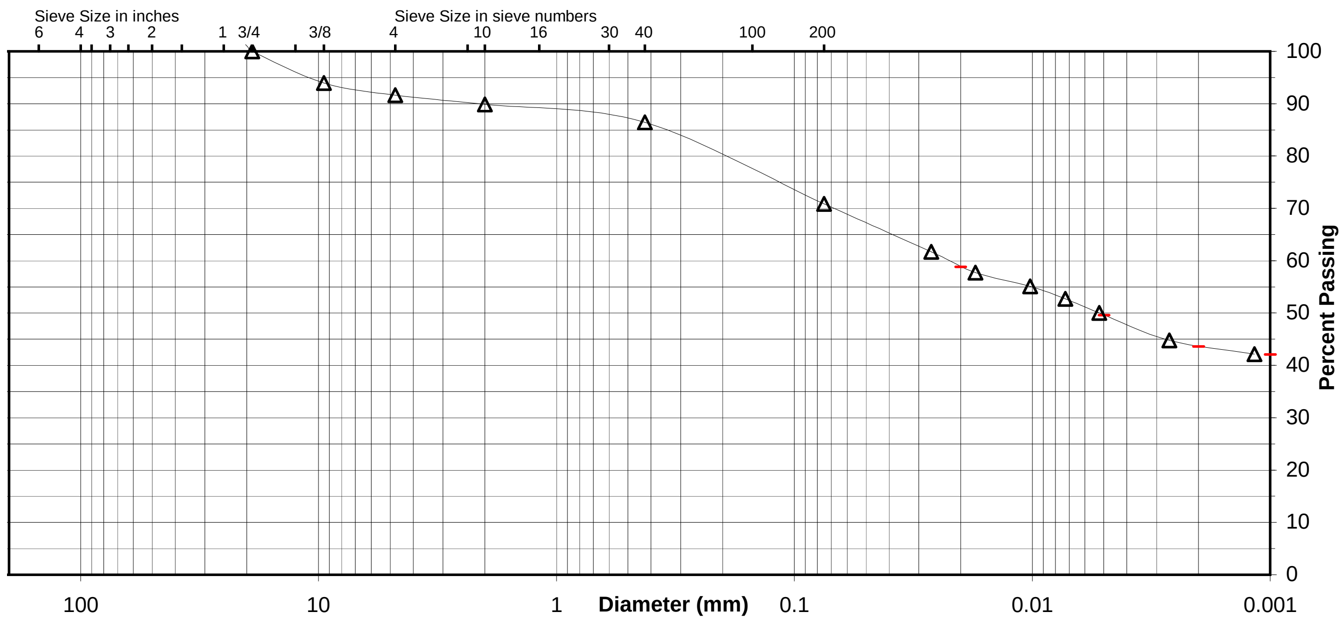
Dispersed using: Apparatus A - Mechanical, for 1 minute

No. 40	86.5
No. 200	70.9
0.02 mm	58.8
0.005 mm	49.6
0.002 mm	43.6
0.001 mm	42.1

Particle Size Distribution

ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay
	0.0	8.4	1.7	3.4	15.6	21.3	49.6

AASHTO	Gravel	Coarse Sand	Fine Sand	Silt	Clay
	10.1	3.4	15.6	27.3	43.6



Comments

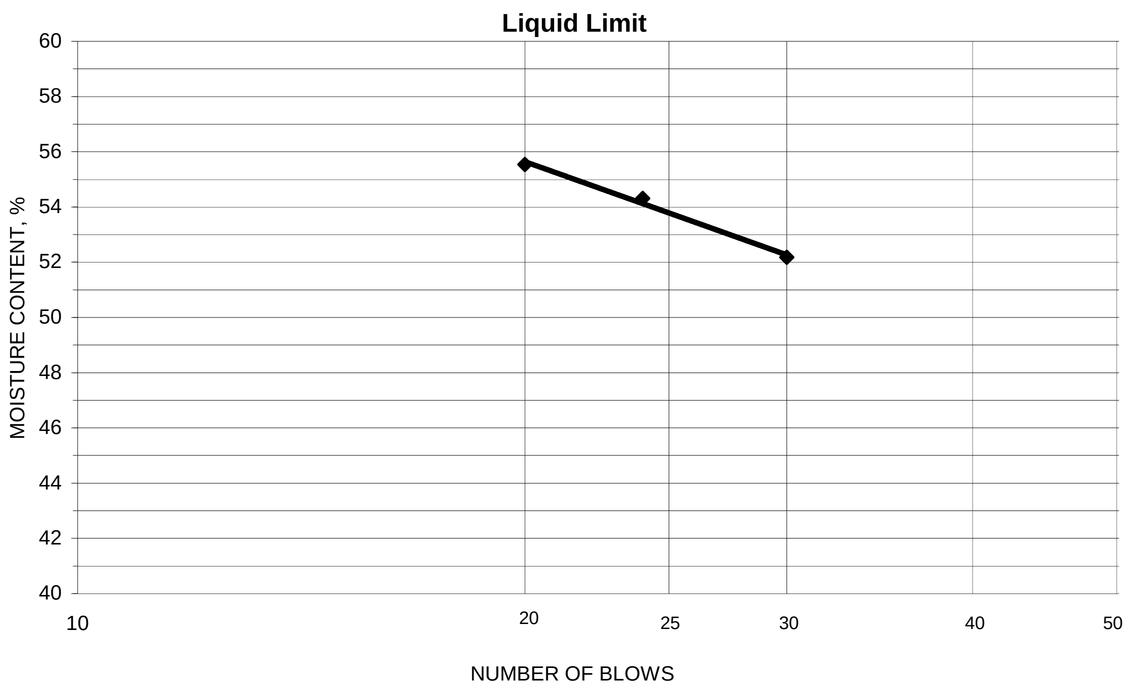
Reviewed By RHB

Stantec

ATTERBERG LIMITS

Project	Gallatin Fossil Plant (GAF) - Ash Ponds	Project No.	175559018
Source	STN-E-20, 4.5'-6.0', 6.0'-7.5', 7.5'-9.0'	Lab ID	851
		% + No. 40	14
Tested By	KDK	Test Method	ASTM D 4318 Method A
Date Received	10-09-2009		
Test Date	11-04-2009	Prepared	Dry

Wet Soil and Tare Mass (g)	Dry Soil and Tare Mass (g)	Tare Mass (g)	Number of Blows	Water Content (%)	Liquid Limit
14.81	11.22	4.34	30	52.2	54
14.52	10.93	4.32	24	54.3	
13.56	10.25	4.29	20	55.5	



PLASTIC LIMIT AND PLASTICITY INDEX

Wet Soil and Tare Mass (g)	Dry Soil and Tare Mass (g)	Tare Mass (g)	Water Content (%)	Plastic Limit	Plasticity Index
10.59	9.64	4.31	17.8	18	36
10.87	9.87	4.31	18.0		

Remarks:

Reviewed By RHB

Stantec

Summary of Soil Tests

Project Name	Gallatin Fossil Plant (GAF) - Ash Ponds	Project Number	175559018
Source	STN-A-6, 29.1'-29.5'	Lab ID	5
County	Sumner	Date Received	9-16-09
Sample Type	ST	Date Reported	5-3-10

Test Results

Natural Moisture Content

Test Method: ASTM D 2216

Moisture Content (%): 31.9

Particle Size Analysis

Preparation Method: ASTM D 421

Gradation Method: ASTM D 422

Hydrometer Method: ASTM D 422

Particle Size		%
Sieve Size	(mm)	Passing
3"	75	
2"	50	
1 1/2"	37.5	
1"	25	
3/4"	19	
3/8"	9.5	100.0
No. 4	4.75	97.5
No. 10	2	95.9
No. 40	0.425	90.3
No. 200	0.075	85.5
	0.02	70.2
	0.005	54.5
	0.002	46.4
estimated	0.001	42.0

Plus 3 in. material, not included: 0 (%)

Range	ASTM (%)	AASHTO (%)
Gravel	2.5	4.1
Coarse Sand	1.6	5.6
Medium Sand	5.6	---
Fine Sand	4.8	4.8
Silt	31.0	39.1
Clay	54.5	46.4

Atterberg Limits

Test Method: ASTM D 4318 Method A

Prepared: Dry

Liquid Limit: 60

Plastic Limit: 19

Plasticity Index: 41

Activity Index: 0.89

Moisture-Density Relationship

Test Not Performed

Maximum Dry Density (lb/ft^3): N/A

Maximum Dry Density (kg/m^3): N/A

Optimum Moisture Content (%): N/A

Over Size Correction %: N/A

California Bearing Ratio

Test Not Performed

Bearing Ratio (%): N/A

Compacted Dry Density (lb/ft^3): N/A

Compacted Moisture Content (%): N/A

Specific Gravity

Test Method: ASTM D 854

Prepared: Dry

Particle Size: No. 10

Specific Gravity at 20° Celsius: 2.77

Classification

Unified Group Symbol: CH

Group Name: Fat clay

AASHTO Classification: A-7-6 (37)

Comments:

Particle-Size Analysis of Soils
ASTM D 422

Project Name: Gallatin Fossil Plant (GAF) - Ash Ponds
Project Number: 175559018
Source: STN-A-6, 29.1'-29.5'
Lab ID: 5

Sieve analysis for the Portion Coarser than the No. 10 Sieve

Test Method: ASTM D 422
Prepared using: ASTM D 421

Particle Shape: Angular
Particle Hardness: Hard and Durable

Tested By: BWT
Test Date: 04-27-2010
Date Received: 09-16-2009

Maximum Particle size: 3/8" Sieve

Sieve Size	% Passing
3"	
2"	
1 1/2"	
1"	
3/4"	
3/8"	100.0
No. 4	97.5
No. 10	95.9

Analysis for the portion Finer than the No. 10 Sieve

Analysis Based on: Total Sample

Specific Gravity: 2.77

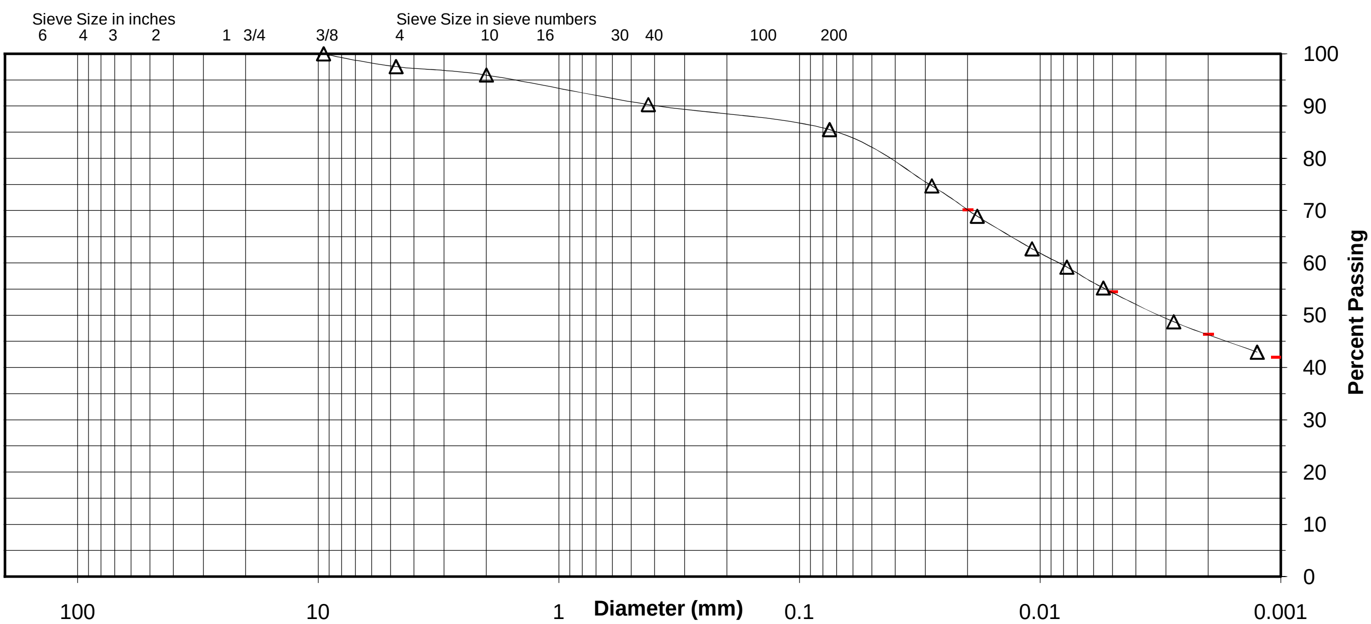
Dispersed using: Apparatus A - Mechanical, for 1 minute

No. 40	90.3
No. 200	85.5
0.02 mm	70.2
0.005 mm	54.5
0.002 mm	46.4
0.001 mm	42.0

Particle Size Distribution

ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay
	0.0	2.5	1.6	5.6	4.8	31.0	54.5

AASHTO	Gravel	Coarse Sand	Fine Sand	Silt	Clay
	4.1	5.6	4.8	39.1	46.4



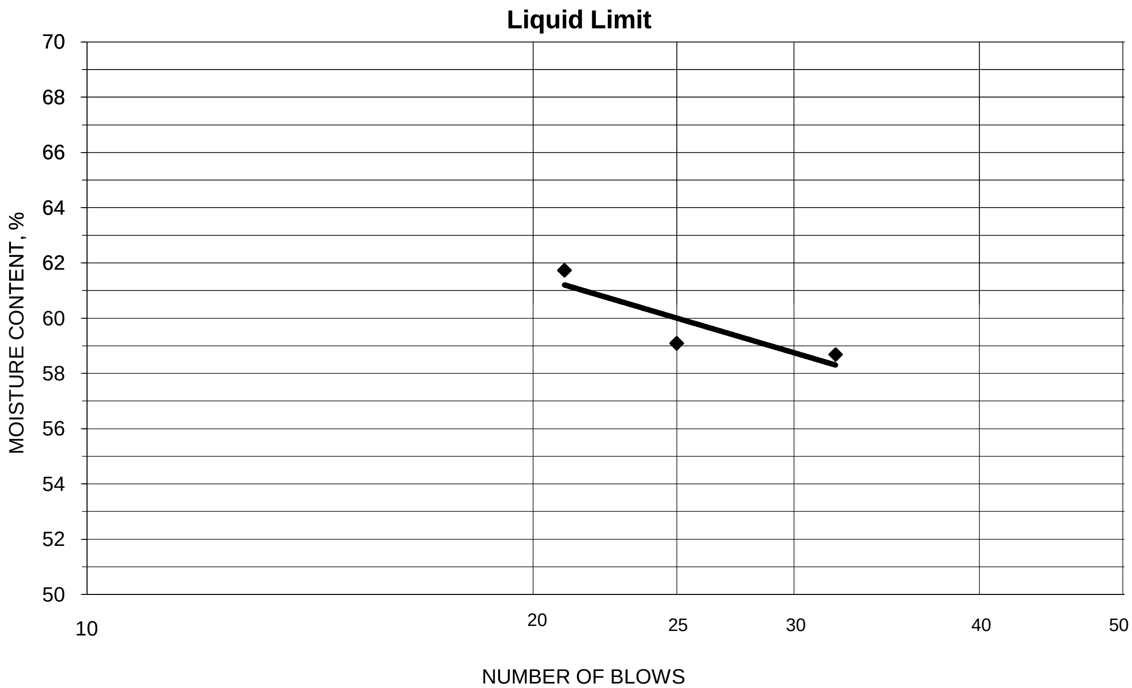
Comments

Reviewed By

ATTERBERG LIMITS

Project	Gallatin Fossil Plant (GAF) - Ash Ponds	Project No.	175559018
Source	STN-A-6, 29.1'-29.5'	Lab ID	5
		% + No. 40	10
Tested By	kdg	Test Method	ASTM D 4318 Method A
Date Received	09-16-2009		
Test Date	04-27-2010	Prepared	Dry

Wet Soil and Tare Mass (g)	Dry Soil and Tare Mass (g)	Tare Mass (g)	Number of Blows	Water Content (%)	Liquid Limit
20.68	17.17	11.23	25	59.1	60
20.98	17.33	11.11	32	58.7	
20.37	16.82	11.07	21	61.7	



PLASTIC LIMIT AND PLASTICITY INDEX

Wet Soil and Tare Mass (g)	Dry Soil and Tare Mass (g)	Tare Mass (g)	Water Content (%)	Plastic Limit	Plasticity Index
17.38	16.37	10.89	18.4	19	41
18.22	17.12	11.29	18.9		

Remarks: ______________________

Reviewed By ______________

Stantec

Summary of Soil Tests

Project Name: Gallatin Fossil Plant (GAF) - Ash Ponds
Project Number: 175559018
Source: STN-E-4S, 5.0'-5.5'
Lab ID: 19

County: Sumner
Date Received: 9-16-09
Sample Type: ST
Date Reported: 5-3-10

Test Results

Natural Moisture Content
Test Method: ASTM D 2216
Moisture Content (%): 19.9

Particle Size Analysis
Preparation Method: ASTM D 421
Gradation Method: ASTM D 422
Hydrometer Method: ASTM D 422

Particle Size		%
Sieve Size	(mm)	Passing
3"	75	
2"	50	
1 1/2"	37.5	
1"	25	
3/4"	19	100.0
3/8"	9.5	93.9
No. 4	4.75	90.1
No. 10	2	72.1
No. 40	0.425	64.7
No. 200	0.075	55.6
	0.02	40.9
	0.005	30.4
	0.002	22.7
estimated	0.001	18.0

Plus 3 in. material, not included: 0 (%)

	ASTM	AASHTO
Range	(%)	(%)
Gravel	9.9	27.9
Coarse Sand	18.0	7.4
Medium Sand	7.4	---
Fine Sand	9.1	9.1
Silt	25.2	32.9
Clay	30.4	22.7

Atterberg Limits
Test Method: ASTM D 4318 Method A
Prepared: Dry
Liquid Limit: 42
Plastic Limit: 18
Plasticity Index: 24
Activity Index: 1.04

Moisture-Density Relationship
Test Not Performed
Maximum Dry Density (lb/ft^3): N/A
Maximum Dry Density (kg/m^3): N/A
Optimum Moisture Content (%): N/A
Over Size Correction %: N/A

California Bearing Ratio
Test Not Performed
Bearing Ratio (%): N/A
Compacted Dry Density (lb/ft^3): N/A
Compacted Moisture Content (%): N/A

Specific Gravity
Test Method: ASTM D 854
Prepared: Dry
Particle Size: No. 10
Specific Gravity at 20° Celsius: 2.77

Classification
Unified Group Symbol: CL
Group Name: Sandy lean clay

AASHTO Classification: A-7-6 (10)

Comments:

Stantec

Particle-Size Analysis of Soils
ASTM D 422

Project Name: Gallatin Fossil Plant (GAF) - Ash Ponds — Project Number: 175559018
Source: STN-E-4S, 5.0'-5.5' — Lab ID: 19

Sieve analysis for the Portion Coarser than the No. 10 Sieve

Test Method: ASTM D 422
Prepared using: ASTM D 421

Particle Shape: Angular
Particle Hardness: Hard and Durable

Tested By: Ford
Test Date: 04-26-2010
Date Received 09-16-2009

Maximum Particle size: 3/4" Sieve

Sieve Size	% Passing
3"	
2"	
1 1/2"	
1"	
3/4"	100.0
3/8"	93.9
No. 4	90.1
No. 10	72.1

Analysis for the portion Finer than the No. 10 Sieve

Analysis Based on: Total Sample

Specific Gravity 2.77

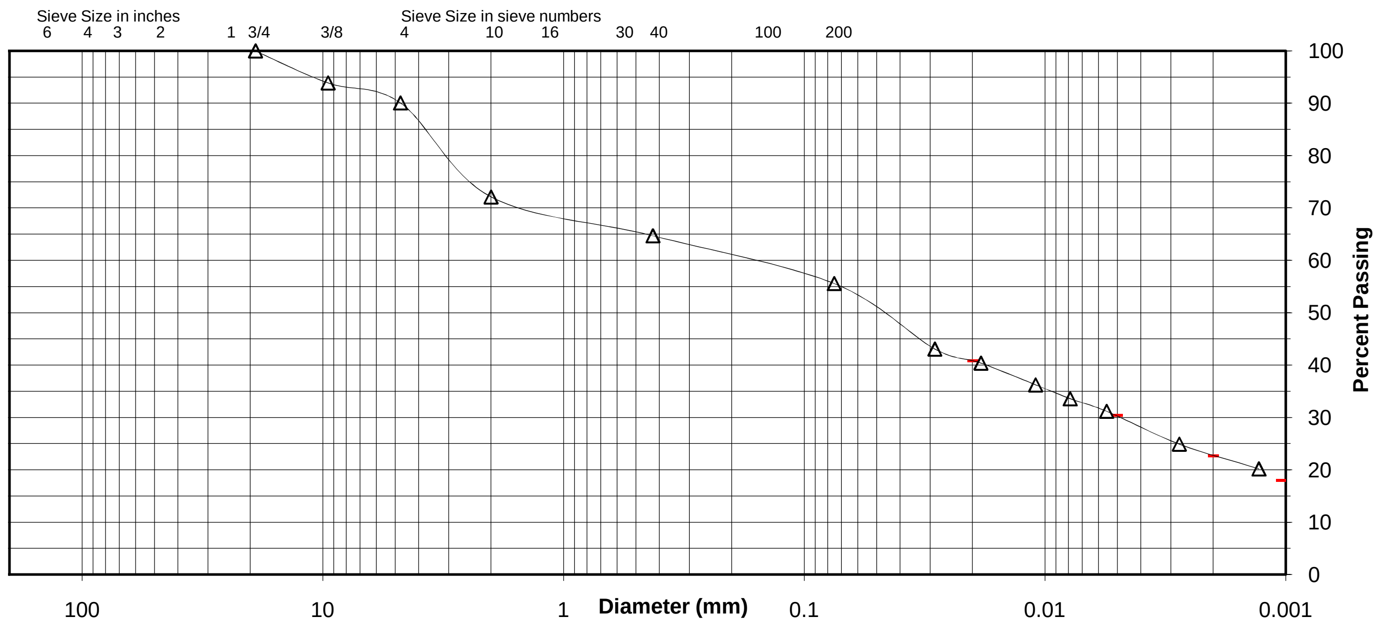
Dispersed using: Apparatus A - Mechanical, for 1 minute

No. 40	64.7
No. 200	55.6
0.02 mm	40.9
0.005 mm	30.4
0.002 mm	22.7
0.001 mm	18.0

Particle Size Distribution

ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay
	0.0	9.9	18.0	7.4	9.1	25.2	30.4

AASHTO	Gravel	Coarse Sand	Fine Sand	Silt	Clay
	27.9	7.4	9.1	32.9	22.7



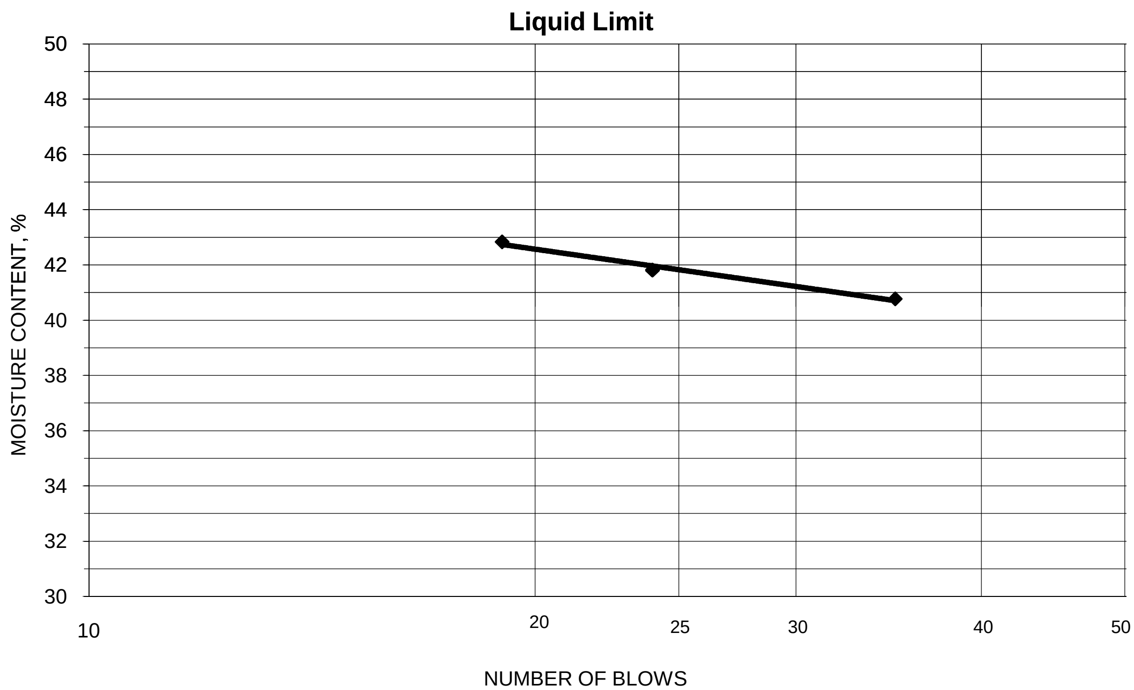
Comments

Reviewed By

ATTERBERG LIMITS

Project	Gallatin Fossil Plant (GAF) - Ash Ponds	Project No.	175559018
Source	STN-E-4S, 5.0'-5.5'	Lab ID	19
		% + No. 40	35
Tested By	KDG	Test Method	ASTM D 4318 Method A
Date Received	09-16-2009		
Test Date	04-29-2010	Prepared	Dry

Wet Soil and Tare Mass (g)	Dry Soil and Tare Mass (g)	Tare Mass (g)	Number of Blows	Water Content (%)	Liquid Limit
21.26	18.28	10.97	35	40.8	42
22.08	18.89	11.26	24	41.8	
21.69	18.52	11.12	19	42.8	



PLASTIC LIMIT AND PLASTICITY INDEX

Wet Soil and Tare Mass (g)	Dry Soil and Tare Mass (g)	Tare Mass (g)	Water Content (%)	Plastic Limit	Plasticity Index
18.93	17.72	10.89	17.7	18	24
17.96	16.93	11.07	17.6		

Remarks: ______

Reviewed By ______

Stantec

Summary of Soil Tests

Project Name	Gallatin Fossil Plant (GAF) - Ash Ponds	Project Number	175559018
Source	STN-E-8, 41.6'-42.1'	Lab ID	26B
County	Sumner	Date Received	9-16-09
Sample Type	ST	Date Reported	5-3-10

Test Results

Natural Moisture Content

Test Method: ASTM D 2216

Moisture Content (%): 19.8

Particle Size Analysis

Preparation Method: ASTM D 421

Gradation Method: ASTM D 422

Hydrometer Method: ASTM D 422

Particle Size		%
Sieve Size	(mm)	Passing
3"	75	
2"	50	
1 1/2"	37.5	
1"	25	100.0
3/4"	19	91.8
3/8"	9.5	71.2
No. 4	4.75	61.2
No. 10	2	48.7
No. 40	0.425	42.0
No. 200	0.075	29.8
	0.02	19.9
	0.005	13.6
	0.002	11.2
estimated	0.001	9.0

Plus 3 in. material, not included: 0 (%)

Range	ASTM (%)	AASHTO (%)
Gravel	38.8	51.3
Coarse Sand	12.5	6.7
Medium Sand	6.7	---
Fine Sand	12.2	12.2
Silt	16.2	18.6
Clay	13.6	11.2

Atterberg Limits

Test Method: ASTM D 4318 Method A

Prepared: Dry

Liquid Limit: 27

Plastic Limit: 13

Plasticity Index: 14

Activity Index: 1.27

Moisture-Density Relationship

Test Not Performed

Maximum Dry Density (lb/ft^3): N/A

Maximum Dry Density (kg/m^3): N/A

Optimum Moisture Content (%): N/A

Over Size Correction %: N/A

California Bearing Ratio

Test Not Performed

Bearing Ratio (%): N/A

Compacted Dry Density (lb/ft^3): N/A

Compacted Moisture Content (%): N/A

Specific Gravity

Test Method: ASTM D 854

Prepared: Dry

Particle Size: No. 10

Specific Gravity at 20° Celsius: 2.67

Classification

Unified Group Symbol: GC

Group Name: Clayey gravel with sand

AASHTO Classification: A-2-6 (1)

Comments:

Particle-Size Analysis of Soils
ASTM D 422

Project Name	Gallatin Fossil Plant (GAF) - Ash Ponds	Project Number	175559018
Source	STN-E-8, 41.6'-42.1'	Lab ID	26B

Sieve analysis for the Portion Coarser than the No. 10 Sieve

Test Method: ASTM D 422
Prepared using: ASTM D 421

Particle Shape: Angular
Particle Hardness: Hard and Durable

Tested By: Ford
Test Date: 04-26-2010
Date Received 09-16-2009

Maximum Particle size: 1" Sieve

Sieve Size	% Passing
3"	
2"	
1 1/2"	
1"	100.0
3/4"	91.8
3/8"	71.2
No. 4	61.2
No. 10	48.7

Analysis for the portion Finer than the No. 10 Sieve

Analysis Based on: Total Sample

Specific Gravity 2.67

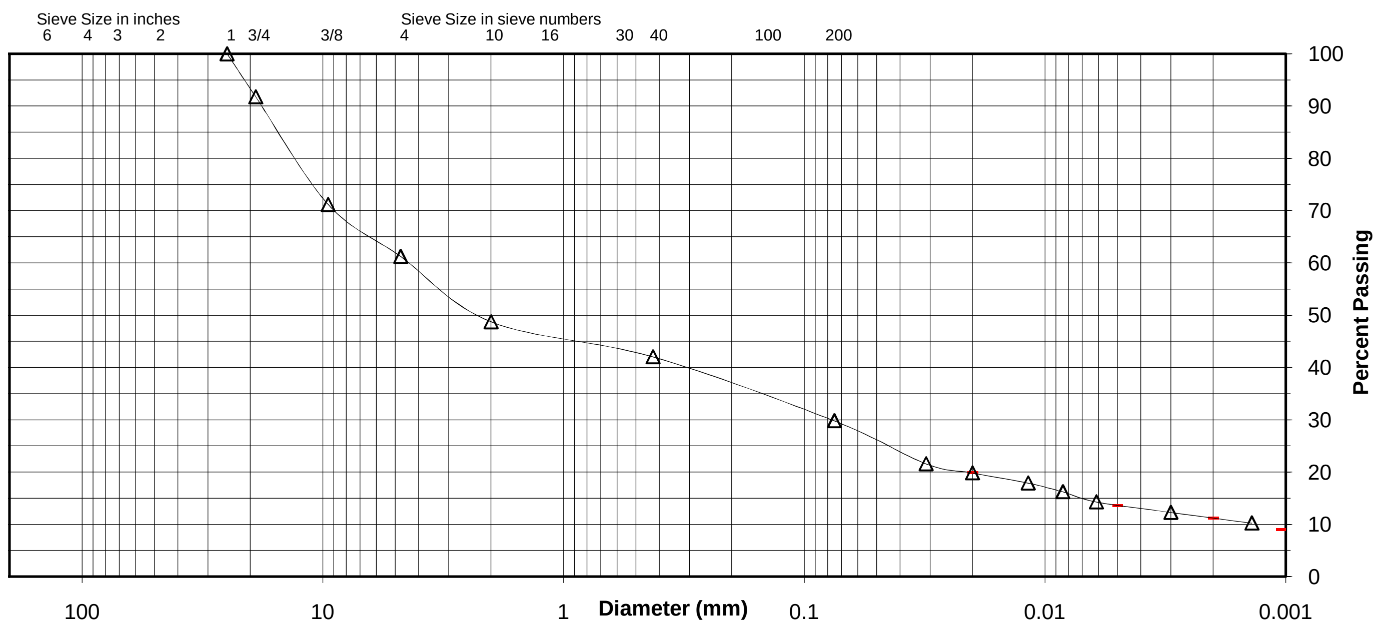
Dispersed using: Apparatus A - Mechanical, for 1 minute

No. 40	42.0
No. 200	29.8
0.02 mm	19.9
0.005 mm	13.6
0.002 mm	11.2
0.001 mm	9.0

Particle Size Distribution

ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay
	8.2	30.6	12.5	6.7	12.2	16.2	13.6

AASHTO	Gravel	Coarse Sand	Fine Sand	Silt	Clay
	51.3	6.7	12.2	18.6	11.2



Comments

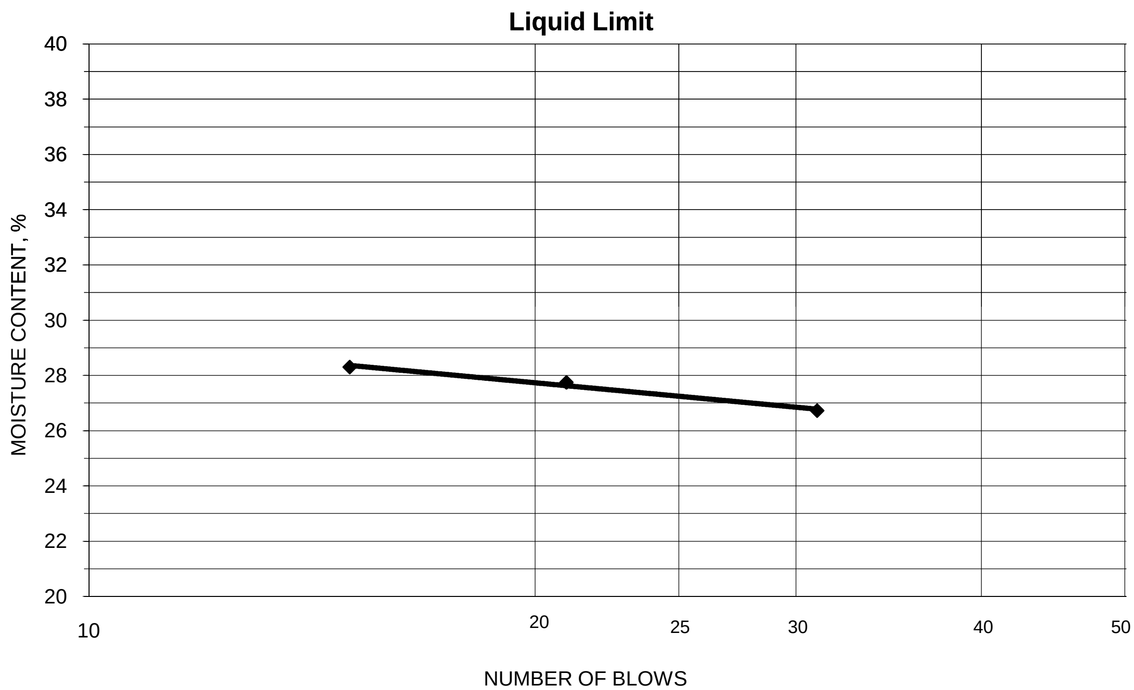
Reviewed By

Stantec

ATTERBERG LIMITS

Project	Gallatin Fossil Plant (GAF) - Ash Ponds	Project No.	175559018
Source	STN-E-8, 41.6'-42.1'	Lab ID	26B
		% + No. 40	58
Tested By	KDG	Test Method	ASTM D 4318 Method A
Date Received	09-16-2009		
Test Date	04-30-2010	Prepared	Dry

Wet Soil and Tare Mass (g)	Dry Soil and Tare Mass (g)	Tare Mass (g)	Number of Blows	Water Content (%)	Liquid Limit
21.75	19.35	10.87	15	28.3	
21.58	19.33	11.22	21	27.7	
22.60	20.16	11.03	31	26.7	27



PLASTIC LIMIT AND PLASTICITY INDEX

Wet Soil and Tare Mass (g)	Dry Soil and Tare Mass (g)	Tare Mass (g)	Water Content (%)	Plastic Limit	Plasticity Index
20.95	19.80	11.16	13.3	13	14
17.59	16.82	10.90	13.0		

Remarks: ______________________

Reviewed By ______________

Stantec

Summary of Soil Tests

Project Name: Gallatin Fossil Plant (GAF) - Ash Ponds
Project Number: 175559018
Source: STN-E-8, 50.2'-50.7'
Lab ID: 28A

County: Sumner
Date Received: 9-16-09
Sample Type: ST
Date Reported: 5-3-10

Test Results

Natural Moisture Content

Test Method: ASTM D 2216
Moisture Content (%): 29.1

Particle Size Analysis

Preparation Method: ASTM D 421
Gradation Method: ASTM D 422
Hydrometer Method: ASTM D 422

Particle Size: Sieve Size	Particle Size: (mm)	% Passing
3"	75	
2"	50	
1 1/2"	37.5	
1"	25	
3/4"	19	100.0
3/8"	9.5	98.3
No. 4	4.75	98.2
No. 10	2	97.9
No. 40	0.425	95.0
No. 200	0.075	77.6
	0.02	51.9
	0.005	41.7
	0.002	34.4
estimated	0.001	29.0

Plus 3 in. material, not included: 0 (%)

Range	ASTM (%)	AASHTO (%)
Gravel	1.8	2.1
Coarse Sand	0.3	2.9
Medium Sand	2.9	---
Fine Sand	17.4	17.4
Silt	35.9	43.2
Clay	41.7	34.4

Atterberg Limits

Test Method: ASTM D 4318 Method A
Prepared: Dry

Liquid Limit: 47
Plastic Limit: 22
Plasticity Index: 25
Activity Index: 0.74

Moisture-Density Relationship

Test Not Performed

Maximum Dry Density (lb/ft^3): N/A
Maximum Dry Density (kg/m^3): N/A
Optimum Moisture Content (%): N/A
Over Size Correction %: N/A

California Bearing Ratio

Test Not Performed

Bearing Ratio (%): N/A
Compacted Dry Density (lb/ft^3): N/A
Compacted Moisture Content (%): N/A

Specific Gravity

Test Method: ASTM D 854
Prepared: Dry

Particle Size: No. 10
Specific Gravity at 20° Celsius: 2.78

Classification

Unified Group Symbol: CL
Group Name: Lean clay with sand

AASHTO Classification: A-7-6 (20)

Comments:

Stantec

Particle-Size Analysis of Soils
ASTM D 422

Project Name: Gallatin Fossil Plant (GAF) - Ash Ponds
Project Number: 175559018
Source: STN-E-8, 50.2'-50.7'
Lab ID: 28A

Sieve analysis for the Portion Coarser than the No. 10 Sieve

Test Method: ASTM D 422
Prepared using: ASTM D 421

Particle Shape: Angular
Particle Hardness: Hard and Durable

Tested By: JF
Test Date: 04-27-2010
Date Received 09-16-2009

Maximum Particle size: 3/4" Sieve

Sieve Size	% Passing
3"	
2"	
1 1/2"	
1"	
3/4"	100.0
3/8"	98.3
No. 4	98.2
No. 10	97.9

Analysis for the portion Finer than the No. 10 Sieve

Analysis Based on: Total Sample

Specific Gravity 2.78

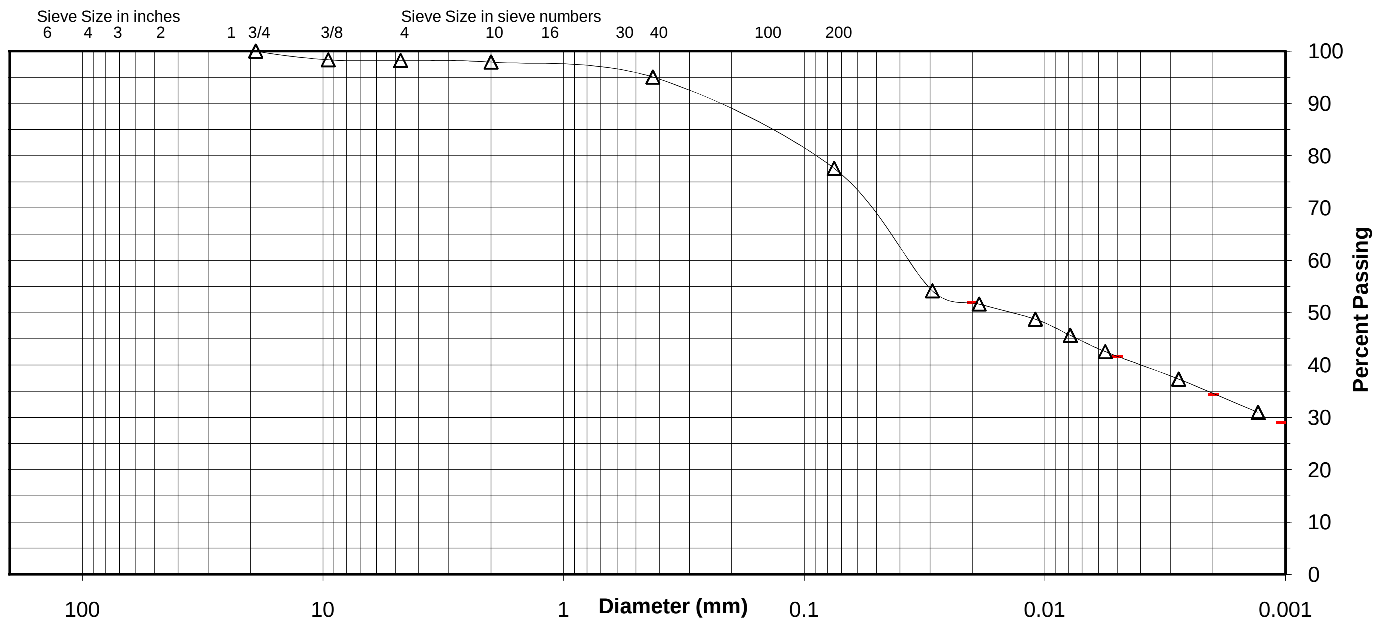
Dispersed using: Apparatus A - Mechanical, for 1 minute

No. 40	95.0
No. 200	77.6
0.02 mm	51.9
0.005 mm	41.7
0.002 mm	34.4
0.001 mm	29.0

Particle Size Distribution

ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay
	0.0	1.8	0.3	2.9	17.4	35.9	41.7

AASHTO	Gravel	Coarse Sand	Fine Sand	Silt	Clay
	2.1	2.9	17.4	43.2	34.4



Comments

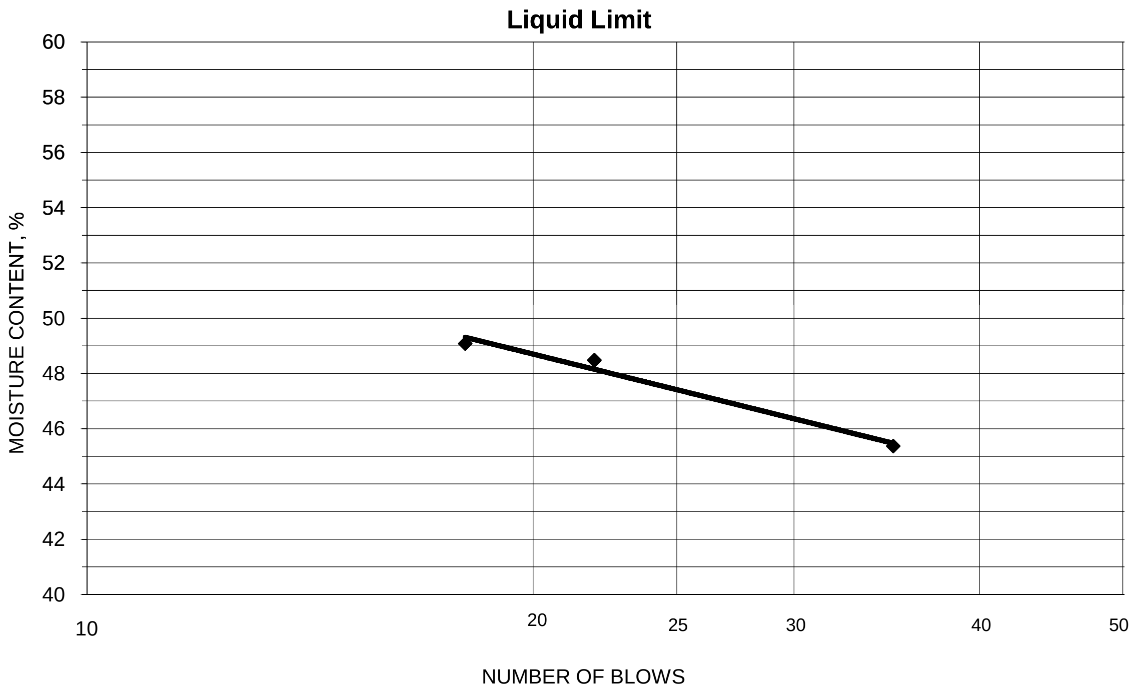
Reviewed By

Stantec

ATTERBERG LIMITS

Project	Gallatin Fossil Plant (GAF) - Ash Ponds	Project No.	175559018
Source	STN-E-8, 50.2'-50.7'	Lab ID	28A
		% + No. 40	5
Tested By	JF	Test Method	ASTM D 4318 Method A
Date Received	09-16-2009		
Test Date	04-30-2010	Prepared	Dry

Wet Soil and Tare Mass (g)	Dry Soil and Tare Mass (g)	Tare Mass (g)	Number of Blows	Water Content (%)	Liquid Limit
20.93	17.73	11.21	18	49.1	47
21.43	18.08	11.17	22	48.5	
20.54	17.55	10.96	35	45.4	



PLASTIC LIMIT AND PLASTICITY INDEX

Wet Soil and Tare Mass (g)	Dry Soil and Tare Mass (g)	Tare Mass (g)	Water Content (%)	Plastic Limit	Plasticity Index
18.03	16.80	11.15	21.8	22	25
17.95	16.73	11.07	21.6		

Remarks:

Reviewed By

Stantec

Summary of Soil Tests

Project Name: Gallatin Fossil Plant (GAF) - Ash Ponds
Project Number: 175559018
Source: STN-E-9, 5.8'-6.3'
Lab ID: 30B

County: Sumner
Date Received: 9-16-09
Sample Type: ST
Date Reported: 5-3-10

Test Results

Natural Moisture Content
Test Method: ASTM D 2216
Moisture Content (%): 18.6

Particle Size Analysis
Preparation Method: ASTM D 421
Gradation Method: ASTM D 422
Hydrometer Method: ASTM D 422

Particle Size: Sieve Size	Particle Size: (mm)	% Passing
3"	75	
2"	50	
1 1/2"	37.5	
1"	25	
3/4"	19	
3/8"	9.5	100.0
No. 4	4.75	99.7
No. 10	2	99.4
No. 40	0.425	97.1
No. 200	0.075	68.9
	0.02	44.5
	0.005	32.6
	0.002	27.2
estimated	0.001	23.0

Plus 3 in. material, not included: 0 (%)

Range	ASTM (%)	AASHTO (%)
Gravel	0.3	0.6
Coarse Sand	0.3	2.3
Medium Sand	2.3	---
Fine Sand	28.2	28.2
Silt	36.3	41.7
Clay	32.6	27.2

Atterberg Limits
Test Method: ASTM D 4318 Method A
Prepared: Dry
Liquid Limit: 31
Plastic Limit: 14
Plasticity Index: 17
Activity Index: 0.63

Moisture-Density Relationship
Test Not Performed
Maximum Dry Density (lb/ft^3): N/A
Maximum Dry Density (kg/m^3): N/A
Optimum Moisture Content (%): N/A
Over Size Correction %: N/A

California Bearing Ratio
Test Not Performed
Bearing Ratio (%): N/A
Compacted Dry Density (lb/ft^3): N/A
Compacted Moisture Content (%): N/A

Specific Gravity
Test Method: ASTM D 854
Prepared: Dry
Particle Size: No. 10
Specific Gravity at 20° Celsius: 2.71

Classification
Unified Group Symbol: CL
Group Name: Sandy lean clay
AASHTO Classification: A-6 (9)

Comments:

Particle-Size Analysis of Soils
ASTM D 422

Project Name	Gallatin Fossil Plant (GAF) - Ash Ponds	Project Number	175559018
Source	STN-E-9, 5.8'-6.3'	Lab ID	30B

Sieve analysis for the Portion Coarser than the No. 10 Sieve

Test Method: ASTM D 422
Prepared using: ASTM D 421

Particle Shape: Angular
Particle Hardness: Hard and Durable

Tested By: BWT
Test Date: 04-27-2010
Date Received 09-16-2009

Maximum Particle size: 3/8" Sieve

Sieve Size	% Passing
3"	
2"	
1 1/2"	
1"	
3/4"	
3/8"	100.0
No. 4	99.7
No. 10	99.4

Analysis for the portion Finer than the No. 10 Sieve

Analysis Based on: Total Sample

Specific Gravity 2.71

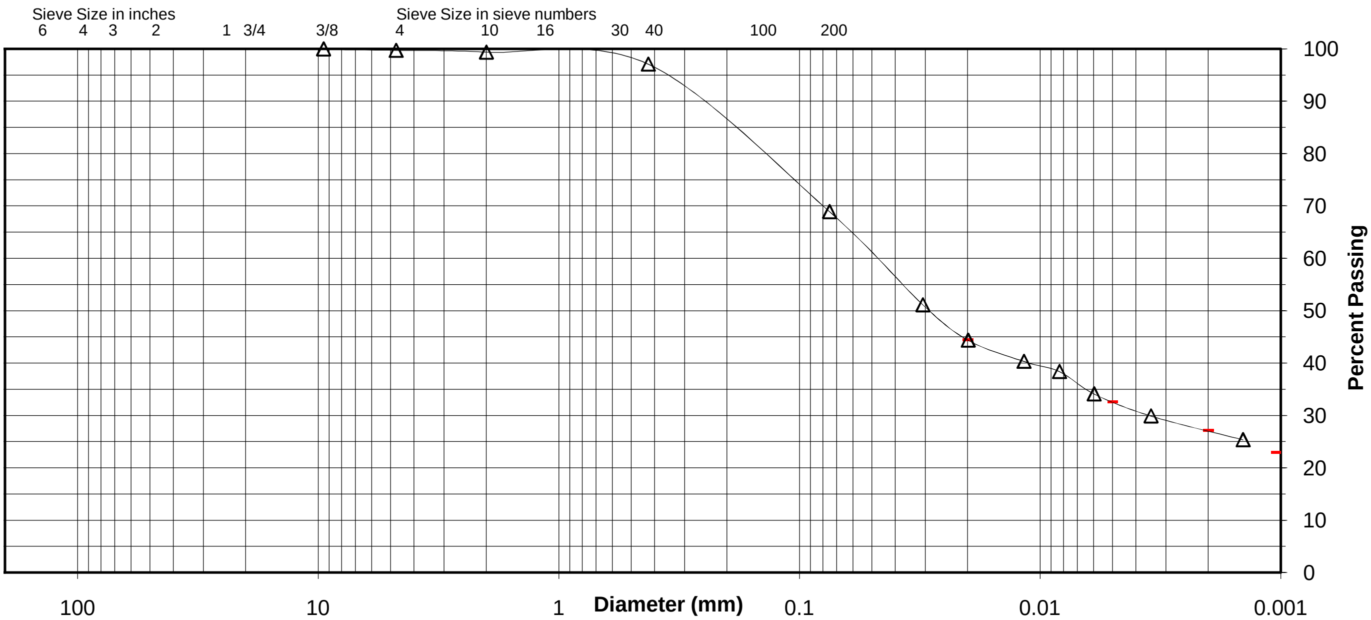
Dispersed using: Apparatus A - Mechanical, for 1 minute

No. 40	97.1
No. 200	68.9
0.02 mm	44.5
0.005 mm	32.6
0.002 mm	27.2
0.001 mm	23.0

Particle Size Distribution

ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay
	0.0	0.3	0.3	2.3	28.2	36.3	32.6

AASHTO	Gravel	Coarse Sand	Fine Sand	Silt	Clay
	0.6	2.3	28.2	41.7	27.2



Comments

Reviewed By

File: frm_175559018_sum_30b.xlsm Sheet: Hydro-Report
Preparation Date: 1998
Revision Date: 1-2008

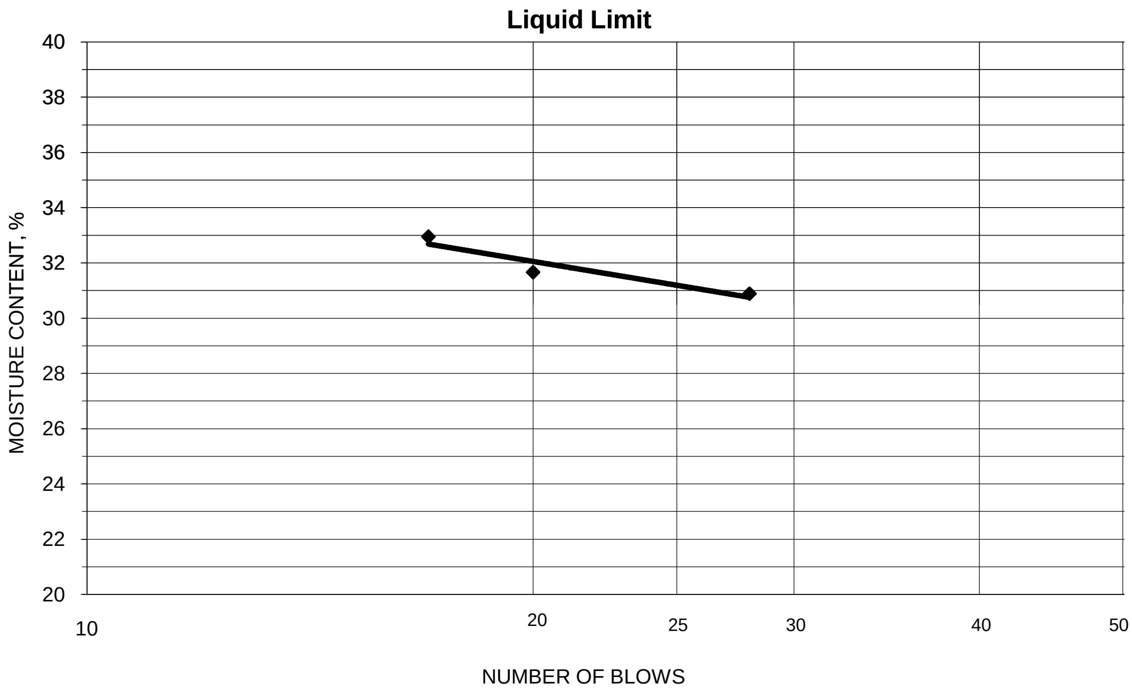
Stantec Consulting Services Inc.

Laboratory Document
Prepared By: MW
Approved BY: TLK

ATTERBERG LIMITS

Project	Gallatin Fossil Plant (GAF) - Ash Ponds	Project No.	175559018
Source	STN-E-9, 5.8'-6.3'	Lab ID	30B
		% + No. 40	3
Tested By	KDG	Test Method	ASTM D 4318 Method A
Date Received	09-16-2009		
Test Date	04-29-2010	Prepared	Dry

Wet Soil and Tare Mass (g)	Dry Soil and Tare Mass (g)	Tare Mass (g)	Number of Blows	Water Content (%)	Liquid Limit
22.29	19.60	10.89	28	30.9	31
21.50	18.98	11.02	20	31.7	
22.42	19.55	10.84	17	33.0	



PLASTIC LIMIT AND PLASTICITY INDEX

Wet Soil and Tare Mass (g)	Dry Soil and Tare Mass (g)	Tare Mass (g)	Water Content (%)	Plastic Limit	Plasticity Index
19.04	18.05	10.93	13.9	14	17
18.23	17.35	10.96	13.8		

Remarks: ______________________________

Reviewed By ______________

Stantec

Summary of Soil Tests

Project Name	Gallatin Fossil Plant (GAF) - Ash Ponds	Project Number	175559018
Source	STN-E-10S, 5.3'-5.8'	Lab ID	32
County	Sumner	Date Received	9-16-09
Sample Type	ST	Date Reported	5-3-10

Test Results

Natural Moisture Content

Test Method: ASTM D 2216

Moisture Content (%): 18.1

Particle Size Analysis

Preparation Method: ASTM D 421

Gradation Method: ASTM D 422

Hydrometer Method: ASTM D 422

Particle Size		%
Sieve Size	(mm)	Passing
3"	75	
2"	50	
1 1/2"	37.5	
1"	25	
3/4"	19	100.0
3/8"	9.5	98.5
No. 4	4.75	95.8
No. 10	2	90.6
No. 40	0.425	85.6
No. 200	0.075	75.7
	0.02	55.8
	0.005	32.2
	0.002	25.5
estimated	0.001	22.0

Plus 3 in. material, not included: 0 (%)

	ASTM	AASHTO
Range	(%)	(%)
Gravel	4.2	9.4
Coarse Sand	5.2	5.0
Medium Sand	5.0	---
Fine Sand	9.9	9.9
Silt	43.5	50.2
Clay	32.2	25.5

Atterberg Limits

Test Method: ASTM D 4318 Method A

Prepared: Dry

Liquid Limit: 38

Plastic Limit: 16

Plasticity Index: 22

Activity Index: 0.85

Moisture-Density Relationship

Test Not Performed

Maximum Dry Density (lb/ft^3): N/A

Maximum Dry Density (kg/m^3): N/A

Optimum Moisture Content (%): N/A

Over Size Correction %: N/A

California Bearing Ratio

Test Not Performed

Bearing Ratio (%): N/A

Compacted Dry Density (lb/ft^3): N/A

Compacted Moisture Content (%): N/A

Specific Gravity

Test Method: ASTM D 854

Prepared: Dry

Particle Size: No. 10

Specific Gravity at 20° Celsius: 2.72

Classification

Unified Group Symbol: CL

Group Name: Lean clay with sand

AASHTO Classification: A-6 (15)

Comments:

Stantec

Particle-Size Analysis of Soils
ASTM D 422

Project Name: Gallatin Fossil Plant (GAF) - Ash Ponds
Project Number: 175559018
Source: STN-E-10S, 5.3'-5.8'
Lab ID: 32

Sieve analysis for the Portion Coarser than the No. 10 Sieve

Test Method: ASTM D 422
Prepared using: ASTM D 421

Particle Shape: Angular
Particle Hardness: Soft

Tested By: JF
Test Date: 04-27-2010
Date Received: 09-16-2009

Maximum Particle size: 3/4" Sieve

Sieve Size	% Passing
3"	
2"	
1 1/2"	
1"	
3/4"	100.0
3/8"	98.5
No. 4	95.8
No. 10	90.6

Analysis for the portion Finer than the No. 10 Sieve

Analysis Based on: Total Sample

Specific Gravity: 2.72

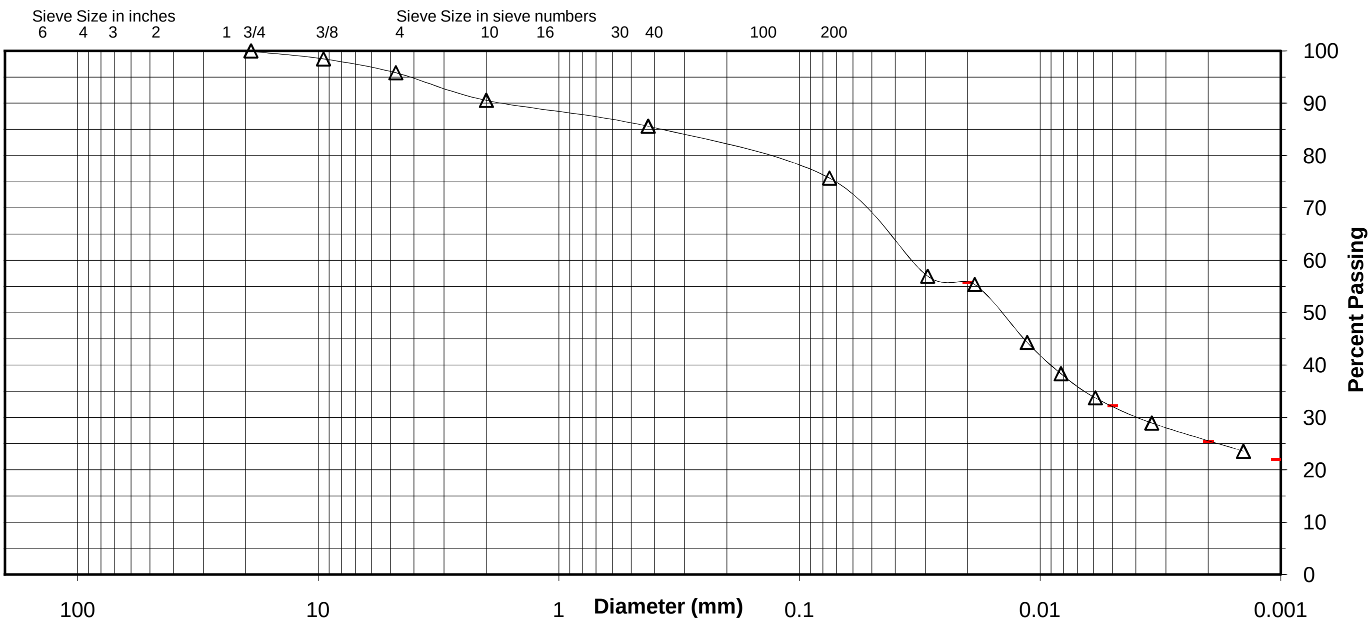
Dispersed using: Apparatus A - Mechanical, for 1 minute

Sieve Size	% Passing
No. 40	85.6
No. 200	75.7
0.02 mm	55.8
0.005 mm	32.2
0.002 mm	25.5
0.001 mm	22.0

Particle Size Distribution

ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay
	0.0	4.2	5.2	5.0	9.9	43.5	32.2

AASHTO	Gravel	Coarse Sand	Fine Sand	Silt	Clay
	9.4	5.0	9.9	50.2	25.5



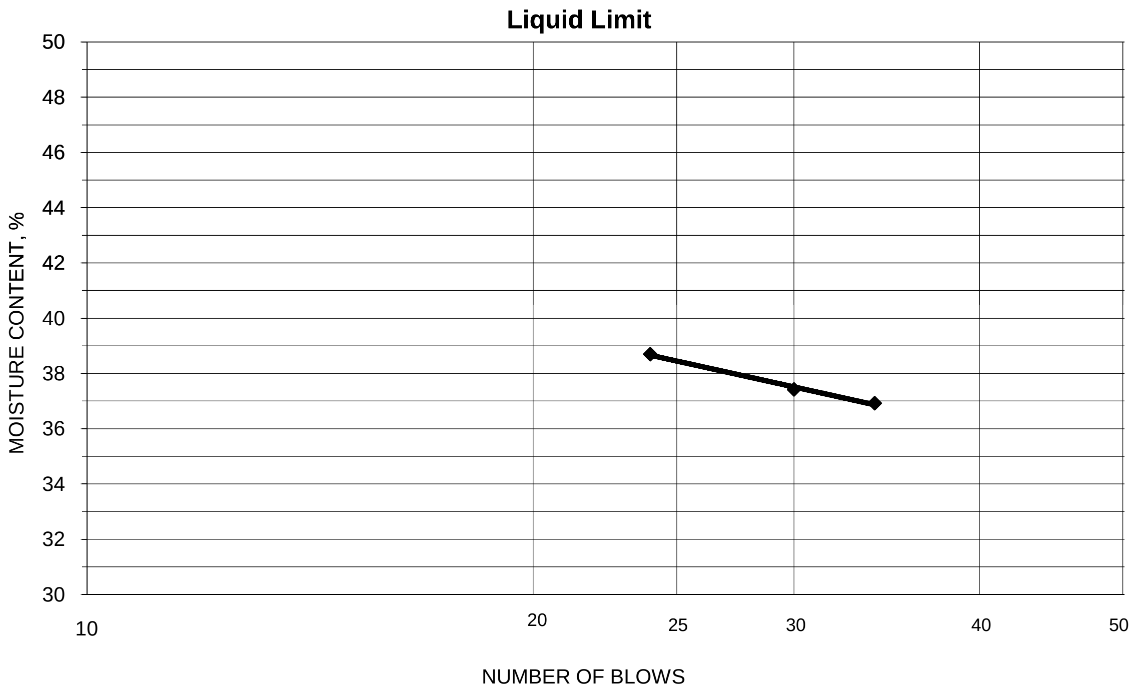
Comments

Reviewed By

ATTERBERG LIMITS

Project	Gallatin Fossil Plant (GAF) - Ash Ponds	Project No.	175559018
Source	STN-E-10S, 5.3'-5.8'	Lab ID	32
		% + No. 40	14
Tested By	KDG	Test Method	ASTM D 4318 Method A
Date Received	09-16-2009		
Test Date	04-29-2010	Prepared	Dry

Wet Soil and Tare Mass (g)	Dry Soil and Tare Mass (g)	Tare Mass (g)	Number of Blows	Water Content (%)	Liquid Limit
22.11	19.30	11.69	34	36.9	
21.95	19.08	11.41	30	37.4	
22.16	19.20	11.55	24	38.7	38



PLASTIC LIMIT AND PLASTICITY INDEX

Wet Soil and Tare Mass (g)	Dry Soil and Tare Mass (g)	Tare Mass (g)	Water Content (%)	Plastic Limit	Plasticity Index
18.68	17.70	11.44	15.7	16	22
19.77	18.63	11.45	15.9		

Remarks: ______________________

Reviewed By ________________

Stantec

Summary of Soil Tests

Project Name	Gallatin Fossil Plant (GAF) - Ash Ponds	Project Number	175559018
Source	STN-E-12, 10.3'-10.8'	Lab ID	37B
County	Sumner	Date Received	9-16-09
Sample Type	ST	Date Reported	5-3-10

Test Results

Natural Moisture Content

Test Method: ASTM D 2216

Moisture Content (%): 22.7

Particle Size Analysis

Preparation Method: ASTM D 421

Gradation Method: ASTM D 422

Hydrometer Method: ASTM D 422

Particle Size		%
Sieve Size	(mm)	Passing
3"	75	
2"	50	
1 1/2"	37.5	
1"	25	
3/4"	19	
3/8"	9.5	
No. 4	4.75	100.0
No. 10	2	99.9
No. 40	0.425	95.8
No. 200	0.075	66.8
	0.02	44.5
	0.005	38.6
	0.002	33.6
estimated	0.001	31.0

Plus 3 in. material, not included: 0 (%)

	ASTM	AASHTO
Range	(%)	(%)
Gravel	0.0	0.1
Coarse Sand	0.1	4.1
Medium Sand	4.1	---
Fine Sand	29.0	29.0
Silt	28.2	33.2
Clay	38.6	33.6

Atterberg Limits

Test Method: ASTM D 4318 Method A

Prepared: Dry

Liquid Limit: 46

Plastic Limit: 20

Plasticity Index: 26

Activity Index: 0.76

Moisture-Density Relationship

Test Not Performed

Maximum Dry Density (lb/ft^3): N/A

Maximum Dry Density (kg/m^3): N/A

Optimum Moisture Content (%): N/A

Over Size Correction %: N/A

California Bearing Ratio

Test Not Performed

Bearing Ratio (%): N/A

Compacted Dry Density (lb/ft^3): N/A

Compacted Moisture Content (%): N/A

Specific Gravity

Test Method: ASTM D 854

Prepared: Dry

Particle Size: No. 10

Specific Gravity at 20° Celsius: 2.79

Classification

Unified Group Symbol: CL

Group Name: Sandy lean clay

AASHTO Classification: A-7-6 (16)

Comments:

Particle-Size Analysis of Soils
ASTM D 422

Project Name: Gallatin Fossil Plant (GAF) - Ash Ponds
Source: STN-E-12, 10.3'-10.8'

Project Number: 175559018
Lab ID: 37B

Sieve analysis for the Portion Coarser than the No. 10 Sieve

Test Method: ASTM D 422
Prepared using: ASTM D 421

Particle Shape: Angular
Particle Hardness: Hard and Durable

Tested By: BWT
Test Date: 04-27-2010
Date Received: 09-16-2009

Maximum Particle size: No. 4 Sieve

Sieve Size	% Passing
3"	
2"	
1 1/2"	
1"	
3/4"	
3/8"	
No. 4	100.0
No. 10	99.9

Analysis for the portion Finer than the No. 10 Sieve

Analysis Based on: Total Sample

Specific Gravity: 2.79

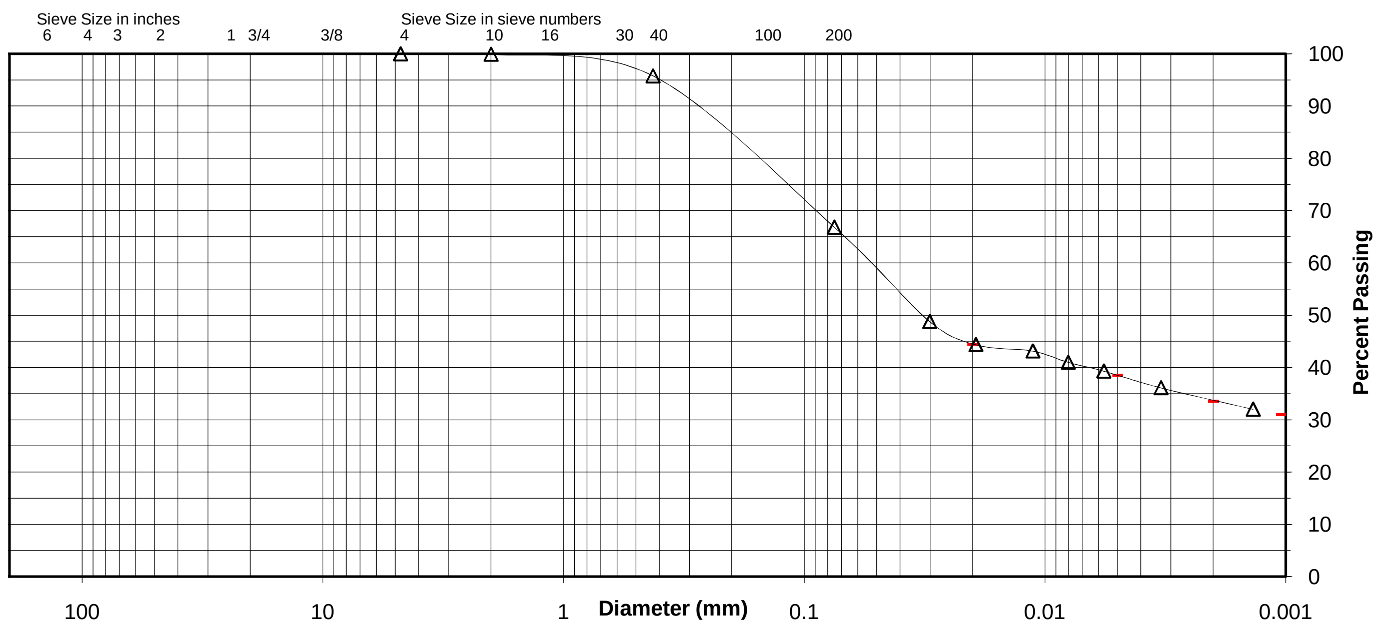
Dispersed using: Apparatus A - Mechanical, for 1 minute

No. 40	95.8
No. 200	66.8
0.02 mm	44.5
0.005 mm	38.6
0.002 mm	33.6
0.001 mm	31.0

Particle Size Distribution

ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay
	0.0	0.0	0.1	4.1	29.0	28.2	38.6

AASHTO	Gravel	Coarse Sand	Fine Sand	Silt	Clay
	0.1	4.1	29.0	33.2	33.6



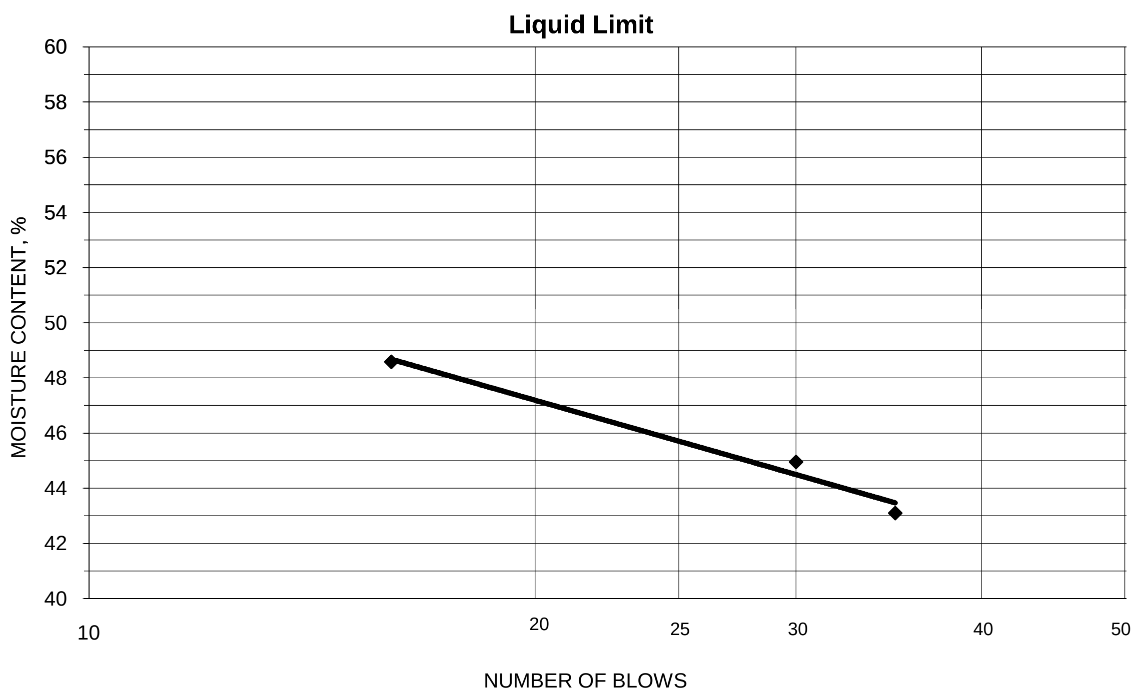
Comments

Reviewed By

ATTERBERG LIMITS

Project	Gallatin Fossil Plant (GAF) - Ash Ponds	Project No.	175559018
Source	STN-E-12, 10.3'-10.8'	Lab ID	37B
		% + No. 40	4
Tested By	JF	Test Method	ASTM D 4318 Method A
Date Received	09-16-2009		
Test Date	04-30-2010	Prepared	Dry

Wet Soil and Tare Mass (g)	Dry Soil and Tare Mass (g)	Tare Mass (g)	Number of Blows	Water Content (%)	Liquid Limit
21.13	17.87	11.16	16	48.6	46
20.28	17.43	11.09	30	45.0	
20.37	17.59	11.14	35	43.1	



PLASTIC LIMIT AND PLASTICITY INDEX

Wet Soil and Tare Mass (g)	Dry Soil and Tare Mass (g)	Tare Mass (g)	Water Content (%)	Plastic Limit	Plasticity Index
18.38	17.14	10.95	20.0	20	26
19.57	18.19	11.14	19.6		

Remarks:

Reviewed By

Stantec

Summary of Soil Tests

Project Name	Gallatin Fossil Plant (GAF) - Ash Ponds	Project Number	175559018
Source	STN-E-14S, 2.0'-2.5'	Lab ID	43A
County	Sumner	Date Received	9-16-09
Sample Type	ST	Date Reported	5-3-10

Test Results

Natural Moisture Content

Test Method: ASTM D 2216

Moisture Content (%): 20.0

Particle Size Analysis

Preparation Method: ASTM D 421

Gradation Method: ASTM D 422

Hydrometer Method: ASTM D 422

Particle Size		%
Sieve Size	(mm)	Passing
3"	75	
2"	50	
1 1/2"	37.5	
1"	25	
3/4"	19	100.0
3/8"	9.5	98.5
No. 4	4.75	97.6
No. 10	2	89.6
No. 40	0.425	87.6
No. 200	0.075	77.1
	0.02	60.1
	0.005	41.4
	0.002	32.1
estimated	0.001	28.0

Plus 3 in. material, not included: 0 (%)

	ASTM	AASHTO
Range	(%)	(%)
Gravel	2.4	10.4
Coarse Sand	8.0	2.0
Medium Sand	2.0	---
Fine Sand	10.5	10.5
Silt	35.7	45.0
Clay	41.4	32.1

Atterberg Limits

Test Method: ASTM D 4318 Method A

Prepared: Dry

Liquid Limit: 38

Plastic Limit: 19

Plasticity Index: 19

Activity Index: 0.59

Moisture-Density Relationship

Test Not Performed

Maximum Dry Density (lb/ft^3): N/A

Maximum Dry Density (kg/m^3): N/A

Optimum Moisture Content (%): N/A

Over Size Correction %: N/A

California Bearing Ratio

Test Not Performed

Bearing Ratio (%): N/A

Compacted Dry Density (lb/ft^3): N/A

Compacted Moisture Content (%): N/A

Specific Gravity

Test Method: ASTM D 854

Prepared: Dry

Particle Size: No. 10

Specific Gravity at 20° Celsius: 2.74

Classification

Unified Group Symbol: CL

Group Name: Lean clay with sand

AASHTO Classification: A-6 (14)

Comments:

Particle-Size Analysis of Soils
ASTM D 422

Project Name	Gallatin Fossil Plant (GAF) - Ash Ponds	Project Number	175559018
Source	STN-E-14S, 2.0'-2.5'	Lab ID	43A

Sieve analysis for the Portion Coarser than the No. 10 Sieve

Test Method: ASTM D 422
Prepared using: ASTM D 421

Particle Shape: Angular
Particle Hardness: Hard and Durable

Tested By: Ford
Test Date: 04-28-2010
Date Received 09-16-2009

Maximum Particle size: 3/4" Sieve

Sieve Size	% Passing
3"	
2"	
1 1/2"	
1"	
3/4"	100.0
3/8"	98.5
No. 4	97.6
No. 10	89.6

Analysis for the portion Finer than the No. 10 Sieve

Analysis Based on: Total Sample

Specific Gravity 2.74

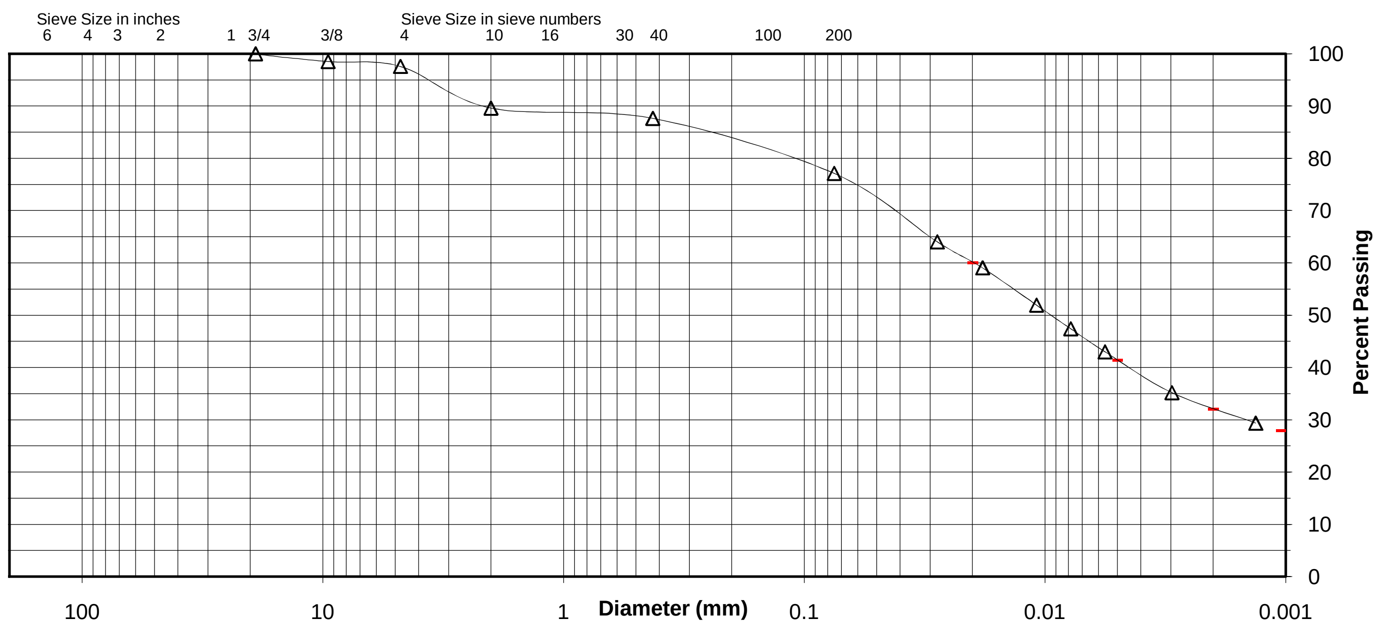
Dispersed using: Apparatus A - Mechanical, for 1 minute

No. 40	87.6
No. 200	77.1
0.02 mm	60.1
0.005 mm	41.4
0.002 mm	32.1
0.001 mm	28.0

Particle Size Distribution

ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay
	0.0	2.4	8.0	2.0	10.5	35.7	41.4

AASHTO	Gravel	Coarse Sand	Fine Sand	Silt	Clay
	10.4	2.0	10.5	45.0	32.1



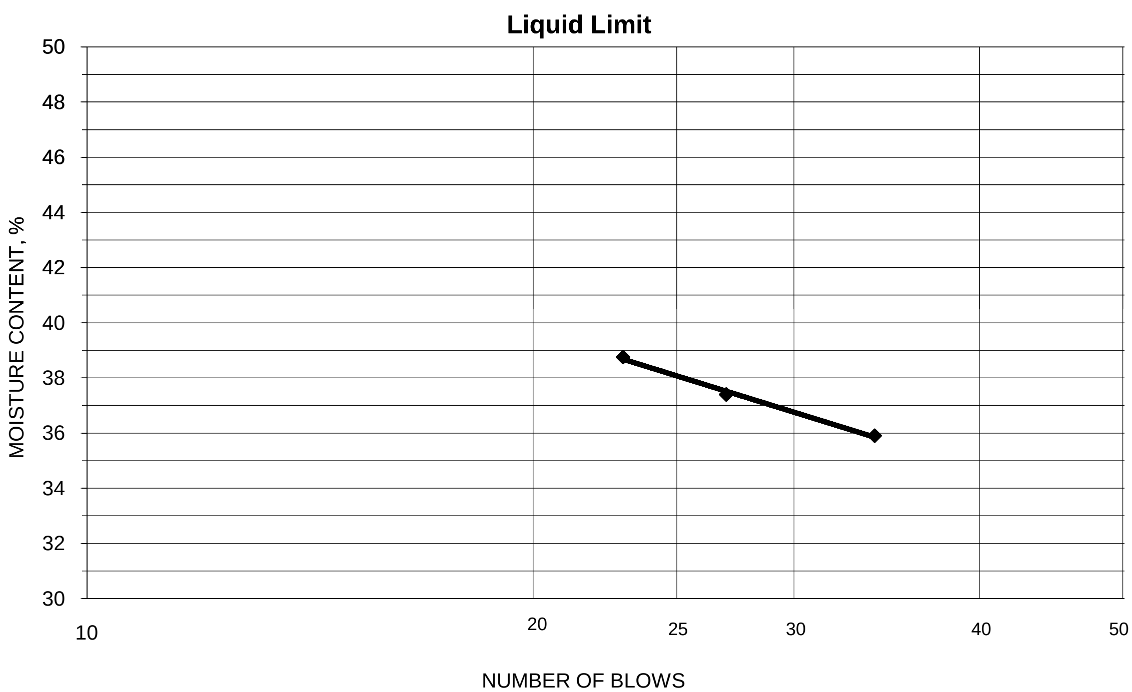
Comments

Reviewed By

ATTERBERG LIMITS

Project	Gallatin Fossil Plant (GAF) - Ash Ponds	Project No.	175559018
Source	STN-E-14S, 2.0'-2.5'	Lab ID	43A
		% + No. 40	12
Tested By	jf	Test Method	ASTM D 4318 Method A
Date Received	09-16-2009		
Test Date	04-29-2010	Prepared	Dry

Wet Soil and Tare Mass (g)	Dry Soil and Tare Mass (g)	Tare Mass (g)	Number of Blows	Water Content (%)	Liquid Limit
22.10	19.12	11.43	23	38.8	38
21.51	18.90	11.63	34	35.9	
21.23	18.62	11.64	27	37.4	



PLASTIC LIMIT AND PLASTICITY INDEX

Wet Soil and Tare Mass (g)	Dry Soil and Tare Mass (g)	Tare Mass (g)	Water Content (%)	Plastic Limit	Plasticity Index
19.10	17.94	11.68	18.5	19	19
19.76	18.45	11.48	18.8		

Remarks:

Reviewed By

Stantec

Summary of Soil Tests

Project Name	Gallatin Fossil Plant (GAF) - Ash Ponds	Project Number	175559018
Source	STN-E-16S, 5.6'-6.1'	Lab ID	47B
County	Sumner	Date Received	9-16-09
Sample Type	ST	Date Reported	5-3-10

Test Results

Natural Moisture Content

Test Method: ASTM D 2216

Moisture Content (%): 27.9

Particle Size Analysis

Preparation Method: ASTM D 421

Gradation Method: ASTM D 422

Hydrometer Method: ASTM D 422

Particle Size		%
Sieve Size	(mm)	Passing
3"	75	
2"	50	
1 1/2"	37.5	
1"	25	
3/4"	19	100.0
3/8"	9.5	97.3
No. 4	4.75	95.8
No. 10	2	93.7
No. 40	0.425	90.0
No. 200	0.075	75.6
	0.02	64.1
	0.005	54.9
	0.002	47.5
estimated	0.001	43.0

Plus 3 in. material, not included: 0 (%)

	ASTM	AASHTO
Range	(%)	(%)
Gravel	4.2	6.3
Coarse Sand	2.1	3.7
Medium Sand	3.7	---
Fine Sand	14.4	14.4
Silt	20.7	28.1
Clay	54.9	47.5

Atterberg Limits

Test Method: ASTM D 4318 Method A

Prepared: Dry

Liquid Limit: 52

Plastic Limit: 19

Plasticity Index: 33

Activity Index: 0.69

Moisture-Density Relationship

Test Not Performed

Maximum Dry Density (lb/ft^3): N/A

Maximum Dry Density (kg/m^3): N/A

Optimum Moisture Content (%): N/A

Over Size Correction %: N/A

California Bearing Ratio

Test Not Performed

Bearing Ratio (%): N/A

Compacted Dry Density (lb/ft^3): N/A

Compacted Moisture Content (%): N/A

Specific Gravity

Test Method: ASTM D 854

Prepared: Dry

Particle Size: No. 10

Specific Gravity at 20° Celsius: 2.78

Classification

Unified Group Symbol: CH

Group Name: Fat clay with sand

AASHTO Classification: A-7-6 (25)

Comments:

Stantec

Particle-Size Analysis of Soils
ASTM D 422

Project Name: Gallatin Fossil Plant (GAF) - Ash Ponds
Project Number: 175559018
Source: STN-E-16S, 5.6'-6.1'
Lab ID: 47B

Sieve analysis for the Portion Coarser than the No. 10 Sieve

Test Method: ASTM D 422
Prepared using: ASTM D 421

Particle Shape: Rounded and Angular
Particle Hardness: Hard and Durable

Tested By: BWT
Test Date: 04-26-2010
Date Received: 09-16-2009

Maximum Particle size: 3/4" Sieve

Sieve Size	% Passing
3"	
2"	
1 1/2"	
1"	
3/4"	100.0
3/8"	97.3
No. 4	95.8
No. 10	93.7

Analysis for the portion Finer than the No. 10 Sieve

Analysis Based on: Total Sample

Specific Gravity: 2.78

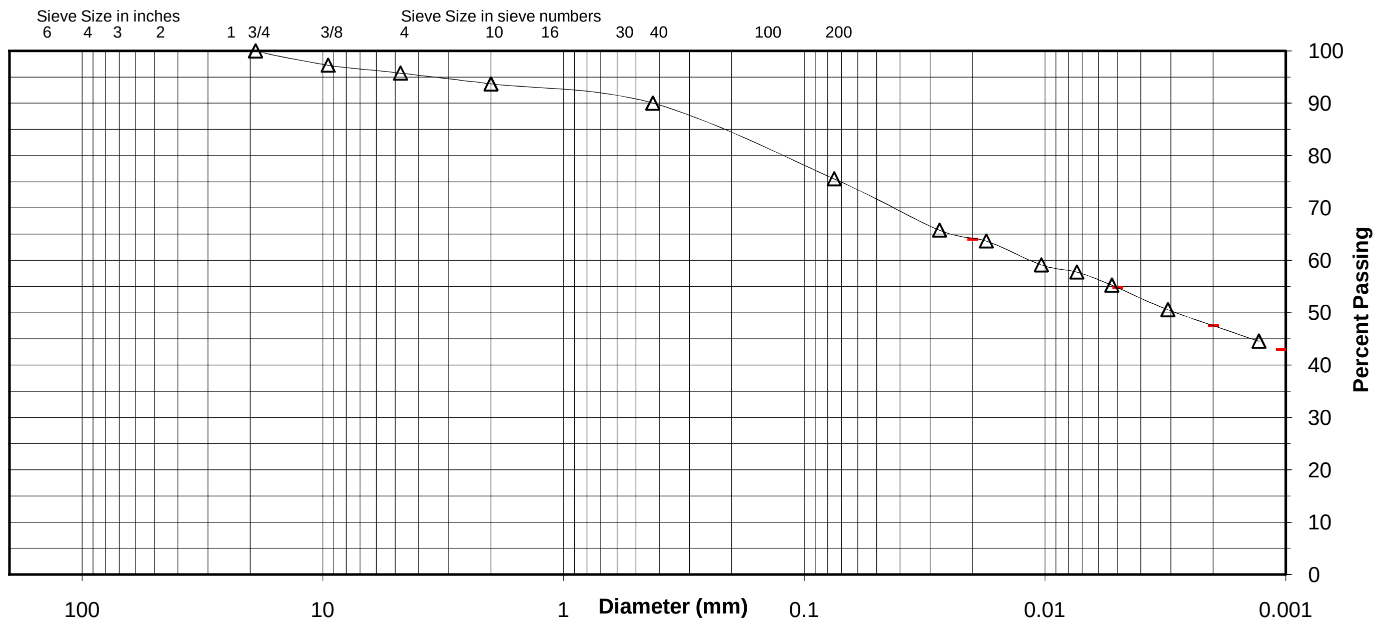
Dispersed using: Apparatus A - Mechanical, for 1 minute

No. 40	90.0
No. 200	75.6
0.02 mm	64.1
0.005 mm	54.9
0.002 mm	47.5
0.001 mm	43.0

Particle Size Distribution

ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay
	0.0	4.2	2.1	3.7	14.4	20.7	54.9

AASHTO	Gravel	Coarse Sand	Fine Sand	Silt	Clay
	6.3	3.7	14.4	28.1	47.5



Comments

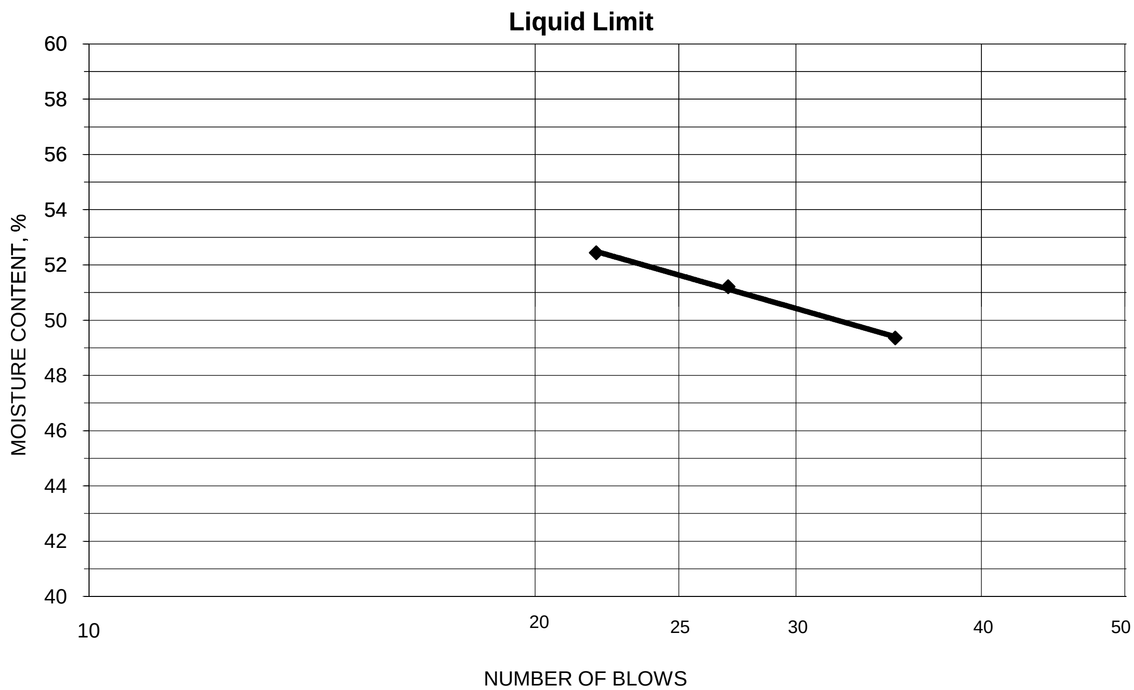
Reviewed By

Stantec

ATTERBERG LIMITS

Project	Gallatin Fossil Plant (GAF) - Ash Ponds	Project No.	175559018
Source	STN-E-16S, 5.6'-6.1'	Lab ID	47B
		% + No. 40	10
Tested By	KDG Test Method ASTM D 4318 Method A	Date Received	09-16-2009
Test Date	04-29-2010 Prepared Dry		

Wet Soil and Tare Mass (g)	Dry Soil and Tare Mass (g)	Tare Mass (g)	Number of Blows	Water Content (%)	Liquid Limit
21.97	18.50	11.47	35	49.4	
21.24	17.86	11.26	27	51.2	
21.57	17.91	10.93	22	52.4	52



PLASTIC LIMIT AND PLASTICITY INDEX

Wet Soil and Tare Mass (g)	Dry Soil and Tare Mass (g)	Tare Mass (g)	Water Content (%)	Plastic Limit	Plasticity Index
18.34	17.15	10.84	18.9	19	33
17.78	16.69	10.90	18.8		

Remarks:

Reviewed By

Stantec

Summary of Soil Tests

Project Name	Gallatin Fossil Plant (GAF) - Ash Ponds	Project Number	175559018
Source	STN-E-16S, 36.0'-36.5'	Lab ID	52A
County	Sumner	Date Received	9-16-09
Sample Type	ST	Date Reported	5-3-10

Test Results

Natural Moisture Content

Test Method: ASTM D 2216

Moisture Content (%): 25.2

Particle Size Analysis

Preparation Method: ASTM D 421

Gradation Method: ASTM D 422

Hydrometer Method: ASTM D 422

Particle Size		%
Sieve Size	(mm)	Passing
3"	75	
2"	50	
1 1/2"	37.5	
1"	25	
3/4"	19	100.0
3/8"	9.5	99.6
No. 4	4.75	99.2
No. 10	2	98.7
No. 40	0.425	98.2
No. 200	0.075	96.7
	0.02	88.0
	0.005	49.8
	0.002	34.5
estimated	0.001	27.0

Plus 3 in. material, not included: 0 (%)

Range	ASTM (%)	AASHTO (%)
Gravel	0.8	1.3
Coarse Sand	0.5	0.5
Medium Sand	0.5	---
Fine Sand	1.5	1.5
Silt	46.9	62.2
Clay	49.8	34.5

Atterberg Limits

Test Method: ASTM D 4318 Method A

Prepared: Dry

Liquid Limit: 34

Plastic Limit: 16

Plasticity Index: 18

Activity Index: 0.53

Moisture-Density Relationship

Test Not Performed

Maximum Dry Density (lb/ft^3): N/A

Maximum Dry Density (kg/m^3): N/A

Optimum Moisture Content (%): N/A

Over Size Correction %: N/A

California Bearing Ratio

Test Not Performed

Bearing Ratio (%): N/A

Compacted Dry Density (lb/ft^3): N/A

Compacted Moisture Content (%): N/A

Specific Gravity

Test Method: ASTM D 854

Prepared: Dry

Particle Size: No. 10

Specific Gravity at 20° Celsius: 2.68

Classification

Unified Group Symbol: CL

Group Name: Lean clay

AASHTO Classification: A-6 (17)

Comments:

Stantec

Particle-Size Analysis of Soils
ASTM D 422

Project Name: Gallatin Fossil Plant (GAF) - Ash Ponds
Project Number: 175559018
Source: STN-E-16S, 36.0'-36.5'
Lab ID: 52A

Sieve analysis for the Portion Coarser than the No. 10 Sieve

Test Method: ASTM D 422
Prepared using: ASTM D 421

Particle Shape: Angular
Particle Hardness: Hard and Durable

Tested By: BWT
Test Date: 04-27-2010
Date Received: 09-16-2009

Maximum Particle size: 3/4" Sieve

Sieve Size	% Passing
3"	
2"	
1 1/2"	
1"	
3/4"	100.0
3/8"	99.6
No. 4	99.2
No. 10	98.7

Analysis for the portion Finer than the No. 10 Sieve

Analysis Based on: Total Sample

Specific Gravity: 2.68

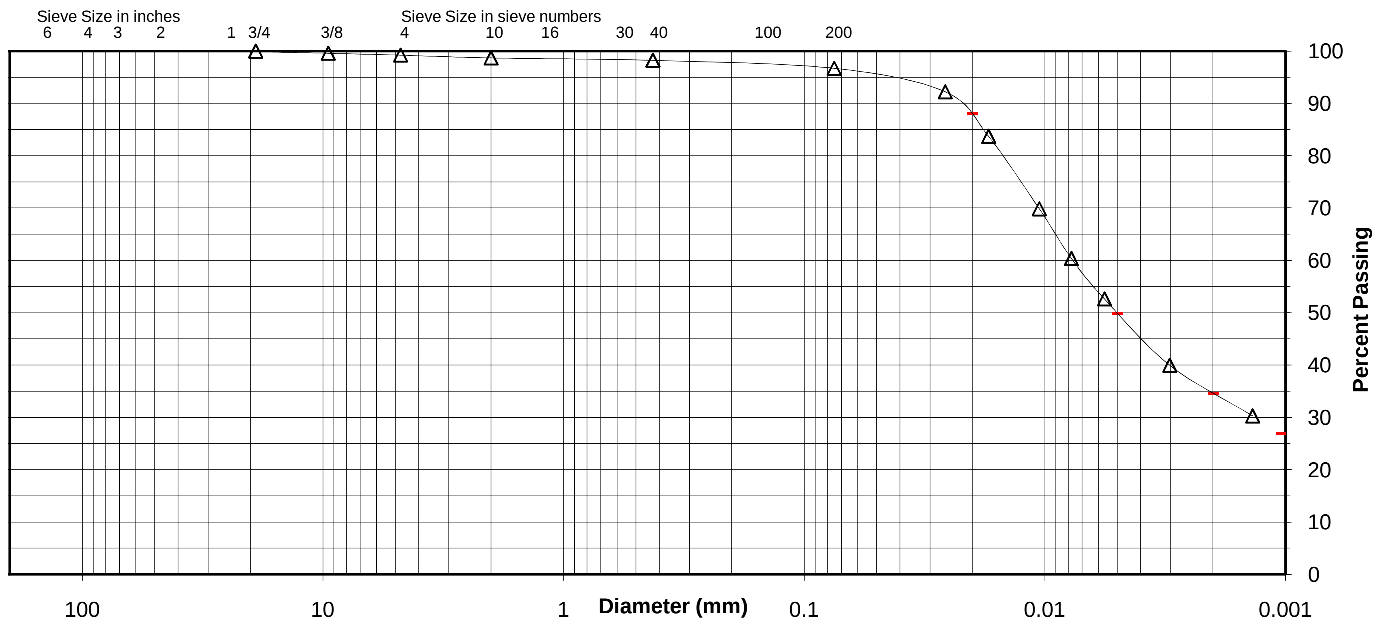
Dispersed using: Apparatus A - Mechanical, for 1 minute

No. 40	98.2
No. 200	96.7
0.02 mm	88.0
0.005 mm	49.8
0.002 mm	34.5
0.001 mm	27.0

Particle Size Distribution

ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay
	0.0	0.8	0.5	0.5	1.5	46.9	49.8

AASHTO	Gravel	Coarse Sand	Fine Sand	Silt	Clay
	1.3	0.5	1.5	62.2	34.5



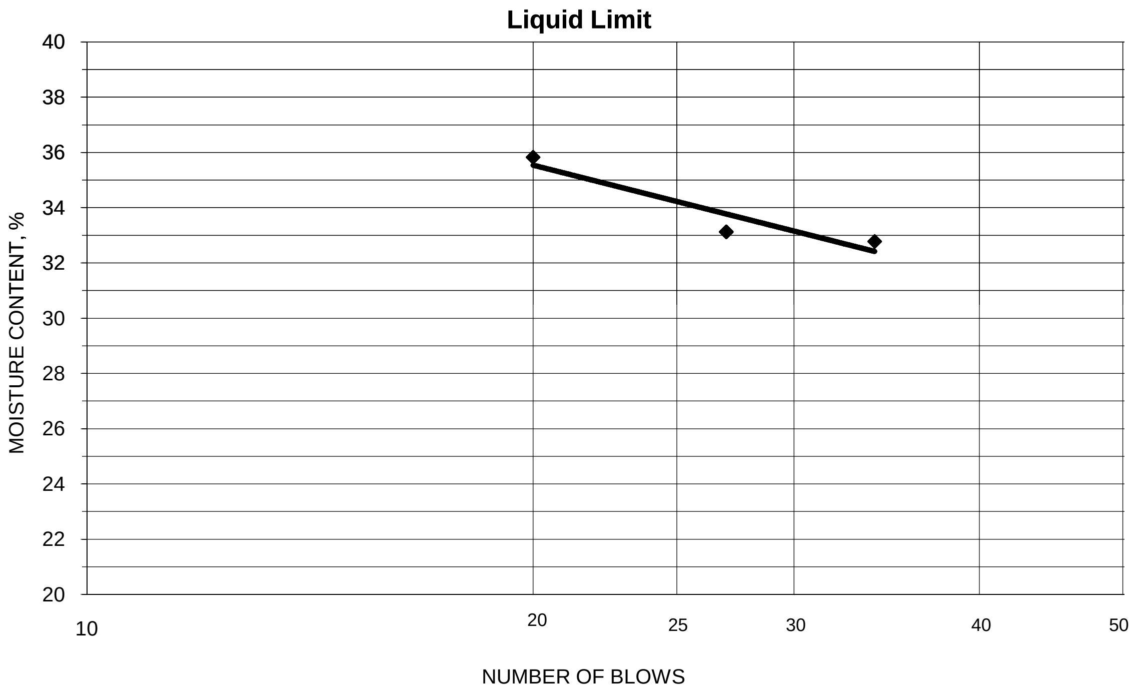
Comments

Reviewed By

ATTERBERG LIMITS

Project	Gallatin Fossil Plant (GAF) - Ash Ponds	Project No.	175559018
Source	STN-E-16S, 36.0'-36.5'	Lab ID	52A
		% + No. 40	2
Tested By	JF	Test Method	ASTM D 4318 Method A
Date Received	09-16-2009		
Test Date	04-29-2010	Prepared	Dry

Wet Soil and Tare Mass (g)	Dry Soil and Tare Mass (g)	Tare Mass (g)	Number of Blows	Water Content (%)	Liquid Limit
20.53	18.13	11.43	20	35.8	34
22.10	19.45	11.45	27	33.1	
21.88	19.30	11.43	34	32.8	



PLASTIC LIMIT AND PLASTICITY INDEX

Wet Soil and Tare Mass (g)	Dry Soil and Tare Mass (g)	Tare Mass (g)	Water Content (%)	Plastic Limit	Plasticity Index
20.14	18.93	11.50	16.3	16	18
18.44	17.43	11.17	16.1		

Remarks: ______________________

Reviewed By ______________

Stantec

Summary of Soil Tests

Project Name	Gallatin Fossil Plant (GAF) - Ash Ponds	Project Number	175559018
Source	STN-E-21S, 11.6'-12.1'	Lab ID	62B
County	Sumner	Date Received	9-16-09
Sample Type	ST	Date Reported	5-3-10

Test Results

Natural Moisture Content

Test Method: ASTM D 2216

Moisture Content (%): 26.0

Particle Size Analysis

Preparation Method: ASTM D 421

Gradation Method: ASTM D 422

Hydrometer Method: ASTM D 422

Particle Size		%
Sieve Size	(mm)	Passing
3"	75	
2"	50	
1 1/2"	37.5	
1"	25	100.0
3/4"	19	99.2
3/8"	9.5	97.7
No. 4	4.75	94.2
No. 10	2	90.8
No. 40	0.425	85.6
No. 200	0.075	81.0
	0.02	67.2
	0.005	46.0
	0.002	38.3
estimated	0.001	36.0

Plus 3 in. material, not included: 0 (%)

Range	ASTM (%)	AASHTO (%)
Gravel	5.8	9.2
Coarse Sand	3.4	5.2
Medium Sand	5.2	---
Fine Sand	4.6	4.6
Silt	35.0	42.7
Clay	46.0	38.3

Atterberg Limits

Test Method: ASTM D 4318 Method A

Prepared: Dry

Liquid Limit: 41

Plastic Limit: 17

Plasticity Index: 24

Activity Index: 0.63

Moisture-Density Relationship

Test Not Performed

Maximum Dry Density (lb/ft^3): N/A

Maximum Dry Density (kg/m^3): N/A

Optimum Moisture Content (%): N/A

Over Size Correction %: N/A

California Bearing Ratio

Test Not Performed

Bearing Ratio (%): N/A

Compacted Dry Density (lb/ft^3): N/A

Compacted Moisture Content (%): N/A

Specific Gravity

Test Method: ASTM D 854

Prepared: Dry

Particle Size: No. 10

Specific Gravity at 20° Celsius: 2.73

Classification

Unified Group Symbol: CL

Group Name: Lean clay with sand

AASHTO Classification: A-7-6 (19)

Comments:

Stantec

Particle-Size Analysis of Soils
ASTM D 422

Project Name: Gallatin Fossil Plant (GAF) - Ash Ponds
Project Number: 175559018
Source: STN-E-21S, 11.6'-12.1'
Lab ID: 62B

Sieve analysis for the Portion Coarser than the No. 10 Sieve

Test Method: ASTM D 422
Prepared using: ASTM D 421

Particle Shape: Angular
Particle Hardness: Hard and Durable

Tested By: Ford
Test Date: 04-27-2010
Date Received: 09-16-2009

Maximum Particle size: 1" Sieve

Sieve Size	% Passing
3"	
2"	
1 1/2"	
1"	100.0
3/4"	99.2
3/8"	97.7
No. 4	94.2
No. 10	90.8

Analysis for the portion Finer than the No. 10 Sieve

Analysis Based on: Total Sample

Specific Gravity: 2.73

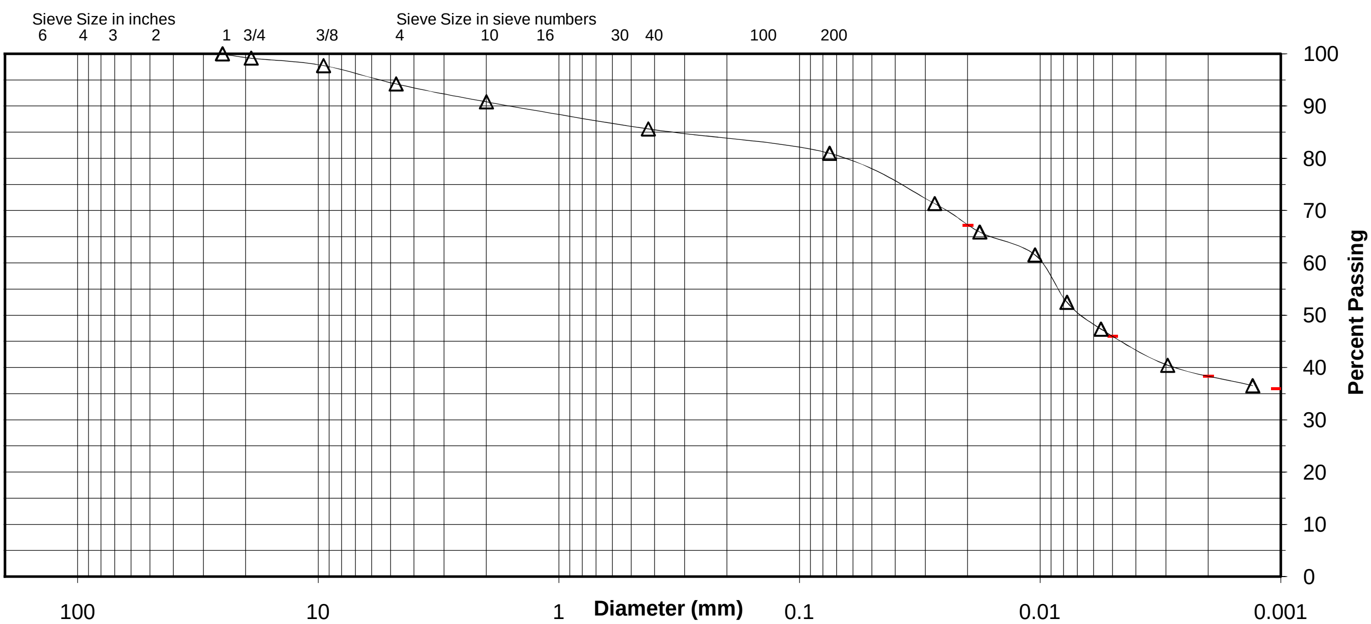
Dispersed using: Apparatus A - Mechanical, for 1 minute

No. 40	85.6
No. 200	81.0
0.02 mm	67.2
0.005 mm	46.0
0.002 mm	38.3
0.001 mm	36.0

Particle Size Distribution

ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay
	0.8	5.0	3.4	5.2	4.6	35.0	46.0

AASHTO	Gravel	Coarse Sand	Fine Sand	Silt	Clay
	9.2	5.2	4.6	42.7	38.3



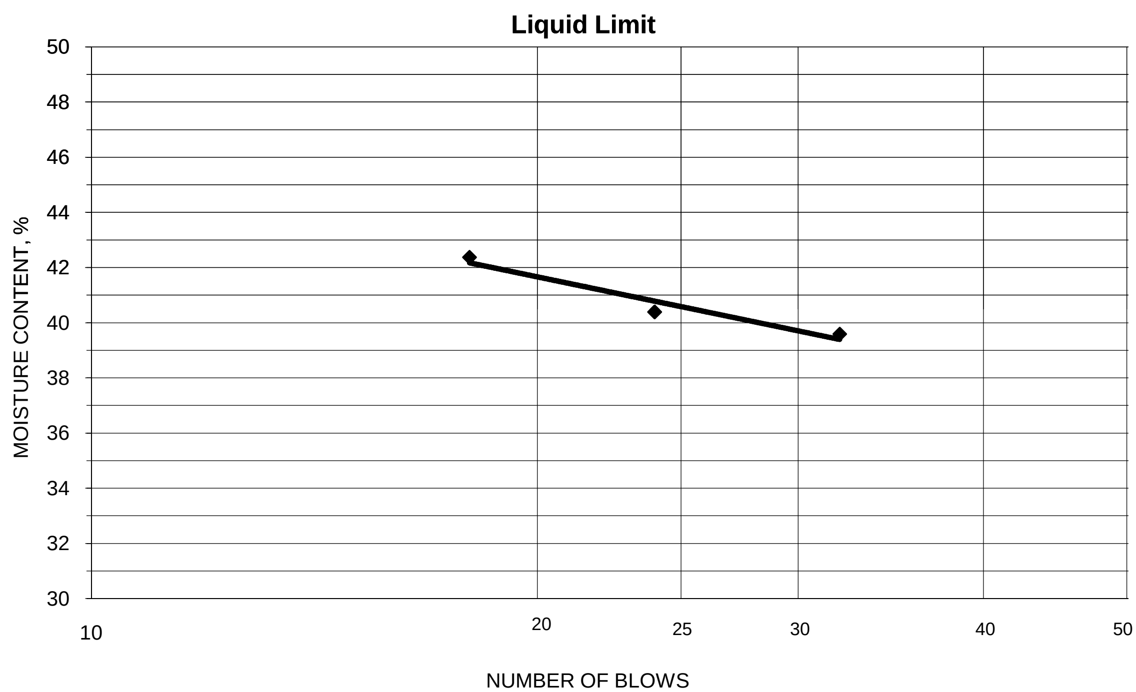
Comments

Reviewed By

ATTERBERG LIMITS

Project	Gallatin Fossil Plant (GAF) - Ash Ponds	Project No.	175559018
Source	STN-E-21S, 11.6'-12.1'	Lab ID	62B
		% + No. 40	14
Tested By	JF Test Method ASTM D 4318 Method A	Date Received	09-16-2009
Test Date	04-30-2010 Prepared Dry		

Wet Soil and Tare Mass (g)	Dry Soil and Tare Mass (g)	Tare Mass (g)	Number of Blows	Water Content (%)	Liquid Limit
21.15	18.18	11.17	18	42.4	
21.89	18.81	11.03	32	39.6	
21.03	18.13	10.95	24	40.4	41



PLASTIC LIMIT AND PLASTICITY INDEX

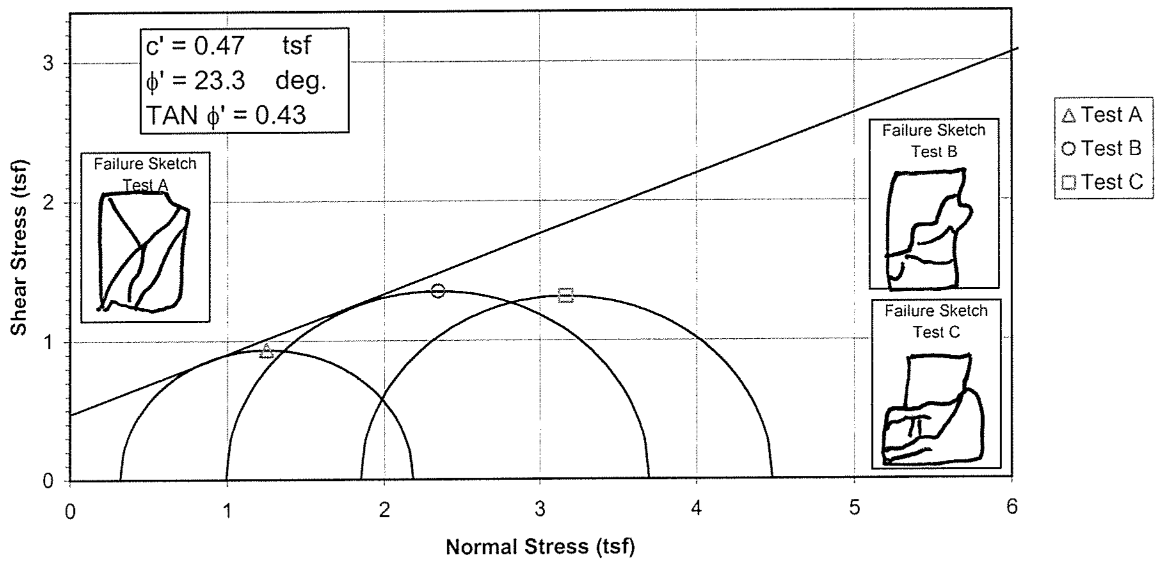
Wet Soil and Tare Mass (g)	Dry Soil and Tare Mass (g)	Tare Mass (g)	Water Content (%)	Plastic Limit	Plasticity Index
17.71	16.76	11.22	17.1	17	24
19.04	17.91	11.29	17.1		

Remarks: ____________________

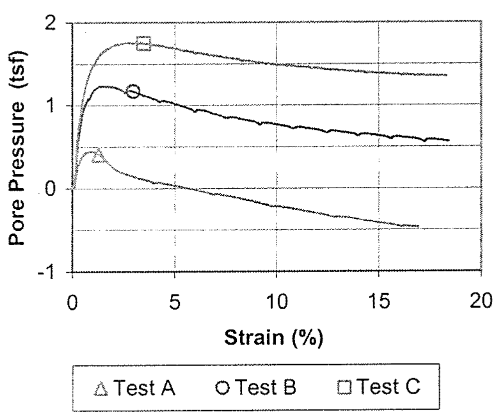
Reviewed By ____________

Failure Criterion: Maximum Effective Principal Stress Ratio

Effective Strength Envelope



Induced Pore Pressure vs. Strain



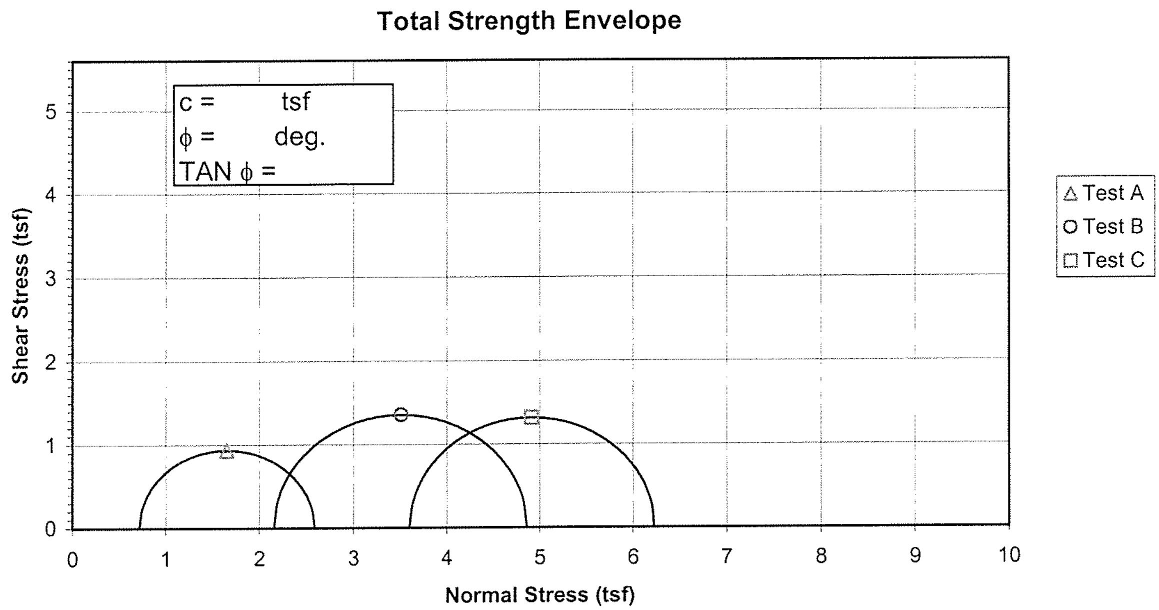
Specimen No.			A	B	C	
Initial Data	Water content %	W_o	21.5	18.1	25.5	
	Dry Density PCF	γ_{d_o}	103.2	106.4	97.5	
	Saturation %	S_o	92.1	84.2	95.0	
	Void Ratio	e_o	0.627	0.578	0.722	
After Shear	Water content %	W_f	23.0	19.3	25.3	
	Dry Density PCF	γ_{d_f}	103.8	110.6	100.0	
	Saturation %	S_f	100.0	100.0	100.0	
	Void Ratio	e_f	0.618	0.518	0.679	
	Final Back Pressure TSF	u_c	5.76	4.32	2.88	
Minor Principal Stress TSF @ failure		σ_3'f	0.32	0.99	1.85	
Maximum Deviator Stress (tsf) @ failure		$(\sigma_1'-\sigma_3')_{max}$	1.87	2.70	2.63	
Time to (σ1'-σ3')max min.		t_f	4.9	21.3	175.4	
Ultimate Deviator Stress, t/sq ft		$(\sigma 1'-\sigma 3')_{ult}$	n/a	n/a	2.37	
Initial Diameter, in.		D_o	2.884	2.882	2.878	
Initial Height, in.		H_o	6.051	6.061	6.020	

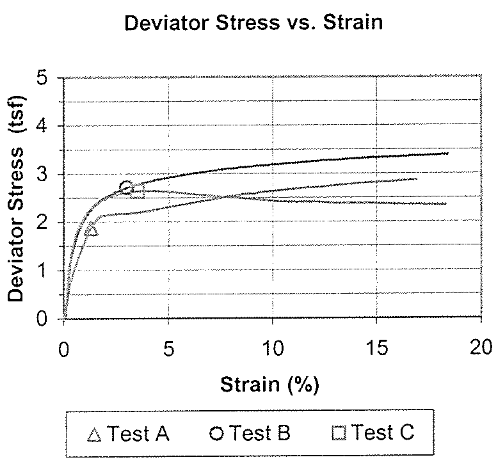
Controlled - Strain Test

Description of Specimens Fat Clay (CH), red brown, moist, firm

		Type of Specimen	Undisturbed	Type of test	$\bar{R}$
LL	PL	PI	Gs 2.69	Project	Gallatin Fossil Plant (GAF) - Ash Ponds
Remarks:					
		Boring No.	STN-D-1S	Sample No.	1
		Depth Elev.	6.0'-6.5', 2.0'-2.5', 2.6'-3.1'		
		Laboratory	Stantec	Date	11-30-09
		TRIAXIAL COMPRESSION TEST REPORT			

Failure Criterion: Maximum Effective Principal Stress Ratio





Specimen No.			A	B	C	
Initial Data	Water content %	W_o	21.5	18.1	25.5	
	Dry Density PCF	γ_{d_o}	103.2	106.4	97.5	
	Saturation %	S_o	92.1	84.2	95.0	
	Void Ratio	e_o	0.627	0.578	0.722	
After Shear	Water content %	W_f	23.0	19.3	25.3	
	Dry Density PCF	γ_{d_f}	103.8	110.6	100.0	
	Saturation %	S_f	100.0	100.0	100.0	
	Void Ratio	e_f	0.618	0.518	0.679	
	Final Back Pressure TSF	u_c	5.76	4.32	2.88	
Minor Principal Stress TSF		σ_3	0.72	2.16	3.60	
Maximum Deviator Stress (tsf) @ failure		$(\sigma_1\text{-}\sigma_3)_{max}$	1.87	2.70	2.63	
Time to $(\sigma_1\text{-}\sigma_3)_{Max.}$ min.		t_f	4.9	21.3	175.4	
Ultimate Deviator Stress, t/sq ft		$(\sigma_1\text{-}\sigma_3)_{ult}$	n/a	n/a	2.37	
Initial Diameter, in.		D_o	2.884	2.882	2.878	
Initial Height, in.		H_o	6.051	6.061	6.020	

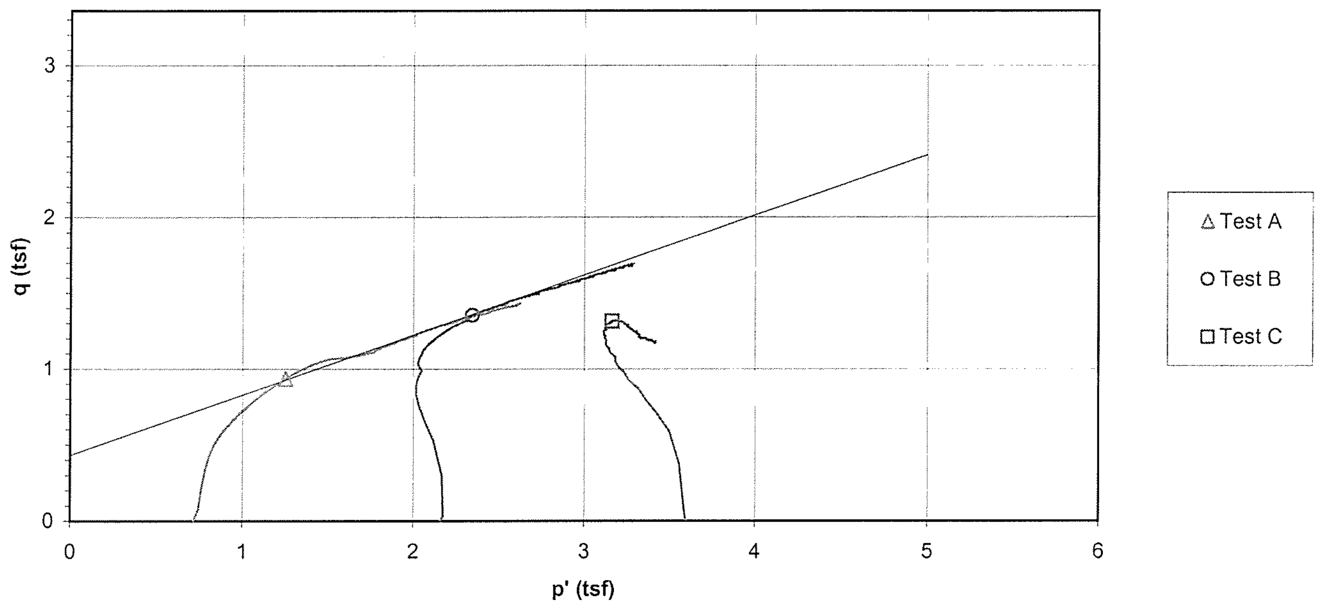
Controlled - Strain Test

Description of Specimens	Fat Clay (CH), red brown, moist, firm				
	Type of Specimen	Undisturbed		Type of test	$\bar{R}$
LL	PL	PI	Gs 2.69	Project	Gallatin Fossil Plant (GAF) - Ash Ponds
Remarks:					
	Boring No.	STN-D-1S		Sample No.	1
	Depth Elev.	6.0'-6.5', 2.0'-2.5', 2.6'-3.1'			
	Laboratory	Stantec		Date	11-30-09
	TRIAXIAL COMPRESSION TEST REPORT				

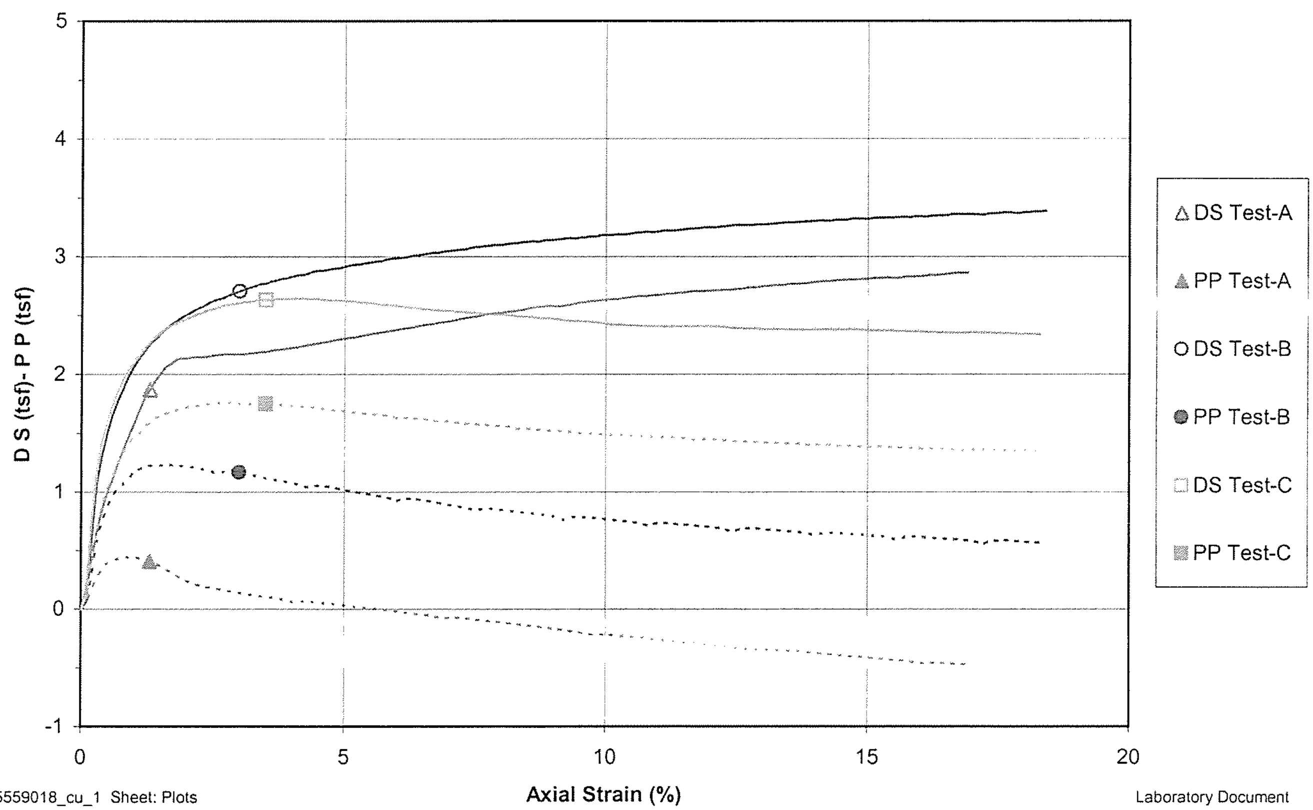
Consolidated Undrained Triaxial Test
EM 1110-2-1906 Appendix X

Project	Gallatin Fossil Plant (GAF) - Ash Ponds	Project No.	175559018
Sample ID	STN-D-1S, 6.0'-6.5' & STN-D-1S, 2.0'-2.5' & STN-D-1S, 2.6'-3.1'	Test Number	1
Failure Criterion:	Maximum Effective Principal Stress Ratio ϕ' = 23.3 deg.	c' =	0.47 tsf

p' vs. q Plot



Deviator Stress and Induced Pore Pressure vs. Axial Strain

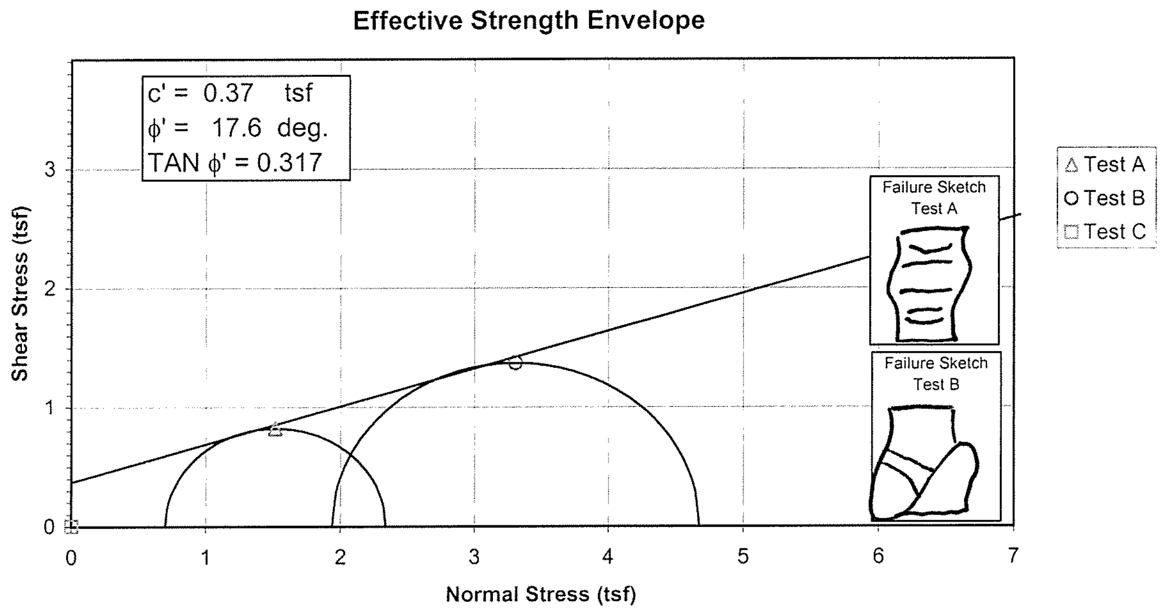


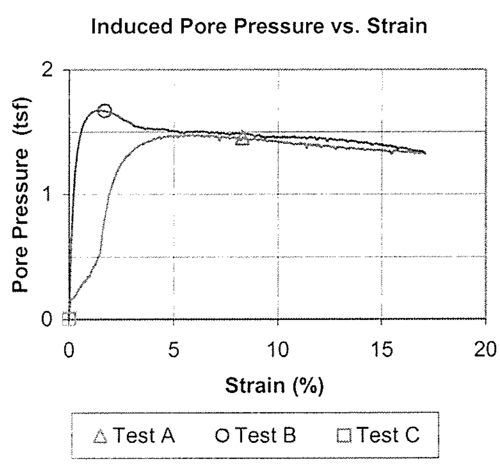
File: 175559018_cu_1 Sheet: Plots
Preparation Date: 1998
Revision Date: 1-2008

Stantec Consulting Services Inc.

Laboratory Document
Prepared By: MW
Approved BY: TLK

Failure Criterion: Maximum Effective Principal Stress Ratio





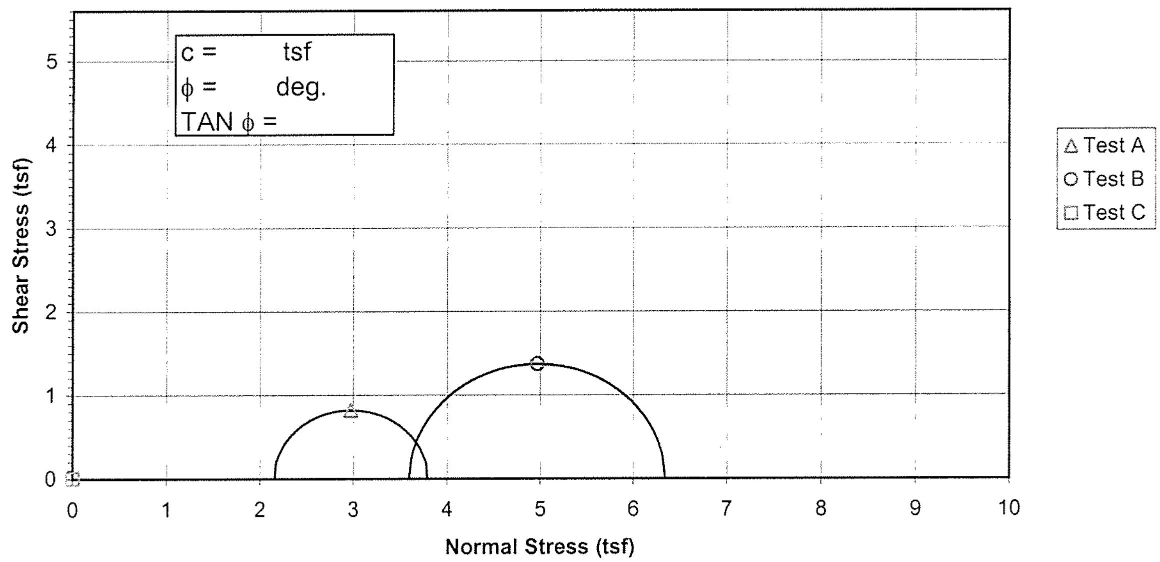
Specimen No.			A	B	C	
Initial Data	Water content %	W_o	19.5	19.7	######	
	Dry Density PCF	γ_{d_o}	102.3	108.2	######	
	Saturation %	S_o	80.3	94.2	######	
	Void Ratio	e_o	0.660	0.569	######	
After Shear	Water content %	W_f	20.7	19.8	######	
	Dry Density PCF	γ_{d_f}	108.6	110.3	######	
	Saturation %	S_f	100.0	100.0	######	
	Void Ratio	e_f	0.564	0.539	######	
	Final Back Pressure TSF	u_c	4.32	2.88	0.00	
Minor Principal Stress TSF @ failure		σ_3'f	0.70	1.94	0.00	
Maximum Deviator Stress (tsf) @ failure		$(\sigma_1'-\sigma_3')_{max}$	1.63	2.74	0.00	
Time to (σ1'-σ3')max min.		t_f	512.3	98.8	0.0	
Ultimate Deviator Stress, t/sq ft		$(\sigma 1'-\sigma 3')_{ult}$	n/a	n/a	0.00	
Initial Diameter, in.		D_o	2.880	2.880	######	
Initial Height, in.		H_o	6.029	6.041	######	

Controlled - Strain Test

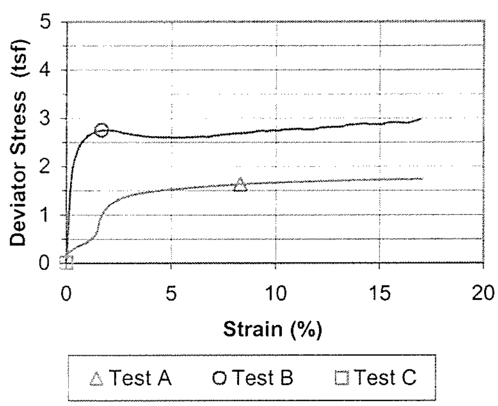
Description of Specimens	Lean Clay (CL), brown, moist, firm				
			Type of Specimen	Undisturbed	Type of test $\overline{R}$
LL	PL	PI	Gs 2.72	Project	Gallatin Fossil Plant (GAF) - Ash Ponds
Remarks:				Boring No.	STN-E-4S, STN-E-8
					Sample No. 2
				Depth Elev.	5.0'-5.5', 5.4'-5.9'
				Laboratory	Stantec — Date 11-30-09
				TRIAXIAL COMPRESSION TEST REPORT	

Failure Criterion: Maximum Effective Principal Stress Ratio

Total Strength Envelope



Deviator Stress vs. Strain



Specimen No.			A	B	C	
Initial Data	Water content %	W_o	19.5	19.7	######	
	Dry Density PCF	γ_{d_o}	102.3	108.2	######	
	Saturation %	S_o	80.3	94.2	######	
	Void Ratio	e_o	0.660	0.569	######	
After Shear	Water content %	W_f	20.7	19.8	######	
	Dry Density PCF	γ_{d_f}	108.6	110.3	######	
	Saturation %	S_f	100.0	100.0	######	
	Void Ratio	e_f	0.564	0.539	######	
	Final Back Pressure TSF	u_c	4.32	2.88	0.00	
Minor Principal Stress TSF		σ_3	2.16	3.60	0.00	
Maximum Deviator Stress (tsf) @ failure		$(\sigma_1\text{-}\sigma_3)_{max}$	1.63	2.74	0.00	
Time to $(\sigma_1\text{-}\sigma_3)_{Max.}$ min.		t_f	512.3	98.8	0.0	
Ultimate Deviator Stress, t/sq ft		$(\sigma_1\text{-}\sigma_3)_{ult}$	n/a	n/a	0.00	
Initial Diameter, in.		D_o	2.880	2.880	######	
Initial Height, in.		H_o	6.029	6.041	######	

Controlled - Strain Test

Description of Specimens Lean Clay (CL), brown, moist, firm

				Type of Specimen	Undisturbed / Type of test $\bar{R}$
LL	PL	PI	Gs 2.72	Project	Gallatin Fossil Plant (GAF) - Ash Ponds
Remarks:				Boring No.	STN-E-4S, STN-E-8
					Sample No. 2
				Depth Elev.	5.0'-5.5', 5.4'-5.9'
				Laboratory	Stantec / Date 11-30-09
				TRIAXIAL COMPRESSION TEST REPORT	

File: 175559018_cu_2 Sheet: CE_Final-T
Preparation Date: 1998
Revision Date: 1-2008

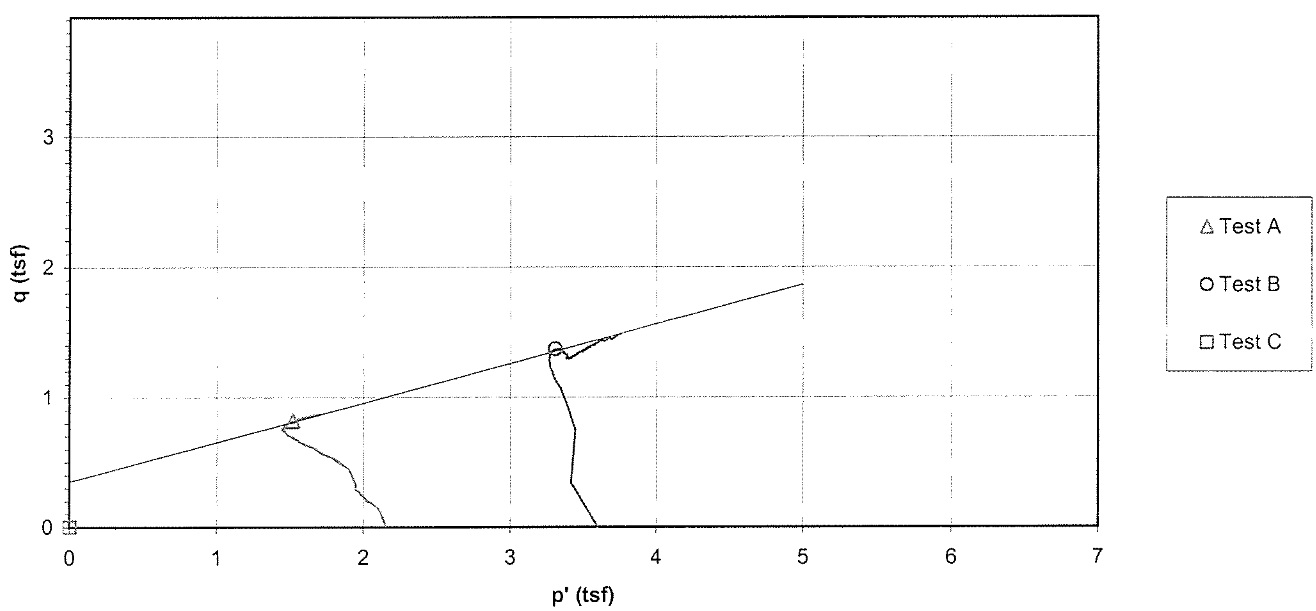
Stantec Consulting Services Inc.

Laboratory Document
Prepared By: MW
Approved BY: TLK

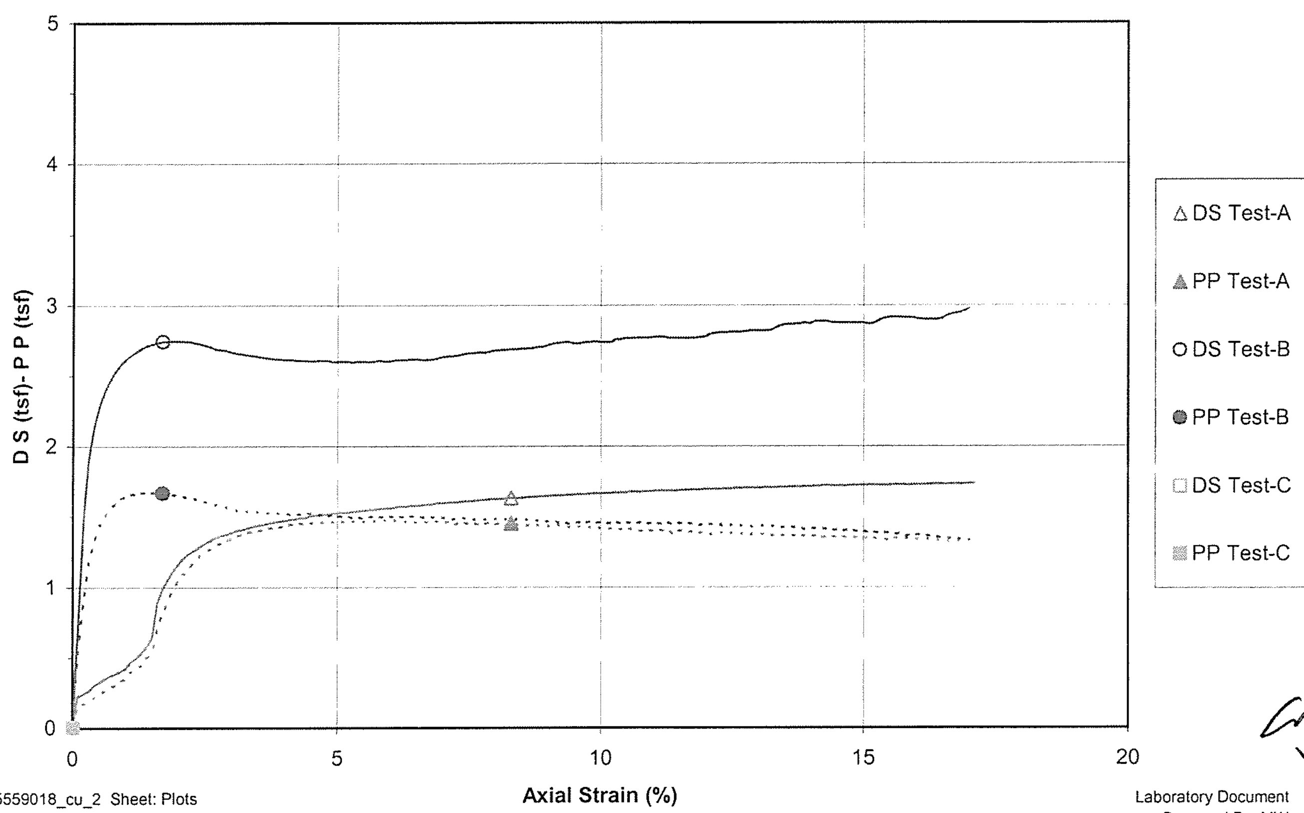
Consolidated Undrained Triaxial Test
EM 1110-2-1906 Appendix X

Project	Gallatin Fossil Plant (GAF) - Ash Ponds	Project No.	175559018
Sample ID	STN-E-4S, 5.0'-5.5' & STN-E-8, 5.4'-5.9'	Test Number	2
Failure Criterion:	Maximum Effective Principal Stress Ratio ϕ' = 17.6 deg.	c' =	0.37 tsf

p' vs. q Plot



Deviator Stress and Induced Pore Pressure vs. Axial Strain

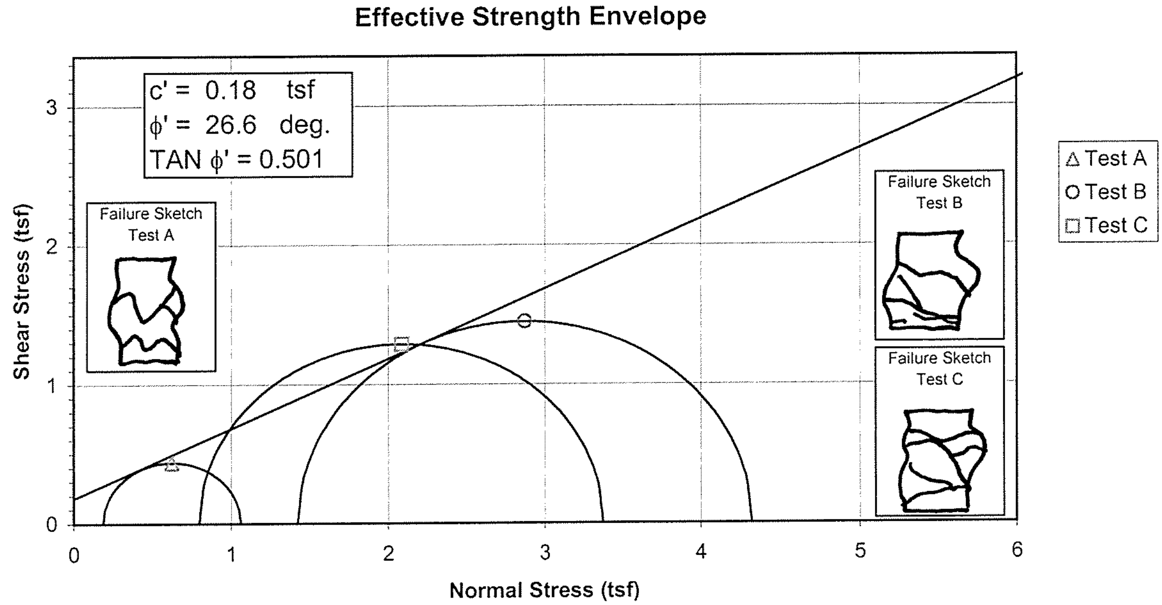


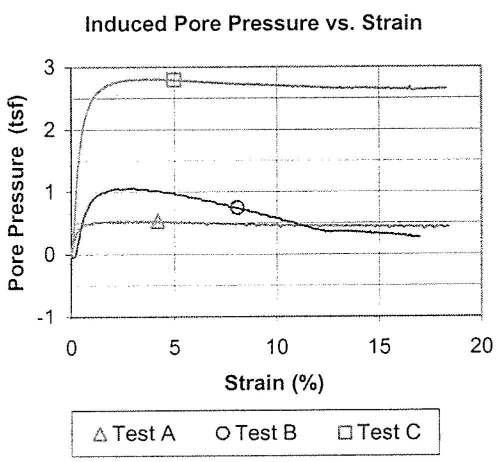
File: 175559018_cu_2 Sheet: Plots
Preparation Date: 1998
Revision Date: 1-2008

Stantec Consulting Services Inc.

Laboratory Document
Prepared By: MW
Approved BY: TLK

Failure Criterion: Maximum Effective Principal Stress Ratio





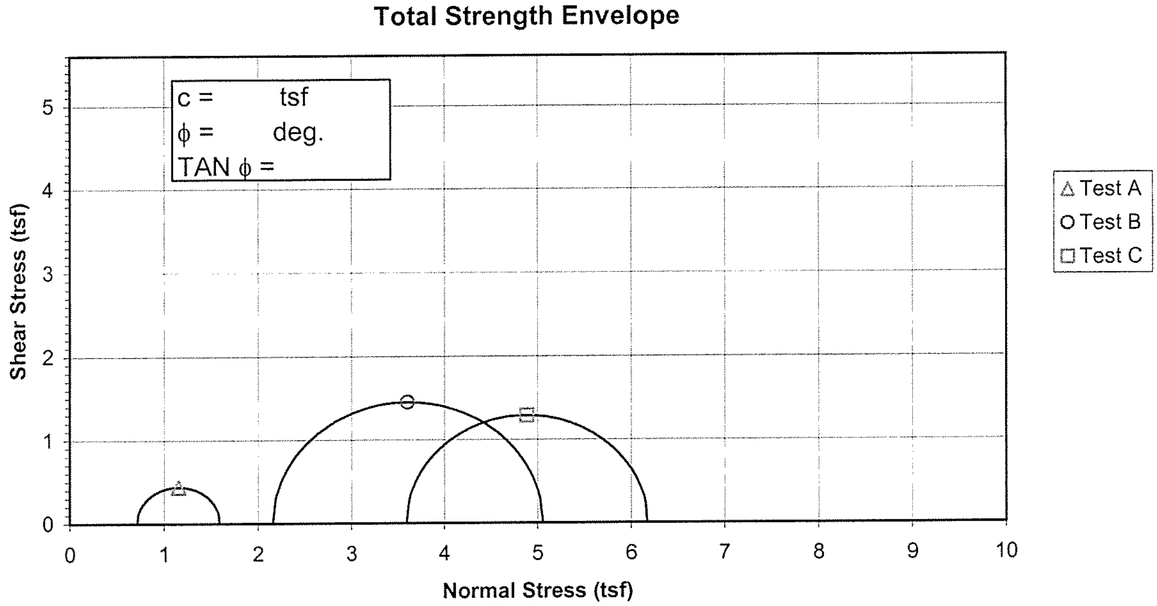
Specimen No.			A	B	C	
Initial Data	Water content %	W_o	15.7	19.7	19.4	
	Dry Density PCF	γ_{d_o}	118.8	108.2	109.3	
	Saturation %	S_o	102.3	96.0	97.1	
	Void Ratio	e_o	0.413	0.552	0.537	
After Shear	Water content %	W_f	12.9	15.5	16.0	
	Dry Density PCF	γ_{d_f}	124.8	118.4	117.5	
	Saturation %	S_f	100.0	100.0	100.0	
	Void Ratio	e_f	0.346	0.418	0.429	
	Final Back Pressure TSF	u_c	5.76	4.32	2.88	
Minor Principal Stress TSF @ failure		σ_3'f	0.19	1.43	0.80	
Maximum Deviator Stress (tsf) @ failure		$(\sigma_1'-\sigma_3')_{max}$	0.87	2.90	2.57	
Time to (σ1'-σ3')max min.		t_f	126.3	715.6	328.7	
Ultimate Deviator Stress, t/sq ft		$(\sigma 1'-\sigma 3')_{ult}$	n/a	n/a	n/a	
Initial Diameter, in.		D_o	2.850	2.882	2.881	
Initial Height, in.		H_o	6.072	6.028	6.036	

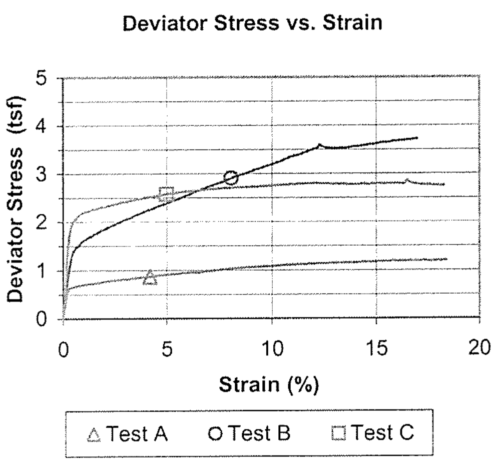
Controlled - Strain Test

Description of Specimens	Gravelly Fat Clay (CH), brown, moist, soft				
		Type of Specimen	Undisturbed	Type of test	$\bar{R}$
LL / PL / PI / Gs 2.69		Project	Gallatin Fossil Plant (GAF) - Ash Ponds		
Remarks:					
		Boring No.	STN-E-8	Sample No.	3
		Depth Elev.	41.0'-41.5', 41.6'-42.1', 45.2'-45.7'		
		Laboratory	Stantec	Date	12-1-09
		TRIAXIAL COMPRESSION TEST REPORT			

MG
CW

Failure Criterion: Maximum Effective Principal Stress Ratio





Specimen No.			A	B	C	
Initial Data	Water content %	W_o	15.7	19.7	19.4	
	Dry Density PCF	γ_{d_o}	118.8	108.2	109.3	
	Saturation %	S_o	102.3	96.0	97.1	
	Void Ratio	e_o	0.413	0.552	0.537	
After Shear	Water content %	W_f	12.9	15.5	16.0	
	Dry Density PCF	γ_{d_f}	124.8	118.4	117.5	
	Saturation %	S_f	100.0	100.0	100.0	
	Void Ratio	e_f	0.346	0.418	0.429	
	Final Back Pressure TSF	u_c	5.76	4.32	2.88	
Minor Principal Stress TSF		σ_3	0.72	2.16	3.60	
Maximum Deviator Stress (tsf) @ failure		$(\sigma_1\text{-}\sigma_3)_{max}$	0.87	2.90	2.57	
Time to $(\sigma_1\text{-}\sigma_3)_{Max.}$ min.		t_f	126.3	715.6	328.7	
Ultimate Deviator Stress, t/sq ft		$(\sigma_1\text{-}\sigma_3)_{ult}$	n/a	n/a	n/a	
Initial Diameter, in.		D_o	2.850	2.882	2.881	
Initial Height, in.		H_o	6.072	6.028	6.036	

Controlled - Strain Test

Description of Specimens	Gravelly Fat Clay (CH), brown, moist, soft				
			Type of Specimen	Undisturbed	Type of test $\bar{R}$
LL	PL	PI	Gs 2.69	Project	Gallatin Fossil Plant (GAF) - Ash Ponds
Remarks:					
			Boring No.	STN-E-8	Sample No. 3
			Depth Elev.	41.0'-41.5', 41.6'-42.1', 45.2'-45.7'	
			Laboratory	Stantec	Date 12-1-09
			TRIAXIAL COMPRESSION TEST REPORT		

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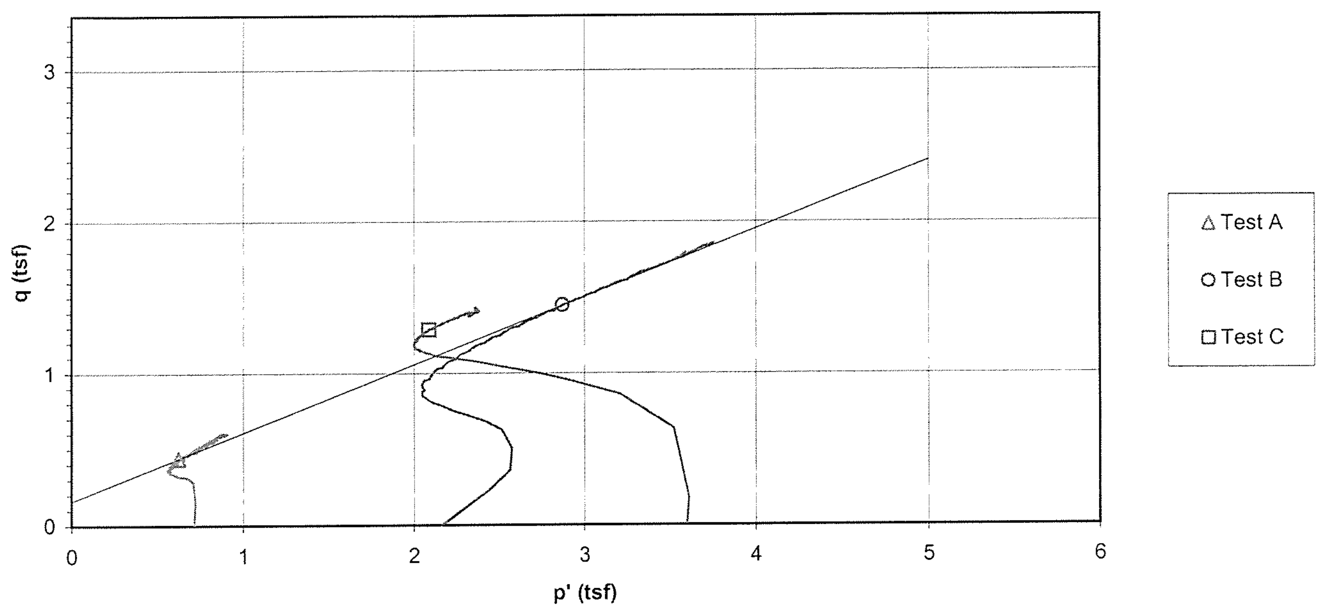
CW

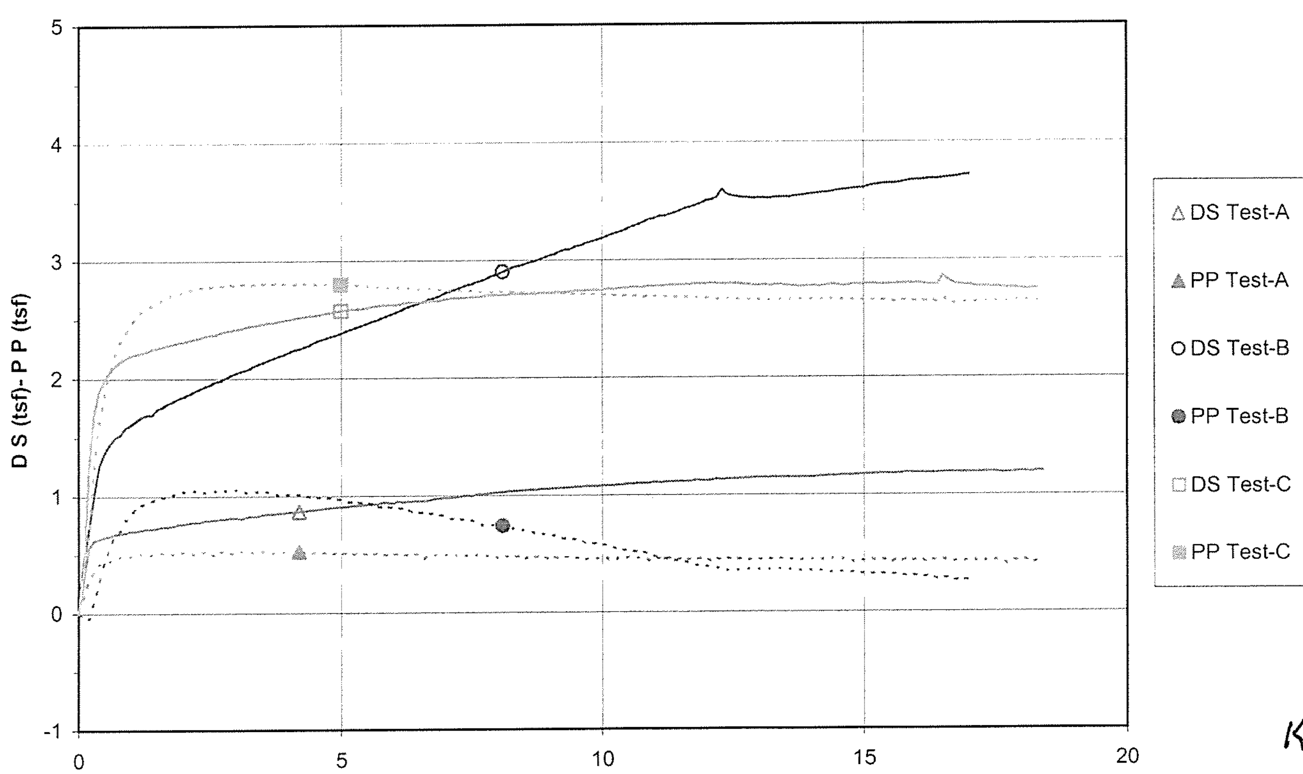
Consolidated Undrained Triaxial Test
EM 1110-2-1906 Appendix X

Project	Gallatin Fossil Plant (GAF) - Ash Ponds	Project No.	175559018
Sample ID	STN-E-8, 41.0'-41.5' & STN-E-8, 41.6'-42.1' & STN-E-8, 45.2'-45.7'	Test Number	3
Failure Criterion:	Maximum Effective Principal Stress Ratio ϕ' = 26.6 deg.	c' =	0.18 tsf

p' vs. q Plot



Deviator Stress and Induced Pore Pressure vs. Axial Strain



KDG

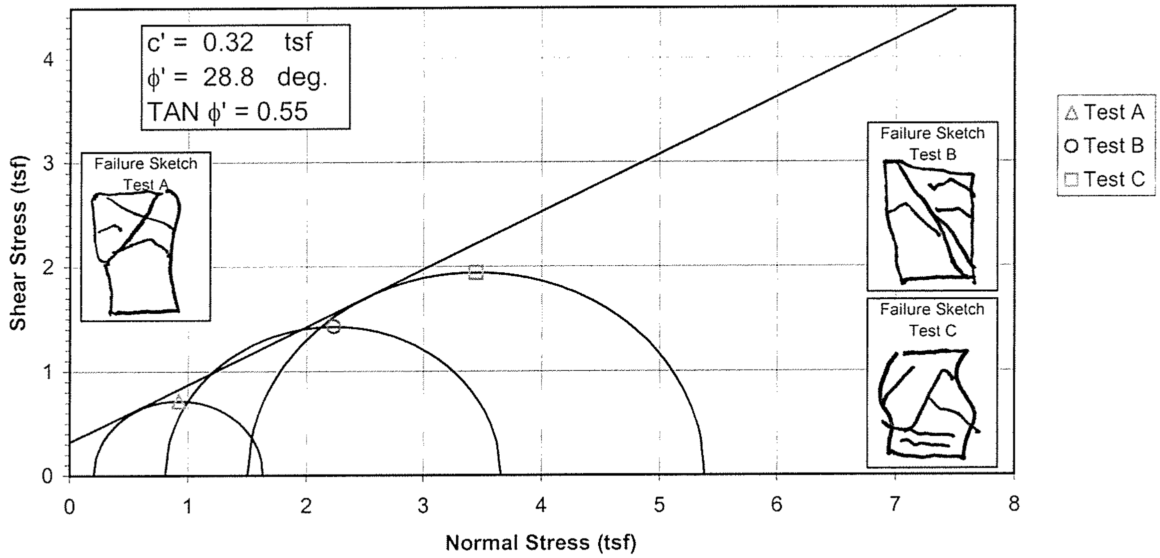
File: 175559018_cu_3 Sheet: Plots
Preparation Date: 1998
Revision Date: 1-2008

Stantec Consulting Services Inc.

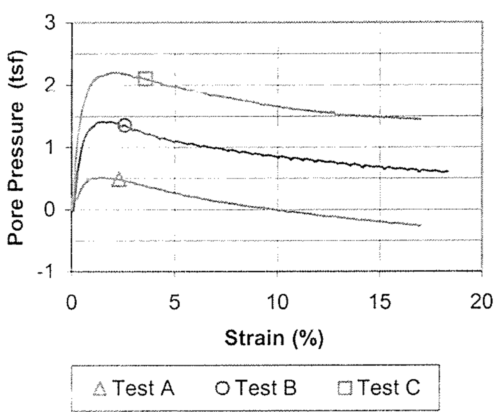
Laboratory Document
Prepared By: MW
Approved BY: TLK

Failure Criterion: Maximum Effective Principal Stress Ratio

Effective Strength Envelope



Induced Pore Pressure vs. Strain

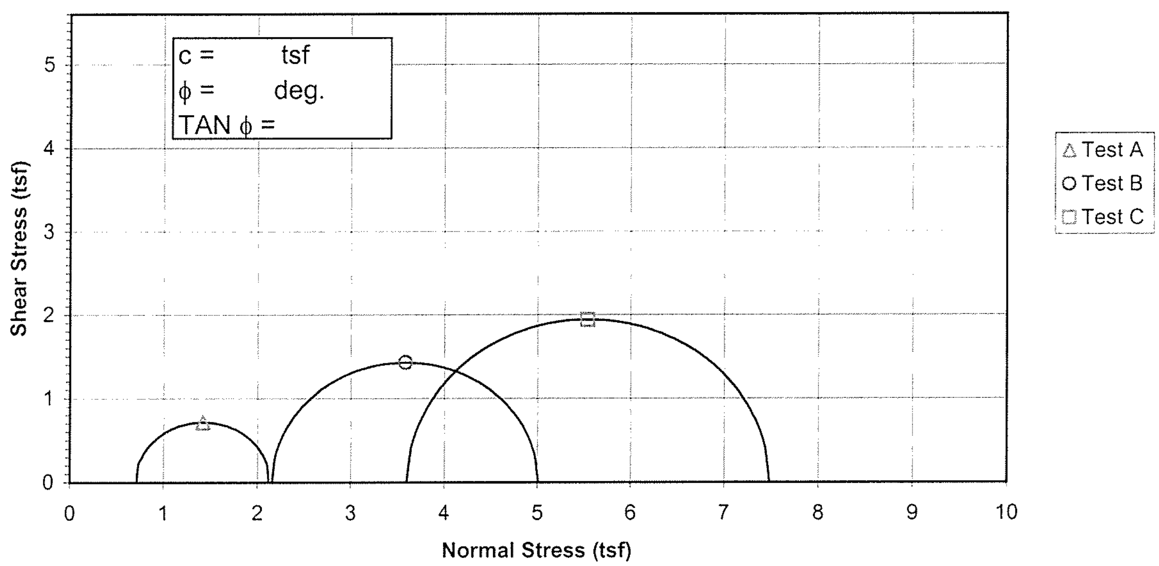


Specimen No.			A	B	C	
Initial Data	Water content %	W_o	21.0	21.7	22.0	
	Dry Density PCF	γ_{d_o}	105.5	105.1	104.8	
	Saturation %	S_o	93.7	96.1	96.5	
	Void Ratio	e_o	0.609	0.615	0.621	
After Shear	Water content %	W_f	21.5	21.4	21.2	
	Dry Density PCF	γ_{d_f}	107.2	107.3	107.7	
	Saturation %	S_f	100.0	100.0	100.0	
	Void Ratio	e_f	0.584	0.582	0.576	
	Final Back Pressure TSF	u_c	5.76	4.32	2.88	
Minor Principal Stress TSF @ failure		σ_3'f	0.21	0.81	1.51	
Maximum Deviator Stress (tsf) @ failure		$(\sigma_1'-\sigma_3')_{max}$	1.40	2.85	3.89	
Time to (σ1'-σ3')max min.		t_f	16.3	43.4	327.5	
Ultimate Deviator Stress, t/sq ft		$(\sigma 1'-\sigma 3')_{ult}$	n/a	n/a	n/a	
Initial Diameter, in.		D_o	2.857	2.865	2.865	
Initial Height, in.		H_o	6.109	6.155	6.020	

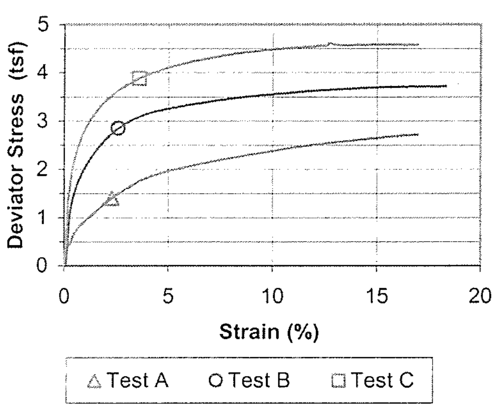
Controlled - Strain Test						
Description of Specimens	Lean Clay (CL), brown, moist, firm, Mn					
				Type of Specimen	Undisturbed	Type of test $\bar{R}$
LL	PL	PI	Gs 2.72	Project	Gallatin Fossil Plant (GAF) - Ash Ponds	
Remarks:						
				Boring No.	STN-E-9	Sample No. 4
				Depth Elev.	9.5'-10.0', 10.1'-10.6', 10.7'-11.2'	
				Laboratory	Stantec	Date 12-1-09
				TRIAXIAL COMPRESSION TEST REPORT		

Failure Criterion: Maximum Effective Principal Stress Ratio

Total Strength Envelope



Deviator Stress vs. Strain



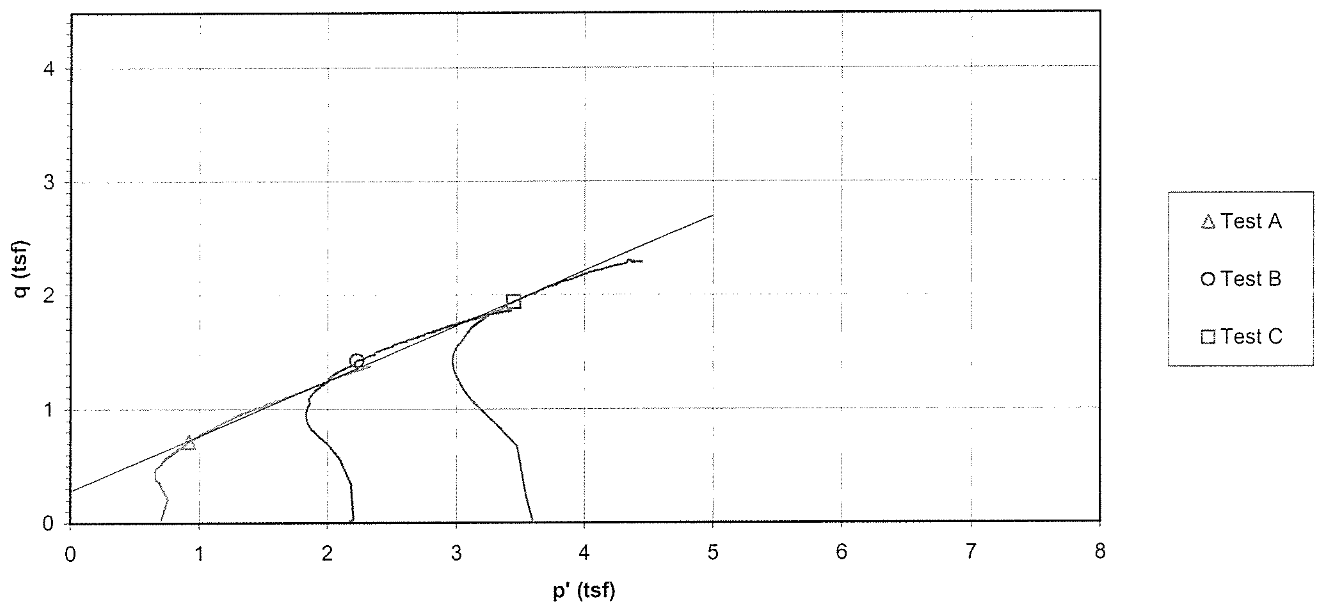
Specimen No.			A	B	C	
Initial Data	Water content %	W_o	21.0	21.7	22.0	
	Dry Density PCF	γ_{d_o}	105.5	105.1	104.8	
	Saturation %	S_o	93.7	96.1	96.5	
	Void Ratio	e_o	0.609	0.615	0.621	
After Shear	Water content %	W_f	21.5	21.4	21.2	
	Dry Density PCF	γ_{d_f}	107.2	107.3	107.7	
	Saturation %	S_f	100.0	100.0	100.0	
	Void Ratio	e_f	0.584	0.582	0.576	
	Final Back Pressure TSF	u_c	5.76	4.32	2.88	
Minor Principal Stress TSF		σ_3	0.72	2.16	3.60	
Maximum Deviator Stress (tsf) @ failure		$(\sigma_1\text{-}\sigma_3)_{max}$	1.40	2.85	3.89	
Time to $(\sigma_1\text{-}\sigma_3)_{Max.}$ min.		t_f	16.3	43.4	327.5	
Ultimate Deviator Stress, t/sq ft		$(\sigma_1\text{-}\sigma_3)_{ult}$	n/a	n/a	n/a	
Initial Diameter, in.		D_o	2.857	2.865	2.865	
Initial Height, in.		H_o	6.109	6.155	6.020	

Controlled - Strain Test					
Description of Specimens	Lean Clay (CL), brown, moist, firm, Mn				
		Type of Specimen	Undisturbed	Type of test	$\bar{R}$
LL	PL	PI	Gs 2.72	Project	Gallatin Fossil Plant (GAF) - Ash Ponds
Remarks:					
		Boring No.	STN-E-9	Sample No.	4
		Depth Elev.	9.5'-10.0', 10.1'-10.6', 10.7'-11.2'		
		Laboratory	Stantec	Date	12-1-09
		TRIAXIAL COMPRESSION TEST REPORT			

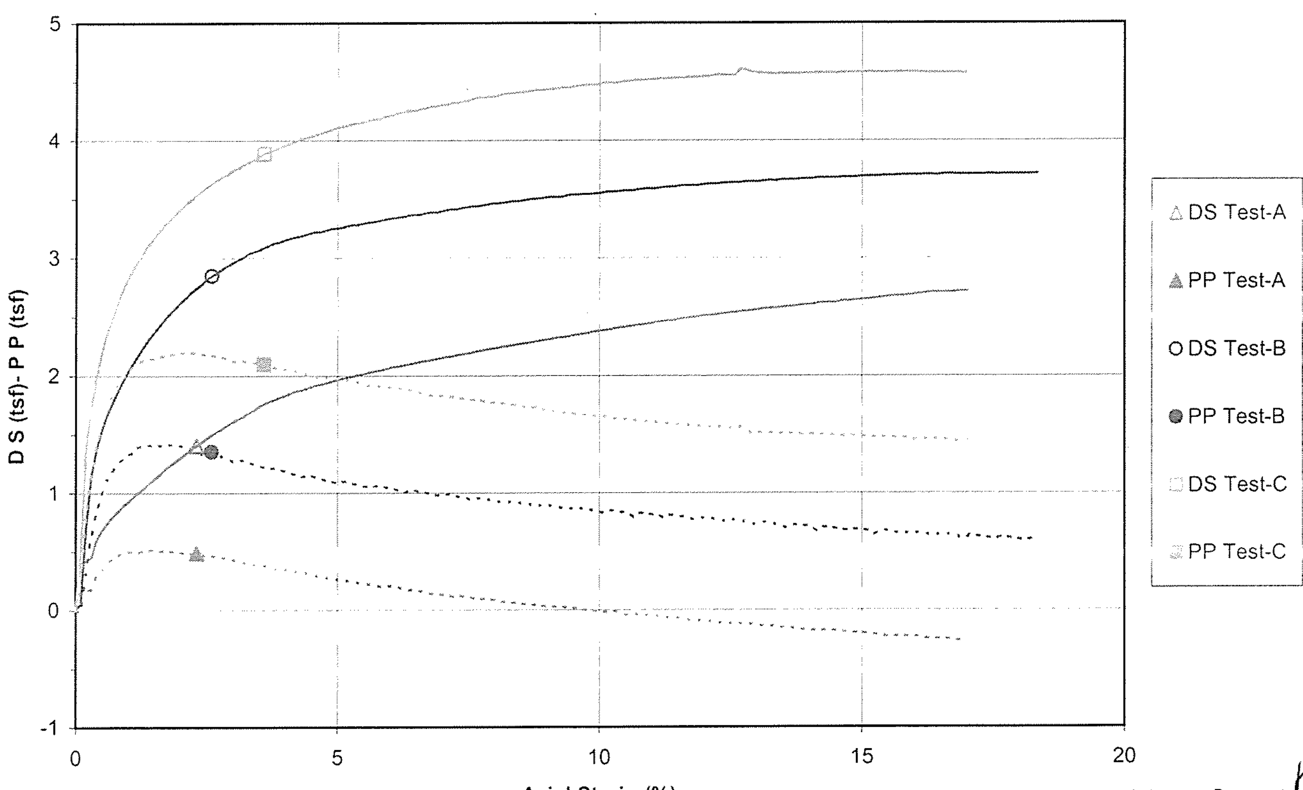
Consolidated Undrained Triaxial Test
EM 1110-2-1906 Appendix X

Project: Gallatin Fossil Plant (GAF) - Ash Ponds
Project No.: 175559018
Sample ID: STN-E-9, 9.5'-10.0' & STN-E-9, 10.1'-10.6' & STN-E-9, 10.7'-11.2'
Test Number: 4
Failure Criterion: Maximum Effective Principal Stress Ratio
ϕ' = 28.8 deg.
c' = 0.32 tsf

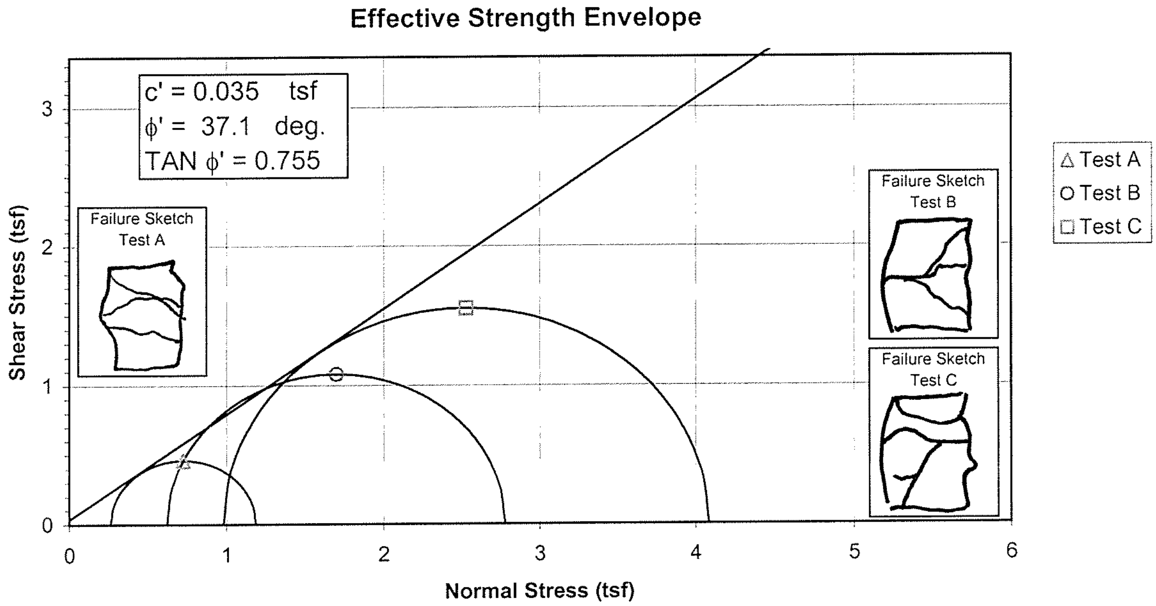
p' vs. q Plot

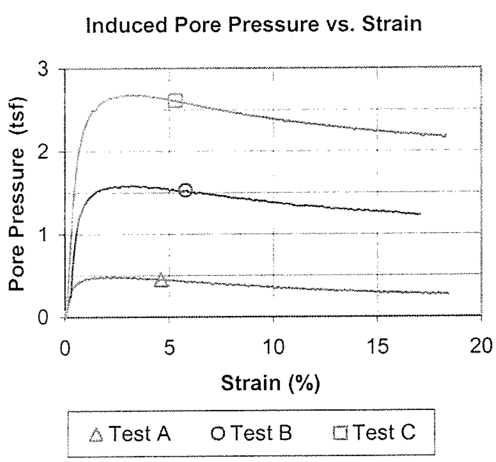


Deviator Stress and Induced Pore Pressure vs. Axial Strain



Failure Criterion: Maximum Effective Principal Stress Ratio





Specimen No.			A	B	C	
Initial Data	Water content %	W_o	27.6	27.1	24.9	
	Dry Density PCF	γ_{d_o}	95.7	97.8	101.7	
	Saturation %	S_o	100.0	103.4	104.9	
	Void Ratio	e_o	0.735	0.697	0.632	
After Shear	Water content %	W_f	23.1	21.1	18.7	
	Dry Density PCF	γ_{d_f}	102.8	106.3	110.9	
	Saturation %	S_f	100.0	100.0	100.0	
	Void Ratio	e_f	0.615	0.562	0.497	
	Final Back Pressure TSF	u_c	5.76	4.32	2.88	
Minor Principal Stress TSF @ failure		σ_3'f	0.27	0.62	0.98	
Maximum Deviator Stress (tsf) @ failure		$(\sigma_1'-\sigma_3')_{max}$	0.92	2.15	3.09	
Time to (σ1'-σ3')max min.		t_f	140.5	396.4	170.4	
Ultimate Deviator Stress, t/sq ft		$(\sigma 1'-\sigma 3')_{ult}$	n/a	n/a	n/a	
Initial Diameter, in.		D_o	2.835	2.861	2.865	
Initial Height, in.		H_o	5.961	5.864	5.944	

Controlled - Strain Test

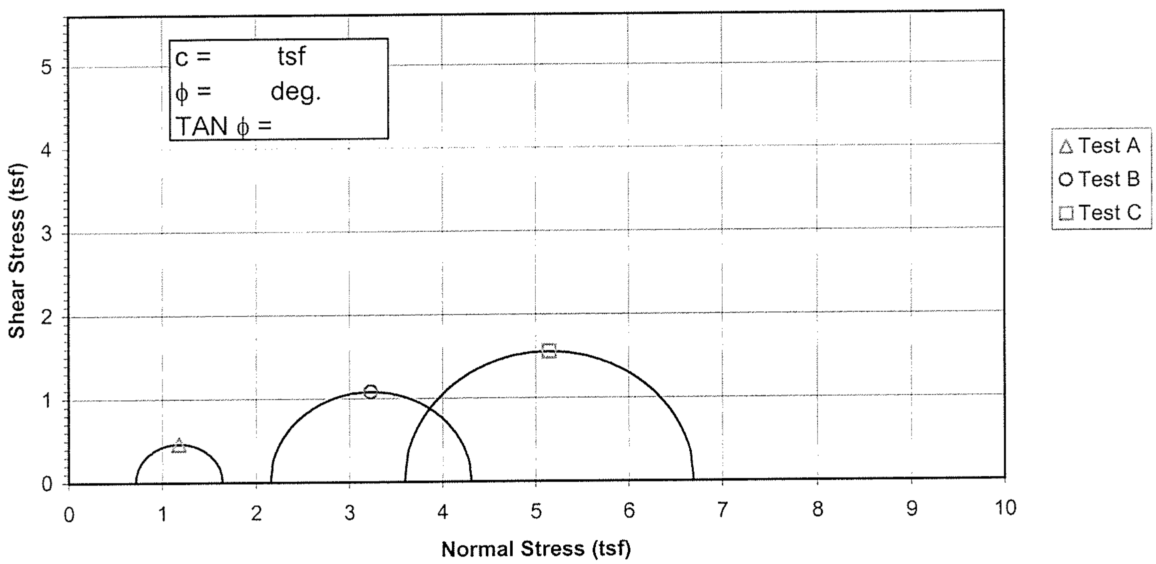
Description of Specimens Lean Clay with Sand (CL), brown, wet, soft

				Type of Specimen	Undisturbed	Type of test $\bar{R}$
LL	PL	PI	Gs 2.66	Project	Gallatin Fossil Plant (GAF) - Ash Ponds
Remarks:					
				Boring No.	STN-E-10S Sample No. 5
				Depth Elev.	25.0'-25.5', 25.5'-26.0', 26.2'-26.7'
				Laboratory	Stantec Date 12-1-09

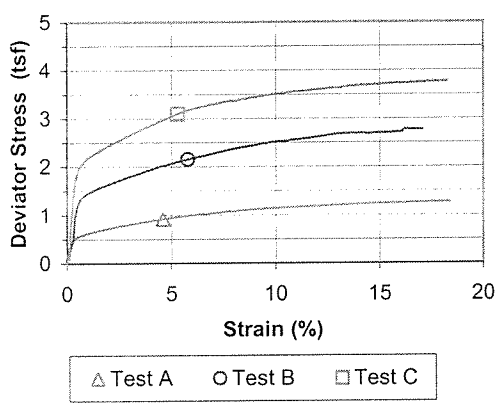
TRIAXIAL COMPRESSION TEST REPORT

Failure Criterion: Maximum Effective Principal Stress Ratio

Total Strength Envelope



Deviator Stress vs. Strain



Specimen No.			A	B	C	
Initial Data	Water content %	W_o	27.6	27.1	24.9	
	Dry Density PCF	γ_{d_o}	95.7	97.8	101.7	
	Saturation %	S_o	100.0	103.4	104.9	
	Void Ratio	e_o	0.735	0.697	0.632	
After Shear	Water content %	W_f	23.1	21.1	18.7	
	Dry Density PCF	γ_{d_f}	102.8	106.3	110.9	
	Saturation %	S_f	100.0	100.0	100.0	
	Void Ratio	e_f	0.615	0.562	0.497	
	Final Back Pressure TSF	u_c	5.76	4.32	2.88	
Minor Principal Stress TSF		σ_3	0.72	2.16	3.60	
Maximum Deviator Stress (tsf) @ failure		$(\sigma_1-\sigma_3)_{max}$	0.92	2.15	3.09	
Time to $(\sigma_1-\sigma_3)_{Max.}$ min.		t_f	140.5	396.4	170.4	
Ultimate Deviator Stress, t/sq ft		$(\sigma_1-\sigma_3)_{ult}$	n/a	n/a	n/a	
Initial Diameter, in.		D_o	2.835	2.861	2.865	
Initial Height, in.		H_o	5.961	5.864	5.944	

Controlled - Strain Test

Description of Specimens: Lean Clay with Sand (CL), brown, wet, soft

			Type of Specimen: Undisturbed	Type of test: $\bar{R}$
LL	PL	PI	Gs 2.66	Project: Gallatin Fossil Plant (GAF) - Ash Ponds
Remarks:				
			Boring No.: STN-E-10S	Sample No. 5
			Depth Elev.: 25.0'-25.5', 25.5'-26.0', 26.2'-26.7'	
			Laboratory: Stantec	Date 12-1-09
			TRIAXIAL COMPRESSION TEST REPORT	

File: 175559018_cu_5 Sheet: CE_Final-T
Preparation Date: 1998
Revision Date: 1-2008

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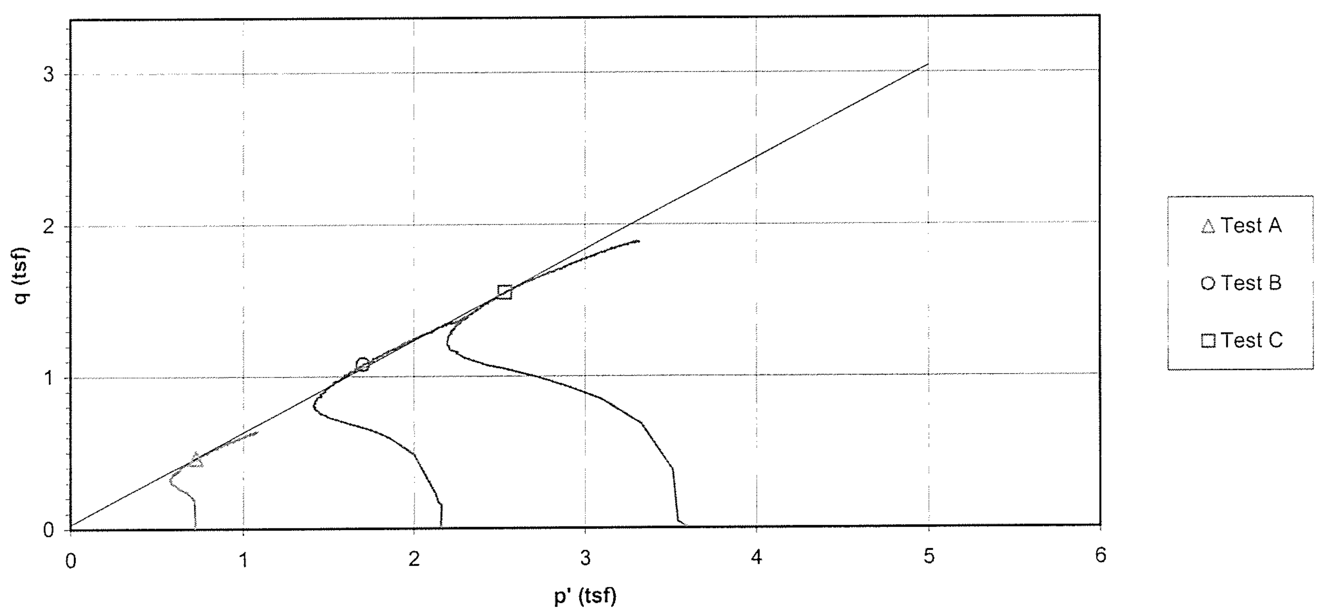
Laboratory Document 106
Prepared By: MW
Approved BY: TLK

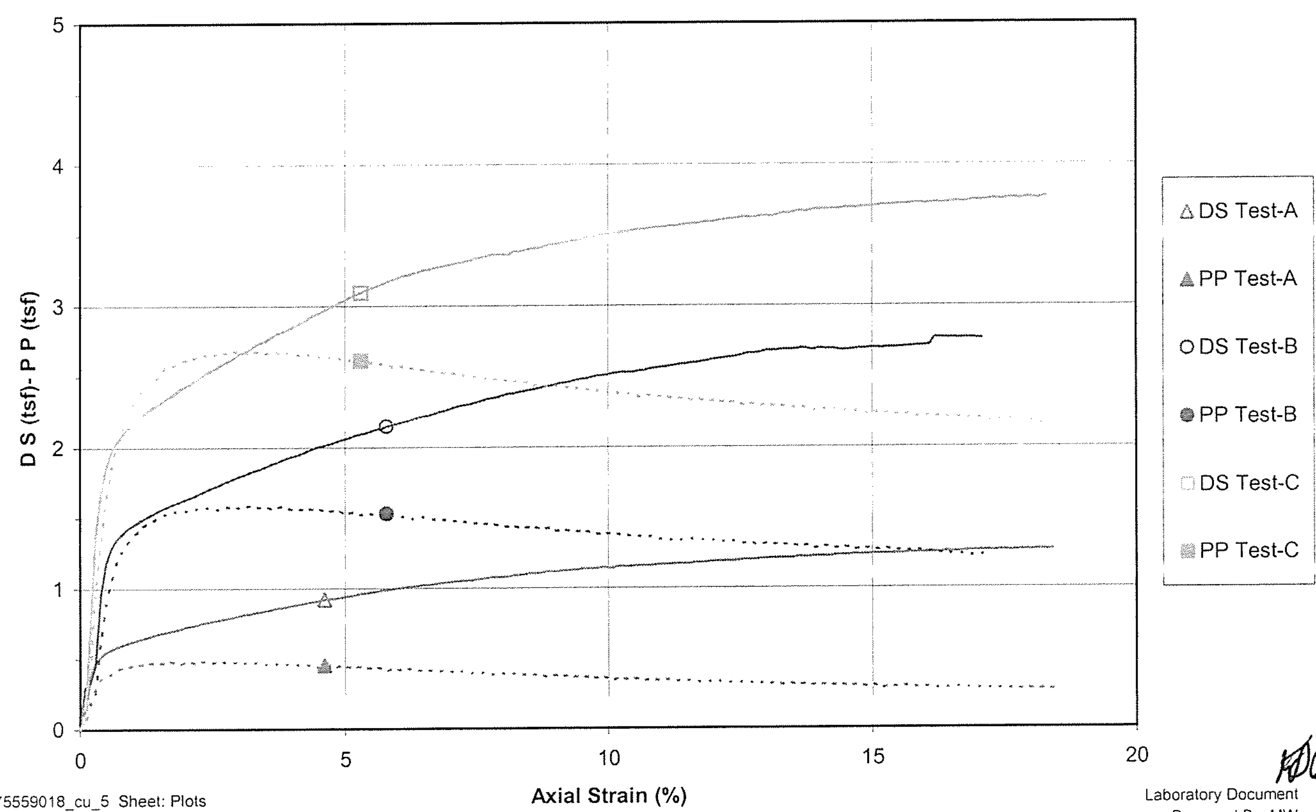
Consolidated Undrained Triaxial Test
EM 1110-2-1906 Appendix X

Project	Gallatin Fossil Plant (GAF) - Ash Ponds	Project No.	175559018
Sample ID	STN-E-10S, 25.0'-25.5' & STN-E-10S, 25.5'-26.0' & STN-E-10S, 26.2'-26.7'	Test Number	5
Failure Criterion:	Maximum Effective Principal Stress Ratio ϕ' = 37.1 deg.	c' =	0.04 tsf

p' vs. q Plot



Deviator Stress and Induced Pore Pressure vs. Axial Strain



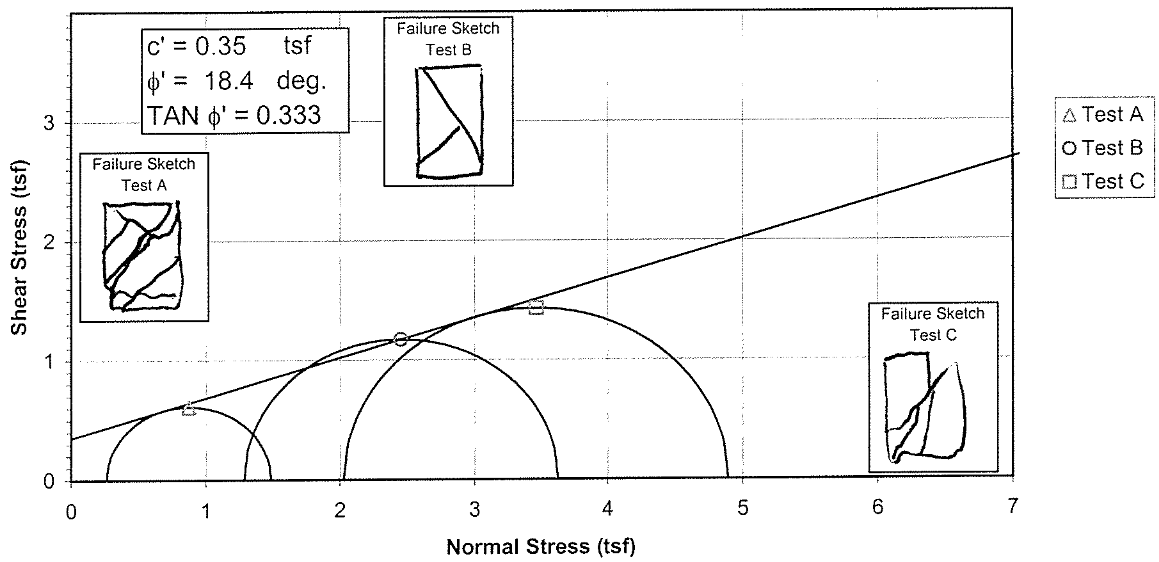
File: 175559018_cu_5 Sheet: Plots
Preparation Date: 1998
Revision Date: 1-2008

Stantec Consulting Services Inc.

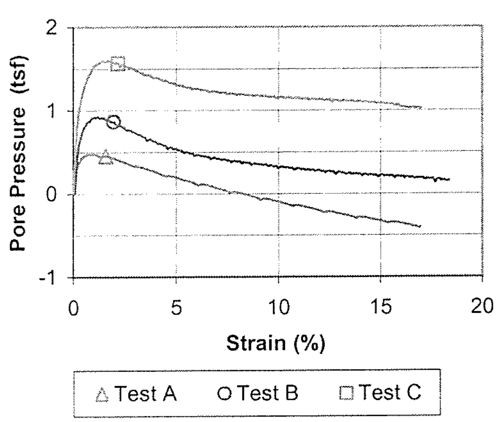
Laboratory Document
Prepared By: MW
Approved BY: TLK

Failure Criterion: Maximum Effective Principal Stress Ratio

Effective Strength Envelope



Induced Pore Pressure vs. Strain

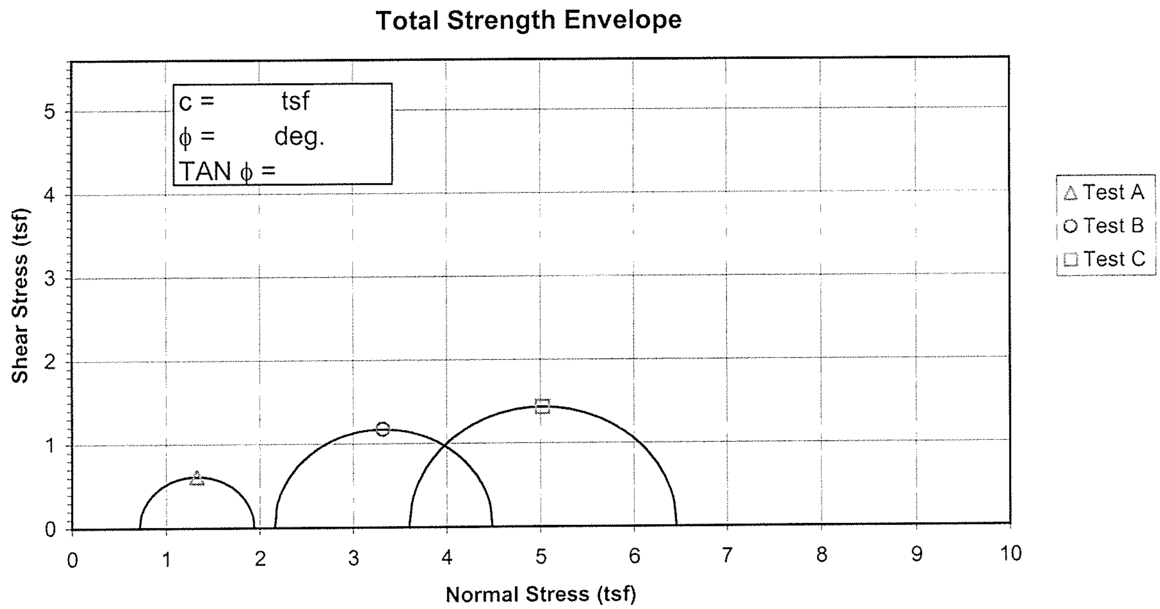


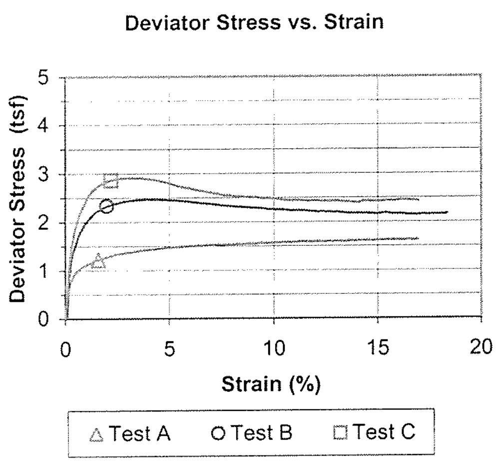
Specimen No.			A	B	C	
Initial Data	Water content %	W_o	28.7	27.4	27.9	
	Dry Density PCF	γ_{d_o}	92.2	95.5	96.3	
	Saturation %	S_o	91.9	94.9	98.5	
	Void Ratio	e_o	0.856	0.790	0.776	
After Shear	Water content %	W_f	30.2	28.3	27.2	
	Dry Density PCF	γ_{d_f}	93.6	96.3	98.1	
	Saturation %	S_f	100.0	100.0	100.0	
	Void Ratio	e_f	0.828	0.776	0.744	
	Final Back Pressure TSF	u_c	5.76	4.32	2.88	
Minor Principal Stress TSF @ failure		σ_3'f	0.26	1.29	2.03	
Maximum Deviator Stress (tsf) @ failure		$(\sigma_1'-\sigma_3')_{max}$	1.22	2.33	2.86	
Time to (σ1'-σ3')max min.		t_f	11.0	123.0	157.9	
Ultimate Deviator Stress, t/sq ft		$(\sigma 1'-\sigma 3')_{ult}$	n/a	2.16	2.39	
Initial Diameter, in.		D_o	2.883	2.884	2.884	
Initial Height, in.		H_o	6.034	6.015	6.022	

Controlled - Strain Test					
Description of Specimens	Fat Clay (CH), red brown, moist, firm				
		Type of Specimen	Undisturbed	Type of test	$\bar{R}$
LL	PL	PI	Gs 2.74	Project	Gallatin Fossil Plant (GAF) - Ash Ponds
Remarks:					
		Boring No.	STN-E-13S	Sample No.	6
		Depth Elev.	20.0'-20.5', 20.6'-21.1', 25.0'-25.5'		
		Laboratory	Stantec	Date	12-1-09
		TRIAXIAL COMPRESSION TEST REPORT			

MB
GV

Failure Criterion: Maximum Effective Principal Stress Ratio





Specimen No.			A	B	C	
Initial Data	Water content %	W_o	28.7	27.4	27.9	
	Dry Density PCF	γ_{d_o}	92.2	95.5	96.3	
	Saturation %	S_o	91.9	94.9	98.5	
	Void Ratio	e_o	0.856	0.790	0.776	
After Shear	Water content %	W_f	30.2	28.3	27.2	
	Dry Density PCF	γ_{d_f}	93.6	96.3	98.1	
	Saturation %	S_f	100.0	100.0	100.0	
	Void Ratio	e_f	0.828	0.776	0.744	
	Final Back Pressure TSF	u_c	5.76	4.32	2.88	
Minor Principal Stress TSF		σ_3	0.72	2.16	3.60	
Maximum Deviator Stress (tsf) @ failure		$(\sigma_1-\sigma_3)_{max}$	1.22	2.33	2.86	
Time to $(\sigma_1-\sigma_3)_{Max.}$ min.		t_f	11.0	123.0	157.9	
Ultimate Deviator Stress, t/sq ft		$(\sigma_1-\sigma_3)_{ult}$	n/a	2.16	2.39	
Initial Diameter, in.		D_o	2.883	2.884	2.884	
Initial Height, in.		H_o	6.034	6.015	6.022	

Controlled - Strain Test					
Description of Specimens	Fat Clay (CH), red brown, moist, firm				
		Type of Specimen	Undisturbed	Type of test	$\overline{R}$
LL	PL	PI	Gs 2.74	Project	Gallatin Fossil Plant (GAF) - Ash Ponds
Remarks:					
		Boring No.	STN-E-13S	Sample No.	6
		Depth Elev.	20.0'-20.5', 20.6'-21.1', 25.0'-25.5'		
		Laboratory	Stantec	Date	12-1-09
		TRIAXIAL COMPRESSION TEST REPORT			

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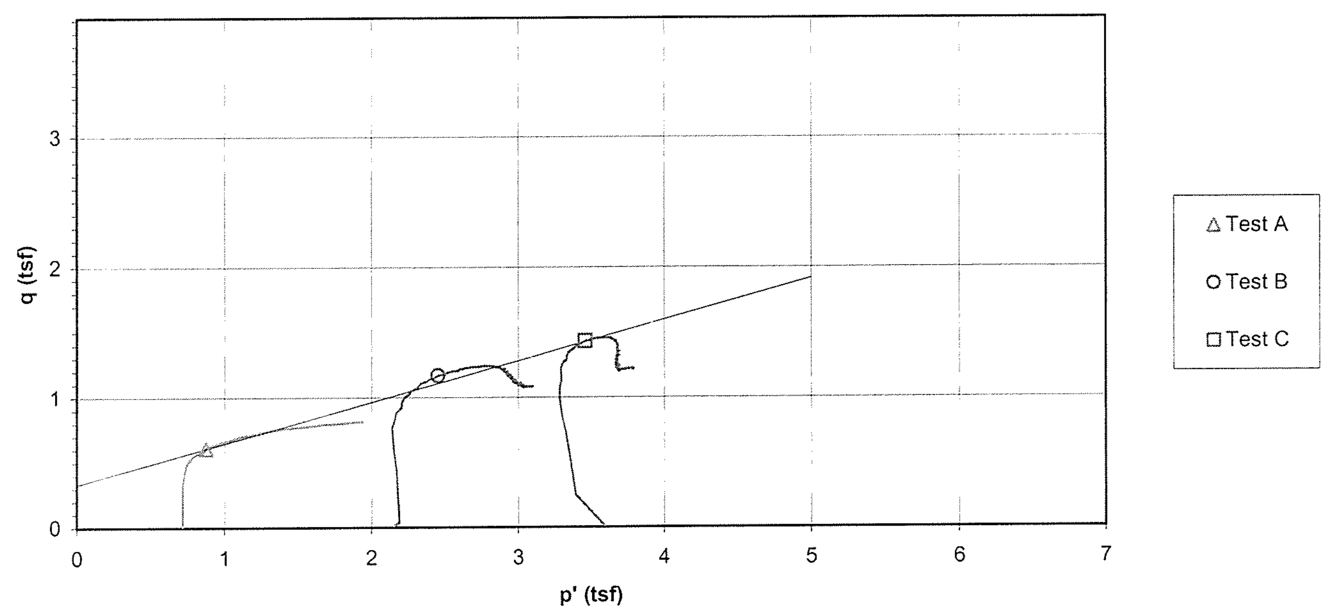
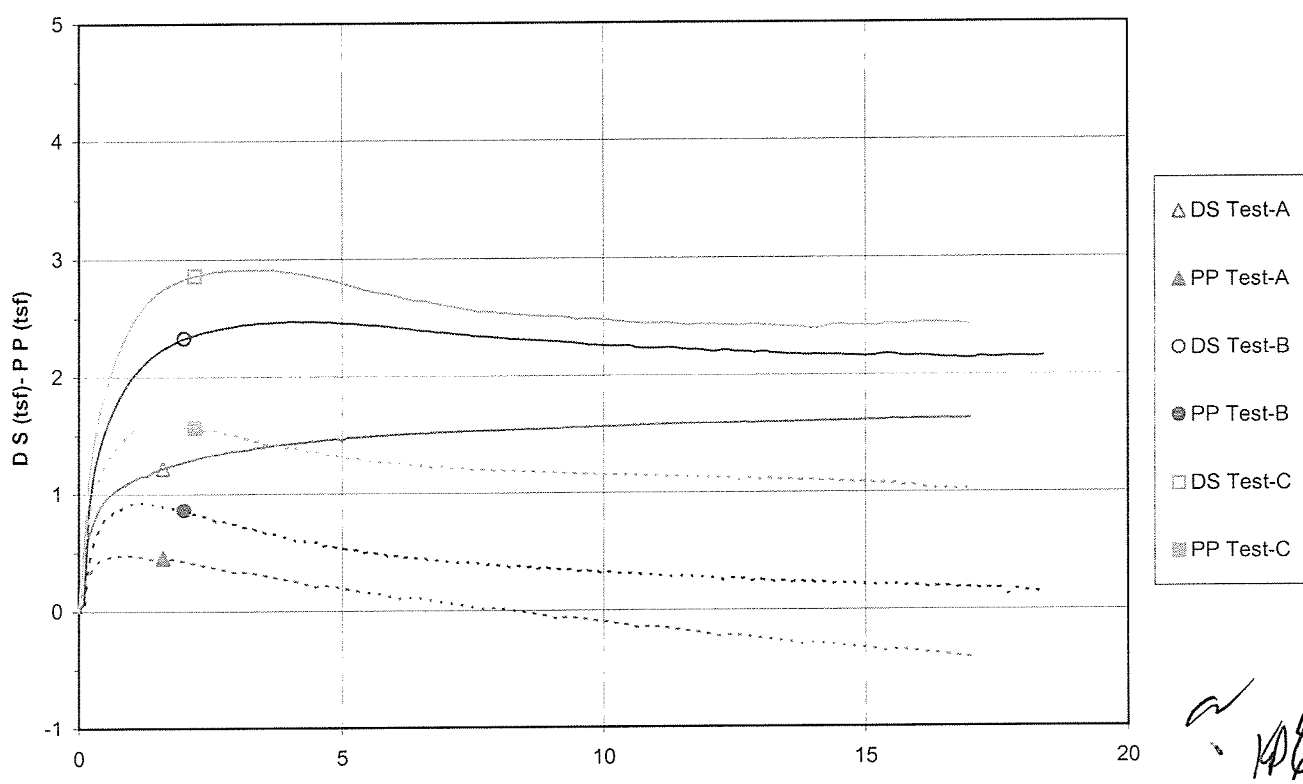
Consolidated Undrained Triaxial Test
EM 1110-2-1906 Appendix X

Project	Gallatin Fossil Plant (GAF) - Ash Ponds	Project No.	175559018
Sample ID	STN-E-13S, 20.0'-20.5' & STN-E-13S, 20.6'-21.1' & STN-E-13S, 25.0'-25.5'	Test Number	6
Failure Criterion:	Maximum Effective Principal Stress Ratio $\phi' =$ 18.4 deg.	c' =	0.35 tsf

p' vs. q Plot



Deviator Stress and Induced Pore Pressure vs. Axial Strain



File: 175559018_cu_6 Sheet: Plots
Preparation Date: 1998
Revision Date: 1-2008

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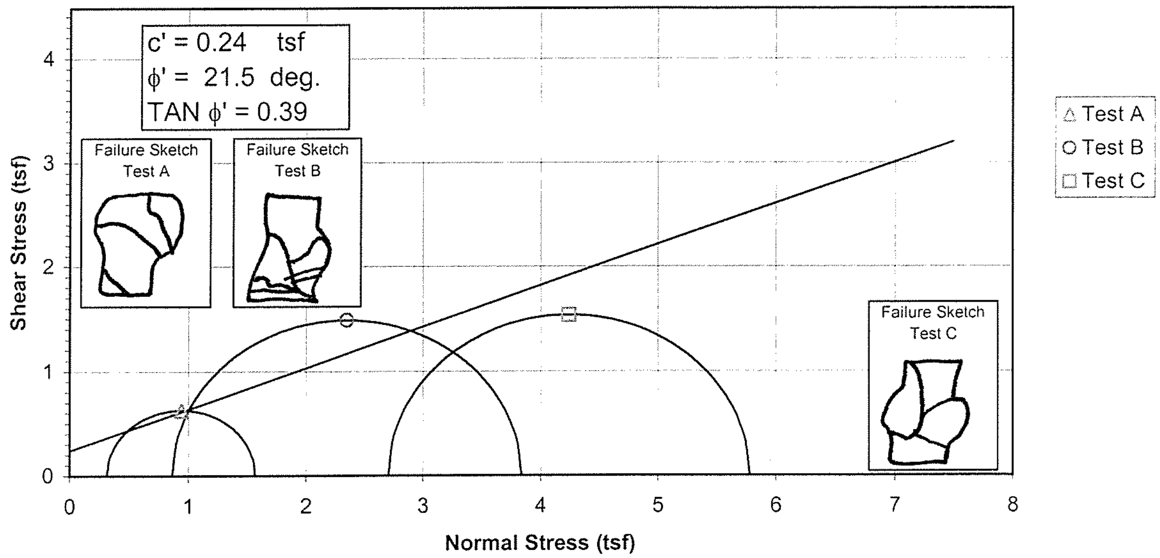
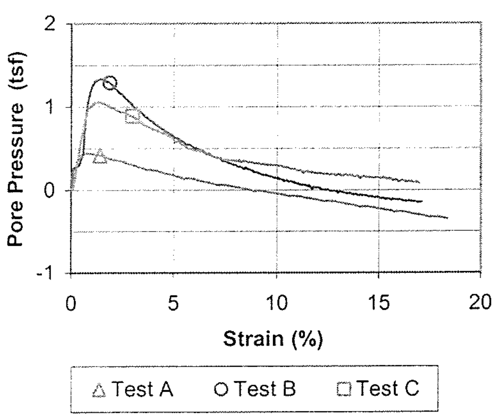
Laboratory Document
Prepared By: MW
Approved BY: TLK

Failure Criterion: Maximum Effective Principal Stress Ratio

Effective Strength Envelope



Induced Pore Pressure vs. Strain

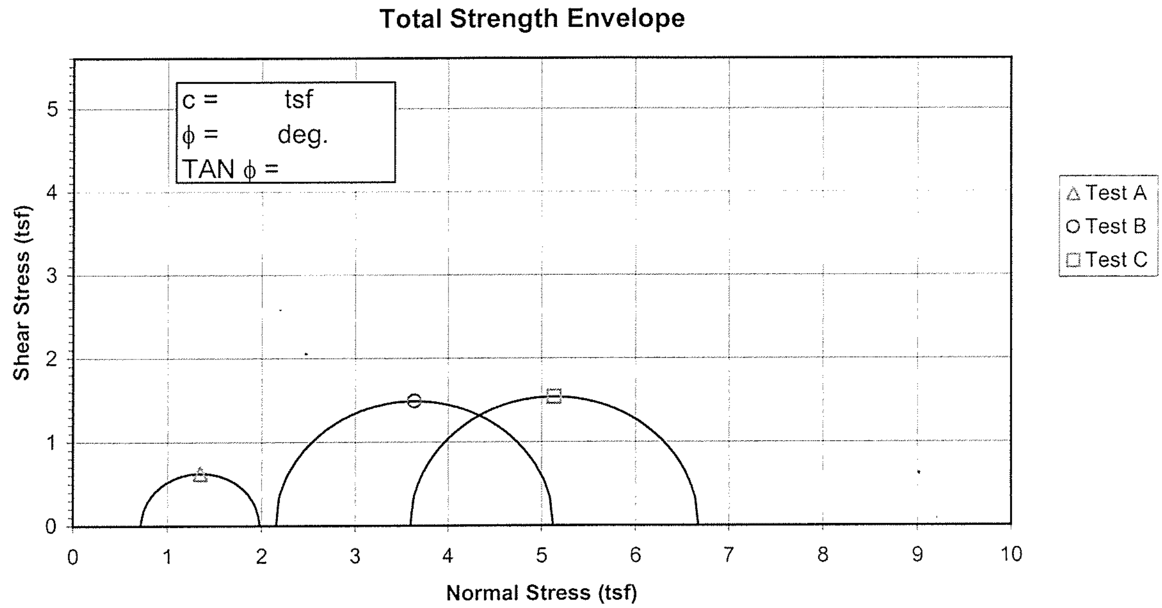


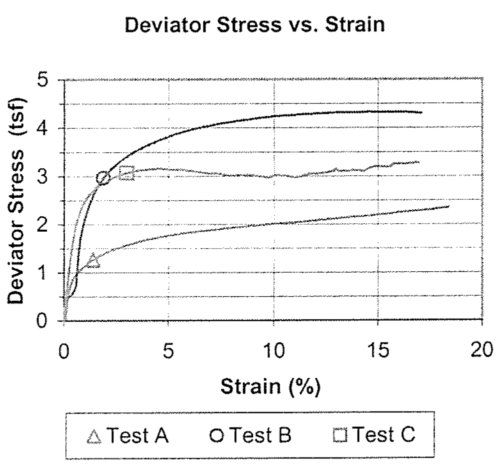
Specimen No.			A	B	C	
Initial Data	Water content %	W_o	21.8	20.4	22.1	
	Dry Density PCF	γ_{d_o}	104.4	107.4	103.6	
	Saturation %	S_o	96.5	97.6	95.5	
	Void Ratio	e_o	0.608	0.563	0.621	
After Shear	Water content %	W_f	22.4	21.0	21.4	
	Dry Density PCF	γ_{d_f}	104.8	107.4	106.6	
	Saturation %	S_f	100.0	100.0	100.0	
	Void Ratio	e_f	0.602	0.564	0.576	
	Final Back Pressure TSF	u_c	5.76	4.32	2.88	
Minor Principal Stress TSF @ failure		σ_3'f	0.32	0.87	2.71	
Maximum Deviator Stress (tsf) @ failure		$(\sigma_1'-\sigma_3')_{max}$	1.26	2.96	3.07	
Time to (σ1'-σ3')max min.		t_f	9.8	123.0	189.7	
Ultimate Deviator Stress, t/sq ft		$(\sigma 1'-\sigma 3')_{ult}$	n/a	n/a	n/a	
Initial Diameter, in.		D_o	2.881	2.884	2.882	
Initial Height, in.		H_o	6.007	6.044	6.005	

Controlled - Strain Test

Description of Specimens	Fat Clay (CH), brown, moist, firm				
		Type of Specimen	Undisturbed	Type of test	$\bar{R}$
LL	PL	PI	Gs 2.69	Project	Gallatin Fossil Plant (GAF) - Ash Ponds
Remarks:					
		Boring No.	STN-E-14S	Sample No.	7
		Depth Elev.	2.0'-2.5', 2.6'-3.1', 5.7'-6.2'		
		Laboratory	Stantec	Date	12-4-09
		TRIAXIAL COMPRESSION TEST REPORT			

Failure Criterion: Maximum Effective Principal Stress Ratio





Specimen No.			A	B	C	
Initial Data	Water content %	W_o	21.8	20.4	22.1	
	Dry Density PCF	γ_{d_o}	104.4	107.4	103.6	
	Saturation %	S_o	96.5	97.6	95.5	
	Void Ratio	e_o	0.608	0.563	0.621	
After Shear	Water content %	W_f	22.4	21.0	21.4	
	Dry Density PCF	γ_{d_f}	104.8	107.4	106.6	
	Saturation %	S_f	100.0	100.0	100.0	
	Void Ratio	e_f	0.602	0.564	0.576	
	Final Back Pressure TSF	u_c	5.76	4.32	2.88	
Minor Principal Stress TSF		σ_3	0.72	2.16	3.60	
Maximum Deviator Stress (tsf) @ failure		$(\sigma_1-\sigma_3)_{max}$	1.26	2.96	3.07	
Time to $(\sigma_1-\sigma_3)_{Max.}$ min.		t_f	9.8	123.0	189.7	
Ultimate Deviator Stress, t/sq ft		$(\sigma_1-\sigma_3)_{ult}$	n/a	n/a	n/a	
Initial Diameter, in.		D_o	2.881	2.884	2.882	
Initial Height, in.		H_o	6.007	6.044	6.005	

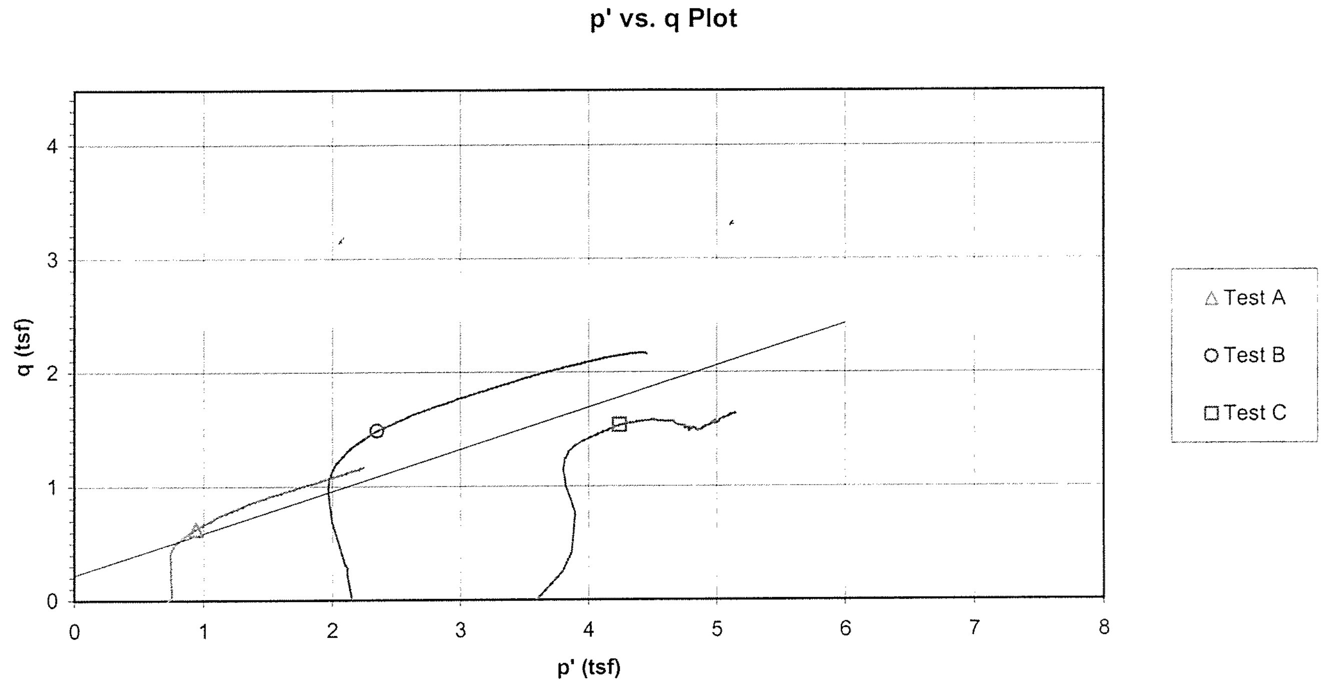
Controlled - Strain Test

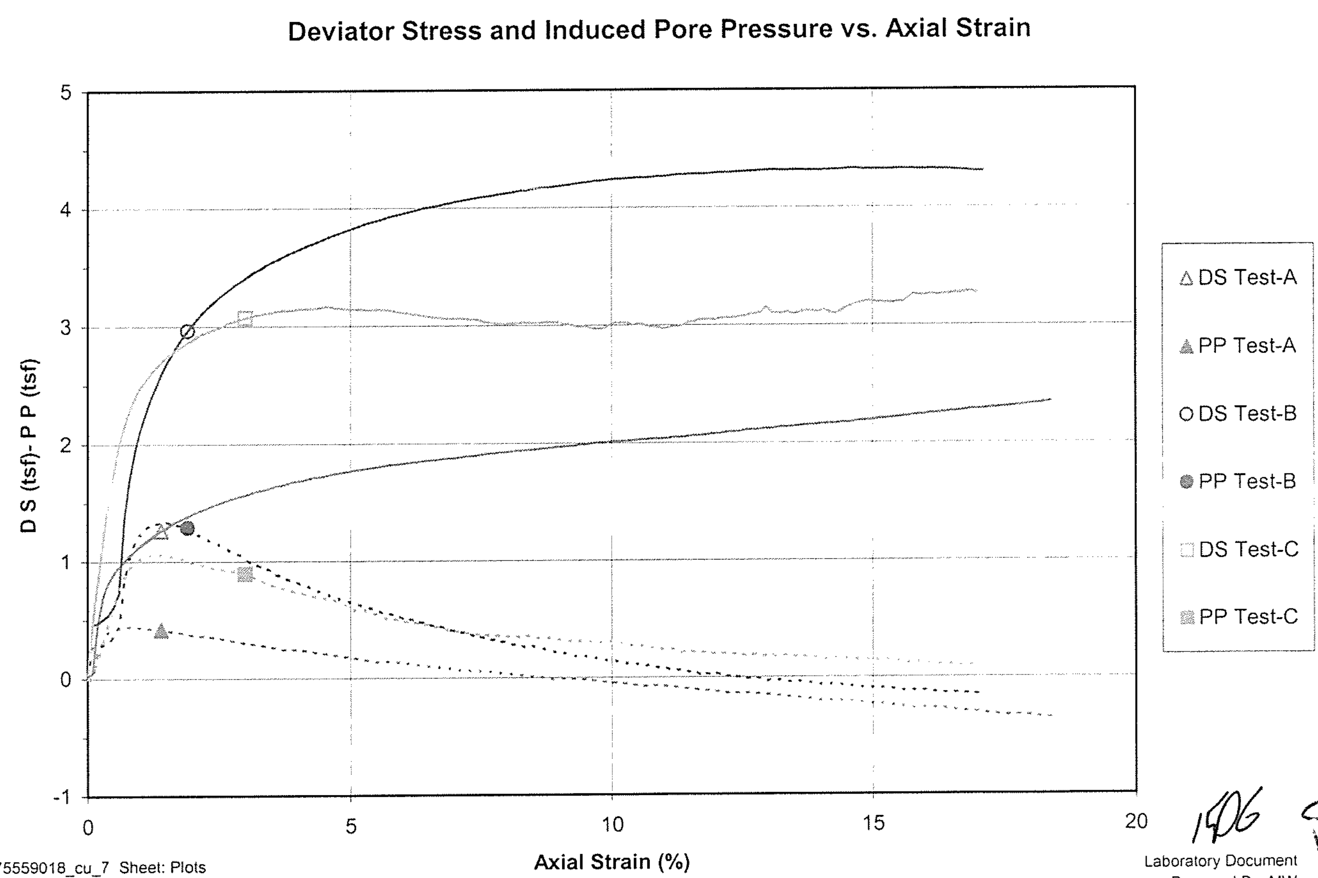
Description of Specimens	Fat Clay (CH), brown, moist, firm			
	Type of Specimen	Undisturbed	Type of test	$\overline{R}$
LL / PL / PI / Gs 2.69	Project	Gallatin Fossil Plant (GAF) - Ash Ponds		
Remarks:				
	Boring No.	STN-E-14S	Sample No.	7
	Depth Elev.	2.0'-2.5', 2.6'-3.1', 5.7'-6.2'		
	Laboratory	Stantec	Date	12-4-09
	TRIAXIAL COMPRESSION TEST REPORT			

1606 ✓

Consolidated Undrained Triaxial Test
EM 1110-2-1906 Appendix X

Project	Gallatin Fossil Plant (GAF) - Ash Ponds	Project No.	175559018
Sample ID	STN-E-14S, 2.0'-2.5' & STN-E-14S, 2.6'-3.1' & STN-E-14S, 5.7'-6.2'	Test Number	7
Failure Criterion:	Maximum Effective Principal Stress Ratio $\phi' =$ 21.5 deg.	c' =	0.24 tsf





1/06 G

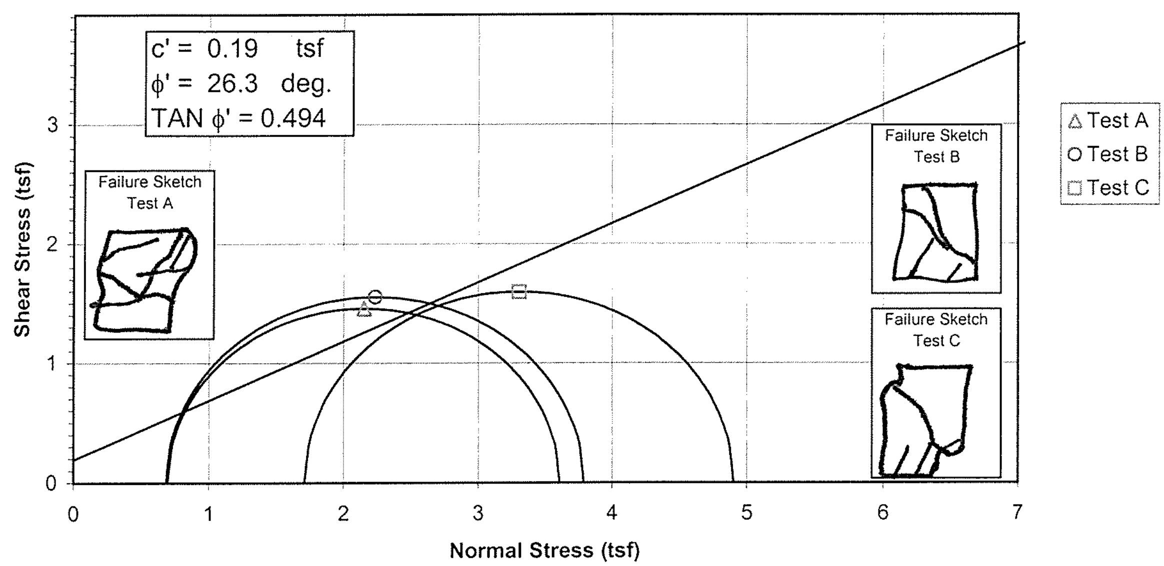
File: 175559018_cu_7 Sheet: Plots
Preparation Date: 1998
Revision Date: 1-2008

Stantec Consulting Services Inc.

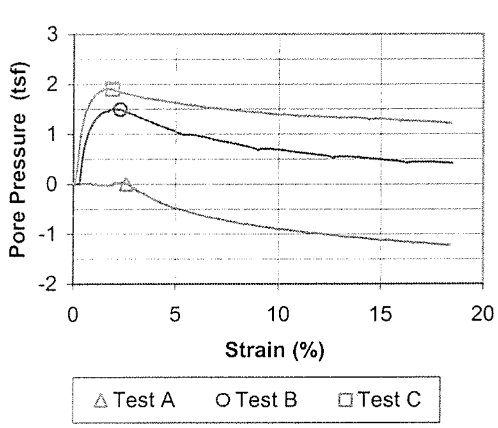
Laboratory Document
Prepared By: MW
Approved BY: TLK

Failure Criterion: Maximum Effective Principal Stress Ratio

Effective Strength Envelope



Induced Pore Pressure vs. Strain



Specimen No.			A	B	C	
Initial Data	Water content %	W_o	22.0	23.3	23.2	
	Dry Density PCF	γ_{d_o}	102.6	101.6	103.4	
	Saturation %	S_o	91.4	94.3	98.3	
	Void Ratio	e_o	0.656	0.671	0.642	
After Shear	Water content %	W_f	22.7	23.8	23.0	
	Dry Density PCF	γ_{d_f}	105.1	103.0	104.5	
	Saturation %	S_f	100.0	100.0	100.0	
	Void Ratio	e_f	0.616	0.648	0.625	
	Final Back Pressure TSF	u_c	5.76	4.32	2.88	
Minor Principal Stress TSF @ failure		σ_3'f	0.70	0.68	1.71	
Maximum Deviator Stress (tsf) @ failure		$(\sigma_1'-\sigma_3')_{max}$	2.89	3.11	3.20	
Time to (σ1'-σ3')max min.		t_f	16.9	6.7	95.5	
Ultimate Deviator Stress, t/sq ft		$(\sigma 1'-\sigma 3')_{ult}$	n/a	n/a	n/a	
Initial Diameter, in.		D_o	2.869	2.865	2.860	
Initial Height, in.		H_o	6.024	6.015	5.741	

Controlled - Strain Test

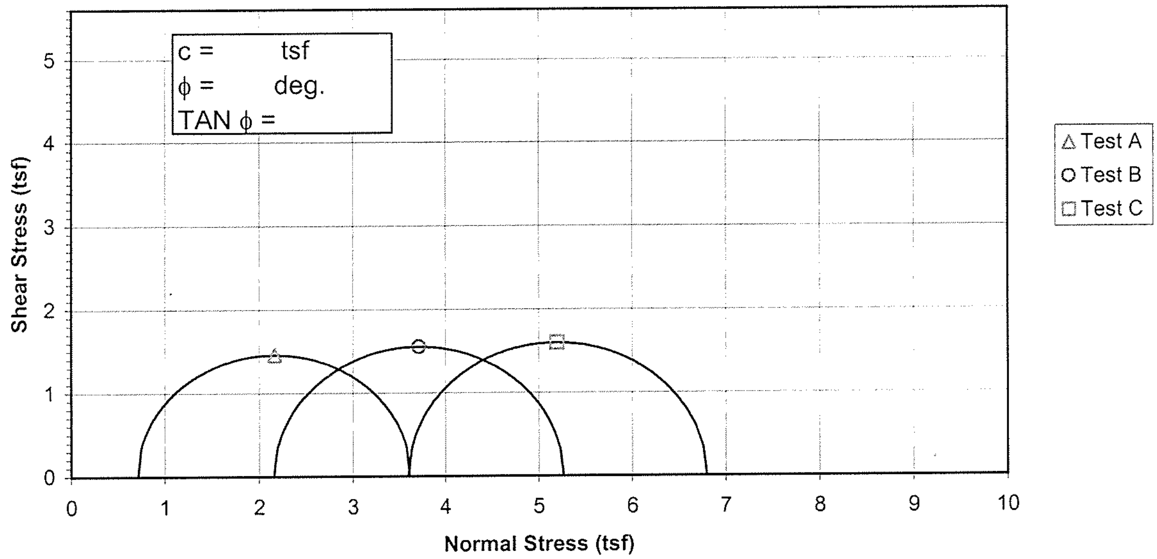
Description of Specimens Fat Clay with Gravel (CH), brown, moist, firm

				Type of Specimen	Undisturbed	Type of test $\bar{R}$
LL	PL	PI	Gs 2.72	Project	Gallatin Fossil Plant (GAF) - Ash Ponds	
Remarks:						
				Boring No.	STN-E-15	Sample No. 8
				Depth Elev.	9.7'-10.2', 10.3'-10.8', 10.9'-11.4'	
				Laboratory	Stantec	Date 12-4-09
				TRIAXIAL COMPRESSION TEST REPORT		

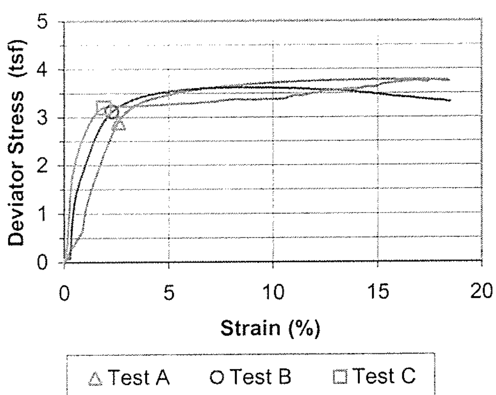
1606

Failure Criterion: Maximum Effective Principal Stress Ratio

Total Strength Envelope



Deviator Stress vs. Strain



Specimen No.			A	B	C	
Initial Data	Water content %	W_o	22.0	23.3	23.2	
	Dry Density PCF	γ_{d_o}	102.6	101.6	103.4	
	Saturation %	S_o	91.4	94.3	98.3	
	Void Ratio	e_o	0.656	0.671	0.642	
After Shear	Water content %	W_f	22.7	23.8	23.0	
	Dry Density PCF	γ_{d_f}	105.1	103.0	104.5	
	Saturation %	S_f	100.0	100.0	100.0	
	Void Ratio	e_f	0.616	0.648	0.625	
	Final Back Pressure TSF	u_c	5.76	4.32	2.88	
Minor Principal Stress TSF		σ_3	0.72	2.16	3.60	
Maximum Deviator Stress (tsf) @ failure		$(\sigma_1\text{-}\sigma_3)_{max}$	2.89	3.11	3.20	
Time to $(\sigma_1\text{-}\sigma_3)_{Max.}$ min.		t_f	16.9	6.7	95.5	
Ultimate Deviator Stress, t/sq ft		$(\sigma_1\text{-}\sigma_3)_{ult}$	n/a	n/a	n/a	
Initial Diameter, in.		D_o	2.869	2.865	2.860	
Initial Height, in.		H_o	6.024	6.015	5.741	

Controlled - Strain Test			
Description of Specimens	Fat Clay with Gravel (CH), brown, moist, firm		
	Type of Specimen	Undisturbed	Type of test $\overline{R}$
LL / PL / PI / Gs 2.72	Project	Gallatin Fossil Plant (GAF) - Ash Ponds	
Remarks:			
	Boring No.	STN-E-15	Sample No. 8
	Depth Elev.	9.7'-10.2', 10.3'-10.8', 10.9'-11.4'	
	Laboratory	Stantec	Date 12-4-09
	TRIAXIAL COMPRESSION TEST REPORT		

File: 175559018_cu_8 Sheet: CE_Final-T
Preparation Date: 1998
Revision Date: 1-2008

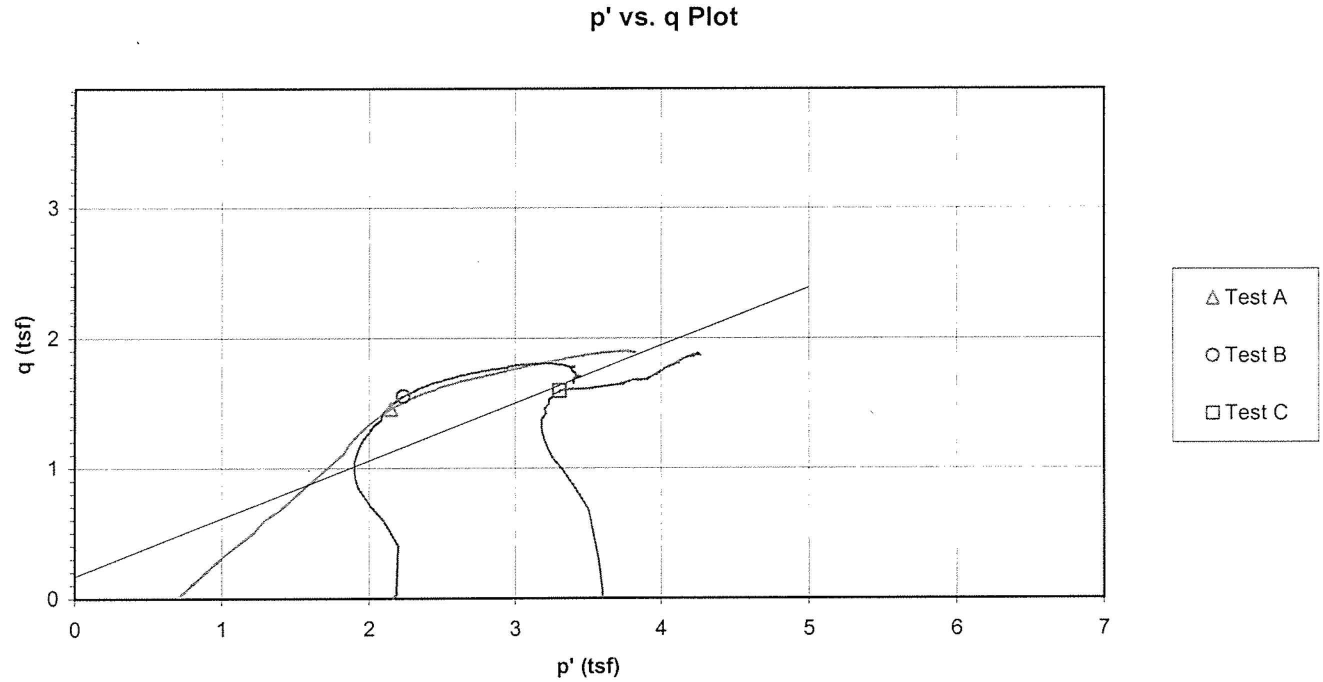
Stantec Consulting Services Inc.

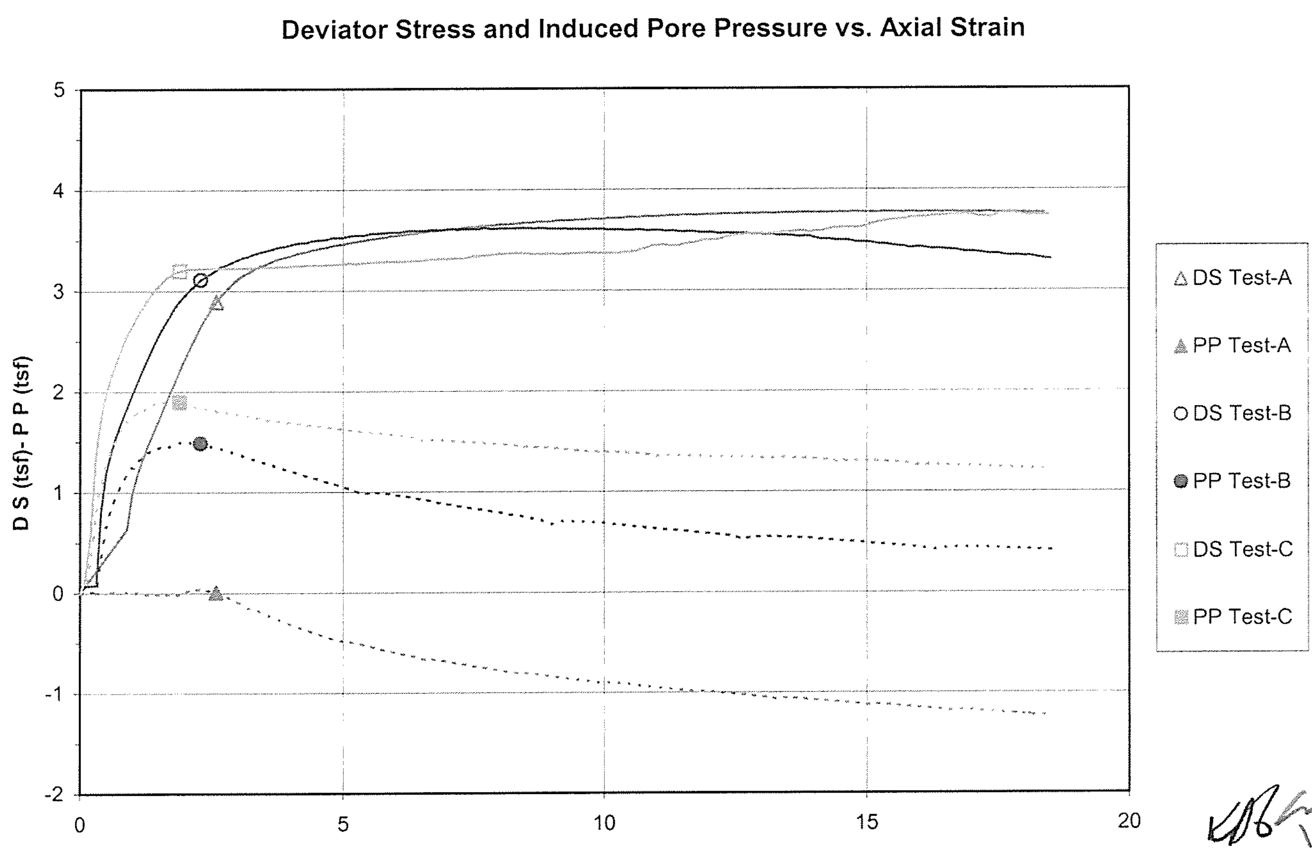
KB6

Laboratory Document
Prepared By: MW
Approved BY: TLK

Consolidated Undrained Triaxial Test
EM 1110-2-1906 Appendix X

Project	Gallatin Fossil Plant (GAF) - Ash Ponds	Project No.	175559018
Sample ID	STN-E-15, 9.7'-10.2' & STN-E-15, 10.3'-10.8' & STN-E-15, 10.9'-11.4'	Test Number	8
Failure Criterion:	Maximum Effective Principal Stress Ratio ϕ' = 26.3 deg.	c' =	0.19 tsf





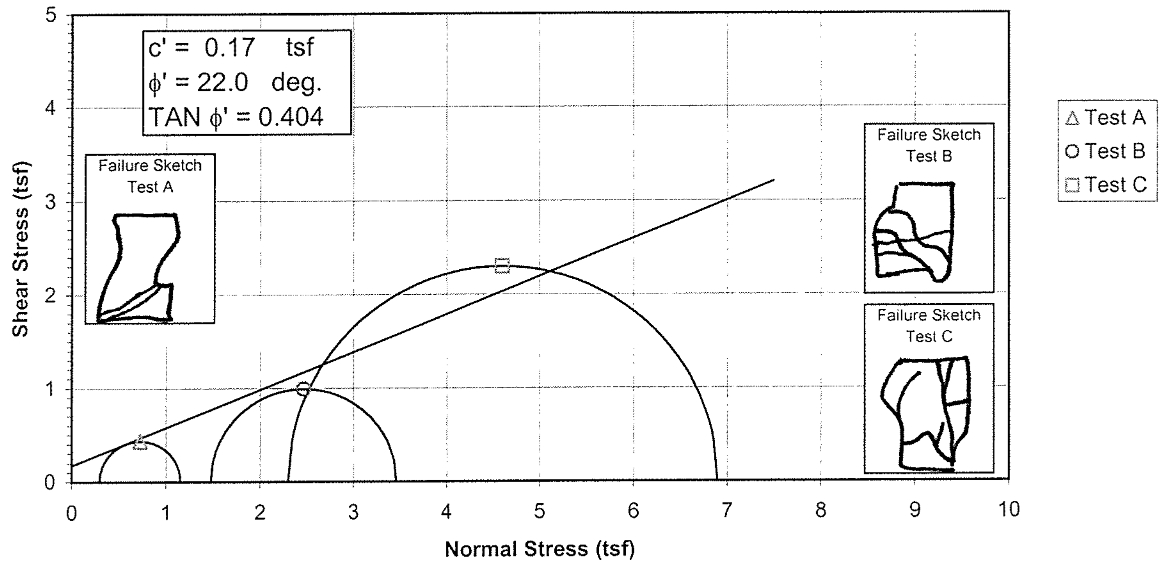
File: 175559018_cu_8 Sheet: Plots
Preparation Date: 1998
Revision Date: 1-2008

Stantec Consulting Services Inc.

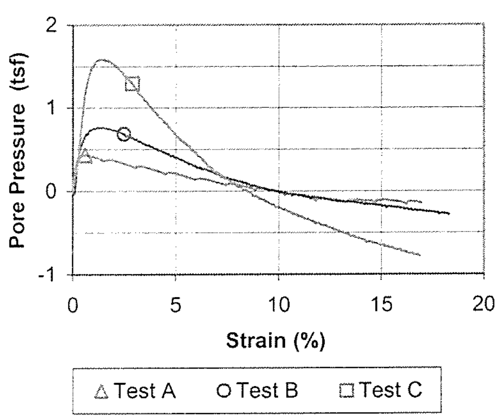
Laboratory Document
Prepared By: MW
Approved BY: TLK

Failure Criterion: Maximum Effective Principal Stress Ratio

Effective Strength Envelope



Induced Pore Pressure vs. Strain



Specimen No.			A	B	C	
Initial Data	Water content %	W_o	22.6	24.3	19.7	
	Dry Density PCF	γ_{d_o}	102.1	99.8	107.2	
	Saturation %	S_o	94.4	95.5	93.3	
	Void Ratio	e_o	0.644	0.683	0.567	
After Shear	Water content %	W_f	24.1	24.4	20.3	
	Dry Density PCF	γ_{d_f}	101.8	101.5	108.6	
	Saturation %	S_f	100.0	100.0	100.0	
	Void Ratio	e_f	0.650	0.655	0.547	
	Final Back Pressure TSF	u_c	5.76	4.32	2.88	
Minor Principal Stress TSF @ failure		σ_3'f	0.30	1.48	2.30	
Maximum Deviator Stress (tsf) @ failure		$(\sigma_1'-\sigma_3')_{max}$	0.87	1.98	4.58	
Time to (σ1'-σ3')max min.		t_f	4.6	127.3	152.7	
Ultimate Deviator Stress, t/sq ft		$(\sigma 1'-\sigma 3')_{ult}$	n/a	1.92	n/a	
Initial Diameter, in.		D_o	2.885	2.881	2.891	
Initial Height, in.		H_o	6.029	6.040	6.018	

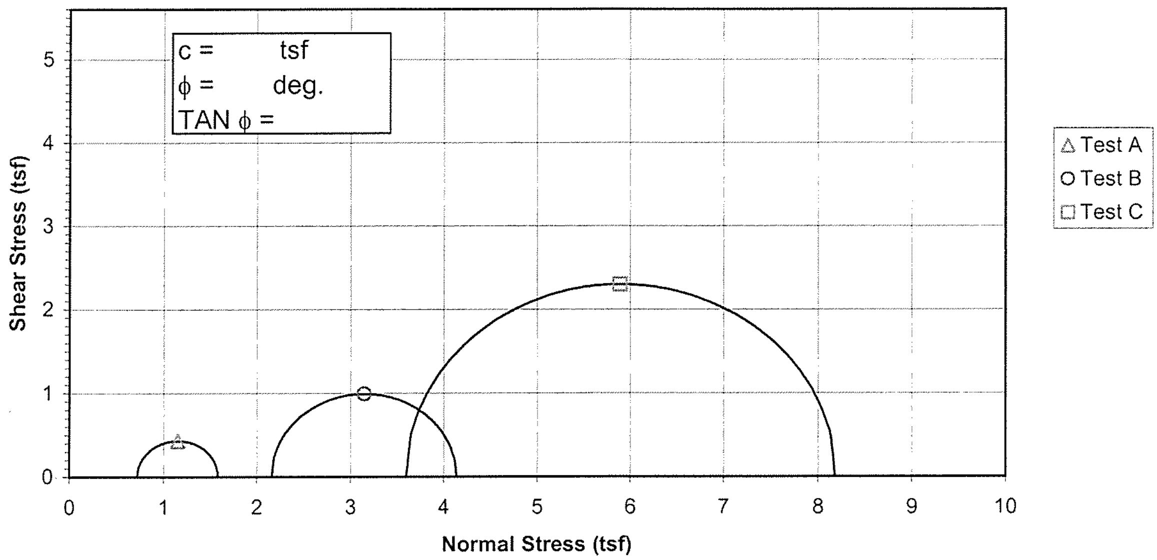
Controlled - Strain Test				
Description of Specimens Fat Clay (CH), red brown, moist, firm				
				Type of Specimen Undisturbed / Type of test $\bar{R}$
LL	PL	PI	Gs 2.69	Project Gallatin Fossil Plant (GAF) - Ash Ponds
Remarks:				
				Boring No. STN-E-16S / Sample No. 9
				Depth Elev. 5.0'-5.5', 5.6'-6.1', 7.7'-8.2'
				Laboratory Stantec / Date 12-4-09
				TRIAXIAL COMPRESSION TEST REPORT

KDG

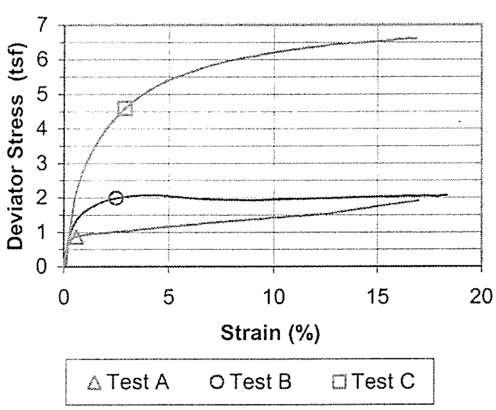
Laboratory Document
Prepared By: MW
Approved BY: TLK

Failure Criterion: Maximum Effective Principal Stress Ratio

Total Strength Envelope



Deviator Stress vs. Strain



Specimen No.			A	B	C	
Initial Data	Water content %	W_o	22.6	24.3	19.7	
	Dry Density PCF	γ_{d_o}	102.1	99.8	107.2	
	Saturation %	S_o	94.4	95.5	93.3	
	Void Ratio	e_o	0.644	0.683	0.567	
After Shear	Water content %	W_f	24.1	24.4	20.3	
	Dry Density PCF	γ_{d_f}	101.8	101.5	108.6	
	Saturation %	S_f	100.0	100.0	100.0	
	Void Ratio	e_f	0.650	0.655	0.547	
	Final Back Pressure TSF	u_c	5.76	4.32	2.88	
Minor Principal Stress TSF		σ_3	0.72	2.16	3.60	
Maximum Deviator Stress (tsf) @ failure		$(\sigma_1\text{-}\sigma_3)_{max}$	0.87	1.98	4.58	
Time to $(\sigma_1\text{-}\sigma_3)_{Max.}$ min.		t_f	4.6	127.3	152.7	
Ultimate Deviator Stress, t/sq ft		$(\sigma_1\text{-}\sigma_3)_{ult}$	n/a	1.92	n/a	
Initial Diameter, in.		D_o	2.885	2.881	2.891	
Initial Height, in.		H_o	6.029	6.040	6.018	

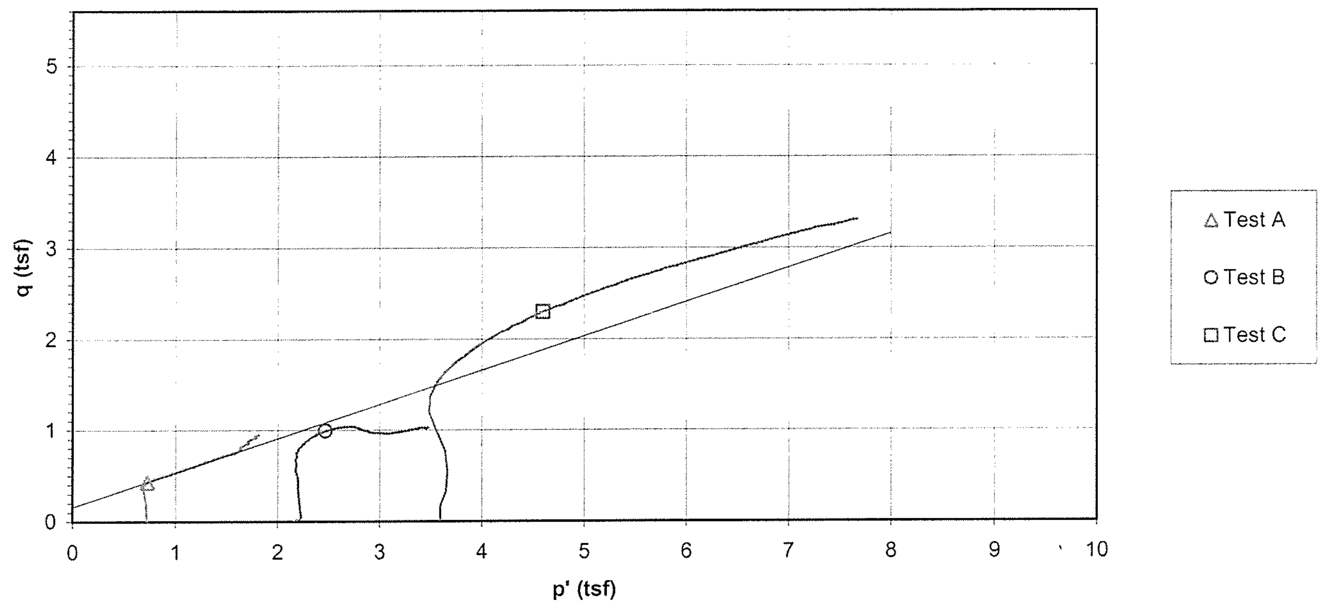
Controlled - Strain Test

Description of Specimens	Fat Clay (CH), red brown, moist, firm					
				Type of Specimen	Undisturbed	Type of test $\bar{R}$
LL	PL	PI	Gs 2.69	Project	Gallatin Fossil Plant (GAF) - Ash Ponds	
Remarks:						
				Boring No.	STN-E-16S	Sample No. 9
				Depth Elev.	5.0'-5.5', 5.6'-6.1', 7.7'-8.2'	
				Laboratory	Stantec	Date 12-4-09
				TRIAXIAL COMPRESSION TEST REPORT		

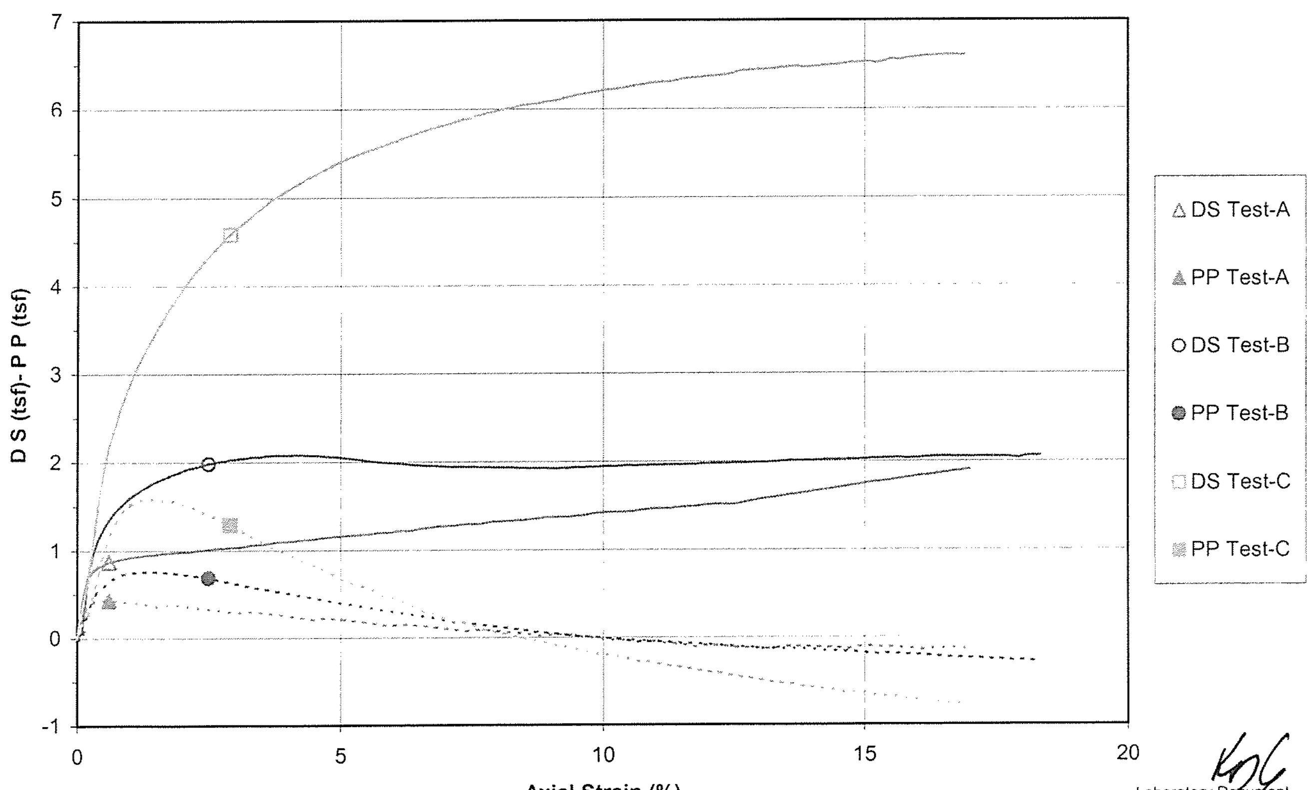
Consolidated Undrained Triaxial Test
EM 1110-2-1906 Appendix X

Project	Gallatin Fossil Plant (GAF) - Ash Ponds	Project No.	175559018
Sample ID	STN-E-16S, 5.0'-5.5' & STN-E-16S, 5.6'-6.1' & STN-E-16S, 7.7'-8.2'	Test Number	9
Failure Criterion:	Maximum Effective Principal Stress Ratio ϕ' = 22.0 deg.	c' =	0.17 tsf

p' vs. q Plot



Deviator Stress and Induced Pore Pressure vs. Axial Strain



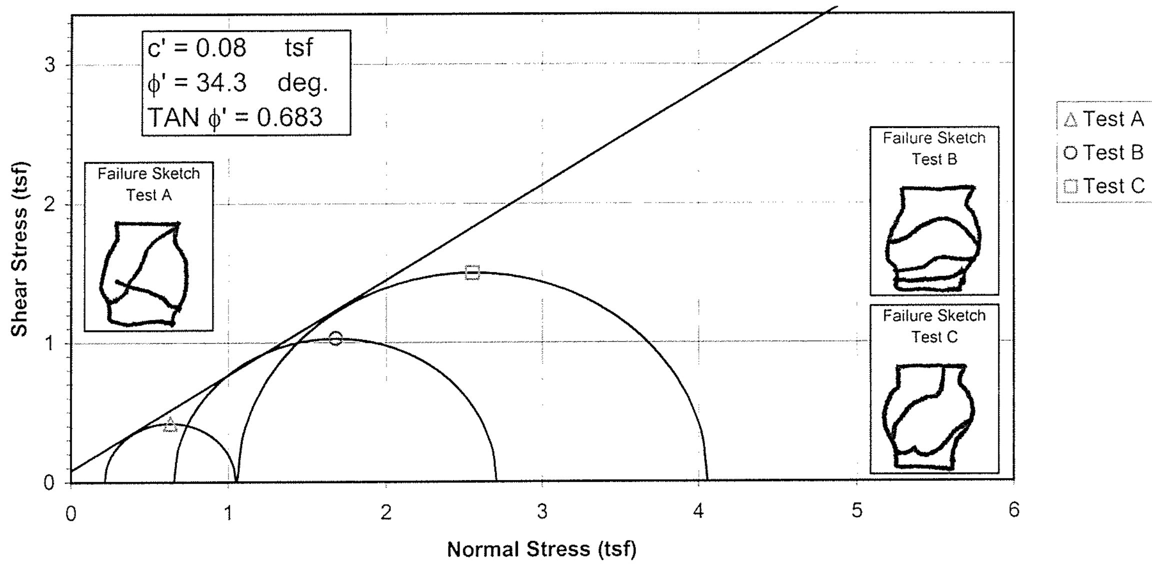
File: 175559018_cu_9 Sheet: Plots
Preparation Date: 1998
Revision Date: 1-2008

Stantec Consulting Services Inc.

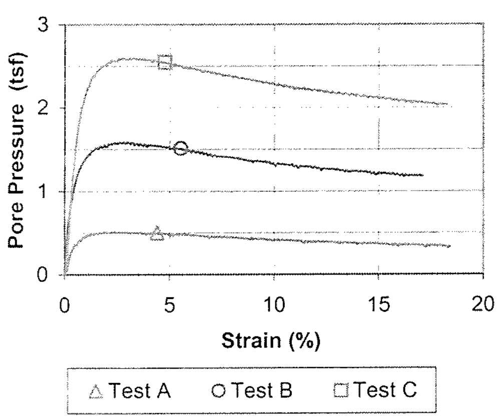
Laboratory Document
Prepared By: MW
Approved BY: TLK

Failure Criterion: Maximum Effective Principal Stress Ratio

Effective Strength Envelope



Induced Pore Pressure vs. Strain

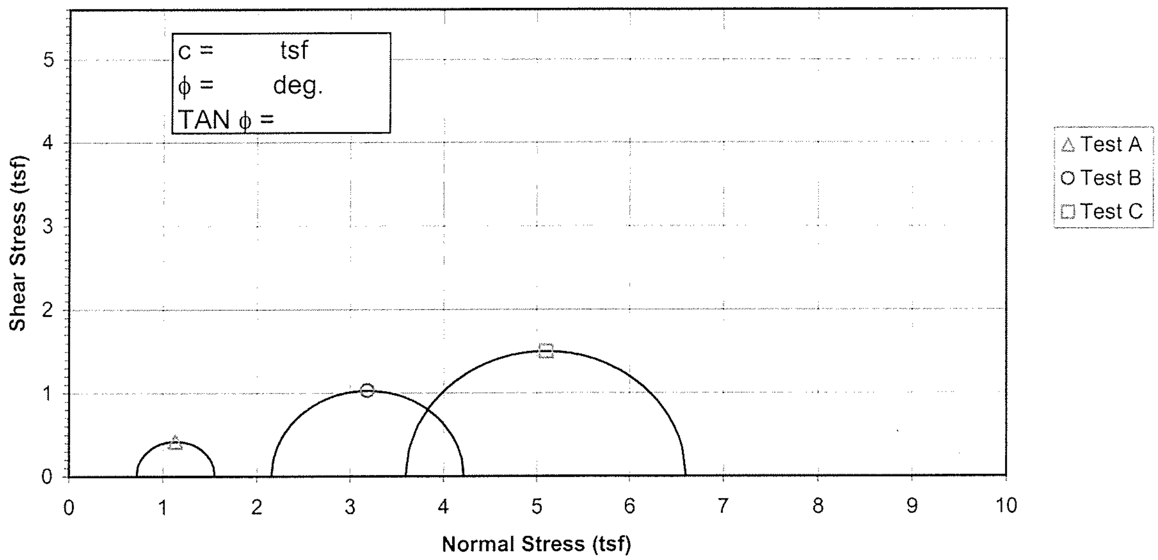


Specimen No.			A	B	C	
Initial Data	Water content %	W_o	28.2	23.9	22.5	
	Dry Density PCF	γ_{d_o}	95.4	102.7	103.7	
	Saturation %	S_o	98.8	100.2	96.6	
	Void Ratio	e_o	0.773	0.647	0.631	
After Shear	Water content %	W_f	23.6	19.8	19.2	
	Dry Density PCF	γ_{d_f}	103.2	110.1	111.2	
	Saturation %	S_f	100.0	100.0	100.0	
	Void Ratio	e_f	0.639	0.537	0.521	
	Final Back Pressure TSF	u_c	5.76	4.32	2.88	
Minor Principal Stress TSF @ failure		σ_3'f	0.21	0.66	1.06	
Maximum Deviator Stress (tsf) @ failure		$(\sigma_1'-\sigma_3')_{max}$	0.83	2.06	3.00	
Time to (σ1'-σ3')max min.		t_f	210.0	287.2	239.7	
Ultimate Deviator Stress, t/sq ft		$(\sigma1'-\sigma3')_{ult}$	n/a	n/a	n/a	
Initial Diameter, in.		D_o	2.834	2.820	2.878	
Initial Height, in.		H_o	5.947	5.952	6.036	

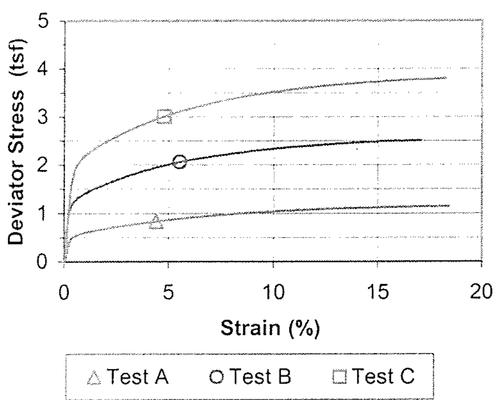
Controlled - Strain Test					
Description of Specimens	Lean Clay (CL), gray, wet, soft				
		Type of Specimen	Undisturbed	Type of test	$\bar{R}$
LL / PL / PI	Gs 2.71	Project	Gallatin Fossil Plant (GAF) - Ash Ponds		
Remarks:					
		Boring No.	STN-E-16S	Sample No.	10
		Depth Elev.	33.0'-33.5', 33.6'-34.1', 34.2'-34.7'		
		Laboratory	Stantec	Date	12-11-09
		TRIAXIAL COMPRESSION TEST REPORT			

Failure Criterion: Maximum Effective Principal Stress Ratio

Total Strength Envelope



Deviator Stress vs. Strain



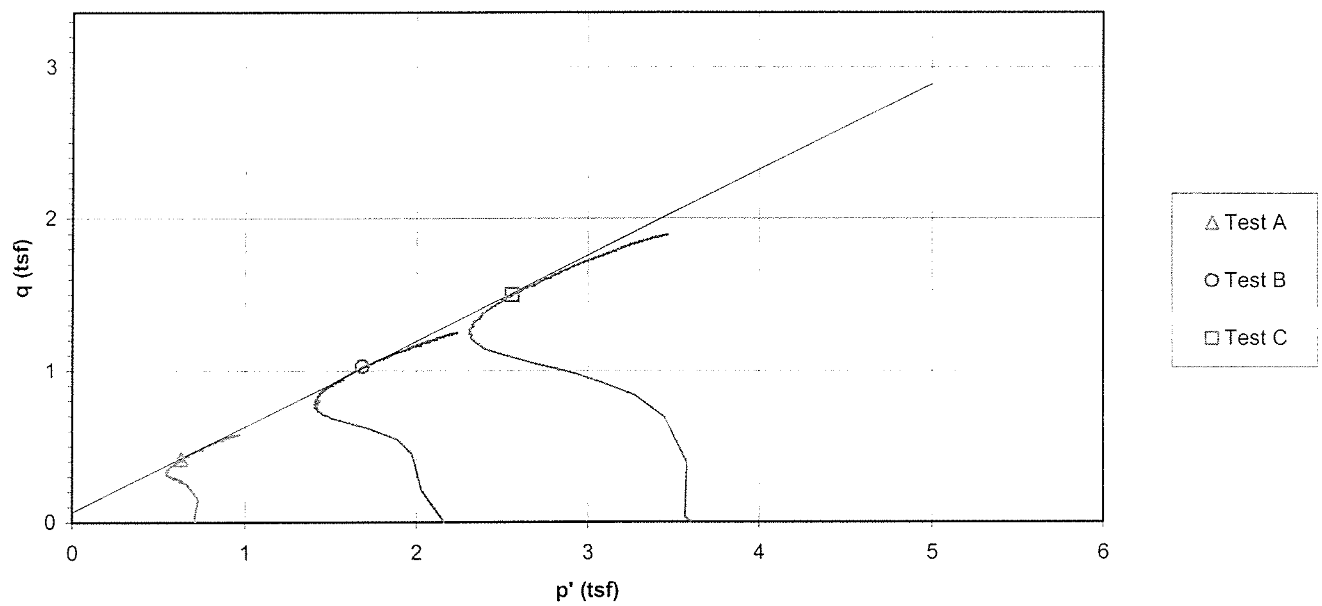
Specimen No.			A	B	C	
Initial Data	Water content %	W_o	28.2	23.9	22.5	
	Dry Density PCF	γd_o	95.4	102.7	103.7	
	Saturation %	S_o	98.8	100.2	96.6	
	Void Ratio	e_o	0.773	0.647	0.631	
After Shear	Water content %	W_f	23.6	19.8	19.2	
	Dry Density PCF	γd_f	103.2	110.1	111.2	
	Saturation %	S_f	100.0	100.0	100.0	
	Void Ratio	e_f	0.639	0.537	0.521	
	Final Back Pressure TSF	u_c	5.76	4.32	2.88	
Minor Principal Stress TSF		σ_3	0.72	2.16	3.60	
Maximum Deviator Stress (tsf) @ failure		$(\sigma_1-\sigma_3)_{max}$	0.83	2.06	3.00	
Time to $(\sigma_1-\sigma_3)_{Max.}$ min.		t_f	210.0	287.2	239.7	
Ultimate Deviator Stress, t/sq ft		$(\sigma_1-\sigma_3)_{ult}$	n/a	n/a	n/a	
Initial Diameter, in.		D_o	2.834	2.820	2.878	
Initial Height, in.		H_o	5.947	5.952	6.036	

Controlled - Strain Test					
Description of Specimens	Lean Clay (CL), gray, wet, soft				
		Type of Specimen	Undisturbed	Type of test	$\bar{R}$
LL	PL	PI	Gs 2.71	Project	Gallatin Fossil Plant (GAF) - Ash Ponds
Remarks:					
		Boring No.	STN-E-16S	Sample No.	10
		Depth Elev.	33.0'-33.5', 33.6'-34.1', 34.2'-34.7'		
		Laboratory	Stantec	Date	12-11-09
		TRIAXIAL COMPRESSION TEST REPORT			

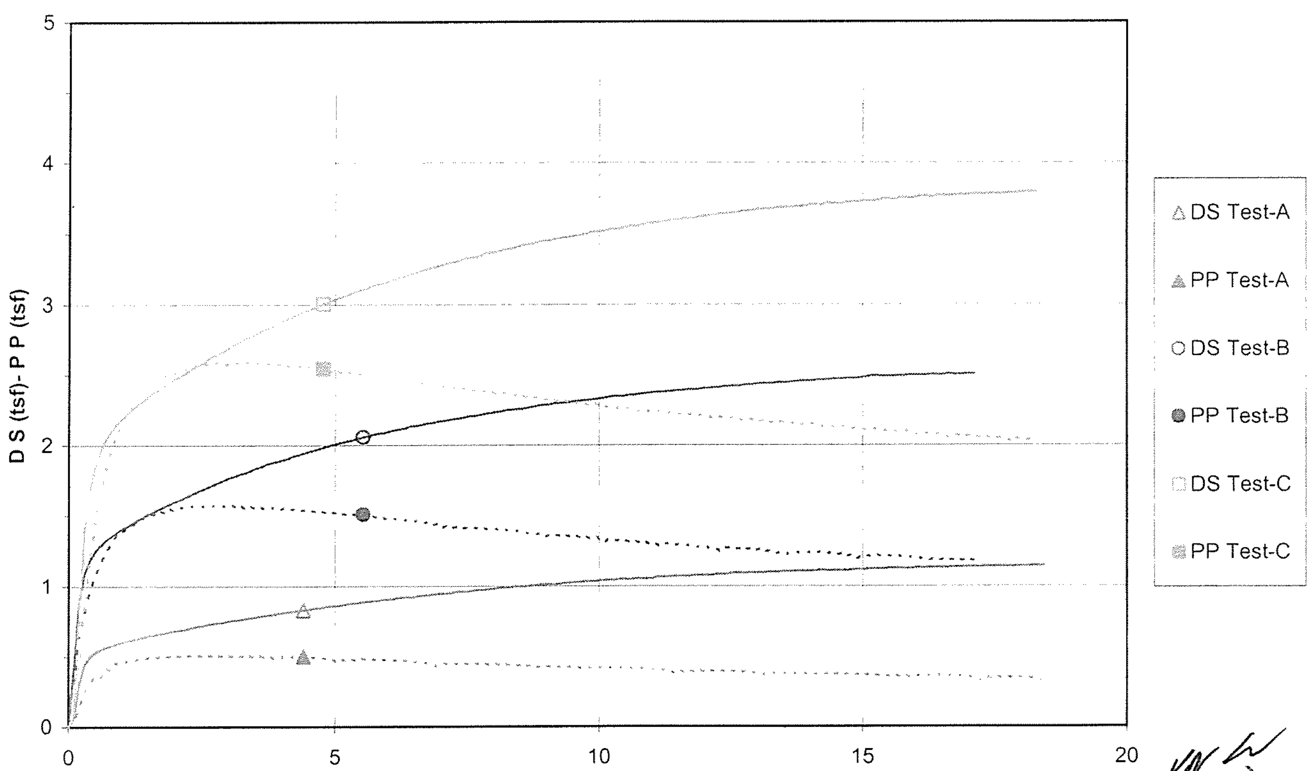
Consolidated Undrained Triaxial Test
EM 1110-2-1906 Appendix X

Project	Gallatin Fossil Plant (GAF) - Ash Ponds	Project No.	175559018
Sample ID	STN-E-16S, 33.0'-33.5' & STN-E-16S, 33.6'-34.1' & STN-E-16S, 34.2'-34.7'	Test Number	10
Failure Criterion:	Maximum Effective Principal Stress Ratio ϕ' = 34.3 deg.	c' =	0.08 tsf

p' vs. q Plot



Deviator Stress and Induced Pore Pressure vs. Axial Strain



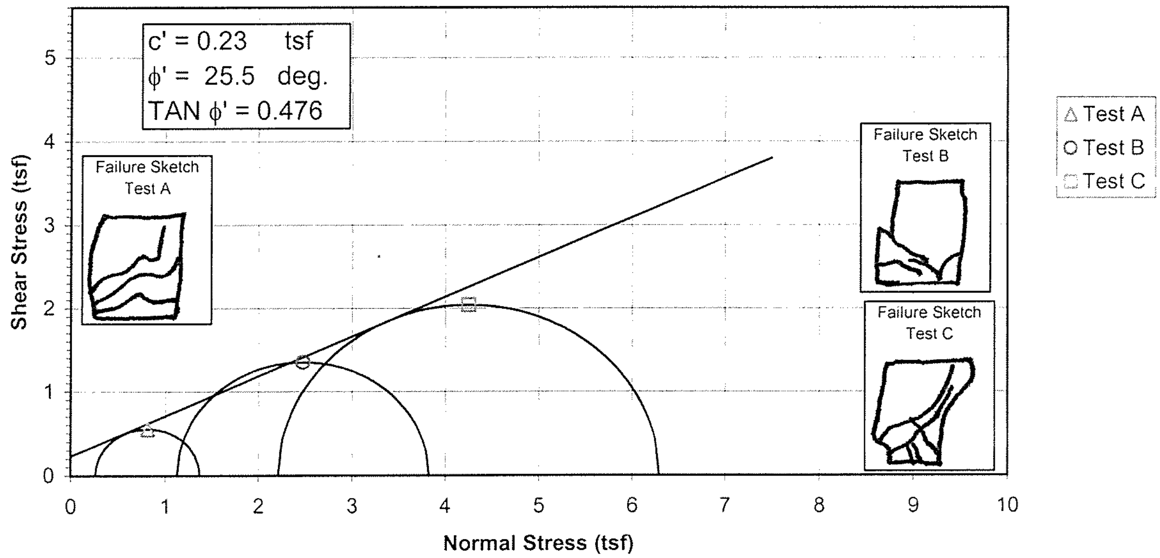
File: 175559018_cu_10 Sheet: Plots
Preparation Date: 1998
Revision Date: 1-2008

Stantec Consulting Services Inc.

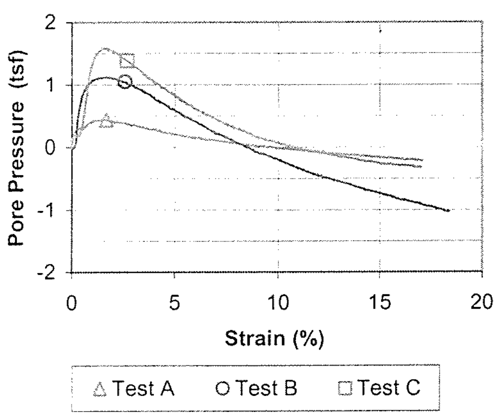
Laboratory Document
Prepared By: MW
Approved BY: TLK

Failure Criterion: Maximum Effective Principal Stress Ratio

Effective Strength Envelope



Induced Pore Pressure vs. Strain

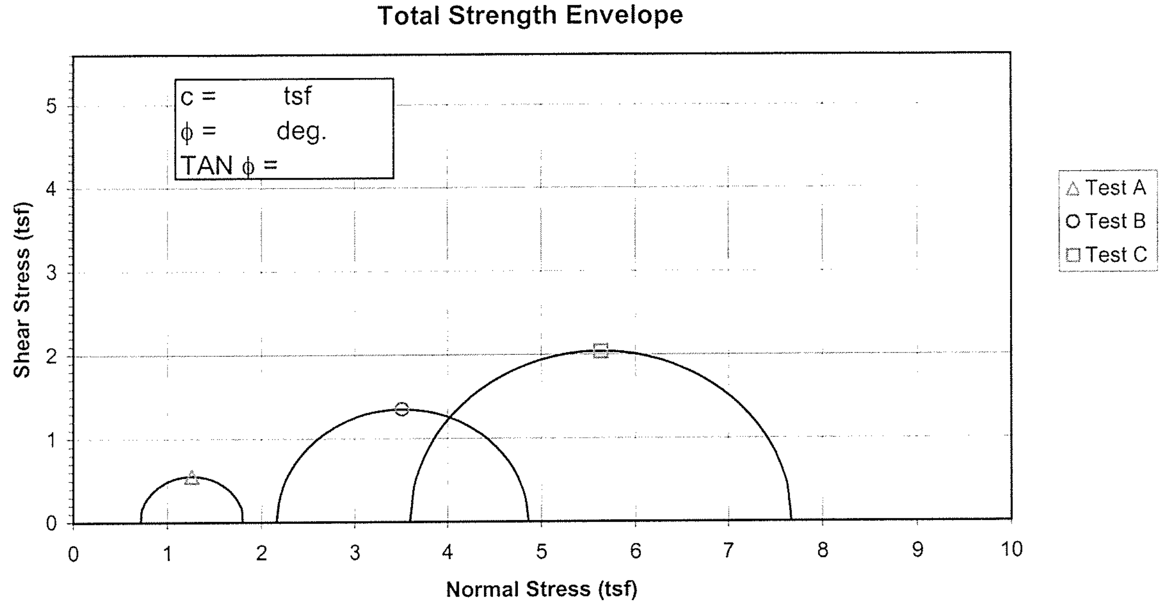


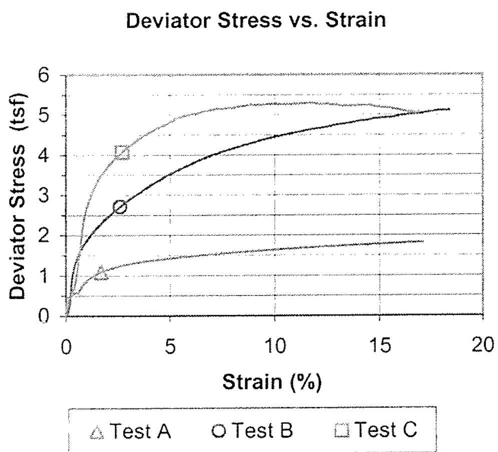
Specimen No.			A	B	C	
Initial Data	Water content %	W_o	21.7	19.6	21.4	
	Dry Density PCF	γ_{d_o}	106.4	109.0	105.5	
	Saturation %	S_o	96.8	93.4	93.3	
	Void Ratio	e_o	0.619	0.580	0.634	
After Shear	Water content %	W_f	22.8	18.8	20.9	
	Dry Density PCF	γ_{d_f}	105.8	113.4	109.3	
	Saturation %	S_f	100.0	100.0	100.0	
	Void Ratio	e_f	0.629	0.519	0.577	
	Final Back Pressure TSF	u_c	5.76	4.32	2.88	
Minor Principal Stress TSF @ failure		σ_3'f	0.26	1.13	2.22	
Maximum Deviator Stress (tsf) @ failure		$(\sigma_1'-\sigma_3')_{max}$	1.08	2.71	4.07	
Time to (σ1'-σ3')max min.		t_f	96.2	137.2	152.3	
Ultimate Deviator Stress, t/sq ft		$(\sigma1'-\sigma3')_{ult}$	n/a	n/a	n/a	
Initial Diameter, in.		D_o	2.886	2.890	2.888	
Initial Height, in.		H_o	6.051	5.998	6.075	

Controlled - Strain Test						
Description of Specimens	Fat Clay with Gravel (CH), brown, moist, firm					
				Type of Specimen	Undisturbed	Type of test $\bar{R}$
LL	PL	PI	Gs 2.76	Project	Gallatin Fossil Plant (GAF) - Ash Ponds	
Remarks:						
				Boring No.	STN-E-20S	Sample No. 11
				Depth Elev.	4.0'-4.5', 6.0'-6.5', 6.6'-7.1'	
				Laboratory	Stantec	Date 12-11-09
				TRIAXIAL COMPRESSION TEST REPORT		

KDB

Failure Criterion: Maximum Effective Principal Stress Ratio





Specimen No.			A	B	C	
Initial Data	Water content %	W_o	21.7	19.6	21.4	
	Dry Density PCF	γ_{d_o}	106.4	109.0	105.5	
	Saturation %	S_o	96.8	93.4	93.3	
	Void Ratio	e_o	0.619	0.580	0.634	
After Shear	Water content %	W_f	22.8	18.8	20.9	
	Dry Density PCF	γ_{d_f}	105.8	113.4	109.3	
	Saturation %	S_f	100.0	100.0	100.0	
	Void Ratio	e_f	0.629	0.519	0.577	
	Final Back Pressure TSF	u_c	5.76	4.32	2.88	
Minor Principal Stress TSF		σ_3	0.72	2.16	3.60	
Maximum Deviator Stress (tsf) @ failure		$(\sigma_1-\sigma_3)_{max}$	1.08	2.71	4.07	
Time to $(\sigma_1-\sigma_3)_{Max.}$ min.		t_f	96.2	137.2	152.3	
Ultimate Deviator Stress, t/sq ft		$(\sigma_1-\sigma_3)_{ult}$	n/a	n/a	n/a	
Initial Diameter, in.		D_o	2.886	2.890	2.888	
Initial Height, in.		H_o	6.051	5.998	6.075	

Controlled - Strain Test

Description of Specimens Fat Clay with Gravel (CH), brown, moist, firm

LL	PL	PI	Gs 2.76	
Type of Specimen	Undisturbed	Type of test	$\overline{R}$	
Project	Gallatin Fossil Plant (GAF) - Ash Ponds			
Boring No.	STN-E-20S	Sample No.	11	
Depth Elev.	4.0'-4.5', 6.0'-6.5', 6.6'-7.1'			
Laboratory	Stantec	Date	12-11-09	

Remarks:

TRIAXIAL COMPRESSION TEST REPORT

File: 175559018_cu_11 Sheet: CE_Final-T
Preparation Date: 1998
Revision Date: 1-2008

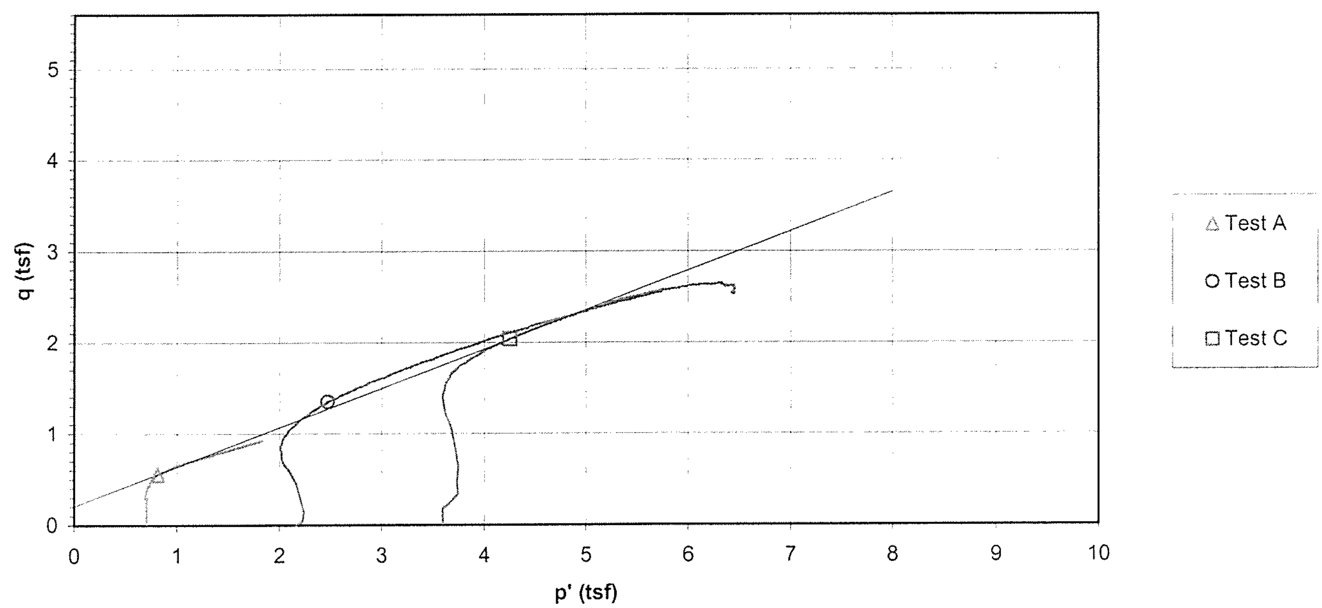
Stantec Consulting Services Inc.

KOB
Laboratory Document
Prepared By: MW
Approved BY: TLK

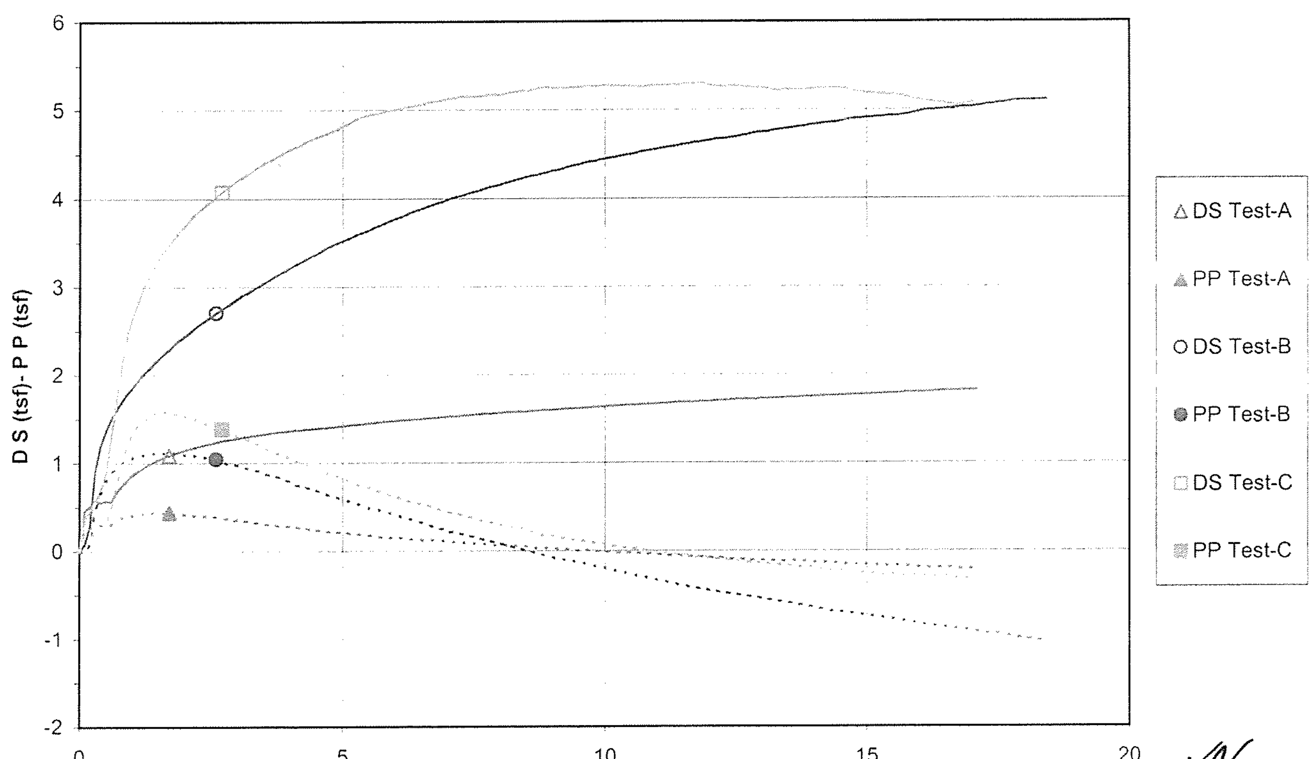
Consolidated Undrained Triaxial Test
EM 1110-2-1906 Appendix X

Project	Gallatin Fossil Plant (GAF) - Ash Ponds	Project No.	175559018
Sample ID	STN-E-20S, 4.0'-4.5' & STN-E-20S, 6.0'-6.5' & STN-E-20S, 6.6'-7.1'	Test Number	11
Failure Criterion:	Maximum Effective Principal Stress Ratio ϕ' = 25.5 deg.	c' =	0.23 tsf

p' vs. q Plot



Deviator Stress and Induced Pore Pressure vs. Axial Strain



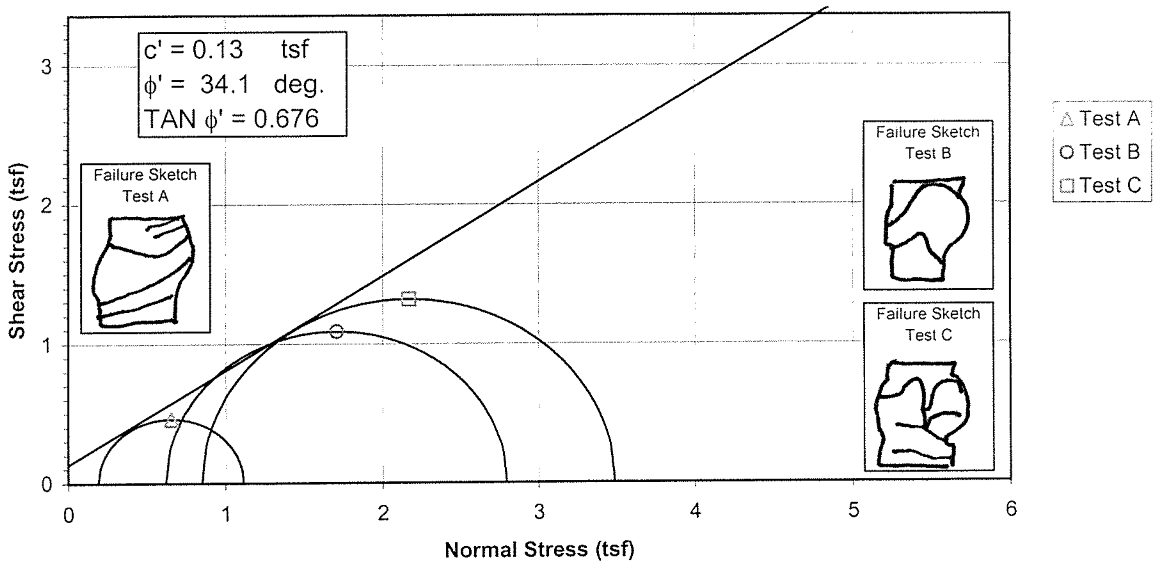
File: 175559018_cu_11 Sheet: Plots
Preparation Date: 1998
Revision Date: 1-2008

Stantec Consulting Services Inc.

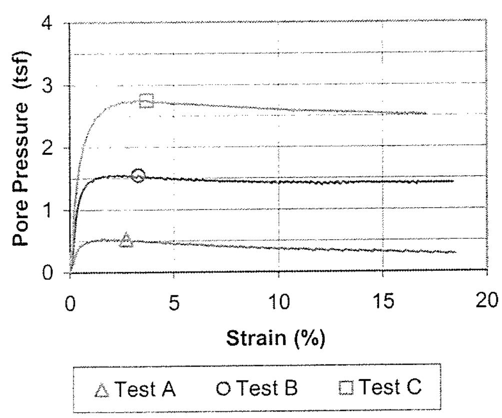
Laboratory Document
Prepared By: MW
Approved BY: TLK

Failure Criterion: Maximum Effective Principal Stress Ratio

Effective Strength Envelope



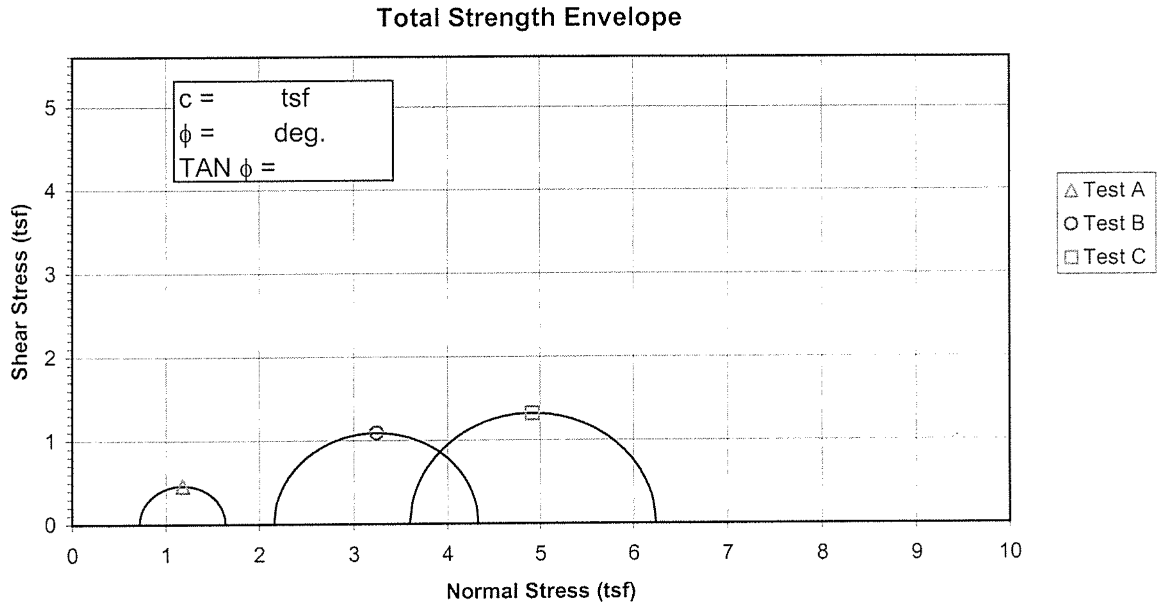
Induced Pore Pressure vs. Strain

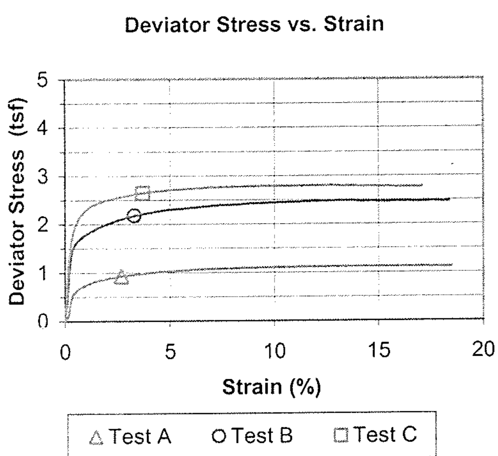


Specimen No.			A	B	C	
Initial Data	Water content %	W_o	34.0	18.1	28.8	
	Dry Density PCF	γ_{d_o}	86.5	110.7	94.5	
	Saturation %	S_o	96.1	92.5	98.4	
	Void Ratio	e_o	0.963	0.533	0.796	
After Shear	Water content %	W_f	32.8	15.3	22.5	
	Dry Density PCF	γ_{d_f}	89.7	119.8	105.3	
	Saturation %	S_f	100.0	100.0	100.0	
	Void Ratio	e_f	0.892	0.417	0.613	
	Final Back Pressure TSF	u_c	5.76	4.32	2.88	
Minor Principal Stress TSF @ failure		σ_3'f	0.19	0.62	0.85	
Maximum Deviator Stress (tsf) @ failure		$(\sigma_1'-\sigma_3')_{max}$	0.92	2.18	2.64	
Time to (σ1'-σ3')max min.		t_f	87.6	109.8	196.1	
Ultimate Deviator Stress, t/sq ft		$(\sigma 1'-\sigma 3')_{ult}$	n/a	n/a	n/a	
Initial Diameter, in.		D_o	2.877	2.857	2.867	
Initial Height, in.		H_o	6.040	5.976	6.094	

Controlled - Strain Test				
Description of Specimens	Fat Clay (CH), red brown, moist, firm			
	Type of Specimen	Undisturbed	Type of test	$\bar{R}$
LL / PL / PI / Gs 2.72	Project	Gallatin Fossil Plant (GAF) - Ash Ponds		
Remarks:				
	Boring No.	STN-E-21S	Sample No.	12
	Depth Elev.	13.0'-13.5', 11.0'-11.5', 11.6'-12.1'		
	Laboratory	Stantec	Date	12-11-09
	TRIAXIAL COMPRESSION TEST REPORT			

Failure Criterion: Maximum Effective Principal Stress Ratio





Specimen No.			A	B	C	
Initial Data	Water content %	W_o	34.0	18.1	28.8	
	Dry Density PCF	γ_{d_o}	86.5	110.7	94.5	
	Saturation %	S_o	96.1	92.5	98.4	
	Void Ratio	e_o	0.963	0.533	0.796	
After Shear	Water content %	W_f	32.8	15.3	22.5	
	Dry Density PCF	γ_{d_f}	89.7	119.8	105.3	
	Saturation %	S_f	100.0	100.0	100.0	
	Void Ratio	e_f	0.892	0.417	0.613	
	Final Back Pressure TSF	u_c	5.76	4.32	2.88	
Minor Principal Stress TSF		σ_3	0.72	2.16	3.60	
Maximum Deviator Stress (tsf) @ failure		$(\sigma_1\text{-}\sigma_3)_{max}$	0.92	2.18	2.64	
Time to $(\sigma_1\text{-}\sigma_3)_{Max.}$ min.		t_f	87.6	109.8	196.1	
Ultimate Deviator Stress, t/sq ft		$(\sigma_1\text{-}\sigma_3)_{ult}$	n/a	n/a	n/a	
Initial Diameter, in.		D_o	2.877	2.857	2.867	
Initial Height, in.		H_o	6.040	5.976	6.094	

Controlled - Strain Test

Description of Specimens Fat Clay (CH), red brown, moist, firm

				Type of Specimen Undisturbed	Type of test $\bar{R}$
LL	PL	PI	Gs 2.72	Project	Gallatin Fossil Plant (GAF) - Ash Ponds
Remarks:					
				Boring No. STN-E-21S	Sample No. 12
				Depth Elev.	13.0'-13.5', 11.0'-11.5', 11.6'-12.1'
				Laboratory Stantec	Date 12-11-09
				TRIAXIAL COMPRESSION TEST REPORT	

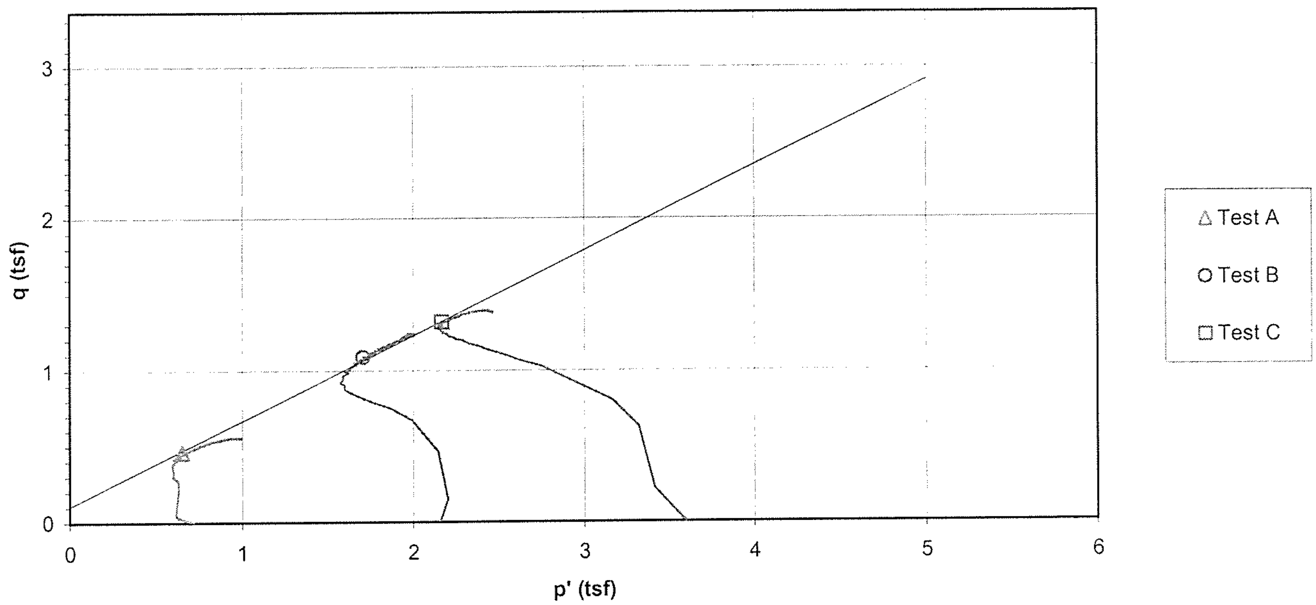
Laboratory Document
Prepared By: MW
Approved BY: TLK

Consolidated Undrained Triaxial Test
EM 1110-2-1906 Appendix X

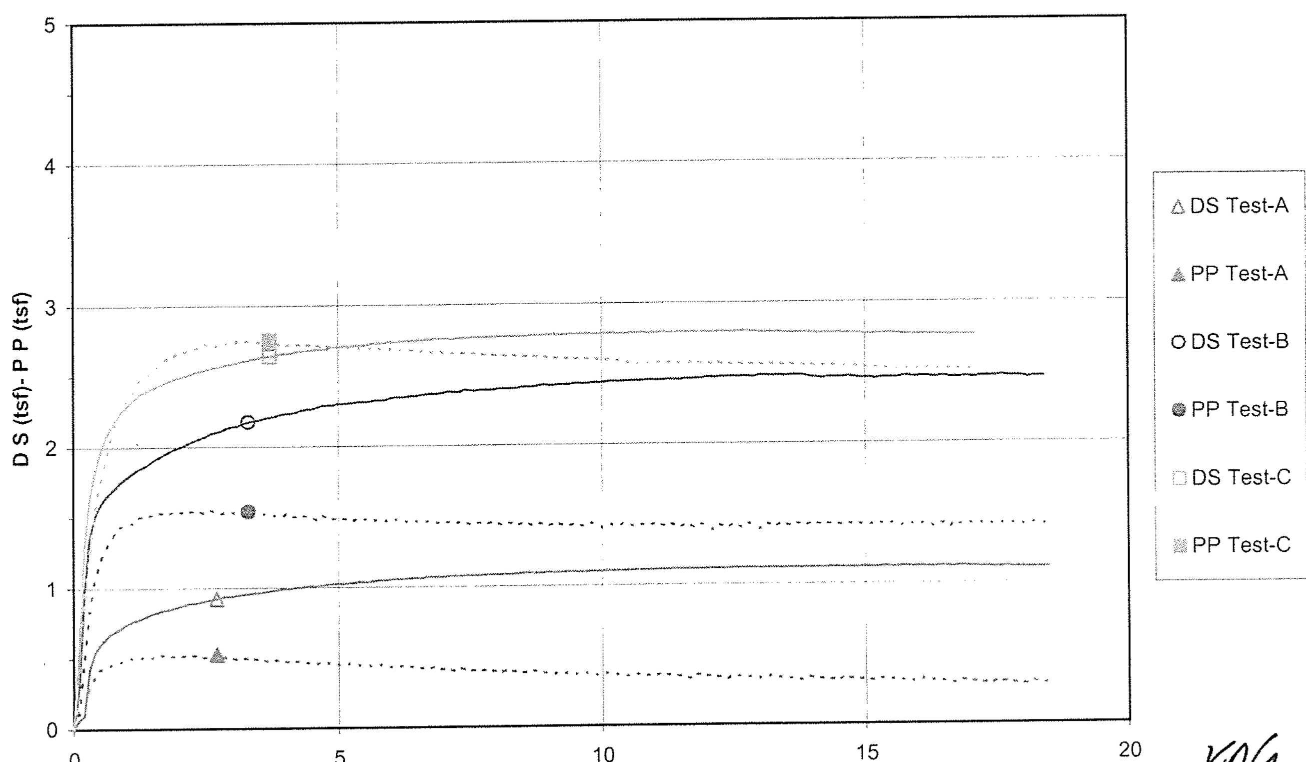
Project: Gallatin Fossil Plant (GAF) - Ash Ponds
Sample ID: STN-E-21S, 13.0'-13.5' & STN-E-21S, 11.0'-11.5' & STN-E-21S, 11.6'-12.1'
Failure Criterion: Maximum Effective Principal Stress Ratio
ϕ' = 34.1 deg.

Project No. 175559018
Test Number 12
c' = 0.13 tsf

p' vs. q Plot



Deviator Stress and Induced Pore Pressure vs. Axial Strain



File: 175559018_cu_12 Sheet: Plots
Preparation Date: 1998
Revision Date: 1-2008

Stantec Consulting Services Inc.

Laboratory Document
Prepared By: MW
Approved BY: TLK

Stantec

Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter ASTM D 5084-03

Project Name: Gallatin Fossil Plant (GAF) - Ash Ponds — Project No. 175559018
Source: STN-A-6, 29.0'-31.0', TI 29.1'-29.5' — Test ID 5
Visual Classification: Fat Clay (CH), red brown, moist, firm — Prepared By KDG
Undisturbed: XX — Specific Gravity 2.71 ASTM D854-A — Date 11-3-09
Maximum Dry Density (pcf) ______ — Percent of Maximum ______

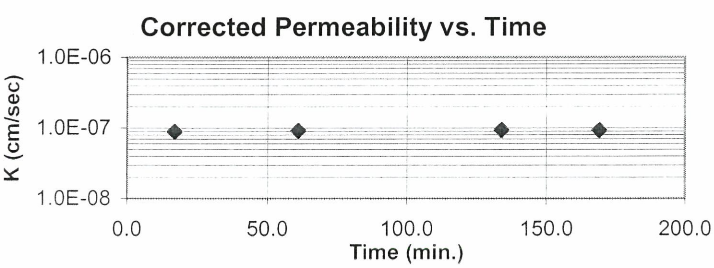
Permeant: De-aired tap water
Selection and Preparation Comments:

Specimens (if compacted) were compacted in a Proctor Mold as follows: The Maximum Dry Density was converted to Wet Density, this mass was divided by 4 (layers) and 3 of the 4 layers were compacted into the mold using a Proctor Hammer using 25 blows per layer. The density was varied by reducing the height of the drop by the amount listed beside "Compacted". The specimen was trimmed from the bottom two layers.

	Initial Specimen Data	After Consolidation Data	After Test Data	Final Pressures (psi)	
Height (in.)	2.4435	2.4338	2.4309	Chamber	75
Diameter (in.)	2.8137		2.8109	Influent	70
Moisture Content (%)	29.2		30.2	Effluent	65
Dry Unit Weight (pcf)	91.7		92.4		
Void Ratio	0.844		0.831		
Degree of Saturation (%)	93.6		98.6		
Trimmings MC (%)	31.6				

Applied Head Difference (psi)	5
Back Pressure Saturated to (psi)	65
Maximum Effective Consolidation Stress (psi)	10
Minimum Effective Consolidation Stress (psi)	5

						Hydraulic Conductivity			
Date	Clock (24H:M)	Temp. °F	Bottom Head	Top Head	Test Time (sec)	k (m/s)	k (cm/s)	k @ 20° C (m/s)	k @ 20° C (cm/s)
12-2-09	11:34	70.0	20.19	4.21	0	---	---	---	---
12-2-09	11:51	70.0	19.93	4.47	1.02E+03	9.0E-10	9.0E-08	8.8E-10	8.8E-08
12-2-09	12:35	70.0	19.25	5.17	2.64E+03	9.3E-10	9.3E-08	9.1E-10	9.1E-08
12-2-09	13:48	70.0	18.10	6.33	4.38E+03	9.5E-10	9.5E-08	9.3E-10	9.3E-08
12-2-09	14:23	70.0	17.57	6.88	2.10E+03	9.4E-10	9.4E-08	9.2E-10	9.2E-08



A gradient of approximately 56.5 was used for this test. This gradient exceeds ASTM guidelines for maximum gradient, but was used to achieve the requestors desired test duration. Examination of the sample shows no signs of material loss or clogging that may affect test results.

Average Hydraulic Conductivity @ 20° C (last 4 determinations) m/s 9.07E-10 cm/s 9.07E-08
Average Hydraulic Conductivity @ 20° C (last run) m/s 9.07E-10 cm/s 9.07E-08

Reviewed by: KDG

Stantec

Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter ASTM D 5084-03

Project Name Gallatin Fossil Plant (GAF) - Ash Ponds — Project No. 175559018
Source STN-E-8, 50.2'-52.2', TI 50.2'-50.7' — Test ID 28A
Visual Classification Lean Clay (CL), brown, moist, soft — Prepared By KDG
Undisturbed XX — Specific Gravity 2.75 ASTM D854-A — Date 11-3-09
Maximum Dry Density (pcf) ______ — Percent of Maximum ______

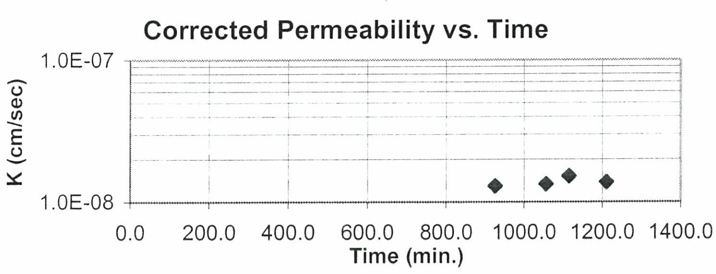
Permeant: De-aired tap water
Selection and Preparation Comments: ______

Specimens (if compacted) were compacted in a Proctor Mold as follows: The Maximum Dry Density was converted to Wet Density, this mass was divided by 4 (layers) and 3 of the 4 layers were compacted into the mold using a Proctor Hammer using 25 blows per layer. The density was varied by reducing the height of the drop by the amount listed beside "Compacted". The specimen was trimmed from the bottom two layers.

	Initial Specimen Data	After Consolidation Data	After Test Data	Final Pressures (psi)	
Height (in.)	2.4574	2.4264	2.4323	Chamber	75
Diameter (in.)	2.8027		2.8015	Influent	70
Moisture Content (%)	26.3		26.2	Effluent	65
Dry Unit Weight (pcf)	97.6		98.7		
Void Ratio	0.759		0.740		
Degree of Saturation (%)	95.5		97.3		
Trimmings MC (%)	27.6				

Applied Head Difference (psi) 5
Back Pressure Saturated to (psi) 65
Maximum Effective Consolidation Stress (psi) 10
Minimum Effective Consolidation Stress (psi) 5

						Hydraulic Conductivity			
Date	Clock (24H:M)	Temp. °F	Bottom Head	Top Head	Test Time (sec)	k (m/s)	k (cm/s)	k @ 20° C (m/s)	k @ 20° C (cm/s)
12-2-09	16:50	68.0	21.89	3.38	0	---	---	---	---
12-3-09	8:16	70.0	19.88	5.45	5.56E+04	1.3E-10	1.3E-08	1.3E-10	1.3E-08
12-3-09	10:26	70.0	19.58	5.73	7.80E+03	1.4E-10	1.4E-08	1.3E-10	1.3E-08
12-3-09	11:25	70.0	19.44	5.89	3.54E+03	1.6E-10	1.6E-08	1.5E-10	1.5E-08
12-3-09	13:01	70.0	19.21	6.10	5.76E+03	1.4E-10	1.4E-08	1.4E-10	1.4E-08



A gradient of approximately 56.2 was used for this test. This gradient exceeds ASTM guidelines for maximum gradient, but was used to achieve the requestors desired test duration. Examination of the sample shows no signs of material loss or clogging that may affect test results.

Average Hydraulic Conductivity @ 20° C (last 4 determinations) m/s 1.38E-10 cm/s 1.38E-08
Average Hydraulic Conductivity @ 20° C (last run) m/s 1.38E-10 cm/s 1.38E-08

Reviewed by:

Stantec

Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter
ASTM D 5084-03

Project Name: Gallatin Fossil Plant (GAF) - Ash Ponds — Project No. 175559018
Source: STN-E-9, 4.5'-6.5', TI 5.8'-6.3' — Test ID 30B
Visual Classification: Lean Clay with Sand (CL), red brown, moist, soft — Prepared By KDG
Undisturbed: XX — Specific Gravity 2.68 ASTM D854-A — Date 11-3-09
Maximum Dry Density (pcf): — Percent of Maximum:

Permeant: De-aired tap water
Selection and Preparation Comments:

Specimens (if compacted) were compacted in a Proctor Mold as follows: The Maximum Dry Density was converted to Wet Density, this mass was divided by 4 (layers) and 3 of the 4 layers were compacted into the mold using a Proctor Hammer using 25 blows per layer. The density was varied by reducing the height of the drop by the amount listed beside "Compacted". The specimen was trimmed from the bottom two layers.

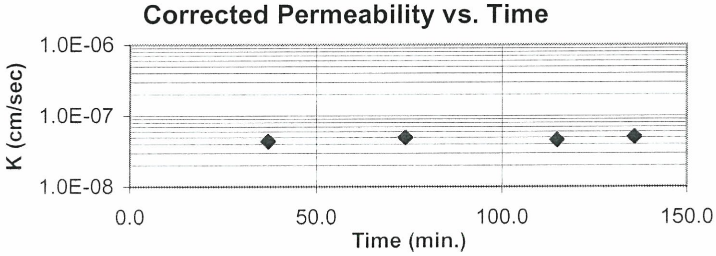
	Initial Specimen Data	After Consolidation Data	After Test Data
Height (in.)	2.4584	2.4182	2.4212
Diameter (in.)	2.8000		2.7937
Moisture Content (%)	20.3		19.8
Dry Unit Weight (pcf)	107.8		110.0
Void Ratio	0.552		0.521
Degree of Saturation (%)	98.4		101.7
Trimmings MC (%)	20.1		

Final Pressures (psi)	
Chamber	75
Influent	70
Effluent	65

Applied Head Difference (psi)	5
Back Pressure Saturated to (psi)	65
Maximum Effective Consolidation Stress (psi)	10
Minimum Effective Consolidation Stress (psi)	5

						Hydraulic Conductivity			
Date	Clock (24H:M)	Temp. °F	Bottom Head	Top Head	Test Time (sec)	k (m/s)	k (cm/s)	k @ 20° C (m/s)	k @ 20° C (cm/s)
12-2-09	14:04	68.0	20.29	4.56	0	---	---	---	---
12-2-09	14:41	68.0	20.02	4.83	2.22E+03	4.3E-10	4.3E-08	4.3E-10	4.3E-08
12-2-09	15:18	68.0	19.74	5.16	2.22E+03	4.9E-10	4.9E-08	4.9E-10	4.9E-08
12-2-09	15:59	68.0	19.44	5.48	2.46E+03	4.5E-10	4.5E-08	4.5E-10	4.5E-08
12-2-09	16:20	68.0	19.27	5.66	1.26E+03	5.0E-10	5.0E-08	5.0E-10	5.0E-08

Corrected Permeability vs. Time



A gradient of approximately 56.1 was used for this test. This gradient exceeds ASTM guidelines for maximum gradient, but was used to achieve the requestors desired test duration. Examination of the sample shows no signs of material loss or clogging that may affect test results.

Average Hydraulic Conductivity @ 20° C (last 4 determinations) m/s 4.70E-10 cm/s 4.70E-08
Average Hydraulic Conductivity @ 20° C (last run) m/s 4.70E-10 cm/s 4.70E-08

Reviewed by:

Stantec

Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter
ASTM D 5084-03

Project Name: Gallatin Fossil Plant (GAF) - Ash Ponds
Project No.: 175559018
Source: STN-E-10S, 5.0'-7.0', TI 5.3'-5.8'
Test ID: 32
Visual Classification: Fat Clay with Sand (CH), red brown, moist, hard
Prepared By: BWT
Undisturbed: XX
Specific Gravity: 2.69 ASTM D854-A
Date: 11-3-09
Maximum Dry Density (pcf):
Percent of Maximum:
Permeant: De-aired tap water
Selection and Preparation Comments:

Specimens (if compacted) were compacted in a Proctor Mold as follows: The Maximum Dry Density was converted to Wet Density, this mass was divided by 4 (layers) and 3 of the 4 layers were compacted into the mold using a Proctor Hammer using 25 blows per layer. The density was varied by reducing the height of the drop by the amount listed beside "Compacted". The specimen was trimmed from the bottom two layers.

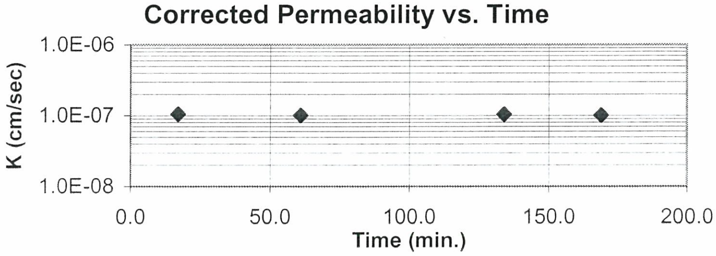
	Initial Specimen Data	After Consolidation Data	After Test Data
Height (in.)	2.4531	2.4321	2.4295
Diameter (in.)	2.7227		2.7014
Moisture Content (%)	18.7		21.2
Dry Unit Weight (pcf)	102.9		105.6
Void Ratio	0.631		0.591
Degree of Saturation (%)	79.7		96.5
Trimmings MC (%)	18.8		

Final Pressures (psi)	
Chamber	75
Influent	70
Effluent	65

Applied Head Difference (psi)	5
Back Pressure Saturated to (psi)	65
Maximum Effective Consolidation Stress (psi)	10
Minimum Effective Consolidation Stress (psi)	5

						Hydraulic Conductivity			
Date	Clock (24H:M)	Temp. °F	Bottom Head	Top Head	Test Time (sec)	k (m/s)	k (cm/s)	k @ 20° C (m/s)	k @ 20° C (cm/s)
12-3-09	11:33	70.0	21.28	3.33	0	---	---	---	---
12-3-09	11:50	70.0	21.01	3.63	1.02E+03	1.1E-09	1.1E-07	1.0E-09	1.0E-07
12-3-09	12:34	70.0	20.31	4.34	2.64E+03	1.0E-09	1.0E-07	1.0E-09	1.0E-07
12-3-09	13:47	70.0	19.14	5.54	4.38E+03	1.1E-09	1.1E-07	1.0E-09	1.0E-07
12-3-09	14:22	70.0	18.59	6.08	2.10E+03	1.0E-09	1.0E-07	1.0E-09	1.0E-07

Corrected Permeability vs. Time



A gradient of approximately 56.3 was used for this test. This gradient exceeds ASTM guidelines for maximum gradient, but was used to achieve the requestors desired test duration. Examination of the sample shows no signs of material loss or clogging that may affect test results.

Average Hydraulic Conductivity @ 20° C (last 4 determinations) m/s 1.02E-09 cm/s 1.02E-07
Average Hydraulic Conductivity @ 20° C (last run) m/s 1.02E-09 cm/s 1.02E-07

Reviewed by: KG

Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter ASTM D 5084-03

Stantec

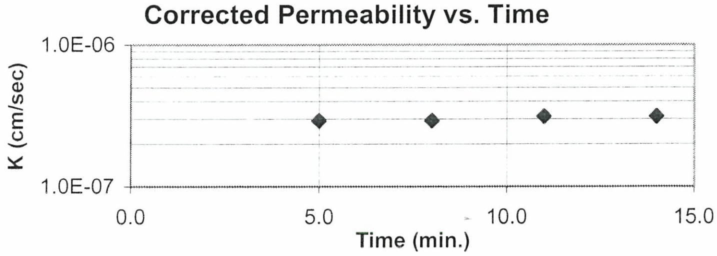
Project Name Gallatin Fossil Plant (GAF) - Ash Ponds — Project No. 175559018
Source STN-E-12, 9.5'-11.5', TI 10.3'-10.8' — Test ID 37B
Visual Classification Lean Clay with Sand (CL), red brown, moist, firm, Mn — Prepared By KDG
Undisturbed XX — Specific Gravity 2.74 ASTM D854-A — Date 11-3-09
Maximum Dry Density (pcf) ______ Percent of Maximum ______
Permeant: De-aired tap water
Selection and Preparation Comments: ______

Specimens (if compacted) were compacted in a Proctor Mold as follows: The Maximum Dry Density was converted to Wet Density, this mass was divided by 4 (layers) and 3 of the 4 layers were compacted into the mold using a Proctor Hammer using 25 blows per layer. The density was varied by reducing the height of the drop by the amount listed beside "Compacted". The specimen was trimmed from the bottom two layers.

	Initial Specimen Data	After Consolidation Data	After Test Data	Final Pressures (psi)	
Height (in.)	2.4581	2.4396	2.4430	Chamber	75
Diameter (in.)	2.8020		2.8013	Influent	70
Moisture Content (%)	23.0		24.1	Effluent	65
Dry Unit Weight (pcf)	102.0		102.6		
Void Ratio	0.678		0.667		
Degree of Saturation (%)	92.9		98.9		
Trimmings MC (%)	23.2				

Applied Head Difference (psi) 5
Back Pressure Saturated to (psi) 65
Maximum Effective Consolidation Stress (psi) 10
Minimum Effective Consolidation Stress (psi) 5

						Hydraulic Conductivity			
Date	Clock (24H:M)	Temp. °F	Bottom Head	Top Head	Test Time (sec)	k (m/s)	k (cm/s)	k @ 20° C (m/s)	k @ 20° C (cm/s)
12-1-09	13:42	70.0	21.83	4.09	0	---	---	---	---
12-1-09	13:47	70.0	21.60	4.36	3.00E+02	3.0E-09	3.0E-07	2.9E-09	2.9E-07
12-1-09	13:50	70.0	21.46	4.52	1.80E+02	3.0E-09	3.0E-07	2.9E-09	2.9E-07
12-1-09	13:53	70.0	21.32	4.70	1.80E+02	3.2E-09	3.2E-07	3.1E-09	3.1E-07
12-1-09	13:56	70.0	21.21	4.91	1.80E+02	3.2E-09	3.2E-07	3.1E-09	3.1E-07



A gradient of approximately 56.1 was used for this test. This gradient exceeds ASTM guidelines for maximum gradient, but was used to achieve the requestors desired test duration. Examination of the sample shows no signs of material loss or clogging that may affect test results.

Average Hydraulic Conductivity @ 20° C (last 4 determinations) m/s 3.01E-09 cm/s 3.01E-07
Average Hydraulic Conductivity @ 20° C (last run) m/s 3.01E-09 cm/s 3.01E-07

Reviewed by: KDG

Stantec

Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter ASTM D 5084-03

Project Name Gallatin Fossil Plant (GAF) - Ash Ponds — Project No. 175559018
Source STN-E-13S, 25.0'-27.0', TI 25.6'-26.1' — Test ID 41B
Visual Classification Fat Clay (CH), red brown, moist, firm — Prepared By BWT
Undisturbed XX — Specific Gravity 2.73 ASTM D854-A — Date 11-3-09
Maximum Dry Density (pcf) ______ Percent of Maximum ______

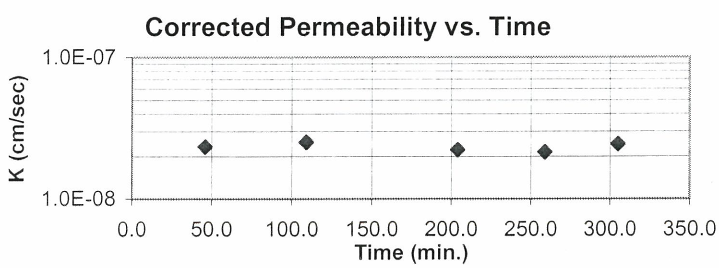
Permeant: De-aired tap water
Selection and Preparation Comments: ______

Specimens (if compacted) were compacted in a Proctor Mold as follows: The Maximum Dry Density was converted to Wet Density, this mass was divided by 4 (layers) and 3 of the 4 layers were compacted into the mold using a Proctor Hammer using 25 blows per layer. The density was varied by reducing the height of the drop by the amount listed beside "Compacted". The specimen was trimmed from the bottom two layers.

	Initial Specimen Data	After Consolidation Data	After Test Data	Final Pressures (psi)	
Height (in.)	2.4581	2.4763	2.4764	Chamber	75
Diameter (in.)	2.8070		2.8210	Influent	70
Moisture Content (%)	25.6		27.6	Effluent	65
Dry Unit Weight (pcf)	98.3		96.6		
Void Ratio	0.733		0.764		
Degree of Saturation (%)	95.3		98.8		
Trimmings MC (%)	27.5				

Applied Head Difference (psi) 5
Back Pressure Saturated to (psi) 65
Maximum Effective Consolidation Stress (psi) 10
Minimum Effective Consolidation Stress (psi) 5

						Hydraulic Conductivity			
Date	Clock (24H:M)	Temp. °F	Bottom Head	Top Head	Test Time (sec)	k (m/s)	k (cm/s)	k @ 20° C (m/s)	k @ 20° C (cm/s)
12-7-09	8:15	68.0	21.16	3.63	0	---	---	---	---
12-7-09	9:01	68.0	20.98	3.81	2.76E+03	2.3E-10	2.3E-08	2.3E-10	2.3E-08
12-7-09	10:04	68.0	20.73	4.09	3.78E+03	2.5E-10	2.5E-08	2.5E-10	2.5E-08
12-7-09	11:39	68.0	20.38	4.44	5.70E+03	2.2E-10	2.2E-08	2.2E-10	2.2E-08
12-7-09	12:34	68.0	20.19	4.64	3.30E+03	2.1E-10	2.1E-08	2.1E-10	2.1E-08
12-7-09	13:20	68.0	20.00	4.82	2.76E+03	2.4E-10	2.4E-08	2.4E-10	2.4E-08



A gradient of approximately 56.1 was used for this test. This gradient exceeds ASTM guidelines for maximum gradient, but was used to achieve the requestors desired test duration. Examination of the sample shows no signs of material loss or clogging that may affect test results.

Average Hydraulic Conductivity @ 20° C (last 4 determinations) m/s 2.32E-10 cm/s 2.32E-08
Average Hydraulic Conductivity @ 20° C (last run) m/s 2.33E-10 cm/s 2.33E-08

Reviewed by: [signature]

Stantec

Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter ASTM D 5084-03

Project Name Gallatin Fossil Plant (GAF) - Ash Ponds   Project No. 175559018
Source STN-E-15, 4.5'-6.5', TI 5.7'-6.2'   Test ID 45B
Visual Classification Fat Clay (CH), red brown, moist, firm, Mn   Prepared By KDG
Undisturbed XX   Specific Gravity 2.72 ASTM D854-A   Date 11-3-09
Maximum Dry Density (pcf) ______   Percent of Maximum ______

Permeant: De-aired tap water
Selection and Preparation Comments: ______

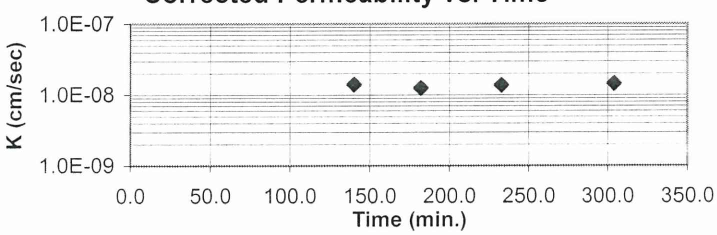
Specimens (if compacted) were compacted in a Proctor Mold as follows: The Maximum Dry Density was converted to Wet Density, this mass was divided by 4 (layers) and 3 of the 4 layers were compacted into the mold using a Proctor Hammer using 25 blows per layer. The density was varied by reducing the height of the drop by the amount listed beside "Compacted". The specimen was trimmed from the bottom two layers.

	Initial Specimen Data	After Consolidation Data	After Test Data	Final Pressures (psi)	
Height (in.)	2.4664	2.4507	2.4521	Chamber	75
Diameter (in.)	2.8020		2.8078	Influent	70
Moisture Content (%)	23.2		23.6	Effluent	65
Dry Unit Weight (pcf)	101.6		101.7		
Void Ratio	0.672		0.669		
Degree of Saturation (%)	93.9		95.9		
Trimmings MC (%)	24.2				

Applied Head Difference (psi) 5
Back Pressure Saturated to (psi) 65
Maximum Effective Consolidation Stress (psi) 10
Minimum Effective Consolidation Stress (psi) 5

Date	Clock (24H:M)	Temp. °F	Bottom Head	Top Head	Test Time (sec)	Hydraulic Conductivity k (m/s)	k (cm/s)	k @ 20° C (m/s)	k @ 20° C (cm/s)
12-3-09	8:03	70.0	19.55	6.29	0	---	---	---	---
12-3-09	10:23	70.0	19.27	6.68	8.40E+03	1.4E-10	1.4E-08	1.4E-10	1.4E-08
12-3-09	11:05	70.0	19.17	6.76	2.52E+03	1.3E-10	1.3E-08	1.2E-10	1.2E-08
12-3-09	11:56	70.0	19.06	6.89	3.06E+03	1.4E-10	1.4E-08	1.4E-10	1.4E-08
12-3-09	13:07	70.0	18.88	7.06	4.26E+03	1.5E-10	1.5E-08	1.4E-10	1.4E-08

Corrected Permeability vs. Time



A gradient of approximately 56 was used for this test. This gradient exceeds ASTM guidelines for maximum gradient, but was used to achieve the requestors desired test duration. Examination of the sample shows no signs of material loss or clogging that may affect test results.

Average Hydraulic Conductivity @ 20° C (last 4 determinations) m/s 1.36E-10 cm/s 1.36E-08
Average Hydraulic Conductivity @ 20° C (last run) m/s 1.36E-10 cm/s 1.36E-08

Reviewed by: [signature]

Stantec

Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter
ASTM D 5084-03

Project Name: Gallatin Fossil Plant (GAF) - Ash Ponds — Project No. 175559018
Source: STN-E-16S, 9.0'-11.0', TI 9.0'-9.5' — Test ID 49A
Visual Classification: Lean Clay with Gravel (CL), brown, moist, firm — Prepared By KDG
Undisturbed: XX — Specific Gravity 2.73 ASTM D854-A — Date 11-5-09
Maximum Dry Density (pcf) ______ — Percent of Maximum ______

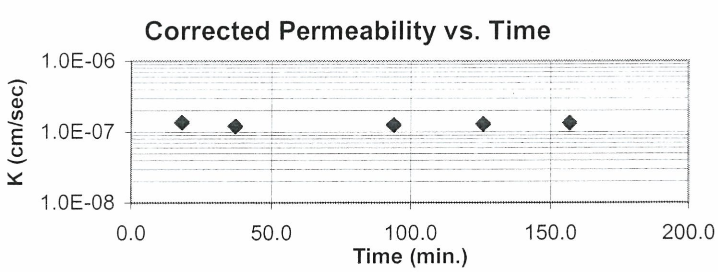
Permeant: De-aired tap water
Selection and Preparation Comments: ______

Specimens (if compacted) were compacted in a Proctor Mold as follows: The Maximum Dry Density was converted to Wet Density, this mass was divided by 4 (layers) and 3 of the 4 layers were compacted into the mold using a Proctor Hammer using 25 blows per layer. The density was varied by reducing the height of the drop by the amount listed beside "Compacted". The specimen was trimmed from the bottom two layers.

	Initial Specimen Data	After Consolidation Data	After Test Data	Final Pressures (psi)	
Height (in.)	2.4781	2.4542	2.4551	Chamber	75
Diameter (in.)	2.7987		2.8108	Influent	70
Moisture Content (%)	17.2		22.0	Effluent	65
Dry Unit Weight (pcf)	104.4		104.5		
Void Ratio	0.632		0.631		
Degree of Saturation (%)	74.3		95.2		
Trimmings MC (%)	21.2				

Applied Head Difference (psi) 5
Back Pressure Saturated to (psi) 65
Maximum Effective Consolidation Stress (psi) 10
Minimum Effective Consolidation Stress (psi) 5

Date	Clock (24H:M)	Temp. °F	Bottom Head	Top Head	Test Time (sec)	Hydraulic Conductivity k (m/s)	k (cm/s)	k @ 20° C (m/s)	k @ 20° C (cm/s)
12-2-09	10:59	68.0	20.76	3.56	0	---	---	---	---
12-2-09	11:17	68.0	20.36	3.98	1.08E+03	1.4E-09	1.4E-07	1.4E-09	1.4E-07
12-2-09	11:36	68.0	19.96	4.34	1.14E+03	1.2E-09	1.2E-07	1.2E-09	1.2E-07
12-2-09	12:33	68.0	18.77	5.50	3.42E+03	1.3E-09	1.3E-07	1.3E-09	1.3E-07
12-2-09	13:05	68.0	18.11	6.18	1.92E+03	1.3E-09	1.3E-07	1.3E-09	1.3E-07
12-2-09	13:36	68.0	17.45	6.84	1.86E+03	1.3E-09	1.3E-07	1.3E-09	1.3E-07



A gradient of approximately 55.7 was used for this test. This gradient exceeds ASTM guidelines for maximum gradient, but was used to achieve the requestors desired test duration. Examination of the sample shows no signs of material loss or clogging that may affect test results.

Average Hydraulic Conductivity @ 20° C (last 4 determinations) — m/s 1.27E-09 — cm/s 1.27E-07
Average Hydraulic Conductivity @ 20° C (last run) — m/s 1.28E-09 — cm/s 1.28E-07

Reviewed by: KDG

Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter
ASTM D 5084-03

Stantec

Project Name: Gallatin Fossil Plant (GAF) - Ash Ponds — Project No. 175559018
Source: STN-E-16S, 36.0'-38.0', TI 36.0'-36.5' — Test ID 52A
Visual Classification: Lean Clay (CL), brown, wet, very soft — Prepared By KDG
Undisturbed: XX — Specific Gravity 2.67 ASTM D854-A — Date 11-5-09
Maximum Dry Density (pcf) ______ — Percent of Maximum ______

Permeant: De-aired tap water
Selection and Preparation Comments:

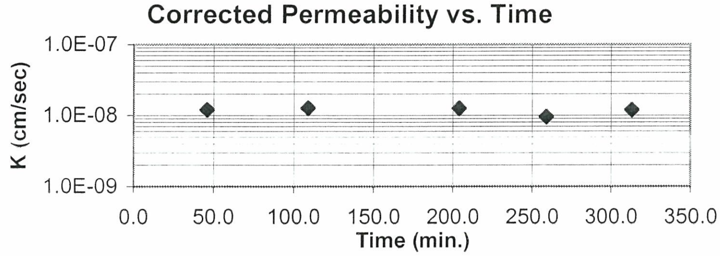
Specimens (if compacted) were compacted in a Proctor Mold as follows: The Maximum Dry Density was converted to Wet Density, this mass was divided by 4 (layers) and 3 of the 4 layers were compacted into the mold using a Proctor Hammer using 19 blows per layer. The density was varied by reducing the height of the drop by the amount listed beside "Compacted". The specimen was trimmed from the bottom two layers.

	Initial Specimen Data	After Consolidation Data	After Test Data
Height (in.)	1.3679	1.3091	1.3092
Diameter (in.)	2.7827		2.7880
Moisture Content (%)	25.4		22.1
Dry Unit Weight (pcf)	101.3		105.4
Void Ratio	0.646		0.582
Degree of Saturation (%)	105.0		101.6
Trimmings MC (%)	25.8		

Final Pressures (psi)	
Chamber	75
Influent	70
Effluent	65

Applied Head Difference (psi)	5
Back Pressure Saturated to (psi)	65
Maximum Effective Consolidation Stress (psi)	10
Minimum Effective Consolidation Stress (psi)	5

						Hydraulic Conductivity			
Date	Clock (24H:M)	Temp. °F	Bottom Head	Top Head	Test Time (sec)	k (m/s)	k (cm/s)	k @ 20° C (m/s)	k @ 20° C (cm/s)
12-7-09	8:14	68.0	21.60	2.64	0	---	---	---	---
12-7-09	9:00	68.0	21.43	2.81	2.76E+03	1.2E-10	1.2E-08	1.2E-10	1.2E-08
12-7-09	10:03	68.0	21.19	3.06	3.78E+03	1.3E-10	1.3E-08	1.3E-10	1.3E-08
12-7-09	11:38	68.0	20.86	3.46	5.70E+03	1.2E-10	1.2E-08	1.2E-10	1.2E-08
12-7-09	12:33	68.0	20.67	3.59	3.30E+03	9.5E-11	9.5E-09	9.5E-11	9.5E-09
12-7-09	13:27	68.0	20.48	3.79	3.24E+03	1.2E-10	1.2E-08	1.2E-10	1.2E-08



A gradient of approximately 100.9 was used for this test. This gradient exceeds ASTM guidelines for maximum gradient, but was used to achieve the requestors desired test duration. Examination of the sample shows no signs of material loss or clogging that may affect test results.

Average Hydraulic Conductivity @ 20° C (last 4 determinations)	m/s	1.16E-10	cm/s	1.16E-08
Average Hydraulic Conductivity @ 20° C (last run)	m/s	1.17E-10	cm/s	1.17E-08

Reviewed by: KDG

Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter ASTM D 5084-03

Stantec

Project Name Gallatin Fossil Plant (GAF) - Ash Ponds — Project No. 175559018

Source STN-E-20S, 23.0'-25.0', TI 23.0'-23.5' — Test ID 60A

Visual Classification Silt (ML), gray, wet, very soft — Prepared By KDG

Undisturbed XX — Specific Gravity 2.4 ASTM D854-A — Date 11-5-09

Maximum Dry Density (pcf) ______ Percent of Maximum ______

Permeant: De-aired tap water

Selection and Preparation Comments: ______

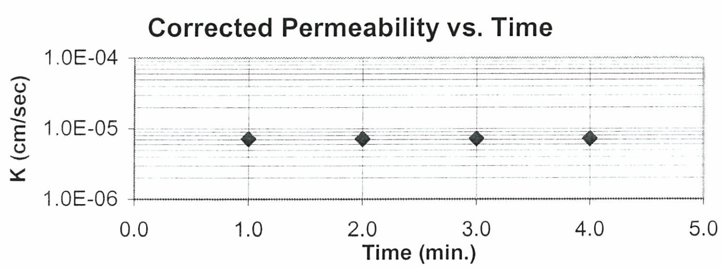
Specimens (if compacted) were compacted in a Proctor Mold as follows: The Maximum Dry Density was converted to Wet Density, this mass was divided by 4 (layers) and 3 of the 4 layers were compacted into the mold using a Proctor Hammer using 19 blows per layer. The density was varied by reducing the height of the drop by the amount listed beside "Compacted". The specimen was trimmed from the bottom two layers.

	Initial Specimen Data	After Consolidation Data	After Test Data
Height (in.)	1.3708	1.2824	1.2840
Diameter (in.)	2.7690		2.7951
Moisture Content (%)	49.6		41.8
Dry Unit Weight (pcf)	69.7		73.0
Void Ratio	1.149		1.052
Degree of Saturation (%)	103.5		95.3
Trimmings MC (%)	41.1		

Final Pressures (psi)	
Chamber	74
Influent	69
Effluent	65

Applied Head Difference (psi)	4
Back Pressure Saturated to (psi)	65
Maximum Effective Consolidation Stress (psi)	9
Minimum Effective Consolidation Stress (psi)	5

						Hydraulic Conductivity			
Date	Clock (24H:M)	Temp. °F	Bottom Head	Top Head	Test Time (sec)	k (m/s)	k (cm/s)	k @ 20° C (m/s)	k @ 20° C (cm/s)
12-4-09	9:52	70.0	21.14	4.28	0	---	---	---	---
12-4-09	9:53	70.0	20.67	4.74	6.00E+01	7.3E-08	7.3E-06	7.1E-08	7.1E-06
12-4-09	9:54	70.0	20.23	5.22	6.00E+01	7.3E-08	7.3E-06	7.1E-08	7.1E-06
12-4-09	9:55	70.0	19.76	5.67	6.00E+01	7.4E-08	7.4E-06	7.2E-08	7.2E-06
12-4-09	9:56	70.0	19.32	6.14	6.00E+01	7.3E-08	7.3E-06	7.1E-08	7.1E-06



A gradient of approximately 100.7 was used for this test. This gradient exceeds ASTM guidelines for maximum gradient, but was used to achieve the requestors desired test duration. Examination of the sample shows no signs of material loss or clogging that may affect test results.

Average Hydraulic Conductivity @ 20° C (last 4 determinations) m/s 7.13E-08 cm/s 7.13E-06

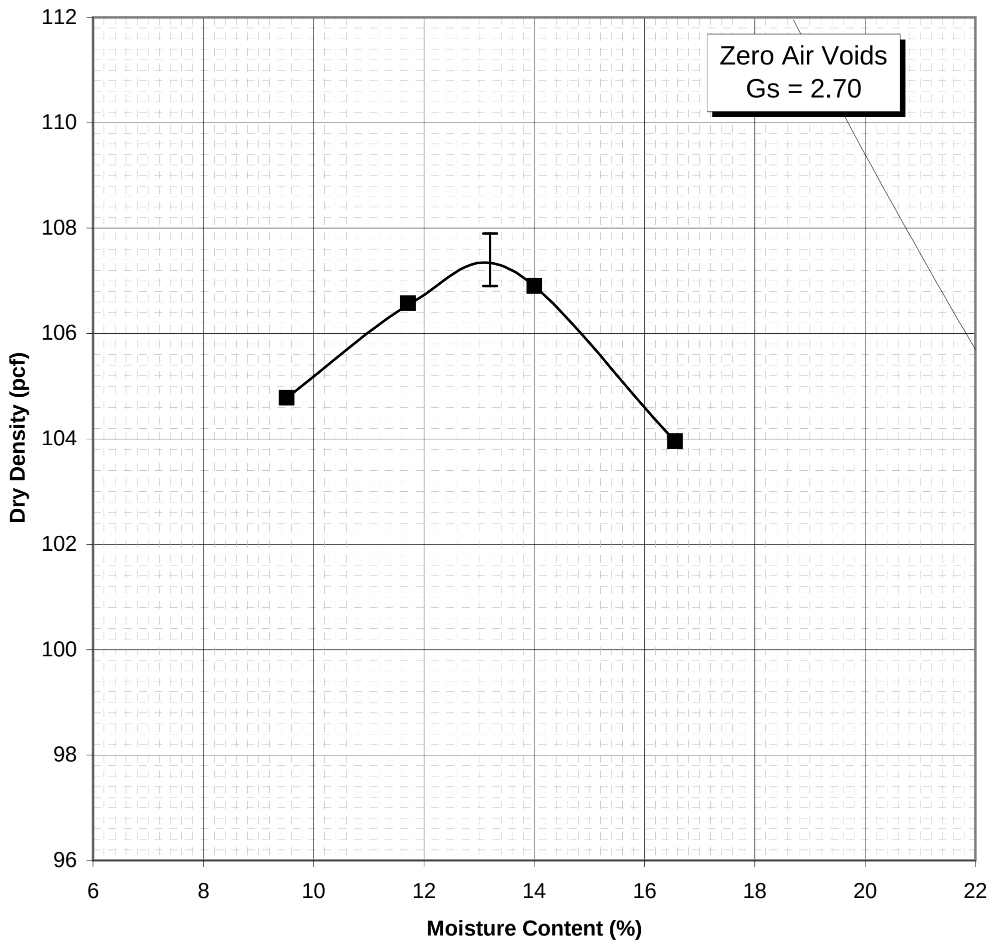
Average Hydraulic Conductivity @ 20° C (last run) m/s 7.13E-08 cm/s 7.13E-06

Reviewed by: KDG

Moisture-Density Data Sheet

Project: Gallatin Fossil Plant (GAF) - Ash Ponds
Project No.: 175559018
Source: STN-A-8, 14.0'-17.0'
Sample No.: 883
Sample Description: Well graded sand with silt and gravel (SW-SM), black
Visual Notes: gravel
Test Method: ASTM D 698 - Method C
Prepared: Dry
Oversized Fraction: < 5 %
Rammer: Manual
Gs - Fines: Assumed

Mold Weight 6453 grams		Moisture Determination				
Wet Weight plus Mold (grams)	Wet Weight minus Mold (grams)	Wet Soil and Can Weight (grams)	Dry Soil and Can Weight (grams)	Can Weight (grams)	Water Content (%)	Dry Density (pcf)
10586	4133	2495.90	2190.10	342.90	16.6	104.0
10610	4157	1161.30	1045.80	221.00	14.0	106.9
10514	4061	1399.40	1285.80	316.10	11.7	106.6
10367	3914	1033.40	953.40	112.50	9.5	104.8

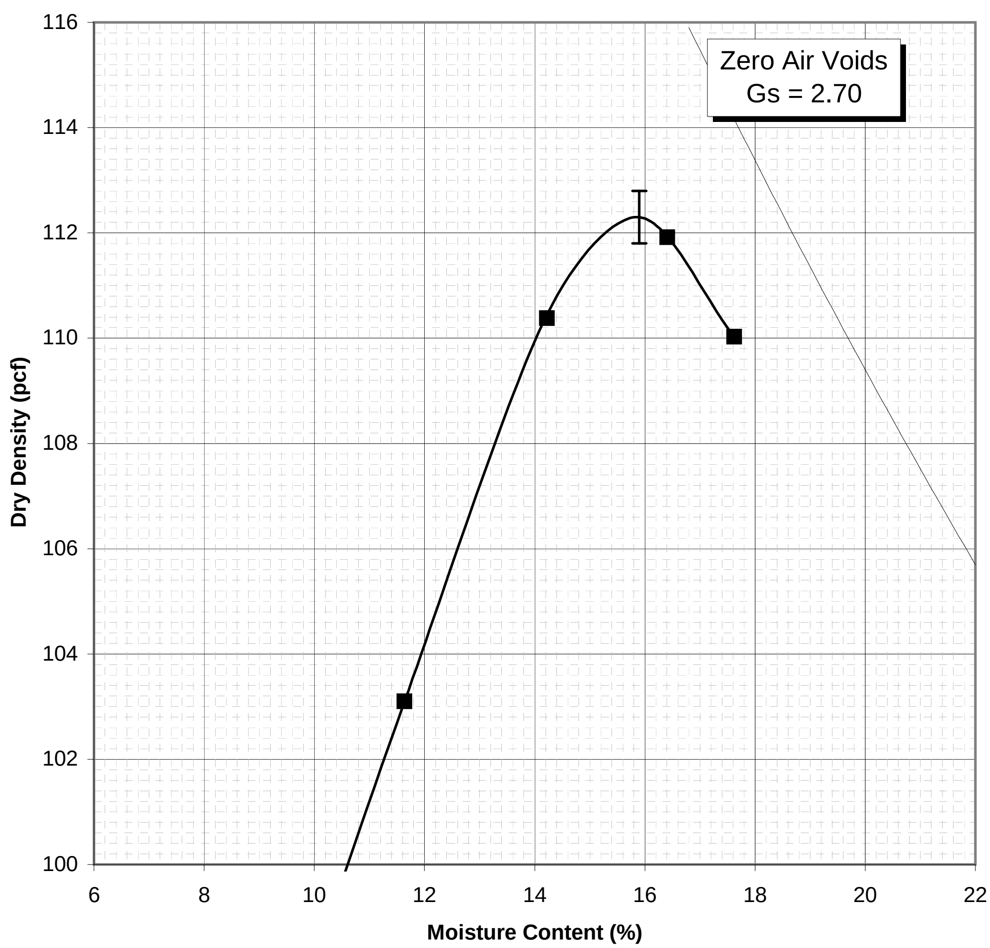


Maximum Dry Density 107.4 PCF
Optimum Moisture Content 13.2 %

Moisture-Density Data Sheet

Project: Gallatin Fossil Plant (GAF) - Ash Ponds
Project No.: 175559018
Source: STN-D-2, 4.0'-6.0'
Sample No.: 884
Sample Description: Lean clay (CL) with sand, brownish gray
Visual Notes: silty with chert fragments
Test Method: ASTM D 698 - Method A
Prepared: Dry
Oversized Fraction: < 5 %
Rammer: Manual
Gs - Fines: Assumed

Mold Weight 2038 grams		Moisture Determination				
Wet Weight plus Mold (grams)	Wet Weight minus Mold (grams)	Wet Soil and Can Weight (grams)	Dry Soil and Can Weight (grams)	Can Weight (grams)	Water Content (%)	Dry Density (pcf)
3632	1594	195.50	180.90	28.60	9.6	96.9
3766	1728	201.50	183.80	31.70	11.6	103.1
3931	1893	249.70	222.50	31.30	14.2	110.4
3994	1956	282.80	247.50	32.40	16.4	111.9
3981	1943	273.80	237.50	31.50	17.6	110.0



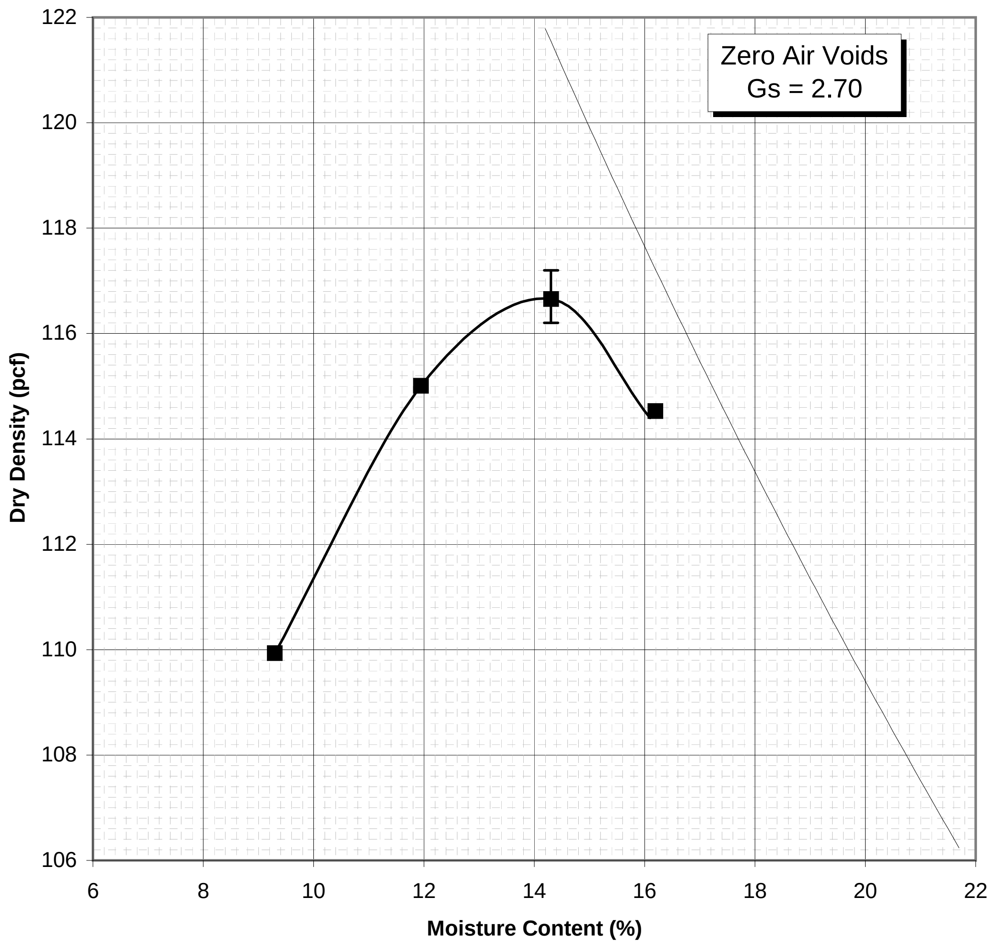
Maximum Dry Density 112.3 PCF
Optimum Moisture Content 15.9 %

Stantec

Moisture-Density Data Sheet

Project: Gallatin Fossil Plant (GAF) - Ash Ponds
Project No.: 175559018
Source: STN-E-8, 3.0'-5.0'
Sample No.: 885
Sample Description: Lean clay (CL), medium brown
Visual Notes: trace silt and gravel
Test Method: ASTM D 698 - Method A
Prepared: Dry
Oversized Fraction: < 5 %
Rammer: Manual
Gs - Fines: Assumed

Mold Weight 4227 grams		Moisture Determination				
Wet Weight plus Mold (grams)	Wet Weight minus Mold (grams)	Wet Soil and Can Weight (grams)	Dry Soil and Can Weight (grams)	Can Weight (grams)	Water Content (%)	Dry Density (pcf)
6031	1804	266.90	246.90	31.80	9.3	109.9
6160	1933	230.90	209.80	33.20	11.9	115.0
6229	2002	249.20	222.16	33.20	14.3	116.7
6225	1998	264.70	232.40	33.00	16.2	114.5

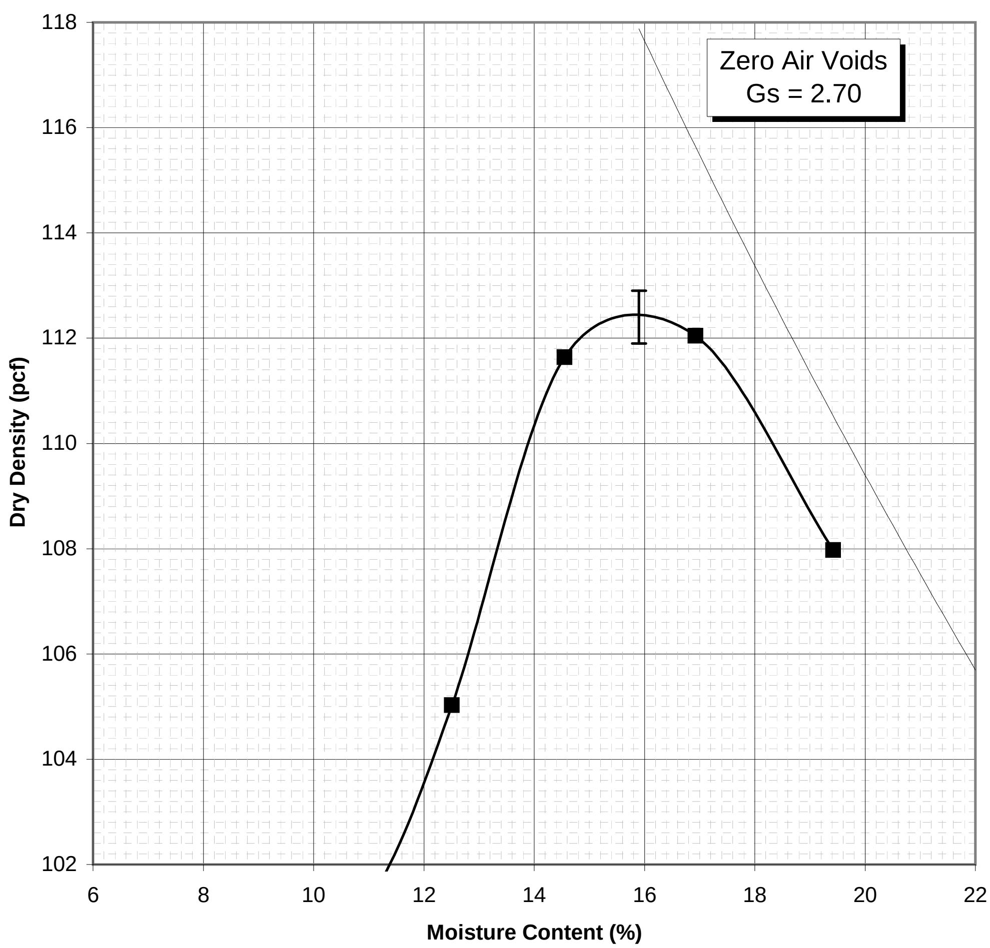


Maximum Dry Density 116.7 PCF
Optimum Moisture Content 14.3 %

Moisture-Density Data Sheet

Project: Gallatin Fossil Plant (GAF) - Ash Ponds
Project No.: 175559018
Source: STN-E-8, 16.0'-19.0'
Sample No.: 886
Sample Description: Lean clay (CL), with gravel, brown
Visual Notes:
Test Method: ASTM D 698 - Method A
Prepared: Dry
Oversized Fraction: < 5 %
Rammer: Manual
Gs - Fines: Assumed

Mold Weight 2038 grams		Moisture Determination				
Wet Weight plus Mold (grams)	Wet Weight minus Mold (grams)	Wet Soil and Can Weight (grams)	Dry Soil and Can Weight (grams)	Can Weight (grams)	Water Content (%)	Dry Density (pcf)
3629	1591	221.70	206.70	32.52	8.6	97.6
3727	1689	217.30	198.70	30.22	11.0	101.3
3812	1774	235.90	213.20	31.68	12.5	105.0
3958	1920	204.80	183.00	33.20	14.6	111.6
4005	1967	268.64	234.50	32.80	16.9	112.0
3974	1936	296.00	253.00	31.62	19.4	108.0



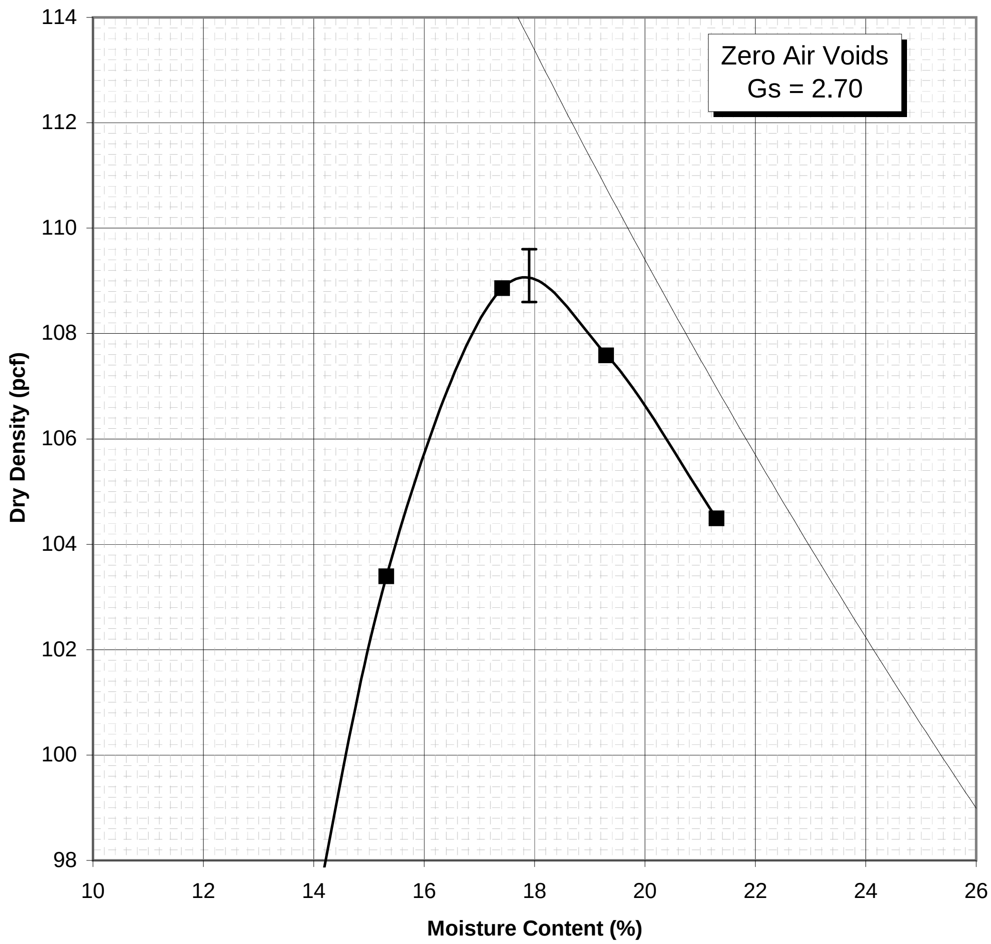
Maximum Dry Density 112.4 PCF
Optimum Moisture Content 15.9 %

Stantec

Moisture-Density Data Sheet

Project: Gallatin Fossil Plant (GAF) - Ash Ponds
Project No.: 175559018
Source: STN-E-19, 8.0'-11.0'
Sample No.: 887
Sample Description: Lean clay (CL), brown
Visual Notes:
Test Method: ASTM D 698 - Method A
Prepared: Dry
Oversized Fraction: < 5 %
Rammer: Manual
Gs - Fines: Assumed

Mold Weight 2032 grams	Moisture Determination					
Wet Weight plus Mold (grams)	Wet Weight minus Mold (grams)	Wet Soil and Can Weight (grams)	Dry Soil and Can Weight (grams)	Can Weight (grams)	Water Content (%)	Dry Density (pcf)
3646	1614	175.60	158.67	34.20	13.6	94.6
3822	1790	264.60	233.56	30.90	15.3	103.4
3951	1919	204.50	178.99	32.50	17.4	108.9
3959	1927	182.10	158.01	33.20	19.3	107.6
3935	1903	231.20	196.43	33.20	21.3	104.5

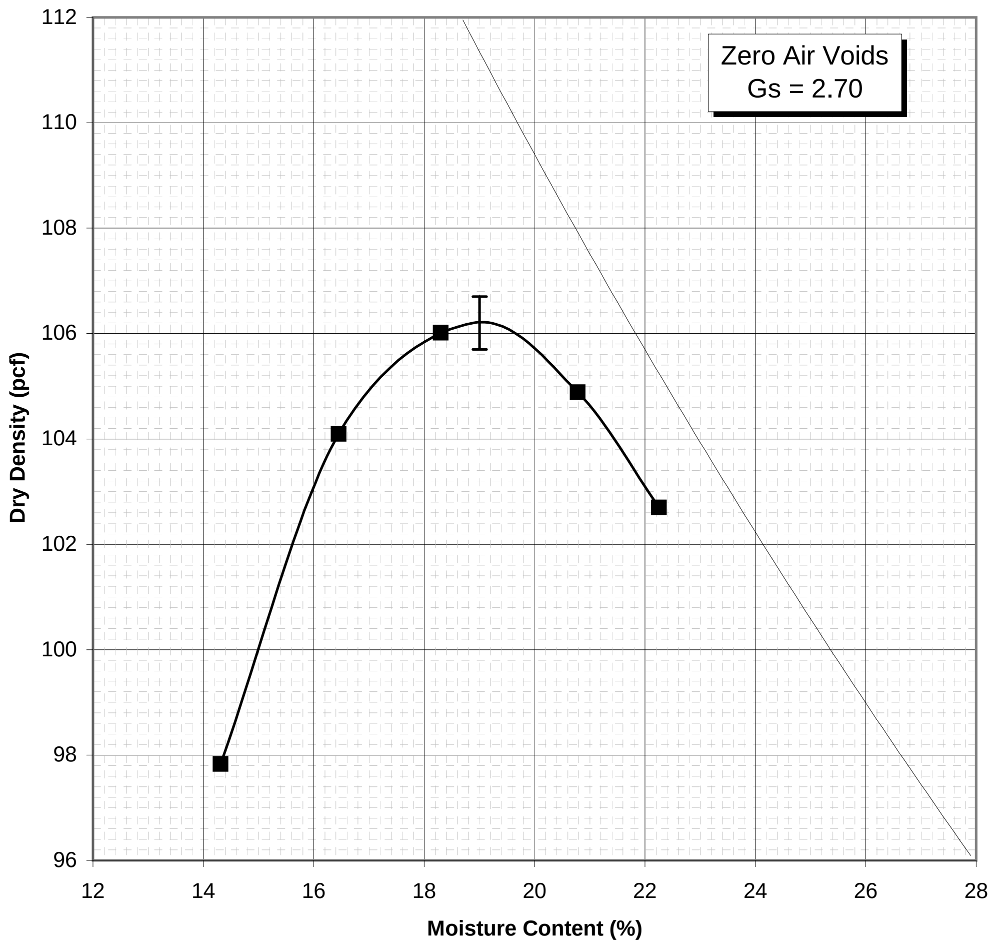


Maximum Dry Density 109.1 PCF
Optimum Moisture Content 17.9 %

Moisture-Density Data Sheet

Project: Gallatin Fossil Plant (GAF) - Ash Ponds
Project No.: 175559018
Source: STN-E-14, 5.0'-8.0'
Sample No.: 888
Sample Description: Lean clay (CL), dark brown
Visual Notes: Trace silt and gravel
Test Method: ASTM D 698 - Method A
Prepared: Dry
Oversized Fraction: < 5 %
Rammer: Manual
Gs - Fines: Assumed

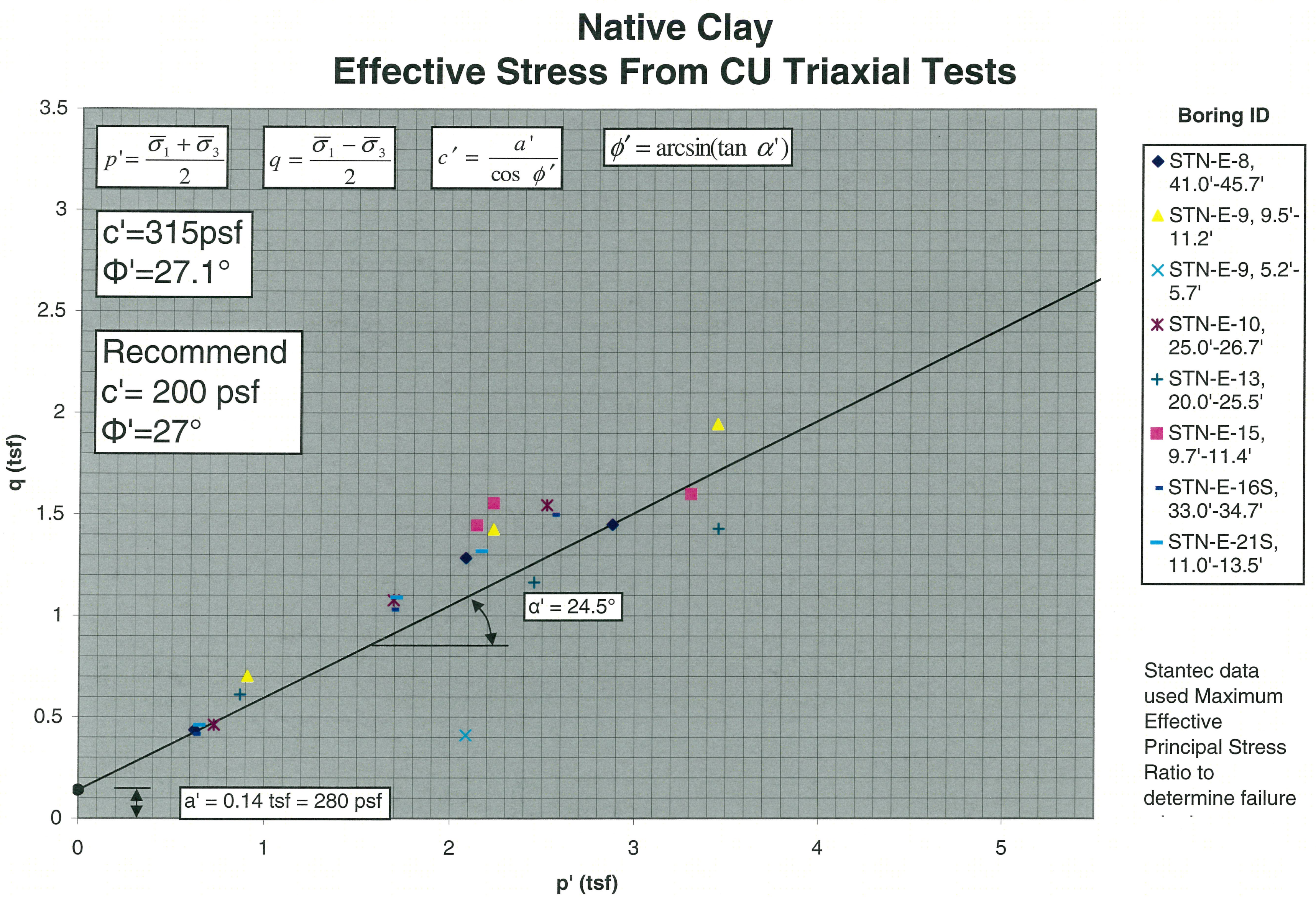
Mold Weight 4227 grams		Moisture Determination				
Wet Weight plus Mold (grams)	Wet Weight minus Mold (grams)	Wet Soil and Can Weight (grams)	Dry Soil and Can Weight (grams)	Can Weight (grams)	Water Content (%)	Dry Density (pcf)
5906	1679	202.10	180.90	32.80	14.3	97.8
6047	1820	255.80	224.00	30.70	16.5	104.1
6110	1883	216.90	188.20	31.40	18.3	106.0
6129	1902	252.10	214.30	32.40	20.8	104.9
6112	1885	267.80	225.00	32.70	22.3	102.7



Maximum Dry Density 106.2 PCF
Optimum Moisture Content 19.0 %

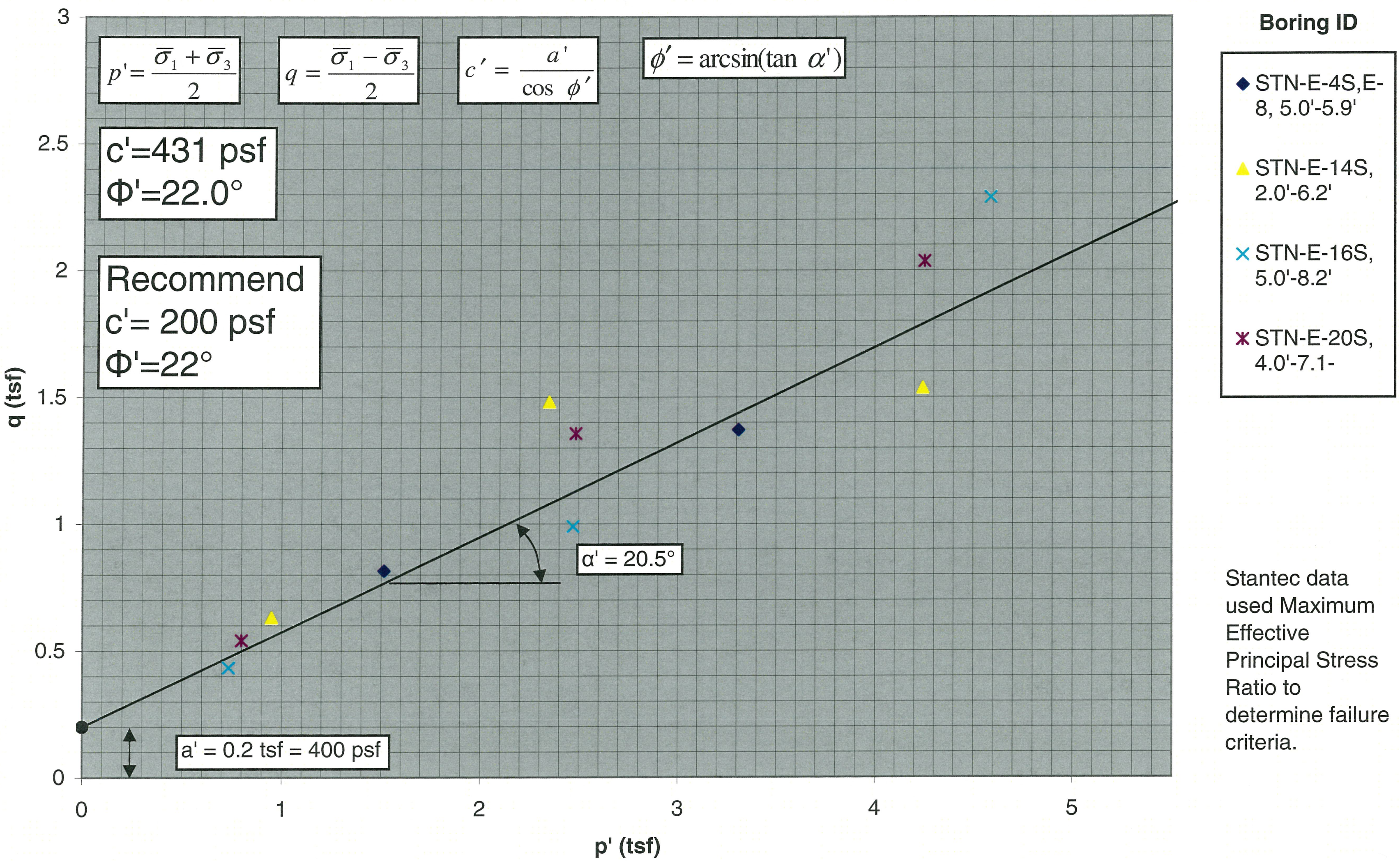
Appendix D

Strength Parameter Selection



Native Clay
Effective Stress From CU Triaxial Tests
$p' = \frac{\overline{\sigma}_1 + \overline{\sigma}_3}{2}$
$q = \frac{\overline{\sigma}_1 - \overline{\sigma}_3}{2}$
$c' = \frac{a'}{\cos \phi'}$
$\phi' = \arcsin(\tan \alpha')$
c'=315psf
Φ'=27.1°
Recommend
c'= 200 psf
Φ'=27°
α' = 24.5°
a' = 0.14 tsf = 280 psf
q (tsf)
p' (tsf)
0
0.5
1
1.5
2
2.5
3
3.5
0
1
2
3
4
5
Boring ID
STN-E-8, 41.0'-45.7'
STN-E-9, 9.5'-11.2'
STN-E-9, 5.2'-5.7'
STN-E-10, 25.0'-26.7'
STN-E-13, 20.0'-25.5'
STN-E-15, 9.7'-11.4'
STN-E-16S, 33.0'-34.7'
STN-E-21S, 11.0'-13.5'
Stantec data used Maximum Effective Principal Stress Ratio to determine failure

2006 Pond E Clay Dike
Effective Stress From CU Triaxial Tests



Stantec data used Maximum Effective Principal Stress Ratio to determine failure criteria.

Appendix E

Geotechnical Drawings

GEOTECHNICAL EXPLORATION
ASH POND/STILLING POND COMPLEX
GALLATIN FOSSIL PLANT
GALLATIN, SUMNER COUNTY, TENNESSEE

PREPARED FOR

TENNESSEE VALLEY AUTHORITY

PREPARED BY

Stantec

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1901 Nelson Miller Pky.
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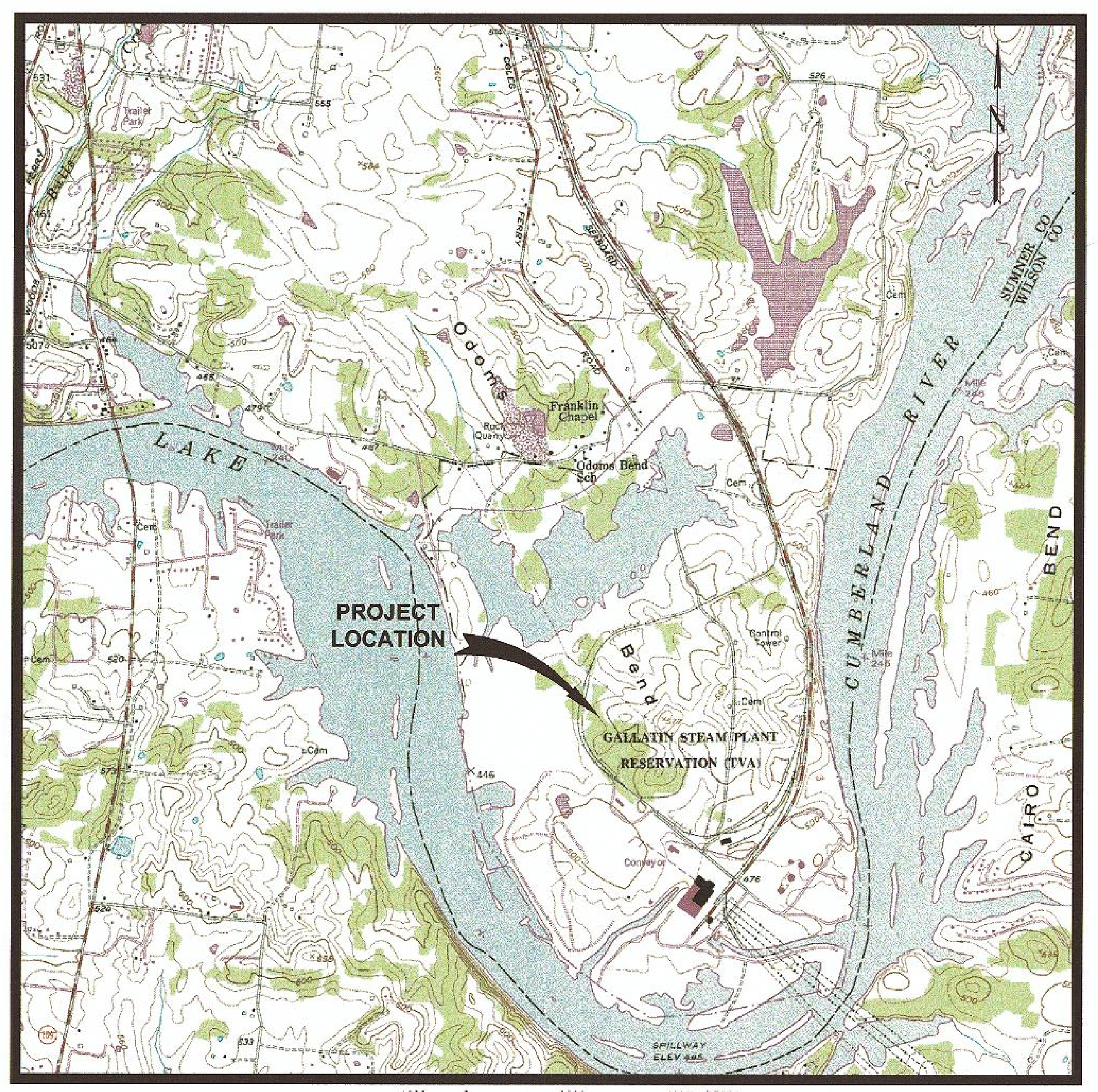


1000 0 2000 4000 FEET
GRAPHIC SCALE

VICINITY MAP

INDEX OF SHEETS

RECORD DRAWING

For Supporting Design Calculations see FPGGAFFESCDX00000020100001

RANDY LEE ROBERTS REGISTERED ENGINEER AGRICULTURE COMMERCE No. 113825 STATE OF TENNESSEE
5/27/10

REV. NO.	DATE	DSGN	DRWN	CHKD	SUPV	RVWD	APPD	ISSD	PROJECT ID	AS CONST	REV CD
R –	–	–	–	–	–	–	–	–	–	–	–
R 0	05/27/10	PC	RP	PC	RLR	RLR	RLR	TJ	–	–	–

RECORD DRAWING

DISCIPLINE INTERFACE 1 2 3 4

SCALE: AS SHOWN EXCEPT AS NOTED

YARD
ASH POND/STILLING POND COMPLEX

GEOTECHNICAL EXPLORATION
COVER SHEET

DESIGNED BY:	DRAWN BY:	CHECKED BY:	SUPERVISED BY:	REVIEWED BY:	APPROVED BY:	ISSUED BY:
P. COOPER	R. PETTY	P. COOPER	R. ROBERTS	R. ROBERTS	R. ROBERTS	T. JOHNSON

GALLATIN FOSSIL PLANT
TENNESSEE VALLEY AUTHORITY
FOSSIL AND HYDRO ENGINEERING

AUTOCAD R 2000	DATE 05/27/10	39	C	10W504–01	R 0

STANTEC	0
TASK COMPLETED BY:	REV NO.

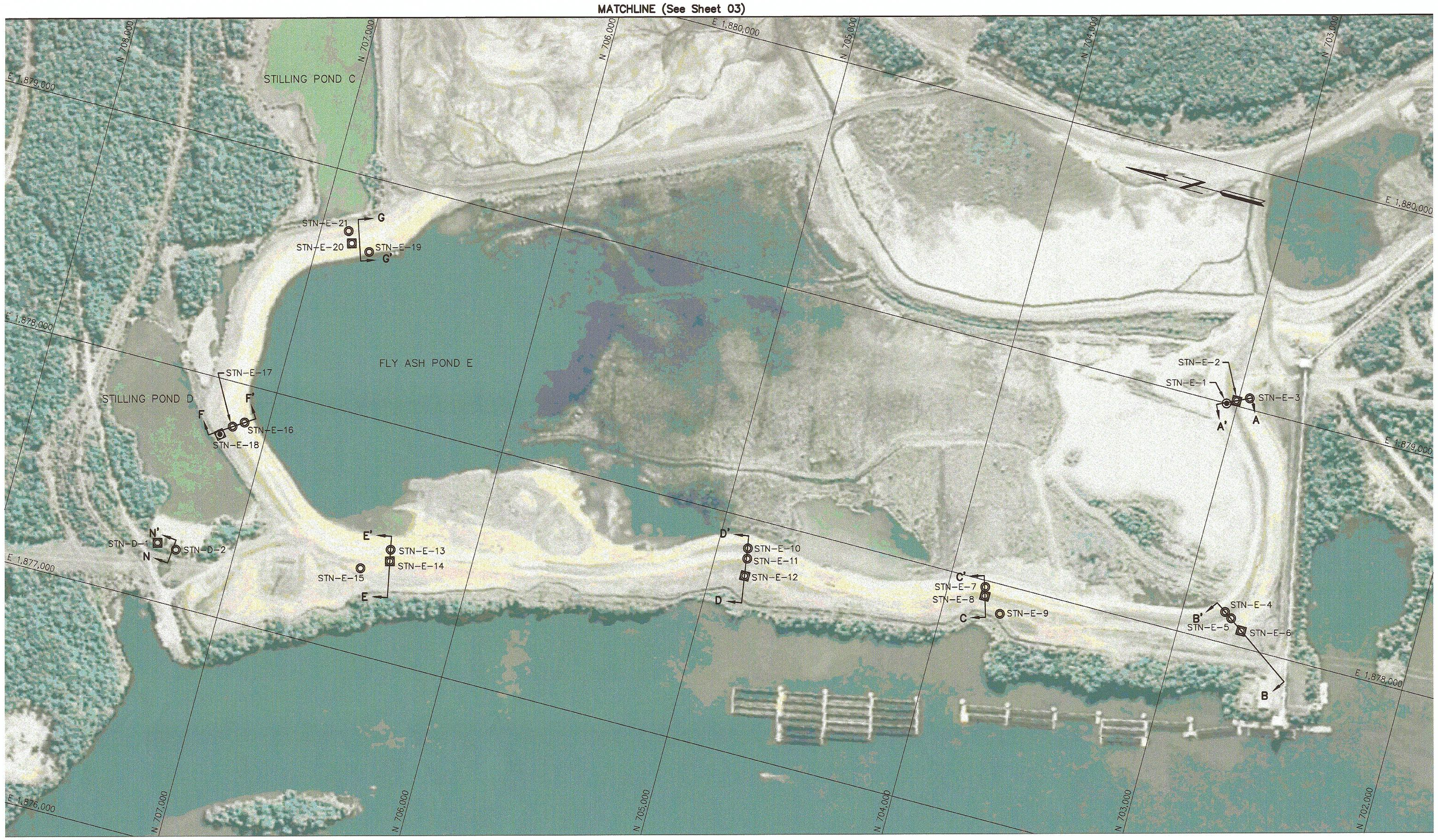
PLOT FACTOR:XX
W_TVA

C.A.D. DRAWING
DO NOT ALTER MANUALLY

PLOT DATE: 05/21/2010

39 C 10W504-01

MATCHLINE (See Sheet 03)



LEGEND

- Soil Boring With Continuous Standard Penetration Tests And/Or Shelby Tube Piston Sampling
- Soil Boring With Continuous Standard Penetration Tests And/Or Shelby Tube Piston Sampling And Rock Core
- Soil Boring With Continuous Standard Penetration Tests And/Or Shelby Tube Piston Sampling And Piezometer Location
- Soil Boring With Continuous Standard Penetration Tests And/Or Shelby Tube Piston Sampling And Rock Core And Piezometer Location
- A A' Cross Section

NOTES

1. Topographic and survey information provided by the Tennessee Valley Authority.
2. The boring logs and related information shown on this drawing depict approximate subsurface conditions only at the specific boring locations noted and at the time of drilling. Conditions at other locations may differ from those occurring at the boring locations. Also, the passage of time may result in a change in the subsurface conditions at the boring locations. Any correlations shown between borings are generally based on straight line interpolation. Actual conditions between borings are unknown and may differ from those shown.

BORING LOCATION TABLE

BORING	NORTHING	EASTING	ELEVATION (ft.)
STN-D-1	707,328.99	1,877,246.92	460.8
STN-D-2	707,245.18	1,877,237.96	460.4
STN-E-1	703,045.88	1,879,000.10	474.1
STN-E-2	703,007.37	1,879,022.21	475.7
STN-E-3	702,955.21	1,879,046.66	459.6
STN-E-4	702,820.82	1,878,131.27	474.3
STN-E-5	702,788.65	1,878,111.48	476.1
STN-E-6	702,733.38	1,878,070.14	459.6
STN-E-7	703,843.80	1,877,971.87	475.1
STN-E-8	703,835.47	1,877,934.64	476.5
STN-E-9	703,753.39	1,877,876.25	451.8
STN-E-10	704,870.32	1,877,862.37	474.9
STN-E-11	704,863.36	1,877,828.40	476.1
STN-E-12	704,854.47	1,877,754.46	455.3
STN-E-13	706,353.41	1,877,474.21	474.3
STN-E-14	706,343.79	1,877,425.50	477.0
STN-E-15	706,458.09	1,877,364.00	463.4
STN-E-16	707,101.38	1,877,842.04	474.9
STN-E-17	707,146.54	1,877,811.85	475.4
STN-E-18	707,190.77	1,877,765.92	461.6
STN-E-19	706,774.43	1,878,687.08	472.8
STN-E-20	706,856.53	1,878,704.54	476.0
STN-E-21	706,883.00	1,878,751.72	461.6

RECORD DRAWING

100 0 200 400 FEET
GRAPHIC SCALE: 1"=200'

For Supporting Design Calculations see FPGGAFFESCDX00000020100001

REV. NO.	DATE	DSGN	DRWN	CHKD	SUPV	RVWD	APPD	ISSD	PROJECT ID	AS CONST	REV CD
R –	–	–	–	–	–	–	–	–	–	–	–
R 0	05/27/10	PC	RP	PC	RLR	RLR	RLR	TJ	–	–	–

RECORD DRAWING

DISCIPLINE INTERFACE 1 2 3 4

SCALE: 1'=200' EXCEPT AS NOTED

YARD
ASH POND/STILLING POND COMPLEX

GEOTECHNICAL EXPLORATION BORING LAYOUT

RANDY LEE ROBERTS REGISTERED ENGINEER AGRICULTURE COMMERCE No. 113825 STATE OF TENNESSEE
Randy L. Roberts
5/27/10

DESIGNED BY:	DRAWN BY:	CHECKED BY:	SUPERVISED BY:	REVIEWED BY:	APPROVED BY:	ISSUED BY:
P. COOPER	R. PETTY	P. COOPER	R. ROBERTS	R. ROBERTS	R. ROBERTS	T. JOHNSON

Stantec Consulting Services Inc.
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GALLATIN FOSSIL PLANT
TENNESSEE VALLEY AUTHORITY
FOSSIL AND HYDRO ENGINEERING

AUTOCAD R 2000 | DATE 05/27/10 | 39 | C | 10W504-02 | R 0

STANTEC | 0
TASK COMPLETED BY: | REV NO.

PLOT FACTOR:XX
W_TVA

C.A.D. DRAWING DO NOT ALTER MANUALLY

MATCHLINE (See Sheet 02)

LEGEND

- Soil Boring With Continuous Standard Penetration Tests And/Or Shelby Tube Piston Sampling
- Soil Boring With Continuous Standard Penetration Tests And/Or Shelby Tube Piston Sampling And Rock Core
- Soil Boring With Continuous Standard Penetration Tests And/Or Shelby Tube Piston Sampling And Piezometer Location
- Soil Boring With Continuous Standard Penetration Tests And/Or Shelby Tube Piston Sampling And Rock Core And Piezometer Location
- A A' Cross Section

NOTES

1. Topographic and survey information provided by the Tennessee Valley Authority.
2. The boring logs and related information shown on this drawing depict approximate subsurface conditions only at the specific boring locations noted and at the time of drilling. Conditions at other locations may differ from those occurring at the boring locations. Also, the passage of time may result in a change in the subsurface conditions at the boring locations. Any correlations shown between borings are generally based on straight line interpolation. Actual conditions between borings are unknown and may differ from those shown.

BORING LOCATION TABLE

BORING	NORTHING	EASTING	ELEVATION (ft.)
STN-A-1	707,019.68	1,879,799.57	472.8
STN-A-2	706,994.16	1,879,810.94	473.3
STN-A-3	707,510.75	1,880,731.90	472.9
STN-A-4	707,498.65	1,880,758.47	473.8
STN-A-5	708,368.74	1,881,417.01	473.7
STN-A-6	708,353.42	1,881,433.71	474.0
STN-A-7	708,921.58	1,881,894.55	474.5
STN-A-8	708,907.06	1,881,914.61	474.8
STN-A-9	709,132.64	1,882,470.74	472.4
STN-A-10	709,085.67	1,882,461.16	474.1
STN-C-1	707,402.48	1,879,680.01	462.0

RECORD DRAWING

100 0 200 400 FEET
GRAPHIC SCALE: 1"=200'

For Supporting Design Calculations see FPGGAFFESCDX00000020100001

REV. NO.	DATE	DSGN	DRWN	CHKD	SUPV	RVWD	APPD	ISSD	PROJECT ID	AS CONST	REV CD
R –	–	–	–	–	–	–	–	–	–	–	–
R 0	05/27/10	PC	RP	PC	RLR	RLR	RLR	TJ	–	–	–

RECORD DRAWING

DISCIPLINE INTERFACE 1 2 3 4

SCALE: 1'=200' EXCEPT AS NOTED

YARD
ASH POND/STILLING POND COMPLEX

GEOTECHNICAL EXPLORATION BORING LAYOUT

RANDY LEE ROBERTS REGISTERED ENGINEER AGRICULTURE COMMERCE No. 113825 STATE OF TENNESSEE

Randy L. Roberts
5/27/10

DESIGNED BY:	DRAWN BY:	CHECKED BY:	SUPERVISED BY:	REVIEWED BY:	APPROVED BY:	ISSUED BY:
P. COOPER	R. PETTY	P. COOPER	R. ROBERTS	R. ROBERTS	R. ROBERTS	T. JOHNSON

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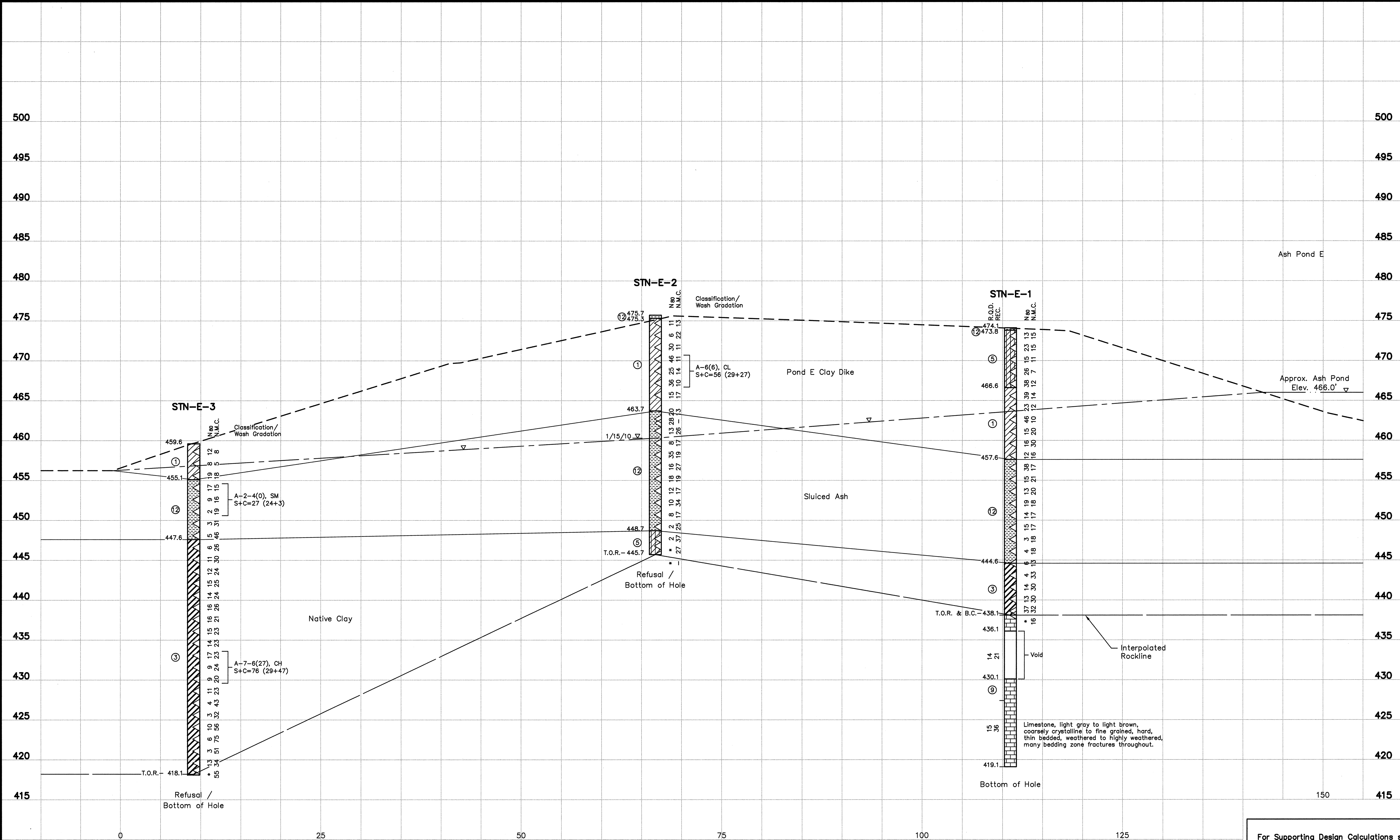
TENNESSEE VALLEY AUTHORITY
FOSSIL AND HYDRO ENGINEERING

AUTOCAD R 2000 | DATE 05/27/10 | 39 | C | 10W504-03 | R 0

STANTEC	0
TASK COMPLETED BY:	REV NO.

PLOT FACTOR:XX
W_TVA

C.A.D. DRAWING
DO NOT ALTER MANUALLY



LEGEND

①	Lean Clay, Sandy Lean Clay, Lean Clay With Sand
②	Silty, Clayey Sand
③	Fat Clay, Fat Clay With Sand
④	Overburden
⑤	Silty Clay
⑥	Poorly Graded Sand
⑦	Silty Sand
⑧	Silt, Sandy Silt, Silt With Sand
⑨	Limestone
⑩	Well Graded Sand With Silt
⑪	Fly Ash
⑫	Bottom Ash
WH	Weight of Hammer
WR	Weight of Rods
◁	Standard Penetration Test Interval
■	Undisturbed Thin-Walled (Shelby) Tube Sample
N_{60}	Standard Penetration Test Blow Count with a 140 lb Safety Hammer (blows/ft.)
N_{80}	Standard Penetration Test Blow Count with a 140 lb Automatic Hammer (blows/ft.)
N.M.C.	Natural Moisture Content (%)
U.W.W.	Unit Weight Wet (lbs./cu.ft.)
U.W.D.	Unit Weight Dry (lbs./cu.ft.)
U.C./U.U.	Unconfined Compressive Strength (psf)/ Unconsolidated Undrained Triaxial Test (psf)
03/31/09 ▽	Water Level and Date Recorded
▽	Phreatic Surface From Pz Data
▽	Phreatic Surface From Seepage Model
T.O.R.-	Top Of Rock (Indicates The Beginning Of Rock-like Resistance To The Advancement Of The Augers. This May Indicate The Beginning Of Weathered Bedrock, Boulders Or Rock Remnants. An Exact Determination Cannot Be Made Without Performing Rock Coring.)
B.C.-	Begin Rock Core
R.Q.D.	Rock Quality Designation (%)
REC.	Recovery (%)
Refusal	Auger Refusal Using A Carbide-tipped Tooth Auger Bit
No Refusal	No Refusal Encountered
•	Standard Penetration Test (SPT) terminated per ASTM D 1586-99. Refer To Typed Boring Log.

RECORD DRAWING

SUMMARY OF OFFSET BORINGS

BORING NO.	SURFACE ELEV.	BOTTOM OF HOLE DEPTH	PIEZOMETER SCREENED INTERVAL	UNDISTURBED "SHELBY" TUBE SAMPLE INTERVALS
STN-E-1S	474.1'	34.5'	N/A	4.0'-6.0', 8.0'-10.0', 12.0'-14.0', 20.0'-22.0', 32.0'-34.0'

For Supporting Design Calculations see FPGGAFFESCDX00000020100001

RANDY LEE ROBERTS · REGISTERED ENGINEER · AGRICULTURE · COMMERCE · No. 102... · STATE OF TENNESSEE

5/27/10

REV. NO.	DATE	DSGN	DRWN	CHKD	SUPV	RVWD	APPD	ISSD	PROJECT ID	AS CONST
R	—	—	—	—	—	—	—	—	—	—
R 0	05/27/10	PC	RP	PC	RLR	RLR	RLR	TJ	—	—

RECORD DRAWING

SCALE: 1"=5' EXCEPT AS NOTED

YARD
ASH POND/STILLING POND COMPLEX
GEOTECHNICAL EXPLORATION
STABILITY SECTION
CROSS-SECTION A

DESIGNED BY:	DRAWN BY:	CHECKED BY:	SUPERVISED BY:	REVIEWED BY:	APPROVED BY:	ISSUED BY:
P. COOPER	R. PETTY	P. COOPER	R. ROBERTS	R. ROBERTS	R. ROBERTS	T. JOHNSON

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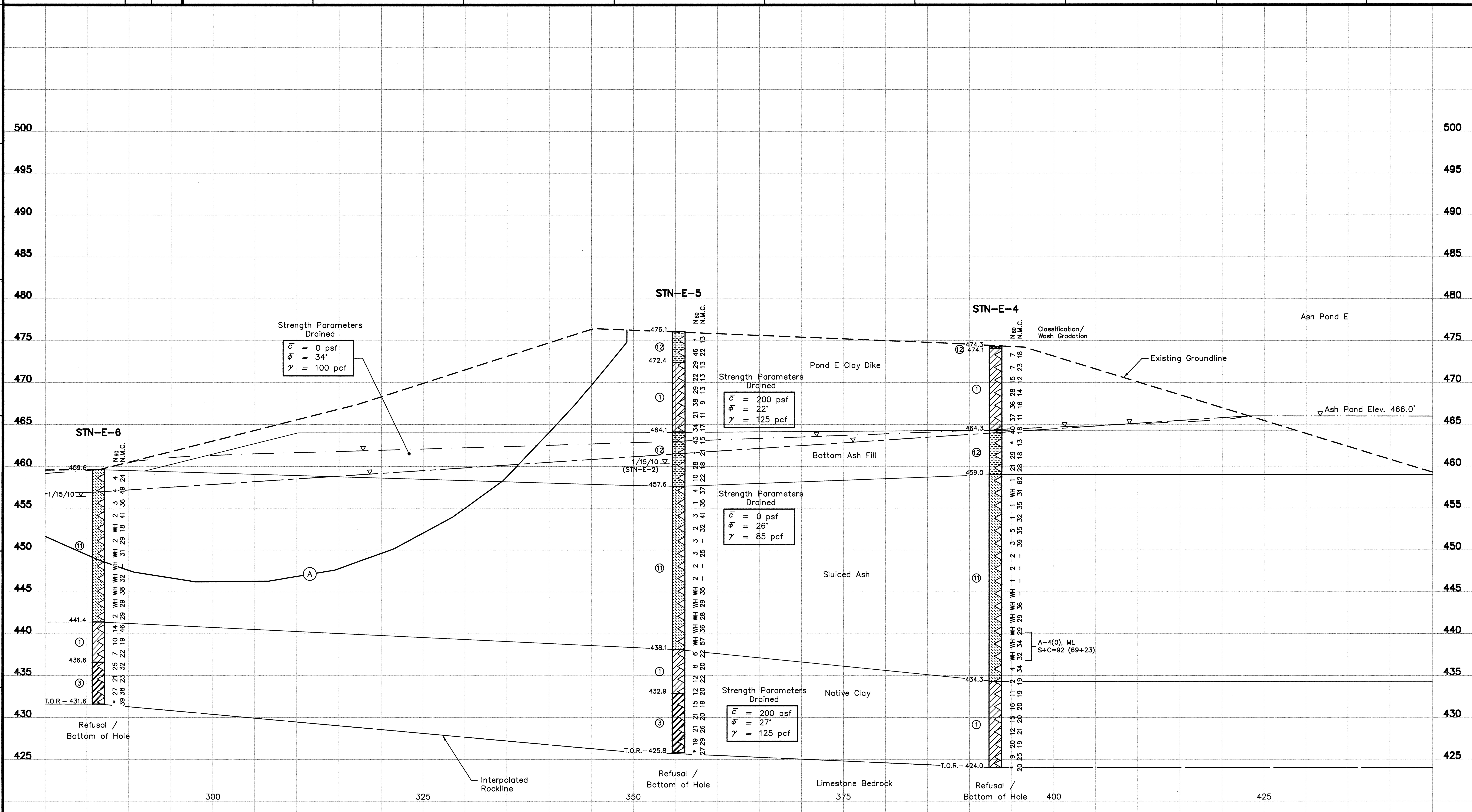
GALLATIN FOSSIL PLANT
TENNESSEE VALLEY AUTHORITY
FOSSIL AND HYDRO ENGINEERING

AUTOCAD R 2000 | DATE 05/27/10 | 39 | C | 10W504-04 | R 0

STANTEC	0
TASK COMPLETED BY:	REV NO.

PLOT FACTOR:XX
W_TVA

C.A.D. DRAWING DO NOT ALTER MANUALLY



LEGEND

- ① Lean Clay, Sandy Lean Clay, Lean Clay With Sand
- ② Silty, Clayey Sand
- ③ Fat Clay, Fat Clay With Sand
- ④ Overburden
- ⑤ Silty Clay
- ⑥ Poorly Graded Sand
- ⑦ Silty Sand
- ⑧ Silt, Sandy Silt, Silt With Sand
- ⑨ Limestone
- ⑩ Well Graded Sand With Silt
- ⑪ Fly Ash
- ⑫ Bottom Ash

WH — Weight of Hammer
WR — Weight of Rods
◁ — Standard Penetration Test Interval
■ — Undisturbed Thin-Walled (Shelby) Tube Sample
N_{60} — Standard Penetration Test Blow Count with a 140 lb Safety Hammer (blows/ft.)
N_{80} — Standard Penetration Test Blow Count with a 140 lb Automatic Hammer (blows/ft.)
N.M.C. — Natural Moisture Content (%)
U.W.W. — Unit Weight Wet (lbs./cu.ft.)
U.W.D. — Unit Weight Dry (lbs./cu.ft.)
U.C./U.U. — Unconfined Compressive Strength (psf)/ Unconsolidated Undrained Triaxial Test (psf)
03/31/09 — Water Level and Date Recorded
— Phreatic Surface From Pz Data
— Phreatic Surface From Seepage Model
T.O.R.— Top Of Rock (Indicates The Beginning Of Rock-like Resistance To The Advancement Of The Augers. This May Indicate The Beginning Of Weathered Bedrock, Boulders Or Rock Remnants. An Exact Determination Cannot Be Made Without Performing Rock Coring.)
B.C.— Begin Rock Core
R.Q.D. Rock Quality Designation (%)
REC. Recovery (%)
Refusal — Auger Refusal Using A Carbide-tipped Tooth Auger Bit
No Refusal — No Refusal Encountered
* — Standard Penetration Test (SPT) terminated per ASTM D 1586-99. Refer To Typed Boring Log.

RECORD DRAWING

CONSOLIDATED UNDRAINED TRIAXIAL TEST RESULTS

Location	STN-E-4S	STN-E-8
Depth	5.0'-5.5'	5.4'-5.9'
φ̄	17.6°	
c̄	740 p.s.f.	

SUMMARY OF OFFSET BORINGS

BORING NO.	SURFACE ELEV.	BOTTOM OF HOLE DEPTH	PIEZOMETER SCREENED INTERVAL	UNDISTURBED "SHELBY" TUBE SAMPLE INTERVALS
STN-E-4S	474.3'	42.0'	N/A	5.0'-7.0', 15.0'-17.0' 20.0'-22.0', 35.0'-37.0' 40.0'-42.0'

SUMMARY OF STABILITY ANALYSES STATIC CONDITION

Failure Surface	Failure Mode	Failure Type	Factor of Safety
A	Circular Optimized With Phreatic Surface from Seepage Model	Global	1.5

For Supporting Design Calculations see FPGGAFFESCDX00000020100001

REV. NO.	DATE	DSGN	DRWN	CHKD	SUPV	RVWD	APPD	ISSD
R 0	05/27/10	PC	RP	PC	RLR	RLR	RLR	TJ

RECORD DRAWING

SCALE: 1"=5' EXCEPT AS NOTED

YARD
ASH POND/STILLING POND COMPLEX
GEOTECHNICAL EXPLORATION
STABILITY SECTION
CROSS-SECTION B

DESIGNED BY: P. COOPER | DRAWN BY: R. PETTY | CHECKED BY: P. COOPER | SUPERVISED BY: R. ROBERTS | REVIEWED BY: R. ROBERTS | APPROVED BY: R. ROBERTS | ISSUED BY: T. JOHNSON

RANDY LEE ROBERTS — REGISTERED ENGINEER — AGRICULTURE COMMERCE — STATE OF TENNESSEE
5/27/10

Stantec Consulting Services Inc.
1901 Nelson Miller Pky.
Louisville, Kentucky 40223-2177
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GALLATIN FOSSIL PLANT
TENNESSEE VALLEY AUTHORITY
FOSSIL AND HYDRO ENGINEERING

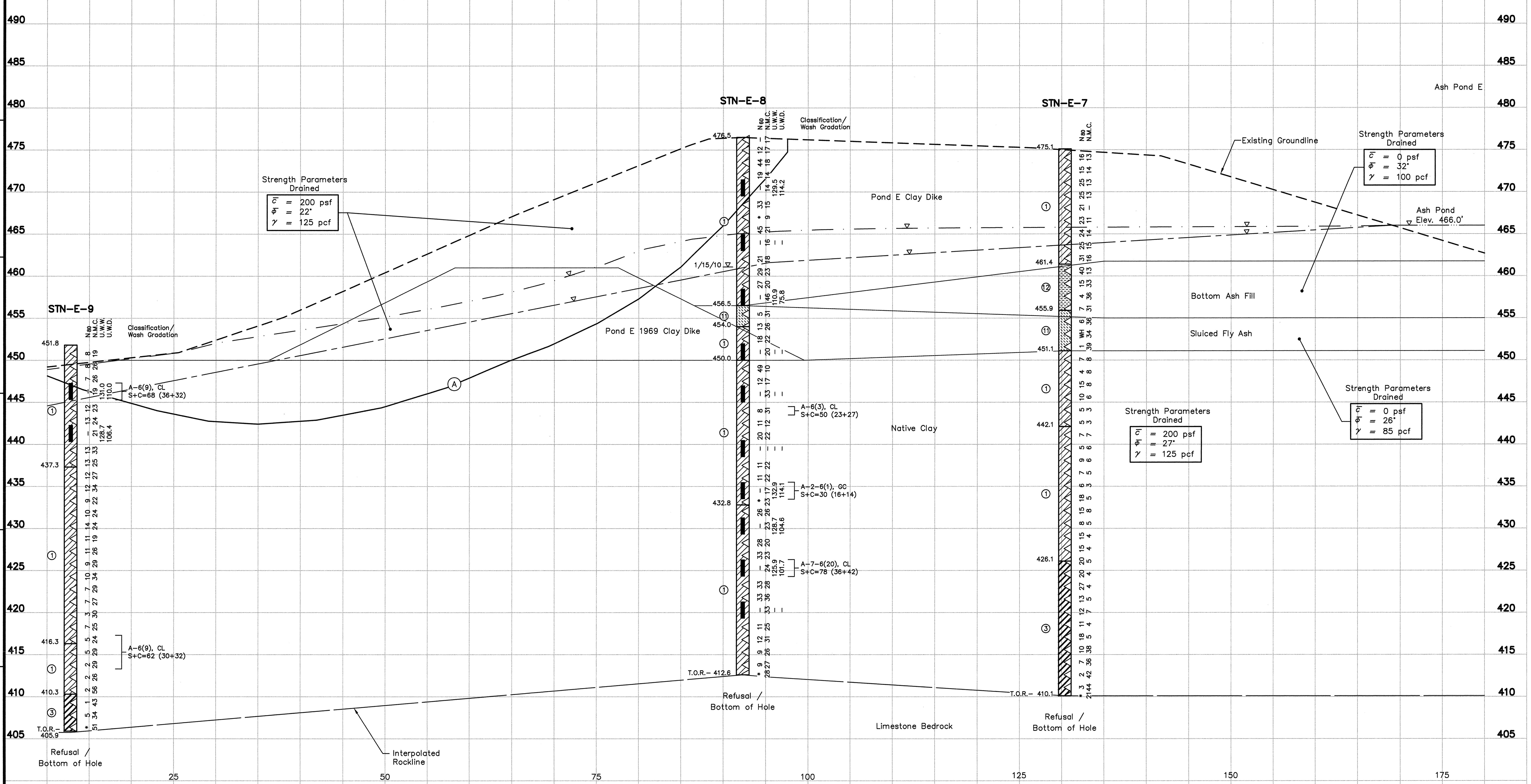
AUTOCAD R 2000 | DATE 05/27/10 | 39 | C | 10W504-05 | R 0

STANTEC | 0
TASK COMPLETED BY: | REV NO.

PLOT FACTOR:XX
W_TVA

C.A.D. DRAWING DO NOT ALTER MANUALLY

10W504-06 | 39 | C



LEGEND

①	Lean Clay, Sandy Lean Clay, Lean Clay With Sand
②	Silty, Clayey Sand
③	Fat Clay, Fat Clay With Sand
④	Overburden
⑤	Silty Clay
⑥	Poorly Graded Sand
⑦	Silty Sand
⑧	Silt, Sandy Silt, Silt With Sand
⑨	Limestone
⑩	Well Graded Sand With Silt
⑪	Fly Ash
⑫	Bottom Ash
WH	Weight of Hammer
WR	Weight of Rods
◁	Standard Penetration Test Interval
■	Undisturbed Thin-Walled (Shelby) Tube Sample
N_{60}	Standard Penetration Test Blow Count with a 140 lb Safety Hammer (blows/ft.)
N_{80}	Standard Penetration Test Blow Count with a 140 lb Automatic Hammer (blows/ft.)
N.M.C.	Natural Moisture Content (%)
U.W.W.	Unit Weight Wet (lbs./cu.ft.)
U.W.D.	Unit Weight Dry (lbs./cu.ft.)
U.C./U.U.	Unconfined Compressive Strength (psf)/ Unconsolidated Undrained Triaxial Test (psf)
03/31/09 ▽	Water Level and Date Recorded
▽	Phreatic Surface From Pz Data
▽	Phreatic Surface From Seepage Model
T.O.R.–	Top Of Rock (Indicates The Beginning Of Rock-like Resistance To The Advancement Of The Augers. This May Indicate The Beginning Of Weathered Bedrock, Boulders Or Rock Remnants. An Exact Determination Cannot Be Made Without Performing Rock Coring.)
B.C.–	Begin Rock Core
R.Q.D.	Rock Quality Designation (%)
REC.	Recovery (%)
Refusal	Auger Refusal Using A Carbide-tipped Tooth Auger Bit
No Refusal	No Refusal Encountered
•	Standard Penetration Test (SPT) terminated per ASTM D 1586-99. Refer To Typed Boring Log.

RECORD DRAWING

CONSOLIDATED UNDRAINED TRIAXIAL TEST RESULTS

Location	STN-E-8		
Depth	41.0'-41.5'	41.6'-42.1'	45.2'-45.7'
φ̄	26.6°		
c̄	360 p.s.f.		
Location	STN-E-9		
Depth	9.5'-10.0'	10.1'-10.6'	10.7'-11.2'
φ̄	28.8°		
c̄	640 p.s.f.		

SUMMARY OF OFFSET BORINGS

BORING NO.	SURFACE ELEV.	BOTTOM OF HOLE DEPTH	PIEZOMETER SCREENED INTERVAL	UNDISTURBED "SHELBY" TUBE SAMPLE INTERVALS
STN-E-8S	476.5'	30.5'	20.0'-30.0'	N/A

SUMMARY OF STABILITY ANALYSES STATIC CONDITION

Failure Surface	Failure Mode	Failure Type	Factor of Safety
A	Circular Optimized With Phreatic Surface from Seepage Model	Global	1.6

For Supporting Design Calculations see FPGGAFFESCDX00000020100001

R –	–	–	–	–	–	–	–	–	–	–	–
R 0	05/27/10	PC	RP	PC	RLR	RLR	RLR	TJ	–	–	–
RECORD DRAWING											
REV. NO.	DATE	DSGN	DRWN	CHKD	SUPV	RVWD	APPD	ISSD	PROJECT ID	AS CONST	REV CD

DISCIPLINE INTERFACE 1 2 3 4

SCALE: 1"=5' EXCEPT AS NOTED

YARD
ASH POND/STILLING POND COMPLEX

GEOTECHNICAL EXPLORATION
STABILITY SECTION
CROSS-SECTION C

RANDY LEE ROBERTS REGISTERED ENGINEER AGRICULTURE COMMERCE No. 113825 STATE OF TENNESSEE
5/27/10

DESIGNED BY:	DRAWN BY:	CHECKED BY:	SUPERVISED BY:	REVIEWED BY:	APPROVED BY:	ISSUED BY:
P. COOPER	R. PETTY	P. COOPER	R. ROBERTS	R. ROBERTS	R. ROBERTS	T. JOHNSON

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GALLATIN FOSSIL PLANT
TENNESSEE VALLEY AUTHORITY
FOSSIL AND HYDRO ENGINEERING

AUTOCAD R 2000 | DATE 05/27/10 | 39 | C | 10W504-06 | R 0

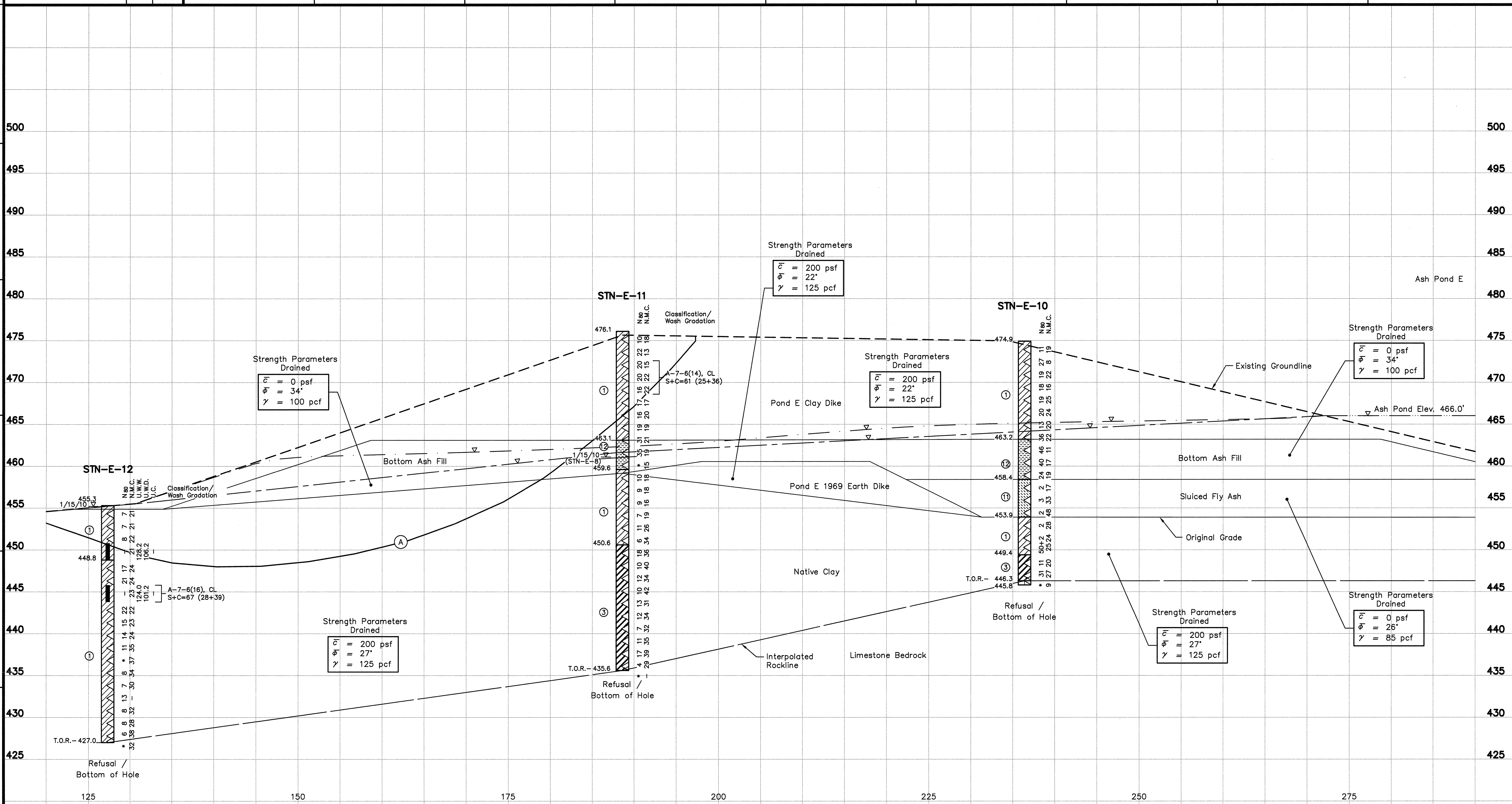
STANTEC	0
TASK COMPLETED BY:	REV NO.

PLOT FACTOR:XX
W_TVA

C.A.D. DRAWING
DO NOT ALTER MANUALLY

PLOT DATE: 05/20/2010 USER: BRADSHAW, STEVEN

39 C 10W504-07



LEGEND

①	Lean Clay, Sandy Lean Clay, Lean Clay With Sand
②	Silty, Clayey Sand
③	Fat Clay, Fat Clay With Sand
④	Overburden
⑤	Silty Clay
⑥	Poorly Graded Sand
⑦	Silty Sand
⑧	Silt, Sandy Silt, Silt With Sand
⑨	Limestone
⑩	Well Graded Sand With Silt
⑪	Fly Ash
⑫	Bottom Ash
WH	Weight of Hammer
WR	Weight of Rods
◁	Standard Penetration Test Interval
■	Undisturbed Thin-Walled (Shelby) Tube Sample
N_{60}	Standard Penetration Test Blow Count with a 140 lb Safety Hammer (blows/ft.)
N_{80}	Standard Penetration Test Blow Count with a 140 lb Automatic Hammer (blows/ft.)
N.M.C.	Natural Moisture Content (%)
U.W.W.	Unit Weight Wet (lbs./cu.ft.)
U.W.D.	Unit Weight Dry (lbs./cu.ft.)
U.C./U.U.	Unconfined Compressive Strength (psf)/ Unconsolidated Undrained Triaxial Test (psf)
03/31/09 ▽	Water Level and Date Recorded
▽	Phreatic Surface From Pz Data
▽	Phreatic Surface From Seepage Model
T.O.R.–	Top Of Rock (Indicates The Beginning Of Rock-like Resistance To The Advancement Of The Augers. This May Indicate The Beginning Of Weathered Bedrock, Boulders Or Rock Remnants. An Exact Determination Cannot Be Made Without Performing Rock Coring.)
B.C.–	Begin Rock Core
R.Q.D.	Rock Quality Designation (%)
REC.	Recovery (%)
Refusal	Auger Refusal Using A Carbide-tipped Tooth Auger Bit
No Refusal	No Refusal Encountered
*	Standard Penetration Test (SPT) terminated per ASTM D 1586-99. Refer To Typed Boring Log.

RECORD DRAWING

CONSOLIDATED UNDRAINED TRIAXIAL TEST RESULTS

Location	STN-E-10S		
Depth	25.0'–25.5	25.5'–26.0'	26.2'–26.7'
φ̄	37.1°		
c̄	70 p.s.f.		

SUMMARY OF OFFSET BORINGS

BORING NO.	SURFACE ELEV.	BOTTOM OF HOLE DEPTH	PIEZOMETER SCREENED INTERVAL	UNDISTURBED "SHELBY" TUBE SAMPLE INTERVALS
STN-E-10S	474.9'	27.0'	N/A	2.0'–4.0', 5.0'–7.0' 18.0'–10.0', 17.0'–19.0' 21.0'–23.0', 25.0'–27.0'

SUMMARY OF STABILITY ANALYSES STATIC CONDITION

Failure Surface	Failure Mode	Failure Type	Factor of Safety
A	Circular Optimized With Phreatic Surface from Seepage Model	Global	2.0

For Supporting Design Calculations see FPGGAFFESCDX00000020100001

R 0 | 05/27/10 | PC | RP | PC | RLR | RLR | RLR | TJ
RECORD DRAWING

SCALE: 1"=5' EXCEPT AS NOTED

YARD
ASH POND/STILLING POND COMPLEX
GEOTECHNICAL EXPLORATION
STABILITY SECTION
CROSS-SECTION D

DESIGNED BY: P. COOPER | DRAWN BY: R. PETTY | CHECKED BY: P. COOPER | SUPERVISED BY: R. ROBERTS | REVIEWED BY: R. ROBERTS | APPROVED BY: R. ROBERTS | ISSUED BY: T. JOHNSON

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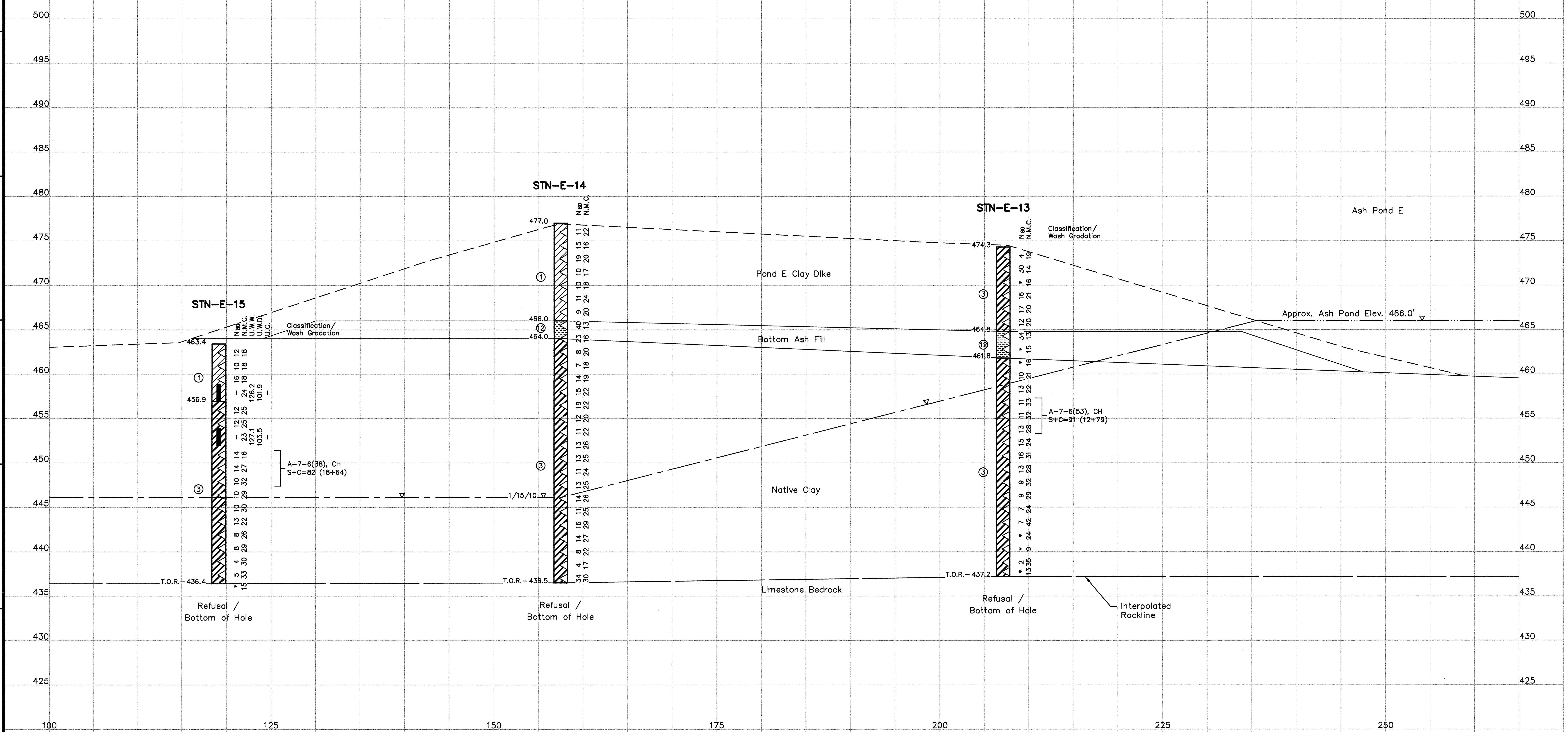
GALLATIN FOSSIL PLANT
TENNESSEE VALLEY AUTHORITY
FOSSIL AND HYDRO ENGINEERING

AUTOCAD R 2000 | DATE 05/27/10 | 39 | C | 10W504-07 | R 0

STANTEC | 0
TASK COMPLETED BY: | REV NO.

PLOT FACTOR:XX
W_TVA

C.A.D. DRAWING
DO NOT ALTER MANUALLY



LEGEND

① Lean Clay, Sandy Lean Clay, Lean Clay With Sand
② Silty, Clayey Sand
③ Fat Clay, Fat Clay With Sand
④ Overburden
⑤ Silty Clay
⑥ Poorly Graded Sand
⑦ Silty Sand
⑧ Silt, Sandy Silt, Silt With Sand
⑨ Limestone
⑩ Well Graded Sand With Silt
⑪ Fly Ash
⑫ Bottom Ash

WH	Weight of Hammer
WR	Weight of Rods
◁	Standard Penetration Test Interval
■	Undisturbed Thin-Walled (Shelby) Tube Sample
N_{60}	Standard Penetration Test Blow Count with a 140 lb Safety Hammer (blows/ft.)
N_{80}	Standard Penetration Test Blow Count with a 140 lb Automatic Hammer (blows/ft.)
N.M.C.	Natural Moisture Content (%)
U.W.W.	Unit Weight Wet (lbs./cu.ft.)
U.W.D.	Unit Weight Dry (lbs./cu.ft.)
U.C./U.U.	Unconfined Compressive Strength (psf)/ Unconsolidated Undrained Triaxial Test (psf)
03/31/09 ▽	Water Level and Date Recorded
— ▽ —	Phreatic Surface From Pz Data
— ▽ —	Phreatic Surface From Seepage Model
T.O.R.–	Top Of Rock (Indicates The Beginning Of Rock-like Resistance To The Advancement Of The Augers. This May Indicate The Beginning Of Weathered Bedrock, Boulders Or Rock Remnants. An Exact Determination Cannot Be Made Without Performing Rock Coring.)
B.C.–	Begin Rock Core
R.Q.D.	Rock Quality Designation (%)
REC.	Recovery (%)
Refusal	Auger Refusal Using A Carbide-tipped Tooth Auger Bit
No Refusal	No Refusal Encountered
•	Standard Penetration Test (SPT) terminated per ASTM D 1586-99. Refer To Typed Boring Log.

RECORD DRAWING

CONSOLIDATED UNDRAINED TRIAXIAL TEST RESULTS

Location	STN-E-13S		
Depth	20.0'–20.5'	20.6'–21.1'	25.0'–25.5'
$\bar{\phi}$	18.4°		
$\bar{c}$	700 p.s.f.		
Location	STN-E-14S		
Depth	2.0'–2.5'	2.6'–3.1'	5.7'–6.2'
$\bar{\phi}$	21.5°		
$\bar{c}$	480 p.s.f.		
Location	STN-E-15		
Depth	9.7'–10.2'	10.3'–10.8'	10.9'–11.4'
$\bar{\phi}$	26.3°		
$\bar{c}$	380 p.s.f.		

SUMMARY OF OFFSET BORINGS

BORING NO.	SURFACE ELEV.	BOTTOM OF HOLE DEPTH	PIEZOMETER SCREENED INTERVAL	UNDISTURBED "SHELBY" TUBE SAMPLE INTERVALS
STN-E-13S	474.3'	34.0'	N/A	2.0'–4.0', 5.0'–7.0' 10.0'–12.0', 15.0'–17.0' 20.0'–22.0', 25.0'–27.0' 30.0'–32.0'
STN-E-14S	477.0'	7.0'	N/A	2.0'–4.0', 5.0'–7.0'

For Supporting Design Calculations see FPGGAFFESCDX00000020100001

RANDY LEE ROBERTS — REGISTERED ENGINEER — AGRICULTURE — STATE OF TENNESSEE
5/27/10

REV. NO.	DATE	DSGN	DRWN	CHKD	SUPV	RVWD	APPD	ISSD
R 0	05/27/10	PC	RP	PC	RLR	RLR	RLR	TJ

RECORD DRAWING

SCALE: 1"=5' EXCEPT AS NOTED

YARD
ASH POND/STILLING POND COMPLEX
GEOTECHNICAL EXPLORATION
STABILITY SECTION
CROSS-SECTION E

DESIGNED BY:	DRAWN BY:	CHECKED BY:	SUPERVISED BY:	REVIEWED BY:	APPROVED BY:	ISSUED BY:
P. COOPER	R. PETTY	P. COOPER	R. ROBERTS	R. ROBERTS	R. ROBERTS	T. JOHNSON

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www.stantec.com

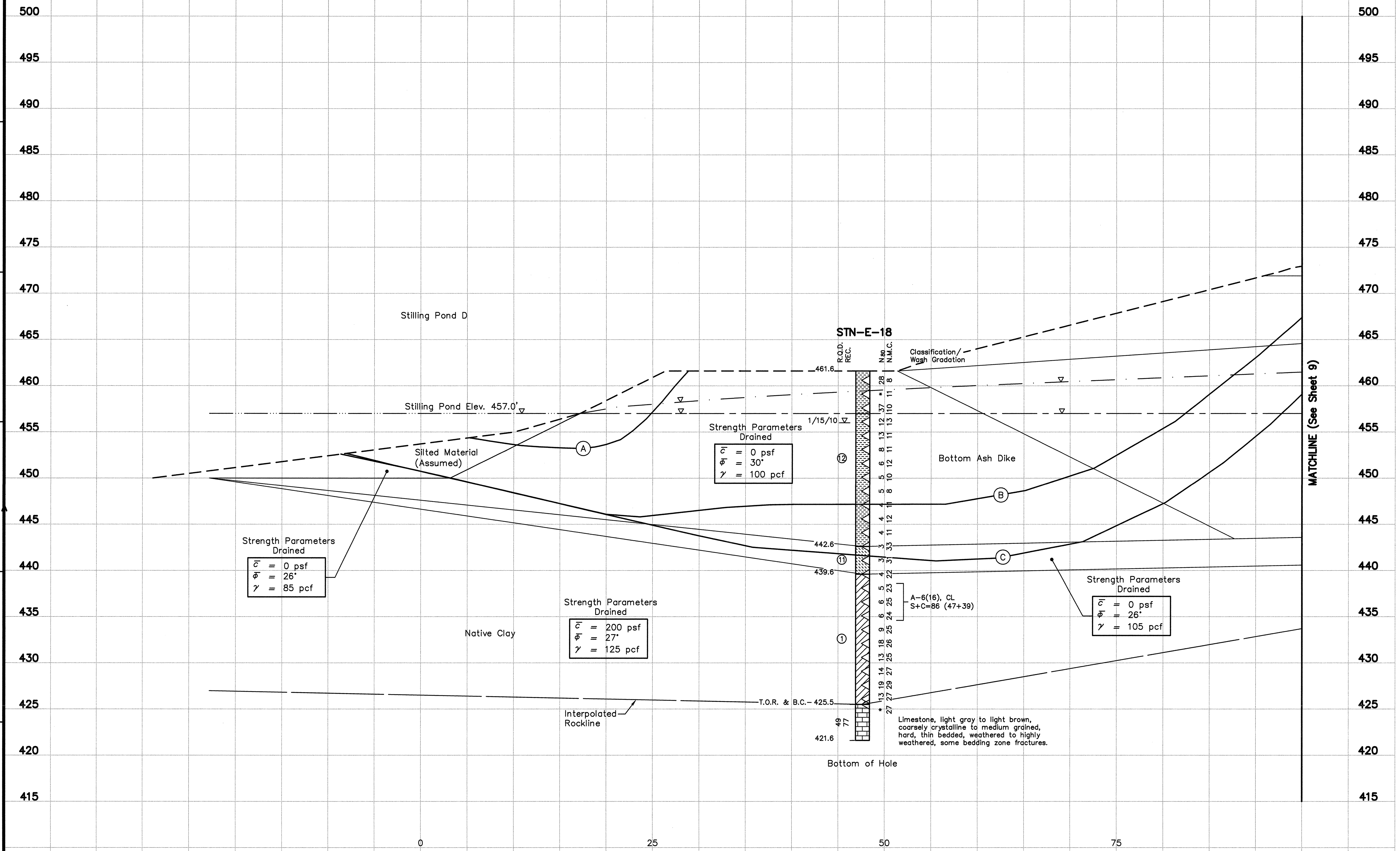
GALLATIN FOSSIL PLANT
TENNESSEE VALLEY AUTHORITY
FOSSIL AND HYDRO ENGINEERING

AUTOCAD R 2000 | DATE 05/27/10 | 39 | C | 10W504-08 | R 0

STANTEC | 0
TASK COMPLETED BY: | REV NO.

PLOT FACTOR:XX
W_TVA

C.A.D. DRAWING
DO NOT ALTER MANUALLY



LEGEND

- ① Lean Clay, Sandy Lean Clay, Lean Clay With Sand
- ② Silty, Clayey Sand
- ③ Fat Clay, Fat Clay With Sand
- ④ Overburden
- ⑤ Silty Clay
- ⑥ Poorly Graded Sand
- ⑦ Silty Sand
- ⑧ Silt, Sandy Silt, Silt With Sand
- ⑨ Limestone
- ⑩ Well Graded Sand With Silt
- ⑪ Fly Ash
- ⑫ Bottom Ash

WH	Weight of Hammer
WR	Weight of Rods
◁	Standard Penetration Test Interval
■	Undisturbed Thin–Walled (Shelby) Tube Sample
N_{60}	Standard Penetration Test Blow Count with a 140 lb Safety Hammer (blows/ft.)
N_{80}	Standard Penetration Test Blow Count with a 140 lb Automatic Hammer (blows/ft.)
N.M.C.	Natural Moisture Content (%)
U.W.W.	Unit Weight Wet (lbs./cu.ft.)
U.W.D.	Unit Weight Dry (lbs./cu.ft.)
U.C./U.U.	Unconfined Compressive Strength (psf)/ Unconsolidated Undrained Triaxial Test (psf)
03/31/09 ▽	Water Level and Date Recorded
— ▽ —	Phreatic Surface From Pz Data
— ▽ —	Phreatic Surface From Seepage Model
T.O.R.–	Top Of Rock (Indicates The Beginning Of Rock–like Resistance To The Advancement Of The Augers. This May Indicate The Beginning Of Weathered Bedrock, Boulders Or Rock Remnants. An Exact Determination Cannot Be Made Without Performing Rock Coring.)
B.C.–	Begin Rock Core
R.Q.D.	Rock Quality Designation (%)
REC.	Recovery (%)
Refusal	Auger Refusal Using A Carbide–tipped Tooth Auger Bit
No Refusal	No Refusal Encountered
•	Standard Penetration Test (SPT) terminated per ASTM D 1586–99. Refer To Typed Boring Log.

RECORD DRAWING

CONSOLIDATED UNDRAINED TRIAXIAL TEST RESULTS			
Location	STN–E–16S		
Depth	5.0'–5.5'	5.6'–6.1'	7.7'–8.2'
$\bar{\phi}$	22.0°		
$\bar{c}$	340 p.s.f.		
Location	STN–E–16S		
Depth	33.0'–33.5'	33.6'–34.1'	34.2'–34.7'
$\bar{\phi}$	34.3°		
$\bar{c}$	160 p.s.f.		

SUMMARY OF OFFSET BORINGS

BORING NO.	SURFACE ELEV.	BOTTOM OF HOLE DEPTH	PIEZOMETER SCREENED INTERVAL	UNDISTURBED "SHELBY" TUBE SAMPLE INTERVALS
STN–E–16S	474.5'	56.0'	N/A	5.0'–7.0', 7.0'–9.0' 9.0'–11.0', 29.0'–31.0' 31.0'–33.0', 33.0'–35.0' 36.0'–38.0', 40.0'–42.0' 44.0'–46.0', 48.0'–50.0' 52.0'–54.0', 54.0'–56.0'
STN–E–18S	461.6'	20.0'	10.0'–20.0'	N/A

SUMMARY OF STABILITY ANALYSES STATIC CONDITION			
Failure Surface	Failure Mode	Failure Type	Factor of Safety
A	Circular Optimized With Phreatic Surface From Seepage Model	Non–Global	1.1
B	Circular Optimized With Phreatic Surface From Seepage Model	Global	2.0
C	Noncircular Optimized With Phreatic Surface From Seepage Model	Global	2.0

For Supporting Design Calculations see FPGGAFFESCDX00000020100001

REV. NO.	DATE	DSGN	DRWN	CHKD	SUPV	RVWD	APPD	ISSD	PROJECT ID	AS CONST	REV CD
R –	–	–	–	–	–	–	–	–	–	–	–
R 0	05/27/10	PC	RP	PC	RLR	RLR	RLR	TJ	–	–	–

RECORD DRAWING

DISCIPLINE INTERFACE 1 2 3 4

SCALE: 1"=5' EXCEPT AS NOTED

YARD
ASH POND/STILLING POND COMPLEX

GEOTECHNICAL EXPLORATION STABILITY SECTION CROSS–SECTION F

RANDY LEE ROBERTS REGISTERED ENGINEER AGRICULTURE COMMERCE No. 113825 STATE OF TENNESSEE

5/27/10

DESIGNED BY:	DRAWN BY:	CHECKED BY:	SUPERVISED BY:	REVIEWED BY:	APPROVED BY:	ISSUED BY:
P. COOPER	R. PETTY	P. COOPER	R. ROBERTS	R. ROBERTS	R. ROBERTS	T. JOHNSON

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GALLATIN FOSSIL PLANT
TENNESSEE VALLEY AUTHORITY
FOSSIL AND HYDRO ENGINEERING

AUTOCAD R 2000 | DATE 05/27/10 | 39 | C | 10W504–09 | R 0

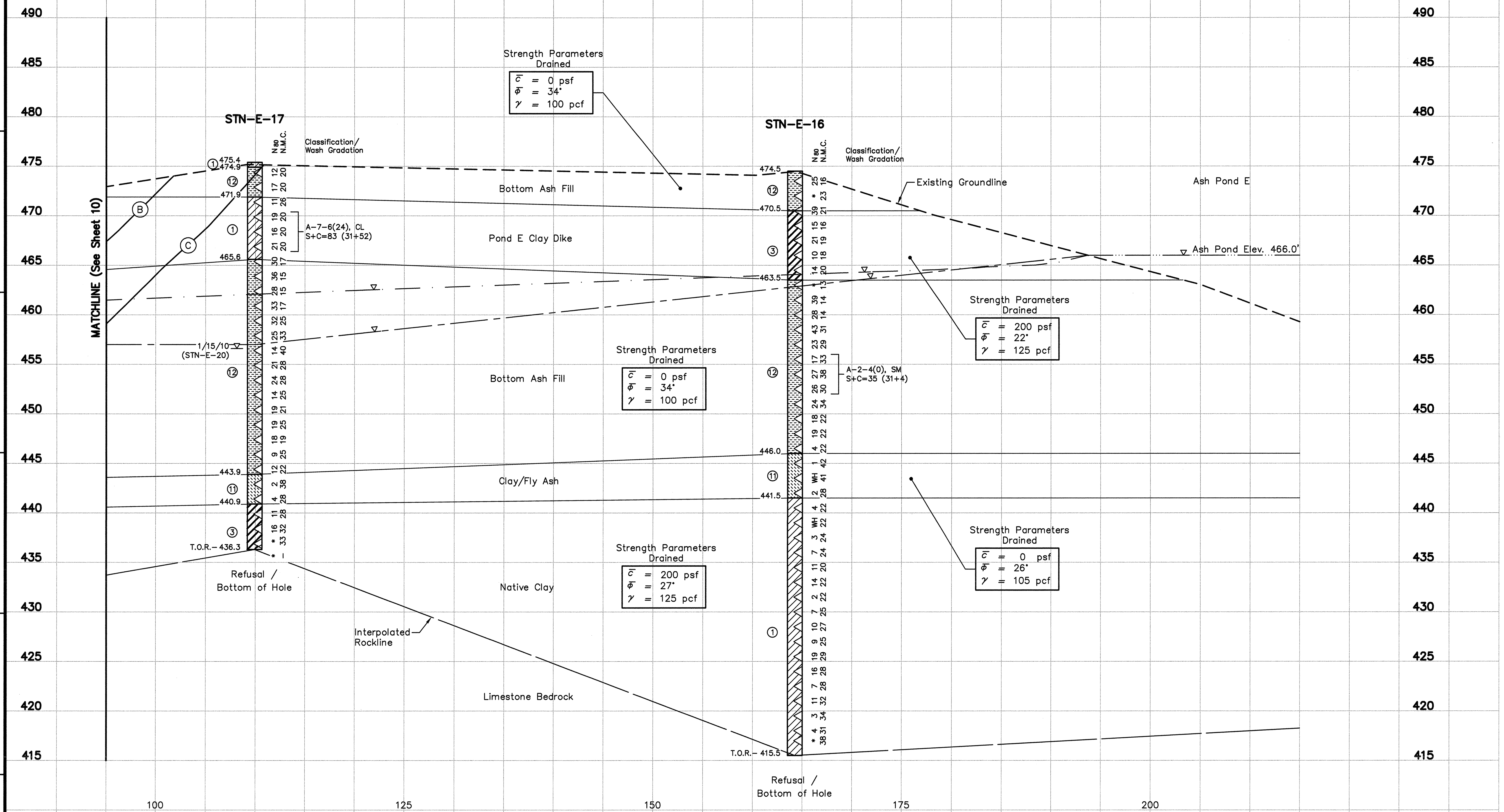
STANTEC | 0
TASK COMPLETED BY: | REV NO.

PLOT FACTOR:XX
W_TVA

C.A.D. DRAWING
DO NOT ALTER MANUALLY

PLOT DATE: 05/20/2010

39 | C | 10W504-10



LEGEND

① Lean Clay, Sandy Lean Clay, Lean Clay With Sand
② Silty, Clayey Sand
③ Fat Clay, Fat Clay With Sand
④ Overburden
⑤ Silty Clay
⑥ Poorly Graded Sand
⑦ Silty Sand
⑧ Silt, Sandy Silt, Silt With Sand
⑨ Limestone
⑩ Well Graded Sand With Silt
⑪ Fly Ash
⑫ Bottom Ash

WH Weight of Hammer
WR Weight of Rods
◁ Standard Penetration Test Interval
■ Undisturbed Thin-Walled (Shelby) Tube Sample
N_{60} Standard Penetration Test Blow Count with a 140 lb Safety Hammer (blows/ft.)
N_{80} Standard Penetration Test Blow Count with a 140 lb Automatic Hammer (blows/ft.)
N.M.C. Natural Moisture Content (%)
U.W.W. Unit Weight Wet (lbs./cu.ft.)
U.W.D. Unit Weight Dry (lbs./cu.ft.)
U.C./U.U. Unconfined Compressive Strength (psf)/ Unconsolidated Undrained Triaxial Test (psf)
03/31/09 Water Level and Date Recorded
Phreatic Surface From Pz Data
Phreatic Surface From Seepage Model
T.O.R.– Top Of Rock (Indicates The Beginning Of Rock-like Resistance To The Advancement Of The Augers. This May Indicate The Beginning Of Weathered Bedrock, Boulders Or Rock Remnants. An Exact Determination Cannot Be Made Without Performing Rock Coring.)
B.C.– Begin Rock Core
R.Q.D. Rock Quality Designation (%)
REC. Recovery (%)
Refusal Auger Refusal Using A Carbide-tipped Tooth Auger Bit
No Refusal No Refusal Encountered
* Standard Penetration Test (SPT) terminated per ASTM D 1586-99. Refer To Typed Boring Log.

RECORD DRAWING

CONSOLIDATED UNDRAINED TRIAXIAL TEST RESULTS			
Location	STN-E-16S		
Depth	5.0'-5.5'	5.6'-6.1'	7.7'-8.2'
$\bar{\phi}$	22.0°		
$\bar{c}$	340 p.s.f.		
Location	STN-E-16S		
Depth	33.0'-33.5'	33.6'-34.1'	34.2'-34.7'
$\bar{\phi}$	34.3°		
$\bar{c}$	160 p.s.f.		

SUMMARY OF OFFSET BORINGS

BORING NO.	SURFACE ELEV.	BOTTOM OF HOLE DEPTH	PIEZOMETER SCREENED INTERVAL	UNDISTURBED "SHELBY" TUBE SAMPLE INTERVALS
STN-E-16S	474.5'	56.0'	N/A	5.0'-7.0', 7.0'-9.0' 9.0'-11.0', 29.0'-31.0' 31.0'-33.0', 33.0'-35.0' 36.0'-38.0', 40.0'-42.0' 44.0'-46.0', 48.0'-50.0' 52.0'-54.0', 54.0'-56.0'
STN-E-18S	461.6'	20.0'	10.0'-20.0'	N/A

SUMMARY OF STABILITY ANALYSES STATIC CONDITION

Failure Surface	Failure Mode	Failure Type	Factor of Safety
A	Circular Optimized With Phreatic Surface From Seepage Model	Non-Global	1.1
B	Circular Optimized With Phreatic Surface From Seepage Model	Global	2.0
C	Noncircular Optimized With Phreatic Surface From Seepage Model	Global	2.0

For Supporting Design Calculations see FPGGAFFESCDX00000020100001

REV. NO.	DATE	DSGN	DRWN	CHKD	SUPV	RVWD	APPD	ISSD	PROJECT ID	AS CONST	REV CD
R –	–	–	–	–	–	–	–	–	–	–	–
R 0	05/27/10	PC	RP	PC	RLR	RLR	RLR	TJ	–	–	–

RECORD DRAWING

DISCIPLINE INTERFACE 1 2 3 4

SCALE: 1"=5' EXCEPT AS NOTED

YARD
ASH POND/STILLING POND COMPLEX

GEOTECHNICAL EXPLORATION
STABILITY SECTION
CROSS-SECTION F

RANDY LEE ROBERTS REGISTERED ENGINEER AGRICULTURE COMMERCE No. 113825 STATE OF TENNESSEE
5/27/10

DESIGNED BY:	DRAWN BY:	CHECKED BY:	SUPERVISED BY:	REVIEWED BY:	APPROVED BY:	ISSUED BY:
P. COOPER	R. PETTY	P. COOPER	R. ROBERTS	R. ROBERTS	R. ROBERTS	T. JOHNSON

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GALLATIN FOSSIL PLANT
TENNESSEE VALLEY AUTHORITY
FOSSIL AND HYDRO ENGINEERING

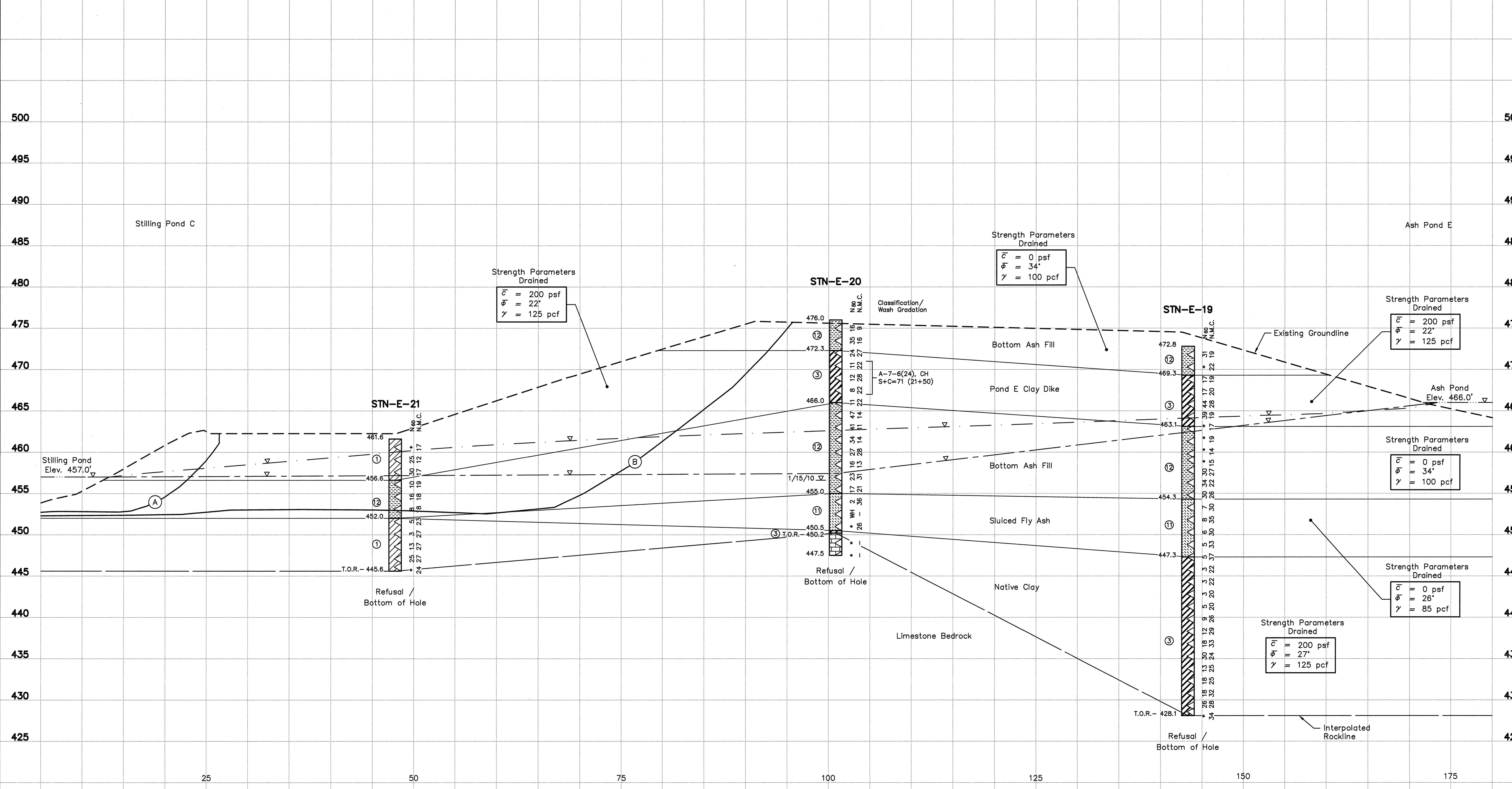
AUTOCAD R 2000 | DATE 05/27/10 | 39 | C | 10W504-10 | R 0

STANTEC | 0
TASK COMPLETED BY: | REV NO.

PLOT FACTOR:XX
W_TVA

C.A.D. DRAWING
DO NOT ALTER MANUALLY

PLOT DATE: 05/20/2010



LEGEND

① Lean Clay, Sandy Lean Clay, Lean Clay With Sand
② Silty, Clayey Sand
③ Fat Clay, Fat Clay With Sand
④ Overburden
⑤ Silty Clay
⑥ Poorly Graded Sand
⑦ Silty Sand
⑧ Silt, Sandy Silt, Silt With Sand
⑨ Limestone
⑩ Well Graded Sand With Silt
⑪ Fly Ash
⑫ Bottom Ash

WH	Weight of Hammer
WR	Weight of Rods
◁	Standard Penetration Test Interval
■	Undisturbed Thin-Walled (Shelby) Tube Sample
N_{60}	Standard Penetration Test Blow Count with a 140 lb Safety Hammer (blows/ft.)
N_{80}	Standard Penetration Test Blow Count with a 140 lb Automatic Hammer (blows/ft.)
N.M.C.	Natural Moisture Content (%)
U.W.W.	Unit Weight Wet (lbs./cu.ft.)
U.W.D.	Unit Weight Dry (lbs./cu.ft.)
U.C./U.U.	Unconfined Compressive Strength (psf)/ Unconsolidated Undrained Triaxial Test (psf)
03/31/09	Water Level and Date Recorded
	Phreatic Surface From Pz Data
	Phreatic Surface From Seepage Model
T.O.R.–	Top Of Rock (Indicates The Beginning Of Rock-like Resistance To The Advancement Of The Augers. This May Indicate The Beginning Of Weathered Bedrock, Boulders Or Rock Remnants. An Exact Determination Cannot Be Made Without Performing Rock Coring.)
B.C.–	Begin Rock Core
R.Q.D.	Rock Quality Designation (%)
REC.	Recovery (%)
Refusal	Auger Refusal Using A Carbide-tipped Tooth Auger Bit
No Refusal	No Refusal Encountered
*	Standard Penetration Test (SPT) terminated per ASTM D 1586-99. Refer To Typed Boring Log.

RECORD DRAWING

CONSOLIDATED UNDRAINED TRIAXIAL TEST RESULTS

Location	STN-E-20S		
Depth	4.0'–4.5'	6.0'–6.5'	6.6'–7.1'
φ̄	25.5°		
c̄	460 p.s.f.		
Location	STN-E-21S		
Depth	13.0'–13.5'	11.0–11.5'	11.6'–12.1'
φ̄	34.1°		
c̄	260 p.s.f.		

SUMMARY OF OFFSET BORINGS

BORING NO.	SURFACE ELEV.	BOTTOM OF HOLE DEPTH	PIEZOMETER SCREENED INTERVAL	UNDISTURBED "SHELBY" TUBE SAMPLE INTERVALS
STN-E-20S	476.0'	25.0'	N/A	4.0'–6.0', 6.0'–8.0' 21.0'–23.0', 23.0'–25.0'
STN-E-21S	461.6'	15.0'	N/A	5.0'–7.0', 7.0'–9.0' 9.0'–11.0', 11.0'–13.0' 13.0'–15.0'

SUMMARY OF STABILITY ANALYSES STATIC CONDITION

Failure Surface	Failure Mode	Failure Type	Factor of Safety
A	Circular Optimized With Phreatic Surface from Seepage Model	Non-Global	1.5
B	Noncircular Optimized With Phreatic Surface from Seepage Model	Global	2.2

For Supporting Design Calculations see FPGAFFESCDX00000020100001

RANDY LEE ROBERTS REGISTERED ENGINEER AGRICULTURE STATE OF TENNESSEE
5/27/10

REV. NO.	DATE	DSGN	DRWN	CHKD	SUPV	RVWD	APPD	ISSD	PROJECT	AS CONST
R 0	05/27/10	PC	RP	PC	RLR	RLR	RLR	TJ	–	–

RECORD DRAWING

SCALE: 1"=5' EXCEPT AS NOTED

YARD
ASH POND/STILLING POND COMPLEX
GEOTECHNICAL EXPLORATION
STABILITY SECTION
CROSS-SECTION G

DESIGNED BY:	DRAWN BY:	CHECKED BY:	SUPERVISED BY:	REVIEWED BY:	APPROVED BY:	ISSUED BY:
P. COOPER	R. PETTY	P. COOPER	R. ROBERTS	R. ROBERTS	R. ROBERTS	T. JOHNSON

Stantec

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www.stantec.com

GALLATIN FOSSIL PLANT
TENNESSEE VALLEY AUTHORITY
FOSSIL AND HYDRO ENGINEERING

AUTOCAD R 2000 | DATE 05/27/10 | 39 | C | 10W504-11 | R 0

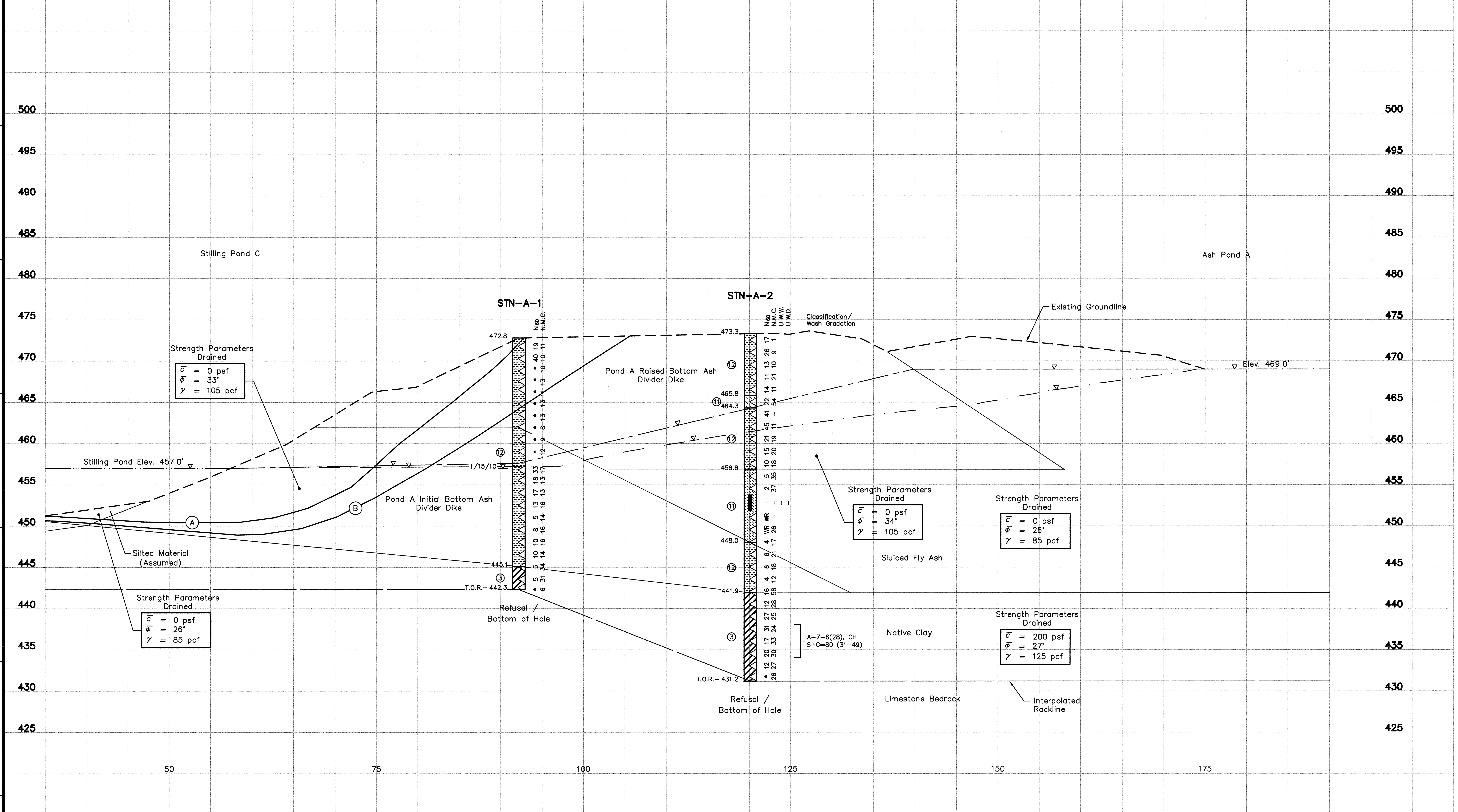
STANTEC	0
TASK COMPLETED BY:	REV NO.

PLOT FACTOR:XX
W_TVA

C.A.D. DRAWING
DO NOT ALTER MANUALLY

39 C 10W504-11

39 C 10W504-12



LEGEND

①	Lean Clay, Sandy Lean Clay, Lean Clay With Sand
②	Silty, Clayey Sand
③	Fat Clay, Fat Clay With Sand
④	Overburden
⑤	Silty Clay
⑥	Poorly Graded Sand
⑦	Silty Sand
⑧	Silt, Sandy Silt, Silt With Sand
⑨	Limestone
⑩	Well Graded Sand With Silt
⑪	Fly Ash
⑫	Bottom Ash
WH	Weight of Hammer
WR	Weight of Rods
◁	Standard Penetration Test Interval
■	Undisturbed Thin-Walled (Shelby) Tube Sample
N_{60}	Standard Penetration Test Blow Count with a 140 lb Safety Hammer (blows/ft.)
N_{80}	Standard Penetration Test Blow Count with a 140 lb Automatic Hammer (blows/ft.)
N.M.C.	Natural Moisture Content (%)
U.W.W.	Unit Weight Wet (lbs./cu.ft.)
U.W.D.	Unit Weight Dry (lbs./cu.ft.)
U.C./U.U.	Unconfined Compressive Strength (psf)/ Unconsolidated Undrained Triaxial Test (psf)
03/31/09 ▽	Water Level and Date Recorded
▽	Phreatic Surface From Pz Data
▽	Phreatic Surface From Seepage Model
T.O.R.-	Top Of Rock (Indicates The Beginning Of Rock-like Resistance To The Advancement Of The Augers. This May Indicate The Beginning Of Weathered Bedrock, Boulders Or Rock Remnants. An Exact Determination Cannot Be Made Without Performing Rock Coring.)
B.C.-	Begin Rock Core
R.Q.D.	Rock Quality Designation (%)
REC.	Recovery (%)
Refusal	Auger Refusal Using A Carbide-tipped Tooth Auger Bit
No Refusal	No Refusal Encountered
•	Standard Penetration Test (SPT) terminated per ASTM D 1586-99. Refer To Typed Boring Log.

RECORD DRAWING

SUMMARY OF STABILITY ANALYSES STATIC CONDITION

Failure Surface	Failure Mode	Failure Type	Factor of Safety
A	Circular Optimized With Phreatic Surface From Seepage Model	Non-Global	1.4
B	Circular Optimized With Phreatic Surface From Seepage Model	Global	1.5

For Supporting Design Calculations see FPGGAFFESCDX00000020100001

REV. NO.	DATE	DSGN	DRWN	CHKD	SUPV	RVWD	APPD	ISSD	PROJECT ID	AS CONST
R 0	05/27/10	PC	RP	PC	RLR	RLR	RLR	TJ	-	-

RECORD DRAWING

SCALE: 1"=5' EXCEPT AS NOTED

YARD
ASH POND/STILLING POND COMPLEX
GEOTECHNICAL EXPLORATION
STABILITY SECTION
CROSS-SECTION H

DESIGNED BY:	DRAWN BY:	CHECKED BY:	SUPERVISED BY:	REVIEWED BY:	APPROVED BY:	ISSUED BY:
P. COOPER	R. PETTY	P. COOPER	R. ROBERTS	R. ROBERTS	R. ROBERTS	T. JOHNSON

Randy Lee Roberts, Registered Engineer, State of Tennessee, 5/27/10

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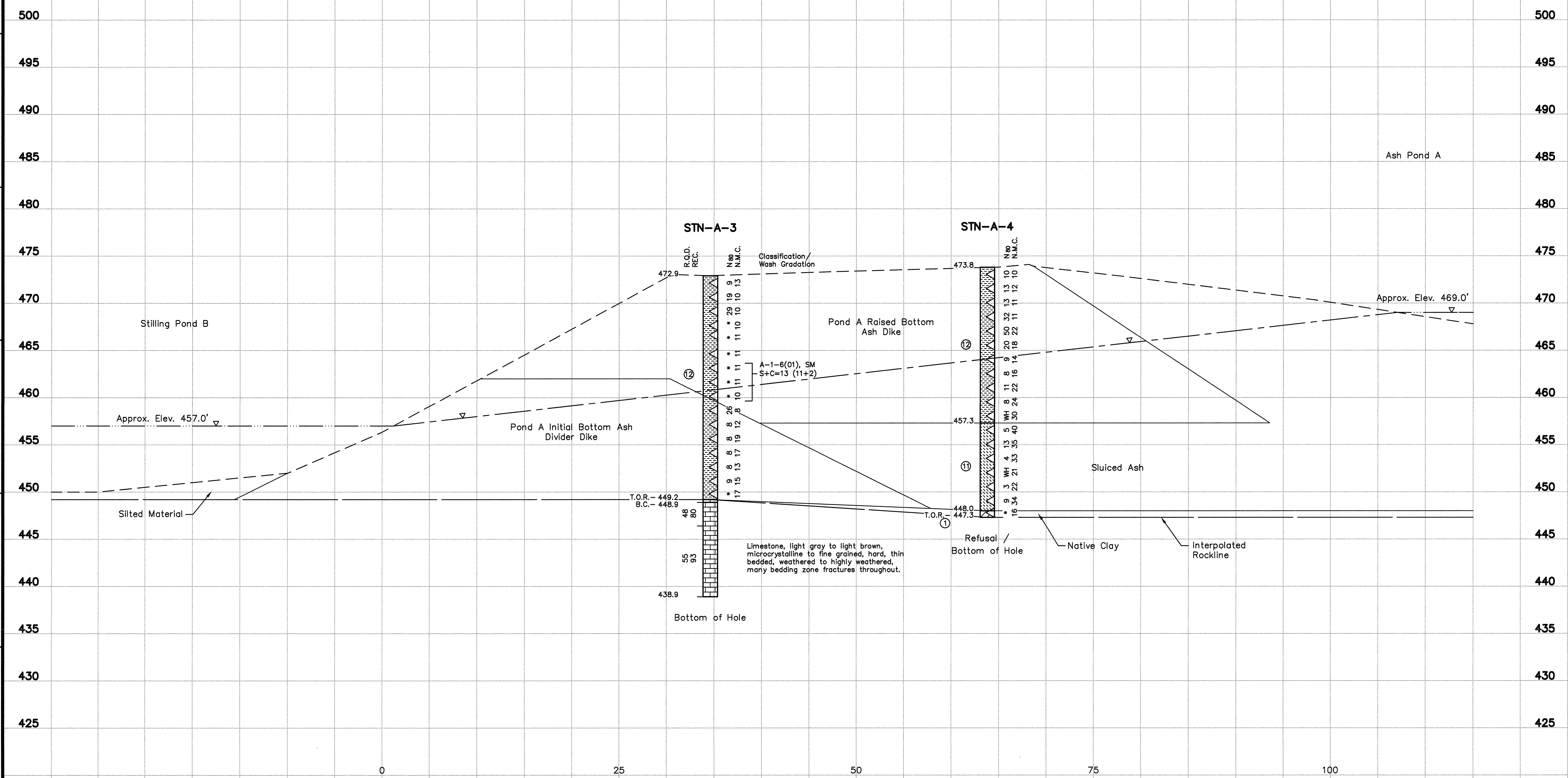
GALLATIN FOSSIL PLANT
TENNESSEE VALLEY AUTHORITY
FOSSIL AND HYDRO ENGINEERING

AUTOCAD R 2000 | DATE 05/27/10 | 39 | C | 10W504-12 | R 0

STANTEC | 0
TASK COMPLETED BY: | REV NO.

PLOT FACTOR:XX
W_TVA

C.A.D. DRAWING
DO NOT ALTER MANUALLY



LEGEND

1. Lean Clay, Sandy Lean Clay, Lean Clay With Sand
2. Silty, Clayey Sand
3. Fat Clay, Fat Clay With Sand
4. Overburden
5. Silty Clay
6. Poorly Graded Sand
7. Silty Sand
8. Silt, Sandy Silt, Silt With Sand
9. Limestone
10. Well Graded Sand With Silt
11. Fly Ash
12. Bottom Ash

WH	Weight of Hammer
WR	Weight of Rods
◁	Standard Penetration Test Interval
■	Undisturbed Thin-Walled (Shelby) Tube Sample
N_{60}	Standard Penetration Test Blow Count with a 140 lb Safety Hammer (blows/ft.)
N_{60}	Standard Penetration Test Blow Count with a 140 lb Automatic Hammer (blows/ft.)
N.M.C.	Natural Moisture Content (%)
U.W.W.	Unit Weight Wet (lbs./cu.ft.)
U.W.D.	Unit Weight Dry (lbs./cu.ft.)
U.C./U.U.	Unconfined Compressive Strength (psf)/ Unconsolidated Undrained Triaxial Test (psf)
03/31/09 ▽	Water Level and Date Recorded
▽	Phreatic Surface From Pz Data
▽	Phreatic Surface From Seepage Model
T.O.R.-	Top Of Rock (Indicates The Beginning Of Rock-like Resistance To The Advancement Of The Augers. This May Indicate The Beginning Of Weathered Bedrock, Boulders Or Rock Remnants. An Exact Determination Cannot Be Made Without Performing Rock Coring.)
B.C.-	Begin Rock Core
R.Q.D.	Rock Quality Designation (%)
REC.	Recovery (%)
Refusal	Auger Refusal Using A Carbide-tipped Tooth Auger Bit
No Refusal	No Refusal Encountered
•	Standard Penetration Test (SPT) terminated per ASTM D 1586-99. Refer To Typed Boring Log.

RECORD DRAWING

SUMMARY OF OFFSET BORINGS

BORING NO.	SURFACE ELEV.	BOTTOM OF HOLE DEPTH	PIEZOMETER SCREENED INTERVAL	UNDISTURBED "SHELBY" TUBE SAMPLE INTERVALS
STN-A-4S	473.8'	26.0'	N/A	6.0'-8.0', 16.5'-18.5' 20.0'-22.0', 23.5'-25.5'

For Supporting Design Calculations see FPGGAFFESCDX00000020100001

REV. NO.	DATE	DSGN	DRWN	CHKD	SUPV	RVWD	APPD	ISSD	PROJECT	AS CONST
R 0	05/27/10	PC	RP	PC	RLR	RLR	RLR	TJ	-	-

RECORD DRAWING

SCALE: 1"=5' EXCEPT AS NOTED

YARD
ASH POND/STILLING POND COMPLEX

GEOTECHNICAL EXPLORATION
STABILITY SECTION
CROSS-SECTION I

DESIGNED BY:	DRAWN BY:	CHECKED BY:	SUPERVISED BY:	REVIEWED BY:	APPROVED BY:	ISSUED BY:
P. COOPER	R. PETTY	P. COOPER	R. ROBERTS	R. ROBERTS	R. ROBERTS	T. JOHNSON

Randy Lee Roberts — Registered Engineer — State of Tennessee
5/27/10

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TENNESSEE VALLEY AUTHORITY
FOSSIL AND HYDRO ENGINEERING

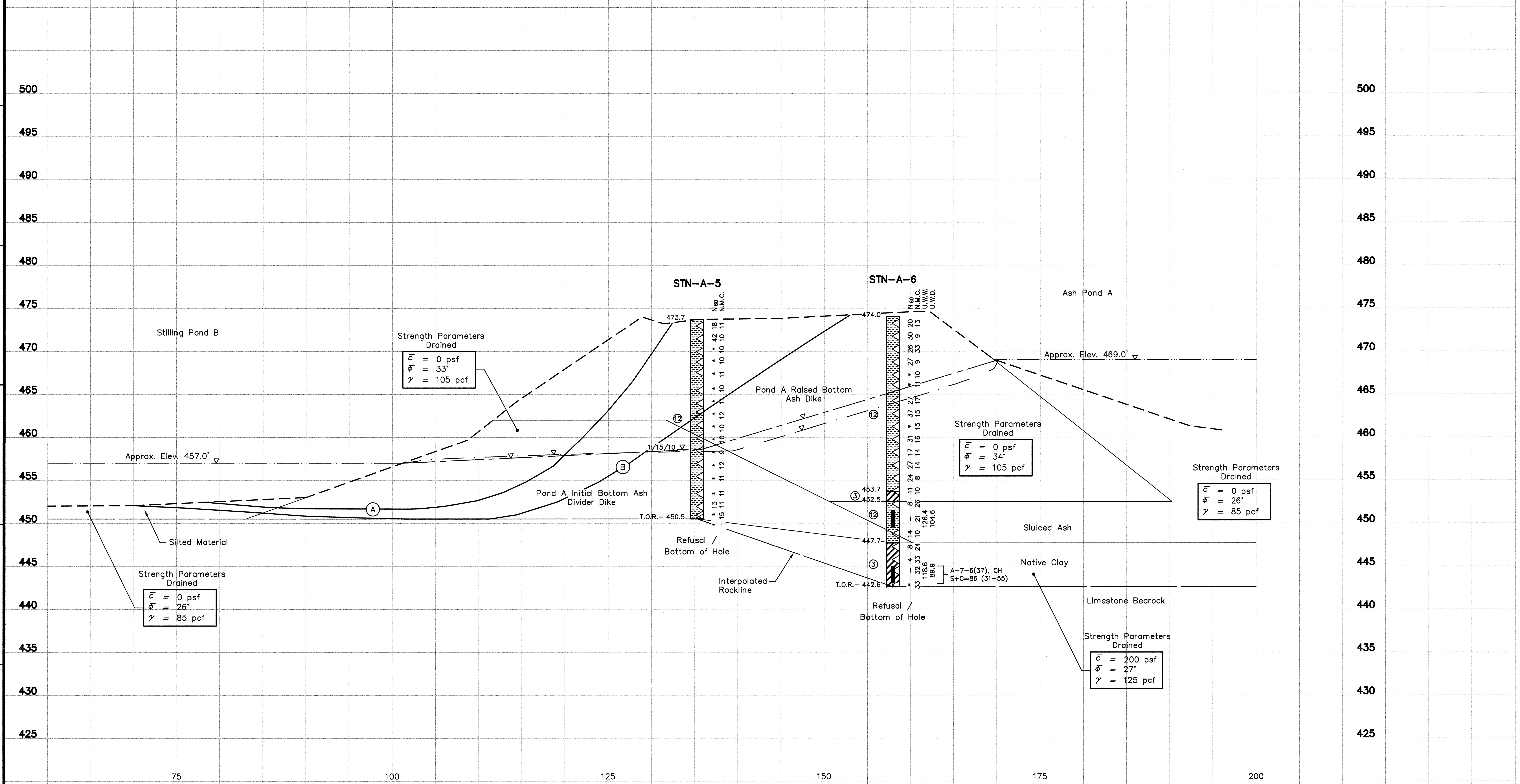
AUTOCAD R 2000 | DATE 05/27/10 | 39 | C | 10W504-13 | R 0

STANTEC | 0
TASK COMPLETED BY: | REV NO.

PLOT FACTOR:XX
W_TVA

C.A.D. DRAWING
DO NOT ALTER MANUALLY

39 C 10W504-14



LEGEND

- ① Lean Clay, Sandy Lean Clay, Lean Clay With Sand
- ② Silty, Clayey Sand
- ③ Fat Clay, Fat Clay With Sand
- ④ Overburden
- ⑤ Silty Clay
- ⑥ Poorly Graded Sand
- ⑦ Silty Sand
- ⑧ Silt, Sandy Silt, Silt With Sand
- ⑨ Limestone
- ⑩ Well Graded Sand With Silt
- ⑪ Fly Ash
- ⑫ Bottom Ash

WH	Weight of Hammer
WR	Weight of Rods
◁	Standard Penetration Test Interval
■	Undisturbed Thin–Walled (Shelby) Tube Sample
N_{60}	Standard Penetration Test Blow Count with a 140 lb Safety Hammer (blows/ft.)
N_{80}	Standard Penetration Test Blow Count with a 140 lb Automatic Hammer (blows/ft.)
N.M.C.	Natural Moisture Content (%)
U.W.W.	Unit Weight Wet (lbs./cu.ft.)
U.W.D.	Unit Weight Dry (lbs./cu.ft.)
U.C./U.U.	Unconfined Compressive Strength (psf)/ Unconsolidated Undrained Triaxial Test (psf)
03/31/09 ▽	Water Level and Date Recorded
—▽—	Phreatic Surface From Pz Data
—▽—	Phreatic Surface From Seepage Model
T.O.R.–	Top Of Rock (Indicates The Beginning Of Rock–like Resistance To The Advancement Of The Augers. This May Indicate The Beginning Of Weathered Bedrock, Boulders Or Rock Remnants. An Exact Determination Cannot Be Made Without Performing Rock Coring.)
B.C.–	Begin Rock Core
R.Q.D.	Rock Quality Designation (%)
REC.	Recovery (%)
Refusal	Auger Refusal Using A Carbide–tipped Tooth Auger Bit
No Refusal	No Refusal Encountered
*	Standard Penetration Test (SPT) terminated per ASTM D 1586–99. Refer To Typed Boring Log.

RECORD DRAWING

SUMMARY OF STABILITY ANALYSES STATIC CONDITION

Failure Surface	Failure Mode	Failure Type	Factor of Safety
A	Circular Optimized With Phreatic Surface from Seepage Model	Non–Global	1.2
B	Circular Optimized With Phreatic Surface from Seepage Model	Global	1.5

For Supporting Design Calculations see FPGGAFFESCDX00000020100001

REV. NO.	DATE	DSGN	DRWN	CHKD	SUPV	RVWD	APPD	ISSD	PROJECT ID	AS CONST
R 0	05/27/10	PC	RP	PC	RLR	RLR	RLR	TJ	–	–

RECORD DRAWING

SCALE: 1"=5' EXCEPT AS NOTED

YARD
ASH POND/STILLING POND COMPLEX
GEOTECHNICAL EXPLORATION
STABILITY SECTION
CROSS–SECTION J

RANDY LEE ROBERTS, REGISTERED ENGINEER, STATE OF TENNESSEE
5/27/10

DESIGNED BY:	DRAWN BY:	CHECKED BY:	SUPERVISED BY:	REVIEWED BY:	APPROVED BY:	ISSUED BY:
P. COOPER	R. PETTY	P. COOPER	R. ROBERTS	R. ROBERTS	R. ROBERTS	T. JOHNSON

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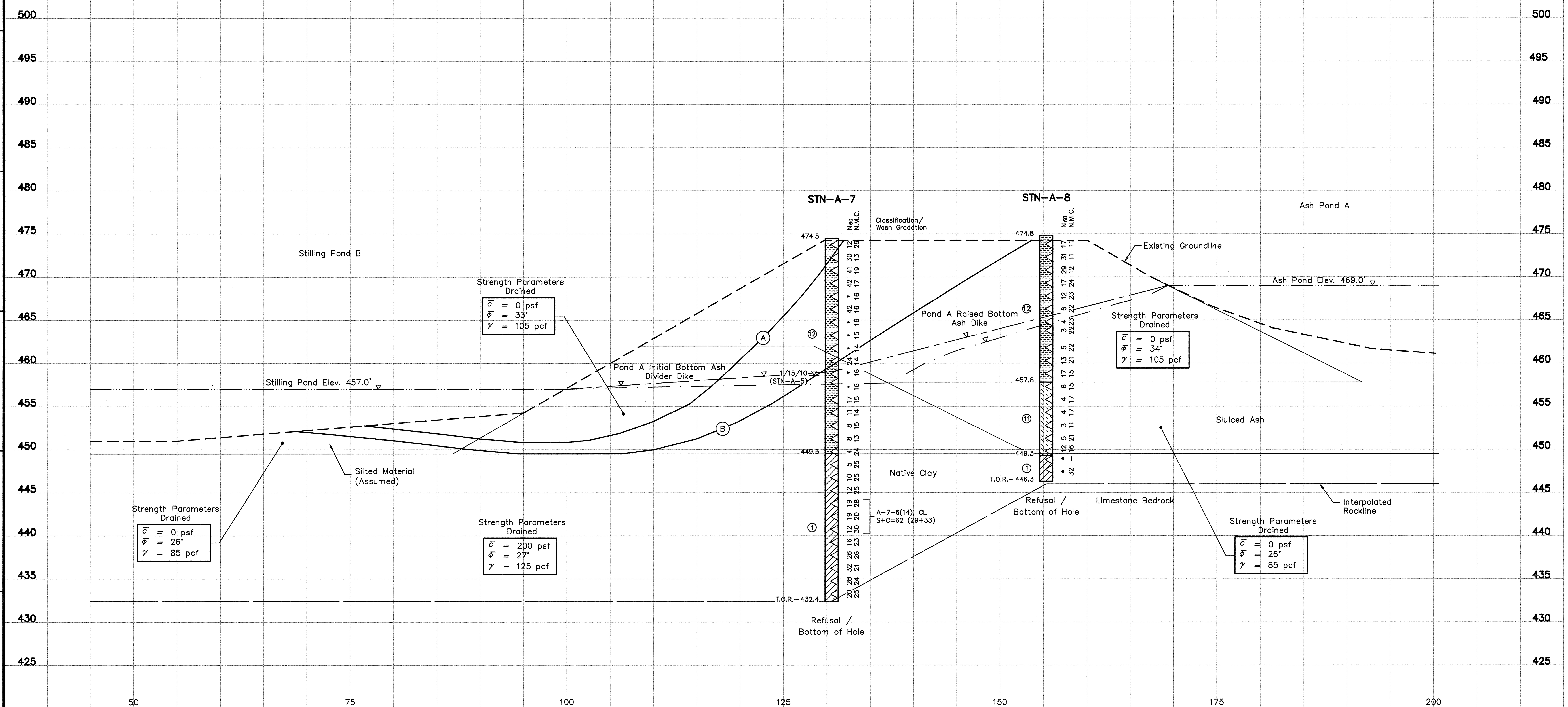
GALLATIN FOSSIL PLANT
TENNESSEE VALLEY AUTHORITY
FOSSIL AND HYDRO ENGINEERING

AUTOCAD R 2000 | DATE 05/27/10 | 39 | C | 10W504–14 | R 0

STANTEC | 0
TASK COMPLETED BY: | REV NO.

PLOT FACTOR:XX
W_TVA

C.A.D. DRAWING
DO NOT ALTER MANUALLY



LEGEND

① Lean Clay, Sandy Lean Clay, Lean Clay With Sand
② Silty, Clayey Sand
③ Fat Clay, Fat Clay With Sand
④ Overburden
⑤ Silty Clay
⑥ Poorly Graded Sand
⑦ Silty Sand
⑧ Silt, Sandy Silt, Silt With Sand
⑨ Limestone
⑩ Well Graded Sand With Silt
⑪ Fly Ash
⑫ Bottom Ash

WH Weight of Hammer
WR Weight of Rods
◁ Standard Penetration Test Interval
■ Undisturbed Thin-Walled (Shelby) Tube Sample
N_{60} Standard Penetration Test Blow Count with a 140 lb Safety Hammer (blows/ft.)
N_{80} Standard Penetration Test Blow Count with a 140 lb Automatic Hammer (blows/ft.)
N.M.C. Natural Moisture Content (%)
U.W.W. Unit Weight Wet (lbs./cu.ft.)
U.W.D. Unit Weight Dry (lbs./cu.ft.)
U.C./U.U. Unconfined Compressive Strength (psf)/ Unconsolidated Undrained Triaxial Test (psf)
03/31/09 Water Level and Date Recorded
Phreatic Surface From Pz Data
Phreatic Surface From Seepage Model
T.O.R.– Top Of Rock (Indicates The Beginning Of Rock-like Resistance To The Advancement Of The Augers. This May Indicate The Beginning Of Weathered Bedrock, Boulders Or Rock Remnants. An Exact Determination Cannot Be Made Without Performing Rock Coring.)
B.C.– Begin Rock Core
R.Q.D. Rock Quality Designation (%)
REC. Recovery (%)
Refusal Auger Refusal Using A Carbide-tipped Tooth Auger Bit
No Refusal No Refusal Encountered
• Standard Penetration Test (SPT) terminated per ASTM D 1586-99. Refer To Typed Boring Log.

RECORD DRAWING

SUMMARY OF OFFSET BORINGS				
BORING NO.	SURFACE ELEV.	BOTTOM OF HOLE DEPTH	PIEZOMETER SCREENED INTERVAL	UNDISTURBED "SHELBY" TUBE SAMPLE INTERVALS
STN-A-8S	474.8'	22.0'	N/A	5.0'-7.0', 10.0'-12.0' 15.0'-17.0', 20.0'-22.0'

SUMMARY OF STABILITY ANALYSES STATIC CONDITION

Failure Surface	Failure Mode	Failure Type	Factor of Safety
A	Circular Optimized With Phreatic Surface From Seepage Model	Non-Global	1.2
B	Circular Optimized With Phreatic Surface From Seepage Model	Global	1.5

For Supporting Design Calculations see FPGGAFFESCDX00000020100001

RANDY LEE ROBERTS REGISTERED ENGINEER AGRICULTURE COMMERCE No. 113825 STATE OF TENNESSEE

5/27/10

REV. NO.	DATE	DSGN	DRWN	CHKD	SUPV	RVWD	APPD	ISSD	PROJECT ID	AS CONST	REV CD
R –	–	–	–	–	–	–	–	–	–	–	–
R 0	05/27/10	PC	RP	PC	RLR	RLR	RLR	TJ	–	–	–

RECORD DRAWING

DISCIPLINE INTERFACE 1 2 3 4

SCALE: 1"=5' EXCEPT AS NOTED

YARD
ASH POND/STILLING POND COMPLEX

GEOTECHNICAL EXPLORATION
STABILITY SECTION
CROSS-SECTION K

DESIGNED BY:	DRAWN BY:	CHECKED BY:	SUPERVISED BY:	REVIEWED BY:	APPROVED BY:	ISSUED BY:
P. COOPER	R. PETTY	P. COOPER	R. ROBERTS	R. ROBERTS	R. ROBERTS	T. JOHNSON

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GALLATIN FOSSIL PLANT
TENNESSEE VALLEY AUTHORITY
FOSSIL AND HYDRO ENGINEERING

AUTOCAD R 2000 | DATE 05/27/10 | 39 | C | 10W504-15 | R 0

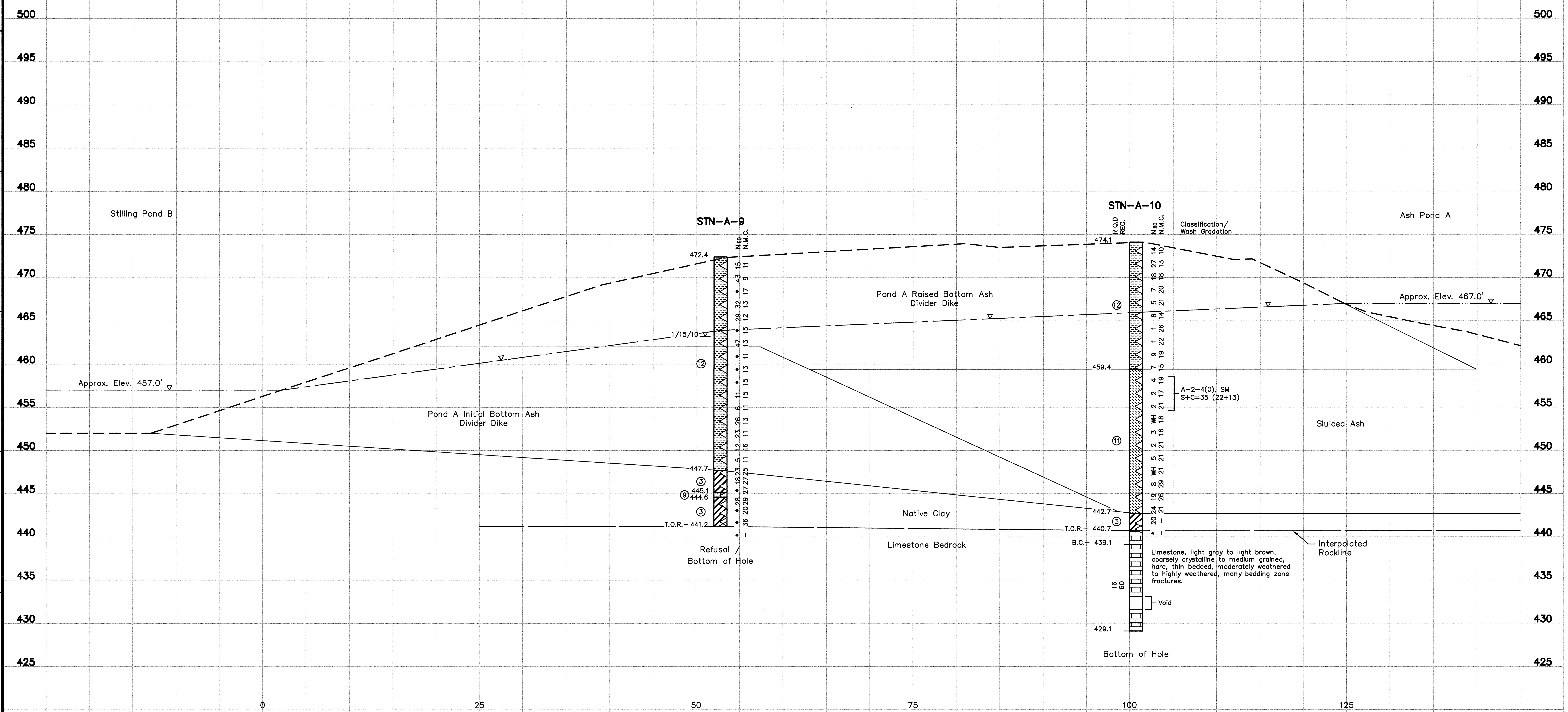
STANTEC	0
TASK COMPLETED BY:	REV NO.

PLOT FACTOR:XX
W_TVA

C.A.D. DRAWING
DO NOT ALTER MANUALLY

PLOT DATE: 05/20/2010

39 | C | 10W504-16



LEGEND

① Lean Clay, Sandy Lean Clay, Lean Clay With Sand
② Silty, Clayey Sand
③ Fat Clay, Fat Clay With Sand
④ Overburden
⑤ Silty Clay
⑥ Poorly Graded Sand
⑦ Silty Sand
⑧ Silt, Sandy Silt, Silt With Sand
⑨ Limestone
⑩ Well Graded Sand With Silt
⑪ Fly Ash
⑫ Bottom Ash

WH Weight of Hammer
WR Weight of Rods
◁ Standard Penetration Test Interval
■ Undisturbed Thin-Walled (Shelby) Tube Sample
N_{60} Standard Penetration Test Blow Count with a 140 lb Safety Hammer (blows/ft.)
N_{80} Standard Penetration Test Blow Count with a 140 lb Automatic Hammer (blows/ft.)
N.M.C. Natural Moisture Content (%)
U.W.W. Unit Weight Wet (lbs./cu.ft.)
U.W.D. Unit Weight Dry (lbs./cu.ft.)
U.C./U.U. Unconfined Compressive Strength (psf)/ Unconsolidated Undrained Triaxial Test (psf)
03/31/09 Water Level and Date Recorded
Phreatic Surface From Pz Data
Phreatic Surface From Seepage Model
T.O.R.– Top Of Rock (Indicates The Beginning Of Rock-like Resistance To The Advancement Of The Augers. This May Indicate The Beginning Of Weathered Bedrock, Boulders Or Rock Remnants. An Exact Determination Cannot Be Made Without Performing Rock Coring.)
B.C.– Begin Rock Core
R.Q.D. Rock Quality Designation (%)
REC. Recovery (%)
Refusal Auger Refusal Using A Carbide-tipped Tooth Auger Bit
No Refusal No Refusal Encountered
* Standard Penetration Test (SPT) terminated per ASTM D 1586-99. Refer To Typed Boring Log.

RECORD DRAWING

SUMMARY OF OFFSET BORINGS

BORING NO.	SURFACE ELEV.	BOTTOM OF HOLE DEPTH	PIEZOMETER SCREENED INTERVAL	UNDISTURBED "SHELBY" TUBE SAMPLE INTERVALS
STN-A-9S	472.4'	25.0'	14.0'-24.0'	N/A

For Supporting Design Calculations see FPGGAFFESCDX00000020100001

R 0 05/27/10 PC RP PC RLR RLR RLR TJ
RECORD DRAWING

SCALE: 1"=5' EXCEPT AS NOTED

YARD
ASH POND/STILLING POND COMPLEX
GEOTECHNICAL EXPLORATION
STABILITY SECTION
CROSS-SECTION L

5/27/10

DESIGNED BY: P. COOPER | DRAWN BY: R. PETTY | CHECKED BY: P. COOPER | SUPERVISED BY: R. ROBERTS | REVIEWED BY: R. ROBERTS | APPROVED BY: R. ROBERTS | ISSUED BY: T. JOHNSON

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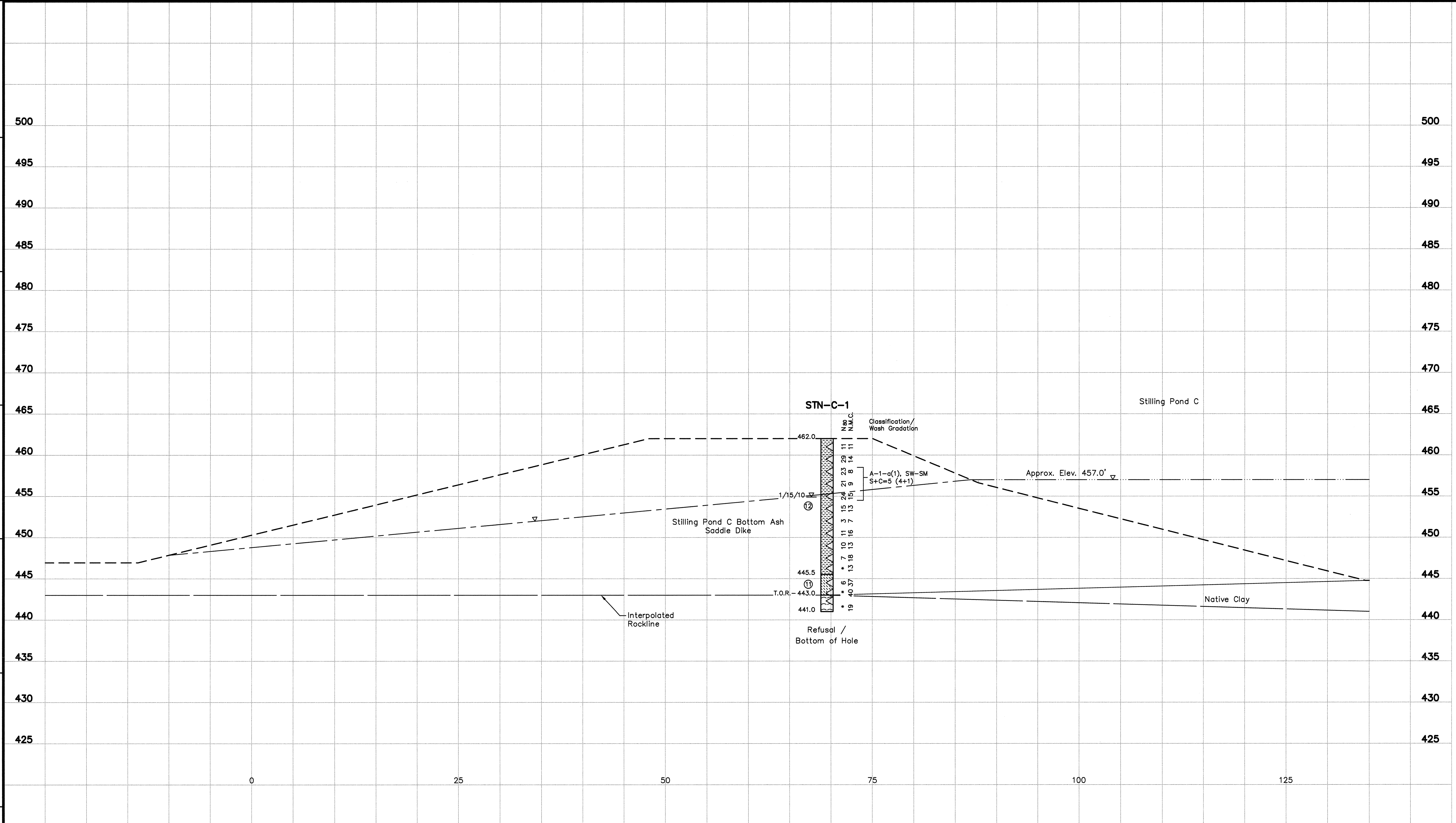
GALLATIN FOSSIL PLANT
TENNESSEE VALLEY AUTHORITY
FOSSIL AND HYDRO ENGINEERING

AUTOCAD R 2000 | DATE 05/27/10 | 39 | C | 10W504-16 | R 0

STANTEC | 0
TASK COMPLETED BY: | REV NO.

PLOT FACTOR:XX
W_TVA

C.A.D. DRAWING DO NOT ALTER MANUALLY



LEGEND

①	Lean Clay, Sandy Lean Clay, Lean Clay With Sand
②	Silty, Clayey Sand
③	Fat Clay, Fat Clay With Sand
④	Overburden
⑤	Silty Clay
⑥	Poorly Graded Sand
⑦	Silty Sand
⑧	Silt, Sandy Silt, Silt With Sand
⑨	Limestone
⑩	Well Graded Sand With Silt
⑪	Fly Ash
⑫	Bottom Ash
	Shale
WH	Weight of Hammer
WR	Weight of Rods
◁	Standard Penetration Test Interval
■	Undisturbed Thin-Walled (Shelby) Tube Sample
N_{60}	Standard Penetration Test Blow Count with a 140 lb Safety Hammer (blows/ft.)
N_{80}	Standard Penetration Test Blow Count with a 140 lb Automatic Hammer (blows/ft.)
N.M.C.	Natural Moisture Content (%)
U.W.W.	Unit Weight Wet (lbs./cu.ft.)
U.W.D.	Unit Weight Dry (lbs./cu.ft.)
U.C./U.U.	Unconfined Compressive Strength (psf)/ Unconsolidated Undrained Triaxial Test (psf)
03/31/09 ▽	Water Level and Date Recorded
▽	Phreatic Surface From Pz Data
▽	Phreatic Surface From Seepage Model
T.O.R.–	Top Of Rock (Indicates The Beginning Of Rock-like Resistance To The Advancement Of The Augers.This May Indicate The Beginning Of Weathered Bedrock, Boulders Or Rock Remnants. An Exact Determination Cannot Be Made Without Performing Rock Coring.)
B.C.–	Begin Rock Core
R.Q.D.	Rock Quality Designation (%)
REC.	Recovery (%)
Refusal	Auger Refusal Using A Carbide-tipped Tooth Auger Bit
No Refusal	No Refusal Encountered
*	Standard Penetration Test (SPT) terminated per ASTM D 1586-99. Refer To Typed Boring Log.

RECORD DRAWING

For Supporting Design Calculations see FPGGAFFESCDX00000020100001

REV. NO.	DATE	DSGN	DRWN	CHKD	SUPV	RVWD	APPD	ISSD	PROJECT ID	AS CONST
R 0	05/27/10	PC	RP	PC	RLR	RLR	RLR	TJ	–	–

RECORD DRAWING

SCALE: 1"=5' EXCEPT AS NOTED

YARD
ASH POND/STILLING POND COMPLEX

GEOTECHNICAL EXPLORATION
STABILITY SECTION
CROSS-SECTION M

DESIGNED BY:	DRAWN BY:	CHECKED BY:	SUPERVISED BY:	REVIEWED BY:	APPROVED BY:	ISSUED BY:
P. COOPER	R. PETTY	P. COOPER	R. ROBERTS	R. ROBERTS	R. ROBERTS	T. JOHNSON

RANDY LEE ROBERTS
REGISTERED ENGINEER
AGRICULTURE
STATE OF TENNESSEE
5/27/10

Stantec
Stantec Consulting Services Inc.
1901 Nelson Miller Pky.
Louisville, Kentucky
40223-2177
Tel. 502.212.5000
Fax 502.212.5055
www.stantec.com

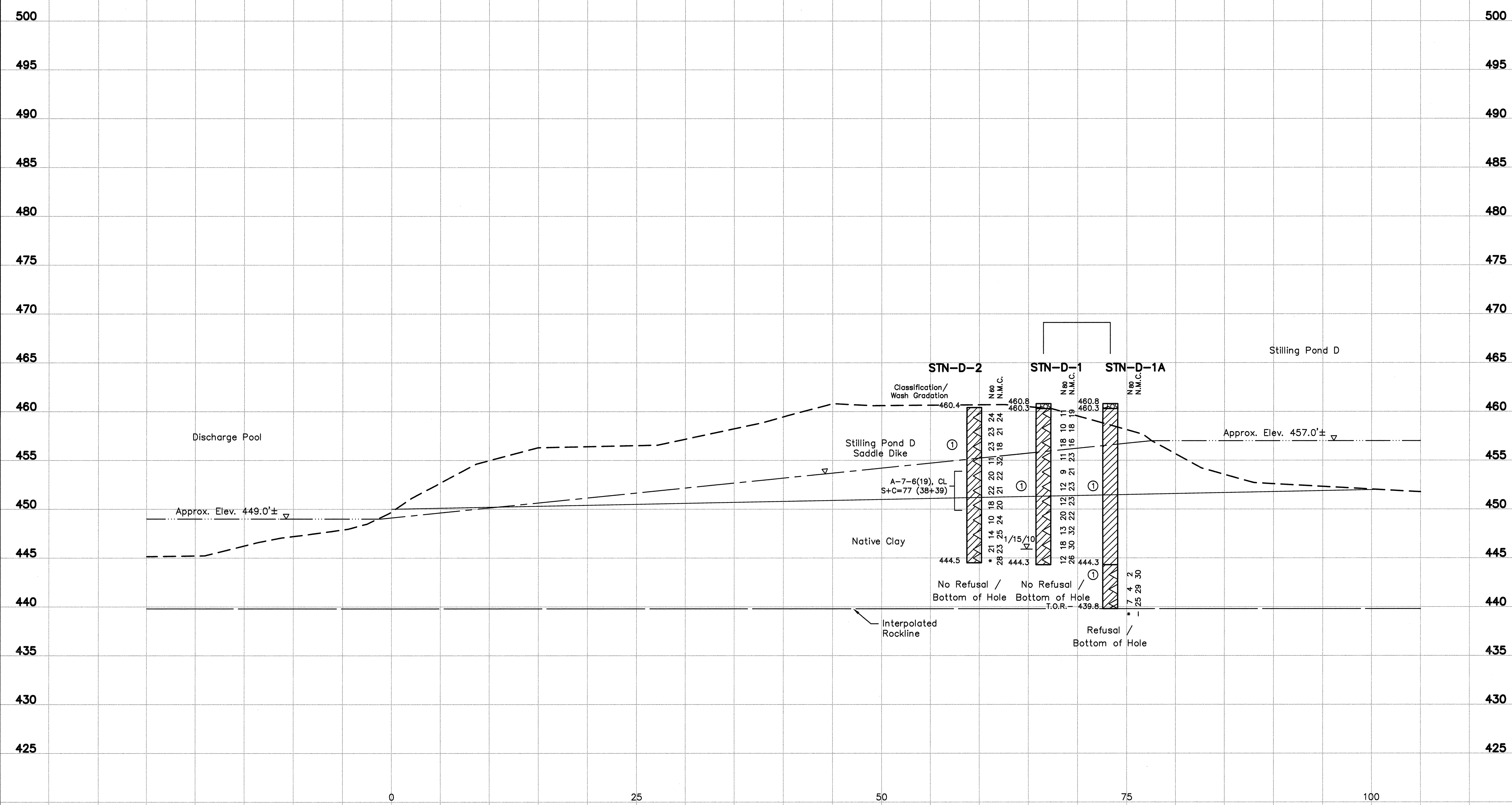
GALLATIN FOSSIL PLANT
TENNESSEE VALLEY AUTHORITY
FOSSIL AND HYDRO ENGINEERING

AUTOCAD R 2000 | DATE 05/27/10 | 39 | C | 10W504-17 | R 0

STANTEC | 0
TASK COMPLETED BY: | REV NO.

PLOT FACTOR:XX
W_TVA

C.A.D. DRAWING
DO NOT ALTER MANUALLY



LEGEND

①		Lean Clay, Sandy Lean Clay, Lean Clay With Sand
②		Silty, Clayey Sand
③		Fat Clay, Fat Clay With Sand
④		Overburden
⑤		Silty Clay
⑥		Poorly Graded Sand
⑦		Silty Sand
⑧		Silt, Sandy Silt, Silt With Sand
⑨		Limestone
⑩		Well Graded Sand With Silt
⑪		Fly Ash
⑫		Bottom Ash
		Shale
	WH	Weight of Hammer
	WR	Weight of Rods
	◁	Standard Penetration Test Interval
	■	Undisturbed Thin-Walled (Shelby) Tube Sample
	N_{60}	Standard Penetration Test Blow Count with a 140 lb Safety Hammer (blows/ft.)
	N_{80}	Standard Penetration Test Blow Count with a 140 lb Automatic Hammer (blows/ft.)
	N.M.C.	Natural Moisture Content (%)
	U.W.W.	Unit Weight Wet (lbs./cu.ft.)
	U.W.D.	Unit Weight Dry (lbs./cu.ft.)
	U.C./U.U.	Unconfined Compressive Strength (psf)/ Unconsolidated Undrained Triaxial Test (psf)
	03/31/09 ▽	Water Level and Date Recorded
	▽	Phreatic Surface From Pz Data
	▽	Phreatic Surface From Seepage Model
	T.O.R.-	Top Of Rock (Indicates The Beginning Of Rock-like Resistance To The Advancement Of The Augers. This May Indicate The Beginning Of Weathered Bedrock, Boulders Or Rock Remnants. An Exact Determination Cannot Be Made Without Performing Rock Coring.)
	B.C.-	Begin Rock Core
	R.Q.D.	Rock Quality Designation (%)
	REC.	Recovery (%)
	Refusal	Auger Refusal Using A Carbide-tipped Tooth Auger Bit
	No Refusal	No Refusal Encountered
	*	Standard Penetration Test (SPT) terminated per ASTM D 1586-99. Refer To Typed Boring Log.

RECORD DRAWING

CONSOLIDATED UNDRAINED TRIAXIAL TEST RESULTS

Location	STN-D-15		
Depth	6.0'-6.5'	2.0-2.5'	2.6'-3.1'
φ	23.3'		
c̄	940 p.s.f.		

SUMMARY OF OFFSET BORINGS

BORING NO.	SURFACE ELEV.	BOTTOM OF HOLE DEPTH	PIEZOMETER SCREENED INTERVAL	UNDISTURBED "SHELBY" TUBE SAMPLE INTERVALS
STN-D-1A	460.8'	21.0'	11.0'-21.0'	N/A
STN-D-1S	460.8'	14.0'	N/A	2.0'-4.0', 6.0'-8.0' 10.0'-12.0', 14.0'-16.0'
STN-D-2S	460.4'	12.0'	N/A	4.0'-6.0', 6.0'-8.0' 10.0'-12.0'

For Supporting Design Calculations see FPGGAFFESCDX00000020100001

RANDY LEE ROBERTS
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Stantec

REV. NO.	DATE	DSGN	DRWN	CHKD	SUPV	RVWD	APPD	ISSD	PROJECT ID	AS CONST	REV CD
R -	-	-	-	-	-	-	-	-	-	-	-
-											
R 0	05/27/10	PC	RP	PC	RLR	RLR	RLR	TJ	-	-	-
RECORD DRAWING											

DISCIPLINE INTERFACE
1
2
3
4

SCALE: 1"=5' EXCEPT AS NOTED

YARD
ASH POND/STILLING POND COMPLEX

GEOTECHNICAL EXPLORATION
STABILITY SECTION
CROSS-SECTION N

DESIGNED BY:	DRAWN BY:	CHECKED BY:	SUPERVISED BY:	REVIEWED BY:	APPROVED BY:	ISSUED BY:
P. COOPER	R. PETTY	P. COOPER	R. ROBERTS	R. ROBERTS	R. ROBERTS	T. JOHNSON

GALLATIN FOSSIL PLANT
TENNESSEE VALLEY AUTHORITY
FOSSIL AND HYDRO ENGINEERING

AUTOCAD R 2000	DATE 05/27/10	39	C	10W504-18	R 0

STANTEC	0
TASK COMPLETED BY:	REV NO.

PLOT FACTOR:XX
W_TVA

C.A.D. DRAWING
DO NOT ALTER MANUALLY

PLOT DATE: 05/20/2010 USER: BRADSHAW, STEVEN
V:\1755\ACTIVE\175559018\GEOTECHNICAL\DRAWING\REVD_RECORD\10W504-18-RO.DWG

Appendix F

Seepage Analyses Results

Seepage Analysis
Section B
Ash Ponds A and E

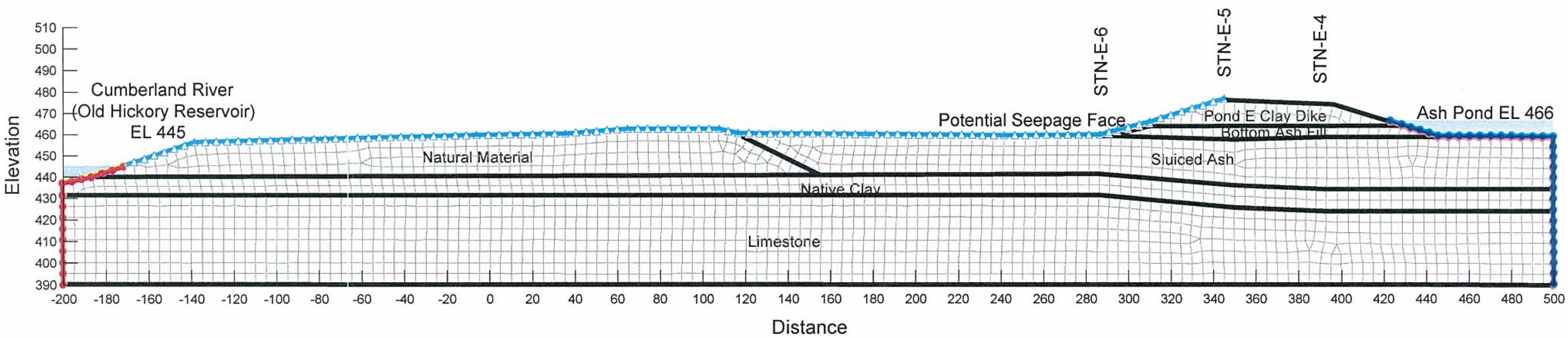
Gallatin Fossil Plant
Tennessee Valley Authority

Boundary Conditions with Mesh

January 2010
Method: Steady-State
File Name: GAF_Section_B.gsz

Material Type	Ksat	Kratio	Wsat
Pond E Clay Dike	1.64e-008	0.2	0.25
Bottom Ash Fill	3.28e-005	1	0.15
Sluiced Ash	9.84e-006	0.03	0.4
Native Clay	6.56e-008	0.05	0.4
Limestone	0.000328	0.1	0.15
Natural Material	0.001	0.03	0.5

Note:
The results of analysis shown here are based on available subsurface information, laboratory test results and approximate soil properties. No warranties can be made regarding the continuity of subsurface conditions between the borings.



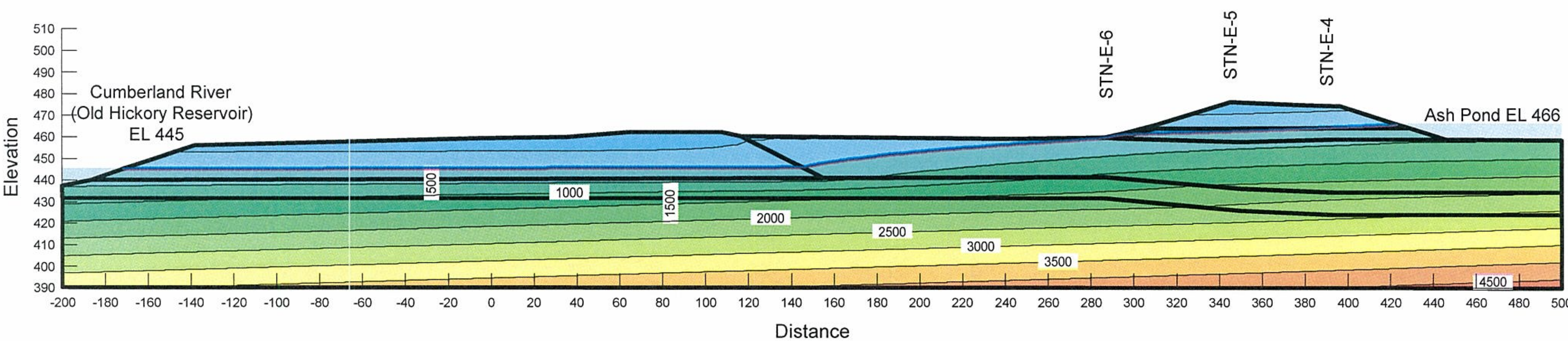
Seepage Analysis
Section B
Ash Ponds A and E

Gallatin Fossil Plant
Tennessee Valley Authority

Pore Water Pressure (psf)

January 2010
Method: Steady-State
File Name: GAF_Section_B.gsz

Note:
The results of analysis shown here are based on available subsurface information, laboratory test results and approximate soil properties. No warranties can be made regarding the continuity of subsurface conditions between the borings.



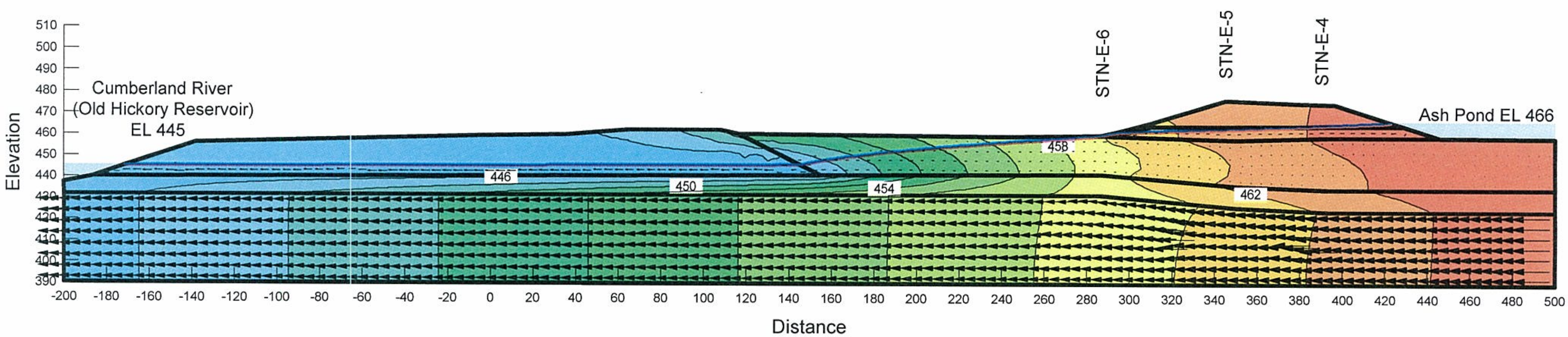
Seepage Analysis
Section B
Ash Ponds A and E

Gallatin Fossil Plant
Tennessee Valley Authority

Total Head with Flow Vectors

January 2010
Method: Steady-State
File Name: GAF_Section_B.gsz

Note:
The results of analysis shown here are based on available subsurface information, laboratory test results and approximate soil properties. No warranties can be made regarding the continuity of subsurface conditions between the borings.



Seepage Analysis
Section B
Ash Ponds A and E

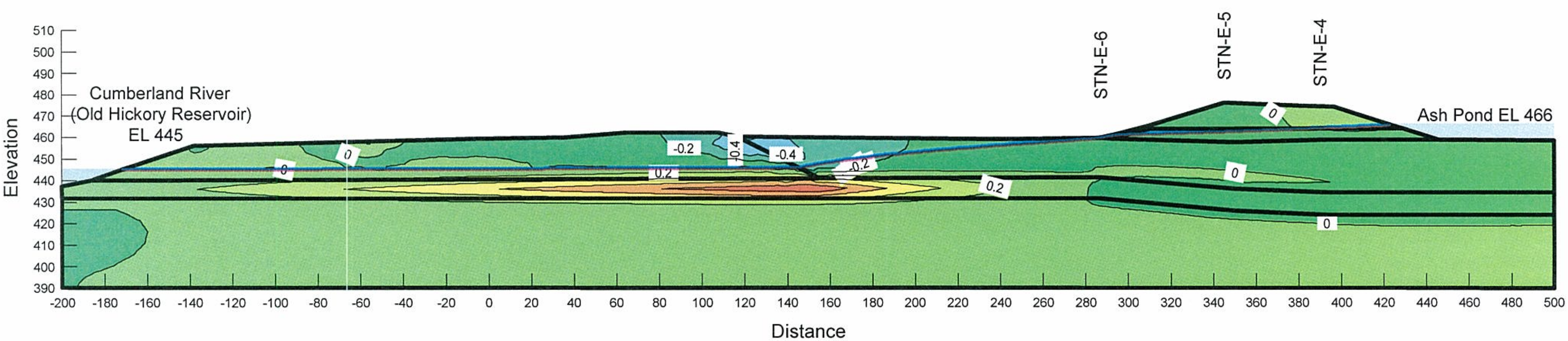
Gallatin Fossil Plant
Tennessee Valley Authority

Vertical Gradient

Critical exit gradient not identified by model.
FS(piping) >3.

January 2010
Method: Steady-State
File Name: GAF_Section_B.gsz

Note:
The results of analysis shown here are based on available subsurface information, laboratory test results and approximate soil properties. No warranties can be made regarding the continuity of subsurface conditions between the borings.



Seepage Analysis
Section C
Ash Ponds A and E

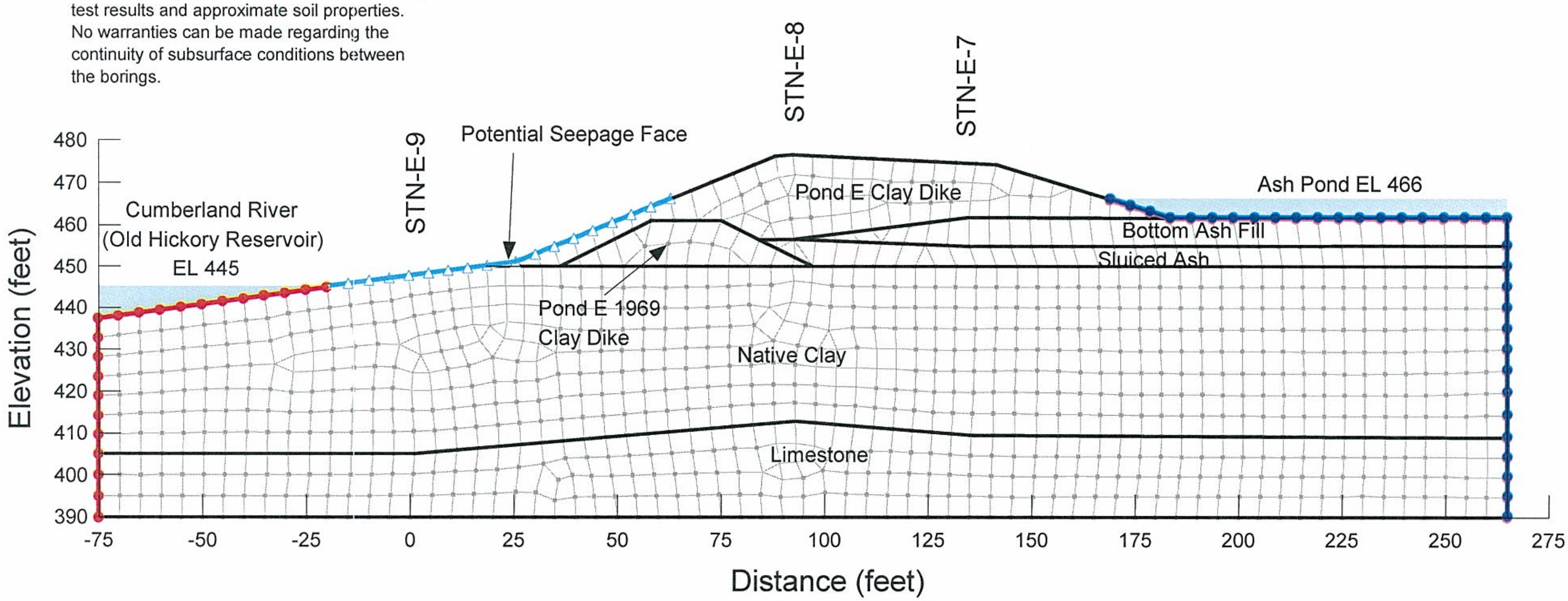
Boundary Conditions with Mesh

Gallatin Fossil Plant
Tennessee Valley Authority

January 2010
Method: Steady-State
File Name: GAF_Section_C.gsz

Note:
The results of analysis shown here are based on available subsurface information, laboratory test results and approximate soil properties. No warranties can be made regarding the continuity of subsurface conditions between the borings.

Material Type	Ksat	Kratio	Wsat
Pond E Clay Dike	3.28e-009	1	0.25
Pond E 1969 Clay Dike	3.28e-009	1	0.25
Bottom Ash Fill	3.28e-005	1	0.15
Sluiced Ash	9.84e-006	0.03	0.4
Native Clay	3.28e-007	0.1	0.4
Limestone	0.000328	0.1	0.15



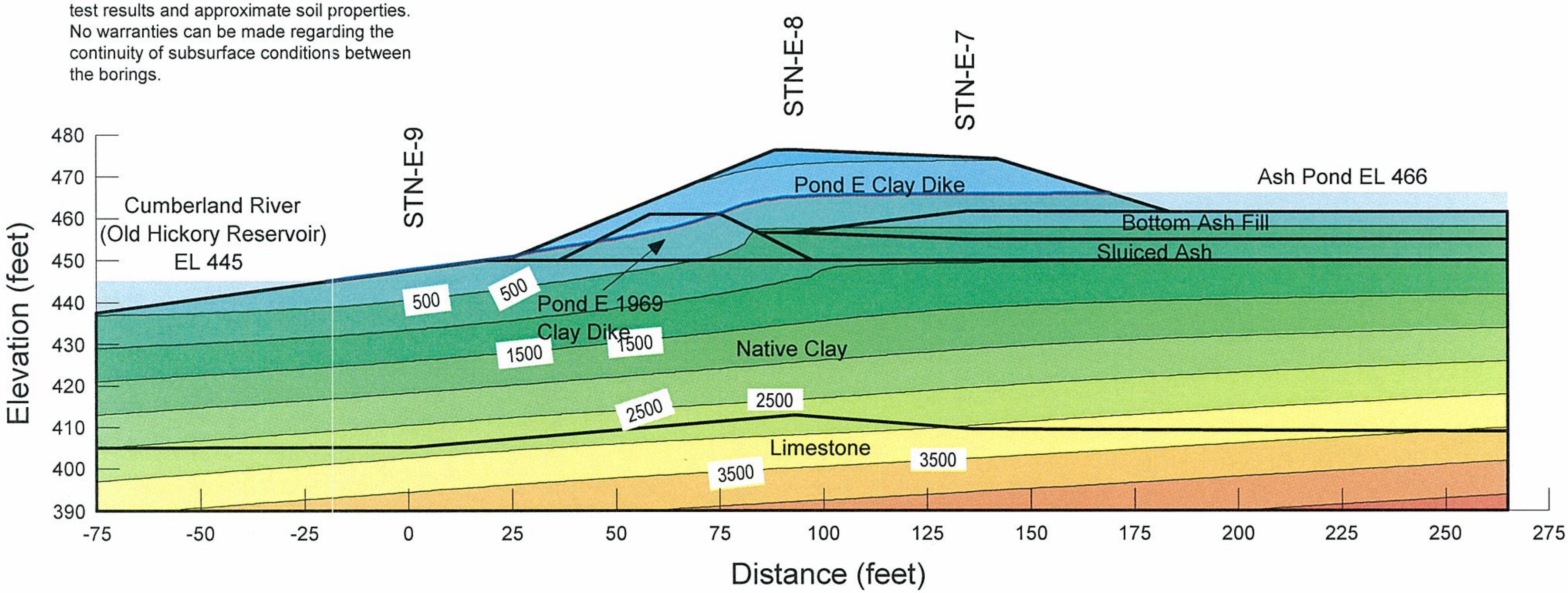
Seepage Analysis
Section C
Ash Ponds A and E

Gallatin Fossil Plant
Tennessee Valley Authority

Pore Water Pressure (psf)

January 2010
Method: Steady-State
File Name: GAF_Section_C.gsz

Note:
The results of analysis shown here are based on available subsurface information, laboratory test results and approximate soil properties. No warranties can be made regarding the continuity of subsurface conditions between the borings.



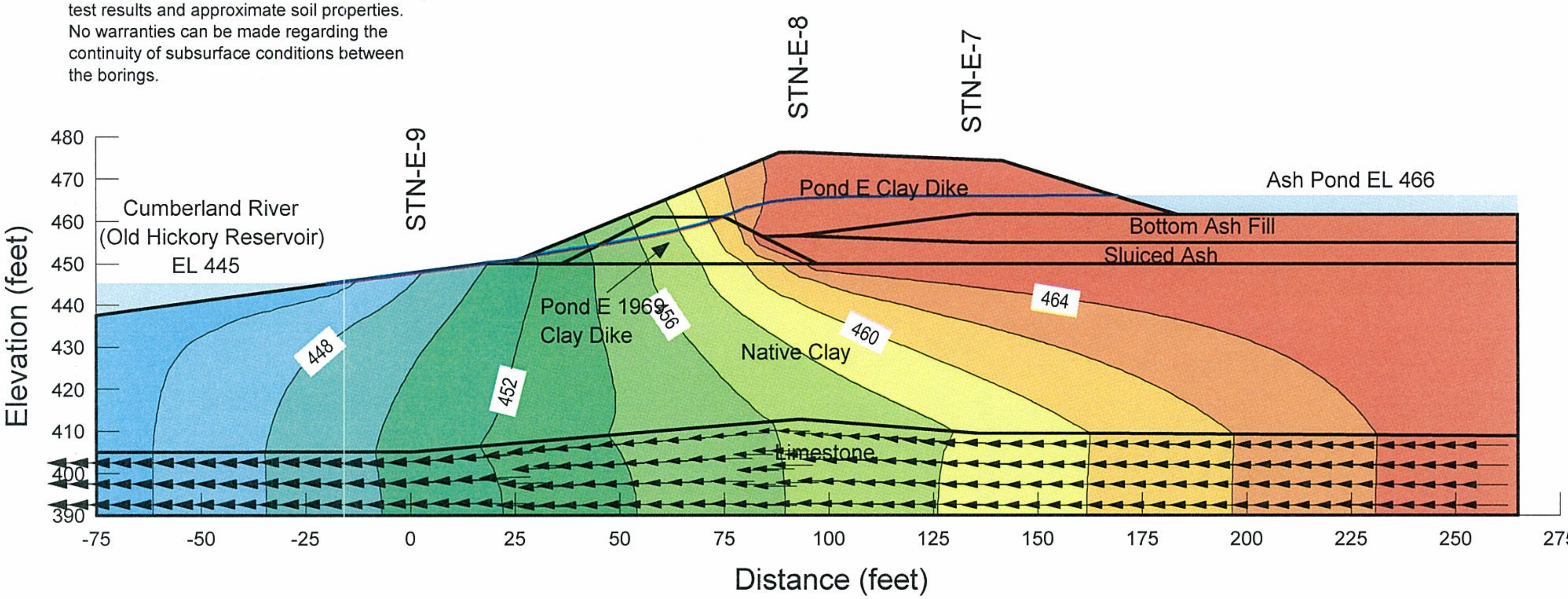
Seepage Analysis
Section C
Ash Ponds A and E

Gallatin Fossil Plant
Tennessee Valley Authority

Total Head with Flow Vectors

January 2010
Method: Steady-State
File Name: GAF_Section_C.gsz

Note:
The results of analysis shown here are based on available subsurface information, laboratory test results and approximate soil properties. No warranties can be made regarding the continuity of subsurface conditions between the borings.



Seepage Analysis
Section C
Ash Ponds A and E

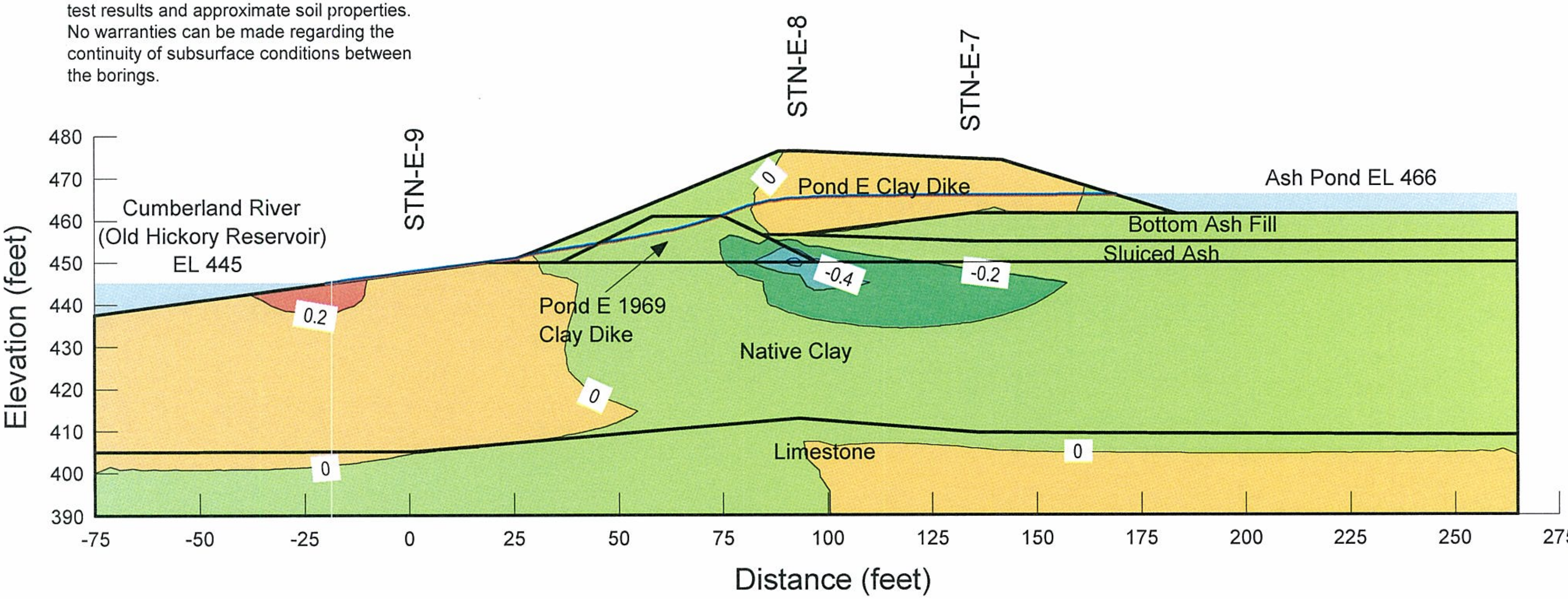
Vertical Gradient

Gallatin Fossil Plant
Tennessee Valley Authority

Piping Potential
Maximum occurs at (-19.9, 445)
Total Head = 445 ft
At (-19.3, 440.0)
Total Head = 446.77 ft
dH = 1.77 ft dL = 5.04
i = 0.35 i(criticial) = 1.05
FSpiping = 3.0

January 2010
Method: Steady-State
File Name: GAF_Section_C.gsz

Note:
The results of analysis shown here are based on available subsurface information, laboratory test results and approximate soil properties. No warranties can be made regarding the continuity of subsurface conditions between the borings.



Seepage Analysis
Section D
Ash Ponds A and E

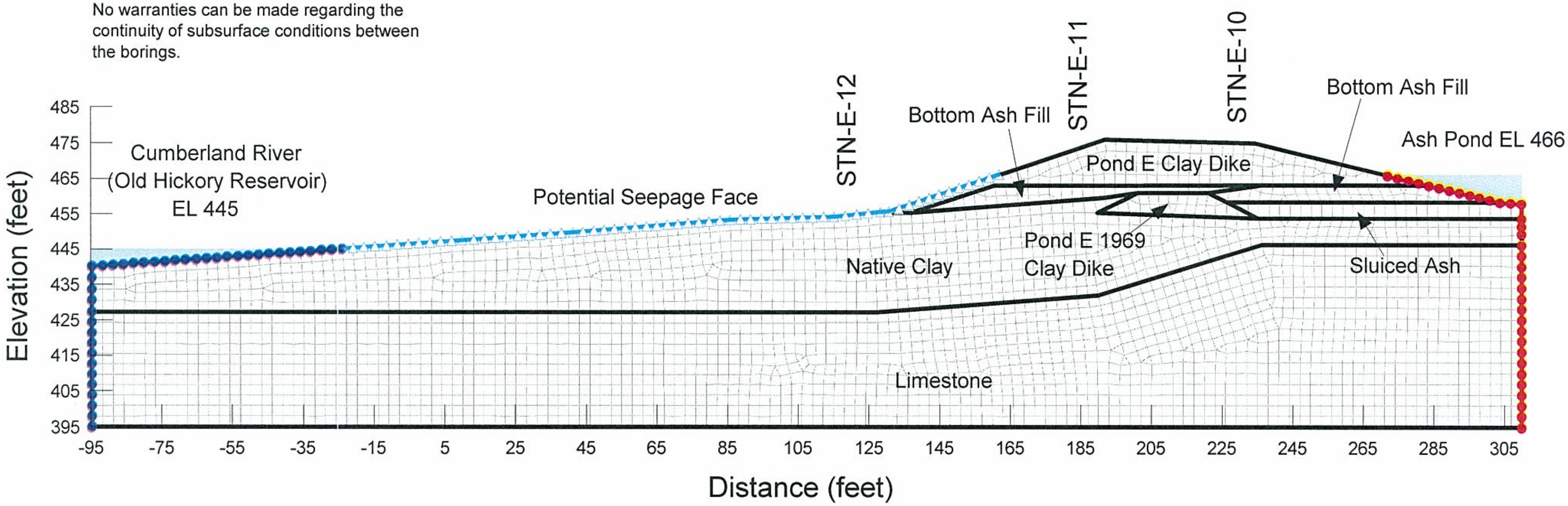
Gallatin Fossil Plant
Tennessee Valley Authority

Boundary Conditions with Mesh

January 2010
Method: Steady-State
File Name: GAF_Section_D.gsz

Note:
The results of analysis shown here are based on available subsurface information, laboratory test results and approximate soil properties. No warranties can be made regarding the continuity of subsurface conditions between the borings.

Material Type	Ksat	Kratio	Wsat
Pond E Clay Dike	1.64e-008	0.2	0.25
Pond E 1969 Clay Dike	1.64e-008	0.2	0.25
Bottom Ash Fill	3.28e-006	1	0.15
Sluiced Ash	9.84e-006	0.033	0.4
Native Clay	3.28e-007	0.1	0.4
Limestone	0.000328	0.1	0.15



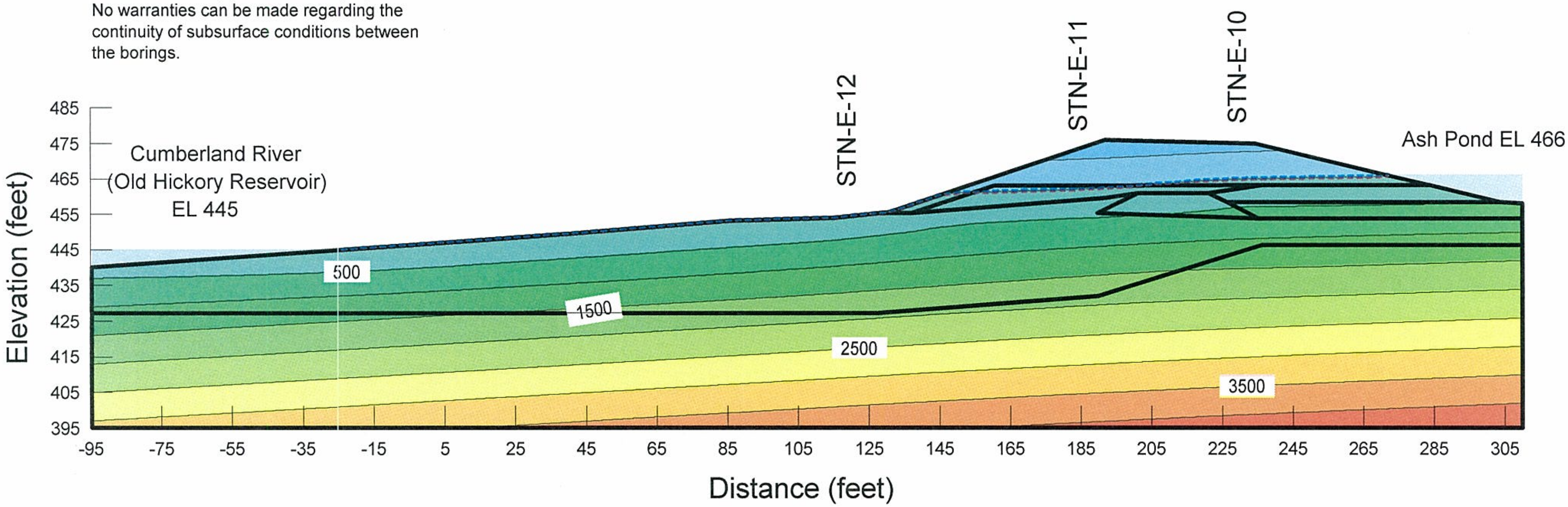
Seepage Analysis
Section D
Ash Ponds A and E

Gallatin Fossil Plant
Tennessee Valley Authority

Pore Water Pressure (psf)

January 2010
Method: Steady-State
File Name: GAF_Section_D.gsz

Note:
The results of analysis shown here are based on available subsurface information, laboratory test results and approximate soil properties. No warranties can be made regarding the continuity of subsurface conditions between the borings.



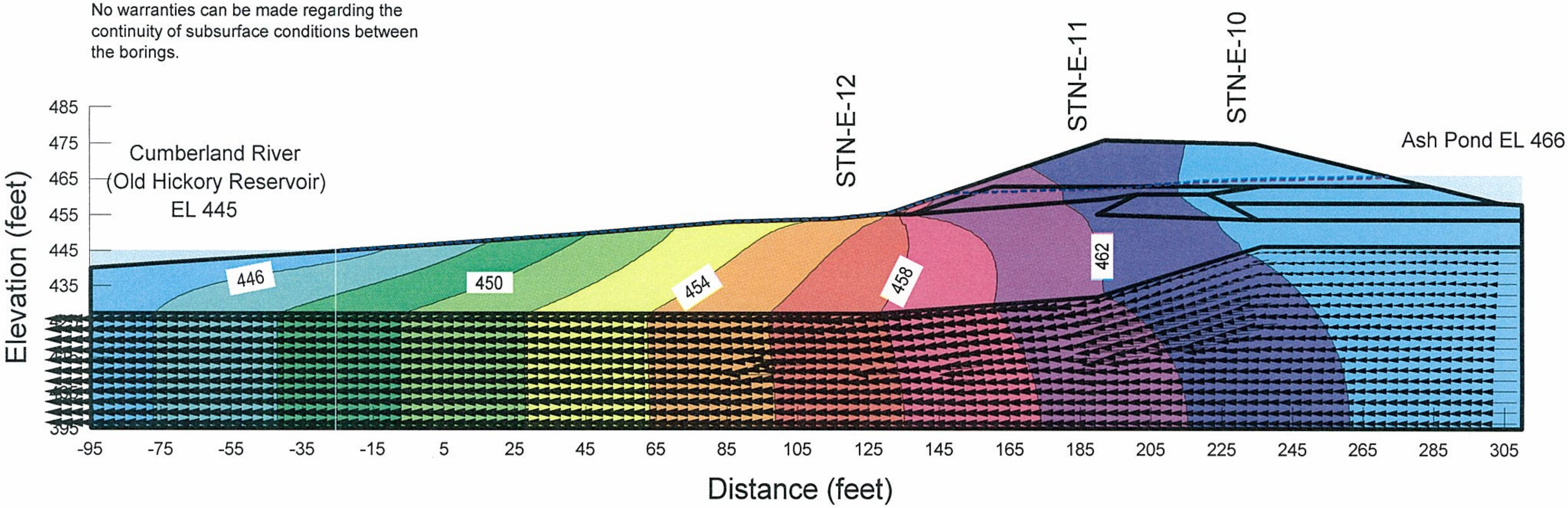
Seepage Analysis
Section D
Ash Ponds A and E

Gallatin Fossil Plant
Tennessee Valley Authority

Total Head with Flow Vectors

January 2010
Method: Steady-State
File Name: GAF_Section_D.gsz

Note:
The results of analysis shown here are based on available subsurface information, laboratory test results and approximate soil properties. No warranties can be made regarding the continuity of subsurface conditions between the borings.



Seepage Analysis
Section D
Ash Ponds A and E

Gallatin Fossil Plant
Tennessee Valley Authority

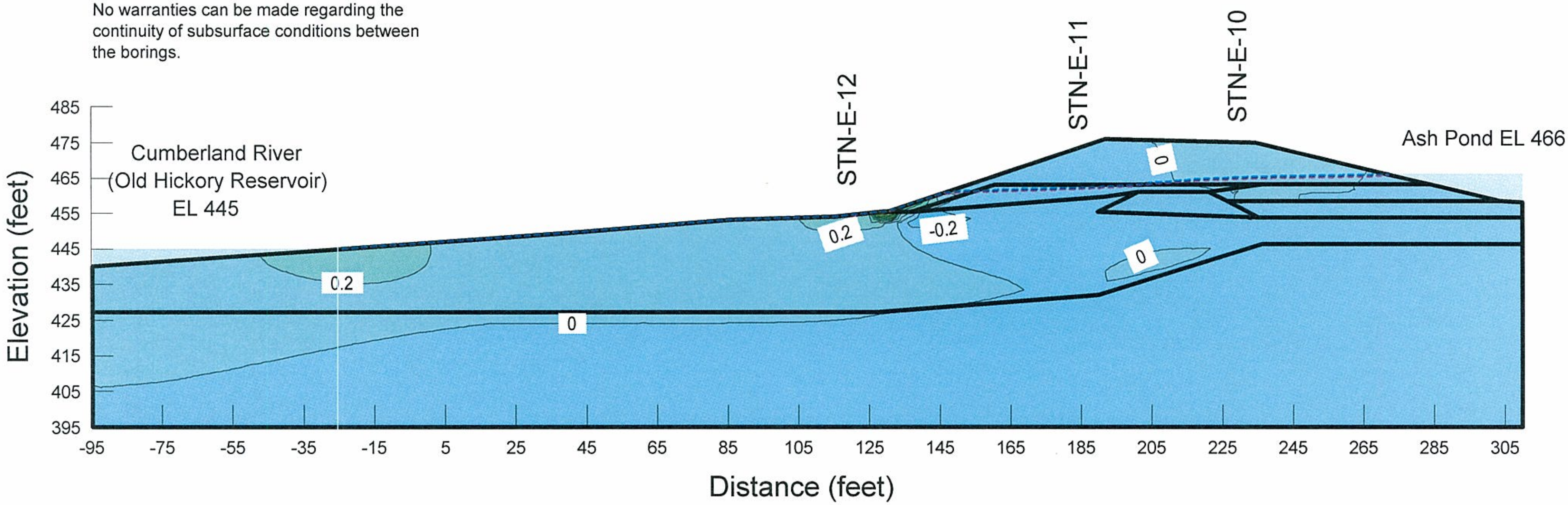
Vertical Gradient

Piping Potential

Maximum occurs at (130.6, 455.52)
Total Head = 455.52 ft
At (131.36, 449.09)
Total Head = 457.39 ft
dH = 1.87 ft   dL = 6.47
i = 0.289   i(criticial) = 1.01
FSpiping = 3.5

January 2010
Method: Steady-State
File Name: GAF_Section_D.gsz

Note:
The results of analysis shown here are based on available subsurface information, laboratory test results and approximate soil properties. No warranties can be made regarding the continuity of subsurface conditions between the borings.



Seepage Analysis
Section F
Ash Ponds A and E

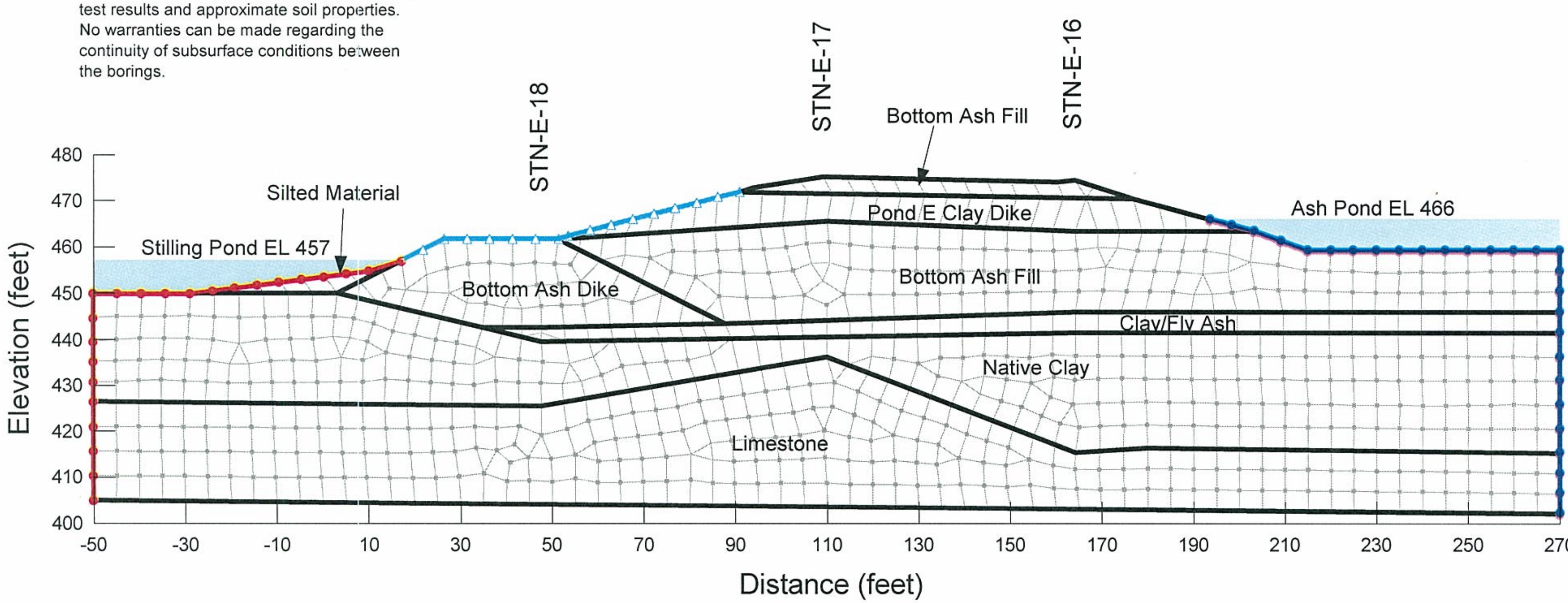
Gallatin Fossil Plant
Tennessee Valley Authority

Boundary Conditions with Mesh

January 2010
Method: Steady-State
File Name: GAF_Section_F.gsz

Note:
The results of analysis shown here are based on available subsurface information, laboratory test results and approximate soil properties. No warranties can be made regarding the continuity of subsurface conditions between the borings.

Material Type	Ksat	Kratio	Wsat
Bottom Ash Fill	3.28e-005	1	0.15
Bottom Ash Dike	3.28e-005	1	0.15
Silted Material	9.84e-005	0.033	0.4
Pond E Clay Dike	3.28e-009	1	0.25
Native Clay	6.56e-008	0.05	0.25
Clay / Fly Ash	9.84e-005	0.033	0.4
Limestone	0.000328	0.1	0.15



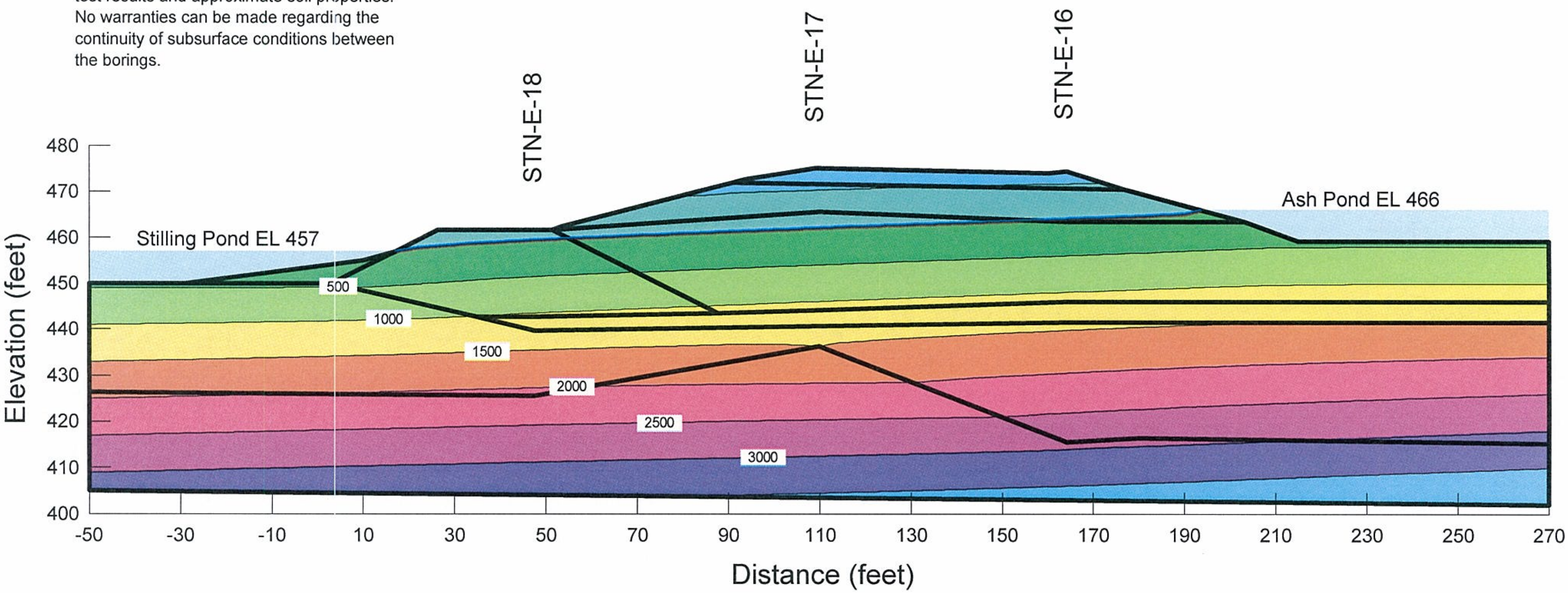
Seepage Analysis
Section F
Ash Ponds A and E

Gallatin Fossil Plant
Tennessee Valley Authority

Pore Water Pressure (psf)

January 2010
Method: Steady-State
File Name: GAF_Section_F.gsz

Note:
The results of analysis shown here are based on available subsurface information, laboratory test results and approximate soil properties. No warranties can be made regarding the continuity of subsurface conditions between the borings.



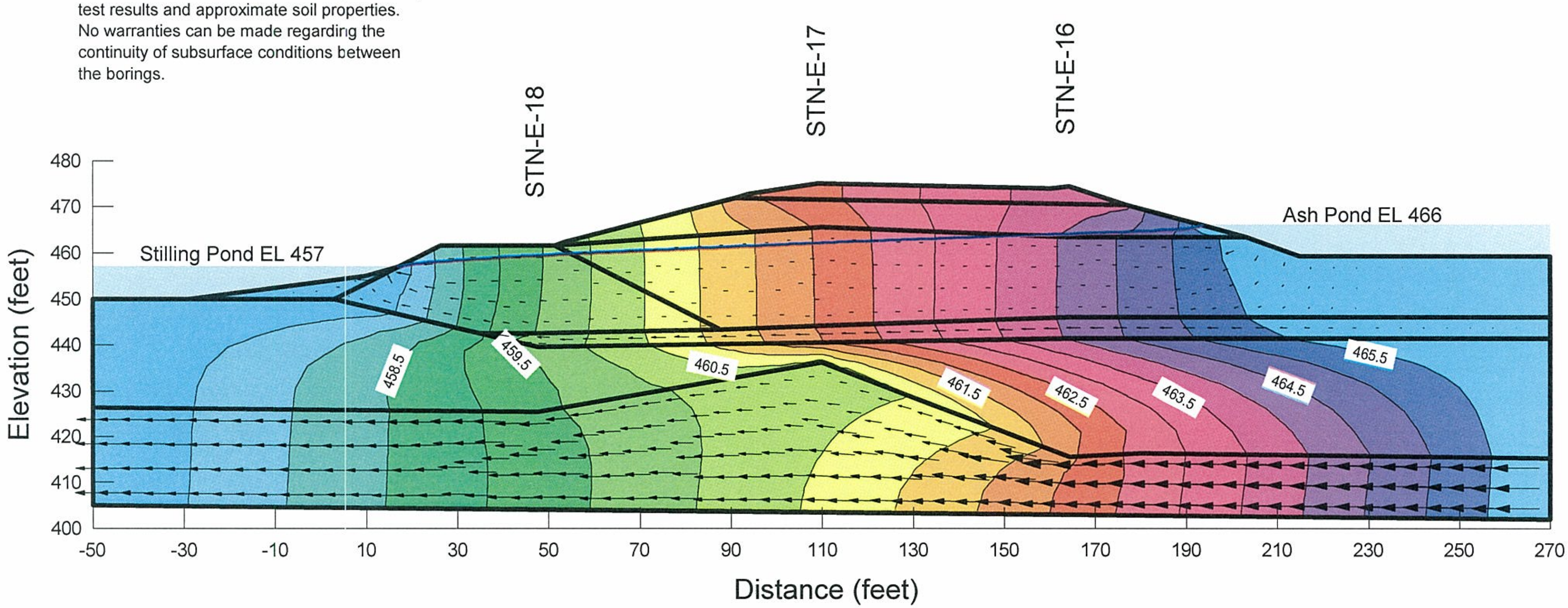
Seepage Analysis
Section F
Ash Ponds A and E

Total Head with Flow Vectors

Gallatin Fossil Plant
Tennessee Valley Authority

January 2010
Method: Steady-State
File Name: GAF_Section_F.gsz

Note:
The results of analysis shown here are based on available subsurface information, laboratory test results and approximate soil properties. No warranties can be made regarding the continuity of subsurface conditions between the borings.



Seepage Analysis
Section F
Ash Ponds A and E

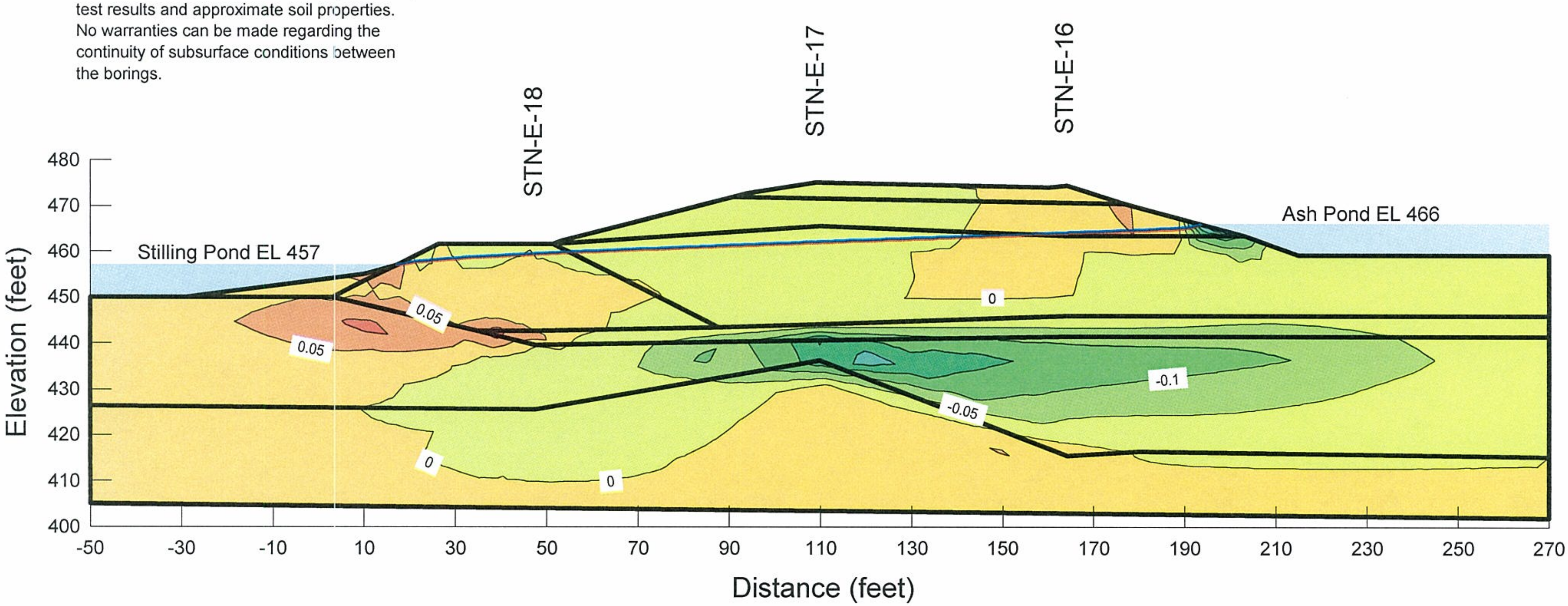
Gallatin Fossil Plant
Tennessee Valley Authority

Vertical Gradient

Piping Potential
Maximum occurs at (17.18, 457)
Total Head = 457 ft
At (18.02, 450.7)
Total Head = 457.54 ft
dH = 0.54 ft dL = 6.36
i = 0.085 i(criticial) = 0.84
FSpiping = 9.9

January 2010
Method: Steady-State
File Name: GAF_Section_F.gsz

Note:
The results of analysis shown here are based on available subsurface information, laboratory test results and approximate soil properties. No warranties can be made regarding the continuity of subsurface conditions between the borings.



Seepage Analysis
Section G
Ash Ponds A and E

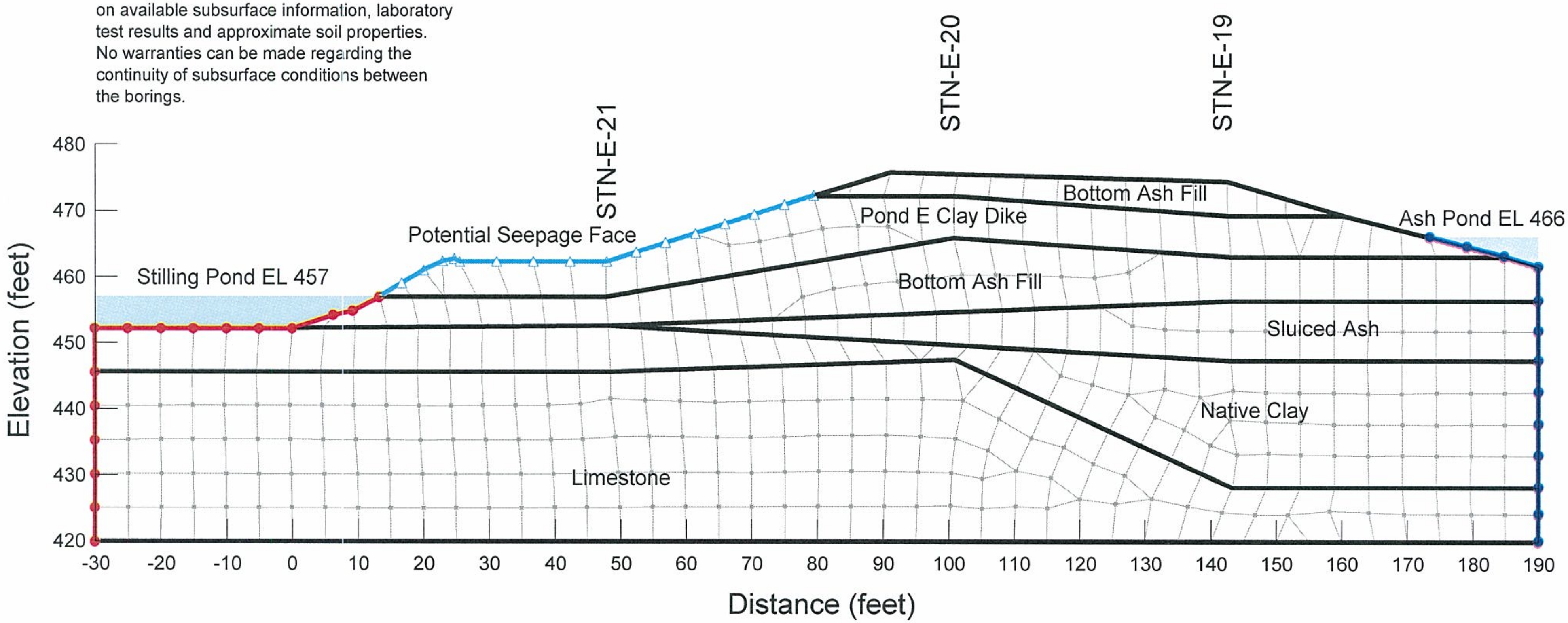
Gallatin Fossil Plant
Tennessee Valley Authority

Boundary Conditions with Mesh

Material Type	Ksat	Kratio	Wsat
Bottom Ash Fill	3.28e-005	1	0.15
Sluiced Ash	9.84e-006	0.033	0.4
Pond E Clay Dike	3.28e-009	1	0.25
Native Clay	6.56e-008	0.05	0.25
Limestone	0.000328	0.1	0.15

January 2010
Method: Steady-State
File Name: GAF_Section_G.gsz

Note:
The results of analysis shown here are based on available subsurface information, laboratory test results and approximate soil properties. No warranties can be made regarding the continuity of subsurface conditions between the borings.



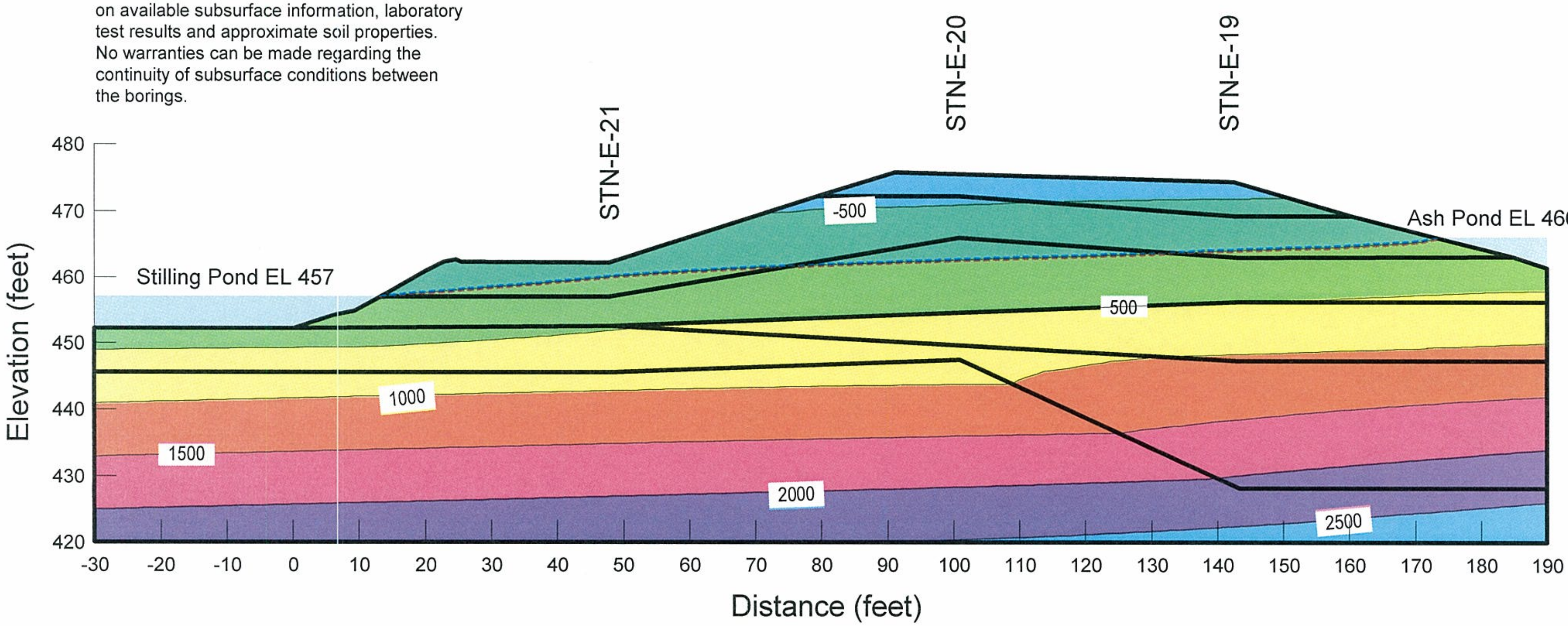
Seepage Analysis
Section G
Ash Ponds A and E

Gallatin Fossil Plant
Tennessee Valley Authority

Pore Water Pressure (psf)

January 2010
Method: Steady-State
File Name: GAF_Section_G.gsz

Note:
The results of analysis shown here are based on available subsurface information, laboratory test results and approximate soil properties. No warranties can be made regarding the continuity of subsurface conditions between the borings.



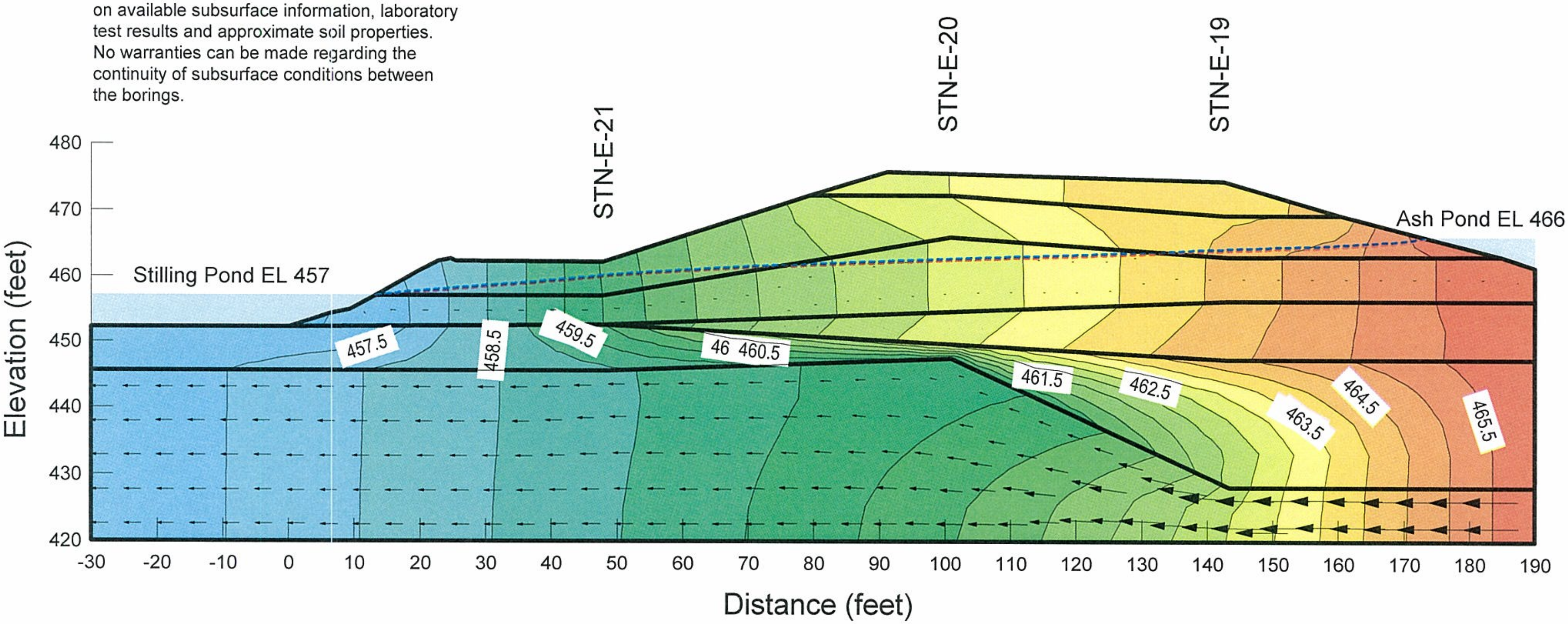
Seepage Analysis
Section G
Ash Ponds A and E

Gallatin Fossil Plant
Tennessee Valley Authority

Total Head with Flow Vectors

January 2010
Method: Steady-State
File Name: GAF_Section_G.gsz

Note:
The results of analysis shown here are based on available subsurface information, laboratory test results and approximate soil properties. No warranties can be made regarding the continuity of subsurface conditions between the borings.



Seepage Analysis
Section G
Ash Ponds A and E

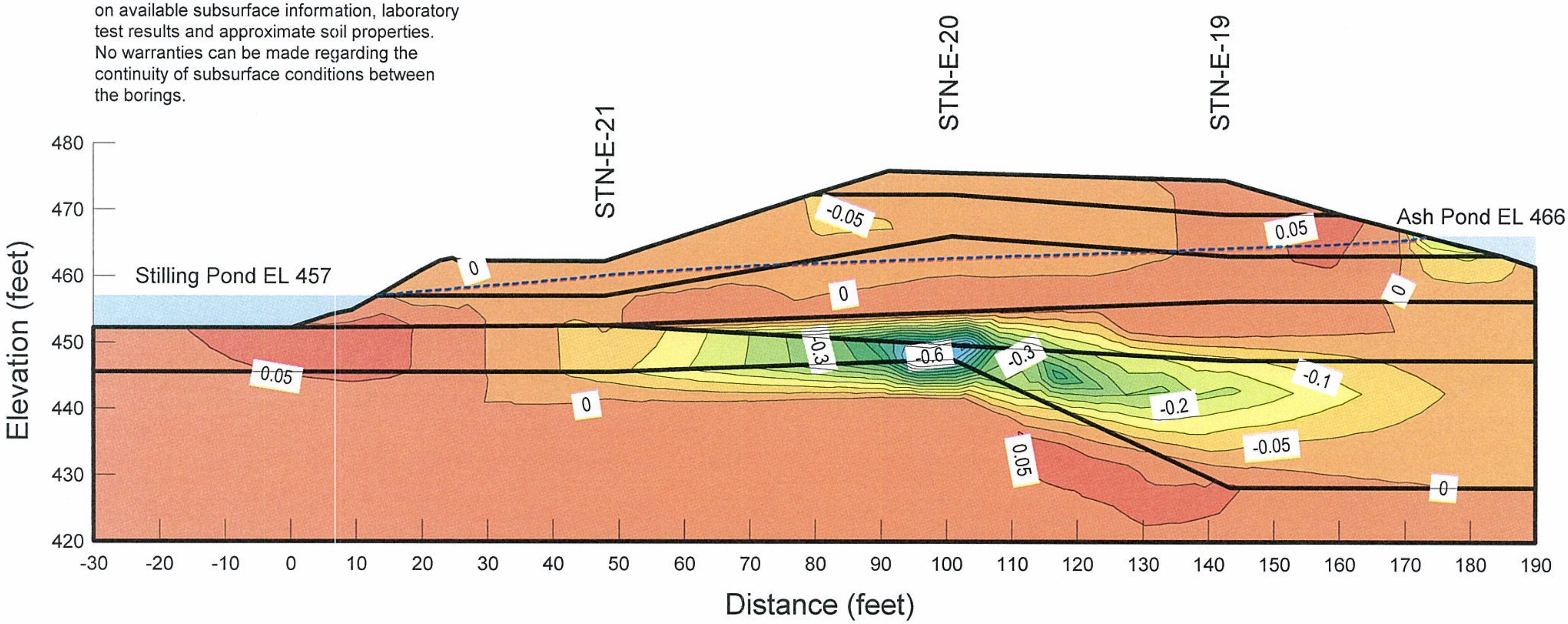
Gallatin Fossil Plant
Tennessee Valley Authority

Vertical Gradient

January 2010
Method: Steady-State
File Name: GAF_Section_G.gsz

Note:
The results of analysis shown here are based on available subsurface information, laboratory test results and approximate soil properties. No warranties can be made regarding the continuity of subsurface conditions between the borings.

Piping Potential
Maximum occurs at (-4.98, 452.25)
Total Head = 457 ft
At (-5.48, 445.6)
Total Head = 457.59 ft
dH = 0.59 ft dL = 6.67
i = 0.088 i(criticial) = 1.01
FSpiping = 11.4



Seepage Analysis
Section H
Ash Ponds A and E

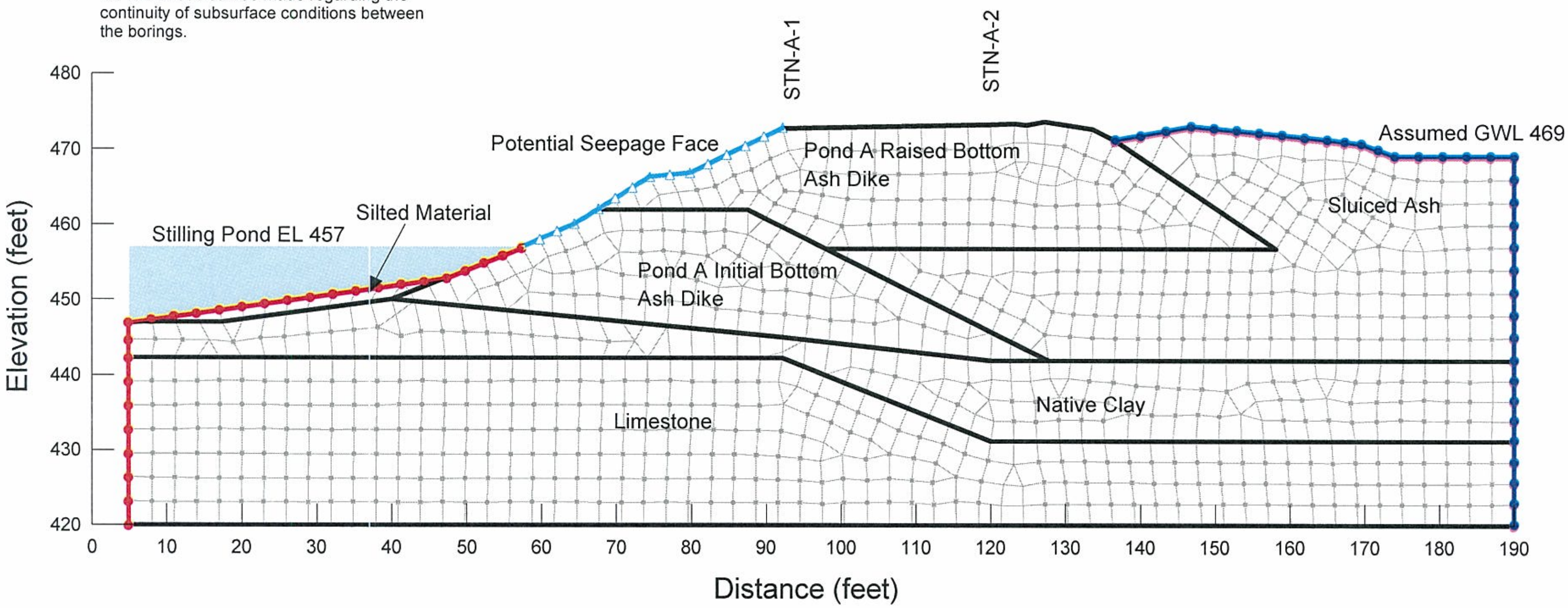
Boundary Conditions with Mesh

Gallatin Fossil Plant
Tennessee Valley Authority

January 2010
Method: Steady-State
File Name: GAF_Section_H.gsz

Note:
The results of analysis shown here are based on available subsurface information, laboratory test results and approximate soil properties. No warranties can be made regarding the continuity of subsurface conditions between the borings.

Material Type	Ksat	Kratio	Wsat
Pond A Raised Bottom Ash Dike	1.64e-005	0.2	0.15
Pond A Initial Bottom Ash Dike	0.00066	0.2	0.15
Sluiced Ash	9.84e-006	0.033	0.4
Silted Material	9.84e-005	0.033	0.4
Native Clay	6.56e-008	0.05	0.25
Limestone	0.000328	0.1	0.15



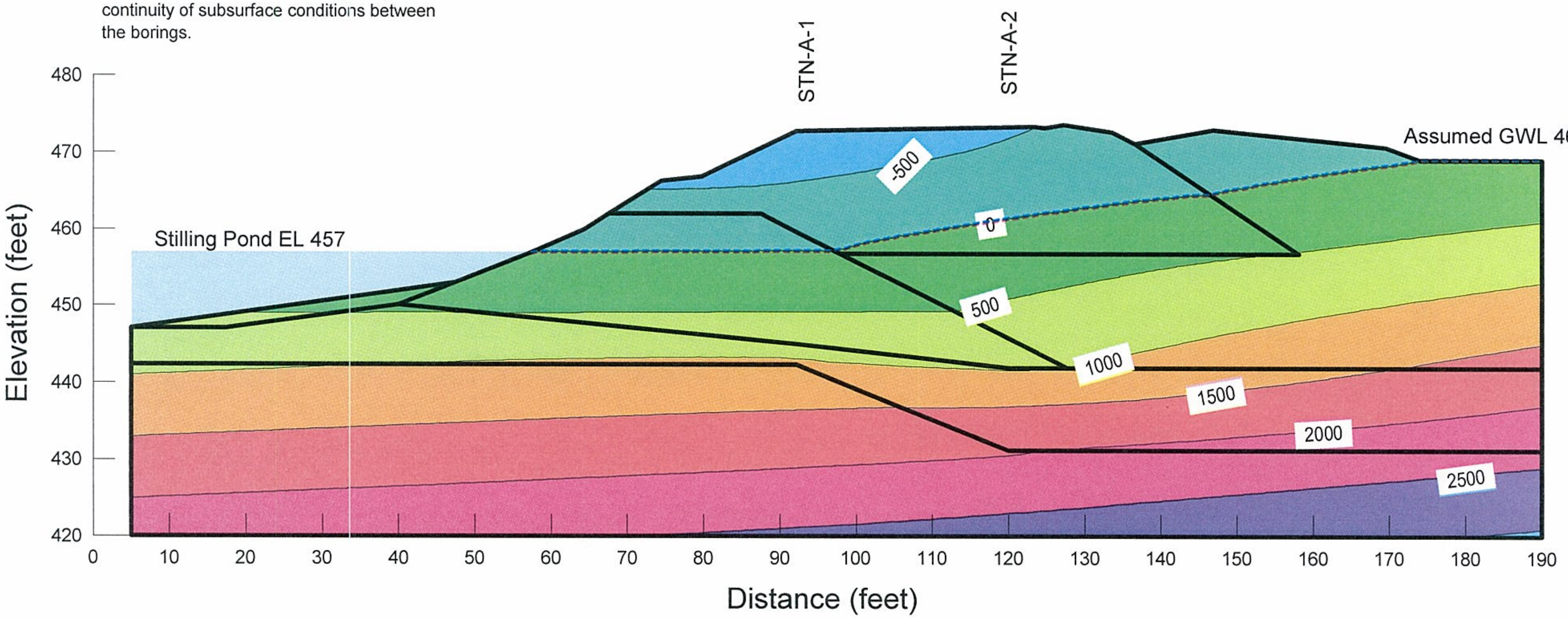
Seepage Analysis
Section H
Ash Ponds A and E

Gallatin Fossil Plant
Tennessee Valley Authority

Pore Water Pressure (psf)

January 2010
Method: Steady-State
File Name: GAF_Section_H.gsz

Note:
The results of analysis shown here are based on available subsurface information, laboratory test results and approximate soil properties. No warranties can be made regarding the continuity of subsurface conditions between the borings.



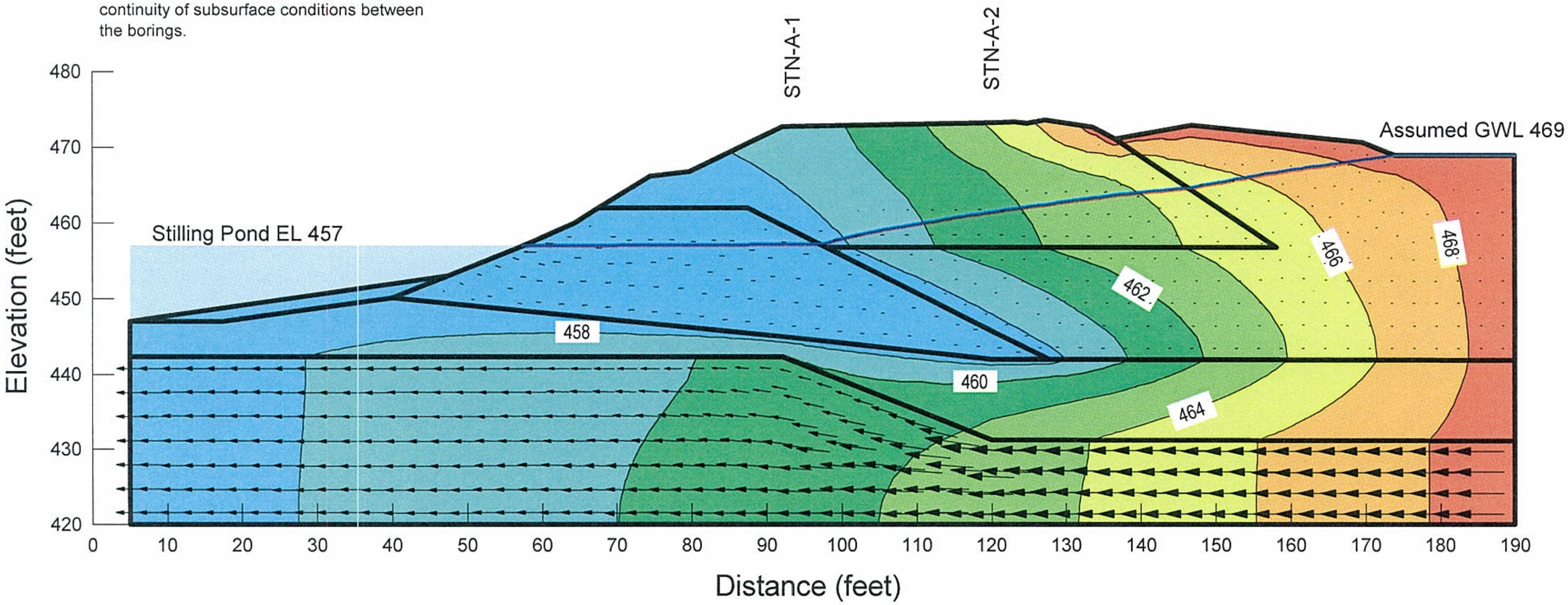
Total Head with Flow Vectors

Seepage Analysis
Section H
Ash Ponds A and E

Gallatin Fossil Plant
Tennessee Valley Authority

January 2010
Method: Steady-State
File Name: GAF_Section_H.gsz

Note:
The results of analysis shown here are based on available subsurface information, laboratory test results and approximate soil properties. No warranties can be made regarding the continuity of subsurface conditions between the borings.



Seepage Analysis
Section H
Ash Ponds A and E

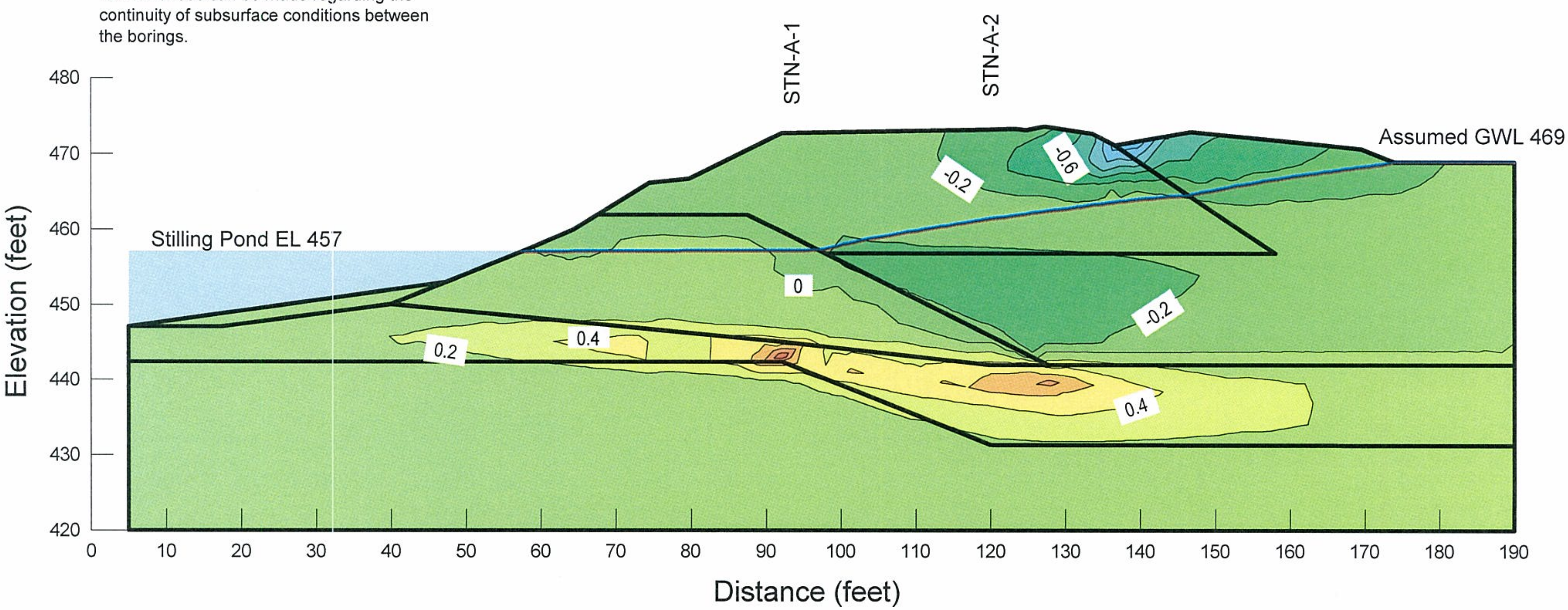
Gallatin Fossil Plant
Tennessee Valley Authority

Vertical Gradient

Piping Potential
Maximum occurs at (57.43, 457)
Total Head = 457 ft
At (58.89, 454.18)
Total Head = 457.04 ft
dH = 0.04 ft   dL = 3.18
i = 0.0125   i(criticial) = 0.86
FSpiping = 68.8

January 2010
Method: Steady-State
File Name: GAF_Section_H.gsz

Note:
The results of analysis shown here are based on available subsurface information, laboratory test results and approximate soil properties. No warranties can be made regarding the continuity of subsurface conditions between the borings.



Seepage Analysis
Section J
Ash Ponds A and E

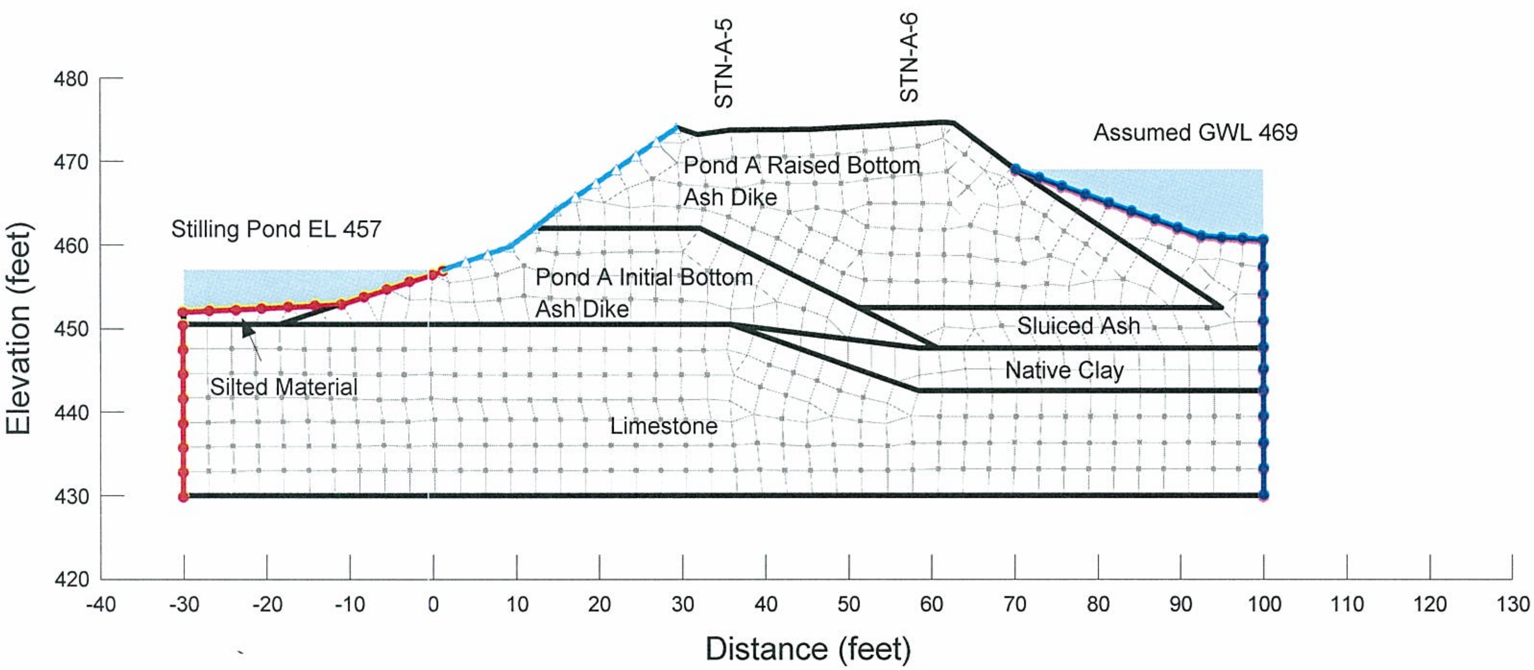
Boundary Conditions with Mesh

Gallatin Fossil Plant
Tennessee Valley Authority

January 2010
Method: Steady-State
File Name: GAF_Section_J.gsz

Note:
The results of analysis shown here are based on available subsurface information, laboratory test results and approximate soil properties. No warranties can be made regarding the continuity of subsurface conditions between the borings.

Material Type	Ksat	Kratio	Wsat
Pond A Raised Bottom Ash Dike	1.64e-005	0.2	0.15
Pond A Initial Bottom Ash Dike	0.00066	0.2	0.15
Sluiced Ash	9.84e-006	0.033	0.4
Silted Material	9.84e-005	0.033	0.4
Native Clay	6.56e-008	0.05	0.25
Limestone	0.000328	0.1	0.15



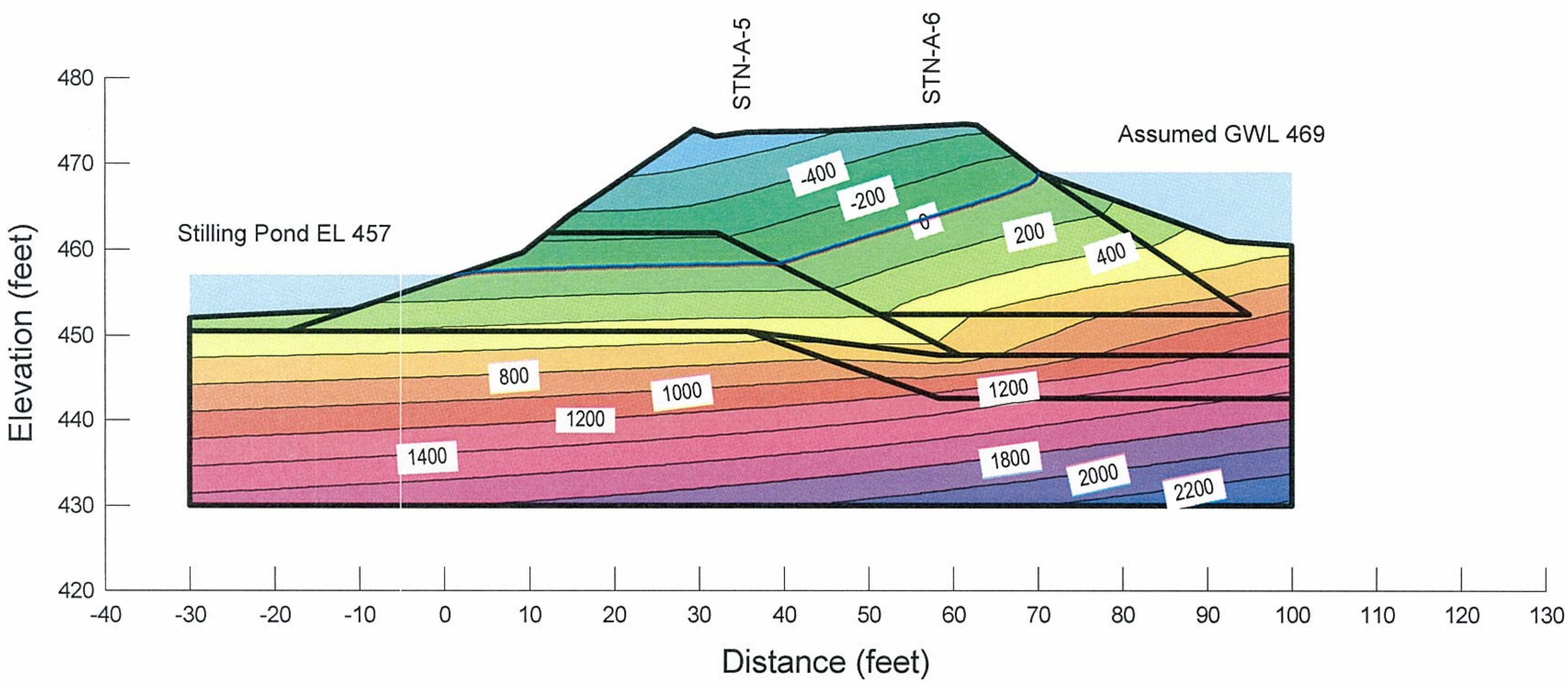
Seepage Analysis
Section J
Ash Ponds A and E

Gallatin Fossil Plant
Tennessee Valley Authority

Pore Water Pressure (psf)

January 2010
Method: Steady-State
File Name: GAF_Section_J.gsz

Note:
The results of analysis shown here are based on available subsurface information, laboratory test results and approximate soil properties. No warranties can be made regarding the continuity of subsurface conditions between the borings.



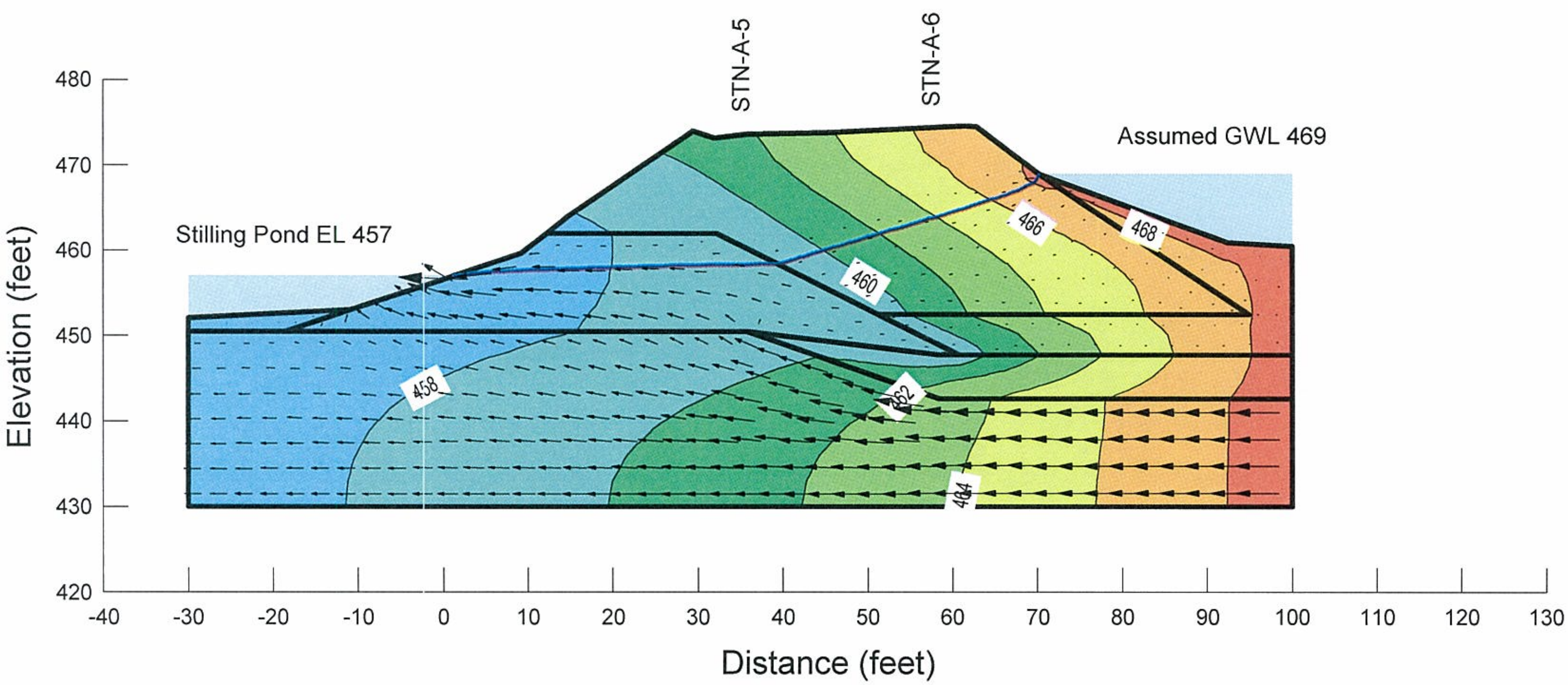
Seepage Analysis
Section J
Ash Ponds A and E

Gallatin Fossil Plant
Tennessee Valley Authority

Total Head with Flow Vectors

January 2010
Method: Steady-State
File Name: GAF_Section_J.gsz

Note:
The results of analysis shown here are based on available subsurface information, laboratory test results and approximate soil properties. No warranties can be made regarding the continuity of subsurface conditions between the borings.



Seepage Analysis
Section J
Ash Ponds A and E

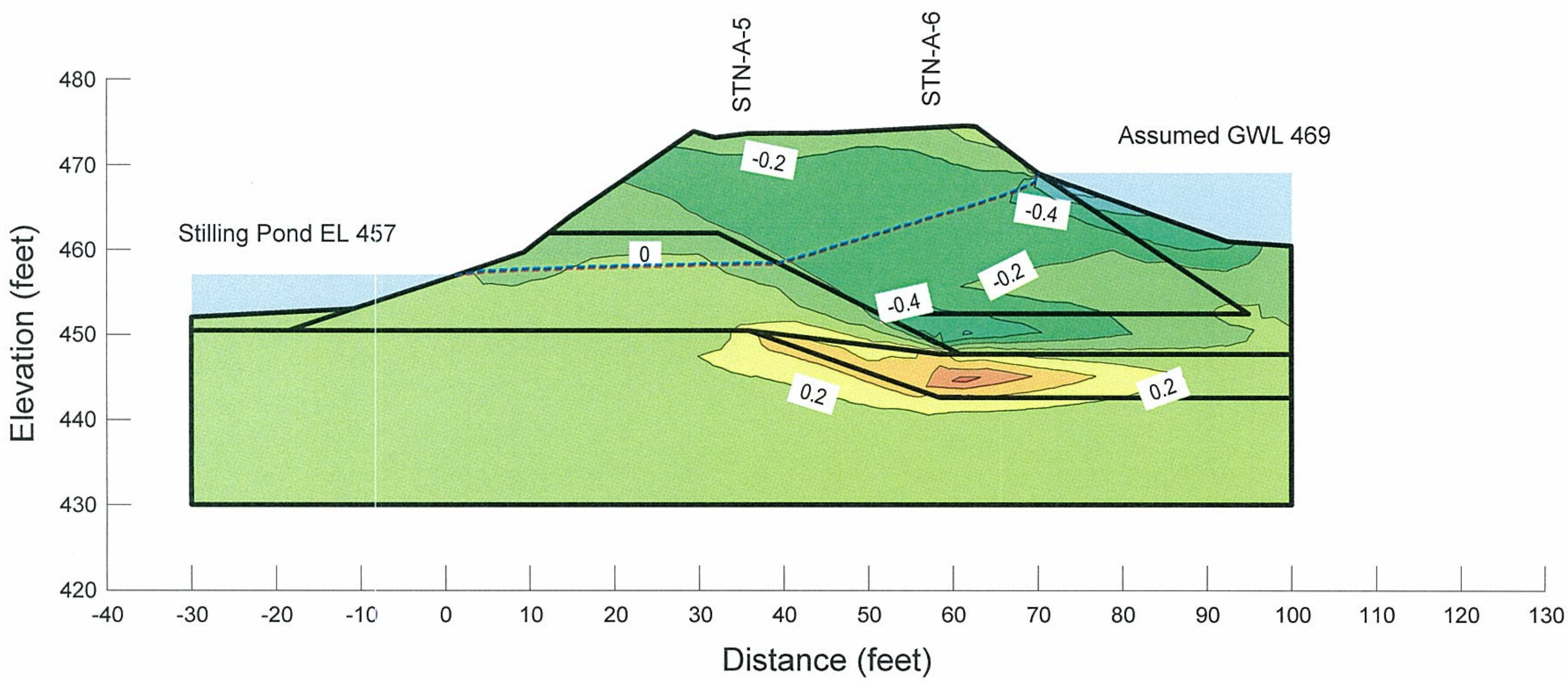
Vertical Gradient

Gallatin Fossil Plant
Tennessee Valley Authority

Piping Potential
Maximum occurs at (0, 456.55
Total Head = 457 ft
At (-0.22, 453.54)
Total Head = 457.27 ft
dH = 0.27ft dL = 3.02
i = 0.089 i(criticial) = 0.96
FSpiping = 10.8

January 2010
Method: Steady-State
File Name: GAF_Section_J.gsz

Note:
The results of analysis shown here are based on available subsurface information, laboratory test results and approximate soil properties. No warranties can be made regarding the continuity of subsurface conditions between the borings.



Seepage Analysis
Section K
Ash Ponds A and E

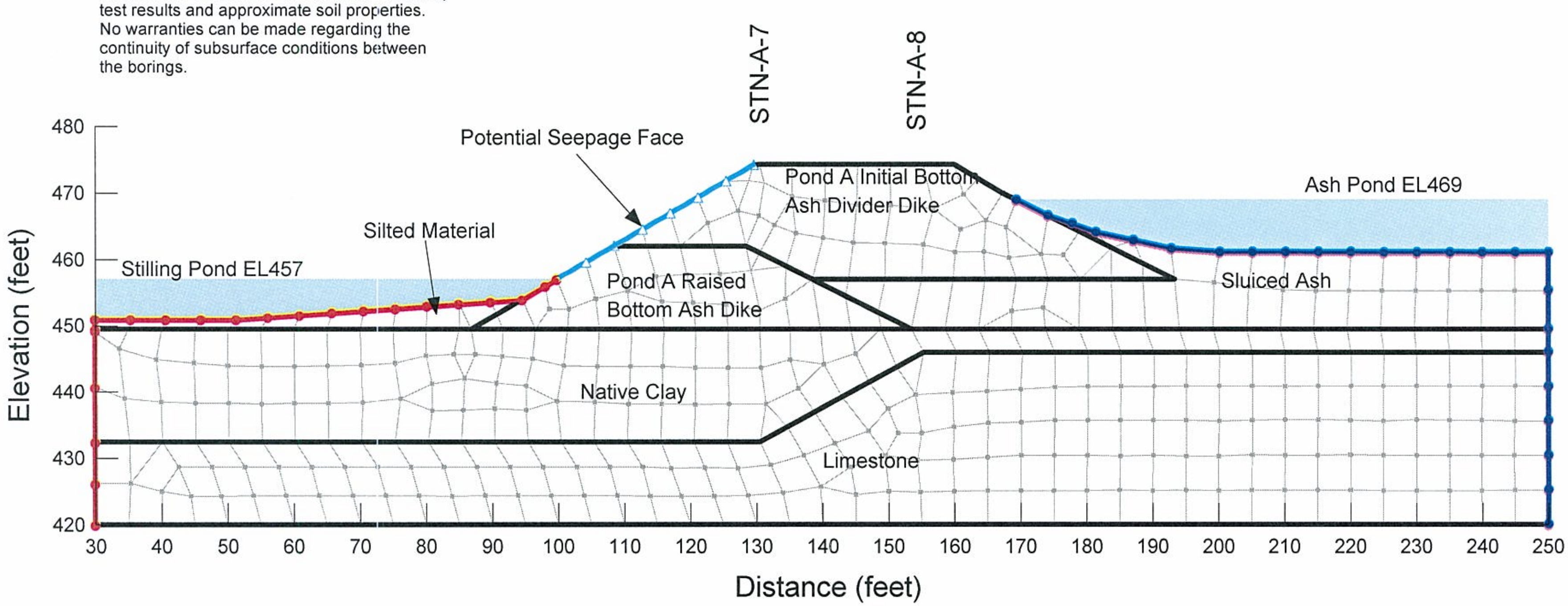
Gallatin Fossil Plant
Tennessee Valley Authority

Boundary Conditions with Mesh

January 2010
Method: Steady-State
File Name: GAF_Section_K.gsz

Note:
The results of analysis shown here are based on available subsurface information, laboratory test results and approximate soil properties. No warranties can be made regarding the continuity of subsurface conditions between the borings.

Material Type	Ksat	Kratio	Wsat
Pond A Initial Bottom Ash Divider Dike	0.00033	0.2	0.15
Pond A Raised Bottom Ash Dike	1.65e-005	0.2	0.15
Sluiced Ash	9.84e-006	0.033	0.4
Native Clay	6.56e-008	0.05	0.25
Silted Material	9.84e-005	0.033	0.4
Limestone	0.000328	0.1	0.15



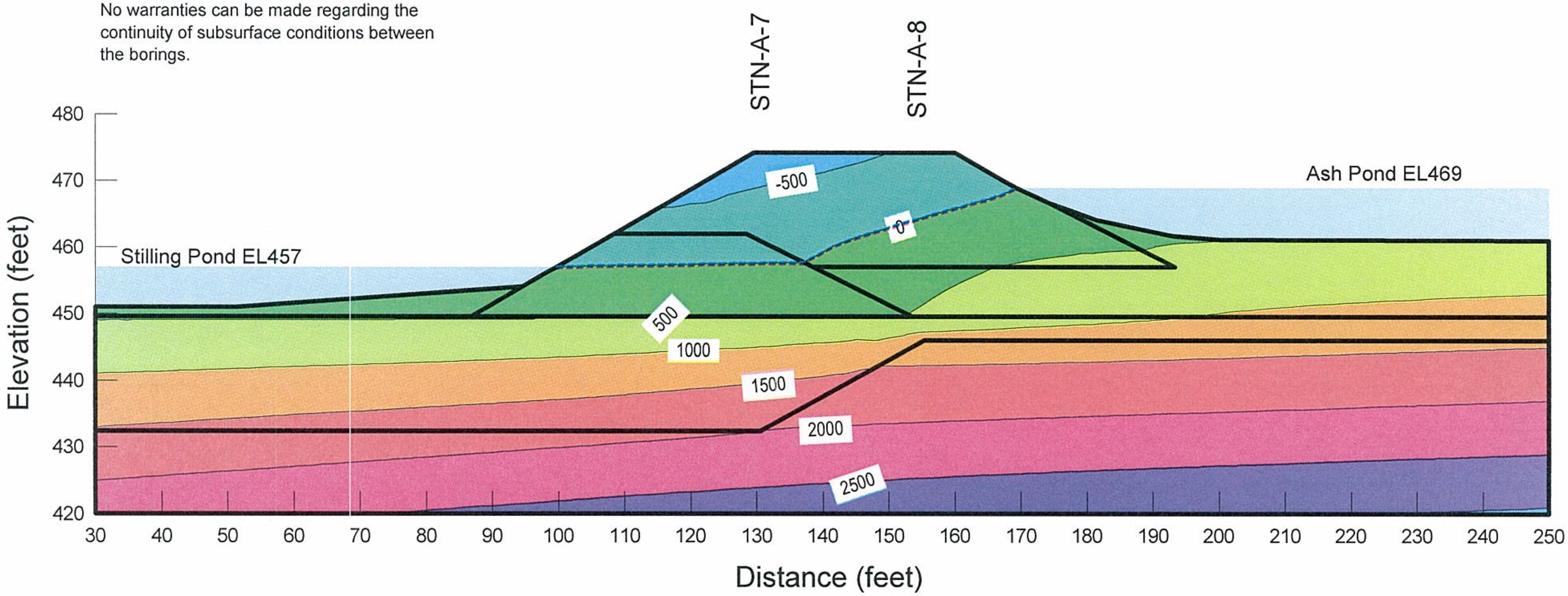
Seepage Analysis
Section K
Ash Ponds A and E

Gallatin Fossil Plant
Tennessee Valley Authority

Pore Water Pressure (psf)

January 2010
Method: Steady-State
File Name: GAF_Section_K.gsz

Note:
The results of analysis shown here are based on available subsurface information, laboratory test results and approximate soil properties. No warranties can be made regarding the continuity of subsurface conditions between the borings.



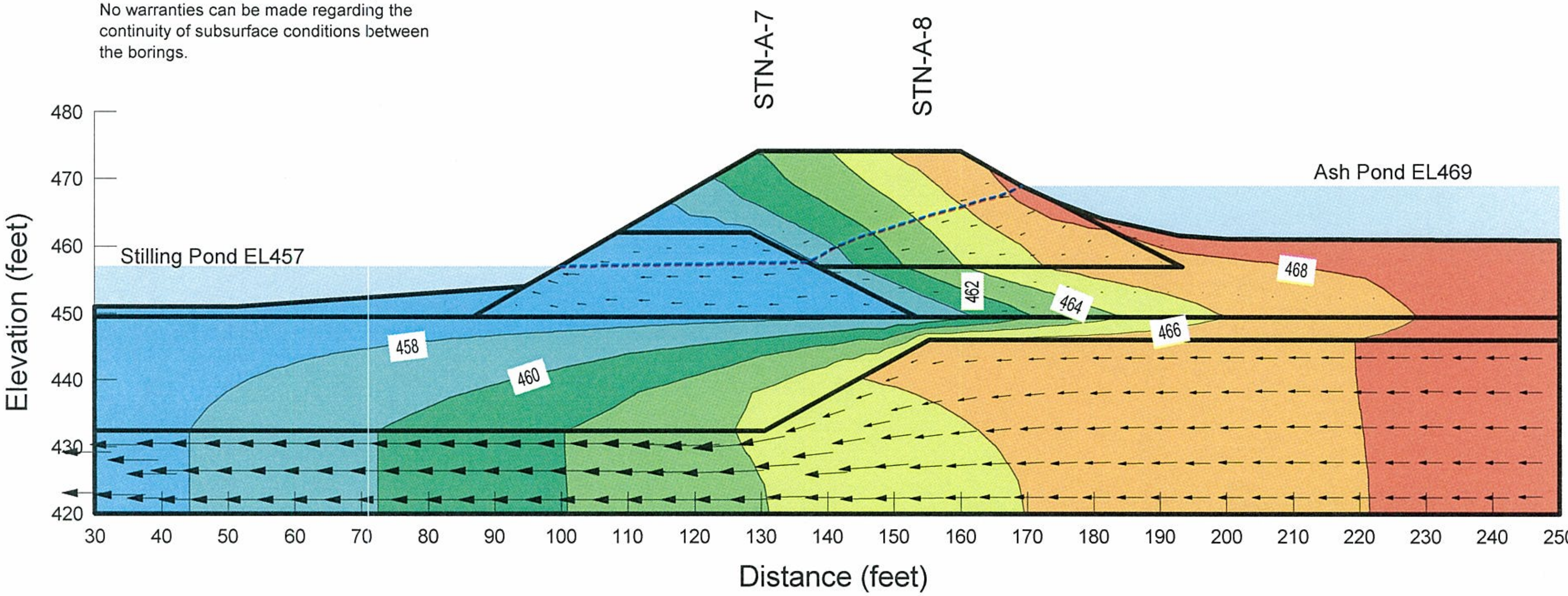
Seepage Analysis
Section K
Ash Ponds A and E

Gallatin Fossil Plant
Tennessee Valley Authority

Total Head with Flow Vectors

January 2010
Method: Steady-State
File Name: GAF_Section_K.gsz

Note:
The results of analysis shown here are based on available subsurface information, laboratory test results and approximate soil properties. No warranties can be made regarding the continuity of subsurface conditions between the borings.



Seepage Analysis
Section K
Ash Ponds A and E

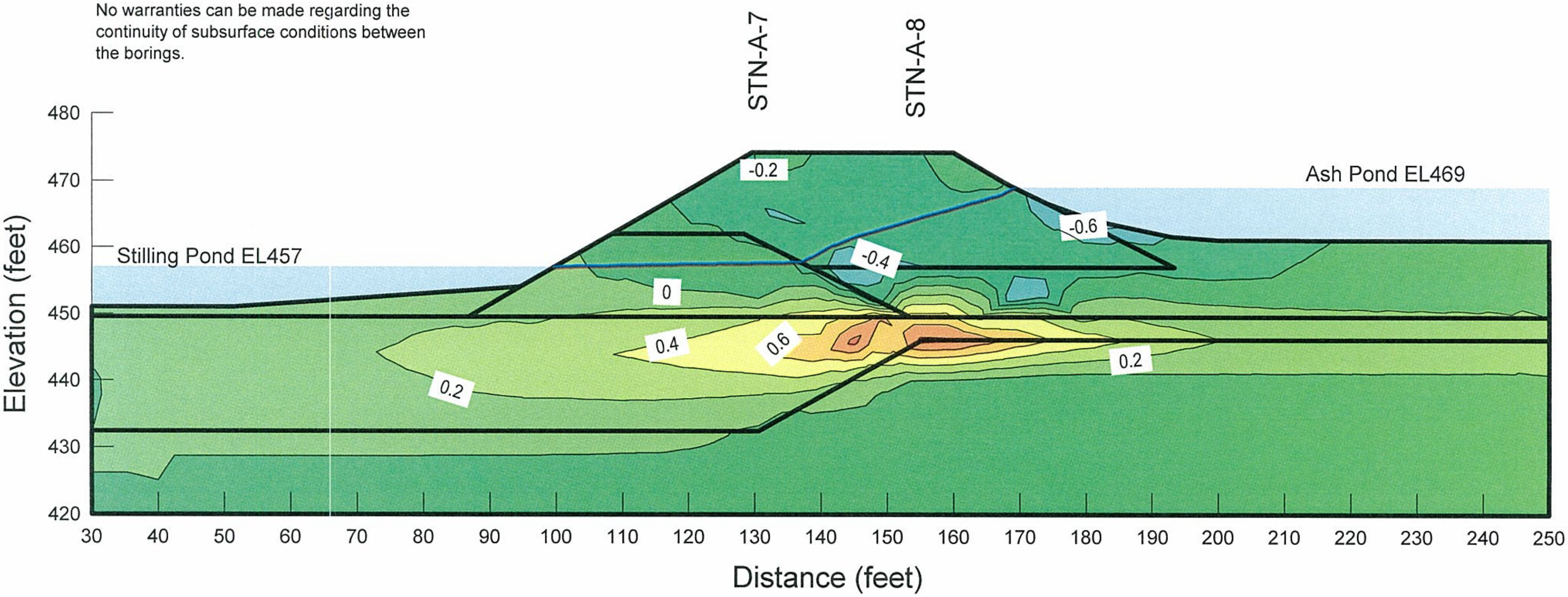
Vertical Gradient

Gallatin Fossil Plant
Tennessee Valley Authority

Piping Potential
Maximum occurs at (99.8, 457)
Total Head = 457 ft
At (101.56, 452.57)
Total Head = 457.12 ft
dH = 0.12 ft dL = 4.77
i = 0.025 i(criticial) = 0.89
FSpiping = 35.6

January 2010
Method: Steady-State
File Name: GAF_Section_K.gsz

Note:
The results of analysis shown here are based on available subsurface information, laboratory test results and approximate soil properties. No warranties can be made regarding the continuity of subsurface conditions between the borings.



Appendix G

MACTEC
October 14, 2004
Geotechnical Report

Attachment 3

REPORT OF GEOTECHNICAL EXPLORATION

ASH DISPOSAL AREA
AND POTENTIAL ON-SITE AND OFF-SITE BORROW AREAS
GALLATIN FOSSIL PLANT
GALLATIN, TENNESSEE

Prepared For:

TENNESSEE VALLEY AUTHORITY

Chattanooga, Tennessee

Prepared By:

MACTEC ENGINEERING AND CONSULTING, INC.

Knoxville, Tennessee

MACTEC Project 3043041043/01

October 14, 2004

MACTEC

MACTEC

October 14, 2004

Mr. Ron Purkey
Tennessee Valley Authority
1101 Market Street, LP-2G
Chattanooga, TN 37402

Subject: **Report of Geotechnical Exploration**
Ash Disposal Area and Potential On-Site and Off-Site Borrow Areas
TVA Gallatin Fossil Plant
Gallatin, Tennessee
MACTEC Project 3043041043/01

Dear Mr. Purkey:

We at MACTEC Engineering and Consulting, Inc., (MACTEC) are pleased to submit this Report of Geotechnical Exploration for your project. Our services, as authorized through TAO No. MAC-0702-00060 were provided in general accordance with our proposal number Prop04Knox/271, dated July 30, 2004.

This report reviews the information provided to us, discusses the site and subsurface conditions, and presents the results of our field and laboratory testing for the materials at the existing ash disposal area and potential on-site and off-site borrow areas. The Appendices contain a brief description of the Field Exploratory Procedures, a Key Sheet and Test Boring Records, Cone Penetrometer Test Results, the Laboratory Test Procedures, and the Laboratory Test Results.

The laboratory testing on lime-stabilized new bottom ash has not been completed to date. The results will be submitted after the testing is completed.

We anticipate further dialog and interaction with the designers as the design proceeds and will be happy to provide any additional information or interpretation of the data presented here in which may be necessary.

We will be pleased to discuss our data with you and would welcome the opportunity to provide the engineering and material testing services needed to successfully complete your project.

Sincerely,

MACTEC ENGINEERING AND CONSULTING, INC.

Hussein A. Benkhayal
Senior Professional

Carl D. Tockstein, P.E.
Chief Engineer - Tennessee Operations

CARL DEWAYNE TOCKSTEIN
REGISTERED ENGINEER
AGRICULTURE
COMMERCE
No. 20094
STATE OF TENNESSEE

HAB/CDT:sjm

MACTEC Engineering and Consulting, Inc.
1725 Louisville Drive • Knoxville, TN 37921-5904
865-588-8544 • Fax: 865-588-8026

REPORT OF GEOTECHNICAL EXPLORATION

ASH DISPOSAL AREA
AND POTENTIAL ON-SITE AND OFF-SITE BORROW AREAS
GALLATIN FOSSIL PLANT
GALLATIN, TENNESSEE

Prepared For:

TENNESSEE VALLEY AUTHORITY

Chattanooga, Tennessee

Prepared By:

MACTEC ENGINEERING AND CONSULTING, INC.

Knoxville, Tennessee

MACTEC Project 3043041043/01

October 14, 2004

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EXECUTIVE SUMMARY

MACTEC was selected by the Tennessee Valley Authority (TVA) to perform a geotechnical exploration for the Ash Disposal Area and potential on-site and off-site borrow areas at the Gallatin Fossil Plant in Gallatin, Tennessee. The objectives of our exploration were to determine general subsurface conditions and to obtain data to evaluate the engineering characteristics of the ash, on-site soils, and potential on-site and off-site borrow soils.

The exploration consisted of performing 13 test borings, 16 auger borings, 14 observation trenches, and cone penetrometer testing (CPT) at seven locations. All test borings were drilled to refusal. The auger borings were drilled to determined depths ranging from about 15 to 20 feet or refusal, whichever occurred first. The major findings of our geotechnical exploration are as follows:

- The test borings drilled in the ash pond area typically encountered ash, fill, alluvium, and residuum. The ash, which was encountered in all test borings except borings B-9 through B-12, ranged in relative densities from very loose to very dense. The fill soils had firm to very hard consistencies. The underlying alluvium and residuum ranged in consistencies from very soft to very stiff and from very soft to very hard, respectively.

- Ground water was encountered in all test borings except borings B-9 and B-10 at the time of drilling. Ground-water measurements were made in the test borings at least 24 hours after completion of drilling. Ground water was not encountered in any of the auger borings. Long-term measurements for the presence or absence of ground water were not obtained during this exploration.

- Cone penetrometer test soundings were performed at seven locations that correspond to test borings. The results of the cone penetrometer testing are presented in Appendix C.

- Laboratory tests were performed on bulk samples from the bottom ash. The tests and test results are summarized in Section 8. The test results are presented in Appendix D.

- Laboratory tests were performed on bulk soil samples from potential on-site and off-site borrow areas. A summary of the tests performed and the test results is presented in Section 8. The test results are presented in Appendix D.

This summary is only an overview and should not be used as a separate document or in place of reading the entire report, including the appendices.

1.0 INTRODUCTION

This report presents the findings of our subsurface exploration and laboratory testing recently performed for the Ash Disposal Area and potential on-site and off-site borrow areas at the TVA Gallatin Fossil Plant. Our services were authorized by Mr. Ron Purkey of TVA.

2.0 OBJECTIVES OF EXPLORATION

The objectives of our exploration were to determine general subsurface conditions and to obtain data to evaluate the engineering characteristics of the ash, on-site soils, and potential on-site and off-site borrow soils. An assessment of site environmental conditions, or an assessment for the presence or absence of pollutants in the soil, bedrock, surface water, or ground water of the site was beyond the proposed objectives of our exploration.

3.0 SCOPE OF EXPLORATION

The scope of our exploration was based on our proposal number Prop04Knox/271, dated July 30, 2004, and the geotechnical scope of work outlined in the project's scope of work prepared by Parsons E&C. It includes the following:

- Reconnaissance of the immediate site
- Drilling 13 test borings to refusal depths which ranged from about 18.5 to 54.2 feet
- Drilling 16 auger borings in potential on-site borrow areas to depths of 15 to 20 feet or refusal
- Collecting four bulk samples from bottom ash (one sample was collected from the "old" bottom ash and three samples were collected from the "new" bottom ash).
- Collecting two bulk soil samples from an off-site potential borrow area
- Performing 14 observation trenches including logging the soil strata and collecting samples within an on-site borrow area
- Performing cone penetrometer testing (CPT) at seven locations
- Conducting laboratory testing on the ash, on-site soils, and potential borrow soils

- Preparing a geotechnical report summarizing the field and laboratory test results

The drilling and sampling were performed in general accordance with ASTM procedures included in Appendix A. The drilling was performed during the period from August 9 to 18, 2004. The equipment used consisted of a CME Model 55 ATV (all-terrain-vehicle) mounted drill rig equipped with an automatic hammer.

Standard penetration tests (SPTs) were performed in all test borings at 3-foot vertical intervals in the upper 20 feet and at 5-foot intervals below a depth of 20 feet. In addition to the SPT samples, 10 relatively undisturbed samples were obtained from five test borings for laboratory testing. Bulk soil samples were obtained from the auger cuttings at some of the auger borings in the potential on-site borrow areas. Bulk soil samples were also obtained from a potential off-site borrow area and from bottom ash.

Ground-water levels were measured during drilling in each boring. Ground-water measurements were also made in the borings at approximately 24 hours or later after the completion of the borings.

Upon completion of drilling, the test borings were plugged and abandoned by backfilling the full depth with cement grout. The auger borings were abandoned by backfilling the full depth with auger cuttings.

The CPT soundings were performed on September 8, 2004. The CPT testing procedures are presented in Appendix C. A track-mounted CPT rig with a 20-ton capacity electronic cone was utilized to perform the testing. During the CPT testing, the cone is continuously pushed into the ground and measurements are taken of the cone tip resistance, sleeve friction, and dynamic pore pressure. Pore pressure dissipation testing was performed only once at each CPT location to estimate the depth to ground-water level. Upon completion of the CPT testing, each hole was plugged and abandoned by backfilling the full depth with hole plug.

All samples were transported to our laboratories in Knoxville, Tennessee, where ash and soil samples were selected for laboratory testing. The testing program for this project (excluding lime-stabilized bottom ash testing) consisted of the following:

- 12 Plasticity Index (Atterberg Limits) Tests
- 26 Grain Size Distribution Tests

- 46 Natural Moisture Content Tests
- 7 Standard Proctor Compaction Tests
- 6 Specific Gravity Tests
- 6 Unit Weight and Natural Moisture Content Tests for Undisturbed Samples
- 9 Consolidated Undrained Triaxial Compression (CU) Tests
- 2 Unconsolidated Undrained Triaxial Compression (UU) Tests
- 3 Permeability Tests

Subsurface conditions encountered in the borings are presented on the Test Boring Records and Auger Boring Records in Appendix B. The results of the CPT testing are presented in Appendix C. The laboratory testing results are presented in Appendix D.

4.0 PROJECT INFORMATION AND SITE CONDITIONS

Project information was provided to us by Mr. Daniel Smith with Parsons E&C in the form of a Geotechnical Investigation Scope of Work and a proposed boring/CPT location plan. The exploration included the ash disposal area, potential on-site borrow areas, and a potential off-site borrow area. The site of the ash disposal area is located on the northwestern side of the Gallatin Fossil Plant site. The ground surface elevations varied by as much as 20 feet in the areas explored at the ash disposal area.

5.0 AREA AND SITE GEOLOGY

The published geologic map of this area shows that this site is underlain by Quaternary-aged alluvium deposits. The alluvium is a water-transported deposit, consisting generally of sand, silt, clay, and gravel. The maximum thickness of this deposit is 60 feet in areas of the Cumberland River flood plain. The site is underlain by limestone bedrock from the Nashville Group (the Hermitage Formation) and the Stones River Group (the Carters Limestone and the Lebanon Limestone Formations). The Hermitage Formation consists of a thin-bedded to laminated sandy and argillaceous blue limestone which occurs at high elevations. This bedrock weathers into buff or brown soils. The Carter Limestone, which is about 50 to 100 feet thick, consists of thick-bedded light gray slightly cherty limestone. Finally, the Lebanon limestone consists of a thin-bedded gray limestone with calcareous shale. The thickness of the Lebanon Limestone ranges from bout 80 to 100 feet.

6.0 SUBSURFACE CONDITIONS

Subsurface conditions in the ash disposal area were explored with 13 test borings (B-1 through B-13) and seven CPT soundings (CPT-1 through CPT-5). In addition, 16 auger borings (A-1 through A-14, A-20, and A-21) were drilled and 14 observation trenches (OT-1 through OT-14) were excavated within potential on-site borrow areas. The locations for all the borings, CPT soundings, and observation trenches were proposed by Parsons E&C. The locations were established in the field by Parsons personnel. After drilling was completed, the boring locations were surveyed by others and we were provided with the surveyed locations and elevations of all borings. Because of access restrictions, some of the borings were offset from the originally proposed location.

Subsurface conditions encountered at each boring location are shown on the Soil Test Boring Records and Auger Boring Records in Appendix B. The Test Boring Records represent our interpretation of the subsurface conditions, based on the field logs and visual examination of the samples by one of our geotechnical engineers. The lines designating the interfaces between various strata on the Test Boring Records represent the approximate interface locations.

The test borings performed at this site typically encountered ash, fill, alluvial, and residual materials. Fill soils are soils which have been transported to their current location by man. Alluvial soils are soils that have been transported to their present location by running water. Residual soils are soils that have developed from the in-place weathering of the underlying parent bedrock. All test borings were advanced to refusal. The auger borings were advanced to predetermined depths of 15 to 20 feet or refusal, whichever occurred first. A summary of the boring depths is presented in Table 1.

Table 1
Soil Test Boring and Auger Boring Summary

Boring Number	Boring Type	Ground Elevation msl (Feet)	Auger Refusal Depth (Feet)	Refusal Elevation msl (Feet)	Boring Termination Depth (Feet)	Boring Termination Elevation msl (Feet)
B-1	STB	480.0	35.2	444.8	35.2	444.8
B-2	STB	475.4	43.6	431.8	43.6	431.8
B-3	STB	472.4	33.7	438.7	33.7	438.7
B-4	STB	474.4	26.9	447.5	26.9	447.5

Table 1

Soil Test Boring and Auger Boring Summary

Boring Number	Boring Type	Ground Elevation msl (Feet)	Auger Refusal Depth (Feet)	Refusal Elevation msl (Feet)	Boring Termination Depth (Feet)	Boring Termination Elevation msl (Feet)
B-5	STB	473.5	33.4	440.1	33.4	440.1
B-6	STB	472.0	32.7	439.3	32.7	439.3
B-7	STB	461.0	28.4	432.6	28.4	432.6
B-8	STB	461.0	23.6	437.4	23.6	437.4
B-9	STB	465.0	36.7	428.3	36.7	428.3
B-10	STB	460.0	26.7	433.3	26.7	433.3
B-11	STB	460.0	54.2	405.8	54.2	405.8
B-12	STB	461.0	39.0	422.0	39.3*	421.7
B-13	STB	461.0	29.5	431.5	29.5	431.5
A-1	AB	478.0	18.5	459.5	18.5	459.5
A-2	AB	483.0	NE	NE	20.0	463.0
A-3	AB	477.0	NE	NE	20.0	457.0
A-4	AB	475.0	NE	NE	15.0	460.0
A-5	AB	473.0	NE	NE	15.0	458.0
A-6	AB	473.0	11.5	461.5	11.5	461.5
A-7	AB	475.0	NE	NE	20.0	455.0
A-8	AB	474.0	NE	NE	15.0	459.0
A-9	AB	541.0	NE	NE	15.0	526.0
A-10	AB	513.0	5.0	508.0	5.0	508.0
A-11	AB	572.0	12.5	559.5	12.5	559.5
A-12	AB	523.0	13.0	510.0	13.0	510.0
A-13	AB	539.0	9.0	530.0	9.0	530.0
A-14	AB	575.0	12.0	563.0	12.0	563.0
A-20	AB	496.0	16.6	479.4	16.6	479.4
A-21	AB	493.0	10.0	483.0	10.0	483.0

STB – Soil Test Boring

AB - Auger Boring

NE - Not Encountered

*A split spoon was driven to this depth to determine auger refusal material.

Prepared/Date: HAB 10/14/04
Checked/Date: CDT 10/14/04

6.1 ASH

Ash material was encountered in all test borings except for borings B-9 through B-12. The ash interval extended from the existing ground surface to depths ranging from about 11.5 to 32 feet. An interval of fill was encountered above the ash in test borings B-8 and B-13. The majority of the ash encountered consisted of gray and dark gray silty sand-sized particles with coal fragments. The standard penetration test (SPT) resistance values in the ash ranged from 0 (weight of hammer) to over 50 blows per foot (bpf); indicating very loose to very dense relative densities.

6.2 FILL

Fill soils were encountered at the ground surface in test borings B-8 and B-10 through B-13 and at a depth of about 11.5 feet in test boring B-4. The fill extended to depths ranging from about 2.5 to 17.5 feet. The fill soils consisted primarily of gray, orange-brown, and brown, silty clay, sandy silt, and silty and clayey sand with chert fragments, gravel, and coal. The SPT resistance values in the fill ranged from 8 to 0ver 50 bpf, indicating firm to very hard consistencies. However, the higher SPT values were probably caused by the presence of rock fragments in the sample interval.

6.3 ALLUVIUM

Alluvial soils were encountered in all test borings except test borings B-3, B-4, B-5, and B-9. The alluvial soils were encountered below the ash/fill and extended to depths ranging from about 11.5 to 50.5 feet. The alluvial soils consisted primarily of brown, gray, olive-gray, and orange-brown silty clay with gravel, chert and coal fragments, and roots. The SPT resistance values in the alluvium ranged from 1 to 16 blows per foot (bpf), indicating very soft to very stiff consistencies.

6.4 RESIDUUM

Residual materials were encountered in all test borings except for test borings B-4 and B-7. The residual soils were encountered below the ash or alluvium and extended to refusal except in test boring B-9 where the residual soils were encountered at the ground surface. The residuum encountered in the borings consisted of orange-brown, yellow-brown, brown, and tan, silty clay with chert fragments. The SPT resistance values in the residuum ranged from 1 to over 50 bpf, indicating very soft to very hard consistencies. However, the majority of the residuum had firm to very stiff consistencies.

7.0 CONE PENETROMETER TESTING

Seven CPT soundings (CPT-3, CPT-4, CPT-5, CPT-7, CPT-8, CPT-12, and CPT-13) were performed in general accordance with ASTM Standard D5778-95 and the procedures in Appendix C. The CPT sounding locations were proposed by Parsons E&C and corresponded to seven boring locations (B-3, B-4, B-5, B-7, B-8, B-12, and B-13). The results are presented in Appendix C.

During the CPT testing, the cone is pushed into the ground at a constant rate. Measurement of tip resistance (q_c), sleeve friction (f_s), and dynamic pore pressure (U) are obtained at small intervals (approximately 2-inch intervals). Using published correlations, the collected data is used to estimate several soil parameters such as unit weight, strength parameters, standard penetration test (SPT) value, relative density, and others. Graphs in Appendix C show plots of recorded field data versus depth. The recorded field data and estimated parameters are presented in table format in Appendix C, in addition to the correlations used to develop them.

In addition to the above, pore pressure dissipation tests were performed at all CPT locations to estimate the depth to ground water. The results of the pore pressure tests are also presented in Appendix C.

The results of the CPT soundings and the estimated SPT values are in good agreement with the SPT values obtained during drilling for the corresponding locations.

8.0 LABORATORY TESTING AND DISCUSSION OF TEST RESULTS

This section describes the geotechnical laboratory testing program and summarizes the test results. The laboratory testing procedures and laboratory test results are included in Appendix D. The laboratory tests were performed on SPT and undisturbed ash and soil samples obtained during drilling from the ash pond, bulk samples from on-site bottom ash, lime-treated bottom ash samples, and bulk soil samples from potential on-site and off-site borrow areas. The following paragraphs provide a short discussion of the general types of testing conducted and the test results.

8.1 ASH POND SAMPLES

8.1.1 Index Properties, Specific Gravity And Unit Weights

Natural moisture content tests were performed on many of the split-spoon and undisturbed soil samples. Liquid limit, plastic limit, and plasticity index tests (collectively referred to herein as Atterberg limits); specific gravity tests; and grain size distributions with and without hydrometer analyses were performed on selected undisturbed and split-spoon samples. These tests were used to confirm our visual-manual classifications.

The plasticity tests were performed only on the clayey alluvial and residual soils. Liquid limits for two clayey soil samples tested were 51 and 78; plastic limits were 20 and 30; and plasticity indices were 31 and 48. The tested soils were classified as CH soils in accordance with the Unified Soil Classification System (USCS).

Natural moisture contents for the ash ranged from 7.1 percent (boring B-1) to 35.7 percent (boring B-13). However, the majority of the moisture contents in the ash varied from about 11.2 to 33.4 percent. The natural moisture content of the alluvium and residuum ranged from 17.9 percent (boring B-10) to 38.2 percent (boring B-13). The majority of the alluvium and residuum samples tested had a natural moisture content ranging from about 26.7 to 32.9 percent. The fill soils tested had moisture contents ranging from 15.9 percent (boring B-4) to 26.9 percent (boring B-13).

Specific gravities of the ash ranged from 2.2 to 2.48.

8.1.2 Strength

Four consolidated undrained (CU) triaxial compression test were performed on undisturbed ash and soil samples. Two CU tests were performed on ash samples obtained from borings B-3 and B-13. One CU test was performed on an alluvium sample obtained from boring B-8. Finally, one CU test was performed on a residuum soil sample from boring B-13.

The results of the CU tests performed on the ash indicated that the tested samples had a total friction angle ranging from 18.3 to 38.5 degrees and a total cohesion intercept from 1,770 to 2,640 pounds per square foot (psf). The tests also indicated that the effective friction angle ranged from

24.4 to 35.5 degrees and the effective cohesion intercept ranged from 0 to 1,280 psf for the ash samples tested.

The CU test performed on the alluvium yielded a total friction angle of 14.2 degrees and a total cohesion intercept of 1,520 psf. The effective friction angle was 22.9 degrees and the effective cohesion intercept was 1,000 psf.

The residual soil sample tested had a total friction angle of 11.3 degrees and a total cohesion of 370 psf. The effective friction angle for this sample was 14.2 degrees and the effective cohesion was 210 psf.

8.1.3 Permeability

A constant head permeability test was performed on a relatively undisturbed sample of ash material obtained from boring B-13. The test results indicated that this sample had a permeability of 2.78×10^{-5} cm/sec.

8.2 BOTTOM ASH SAMPLES

Four bulk samples were collected from the on-site bottom ash. One samples was collected from the "old" bottom ash and three samples were collected fro the "new" bottom ash. Selected samples from the bottom ash were subjected to a series of laboratory tests to determine their natural moisture content, specific gravity, gain size distribution, compaction characteristics, strength, and permeability.

8.2.1 Natural Moisture Content, Grain Size Distribution, and Specific Gravity

Natural moisture content and grain size analysis tests were performed on all bottom ash samples. The "old" bottom ash sample had a natural moisture content of 11.1 percent. The natural moisture contents for the "new" bottom ash samples ranged from 9.6 to 14.0 percent.

The results of the grain size analysis tests indicated the "old" bottom ash sample was a sand with 15 percent fines and 12 percent gravel. The "new" bottom ash samples were sand with fines ranging from 9.8 to 12.1 percent and gravel ranging from 6.1 to 11.6 percent.

Specific gravity tests were performed on the "old" bottom ash sample and two of the three "new" bottom ash samples. The test results indicated that the "old" bottom ash sample had a specific gravity of 2.64. The specific gravities of the "new" bottom ash tested were 2.37 and 2.49.

8.2.2 Moisture-Density Relationship

Standard Proctor compaction tests were performed on the "old" bottom ash sample and two "new" bottom ash samples (Samples 2 and 3). The maximum dry density for the "old" bottom ash was 104.2 pounds per cubic foot (pcf) and the optimum moisture content was 15.8 percent. The results of the compaction tests performed on the two "new" bottom ash samples indicated that the maximum dry densities were 75.6 and 79.4 pcf, respectively, and the optimum moisture contents were 32.6 and 29.2 percent, respectively.

8.2.3 Strength

Consolidated undrained (CU) triaxial compression tests were performed on remolded samples from the "old" bottom ash and Sample 2 of the "new" bottom ash. The samples were remolded to or near 95 percent of the standard Proctor maximum dry density and at or near the optimum moisture content.

The results of the CU test indicated that the "old" bottom ash tested had a total friction angle of 31.7 degrees and a total cohesion of 1,390 psf. The results also indicated that the effective friction angle was 40.2 degrees and the effective cohesion was 0 psf.

The CU test performed on the "new" bottom ash (Sample 2) yielded a total friction angle of 22.5 degrees and a total cohesion of 3,400 psf. The effective friction angle for this sample was 37.3 degrees and the effective cohesion was 600 psf.

8.2.4 Permeability

Constant head permeability tests were performed on remolded samples from the "old" bottom ash and Sample 2 of the "new" bottom ash. The samples were remolded to or near 92 percent of the standard Proctor maximum dry density and at or near the optimum moisture content. The permeability tests results indicated that the permeabilities were 8.55×10^{-4} cm/sec and 2.15×10^{-3} cm/sec for the "old" and "new" bottom ash samples tested, respectively.

8.3 ON-SITE BORROW SAMPLES

Laboratory tests were performed on bulk soil samples of auger cuttings obtained during drilling from auger borings A-1, A-2, A-5, A-7, A-9, A-11, A-12, and A-14. The laboratory testing for the potential on-site borrow soils included natural moisture content, Atterberg limits, grain size analysis, standard Proctor compaction, and triaxial compression tests. The tests and test results are summarized below.

8.3.1 Index Properties

Natural moisture content, Atterberg limits, and grain size analysis tests were performed on all bulk samples from the potential on-site borrow soils.

Natural moisture contents of the tested samples ranged from 10.8 percent (boring A-11) to 29.9 percent boring (A-5). With the exception of these two values, the natural moisture contents ranged from 17.7 to 24.1 percent.

The Atterberg limits test results indicated that liquid limits for the on-site borrow soils tested ranged from 36 to 80, plastic limits ranged from 17 to 32, and plasticity indices ranged from 19 to 49. The tested on-site borrow soils were classified as CH and CL in accordance with the USCS.

8.3.2 Moisture-Density Relationship

Standard Proctor compaction tests were performed on the bulk samples from borings A-2 and A-9. The test results indicated that the maximum dry density for these samples were 104.8 and 105.6 pcf, and the corresponding optimum moisture contents were 19.1 and 19.2, respectively.

8.3.3 Strength

One consolidated undrained (CU) triaxial compression test and one unconsolidated undrained (UU) triaxial compression test were performed on remolded samples from each of the bulk samples from borings A-2 and A-9. All samples tested were remolded to dry densities at or near 95 percent of the standard Proctor maximum dry density and at or near the corresponding optimum moisture contents. Further, the samples were tested in a saturated condition.

The results of the CU test performed on remolded samples from boring A-2 indicated that the samples tested had a total friction angle of 13.3 degrees and a total cohesion of 750 psf. The effective friction angle for these samples was 22.9 degrees and the effective cohesion was 670 psf. The UU test results on samples from boring A-2 yielded a friction angle of 2.4 degrees and a cohesion of 700 psf.

The CU test performed on remolded samples from boring A-9 yielded a total friction angle of 8.5 degrees and a total cohesion of 750 psf. The effective friction angle was 21.2 degrees and the effective cohesion was 410 psf. The UU test results indicated a friction angle of 4.0 degrees and a cohesion of 500 psf.

8.4 OFF-SITE BORROW SAMPLES

Laboratory tests were performed on two bulk soil samples, designated Sample 1 and Sample 2, obtained from the potential off-site borrow area. The laboratory testing performed on these samples includes natural moisture content, Atterberg limits, grain size analysis, standard Proctor compaction, and triaxial compression tests. The tests and test results are summarized below.

8.4.1 Index Properties

Natural moisture content, Atterberg limits, and grain size analysis tests were performed on both bulk samples from the potential off-site borrow soils.

Natural moisture contents of the two bulk samples were 32.1 percent and 22.6 percent.

The Atterberg limits test results indicated that liquid limits for the off-site borrow soils samples were 41 and 33, plastic limits were 24 and 21, and plasticity indices were 17 and 12, for Samples 1 and 2, respectively. The tested off-site borrow soils were classified as CL in accordance with the USCS.

The specific gravity of Sample 2 was 2.61.

8.4.2 Moisture-Density Relationship

Standard Proctor compaction tests were performed on both the bulk samples from the off-site borrow area. The test results indicated that the maximum dry density for these samples were 94.4 and 103.3 pcf, and the corresponding optimum moisture contents were 23.9 and 19.6 for Samples 1 and 2, respectively.

8.4.3 Strength

One consolidated undrained (CU) triaxial compression test was performed on remolded samples from bulk Sample 2. The samples tested were remolded to dry densities at or near 95 percent of the standard Proctor maximum dry density and at or near the corresponding optimum moisture contents. Further, the samples were tested in a saturated condition.

The results of the CU test performed indicated that the samples tested had a total friction angle of 13.1 degrees and a total cohesion of 940 psf. The effective friction angle for this sample was 33 degrees and the effective cohesion was 0 psf.

9.0 GROUND-WATER CONDITIONS

Ground-water levels were observed in all test borings except borings B-9 and B-10 at the time of drilling. Further, ground-water measurements were obtained approximately 24 hours or later after the completion of drilling in the test borings. Ground water was not observed in any of the auger borings at the time of drilling. The recorded ground-water levels are presented in Table 2. For safety reasons, the borings were backfilled promptly; consequently, long-term measurements for the presence or absence of ground water were not obtained.

Fluctuations in the ground-water level occur because of variation in rainfall, evaporation, construction activity, surface run-off, and other site-specific factors such as fluctuation of water levels in the adjacent Cumberland River.

Table 2
Ground-Water Data

Boring Number	Ground Elevation (Feet msl)	Depth to Ground Water at Time of Drilling (Feet)	Ground-Water Elevation at Time of Drilling (Feet msl)	Depth to Ground Water 24 Hours After Drilling (Feet)	Ground-Water Elevation 24 Hours After Drilling (Feet msl)
B-1	480.0	20.0	460.0	13.6	466.4
B-2	475.4	13.0	462.4	12.3	463.1
B-3	472.4	6.0	466.4	8.2	464.2
B-4	474.4	18.0	456.4	7.6	466.8
B-5	473.5	16.5	457.0	13.4	460.1
B-6	472.0	6.0	466.0	4.4	467.6
B-7	461.0	6.0	455.0	5.0	456.0
B-8	461.0	6.0	455.0	4.7	456.3
B-9	465.0	NE	NE	NM	NM
B-10	460.0	NE	NE	6.3	453.7
B-11	460.0	18.5	441.5	9.3	450.7
B-12	461.0	29.0	432.0	16.1	444.9
B-13	461.0	6.0	455.0	5.5	455.5

NE - Not Encountered
NM - Not Measured

Prepared/Date: HAB 10/14/04
Checked/Date: CDT 10/14/04

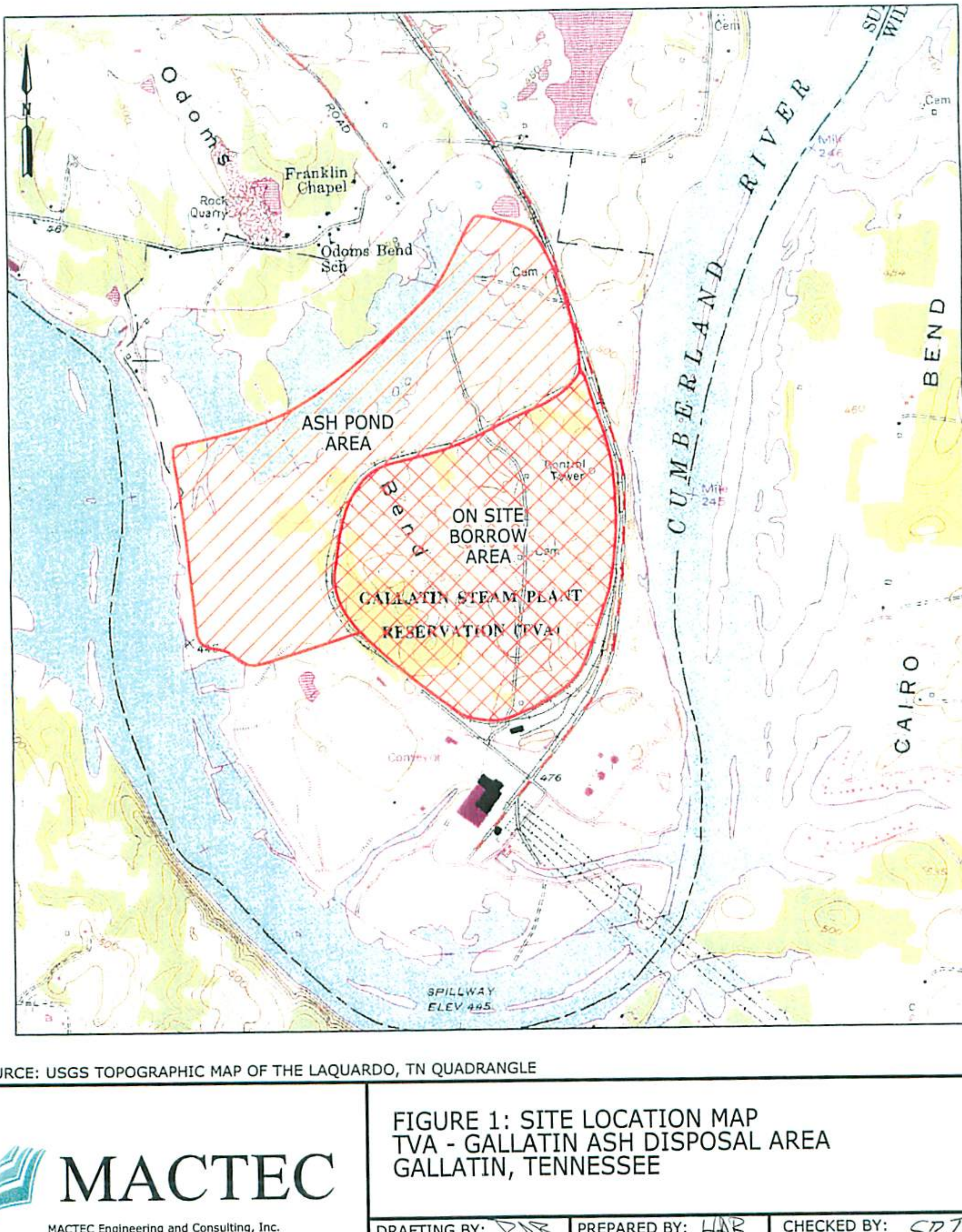
10.0 BASIS OF RESULTS

The results provided herein are based on the encountered subsurface conditions related to the specific project and site discussed in this report.

Regardless of the thoroughness of a field exploration, there is always a possibility that conditions between test locations will differ from those at specific test locations, and that conditions may not be anticipated. In addition, interpretation of the data is critical to the intended design and/or analysis. Therefore, experienced geotechnical engineer should interpret the field data and review any site-specific analysis or design that incorporates the field data. We recommend that TVA retain MACTEC to provide this service, based upon our familiarity with the subsurface conditions, the field and laboratory data, and our geotechnical experience.

Our exploration services include storing the collected samples and making them available for inspection for a period of 30 days. The samples are then discarded unless you request otherwise.

FIGURES



SOURCE: USGS TOPOGRAPHIC MAP OF THE LAQUARDO, TN QUADRANGLE

MACTEC

MACTEC Engineering and Consulting, Inc.
1725 Louisville Drive
Knoxville, Tennessee 37921-5904
865-588-8544 • Fax: 865-588-8026

FIGURE 1: SITE LOCATION MAP
TVA - GALLATIN ASH DISPOSAL AREA
GALLATIN, TENNESSEE

DRAFTING BY: RBB	PREPARED BY: HAB	CHECKED BY: CDT
JOB NUMBER: 3043041043/0001	DATE: OCTOBER 13, 2004	SCALE: 0 2000'

COORDINATES: N36.31578° W 86.39995°

APPENDIX A

FIELD EXPLORATORY PROCEDURES

FIELD EXPLORATORY PROCEDURES

Soil Test Boring (Hollow Stem)

All boring and sampling operations were conducted in general accordance with ASTM D 1586. The borings were advanced by mechanically twisting continuous steel hollow-stem auger flights into the ground. At regular intervals, soil samples were obtained with a standard 1.4-inch I.D., 2-inch O.D., split-tube sampler. The sampler was first seated six inches to penetrate any loose cuttings and then driven an additional foot with blows of a 140-pound hammer falling 30 inches. The number of hammer blows required to drive the sampler the final foot of penetration was recorded and is designated the "standard penetration resistance (SPT)". Proper evaluation of the penetration resistance provides an index to the soil's strength, density, and ability to support foundations.

Representative portions of the soil samples obtained from the split-tube sampler were sealed in glass jars and transported to our laboratory, where they were examined by our engineer to verify the driller's field classifications. Test Boring Records are attached, graphically showing the soil descriptions and penetration resistances.

Undisturbed Sampling

The relatively undisturbed samples were obtained by pushing a section of 3-inch O.D., 16-gauge steel tubing into the soil at the desired sampling level. The sampling was performed in general accordance with ASTM D-1587. The tube, together with the encased soils, was carefully removed from the ground, made airtight, and transported to our laboratory.

Boring Backfill

The borings were backfilled to the ground surface with auger cuttings. The owner is advised that, even with this backfill technique, there is the possibility of future borehole subsidence depending on actual subsurface conditions, surface drainage, etc. The property owner should monitor the boring locations over time to discover subsidence and make the necessary repairs.

APPENDIX B

KEY TO SYMBOLS AND DESCRIPTIONS

SOIL TEST BORING RECORDS

AUGER BORING RECORDS

OBSERVATION TRENCH LOGS

GROUP SYMBOLS	TYPICAL NAMES	GROUP SYMBOLS	TYPICAL NAMES
	TOPSOIL		**CONCRETE**
	ASPHALT		**DOLOMITE**
	GRAVEL		**LIMESTONE**
	FILL		**SHALE**
	SUBSOIL		**LIMESTONE/SHALE** - Limestone with shale interbeds
	ALLUVIUM		**SANDSTONE**
	COLLUVIUM		**SILTSTONE**
	RESIDUUM - Soft to firm		**AUGER BORING**
	RESIDUUM - Stiff to very hard		**UNDISTURBED SAMPLE ATTEMPT**

Undisturbed Sample 1.5-2.0 = Recovered (ft) / Pushed (ft)	
Split Spoon Sample	Auger Cuttings
Rock Core 60-100 = RQD / Recovery	Dilatometer
No Sample	Crandall Sampler
Rotary Drill	Pressure Meter
Water Table at time of drilling	No Recovery
	Water Table after 24 hours

Correlation of Penetration Resistance
with Relative Density and Consistency

SAND & GRAVEL		SILT & CLAY	
No. of Blows	Relative Density	No. of Blows	Consistency
0 - 4	Very Loose	0 - 2	Very Soft
5 - 10	Loose	3 - 4	Soft
11 - 20	Firm	5 - 8	Firm
21 - 30	Very Firm	9 - 15	Stiff
31 - 50	Dense	16 - 30	Very Stiff
Over 50	Very Dense	31 - 50	Hard
		Over 50	Very Hard

BOUNDARY CLASSIFICATIONS: Soils possessing characteristics of two groups are designated by combinations of group symbols.

SILT OR CLAY	SAND			GRAVEL		Cobbles	Boulders
	Fine	Medium	Coarse	Fine	Coarse		

No.200 No.40 No.10 No.4 3/4" 3" 12"
U.S. STANDARD SIEVE SIZE

Reference: The Unified Soil Classification System, Corps of Engineers, U.S. Army Technical Memorandum No. 3-357, Vol. 1, March, 1953 (Revised April, 1960)

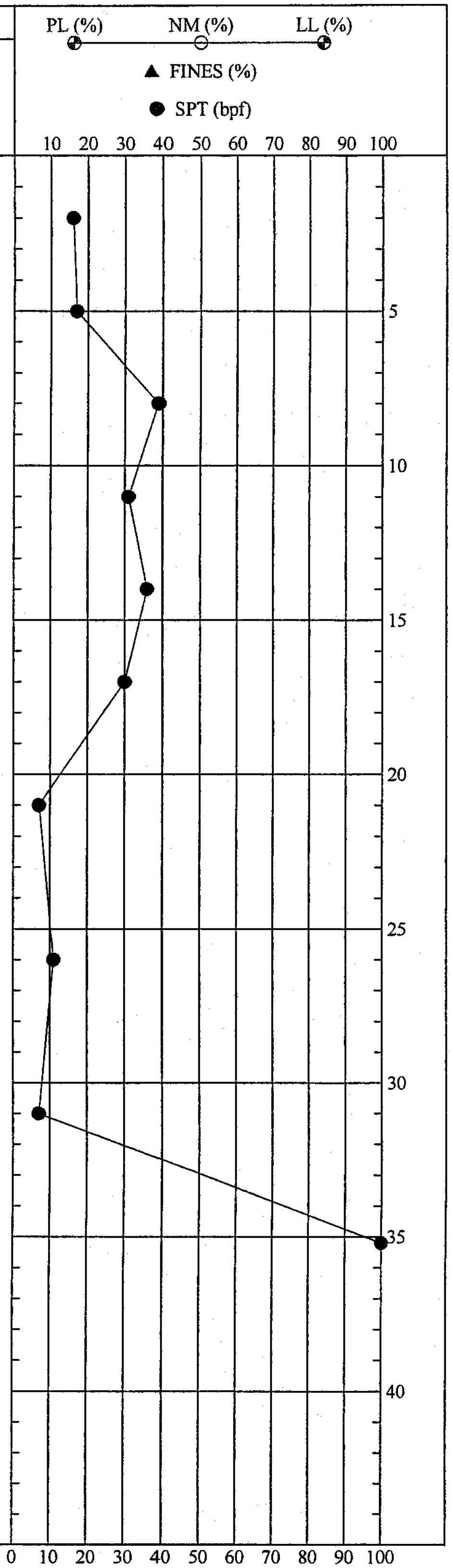
KEY TO SYMBOLS AND DESCRIPTIONS

MACTEC

MACTEC Engineering and Consulting, Inc.
1725 Louisville Drive
Knoxville, Tennessee 37921-5904
865-588-8544 • Fax: 865-588-8026

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS	ELEV (ft)	IDENT	N-COUNT (1st 6" - 2nd 6" - 3rd 6")
0	LOOSE TO DENSE, DARK GRAY, SLIGHTLY MOIST TO WET, SILTY SAND WITH COAL FRAGMENTS - ASH	480.0		
			SPT-1	4-8-8
5		475.0	SPT-2	8-8-9
			SPT-3	14-19-20
10		470.0	SPT-4	10-14-17
			SPT-5	10-17-19
15		465.0	SPT-6	7-11-19
20		460.0	SPT-7	5-4-3
	FIRM, BLACK, WET, COAL FRAGMENTS WITH SILTY SAND - ASH			
25		455.0	SPT-8	3-6-5
30	FIRM, OLIVE GRAY TO TAN, MOIST, SILTY CLAY WITH A FEW ROOTS - ALLUVIUM / POSSIBLE RESIDUUM	450.0	SPT-9	WOH-2-5
35	VERY HARD, GRAY, CHERT FRAGMENTS WITH ORANGE BROWN, SLIGHTLY MOIST, SILTY CLAY - RESIDUUM AUGER REFUSAL AT 35.2'	445.0	SPT-10	50/0.2
40		440.0		
45		435.0		

SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.



REMARKS: STANDARD PENETRATION RESISTANCE TESTING PERFORMED USING AN AUTOMATIC HAMMER. GROUND SURFACE ELEVATION WAS OBTAINED FROM SURVEY DATA PROVIDED BY PARSONS E&C.

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 BEWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

Driller : Akins
Prepared By: Justice
Checked By: H.A.B.

SOIL TEST BORING RECORD

PROJECT: TVA - Gallatin Ash Disposal Area

DRILLED: August 11, 2004 **BORING NO.:** B-1

PROJ. NO.: 3043041043/0001 **PAGE 1 OF 1**

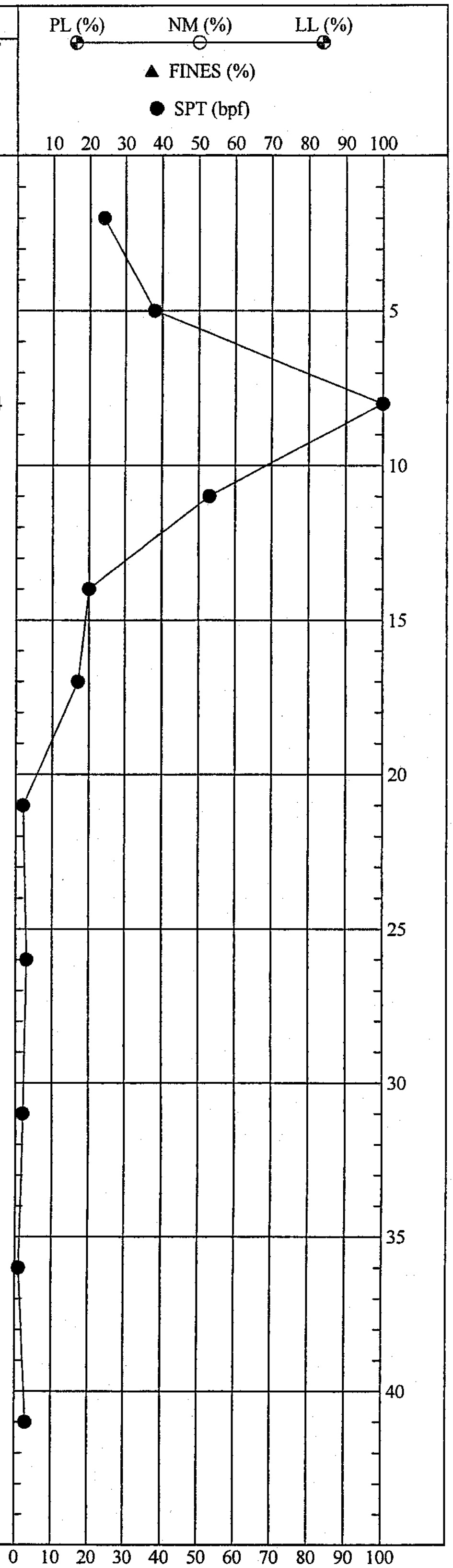
MACTEC

SOIL 3043041043_01_SPT.GPJ LAW_GIBB.GDT 10/13/04

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS (SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.)
0	FIRM TO VERY DENSE, DARK GRAY, SLIGHTLY MOIST TO WET, SILTY SAND WITH COAL FRAGMENTS - ASH
18	VERY SOFT TO SOFT, DARK GRAY, WET, SANDY SILT - ASH
32	VERY SOFT, OLIVE GRAY TO BROWN, MOIST TO VERY MOIST, SILTY CLAY - ALLUVIUM / POSSIBLE RESIDUUM
37.5	SOFT, ORANGE BROWN, MOIST, SILTY CLAY WITH CHERT FRAGMENTS - RESIDUUM
43.6	AUGER REFUSAL 43.6'

DEPTH (ft)	ELEV (ft)
0	475.4
5	470.4
10	465.4
15	460.4
20	455.4
25	450.4
30	445.4
35	440.4
40	435.4
45	430.4

SAMPLES IDENT	N-COUNT (1st 6" 2nd 6" 3rd 6")
SPT-1	8-11-13
SPT-2	7-20-18
SPT-3	7-27-50/0.4
SPT-4	7-33-20
SPT-5	8-10-10
SPT-6	7-8-9
SPT-7	WOH-1-1
SPT-8	1-1-2
SPT-9	1-1-1
SPT-10	WOH-0-1
SPT-11	2-2-1



REMARKS: STANDARD PENETRATION RESISTANCE TESTING PERFORMED USING AN AUTOMATIC HAMMER. BLOW COUNT "0" REPRESENTS WOH (WEIGHT OF HAMMER). GROUND SURFACE ELEVATION WAS OBTAINED FROM SURVEY DATA PROVIDED BY PARSONS E&C.

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Driller : Akins
Prepared By: Justice
Checked By: H.A.B.

SOIL TEST BORING RECORD

PROJECT: TVA - Gallatin Ash Disposal Area

DRILLED: August 11, 2004 **BORING NO.:** B-2

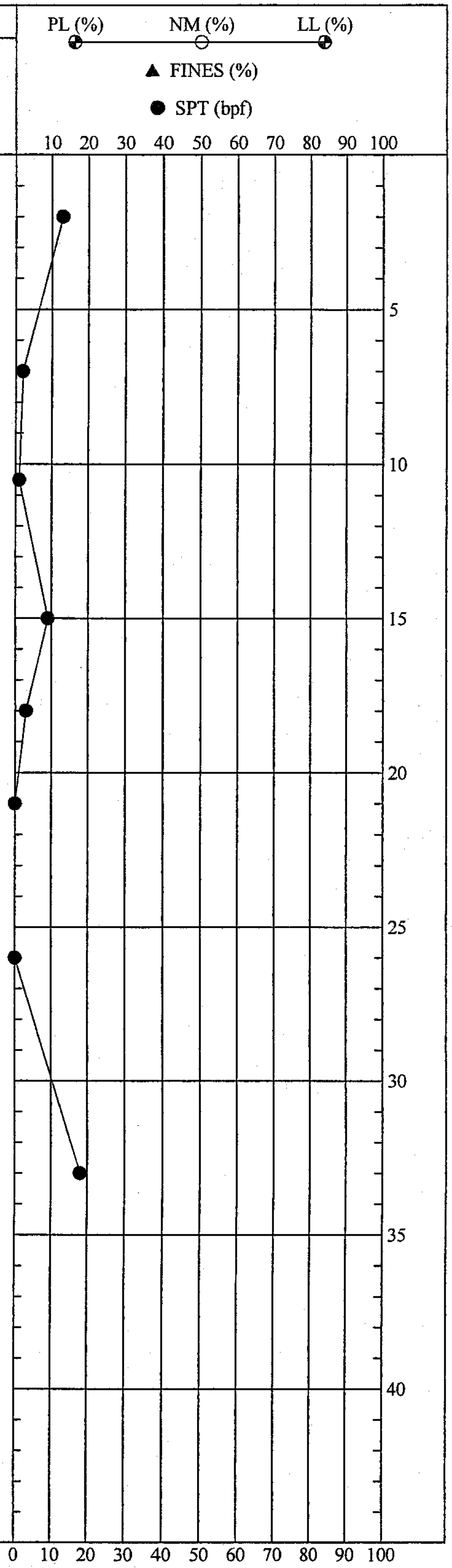
PROJ. NO.: 3043041043/0001 **PAGE** 1 **OF** 1

MACTEC

SOIL 3043041043 01_SPT.GPJ LAW_GIBB.GDT 10/13/04

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS	ELEV (ft)	SAMPLES IDENT	N-COUNT (1st 6" / 2nd 6" / 3rd 6")
0	FIRM, DARK GRAY, SLIGHTLY MOIST, SILTY SAND WITH COAL FRAGMENTS - ASH	472.4		
			SPT-1	5-6-7
	VERY SOFT, DARK GRAY, SLIGHTY MOIST TO WET, SANDY SILT - ASH			
5		467.4	UD-1	0.6-2.0
			SPT-2	WOH-1-1
			UD-2	2.0-2.0
10		462.4	SPT-3	WOH-0-1
	LOOSE, DARK GRAY, WET, SILTY SAND WITH GRAVEL - ASH			
15		457.4	SPT-4	3-6-3
	SOFT, DARK GRAY, WET, CLAYEY SANDY SILT - ASH			
			SPT-5	1-2-1
	VERY SOFT, DARK GRAY, WET, CLAYEY SILT - ASH			
20		452.4	SPT-6	WOH
25		447.4	SPT-7	WOH
	VERY STIFF, YELLOW BROWN TO BROWN, SLIGHTLY MOIST, SILTY CLAY WITH A FEW CHERT FRAGMENTS - RESIDUUM			
30		442.4	UD-3	0.0-2.0
			SPT-8	4-7-11
	AUGER REFUSAL AT 33.7'			
35		437.4		
40		432.4		
45		427.4		

SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.



REMARKS: STANDARD PENETRATION RESISTANCE TESTING PERFORMED USING AN AUTOMATIC HAMMER. BLOW COUNT "0" REPRESENTS WOH (WEIGHT OF HAMMER). GROUND SURFACE ELEVATION WAS OBTAINED FROM SURVEY DATA PROVIDED BY PARSONS E&C.

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Driller : Akins
Prepared By: Justice
Checked By: H.A.B.

SOIL TEST BORING RECORD

PROJECT: TVA - Gallatin Ash Disposal Area

DRILLED: August 17, 2004 **BORING NO.:** B-3

PROJ. NO.: 3043041043/0001 **PAGE** 1 **OF** 1

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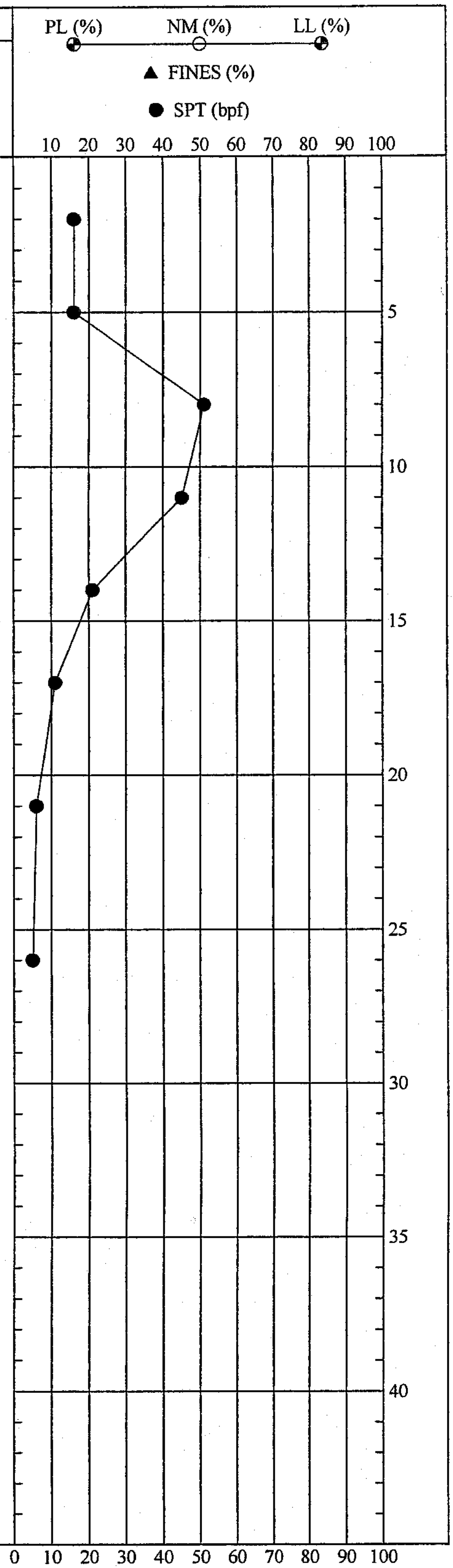
SOIL 3043041043_01_SPT.GPJ LAW_GIBB.GDT 10/13/04

SOIL TEST BORING RECORD

SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS	ELEV (ft)	SAMPLE IDENT	N-COUNT (1st 6" - 2nd 6" - 3rd 6")
0	FIRM TO VERY DENSE, DARK GRAY, DRY TO SLIGHTLY MOIST, SILTY SAND WITH OCCASIONAL COAL FRAGMENTS - ASH	474.4		
			SPT-1	3-8-8
5		469.4	SPT-2	6-8-8
			SPT-3	5-20-31
	DENSE, DARK GRAY, SLIGHTLY MOIST TO MOIST, SILTY SAND WITH ROCK FRAGMENTS AND ORANGE BROWN SILTY CLAY - ASH / FILL			
10		464.4		
			SPT-4	12-21-24
	VERY STIFF, GRAY, SLIGHTLY MOIST, SANDY CLAY WITH COAL FRAGMENTS - FILL			
			SPT-5	6-11-10
	FIRM, GRAY, MOIST TO VERY MOIST, CLAYEY SAND WITH COAL FRAGMENTS - FILL			
15		459.4		
			SPT-6	4-7-4
	LOOSE, GRAY, WET, SILTY SAND WITH COAL FRAGMENTS - ASH			
20		454.4		
			SPT-7	3-3-3
25		449.4		
			SPT-8	2-3-2
	AUGER REFUSAL AT 26.9'			
30		444.4		
35		439.4		
40		434.4		
45		429.4		



SOIL 3043041043_01_SPT.GPJ LAW_GIBB.GDT 10/13/04

REMARKS: STANDARD PENETRATION RESISTANCE TESTING PERFORMED USING AN AUTOMATIC HAMMER. GROUND SURFACE ELEVATION WAS OBTAINED FROM SURVEY DATA PROVIDED BY PARSONS E&C.

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 BEWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

Driller : Akins
Prepared By: Justice
Checked By: H.A.B.

SOIL TEST BORING RECORD

PROJECT: TVA - Gallatin Ash Disposal Area

DRILLED: August 17, 2004 **BORING NO.:** B-4

PROJ. NO.: 3043041043/0001 **PAGE** 1 **OF** 1

MACTEC

SOIL TEST BORING RECORD

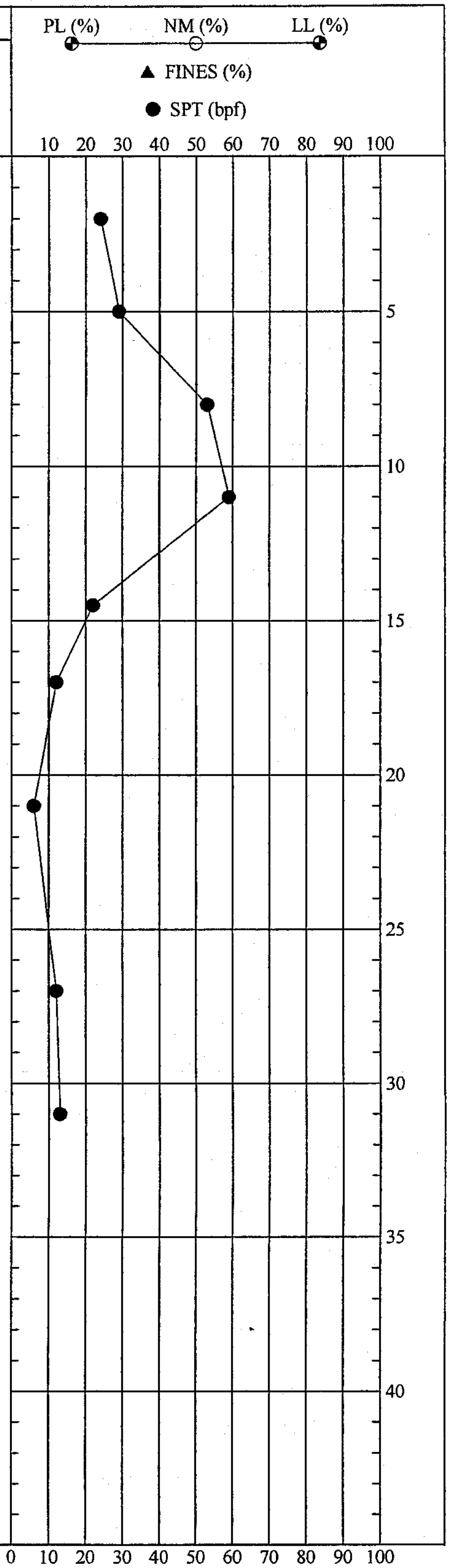
PROJECT: TVA - Gallatin Ash Disposal Area

DRILLED: August 17, 2004 **BORING NO.:** B-5

PROJ. NO.: 3043041043/0001 **PAGE** 1 **OF** 1

SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS	ELEV (ft)	SAMPLES IDENT	N-COUNT (1st 6" - 2nd 6" - 3rd 6")
0	LOOSE TO VERY DENSE, DARK GRAY, DRY TO WET, SILTY SAND WITH COAL FRAGMENTS - ASH	473.5		
			SPT-1	4-9-15
5		468.5	SPT-2	9-14-15
			SPT-3	20-23-30
10		463.5		
			SPT-4	9-28-31
			UD-1	0-0.5
			SPT-5	10-14-8
15		458.5		
			SPT-6	4-4-8
			UD-2	0.8-2.0
20		453.5		
			SPT-7	2-3-3
	STIFF, ORANGE BROWN, SLIGHTLY MOIST, SILTY CLAY WITH A FEW CHERT FRAGMENTS - RESIDUUM			
25		448.5	UD-3	1.0-2.0
			SPT-8	3-5-7
30		443.5		
			SPT-9	2-5-8
	AUGER REFUSAL AT 33.4'			
35		438.5		
40		433.5		
45		428.5		



REMARKS: STANDARD PENETRATION RESISTANCE TESTING PERFORMED USING AN AUTOMATIC HAMMER. GROUND SURFACE ELEVATION WAS OBTAINED FROM SURVEY DATA PROVIDED BY PARSONS E&C.

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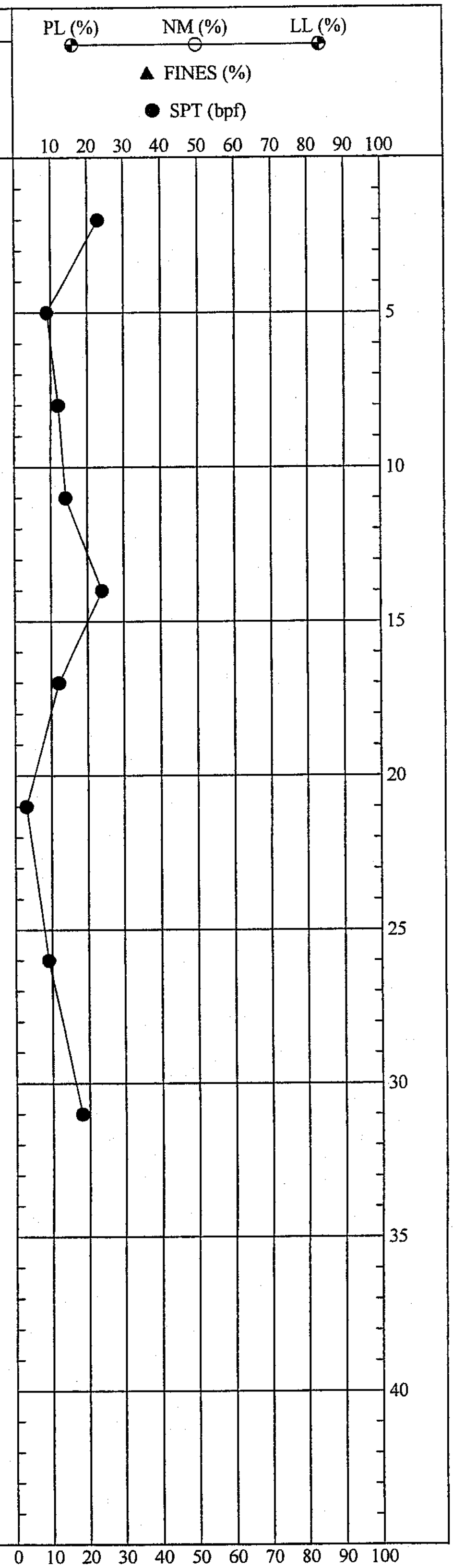
Driller : Akins
Prepared By: Justice
Checked By: H.A.B.

MACTEC

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS (SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.)	ELEV (ft)	SAMPLES IDENT	N-COUNT (1st 6" - 2nd 6" - 3rd 6")
0	LOOSE TO VERY FIRM, DARK GRAY, SLIGHTLY MOIST TO WET, SILTY SAND WITH COAL FRAGMENTS - ASH	472.0		
			SPT-1	9-11-12
5		467.0	SPT-2	3-4-5
			SPT-3	3-3-9
10		462.0	SPT-4	3-5-9
			SPT-5	7-13-11
15		457.0	SPT-6	4-6-6
	VERY LOOSE, DARK GRAY, WET, COAL AND GRAVEL FRAGMENTS WITH SILTY SAND - ASH/FILL			
20		452.0	SPT-7	1-1-2
	STIFF, ORANGE BROWN, SLIGHTLY MOIST TO MOIST, SILTY CLAY WITH A FEW ROUNDED GRAVELS - ALLUVIUM / POSSIBLE RESIDUUM			
25		447.0	SPT-8	3-3-6
	VERY STIFF, ORANGE BROWN AND TAN, SLIGHTLY MOIST, SILTY CLAY - RESIDUUM / POSSIBLE ALLUVIUM			
30		442.0	SPT-9	6-7-11
	AUGER REFUSAL AT 32.7'			
35		437.0		
40		432.0		
45		427.0		



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Driller : Akins
Prepared By: Justice
Checked By: H.A.B.

SOIL TEST BORING RECORD

PROJECT: TVA - Gallatin Ash Disposal Area

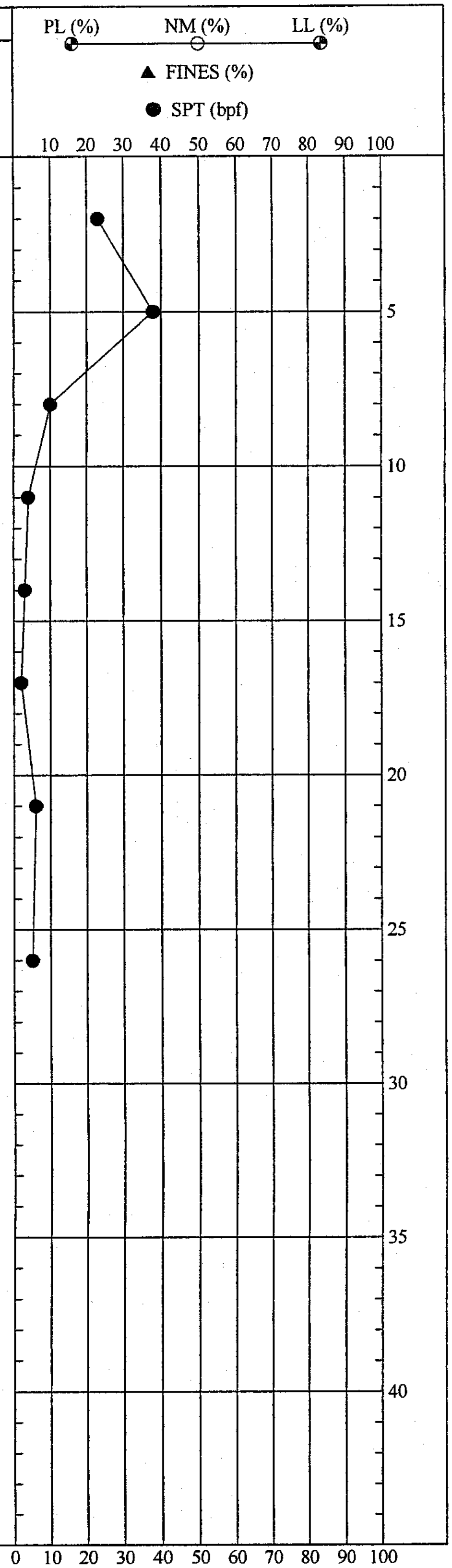
DRILLED: August 12, 2004 **BORING NO.:** B-6

PROJ. NO.: 3043041043/0001 **PAGE** 1 **OF** 1

MACTEC

SOIL 3043041043_01_SPT.GPJ LAW_GIBB.GDT 10/13/04

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS (SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.)	ELEV (ft)	SAMPLES IDENT	N-COUNT (1st 6" - 2nd 6" - 3rd 6")
0	LOOSE TO DENSE, DARK GRAY, DRY TO WET, SILTY SAND WITH COAL FRAGMENTS - ASH	461.0		
			SPT-1	9-13-10
5		456.0	SPT-2	20-23-15
			SPT-3	4-6-4
	VERY LOOSE TO LOOSE, DARK GRAY, WET, SILTY SAND WITH COAL FRAGMENTS AND ORANGE BROWN, SILTY CLAY - ASH / FILL			
10		451.0		
			SPT-4	2-2-2
			SPT-5	2-1-2
15		446.0		
			SPT-6	3-1-1
20		441.0		
			SPT-7	3-3-3
	FIRM, GRAY, SLIGHTLY MOIST, SILTY CLAY WITH CHERT FRAGMENTS, COAL FRAGMENTS, AND ROOTS - ALLUVIUM			
25		436.0		
			SPT-8	2-3-2
	AUGER REFUSAL AT 28.4'			
30		431.0		
35		426.0		
40		421.0		
45		416.0		



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Driller : Akins
Prepared By: Justice
Checked By: H.A.B.

SOIL TEST BORING RECORD

PROJECT: TVA - Gallatin Ash Disposal Area

DRILLED: August 17, 2004 **BORING NO.:** B-7

PROJ. NO.: 3043041043/0001 **PAGE** 1 **OF** 1

MACTEC

SOIL 3043041043_01_SPT.GPJ LAW_GIBB.GDT 10/13/04

SOIL TEST BORING RECORD

PROJECT: TVA - Gallatin Ash Disposal Area

DRILLED: August 12, 2004 **BORING NO.:** B-8

PROJ. NO.: 3043041043/0001 **PAGE** 1 **OF** 1

MACTEC

SOIL CLASSIFICATION AND REMARKS

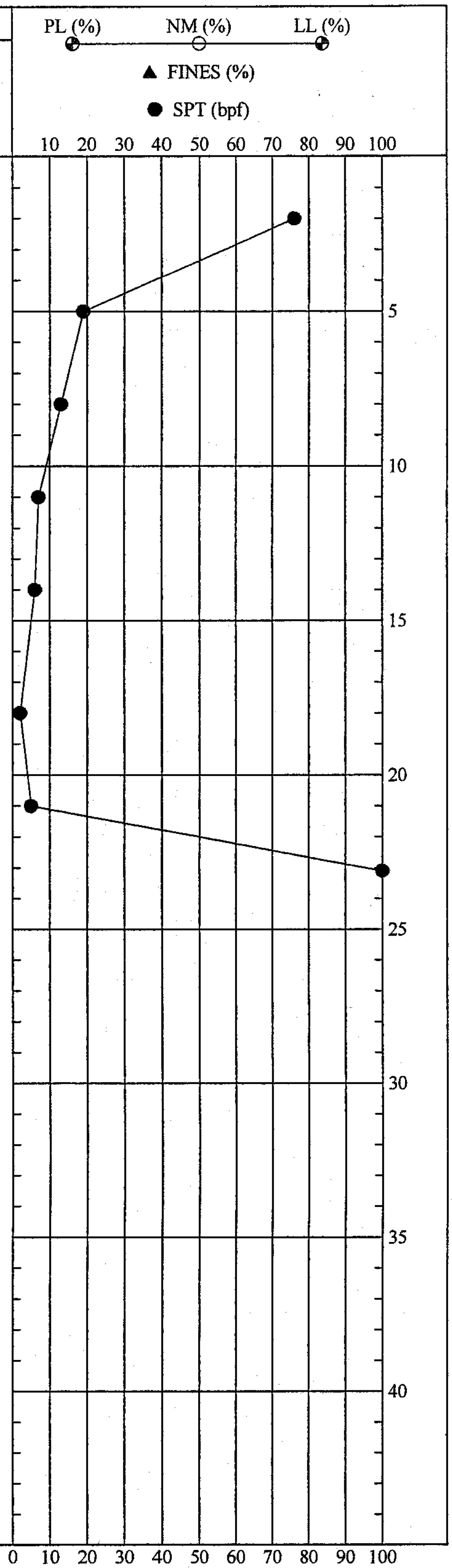
SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.

DEPTH (ft)	ELEV (ft)	SOIL CLASSIFICATION AND REMARKS
0	461.0	VERY DENSE, BROWN, SLIGHTLY MOIST, SAND WITH ASH AND ROCK FRAGMENTS - FILL
		VERY LOOSE TO FIRM, DARK GRAY, WET, SILTY SAND WITH COAL FRAGMENTS AND GRAVEL - ASH
		FIRM, OLIVE GRAY TO ORANGE BROWN, MOIST TO VERY MOIST, SILTY CLAY WITH A FEW CHERT FRAGMENTS - ALLUVIUM / POSSIBLE RESIDUUM
		VERY HARD, LIMESTONE AND CHERT FRAGMENTS WITH ORANGE BROWN, MOIST, SILTY CLAY - RESIDUUM
		AUGER REFUSAL AT 23.6'

DEPTH (ft)	ELEV (ft)
0	461.0
5	456.0
10	451.0
15	446.0
20	441.0
25	436.0
30	431.0
35	426.0
40	421.0
45	416.0

SAMPLES

IDENT	N-COUNT (1st 6" - 2nd 6" - 3rd 6")
SPT-1	11-40-36
SPT-2	8-9-10
SPT-3	6-7-6
SPT-4	3-3-4
SPT-5	1-3-3
SPT-6	3-1-1
SPT-7	WOH-2-3
UD-1	1.5-1.5
SPT-8	50/0.1



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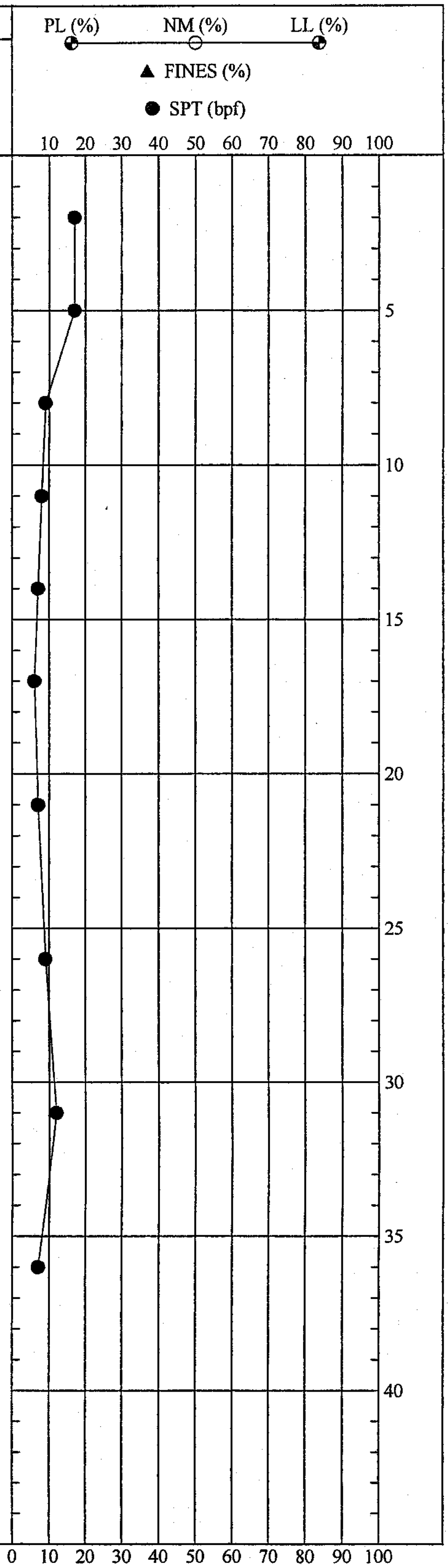
Prepared By: Justice
Checked By: H.A.B.

SOIL 3043041043 01 SPT.GPJ LAW_GIBB.GDT 10/13/04

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS (SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.)	ELEV (ft)	SAMPLES IDENT	N-COUNT (1st 6" - 2nd 6" - 3rd 6")
0	VERY STIFF, ORANGE BROWN, DRY TO SLIGHTLY MOIST, SILTY CLAY - RESIDUUM	465.0		
			SPT-1	4-7-10
	VERY STIFF, ORANGE BROWN, DRY TO SLIGHTLY MOIST, SILTY CLAY WITH CHERT FRAGMENTS - RESIDUUM			
5		460.0	SPT-2	6-8-9
	FIRM TO STIFF, ORANGE BROWN, SLIGHTLY MOIST TO MOIST, SILTY CLAY - RESIDUUM			
			SPT-3	4-4-5
10		455.0		
			SPT-4	4-3-5
			SPT-5	2-3-4
15		450.0		
			SPT-6	3-3-3
20		445.0		
			SPT-7	3-2-5
	FIRM TO STIFF, ORANGE BROWN TO YELLOW BROWN, SLIGHTLY MOIST TO MOIST, SILTY CLAY WITH CHERT FRAGMENTS - RESIDUUM			
25		440.0		
			SPT-8	3-4-5
30		435.0		
			SPT-9	4-6-6
35		430.0		
			SPT-10	2-3-4
	AUGER REFUSAL AT 36.7'			
40		425.0		
45		420.0		



SOIL 3043041043_01_SPT.GPJ LAW_GIBB.GDT 10/13/04

REMARKS: STANDARD PENETRATION RESISTANCE TESTING PERFORMED USING AN AUTOMATIC HAMMER. NO GROUND WATER ENCOUNTERED AT TIME OF EXPLORATION. GROUND SURFACE ELEVATION WAS OBTAINED FROM SURVEY DATA PROVIDED BY PARSONS E&C.

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Driller : Akins
Prepared By: Justice
Checked By: H.A.B.

SOIL TEST BORING RECORD

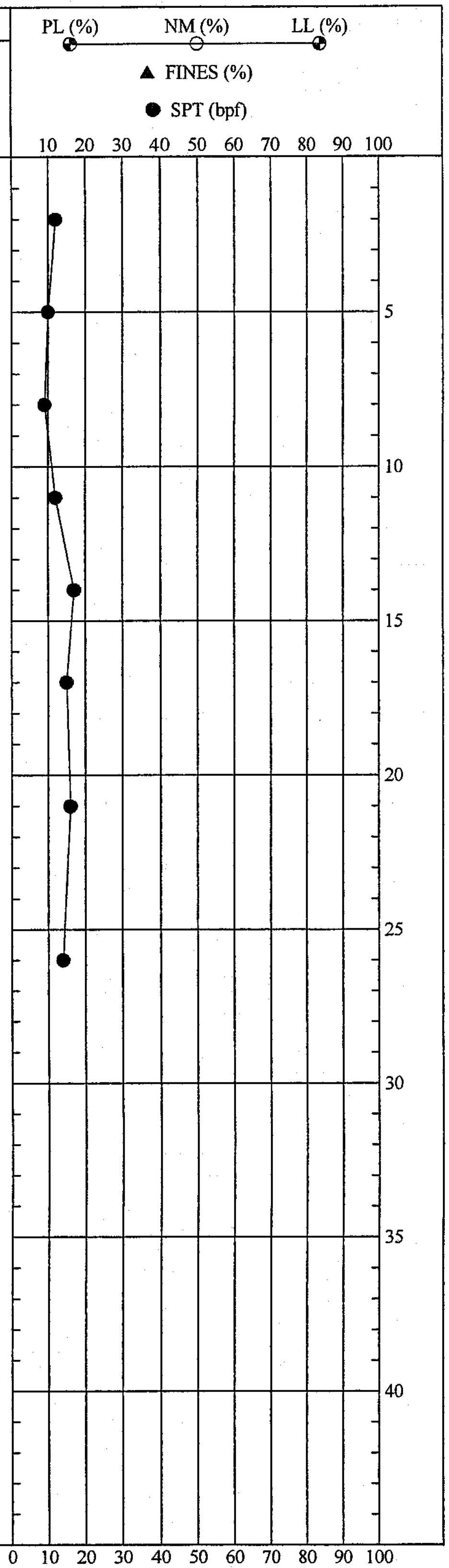
PROJECT: TVA - Gallatin Ash Disposal Area

DRILLED: August 18, 2004 **BORING NO.:** B-9

PROJ. NO.: 3043041043/0001 **PAGE** 1 **OF** 1

MACTEC

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.	ELEV (ft)	SAMPLES IDENT	N-COUNT (1st 6" / 2nd 6" / 3rd 6")
0	STIFF, ORANGE BROWN, BROWN, AND OLIVE GREEN, SLIGHTLY MOIST, SILTY CLAY WITH CHERT FRAGMENTS, GRAVEL, AND ROOTS - FILL	460.0		
			SPT-1	5-6-6
5		455.0	SPT-2	3-4-6
	STIFF, OLIVE GRAY TO ORANGE BROWN, MOIST TO SLIGHTLY MOIST, SILTY CLAY WITH CHERT FRAGMENTS AND ROUNDED GRAVEL - ALLUVIUM		SPT-3	2-5-4
10		450.0	SPT-4	3-5-7
	STIFF TO VERY STIFF, ORANGE BROWN, SLIGHTLY MOIST, SILTY CLAY WITH CHERT FRAGMENTS - RESIDUUM		SPT-5	6-7-10
15		445.0	SPT-6	5-7-8
20		440.0	SPT-7	5-7-9
25		435.0	SPT-8	3-6-8
	AUGER REFUSAL AT 26.7'			
30		430.0		
35		425.0		
40		420.0		
45		415.0		



SOIL 3043041043_01_SPT.GPJ LAW_GIBB.GDT 10/13/04

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Driller : Akins
Prepared By: Justice
Checked By: H.A.B.

SOIL TEST BORING RECORD

PROJECT: TVA - Gallatin Ash Disposal Area

DRILLED: August 12, 2004 **BORING NO.:** B-10

PROJ. NO.: 3043041043/0001 **PAGE** 1 **OF** 1

MACTEC

SOIL TEST BORING RECORD

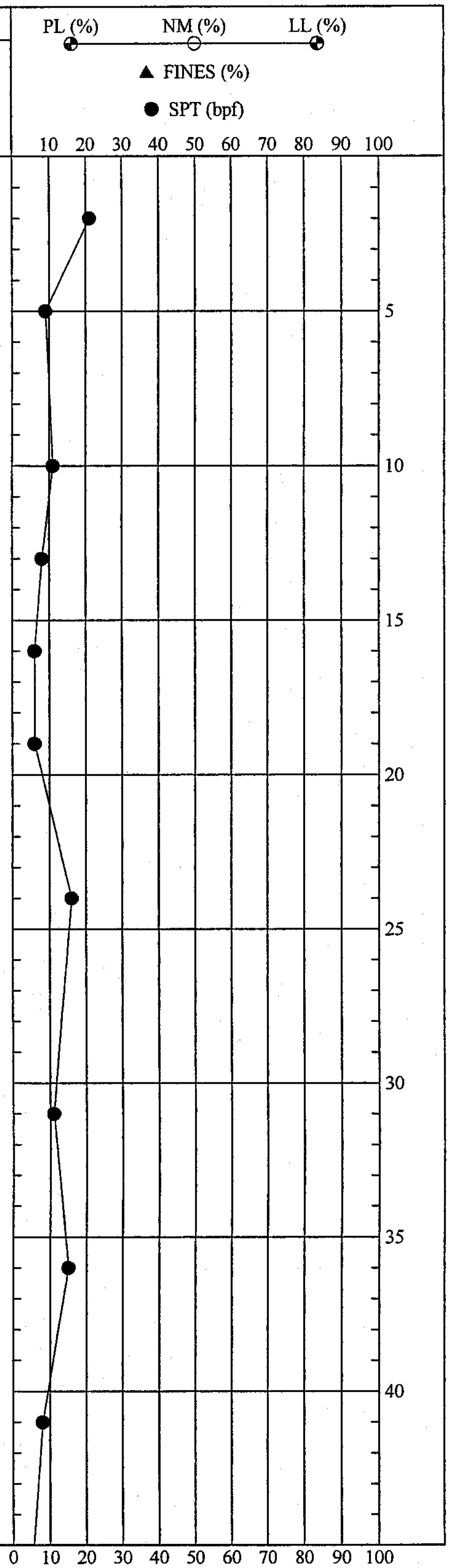
PROJECT: TVA - Gallatin Ash Disposal Area

DRILLED: August 10, 2004 **BORING NO.:** B-11

PROJ. NO.: 3043041043/0001 **PAGE 1 OF 2**

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS (SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.)	ELEV (ft)
0	VERY STIFF, BROWN, SLIGHTLY MOIST , SILTY CLAY WITH ASH, COAL FRAGMENTS, AND ROCK FRAGMENTS - FILL	460.0
	FIRM TO STIFF, ORANGE BROWN, SLIGHTLY MOIST, SILTY CLAY WITH ROCK FRAGMENTS - FILL	
5		455.0
10		450.0
	FIRM TO VERY STIFF, ORANGE BROWN, SLIGHTLY MOIST TO VERY MOIST, SILTY CLAY WITH ROUNDED GRAVEL - ALLUVIUM	
15		445.0
20		440.0
25		435.0
	FIRM, ORANGE BROWN, MOIST TO WET, SILTY SAND - ALLUVIUM	
30		430.0
	STIFF, ORANGE BROWN TO LIGHT GRAY, SLIGHTLY MOIST, SILTY CLAY - ALLUVIUM	
	FIRM, ORANGE BROWN, VERY MOIST TO WET, CLAYEY SAND WITH GRAVEL - ALLUVIUM	
35		425.0
	FIRM, ORANGE BROWN, MOIST TO WET, SILTY CLAY WITH SAND AND ROUNDED GRAVEL - ALLUVIUM	
40		420.0
45		415.0

SAMPLES IDENT	N-COUNT (1st 6" 2nd 6" 3rd 6")
SPT-1	4-9-12
SPT-2	4-4-5
UD-1	1.6-2.0
SPT-3	3-6-5
SPT-4	3-3-5
SPT-5	3-3-3
SPT-6	1-3-3
SPT-7	6-8-8
UD-2	2.0-2.0
SPT-8	4-6-5
SPT-9	WOH-8-7
SPT-10	1-4-4



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Driller : Akins

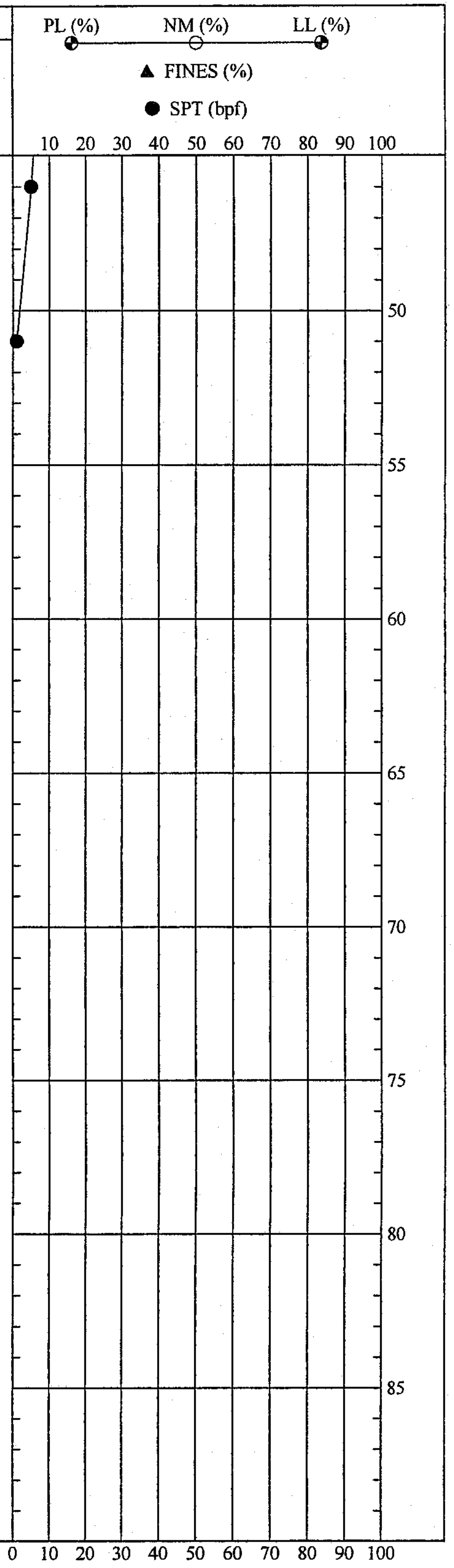
Prepared By: Justice

Checked By: H.A.B.

MACTEC

SOIL 3043041043 01_SPT.GPJ LAW_GIBB.GDT 10/13/04

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.	ELEV (ft)	SAMPLES IDENT	TYPE	N-COUNT (1st 6" / 2nd 6" / 3rd 6")
45	FIRM, ORANGE BROWN, MOIST TO WET, SILTY CLAY WITH SAND AND ROUNDED GRAVEL - ALLUVIUM	415.0	SPT-11		WOH-3-2
50	VERY SOFT, ORANGE BROWN, VERY MOIST TO WET, SILTY CLAY WITH CHERT FRAGMENTS - RESIDUUM	410.0	SPT-12		WOH-0-1
55	AUGER REFUSAL AT 54.2'	405.0			
60		400.0			
65		395.0			
70		390.0			
75		385.0			
80		380.0			
85		375.0			
90		370.0			



SOIL 3043041043 01_SPT.GPJ LAW_GIBB.GDT 10/13/04

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Driller : Akins
Prepared By: Justice
Checked By: H.A.B.

SOIL TEST BORING RECORD

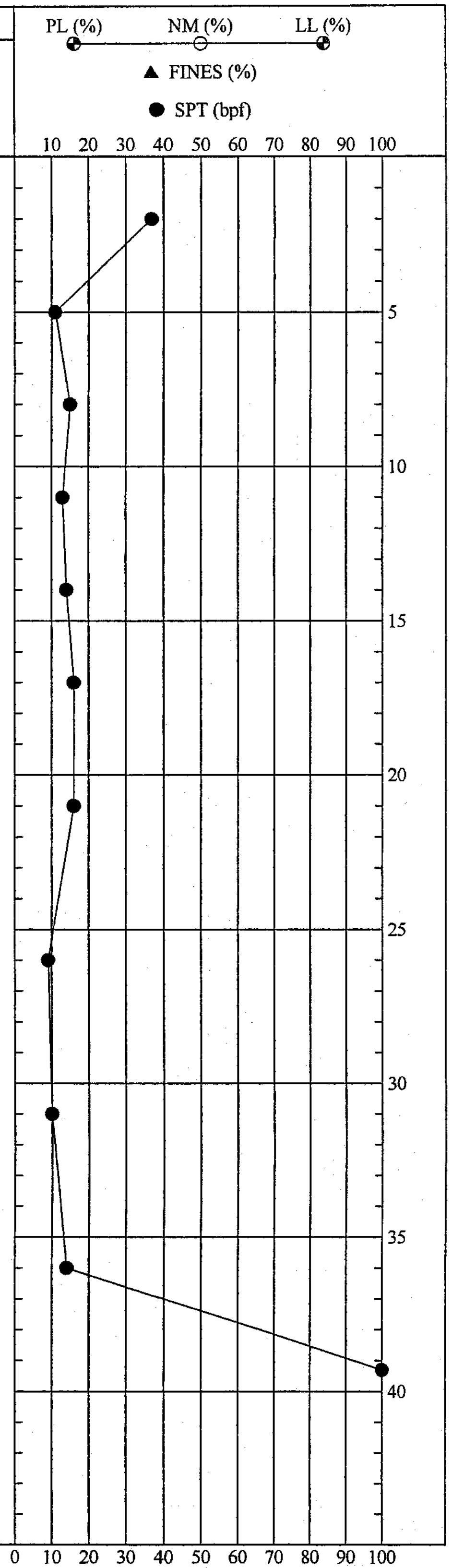
PROJECT: TVA - Gallatin Ash Disposal Area

DRILLED: August 10, 2004 **BORING NO.:** B-11

PROJ. NO.: 3043041043/0001 **PAGE** 2 **OF** 2

MACTEC

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.	ELEV (ft)	SAMPLES IDENT	N-COUNT (1st 6" 2nd 6" 3rd 6")
0	GRAVEL (CRUSHED LIMESTONE)	461.0		
	STIFF TO HARD, OLIVE BROWN TO REDDISH BROWN, DRY TO SLIGHTLY MOIST, SANDY SILT WITH DARK GRAY ASH, ROCK FRAGMENTS AND WOOD FRAGMENTS - FILL		SPT-1	5-12-25
5		456.0	SPT-2	3-5-6
	STIFF, GRAYISH BROWN TO BROWN, DRY TO SLIGHTLY MOIST, SILTY CLAY - ALLUVIUM		SPT-3	4-7-8
10		451.0	SPT-4	3-6-7
	STIFF TO VERY STIFF, BROWN AND GRAY, DRY TO MOIST, SILTY CLAY WITH AN OCCASIONAL SANDY LENSE - ALLUVIUM		SPT-5	3-6-8
15		446.0	SPT-6	5-7-9
20		441.0	SPT-7	5-7-9
25		436.0	SPT-8	2-4-5
	STIFF, ORANGE BROWN, SLIGHTLY MOIST TO MOIST, SILTY CLAY WITH OCCASIONAL ROUNDED GRAVEL - ALLUVIUM			
30		431.0	SPT-9	3-4-6
	STIFF, ORANGE BROWN, SLIGHTLY MOIST, SILTY CLAY WITH A TRACE OF CHERT FRAGMENTS - RESIDUUM			
35		426.0	SPT-10	3-6-8
	VERY HARD, GRAY, CHERT FRAGMENTS WITH WET ORANGE BROWN, SILTY CLAY - RESIDUUM		SPT-11	50/0.3
40	AUGER REFUSAL AT 39.0' BORING TERMINATED AT 39.3'	421.0		
45		416.0		



SOIL 3043041043_01_SPT.GPJ LAW_GIBB.GDT 10/13/04

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Driller : Akins
Prepared By: Justice
Checked By: H.A.B.

SOIL TEST BORING RECORD

PROJECT: TVA - Gallatin Ash Disposal Area

DRILLED: August 9, 2004 **BORING NO.:** B-12

PROJ. NO.: 3043041043/0001 **PAGE** 1 **OF** 1

MACTEC

SOIL TEST BORING RECORD

PROJECT: TVA - Gallatin Ash Disposal Area

DRILLED: August 10, 2004 **BORING NO.:** B-13

PROJ. NO.: 3043041043/0001 **PAGE** 1 **OF** 1

MACTEC

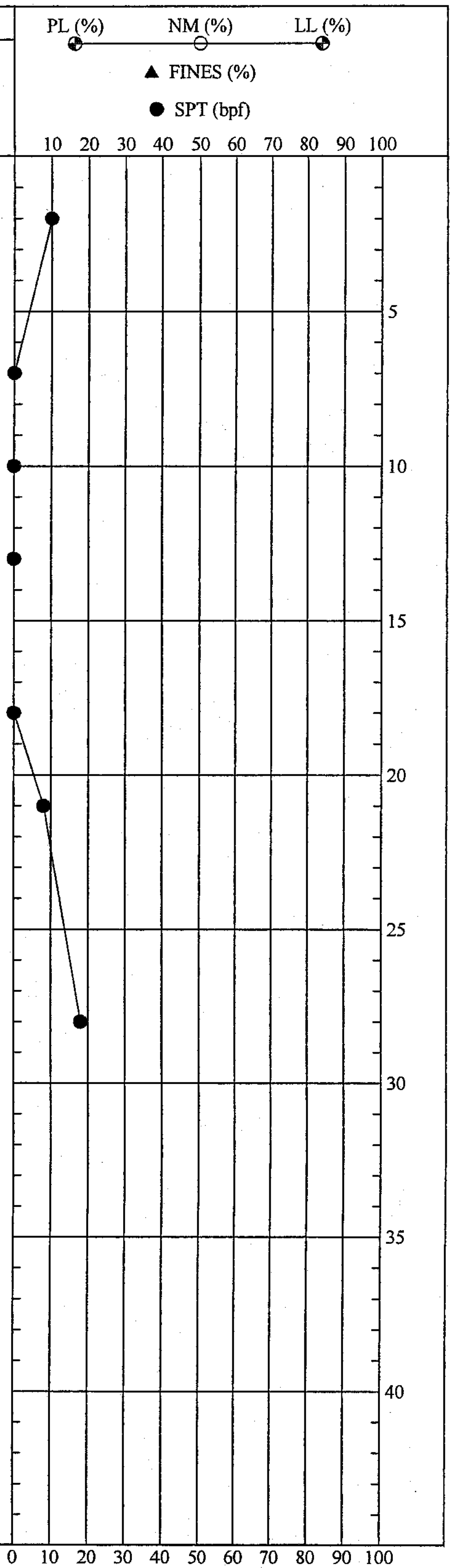
SOIL CLASSIFICATION AND REMARKS

SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS	ELEV (ft)
0	STIFF, BROWN TO OLIVE GRAY, SLIGHTLY MOIST, SANDY CLAY - FILL	461.0
5	VERY SOFT, GRAY, WET, SANDY SILT - ASH	456.0
10		451.0
	VERY SOFT, GRAY, WET, CLAYEY SILT - ASH	
15		446.0
	FIRM, GRAY, MOIST, SILTY CLAY - ALLUVIUM	
20		441.0
	FIRM TO VERY STIFF, ORANGE BROWN, SLIGHTLY MOIST SILT CLAY WITH A FEW CHERT FRAGMENTS - RESIDUUM	
25		436.0
30	AUGER REFUSAL AT 29.5'	431.0
35		426.0
40		421.0
45		416.0

SAMPLES

IDENT	N-COUNT (1st 6" - 2nd 6" - 3rd 6")
SPT-1	3-5-5
UD-1	2.0-2.0
SPT-2	WOH
SPT-3	WOH
SPT-4	WOH
UD-2	2.0-2.0
SPT-5	WOH
SPT-6	1-3-5
UD-3	1.5-2.0
SPT-7	10-9-9



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Driller : Akins
Prepared By: Justice
Checked By: H.A.B.

SOIL 3043041043_01_SPT.GPJ LAW_GIBB.GDT 10/13/04

GROUP SYMBOLS	TYPICAL NAMES	GROUP SYMBOLS	TYPICAL NAMES
	TOPSOIL		**CONCRETE**
	ASPHALT		**DOLOMITE**
	GRAVEL		**LIMESTONE**
	FILL		**SHALE**
	SUBSOIL		**LIMESTONE/SHALE** - Limestone with shale interbeds
	ALLUVIUM		**SANDSTONE**
	COLLUVIUM		**SILTSTONE**
	RESIDUUM - Soft to firm		**AUGER BORING**
	RESIDUUM - Stiff to very hard		**UNDISTURBED SAMPLE ATTEMPT**

Undisturbed Sample 1.5-2.0 = Recovered (ft) / Pushed (ft)	
Split Spoon Sample	Auger Cuttings
Rock Core 60-100 = RQD / Recovery	Dilatometer
No Sample	Crandall Sampler
Rotary Drill	Pressure Meter
Water Table at time of drilling	No Recovery
	Water Table after 24 hours

Correlation of Penetration Resistance with Relative Density and Consistency

SAND & GRAVEL		SILT & CLAY	
No. of Blows	Relative Density	No. of Blows	Consistency
0 - 4	Very Loose	0 - 2	Very Soft
5 - 10	Loose	3 - 4	Soft
11 - 20	Firm	5 - 8	Firm
21 - 30	Very Firm	9 - 15	Stiff
31 - 50	Dense	16 - 30	Very Stiff
Over 50	Very Dense	31 - 50	Hard
		Over 50	Very Hard

BOUNDARY CLASSIFICATIONS: Soils possessing characteristics of two groups are designated by combinations of group symbols.

SILT OR CLAY	SAND			GRAVEL		Cobbles	Boulders
	Fine	Medium	Coarse	Fine	Coarse		

No.200 No.40 No.10 No.4 3/4" 3" 12"

U.S. STANDARD SIEVE SIZE

Reference: The Unified Soil Classification System, Corps of Engineers, U.S. Army Technical Memorandum No. 3-357, Vol. 1, March, 1953 (Revised April, 1960)

KEY TO SYMBOLS AND DESCRIPTIONS

MACTEC

MACTEC Engineering and Consulting, Inc.
1725 Louisville Drive
Knoxville, Tennessee 37921-5904
865-588-8544 • Fax: 865-588-8026

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	ORANGE-BROWN, SILTY CLAY WITH ROCK FRAGMENTS (ROUNDED GRAVEL AND CHERT)		478.0					
5			473.0					
10			468.0					
15			463.0					
18.5	AUGER REFUSAL AT 18.5'							
20			458.0					
25			453.0					
30			448.0					
35			443.0					
40			438.0					
45			433.0					

SOIL-AUGER 3043041043 01.GPJ LAW_GIBB.GDT 10/13/04

REMARKS: NO GROUND WATER ENCOUNTERED AT TIME OF EXPLORATION. GROUND SURFACE ELEVATION WAS OBTAINED FROM SURVEY DATA PROVIDED BY PARSONS E&C.

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 BEWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

Driller : Akins
Prepared By: Justice
Checked By: H.A.B.

AUGER BORING RECORD

PROJECT: TVA - Gallatin Ash Disposal Area

DRILLED: August 11, 2004 **BORING NO.:** A-1

PROJ. NO.: 3043041043/0001 **PAGE** 1 **OF** 1

MACTEC

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	ORANGE-BROWN TO BROWN, SILTY CLAY WITH ROCK FRAGMENTS (ROUNDED GRAVEL AND CHERT)		483.0					
5			478.0					
10			473.0					
15			468.0					
20	BORING TERMINATED AT 20.0'		463.0					
25			458.0					
30			453.0					
35			448.0					
40			443.0					
45			438.0					

SOIL-AUGER 3043041043_01.GPJ LAW_GIBB.GDT 10/13/04

REMARKS: NO GROUND WATER ENCOUNTERED AT TIME OF EXPLORATION. GROUND SURFACE ELEVATION WAS OBTAINED FROM SURVEY DATA PROVIDED BY PARSONS E&C.

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Driller : Akins
Prepared By: Justice
Checked By: H.A.B.

AUGER BORING RECORD

PROJECT: TVA - Gallatin Ash Disposal Area

DRILLED: August 11, 2004 **BORING NO.:** A-2

PROJ. NO.: 3043041043/0001 **PAGE** 1 **OF** 1

MACTEC

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	ORANGE-BROWN, SILTY CLAY		477.0					
5			472.0					
10			467.0					
15			462.0					
20	BORING TERMINATED AT 20.0'		457.0					
25			452.0					
30			447.0					
35			442.0					
40			437.0					
45			432.0					

SOIL-AUGER 3043041043_01.GPJ LAW_GIBB.GDT 10/13/04

REMARKS: NO GROUND WATER ENCOUNTERED AT TIME OF EXPLORATION. GROUND SURFACE ELEVATION WAS OBTAINED FROM SURVEY DATA PROVIDED BY PARSONS E&C.

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 BEWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

Driller : Akins
Prepared By: Justice
Checked By: H.A.B.

AUGER BORING RECORD

PROJECT: TVA - Gallatin Ash Disposal Area

DRILLED: August 11, 2004 **BORING NO.:** A-3

PROJ. NO.: 3043041043/0001 **PAGE** 1 **OF** 1

MACTEC

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	ORANGE-BROWN, SILTY CLAY WITH ROCK FRAGMENTS		475.0						
5			470.0						
10			465.0						
15	BORING TERMINATED AT 15.0'		460.0						
20			455.0						
25			450.0						
30			445.0						
35			440.0						
40			435.0						
45			430.0						

SOIL-AUGER 3043041043_01.GPJ LAW_GIBB.GDT 10/13/04

REMARKS: NO GROUND WATER ENCOUNTERED AT TIME OF EXPLORATION. GROUND SURFACE ELEVATION WAS OBTAINED FROM SURVEY DATA PROVIDED BY PARSONS E&C.

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 BEWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

Driller : Akins
Prepared By: Justice
Checked By: H.A.B.

AUGER BORING RECORD

PROJECT: TVA - Gallatin Ash Disposal Area

DRILLED: August 11, 2004 **BORING NO.:** A-4

PROJ. NO.: 3043041043/0001 **PAGE** 1 **OF** 1

MACTEC

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	SAMPLES TYPE	N-COUNT 1st 6"	N-COUNT 2nd 6"	N-COUNT 3rd 6"
0	ORANGE-BROWN, SILTY CLAY WITH A FEW ROCK FRAGMENTS		473.0					
5			468.0					
10			463.0					
15	BORING TERMINATED AT 15.0'		458.0					
20			453.0					
25			448.0					
30			443.0					
35			438.0					
40			433.0					
45			428.0					

SOIL-AUGER 3043041043_01.GPJ LAW_GIBB.GDT 10/13/04

REMARKS: NO GROUND WATER ENCOUNTERED AT TIME OF EXPLORATION. GROUND SURFACE ELEVATION WAS OBTAINED FROM SURVEY DATA PROVIDED BY PARSONS E&C.

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 BEWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

Driller : Akins
Prepared By: Justice
Checked By: H.A.B.

AUGER BORING RECORD

PROJECT: TVA - Gallatin Ash Disposal Area

DRILLED: August 11, 2004 **BORING NO.:** A-5

PROJ. NO.: 3043041043/0001 **PAGE** 1 **OF** 1

MACTEC

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	SAMPLES TYPE	N-COUNT 1st 6"	N-COUNT 2nd 6"	N-COUNT 3rd 6"
0	TAN TO ORANGE-BROWN, SILTY CLAY WITH A FEW ROCK FRAGMENTS		473.0					
5			468.0					
10			463.0					
11.5	AUGER REFUSAL AT 11.5'							
15			458.0					
20			453.0					
25			448.0					
30			443.0					
35			438.0					
40			433.0					
45			428.0					

SOIL-AUGER 3043041043_01.GPJ LAW_GIBB.GDT 10/13/04

REMARKS: NO GROUND WATER ENCOUNTERED AT TIME OF EXPLORATION. GROUND SURFACE ELEVATION WAS OBTAINED FROM SURVEY DATA PROVIDED BY PARSONS E&C.

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 BEWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

Driller : Akins
Prepared By: Justice
Checked By: H.A.B.

AUGER BORING RECORD

PROJECT: TVA - Gallatin Ash Disposal Area

DRILLED: August 11, 2004 **BORING NO.:** A-6

PROJ. NO.: 3043041043/0001 **PAGE** 1 **OF** 1

MACTEC

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	ORANGE-BROWN TO TAN, SILTY CLAY WITH A FEW ROCK FRAGMENTS		475.0						
5			470.0						
10			465.0						
15			460.0						
20	BORING TERMINATED AT 20.0'		455.0						
25			450.0						
30			445.0						
35			440.0						
40			435.0						
45			430.0						

SOIL-AUGER 3043041043_01.GPJ LAW_GIBB.GDT 10/13/04

REMARKS: NO GROUND WATER ENCOUNTERED AT TIME OF EXPLORATION. GROUND SURFACE ELEVATION WAS OBTAINED FROM SURVEY DATA PROVIDED BY PARSONS E&C.

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Driller : Akins
Prepared By: Justice
Checked By: H.A.B.

AUGER BORING RECORD

PROJECT: TVA - Gallatin Ash Disposal Area

DRILLED: August 11, 2004 **BORING NO.:** A-7

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MACTEC

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	BROWN, SILTY CLAY WITH ROUNDED GRAVEL AND CHERT FRAGMENTS		474.0					
5			469.0					
10			464.0					
15	BORING TERMINATED AT 15.0'		459.0					
20			454.0					
25			449.0					
30			444.0					
35			439.0					
40			434.0					
45			429.0					

SOIL-AUGER 3043041043_01.GPJ LAW_GIBB.GDT 10/13/04

REMARKS: NO GROUND WATER ENCOUNTERED AT TIME OF EXPLORATION. GROUND SURFACE ELEVATION WAS OBTAINED FROM SURVEY DATA PROVIDED BY PARSONS E&C.

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Driller : Akins
Prepared By: Justice
Checked By: H.A.B.

AUGER BORING RECORD

PROJECT: TVA - Gallatin Ash Disposal Area

DRILLED: August 11, 2004 **BORING NO.:** A-8

PROJ. NO.: 3043041043/0001 **PAGE** 1 **OF** 1

MACTEC

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	SAMPLES TYPE	N-COUNT 1st 6"	N-COUNT 2nd 6"	N-COUNT 3rd 6"
0	TAN, SILTY CLAY		541.0					
5			536.0					
10			531.0					
15	BORING TERMINATED AT 15.0'		526.0					
20			521.0					
25			516.0					
30			511.0					
35			506.0					
40			501.0					
45			496.0					

SOIL-AUGER 3043041043_01.GPJ LAW_GIBB.GDT 10/13/04

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Driller : Akins
Prepared By: Justice
Checked By: H.A.B.

AUGER BORING RECORD

PROJECT: TVA - Gallatin Ash Disposal Area

DRILLED: August 13, 2004 **BORING NO.:** A-9

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MACTEC

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	LIGHT GRAYISH BROWN, SILTY CLAY / CLAYEY SILT		513.0					
5	AUGER REFUSAL AT 5.0'		508.0					
10			503.0					
15			498.0					
20			493.0					
25			488.0					
30			483.0					
35			478.0					
40			473.0					
45			468.0					

SOIL-AUGER 3043041043_01.GPJ LAW_GIBB.GDT 10/13/04

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Driller : Akins
Prepared By: Justice
Checked By: H.A.B.

AUGER BORING RECORD

PROJECT: TVA - Gallatin Ash Disposal Area

DRILLED: August 13, 2004 **BORING NO.:** A-10

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MACTEC

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	TAN TO LIGHT BROWN, CLAYEY SILT AND SILTY CLAY		572.0						
5			567.0						
10			562.0						
12.5	AUGER REFUSAL AT 12.5'								
15			557.0						
20			552.0						
25			547.0						
30			542.0						
35			537.0						
40			532.0						
45			527.0						

SOIL-AUGER 3043041043_01.GPJ LAW_GIBB.GDT 10/13/04

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Driller : Akins
Prepared By: Justice
Checked By: H.A.B.

AUGER BORING RECORD

PROJECT: TVA - Gallatin Ash Disposal Area

DRILLED: August 13, 2004 **BORING NO.:** A-11

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MACTEC

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	LIGHT BROWN TO BROWN, SILTY CLAY WITH A FEW CHERT FRAGMENTS		523.0					
5			518.0					
10			513.0					
	AUGER REFUSAL AT 13.0'							
15			508.0					
20			503.0					
25			498.0					
30			493.0					
35			488.0					
40			483.0					
45			478.0					

SOIL-AUGER 3043041043_01.GPJ LAW_GIBB.GDT 10/13/04

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Driller : Akins
Prepared By: Justice
Checked By: H.A.B.

AUGER BORING RECORD

PROJECT: TVA - Gallatin Ash Disposal Area

DRILLED: August 13, 2004 **BORING NO.:** A-12

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MACTEC

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	ORANGE-BROWN TO LIGHT BROWN, CLAYEY SILT / SILTY CLAY		539.0					
5			534.0					
10	AUGER REFUSAL AT 9.0'		529.0					
15			524.0					
20			519.0					
25			514.0					
30			509.0					
35			504.0					
40			499.0					
45			494.0					

SOIL-AUGER 3043041043_01.GPJ LAW_GIBB.GDT 10/13/04

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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 BEWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

Driller : Akins
Prepared By: Justice
Checked By: H.A.B.

AUGER BORING RECORD

PROJECT: TVA - Gallatin Ash Disposal Area

DRILLED: August 13, 2004 **BORING NO.:** A-13

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MACTEC

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	ORANGE-BROWN TO BROWN, SILTY CLAY		575.0					
5			570.0					
10			565.0					
	AUGER REFUSAL AT 12.0'							
15			560.0					
20			555.0					
25			550.0					
30			545.0					
35			540.0					
40			535.0					
45			530.0					

SOIL-AUGER 3043041043_01.GPJ LAW_GIBB.GDT 10/13/04

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Driller : Akins
Prepared By: Justice
Checked By: H.A.B.

AUGER BORING RECORD

PROJECT: TVA - Gallatin Ash Disposal Area

DRILLED: August 13, 2004 **BORING NO.:** A-14

PROJ. NO.: 3043041043/0001 **PAGE** 1 **OF** 1

MACTEC

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	ASH WITH SILTY CLAY		496.0					
	SEVERELY WEATHERED BEDROCK INTERVAL							
5			491.0					
10			486.0					
15			481.0					
	AUGER REFUSAL AT 16.6'							
20			476.0					
25			471.0					
30			466.0					
35			461.0					
40			456.0					
45			451.0					

SOIL-AUGER 3043041043_01.GPJ LAW_GIBB.GDT 10/13/04

REMARKS: NO GROUND WATER ENCOUNTERED AT TIME OF EXPLORATION. GROUND SURFACE ELEVATION WAS OBTAINED FROM SURVEY DATA PROVIDED BY PARSONS E&C BASED ON AVAILABLE TOPOGRAPHIC MAP.

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 BEWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

Driller : Akins
Prepared By: Justice
Checked By: H.A.B.

AUGER BORING RECORD

PROJECT: TVA - Gallatin Ash Disposal Area

DRILLED: August 10, 2004 **BORING NO.:** A-20

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MACTEC

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	SAMPLES TYPE	N-COUNT 1st 6"	N-COUNT 2nd 6"	N-COUNT 3rd 6"
0	ASH		493.0					
	ORANGE-BROWN, SILTY CLAY							
5			488.0					
10	AUGER REFUSAL AT 10.0'		483.0					
15			478.0					
20			473.0					
25			468.0					
30			463.0					
35			458.0					
40			453.0					
45			448.0					

SOIL-AUGER 3043041043_01.GPJ LAW_GIBB.GDT 10/13/04

REMARKS: NO GROUND WATER ENCOUNTERED AT TIME OF EXPLORATION. GROUND SURFACE ELEVATION WAS OBTAINED FROM SURVEY DATA PROVIDED BY PARSONS E&C BASED ON AVAILABLE TOPOGRAPHIC MAP.

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Driller : Akins
Prepared By: Justice
Checked By: H.A.B.

AUGER BORING RECORD

PROJECT: TVA - Gallatin Ash Disposal Area

DRILLED: August 10, 2004 **BORING NO.:** A-21

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MACTEC

OBSERVATION TRENCH LOG		
Project Name: TVA Gallatin Ash Disposal Area		**Logged By:** Todd Justice
Project Number: 3043041043/01		**Date Logged:** 8/16/04
Observation Trench Number: OT-1		**Surface Elevation:** 576.0
Depth (Feet)		
From	**To**	**Stratum Description**
0	0.5	Topsoil
0.5	3.5	Tan to light brown clayey silt / silty clay with some rock fragments
Remarks and Notes: Observation trench terminated at 3.5 feet. Ground surface elevation was obtained from survey data provided by Parsons E&C.		

Prepared/Date: CTJ 8/31/04
Checked/Date: HAB 9/8/04

OBSERVATION TRENCH LOG		
Project Name: TVA Gallatin Ash Disposal Area		**Logged By:** Todd Justice
Project Number: 3043041043/01		**Date Logged:** 8/16/04
Observation Trench Number: OT-2		**Surface Elevation:** 545.0
Depth (Feet)		
From	**To**	**Stratum Description**
0	0.5	Topsoil
0.5	2.0	Light grayish brown silt with rock fragments
2.0	2.5	Limestone bedrock fragments
Remarks and Notes: Observation trench refusal at 2.5 feet. Ground surface elevation was obtained from survey data provided by Parsons E&C.		

Prepared/Date: CTJ 8/31/04
Checked/Date: HAB 9/8/04

OBSERVATION TRENCH LOG		
Project Name: TVA Gallatin Ash Disposal Area		**Logged By:** Todd Justice
Project Number: 3043041043/01		**Date Logged:** 8/16/04
Observation Trench Number: OT-3		**Surface Elevation:** 526.0
Depth (Feet)		**Stratum Description**
From	**To**	
0	0.5	Topsoil
0.5	2.0	Light brownish gray silt with rock fragments
Remarks and Notes: Observation trench refusal at 2.0 feet. Ground surface elevation was obtained from survey data provided by Parsons E&C.		

Prepared/Date: CTJ 8/31/04
Checked/Date: HAB 9/8/04

OBSERVATION TRENCH LOG		
Project Name: TVA Gallatin Ash Disposal Area		**Logged By:** Todd Justice
Project Number: 3043041043/01		**Date Logged:** 8/16/04
Observation Trench Number: OT-4		**Surface Elevation:** 528.0
Depth (Feet)		**Stratum Description**
From	**To**	
0	0.5	Topsoil
0.5	4.5	Reddish brown to gray silty clay
Remarks and Notes: Observation trench terminated at 4.5 feet. Ground surface elevation was obtained from survey data provided by Parsons E&C.		

Prepared/Date: CTJ 8/31/04
Checked/Date: HAB 9/8/04

OBSERVATION TRENCH LOG		
Project Name: TVA Gallatin Ash Disposal Area		**Logged By:** Todd Justice
Project Number: 3043041043/01		**Date Logged:** 8/16/04
Observation Trench Number: OT-5		**Surface Elevation:** 528.0
Depth (Feet)		**Stratum Description**
From	**To**	
0	0.5	Topsoil
0.5	3.5	Reddish brown, brown, and gray sandy clay
3.5	4.0	Shale and limestone bedrock fragments
Remarks and Notes: Observation trench refusal at 4.0 feet. Ground surface elevation was obtained from survey data provided by Parsons E&C.		

Prepared/Date: CTJ 8/31/04
Checked/Date: HAB 9/8/04

OBSERVATION TRENCH LOG		
Project Name: TVA Gallatin Ash Disposal Area		**Logged By:** Todd Justice
Project Number: 3043041043/01		**Date Logged:** 8/16/04
Observation Trench Number: OT-6		**Surface Elevation:** 536.0
Depth (Feet)		**Stratum Description**
From	**To**	
0	0.5	Topsoil
0.5	4.0	Orange-brown sandy clay
Remarks and Notes: Observation trench terminated at 4.0 feet. Ground surface elevation was obtained from survey data provided by Parsons E&C.		

Prepared/Date: CTJ 8/31/04
Checked/Date: HAB 9/8/04

OBSERVATION TRENCH LOG		
Project Name: TVA Gallatin Ash Disposal Area		**Logged By:** Todd Justice
Project Number: 3043041043/01		**Date Logged:** 8/16/04
Observation Trench Number: OT-7		**Surface Elevation:** 530.0
Depth (Feet)		**Stratum Description**
From	**To**	
0	0.5	Topsoil
0.5	5.0	Orange-brown and gray sandy silty clay
Remarks and Notes: Observation trench terminated at 5.0 feet. Ground surface elevation was obtained from survey data provided by Parsons E&C.		

Prepared/Date: CTJ 8/31/04
Checked/Date: HAB 9/8/04

OBSERVATION TRENCH LOG		
Project Name: TVA Gallatin Ash Disposal Area		**Logged By:** Todd Justice
Project Number: 3043041043/01		**Date Logged:** 8/16/04
Observation Trench Number: OT-8		**Surface Elevation:** 525.0
Depth (Feet)		**Stratum Description**
From	**To**	
0	0.5	Topsoil
0.5	5.0	Orange-brown and gray sandy silty clay
Remarks and Notes: Observation trench terminated at 5.0 feet. Ground surface elevation was obtained from survey data provided by Parsons E&C.		

Prepared/Date: CTJ 8/31/04
Checked/Date: HAB 9/8/04

OBSERVATION TRENCH LOG		
Project Name: TVA Gallatin Ash Disposal Area		**Logged By:** Todd Justice
Project Number: 3043041043/01		**Date Logged:** 8/16/04
Observation Trench Number: OT-9		**Surface Elevation:** 542.0
Depth (Feet)		
From	**To**	**Stratum Description**
0	0.5	Topsoil
0.5	6.5	Orange-brown and gray silty clay
Remarks and Notes: Observation trench terminated at 6.5 feet. Ground surface elevation was obtained from survey data provided by Parsons E&C.		

Prepared/Date: CTJ 8/31/04
Checked/Date: HAB 9/8/04

OBSERVATION TRENCH LOG		
Project Name: TVA Gallatin Ash Disposal Area		**Logged By:** Todd Justice
Project Number: 3043041043/01		**Date Logged:** 8/16/04
Observation Trench Number: OT-10		**Surface Elevation:** 513.0
Depth (Feet)		
From	**To**	**Stratum Description**
0	0.5	Topsoil
0.5	5.0	Orange-brown and grayish brown clayey silt / silty clay
Remarks and Notes: Observation trench refusal at 5.0 feet. Ground surface elevation was obtained from survey data provided by Parsons E&C.		

Prepared/Date: CTJ 8/31/04
Checked/Date: HAB 9/8/04

OBSERVATION TRENCH LOG		
Project Name: TVA Gallatin Ash Disposal Area		**Logged By:** Todd Justice
Project Number: 3043041043/01		**Date Logged:** 8/16/04
Observation Trench Number: OT-11		**Surface Elevation:** 501.0
Depth (Feet)		
From	**To**	**Stratum Description**
0	0.5	Topsoil
0.5	2.0	Light brown to tan silt with rock fragments
Remarks and Notes: Observation trench refusal at 2.0 feet. Ground surface elevation was obtained from survey data provided by Parsons E&C.		

Prepared/Date: CTJ 8/31/04
Checked/Date: HAB 9/8/04

OBSERVATION TRENCH LOG		
Project Name: TVA Gallatin Ash Disposal Area		**Logged By:** Todd Justice
Project Number: 3043041043/01		**Date Logged:** 8/16/04
Observation Trench Number: OT-12		**Surface Elevation:** 598.0
Depth (Feet)		
From	**To**	**Stratum Description**
0	0.5	Topsoil
0.5	3.5	Orange-brown silty clay
Remarks and Notes: Observation trench terminated at 3.5 feet. Ground surface elevation was obtained from survey data provided by Parsons E&C.		

Prepared/Date: CTJ 8/31/04
Checked/Date: HAB 9/8/04

OBSERVATION TRENCH LOG		
Project Name: TVA Gallatin Ash Disposal Area		**Logged By:** Todd Justice
Project Number: 3043041043/01		**Date Logged:** 8/16/04
Observation Trench Number: OT-13		**Surface Elevation:** 582.0
Depth (Feet)		**Stratum Description**
From	**To**	
0	0.5	Topsoil
0.5	5.0	Orange-brown silty clay
Remarks and Notes: Observation trench terminated at 5.0 feet. Ground surface elevation was obtained from survey data provided by Parsons E&C.		

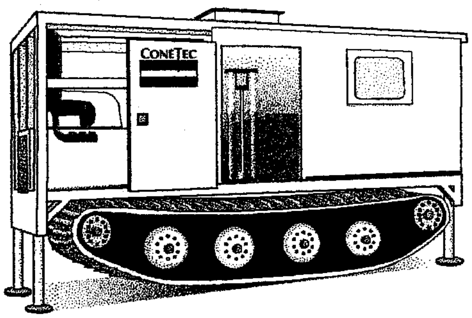
Prepared/Date: CTJ 8/31/04
Checked/Date: HAB 9/8/04

OBSERVATION TRENCH LOG		
Project Name: TVA Gallatin Ash Disposal Area		**Logged By:** Todd Justice
Project Number: 3043041043/01		**Date Logged:** 8/16/04
Observation Trench Number: OT-14		**Surface Elevation:** 589.0
Depth (Feet)		**Stratum Description**
From	**To**	
0	0.5	Topsoil
0.5	5.0	Orange-brown and brown silty clay
Remarks and Notes: Observation trench refusal at 5.0 feet. Ground surface elevation was obtained from survey data provided by Parsons E&C.		

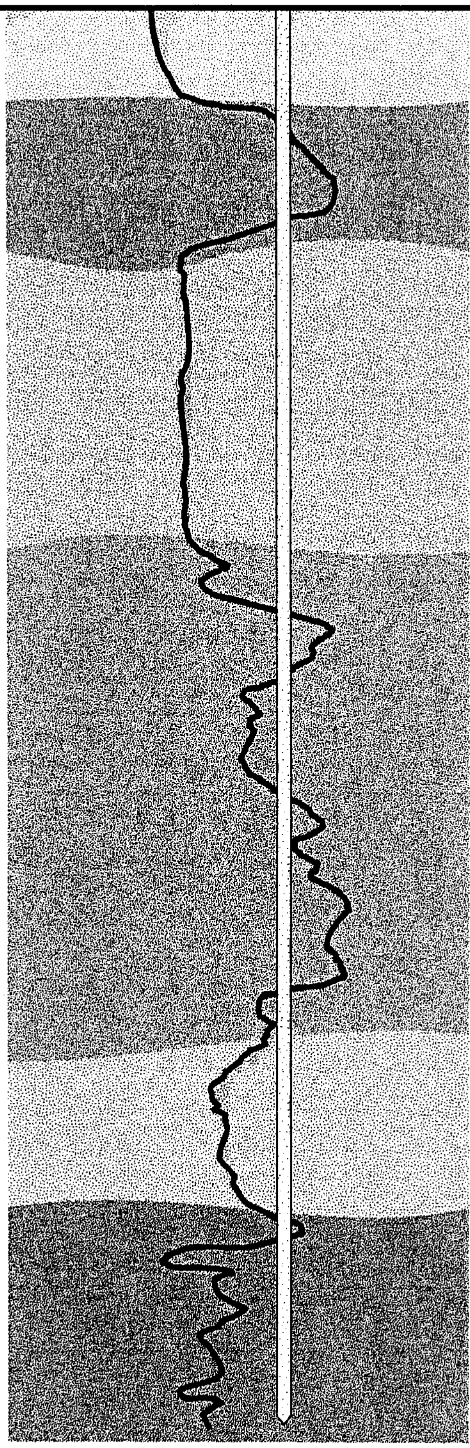
Prepared/Date: CTJ 8/31/04
Checked/Date: HAB 9/8/04

APPENDIX C

CONE PENETROMETER TEST PROCEDURES AND RESULTS



CONETEC



Geotechnical and Environmental In Situ Testing Contractors

ConeTec Field Report

Presentation of In Situ Test Results for:

Gallatin TVA Plant Gallatin, Tennessee

Presented to:	MACTEC, Inc.
Date:	September 8th, 2004
Presented by:	ConeTec Inc. 436 Commerce Lane, Unit C West Berlin, NJ 08091 (856) 767-8600

PRESENTATION OF IN SITU TESTING PROGRAM RESULTS

Gallatin TVA Plant
Gallatin, Tennessee

September 8th, 2004

Prepared for:

MACTEC, Inc.
Knoxville, Tennessee

Prepared by:

ConeTec Inc.
West Berlin, NJ

September 10, 2004

TABLE OF CONTENTS

1.0 INTRODUCTION

This report presents the results of a peizo cone penetrometer testing (CPTU) program carried out at the Gallatin TVA Plant located south of Gallatin, Tennessee. The work was performed under subcontract to MACTEC, Inc. of Knoxville, Tennessee. The CPTU program took place during a single day period, on September 8th, 2004.

A total of eight soundings were completed at seven different sounding locations. The CPT testing was performed to evaluate in situ geotechnical criteria.

CPT sounding locations were selected and numbered under the direction and supervision of MACTEC personnel (Messrs. Todd Justice and Hussein Benkhayal).

2.0 FIELD EQUIPMENT AND PROCEDURES

2.1 CONE PENETRATION TESTING

The cone penetrometer tests were carried out using an integrated electronic piezo cone manufactured by ConeTec in Vancouver, Canada. The piezo cone used was a compression model cone penetrometer with a 15 cm^2 tip and a 225 cm^2 friction sleeve. The cone is designed with an equal end area friction sleeve and a tip end area ratio of 0.85. The piezo cone dimensions and the operating procedure were in accordance with ASTM Standard D-5778-95. A diagram of the cone penetrometer used for this project is shown as Figure 1.

Pore pressure filter elements, made of porous plastic, were saturated under a vacuum using glycerin as the saturating fluid. The pore pressure element was six millimeters thick and was located immediately behind the tip (the U_2 location) for all soundings.

The cone was advanced using a 25 ton, unitized, truck-mounted cone penetration rig. The following data were recorded onto magnetic media every five centimeters (approximately every two inches) as the cone was advanced into the ground:

- Tip Resistance (Qc)
- Sleeve Friction (Fs)
- Dynamic Pore Pressure (Ut)

The field data recorded is included on the attached diskette (appendix D).

Before each sounding a complete set of analog baseline readings are taken with a multi-meter and compared with the digitized value on the computer screen. This provides a check on the analog to digital conversion board.

Evaluation of the analog baselines is key to consistent readings. The baseline data should be stable and should not wander excessively during the course of a sounding. Baseline data can be used to apply corrections to the cone data where necessary. For this project, the baseline shift from sounding to sounding was small, typically less than 0.1% of full scale, and no data corrections were applied.

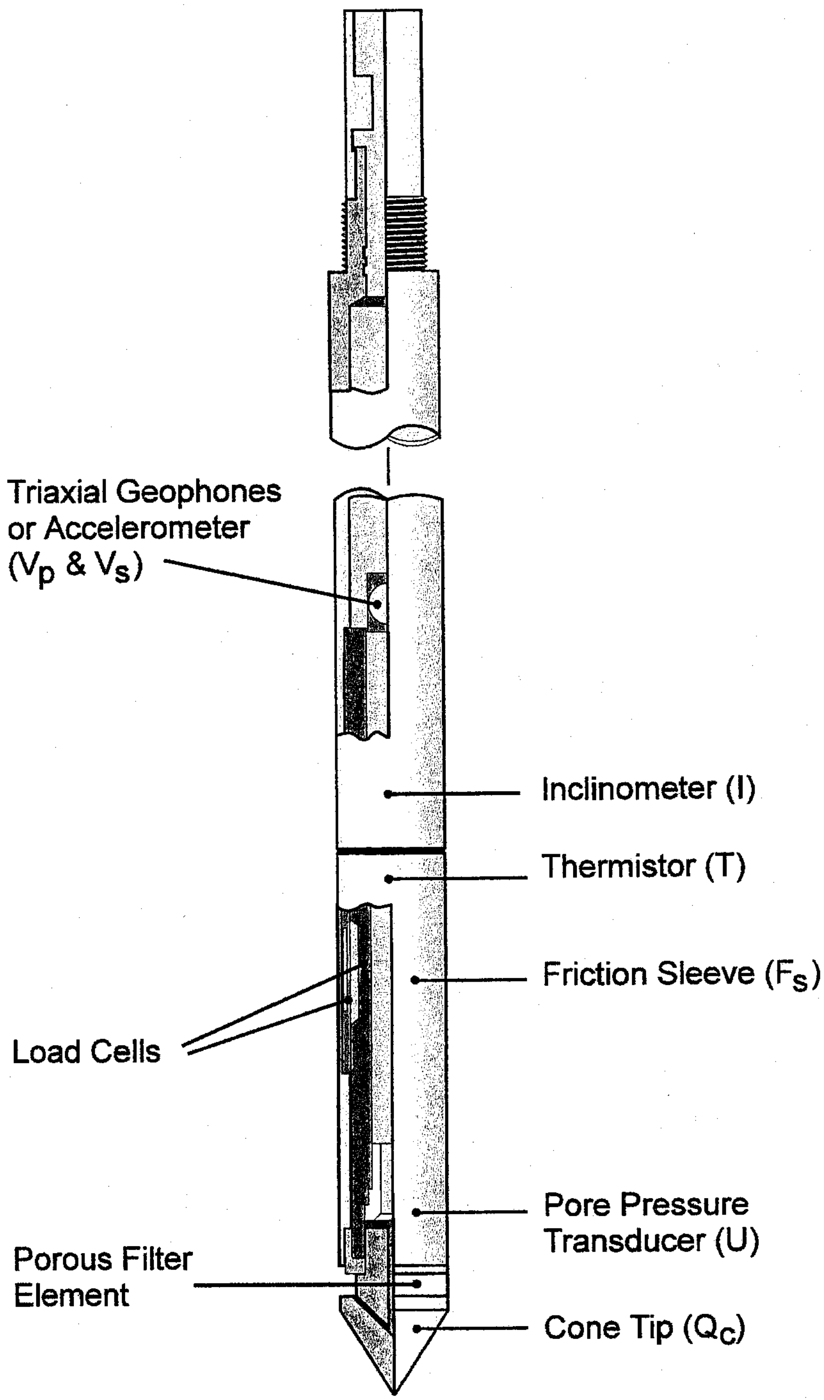


FIGURE 1 - TYPICAL CONE PENETROMETER

2.2 PORE PRESSURE DISSIPATION TESTS

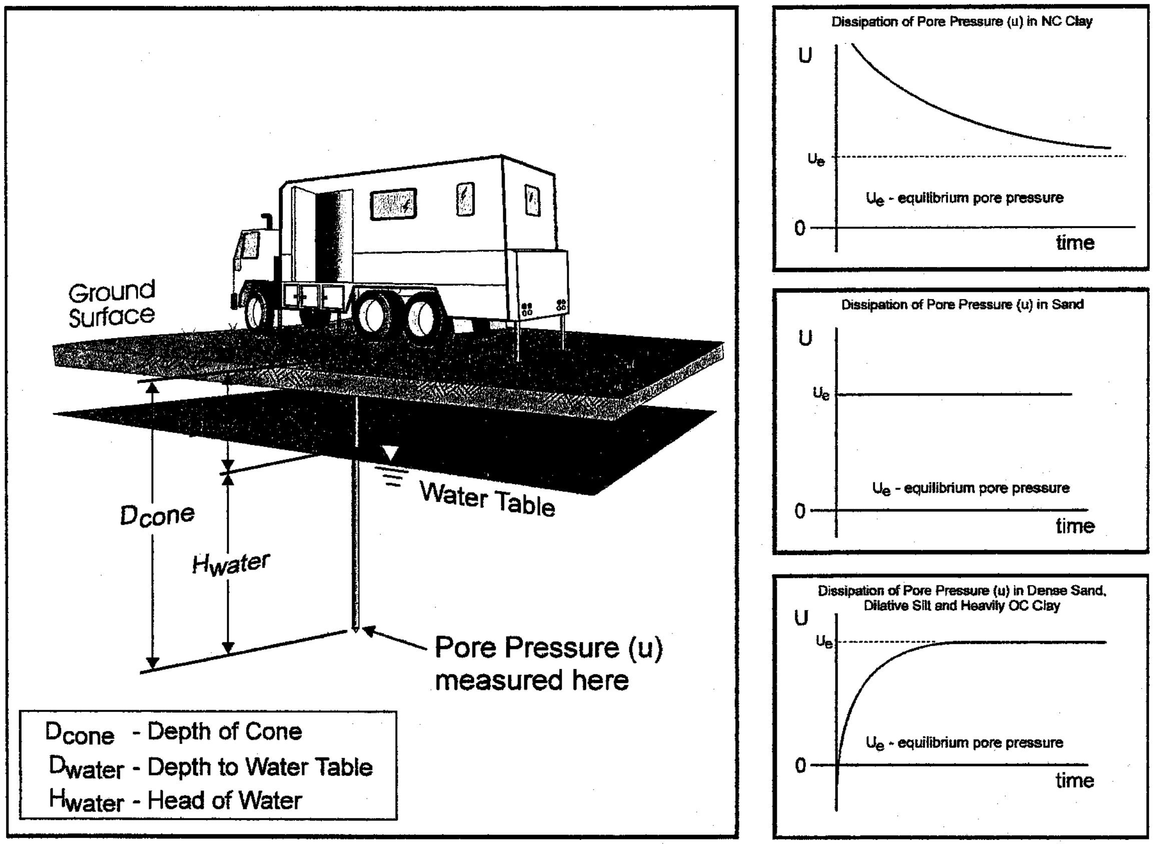
When cone penetration is stopped, the piezo cone essentially becomes a piezometer. While stopped, pore water pressures are automatically recorded at five-second intervals and the readings are stored in a dissipation file (.ppd). Dissipation data can then be plotted onto a dissipation curve consisting of pore water pressure (U) verses time (t). The shapes of dissipation curves are very useful in evaluating soil type, drainage and in situ static water level.

A flat curve that stabilizes quickly (i.e. less than 30 seconds) is typical of a free draining sand. In this case, the final measured pore water pressure is the static in situ water pressure.

Soils that generate excess dynamic pore water pressure during penetration will dissipate this excess pressure when penetration stops. The shape of the dissipation curve and the time of dissipation can be used to estimate C_h, the coefficient of consolidation that can in turn be used to calculate K_h, the horizontal permeability.

Figure 2 shows some idealized shapes of various pore water pressure dissipation curves. The reader is referred Robertson et. al., 1990 to reference dissipation test data analytical techniques.

Estimation of Ground Water Table from CPT Dissipation Tests



Water Table Calculation

$$D_{water} = D_{cone} - H_{water}$$

where $H_{water} = U_e$ (depth units)

Useful Conversion Factors:
1psi = 0.704m = 2.31 feet (water)
1tsf = 0.958 bar = 13.9 psi
1m = 3.28 feet

FIGURE 2 - TYPICAL DISSIPATION TESTS

3.0 CONE PENETRATION TEST DATA AND INTERPRETATION

3.1 ANALYSIS OF PIEZOCONE DATA - GENERAL

A total of eight CPT soundings, involving 1185.5 feet of testing, were completed at seven locations.

The interpretation of cone data is based on the relationship between cone bearing, Qc, sleeve friction, Fs, and penetration pore water pressure, U. The friction ratio, Rf , (sleeve friction divided by cone bearing) is a calculated parameter which is used to infer soil behavior type. Generally, saturated cohesive soils have low tip resistance, high friction ratios and generate large excess pore water pressures. Cohesionless soils have higher tip resistances, lower friction ratios and do not generate significant excess pore water pressure.

The interpretation of soils encountered on this project was carried out using correlations developed by Robertson et al., 1986. It should be noted that it is not always possible to clearly identify a soil type based on Qc, Fs and Ut. Occasionally soils will fall within different soil categories on the classification charts. In these situations, experience and judgment and an assessment of the pore pressure dissipation data should be used to infer the soil behavior type. Computer tabulations of the interpreted soil types along with certain other geotechnical parameters for each cone hole is presented in Appendix B.

Each of the parameters measured in the sounding is discussed briefly below. A detailed explanation of CPTU testing and interpretation of the results can be found in "Guidelines for Geotechnical Design Using CPT and CPTU" by P. K. Robertson and R. G. Campanella, listed in the references.

TIP RESISTANCE (Q_c): The resistance to penetration, measured at the cone tip, provides an accurate profile of subsurface strata. The recorded tip resistance is a composite of the penetration resistance of the soils located five to ten cone diameters (7 to 14 inches) in front of and behind the tip. The actual resistance "sensed" by the tip depends on the soil properties and on the relative stiffness of the layers encountered. Tip resistance is often corrected for pore pressure effects when testing in soft saturated cohesive soils.

For this project the correction was made and the tip resistance shown, Q_t is the corrected tip resistance.

The correction used is: $Q_t = Q_c + (1\text{-}a)U$

Where:
- Q_t = corrected tip resistance
- Q_c = measured tip resistance
- a = net area ratio for cone (0.85 for this project)
- U = dynamic pore water pressure measured behind tip

SLEEVE FRICTION (F_s) The resistance recorded on the friction sleeve, is a measure of the remolded strength of the soil. Values of sleeve friction in very soft soils (such as peat) may fluctuate due to the measured force being small relative to the capacity of the measuring load cell.

FRICTION RATIO (R_f) The ratio of sleeve friction to tip resistance expressed as a percentage, is an indicator of soil type. Cohesive soils generally have friction ratios that are greater than two, while sands and non-plastic silts have friction ratios that are lower than two.

PORE PRESSURE (U) Dynamic pore water pressure is measured during penetration. (dynamic pore water pressure data can be found in the .cor, .ifi (importable) and .ifp (printable) files). Static pore water pressure is measured when cone penetration is stopped (static pore water pressure data can be found in the .ppd files). The measured dynamic pore water pressure changes with the location of the porous filter and negative readings are possible when the filter is located behind the tip.

It is important to note that the CPT classifies soil by physical behavior, not by grain size; therefore, the CPT classification should be verified against samples obtained from a conventional drilling program. While the CPT soil classification may not always be accurate in terms of the actual label it applies to a particular soil, it is very accurate in grouping soils with similar mechanical properties.

Table 1 presents a summary of CPT soundings, including sounding depths.

3.2 CONE PLOTS

The data from each sounding was plotted using the computer program ScreenZ. The plots are included in Appendix A. ScreenZ was developed by ConeTec Inc. and it incorporates soil behavior type (SBT) classification as part of the plot. The soil classification is based on the classification chart reproduced chart in Appendix B.

3.3 PORE PRESSURE DISSIPATION TEST RESULTS

When conducting CPT investigations, a total of three meaningful pore water pressure dissipation tests were collected. Pore water pressure dissipation data are collected and automatically recorded during pauses in penetration. The pore water pressure data is recorded at five second intervals. Two pore water pressure dissipation tests were completed to determine approximate water table depths which were used in generating the tabular data for the project.

CONETEC

TABLE 1 - SUMMARY OF CPTU SOUNDINGS

Job No.: 04-783
Location: Gallatin TVA Plant, Gallatin, TN
Client: MACTEC, Inc.
Date: September 8th, 2004

Date	CPTU Sounding	File Name	Total Depth (ft)	Pore Water Pressure Dissipation Test Depth (ft)	Pore Water Pressure Dissipation Test Duration (sec)	Est. Water Table Depth (ft)	Umax (ft)	Est. Ch (cm^2/min.)	Est. t50 (sec)	Comments
08-Sep-04	CPT-3	783CP003.COR	5.74			9.0				Refusal
08-Sep-04	CPT-3A	783CP03A.COR	54.46	15.75	600	9.0	53.5	22.42	32	Refusal
08-Sep-04	CPT-4	789CP004.COR	6.73			5.0				Refusal
08-Sep-04	CPT-5	789CP005.COR	10.17			5.0				Refusal
08-Sep-04	CPT-7	789CP007.COR	25.43			5.0				Refusal
08-Sep-04	CPT-8	789CP008.COR	21.33	12.96	180	4.0				Refusal
08-Sep-04	CPT-12	789CP012.COR	35.27			5.0				Refusal
08-Sep-04	CPT-13	789CP013.COR	26.41	12.47	120	3.7				Refusal
				19.03	1,000	3.7	89.2	1.49	481	
		8	185.5		1,900					
					0.5	hours				

One longer pore water pressure dissipation tests were completed to determine hydraulic conductivities and consolidation parameters.

3.4 CPT DATA PROCESSING

The electronic data files were processed using the program CPTSumm. CPTSumm is a program developed by ConeTec to calculate common engineering parameters from CPT data. The processed data files are attached in Appendix B. The files are also included on the data disk. The calculations used are summarized in the table at the front of the Appendix. Each calculation is derived according to the referenced article.

For this project, the depth to ground water was determined from pore water pressure dissipation data collected during the program. The exact depth used is noted in the header of each .xls, .nli and .nlp files.

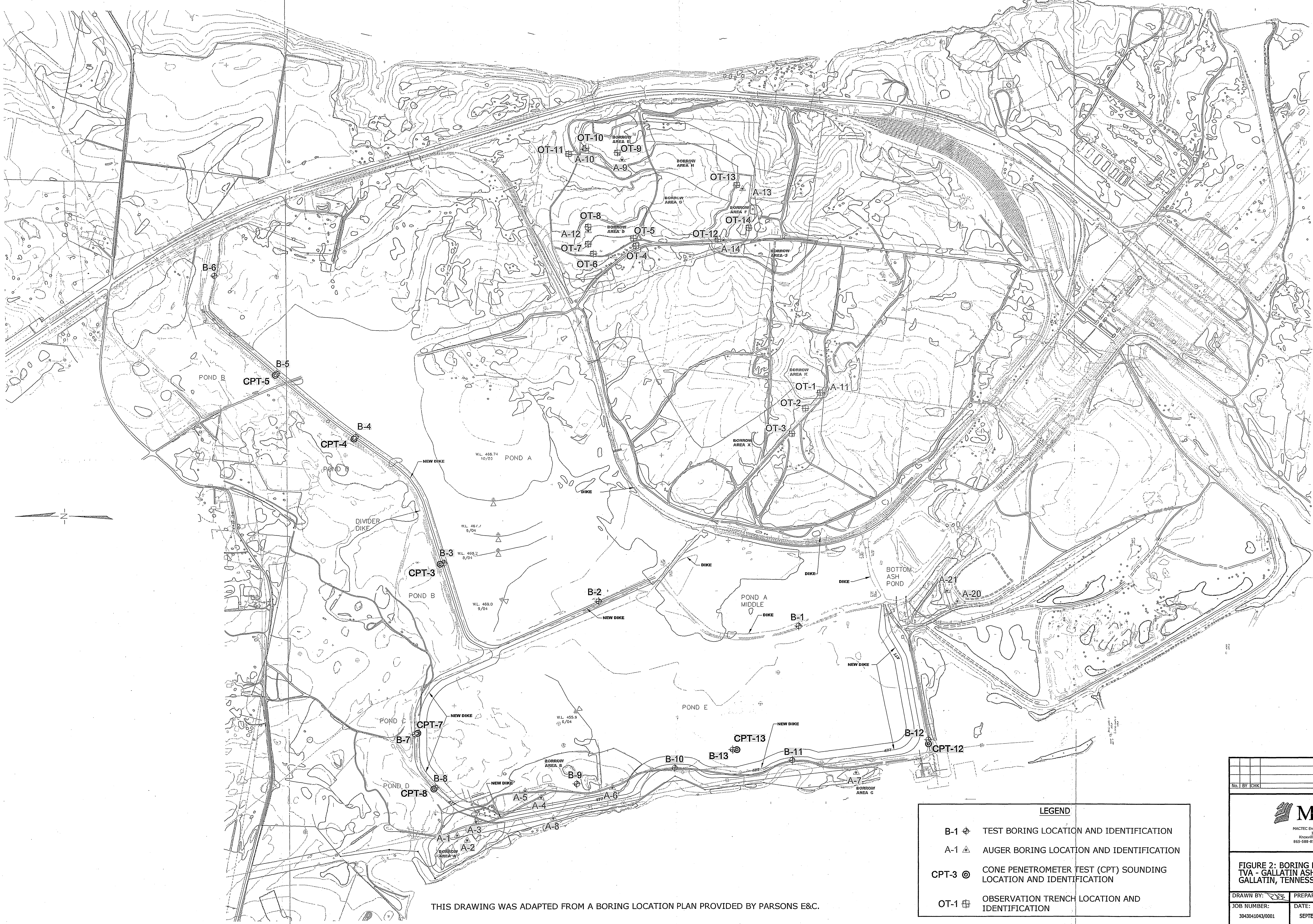
3.5 DATA DISK

One data disk is included in Appendix D. The disk includes all of the CPT, dynamic and static pore water pressure and tabular data.

5.0 REFERENCES

Robertson, P.K. and Campananella, R.G., 1989, "Guidelines for Geotechnical Design using CPT and CPTU", Soil Mechanics Series No. 120, The University of British Columbia.

Robertson, P.K., Sully, J., Woeller, D.G., Lunne, T., Powell, J.M., and Gillespie, D.J., 1990, "Guidelines for Interpretation of CPTU Test Data for determination of consolidation and permeability Parameters for Soils, Report prepared by ConeTec Investigations Ltd. for Energy Mines and Resources, Contract No. 23420-9-m644/01-OSC (copies available from ConeTec, Inc.).



THIS DRAWING WAS ADAPTED FROM A BORING LOCATION PLAN PROVIDED BY PARSONS E&C.

LEGEND

B-1 ⊕	TEST BORING LOCATION AND IDENTIFICATION
A-1 ▲	AUGER BORING LOCATION AND IDENTIFICATION
CPT-3 ◎	CONE PENETROMETER TEST (CPT) SOUNDING LOCATION AND IDENTIFICATION
OT-1 ⊞	OBSERVATION TRENCH LOCATION AND IDENTIFICATION

No.	BY	CHK	DESCRIPTION

REVISIONS

MACTEC

MACTEC Engineering and Consulting, Inc.
1725 Louisville Drive
Knoxville, Tennessee 37921-5904
865-588-8544 • Fax: 865-588-8026

FIGURE 2: BORING LOCATION PLAN
TVA - GALLATIN ASH DISPOSAL AREA
GALLATIN, TENNESSEE

DRAWN BY: RBB	PREPARED BY: HAB	CHECKED BY: CDT
JOB NUMBER: 3043041043/0001	DATE: SEPTEMBER 30, 2004	SCALE: 0 — 400'

APPENDIX A

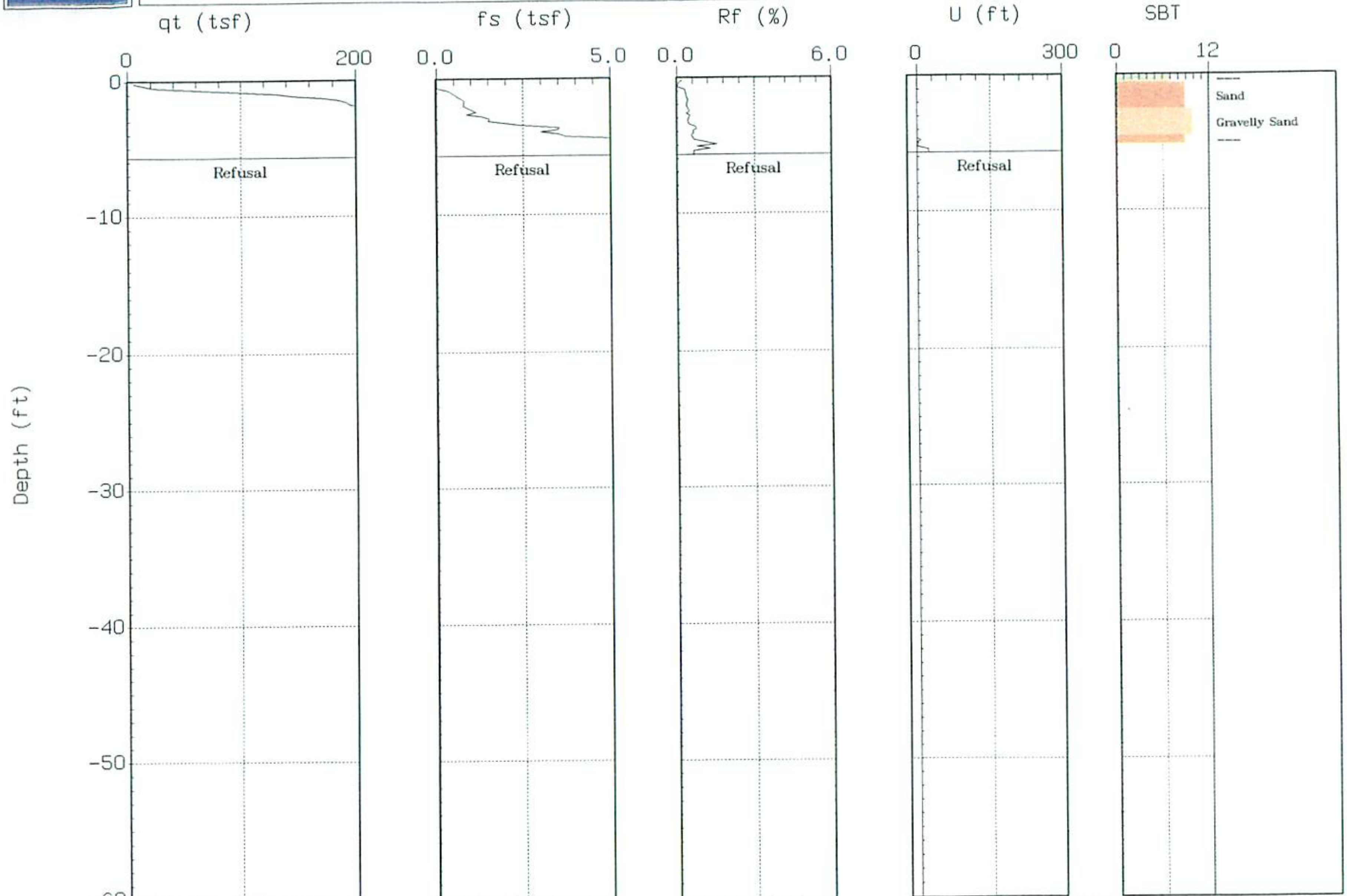
CPT PLOTS

CONETEC

MACTEC

Site: CPT-03
Location: TVA Plant

Cone: 20 TON AD163
Date: 09:08:04 14:14



Max. Depth: 5.74 (ft)

Depth Inc.: 0.164 (ft)

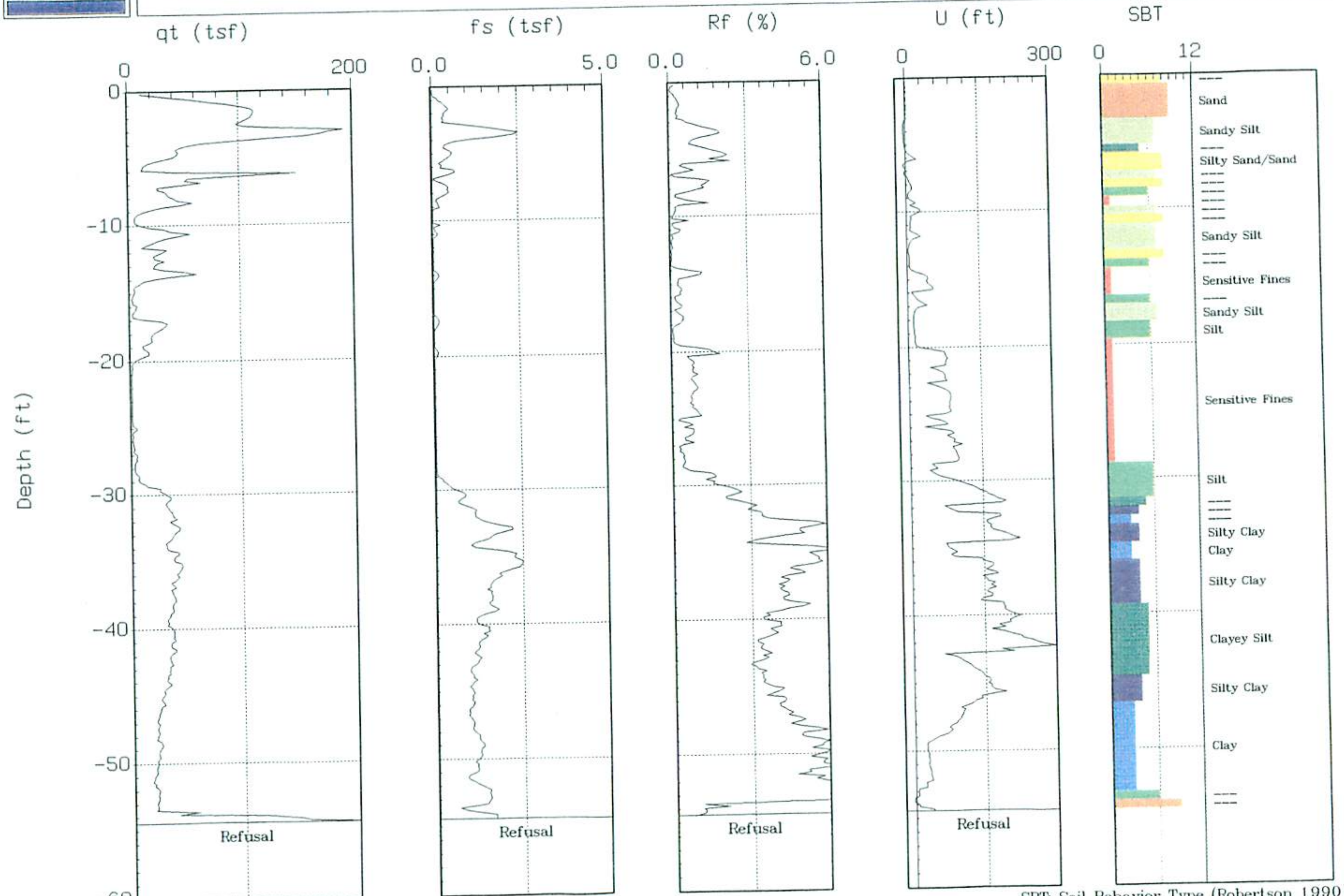
SBT: Soil Behavior Type (Robertson 1990)

CONETEC

MACTEC

Site: CPT-3A
Location: TVA Plant

Cone: 20 TON AD163
Date: 09:08:04 14:41



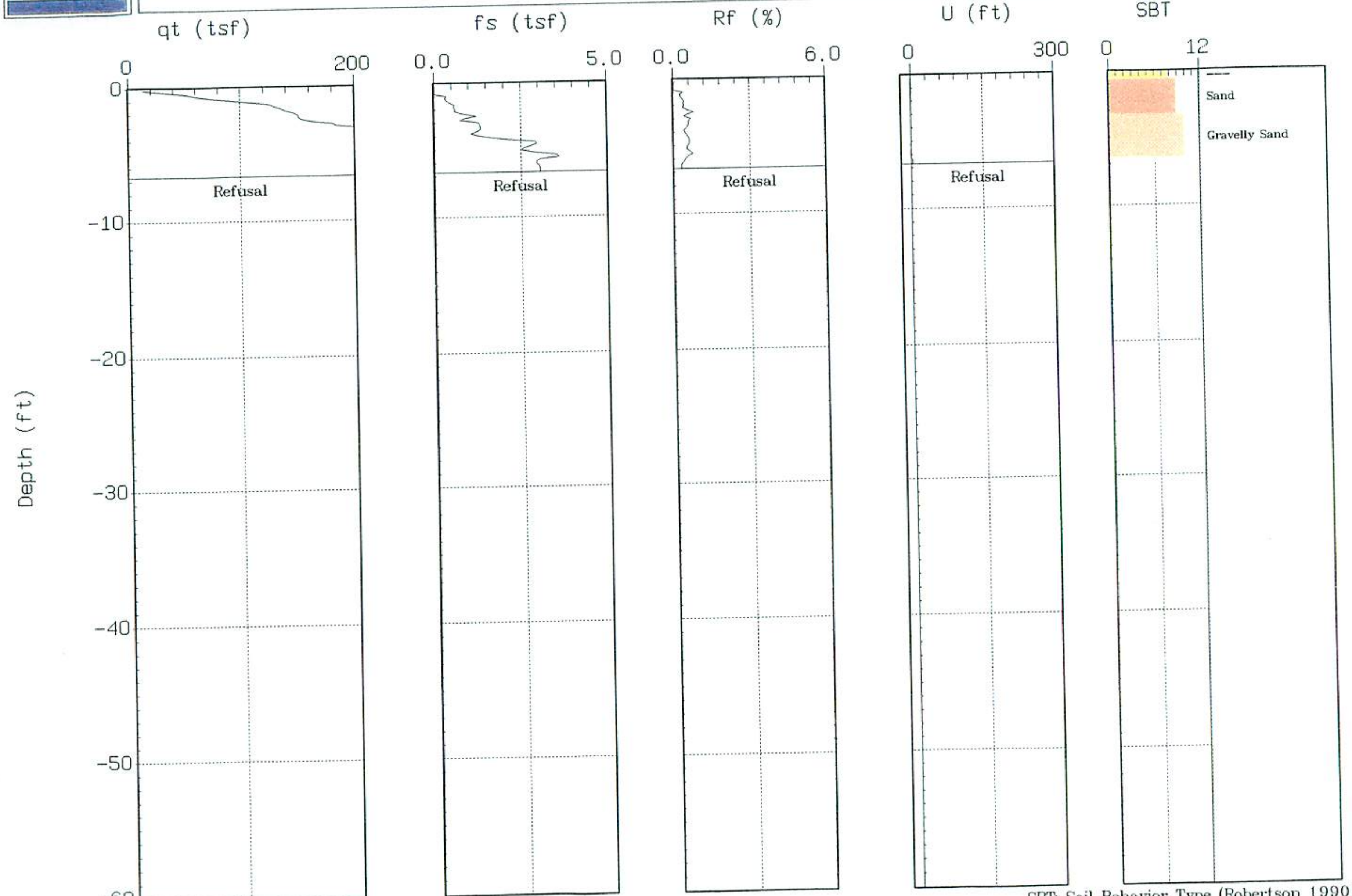
Max. Depth: 54.46 (ft)
Depth Inc.: 0.164 (ft)

SBT: Soil Behavior Type (Robertson 1990)

MACTEC

Site: CPT-04
Location: TVA Plant

Cone: 20 TON AD163
Date: 09:08:04 13:39



Max. Depth: 6.73 (ft)

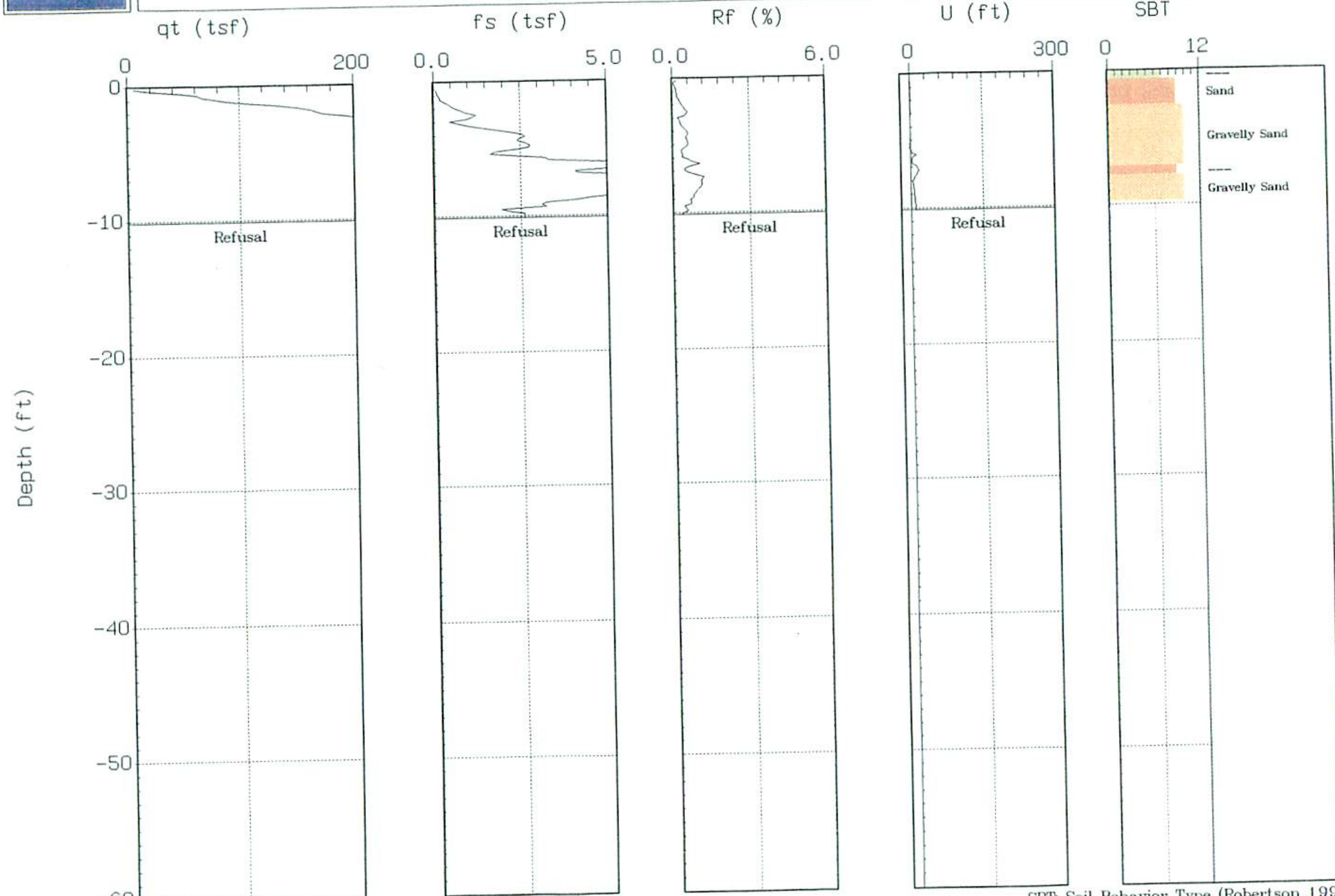
Depth Inc.: 0.164 (ft)

SBT: Soil Behavior Type (Robertson 1990)

MACTEC

Site: CPT-05
Location: TVA Plant

Cone: 20 TON AD163
Date: 09:08:04 12:51



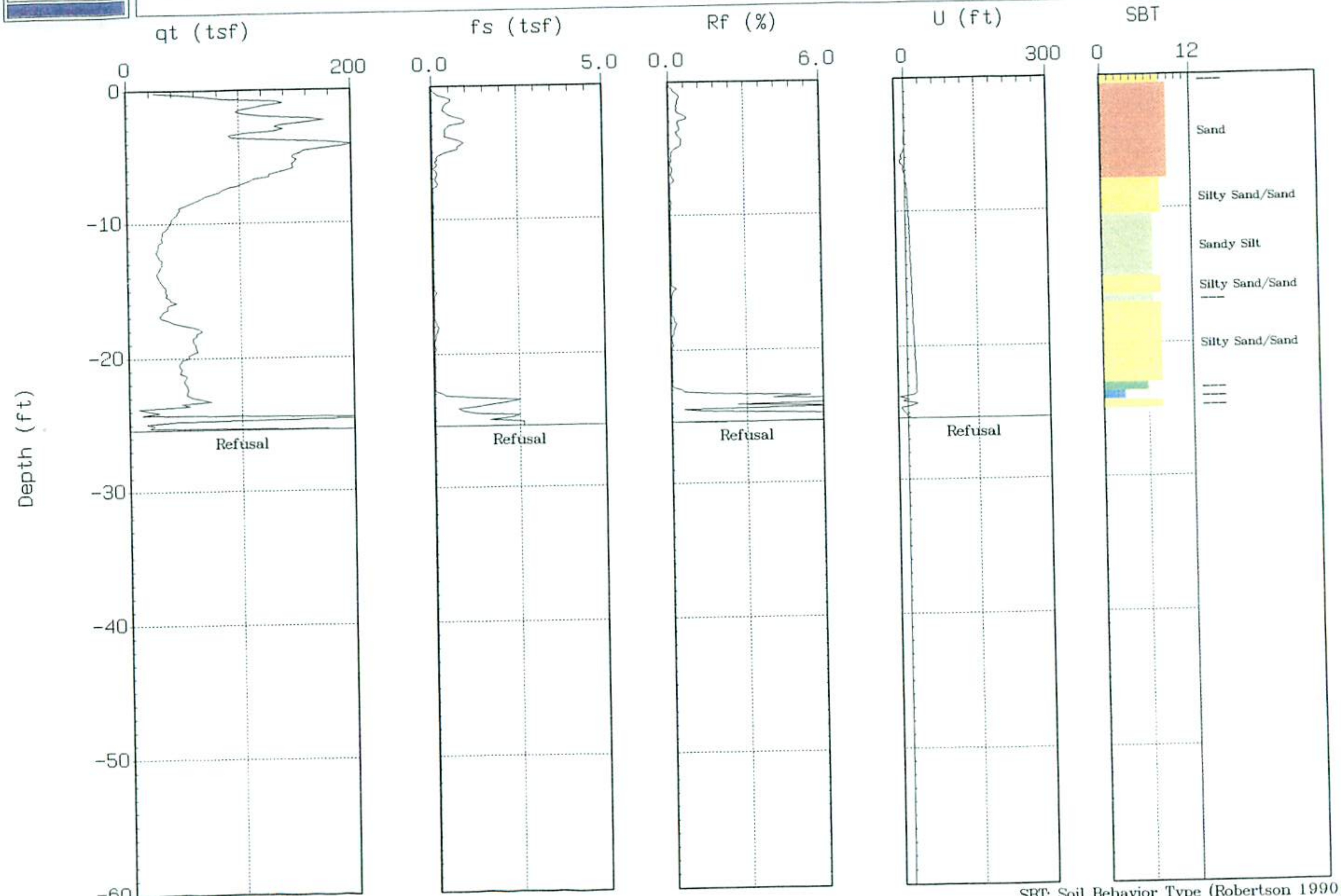
Max. Depth: 10.17 (ft)
Depth Inc.: 0.164 (ft)

SBT: Soil Behavior Type (Robertson 1990)

MACTEC

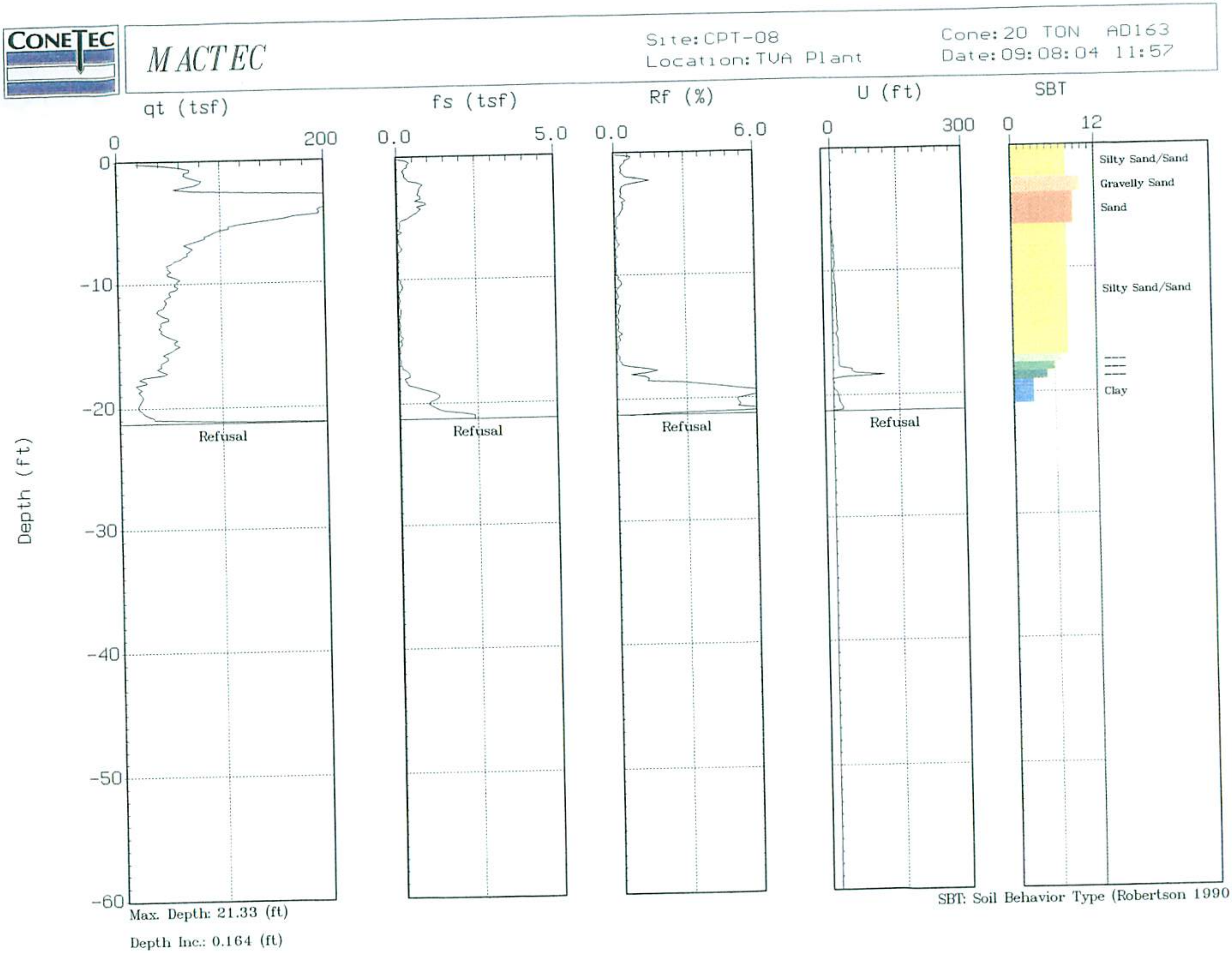
Site: CPT-07
Location: TVA Plant

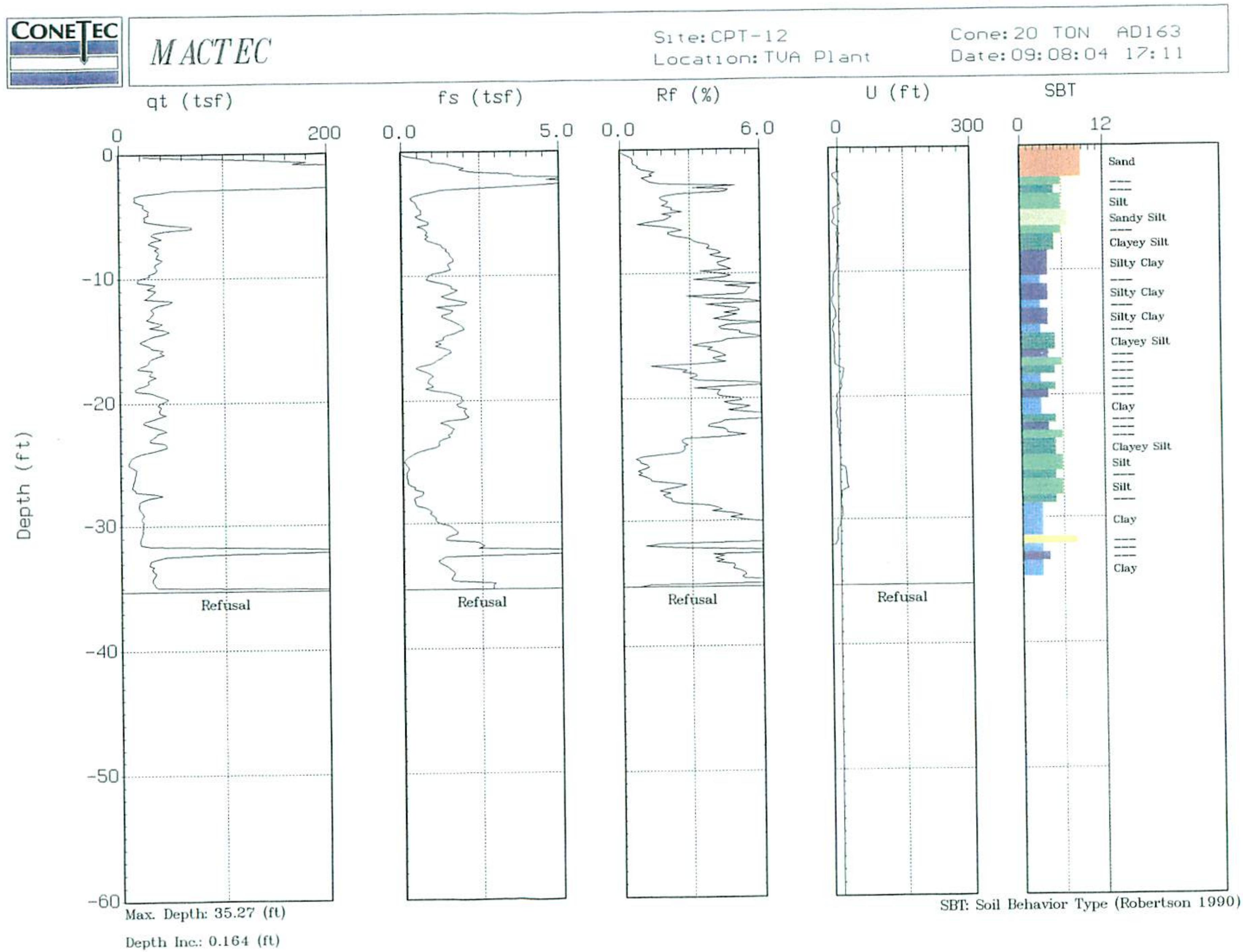
Cone: 20 TON AD163
Date: 09:08:04 16:17



Max. Depth: 25.43 (ft)
Depth Inc.: 0.164 (ft)

SBT: Soil Behavior Type (Robertson 1990)


CONETEC
MACTEC
Site: CPT-08
Location: TVA Plant
Cone: 20 TON AD163
Date: 09:08:04 11:57
qt (tsf)
fs (tsf)
Rf (%)
U (ft)
SBT
0
200
0.0
5.0
0.0
6.0
0
300
0
12
Depth (ft)
0
-10
-20
-30
-40
-50
-60
Refusal
Refusal
Refusal
Refusal
Silty Sand/Sand
Gravelly Sand
Sand
Silty Sand/Sand
Clay
Max. Depth: 21.33 (ft)
Depth Inc.: 0.164 (ft)
SBT: Soil Behavior Type (Robertson 1990)

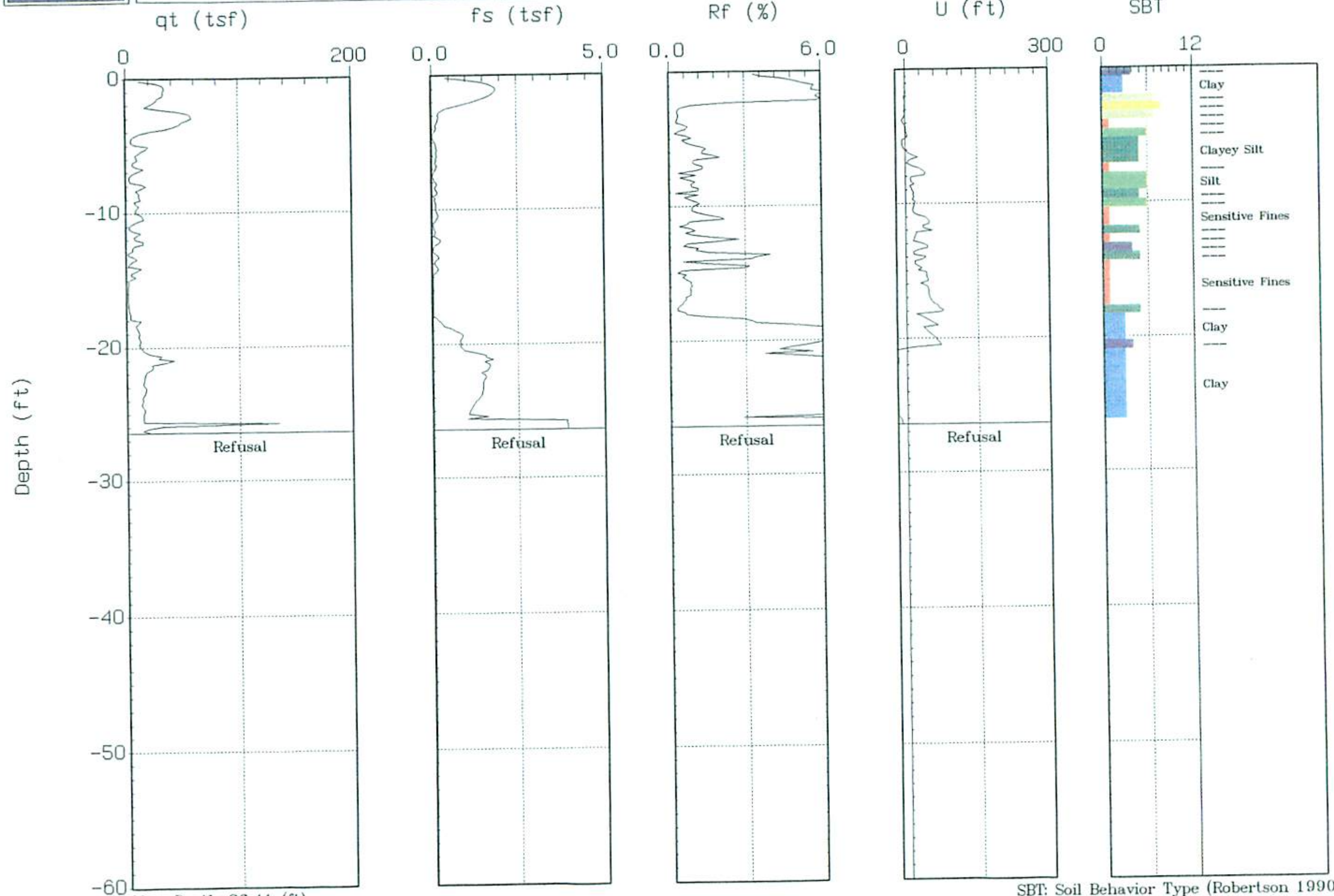


CONETEC
MACTEC
Site: CPT-12
Location: TVA Plant
Cone: 20 TON AD163
Date: 09:08:04 17:11
qt (tsf)
fs (tsf)
Rf (%)
U (ft)
SBT
Depth (ft)
Refusal
Sand
Silt
Sandy Silt
Clayey Silt
Silty Clay
Silty Clay
Silty Clay
Clayey Silt
Clay
Clayey Silt
Silt
Silt
Clay
Clay
Max. Depth: 35.27 (ft)
Depth Inc.: 0.164 (ft)
SBT: Soil Behavior Type (Robertson 1990)

MACTEC

Site: CPT-13
Location: TVA Plant

Cone: 20 TON AD163
Date: 09:08:04 10:31



Max. Depth: 26.41 (ft)

Depth Inc.: 0.164 (ft)

SBT: Soil Behavior Type (Robertson 1990)

APPENDIX B

DATA INTERPRETATION

ConeTec CPT Interpretations as of January 7, 1999 (Release 1.00.19)

ConeTec's interpretation routine should be considered a calculator of current published CPT correlations and is subject to change to reflect the current state of practice. The interpreted values are not considered valid for all soil types. The interpretations are presented only as a guide for geotechnical use and should be carefully scrutinized for consideration in any geotechnical design. Reference to current literature is strongly recommended.

The CPT interpretations are based on values of tip, sleeve friction and pore pressure averaged over a user specified interval (typically 0.25m). Note that Qt is the recorded tip value, Qc, corrected for pore pressure effects. Since all ConeTec cones have equal end area friction sleeves, pore pressure corrections to sleeve friction, Fs, are not required.

The tip correction is: $Qt = Qc + (1-a) \bullet Ud$

where: *Qt* is the corrected tip load
Qc is the recorded tip load
Ud is the recorded dynamic pore pressure
a is the Net Area Ratio for the cone (typically 0.85 for ConeTec cones)

Effective vertical overburden stresses are calculated based on a hydrostatic distribution of equilibrium pore pressures below the water table or from a user defined equilibrium pore pressure profile (this can be obtained from CPT dissipation tests). The stress calculations use unit weights assigned to the Soil Behaviour Type zones or from a user defined unit weight profile.

Details regarding the interpretation methods for all of the interpreted parameters is given in table 1. The appropriate references referred to in table 1 are listed in table 2.

The estimated Soil Behavior Type is based on the charts developed by Robertson and Campanella shown in figure 1.

Table 1 CPT Interpretation Methods

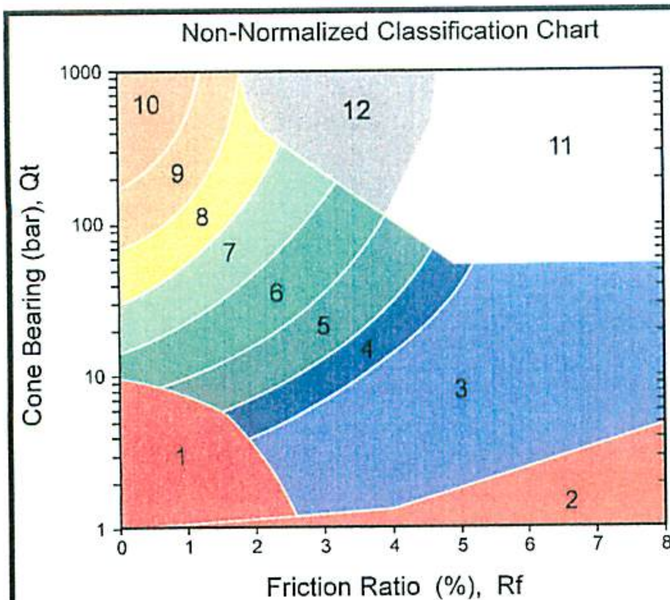
Interpreted Parameter	Description	Equation	Ref
Depth	mid layer depth		
AvgQt	Averaged corrected tip (Qt)	$AvgQt = \frac{1}{n}\sum_{i=1}^{n} Qt_i$	
AvgFs	Averaged sleeve friction (Fs)	$AvgFs = \frac{1}{n}\sum_{i=1}^{n} Fs_i$	
AvgRf	Averaged friction ratio (Rf)	$AvgRf = 100\% \bullet \frac{AvgFs}{AvgQt}$	
AvgUd	Averaged dynamic pore pressure (Ud)	$AvgUd = \frac{1}{n}\sum_{i=1}^{n} Ud_i$	
SBT	Soil Behavior Type as defined by Robertson and Campanella		1

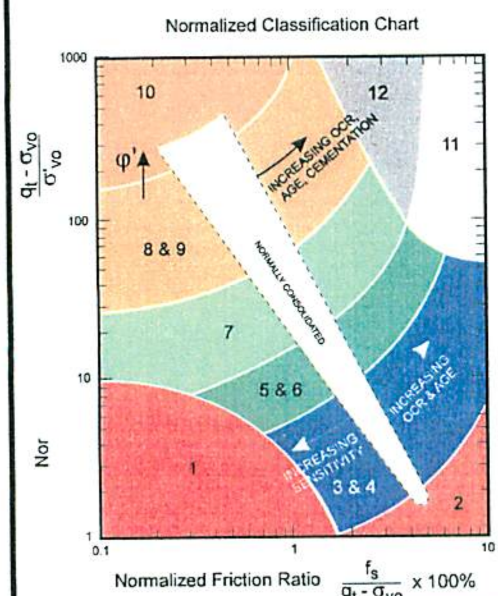
CPT Interpretations

U.Wt.	Unit Weight of soil determined from: 1) uniform value or 2) value assigned to each SBT zone 3) user supplied unit weight profile		
TStress	Total vertical overburden stress at mid layer depth	$TStress = \sum_{i=1}^{n} \gamma_i h_i$ where γ_i is layer unit weight h_i is layer thickness	
EStress	Effective vertical overburden stress at mid layer depth	$EStress = TStress - Ueq$	
Ueq	Equilibrium pore pressure determined from: 1) hydrostatic from water table depth 2) user supplied profile		
Cn	SPT N_{60} overburden correction factor	$Cn=(\sigma_v')^{-0.5}$ where σ_v' is in tsf $0.5 < C_n < 2.0$	
N_{60}	SPT N value at 60% energy calculated from Qt/N ratios assigned to each SBT zone		3
$(N1)_{60}$	SPT N_{60} value corrected for overburden pressure	$N1_{60} = Cn \bullet N_{60}$	3
$\Delta(N1)_{60}$	Equivalent Clean Sand Correction to $(N1)_{60}$	$\Delta(N1)_{60} = \frac{K_{SPT}}{1-K_{SPT}} \bullet (N1)_{60}$ Where: K_{SPT} is defined as: 0.0 for FC < 5% 0.0167 • (FC - 5) for 5% < FC < 35% 0.5 for FC > 35% FC - Fines Content in %	7
$(N1)_{60cs}$	Equivalent Clean Sand $(N1)_{60}$	$(N1)_{60cs} = (N1)_{60} + \Delta(N1)_{60}$	7
Su	Undrained shear strength - Nkt is use selectable	$Su = \frac{Qt - \sigma_v}{N_{kt}}$	2
k	Coefficient of permeability (assigned to each SBT zone)		6
Bq	Pore pressure parameter	$Bq = \frac{\Delta u}{Qt - \sigma_v}$	2
Qtn	Normalized Qt for Soil Behavior Type classification as defined by Robertson, 1990	$Qtn = \frac{Qt - \sigma_v}{\sigma'_v}$	4
Rfn	Normalized Rf for Soil Behavior Type classification as defined by Robertson, 1990	$Rfn = 100\% \bullet \frac{f_s}{Qt - \sigma_v}$	4
SBTn	Normalized Soil Behavior Type (slightly modified from that published by Robertson, 1990. This version includes all the soil zones of the original non-normalized SBT chart - see figure 1)		4
Qc1	Normalized Qt for seismic analysis	$qc1 = qc \bullet (Pa/\sigma_v')^{0.5}$ where: Pa = atm. pressure	5
Qc1N	Dimensionless Normalized Qt1	qc1N = qc1 / Pa where: Pa = atm. pressure	

ΔQc1N1	Equivalent clean sand correction	$\Delta qc1N = \frac{K_{CPT}}{1 - K_{CPT}} \bullet qc1N$ Where: K_{CPT} is defined as: 0.0 for FC < 5% 0.0267 • (FC - 5) for 5% < FC < 35% 0.5 for FC > 35% FC - Fines Content in %	5
Qc1Ncs	Clean Sand equivalent Qc1N	*qc1Ncs = qc1N + Δqc1N*	5
Ic	Soil index for estimating grain characteristics	$Ic = [(3.47 - \log Q)^2 + (\log F + 1.22)^2]^{0.5}$	5
FC	Fines content (%)	$FC=1.75(Ic^{3.25}) - 3.7$ *FC=100 for Ic > 3.5* *FC=0 for Ic < 1.26* *FC = 5% if 1.64 < Ic < 2.6 AND Rfn<0.5*	8
PHI	Friction Angle	Campanella and Robertson Durunoglu and Mitchel Janbu	1
Dr	Relative Density	Ticino Sand Hokksund Sand Schmertmann 1976 Jamiolkowski - All Sands	1
OCR	Over Consolidation Ratio		1
State Parameter			9
CRR	Cyclic Resistance Ratio		7

ConeTec





Zone	Q_t / N	Soil Behaviour Type
1	2	sensitive fine grained
2	1	organic material
3	1	clay
4	1.5	silty clay to clay
5	2	clayey silt to silty clay
6	2.5	sandy silt to clayey silt
7	3	
8	4	and to silty sand
9	5	sand
10	6	gravelly sand to sand
11	1	very stiff fine grained *
12	2	sand to clayey sand *

Figure 1 Non-Normalized and Normalized Soil Behaviour Type Classification Charts

Table 2 References

No.	Reference
1	Robertson, P.K. and Campanella, R.G., 1986, "Guidelines for Use, Interpretation and Application of the CPT and CPTU", UBC, Soil Mechanics Series No. 105, Civil Eng. Dept., Vancouver, B.C., Canada
2	Robertson, P.K., Campanella, R.G., Gillespie, D. and Greig, J., 1986, "Use of Piezometer Cone Data", Proceedings of InSitu 86, ASCE Specialty Conference, Blacksburg, Virginia.
3	Robertson, P.K. and Campanella, R.G., 1989, "Guidelines for Geotechnical Design Using CPT and CPTU", UBC, Soil Mechanics Series No. 120, Civil Eng. Dept., Vancouver, B.C., Canada
4	Robertson, P.K., 1990, "Soil Classification Using the Cone Penetration Test", Canadian Geotechnical Journal, Volume 27.
5	Robertson, P.K. and Fear, C.E., 1995, "Liquefaction of Sands and its Evaluation", Keynote Lecture, First International Conference on Earthquake Geotechnical Enginnering, Tokyo, Japan.
6	ConeTec Internal Report
7	Robertson, P.K. and Wride, C.E., 1997, "Cyclic Liquefaction and its Evaluation Based on SPT and CPT", NCEER Workshop Paper, January 22, 1997
8	Wride, C.E. and Robertson, P.K., 1997, "Phase II Data Review Report (Massey and Kidd Sites, Fraser River Delta)", Volume 1 - Data Report (June 1997), University of Alberta.
9	Plewes, H.D., Davies, M.P. and Jefferies, M.G., 1992, "CPT Based Screening Procedure for Evaluating Liquefaction Susceptibility", 45th Canadian Geotechnical Conference, Toronto, Ontario, October 1992.

ConeTec Inc. - CPT Interpretation

Interpretation Output - Release 1.00.19M

No: 04-0913-1621-1007

Job No: 04-783

Client: MACTEC, Inc.

Project: TVA Plant, Gallatin, TN

Site: CPT-03

Location: TVA Plant

Cone: 20 TON AD163

CPT Date: 04/08/09

CPT Time: 14:14

CPT File: 783CP003.COR

Northing (m): 0.000

Easting (m): 0.000

Elevation (m): 0.000

Water Table (m): 2.74 (ft): 9.0

Unit Weight of Water (default): 62.40 kN/m^3

Su Nkt used: 12.50 Su/P' (nc): 0.30

Averaging Increment (m): 0.10

Phi Method : Robertson and Campanella, 1983

Dr Method : Jamiolkowski - All Sands

State Parameter M: 1.20

Used Unit Weights Assigned to Soil Zones

Values of 1.0E9 or UnDef are printed for parameters that are not valid for the material type (SBT)

Depth (ft)	AvgQt (tsf)	AvgFs (tsf)	AvgRf (%)	AvgUd (ft)	SBT	U.Wt. pcf	TStress (tsf)	EStress (tsf)	Ueq (tsf)	Cn	N60 (blows/ft)	(N1)60 (blows/ft)	Su (tsf)	CRR
0.16	. 8.7	0.01	0.11	0.0	1	111.4	0.01	0.01	0.00	2.00	4.2	8.4	0.70	0.00
0.49	41.4	0.01	0.02	-0.1	8	120.9	0.03	0.03	0.00	2.00	9.9	19.8	UnDef	0.13
0.82	117.2	0.36	0.31	-0.1	9	124.1	0.05	0.05	0.00	2.00	22.4	44.9	UnDef	0.00
15	160.6	0.57	0.35	-0.1	9	124.1	0.07	0.07	0.00	2.00	30.8	61.5	UnDef	0.00
18	189.5	0.76	0.40	-0.3	9	124.1	0.09	0.09	0.00	2.00	36.3	72.6	UnDef	0.00
1.80	202.7	0.78	0.39	-0.3	9	124.1	0.11	0.11	0.00	2.00	38.8	77.7	UnDef	0.00
2.13	231.0	0.94	0.41	-0.3	9	124.1	0.13	0.13	0.00	2.00	44.2	88.5	UnDef	0.00
2.46	229.8	1.00	0.43	-0.3	9	124.1	0.15	0.15	0.00	2.00	44.0	88.0	UnDef	0.00
2.79	298.0	1.43	0.48	-0.5	10	127.3	0.17	0.17	0.00	2.00	47.6	95.1	UnDef	0.00
3.12	408.9	1.71	0.42	-0.2	10	127.3	0.19	0.19	0.00	2.00	65.3	130.5	UnDef	0.00
3.44	505.2	2.99	0.59	-0.6	10	127.3	0.21	0.21	0.00	2.00	80.6	161.3	UnDef	0.00
3.77	470.4	3.25	0.69	-0.2	10	127.3	0.23	0.23	0.00	2.00	75.1	150.2	UnDef	0.00
4.10	610.9	3.63	0.59	-0.4	10	127.3	0.25	0.25	0.00	1.98	97.5	193.4	UnDef	0.00
4.43	871.1	5.52	0.63	-0.7	10	127.3	0.28	0.28	0.00	1.91	139.0	265.1	UnDef	0.00
4.76	869.9	11.52	1.32	4.4	9	124.1	0.30	0.30	0.00	1.84	166.6	306.4	UnDef	0.00
5.09	775.6	7.97	1.03	1.0	10	127.3	0.32	0.32	0.00	1.78	123.8	220.1	UnDef	0.00
5.41	845.9	5.52	0.65	22.4	10	127.3	0.34	0.34	0.00	1.72	135.0	232.5	UnDef	0.00

ConeTec Inc. - CPT Interpretation   Page: 1b
Interpretation Output - Release 1.00.19M
Run No: 04-0913-1621-1007
Job No: 04-783
Client: MACTEC, Inc.
Project: TVA Plant, Gallatin, TN
Site: CPT-03
Location: TVA Plant
Cone: 20 TON AD163
CPT Date: 04/08/09
CPT Time: 14:14
CPT File: 783CP003.COR
Northing (m): 0.000
Easting (m): 0.000
Elevation (m): 0.000

Water Table (m): 2.74 (ft): 9.0
Unit Weight of Water (default): 62.40 kN/m^3
Su Nkt used: 12.50 Su/P' (nc): 0.30
Averaging Increment (m): 0.10
Phi Method : Robertson and Campanella, 1983
Dr Method : Jamiolkowski - All Sands
State Parameter M: 1.20
Used Unit Weights Assigned to Soil Zones
Values of 1.0E9 or UnDef are printed for parameters that are not valid for the material type (SBT)

Depth (ft)	k (cm/s)	Bq	Qtn	Rfn	SBTn	Qc1N	DeltaQc1N	Qc1Ncs	Fc (%)	Phi (Deg)	Dr (%)	OCR	State Param	Del(n1)60	(N1)60cs
0.16	1.0E-07	0.00	953.5	0.12	10	16.7	0.0	16.7	0.0	UnDef	UnDef	10.0	UnDef	0.0	8.4
0.49	5.0E-03	0.00	1000.0	0.02	10	79.3	0.0	79.3	0.0	50	92.5	1.0	-0.07	0.0	19.8
0.82	5.0E-02	0.00	1000.0	0.31	10	224.5	0.0	224.5	0.0	50	95.0	1.0	-0.29	0.0	44.9
1.15	5.0E-02	0.00	1000.0	0.35	10	307.6	0.0	307.6	0.0	50	95.0	1.0	-0.30	0.0	61.5
1.48	5.0E-02	0.00	1000.0	0.40	10	362.9	0.0	362.9	0.0	50	95.0	1.0	-0.31	0.0	72.6
1.80	5.0E-02	0.00	1000.0	0.39	10	388.3	0.0	388.3	0.0	50	95.0	1.0	-0.31	0.0	77.7
2.13	5.0E-02	0.00	1000.0	0.41	10	442.5	0.0	442.5	0.0	50	95.0	1.0	-0.31	0.0	88.5
2.46	5.0E-02	0.00	1000.0	0.43	10	440.2	0.0	440.2	0.0	50	95.0	1.0	-0.32	0.0	88.0
2.79	5.0E+00	0.00	1000.0	0.48	10	570.7	0.0	570.7	0.0	50	95.0	1.0	-0.33	0.0	95.1
3.12	5.0E+00	0.00	1000.0	0.42	10	783.2	0.0	783.2	0.0	50	95.0	1.0	-0.32	0.0	130.5
3.44	5.0E+00	0.00	1000.0	0.59	10	967.6	0.0	967.6	0.0	50	95.0	1.0	-0.35	0.0	161.3
3.77	5.0E+00	0.00	1000.0	0.69	10	901.0	0.0	901.0	0.0	50	95.0	1.0	-0.36	0.0	150.2
4.10	5.0E+00	0.00	1000.0	0.59	10	1170.1	0.0	1170.1	0.0	50	95.0	1.0	-0.35	0.0	193.4
4.43	5.0E+00	0.00	1000.0	0.63	10	1625.2	0.0	1625.2	0.0	50	95.0	1.0	-0.36	0.0	265.1
4.76	5.0E-02	0.00	1000.0	1.32	9	1565.4	0.0	1565.4	1.8	50	95.0	1.0	-0.44	0.0	306.4
5.09	5.0E+00	0.00	1000.0	1.03	9	1349.4	0.0	1349.4	0.6	50	95.0	1.0	-0.41	0.0	220.1
5.41	5.0E+00	0.00	1000.0	0.65	10	1425.4	0.0	1425.4	0.0	50	95.0	1.0	-0.36	0.0	232.5

ConeTec Inc. - CPT Interpretation
Interpretation Output - Release 1.00.19M
Run No: 04-0913-1621-1029
No: 04-783
Client: MACTEC, Inc.
Project: TVA Plant, Gallatin, TN
Site: CPT-3A
Location: TVA Plant
Cone: 20 TON AD163
CPT Date: 04/08/09
CPT Time: 14:41
CPT File: 783CP03A.COR
Northing (m): 0.000
Easting (m): 0.000
Elevation (m): 0.000

Water Table (m): 2.74 (ft): 9.0
Unit Weight of Water (default): 62.40 kN/m^3
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Values of 1.0E9 or UnDef are printed for parameters that are not valid for the material type (SBT)

Depth (ft)	AvgQt (tsf)	AvgFs (tsf)	AvgRf (%)	AvgUd (ft)	SBT	U.Wt. pcf	TStress (tsf)	EStress (tsf)	Ueq (tsf)	Cn	N60	(N1)60 (blows/ft)	Su (tsf)	CRR
0.16	19.0	0.02	0.12	1.0	7	117.8	0.01	0.01	0.00	2.00	6.1	12.1	UnDef	0.08
0.49	51.9	0.03	0.06	0.9	8	120.9	0.03	0.03	0.00	2.00	12.4	24.8	UnDef	0.17
0.82	83.8	0.18	0.21	1.1	9	124.1	0.05	0.05	0.00	2.00	16.1	32.1	UnDef	0.00
1.15	107.1	0.35	0.33	1.0	9	124.1	0.07	0.07	0.00	2.00	20.5	41.0	UnDef	0.00
48	113.5	0.47	0.41	1.2	9	124.1	0.09	0.09	0.00	2.00	21.7	43.5	UnDef	0.00
30	111.7	0.39	0.35	1.1	9	124.1	0.11	0.11	0.00	2.00	21.4	42.8	UnDef	0.00
2.13	105.1	0.33	0.31	1.2	9	124.1	0.13	0.13	0.00	2.00	20.1	40.2	UnDef	0.00
2.46	101.3	0.33	0.33	1.1	9	124.1	0.15	0.15	0.00	2.00	19.4	38.8	UnDef	0.00
2.79	161.9	1.05	0.65	0.9	9	124.1	0.17	0.17	0.00	2.00	31.0	62.0	UnDef	0.00
3.12	175.4	1.98	1.13	-2.4	8	120.9	0.19	0.19	0.00	2.00	42.0	84.0	UnDef	0.00
3.44	139.8	2.45	1.75	-4.0	8	120.9	0.21	0.21	0.00	2.00	33.5	67.0	UnDef	0.00
3.77	77.6	1.48	1.90	-3.9	7	117.8	0.23	0.23	0.00	2.00	24.8	49.5	UnDef	0.46
4.10	49.7	0.55	1.11	-3.7	7	117.8	0.25	0.25	0.00	2.00	15.9	31.7	UnDef	0.17
4.43	44.0	0.36	0.82	-3.6	7	117.8	0.27	0.27	0.00	1.93	14.0	27.1	UnDef	0.14
4.76	42.7	0.55	1.29	-2.8	7	117.8	0.29	0.29	0.00	1.86	13.6	25.4	UnDef	0.14
5.09	29.5	0.54	1.83	-1.5	6	114.6	0.31	0.31	0.00	1.80	11.3	20.3	2.33	0.12
5.41	15.6	0.34	2.20	2.2	5	114.6	0.33	0.33	0.00	1.75	7.5	13.1	1.22	0.10
5.74	12.5	0.24	1.95	11.2	5	114.6	0.35	0.35	0.00	1.70	6.0	10.2	0.97	0.10
6.07	97.0	0.43	0.45	13.3	9	124.1	0.37	0.37	0.00	1.65	18.6	30.7	UnDef	0.44
6.40	76.5	0.59	0.78	-4.5	8	120.9	0.39	0.39	0.00	1.61	18.3	29.5	UnDef	0.24
6.73	58.0	0.14	0.24	-1.2	8	120.9	0.41	0.41	0.00	1.57	13.9	21.8	UnDef	0.15
7.05	36.6	0.21	0.57	-3.2	7	117.8	0.42	0.42	0.00	1.53	11.7	17.9	UnDef	0.10
7.38	29.5	0.44	1.50	2.8	6	114.6	0.44	0.44	0.00	1.50	11.3	17.0	2.33	0.11
7.79	37.6	0.43	1.14	8.1	7	117.8	0.47	0.47	0.00	1.46	12.0	17.6	UnDef	0.11
8.20	50.6	0.22	0.44	11.4	8	120.9	0.49	0.49	0.00	1.43	12.1	17.3	UnDef	0.11
8.53	39.1	0.12	0.30	4.8	8	120.9	0.51	0.51	0.00	1.40	9.4	13.1	UnDef	0.09
8.86	16.9	0.18	1.09	4.7	6	114.6	0.53	0.53	0.00	1.37	6.5	8.9	1.31	0.09
9.19	7.4	0.02	0.31	14.3	1	111.4	0.55	0.54	0.01	1.36	3.6	4.8	0.55	0.00
9.51	5.4	0.01	0.22	13.5	1	111.4	0.57	0.55	0.02	1.35	2.6	3.5	0.39	0.08
9.84	8.4	0.01	0.13	27.3	1	111.4	0.59	0.56	0.03	1.34	4.0	5.4	0.62	0.00
10.17	25.4	0.12	0.49	13.0	7	117.8	0.61	0.57	0.04	1.33	8.1	10.8	UnDef	0.08
10.50	46.1	0.05	0.10	8.8	8	120.9	0.62	0.58	0.05	1.32	11.0	14.5	UnDef	0.10
10.83	38.8	0.11	0.29	7.8	8	120.9	0.64	0.59	0.06	1.30	9.3	12.1	UnDef	0.09
11.15	23.6	0.05	0.22	6.9	7	117.8	0.66	0.60	0.07	1.29	7.5	9.8	UnDef	0.00
11.48	13.2	0.01	0.10	16.1	6	114.6	0.68	0.61	0.08	1.29	5.1	6.5	1.00	0.00
81	32.2	0.02	0.06	20.5	7	117.8	0.70	0.61	0.09	1.28	10.3	13.1	UnDef	0.09
.14	23.8	0.02	0.08	7.5	7	117.8	0.72	0.62	0.10	1.27	7.6	9.6	UnDef	0.00
12.47	27.8	0.01	0.04	4.0	7	117.8	0.74	0.63	0.11	1.26	8.9	11.2	UnDef	0.08
12.80	24.3	0.01	0.05	2.7	7	117.8	0.76	0.64	0.12	1.25	7.8	9.7	UnDef	0.00

[illegible]h (ft)	AvgQt (tsf)	AvgFs (tsf)	AvgRf (%)	AvgUd (ft)	SBT	U.Wt. pcf	TStress (tsf)	EStress (tsf)	Ueq (tsf)	Cn	N60 (blows/ft)	(N1)60 (blows/ft)	Su (tsf)	CRR
13.12	25.8	0.01	0.05	3.9	7	117.8	0.78	0.65	0.13	1.24	8.2	10.2	UnDef	0.08
13.45	55.2	0.01	0.02	4.4	8	120.9	0.80	0.66	0.14	1.23	13.2	16.3	UnDef	0.11
13.78	32.0	0.12	0.38	4.6	7	117.8	0.82	0.67	0.15	1.22	10.2	12.5	UnDef	0.09
14.11	11.5	0.14	1.20	6.4	6	114.6	0.84	0.68	0.16	1.21	4.4	5.4	0.85	0.11
14.44	5.1	0.03	0.55	26.0	1	111.4	0.86	0.69	0.17	1.21	2.5	3.0	0.34	0.08
14.76	4.5	0.01	0.29	40.7	1	111.4	0.87	0.69	0.18	1.20	2.1	2.6	0.29	0.00
15.09	3.2	0.01	0.33	39.2	1	111.4	0.89	0.70	0.19	1.19	1.5	1.8	0.19	0.00
15.42	2.6	0.01	0.39	49.0	1	111.4	0.91	0.71	0.20	1.19	1.2	1.5	0.13	0.00
15.75	4.7	0.01	0.22	29.1	1	111.4	0.93	0.72	0.21	1.18	2.3	2.7	0.31	0.00
16.08	5.8	0.01	0.18	12.4	1	111.4	0.95	0.73	0.22	1.17	2.8	3.3	0.39	0.00
16.40	2.9	0.01	0.36	21.0	1	111.4	0.97	0.73	0.23	1.17	1.4	1.6	0.16	0.00
16.73	6.8	0.01	0.19	35.3	1	111.4	0.98	0.74	0.24	1.16	3.2	3.8	0.46	0.00
17.06	31.0	0.10	0.32	17.2	7	117.8	1.00	0.75	0.25	1.15	9.9	11.4	UnDef	0.08
17.39	31.5	0.15	0.47	12.6	7	117.8	1.02	0.76	0.26	1.15	10.1	11.5	UnDef	0.08
17.72	24.4	0.09	0.38	11.6	7	117.8	1.04	0.77	0.27	1.14	7.8	8.9	UnDef	0.00
18.04	19.9	0.02	0.12	11.4	7	117.8	1.06	0.78	0.28	1.13	6.4	7.2	UnDef	0.00
18.37	19.8	0.01	0.06	11.6	7	117.8	1.08	0.79	0.29	1.13	6.3	7.1	UnDef	0.00
18.70	13.7	0.01	0.08	12.1	6	114.6	1.10	0.80	0.30	1.12	5.3	5.9	1.01	0.00
19.03	13.3	0.01	0.08	13.1	6	114.6	1.12	0.80	0.31	1.11	5.1	5.7	0.98	0.00
19.36	17.1	0.04	0.25	13.3	6	114.6	1.14	0.81	0.32	1.11	6.5	7.2	1.27	0.00
19.68	9.3	0.11	1.21	14.7	5	114.6	1.16	0.82	0.33	1.10	4.5	4.9	0.66	0.09
20.01	3.1	0.05	1.72	36.6	1	111.4	1.17	0.83	0.34	1.10	1.5	1.6	0.15	0.00
20.34	1.9	0.01	0.65	72.6	1	111.4	1.19	0.84	0.35	1.09	0.9	1.0	0.05	0.00
20.67	1.5	0.01	0.86	77.3	1	111.4	1.21	0.85	0.36	1.09	0.7	0.8	0.02	0.00
21.00	1.4	0.01	0.82	74.3	1	111.4	1.23	0.85	0.37	1.08	0.7	0.7	0.01	0.00
21.33	1.3	0.01	0.81	58.2	1	111.4	1.25	0.86	0.38	1.08	0.6	0.7	0.00	0.00
21.65	1.3	0.01	0.92	61.6	1	111.4	1.27	0.87	0.40	1.07	0.6	0.7	0.00	0.00
[illegible]98	1.4	0.01	0.77	71.8	1	111.4	1.28	0.88	0.41	1.07	0.7	0.7	0.01	0.00
[illegible]31	1.4	0.01	0.91	74.7	1	111.4	1.30	0.89	0.42	1.06	0.7	0.7	0.01	0.00
22.64	1.2	0.01	0.98	43.0	1	111.4	1.32	0.89	0.43	1.06	0.6	0.6	0.00	0.00
22.97	1.3	0.01	0.82	68.5	1	111.4	1.34	0.90	0.44	1.05	0.6	0.7	0.00	0.00
23.29	1.4	0.01	0.75	80.9	1	111.4	1.36	0.91	0.45	1.05	0.7	0.7	0.00	0.00
23.62	1.4	0.01	0.74	83.3	1	111.4	1.38	0.92	0.46	1.04	0.7	0.7	0.00	0.00
23.95	1.4	0.01	0.81	81.6	1	111.4	1.39	0.93	0.47	1.04	0.7	0.7	0.00	0.00
24.28	1.4	0.01	0.96	80.7	1	111.4	1.41	0.93	0.48	1.03	0.7	0.7	0.00	0.00
24.61	1.5	0.02	1.09	83.3	1	111.4	1.43	0.94	0.49	1.03	0.7	0.7	0.00	0.00
24.93	5.1	0.01	0.26	52.7	1	111.4	1.45	0.95	0.50	1.03	2.4	2.5	0.29	0.00
25.26	1.6	0.01	0.68	52.2	1	111.4	1.47	0.96	0.51	1.02	0.8	0.8	0.01	0.00
25.59	1.9	0.01	0.59	74.7	1	111.4	1.48	0.97	0.52	1.02	0.9	0.9	0.03	0.00
25.92	1.4	0.01	0.81	43.6	1	111.4	1.50	0.97	0.53	1.01	0.7	0.7	0.00	0.00
26.25	2.3	0.01	0.55	86.1	1	111.4	1.52	0.98	0.54	1.01	1.1	1.1	0.06	0.00
26.57	2.3	0.01	0.62	80.1	1	111.4	1.54	0.99	0.55	1.00	1.1	1.1	0.06	0.00
26.90	4.6	0.01	0.31	89.3	1	111.4	1.56	1.00	0.56	1.00	2.2	2.2	0.25	0.00
27.23	4.7	0.01	0.29	96.1	1	111.4	1.58	1.01	0.57	1.00	2.3	2.3	0.25	0.00
27.56	3.1	0.01	0.41	90.0	1	111.4	1.59	1.02	0.58	0.99	1.5	1.5	0.12	0.00
27.89	2.8	0.01	0.42	94.4	1	111.4	1.61	1.02	0.59	0.99	1.3	1.3	0.09	0.00
28.21	3.5	0.02	0.43	97.6	1	111.4	1.63	1.03	0.60	0.98	1.7	1.7	0.15	0.00
28.54	6.6	0.03	0.42	67.1	1	111.4	1.65	1.04	0.61	0.98	3.2	3.1	0.40	0.00
28.87	7.1	0.08	1.10	51.9	5	114.6	1.67	1.05	0.62	0.98	3.4	3.3	0.44	0.08
29.20	13.1	0.21	1.63	42.1	5	114.6	1.69	1.06	0.63	0.97	6.3	6.1	0.91	0.10
29.53	25.5	0.36	1.43	60.9	6	114.6	1.71	1.06	0.64	0.97	9.8	9.5	1.90	0.15
29.86	30.0	0.52	1.74	91.3	6	114.6	1.72	1.07	0.65	0.97	11.5	11.1	2.27	0.18
30.18	34.7	0.82	2.36	116.4	6	114.6	1.74	1.08	0.66	0.96	13.3	12.8	2.64	0.31
30.59	31.1	0.73	2.35	142.5	6	114.6	1.77	1.09	0.67	0.96	11.9	11.4	2.35	0.37
31.00	33.1	0.75	2.28	164.5	6	114.6	1.79	1.10	0.69	0.95	12.7	12.1	2.51	0.33
31.33	36.3	1.11	3.06	186.2	5	114.6	1.81	1.11	0.70	0.95	17.4	16.5	2.76	0.00
31.66	38.7	1.14	2.93	124.9	5	114.6	1.83	1.12	0.71	0.94	18.5	17.5	2.95	0.00
31.99	35.0	1.19	3.40	79.3	5	114.6	1.85	1.13	0.72	0.94	16.8	15.8	2.65	0.00
[illegible]32	41.6	1.48	3.56	137.5	5	114.6	1.87	1.14	0.73	0.94	19.9	18.7	3.18	0.00
[illegible]64	40.5	2.04	5.03	176.0	3	111.4	1.88	1.15	0.74	0.93	38.8	36.2	3.09	0.00
32.97	36.5	2.07	5.68	154.6	3	111.4	1.90	1.15	0.75	0.93	35.0	32.6	2.77	0.00
33.30	33.8	1.67	4.94	162.5	3	111.4	1.92	1.16	0.76	0.93	32.3	30.0	2.55	0.00

Depth (ft)	AvgQt (tsf)	AvgFs (tsf)	AvgRf (%)	AvgUd (ft)	SBT	U.Wt. pcf	TStress (tsf)	EStress (tsf)	Ueq (tsf)	Cn	N60 (blows/ft)	(N1)60 (blows/ft)	Su (tsf)	CRR
33.63	30.2	1.41	4.66	176.2	3	111.4	1.94	1.17	0.77	0.92	28.9	26.7	2.26	0.00
33.96	31.3	1.05	3.35	202.2	5	114.6	1.96	1.18	0.78	0.92	15.0	13.8	2.35	0.34
34.28	41.3	1.43	3.47	210.4	5	114.6	1.98	1.19	0.79	0.92	19.8	18.2	3.15	0.00
34.61	37.7	2.19	5.82	69.9	3	111.4	1.99	1.19	0.80	0.91	36.1	33.0	2.86	0.00
34.94	40.3	2.26	5.60	79.9	3	111.4	2.01	1.20	0.81	0.91	38.6	35.2	3.06	0.00
35.27	44.5	2.48	5.58	85.4	3	111.4	2.03	1.21	0.82	0.91	42.6	38.7	3.39	0.00
35.60	42.4	2.43	5.73	114.9	3	111.4	2.05	1.22	0.83	0.91	40.6	36.8	3.23	0.00
35.92	40.7	2.06	5.07	154.6	3	111.4	2.07	1.23	0.84	0.90	38.9	35.2	3.09	0.00
36.25	39.0	1.85	4.73	163.5	3	111.4	2.09	1.23	0.85	0.90	37.4	33.7	2.96	0.00
36.58	35.6	1.70	4.76	160.5	3	111.4	2.10	1.24	0.86	0.90	34.1	30.6	2.68	0.00
36.91	36.5	1.57	4.31	159.7	4	114.6	2.12	1.25	0.87	0.89	23.3	20.8	2.75	0.00
37.24	35.9	1.51	4.21	153.2	4	114.6	2.14	1.26	0.88	0.89	22.9	20.4	2.70	0.44
37.57	37.6	1.58	4.20	165.6	4	114.6	2.16	1.27	0.89	0.89	24.0	21.3	2.83	0.00
37.89	37.4	1.61	4.31	164.1	4	114.6	2.18	1.28	0.90	0.89	23.9	21.1	2.81	0.00
38.22	35.7	1.55	4.34	158.1	4	114.6	2.20	1.29	0.91	0.88	22.8	20.1	2.68	0.00
38.55	36.2	1.60	4.43	153.0	4	114.6	2.22	1.29	0.92	0.88	23.1	20.3	2.72	0.00
38.88	33.4	1.72	5.16	162.3	3	111.4	2.24	1.30	0.93	0.88	32.0	28.0	2.49	0.00
39.21	31.2	1.34	4.29	188.2	4	114.6	2.25	1.31	0.94	0.87	19.9	17.4	2.32	0.00
39.53	31.4	1.14	3.62	193.1	5	114.6	2.27	1.32	0.95	0.87	15.0	13.1	2.33	0.30
39.86	34.9	1.20	3.44	214.2	5	114.6	2.29	1.33	0.96	0.87	16.7	14.5	2.61	0.38
40.19	36.3	1.49	4.11	203.3	4	114.6	2.31	1.34	0.97	0.87	23.2	20.1	2.72	0.42
40.52	36.3	1.43	3.93	188.7	5	114.6	2.33	1.34	0.98	0.86	17.4	15.0	2.72	0.41
40.85	36.1	1.42	3.93	175.6	5	114.6	2.35	1.35	0.99	0.86	17.3	14.9	2.70	0.41
41.17	33.8	1.23	3.64	194.8	5	114.6	2.37	1.36	1.00	0.86	16.2	13.9	2.52	0.35
41.50	37.9	1.21	3.20	223.9	5	114.6	2.39	1.37	1.01	0.85	18.1	15.5	2.84	0.45
41.83	33.9	1.15	3.38	251.9	5	114.6	2.40	1.38	1.03	0.85	16.2	13.8	2.52	0.34
42.16	32.8	1.12	3.42	284.1	5	114.6	2.42	1.39	1.04	0.85	15.7	13.3	2.43	0.31
42.49	34.5	1.23	3.57	194.6	5	114.6	2.44	1.40	1.05	0.85	16.5	14.0	2.56	0.35
42.81	32.5	1.15	3.52	72.6	5	114.6	2.46	1.40	1.06	0.84	15.6	13.2	2.41	0.31
43.14	32.3	0.97	2.99	97.7	5	114.6	2.48	1.41	1.07	0.84	15.5	13.0	2.38	0.30
43.47	30.4	0.96	3.14	112.2	5	114.6	2.50	1.42	1.08	0.84	14.6	12.2	2.23	0.26
43.80	30.4	1.04	3.43	124.1	5	114.6	2.52	1.43	1.09	0.84	14.5	12.2	2.23	0.26
44.13	32.1	1.09	3.38	139.5	5	114.6	2.54	1.44	1.10	0.83	15.4	12.8	2.36	0.29
44.45	27.5	0.95	3.44	149.8	5	114.6	2.55	1.45	1.11	0.83	13.2	11.0	2.00	0.21
44.78	27.2	1.00	3.68	155.2	5	114.6	2.57	1.46	1.12	0.83	13.0	10.8	1.97	0.00
45.11	24.8	1.03	4.14	159.3	4	114.6	2.59	1.46	1.13	0.83	15.8	13.1	1.78	0.00
45.44	27.1	0.99	3.65	177.9	5	114.6	2.61	1.47	1.14	0.82	13.0	10.7	1.96	0.00
45.77	24.3	1.04	4.26	149.6	3	111.4	2.63	1.48	1.15	0.82	23.3	19.1	1.73	0.00
46.10	23.0	0.95	4.13	132.9	4	114.6	2.65	1.49	1.16	0.82	14.7	12.0	1.63	0.00
46.42	21.8	0.90	4.14	114.8	3	111.4	2.67	1.50	1.17	0.82	20.8	17.0	1.53	0.00
46.75	20.4	0.91	4.46	98.7	3	111.4	2.68	1.51	1.18	0.81	19.5	15.9	1.42	0.00
47.08	22.0	1.01	4.57	98.9	3	111.4	2.70	1.51	1.19	0.81	21.1	17.1	1.54	0.00
47.41	20.7	1.03	4.95	93.8	3	111.4	2.72	1.52	1.20	0.81	19.9	16.1	1.44	0.00
47.74	21.6	1.01	4.66	85.9	3	111.4	2.74	1.53	1.21	0.81	20.7	16.7	1.51	0.00
48.06	20.0	1.15	5.73	72.3	3	111.4	2.76	1.54	1.22	0.81	19.1	15.4	1.38	0.00
48.39	24.0	1.18	4.92	73.0	3	111.4	2.78	1.55	1.23	0.80	23.0	18.5	1.70	0.00
48.72	24.1	1.27	5.27	57.0	3	111.4	2.79	1.55	1.24	0.80	23.1	18.5	1.71	0.00
49.05	21.7	1.28	5.87	37.2	3	111.4	2.81	1.56	1.25	0.80	20.8	16.7	1.51	0.00
49.38	22.2	1.22	5.48	24.0	3	111.4	2.83	1.57	1.26	0.80	21.3	17.0	1.55	0.00
49.70	20.6	1.23	5.94	23.8	3	111.4	2.85	1.58	1.27	0.80	19.8	15.7	1.42	0.00
50.03	20.3	1.10	5.39	25.6	3	111.4	2.87	1.59	1.28	0.79	19.5	15.5	1.40	0.00
50.36	19.4	1.13	5.83	26.5	3	111.4	2.89	1.59	1.29	0.79	18.6	14.7	1.32	0.00
50.69	19.2	1.14	5.90	27.2	3	111.4	2.90	1.60	1.30	0.79	18.4	14.6	1.31	0.00
51.02	17.4	0.97	5.57	27.5	3	111.4	2.92	1.61	1.31	0.79	16.7	13.1	1.16	0.00
51.34	17.4	0.86	4.95	30.4	3	111.4	2.94	1.62	1.32	0.79	16.6	13.1	1.15	0.00
51.67	19.3	1.08	5.60	31.4	3	111.4	2.96	1.63	1.33	0.78	18.5	14.5	1.31	0.00
52.00	21.5	1.32	6.14	33.4	3	111.4	2.98	1.63	1.34	0.78	20.6	16.1	1.48	0.00
52.33	20.8	1.48	7.13	21.4	3	111.4	3.00	1.64	1.35	0.78	19.9	15.5	1.42	0.00
52.66	20.9	1.48	7.10	14.3	3	111.4	3.01	1.65	1.36	0.78	20.0	15.6	1.43	0.00
52.98	19.7	1.47	7.43	4.9	3	111.4	3.03	1.66	1.37	0.78	18.9	14.7	1.34	0.00
53.31	19.3	1.24	6.40	1.8	3	111.4	3.05	1.67	1.38	0.77	18.5	14.3	1.30	0.00
53.64	48.8	0.70	1.43	-3.4	7	117.8	3.07	1.68	1.39	0.77	15.6	12.0	UnDef	0.19

[illegible]h ([illegible])	AvgQt (tsf)	AvgFs (tsf)	AvgRf (%)	AvgUd (ft)	SBT	U.Wt. pcf	TStress (tsf)	EStress (tsf)	Ueq (tsf)	Cn	N60 (blows/ft)	(N1)60 (blows/ft)	Su (tsf)	CRR
53.97	132.8	1.40	1.06	6.0	8	120.9	3.09	1.68	1.40	0.77	31.8	24.5	UnDef	0.28

ConeTec Inc. - CPT Interpretation
Interpretation Output - Release 1.00.19M

Run No: 04-0913-1621-1029
Job No: 04-783
Client: MACTEC, Inc.
Project: TVA Plant, Gallatin, TN
Site: CPT-3A
Location: TVA Plant
Cone: 20 TON AD163
CPT Date: 04/08/09
CPT Time: 14:41
CPT File: 783CP03A.COR
Northing (m): 0.000
Easting (m): 0.000
Elevation (m): 0.000

Water Table (m): 2.74 (ft): 9.0
Unit Weight of Water (default): 62.40 kN/m^3
Su Nkt used: 12.50 Su/P' (nc): 0.30
Averaging Increment (m): 0.10
Phi Method : Robertson and Campanella, 1983
Dr Method : Jamiolkowski - All Sands
State Parameter M: 1.20
Used Unit Weights Assigned to Soil Zones
Values of 1.0E9 or UnDef are printed for parameters that are not valid for the material type (SBT)

Depth (ft)	k (cm/s)	Bq	Qtn	Rfn	SBTn	Qc1N	DeltaQc1N	Qc1Ncs	Fc (%)	Phi (Deg)	Dr (%)	OCR	State Param	Del(n1)60	(N1)60cs
0.16	5.0E-04	0.00	1000.0	0.12	10	36.4	0.0	36.4	0.0	50	85.6	1.0	-0.21	0.0	12.1
0.49	5.0E-03	0.00	1000.0	0.06	10	99.4	0.0	99.4	0.0	50	95.0	1.0	-0.15	0.0	24.8
0.82	5.0E-02	0.00	1000.0	0.21	10	160.6	0.0	160.6	0.0	50	95.0	1.0	-0.26	0.0	32.1
1.15	5.0E-02	0.00	1000.0	0.33	10	205.1	0.0	205.1	0.0	50	95.0	1.0	-0.29	0.0	41.0
1.48	5.0E-02	0.00	1000.0	0.41	10	217.4	0.0	217.4	0.0	50	95.0	1.0	-0.31	0.0	43.5
80	5.0E-02	0.00	1000.0	0.35	10	214.0	0.0	214.0	0.0	50	95.0	1.0	-0.30	0.0	42.8
13	5.0E-02	0.00	802.4	0.31	10	201.2	0.0	201.2	0.0	50	95.0	1.0	-0.27	0.0	40.2
2.46	5.0E-02	0.00	669.2	0.33	10	194.0	0.0	194.0	0.0	50	94.1	1.0	-0.26	0.0	38.8
2.79	5.0E-02	0.00	942.7	0.65	10	310.0	0.0	310.0	0.0	50	95.0	1.0	-0.35	0.0	62.0
3.12	5.0E-03	0.00	914.2	1.13	9	335.9	0.0	335.9	1.2	50	95.0	1.0	-0.41	0.0	84.0
3.44	5.0E-03	0.00	660.3	1.75	12	267.8	UnDef	UnDef	0.0	50	95.0	1.0	-0.44	UnDef	UnDef
3.77	5.0E-04	0.00	334.9	1.91	9	148.6	10.9	159.6	7.6	48	80.4	1.0	-0.39	2.2	51.8
4.10	5.0E-04	0.00	197.5	1.11	9	95.2	4.3	99.5	6.6	46	66.5	1.0	-0.26	0.9	32.6
4.43	5.0E-04	0.00	162.2	0.82	9	82.9	2.3	85.3	6.0	44	61.9	1.0	-0.21	0.5	27.5
4.76	5.0E-04	0.00	146.9	1.29	9	77.8	10.7	88.5	9.5	44	60.1	1.0	-0.25	2.1	27.5
5.09	5.0E-05	0.00	94.6	1.85	7	51.9	21.7	73.7	16.1	42	48.5	10.0	-0.25	4.6	24.9
5.41	5.0E-06	0.00	46.8	2.25	7	26.7	34.1	60.8	26.0	UnDef	UnDef	10.0	UnDef	7.1	20.1
5.74	5.0E-06	0.03	35.1	2.01	7	20.8	35.6	56.4	28.7	UnDef	UnDef	10.0	UnDef	6.6	16.8
6.07	5.0E-02	0.00	264.6	0.45	9	157.1	0.0	157.1	1.1	46	80.2	1.0	-0.20	0.0	30.7
6.40	5.0E-03	0.00	197.4	0.78	9	120.5	0.0	120.5	4.7	46	72.6	1.0	-0.23	0.0	29.5
6.73	5.0E-03	0.00	142.3	0.24	9	89.2	0.0	89.2	2.1	44	64.0	1.0	-0.10	0.0	21.8
7.05	5.0E-04	0.00	85.3	0.58	9	55.0	6.0	61.0	8.7	42	50.1	1.0	-0.12	1.2	19.1
7.38	5.0E-05	0.00	65.6	1.53	7	43.4	23.0	66.4	18.0	40	43.3	10.0	-0.19	4.7	21.7
7.79	5.0E-04	0.01	79.4	1.15	9	53.8	16.3	70.1	13.7	42	49.5	1.0	-0.18	3.0	20.5
8.20	5.0E-03	0.01	101.8	0.45	9	70.6	0.0	70.6	5.0	42	57.3	1.0	-0.12	0.0	17.3
8.53	5.0E-03	0.00	75.4	0.31	9	53.5	0.0	53.5	5.0	40	49.3	1.0	-0.06	0.0	13.1
8.86	5.0E-05	0.01	30.8	1.12	7	22.7	24.7	47.4	24.5	36	30.0	10.0	-0.08	4.3	13.2
9.19	1.0E-07	0.06	12.6	0.34	7	9.9	0.0	9.9	5.0	UnDef	UnDef	4.6	UnDef	0.0	4.8
9.51	1.0E-07	0.08	8.8	0.25	7	7.1	28.5	35.6	35.4	UnDef	UnDef	2.7	UnDef	3.5	7.0
9.84	1.0E-07	0.11	13.9	0.14	7	11.0	0.0	11.0	5.0	UnDef	UnDef	5.4	UnDef	0.0	5.4
10.17	5.0E-04	0.01	43.6	0.50	9	33.0	0.0	33.0	5.0	38	35.5	1.0	-0.05	0.0	10.8
10.50	5.0E-03	0.01	78.7	0.11	9	59.3	0.0	59.3	4.3	42	52.3	1.0	0.02	0.0	14.5
10.83	5.0E-03	0.00	64.9	0.30	9	49.5	0.0	49.5	5.0	40	47.1	1.0	-0.05	0.0	12.1
11.15	5.0E-04	0.01	38.5	0.23	9	29.9	0.0	29.9	5.0	38	32.7	1.0	0.02	0.0	9.8
11.48	5.0E-05	0.03	20.7	0.10	7	16.6	0.0	16.6	5.0	34	30.0	10.0	0.14	0.0	6.5
11.81	5.0E-04	0.02	51.3	0.06	9	40.2	0.0	40.2	5.0	38	41.2	1.0	0.11	0.0	13.1
14	5.0E-04	0.01	37.1	0.08	9	29.6	0.0	29.6	5.0	38	32.3	1.0	0.11	0.0	9.6
47	5.0E-04	0.00	42.8	0.04	9	34.2	0.0	34.2	5.0	38	36.5	1.0	0.15	0.0	11.2
12.80	5.0E-04	0.00	36.7	0.05	9	29.7	0.0	29.7	5.0	38	32.5	1.0	0.15	0.0	9.7

[illegible]h ([illegible])	k (cm/s)	Bq	Qtn	Rfn	SBTn	Qc1N	DeltaQc1N	Qc1Ncs	Fc (%)	Phi (Deg)	Dr (%)	OCR	State Param	Del(n1)60	(N1)60cs
13.12	5.0E-04	0.00	38.5	0.05	9	31.3	0.0	31.3	5.0	38	34.0	1.0	0.14	0.0	10.2
13.45	5.0E-03	0.00	82.4	0.02	9	66.4	0.0	66.4	4.4	42	55.6	1.0	0.14	0.0	16.3
13.78	5.0E-04	0.00	46.6	0.39	9	38.3	0.0	38.3	5.0	38	39.8	1.0	-0.04	0.0	12.5
14.11	5.0E-05	0.00	15.7	1.30	6	13.7	54.7	68.4	37.1	32	30.0	6.5	-0.03	5.4	10.7
14.44	1.0E-07	0.15	6.2	0.66	6	6.0	24.2	30.2	50.2	UnDef	UnDef	1.7	UnDef	3.0	5.9
14.76	1.0E-07	0.30	5.2	0.36	1	5.3	UnDef	UnDef	100.0	UnDef	UnDef	1.4	UnDef	UnDef	UnDef
15.09	1.0E-07	0.44	3.3	0.45	1	3.8	UnDef	UnDef	100.0	UnDef	UnDef	0.9	UnDef	UnDef	UnDef
15.42	1.0E-07	0.80	2.3	0.60	1	3.0	UnDef	UnDef	100.0	UnDef	UnDef	0.7	UnDef	UnDef	UnDef
15.75	1.0E-07	0.18	5.3	0.28	1	5.5	UnDef	UnDef	100.0	UnDef	UnDef	1.4	UnDef	UnDef	UnDef
16.08	1.0E-07	0.03	6.7	0.22	1	6.6	UnDef	UnDef	100.0	UnDef	UnDef	1.9	UnDef	UnDef	UnDef
16.40	1.0E-07	0.22	2.7	0.54	1	3.3	UnDef	UnDef	100.0	UnDef	UnDef	0.8	UnDef	UnDef	UnDef
16.73	1.0E-07	0.15	7.8	0.22	1	7.7	UnDef	UnDef	100.0	UnDef	UnDef	2.3	UnDef	UnDef	UnDef
17.06	5.0E-04	0.01	40.0	0.33	9	35.0	0.0	35.0	5.0	38	37.2	1.0	-0.01	0.0	11.4
17.39	5.0E-04	0.00	40.1	0.49	9	35.4	0.0	35.4	5.0	38	37.5	1.0	-0.04	0.0	11.5
17.72	5.0E-04	0.00	30.4	0.40	7	27.2	0.0	27.2	5.0	36	30.0	1.0	0.00	0.0	8.9
18.04	5.0E-04	0.00	24.2	0.13	7	22.1	0.0	22.1	5.0	34	30.0	1.0	0.11	0.0	7.2
18.37	5.0E-04	0.00	23.8	0.06	7	21.8	0.0	21.8	5.0	34	30.0	1.0	0.16	0.0	7.1
18.70	5.0E-05	0.01	15.9	0.08	7	15.1	0.0	15.1	5.0	32	30.0	6.6	0.18	0.0	5.9
19.03	5.0E-05	0.01	15.2	0.09	7	14.5	0.0	14.5	5.0	32	30.0	6.1	0.18	0.0	5.7
19.36	5.0E-05	0.01	19.6	0.27	7	18.5	0.0	18.5	5.0	34	30.0	9.1	0.07	0.0	7.2
19.68	5.0E-06	0.02	10.0	1.38	6	10.1	40.4	50.4	47.2	UnDef	UnDef	3.3	UnDef	4.9	9.9
20.01	1.0E-07	0.42	2.3	2.79	1	3.3	UnDef	UnDef	100.0	UnDef	UnDef	0.7	UnDef	UnDef	UnDef
20.34	1.0E-07	2.89	0.8	1.82	1	2.0	UnDef	UnDef	100.0	UnDef	UnDef	0.5	UnDef	UnDef	UnDef
20.67	1.0E-07	8.23	0.3	5.03	1	1.6	UnDef	UnDef	100.0	UnDef	UnDef	0.5	UnDef	UnDef	UnDef
21.00	1.0E-07	10.71	0.2	6.34	1	1.5	UnDef	UnDef	100.0	UnDef	UnDef	0.5	UnDef	UnDef	UnDef
21.33	1.0E-07	30.07	0.1	10.00	1	1.4	UnDef	UnDef	100.0	UnDef	UnDef	0.5	UnDef	UnDef	UnDef
21.65	1.0E-07	33.62	0.1	10.00	1	1.4	UnDef	UnDef	100.0	UnDef	UnDef	0.5	UnDef	UnDef	UnDef
[illegible]98	1.0E-07	24.49	0.1	10.00	1	1.4	UnDef	UnDef	100.0	UnDef	UnDef	0.5	UnDef	UnDef	UnDef
[illegible]31	1.0E-07	25.47	0.1	10.00	1	1.4	UnDef	UnDef	100.0	UnDef	UnDef	0.5	UnDef	UnDef	UnDef
22.64	1.0E-07	87.82	0.0	10.00	1	1.3	UnDef	UnDef	100.0	UnDef	UnDef	0.5	UnDef	UnDef	UnDef
22.97	1.0E-07	175.47	0.0	10.00	1	1.4	UnDef	UnDef	100.0	UnDef	UnDef	0.5	UnDef	UnDef	UnDef
23.29	1.0E-07	42.00	0.1	10.00	1	1.4	UnDef	UnDef	100.0	UnDef	UnDef	0.5	UnDef	UnDef	UnDef
23.62	1.0E-07	50.71	0.0	10.00	1	1.4	UnDef	UnDef	100.0	UnDef	UnDef	0.5	UnDef	UnDef	UnDef
23.95	1.0E-07	57.22	0.0	10.00	1	1.5	UnDef	UnDef	100.0	UnDef	UnDef	0.5	UnDef	UnDef	UnDef
24.28	1.0E-07	576.60	0.0	10.00	1	1.4	UnDef	UnDef	100.0	UnDef	UnDef	0.5	UnDef	UnDef	UnDef
24.61	1.0E-07	44.28	0.1	10.00	1	1.5	UnDef	UnDef	100.0	UnDef	UnDef	0.5	UnDef	UnDef	UnDef
24.93	1.0E-07	0.31	3.9	0.37	1	5.1	UnDef	UnDef	100.0	UnDef	UnDef	1.0	UnDef	UnDef	UnDef
25.26	1.0E-07	6.75	0.2	6.63	1	1.6	UnDef	UnDef	100.0	UnDef	UnDef	0.5	UnDef	UnDef	UnDef
25.59	1.0E-07	4.67	0.4	2.84	1	1.9	UnDef	UnDef	100.0	UnDef	UnDef	0.5	UnDef	UnDef	UnDef
25.92	1.0E-07	79.75	0.0	10.00	1	1.4	UnDef	UnDef	100.0	UnDef	UnDef	0.5	UnDef	UnDef	UnDef
26.25	1.0E-07	2.88	0.8	1.68	1	2.2	UnDef	UnDef	100.0	UnDef	UnDef	0.5	UnDef	UnDef	UnDef
26.57	1.0E-07	2.44	0.8	1.82	1	2.3	UnDef	UnDef	100.0	UnDef	UnDef	0.5	UnDef	UnDef	UnDef
26.90	1.0E-07	0.72	3.1	0.47	1	4.6	UnDef	UnDef	100.0	UnDef	UnDef	0.8	UnDef	UnDef	UnDef
27.23	1.0E-07	0.77	3.1	0.43	1	4.6	UnDef	UnDef	100.0	UnDef	UnDef	0.9	UnDef	UnDef	UnDef
27.56	1.0E-07	1.53	1.4	0.86	1	3.0	UnDef	UnDef	100.0	UnDef	UnDef	0.6	UnDef	UnDef	UnDef
27.89	1.0E-07	2.06	1.1	1.01	1	2.7	UnDef	UnDef	100.0	UnDef	UnDef	0.5	UnDef	UnDef	UnDef
28.21	1.0E-07	1.31	1.8	0.80	1	3.4	UnDef	UnDef	100.0	UnDef	UnDef	0.6	UnDef	UnDef	UnDef
28.54	1.0E-07	0.30	4.8	0.56	1	6.4	UnDef	UnDef	100.0	UnDef	UnDef	1.3	UnDef	UnDef	UnDef
28.87	5.0E-06	0.18	5.2	1.43	4	6.8	27.3	34.1	63.9	UnDef	UnDef	1.4	UnDef	3.3	6.7
29.20	5.0E-06	0.06	10.8	1.87	6	12.5	50.0	62.4	49.3	UnDef	UnDef	3.7	UnDef	6.1	12.2
29.53	5.0E-05	0.05	22.4	1.53	7	24.2	68.4	92.6	32.7	34	30.0	10.0	-0.07	8.1	17.6
29.86	5.0E-05	0.08	26.4	1.85	7	28.4	74.4	102.8	32.1	36	31.2	10.0	-0.10	9.2	20.3
30.18	5.0E-05	0.09	30.5	2.49	6	32.7	103.3	135.9	33.5	36	35.2	10.0	-0.15	11.6	24.4
30.59	5.0E-05	0.13	26.9	2.49	6	29.1	116.5	145.6	35.5	36	31.9	10.0	-0.13	11.4	22.8
31.00	5.0E-05	0.14	28.4	2.41	6	30.9	108.4	139.3	34.2	36	33.6	10.0	-0.13	11.5	23.6
31.33	5.0E-06	0.15	31.0	3.22	6	33.7	134.7	168.4	36.7	UnDef	UnDef	10.0	UnDef	16.5	33.0
31.66	5.0E-06	0.09	32.9	3.08	6	35.8	143.1	178.9	35.1	UnDef	UnDef	10.0	UnDef	17.5	35.0
31.99	5.0E-06	0.05	29.4	3.59	6	32.2	129.0	161.2	39.2	UnDef	UnDef	10.0	UnDef	15.8	31.6
[illegible]32	5.0E-06	0.09	34.9	3.73	6	38.2	152.7	190.9	36.9	UnDef	UnDef	10.0	UnDef	18.7	37.4
[illegible].64	5.0E-08	0.12	33.7	5.28	1	37.0	UnDef	UnDef	100.0	UnDef	UnDef	10.0	UnDef	UnDef	UnDef
32.97	5.0E-08	0.12	30.0	5.99	1	33.3	UnDef	UnDef	100.0	UnDef	UnDef	10.0	UnDef	UnDef	UnDef
33.30	5.0E-08	0.14	27.4	5.23	1	30.7	UnDef	UnDef	100.0	UnDef	UnDef	10.0	UnDef	UnDef	UnDef

[illegible]h ([illegible])	k (cm/s)	Bq	Qtn	Rfn	SBTn	Qc1N	DeltaQc1N	Qc1Ncs	Fc (%)	Phi (Deg)	Dr (%)	OCR	State Param	Del(n1)60	(N1)60cs
33.63	5.0E-08	0.17	24.2	4.98	1	27.3	UnDef	UnDef	100.0	UnDef	UnDef	10.0	UnDef	UnDef	UnDef
33.96	5.0E-06	0.19	24.9	3.58	6	28.3	113.0	141.3	42.0	UnDef	UnDef	10.0	UnDef	UnDef	UnDef
34.28	5.0E-06	0.15	33.1	3.64	6	37.1	148.4	185.5	37.4	UnDef	UnDef	10.0	UnDef	13.8	27.7
34.61	5.0E-08	0.04	29.9	6.15	1	33.7	UnDef	UnDef	100.0	UnDef	UnDef	10.0	UnDef	18.2	36.3
34.94	5.0E-08	0.04	31.8	5.90	1	36.0	UnDef	UnDef	100.0	UnDef	UnDef	10.0	UnDef	UnDef	UnDef
35.27	5.0E-08	0.04	35.0	5.84	1	39.5	UnDef	UnDef	100.0	UnDef	UnDef	10.0	UnDef	UnDef	UnDef
35.60	5.0E-08	0.07	33.1	6.02	1	37.6	UnDef	UnDef	100.0	UnDef	UnDef	10.0	UnDef	UnDef	UnDef
35.92	5.0E-08	0.10	31.5	5.34	1	35.9	UnDef	UnDef	100.0	UnDef	UnDef	10.0	UnDef	UnDef	UnDef
36.25	5.0E-08	0.12	29.9	5.00	1	34.4	UnDef	UnDef	100.0	UnDef	UnDef	10.0	UnDef	UnDef	UnDef
36.58	5.0E-08	0.12	27.0	5.06	1	31.3	UnDef	UnDef	100.0	UnDef	UnDef	10.0	UnDef	UnDef	UnDef
36.91	5.0E-07	0.12	27.5	4.58	1	31.9	UnDef	UnDef	100.0	UnDef	UnDef	10.0	UnDef	UnDef	UnDef
37.24	5.0E-07	0.12	26.8	4.48	4	31.3	125.1	156.4	44.3	UnDef	UnDef	10.0	UnDef	UnDef	UnDef
37.57	5.0E-07	0.12	27.9	4.45	4	32.7	130.6	163.3	43.4	UnDef	UnDef	10.0	UnDef	20.4	40.8
37.89	5.0E-07	0.12	27.6	4.58	1	32.4	UnDef	UnDef	100.0	UnDef	UnDef	10.0	UnDef	21.3	42.6
38.22	5.0E-07	0.12	26.1	4.63	1	30.8	UnDef	UnDef	100.0	UnDef	UnDef	10.0	UnDef	UnDef	UnDef
38.55	5.0E-07	0.11	26.3	4.72	1	31.1	UnDef	UnDef	100.0	UnDef	UnDef	10.0	UnDef	UnDef	UnDef
38.88	5.0E-08	0.13	23.9	5.53	1	28.6	UnDef	UnDef	100.0	UnDef	UnDef	10.0	UnDef	UnDef	UnDef
39.21	5.0E-07	0.17	22.1	4.63	1	26.7	UnDef	UnDef	100.0	UnDef	UnDef	10.0	UnDef	UnDef	UnDef
39.53	5.0E-06	0.17	22.1	3.90	6	26.7	107.0	133.7	45.6	UnDef	UnDef	10.0	UnDef	UnDef	UnDef
39.86	5.0E-06	0.18	24.5	3.69	6	29.6	118.5	148.1	42.7	UnDef	UnDef	10.0	UnDef	13.1	26.2
40.19	5.0E-07	0.16	25.5	4.39	4	30.8	123.0	153.8	44.8	UnDef	UnDef	10.0	UnDef	14.5	29.0
40.52	5.0E-06	0.14	25.3	4.20	6	30.7	122.6	153.3	44.3	UnDef	UnDef	10.0	UnDef	20.1	40.1
40.85	5.0E-06	0.13	25.0	4.21	4	30.4	121.6	152.0	44.5	UnDef	UnDef	10.0	UnDef	15.0	30.0
41.17	5.0E-06	0.16	23.1	3.91	6	28.4	113.5	141.8	44.8	UnDef	UnDef	10.0	UnDef	14.9	29.7
41.50	5.0E-06	0.17	25.9	3.41	6	31.7	126.7	158.4	40.6	UnDef	UnDef	10.0	UnDef	13.9	27.8
41.83	5.0E-06	0.22	22.9	3.63	6	28.3	113.1	141.4	43.8	UnDef	UnDef	10.0	UnDef	15.5	31.0
42.16	5.0E-06	0.26	21.9	3.69	6	27.2	108.9	136.1	44.9	UnDef	UnDef	10.0	UnDef	13.8	27.7
[illegible].49	5.0E-06	0.16	22.9	3.84	6	28.5	114.2	142.7	44.6	UnDef	UnDef	10.0	UnDef	13.3	26.6
[illegible].31	5.0E-06	0.04	21.4	3.81	6	26.9	107.5	134.4	45.8	UnDef	UnDef	10.0	UnDef	14.0	27.9
43.14	5.0E-06	0.07	21.1	3.24	6	26.6	106.3	132.9	43.5	UnDef	UnDef	10.0	UnDef	13.2	26.3
43.47	5.0E-06	0.09	19.6	3.42	6	25.0	99.8	124.8	45.8	UnDef	UnDef	10.0	UnDef	13.0	26.0
43.80	5.0E-06	0.10	19.5	3.74	4	24.8	99.4	124.2	47.3	UnDef	UnDef	9.2	UnDef	12.2	24.4
44.13	5.0E-06	0.11	20.5	3.67	6	26.2	104.7	130.9	46.0	UnDef	UnDef	9.1	UnDef	12.2	24.3
44.45	5.0E-06	0.14	17.2	3.79	4	22.4	89.5	111.9	50.0	UnDef	UnDef	9.9	UnDef	12.8	25.6
44.78	5.0E-06	0.15	16.9	4.06	1	22.0	UnDef	UnDef	100.0	UnDef	UnDef	7.5	UnDef	11.0	21.9
45.11	5.0E-07	0.17	15.2	4.62	1	20.0	UnDef	UnDef	100.0	UnDef	UnDef	7.2	UnDef	UnDef	UnDef
45.44	5.0E-06	0.18	16.6	4.04	1	21.9	UnDef	UnDef	100.0	UnDef	UnDef	6.1	UnDef	UnDef	UnDef
45.77	5.0E-08	0.16	14.6	4.78	1	19.5	UnDef	UnDef	100.0	UnDef	UnDef	7.1	UnDef	UnDef	UnDef
46.10	5.0E-07	0.15	13.7	4.66	1	18.5	UnDef	UnDef	100.0	UnDef	UnDef	5.8	UnDef	UnDef	UnDef
46.42	5.0E-08	0.13	12.7	4.71	1	17.4	UnDef	UnDef	100.0	UnDef	UnDef	5.2	UnDef	UnDef	UnDef
46.75	5.0E-08	0.11	11.8	5.14	1	16.3	UnDef	UnDef	100.0	UnDef	UnDef	4.7	UnDef	UnDef	UnDef
47.08	5.0E-08	0.10	12.7	5.21	1	17.5	UnDef	UnDef	100.0	UnDef	UnDef	4.2	UnDef	UnDef	UnDef
47.41	5.0E-08	0.10	11.8	5.69	1	16.4	UnDef	UnDef	100.0	UnDef	UnDef	4.7	UnDef	UnDef	UnDef
47.74	5.0E-08	0.08	12.3	5.34	1	17.1	UnDef	UnDef	100.0	UnDef	UnDef	4.2	UnDef	UnDef	UnDef
48.06	5.0E-08	0.06	11.2	6.65	1	15.8	UnDef	UnDef	100.0	UnDef	UnDef	4.4	UnDef	UnDef	UnDef
48.39	5.0E-08	0.05	13.7	5.57	1	18.9	UnDef	UnDef	100.0	UnDef	UnDef	3.9	UnDef	UnDef	UnDef
48.72	5.0E-08	0.03	13.7	5.95	1	18.9	UnDef	UnDef	100.0	UnDef	UnDef	5.2	UnDef	UnDef	UnDef
49.05	5.0E-08	0.00	12.1	6.74	1	17.0	UnDef	UnDef	100.0	UnDef	UnDef	5.3	UnDef	UnDef	UnDef
49.38	5.0E-08	-0.03	12.3	6.28	1	17.3	UnDef	UnDef	100.0	UnDef	UnDef	4.3	UnDef	UnDef	UnDef
49.70	5.0E-08	-0.03	11.3	6.90	1	16.1	UnDef	UnDef	100.0	UnDef	UnDef	4.5	UnDef	UnDef	UnDef
50.03	5.0E-08	-0.03	11.0	6.28	1	15.8	UnDef	UnDef	100.0	UnDef	UnDef	3.9	UnDef	UnDef	UnDef
50.36	5.0E-08	-0.03	10.4	6.85	1	15.0	UnDef	UnDef	100.0	UnDef	UnDef	3.8	UnDef	UnDef	UnDef
50.69	5.0E-08	-0.03	10.2	6.95	1	14.9	UnDef	UnDef	100.0	UnDef	UnDef	3.4	UnDef	UnDef	UnDef
51.02	5.0E-08	-0.03	9.0	6.69	1	13.4	UnDef	UnDef	100.0	UnDef	UnDef	3.4	UnDef	UnDef	UnDef
51.34	5.0E-08	-0.03	8.9	5.96	1	13.4	UnDef	UnDef	100.0	UnDef	UnDef	2.8	UnDef	UnDef	UnDef
51.67	5.0E-08	-0.02	10.0	6.62	1	14.8	UnDef	UnDef	100.0	UnDef	UnDef	2.8	UnDef	UnDef	UnDef
52.00	5.0E-08	-0.02	11.3	7.13	1	16.5	UnDef	UnDef	100.0	UnDef	UnDef	3.3	UnDef	UnDef	UnDef
52.33	5.0E-08	-0.04	10.8	8.33	1	15.9	UnDef	UnDef	100.0	UnDef	UnDef	3.9	UnDef	UnDef	UnDef
[illegible].66	5.0E-08	-0.05	10.8	8.29	1	15.9	UnDef	UnDef	100.0	UnDef	UnDef	3.7	UnDef	UnDef	UnDef
[illegible].98	5.0E-08	-0.07	10.1	8.78	1	15.0	UnDef	UnDef	100.0	UnDef	UnDef	3.7	UnDef	UnDef	UnDef
53.31	5.0E-08	-0.08	9.8	7.60	1	14.6	UnDef	UnDef	100.0	UnDef	UnDef	3.3	UnDef	UnDef	UnDef
53.64	5.0E-04	-0.03	27.3	1.53	7	36.9	69.2	106.1	29.4	36	38.7	1.0	-0.10	8.3	20.3

[illegible]h ([illegible])	k (cm/s)	Bq	Qtn	Rfn	SBTn	Qc1N	DeltaQc1N	Qc1Ncs	Fc (%)	Phi (Deg)	Dr (%)	OCR	State Param	Del(n1)60	(N1)60cs
53.97	5.0E-03	-0.01	77.0	1.08	9	100.1	29.3	129.5	13.5	40	67.3	1.0	-0.17	4.0	28.5

ConeTec Inc. - CPT Interpretation
Interpretation Output - Release 1.00.19M
Run No: 04-0913-1621-1051
No: 04-783
Client: MACTEC, Inc.
Project: TVA Plant, Gallatin, TN
Site: CPT-04
Location: TVA Plant
Cone: 20 TON AD163
CPT Date: 04/08/09
CPT Time: 13:39
CPT File: 783CP004.COR
Northing (m): 0.000
Easting (m): 0.000
Elevation (m): 0.000

Water Table (m): 1.52 (ft): 5.0
Unit Weight of Water (default): 62.40 kN/m^3
Su Nkt used: 12.50 Su/P' (nc): 0.30
Averaging Increment (m): 0.10
Phi Method : Robertson and Campanella, 1983
Dr Method : Jamiolkowski - All Sands
State Parameter M: 1.20
Used Unit Weights Assigned to Soil Zones
Values of 1.0E9 or UnDef are printed for parameters that are not valid for the material type (SBT)

Depth (ft)	AvgQt (tsf)	AvgFs (tsf)	AvgRf (%)	AvgUd (ft)	SBT	U.Wt. pcf	TStress (tsf)	EStress (tsf)	Ueq (tsf)	Cn	N60 (blows/ft)	(N1)60 (blows/ft)	Su (tsf)	CRR
0.16	22.5	0.01	0.04	0.0	7	117.8	0.01	0.01	0.00	2.00	7.2	14.4	UnDef	0.09
0.49	56.1	0.01	0.02	-0.3	8	120.9	0.03	0.03	0.00	2.00	13.4	26.9	UnDef	0.20
0.82	81.9	0.18	0.22	-0.3	8	120.9	0.05	0.05	0.00	2.00	19.6	39.2	UnDef	0.44
1.15	117.7	0.34	0.29	0.0	9	124.1	0.07	0.07	0.00	2.00	22.5	45.1	UnDef	0.00
[illegible]48	132.4	0.52	0.39	-0.2	9	124.1	0.09	0.09	0.00	2.00	25.4	50.7	UnDef	0.00
[illegible]30	143.8	0.59	0.41	0.1	9	124.1	0.11	0.11	0.00	2.00	27.5	55.1	UnDef	0.00
2.13	151.0	0.70	0.46	0.0	9	124.1	0.13	0.13	0.00	2.00	28.9	57.8	UnDef	0.00
2.46	158.8	1.07	0.67	-0.1	9	124.1	0.15	0.15	0.00	2.00	30.4	60.8	UnDef	0.00
2.79	183.0	1.01	0.55	-0.3	9	124.1	0.17	0.17	0.00	2.00	35.0	70.1	UnDef	0.00
3.12	219.1	1.32	0.60	-0.2	9	124.1	0.19	0.19	0.00	2.00	42.0	83.9	UnDef	0.00
3.44	230.1	1.29	0.56	0.0	9	124.1	0.21	0.21	0.00	2.00	44.1	88.2	UnDef	0.00
3.77	271.7	1.15	0.42	-0.1	10	127.3	0.23	0.23	0.00	2.00	43.4	86.7	UnDef	0.00
4.10	361.6	1.91	0.53	0.0	10	127.3	0.25	0.25	0.00	1.99	57.7	114.7	UnDef	0.00
4.43	480.6	2.94	0.61	-0.3	10	127.3	0.27	0.27	0.00	1.91	76.7	146.5	UnDef	0.00
4.76	440.3	2.66	0.60	-0.3	10	127.3	0.29	0.29	0.00	1.84	70.3	129.4	UnDef	0.00
5.09	508.6	2.72	0.54	-0.7	10	127.3	0.32	0.31	0.00	1.79	81.2	145.1	UnDef	0.00
5.41	501.0	3.58	0.71	-0.8	10	127.3	0.34	0.32	0.01	1.76	80.0	140.5	UnDef	0.00
5.74	556.8	3.01	0.54	-1.4	10	127.3	0.36	0.33	0.02	1.73	88.9	153.7	UnDef	0.00
6.07	734.9	3.00	0.41	-1.5	10	127.3	0.38	0.35	0.03	1.70	117.3	199.7	UnDef	0.00
6.40	969.6	3.06	0.32	3.4	10	127.3	0.40	0.36	0.04	1.68	154.8	259.5	UnDef	0.00

ConeTec Inc. - CPT Interpretation

Interpretation Output - Release 1.00.19M

Run No: 04-0913-1621-1051
Job No: 04-783
Client: MACTEC, Inc.
Project: TVA Plant, Gallatin, TN
Site: CPT-04
Location: TVA Plant
Cone: 20 TON AD163
CPT Date: 04/08/09
CPT Time: 13:39
CPT File: 783CP004.COR
Northing (m): 0.000
Easting (m): 0.000
Elevation (m): 0.000

Water Table (m): 1.52 (ft): 5.0
Unit Weight of Water (default): 62.40 kN/m^3
Su Nkt used: 12.50 Su/P' (nc): 0.30
Averaging Increment (m): 0.10
Phi Method : Robertson and Campanella, 1983
Dr Method : Jamiolkowski - All Sands
State Parameter M: 1.20
Used Unit Weights Assigned to Soil Zones
Values of 1.0E9 or UnDef are printed for parameters that are not valid for the material type (SBT)

Depth (ft)	k (cm/s)	Bq	Qtn	Rfn	SBTn	Qc1N	DeltaQc1N	Qc1Ncs	Fc (%)	Phi (Deg)	Dr (%)	OCR	State Param	Del(n1)60	(N1)60cs
0.16	5.0E-04	0.00	1000.0	0.04	10	43.2	0.0	43.2	0.0	50	90.5	1.0	-0.12	0.0	14.4
0.49	5.0E-03	0.00	1000.0	0.02	10	107.5	0.0	107.5	0.0	50	95.0	1.0	-0.05	0.0	26.9
0.82	5.0E-03	0.00	1000.0	0.22	10	156.9	0.0	156.9	0.0	50	95.0	1.0	-0.26	0.0	39.2
1.15	5.0E-02	0.00	1000.0	0.29	10	225.5	0.0	225.5	0.0	50	95.0	1.0	-0.28	0.0	45.1
1.48	5.0E-02	0.00	1000.0	0.39	10	253.6	0.0	253.6	0.0	50	95.0	1.0	-0.31	0.0	50.7
[illegible]80	5.0E-02	0.00	1000.0	0.41	10	275.5	0.0	275.5	0.0	50	95.0	1.0	-0.31	0.0	55.1
[illegible]13	5.0E-02	0.00	1000.0	0.46	10	289.1	0.0	289.1	0.0	50	95.0	1.0	-0.32	0.0	57.8
2.46	5.0E-02	0.00	1000.0	0.67	10	304.2	0.0	304.2	0.0	50	95.0	1.0	-0.36	0.0	60.8
2.79	5.0E-02	0.00	1000.0	0.55	10	350.5	0.0	350.5	0.0	50	95.0	1.0	-0.34	0.0	70.1
3.12	5.0E-02	0.00	1000.0	0.60	10	419.7	0.0	419.7	0.0	50	95.0	1.0	-0.35	0.0	83.9
3.44	5.0E-02	0.00	1000.0	0.56	10	440.8	0.0	440.8	0.0	50	95.0	1.0	-0.34	0.0	88.2
3.77	5.0E+00	0.00	1000.0	0.42	10	520.5	0.0	520.5	0.0	50	95.0	1.0	-0.32	0.0	86.7
4.10	5.0E+00	0.00	1000.0	0.53	10	692.5	0.0	692.5	0.0	50	95.0	1.0	-0.34	0.0	114.7
4.43	5.0E+00	0.00	1000.0	0.61	10	898.4	0.0	898.4	0.0	50	95.0	1.0	-0.35	0.0	146.5
4.76	5.0E+00	0.00	1000.0	0.60	10	793.3	0.0	793.3	0.0	50	95.0	1.0	-0.35	0.0	129.4
5.09	5.0E+00	0.00	1000.0	0.54	10	889.3	0.0	889.3	0.0	50	95.0	1.0	-0.34	0.0	145.1
5.41	5.0E+00	0.00	1000.0	0.71	10	861.6	0.0	861.6	0.0	50	95.0	1.0	-0.37	0.0	140.5
5.74	5.0E+00	0.00	1000.0	0.54	10	942.2	0.0	942.2	0.0	50	95.0	1.0	-0.34	0.0	153.7
6.07	5.0E+00	0.00	1000.0	0.41	10	1224.2	0.0	1224.2	0.0	50	95.0	1.0	-0.31	0.0	199.7
6.40	5.0E+00	0.00	1000.0	0.32	10	1590.8	0.0	1590.8	0.0	50	95.0	1.0	-0.29	0.0	259.5

ConeTec Inc. - CPT Interpretation
Interpretation Output - Release 1.00.19M
Run No: 04-0913-1621-1073
No: 04-783
Client: MACTEC, Inc.
Project: TVA Plant, Gallatin, TN
Site: CPT-05
Location: TVA Plant
Cone: 20 TON AD163
CPT Date: 04/08/09
CPT Time: 12:51
CPT File: 783CP005.COR
Northing (m): 0.000
Easting (m): 0.000
Elevation (m): 0.000

Water Table (m): 1.52 (ft): 5.0
Unit Weight of Water (default): 62.40 kN/m^3
Su Nkt used: 12.50 Su/P' (nc): 0.30
Averaging Increment (m): 0.10
Phi Method : Robertson and Campanella, 1983
Dr Method : Jamiolkowski - All Sands
State Parameter M: 1.20
Used Unit Weights Assigned to Soil Zones
Values of 1.0E9 or UnDef are printed for parameters that are not valid for the material type (SBT)

Depth (ft)	AvgQt (tsf)	AvgFs (tsf)	AvgRf (%)	AvgUd (ft)	SBT	U.Wt. pcf	TStress (tsf)	EStress (tsf)	Ueq (tsf)	Cn	N60 (blows/ft)	(N1)60 (blows/ft)	Su (tsf)	CRR
0.16	12.0	0.01	0.08	0.0	6	114.6	0.01	0.01	0.00	2.00	4.6	9.2	0.96	0.00
0.49	52.4	0.05	0.10	0.0	8	120.9	0.03	0.03	0.00	2.00	12.5	25.1	UnDef	0.17
0.82	71.9	0.11	0.15	0.2	8	120.9	0.05	0.05	0.00	2.00	17.2	34.4	UnDef	0.32
1.15	100.4	0.18	0.18	0.3	9	124.1	0.07	0.07	0.00	2.00	19.2	38.5	UnDef	0.00
1.48	140.2	0.35	0.25	0.2	9	124.1	0.09	0.09	0.00	2.00	26.9	53.7	UnDef	0.00
1.80	165.3	0.57	0.34	0.3	9	124.1	0.11	0.11	0.00	2.00	31.7	63.3	UnDef	0.00
2.13	183.1	0.85	0.47	0.0	9	124.1	0.13	0.13	0.00	2.00	35.1	70.1	UnDef	0.00
2.46	203.8	1.17	0.58	-0.1	9	124.1	0.15	0.15	0.00	2.00	39.0	78.1	UnDef	0.00
2.79	214.2	0.71	0.33	0.0	9	124.1	0.17	0.17	0.00	2.00	41.0	82.1	UnDef	0.00
3.12	300.7	0.85	0.28	-0.3	10	127.3	0.19	0.19	0.00	2.00	48.0	96.0	UnDef	0.00
3.44	446.8	1.60	0.36	-0.4	10	127.3	0.21	0.21	0.00	2.00	71.3	142.6	UnDef	0.00
3.77	460.7	2.39	0.52	-0.3	10	127.3	0.23	0.23	0.00	2.00	73.5	147.1	UnDef	0.00
4.10	442.1	2.55	0.58	-0.3	10	127.3	0.25	0.25	0.00	1.99	70.6	140.1	UnDef	0.00
4.43	472.6	2.52	0.53	-0.5	10	127.3	0.27	0.27	0.00	1.91	75.4	143.9	UnDef	0.00
4.76	463.0	2.76	0.60	-0.8	10	127.3	0.30	0.30	0.00	1.84	73.9	136.0	UnDef	0.00
5.09	430.2	2.09	0.48	-0.8	10	127.3	0.32	0.31	0.00	1.79	68.7	122.6	UnDef	0.00
5.41	602.6	2.06	0.34	-1.5	10	127.3	0.34	0.32	0.01	1.76	96.2	168.9	UnDef	0.00
5.74	871.4	3.26	0.37	1.5	10	127.3	0.36	0.34	0.02	1.73	139.1	240.3	UnDef	0.00
6.07	837.7	5.55	0.66	8.5	10	127.3	0.38	0.35	0.03	1.70	133.7	227.4	UnDef	0.00
6.40	754.3	6.61	0.88	2.7	10	127.3	0.40	0.36	0.04	1.68	120.4	201.7	UnDef	0.00
6.73	881.7	4.11	0.47	7.0	10	127.3	0.42	0.37	0.05	1.65	140.7	232.4	UnDef	0.00
7.05	886.6	7.03	0.79	14.8	10	127.3	0.44	0.38	0.06	1.63	141.5	230.3	UnDef	0.00
7.38	830.6	9.91	1.19	12.8	9	124.1	0.46	0.39	0.07	1.61	159.1	255.4	UnDef	0.00
7.79	714.9	7.99	1.12	5.6	9	124.1	0.49	0.40	0.09	1.58	136.9	216.3	UnDef	0.00
8.20	683.3	6.70	0.98	5.0	9	124.1	0.51	0.41	0.10	1.56	130.9	203.6	UnDef	0.00
8.53	606.3	5.15	0.85	5.9	10	127.3	0.53	0.42	0.11	1.54	96.8	148.7	UnDef	0.00
8.86	493.0	3.69	0.75	6.8	10	127.3	0.55	0.43	0.12	1.52	78.7	119.4	UnDef	0.00
9.19	447.6	3.17	0.71	7.2	10	127.3	0.58	0.44	0.13	1.50	71.4	107.1	UnDef	0.00
9.51	430.3	2.07	0.48	8.0	10	127.3	0.60	0.46	0.14	1.48	68.7	101.8	UnDef	0.00
9.84	531.1	2.61	0.49	9.2	10	127.3	0.62	0.47	0.15	1.46	84.8	124.2	UnDef	0.00

ConeTec Inc. - CPT Interpretation
Interpretation Output - Release 1.00.19M
Run No: 04-0913-1621-1073
Job No: 04-783
Client: MACTEC, Inc.
Project: TVA Plant, Gallatin, TN
Site: CPT-05
Location: TVA Plant
Cone: 20 TON AD163
CPT Date: 04/08/09
CPT Time: 12:51
CPT File: 783CP005.COR
Northing (m): 0.000
Easting (m): 0.000
Elevation (m): 0.000

Water Table (m): 1.52 (ft): 5.0
Unit Weight of Water (default): 62.40 kN/m^3
Su Nkt used: 12.50 Su/P' (nc): 0.30
Averaging Increment (m): 0.10
Phi Method : Robertson and Campanella, 1983
Dr Method : Jamiolkowski - All Sands
State Parameter M: 1.20
Used Unit Weights Assigned to Soil Zones
Values of 1.0E9 or UnDef are printed for parameters that are not valid for the material type (SBT)

Depth (ft)	k (cm/s)	Bq	Qtn	Rfn	SBTn	Qc1N	DeltaQc1N	Qc1Ncs	Fc (%)	Phi (Deg)	Dr (%)	OCR	State Param	Del(n1)60	(N1)60cs
0.16	5.0E-05	0.00	1000.0	0.08	10	23.1	0.0	23.1	0.0	50	72.9	10.0	-0.18	0.0	9.2
0.49	5.0E-03	0.00	1000.0	0.10	10	100.3	0.0	100.3	0.0	50	95.0	1.0	-0.19	0.0	25.1
0.82	5.0E-03	0.00	1000.0	0.15	10	137.7	0.0	137.7	0.0	50	95.0	1.0	-0.23	0.0	34.4
1.15	5.0E-02	0.00	1000.0	0.18	10	192.3	0.0	192.3	0.0	50	95.0	1.0	-0.24	0.0	38.5
1.48	5.0E-02	0.00	1000.0	0.25	10	268.6	0.0	268.6	0.0	50	95.0	1.0	-0.27	0.0	53.7
1.80	5.0E-02	0.00	1000.0	0.34	10	316.6	0.0	316.6	0.0	50	95.0	1.0	-0.30	0.0	63.3
2.13	5.0E-02	0.00	1000.0	0.47	10	350.7	0.0	350.7	0.0	50	95.0	1.0	-0.33	0.0	70.1
2.46	5.0E-02	0.00	1000.0	0.58	10	390.3	0.0	390.3	0.0	50	95.0	1.0	-0.35	0.0	78.1
2.79	5.0E-02	0.00	1000.0	0.33	10	410.3	0.0	410.3	0.0	50	95.0	1.0	-0.29	0.0	82.1
3.12	5.0E+00	0.00	1000.0	0.28	10	576.0	0.0	576.0	0.0	50	95.0	1.0	-0.28	0.0	96.0
3.44	5.0E+00	0.00	1000.0	0.36	10	855.7	0.0	855.7	0.0	50	95.0	1.0	-0.30	0.0	142.6
3.77	5.0E+00	0.00	1000.0	0.52	10	882.4	0.0	882.4	0.0	50	95.0	1.0	-0.34	0.0	147.1
4.10	5.0E+00	0.00	1000.0	0.58	10	846.8	0.0	846.8	0.0	50	95.0	1.0	-0.35	0.0	140.1
4.43	5.0E+00	0.00	1000.0	0.53	10	882.5	0.0	882.5	0.0	50	95.0	1.0	-0.34	0.0	143.9
4.76	5.0E+00	0.00	1000.0	0.60	10	833.6	0.0	833.6	0.0	50	95.0	1.0	-0.35	0.0	136.0
5.09	5.0E+00	0.00	1000.0	0.49	10	751.6	0.0	751.6	0.0	50	95.0	1.0	-0.33	0.0	122.6
5.41	5.0E+00	0.00	1000.0	0.34	10	1035.5	0.0	1035.5	0.0	50	95.0	1.0	-0.30	0.0	168.9
5.74	5.0E+00	0.00	1000.0	0.37	10	1473.2	0.0	1473.2	0.0	50	95.0	1.0	-0.31	0.0	240.3
6.07	5.0E+00	0.00	1000.0	0.66	10	1394.4	0.0	1394.4	0.0	50	95.0	1.0	-0.36	0.0	227.4
6.40	5.0E+00	0.00	1000.0	0.88	10	1236.7	0.0	1236.7	0.0	50	95.0	1.0	-0.39	0.0	201.7
6.73	5.0E+00	0.00	1000.0	0.47	10	1424.5	0.0	1424.5	0.0	50	95.0	1.0	-0.33	0.0	232.4
7.05	5.0E+00	0.00	1000.0	0.79	10	1412.0	0.0	1412.0	0.0	50	95.0	1.0	-0.38	0.0	230.3
7.38	5.0E-02	0.00	1000.0	1.19	9	1305.0	0.0	1305.0	1.3	50	95.0	1.0	-0.43	0.0	255.4
7.79	5.0E-02	0.00	1000.0	1.12	9	1105.3	0.0	1105.3	1.0	50	95.0	1.0	-0.42	0.0	216.3
8.20	5.0E-02	0.00	1000.0	0.98	10	1040.1	0.0	1040.1	0.4	50	95.0	1.0	-0.40	0.0	203.6
8.53	5.0E+00	0.00	1000.0	0.85	10	911.6	0.0	911.6	0.0	50	95.0	1.0	-0.39	0.0	148.7
8.86	5.0E+00	0.00	1000.0	0.75	10	732.1	0.0	732.1	0.0	50	95.0	1.0	-0.37	0.0	119.4
9.19	5.0E+00	0.00	1000.0	0.71	10	656.7	0.0	656.7	0.0	50	95.0	1.0	-0.37	0.0	107.1
9.51	5.0E+00	0.00	943.2	0.48	10	623.9	0.0	623.9	0.0	50	95.0	1.0	-0.32	0.0	101.8
9.84	5.0E+00	0.00	1000.0	0.49	10	761.2	0.0	761.2	0.0	50	95.0	1.0	-0.33	0.0	124.2

ConeTec Inc. - CPT Interpretation
Interpretation Output - Release 1.00.19M
Run No: 04-0913-1621-1095
No: 04-783
Client: MACTEC, Inc.
Project: TVA Plant, Gallatin, TN
Site: CPT-07
Location: TVA Plant
Cone: 20 TON AD163
CPT Date: 04/08/09
CPT Time: 16:17
CPT File: 783CP007.COR
Northing (m): 0.000
Easting (m): 0.000
Elevation (m): 0.000

Water Table (m): 1.52 (ft): 5.0
Unit Weight of Water (default): 62.40 kN/m^3
Su Nkt used: 12.50 Su/P' (nc): 0.30
Averaging Increment (m): 0.10
Phi Method : Robertson and Campanella, 1983
Dr Method : Jamiolkowski - All Sands
State Parameter M: 1.20
Used Unit Weights Assigned to Soil Zones
Values of 1.0E9 or UnDef are printed for parameters that are not valid for the material type (SBT)

Depth (ft)	AvgQt (tsf)	AvgFs (tsf)	AvgRf (%)	AvgUd (ft)	SBT	U.Wt. pcf	TStress (tsf)	EStress (tsf)	Ueq (tsf)	Cn	N60 (blows/ft)	(N1)60 (blows/ft)	Su (tsf)	CRR
0.16	37.9	0.01	0.03	-0.1	8	120.9	0.01	0.01	0.00	2.00	9.1	18.2	UnDef	0.12
0.49	78.7	0.15	0.18	-0.1	8	120.9	0.03	0.03	0.00	2.00	18.8	37.7	UnDef	0.40
0.82	136.8	0.49	0.36	0.0	9	124.1	0.05	0.05	0.00	2.00	26.2	52.4	UnDef	0.00
1.15	118.2	0.48	0.41	-0.3	9	124.1	0.07	0.07	0.00	2.00	22.6	45.3	UnDef	0.00
48	100.0	0.35	0.35	-0.3	9	124.1	0.09	0.09	0.00	2.00	19.2	38.3	UnDef	0.00
80	114.1	0.36	0.31	-0.3	9	124.1	0.11	0.11	0.00	2.00	21.8	43.7	UnDef	0.00
2.13	168.6	0.54	0.32	-0.4	9	124.1	0.13	0.13	0.00	2.00	32.3	64.6	UnDef	0.00
2.46	147.9	0.94	0.63	-0.4	9	124.1	0.15	0.15	0.00	2.00	28.3	56.7	UnDef	0.00
2.79	135.9	0.72	0.53	-1.3	9	124.1	0.17	0.17	0.00	2.00	26.0	52.1	UnDef	0.00
3.12	117.7	0.42	0.35	-1.1	9	124.1	0.19	0.19	0.00	2.00	22.5	45.1	UnDef	0.00
3.44	92.1	0.39	0.42	-0.4	8	120.9	0.21	0.21	0.00	2.00	22.0	44.1	UnDef	0.00
3.77	157.3	0.46	0.29	-0.4	9	124.1	0.23	0.23	0.00	2.00	30.1	60.2	UnDef	0.00
4.10	197.4	0.87	0.44	-0.7	9	124.1	0.25	0.25	0.00	1.99	37.8	75.2	UnDef	0.00
4.43	167.0	0.80	0.48	-1.5	9	124.1	0.27	0.27	0.00	1.91	32.0	61.2	UnDef	0.00
4.76	151.8	0.62	0.41	-1.3	9	124.1	0.29	0.29	0.00	1.85	29.1	53.7	UnDef	0.00
5.09	149.6	0.25	0.16	-0.4	9	124.1	0.31	0.31	0.00	1.79	28.6	51.3	UnDef	0.00
5.41	148.6	0.13	0.08	-2.9	9	124.1	0.33	0.32	0.01	1.76	28.5	50.2	UnDef	0.00
5.74	148.2	0.10	0.07	-7.7	9	124.1	0.35	0.33	0.02	1.74	28.4	49.3	UnDef	0.00
6.07	138.3	0.06	0.04	-8.3	9	124.1	0.38	0.34	0.03	1.71	26.5	45.3	UnDef	0.00
6.40	126.7	0.12	0.09	-7.0	9	124.1	0.40	0.35	0.04	1.69	24.3	40.9	UnDef	0.00
6.73	111.5	0.11	0.10	-3.7	9	124.1	0.42	0.36	0.05	1.66	21.3	35.5	UnDef	0.00
7.05	101.6	0.10	0.09	-2.2	9	124.1	0.44	0.37	0.06	1.64	19.5	31.9	UnDef	0.00
7.38	87.4	0.14	0.16	0.5	9	124.1	0.46	0.38	0.07	1.62	16.7	27.1	UnDef	0.33
7.79	75.3	0.02	0.02	1.0	9	124.1	0.48	0.39	0.09	1.59	14.4	23.0	UnDef	0.23
8.20	62.6	0.01	0.02	3.6	8	120.9	0.51	0.41	0.10	1.57	15.0	23.5	UnDef	0.16
8.53	53.3	0.01	0.02	4.3	8	120.9	0.53	0.42	0.11	1.55	12.8	19.8	UnDef	0.13
8.86	46.0	0.02	0.04	4.6	8	120.9	0.55	0.43	0.12	1.53	11.0	16.9	UnDef	0.11
9.19	44.4	0.02	0.05	5.4	8	120.9	0.57	0.44	0.13	1.51	10.6	16.1	UnDef	0.11
9.51	40.3	0.02	0.05	5.5	8	120.9	0.59	0.45	0.14	1.50	9.7	14.5	UnDef	0.10
9.84	38.7	0.01	0.03	5.7	8	120.9	0.61	0.46	0.15	1.48	9.3	13.7	UnDef	0.10
10.17	36.0	0.01	0.03	6.1	8	120.9	0.63	0.46	0.16	1.47	8.6	12.7	UnDef	0.09
10.50	32.0	0.01	0.03	7.3	8	120.9	0.65	0.47	0.17	1.45	7.7	11.1	UnDef	0.09
10.83	30.6	0.01	0.03	7.2	7	117.8	0.67	0.48	0.18	1.44	9.8	14.0	UnDef	0.09
11.15	30.4	0.01	0.03	7.8	7	117.8	0.68	0.49	0.19	1.42	9.7	13.8	UnDef	0.09
11.48	27.3	0.01	0.04	7.8	7	117.8	0.70	0.50	0.20	1.41	8.7	12.3	UnDef	0.08
31	26.6	0.01	0.04	8.3	7	117.8	0.72	0.51	0.21	1.40	8.5	11.9	UnDef	0.08
.14	25.6	0.01	0.04	8.1	7	117.8	0.74	0.52	0.22	1.39	8.2	11.3	UnDef	0.08
12.47	27.8	0.01	0.04	8.8	7	117.8	0.76	0.53	0.23	1.37	8.9	12.2	UnDef	0.08
12.80	30.4	0.01	0.03	8.5	7	117.8	0.78	0.54	0.24	1.36	9.7	13.2	UnDef	0.09

Run No: 04-0913-1621-1095
CPT File: 783CP007.COR

:h (rt)	AvgQt (tsf)	AvgFs (tsf)	AvgRf (%)	AvgUd (ft)	SBT	U.Wt. pcf	TStress (tsf)	EStress (tsf)	Ueq (tsf)	Cn	N60 (blows/ft)	(N1)60 (blows/ft)	Su (tsf)	CRR
13.12	29.5	0.01	0.03	9.3	7	117.8	0.80	0.55	0.25	1.35	9.4	12.7	UnDef	0.09
13.45	27.3	0.01	0.04	8.7	7	117.8	0.82	0.56	0.26	1.34	8.7	11.7	UnDef	0.08
13.78	25.7	0.01	0.04	9.7	7	117.8	0.84	0.57	0.27	1.33	8.2	10.9	UnDef	0.08
14.11	27.7	0.01	0.04	10.0	7	117.8	0.86	0.57	0.28	1.32	8.9	11.7	UnDef	0.08
14.44	30.1	0.01	0.03	10.4	7	117.8	0.88	0.58	0.29	1.31	9.6	12.6	UnDef	0.09
14.76	33.2	0.01	0.03	10.8	8	120.9	0.90	0.59	0.30	1.30	8.0	10.3	UnDef	0.09
15.09	33.6	0.01	0.03	11.2	8	120.9	0.92	0.60	0.32	1.29	8.0	10.4	UnDef	0.09
15.42	35.0	0.07	0.19	11.5	7	117.8	0.94	0.61	0.33	1.28	11.2	14.3	UnDef	0.09
15.75	39.9	0.03	0.06	11.3	8	120.9	0.96	0.62	0.34	1.27	9.6	12.1	UnDef	0.09
16.08	35.0	0.01	0.03	11.8	8	120.9	0.98	0.63	0.35	1.26	8.4	10.5	UnDef	0.09
16.40	32.4	0.01	0.03	12.1	8	120.9	1.00	0.64	0.36	1.25	7.8	9.7	UnDef	0.09
16.73	28.2	0.01	0.04	12.5	7	117.8	1.02	0.65	0.37	1.24	9.0	11.2	UnDef	0.08
17.06	32.6	0.01	0.03	12.6	8	120.9	1.04	0.66	0.38	1.23	7.8	9.6	UnDef	0.09
17.39	42.5	0.03	0.06	13.2	8	120.9	1.06	0.67	0.39	1.22	10.2	12.5	UnDef	0.09
17.72	60.2	0.08	0.12	13.3	8	120.9	1.08	0.68	0.40	1.21	14.4	17.5	UnDef	0.11
18.04	62.5	0.13	0.20	12.1	8	120.9	1.10	0.69	0.41	1.21	15.0	18.1	UnDef	0.12
18.37	58.5	0.08	0.13	13.8	8	120.9	1.11	0.70	0.42	1.20	14.0	16.8	UnDef	0.11
18.70	57.1	0.06	0.10	14.1	8	120.9	1.13	0.71	0.43	1.19	13.7	16.3	UnDef	0.11
19.03	59.2	0.01	0.02	14.2	8	120.9	1.15	0.72	0.44	1.18	14.2	16.8	UnDef	0.11
19.36	60.1	0.03	0.04	14.5	8	120.9	1.17	0.73	0.45	1.17	14.4	16.9	UnDef	0.11
19.68	53.8	0.03	0.06	15.1	8	120.9	1.19	0.74	0.46	1.17	12.9	15.0	UnDef	0.10
20.01	50.1	0.01	0.02	15.5	8	120.9	1.21	0.75	0.47	1.16	12.0	13.9	UnDef	0.10
20.34	45.0	0.02	0.03	15.9	8	120.9	1.23	0.75	0.48	1.15	10.8	12.4	UnDef	0.09
20.67	45.7	0.01	0.02	15.7	8	120.9	1.25	0.76	0.49	1.14	10.9	12.5	UnDef	0.09
21.00	45.5	0.01	0.02	16.4	8	120.9	1.27	0.77	0.50	1.14	10.9	12.4	UnDef	0.09
21.33	50.5	0.01	0.02	16.8	8	120.9	1.29	0.78	0.51	1.13	12.1	13.7	UnDef	0.10
21.65	48.7	0.01	0.02	16.8	8	120.9	1.31	0.79	0.52	1.12	11.6	13.1	UnDef	0.09
98	50.5	0.01	0.02	17.4	8	120.9	1.33	0.80	0.53	1.12	12.1	13.5	UnDef	0.10
31	51.7	0.02	0.03	17.8	8	120.9	1.35	0.81	0.54	1.11	12.4	13.7	UnDef	0.10
22.64	50.9	0.02	0.04	18.1	8	120.9	1.37	0.82	0.55	1.10	12.2	13.4	UnDef	0.10
22.97	60.3	0.27	0.45	18.4	8	120.9	1.39	0.83	0.56	1.10	14.4	15.8	UnDef	0.11
23.29	59.3	1.86	3.14	18.4	6	114.6	1.41	0.84	0.57	1.09	22.7	24.8	4.63	0.33
23.62	30.6	1.90	6.22	-2.2	3	111.4	1.43	0.85	0.58	1.09	29.3	31.8	2.33	0.00
23.95	20.7	0.99	4.78	-5.6	3	111.4	1.45	0.86	0.59	1.08	19.8	21.4	1.54	0.00
24.28	123.9	1.01	0.81	14.7	9	124.1	1.47	0.87	0.60	1.07	23.7	25.5	UnDef	0.32
24.61	125.6	2.39	1.90	-12.2	7	117.8	1.49	0.88	0.61	1.07	40.1	42.8	UnDef	0.00
24.93	18.5	2.12	11.41	-5.2	3	111.4	1.51	0.88	0.62	1.06	17.8	18.9	1.36	0.00

ConeTec Inc. - CPT Interpretation

Interpretation Output - Release 1.00.19M
Run No: 04-0913-1621-1095
Job No: 04-783
Client: MACTEC, Inc.
Project: TVA Plant, Gallatin, TN
Site: CPT-07
Location: TVA Plant
Cone: 20 TON AD163
CPT Date: 04/08/09
CPT Time: 16:17
CPT File: 783CP007.COR
Northing (m): 0.000
Easting (m): 0.000
Elevation (m): 0.000

Water Table (m): 1.52 (ft): 5.0
Unit Weight of Water (default): 62.40 kN/m^3
Su Nkt used: 12.50 Su/P' (nc): 0.30
Averaging Increment (m): 0.10
Phi Method : Robertson and Campanella, 1983
Dr Method : Jamiolkowski - All Sands
State Parameter M: 1.20
Used Unit Weights Assigned to Soil Zones
Values of 1.0E9 or UnDef are printed for parameters that are not valid for the material type (SBT)

Depth (ft)	k (cm/s)	Bq	Qtn	Rfn	SBTn	Qc1N	DeltaQc1N	Qc1Ncs	Fc (%)	Phi (Deg)	Dr (%)	OCR	State Param	Del(n1)60	(N1)60cs
0.16	5.0E-03	0.00	1000.0	0.03	10	72.6	0.0	72.6	0.0	50	95.0	1.0	-0.08	0.0	18.2
0.49	5.0E-03	0.00	1000.0	0.18	10	150.7	0.0	150.7	0.0	50	95.0	1.0	-0.24	0.0	37.7
0.82	5.0E-02	0.00	1000.0	0.36	10	262.1	0.0	262.1	0.0	50	95.0	1.0	-0.30	0.0	52.4
1.15	5.0E-02	0.00	1000.0	0.41	10	226.5	0.0	226.5	0.0	50	95.0	1.0	-0.31	0.0	45.3
1.48	5.0E-02	0.00	1000.0	0.35	10	191.6	0.0	191.6	0.0	50	95.0	1.0	-0.30	0.0	38.3
80	5.0E-02	0.00	1000.0	0.31	10	218.5	0.0	218.5	0.0	50	95.0	1.0	-0.29	0.0	43.7
13	5.0E-02	0.00	1000.0	0.32	10	322.9	0.0	322.9	0.0	50	95.0	1.0	-0.29	0.0	64.6
2.46	5.0E-02	0.00	974.1	0.63	10	283.3	0.0	283.3	0.0	50	95.0	1.0	-0.35	0.0	56.7
2.79	5.0E-02	0.00	789.2	0.53	10	260.4	0.0	260.4	0.0	50	95.0	1.0	-0.32	0.0	52.1
3.12	5.0E-02	0.00	610.6	0.35	10	225.4	0.0	225.4	0.0	50	94.9	1.0	-0.26	0.0	45.1
3.44	5.0E-03	0.00	432.3	0.42	10	176.4	0.0	176.4	0.0	48	86.5	1.0	-0.24	0.0	44.1
3.77	5.0E-02	0.00	675.2	0.29	10	301.2	0.0	301.2	0.0	50	95.0	1.0	-0.25	0.0	60.2
4.10	5.0E-02	0.00	779.2	0.44	10	378.0	0.0	378.0	0.0	50	95.0	1.0	-0.30	0.0	75.2
4.43	5.0E-02	0.00	610.2	0.48	10	312.7	0.0	312.7	0.0	50	95.0	1.0	-0.28	0.0	61.2
4.76	5.0E-02	0.00	516.0	0.41	10	274.2	0.0	274.2	0.0	48	95.0	1.0	-0.26	0.0	53.7
5.09	5.0E-02	0.00	479.4	0.16	10	262.3	0.0	262.3	0.0	48	94.9	1.0	-0.17	0.0	51.3
5.41	5.0E-02	0.00	461.1	0.08	10	256.4	0.0	256.4	0.0	48	94.3	1.0	-0.11	0.0	50.2
5.74	5.0E-02	0.00	445.7	0.07	10	251.8	0.0	251.8	0.0	48	93.7	1.0	-0.09	0.0	49.3
6.07	5.0E-02	0.00	403.6	0.04	10	231.5	0.0	231.5	0.0	48	91.3	1.0	-0.04	0.0	45.3
6.40	5.0E-02	0.00	358.9	0.10	10	209.0	0.0	209.0	0.0	48	88.4	1.0	-0.10	0.0	40.9
6.73	5.0E-02	0.00	306.8	0.10	10	181.3	0.0	181.3	0.0	46	84.3	1.0	-0.09	0.0	35.5
7.05	5.0E-02	0.00	271.9	0.09	10	163.0	0.0	163.0	0.0	46	81.3	1.0	-0.08	0.0	31.9
7.38	5.0E-02	0.00	227.5	0.16	10	138.4	0.0	138.4	0.0	46	76.6	1.0	-0.10	0.0	27.1
7.79	5.0E-02	0.00	189.5	0.02	10	117.3	0.0	117.3	0.2	44	71.8	1.0	0.08	0.0	23.0
8.20	5.0E-03	0.00	152.4	0.02	10	95.9	0.0	95.9	1.6	44	66.1	1.0	0.12	0.0	23.5
8.53	5.0E-03	0.00	126.6	0.02	10	80.8	0.0	80.8	2.2	44	61.2	1.0	0.12	0.0	19.8
8.86	5.0E-03	0.00	106.7	0.04	9	69.0	0.0	69.0	2.1	42	56.6	1.0	0.07	0.0	16.9
9.19	5.0E-03	0.00	100.5	0.05	9	65.8	0.0	65.8	2.5	42	55.3	1.0	0.07	0.0	16.1
9.51	5.0E-03	0.00	89.2	0.05	9	59.1	0.0	59.1	3.1	42	52.2	1.0	0.07	0.0	14.5
9.84	5.0E-03	0.00	83.8	0.03	9	56.2	0.0	56.2	4.2	42	50.8	1.0	0.13	0.0	13.7
10.17	5.0E-03	0.00	76.2	0.03	9	51.7	0.0	51.7	4.7	40	48.4	1.0	0.13	0.0	12.7
10.50	5.0E-03	0.00	66.2	0.03	9	45.5	0.0	45.5	5.0	40	44.7	1.0	0.13	0.0	11.1
10.83	5.0E-04	0.00	61.9	0.03	9	43.1	0.0	43.1	5.0	40	43.1	1.0	0.14	0.0	14.0
11.15	5.0E-04	0.00	60.3	0.03	9	42.3	0.0	42.3	5.0	40	42.6	1.0	0.14	0.0	13.8
11.48	5.0E-04	0.00	52.9	0.04	9	37.6	0.0	37.6	5.0	40	39.3	1.0	0.14	0.0	12.3
11.81	5.0E-04	0.00	50.7	0.04	9	36.5	0.0	36.5	5.0	38	38.4	1.0	0.14	0.0	11.9
14	5.0E-04	0.00	47.7	0.04	9	34.7	0.0	34.7	5.0	38	36.9	1.0	0.14	0.0	11.3
.47	5.0E-04	0.00	51.1	0.04	9	37.4	0.0	37.4	5.0	38	39.1	1.0	0.14	0.0	12.2
12.80	5.0E-04	0.00	54.9	0.03	9	40.5	0.0	40.5	5.0	40	41.4	1.0	0.14	0.0	13.2

Run No: 04-0913-1621-1095
CPT File: 783CP007.COR

[illegible]h ([illegible]t)	k (cm/s)	Bq	Qtn	Rfn	SBTn	Qc1N	DeltaQc1N	Qc1Ncs	Fc (%)	Phi (Deg)	Dr (%)	OCR	State Param	Del(n1)60	(N1)60cs
13.12	5.0E-04	0.00	52.4	0.03	9	39.0	0.0	39.0	5.0	40	40.3	1.0	0.15	0.0	12.7
13.45	5.0E-04	0.00	47.6	0.04	9	35.8	0.0	35.8	5.0	38	37.9	1.0	0.15	0.0	11.7
13.78	5.0E-04	0.00	43.9	0.04	9	33.4	0.0	33.4	5.0	38	35.8	1.0	0.15	0.0	10.9
14.11	5.0E-04	0.00	46.8	0.04	9	35.8	0.0	35.8	5.0	38	37.8	1.0	0.15	0.0	11.7
14.44	5.0E-04	0.00	50.0	0.03	9	38.5	0.0	38.5	5.0	38	39.9	1.0	0.15	0.0	12.6
14.76	5.0E-03	0.00	54.5	0.03	9	42.2	0.0	42.2	5.0	40	42.6	1.0	0.15	0.0	10.3
15.09	5.0E-03	0.00	54.2	0.03	9	42.3	0.0	42.3	5.0	40	42.6	1.0	0.15	0.0	10.4
15.42	5.0E-04	0.00	55.7	0.19	9	43.8	0.0	43.8	5.0	40	43.6	1.0	0.00	0.0	14.3
15.75	5.0E-03	0.00	62.8	0.06	9	49.6	0.0	49.6	5.0	40	47.2	1.0	0.08	0.0	12.1
16.08	5.0E-03	0.00	53.9	0.03	9	43.1	0.0	43.1	5.0	40	43.1	1.0	0.16	0.0	10.5
16.40	5.0E-03	0.00	49.1	0.03	9	39.6	0.0	39.6	5.0	38	40.8	1.0	0.16	0.0	9.7
16.73	5.0E-04	0.00	41.9	0.04	9	34.3	0.0	34.3	5.0	38	36.6	1.0	0.16	0.0	11.2
17.06	5.0E-03	0.00	47.9	0.03	9	39.3	0.0	39.3	5.0	38	40.5	1.0	0.16	0.0	9.6
17.39	5.0E-03	0.00	62.1	0.06	9	50.9	0.0	50.9	5.0	40	47.9	1.0	0.09	0.0	12.5
17.72	5.0E-03	0.00	87.2	0.13	9	71.5	0.0	71.5	3.8	42	57.7	1.0	0.00	0.0	17.5
18.04	5.0E-03	0.00	89.3	0.20	9	73.8	0.0	73.8	4.5	42	58.6	1.0	-0.04	0.0	18.1
18.37	5.0E-03	0.00	82.3	0.13	9	68.6	0.0	68.6	4.2	42	56.5	1.0	0.00	0.0	16.8
18.70	5.0E-03	0.00	79.1	0.10	9	66.4	0.0	66.4	4.1	42	55.6	1.0	0.03	0.0	16.3
19.03	5.0E-03	0.00	81.1	0.02	9	68.5	0.0	68.5	5.0	42	56.4	1.0	0.17	0.0	16.8
19.36	5.0E-03	0.00	81.2	0.04	9	69.1	0.0	69.1	3.8	42	56.7	1.0	0.09	0.0	16.9
19.68	5.0E-03	0.00	71.4	0.06	9	61.3	0.0	61.3	4.6	40	53.3	1.0	0.08	0.0	15.0
20.01	5.0E-03	0.00	65.5	0.02	9	56.7	0.0	56.7	5.0	40	51.0	1.0	0.17	0.0	13.9
20.34	5.0E-03	0.00	57.9	0.03	9	50.7	0.0	50.7	5.0	40	47.8	1.0	0.14	0.0	12.4
20.67	5.0E-03	0.00	58.2	0.02	9	51.2	0.0	51.2	5.0	40	48.1	1.0	0.17	0.0	12.5
21.00	5.0E-03	0.00	57.2	0.02	9	50.6	0.0	50.6	5.0	40	47.8	1.0	0.17	0.0	12.4
21.33	5.0E-03	0.00	62.8	0.02	9	55.8	0.0	55.8	5.0	40	50.6	1.0	0.18	0.0	13.7
21.65	5.0E-03	0.00	59.7	0.02	9	53.5	0.0	53.5	5.0	40	49.3	1.0	0.18	0.0	13.1
[illegible]98	5.0E-03	0.00	61.2	0.02	9	55.2	0.0	55.2	5.0	40	50.2	1.0	0.18	0.0	13.5
[illegible]31	5.0E-03	0.00	62.0	0.03	9	56.1	0.0	56.1	5.0	40	50.7	1.0	0.14	0.0	13.7
22.64	5.0E-03	0.00	60.2	0.04	9	54.9	0.0	54.9	5.0	40	50.1	1.0	0.12	0.0	13.4
22.97	5.0E-03	0.00	70.9	0.46	9	64.7	0.0	64.7	5.0	40	54.8	1.0	-0.09	0.0	15.8
23.29	5.0E-05	0.00	68.9	3.22	7	63.3	76.3	139.6	25.5	40	54.2	10.0	-0.30	12.9	37.7
23.62	5.0E-08	-0.02	34.3	6.52	1	32.5	UnDef	UnDef	100.0	UnDef	UnDef	10.0	UnDef	UnDef	UnDef
23.95	5.0E-08	-0.04	22.4	5.14	1	21.9	UnDef	UnDef	100.0	UnDef	UnDef	10.0	UnDef	UnDef	UnDef
24.28	5.0E-02	0.00	141.3	0.82	9	130.3	7.0	137.3	6.9	44	74.9	1.0	-0.20	0.8	26.3
24.61	5.0E-04	-0.01	141.7	1.93	9	131.3	35.5	166.8	13.0	44	75.1	1.0	-0.30	6.6	49.4
24.93	5.0E-08	-0.05	19.3	10.00	1	19.3	UnDef	UnDef	100.0	UnDef	UnDef	8.9	UnDef	UnDef	UnDef

ConeTec Inc. - CPT Interpretation
Interpretation Output - Release 1.00.19M

Page: 1a

No: 04-0913-1621-1117
No: 04-783
Client: MACTEC, Inc.
Project: TVA Plant, Gallatin, TN
Site: CPT-08
Location: TVA Plant
Cone: 20 TON AD163
CPT Date: 04/08/09
CPT Time: 11:57
CPT File: 783CP008.COR
Northing (m): 0.000
Easting (m): 0.000
Elevation (m): 0.000

Water Table (m): 1.22 (ft): 4.0
Unit Weight of Water (default): 62.40 kN/m^3
Su Nkt used: 12.50 Su/P' (nc): 0.30
Averaging Increment (m): 0.10
Phi Method : Robertson and Campanella, 1983
Dr Method : Jamiolkowski - All Sands
State Parameter M: 1.20
Used Unit Weights Assigned to Soil Zones
Values of 1.0E9 or UnDef are printed for parameters that are not valid for the material type (SBT)

Depth (ft)	AvgQt (tsf)	AvgFs (tsf)	AvgRf (%)	AvgUd (ft)	SBT	U.Wt. pcf	TStress (tsf)	EStress (tsf)	Ueq (tsf)	Cn	N60 (blows/ft)	(N1)60 (blows/ft)	Su (tsf)	CRR
0.16	29.9	0.16	0.52	-0.1	7	117.8	0.01	0.01	0.00	2.00	9.5	19.1	UnDef	0.10
0.49	64.7	0.37	0.57	-0.4	8	120.9	0.03	0.03	0.00	2.00	15.5	31.0	UnDef	0.26
0.82	67.6	0.29	0.43	-0.2	8	120.9	0.05	0.05	0.00	2.00	16.2	32.4	UnDef	0.28
1.15	67.0	0.20	0.30	-0.3	8	120.9	0.07	0.07	0.00	2.00	16.0	32.1	UnDef	0.28
48	78.3	0.24	0.31	0.0	8	120.9	0.09	0.09	0.00	2.00	18.7	37.5	UnDef	0.39
80	77.5	0.34	0.43	-0.5	8	120.9	0.11	0.11	0.00	2.00	18.6	37.1	UnDef	0.38
2.13	59.3	0.74	1.25	-0.1	7	117.8	0.13	0.13	0.00	2.00	18.9	37.9	UnDef	0.22
2.46	109.7	0.74	0.67	-0.5	8	120.9	0.15	0.15	0.00	2.00	26.3	52.5	UnDef	0.00
2.79	214.3	0.70	0.33	-1.0	9	124.1	0.17	0.17	0.00	2.00	41.0	82.1	UnDef	0.00
3.12	240.3	0.70	0.29	-0.7	10	127.3	0.19	0.19	0.00	2.00	38.4	76.7	UnDef	0.00
3.44	237.0	0.67	0.28	0.3	10	127.3	0.21	0.21	0.00	2.00	37.8	75.7	UnDef	0.00
3.77	215.9	0.92	0.43	0.0	9	124.1	0.23	0.23	0.00	2.00	41.4	82.7	UnDef	0.00
4.10	194.9	0.69	0.35	-0.4	9	124.1	0.25	0.25	0.00	2.00	37.3	74.7	UnDef	0.00
4.43	183.3	0.66	0.36	-0.2	9	124.1	0.27	0.26	0.01	1.97	35.1	69.2	UnDef	0.00
4.76	154.3	0.45	0.29	-0.3	9	124.1	0.29	0.27	0.02	1.93	29.5	57.1	UnDef	0.00
5.09	126.0	0.22	0.17	-0.3	9	124.1	0.31	0.28	0.03	1.90	24.1	45.8	UnDef	0.00
5.41	108.3	0.07	0.06	-0.2	9	124.1	0.33	0.29	0.04	1.86	20.7	38.7	UnDef	0.00
5.74	96.5	0.07	0.07	-0.6	9	124.1	0.35	0.30	0.05	1.83	18.5	33.9	UnDef	0.00
6.07	86.9	0.08	0.09	-1.6	9	124.1	0.37	0.31	0.06	1.80	16.6	30.0	UnDef	0.41
6.40	80.6	0.02	0.02	-1.2	9	124.1	0.39	0.32	0.07	1.77	15.4	27.4	UnDef	0.33
6.73	66.7	0.03	0.05	1.4	8	120.9	0.41	0.33	0.09	1.75	16.0	27.9	UnDef	0.22
7.05	70.7	0.05	0.06	2.7	8	120.9	0.43	0.34	0.10	1.72	16.9	29.1	UnDef	0.24
7.38	68.4	0.10	0.15	3.4	8	120.9	0.45	0.35	0.11	1.70	16.4	27.8	UnDef	0.22
7.79	64.2	0.05	0.08	3.9	8	120.9	0.48	0.36	0.12	1.67	15.4	25.6	UnDef	0.19
8.20	53.2	0.01	0.02	4.3	8	120.9	0.50	0.37	0.13	1.64	12.7	20.9	UnDef	0.14
8.53	47.4	0.03	0.06	4.8	8	120.9	0.52	0.38	0.14	1.62	11.3	18.4	UnDef	0.12
8.86	49.5	0.01	0.02	5.4	8	120.9	0.54	0.39	0.15	1.60	11.8	19.0	UnDef	0.12
9.19	47.6	0.01	0.02	6.0	8	120.9	0.56	0.40	0.16	1.58	11.4	18.0	UnDef	0.12
9.51	57.4	0.03	0.04	6.1	8	120.9	0.58	0.41	0.17	1.56	13.7	21.5	UnDef	0.14
9.84	56.2	0.02	0.03	3.3	8	120.9	0.60	0.42	0.18	1.54	13.5	20.8	UnDef	0.14
10.17	55.9	0.07	0.13	5.4	8	120.9	0.62	0.43	0.19	1.53	13.4	20.4	UnDef	0.13
10.50	52.5	0.13	0.25	5.1	8	120.9	0.64	0.44	0.20	1.51	12.6	19.0	UnDef	0.12
10.83	49.7	0.10	0.19	6.8	8	120.9	0.66	0.45	0.21	1.49	11.9	17.8	UnDef	0.12
11.15	45.3	0.03	0.06	7.5	8	120.9	0.68	0.46	0.22	1.48	10.8	16.0	UnDef	0.11
11.48	45.8	0.04	0.08	7.6	8	120.9	0.70	0.47	0.23	1.46	11.0	16.1	UnDef	0.11
81	43.5	0.04	0.08	7.7	8	120.9	0.72	0.48	0.24	1.45	10.4	15.1	UnDef	0.10
.14	37.3	0.01	0.03	8.4	8	120.9	0.74	0.49	0.25	1.43	8.9	12.8	UnDef	0.09
12.47	40.6	0.08	0.19	8.3	8	120.9	0.76	0.50	0.26	1.42	9.7	13.8	UnDef	0.10
12.80	48.0	0.06	0.13	9.1	8	120.9	0.78	0.51	0.27	1.41	11.5	16.2	UnDef	0.11

th (..c)	AvgQt (tsf)	AvgFs (tsf)	AvgRf (%)	AvgUd (ft)	SBT	U.Wt. pcf	TStress (tsf)	EStress (tsf)	Ueq (tsf)	Cn	N60 (blows/ft)	(N1)60 (blows/ft)	Su (tsf)	CRR
13.12	40.5	0.03	0.07	9.1	8	120.9	0.80	0.52	0.28	1.39	9.7	13.5	UnDef	0.10
13.45	39.5	0.04	0.09	9.2	8	120.9	0.82	0.52	0.30	1.38	9.5	13.1	UnDef	0.09
13.78	40.6	0.04	0.10	9.6	8	120.9	0.84	0.53	0.31	1.37	9.7	13.3	UnDef	0.09
14.11	45.0	0.05	0.10	9.6	8	120.9	0.86	0.54	0.32	1.36	10.8	14.6	UnDef	0.10
14.44	54.4	0.05	0.09	10.6	8	120.9	0.88	0.55	0.33	1.34	13.0	17.5	UnDef	0.11
14.76	53.9	0.10	0.19	10.1	8	120.9	0.90	0.56	0.34	1.33	12.9	17.2	UnDef	0.11
15.09	56.3	0.09	0.16	8.1	8	120.9	0.92	0.57	0.35	1.32	13.5	17.8	UnDef	0.12
15.42	49.0	0.04	0.07	11.4	8	120.9	0.94	0.58	0.36	1.31	11.7	15.4	UnDef	0.10
15.75	44.4	0.04	0.08	12.6	8	120.9	0.96	0.59	0.37	1.30	10.6	13.8	UnDef	0.10
16.08	46.2	0.02	0.03	11.9	8	120.9	0.98	0.60	0.38	1.29	11.1	14.3	UnDef	0.10
16.40	40.1	0.04	0.09	11.9	8	120.9	1.00	0.61	0.39	1.28	9.6	12.3	UnDef	0.09
16.73	38.1	0.05	0.12	12.2	8	120.9	1.02	0.62	0.40	1.27	9.1	11.6	UnDef	0.09
17.06	43.2	0.10	0.23	13.0	8	120.9	1.04	0.63	0.41	1.26	10.3	13.0	UnDef	0.09
17.39	32.8	0.26	0.79	13.4	7	117.8	1.06	0.64	0.42	1.25	10.5	13.1	UnDef	0.10
17.72	21.7	0.33	1.52	29.2	6	114.6	1.08	0.65	0.43	1.24	8.3	10.3	1.65	0.11
18.04	20.4	0.18	0.86	45.5	6	114.6	1.10	0.66	0.44	1.23	7.8	9.7	1.55	0.09
18.37	19.5	0.27	1.36	68.5	6	114.6	1.11	0.67	0.45	1.23	7.5	9.2	1.47	0.10
18.70	18.5	0.60	3.25	-1.5	5	114.6	1.13	0.67	0.46	1.22	8.9	10.8	1.39	0.20
19.03	21.6	1.05	4.87	0.7	3	111.4	1.15	0.68	0.47	1.21	20.7	25.1	1.64	0.00
19.36	20.4	1.27	6.20	1.0	3	111.4	1.17	0.69	0.48	1.20	19.6	23.6	1.54	0.00
19.68	18.4	1.10	5.97	8.3	3	111.4	1.19	0.70	0.49	1.20	17.6	21.1	1.37	0.00
20.01	18.3	0.95	5.20	11.9	3	111.4	1.21	0.71	0.50	1.19	17.5	20.9	1.37	0.00
20.34	22.0	1.16	5.28	13.1	3	111.4	1.22	0.71	0.51	1.18	21.1	24.9	1.66	0.00
20.67	29.7	1.74	5.88	17.5	3	111.4	1.24	0.72	0.52	1.18	28.4	33.4	2.27	0.00
21.00	65.5	2.41	3.67	21.7	5	114.6	1.26	0.73	0.53	1.17	31.4	36.7	5.14	0.44

ConeTec Inc. - CPT Interpretation
Interpretation Output - Release 1.00.19M
Run No: 04-0913-1621-1117
Job No: 04-783
Client: MACTEC, Inc.
Project: TVA Plant, Gallatin, TN
Site: CPT-08
Location: TVA Plant
Cone: 20 TON AD163
CPT Date: 04/08/09
CPT Time: 11:57
CPT File: 783CP008.COR
Northing (m): 0.000
Easting (m): 0.000
Elevation (m): 0.000

Water Table (m): 1.22 (ft): 4.0
Unit Weight of Water (default): 62.40 kN/m^3
Su Nkt used: 12.50 Su/P' (nc): 0.30
Averaging Increment (m): 0.10
Phi Method : Robertson and Campanella, 1983
Dr Method : Jamiolkowski - All Sands
State Parameter M: 1.20
Used Unit Weights Assigned to Soil Zones
Values of 1.0E9 or UnDef are printed for parameters that are not valid for the material type (SBT)

Depth (ft)	k (cm/s)	Bq	Qtn	Rfn	SBTn	Qc1N	DeltaQc1N	Qc1Ncs	Fc (%)	Phi (Deg)	Dr (%)	OCR	State Param	Del(n1)60	(N1)60cs
0.16	5.0E-04	0.00	1000.0	0.52	10	57.2	0.0	57.2	0.0	50	95.0	1.0	-0.34	0.0	19.1
0.49	5.0E-03	0.00	1000.0	0.57	10	124.0	0.0	124.0	0.0	50	95.0	1.0	-0.35	0.0	31.0
0.82	5.0E-03	0.00	1000.0	0.43	10	129.6	0.0	129.6	0.0	50	95.0	1.0	-0.32	0.0	32.4
1.15	5.0E-03	0.00	970.9	0.30	10	128.3	0.0	128.3	0.0	50	93.5	1.0	-0.28	0.0	32.1
1.48	5.0E-03	0.00	881.0	0.31	10	149.9	0.0	149.9	0.0	50	94.3	1.0	-0.28	0.0	37.5
80	5.0E-03	0.00	712.5	0.43	10	148.4	0.0	148.4	0.0	50	91.2	1.0	-0.29	0.0	37.1
13	5.0E-04	0.00	461.8	1.25	9	113.6	0.0	113.6	3.5	48	81.1	1.0	-0.36	0.0	37.9
2.46	5.0E-03	0.00	741.3	0.67	10	210.1	0.0	210.1	0.0	50	95.0	1.0	-0.33	0.0	52.5
2.79	5.0E-02	0.00	1000.0	0.33	10	410.4	0.0	410.4	0.0	50	95.0	1.0	-0.29	0.0	82.1
3.12	5.0E+00	0.00	1000.0	0.29	10	460.2	0.0	460.2	0.0	50	95.0	1.0	-0.28	0.0	76.7
3.44	5.0E+00	0.00	1000.0	0.28	10	454.0	0.0	454.0	0.0	50	95.0	1.0	-0.28	0.0	75.7
3.77	5.0E-02	0.00	938.0	0.43	10	413.6	0.0	413.6	0.0	50	95.0	1.0	-0.31	0.0	82.7
4.10	5.0E-02	0.00	787.4	0.36	10	373.3	0.0	373.3	0.0	50	95.0	1.0	-0.28	0.0	74.7
4.43	5.0E-02	0.00	711.3	0.36	10	351.1	0.0	351.1	0.0	50	95.0	1.0	-0.27	0.0	69.2
4.76	5.0E-02	0.00	575.8	0.29	10	291.9	0.0	291.9	0.0	50	95.0	1.0	-0.23	0.0	57.1
5.09	5.0E-02	0.00	453.0	0.17	10	234.1	0.0	234.1	0.0	48	91.7	1.0	-0.17	0.0	45.8
5.41	5.0E-02	0.00	375.4	0.06	10	197.6	0.0	197.6	0.0	48	86.8	1.0	-0.07	0.0	38.7
5.74	5.0E-02	0.00	322.9	0.07	10	173.1	0.0	173.1	0.0	48	83.0	1.0	-0.07	0.0	33.9
6.07	5.0E-02	0.00	280.9	0.09	10	153.2	0.0	153.2	0.0	46	79.5	1.0	-0.07	0.0	30.0
6.40	5.0E-02	0.00	252.3	0.02	10	139.9	0.0	139.9	0.0	46	76.9	1.0	0.07	0.0	27.4
6.73	5.0E-03	0.00	202.3	0.05	10	114.0	0.0	114.0	0.0	46	71.0	1.0	0.01	0.0	27.9
7.05	5.0E-03	0.00	208.1	0.06	10	119.0	0.0	119.0	0.0	46	72.3	1.0	-0.02	0.0	29.1
7.38	5.0E-03	0.00	195.7	0.15	10	113.6	0.0	113.6	0.0	44	70.9	1.0	-0.08	0.0	27.8
7.79	5.0E-03	0.00	177.4	0.08	10	104.8	0.0	104.8	0.0	44	68.6	1.0	-0.02	0.0	25.6
8.20	5.0E-03	0.00	141.9	0.02	10	85.4	0.0	85.4	1.6	44	62.8	1.0	0.11	0.0	20.9
8.53	5.0E-03	0.00	123.1	0.06	9	75.1	0.0	75.1	1.3	42	59.1	1.0	0.02	0.0	18.4
8.86	5.0E-03	0.00	125.4	0.02	10	77.5	0.0	77.5	2.1	44	60.0	1.0	0.12	0.0	19.0
9.19	5.0E-03	0.00	117.6	0.02	9	73.6	0.0	73.6	2.4	42	58.5	1.0	0.12	0.0	18.0
9.51	5.0E-03	0.00	138.8	0.04	10	87.8	0.0	87.8	0.8	44	63.5	1.0	0.04	0.0	21.5
9.84	5.0E-03	0.00	132.8	0.03	10	85.0	0.0	85.0	1.4	44	62.6	1.0	0.09	0.0	20.8
10.17	5.0E-03	0.00	128.9	0.13	9	83.5	0.0	83.5	1.5	44	62.1	1.0	-0.04	0.0	20.4
10.50	5.0E-03	0.00	118.3	0.25	9	77.6	0.0	77.6	3.2	42	60.0	1.0	-0.09	0.0	19.0
10.83	5.0E-03	0.00	109.4	0.19	9	72.6	0.0	72.6	3.1	42	58.1	1.0	-0.06	0.0	17.8
11.15	5.0E-03	0.00	97.5	0.06	9	65.5	0.0	65.5	2.6	42	55.1	1.0	0.05	0.0	16.0
11.48	5.0E-03	0.00	96.6	0.08	9	65.6	0.0	65.6	2.7	42	55.2	1.0	0.03	0.0	16.1
11.81	5.0E-03	0.00	89.7	0.08	9	61.6	0.0	61.6	3.2	42	53.4	1.0	0.03	0.0	15.1
14	5.0E-03	0.00	75.2	0.03	9	52.3	0.0	52.3	4.9	40	48.7	1.0	0.14	0.0	12.8
.47	5.0E-03	0.00	80.4	0.19	9	56.4	0.0	56.4	5.0	42	50.9	1.0	-0.03	0.0	13.8
12.80	5.0E-03	0.00	93.5	0.13	9	66.1	0.0	66.1	3.3	42	55.4	1.0	-0.01	0.0	16.2

Depth (ft)	k (cm/s)	Bq	Qtn	Rfn	SBTn	Qc1N	DeltaQc1N	Qc1Ncs	Fc (%)	Phi (Deg)	Dr (%)	OCR	State Param	Del(n1)60	(N1)60cs
13.12	5.0E-03	0.00	77.0	0.08	9	55.2	0.0	55.2	4.1	40	50.2	1.0	0.05	0.0	13.5
13.45	5.0E-03	0.00	73.8	0.09	9	53.4	0.0	53.4	4.6	40	49.3	1.0	0.04	0.0	13.1
13.78	5.0E-03	0.00	74.5	0.10	9	54.4	0.0	54.4	4.6	40	49.8	1.0	0.03	0.0	13.3
14.11	5.0E-03	0.00	81.1	0.10	9	59.7	0.0	59.7	4.0	42	52.5	1.0	0.02	0.0	14.6
14.44	5.0E-03	0.00	96.7	0.09	9	71.5	0.0	71.5	2.8	42	57.7	1.0	0.01	0.0	17.5
14.76	5.0E-03	0.00	94.1	0.19	9	70.3	0.0	70.3	4.0	42	57.2	1.0	-0.04	0.0	17.2
15.09	5.0E-03	0.00	96.7	0.16	9	72.8	0.0	72.8	3.5	42	58.2	1.0	-0.03	0.0	17.8
15.42	5.0E-03	0.00	82.6	0.07	9	62.9	0.0	62.9	3.7	42	54.0	1.0	0.05	0.0	15.4
15.75	5.0E-03	0.00	73.3	0.08	9	56.4	0.0	56.4	4.5	40	50.9	1.0	0.05	0.0	13.8
16.08	5.0E-03	0.00	75.2	0.03	9	58.3	0.0	58.3	4.6	40	51.8	1.0	0.12	0.0	14.3
16.40	5.0E-03	0.00	64.1	0.09	9	50.3	0.0	50.3	5.0	40	47.6	1.0	0.05	0.0	12.3
16.73	5.0E-03	0.00	59.8	0.12	9	47.4	0.0	47.4	5.0	40	45.9	1.0	0.03	0.0	11.6
17.06	5.0E-03	0.00	66.9	0.24	9	53.3	0.0	53.3	5.0	40	49.2	1.0	-0.03	0.0	13.0
17.39	5.0E-04	0.00	49.7	0.82	7	40.2	16.6	56.8	16.0	38	41.1	1.0	-0.10	2.9	16.0
17.72	5.0E-05	0.02	31.8	1.60	7	26.4	40.2	66.6	27.6	36	30.0	10.0	-0.12	6.3	16.6
18.04	5.0E-05	0.05	29.4	0.91	7	24.7	23.7	48.4	23.3	36	30.0	10.0	-0.06	4.3	13.9
18.37	5.0E-05	0.09	27.7	1.44	7	23.5	39.8	63.3	28.6	36	30.0	10.0	-0.09	6.0	15.1
18.70	5.0E-06	-0.03	25.8	3.47	6	22.0	88.2	110.2	40.9	UnDef	UnDef	10.0	UnDef	10.8	21.6
19.03	5.0E-08	-0.02	30.0	5.14	1	25.6	UnDef	UnDef	100.0	UnDef	UnDef	10.0	UnDef	UnDef	UnDef
19.36	5.0E-08	-0.02	27.9	6.58	1	24.1	UnDef	UnDef	100.0	UnDef	UnDef	10.0	UnDef	UnDef	UnDef
19.68	5.0E-08	-0.01	24.6	6.39	1	21.5	UnDef	UnDef	100.0	UnDef	UnDef	10.0	UnDef	UnDef	UnDef
20.01	5.0E-08	-0.01	24.2	5.56	1	21.3	UnDef	UnDef	100.0	UnDef	UnDef	10.0	UnDef	UnDef	UnDef
20.34	5.0E-08	0.00	29.1	5.60	1	25.5	UnDef	UnDef	100.0	UnDef	UnDef	10.0	UnDef	UnDef	UnDef
20.67	5.0E-08	0.00	39.3	6.14	1	34.1	UnDef	UnDef	100.0	UnDef	UnDef	10.0	UnDef	UnDef	UnDef
21.00	5.0E-06	0.00	87.9	3.74	7	75.0	82.3	157.4	24.6	UnDef	UnDef	10.0	UnDef	17.9	54.6

ConeTec Inc. - CPT Interpretation

Interpretation Output - Release 1.00.19M

Run No: 04-0913-1621-1139
No: 04-783
Client: MACTEC, Inc.
Project: TVA Plant, Gallatin, TN
Site: CPT-12
Location: TVA Plant
Cone: 20 TON AD163
CPT Date: 04/08/09
CPT Time: 17:11
CPT File: 783CP012.COR
Northing (m): 0.000
Easting (m): 0.000
Elevation (m): 0.000

Water Table (m): 1.52 (ft): 5.0
Unit Weight of Water (default): 62.40 kN/m^3
Su Nkt used: 12.50 Su/P' (nc): 0.30
Averaging Increment (m): 0.10
Phi Method : Robertson and Campanella, 1983
Dr Method : Jamiolkowski - All Sands
State Parameter M: 1.20
Used Unit Weights Assigned to Soil Zones
Values of 1.0E9 or UnDef are printed for parameters that are not valid for the material type (SBT)

Depth (ft)	AvgQt (tsf)	AvgFs (tsf)	AvgRf (%)	AvgUd (ft)	SBT	U.Wt. pcf	TStress (tsf)	EStress (tsf)	Ueq (tsf)	Cn	N60 (blows/ft)	(N1)60 (blows/ft)	Su (tsf)	CRR
0.16	45.8	0.05	0.11	-0.1	8	120.9	0.01	0.01	0.00	2.00	11.0	21.9	UnDef	0.14
0.49	155.8	0.67	0.43	-0.2	9	124.1	0.03	0.03	0.00	2.00	29.8	59.7	UnDef	0.00
0.82	218.4	1.19	0.55	-1.9	9	124.1	0.05	0.05	0.00	2.00	41.8	83.6	UnDef	0.00
1.15	286.1	1.84	0.64	-1.6	9	124.1	0.07	0.07	0.00	2.00	54.8	109.6	UnDef	0.00
.48	243.5	2.02	0.83	-2.1	9	124.1	0.09	0.09	0.00	2.00	46.6	93.3	UnDef	0.00
.80	261.3	3.56	1.36	-1.9	8	120.9	0.11	0.11	0.00	2.00	62.6	125.1	UnDef	0.00
2.13	455.9	5.14	1.13	-12.6	9	124.1	0.13	0.13	0.00	2.00	87.3	174.6	UnDef	0.00
2.46	488.7	5.77	1.18	-5.8	9	124.1	0.15	0.15	0.00	2.00	93.6	187.2	UnDef	0.00
2.79	141.3	3.28	2.32	-1.8	7	117.8	0.17	0.17	0.00	2.00	45.1	90.2	UnDef	0.00
3.12	30.2	1.12	3.70	-0.3	5	114.6	0.19	0.19	0.00	2.00	14.5	29.0	2.40	0.00
3.44	14.7	0.51	3.48	-0.4	4	114.6	0.21	0.21	0.00	2.00	9.4	18.8	1.16	0.11
3.77	16.4	0.29	1.78	1.9	6	114.6	0.23	0.23	0.00	2.00	6.3	12.5	1.29	0.09
4.10	23.0	0.44	1.92	3.2	6	114.6	0.25	0.25	0.00	2.00	8.8	17.6	1.82	0.10
4.43	26.5	0.50	1.89	4.6	6	114.6	0.27	0.27	0.00	1.94	10.2	19.7	2.10	0.11
4.76	27.8	0.61	2.20	-8.1	6	114.6	0.28	0.28	0.00	1.87	10.6	19.9	2.20	0.12
5.09	24.2	0.54	2.22	-11.8	6	114.6	0.30	0.30	0.00	1.82	9.3	16.9	1.91	0.11
5.41	29.5	0.63	2.13	-10.3	6	114.6	0.32	0.31	0.01	1.80	11.3	20.3	2.33	0.12
5.74	57.6	0.85	1.48	-10.8	7	117.8	0.34	0.32	0.02	1.77	18.4	32.6	UnDef	0.21
6.07	57.1	0.59	1.03	-12.2	7	117.8	0.36	0.33	0.03	1.75	18.2	31.8	UnDef	0.18
6.40	31.6	0.79	2.49	-2.6	6	114.6	0.38	0.34	0.04	1.73	12.1	20.9	2.50	0.14
6.73	38.3	0.79	2.07	-2.5	6	114.6	0.40	0.34	0.05	1.70	14.7	25.0	3.03	0.15
7.05	29.3	0.78	2.67	-3.9	6	114.6	0.42	0.35	0.06	1.68	11.2	18.9	2.31	0.14
7.38	35.2	1.13	3.21	-2.9	5	114.6	0.44	0.36	0.07	1.66	16.9	28.1	2.78	0.19
7.79	35.8	1.34	3.75	-2.7	5	114.6	0.46	0.37	0.09	1.64	17.2	28.1	2.83	0.23
8.20	35.6	1.52	4.26	-2.5	4	114.6	0.48	0.38	0.10	1.62	22.8	36.8	2.81	0.00
8.53	40.3	1.61	4.01	-3.0	5	114.6	0.50	0.39	0.11	1.60	19.3	30.8	3.18	0.00
8.86	34.0	1.56	4.60	-3.6	3	111.4	0.52	0.40	0.12	1.58	32.6	51.5	2.68	0.00
9.19	35.7	1.50	4.20	-3.5	4	114.6	0.54	0.41	0.13	1.57	22.8	35.6	2.81	0.00
9.51	30.8	1.43	4.64	-5.3	3	111.4	0.56	0.42	0.14	1.55	29.5	45.7	2.42	0.34
9.84	24.2	0.91	3.77	-6.4	4	114.6	0.58	0.42	0.15	1.53	15.5	23.7	1.89	0.22
10.17	17.2	0.79	4.60	-12.0	3	111.4	0.59	0.43	0.16	1.52	16.5	25.1	1.33	0.28
10.50	32.9	1.23	3.75	-12.1	5	114.6	0.61	0.44	0.17	1.51	15.7	23.7	2.58	0.23
10.83	30.7	1.58	5.14	-13.3	3	111.4	0.63	0.45	0.18	1.49	29.4	43.9	2.41	0.00
11.15	31.0	1.70	5.51	-12.7	3	111.4	0.65	0.46	0.19	1.48	29.6	43.8	2.42	0.00
11.48	25.2	1.34	5.33	-12.6	3	111.4	0.67	0.47	0.20	1.47	24.1	35.4	1.96	0.00
81	48.8	1.62	3.32	-13.0	5	114.6	0.69	0.47	0.21	1.45	23.4	34.0	3.85	0.26
.14	35.3	2.04	5.80	-15.5	3	111.4	0.71	0.48	0.22	1.44	33.8	48.6	2.76	0.00
12.47	31.0	1.26	4.05	-14.4	4	114.6	0.72	0.49	0.23	1.43	19.8	28.3	2.43	0.30
12.80	31.3	1.58	5.06	-10.6	3	111.4	0.74	0.50	0.24	1.42	30.0	42.4	2.44	0.00

Depth (ft)	AvgQt (tsf)	AvgFs (tsf)	AvgRf (%)	AvgUd (ft)	SBT	U.Wt. pcf	TStress (tsf)	EStress (tsf)	Ueq (tsf)	Cn	N60 (blows/ft)	(N1)60 (blows/ft)	Su (tsf)	CRR
13.12	27.0	1.27	4.71	-7.6	3	111.4	0.76	0.51	0.25	1.40	25.9	36.4	2.10	0.00
13.45	36.2	1.53	4.22	-7.3	4	114.6	0.78	0.52	0.26	1.39	23.1	32.2	2.83	0.35
13.78	32.4	1.80	5.55	-12.6	3	111.4	0.80	0.52	0.27	1.38	31.1	42.9	2.53	0.00
14.11	44.7	1.96	4.39	-13.2	4	114.6	0.82	0.53	0.28	1.37	28.5	39.1	3.51	0.00
14.44	36.7	1.72	4.68	-15.5	3	111.4	0.83	0.54	0.29	1.36	35.2	47.9	2.87	0.00
14.76	25.1	1.35	5.37	-13.0	3	111.4	0.85	0.55	0.30	1.35	24.0	32.5	1.94	0.00
15.09	21.0	1.18	5.63	-11.7	3	111.4	0.87	0.56	0.32	1.34	20.1	27.0	1.61	0.00
15.42	29.3	1.14	3.90	-10.7	4	114.6	0.89	0.56	0.33	1.33	18.7	24.9	2.28	0.36
15.75	39.7	1.39	3.50	-11.0	5	114.6	0.91	0.57	0.34	1.32	19.0	25.1	3.10	0.26
16.08	39.0	1.51	3.88	-11.6	5	114.6	0.93	0.58	0.35	1.31	18.7	24.5	3.05	0.32
16.40	28.8	1.27	4.42	-12.1	3	111.4	0.95	0.59	0.36	1.30	27.6	35.9	2.23	0.00
16.73	26.3	1.05	4.01	-11.2	4	114.6	0.96	0.60	0.37	1.29	16.8	21.7	2.02	0.00
17.06	17.8	0.70	3.94	-10.7	3	111.4	0.98	0.61	0.38	1.28	17.1	21.9	1.35	0.21
17.39	30.4	0.49	1.62	-5.8	6	114.6	1.00	0.61	0.39	1.28	11.6	14.8	2.35	0.11
17.72	31.1	0.85	2.74	10.0	6	114.6	1.02	0.62	0.40	1.27	11.9	15.1	2.41	0.18
18.04	28.3	0.92	3.26	7.8	5	114.6	1.04	0.63	0.41	1.26	13.6	17.1	2.18	0.28
18.37	25.8	0.81	3.12	6.6	5	114.6	1.06	0.64	0.42	1.25	12.4	15.5	1.98	0.29
18.70	15.6	0.94	6.03	3.9	3	111.4	1.08	0.65	0.43	1.24	15.0	18.6	1.16	0.00
19.03	22.6	0.83	3.66	5.0	4	114.6	1.09	0.66	0.44	1.23	14.4	17.8	1.72	0.32
19.36	37.9	1.60	4.22	1.3	4	114.6	1.11	0.67	0.45	1.23	24.2	29.7	2.94	0.00
19.68	44.6	1.87	4.19	-5.1	5	114.6	1.13	0.67	0.46	1.22	21.4	26.0	3.48	0.00
20.01	37.0	1.89	5.11	-5.7	3	111.4	1.15	0.68	0.47	1.21	35.4	42.9	2.86	0.00
20.34	38.6	1.75	4.54	-5.5	4	114.6	1.17	0.69	0.48	1.20	24.6	29.6	2.99	0.00
20.67	37.3	1.99	5.33	-5.9	3	111.4	1.19	0.70	0.49	1.20	35.7	42.7	2.89	0.00
21.00	39.9	1.99	5.00	-6.6	3	111.4	1.21	0.71	0.50	1.19	38.2	45.4	3.10	0.00
21.33	26.8	2.03	7.59	-8.4	3	111.4	1.22	0.71	0.51	1.18	25.7	30.4	2.05	0.00
21.65	24.2	1.29	5.35	-6.7	3	111.4	1.24	0.72	0.52	1.18	23.2	27.2	1.84	0.00
[illegible]98	36.4	1.46	4.01	-5.9	5	114.6	1.26	0.73	0.53	1.17	17.4	20.4	2.81	0.00
[illegible]31	39.7	1.60	4.03	-6.5	5	114.6	1.28	0.74	0.54	1.16	19.0	22.1	3.07	0.00
22.64	32.6	1.48	4.55	-3.6	3	111.4	1.30	0.75	0.55	1.16	31.2	36.1	2.51	0.00
22.97	28.2	1.38	4.91	-3.9	3	111.4	1.32	0.76	0.56	1.15	27.0	31.0	2.15	0.00
23.29	43.0	1.14	2.66	-2.3	6	114.6	1.34	0.76	0.57	1.14	16.5	18.8	3.33	0.21
23.62	40.2	1.10	2.73	-1.9	6	114.6	1.35	0.77	0.58	1.14	15.4	17.5	3.11	0.22
23.95	24.8	0.67	2.69	-1.9	5	114.6	1.37	0.78	0.59	1.13	11.9	13.4	1.88	0.32
24.28	12.3	0.32	2.58	-0.9	5	114.6	1.39	0.79	0.60	1.13	5.9	6.6	0.87	0.11
24.61	8.9	0.12	1.29	-0.7	5	114.6	1.41	0.80	0.61	1.12	4.3	4.8	0.60	0.09
24.93	7.5	0.05	0.67	-0.6	1	111.4	1.43	0.81	0.62	1.11	3.6	4.0	0.48	0.09
25.26	13.3	0.13	0.95	0.0	6	114.6	1.45	0.82	0.63	1.11	5.1	5.6	0.94	0.11
25.59	14.6	0.16	1.07	5.8	6	114.6	1.47	0.82	0.64	1.10	5.6	6.1	1.05	0.12
25.92	13.3	0.10	0.75	12.4	6	114.6	1.49	0.83	0.65	1.10	5.1	5.6	0.94	0.11
26.25	12.7	0.11	0.83	13.6	6	114.6	1.50	0.84	0.66	1.09	4.9	5.3	0.89	0.11
26.57	11.4	0.14	1.23	13.9	5	114.6	1.52	0.85	0.67	1.09	5.4	5.9	0.79	0.10
26.90	11.9	0.29	2.45	14.6	5	114.6	1.54	0.86	0.68	1.08	5.7	6.1	0.83	0.10
27.23	24.0	0.49	2.05	16.9	6	114.6	1.56	0.87	0.69	1.07	9.2	9.9	1.80	0.23
27.56	33.6	0.60	1.79	5.3	6	114.6	1.58	0.88	0.70	1.07	12.9	13.7	2.56	0.14
27.89	19.3	0.35	1.79	1.9	6	114.6	1.60	0.88	0.71	1.06	7.4	7.9	1.42	0.17
28.21	17.3	0.37	2.12	1.3	5	114.6	1.62	0.89	0.72	1.06	8.3	8.7	1.25	0.15
28.54	17.7	0.55	3.09	0.3	5	114.6	1.64	0.90	0.74	1.05	8.5	8.9	1.28	0.15
28.87	20.5	0.86	4.18	1.9	3	111.4	1.65	0.91	0.75	1.05	19.6	20.6	1.51	0.00
29.20	20.5	0.87	4.26	3.8	3	111.4	1.67	0.92	0.76	1.04	19.6	20.5	1.50	0.00
29.53	20.6	1.01	4.89	4.1	3	111.4	1.69	0.93	0.77	1.04	19.7	20.5	1.51	0.00
29.86	20.9	1.13	5.39	-0.2	3	111.4	1.71	0.93	0.78	1.04	20.0	20.7	1.54	0.00
30.18	20.5	1.51	7.37	-1.0	3	111.4	1.73	0.94	0.79	1.03	19.6	20.2	1.50	0.00
30.59	20.1	1.68	8.39	-5.8	3	111.4	1.75	0.95	0.80	1.03	19.2	19.7	1.47	0.00
31.00	18.4	1.42	7.73	-8.0	3	111.4	1.77	0.96	0.81	1.02	17.6	17.9	1.33	0.00
31.33	18.6	1.86	10.01	-8.0	3	111.4	1.79	0.97	0.82	1.02	17.8	18.1	1.34	0.00
31.66	91.1	2.53	2.77	-9.1	6	114.6	1.81	0.98	0.83	1.01	34.9	35.3	7.14	0.43
31.99	241.9	3.98	1.65	-20.7	8	120.9	1.83	0.99	0.84	1.01	57.9	58.3	UnDef	0.00
[illegible]32	67.4	5.78	8.58	-28.9	11	130.5	1.85	1.00	0.85	1.00	64.5	64.6	UnDef	0.00
[illegible].64	31.1	1.27	4.10	-26.7	4	114.6	1.87	1.01	0.86	1.00	19.8	19.8	2.33	0.40
32.97	26.9	1.12	4.15	-26.5	4	114.6	1.89	1.02	0.87	0.99	17.2	17.1	2.00	0.00
33.30	30.0	1.32	4.39	-26.1	4	114.6	1.91	1.02	0.88	0.99	19.2	18.9	2.25	0.00

:h (\.t)	AvgQt (tsf)	AvgFs (tsf)	AvgRf (%)	AvgUd (ft)	SBT	U.Wt. pcf	TStress (tsf)	EStress (tsf)	Ueq (tsf)	Cn	N60 (blows/ft)	(N1)60	Su (tsf)	CRR
33.63	31.9	1.52	4.76	-26.2	3	111.4	1.93	1.03	0.89	0.98	30.5	30.1	2.40	0.00
33.96	31.5	1.61	5.11	-26.0	3	111.4	1.94	1.04	0.90	0.98	30.2	29.6	2.36	0.00
34.28	29.3	1.52	5.20	-25.8	3	111.4	1.96	1.05	0.91	0.98	28.1	27.4	2.19	0.00
34.61	31.5	2.28	7.22	-25.8	3	111.4	1.98	1.06	0.92	0.97	30.2	29.4	2.36	0.00
34.94	136.6	2.86	2.09	-25.7	7	117.8	2.00	1.06	0.93	0.97	43.6	42.3	UnDef	0.00

ConeTec Inc. - CPT Interpretation　　　　　　　　　　Page: 1b

Interpretation Output - Release 1.00.19M
Run No: 04-0913-1621-1139
Job No: 04-783
[illegible]ent: MACTEC, Inc.
Project: TVA Plant, Gallatin, TN
Site: CPT-12
Location: TVA Plant
Cone: 20 TON AD163
CPT Date: 04/08/09
CPT Time: 17:11
CPT File: 783CP012.COR
Northing (m): 0.000
Easting (m): 0.000
Elevation (m): 0.000

Water Table (m): 1.52 (ft): 5.0
Unit Weight of Water (default): 62.40 kN/m^3
Su Nkt used: 12.50 Su/P' (nc): 0.30
Averaging Increment (m): 0.10
Phi Method : Robertson and Campanella, 1983
Dr Method : Jamiolkowski - All Sands
State Parameter M: 1.20
Used Unit Weights Assigned to Soil Zones
Values of 1.0E9 or UnDef are printed for parameters that are not valid for the material type (SBT)

Depth (ft)	k (cm/s)	Bq	Qtn	Rfn	SBTn	Qc1N	DeltaQc1N	Qc1Ncs	Fc (%)	Phi (Deg)	Dr (%)	OCR	State Param	Del(n1)60	(N1)60cs
0.16	5.0E-03	0.00	1000.0	0.11	10	87.8	0.0	87.8	0.0	50	95.0	1.0	-0.20	0.0	21.9
0.49	5.0E-02	0.00	1000.0	0.43	10	298.5	0.0	298.5	0.0	50	95.0	1.0	-0.32	0.0	59.7
0.82	5.0E-02	0.00	1000.0	0.55	10	418.2	0.0	418.2	0.0	50	95.0	1.0	-0.34	0.0	83.6
1.15	5.0E-02	0.00	1000.0	0.64	10	548.0	0.0	548.0	0.0	50	95.0	1.0	-0.36	0.0	109.6
1.48	5.0E-02	0.00	1000.0	0.83	10	466.3	0.0	466.3	0.0	50	95.0	1.0	-0.38	0.0	93.3
.80	5.0E-03	0.00	1000.0	1.36	12	500.5	UnDef	UnDef	0.0	50	95.0	1.0	-0.45	UnDef	UnDef
13	5.0E-02	0.00	1000.0	1.13	9	873.1	0.0	873.1	1.0	50	95.0	1.0	-0.42	0.0	174.6
2.46	5.0E-02	0.00	1000.0	1.18	9	936.1	0.0	936.1	1.2	50	95.0	1.0	-0.43	0.0	187.2
2.79	5.0E-04	0.00	823.0	2.33	12	270.7	UnDef	UnDef	0.0	50	95.0	1.0	-0.53	UnDef	UnDef
3.12	5.0E-06	0.00	157.7	3.72	12	57.9	UnDef	UnDef	0.0	UnDef	UnDef	10.0	UnDef	UnDef	UnDef
3.44	5.0E-07	0.00	69.2	3.53	6	28.1	38.4	66.5	26.6	UnDef	UnDef	10.0	UnDef	10.6	29.3
3.77	5.0E-05	0.00	70.7	1.80	7	31.3	18.1	49.5	18.7	40	35.9	10.0	-0.21	3.7	16.3
4.10	5.0E-05	0.00	92.1	1.94	7	44.0	20.2	64.2	16.8	42	44.5	10.0	-0.25	4.3	21.9
4.43	5.0E-05	0.01	98.7	1.91	7	50.3	20.8	71.1	16.0	42	47.6	10.0	-0.26	4.4	24.1
4.76	5.0E-05	-0.01	96.5	2.23	7	50.9	26.0	76.9	17.7	42	47.9	10.0	-0.28	5.3	25.3
5.09	5.0E-05	-0.02	79.4	2.25	7	43.2	27.9	71.1	19.7	42	43.2	10.0	-0.26	5.5	22.4
5.41	5.0E-05	-0.01	94.2	2.15	7	51.9	26.1	78.0	17.5	42	48.4	10.0	-0.27	5.4	25.7
5.74	5.0E-04	-0.01	180.1	1.49	9	100.0	12.5	112.5	9.2	44	67.3	1.0	-0.29	2.4	35.1
6.07	5.0E-04	-0.01	173.3	1.03	9	97.6	5.4	103.0	7.0	44	66.6	1.0	-0.24	1.1	32.9
6.40	5.0E-05	0.00	93.1	2.52	7	53.4	33.0	86.4	19.3	42	49.3	10.0	-0.29	6.6	27.5
6.73	5.0E-05	0.00	110.0	2.09	7	63.8	26.0	89.8	15.8	42	54.4	10.0	-0.28	5.5	30.5
7.05	5.0E-05	-0.01	81.7	2.71	7	48.2	37.8	86.0	21.5	42	46.4	10.0	-0.29	7.2	26.0
7.38	5.0E-06	0.00	96.3	3.25	7	57.4	47.1	104.5	21.9	UnDef	UnDef	10.0	UnDef	11.0	39.1
7.79	5.0E-06	0.00	95.0	3.80	7	57.5	58.8	116.3	23.9	UnDef	UnDef	10.0	UnDef	13.0	41.1
8.20	5.0E-07	-0.01	91.8	4.32	11	56.4	UnDef	UnDef	0.0	UnDef	UnDef	10.0	UnDef	UnDef	UnDef
8.53	5.0E-06	-0.01	101.6	4.06	11	63.0	UnDef	UnDef	0.0	UnDef	UnDef	10.0	UnDef	UnDef	UnDef
8.86	5.0E-08	-0.01	83.8	4.67	11	52.7	UnDef	UnDef	0.0	UnDef	UnDef	10.0	UnDef	UnDef	UnDef
9.19	5.0E-07	-0.01	86.1	4.27	11	54.6	UnDef	UnDef	0.0	UnDef	UnDef	10.0	UnDef	UnDef	UnDef
9.51	5.0E-08	-0.01	72.6	4.72	6	46.7	94.1	140.8	30.0	UnDef	UnDef	10.0	UnDef	32.8	78.5
9.84	5.0E-07	-0.01	55.7	3.86	6	36.4	78.2	114.6	30.6	UnDef	UnDef	10.0	UnDef	17.7	41.4
10.17	5.0E-08	-0.03	38.4	4.76	6	25.6	102.4	128.1	39.2	UnDef	UnDef	10.0	UnDef	25.1	50.1
10.50	5.0E-06	-0.02	73.1	3.82	6	48.4	68.8	117.3	27.0	UnDef	UnDef	10.0	UnDef	13.8	37.4
10.83	5.0E-08	-0.02	66.9	5.25	6	44.8	126.3	171.2	32.6	UnDef	UnDef	10.0	UnDef	37.6	81.5
11.15	5.0E-08	-0.02	66.2	5.62	6	44.8	150.5	195.3	33.9	UnDef	UnDef	10.0	UnDef	40.8	84.6
11.48	5.0E-08	-0.02	52.7	5.47	6	36.2	144.6	180.8	36.6	UnDef	UnDef	10.0	UnDef	35.4	70.8
11.81	5.0E-06	-0.01	101.5	3.36	7	69.4	56.1	125.5	21.7	UnDef	UnDef	10.0	UnDef	13.2	47.1
14	5.0E-08	-0.02	71.6	5.92	11	49.7	UnDef	UnDef	0.0	UnDef	UnDef	10.0	UnDef	UnDef	UnDef
.47	5.0E-07	-0.02	61.8	4.15	6	43.4	89.3	132.7	30.2	UnDef	UnDef	10.0	UnDef	20.6	48.9
12.80	5.0E-08	-0.02	61.2	5.19	6	43.3	141.0	184.4	33.6	UnDef	UnDef	10.0	UnDef	38.9	81.3

ConeTec Inc. - CPT Interpretation
Run No: 04-0913-1621-1139
CPT File: 783CP012.COR

Depth (ft)	k (cm/s)	Bq	Qtn	Rfn	SBTn	Qc1N	DeltaQc1N	Qc1Ncs	Fc (%)	Phi (Deg)	Dr (%)	OCR	State Param	Del(n1)60	(N1)60cs
13.12	5.0E-08	-0.02	51.8	4.85	6	37.1	147.5	184.6	34.9	UnDef	UnDef	10.0	UnDef	36.3	72.7
13.45	5.0E-07	-0.01	68.7	4.32	6	49.3	92.5	141.8	29.4	UnDef	UnDef	10.0	UnDef	22.2	54.4
13.78	5.0E-08	-0.02	60.4	5.69	6	43.9	175.4	219.3	35.3	UnDef	UnDef	10.0	UnDef	42.9	85.9
14.11	5.0E-07	-0.02	82.4	4.47	11	59.9	UnDef	UnDef	0.0	UnDef	UnDef	10.0	UnDef	UnDef	UnDef
14.44	5.0E-08	-0.02	66.5	4.79	6	48.9	116.2	165.1	31.4	UnDef	UnDef	10.0	UnDef	37.6	85.5
14.76	5.0E-08	-0.03	44.3	5.56	1	33.2	UnDef	UnDef	100.0	UnDef	UnDef	10.0	UnDef	UnDef	UnDef
15.09	5.0E-08	-0.03	36.2	5.87	1	27.6	UnDef	UnDef	100.0	UnDef	UnDef	10.0	UnDef	UnDef	UnDef
15.42	5.0E-07	-0.02	50.4	4.02	6	38.2	105.5	143.7	32.5	UnDef	UnDef	10.0	UnDef	21.2	46.1
15.75	5.0E-06	-0.02	67.7	3.58	6	51.3	73.3	124.7	27.0	UnDef	UnDef	10.0	UnDef	14.6	39.8
16.08	5.0E-06	-0.02	65.6	3.97	6	50.1	87.8	137.9	28.8	UnDef	UnDef	10.0	UnDef	16.2	40.7
16.40	5.0E-08	-0.03	47.3	4.57	6	36.7	146.9	183.6	35.3	UnDef	UnDef	10.0	UnDef	35.9	71.9
16.73	5.0E-07	-0.03	42.3	4.16	6	33.2	133.0	166.2	35.6	UnDef	UnDef	10.0	UnDef	21.7	43.4
17.06	5.0E-08	-0.04	27.8	4.17	6	22.4	89.5	111.9	42.5	UnDef	UnDef	10.0	UnDef	21.9	43.8
17.39	5.0E-05	-0.02	47.8	1.67	7	37.9	33.3	71.2	22.5	38	39.5	10.0	-0.17	6.1	21.0
17.72	5.0E-05	0.00	48.3	2.83	7	38.5	64.0	102.5	28.4	38	39.9	10.0	-0.23	9.7	24.7
18.04	5.0E-06	-0.01	43.2	3.38	6	34.9	93.4	128.2	32.3	UnDef	UnDef	10.0	UnDef	14.3	31.3
18.37	5.0E-06	-0.01	38.7	3.26	6	31.6	98.6	130.2	33.4	UnDef	UnDef	10.0	UnDef	13.9	29.4
18.70	5.0E-08	-0.02	22.5	6.47	1	19.0	UnDef	UnDef	100.0	UnDef	UnDef	10.0	UnDef	UnDef	UnDef
19.03	5.0E-07	-0.01	32.7	3.85	6	27.3	109.1	136.3	38.4	UnDef	UnDef	10.0	UnDef	17.8	35.6
19.36	5.0E-07	-0.01	55.3	4.34	6	45.5	123.1	168.6	32.3	UnDef	UnDef	10.0	UnDef	25.0	54.6
19.68	5.0E-06	-0.01	64.5	4.30	6	53.2	109.0	162.2	30.2	UnDef	UnDef	10.0	UnDef	18.9	44.9
20.01	5.0E-08	-0.02	52.5	5.28	6	43.8	175.2	218.9	36.1	UnDef	UnDef	10.0	UnDef	42.9	85.7
20.34	5.0E-07	-0.02	54.1	4.68	6	45.4	150.1	195.5	33.8	UnDef	UnDef	10.0	UnDef	27.4	57.0
20.67	5.0E-08	-0.02	51.7	5.51	6	43.7	174.7	218.4	37.0	UnDef	UnDef	10.0	UnDef	42.7	85.5
21.00	5.0E-08	-0.02	54.7	5.16	6	46.4	185.8	232.2	35.1	UnDef	UnDef	10.0	UnDef	45.4	90.9
21.33	5.0E-08	-0.03	35.8	7.96	1	31.0	UnDef	UnDef	100.0	UnDef	UnDef	10.0	UnDef	UnDef	UnDef
21.65	5.0E-08	-0.03	31.7	5.64	1	27.8	UnDef	UnDef	100.0	UnDef	UnDef	10.0	UnDef	UnDef	UnDef
.98	5.0E-06	-0.02	48.0	4.16	6	41.6	136.1	177.7	33.7	UnDef	UnDef	10.0	UnDef	18.7	39.1
.31	5.0E-06	-0.02	51.9	4.16	6	45.1	126.7	171.8	32.6	UnDef	UnDef	10.0	UnDef	18.9	41.0
22.64	5.0E-08	-0.02	41.9	4.74	6	36.9	147.7	184.6	37.7	UnDef	UnDef	10.0	UnDef	36.1	72.3
22.97	5.0E-08	-0.03	35.5	5.15	1	31.7	UnDef	UnDef	100.0	UnDef	UnDef	10.0	UnDef	UnDef	UnDef
23.29	5.0E-05	-0.02	54.5	2.74	7	48.1	63.9	112.0	26.4	40	46.3	10.0	-0.25	10.5	29.3
23.62	5.0E-05	-0.02	50.3	2.83	7	44.8	69.6	114.3	27.8	38	44.2	10.0	-0.24	10.8	28.3
23.95	5.0E-06	-0.03	30.0	2.84	6	27.5	109.9	137.3	35.5	UnDef	UnDef	10.0	UnDef	13.4	26.9
24.28	5.0E-06	-0.06	13.8	2.91	6	13.5	54.0	67.5	50.5	UnDef	UnDef	5.3	UnDef	6.6	13.2
24.61	5.0E-06	-0.08	9.4	1.54	6	9.8	39.0	48.8	49.9	UnDef	UnDef	3.0	UnDef	4.8	9.5
24.93	1.0E-07	-0.11	7.5	0.83	6	8.1	32.6	40.7	48.0	UnDef	UnDef	2.2	UnDef	4.0	8.0
25.26	5.0E-05	-0.05	14.5	1.06	6	14.4	57.5	71.8	36.5	32	30.0	5.7	-0.01	5.6	11.2
25.59	5.0E-05	-0.04	15.9	1.19	6	15.7	62.8	78.5	36.0	32	30.0	6.6	-0.03	6.1	12.3
25.92	5.0E-05	-0.02	14.2	0.85	6	14.2	55.2	69.4	34.8	32	30.0	5.5	0.01	5.5	11.1
26.25	5.0E-05	-0.02	13.3	0.94	6	13.5	54.1	67.7	37.0	32	30.0	5.0	0.01	5.3	10.6
26.57	5.0E-06	-0.02	11.6	1.42	6	12.1	48.3	60.4	44.3	UnDef	UnDef	4.1	UnDef	5.9	11.8
26.90	5.0E-06	-0.02	12.0	2.82	4	12.5	50.1	62.6	53.0	UnDef	UnDef	4.3	UnDef	6.1	12.3
27.23	5.0E-05	-0.01	25.9	2.19	6	25.2	92.9	118.2	34.5	36	30.0	10.0	-0.13	9.6	19.4
27.56	5.0E-05	-0.02	36.6	1.88	7	35.1	52.0	87.1	27.4	38	37.3	10.0	-0.15	8.2	21.9
27.89	5.0E-05	-0.04	20.1	1.95	6	20.1	80.5	100.6	37.4	34	30.0	9.5	-0.09	7.9	15.8
28.21	5.0E-06	-0.04	17.5	2.34	6	17.9	71.5	89.4	42.4	UnDef	UnDef	7.7	UnDef	8.7	17.5
28.54	5.0E-06	-0.05	17.8	3.41	6	18.2	72.9	91.1	47.6	UnDef	UnDef	7.9	UnDef	8.9	17.8
28.87	5.0E-08	-0.04	20.7	4.55	1	21.0	UnDef	UnDef	100.0	UnDef	UnDef	10.0	UnDef	UnDef	UnDef
29.20	5.0E-08	-0.03	20.5	4.64	1	20.9	UnDef	UnDef	100.0	UnDef	UnDef	9.8	UnDef	UnDef	UnDef
29.53	5.0E-08	-0.03	20.4	5.33	1	20.9	UnDef	UnDef	100.0	UnDef	UnDef	9.8	UnDef	UnDef	UnDef
29.86	5.0E-08	-0.04	20.6	5.87	1	21.2	UnDef	UnDef	100.0	UnDef	UnDef	9.9	UnDef	UnDef	UnDef
30.18	5.0E-08	-0.04	19.9	8.05	1	20.6	UnDef	UnDef	100.0	UnDef	UnDef	9.4	UnDef	UnDef	UnDef
30.59	5.0E-08	-0.05	19.3	9.19	1	20.1	UnDef	UnDef	100.0	UnDef	UnDef	8.9	UnDef	UnDef	UnDef
31.00	5.0E-08	-0.06	17.3	8.55	1	18.3	UnDef	UnDef	100.0	UnDef	UnDef	7.5	UnDef	UnDef	UnDef
31.33	5.0E-08	-0.06	17.3	10.00	1	18.5	UnDef	UnDef	100.0	UnDef	UnDef	7.5	UnDef	UnDef	UnDef
31.66	5.0E-05	-0.01	91.4	2.83	7	90.2	65.7	155.9	20.8	42	64.3	10.0	-0.31	12.6	47.9
31.99	5.0E-03	-0.01	243.3	1.66	9	238.3	22.0	260.3	8.2	46	92.2	1.0	-0.33	3.3	61.6
32	1.0E-15	-0.03	65.7	8.83	11	66.0	UnDef	UnDef	0.0	40	55.4	1.0	-16.35	UnDef	UnDef
.64	5.0E-07	-0.06	29.0	4.36	6	30.3	121.1	151.4	42.4	UnDef	UnDef	10.0	UnDef	19.8	39.5
32.97	5.0E-07	-0.07	24.7	4.46	1	26.2	UnDef	UnDef	100.0	UnDef	UnDef	10.0	UnDef	UnDef	UnDef
33.30	5.0E-07	-0.06	27.4	4.69	1	29.0	UnDef	UnDef	100.0	UnDef	UnDef	10.0	UnDef	UnDef	UnDef

:h (rt)	k (cm/s)	Bq	Qtn	Rfn	SBTn	Qc1N	DeltaQc1N	Qc1Ncs	Fc (%)	Phi (Deg)	Dr (%)	OCR	State Param	Del(n1)60	(N1)60cs
33.63	5.0E-08	-0.06	29.0	5.07	1	30.7	UnDef	UnDef	100.0	UnDef	UnDef	10.0	UnDef	UnDef	UnDef
33.96	5.0E-08	-0.06	28.4	5.44	1	30.2	UnDef	UnDef	100.0	UnDef	UnDef	10.0	UnDef	UnDef	UnDef
34.28	5.0E-08	-0.06	26.1	5.57	1	28.0	UnDef	UnDef	100.0	UnDef	UnDef	10.0	UnDef	UnDef	UnDef
34.61	5.0E-08	-0.06	27.9	7.71	1	30.0	UnDef	UnDef	100.0	UnDef	UnDef	10.0	UnDef	UnDef	UnDef
34.94	5.0E-04	-0.01	126.5	2.12	7	129.6	45.7	175.3	14.8	44	74.7	1.0	-0.30	8.2	50.5

ConeTec Inc. - CPT Interpretation
Interpretation Output - Release 1.00.19M
Run No: 04-0913-1621-1161
[illegible] No: 04-783
Client: MACTEC, Inc.
Project: TVA Plant, Gallatin, TN
Site: CPT-13
Location: TVA Plant
Cone: 20 TON AD163
CPT Date: 04/08/09
CPT Time: 10:31
CPT File: 783CP013.COR
Northing (m): 0.000
Easting (m): 0.000
Elevation (m): 0.000

Water Table (m): 1.13 (ft): 3.7
Unit Weight of Water (default): 62.40 kN/m^3
Su Nkt used: 12.50 Su/P' (nc): 0.30
Averaging Increment (m): 0.10
Phi Method : Robertson and Campanella, 1983
Dr Method : Jamiolkowski - All Sands
State Parameter M: 1.20
Used Unit Weights Assigned to Soil Zones
Values of 1.0E9 or UnDef are printed for parameters that are not valid for the material type (SBT)

Depth (ft)	AvgQt (tsf)	AvgFs (tsf)	AvgRf (%)	AvgUd (ft)	SBT	U.Wt. pcf	TStress (tsf)	EStress (tsf)	Ueq (tsf)	Cn	N60 (blows/ft)	(N1)60 (blows/ft)	Su (tsf)	CRR
0.16	19.1	0.68	3.54	0.2	4	114.6	0.01	0.01	0.00	2.00	12.2	24.4	1.53	0.00
0.49	33.2	1.57	4.73	0.2	3	111.4	0.03	0.03	0.00	2.00	31.8	63.5	2.65	0.00
0.82	33.5	1.85	5.54	0.1	3	111.4	0.05	0.05	0.00	2.00	32.1	64.1	2.67	0.00
1.15	32.6	1.84	5.64	-1.0	3	111.4	0.06	0.06	0.00	2.00	31.2	62.5	2.60	0.00
[illegible]48	27.5	1.66	6.03	0.3	3	111.4	0.08	0.08	0.00	2.00	26.3	52.7	2.19	0.00
[illegible]	21.8	1.28	5.87	-0.7	3	111.4	0.10	0.10	0.00	2.00	20.9	41.8	1.74	0.00
2.13	23.4	0.84	3.59	-1.5	5	114.6	0.12	0.12	0.00	2.00	11.2	22.4	1.87	0.00
2.46	50.5	0.34	0.66	-0.8	8	120.9	0.14	0.14	0.00	2.00	12.1	24.2	UnDef	0.16
2.79	57.6	0.20	0.34	-1.7	8	120.9	0.16	0.16	0.00	2.00	13.8	27.6	UnDef	0.20
3.12	51.5	0.19	0.36	-1.2	8	120.9	0.18	0.18	0.00	2.00	12.3	24.6	UnDef	0.17
3.44	44.4	0.14	0.32	-2.8	8	120.9	0.20	0.20	0.00	2.00	10.6	21.3	UnDef	0.14
3.77	27.7	0.11	0.40	-6.5	7	117.8	0.22	0.22	0.00	2.00	8.8	17.7	UnDef	0.09
4.10	10.1	0.07	0.70	-1.1	6	114.6	0.24	0.22	0.01	2.00	3.9	7.7	0.79	0.00
4.43	5.1	0.02	0.30	0.4	1	111.4	0.26	0.23	0.02	2.00	2.4	4.9	0.39	0.00
4.76	6.2	0.05	0.80	3.1	1	111.4	0.27	0.24	0.03	2.00	3.0	6.0	0.48	0.00
5.09	18.8	0.11	0.56	-1.7	6	114.6	0.29	0.25	0.04	2.00	7.2	14.4	1.48	0.09
5.41	12.3	0.13	1.06	-6.8	6	114.6	0.31	0.26	0.05	1.97	4.7	9.3	0.96	0.08
5.74	8.6	0.12	1.39	-4.9	5	114.6	0.33	0.27	0.06	1.94	4.1	8.0	0.66	0.09
6.07	8.2	0.12	1.47	2.9	5	114.6	0.35	0.27	0.07	1.91	3.9	7.5	0.63	0.09
6.40	6.7	0.10	1.43	19.4	5	114.6	0.37	0.28	0.08	1.88	3.2	6.0	0.50	0.09
6.73	13.6	0.13	0.96	6.9	6	114.6	0.39	0.29	0.09	1.85	5.2	9.6	1.06	0.09
7.05	5.3	0.07	1.33	9.7	1	111.4	0.40	0.30	0.10	1.83	2.5	4.6	0.39	0.09
7.38	2.9	0.02	0.69	31.5	1	111.4	0.42	0.31	0.11	1.80	1.4	2.5	0.20	0.00
7.79	10.6	0.08	0.76	26.0	6	114.6	0.45	0.32	0.13	1.77	4.1	7.2	0.81	0.08
8.20	10.4	0.10	0.96	10.6	6	114.6	0.47	0.33	0.14	1.74	4.0	6.9	0.79	0.08
8.53	11.2	0.12	1.03	13.5	6	114.6	0.49	0.34	0.15	1.72	4.3	7.4	0.86	0.09
8.86	12.0	0.08	0.67	13.0	6	114.6	0.51	0.35	0.16	1.70	4.6	7.8	0.92	0.08
9.19	7.7	0.07	0.84	15.7	5	114.6	0.53	0.35	0.17	1.68	3.7	6.2	0.58	0.08
9.51	10.2	0.10	0.93	14.9	6	114.6	0.55	0.36	0.18	1.66	3.9	6.5	0.77	0.08
9.84	8.5	0.09	1.07	18.8	5	114.6	0.56	0.37	0.19	1.64	4.1	6.6	0.63	0.09
10.17	14.0	0.13	0.90	16.4	6	114.6	0.58	0.38	0.20	1.62	5.4	8.7	1.07	0.09
10.50	12.2	0.16	1.27	15.2	6	114.6	0.60	0.39	0.21	1.60	4.7	7.5	0.93	0.09
10.83	3.8	0.08	2.10	32.0	3	111.4	0.62	0.40	0.22	1.59	3.7	5.8	0.26	0.00
11.15	4.1	0.03	0.74	47.5	1	111.4	0.64	0.41	0.23	1.57	1.9	3.1	0.27	0.08
11.48	11.4	0.07	0.57	40.5	6	114.6	0.66	0.41	0.24	1.55	4.4	6.8	0.86	0.08
[illegible]81	7.4	0.06	0.81	46.7	5	114.6	0.68	0.42	0.25	1.54	3.6	5.5	0.54	0.09
[illegible].14	14.9	0.19	1.25	20.7	6	114.6	0.69	0.43	0.26	1.52	5.7	8.7	1.14	0.09
12.47	6.4	0.15	2.35	17.6	4	114.6	0.71	0.44	0.27	1.51	4.1	6.2	0.46	0.09
12.80	3.8	0.03	0.66	25.3	1	111.4	0.73	0.45	0.28	1.49	1.8	2.7	0.24	0.00

ConeTec Inc. - CPT Interpretation

Run No: 04-0913-1621-1161

CPT File: 783CP013.COR

Depth (ft)	AvgQt (tsf)	AvgFs (tsf)	AvgRf (%)	AvgUd (ft)	SBT	U.Wt. pcf	TStress (tsf)	EStress (tsf)	Ueq (tsf)	Cn	N60 (blows/ft)	(N1)60 (blows/ft)	Su (tsf)	CRR
13.12	4.2	0.05	1.07	45.0	1	111.4	0.75	0.46	0.29	1.48	2.0	3.0	0.28	0.08
13.45	7.2	0.17	2.37	19.1	4	114.6	0.77	0.46	0.30	1.47	4.6	6.7	0.51	0.09
13.78	2.1	0.07	3.37	28.9	3	111.4	0.79	0.47	0.31	1.46	2.0	2.9	0.10	0.00
14.11	11.1	0.11	0.95	26.8	6	114.6	0.81	0.48	0.32	1.44	4.3	6.1	0.82	0.09
14.44	4.5	0.14	3.12	20.0	3	111.4	0.82	0.49	0.34	1.43	4.3	6.2	0.29	0.00
14.76	5.8	0.03	0.43	28.7	1	111.4	0.84	0.50	0.35	1.42	2.8	4.0	0.40	0.09
15.09	1.8	0.01	0.56	41.8	1	111.4	0.86	0.51	0.36	1.41	0.9	1.2	0.07	0.00
15.42	1.4	0.01	0.73	43.4	1	111.4	0.88	0.51	0.37	1.40	0.7	0.9	0.04	0.00
15.75	1.2	0.01	0.85	36.6	1	111.4	0.90	0.52	0.38	1.39	0.6	0.8	0.02	0.00
16.08	1.2	0.01	0.80	43.5	1	111.4	0.92	0.53	0.39	1.37	0.6	0.8	0.03	0.00
16.40	1.2	0.01	0.82	46.7	1	111.4	0.93	0.54	0.40	1.36	0.6	0.8	0.02	0.00
16.73	1.6	0.01	0.63	47.3	1	111.4	0.95	0.55	0.41	1.35	0.8	1.0	0.05	0.00
17.06	2.0	0.01	0.51	51.5	1	111.4	0.97	0.55	0.42	1.34	0.9	1.3	0.08	0.00
17.39	3.0	0.01	0.34	61.1	1	111.4	0.99	0.56	0.43	1.33	1.4	1.9	0.16	0.00
17.72	3.3	0.02	0.45	72.2	1	111.4	1.01	0.57	0.44	1.33	1.6	2.1	0.19	0.00
18.04	11.4	0.12	1.01	46.3	6	114.6	1.03	0.58	0.45	1.32	4.4	5.7	0.83	0.10
18.37	8.3	0.26	3.10	36.9	4	114.6	1.04	0.59	0.46	1.31	5.3	6.9	0.58	0.09
18.70	10.2	0.44	4.26	52.8	3	111.4	1.06	0.59	0.47	1.30	9.8	12.7	0.73	0.00
19.03	10.6	0.72	6.80	49.6	3	111.4	1.08	0.60	0.48	1.29	10.2	13.1	0.76	0.00
19.36	11.4	0.87	7.62	42.7	3	111.4	1.10	0.61	0.49	1.28	11.0	14.0	0.83	0.00
19.68	11.0	0.79	7.21	53.2	3	111.4	1.12	0.62	0.50	1.27	10.5	13.4	0.79	0.00
20.01	13.0	0.81	6.19	62.7	3	111.4	1.14	0.63	0.51	1.26	12.5	15.8	0.95	0.00
20.34	17.5	0.89	5.07	69.9	3	111.4	1.15	0.63	0.52	1.26	16.8	21.1	1.31	0.00
20.67	29.0	1.43	4.93	-2.7	3	111.4	1.17	0.64	0.53	1.25	27.8	34.6	2.23	0.00
21.00	37.6	1.66	4.41	-21.3	4	114.6	1.19	0.65	0.54	1.24	24.0	29.7	2.91	0.00
21.33	22.4	1.58	7.05	-20.0	3	111.4	1.21	0.66	0.55	1.23	21.4	26.4	1.69	0.00
21.65	19.7	1.66	8.43	-18.9	3	111.4	1.23	0.67	0.56	1.22	18.9	23.1	1.48	0.00
21.98	15.8	1.50	9.48	-20.0	3	111.4	1.25	0.68	0.57	1.22	15.1	18.4	1.17	0.00
22.31	15.0	1.54	10.31	-20.2	3	111.4	1.26	0.68	0.58	1.21	14.3	17.4	1.10	0.00
22.64	14.4	1.50	10.38	-19.7	3	111.4	1.28	0.69	0.59	1.20	13.8	16.6	1.05	0.00
22.97	16.4	1.47	8.98	-19.6	3	111.4	1.30	0.70	0.60	1.20	15.7	18.7	1.20	0.00
23.29	15.9	1.46	9.15	-19.9	3	111.4	1.32	0.71	0.61	1.19	15.3	18.2	1.17	0.00
23.62	13.7	1.43	10.44	-20.8	3	111.4	1.34	0.72	0.62	1.18	13.1	15.5	0.99	0.00
23.95	13.4	1.36	10.10	-21.0	3	111.4	1.36	0.72	0.63	1.18	12.9	15.1	0.97	0.00
24.28	12.7	1.22	9.62	-21.0	3	111.4	1.37	0.73	0.64	1.17	12.2	14.2	0.91	0.00
24.61	15.0	1.15	7.70	-20.9	3	111.4	1.39	0.74	0.65	1.16	14.3	16.7	1.09	0.00
24.93	14.2	1.07	7.53	-20.9	3	111.4	1.41	0.75	0.66	1.16	13.6	15.8	1.03	0.00
25.26	13.9	1.32	9.50	-20.9	3	111.4	1.43	0.76	0.67	1.15	13.3	15.3	1.00	0.00
25.59	74.8	2.46	3.28	-20.1	6	114.6	1.45	0.76	0.68	1.14	28.7	32.8	5.87	0.43
25.92	24.8	3.91	15.76	-14.4	3	111.4	1.47	0.77	0.69	1.14	23.8	27.0	1.87	0.00

ConeTec Inc. - CPT Interpretation
Interpretation Output - Release 1.00.19M
Run No: 04-0913-1621-1161
Job No: 04-783
Client: MACTEC, Inc.
Project: TVA Plant, Gallatin, TN
Site: CPT-13
Location: TVA Plant
Cone: 20 TON AD163
CPT Date: 04/08/09
CPT Time: 10:31
CPT File: 783CP013.COR
Northing (m): 0.000
Easting (m): 0.000
Elevation (m): 0.000

Water Table (m): 1.13 (ft): 3.7
Unit Weight of Water (default): 62.40 kN/m^3
Su Nkt used: 12.50 Su/P' (nc): 0.30
Averaging Increment (m): 0.10
Phi Method : Robertson and Campanella, 1983
Dr Method : Jamiolkowski - All Sands
State Parameter M: 1.20
Used Unit Weights Assigned to Soil Zones
Values of 1.0E9 or UnDef are printed for parameters that are not valid for the material type (SBT)

Depth (ft)	k (cm/s)	Bq	Qtn	Rfn	SBTn	Qc1N	DeltaQc1N	Qc1Ncs	Fc (%)	Phi (Deg)	Dr (%)	OCR	State Param	Del(n1)60	(N1)60cs
0.16	5.0E-07	0.00	1000.0	3.54	12	36.6	UnDef	UnDef	0.0	UnDef	UnDef	10.0	UnDef	UnDef	UnDef
0.49	5.0E-08	0.00	1000.0	4.74	12	63.5	UnDef	UnDef	0.0	UnDef	UnDef	10.0	UnDef	UnDef	UnDef
0.82	5.0E-08	0.00	723.4	5.55	11	64.1	UnDef	UnDef	0.0	UnDef	UnDef	10.0	UnDef	UnDef	UnDef
1.15	5.0E-08	0.00	504.7	5.65	11	62.5	UnDef	UnDef	0.0	UnDef	UnDef	10.0	UnDef	UnDef	UnDef
1.48	5.0E-08	0.00	331.4	6.05	11	52.7	UnDef	UnDef	0.0	UnDef	UnDef	10.0	UnDef	UnDef	UnDef
1.80	5.0E-08	0.00	215.2	5.90	11	41.8	UnDef	UnDef	0.0	UnDef	UnDef	10.0	UnDef	UnDef	UnDef
2.13	5.0E-06	0.00	195.0	3.61	12	44.9	UnDef	UnDef	0.0	UnDef	UnDef	10.0	UnDef	UnDef	UnDef
2.46	5.0E-03	0.00	362.8	0.67	9	96.8	0.0	96.8	1.3	48	75.4	1.0	-0.27	0.0	24.2
2.79	5.0E-03	0.00	361.8	0.34	10	110.3	0.0	110.3	0.0	48	77.2	1.0	-0.21	0.0	27.6
3.12	5.0E-03	0.00	287.2	0.36	10	98.6	0.0	98.6	0.2	46	72.3	1.0	-0.19	0.0	24.6
3.44	5.0E-03	0.00	222.7	0.32	10	85.0	0.0	85.0	0.8	46	66.6	1.0	-0.16	0.0	21.3
3.77	5.0E-04	-0.01	127.2	0.40	9	53.0	0.0	53.0	4.3	44	51.8	1.0	-0.13	0.0	17.7
4.10	5.0E-05	0.00	43.9	0.71	7	19.3	8.5	27.8	16.4	38	30.0	10.0	-0.08	1.8	9.5
4.43	1.0E-07	0.00	20.7	0.31	7	9.7	0.0	9.7	5.0	UnDef	UnDef	10.0	UnDef	0.0	4.9
4.76	1.0E-07	0.01	24.8	0.84	7	12.0	14.0	26.0	25.2	UnDef	UnDef	10.0	UnDef	3.0	9.0
5.09	5.0E-05	-0.01	74.2	0.57	9	36.0	5.2	41.2	9.8	40	38.6	10.0	-0.11	1.2	15.6
5.41	5.0E-05	-0.02	46.5	1.09	7	23.6	13.9	37.4	18.9	38	30.0	10.0	-0.12	2.8	12.1
5.74	5.0E-06	-0.03	31.2	1.45	7	16.4	22.9	39.3	26.9	UnDef	UnDef	10.0	UnDef	4.6	12.6
6.07	5.0E-06	0.00	28.5	1.53	7	15.3	26.6	41.9	28.8	UnDef	UnDef	10.0	UnDef	4.9	12.4
6.40	5.0E-06	0.08	22.2	1.51	7	12.3	34.5	46.7	32.6	UnDef	UnDef	10.0	UnDef	5.1	11.1
6.73	5.0E-05	0.01	45.2	0.99	7	24.6	13.8	38.4	18.5	38	30.0	10.0	-0.11	2.8	12.4
7.05	1.0E-07	0.04	16.3	1.44	6	9.4	37.8	47.2	37.6	UnDef	UnDef	6.8	UnDef	4.6	9.2
7.38	1.0E-07	0.35	8.0	0.81	6	5.1	20.4	25.5	46.2	UnDef	UnDef	2.4	UnDef	2.5	5.0
7.79	5.0E-05	0.07	31.9	0.79	7	18.4	13.9	32.3	21.1	36	30.0	10.0	-0.05	2.7	9.8
8.20	5.0E-05	0.02	30.2	1.01	7	17.7	18.1	35.8	23.9	36	30.0	10.0	-0.07	3.2	10.1
8.53	5.0E-05	0.03	31.6	1.08	7	18.8	19.0	37.8	23.8	36	30.0	10.0	-0.08	3.4	10.7
8.86	5.0E-05	0.02	33.2	0.70	7	20.0	12.9	32.8	19.7	36	30.0	10.0	-0.05	2.5	10.4
9.19	5.0E-06	0.04	20.3	0.90	7	12.7	22.6	35.3	29.0	UnDef	UnDef	9.7	UnDef	4.2	10.4
9.51	5.0E-05	0.03	26.6	0.98	7	16.6	20.0	36.7	25.5	36	30.0	10.0	-0.06	3.4	9.9
9.84	5.0E-06	0.05	21.2	1.14	7	13.6	28.9	42.4	30.5	UnDef	UnDef	10.0	UnDef	4.9	11.6
10.17	5.0E-05	0.02	35.2	0.94	7	22.2	16.8	39.0	21.2	38	30.0	10.0	-0.08	3.2	11.9
10.50	5.0E-05	0.02	29.8	1.34	7	19.1	26.4	45.6	26.7	36	30.0	10.0	-0.09	4.3	11.8
10.83	5.0E-08	0.24	8.1	2.50	4	5.9	23.7	29.7	60.7	UnDef	UnDef	2.4	UnDef	5.8	11.6
11.15	1.0E-07	0.37	8.4	0.88	6	6.2	24.9	31.2	45.9	UnDef	UnDef	2.6	UnDef	3.1	6.1
11.48	5.0E-05	0.09	26.0	0.60	7	17.4	14.4	31.8	22.0	36	30.0	10.0	-0.01	2.7	9.5
11.81	5.0E-06	0.18	16.0	0.89	7	11.2	32.9	44.1	32.9	UnDef	UnDef	6.7	UnDef	4.8	10.3
12.14	5.0E-05	0.03	32.9	1.31	7	22.2	25.5	47.7	25.0	36	30.0	10.0	-0.10	4.4	13.1
12.47	5.0E-07	0.05	13.0	2.64	6	9.5	37.8	47.3	50.3	UnDef	UnDef	4.8	UnDef	6.2	12.3
12.80	1.0E-07	0.17	6.8	0.82	6	5.5	22.2	27.7	50.1	UnDef	UnDef	1.9	UnDef	2.7	5.4

Depth (ft)	k (cm/s)	Bq	Qtn	Rfn	SBTn	Qc1N	DeltaQc1N	Qc1Ncs	Fc (%)	Phi (Deg)	Dr (%)	OCR	State Param	Del(n1)60	(N1)60cs
13.12	1.0E-07	0.32	7.6	1.31	6	6.1	24.4	30.5	52.9	UnDef	UnDef	2.2	UnDef	3.0	6.0
13.45	5.0E-07	0.05	13.8	2.66	6	10.3	41.3	51.6	49.0	UnDef	UnDef	5.3	UnDef	6.7	13.5
13.78	5.0E-08	0.45	2.7	5.41	1	3.0	UnDef	UnDef	100.0	UnDef	UnDef	0.8	UnDef	UnDef	UnDef
14.11	5.0E-05	0.05	21.5	1.02	7	15.7	28.7	44.4	29.2	34	30.0	10.0	-0.04	4.2	10.3
14.44	5.0E-08	0.08	7.5	3.82	1	6.3	UnDef	UnDef	100.0	UnDef	UnDef	2.2	UnDef	UnDef	UnDef
14.76	1.0E-07	0.11	10.0	0.50	6	8.1	32.3	40.4	37.1	UnDef	UnDef	3.3	UnDef	4.0	7.9
15.09	1.0E-07	1.02	1.8	1.07	1	2.5	UnDef	UnDef	100.0	UnDef	UnDef	0.6	UnDef	UnDef	UnDef
15.42	1.0E-07	1.99	1.0	2.02	1	1.9	UnDef	UnDef	100.0	UnDef	UnDef	0.5	UnDef	UnDef	UnDef
15.75	1.0E-07	2.77	0.5	3.62	1	1.6	UnDef	UnDef	100.0	UnDef	UnDef	0.5	UnDef	UnDef	UnDef
16.08	1.0E-07	2.94	0.6	3.03	1	1.7	UnDef	UnDef	100.0	UnDef	UnDef	0.5	UnDef	UnDef	UnDef
16.40	1.0E-07	3.69	0.5	3.49	1	1.6	UnDef	UnDef	100.0	UnDef	UnDef	0.5	UnDef	UnDef	UnDef
16.73	1.0E-07	1.66	1.2	1.56	4	2.1	8.5	10.6	100.0	UnDef	UnDef	0.5	UnDef	1.0	2.1
17.06	1.0E-07	1.20	1.8	1.01	1	2.6	UnDef	UnDef	100.0	UnDef	UnDef	0.6	UnDef	UnDef	UnDef
17.39	1.0E-07	0.75	3.5	0.51	1	3.9	UnDef	UnDef	100.0	UnDef	UnDef	0.9	UnDef	UnDef	UnDef
17.72	1.0E-07	0.78	4.1	0.64	1	4.3	UnDef	UnDef	100.0	UnDef	UnDef	1.1	UnDef	UnDef	UnDef
18.04	5.0E-05	0.10	18.0	1.11	7	14.7	43.8	58.5	33.1	32	30.0	8.0	-0.02	5.1	10.8
18.37	5.0E-07	0.10	12.3	3.55	4	10.5	42.2	52.7	56.2	UnDef	UnDef	4.4	UnDef	6.9	13.8
18.70	5.0E-08	0.13	15.4	4.75	1	13.0	UnDef	UnDef	100.0	UnDef	UnDef	6.3	UnDef	UnDef	UnDef
19.03	5.0E-08	0.11	15.8	7.57	1	13.4	UnDef	UnDef	100.0	UnDef	UnDef	6.5	UnDef	UnDef	UnDef
19.36	5.0E-08	0.08	17.0	8.43	1	14.3	UnDef	UnDef	100.0	UnDef	UnDef	7.3	UnDef	UnDef	UnDef
19.68	5.0E-08	0.12	15.9	8.03	1	13.7	UnDef	UnDef	100.0	UnDef	UnDef	6.6	UnDef	UnDef	UnDef
20.01	5.0E-08	0.12	19.0	6.78	1	16.1	UnDef	UnDef	100.0	UnDef	UnDef	8.7	UnDef	UnDef	UnDef
20.34	5.0E-08	0.10	25.8	5.42	1	21.5	UnDef	UnDef	100.0	UnDef	UnDef	10.0	UnDef	UnDef	UnDef
20.67	5.0E-08	-0.02	43.3	5.14	6	35.4	141.6	176.9	38.5	UnDef	UnDef	10.0	UnDef	34.6	69.3
21.00	5.0E-07	-0.03	55.9	4.56	6	45.6	133.4	179.0	32.9	UnDef	UnDef	10.0	UnDef	26.0	55.7
21.33	5.0E-08	-0.06	32.1	7.45	1	27.0	UnDef	UnDef	100.0	UnDef	UnDef	10.0	UnDef	UnDef	UnDef
21.65	5.0E-08	-0.06	27.7	8.99	1	23.6	UnDef	UnDef	100.0	UnDef	UnDef	10.0	UnDef	UnDef	UnDef
[illegible].98	5.0E-08	-0.08	21.6	10.00	1	18.8	UnDef	UnDef	100.0	UnDef	UnDef	10.0	UnDef	UnDef	UnDef
[illegible]31	5.0E-08	-0.09	20.1	10.00	1	17.7	UnDef	UnDef	100.0	UnDef	UnDef	9.5	UnDef	UnDef	UnDef
22.64	5.0E-08	-0.09	19.0	10.00	1	17.0	UnDef	UnDef	100.0	UnDef	UnDef	8.7	UnDef	UnDef	UnDef
22.97	5.0E-08	-0.08	21.5	9.75	1	19.1	UnDef	UnDef	100.0	UnDef	UnDef	10.0	UnDef	UnDef	UnDef
23.29	5.0E-08	-0.08	20.7	9.98	1	18.5	UnDef	UnDef	100.0	UnDef	UnDef	10.0	UnDef	UnDef	UnDef
23.62	5.0E-08	-0.10	17.3	10.00	1	15.9	UnDef	UnDef	100.0	UnDef	UnDef	7.5	UnDef	UnDef	UnDef
23.95	5.0E-08	-0.11	16.7	10.00	1	15.5	UnDef	UnDef	100.0	UnDef	UnDef	7.1	UnDef	UnDef	UnDef
24.28	5.0E-08	-0.11	15.5	10.00	1	14.5	UnDef	UnDef	100.0	UnDef	UnDef	6.3	UnDef	UnDef	UnDef
24.61	5.0E-08	-0.10	18.4	8.49	1	17.0	UnDef	UnDef	100.0	UnDef	UnDef	8.3	UnDef	UnDef	UnDef
24.93	5.0E-08	-0.10	17.2	8.36	1	16.1	UnDef	UnDef	100.0	UnDef	UnDef	7.4	UnDef	UnDef	UnDef
25.26	5.0E-08	-0.11	16.5	10.00	1	15.7	UnDef	UnDef	100.0	UnDef	UnDef	7.0	UnDef	UnDef	UnDef
25.59	5.0E-05	-0.02	96.0	3.35	7	83.8	71.6	155.3	22.3	42	62.2	10.0	-0.36	13.3	46.1
25.92	5.0E-08	-0.05	30.2	10.00	1	27.6	UnDef	UnDef	100.0	UnDef	UnDef	10.0	UnDef	UnDef	UnDef

APPENDIX C

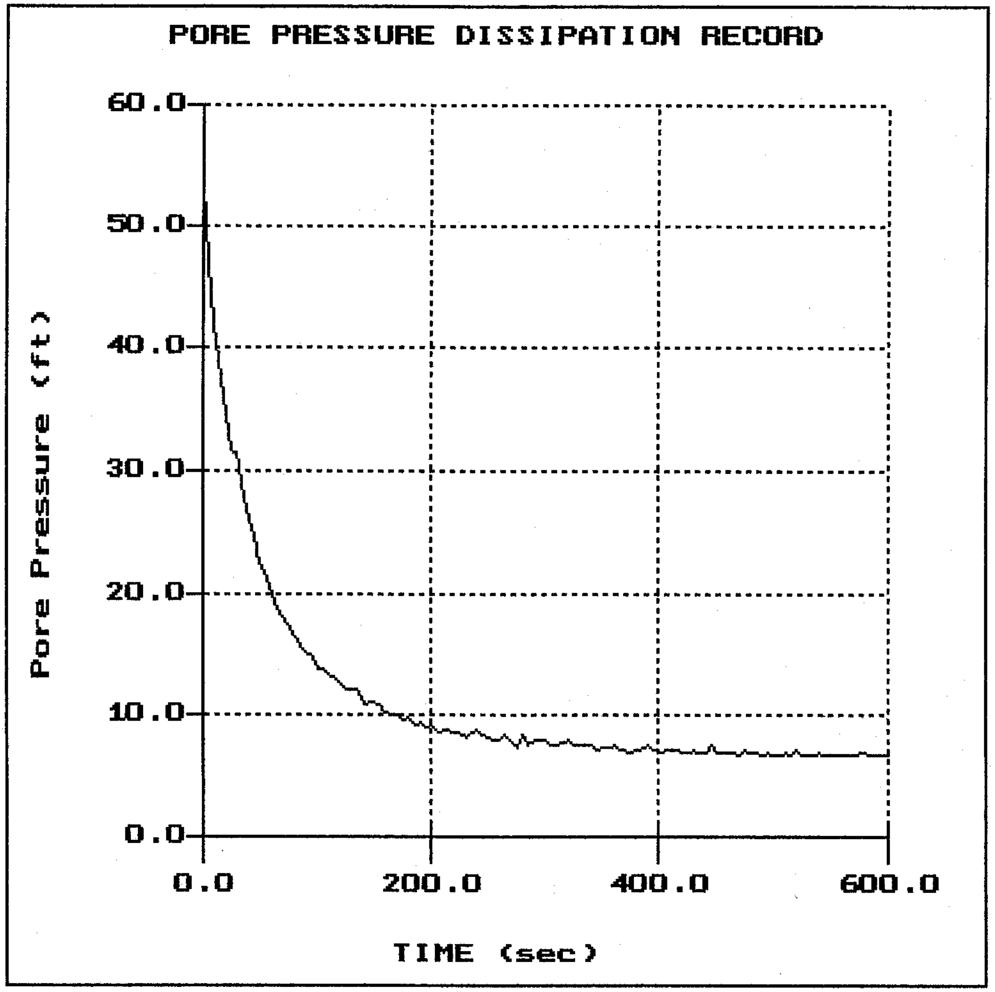
PORE PRESSURE DISSIPATION TEST RESULTS

MACTEC

Hole:CPT-3A
Location:TVA Plant

Cone:20 TON AD163
Date:09:08:04 14:41

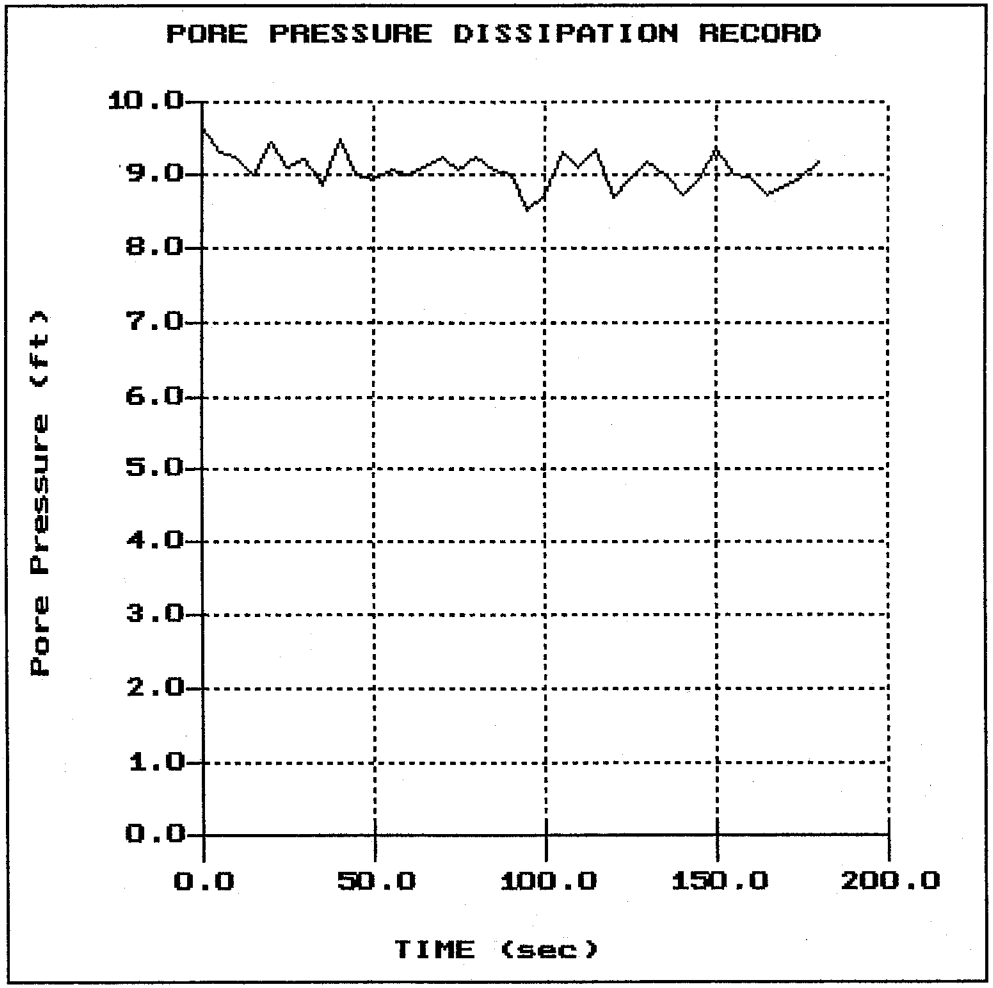
File: 783CP03A.PPD
Depth (m): 4.80
(ft): 15.75
Duration : 600.0s
U-min: 6.62 585.0s
U-max: 53.45 0.0s



MACTEC

Hole:CPT-08
Location:TVA Plant

Cone:20 TON AD163
Date:09:08:04 11:57



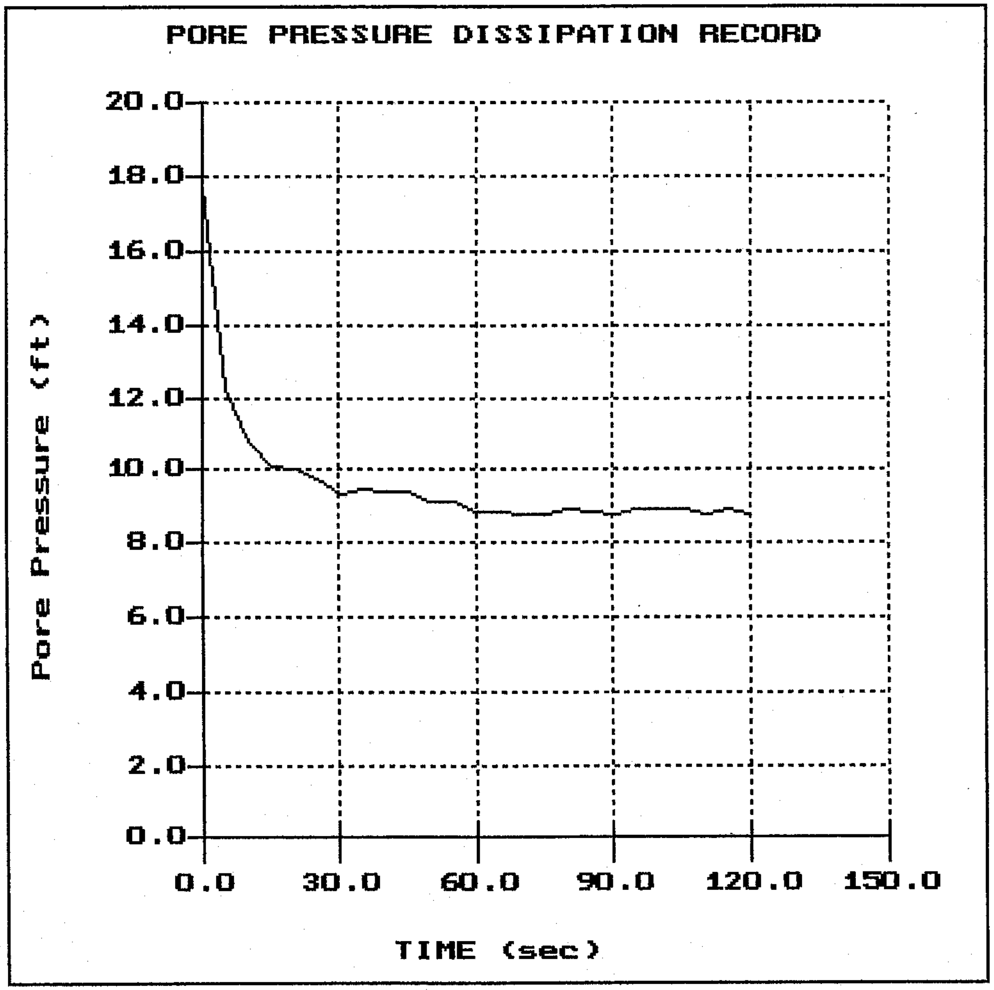
File: 783CP008.PPD
Depth (m): 3.95
(ft): 12.96
Duration : 180.0s
U-min: 8.49 95.0s
U-max: 9.67 0.0s

MACTEC

Hole:CPT-13
Location:TVA Plant

Cone:20 TON AD163
Date:09:08:04 10:31

File: 783CP013.PPD
Depth (m): 3.80
(ft): 12.47
Duration : 120.0s
U-min: 8.73 120.0s
U-max: 17.79 0.0s

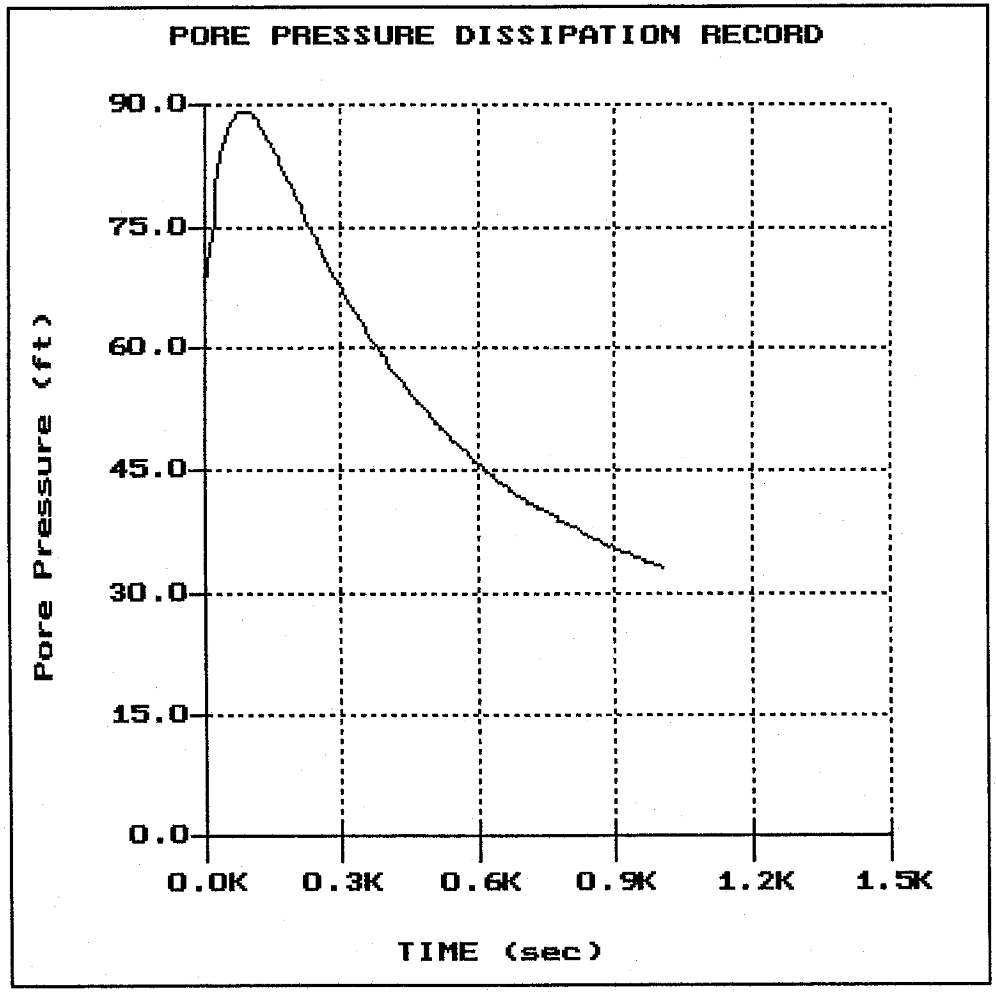


MACTEC

Hole:CPT-13
Location:TVA Plant

Cone:20 TON AD163
Date:09:08:04 10:31

File: 783CP013.PPD
Depth (m): 5.80
(ft): 19.03
Duration : 1000.0s
U-min: 33.08 1000.0s
U-max: 89.21 85.0s



APPENDIX D

LABORATORY TEST PROCEDURES

LABORATORY TEST RESULTS

LABORATORY TEST PROCEDURES

Moisture Content

The moisture content in a given mass of soil is the ratio, expressed as a percentage, of the weight of the water to the weight of the solid particles. This test was conducted in accordance with ASTM D-2216.

Atterberg Limits (Plasticity Index)

Originally, the Atterberg Limits consisted of seven "limits of consistency" of fine-grained soils. In current engineering usage, the term usually refers only to the liquid limit (LL) and plastic limit (PL). The LL (between the liquid and plastic states) is the water content at which a trapezoidal groove of specified shape, cut in moist soil held in a special cup, is closed after 25 taps on a hard rubber plate. The PL (between plastic and semi-solid states) is the water content at which the soil crumbles when rolled into threads of 1/8-inch in diameter.

The LL has been found to be proportional to the compressibility of the normally consolidated soil. The Plasticity Index (PI) is the calculated difference in water contents between the LL and PL. Together the LL and PI are used to classify silts and clays according to the Unified Soils Classification System (ASTM D 2487). The PI is used to predict the potential for volume changes in confined soils beneath foundations or grade slabs. The LL, PL, and PI are determined in accordance with ASTM D 4318.

Triaxial Shear Tests

Triaxial shear tests are used to determine the strength characteristics (cohesion and friction angle) of a given soil sample. Triaxial tests are also used to determine the elastic properties of the soil specimen.

Triaxial shear tests are performed on several sections of a relatively undisturbed sample extruded from the sampling tube or on remolded samples. The samples are trimmed into cylinders 1.4 to 2.8 inches in diameter and encased in rubber membranes. Each is then placed in a compression chamber and confined by all-around air pressure. The test results are presented in the form of stress-strain curves and Mohr envelopes, or p-q plots on the accompanying Triaxial Shear Test Sheets.

One of three types of triaxial tests is normally performed, the most suitable type being determined by the loading conditions imposed on the soil in the field and the soil characteristics.

1. Consolidated-Undrained (Designated as a CU or R Test)
2. Consolidated-Drained (designated as a CD or S Test)
3. Unconsolidated-Undrained (designated as a UU or Q Test)

Grain Size Distribution

Grain size tests are performed to aid in determining the soil classification and the grain size distribution. The soil samples are prepared for testing according to ASTM D 421 (dry preparation) or ASTM D 2217 (wet preparation). If only the grain size distribution of soils coarser than a number 200 sieve (0.074-mm opening) is desired, the grain size distribution is determined by washing the sample over a number 200 sieve and, after drying, passing the samples through a standard set of nested sieves. If the grain size distribution of the soils finer than the number 200 sieve is also desired, the grain size distribution of the soils coarser than the number 10 sieve is determined by passing the sample through a set of nested sieves. Materials passing the number 10 sieve are dispersed with a dispersing agent and suspended in water, and the grain size distribution calculated from the measured settlement rate of the particles. These tests are conducted in accordance with ASTM D 422. The percentage of clay, silt, sand, and gravel which are given on the individual particle size analysis sheets presented later in this appendix, were obtained on particle size boundaries in accordance with AASHTO M145-94 (1995).

Specific Gravity

The specific gravity of soil solids is the ratio of the mass of a unit volume of a soil solids to the mass of the same volume of gas-free distilled water at 20C. The test method for determining the specific gravity of soil solids that passes the 4.75-mm (No. 4) sieve using a water pycnometer is described in ASTM D 854, Method B, "Test Methods for Specific Gravity of Soil Solids by Water Pycnometer".

Compaction Tests (Moisture-Density Relationship)

Compaction tests are performed on representative soil samples to determine the maximum dry density and optimum moisture content. The results of the tests are used in conjunction with other tests to determine engineering properties relating to settlement, bearing capacity, shear strength, and permeability. The results may also be used as a standard to determine the percent compaction of any soil embankment.

The two most commonly used compaction tests are the standard Proctor test and the modified Proctor test. They are performed in accordance with ASTM D 698 and D 1557, respectively. Generally, the standard Proctor compaction test is run on samples from building areas and areas where moderate loads are anticipated. The modified Proctor compaction test is generally used for analyses of highways and other areas where large building loads are expected. Both tests have three procedures, depending upon soil particle size:

Test	Procedure	Hammer Weight (Pounds)	Hammer Fall (Inches)	Mold Diameter (Inches)	Screen Size (Material Finer Than)	Number of Layers	Number of Blows per Layer
Standard (D 698)	A	5.5	12	4	No. 4 sieve	3	25
	B	5.5	12	4	No. 3/8" sieve	3	25
	C	5.5	12	6	3/4" sieve	3	56
Modified (D 1557)	A	10	18	4	No. 4 sieve	5	25
	B	10	18	4	No. 3/8" sieve	5	25
	C	10	18	6	3/4" sieve	5	56

Test results are presented as a curve depicting dry unit weight versus moisture content. The compaction method used and any deviations from the recommended procedures are noted in the report.

Constant Head Permeability Test

The test was performed on undisturbed and remolded samples. The physical dimensions and weight were obtained and the sample was encased in a rubber membrane and placed in a triaxial chamber. The sample was then back-pressure saturated until a B value of 0.95 or greater was reached. After saturation was obtained, the sample was consolidated under 10-psi confining stress. Upon completion of consolidation, a constant head permeability test was performed.

TABLE D-1
Natural Moisture Content and Atterberg Limits Laboratory Test Results
TVA Gallatin Ash Disposal Area and Potential On-Site and Off-Site Borrow Areas
MACTEC Project 3043041043/01

Boring Number	Sample Number	Sample Type	Sample Description / Origin	Sample Depth (Feet)	Moisture Content (%)	Atterberg Limits		
						Liquid Limit (LL)	Plastic Limit (PL)	Plasticity Index (PI)
B-1	1	SPT	Ash	1 - 2.5	11.2	NT	NT	NT
B-1	2	SPT	Ash	4 - 5.5	17.1	NT	NT	NT
B-1	3	SPT	Ash	7 - 8.5	7.1	NT	NT	NT
B-1	4	SPT	Ash	10 - 11.5	10.2	NT	NT	NT
B-1	5	SPT	Ash	13 - 14.5	13.2	NT	NT	NT
B-1	6	SPT	Ash	16 - 17.5	17.1	NT	NT	NT
B-1	7	SPT	Ash	20 - 21.5	16.7	NT	NT	NT
B-1	8	SPT	Ash	25 - 26.5	25	NT	NT	NT
B-1	9	SPT	Alluvium	30 - 31.5	26.7	NT	NT	NT
B-4	1	SPT	Ash	1 - 2.5	9	NT	NT	NT
B-4	2	SPT	Ash	4 - 5.5	11.8	NT	NT	NT
B-4	3	SPT	Ash	7 - 8.5	15.4	NT	NT	NT
B-4	4	SPT	Ash	10 - 11.5	16.5	NT	NT	NT
B-4	5	SPT	Fill	13 - 14.5	19.1	NT	NT	NT
B-4	6	SPT	Fill	16 - 17.5	15.9	NT	NT	NT
B-4	7	SPT	Ash	20 - 21.5	21.6	NT	NT	NT
B-4	8	SPT	Ash	25 - 26.5	22.1	NT	NT	NT
B-10	1	SPT	Fill	1 - 2.5	18.4	NT	NT	NT
B-10	2	SPT	Fill	4 - 5.5	20	NT	NT	NT
B-10	3	SPT	Alluvium	7 - 8.5	17.9	NT	NT	NT
B-10	4	SPT	Alluvium	10 - 11.5	27.3	NT	NT	NT
B-10	5	SPT	Residuum	13 - 14.5	30.9	NT	NT	NT
B-10	6	SPT	Residuum	16 - 17.5	29.9	NT	NT	NT
B-10	7	SPT	Residuum	20 - 21.5	25.9	NT	NT	NT
B-10	8	SPT	Residuum	25 - 26.5	32.9	NT	NT	NT
B-13	1	SPT	Fill	1 - 2.5	26.9	NT	NT	NT
B-13	2	SPT	Ash	6 - 7.5	35.7	NT	NT	NT
B-13	3	SPT	Ash	9 - 10.5	35.2	NT	NT	NT
B-13	4	SPT	Ash	12 - 13.5	29.5	NT	NT	NT
B-13	5	SPT	Ash	17 - 18.5	33.4	NT	NT	NT
B-13	6	SPT	Residuum / Alluvium	20 - 21.5	21.8	NT	NT	NT
B-13	7	SPT	Residuum	27 - 28.5	38.2	NT	NT	NT
NT - Not Tested								

Prepared/Date: ISH 10/13/04
Checked/Date: HAB 10/13/04

TABLE D-1A
Natural Moisture Content and Atterberg Limits Laboratory Test Results
TVA Gallatin Ash Disposal Area and Potential On-Site and Off-Site Borrow Areas
MACTEC Project 3043041043/01

Bulk Sample ID	Sample Number	Sample Type	Sample Depth (Feet)	Moisture Content (%)	Atterberg Limits		
					Liquid Limit (LL)	Plastic Limit (PL)	Plasticity Index (PI)
Old Bottom Ash	1	Bulk	NA	11.1	NT	NT	NT
New Bottom Ash	1	Bulk	NA	10	NT	NT	NT
New Bottom Ash	2	Bulk	NA	9.6	NT	NT	NT
New Bottom Ash	3	Bulk	NA	14	NT	NT	NT

NT - Not Tested
Bulk - Bulk Sample
NA - Not Applicable

Prepared/Date: ISH/REF 10/13/04
Checked/Date: HAB 10/13/04

TABLE D-2
Unit Weight and Natural Moisture Content Laboratory Test Results
TVA Gallatin Ash Disposal Area and Potential On-Site and Off-Site Borrow Areas
MACTEC Project 3043041043/01

Boring Number	Depth (Feet)	Sample Type	Natural Moisture Content (%)	Dry Unit Weight (pcf)	Wet Unit Weight (pcf)
B-3	4.0 - 6.0	UD	36.6	67.1	91.7
B-3	7.5 - 9.5	UD	47.6	71.1	104.9
B-5	18.0 - 20.0	UD	17.1	115.8	135.6
B-5	24.0 - 26.0	UD	17.7	105.0	123.6
B-8	22.0 - 23.5	UD	26.1	100.2	126.4
B-11	7.0 - 9.0	UD	20.9	102.2	123.6
B-11	28.0 - 30.0	UD	23.5	100.4	124.0
B-13	4.0 - 6.0	UD	39.7	77.5	108.2
B-13	15.0 - 17.0	UD	33.8	78.8	105.4
B-13	25.0 - 27.0	UD	32.5	90.1	119.4

Prepared/Date: ISH 10/13/04
Checked/Date: HAB 10/13/04

TABLE D-3
Standard Proctor Compaction Laboratory Test Results
TVA Gallatin Ash Disposal Area and Potential On-Site and Off-Site Borrow Areas
MACTEC Project 3043041043/01

Sample Location	Maximum Dry Density (pcf)	Optimum Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Classification*
Old Bottom Ash	104.2	15.8	---	---	---	---
New Bottom Ash 2	79.4	29.2	---	---	---	---
New Bottom Ash 3	75.6	32.6	---	---	---	---
A-2	104.8	19.1	47	17.0	30	CL
A-9	105.6	19.2	38	18.0	20	CL
Off-Site 1	94.4	23.9	41	24.0	17	CL
Off-Site 2	103.3	19.6	33	21.0	12	CL
CL - Clay with low plasticity						

Prepared/Date: REF/ISH 10/13/04

Checked/Date: HAB 10/13/04

TABLE D-4
Triaxial Compression Laboratory Test Results
TVA Gallatin Ash Disposal Area and Potential On-Site and Off-Site Borrow Areas
MACTEC Project 3043041043/01

				CU Triaxial Test						UU Triaxial Test			
						Total		Effective					
Boring Number / Sample ID	Depth (Feet)	Sample Type	Material Type	Average Dry Density (pcf)	Average Moisture Content (%)	Cohesion, C (psf)	Friction Angle, Φ (degrees)	Cohesion, C' (psf)	Friction Angle, Φ' (degrees)	Average Dry Density (pcf)	Average Moisture Content (%)	Cohesion, C (psf)	Friction Angle, Φ (degrees)
B-3	7.5 - 9.5	UD	Ash	71.1	47.6	1,770	18.3	1,280	24.4	---	---	---	---
B-8	22 - 23.5	UD	Silty Clay	100.2	26.1	1,520	14.2	1,000	22.9	---	---	---	---
B-13	15 - 17	UD	Ash	78.8	33.8	2,640	38.5	0	35.5	---	---	---	---
B-13	25 - 27	UD	Silty Clay	90.1	32.5	370	11.3	210	14.2	---	---	---	---
Old Bottom Ash	NA	Bulk	Bottom Ash	99.0	15.8	1,390	31.7	0	40.2	---	---	---	---
New Bottom Ash	NA	Bulk	Bottom Ash	75.5	29.2	3,400	22.5	600	37.3	---	---	---	---
A-2	0 - 20	Bulk	Silty Clay	98.6	19.0	750	13.3	670	22.9	102.1	21.0	700	2.4
A-9	0 - 15	Bulk	Silty Clay	100.4	19.2	750	8.5	410	21.2	102.0	19.0	500	4.0
Off-Site Sample 2	NA	Bulk	Silty Clay	99.5	19.4	940	13.1	0	33.0	---	---	---	---

UD - Undisturbed Sample
Bulk - Bulk Sample
NA - Not Applicable

Prepared/Date: ISH 10/13/04
Checked/Date: HAB 10/13/04

TABLE D-5
Permeability Laboratory Test Results
TVA Gallatin Ash Disposal Area and Potential On-Site and Off-Site Borrow Areas
MACTEC Project 3043041043/01

Sample Location	Sample Depth (Feet)	Sample Type	Remolded / In-Situ Dry Density (pcf)	Remolded Percent Compaction (%)	Remolded / In-Situ Moisture Content (%)	Percentage from Optimum Moisture Content (%)	Permeability (cm/sec)
Old Bottom Ash	NA	Bulk	95.9	92.0	15.7	-0.1	8.55×10^{-4}
New Bottom Ash Sample 2	NA	Bulk	73.1	92.0	29.2	0	2.15×10^{-3}
B-13	15 - 17	UD	78.1	NA	34.5	NA	2.78×10^{-5}

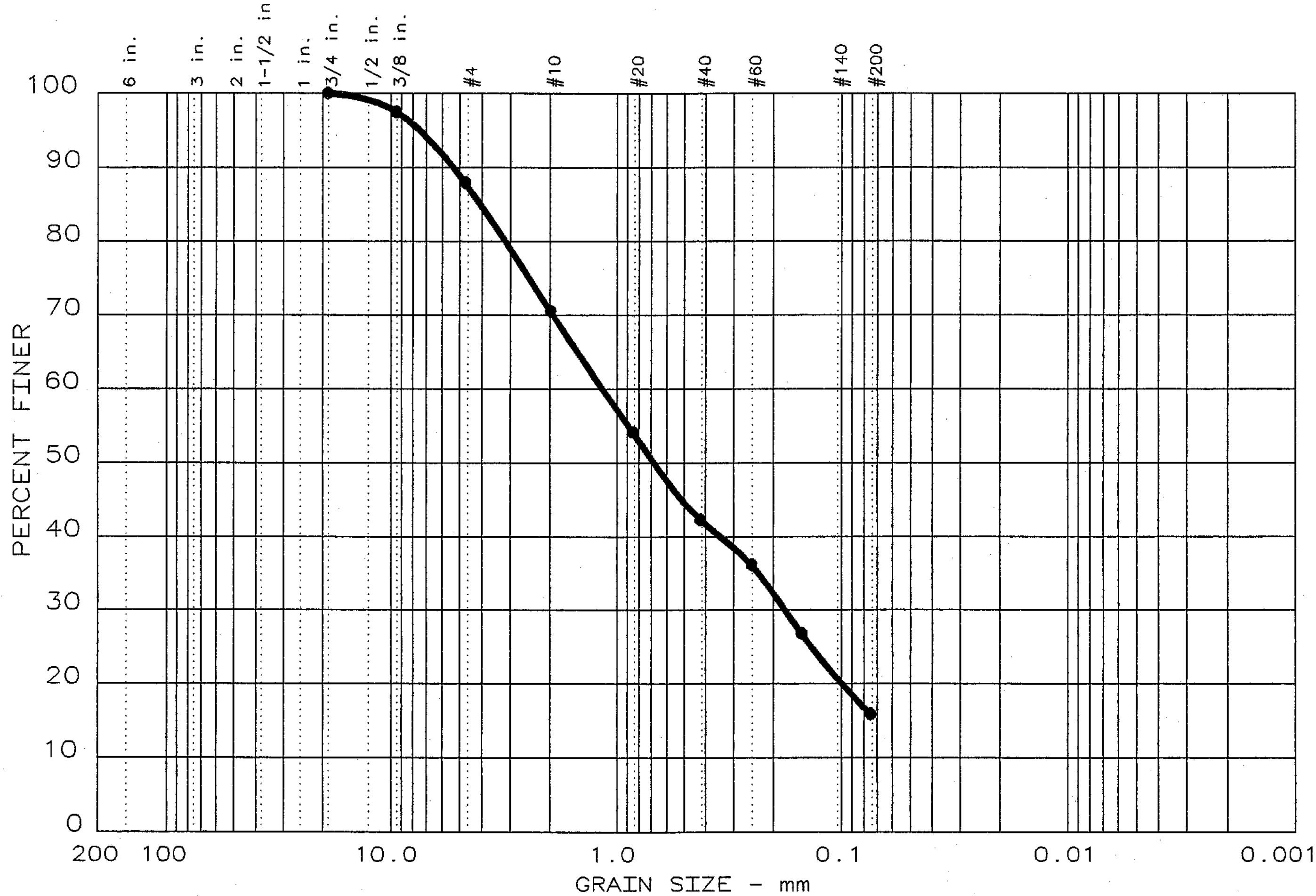
NA - Not Applicable
Bulk - Bulk Sample
UD - Undisturbed Sample

Prepared/Date: ISH 10/13/04
Checked/Date: HAB 10/13/04

GRAIN SIZE ANALYSIS TEST RESULTS

BOTTOM ASH SAMPLES

PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	LL	PI
●	6	0.0	12.0	72.1	15.9		NT	NT	NT

SIEVE inches size	PERCENT FINER ●		
0.75	100.0		
0.375	97.5		
	GRAIN SIZE		
D_{60}	1.15		
D_{30}			
D_{10}			
	COEFFICIENTS		
C_c			
C_u			

SIEVE number size	PERCENT FINER ●		
4	88.0		
10	70.6		
20	54.2		
40	42.3		
60	36.1		
100	26.8		
200	15.9		

Sample information:
● Old bottom ash
Gray ash sand
Sample Number 3017

Remarks:
Methods: Particle Size:
ASTM D 422-63(2002);
%< No.200:ASTM D1140-00;
Spec. Gravity -10: 2.64

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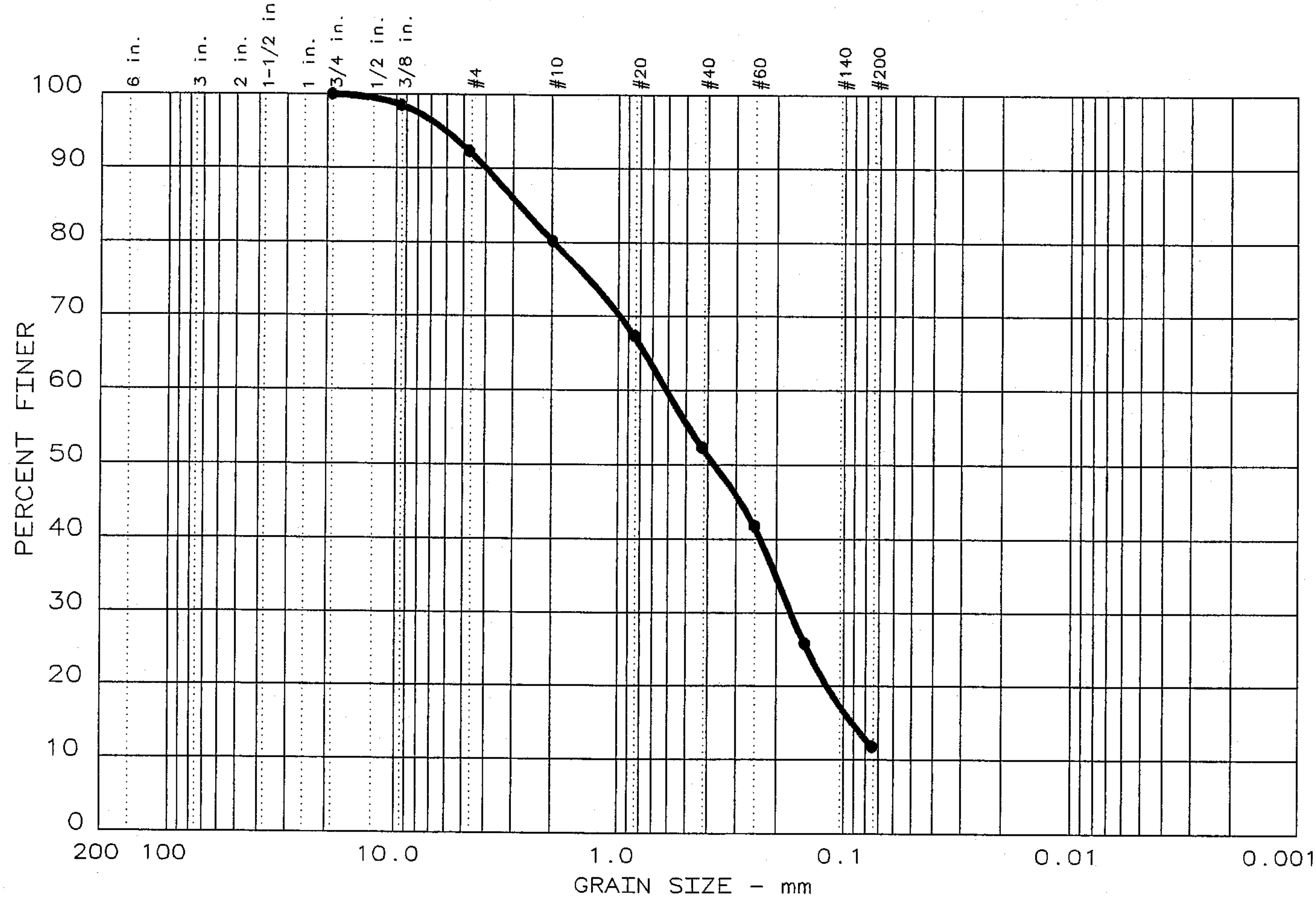
Project No.: 3043041037.0001
Project: TVA Gallatin Fossil Plant Ash Disposal

Date: August 20, 2004 HB Fig. No.: 017

PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	LL	PI
●	7	0.0	7.7	80.5	11.8		NT	NT	NT

SIEVE inches size	PERCENT FINER ●		
0.75	100.0		
0.375	98.5		
	GRAIN SIZE		
D_{60}	0.603		
D_{30}			
D_{10}			
	COEFFICIENTS		
C_c			
C_u			

SIEVE number size	PERCENT FINER ●		
4	92.3		
10	80.2		
20	67.4		
40	52.3		
60	41.8		
100	25.8		
200	11.8		

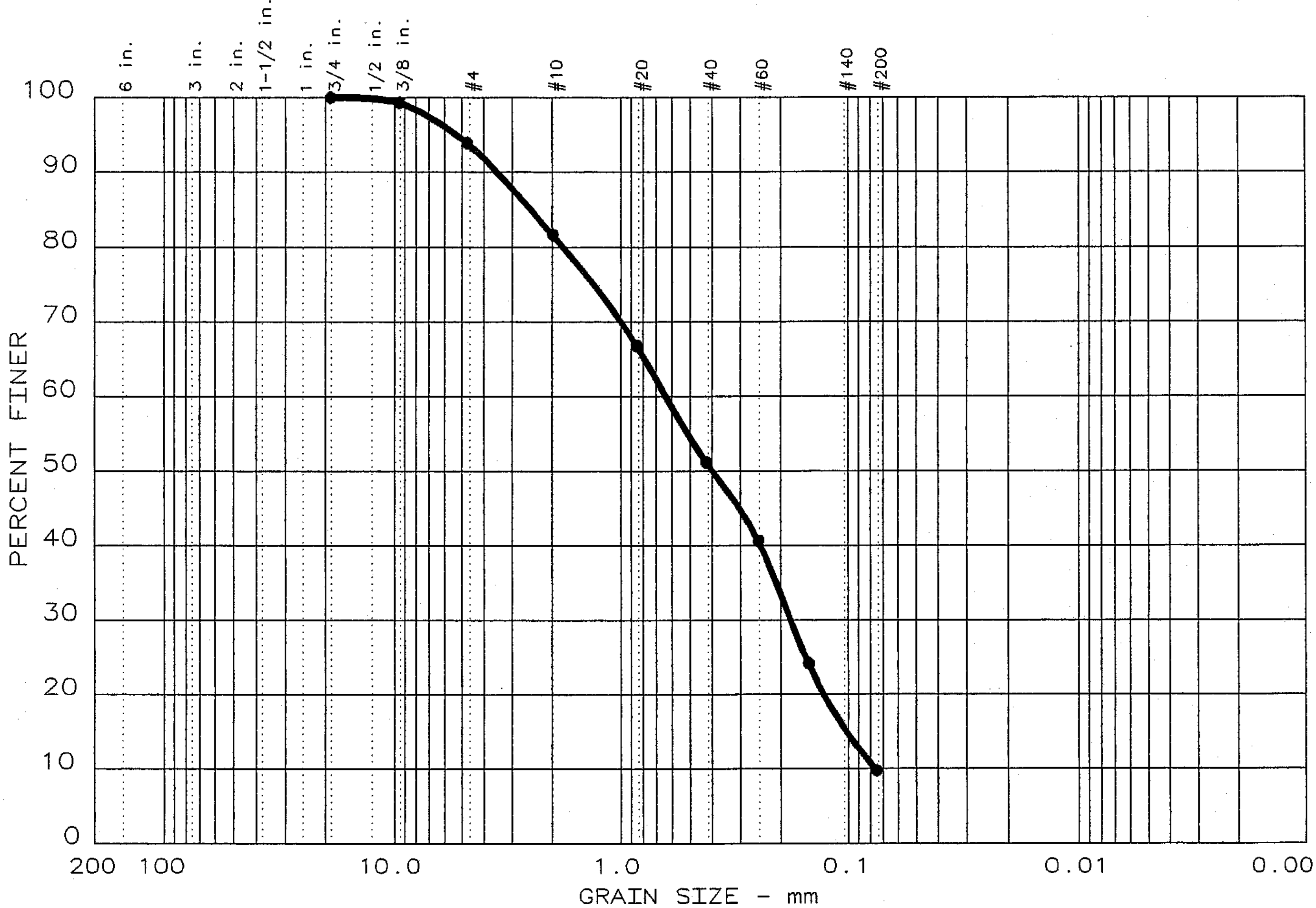
Sample information:
● New bottom ash, Bulk 1
Gray ash sand
Sample Number 3018

Remarks:
Methods: Particle Size:
ASTM D 422-63(2002);
%< No.200:ASTM D1140-00;
Sieve Analysis: T 27-99

LAW ENGINEERING AND ENVIRONMENTAL SERVICES, INC.

Project No.: 3043041043.0001
Project: TVA Gallatin Fossil Plant Ash Disposal
Date: August 20, 2004 HB Fig. No.: 018

PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	LL	PI
●	8	0.0	6.1	84.1	9.8		NT	NT	NT

SIEVE inches size	PERCENT FINER ●		
0.75	100.0		
0.375	99.3		
	GRAIN SIZE		
D_{60}	0.631		
D_{30}			
D_{10}	0.0757		
	COEFFICIENTS		
C_c	0.67		
C_u	8.3		

SIEVE number size	PERCENT FINER ●		
4	93.9		
10	81.7		
20	66.8		
40	51.2		
60	40.6		
100	24.2		
200	9.8		

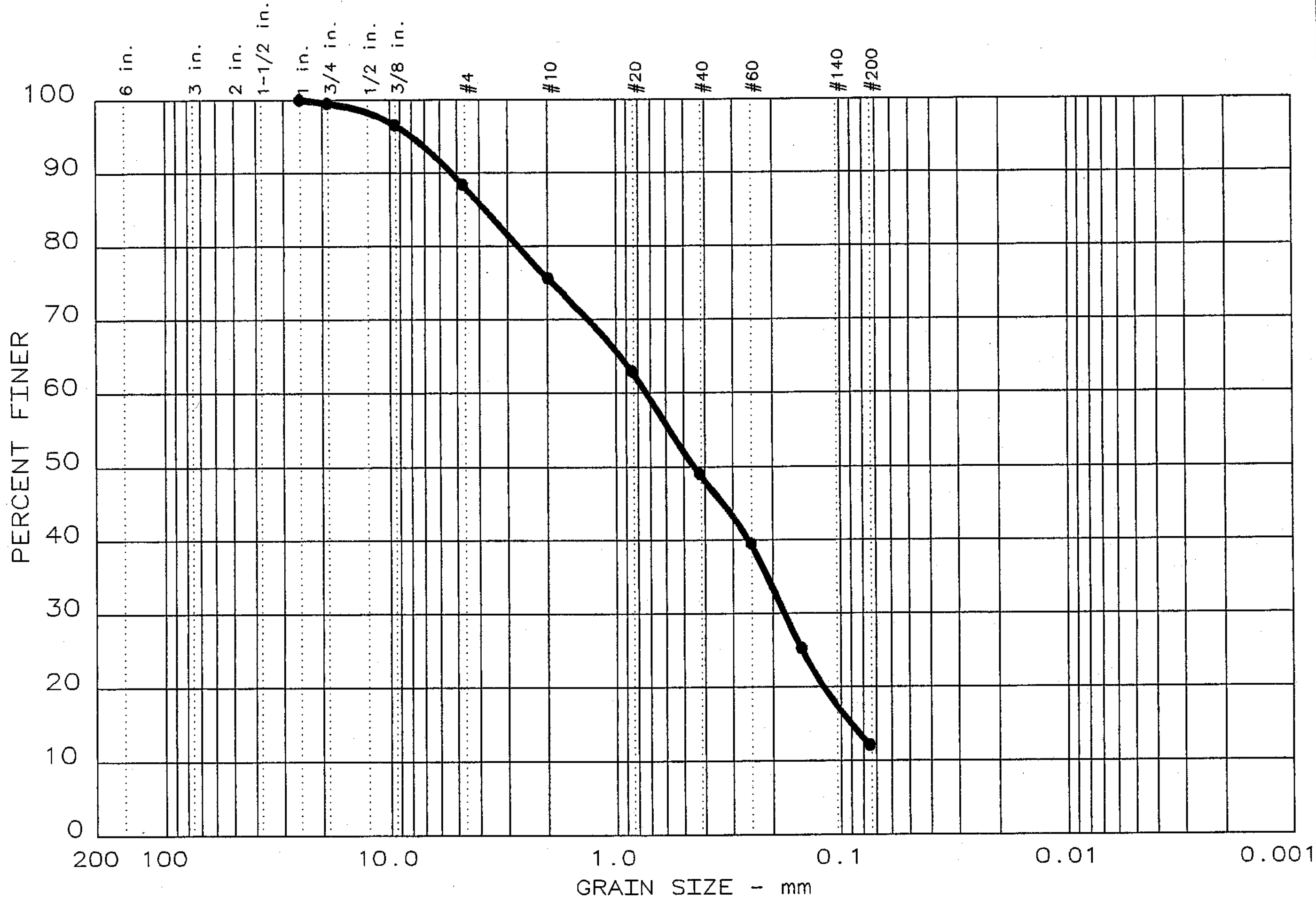
Sample information:
● New bottom ash, Bulk 2
Gray ash sand
Sample Number 3019

Remarks:
Methods: Particle Size:
ASTM D 422-63(2002);
%< No.200:ASTM D1140-00;
Spec. Gravity -10: 2.49

LAW ENGINEERING AND ENVIRONMENTAL SERVICES, INC.

Project No.: 3043041043.0001
Project: TVA Gallatin Fossil Plant Ash Disposal
Date: August 20, 2004 HB Fig. No.: 019

PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	LL	PI
●	9	0.0	11.6	76.3	12.1		NT	NT	NT

SIEVE inches size	PERCENT FINER ●		
1	100.0		
0.75	99.5		
0.375	96.6		
	GRAIN SIZE		
D_{60}	0.724		
D_{30}			
D_{10}			
	COEFFICIENTS		
C_c			
C_u			

SIEVE number size	PERCENT FINER ●		
4	88.4		
10	75.6		
20	63.0		
40	49.1		
60	39.5		
100	25.3		
200	12.1		

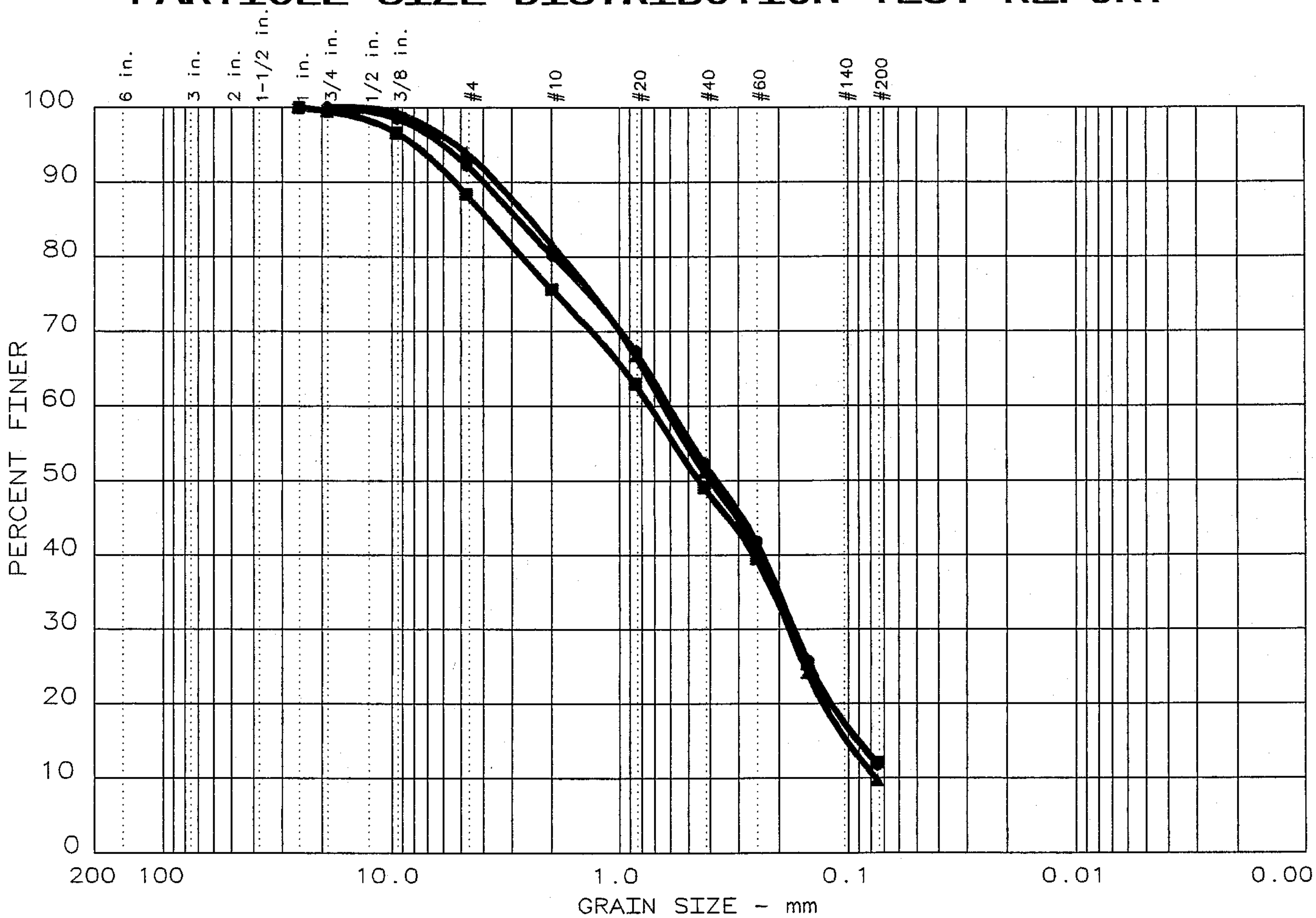
Sample information:
● New bottom ash, Bulk 3
Gray ash sand
Sample Number 3020

Remarks:
Methods: Particle Size:
ASTM D 422-63(2002);
%< No.200:ASTM D1140-00;
Sieve Analysis: T 27-99

LAW ENGINEERING AND ENVIRONMENTAL SERVICES, INC.

Project No.: 3043041043.0001
Project: TVA Gallatin Fossil Plant Ash Disposal
Date: August 20, 2004 HB Fig. No.: 020

PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	LL	PI
●	7	0.0	7.7	80.5	11.8		NT	NT	NT
▲	8	0.0	6.1	84.1	9.8		NT	NT	NT
■	9	0.0	11.6	76.3	12.1		NT	NT	NT

SIEVE inches size	PERCENT FINER ●	▲	■
1			100.0
0.75	100.0	100.0	99.5
0.375	98.5	99.3	96.6
	GRAIN SIZE		
D_{60}	0.603	0.631	0.724
D_{30}			
D_{10}		0.0757	
	COEFFICIENTS		
C_c		0.67	
C_u		8.3	

SIEVE number size	PERCENT FINER ●	▲	■
4	92.3	93.9	88.4
10	80.2	81.7	75.6
20	67.4	66.8	63.0
40	52.3	51.2	49.1
60	41.8	40.6	39.5
100	25.8	24.2	25.3
200	11.8	9.8	12.1

Sample information:
● New bottom ash, Bulk 1
Gray ash sand
Sample Number 3018
▲ New bottom ash, Bulk 2
Gray ash sand
Sample Number 3019
■ New bottom ash, Bulk 3
Gray ash sand
Sample Number 3020

Remarks:
Methods: Particle Size:
ASTM D 422-63(2002);
%< No.200:ASTM D1140-00;
Sieve Analysis: T 27-99

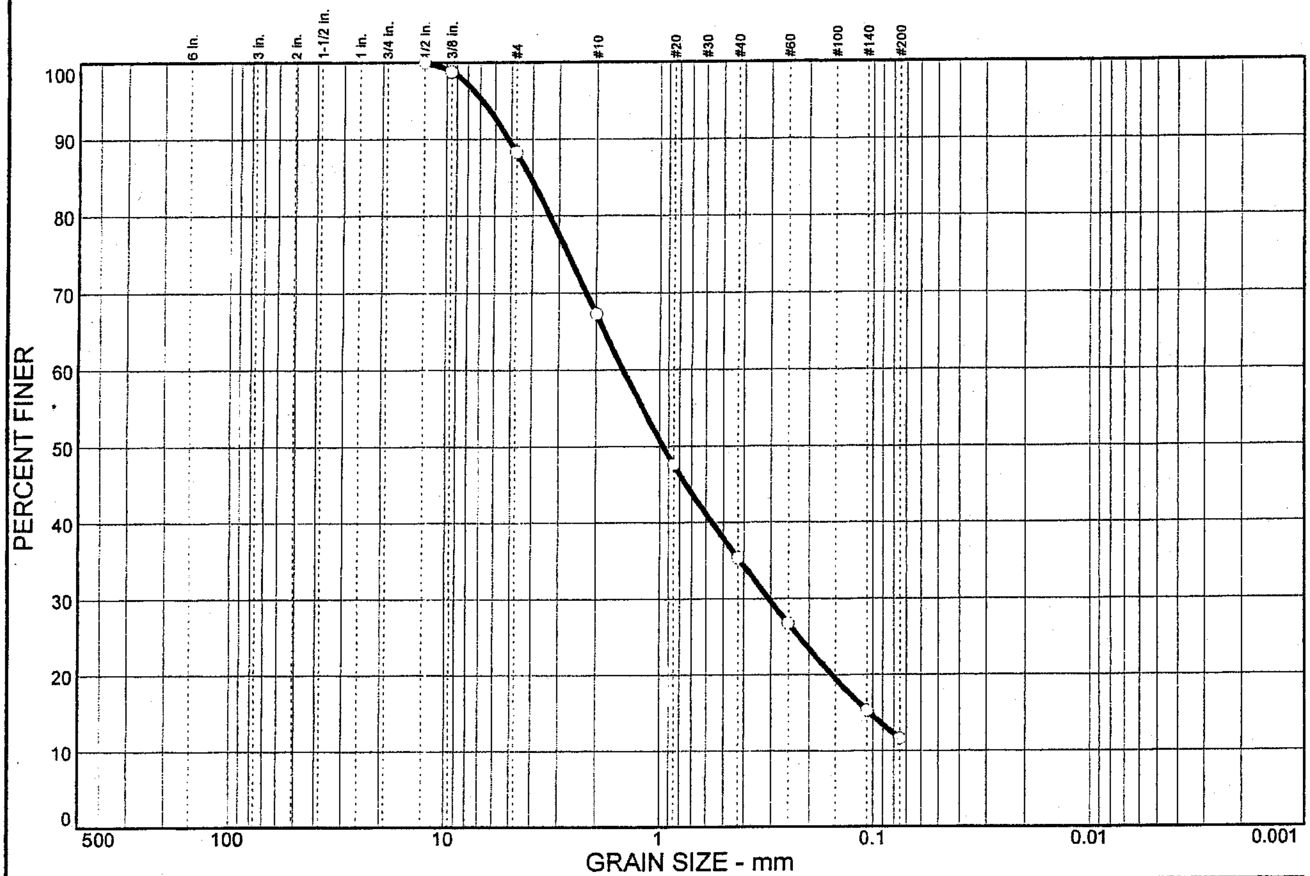
LAW ENGINEERING AND ENVIRONMENTAL SERVICES, INC.

Project No.: 3043041043.0001
Project: TVA Gallatin Fossil Plant Ash Disposal
Date: August 20, 2004 HB Fig. No.: 018

GRAIN SIZE ANALYSIS TEST RESULTS

ASH POND SAMPLES

Grain Size Analysis



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	0.0	11.7	21.0	32.0	23.7	11.6	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.5 in.	100.0		
0.375 in.	98.8		
#4	88.3		
#10	67.3		
#20	47.6		
#40	35.3		
#60	26.8		
#140	15.3		
#200	11.6		

* (no specification provided)

Soil Description

Gray Bottom Ash

Atterberg Limits

PL= LL= PI=

Coefficients

D_{85}= 4.09 D_{60}= 1.49 D_{50}= 0.956
D_{30}= 0.307 D_{15}= 0.103 D_{10}=
C_u= C_c=

Classification

USCS= AASHTO=

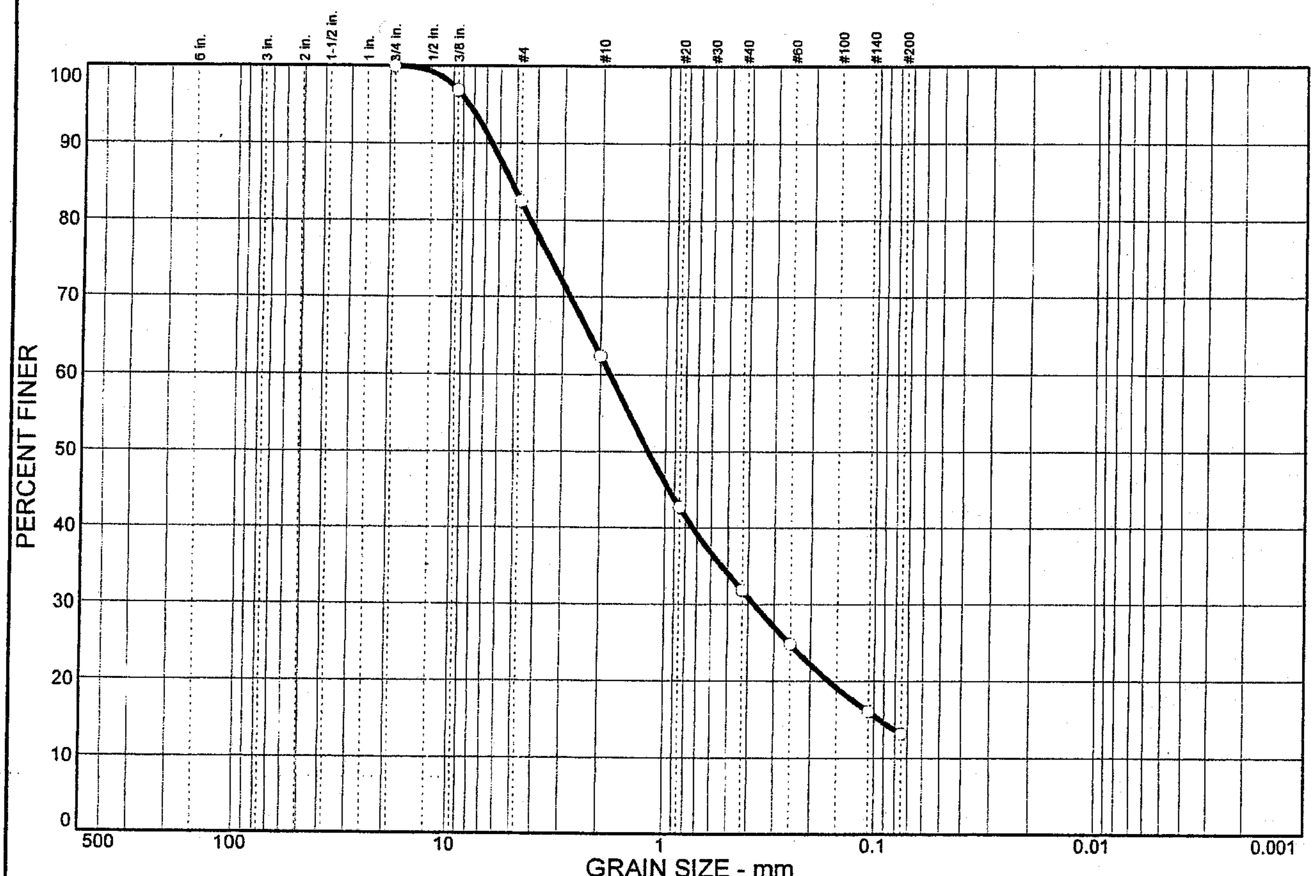
Remarks

Sample No.: **Source of Sample:** **Date:** 09-22-04
Location: B-1 SPT @ 7'-8.5' and 10'-11.5' **Elev./Depth:**

MACTEC, INC.

Client: TVA
Project: Ash Disposal Areas - TVA Gallatin Fossil Plant
Project No: 3043041043 HB **Figure**

Grain Size Analysis



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	0.0	17.5	20.1	30.6	18.6	13.2	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.75 in.	100.0		
0.375 in.	96.9		
#4	82.5		
#10	62.4		
#20	42.7		
#40	31.8		
#60	24.8		
#140	16.1		
#200	13.2		

* (no specification provided)

Soil Description

Gray Bottom Ash

Atterberg Limits

PL= LL= PI=

Coefficients

D_{85}= 5.27 D_{60}= 1.81 D_{50}= 1.19
D_{30}= 0.373 D_{15}= 0.0932 D_{10}=
C_u= C_c=

Classification

USCS= AASHTO=

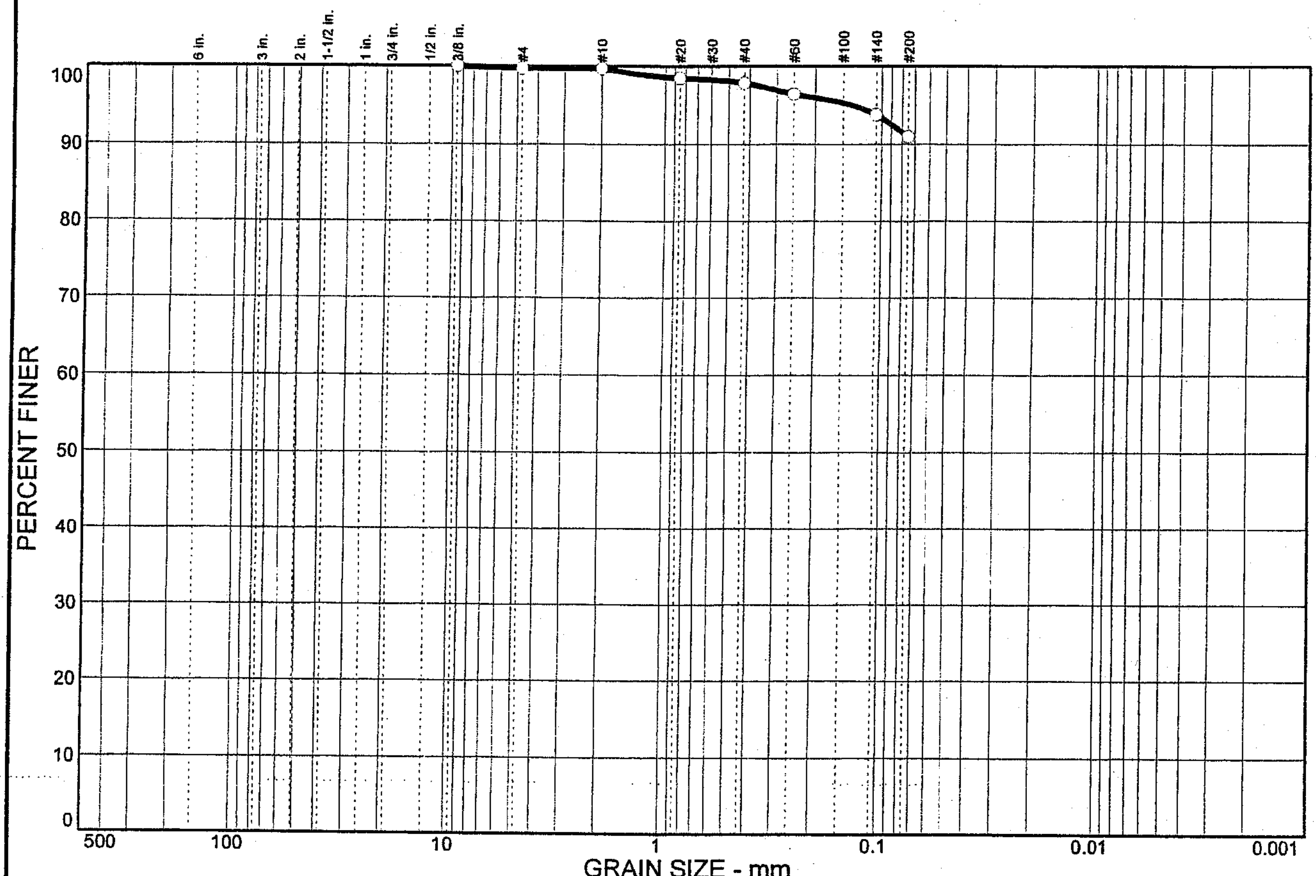
Remarks

Sample No.: **Source of Sample:** **Date:** 09-22-04
Location: B-1 SPT @ 20'-21.5' and 25'-26.5' **Elev./Depth:**

MACTEC, INC.

Client: TVA
Project: Ash Disposal Areas - TVA Gallatin Fossil Plant
Project No: 3043041043 H8 **Figure**

Grain Size Analysis



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	0.0	0.3	0.0	1.8	6.9	91.0	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.375 in.	100.0		
#4	99.7		
#10	99.7		
#20	98.5		
#40	97.9		
#60	96.5		
#140	93.8		
#200	91.0		

* (no specification provided)

Soil Description

Gray Ash Sand

Atterberg Limits

PL= LL= PI=

Coefficients

D_{85}= D_{60}= D_{50}=
D_{30}= D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= AASHTO=

Remarks

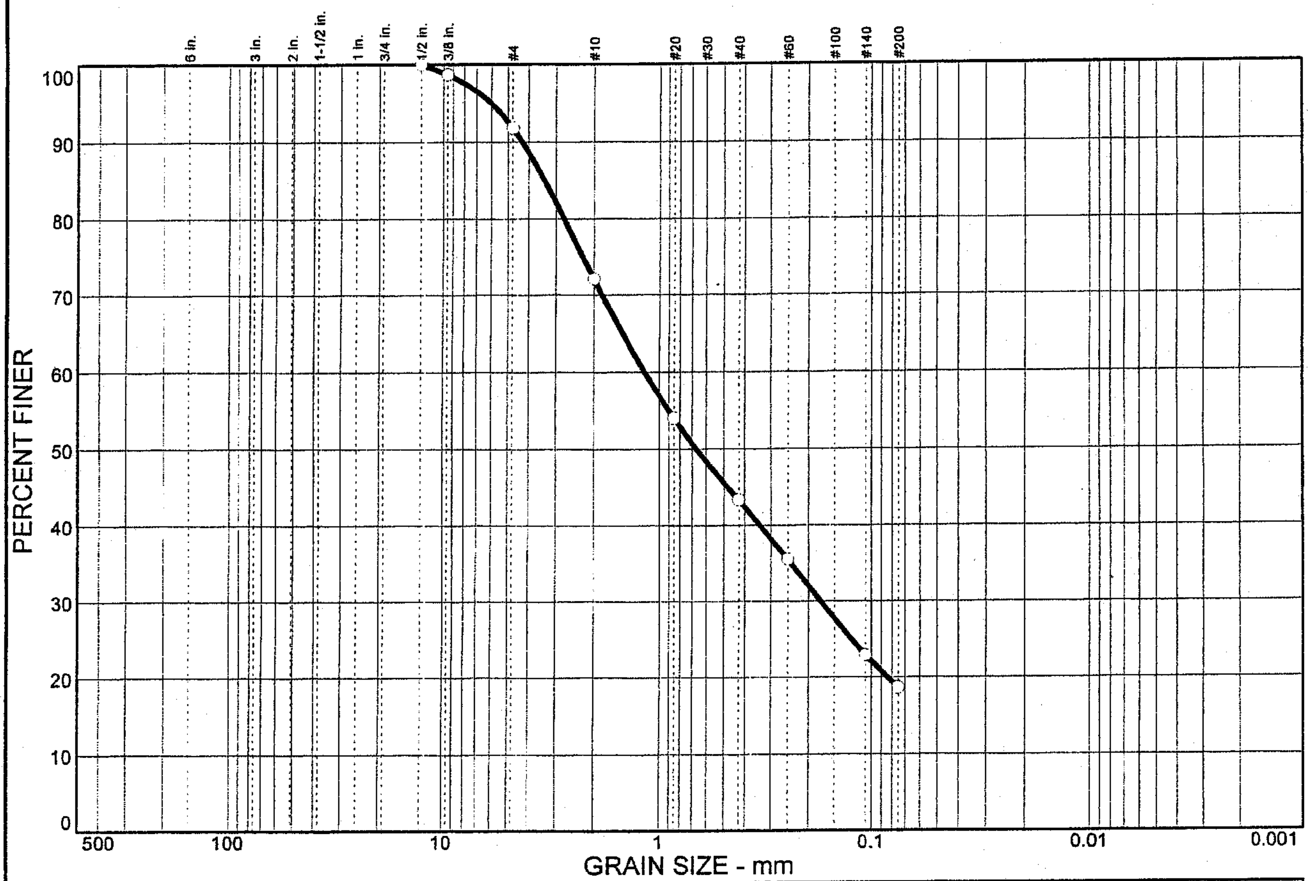
Specific Gravity: 2.48

Sample No.: **Source of Sample:** **Date:** 09-22-04
Location: B-3 UD @ 7.5'-9.5' **Elev./Depth:**

MACTEC, INC.

Client: TVA
Project: Ash Disposal Areas - TVA Gallatin Fossil Plant
Project No: 3043041043 HB **Figure**

Grain Size Analysis



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	0.0	8.2	19.7	28.8	24.6	18.7	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.5 in.	100.0		
0.375 in.	98.7		
#4	91.8		
#10	72.1		
#20	54.0		
#40	43.3		
#60	35.5		
#140	22.9		
#200	18.7		

* (no specification provided)

Soil Description

Dark Gray Bottom Ash

Atterberg Limits

PL= LL= PI=

Coefficients

D_{85}= 3.39 D_{60}= 1.17 D_{50}= 0.668
D_{30}= 0.174 D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= AASHTO=

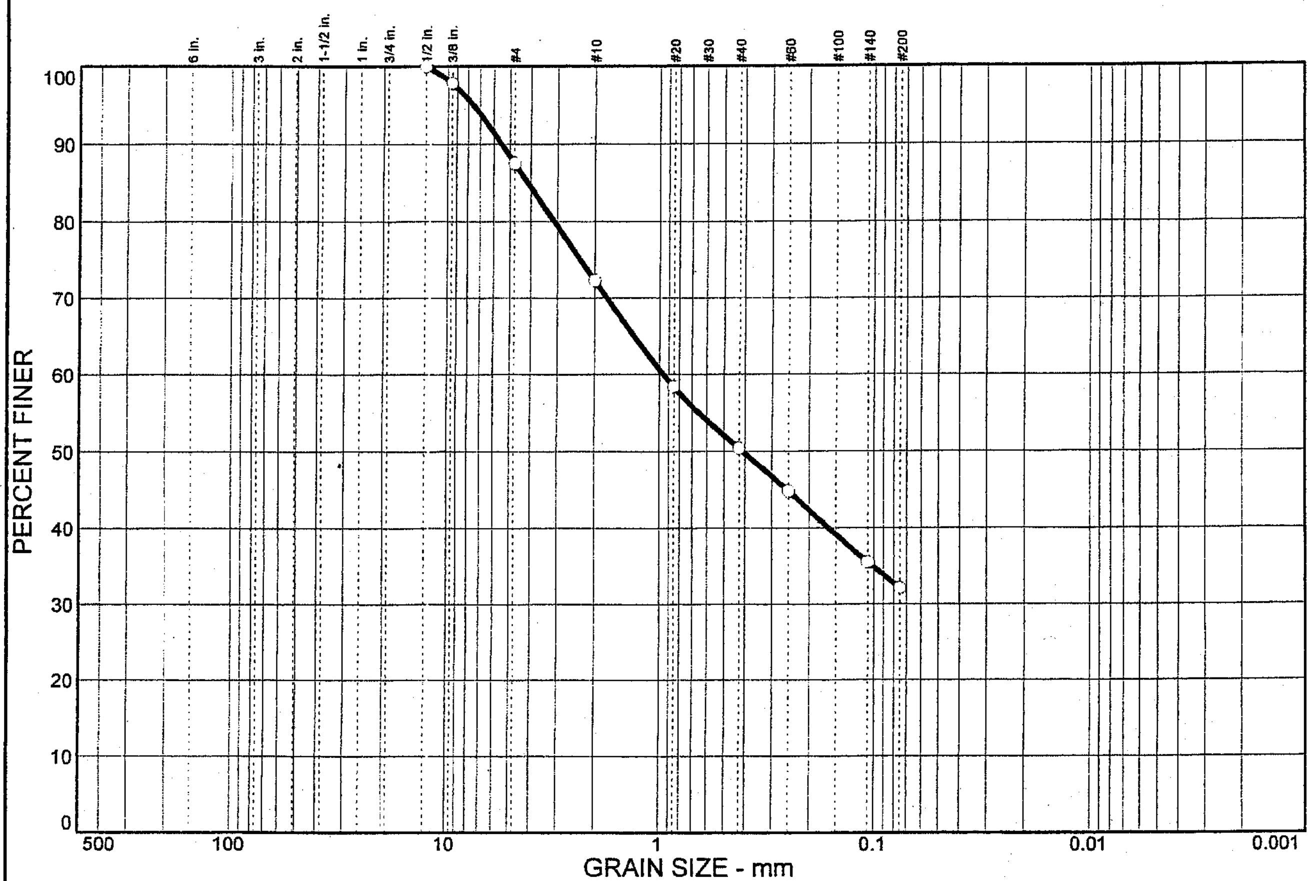
Remarks

Sample No.: **Source of Sample:** **Date:** 09-22-04
Location: B-4 SPT @ 4'-5.5' and 7'-8.5' **Elev./Depth:**

MACTEC, INC.

Client: TVA
Project: Ash Disposal Areas - TVA Gallatin Fossil Plant
Project No: 3043041043 HB **Figure**

Grain Size Analysis



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	0.0	12.5	15.2	21.9	18.3	32.1	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.5 in.	100.0		
0.375 in.	97.8		
#4	87.5		
#10	72.3		
#20	58.4		
#40	50.4		
#60	44.8		
#140	35.5		
#200	32.1		

* (no specification provided)

Soil Description

Gray Fine to Coarse Sandy Ash with Clay Seams

Atterberg Limits

PL= LL= PI=

Coefficients

D_{85}= 4.12 D_{60}= 0.952 D_{50}= 0.409
D_{30}= D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= AASHTO=

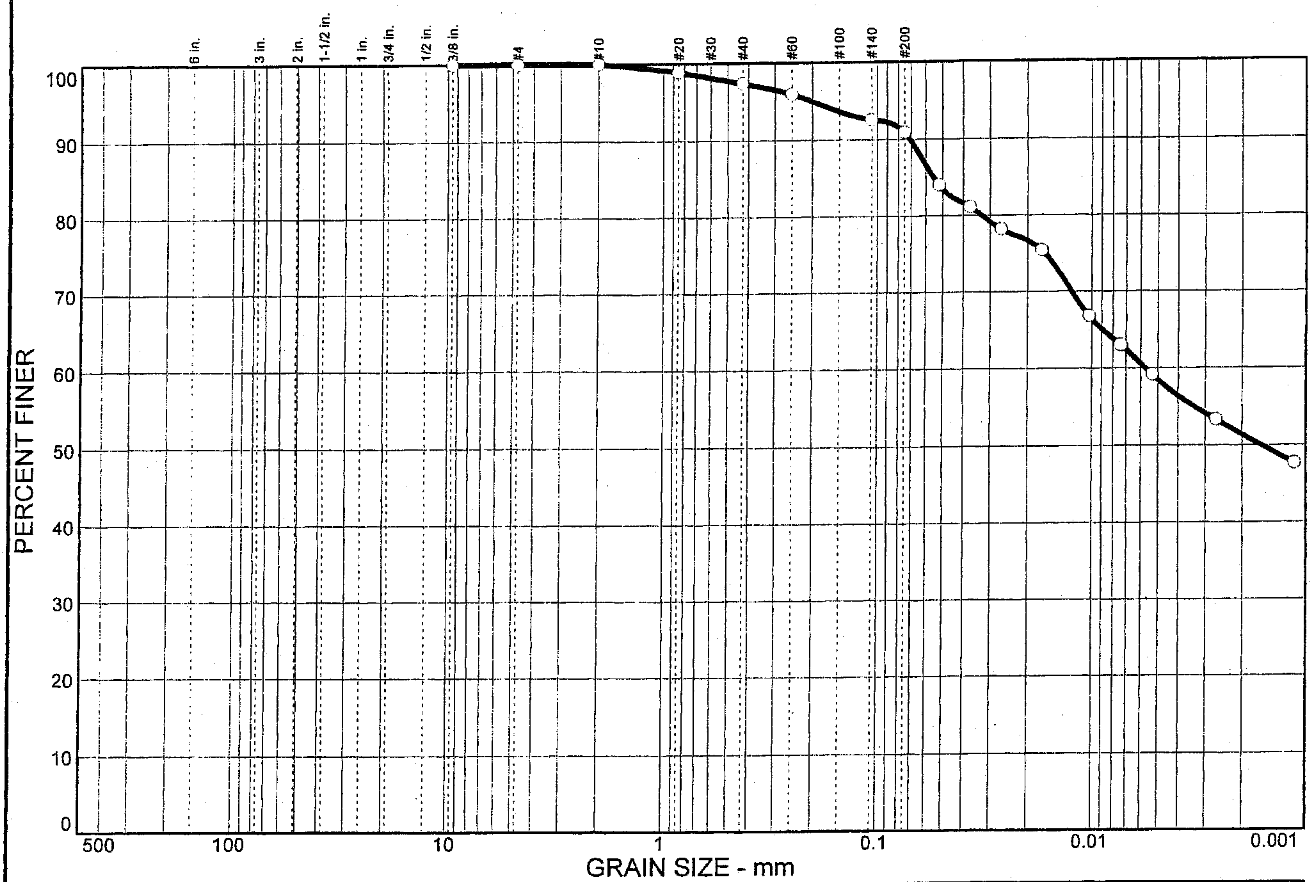
Remarks

Sample No.: **Source of Sample:** **Date:** 09-22-04
Location: B-4 SPT @ 13'-14.5' and 16'-17.5' **Elev./Depth:**

MACTEC, INC.

Client: TVA
Project: Ash Disposal Areas - TVA Gallatin Fossil Plant
Project No: 3043041043 HB **Figure**

Grain Size Analysis



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	0.0	0.0	0.0	2.6	6.5	32.3	58.6

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.375 in.	100.0		
#4	100.0		
#10	100.0		
#20	98.9		
#40	97.4		
#60	96.0		
#140	92.6		
#200	90.9		

* (no specification provided)

Soil Description

Orange-Brown Silty Clay

Atterberg Limits

PL= 20 LL= 51 PI= 31

Coefficients

D_{85}= 0.0550 D_{60}= 0.0057 D_{50}= 0.0016
D_{30}= D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= CH AASHTO=

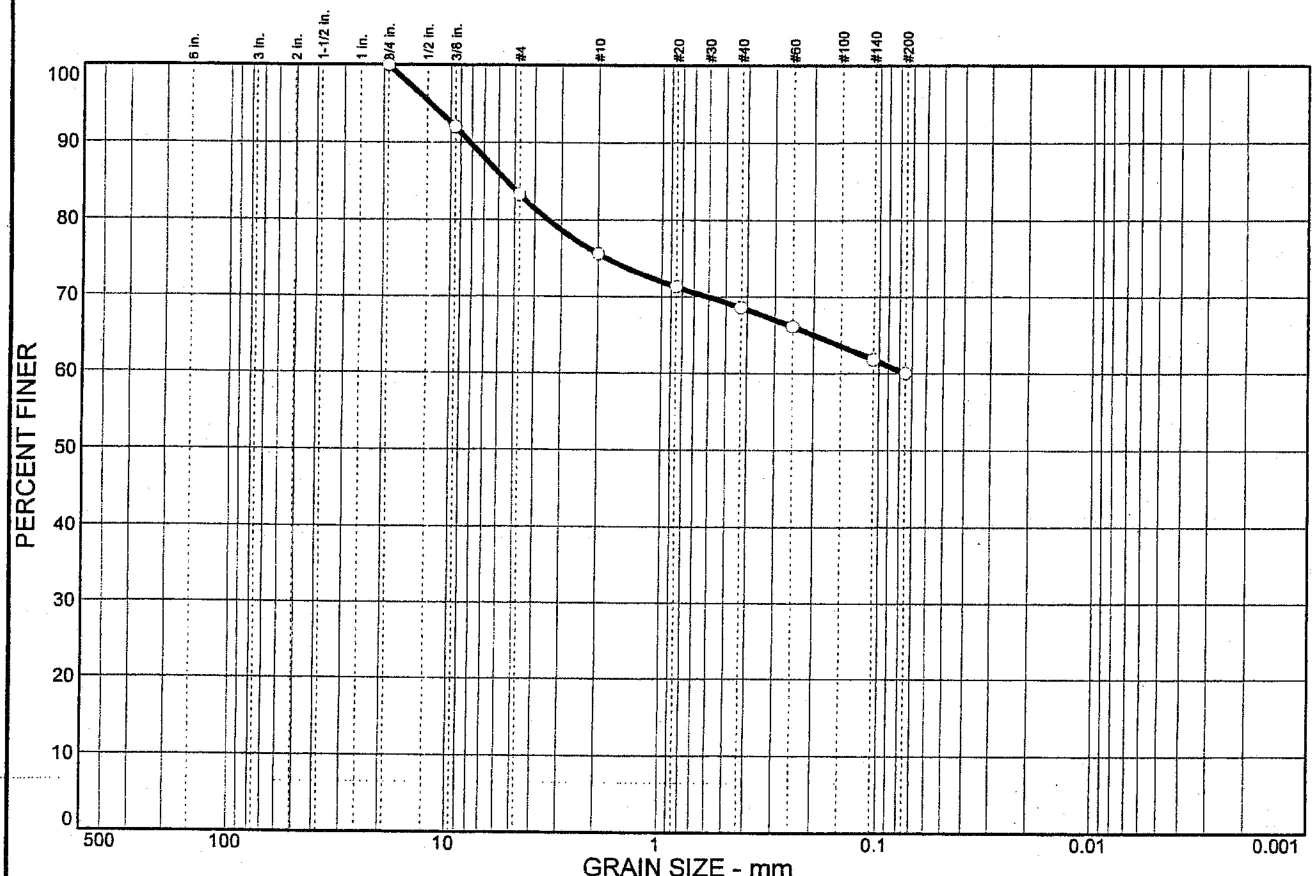
Remarks

Sample No.: **Source of Sample:** **Date:** 10-12-04
Location: B-8 UD @ 22'-23.5' **Elev./Depth:**

MACTEC, INC.

Client: TVA
Project: Ash Disposal Areas - TVA Gallatin Fossil Plant
Project No: 3043041043 48 **Figure**

Grain Size Analysis



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	0.0	16.7	7.7	7.0	8.6	60.0	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.75 in.	100.0		
0.375 in.	92.0		
#4	83.3		
#10	75.6		
#20	71.3		
#40	68.6		
#60	66.1		
#140	61.8		
#200	60.0		

* (no specification provided)

Soil Description

Orange-Brown Silty Clay with Chert Fragments

Atterberg Limits

PL= LL= PI=

Coefficients

D_{85}= 5.48 D_{60}= 0.0750 D_{50}=
D_{30}= D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= AASHTO=

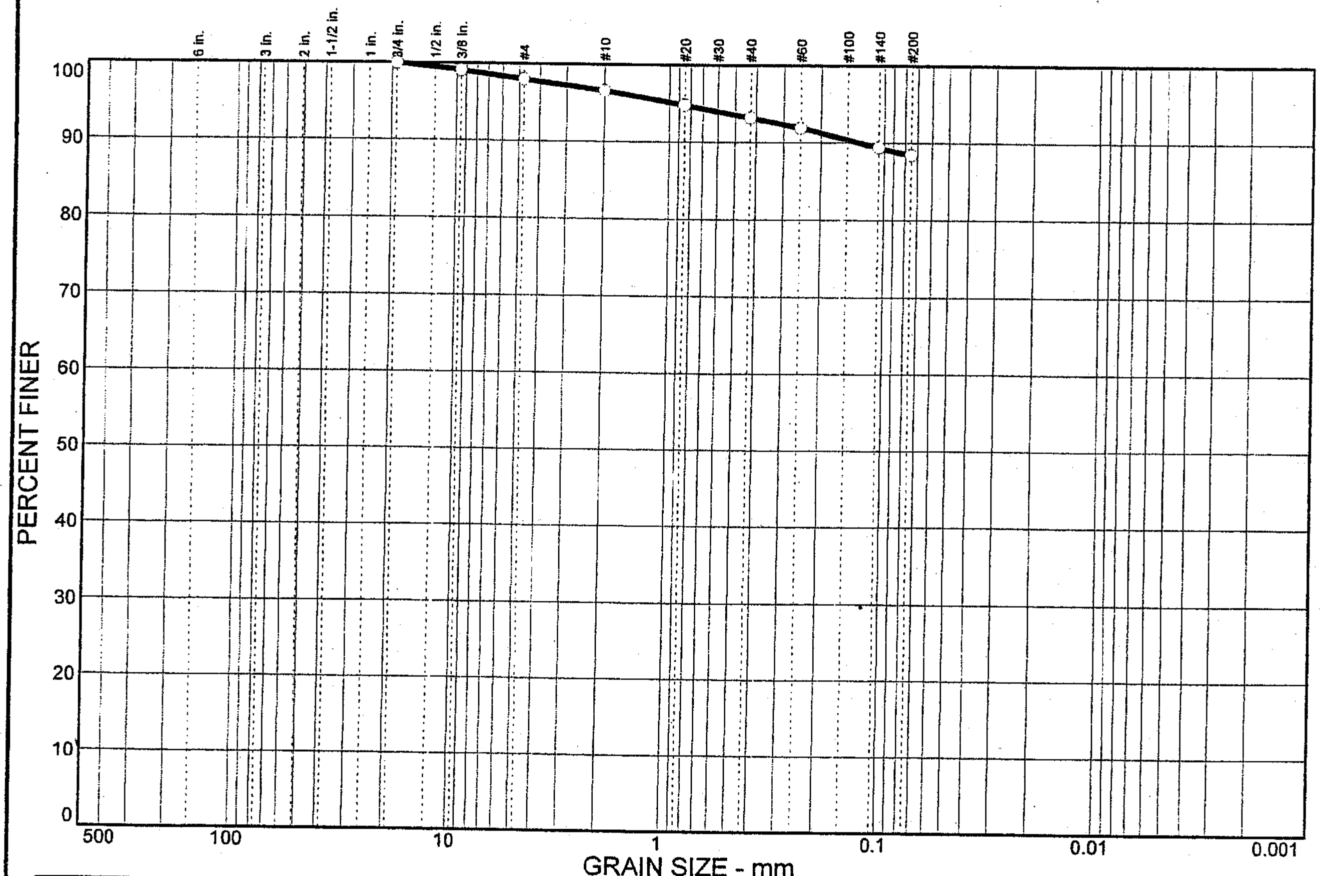
Remarks

Sample No.: **Source of Sample:** **Date:** 09-22-04
Location: B-10 SPT @ 7'-8.5' and 10'-11.5' **Elev./Depth:**

MACTEC, INC.

Client: TVA
Project: Ash Disposal Areas - TVA Gallatin Fossil Plant
Project No: 3043041043 HB **Figure**

Grain Size Analysis



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	0.0	2.0	1.4	3.4	4.8	88.4	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.75 in.	100.0		
0.375 in.	99.1		
#4	98.0		
#10	96.6		
#20	94.8		
#40	93.2		
#60	91.9		
#140	89.4		
#200	88.4		

* (no specification provided)

Soil Description

Orange-Brown Silty Clay

Atterberg Limits

PL= LL= PI=

Coefficients

D_{85}= D_{60}= D_{50}=
D_{30}= D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Sample No.: **Source of Sample:** **Date:** 09-22-04
Location: B-10 SPT @ 16'-17.5' and 20'-21.5' **Elev./Depth:**

MACTEC, INC.

Client: TVA
Project: Ash Disposal Areas - TVA Gallatin Fossil Plant
Project No: 3043041043 HB **Figure**

Grain Size Analysis

% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	0.0	0.0	0.0	0.2	8.8	91.0	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.375 in.	100.0		
#4	100.0		
#10	100.0		
#20	100.0		
#40	99.8		
#60	98.7		
#140	94.4		
#200	91.0		

* (no specification provided)

Soil Description

Gray Fly Ash

Atterberg Limits

PL= LL= PI=

Coefficients

D_{85}= D_{60}= D_{50}=
D_{30}= D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= AASHTO=

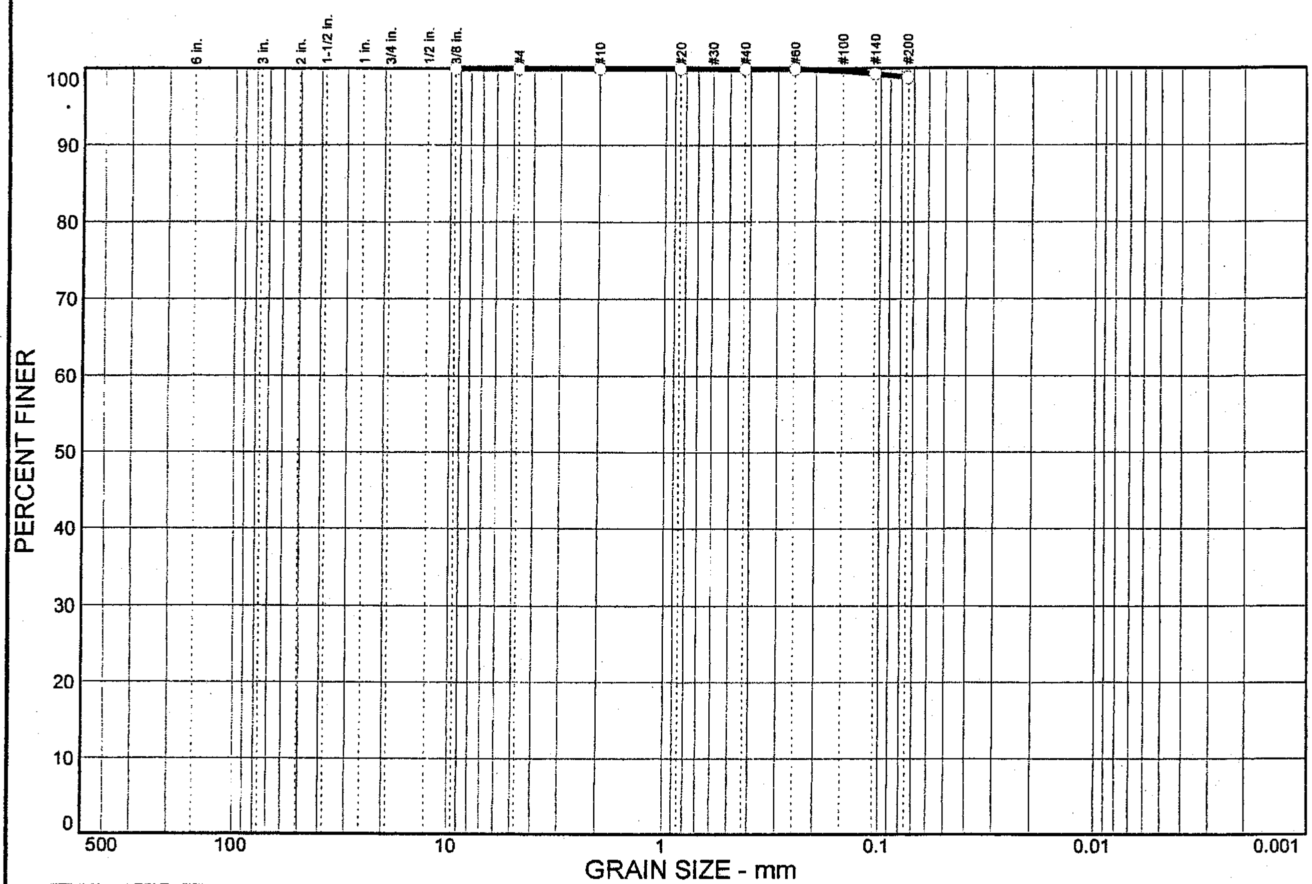
Remarks

Sample No.: **Source of Sample:** **Date:** 09-22-04
Location: B-13 SPT @ 6'-7.5' and 9'-10.5' **Elev./Depth:**

MACTEC, INC.

Client: TVA
Project: Ash Disposal Areas - TVA Gallatin Fossil Plant
Project No: 3043041043 HB **Figure**

Grain Size Analysis



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	0.0	0.0	0.0	0.1	1.1	98.8	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.375 in.	100.0		
#4	100.0		
#10	100.0		
#20	100.0		
#40	99.9		
#60	99.9		
#140	99.3		
#200	98.8		

* (no specification provided)

Soil Description

Grey Ash Sand

Atterberg Limits

PL= LL= PI=

Coefficients

D_{85}= D_{60}= D_{50}=
D_{30}= D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= AASHTO=

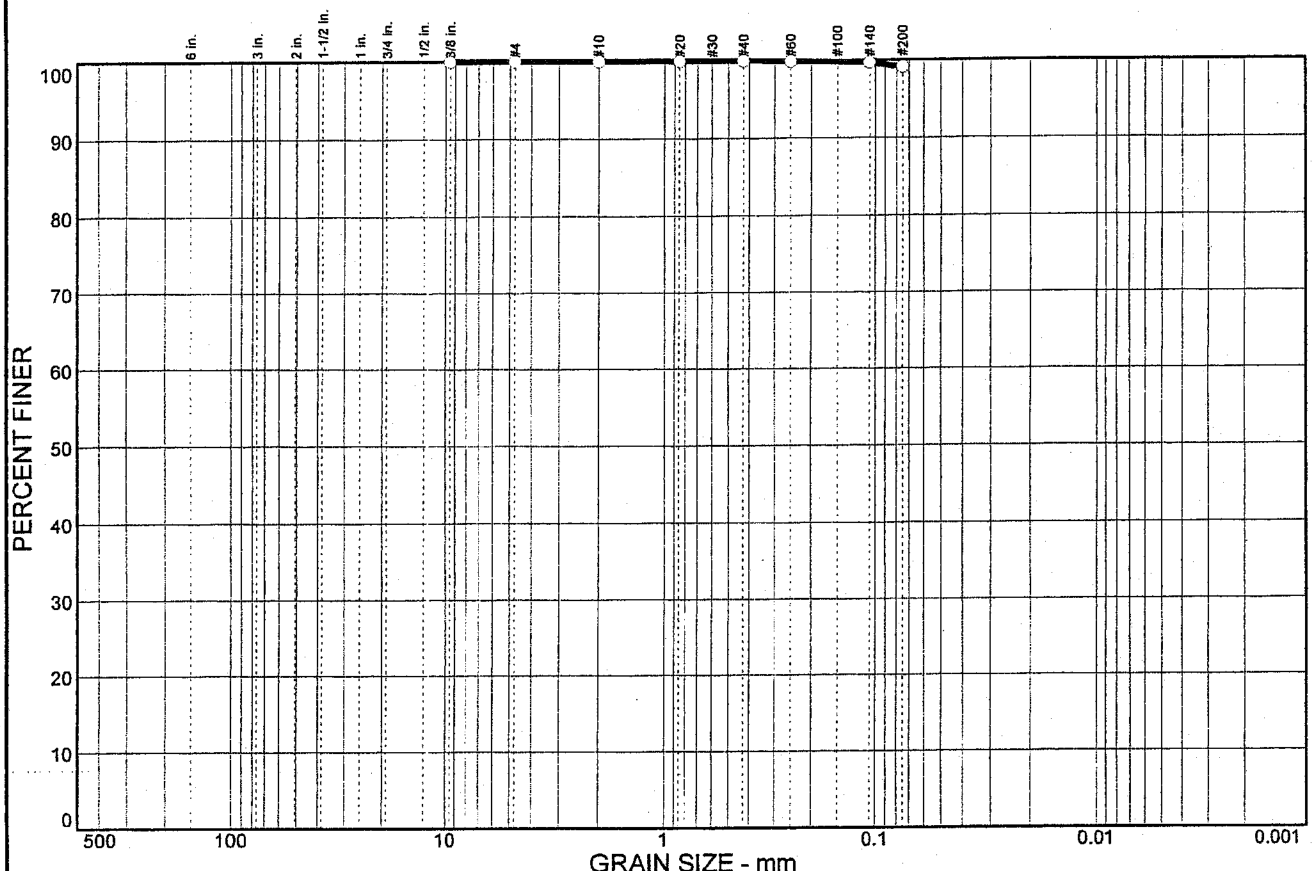
Remarks

Sample No.: **Source of Sample:** **Date:** 09-22-04
Location: B-13 SPT @ 12'-13.5' and 17'-18.5' **Elev./Depth:**

MACTEC, INC.

Client: TVA
Project: Ash Disposal Areas - TVA Gallatin Fossil Plant
Project No: 3043041043 H8 **Figure**

Grain Size Analysis



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	0.0	0.0	0.0	0.0	0.9	99.1	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.375 in.	100.0		
#4	100.0		
#10	100.0		
#20	100.0		
#40	100.0		
#60	99.9		
#140	99.7		
#200	99.1		

* (no specification provided)

Soil Description

Gray Ash Sand

Atterberg Limits

PL= LL= PI=

Coefficients

D_{85}= D_{60}= D_{50}=
D_{30}= D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= AASHTO=

Remarks

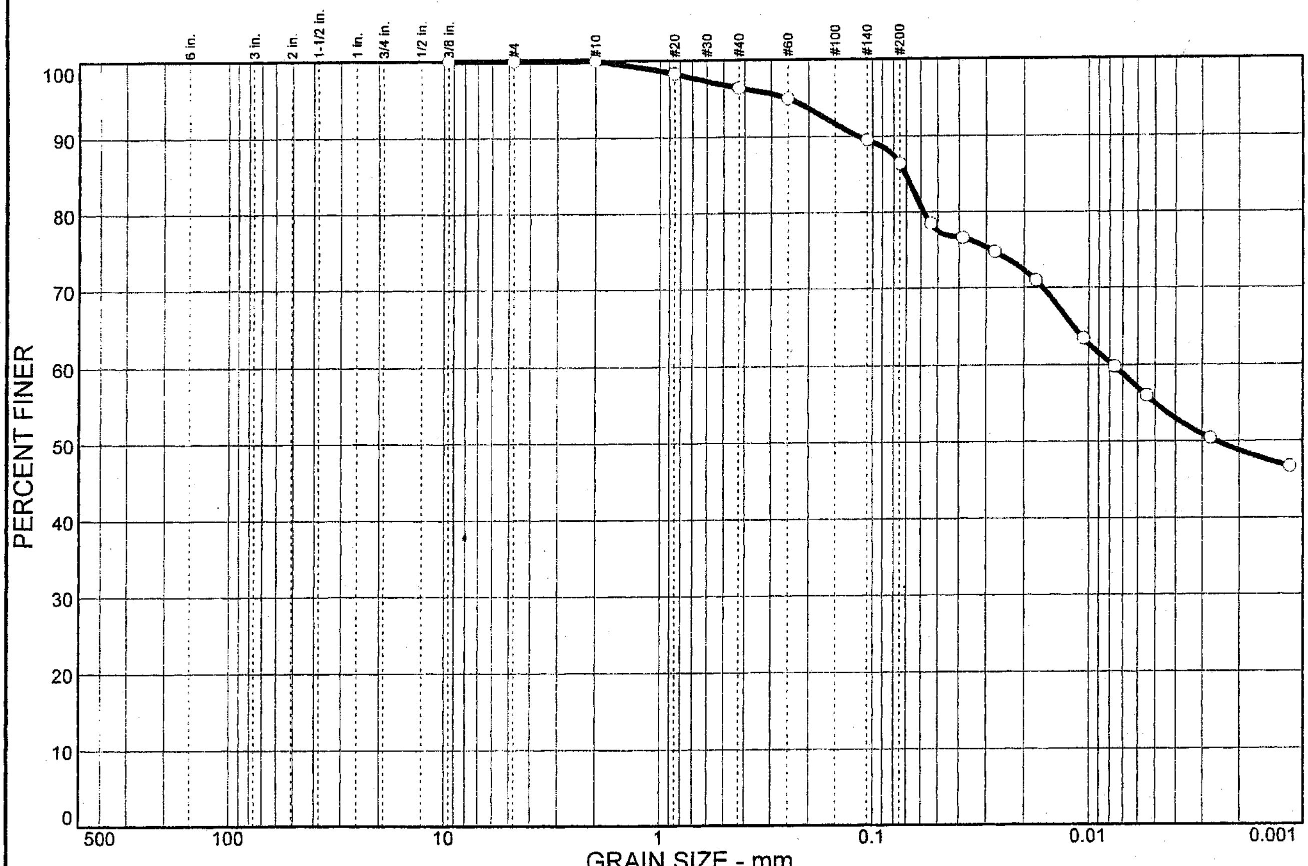
Specific Gravity: 2.20

Sample No.: **Source of Sample:** **Date:** 09-22-04
Location: B-13 UD @ 15'-17' **Elev./Depth:**

MACTEC, INC.

Client: TVA
Project: Ash Disposal Areas - TVA Gallatin Fossil Plant
Project No: 3043041043 HB **Figure**

Grain Size Analysis



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	0.0	0.0	0.0	3.6	10.0	31.3	55.1

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.375 in.	100.0		
#4	100.0		
#10	100.0		
#20	98.3		
#40	96.4		
#60	95.0		
#140	89.5		
#200	86.4		

* (no specification provided)

Soil Description

Orange-Brown Silty Clay

Atterberg Limits

PL= 30 LL= 78 PI= 48

Coefficients

D_{85}= 0.0704 D_{60}= 0.0077 D_{50}= 0.0025
D_{30}= D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= CH AASHTO=

Remarks

Sample No.: **Source of Sample:** **Date:** 10-12-04
Location: B-13 UD @ 25'-27' **Elev./Depth:**

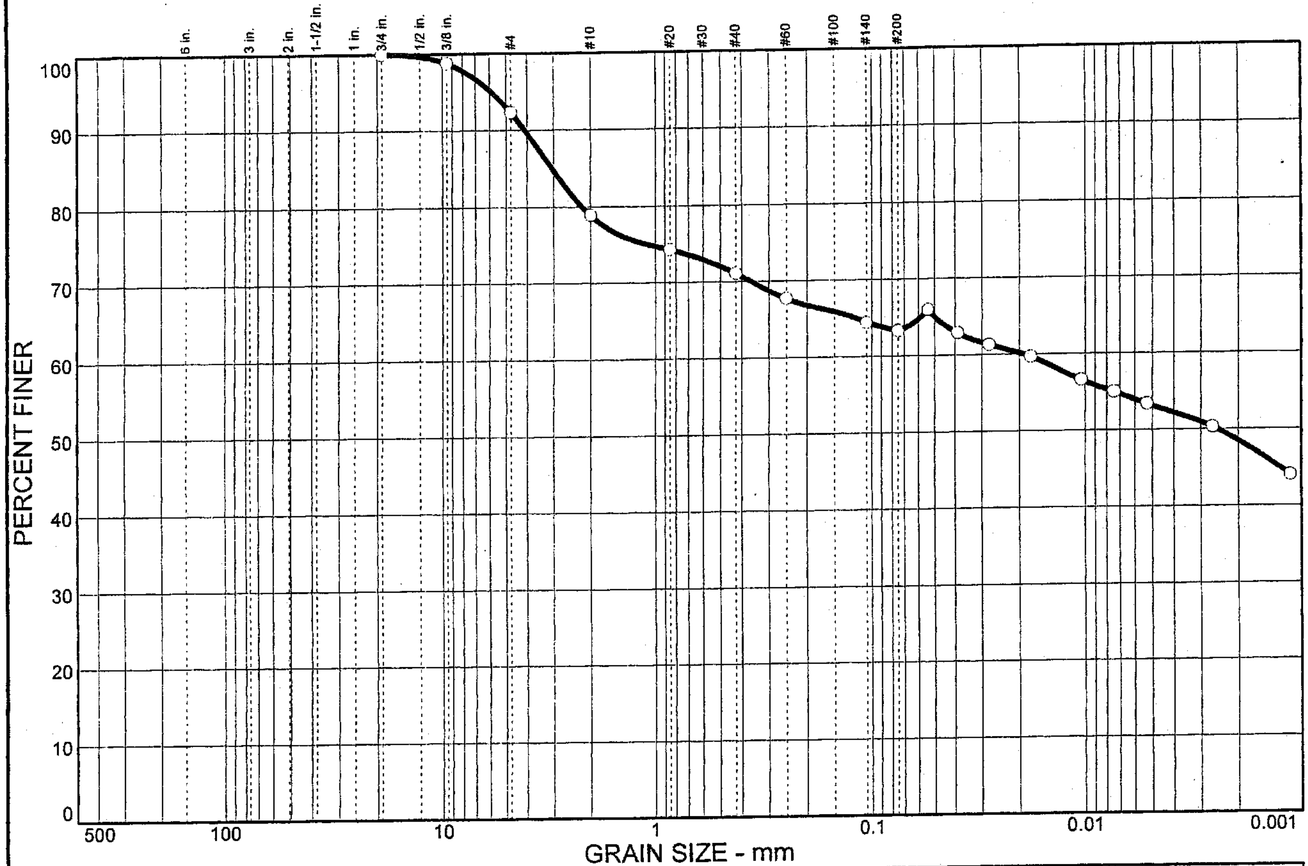
MACTEC, INC.

Client: TVA
Project: Ash Disposal Areas - TVA Gallatin Fossil Plant
Project No: 3043041043 HB **Figure**

GRAIN SIZE ANALYSIS TEST RESULTS

ON-SITE BORROW SAMPLES

Grain Size Analysis



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	0.0	7.7	13.4	7.8	7.8	10.1	53.2

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.75 in.	100.0		
0.375 in.	98.8		
#4	92.3		
#10	78.9		
#20	74.3		
#40	71.1		
#60	67.7		
#140	64.4		
#200	63.3		

* (no specification provided)

Soil Description

Dark-Brown Sandy Silty Clay

Atterberg Limits

PL= 26 LL= 75 PI= 49

Coefficients

D_{85}= 3.03 D_{60}= 0.0190 D_{50}= 0.0025
D_{30}= D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= CH AASHTO=

Remarks

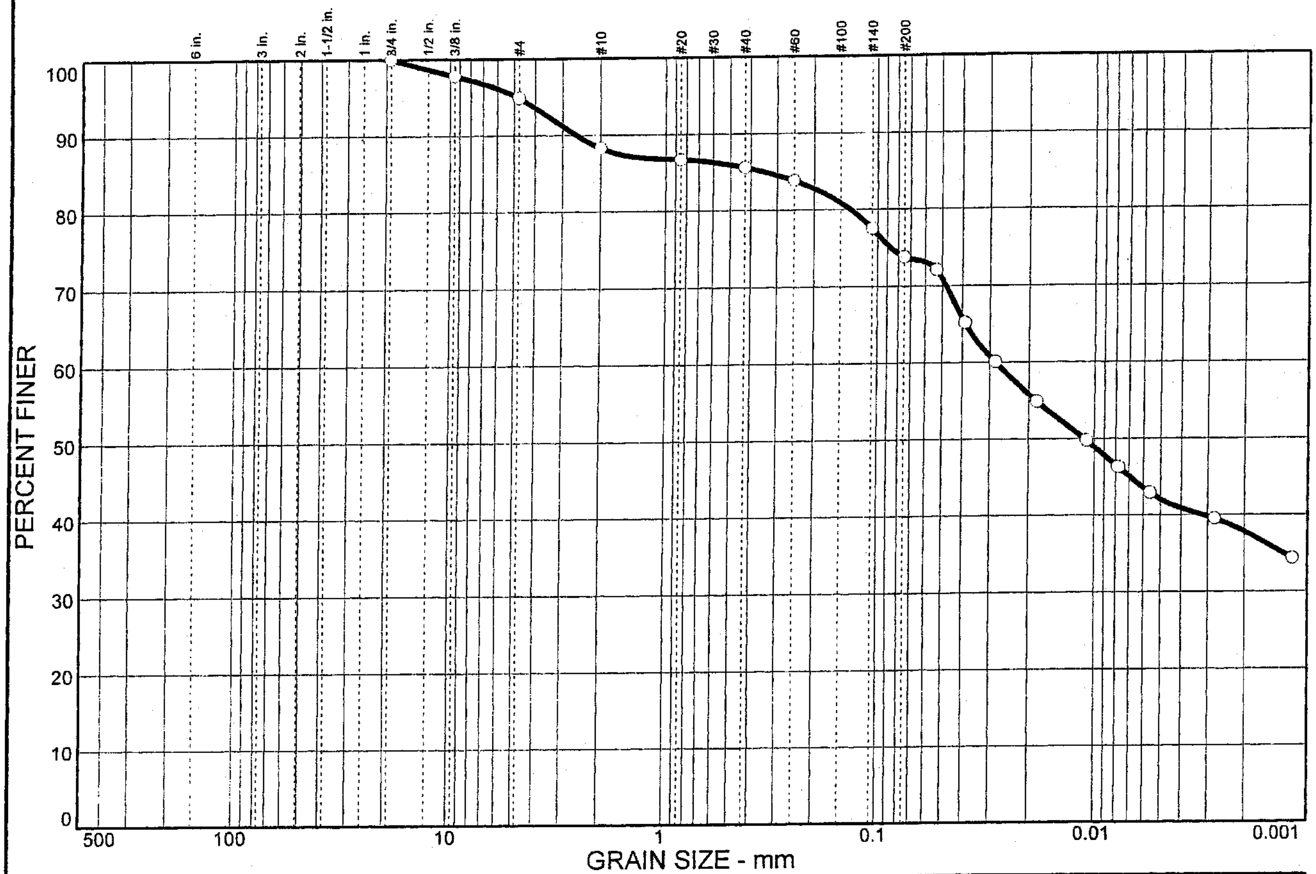
Moisture Content: 21.4%

Sample No.: **Source of Sample:** **Date:** 09-02-04
Location: A-1 Bulk @ 0'-18.5' **Elev./Depth:**

MACTEC, INC.

Client: TVA
Project: Ash Disposal Areas - TVA Gallatin Fossil Plant
Project No: 3043041043 HR **Figure**

Grain Size Analysis



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	0.0	5.1	6.6	2.7	11.8	31.7	42.1

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.75 in.	100.0		
0.375 in.	97.8		
#4	94.9		
#10	88.3		
#20	86.7		
#40	85.6		
#60	83.8		
#140	77.5		
#200	73.8		

* (no specification provided)

Soil Description

Orange-Brown Silty Clay with Sand

Atterberg Limits

PL= 17 LL= 47 PI= 30

Coefficients

D_{85}= 0.345 D_{60}= 0.0281 D_{50}= 0.0111
D_{30}= D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= CL AASHTO=

Remarks

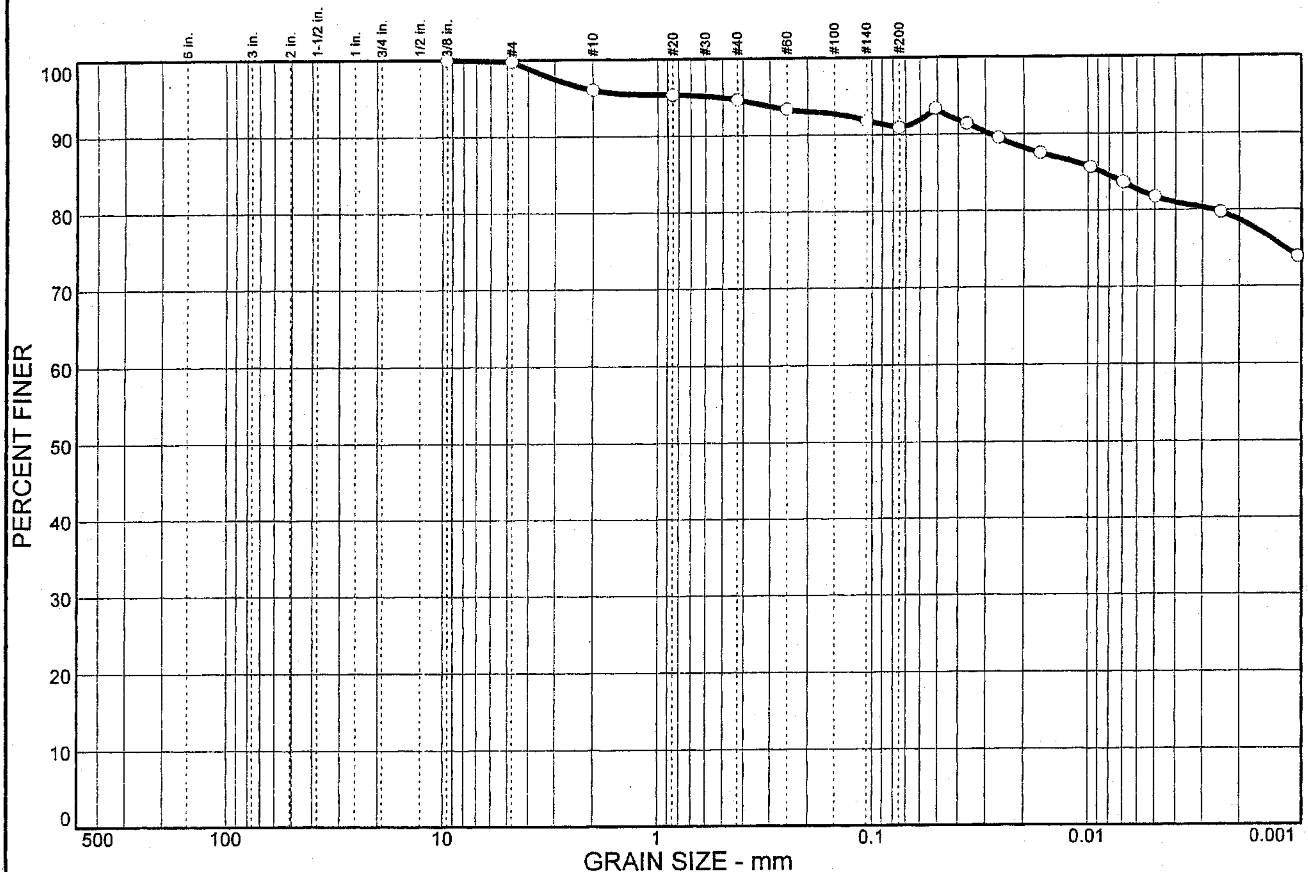
Moisture Content: 21.3%

Sample No.: **Source of Sample:** **Date:** 09-02-04
Location: A-2 Bulk @ 0'-20.0' **Elev./Depth:**

MACTEC, INC.

Client: TVA
Project: Ash Disposal Areas - TVA Gallatin Fossil Plant
Project No: 3043041043 HB **Figure**

Grain Size Analysis



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	0.0	0.2	3.7	1.4	3.8	9.2	81.7

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.375 in.	100.0		
#4	99.8		
#10	96.1		
#20	95.4		
#40	94.7		
#60	93.4		
#140	91.8		
#200	90.9		

* (no specification provided)

Soil Description

Orange-Brown Silty Clay

Atterberg Limits

PL= 32 LL= 80 PI= 48

Coefficients

D_{85}= 0.0087 D_{60}= D_{50}=
D_{30}= D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= CH AASHTO=

Remarks

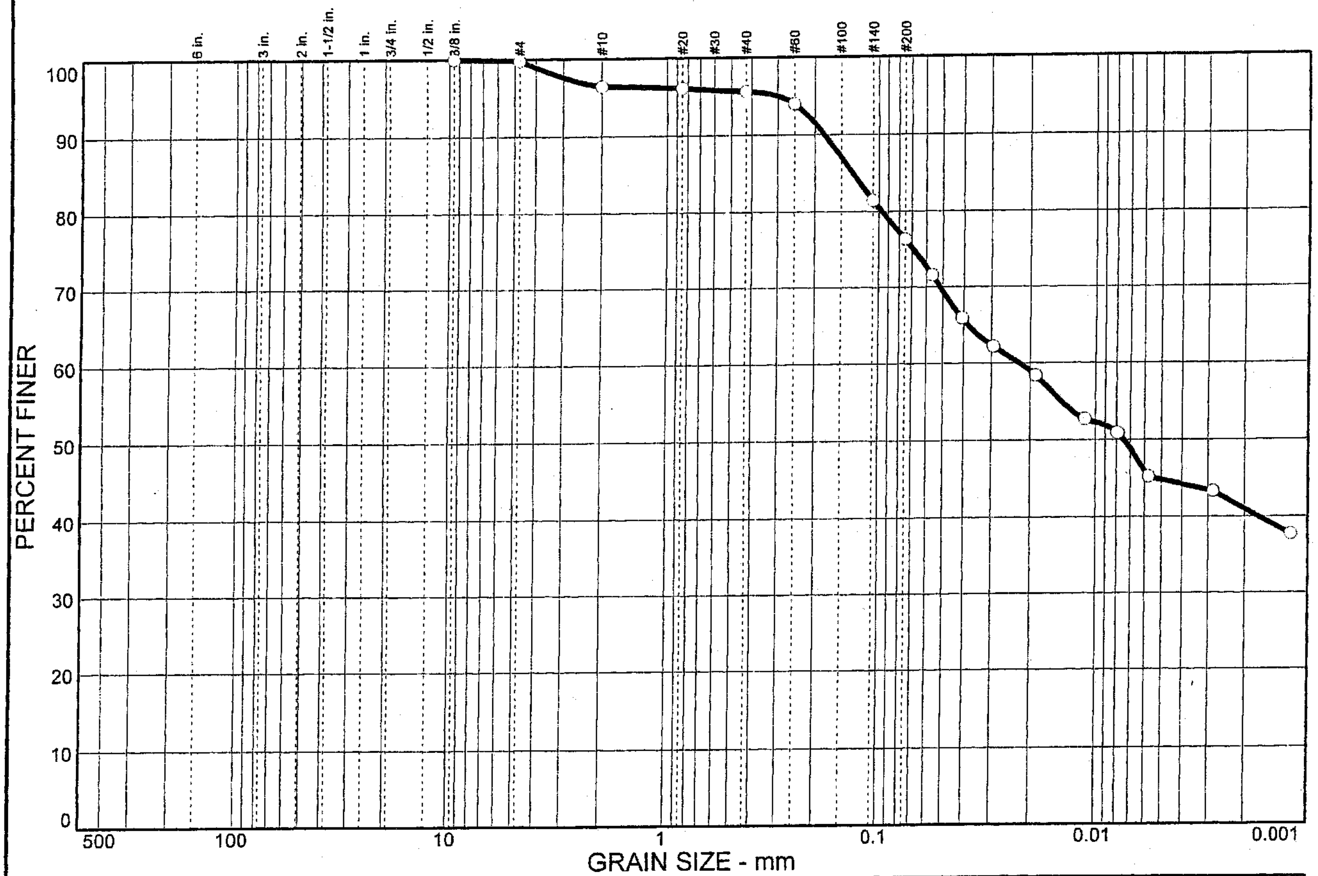
Moisture Content: 29.9%

Sample No.: **Source of Sample:** **Date:** 09-02-04
Location: A-5 Bulk @ 0'-15.0' **Elev./Depth:**

MACTEC, INC.

Client: TVA
Project: Ash Disposal Areas - TVA Gallatin Fossil Plant
Project No: 3043041043 HB **Figure**

Grain Size Analysis



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	0.0	0.2	3.4	0.8	19.3	31.5	44.8

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.375 in.	100.0		
#4	99.8		
#10	96.4		
#20	96.1		
#40	95.6		
#60	94.0		
#140	81.4		
#200	76.3		

* (no specification provided)

Soil Description

Yellow-Brown Silty Clay with Sand

Atterberg Limits

PL= 19 LL= 43 PI= 24

Coefficients

D_{85}= 0.132 D_{60}= 0.0223 D_{50}= 0.0074
D_{30}= D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= CL AASHTO=

Remarks

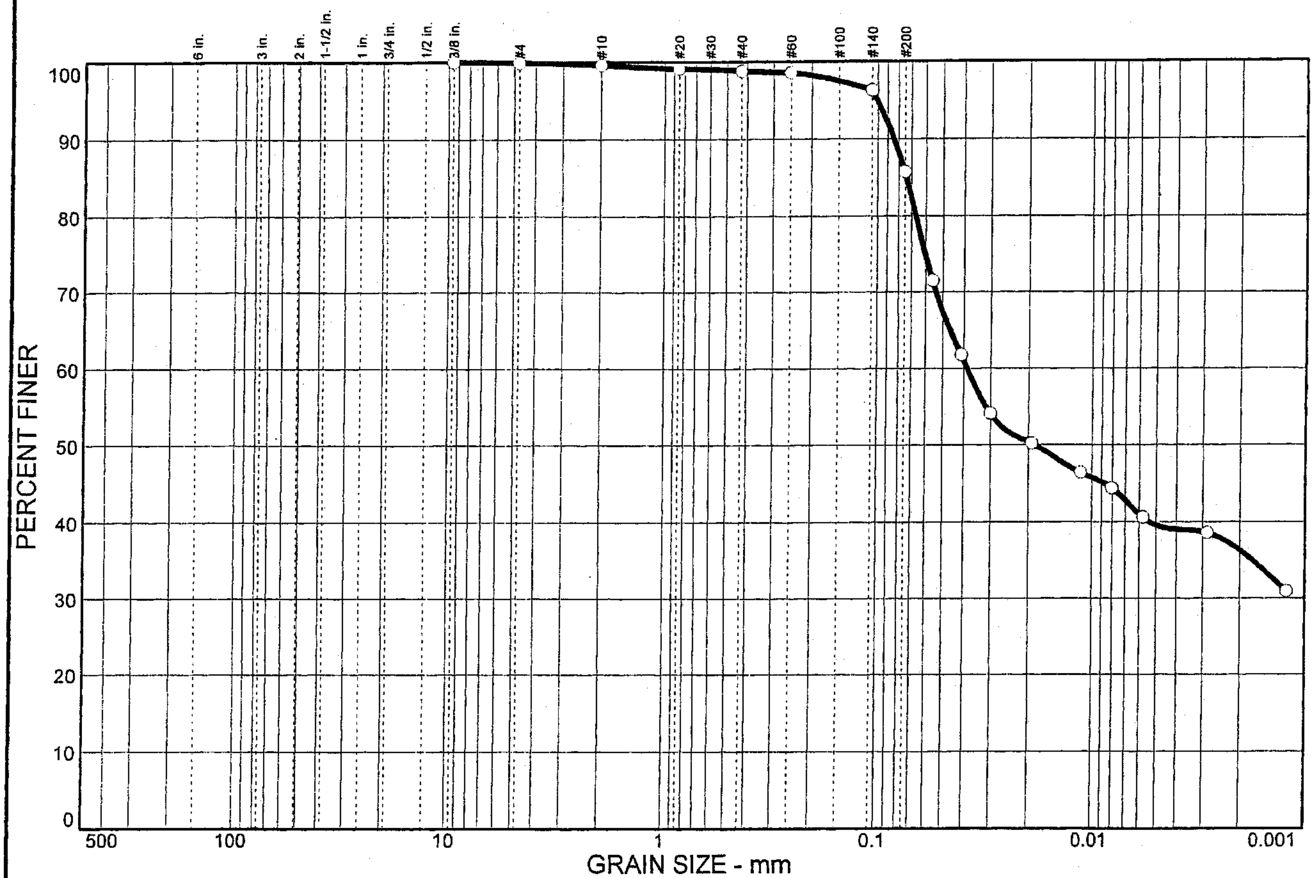
Moisture Content: 19.4%

Sample No.: **Source of Sample:** **Date:** 09-02-04
Location: A-7 Bulk @ 0'-20.0' **Elev./Depth:**

MACTEC, INC.

Client: TVA
Project: Ash Disposal Areas - TVA Gallatin Fossil Plant
Project No: 3043041043 HR **Figure**

Grain Size Analysis



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	0.0	0.1	0.3	0.8	13.1	46.1	39.6

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.375 in.	100.0		
#4	99.9		
#10	99.6		
#20	99.1		
#40	98.8		
#60	98.6		
#140	96.3		
#200	85.7		

* (no specification provided)

Soil Description

Light-Brown Silty Clay

Atterberg Limits

PL= 18 LL= 38 PI= 20

Coefficients

D_{85}= 0.0738 D_{60}= 0.0385 D_{50}= 0.0187
D_{30}= D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= CL AASHTO=

Remarks

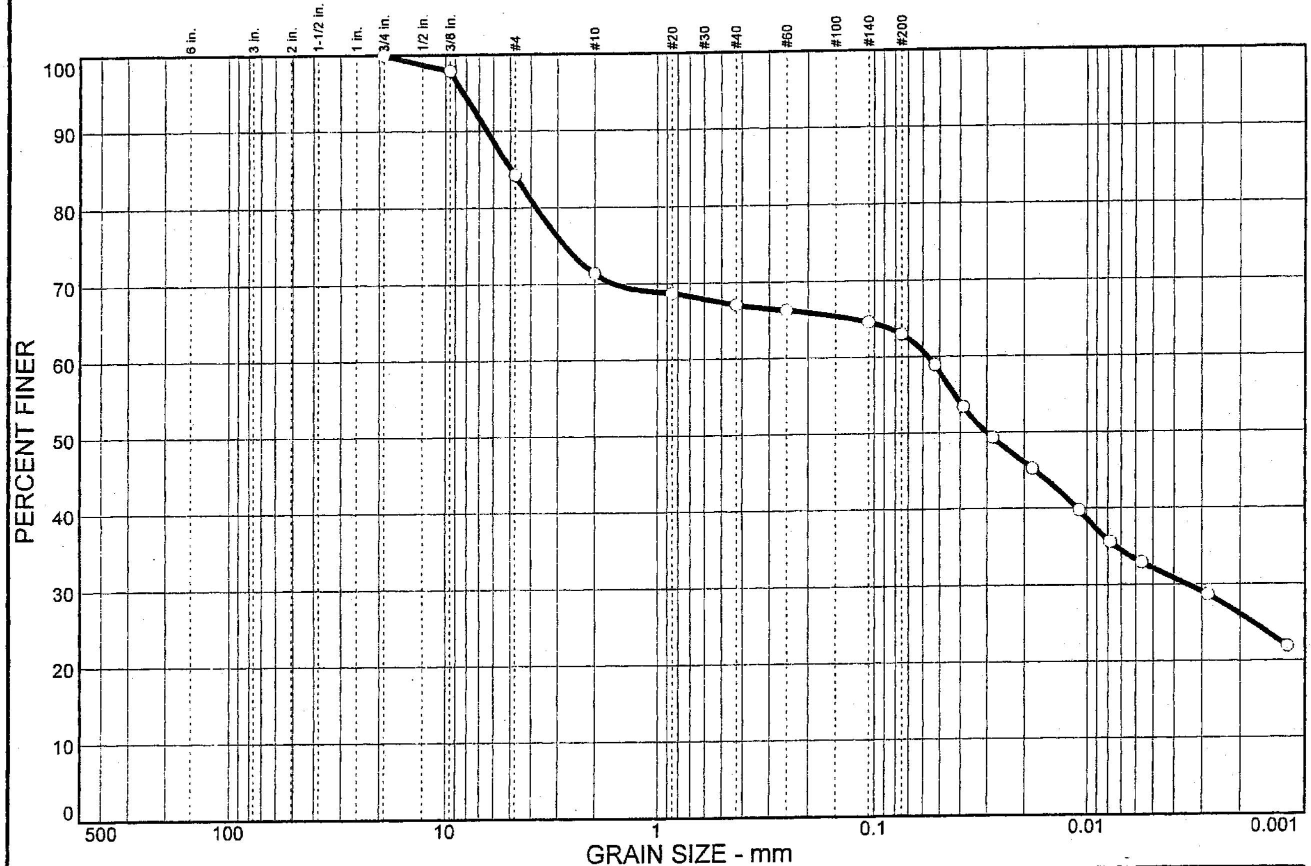
Moisture Content: 19.0%

Sample No.: **Source of Sample:** **Date:** 09-02-04
Location: A-9 Bulk @ 0'-15.0' **Elev./Depth:**

MACTEC, INC.

Client: TVA
Project: Ash Disposal Areas - TVA Gallatin Fossil Plant
Project No: 3043041043 AB **Figure**

Grain Size Analysis



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	0.0	15.8	12.8	4.3	4.1	30.8	32.2

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.75 in.	100.0		
0.375 in.	97.9		
#4	84.2		
#10	71.4		
#20	68.7		
#40	67.1		
#60	66.3		
#140	64.6		
#200	63.0		

* (no specification provided)

Soil Description

Olive-Brown Sandy Silty Clay with Gravel

Atterberg Limits

PL= 17 LL= 36 PI= 19

Coefficients

D_{85}= 4.96 D_{60}= 0.0566 D_{50}= 0.0300
D_{30}= 0.0035 D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= CL AASHTO=

Remarks

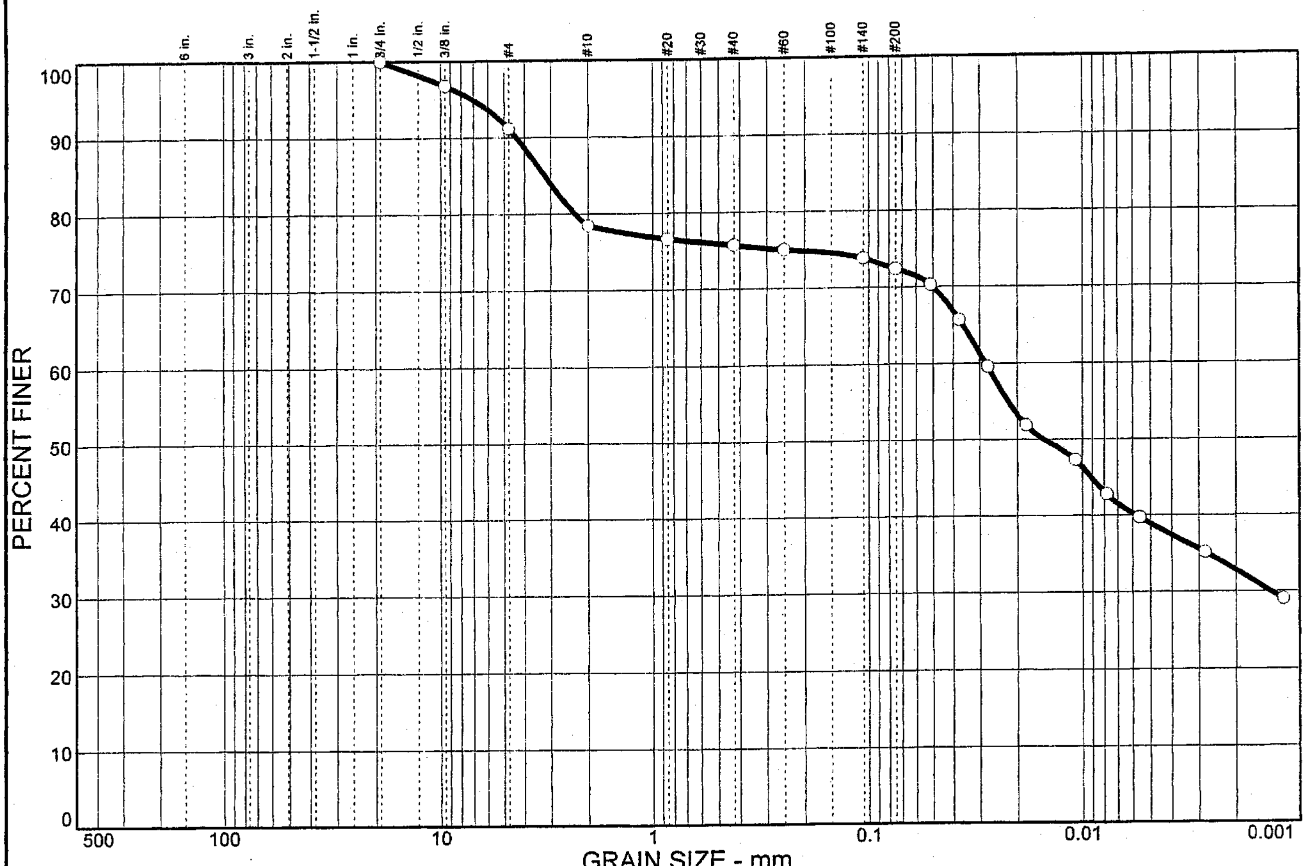
Moisture Content: 10.8%

Sample No.: **Source of Sample:** **Date:** 09-02-04
Location: A-11 Bulk @ 0'-12.5' **Elev./Depth:**

MACTEC, INC.

Client: TVA
Project: Ash Disposal Areas - TVA Gallatin Fossil Plant
Project No: 3043041043 KB **Figure**

Grain Size Analysis



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	0.0	8.8	12.8	2.7	3.3	33.5	38.9

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.75 in.	100.0		
0.375 in.	96.8		
#4	91.2		
#10	78.4		
#20	76.6		
#40	75.7		
#60	75.0		
#140	73.8		
#200	72.4		

* (no specification provided)

Soil Description

Yellow-Brown Lean Clay with Sand

Atterberg Limits

PL= 20 LL= 42 PI= 22

Coefficients

D_{85}= 3.19 D_{60}= 0.0280 D_{50}= 0.0150
D_{30}= 0.0014 D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= CL AASHTO=

Remarks

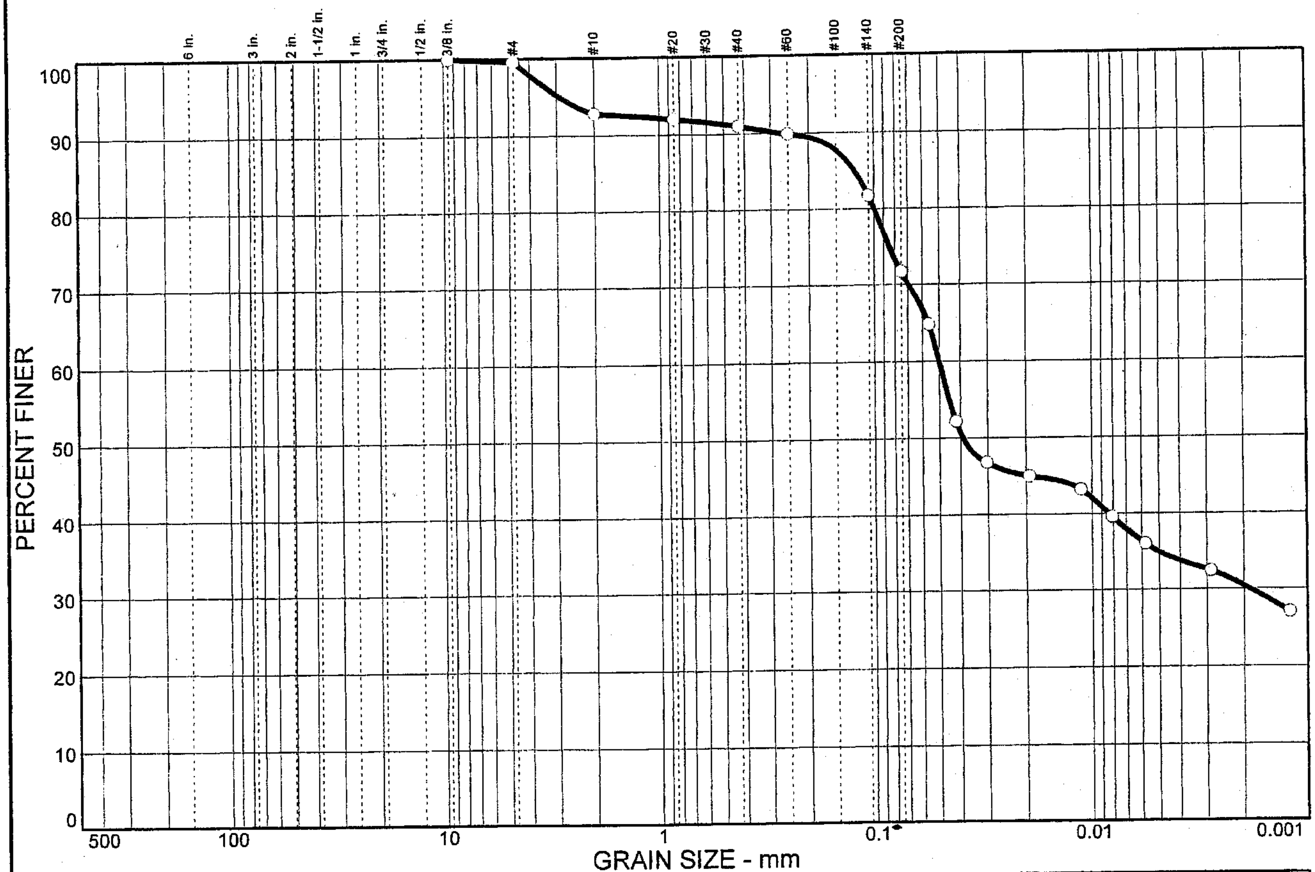
Moisture Content: 17.7%

Sample No.: **Source of Sample:** **Date:** 09-02-04
Location: A-12 Bulk @ 0'-13.0' **Elev./Depth:**

MACTEC, INC.

Client: TVA
Project: Ash Disposal Areas - TVA Gallatin Fossil Plant
Project No: 3043041043 H8 **Figure**

Grain Size Analysis



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	0.0	0.4	6.8	1.8	19.3	36.8	34.9

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.375 in.	100.0		
#4	99.6		
#10	92.8		
#20	92.0		
#40	91.0		
#60	89.9		
#140	81.7		
#200	71.7		

* (no specification provided)

Soil Description

Orange-Brown Silty Clay with Sand

Atterberg Limits

PL= 19 LL= 38 PI= 19

Coefficients

D_{85}= 0.123 D_{60}= 0.0500 D_{50}= 0.0389
D_{30}= 0.0019 D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= CL AASHTO=

Remarks

Moisture Content: 24.1%

Sample No.: **Source of Sample:** **Date:** 09-02-04
Location: A-14 Bulk @ 0'-12.0' **Elev./Depth:**

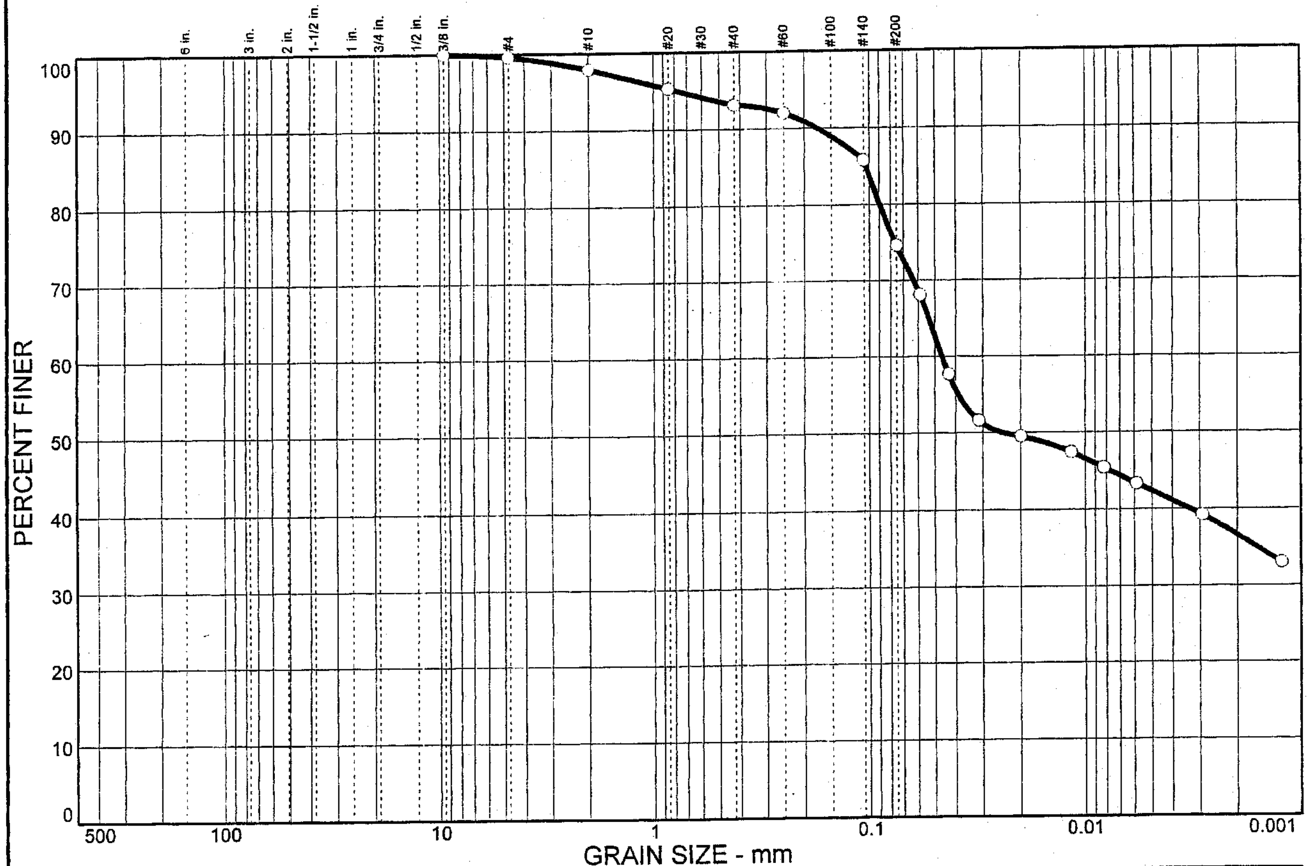
MACTEC, INC.

Client: TVA
Project: Ash Disposal Areas - TVA Gallatin Fossil Plant
Project No: 3043041043 HR **Figure**

GRAIN SIZE ANALYSIS TEST RESULTS

OFF-SITE BORROW SAMPLES

Grain Size Analysis



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	0.0	0.4	1.7	4.8	18.5	32.2	42.4

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.375 in.	100.0		
#4	99.6		
#10	97.9		
#20	95.3		
#40	93.1		
#60	92.0		
#140	85.8		
#200	74.6		

* (no specification provided)

Soil Description

Olive-Brown Silty Clay with Sand

Atterberg Limits

PL= 24 LL= 41 PI= 17

Coefficients

D_{85}= 0.104 D_{60}= 0.0463 D_{50}= 0.0241
D_{30}= D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= CL AASHTO=

Remarks

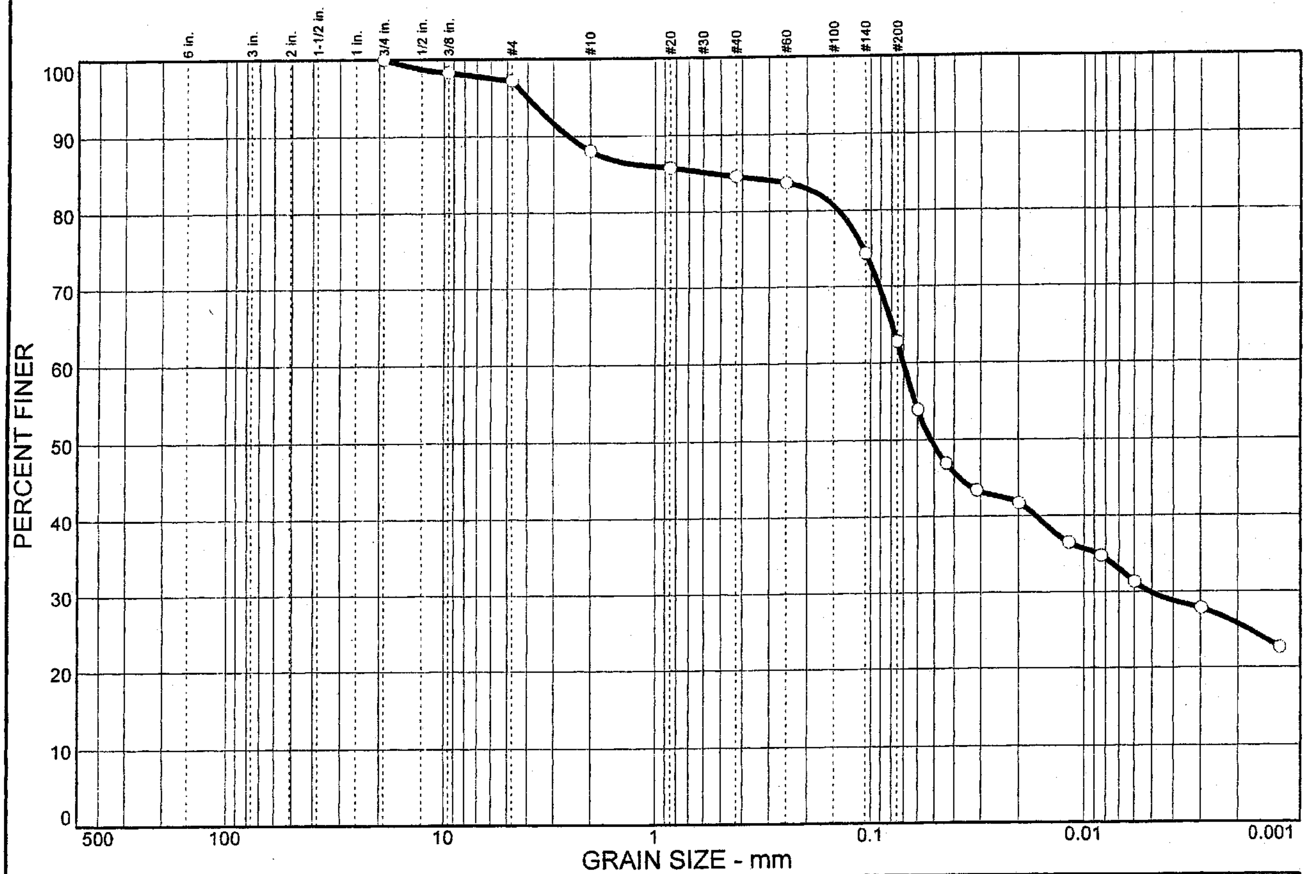
Moisture Content: 32.1%

Sample No.: **Source of Sample:** **Date:** 09-02-04
Location: Off Site Borrow Sample #1 **Elev./Depth:**

MACTEC, INC.

Client: TVA
Project: Ash Disposal Areas - TVA Gallatin Fossil Plant
Project No: 3043041043 HB **Figure**

Grain Size Analysis



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	0.0	2.8	9.1	3.5	21.8	32.9	29.9

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.75 in.	100.0		
0.375 in.	98.3		
#4	97.2		
#10	88.1		
#20	85.8		
#40	84.6		
#60	83.7		
#140	74.3		
#200	62.8		

* (no specification provided)

Soil Description

Yellow-Brown Sandy Silty Clay

Atterberg Limits

PL= 21 LL= 33 PI= 12

Coefficients

D_{85}= 0.535 D_{60}= 0.0700 D_{50}= 0.0516
D_{30}= 0.0051 D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= CL AASHTO=

Remarks

Moisture Content: 22.6%

Sample No.: **Source of Sample:** **Date:** 09-02-04
Location: Off Site Borrow Sample #2 **Elev./Depth:**

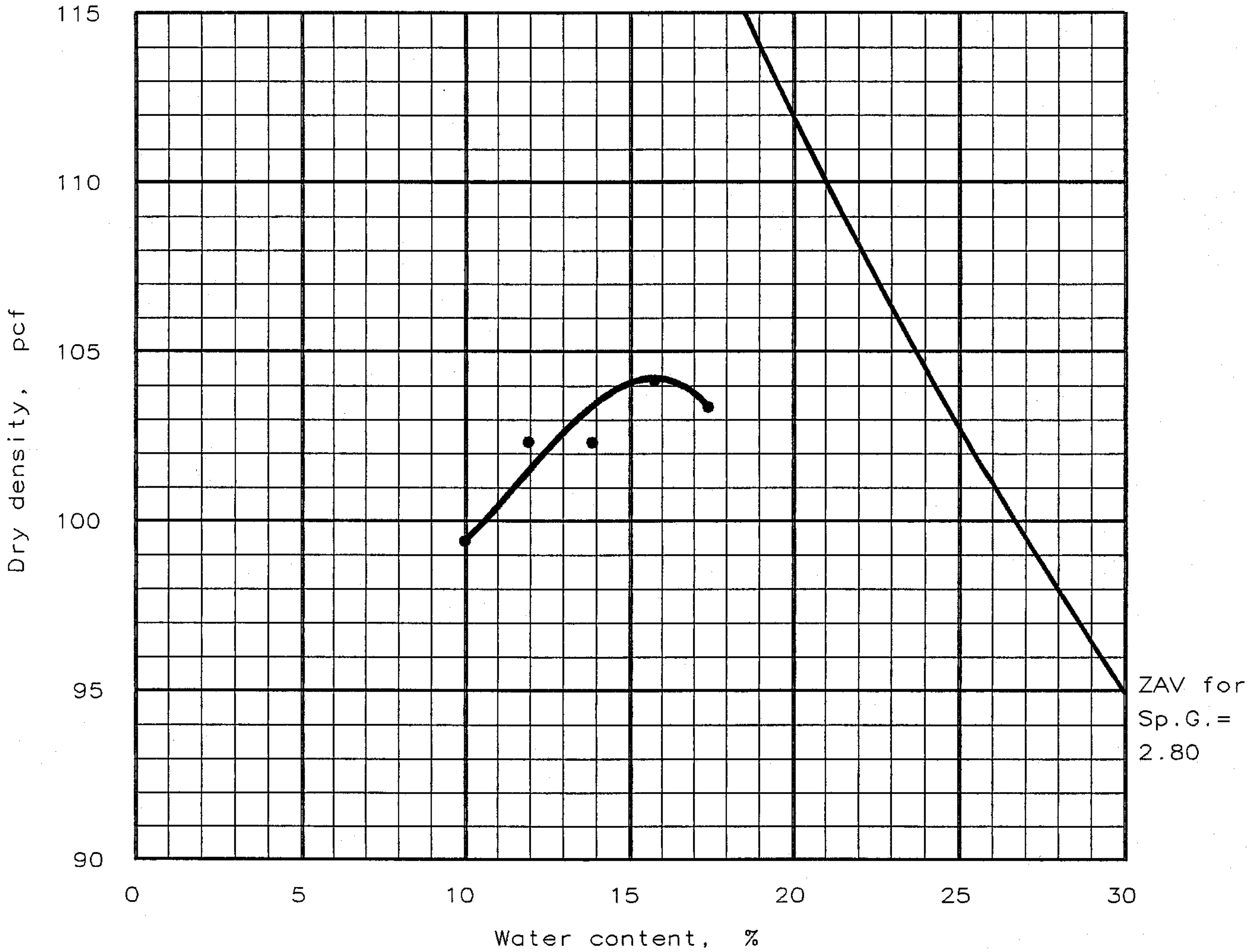
MACTEC, INC.

Client: TVA
Project: Ash Disposal Areas - TVA Gallatin Fossil Plant
Project No: 3043041043 HB **Figure**

MOISTURE-DENSITY RELATIONSHIP TEST RESULTS

BOTTOM ASH SAMPLES

MOISTURE-DENSITY RELATIONSHIP TEST



Test specification: ASTM D 698-00a Procedure C, Standard

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > 3/4 in	% < No.200
	USCS	AASHTO						
NA	NT	NT	11.1 %	2.64	NT	NT	0 %	15.9 %

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 104.2 pcf Optimum moisture = 15.8 %	Gray ash sand

Project No.: 3043041043.0001

Project: TVA Gallatin Fossil Plant Ash Disposal

Location: Old bottom ash Bulk Sample

Date: 8-20-2004

MOISTURE-DENSITY RELATIONSHIP TEST

HC

LAW ENGINEERING AND ENVIRONMENTAL SERVICES, INC.

Remarks:

Sample Number 3017

NT- No Test

DNS- Data Not Submitted

Fig. No. 3017

MOISTURE-DENSITY RELATIONSHIP TEST

Test specification: ASTM D 698-00a Procedure C, Standard

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > 3/4 in	% < No.200
	USCS	AASHTO						
NA	NT	NT	9.6 %	2.49	NT	NT	0 %	9.8 %

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 79.4 pcf Optimum moisture = 29.2 %	Gray ash sand

Project No.: 3043041043.0001

Project: TVA Gallatin Fossil Plant Ash Disposal

Location: New bottom ash Bulk Sample 2

Date: 8-20-2004

Remarks:

Sample Number 3019

NT- No Test

DNS- Data Not Submitted

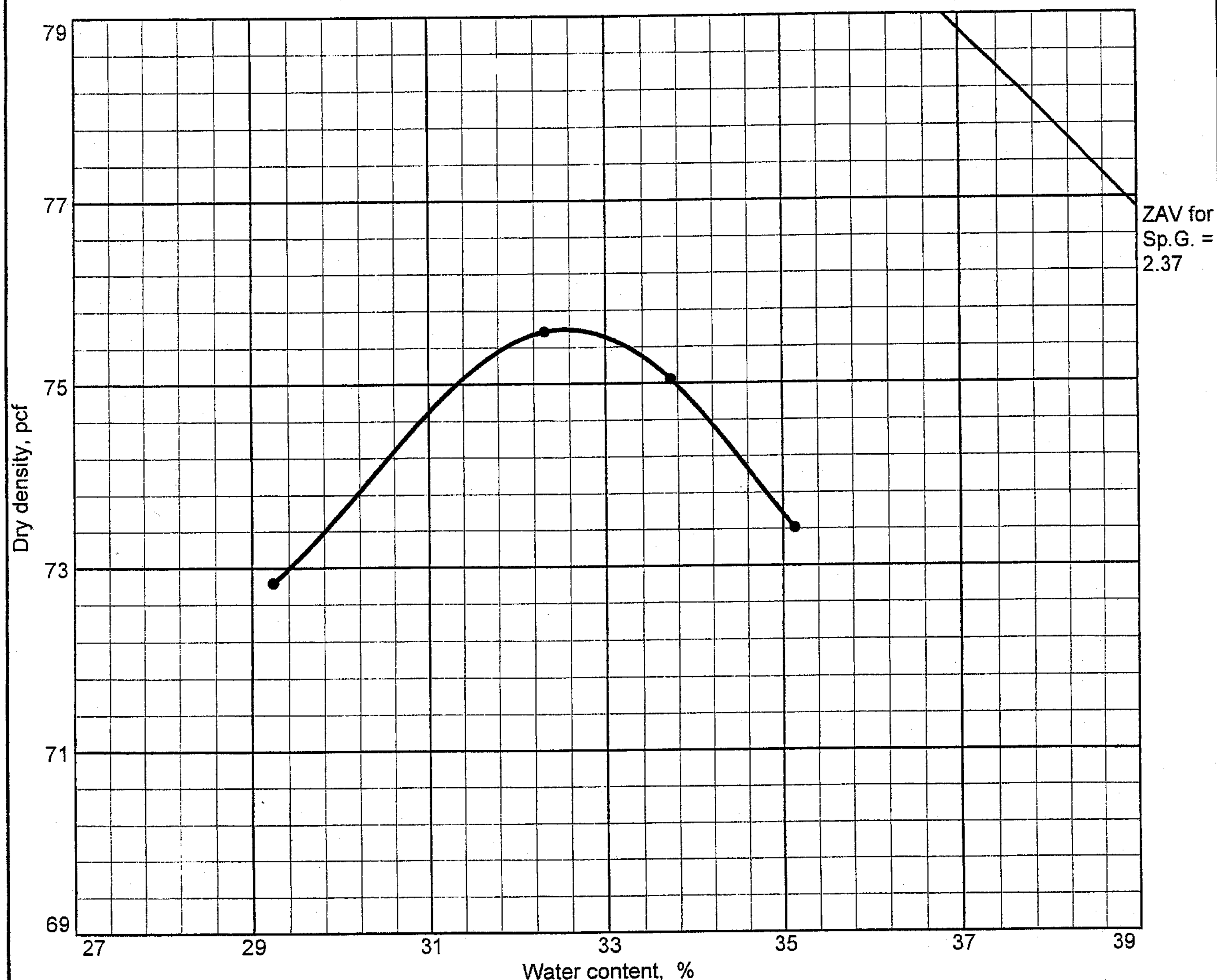
MOISTURE-DENSITY RELATIONSHIP TEST

HB

LAW ENGINEERING AND ENVIRONMENTAL SERVICES, INC.

Fig. No. 3019

COMPACTION TEST REPORT



Test specification: ASTM D 698-00a Method C Standard

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > 3/4 in.	% < No.200
	USCS	AASHTO						

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 75.6 pcf Optimum moisture = 32.6 %	Grey Bottom Ash

Project No. 3043041043 **Client:** TVA
Project: Ash Disposal Areas - TVA Gallatin Fossil Plant

● **Location:** New Bottom Ash Sample #3

COMPACTION TEST REPORT HB

MACTEC ENGINEERING AND CONSULTING, INC.

Remarks:

Figure

MOISTURE-DENSITY RELATIONSHIP TEST RESULTS

ON-SITE BORROW SAMPLES

COMPACTION TEST REPORT

Test specification: ASTM D 698-00a Method A Standard

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > No.4	% < No.200
	USCS	AASHTO						
	CL				47	30	5.1	73.8

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 104.8 pcf Optimum moisture = 19.1 %	Orange-Brown Silty Clay with Sand

Project No. 3043041043 **Client:** TVA

Project: Ash Disposal Areas - TVA Gallatin Fossil Plant

● **Location:** A-2 Bulk @ 0'-20.0'

Remarks:

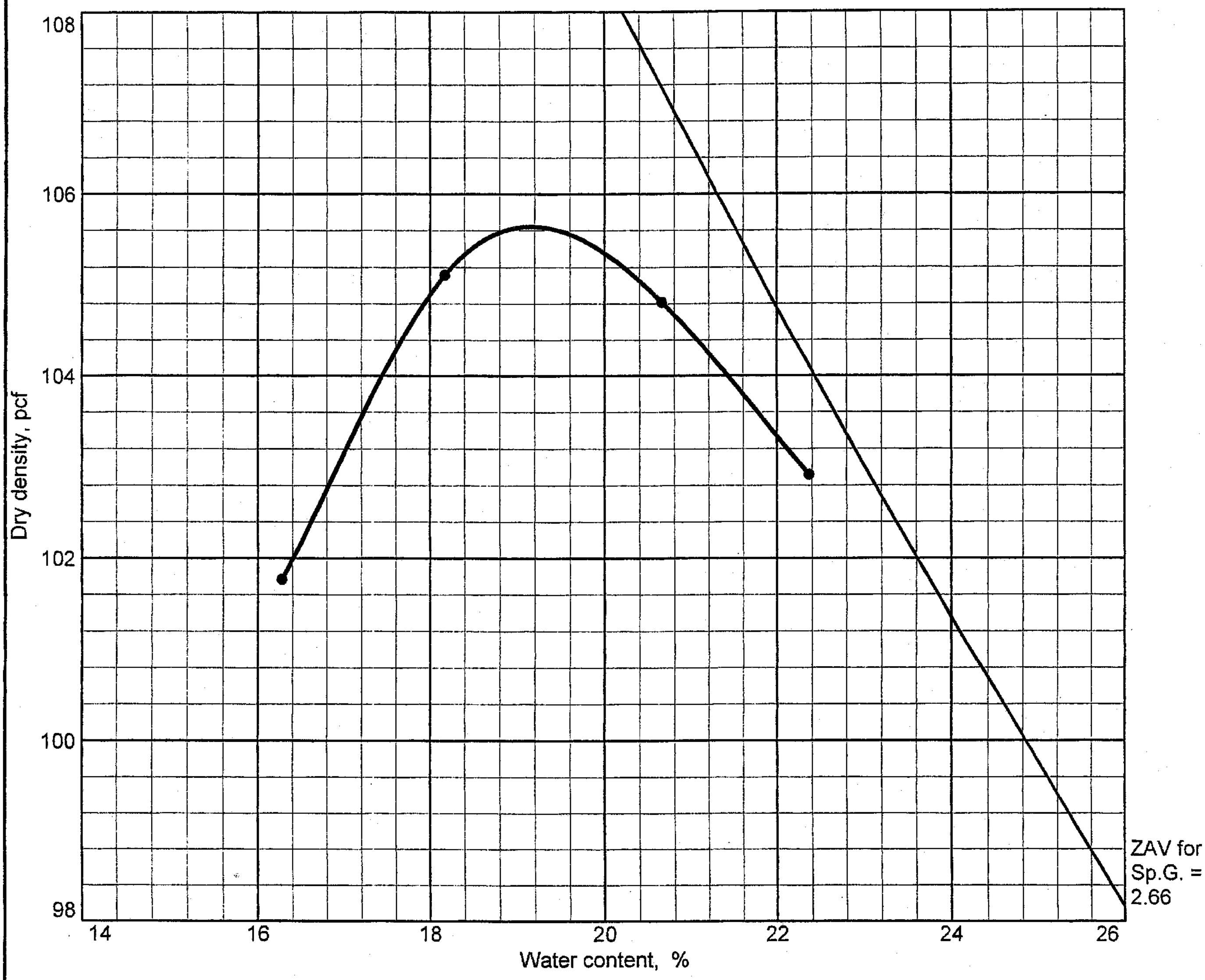
COMPACTION TEST REPORT

MACTEC, INC.

HB

Figure

COMPACTION TEST REPORT



Test specification: ASTM D 698-00a Method A Standard

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > No.4	% < No.200
	USCS	AASHTO						
	CL				38	20	0.1	85.7

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 105.6 pcf Optimum moisture = 19.2 %	Light-Brown Silty Clay

Project No. 3043041043 **Client:** TVA

Project: Ash Disposal Areas - TVA Gallatin Fossil Plant

● **Location:** A-9 Bulk @ 0'-15.0'

Remarks:

COMPACTION TEST REPORT

MACTEC, INC.

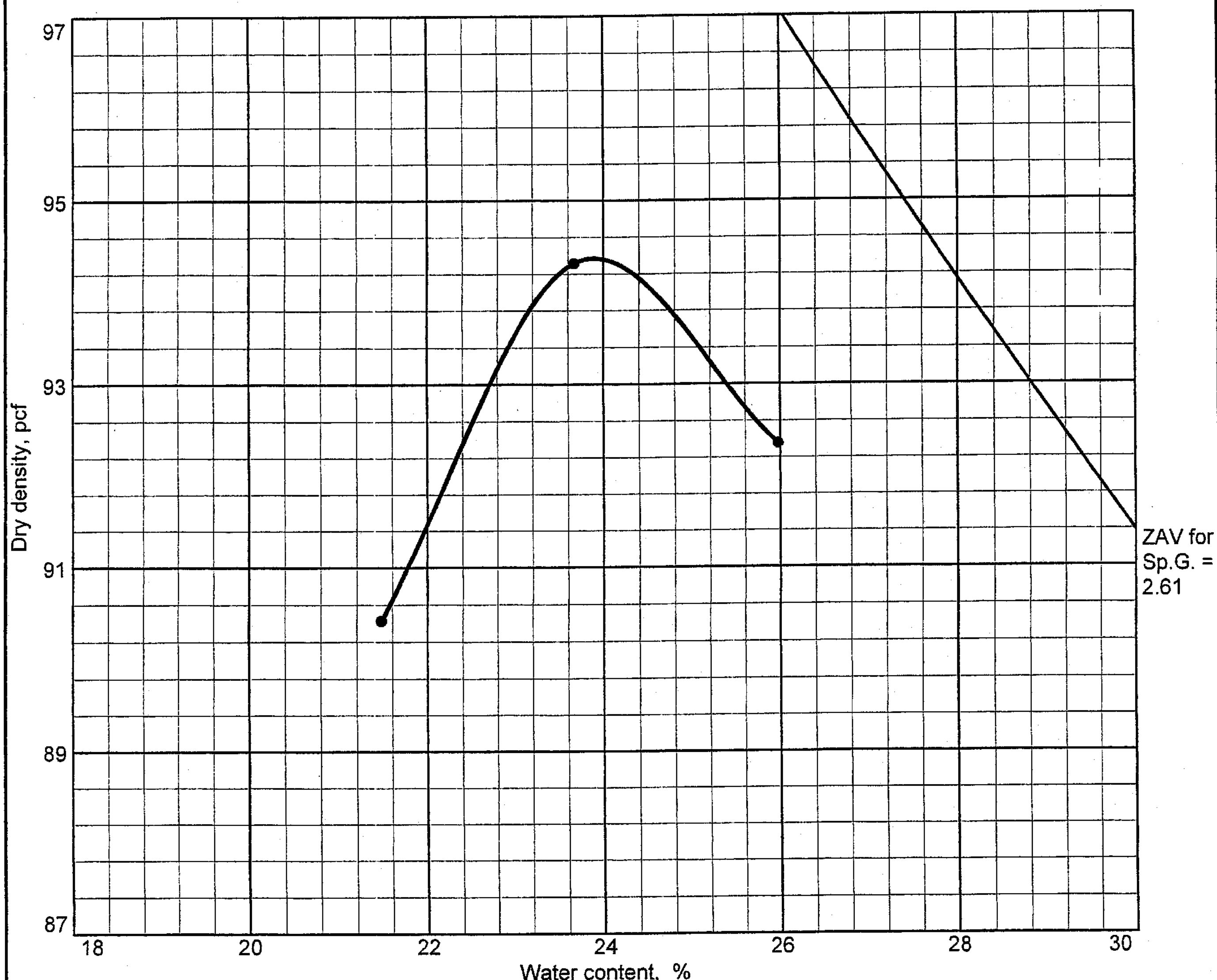
HB

Figure

MOISTURE-DENSITY RELATIONSHIP TEST RESULTS

OFF-SITE BORROW SAMPLES

COMPACTION TEST REPORT



Test specification: ASTM D 698-00a Method C Standard
Oversize correction applied to each point

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > 3/4 in.	% < No.200
	USCS	AASHTO						
	CL		32.1		41	17	0.0	74.6

ROCK CORRECTED TEST RESULTS	UNCORRECTED	MATERIAL DESCRIPTION
Maximum dry density = 94.4 pcf	94.4 pcf	Olive-Brown Silty Clay with Sand
Optimum moisture = 23.9 %	23.9 %	

Project No. 3043041043 **Client:** TVA
Project: Ash Disposal Areas - TVA Gallatin Fossil Plant

• **Location:** Off Site Borrow Sample #1

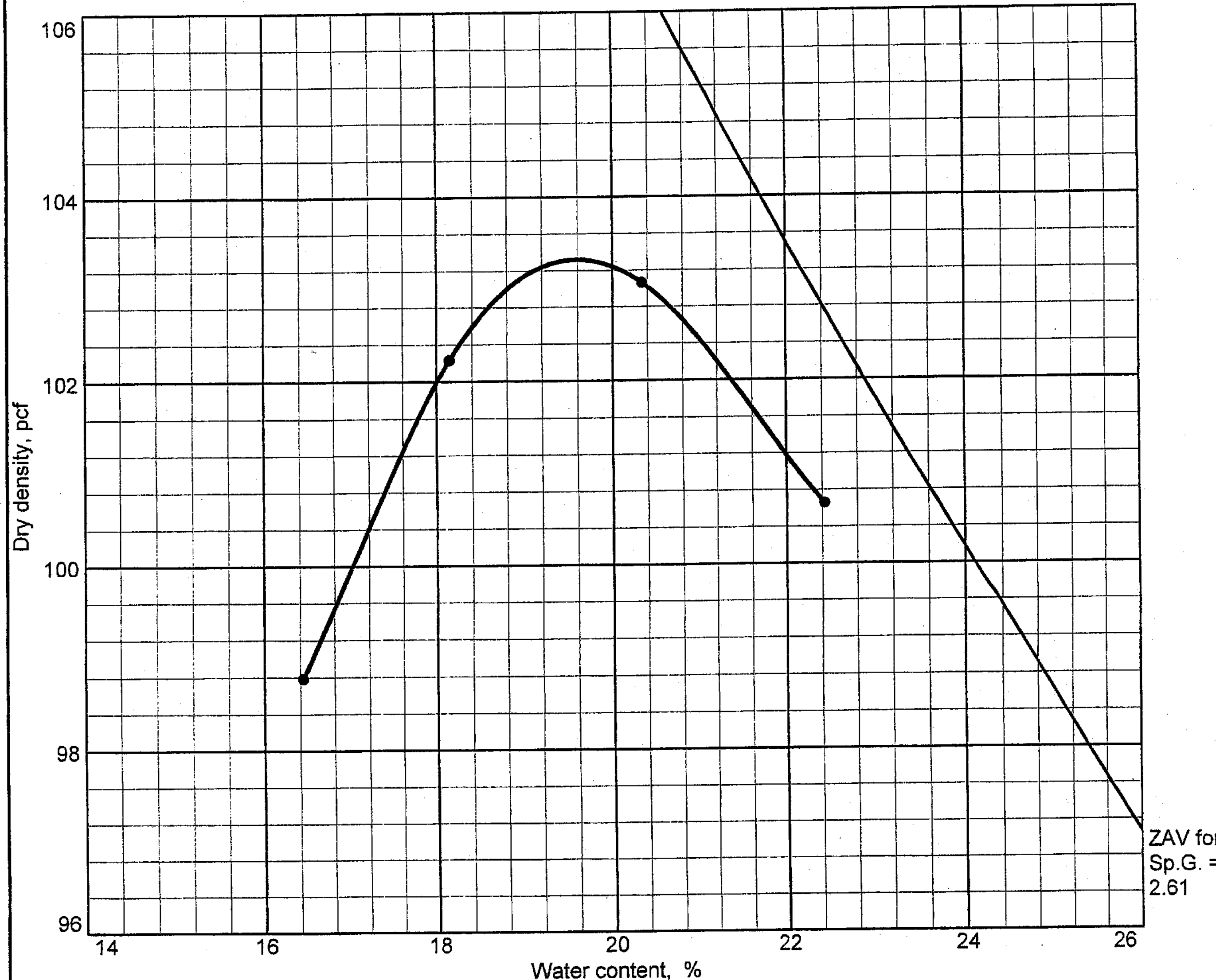
Remarks:

COMPACTION TEST REPORT

MACTEC, INC. HB

Figure

COMPACTION TEST REPORT



Test specification: ASTM D 698-00a Method A Standard

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > No.4	% < No.200
	USCS	AASHTO						
	CL				33	12	2.8	62.8

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 103.3 pcf Optimum moisture = 19.6 %	Yellow-Brown Sandy Silty Clay

Project No. 3043041043 **Client:** TVA
Project: Ash Disposal Areas - TVA Gallatin Fossil Plant

● **Location:** Off Site Borrow Sample #2

Remarks:

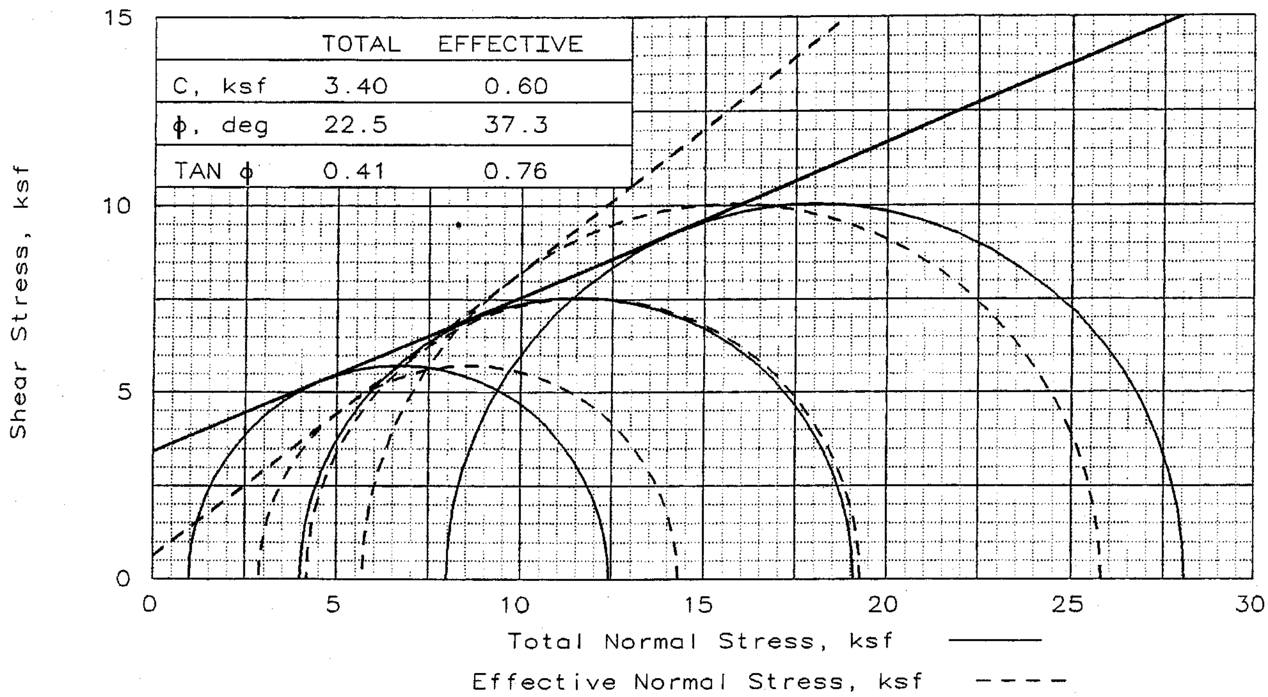
COMPACTION TEST REPORT

MACTEC, INC. HB

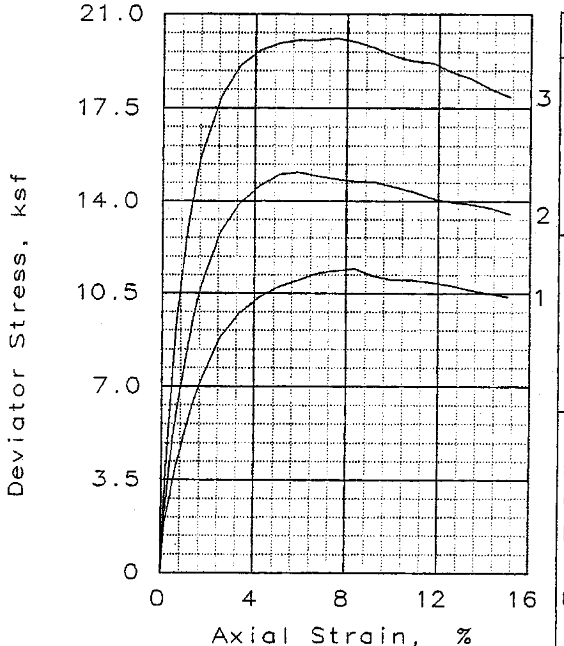
Figure

TRIAXIAL COMPRESSION TEST RESULTS

BOTTOM ASH SAMPLES



	TOTAL	EFFECTIVE
C, ksf	3.40	0.60
ϕ, deg	22.5	37.3
TAN ϕ	0.41	0.76



SAMPLE NO.:		1	2	3
INITIAL	WATER CONTENT, %	29.2	29.2	29.2
	DRY DENSITY, pcf	75.5	75.5	75.5
	SATURATION, %	68.6	68.6	68.6
	VOID RATIO	1.060	1.060	1.060
	DIAMETER, in	2.84	2.84	2.84
	HEIGHT, in	6.00	6.00	6.00
AT TEST	WATER CONTENT, %	43.6	43.5	42.3
	DRY DENSITY, pcf	74.5	74.7	75.7
	SATURATION, %	100.0	100.0	100.0
	VOID RATIO	1.086	1.082	1.052
	DIAMETER, in	2.86	2.87	2.85
	HEIGHT, in	5.99	5.95	5.95
Strain rate, %/min		0.17	0.17	0.17
BACK PRESSURE, ksf		7.2	7.2	7.2
CELL PRESSURE, ksf		8.2	11.2	15.2
FAIL. STRESS, ksf		11.4	15.1	20.1
TOTAL PORE PR., ksf		5.3	7.0	9.5
ULT. STRESS, ksf				
TOTAL PORE PR., ksf				
$\bar{\sigma}_1$ FAILURE, ksf		14.3	19.3	25.8
$\bar{\sigma}_3$ FAILURE, ksf		2.9	4.2	5.7

TYPE OF TEST:
CU with Pore Pressures

SAMPLE TYPE: Remolded Sample

DESCRIPTION: Gray Ash Sand

SPECIFIC GRAVITY= 2.49

REMARKS: Remolded to 95% MDD @ Optimum Moisture Content of Standard Proctor

Fig. No.: ______ HB

CLIENT: TVA

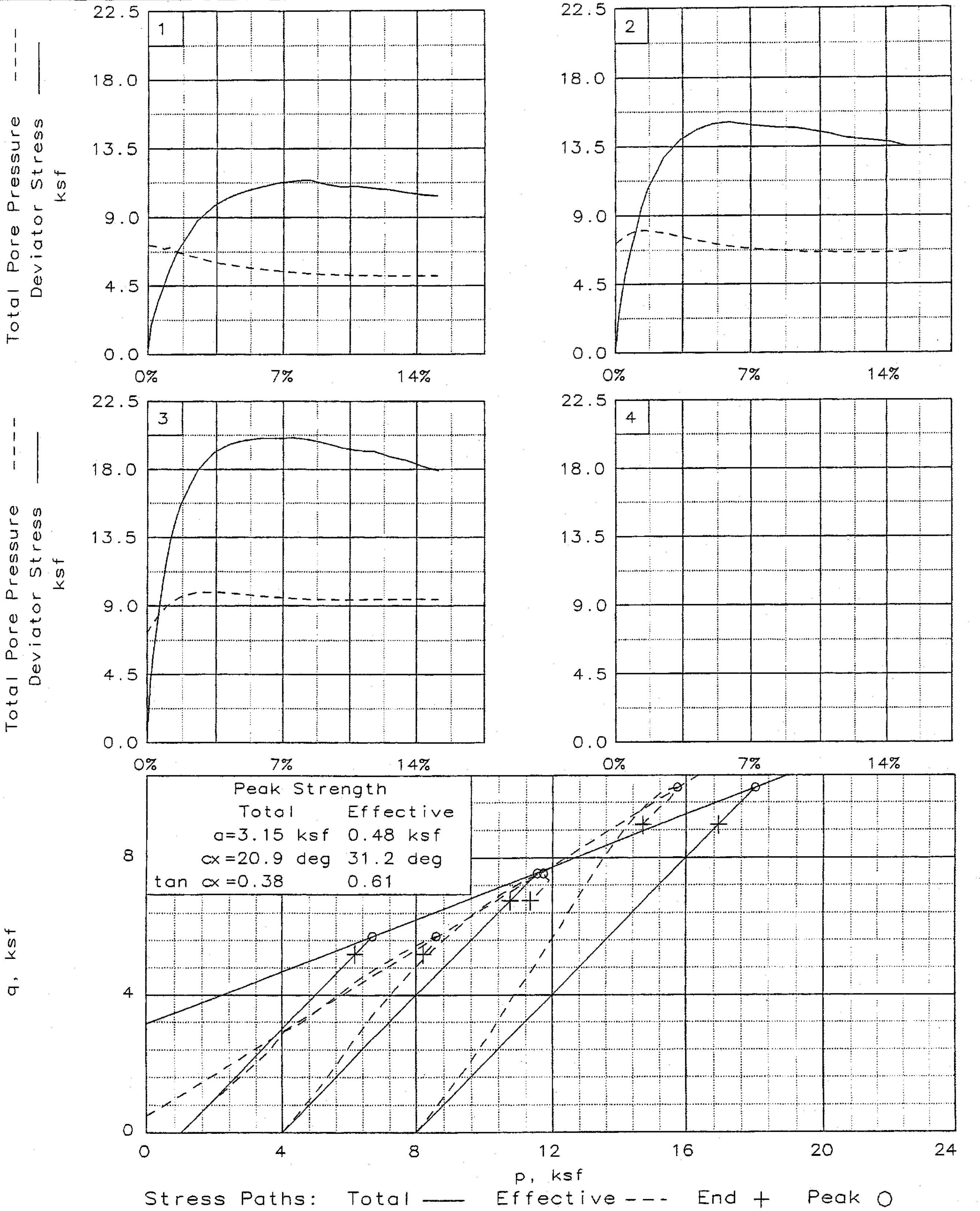
PROJECT: Ash Disposal Areas
TVA Gallatin Fossil Plant

SAMPLE LOCATION: New Bottom Ash #2 Bulk Sample

PROJ. NO.: 3043-04-1043 DATE: 09-13-04

TRIAXIAL SHEAR TEST REPORT

LAW ENGINEERING AND ENVIRONMENTAL SERVICES



Client: TVA

Project: Ash Disposal Areas TVA Gallatin Fossil Plant

Location: New Bottom Ash #2 Bulk Sample

File: FOSSIL2 Project No.: 3043-04-1043 Fig. No.: _____

TRIAXIAL COMPRESSION TEST
CU with Pore Pressures

Project and Sample Data

Date: 09-13-04
Client: TVA
Project: Ash Disposal Areas TVA Gallatin Fossil Plant
Sample location: New Bottom Ash #2 Bulk Sample
Sample description: Gray Ash Sand
Remarks: Remolded to 95% MDD @ Optimum Moisture Content of Standard Proctor
Fig no.: 2nd page Fig no. (if applicable):
Type of sample: Remolded Sample
Specific gravity= 2.49 LL= PL= PI=
Test method: Corps of Eng. - saturation assumed

Specimen Parameters for Specimen No. 1

Specimen Parameter	Initial	Saturated	Consolidated	Final
Wt. moist soil and tare:	972.800			1039.980
Wt. dry soil and tare:	752.940			752.940
Wt. of tare:	0.000			0.000
Weight, gms:	972.8			
Diameter, in:	2.840	2.863	2.861	
Area, in²:	6.335	6.438	6.430	
Height, in:	6.000	6.000	5.985	
Net decrease in height, in:		0.000	0.015	
Net decrease in water volume, cc:		-110.800	2.400	
% Moisture:	29.2	43.9	43.6	38.1
Wet density, pcf:	97.5	106.9	107.0	
Dry density, pcf:	75.5	74.3	74.5	
Void ratio:	1.0598	1.0935	1.0856	
% Saturation:	68.6	100.0	100.0	

Test Readings Data for Specimen No. 1

Deformation dial constant= 1 in per input unit
Primary load ring constant= 2.8 lbs per input unit
Secondary load ring constant= 0 lbs per input unit
Crossover reading for secondary load ring= 0 input units
Membrane modulus = 0.14000 kN/cm^2
Membrane thickness = 0.012 cm
Consolidation cell pressure = 56.90 psi = 8.19 ksf
Consolidation back pressure = 50.00 psi = 7.20 ksf
Consolidation effective confining stress = 0.99 ksf
Strain rate, %/min = 0.17
FAIL. STRESS = 11.44 ksf at reading no. 18
ULT. STRESS = not selected

Test Readings Data for Specimen No. 1

No.	Def. Dial Units	Def. in	Load Dial Units	Load lbs	Strain %	Deviator Stress ksf	Effective Stresses Minor ksf	Major ksf	1:3 Ratio	Pore Pres. psi	P ksf	Q ksf
0	0.0000	0.000	0.00	0.0	0.0	0.00	0.99	0.99	1.00	50.00	0.99	0.00
1	0.0100	0.010	30.00	84.0	0.2	1.88	1.02	2.90	2.84	49.80	1.96	0.94
2	0.0200	0.020	43.00	120.4	0.3	2.69	1.08	3.77	3.49	49.40	2.42	1.34
3	0.0300	0.030	55.00	154.0	0.5	3.43	1.14	4.57	4.02	49.00	2.85	1.72
4	0.0400	0.040	65.00	182.0	0.7	4.05	1.20	5.24	4.39	48.60	3.22	2.02
5	0.0500	0.050	75.00	210.0	0.8	4.66	1.25	5.92	4.72	48.20	3.58	2.33
6	0.0600	0.060	85.00	238.0	1.0	5.28	1.20	6.47	5.41	48.60	3.83	2.64
7	0.0700	0.070	94.00	263.2	1.2	5.83	1.15	6.98	6.06	48.90	4.06	2.91
8	0.0800	0.080	102.00	285.6	1.3	6.31	1.38	7.69	5.56	47.30	4.54	3.16
9	0.0900	0.090	110.00	308.0	1.5	6.79	1.47	8.26	5.63	46.70	4.87	3.40
10	0.1000	0.100	116.00	324.8	1.7	7.15	1.53	8.68	5.69	46.30	5.10	3.58
11	0.1500	0.150	144.00	403.2	2.5	8.80	1.83	10.63	5.81	44.20	6.23	4.40
12	0.2000	0.200	161.00	450.8	3.3	9.76	2.12	11.87	5.61	42.20	7.00	4.88
13	0.2500	0.250	172.00	481.6	4.2	10.33	2.30	12.64	5.49	40.90	7.47	5.17
14	0.3000	0.300	180.00	504.0	5.0	10.72	2.46	13.18	5.35	39.80	7.82	5.36
15	0.3500	0.350	186.00	520.8	5.8	10.98	2.59	13.57	5.24	38.90	8.08	5.49
16	0.4000	0.400	192.00	537.6	6.7	11.23	2.69	13.93	5.17	38.20	8.31	5.62
17	0.4500	0.450	196.00	548.8	7.5	11.37	2.79	14.16	5.07	37.50	8.48	5.68
18	0.5000	0.500	199.00	557.2	8.4	11.44	2.88	14.32	4.97	36.90	8.60	5.72
19	0.5500	0.550	196.00	548.8	9.2	11.16	2.94	14.10	4.80	36.50	8.52	5.58
20	0.6000	0.600	195.00	546.0	10.0	11.00	2.97	13.97	4.71	36.30	8.47	5.50
21	0.6500	0.650	197.00	551.6	10.9	11.01	3.00	14.01	4.68	36.10	8.50	5.51
22	0.7000	0.700	197.00	551.6	11.7	10.91	3.01	13.92	4.62	36.00	8.46	5.45
23	0.7500	0.750	197.00	551.6	12.5	10.80	3.02	13.83	4.57	35.90	8.43	5.40
24	0.8000	0.800	196.00	548.8	13.4	10.65	3.02	13.67	4.52	35.90	8.35	5.32
25	0.8500	0.850	195.00	546.0	14.2	10.49	3.02	13.51	4.47	35.90	8.27	5.25
26	0.9000	0.900	195.00	546.0	15.0	10.39	3.02	13.41	4.44	35.90	8.22	5.19

Specimen Parameters for Specimen No. 2

Specimen Parameter	Initial	Saturated	Consolidated	Final
Wt. moist soil and tare:	972.800			1045.020
Wt. dry soil and tare:	752.940			752.940
Wt. of tare:	0.000			0.000
Weight, gms:	972.8			
Diameter, in:	2.840	2.869	2.868	
Area, in^2:	6.335	6.464	6.460	
Height, in:	6.000	6.000	5.948	
Net decrease in height, in:		0.000	0.052	
Net decrease in water volume, cc:		-113.300	5.900	
% Moisture:	29.2	44.2	43.5	38.8
Wet density, pcf:	97.5	106.7	107.1	
Dry density, pcf:	75.5	74.0	74.7	
Void ratio:	1.0598	1.1018	1.0823	
% Saturation:	68.6	100.0	100.0	

Test Readings Data for Specimen No. 2

Deformation dial constant= 1 in per input unit
Primary load ring constant= 2.8 lbs per input unit
Secondary load ring constant= 0 lbs per input unit
Crossover reading for secondary load ring= 0 input units
Membrane modulus = 0.14000 kN/cm^2
Membrane thickness = 0.012 cm
Consolidation cell pressure = 77.80 psi = 11.20 ksf
Consolidation back pressure = 50.00 psi = 7.20 ksf
Consolidation effective confining stress = 4.00 ksf
Strain rate, %/min = 0.17
FAIL. STRESS = 15.10 ksf at reading no. 15
ULT. STRESS = not selected

No.	Def. Dial Units	Def. in	Load Dial Units	Load lbs	Strain %	Deviator Stress ksf	Effective Stresses Minor ksf	Major ksf	1:3 Ratio	Pore Pres. psi	P ksf	Q ksf
0	0.0000	0.000	0.00	0.0	0.0	0.00	4.00	4.00	1.00	50.00	4.00	0.00
1	0.0100	0.010	41.00	114.8	0.2	2.55	3.82	6.37	1.67	51.30	5.09	1.28
2	0.0200	0.020	63.00	176.4	0.3	3.92	3.66	7.58	2.07	52.40	5.62	1.96
3	0.0300	0.030	83.00	232.4	0.5	5.15	3.50	8.65	2.47	53.50	6.08	2.58
4	0.0400	0.040	98.00	274.4	0.7	6.08	3.40	9.47	2.79	54.20	6.44	3.04
5	0.0500	0.050	113.00	316.4	0.8	6.99	3.30	10.29	3.12	54.90	6.79	3.50
6	0.0600	0.060	127.00	355.6	1.0	7.85	3.24	11.09	3.42	55.30	7.16	3.92
7	0.0700	0.070	140.00	392.0	1.2	8.64	3.20	11.83	3.70	55.60	7.51	4.32
8	0.0800	0.080	155.00	434.0	1.3	9.54	3.17	12.71	4.01	55.80	7.94	4.77
9	0.0900	0.090	165.00	462.0	1.5	10.14	3.17	13.31	4.20	55.80	8.24	5.07
10	0.1000	0.100	175.00	490.0	1.7	10.74	3.17	13.91	4.39	55.80	8.54	5.37
11	0.1500	0.150	211.00	590.8	2.5	12.84	3.31	16.15	4.88	54.80	9.73	6.42
12	0.2000	0.200	231.00	646.8	3.4	13.93	3.57	17.50	4.90	53.00	10.54	6.97
13	0.2500	0.250	244.00	683.2	4.2	14.59	3.80	18.39	4.84	51.40	11.10	7.29
14	0.3000	0.300	253.00	708.4	5.0	14.99	4.00	19.00	4.75	50.00	11.50	7.50
15	0.3500	0.350	257.00	719.6	5.9	15.10	4.19	19.29	4.60	48.70	11.74	7.55
16	0.4000	0.400	257.00	719.6	6.7	14.96	4.31	19.27	4.48	47.90	11.79	7.48
17	0.4500	0.450	257.00	719.6	7.6	14.83	4.41	19.23	4.36	47.20	11.82	7.41
18	0.5000	0.500	258.00	722.4	8.4	14.75	4.48	19.23	4.29	46.70	11.85	7.37
19	0.5500	0.550	260.00	728.0	9.2	14.73	4.54	19.26	4.25	46.30	11.90	7.36
20	0.6000	0.600	259.00	725.2	10.1	14.54	4.58	19.11	4.17	46.00	11.85	7.27

Test Readings Data for Specimen No. 2

No.	Def. Dial Units	Def. in	Load Dial Units	Load lbs	Strain %	Deviator Stress ksf	Effective Stresses Minor ksf	Major ksf	1:3 Ratio	Pore Pres. psi	P ksf	Q ksf
21	0.6500	0.650	258.00	722.4	10.9	14.34	4.59	18.94	4.12	45.90	11.77	7.17
22	0.7000	0.700	256.00	716.8	11.8	14.10	4.61	18.71	4.06	45.80	11.66	7.05
23	0.7500	0.750	256.00	716.8	12.6	13.96	4.61	18.57	4.03	45.80	11.59	6.98
24	0.8000	0.800	257.00	719.6	13.4	13.88	4.61	18.49	4.01	45.80	11.55	6.94
25	0.8500	0.850	257.00	719.6	14.3	13.75	4.61	18.36	3.98	45.80	11.48	6.87
26	0.9000	0.900	255.00	714.0	15.1	13.51	4.59	18.10	3.94	45.90	11.35	6.75

Specimen Parameters for Specimen No. 3

Specimen Parameter	Initial	Saturated	Consolidated	Final
Wt. moist soil and tare:	972.800			1040.110
Wt. dry soil and tare:	752.940			752.940
Wt. of tare:	0.000			0.000
Weight, gms:	972.8			
Diameter, in:	2.840	2.862	2.846	
Area, in^2:	6.335	6.435	6.363	
Height, in:	6.000	6.000	5.952	
Net decrease in height, in:		0.000	0.048	
Net decrease in water volume, cc:		-110.500	12.100	
% Moisture:	29.2	43.9	42.3	38.1
Wet density, pcf:	97.5	106.9	107.7	
Dry density, pcf:	75.5	74.3	75.7	
Void ratio:	1.0598	1.0925	1.0525	
% Saturation:	68.6	100.0	100.0	

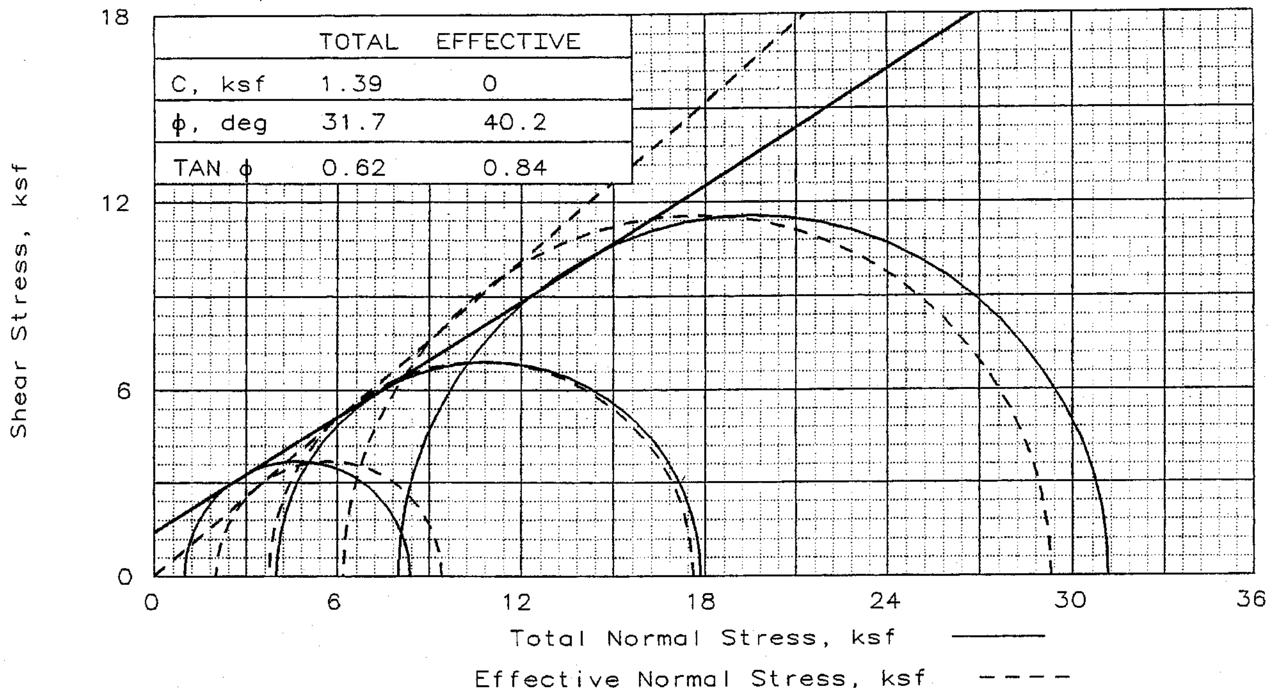
Test Readings Data for Specimen No. 3

Deformation dial constant= 1 in per input unit
Primary load ring constant= 2.8 lbs per input unit
Secondary load ring constant= 0 lbs per input unit
Crossover reading for secondary load ring= 0 input units
Membrane modulus = 0.14000 kN/cm^2
Membrane thickness = 0.012 cm
Consolidation cell pressure = 105.50 psi = 15.19 ksf
Consolidation back pressure = 50.00 psi = 7.20 ksf
Consolidation effective confining stress = 7.99 ksf
Strain rate, %/min = 0.17
FAIL. STRESS = 20.09 ksf at reading no. 17
ULT. STRESS = not selected

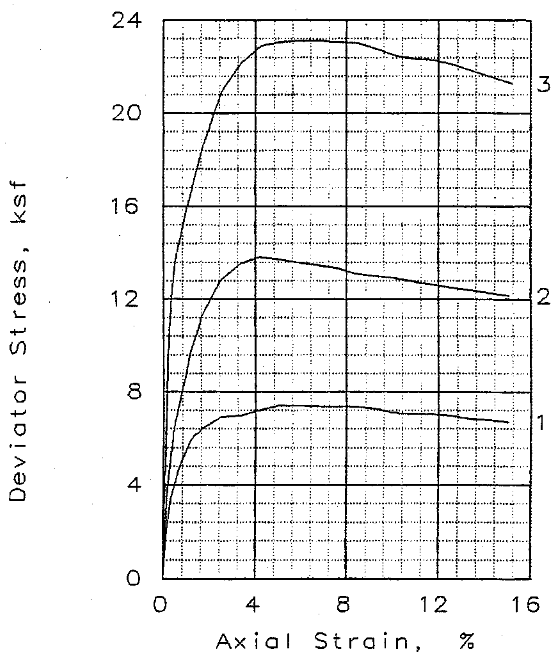
No.	Def. Dial Units	Def. in	Load Dial Units	Load lbs	Strain %	Deviator Stress ksf	Effective Stresses Minor ksf	Major ksf	1:3 Ratio	Pore Pres. psi	P ksf	Q ksf
0	0.0000	0.000	0.00	0.0	0.0	0.00	7.99	7.99	1.00	50.00	7.99	0.00
1	0.0100	0.010	62.00	173.6	0.2	3.92	7.57	11.50	1.52	52.90	9.54	1.96
2	0.0200	0.020	95.00	266.0	0.3	6.00	7.26	13.26	1.83	55.10	10.26	3.00
3	0.0300	0.030	123.00	344.4	0.5	7.75	6.91	14.67	2.12	57.50	10.79	3.88
4	0.0400	0.040	151.00	422.8	0.7	9.50	6.67	16.17	2.43	59.20	11.42	4.75
5	0.0500	0.050	173.00	484.4	0.8	10.87	6.41	17.28	2.70	61.00	11.84	5.43
6	0.0600	0.060	194.00	543.2	1.0	12.17	6.21	18.38	2.96	62.40	12.29	6.08
7	0.0700	0.070	212.00	593.6	1.2	13.28	5.99	19.27	3.22	63.90	12.63	6.64
8	0.0800	0.080	227.00	635.6	1.3	14.19	5.85	20.04	3.43	64.90	12.94	7.10
9	0.0900	0.090	241.00	674.8	1.5	15.04	5.70	20.74	3.64	65.90	13.22	7.52
10	0.1000	0.100	252.00	705.6	1.7	15.70	5.59	21.29	3.81	66.70	13.44	7.85
11	0.1500	0.150	290.00	812.0	2.5	17.91	5.30	23.21	4.38	68.70	14.26	8.96
12	0.2000	0.200	312.00	873.6	3.4	19.11	5.28	24.39	4.62	68.80	14.84	9.55
13	0.2500	0.250	324.00	907.2	4.2	19.67	5.34	25.01	4.68	68.40	15.18	9.83
14	0.3000	0.300	331.00	926.8	5.0	19.92	5.44	25.36	4.66	67.70	15.40	9.96
15	0.3500	0.350	336.00	940.8	5.9	20.04	5.57	25.61	4.60	66.80	15.59	10.02
16	0.4000	0.400	339.00	949.2	6.7	20.04	5.63	25.67	4.56	66.40	15.65	10.02
17	0.4500	0.450	343.00	960.4	7.6	20.09	5.70	25.79	4.52	65.90	15.75	10.05
18	0.5000	0.500	344.00	963.2	8.4	19.97	5.76	25.73	4.47	65.50	15.74	9.98
19	0.5500	0.550	343.00	960.4	9.2	19.73	5.77	25.50	4.42	65.40	15.64	9.86
20	0.6000	0.600	341.00	954.8	10.1	19.43	5.79	25.22	4.36	65.30	15.50	9.71

Test Readings Data for Specimen No. 3

No.	Def. Dial Units	Def. in	Load Dial Units	Load lbs	Strain %	Deviator Stress ksf	Effective Stresses Minor ksf	Effective Stresses Major ksf	Effective Stresses 1:3 Ratio	Pore Pres. psi	P ksf	Q ksf
21	0.6500	0.650	341.00	954.8	10.9	19.25	5.79	25.04	4.32	65.30	15.41	9.62
22	0.7000	0.700	343.00	960.4	11.8	19.18	5.77	24.95	4.32	65.40	15.36	9.59
23	0.7500	0.750	340.00	952.0	12.6	18.83	5.76	24.59	4.27	65.50	15.17	9.41
24	0.8000	0.800	339.00	949.2	13.4	18.59	5.76	24.35	4.23	65.50	15.06	9.30
25	0.8500	0.850	335.00	938.0	14.3	18.20	5.75	23.94	4.17	65.60	14.84	9.10
26	0.9000	0.900	333.00	932.4	15.1	17.91	5.76	23.67	4.11	65.50	14.71	8.95



	TOTAL	EFFECTIVE
C, ksf	1.39	0
ϕ, deg	31.7	40.2
TAN ϕ	0.62	0.84



SAMPLE NO.:		1	2	3
INITIAL	WATER CONTENT, %	15.8	15.8	15.8
	DRY DENSITY, pcf	99.0	99.0	99.0
	SATURATION, %	62.7	62.7	62.7
	VOID RATIO	0.665	0.665	0.665
	DIAMETER, in	2.84	2.84	2.84
	HEIGHT, in	6.00	6.00	6.00
AT TEST	WATER CONTENT, %	25.5	24.9	21.9
	DRY DENSITY, pcf	98.6	99.4	104.4
	SATURATION, %	100.0	100.0	100.0
	VOID RATIO	0.672	0.658	0.578
	DIAMETER, in	2.85	2.84	2.79
	HEIGHT, in	5.98	5.97	5.91
Strain rate, %/min		0.17	0.17	0.17
BACK PRESSURE, ksf		7.2	7.2	7.2
CELL PRESSURE, ksf		8.2	11.2	15.2
FAIL. STRESS, ksf		7.4	13.8	23.1
TOTAL PORE PR., ksf		6.2	7.4	9.0
ULT. STRESS, ksf				
TOTAL PORE PR., ksf				
$\bar{\sigma}_1$ FAILURE, ksf		9.4	17.6	29.3
$\bar{\sigma}_3$ FAILURE, ksf		2.0	3.8	6.2

TYPE OF TEST:
CU with Pore Pressures

SAMPLE TYPE: Remolded Sample

DESCRIPTION: Gray Ash Sand

SPECIFIC GRAVITY= 2.64

REMARKS: Remolded to 95% MDD @ Optimum Moisture Content of Standard Proctor

Fig. No.: ______ HB

CLIENT: TVA

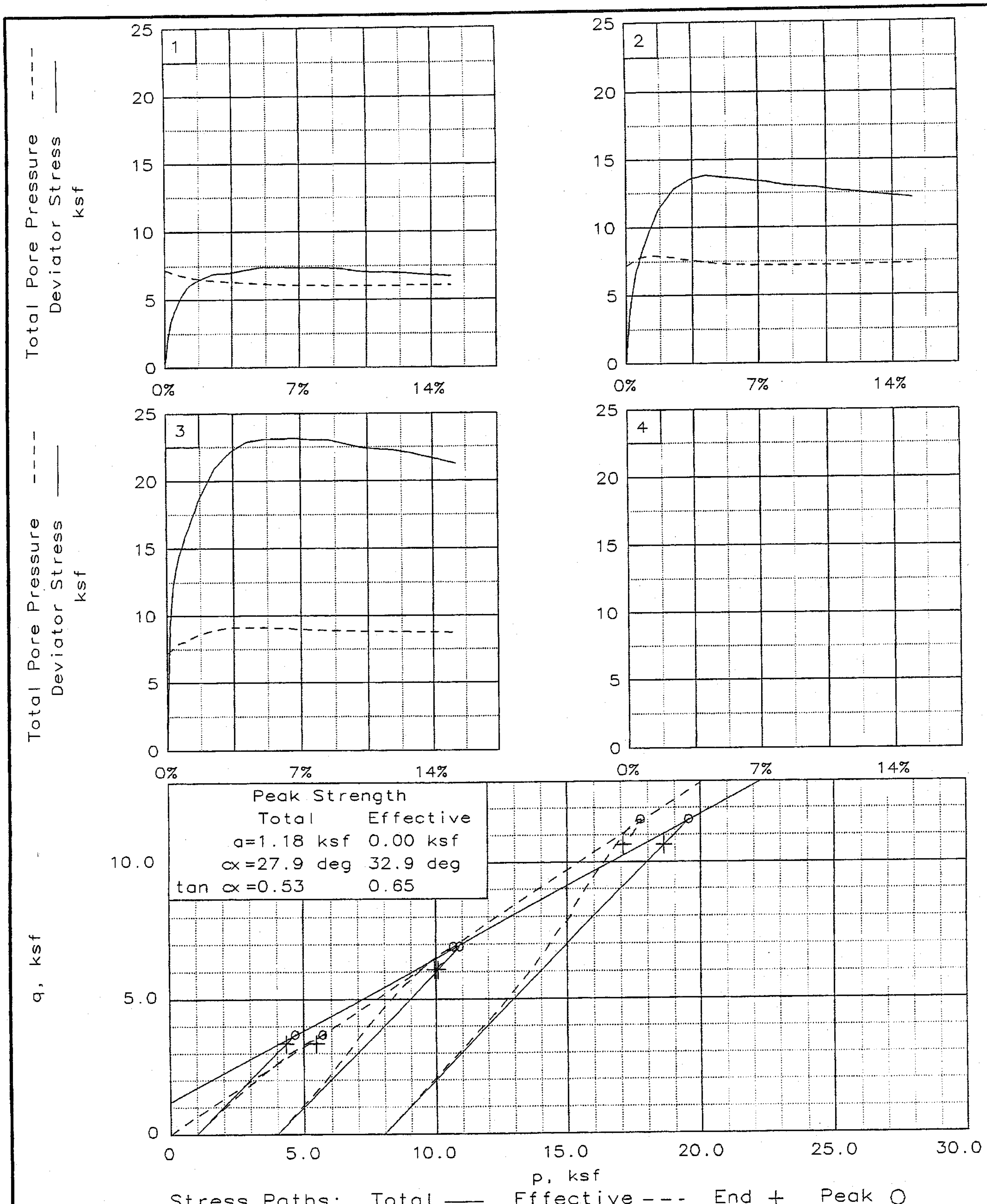
PROJECT: Ash Disposal Areas
TVA Gallatin Fossil Plant

SAMPLE LOCATION: Old Bottom Ash Bulk Sample

PROJ. NO.: 3043-04-1043 DATE: 09-13-04

TRIAXIAL SHEAR TEST REPORT

LAW ENGINEERING AND ENVIRONMENTAL SERVICES



Client: TVA

Project: Ash Disposal Areas TVA Gallatin Fossil Plant

Location: Old Bottom Ash Bulk Sample

File: FOSSIL1 Project No.: 3043-04-1043 Fig. No.: ____

TRIAXIAL COMPRESSION TEST
CU with Pore Pressures

9-14-2004
1:30 pm

Project and Sample Data

Date: 09-13-04
Client: TVA
Project: Ash Disposal Areas TVA Gallatin Fossil Plant
Sample location: Old Bottom Ash Bulk Sample
Sample description: Gray Ash Sand
Remarks: Remolded to 95% MDD @ Optimum Moisture Content of Standard Proctor
Fig no.: 2nd page Fig no. (if applicable):
Type of sample: Remolded Sample
Specific gravity= 2.64 LL= PL= PI=
Test method: Corps of Eng. - saturation assumed

Specimen Parameters for Specimen No. 1

Specimen Parameter	Initial	Saturated	Consolidated	Final
Wt. moist soil and tare:	1143.400			1175.040
Wt. dry soil and tare:	987.390			987.390
Wt. of tare:	0.000			0.000
Weight, gms:	1143.4			
Diameter, in:	2.840	2.852	2.850	
Area, in²:	6.335	6.389	6.379	
Height, in:	6.000	6.000	5.983	
Net decrease in height, in:		0.000	0.017	
Net decrease in water volume, cc:		-98.200	2.800	
% Moisture:	15.8	25.7	25.5	19.0
Wet density, pcf:	114.6	123.4	123.7	
Dry density, pcf:	99.0	98.1	98.6	
Void ratio:	0.6653	0.6797	0.6722	
% Saturation:	62.7	100.0	100.0	

Test Readings Data for Specimen No. 1

Deformation dial constant= 1 in per input unit
Primary load ring constant= 2.8 lbs per input unit
Secondary load ring constant= 0 lbs per input unit
Crossover reading for secondary load ring= 0 input units
Membrane modulus = 0.14000 kN/cm²
Membrane thickness = 0.012 cm
Consolidation cell pressure = 56.90 psi = 8.19 ksf
Consolidation back pressure = 50.00 psi = 7.20 ksf
Consolidation effective confining stress = 0.99 ksf
Strain rate, %/min = 0.17
FAIL. STRESS = 7.38 ksf at reading no. 14
ULT. STRESS = not selected

Test Readings Data for Specimen No. 1

No.	Def. Dial Units	Def. in	Load Dial Units	Load lbs	Strain %	Deviator Stress ksf	Effective Stresses Minor ksf	Major ksf	1:3 Ratio	Pore Pres. psi	P ksf	Q ksf
0	0.0000	0.000	0.00	0.0	0.0	0.00	0.99	0.99	1.00	50.00	0.99	0.00
1	0.0100	0.010	33.00	92.4	0.2	2.08	1.08	3.16	2.93	49.40	2.12	1.04
2	0.0200	0.020	54.00	151.2	0.3	3.40	1.17	4.57	3.92	48.80	2.87	1.70
3	0.0300	0.030	65.00	182.0	0.5	4.09	1.25	5.34	4.26	48.20	3.30	2.04
4	0.0400	0.040	74.00	207.2	0.7	4.65	1.31	5.96	4.55	47.80	3.63	2.32
5	0.0500	0.050	82.00	229.6	0.8	5.14	1.38	6.52	4.72	47.30	3.95	2.57
6	0.0600	0.060	88.00	246.4	1.0	5.51	1.43	6.93	4.86	47.00	4.18	2.75
7	0.0700	0.070	94.00	263.2	1.2	5.87	1.48	7.36	4.96	46.60	4.42	2.94
8	0.0800	0.080	98.00	274.4	1.3	6.11	1.54	7.65	4.97	46.20	4.60	3.06
9	0.0900	0.090	100.00	280.0	1.5	6.23	1.58	7.81	4.93	45.90	4.70	3.11
10	0.1000	0.100	103.00	288.4	1.7	6.40	1.63	8.03	4.93	45.60	4.83	3.20
11	0.1500	0.150	112.00	313.6	2.5	6.90	1.77	8.67	4.90	44.60	5.22	3.45
12	0.2000	0.200	114.00	319.2	3.3	6.96	1.87	8.84	4.72	43.90	5.35	3.48
13	0.2500	0.250	119.00	333.2	4.2	7.21	1.94	9.15	4.71	43.40	5.55	3.60
14	0.3000	0.300	123.00	344.4	5.0	7.38	2.02	9.40	4.66	42.90	5.71	3.69
15	0.3500	0.350	124.00	347.2	5.8	7.38	2.06	9.44	4.58	42.60	5.75	3.69
16	0.4000	0.400	125.00	350.0	6.7	7.37	2.12	9.49	4.48	42.20	5.80	3.69
17	0.4500	0.450	126.00	352.8	7.5	7.37	2.13	9.50	4.46	42.10	5.81	3.68
18	0.5000	0.500	127.00	355.6	8.4	7.36	2.15	9.50	4.43	42.00	5.82	3.68
19	0.5500	0.550	127.00	355.6	9.2	7.29	2.16	9.45	4.37	41.90	5.80	3.64
20	0.6000	0.600	125.00	350.0	10.0	7.11	2.16	9.27	4.29	41.90	5.71	3.55
21	0.6500	0.650	125.00	350.0	10.9	7.04	2.16	9.20	4.26	41.90	5.68	3.52
22	0.7000	0.700	126.00	352.8	11.7	7.03	2.16	9.19	4.26	41.90	5.68	3.52
23	0.7500	0.750	126.00	352.8	12.5	6.97	2.15	9.11	4.25	42.00	5.63	3.48
24	0.8000	0.800	125.00	350.0	13.4	6.84	2.12	8.96	4.23	42.20	5.54	3.42
25	0.8500	0.850	125.00	350.0	14.2	6.78	2.12	8.90	4.20	42.20	5.51	3.39
26	0.9000	0.900	125.00	350.0	15.0	6.71	2.12	8.83	4.17	42.20	5.47	3.36

Specimen Parameters for Specimen No. 2

Specimen Parameter	Initial	Saturated	Consolidated	Final
Wt. moist soil and tare:	1143.400			1195.770
Wt. dry soil and tare:	987.390			987.390
Wt. of tare:	0.000			0.000
Weight, gms:	1143.4			
Diameter, in:	2.840	2.849	2.841	
Area, in^2:	6.335	6.375	6.338	
Height, in:	6.000	6.000	5.972	
Net decrease in height, in:		0.000	0.028	
Net decrease in water volume, cc:		-96.800	6.600	
% Moisture:	15.8	25.6	24.9	21.1
Wet density, pcf:	114.6	123.5	124.2	
Dry density, pcf:	99.0	98.3	99.4	
Void ratio:	0.6653	0.6759	0.6583	
% Saturation:	62.7	100.0	100.0	

Test Readings Data for Specimen No. 2

Deformation dial constant= 1 in per input unit
Primary load ring constant= 2.8 lbs per input unit
Secondary load ring constant= 0 lbs per input unit
Crossover reading for secondary load ring= 0 input units
Membrane modulus = 0.14000 kN/cm^2
Membrane thickness = 0.012 cm
Consolidation cell pressure = 77.80 psi = 11.20 ksf
Consolidation back pressure = 50.00 psi = 7.20 ksf
Consolidation effective confining stress = 4.00 ksf
Strain rate, %/min = 0.17
FAIL. STRESS = 13.84 ksf at reading no. 13
ULT. STRESS = not selected

No.	Def. Dial Units	Def. in	Load Dial Units	Load lbs	Strain %	Deviator Stress ksf	Effective Stresses Minor ksf	Major ksf	1:3 Ratio	Pore Pres. psi	P ksf	Q ksf
0	0.0000	0.000	0.00	0.0	0.0	0.00	4.00	4.00	1.00	50.00	4.00	0.00
1	0.0100	0.010	60.00	168.0	0.2	3.81	3.84	7.66	1.99	51.10	5.75	1.91
2	0.0200	0.020	84.00	235.2	0.3	5.33	3.69	9.01	2.44	52.20	6.35	2.66
3	0.0300	0.030	105.00	294.0	0.5	6.65	3.54	10.19	2.88	53.20	6.87	3.32
4	0.0400	0.040	116.00	324.8	0.7	7.33	3.46	10.79	3.12	53.80	7.12	3.67
5	0.0500	0.050	130.00	364.0	0.8	8.20	3.38	11.59	3.42	54.30	7.48	4.10
6	0.0600	0.060	141.00	394.8	1.0	8.88	3.34	12.22	3.66	54.60	7.78	4.44
7	0.0700	0.070	154.00	431.2	1.2	9.68	3.30	12.98	3.94	54.90	8.14	4.84
8	0.0800	0.080	162.00	453.6	1.3	10.17	3.28	13.45	4.10	55.00	8.37	5.08
9	0.0900	0.090	171.00	478.8	1.5	10.72	3.27	13.98	4.28	55.10	8.63	5.36
10	0.1000	0.100	181.00	506.8	1.7	11.32	3.28	14.61	4.45	55.00	8.94	5.66
11	0.1500	0.150	207.00	579.6	2.5	12.84	3.43	16.27	4.75	54.00	9.85	6.42
12	0.2000	0.200	220.00	616.0	3.3	13.53	3.60	17.13	4.76	52.80	10.36	6.76
13	0.2500	0.250	227.00	635.6	4.2	13.84	3.76	17.60	4.68	51.70	10.68	6.92
14	0.3000	0.300	227.00	635.6	5.0	13.72	3.87	17.59	4.54	50.90	10.73	6.86
15	0.3500	0.350	227.00	635.6	5.9	13.60	3.93	17.53	4.46	50.50	10.73	6.80
16	0.4000	0.400	227.00	635.6	6.7	13.47	3.97	17.45	4.39	50.20	10.71	6.74
17	0.4500	0.450	227.00	635.6	7.5	13.35	3.99	17.34	4.35	50.10	10.67	6.68
18	0.5000	0.500	225.00	630.0	8.4	13.12	3.99	17.10	4.29	50.10	10.55	6.56
19	0.5500	0.550	225.00	630.0	9.2	13.00	3.99	16.99	4.26	50.10	10.49	6.50
20	0.6000	0.600	226.00	632.8	10.0	12.93	3.97	16.91	4.25	50.20	10.44	6.47

Test Readings Data for Specimen No. 2

No.	Def. Dial Units	Def. in	Load Dial Units	Load lbs	Strain %	Deviator Stress ksf	Effective Stresses Minor ksf	Major ksf	1:3 Ratio	Pore Pres. psi	P ksf	Q ksf
21	0.6500	0.650	225.00	630.0	10.9	12.76	3.97	16.73	4.21	50.20	10.35	6.38
22	0.7000	0.700	225.00	630.0	11.7	12.64	3.96	16.60	4.19	50.30	10.28	6.32
23	0.7500	0.750	225.00	630.0	12.6	12.52	3.92	16.43	4.20	50.60	10.18	6.26
24	0.8000	0.800	225.00	630.0	13.4	12.40	3.92	16.31	4.17	50.60	10.12	6.20
25	0.8500	0.850	225.00	630.0	14.2	12.28	3.89	16.17	4.16	50.80	10.03	6.14
26	0.9000	0.900	225.00	630.0	15.1	12.16	3.87	16.03	4.14	50.90	9.95	6.08

Specimen Parameters for Specimen No. 3

Specimen Parameter	Initial	Saturated	Consolidated	Final
Wt. moist soil and tare:	1143.400			1166.180
Wt. dry soil and tare:	987.390			987.390
Wt. of tare:	0.000			0.000
Weight, gms:	1143.4			
Diameter, in:	2.840	2.787	2.785	
Area, in²:	6.335	6.099	6.092	
Height, in:	6.000	6.000	5.913	
Net decrease in height, in:		0.000	0.087	
Net decrease in water volume, cc:		-69.600	9.300	
% Moisture:	15.8	22.8	21.9	18.1
Wet density, pcf:	114.6	126.3	127.3	
Dry density, pcf:	99.0	102.8	104.4	
Void ratio:	0.6653	0.6032	0.5784	
% Saturation:	62.7	100.0	100.0	

Test Readings Data for Specimen No. 3

Deformation dial constant= 1 in per input unit
Primary load ring constant= 2.8 lbs per input unit
Secondary load ring constant= 0 lbs per input unit
Crossover reading for secondary load ring= 0 input units
Membrane modulus = 0.14000 kN/cm²
Membrane thickness = 0.012 cm
Consolidation cell pressure = 105.50 psi = 15.19 ksf
Consolidation back pressure = 50.00 psi = 7.20 ksf
Consolidation effective confining stress = 7.99 ksf
Strain rate, %/min = 0.17
FAIL. STRESS = 23.14 ksf at reading no. 16
ULT. STRESS = not selected

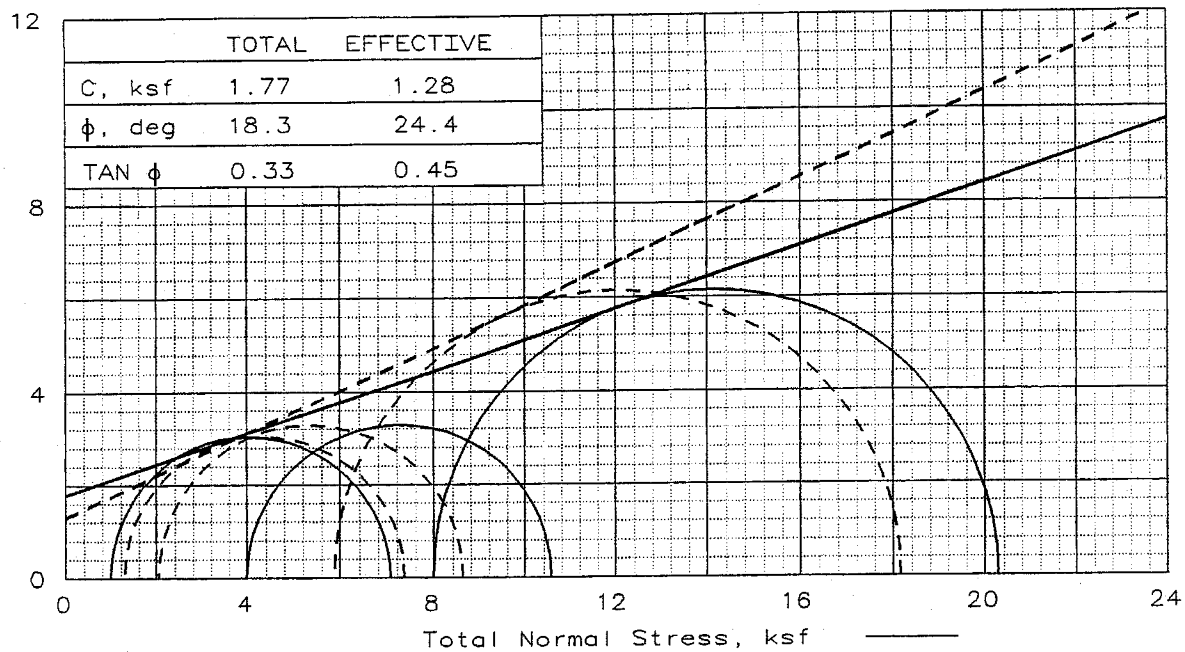
No.	Def. Dial Units	Def. in	Load Dial Units	Load lbs	Strain %	Deviator Stress ksf	Effective Stresses Minor ksf	Major ksf	1:3 Ratio	Pore Pres. psi	P ksf	Q ksf
0	0.0000	0.000	0.00	0.0	0.0	0.00	7.99	7.99	1.00	50.00	7.99	0.00
1	0.0100	0.010	138.00	386.4	0.2	9.12	7.82	16.94	2.17	51.20	12.38	4.56
2	0.0200	0.020	183.00	512.4	0.3	12.07	7.60	19.67	2.59	52.70	13.64	6.04
3	0.0300	0.030	206.00	576.8	0.5	13.56	7.42	20.98	2.83	54.00	14.20	6.78
4	0.0400	0.040	220.00	616.0	0.7	14.46	7.27	21.73	2.99	55.00	14.50	7.23
5	0.0500	0.050	231.00	646.8	0.8	15.16	7.17	22.33	3.11	55.70	14.75	7.58
6	0.0600	0.060	243.00	680.4	1.0	15.92	7.16	23.08	3.22	55.80	15.12	7.96
7	0.0700	0.070	253.00	708.4	1.2	16.55	6.96	23.50	3.38	57.20	15.23	8.27
8	0.0800	0.080	264.00	739.2	1.4	17.24	6.84	24.08	3.52	58.00	15.46	8.62
9	0.0900	0.090	273.00	764.4	1.5	17.79	6.74	24.53	3.64	58.70	15.64	8.90
10	0.1000	0.100	285.00	798.0	1.7	18.54	6.60	25.14	3.81	59.70	15.87	9.27
11	0.1500	0.150	325.00	910.0	2.5	20.96	6.25	27.21	4.35	62.10	16.73	10.48
12	0.2000	0.200	347.00	971.6	3.4	22.19	6.09	28.28	4.64	63.20	17.19	11.09
13	0.2500	0.250	361.00	1010.8	4.2	22.88	6.06	28.94	4.77	63.40	17.50	11.44
14	0.3000	0.300	367.00	1027.6	5.1	23.06	6.08	29.13	4.79	63.30	17.61	11.53
15	0.3500	0.350	371.00	1038.8	5.9	23.10	6.11	29.21	4.78	63.10	17.66	11.55
16	0.4000	0.400	375.00	1050.0	6.8	23.14	6.19	29.33	4.74	62.50	17.76	11.57
17	0.4500	0.450	377.00	1055.6	7.6	23.05	6.25	29.30	4.69	62.10	17.78	11.53
18	0.5000	0.500	380.00	1064.0	8.5	23.02	6.29	29.32	4.66	61.80	17.80	11.51
19	0.5500	0.550	379.00	1061.2	9.3	22.75	6.34	29.09	4.59	61.50	17.71	11.38
20	0.6000	0.600	378.00	1058.4	10.1	22.48	6.36	28.84	4.53	61.30	17.60	11.24

Test Readings Data for Specimen No. 3

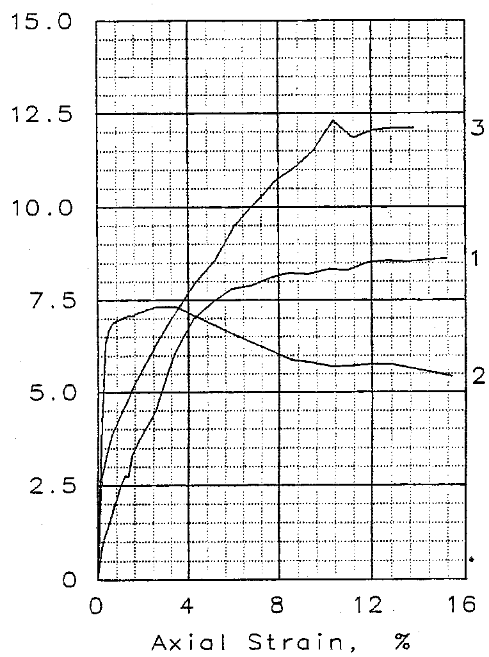
No.	Def. Dial Units	Def. in	Load Dial Units	Load lbs	Strain %	Deviator Stress ksf	Effective Stresses Minor ksf	Major ksf	1:3 Ratio	Pore Pres. psi	P ksf	Q ksf
21	0.6500	0.650	379.00	1061.2	11.0	22.33	6.38	28.71	4.50	61.20	17.54	11.16
22	0.7000	0.700	382.00	1069.6	11.8	22.29	6.39	28.68	4.49	61.10	17.54	11.14
23	0.7500	0.750	382.00	1069.6	12.7	22.07	6.42	28.50	4.44	60.90	17.46	11.04
24	0.8000	0.800	381.00	1066.8	13.5	21.80	6.44	28.24	4.39	60.80	17.34	10.90
25	0.8500	0.850	380.00	1064.0	14.4	21.53	6.45	27.99	4.34	60.70	17.22	10.77
26	0.9000	0.900	379.00	1061.2	15.2	21.27	6.47	27.73	4.29	60.60	17.10	10.63

TRIAXIAL COMPRESSION TEST RESULTS

ASH POND SAMPLES



	TOTAL	EFFECTIVE
C, ksf	1.77	1.28
ϕ, deg	18.3	24.4
TAN ϕ	0.33	0.45



	SAMPLE NO.:	1	2	3
INITIAL	WATER CONTENT, %	47.6	50.6	44.7
	DRY DENSITY, pcf	71.0	68.8	73.4
	SATURATION, %	100.0	100.4	100.0
	VOID RATIO	1.181	1.250	1.109
	DIAMETER, in	2.84	2.88	2.87
	HEIGHT, in	5.93	6.00	5.87
AT TEST	WATER CONTENT, %	47.6	44.9	42.5
	DRY DENSITY, pcf	71.0	73.3	75.4
	SATURATION, %	100.0	100.0	100.0
	VOID RATIO	1.180	1.113	1.053
	DIAMETER, in	2.84	2.83	2.85
	HEIGHT, in	5.91	5.85	5.79
	Strain rate, %/min	0.17	0.17	0.17
	BACK PRESSURE, ksf	7.2	7.2	7.2
	CELL PRESSURE, ksf	8.2	11.2	15.2
	FAIL. STRESS, ksf	6.1	6.6	12.3
	TOTAL PORE PR., ksf	6.9	9.1	9.3
	ULT. STRESS, ksf			
	TOTAL PORE PR., ksf			
	$\bar{\sigma}_1$ FAILURE, ksf	7.4	8.6	18.2
	$\bar{\sigma}_3$ FAILURE, ksf	1.3	2.1	5.9

TYPE OF TEST:
CU with Pore Pressures
SAMPLE TYPE: Shelby Tube
DESCRIPTION: Gray Ash Sand

SPECIFIC GRAVITY= 2.48
REMARKS: Wet pockets and clay seams in specimen #2

Fig. No.: ______ HB

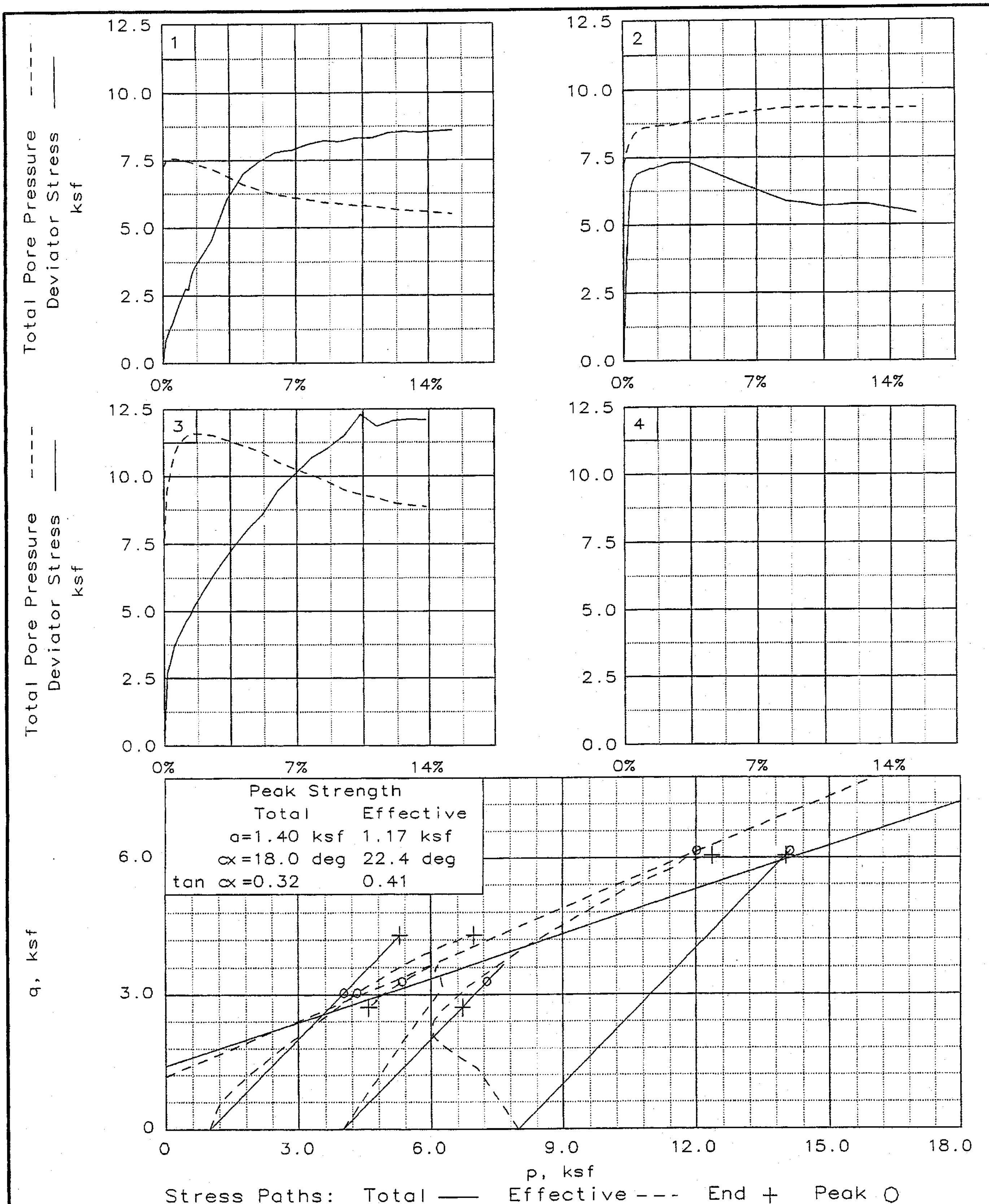
CLIENT: TVA

PROJECT: Ash Disposal Areas - TVA Gallatin Fossil Plant
SAMPLE LOCATION: B-3 UD @ 7.5'-9.5'

PROJ. NO.: 3043-04-1043 DATE: 09-23-04

TRIAXIAL SHEAR TEST REPORT

LAW ENGINEERING AND ENVIRONMENTAL SERVICES



Client: TVA

Project: Ash Disposal Areas - TVA Gallatin Fossil Plant

Location: B-3 UD @ 7.5'-9.5'

File: FOSSIL5 Project No.: 3043-04-1043 Fig. No.: ____

TRIAXIAL COMPRESSION TEST
CU with Pore Pressures

9-23-2004
5:32 pm

Project and Sample Data

Date: 09-23-04
Client: TVA
Project: Ash Disposal Areas - TVA Gallatin Fossil Plant
Sample location: B-3 UD @ 7.5'-9.5'
Sample description: Gray Ash Sand
Remarks: Wet pockets and clay seams in specimen #2

Fig no.: 2nd page Fig no. (if applicable):
Type of sample: Shelby Tube
Specific gravity= 2.48 LL= PL= PI=
Test method: Corps of Eng. - saturation assumed

Specimen Parameters for Specimen No. 1

Specimen Parameter	Initial	Saturated	Consolidated	Final
Wt. moist soil and tare:	1031.600			1019.960
Wt. dry soil and tare:	698.950			698.950
Wt. of tare:	0.000			0.000
Weight, gms:	1031.6			
Diameter, in:	2.838	2.843	2.842	
Area, in^2:	6.326	6.347	6.345	
Height, in:	5.929	5.929	5.910	
Net decrease in height, in:		0.000	0.019	
Net decrease in water volume, cc:		-2.200	2.200	
% Moisture:	47.6	47.9	47.6	45.9
Wet density, pcf:	104.8	104.7	104.8	
Dry density, pcf:	71.0	70.8	71.0	
Void ratio:	1.1807	1.1881	1.1803	
% Saturation:	100.0	100.0	100.0	

Test Readings Data for Specimen No. 1

Deformation dial constant= 1 in per input unit
Primary load ring constant= 0.72 lbs per input unit
Secondary load ring constant= 0 lbs per input unit
Crossover reading for secondary load ring= 0 input units
Membrane modulus = 0.14000 kN/cm^2
Membrane thickness = 0.012 cm
Consolidation cell pressure = 56.90 psi = 8.19 ksf
Consolidation back pressure = 50.00 psi = 7.20 ksf
Consolidation effective confining stress = 0.99 ksf
Strain rate, %/min = 0.17
FAIL. STRESS = 6.08 ksf at reading no. 12
ULT. STRESS = not selected

Test Readings Data for Specimen No. 1

No.	Def. Dial Units	Def. in	Load Dial Units	Load lbs	Strain %	Deviator Stress ksf	Effective Stresses Minor ksf	Effective Stresses Major ksf	Effective Stresses 1:3 Ratio	Pore Pres. psi	P ksf	Q ksf
0	0.0000	0.000	0.0	0.0	0.0	0.00	0.99	0.99	1.00	50.00	0.99	0.00
1	0.0100	0.010	53.0	38.2	0.2	0.86	0.72	1.58	2.20	51.90	1.15	0.43
2	0.0200	0.020	73.0	52.6	0.3	1.19	0.65	1.84	2.83	52.40	1.24	0.59
3	0.0300	0.030	91.0	65.5	0.5	1.48	0.63	2.11	3.34	52.50	1.37	0.74
4	0.0400	0.040	113.0	81.4	0.7	1.83	0.63	2.47	3.89	52.50	1.55	0.92
5	0.0500	0.050	132.0	95.0	0.8	2.14	0.65	2.79	4.30	52.40	1.72	1.07
6	0.0600	0.060	151.0	108.7	1.0	2.44	0.68	3.12	4.61	52.20	1.90	1.22
7	0.0700	0.070	170.0	122.4	1.2	2.75	0.72	3.47	4.81	51.90	2.09	1.37
8	0.0800	0.080	169.0	121.7	1.4	2.72	0.75	3.47	4.64	51.70	2.11	1.36
9	0.0900	0.090	205.0	147.6	1.5	3.30	0.78	4.08	5.24	51.50	2.43	1.65
10	0.1000	0.100	222.0	159.8	1.7	3.57	0.82	4.39	5.34	51.20	2.60	1.78
11	0.1500	0.150	284.0	204.5	2.5	4.52	1.01	5.53	5.49	49.90	3.27	2.26
12	0.2000	0.200	385.0	277.2	3.4	6.08	1.30	7.37	5.69	47.90	4.34	3.04
13	0.2500	0.250	447.0	321.8	4.2	7.00	1.60	8.59	5.38	45.80	5.10	3.50
14	0.3000	0.300	480.0	345.6	5.1	7.45	1.79	9.23	5.17	44.50	5.51	3.72
15	0.3500	0.350	507.0	365.0	5.9	7.79	1.97	9.77	4.95	43.20	5.87	3.90
16	0.4000	0.400	517.0	372.2	6.8	7.88	2.07	9.95	4.80	42.50	6.01	3.94
17	0.4500	0.450	536.0	385.9	7.6	8.09	2.16	10.25	4.75	41.90	6.21	4.05
18	0.5000	0.500	550.0	396.0	8.5	8.23	2.26	10.49	4.64	41.20	6.37	4.11
19	0.5500	0.550	553.0	398.2	9.3	8.20	2.32	10.51	4.53	40.80	6.42	4.10
20	0.6000	0.600	567.0	408.2	10.2	8.32	2.39	10.72	4.48	40.30	6.55	4.16
21	0.6500	0.650	572.0	411.8	11.0	8.32	2.42	10.74	4.44	40.10	6.58	4.16
22	0.7000	0.700	591.0	425.5	11.8	8.51	2.49	11.00	4.42	39.60	6.75	4.26
23	0.7500	0.750	600.0	432.0	12.7	8.56	2.56	11.12	4.34	39.10	6.84	4.28
24	0.8000	0.800	603.0	434.2	13.5	8.52	2.59	11.11	4.29	38.90	6.85	4.26
25	0.8500	0.850	613.0	441.4	14.4	8.58	2.65	11.23	4.24	38.50	6.94	4.29
26	0.9000	0.900	621.0	447.1	15.2	8.60	2.69	11.30	4.19	38.20	6.99	4.30

Specimen Parameters for Specimen No. 2

Specimen Parameter	Initial	Saturated	Consolidated	Final
Wt. moist soil and tare:	1063.470			1022.260
Wt. dry soil and tare:	706.070			706.070
Wt. of tare:	0.000			0.000
Weight, gms:	1063.5			
Diameter, in:	2.880	2.889	2.828	
Area, in²:	6.514	6.557	6.282	
Height, in:	6.000	6.000	5.845	
Net decrease in height, in:		0.000	0.155	
Net decrease in water volume, cc:		-2.600	43.000	
% Moisture:	50.6	51.0	44.9	44.8
Wet density, pcf:	103.7	103.2	106.1	
Dry density, pcf:	68.8	68.4	73.3	
Void ratio:	1.2497	1.2645	1.1134	
% Saturation:	100.4	100.0	100.0	

Test Readings Data for Specimen No. 2

Deformation dial constant= 1 in per input unit
Primary load ring constant= 2.8 lbs per input unit
Secondary load ring constant= 0 lbs per input unit
Crossover reading for secondary load ring= 0 input units
Membrane modulus = 0.14000 kN/cm²
Membrane thickness = 0.012 cm
Consolidation cell pressure = 77.80 psi = 11.20 ksf
Consolidation back pressure = 50.00 psi = 7.20 ksf
Consolidation effective confining stress = 4.00 ksf
Strain rate, %/min = 0.17
FAIL. STRESS = 6.58 ksf at reading no. 15
ULT. STRESS = not selected

No.	Def. Dial Units	Def. in	Load Dial Units	Load lbs	Strain %	Deviator Stress ksf	Effective Stresses Minor ksf	Effective Stresses Major ksf	1:3 Ratio	Pore Pres. psi	P ksf	Q ksf
0	0.0000	0.000	0.00	0.0	0.0	0.00	4.00	4.00	1.00	50.00	4.00	0.00
1	0.0100	0.010	65.00	182.0	0.2	4.16	3.37	7.53	2.24	54.40	5.45	2.08
2	0.0200	0.020	99.00	277.2	0.3	6.33	3.11	9.44	3.04	56.20	6.28	3.17
3	0.0300	0.030	105.00	294.0	0.5	6.70	2.88	9.58	3.33	57.80	6.23	3.35
4	0.0400	0.040	108.00	302.4	0.7	6.88	2.75	9.63	3.50	58.70	6.19	3.44
5	0.0500	0.050	109.00	305.2	0.9	6.94	2.68	9.61	3.59	59.20	6.15	3.47
6	0.0600	0.060	110.00	308.0	1.0	6.99	2.62	9.61	3.67	59.60	6.11	3.49
7	0.0700	0.070	111.00	310.8	1.2	7.04	2.58	9.62	3.73	59.90	6.10	3.52
8	0.0800	0.080	112.00	313.6	1.4	7.09	2.58	9.67	3.75	59.90	6.12	3.55
9	0.0900	0.090	112.00	313.6	1.5	7.08	2.55	9.63	3.78	60.10	6.09	3.54
10	0.1000	0.100	113.00	316.4	1.7	7.13	2.53	9.66	3.81	60.20	6.10	3.56
11	0.1500	0.150	117.00	327.6	2.6	7.32	2.51	9.82	3.92	60.40	6.16	3.66
12	0.2000	0.200	118.00	330.4	3.4	7.31	2.39	9.70	4.06	61.20	6.05	3.66
13	0.2500	0.250	115.00	322.0	4.3	7.07	2.28	9.34	4.11	62.00	5.81	3.53
14	0.3000	0.300	112.00	313.6	5.1	6.82	2.17	8.99	4.14	62.70	5.58	3.41
15	0.3500	0.350	109.00	305.2	6.0	6.58	2.06	8.64	4.19	63.50	5.35	3.29
16	0.4000	0.400	106.00	296.8	6.8	6.34	1.99	8.33	4.19	64.00	5.16	3.17
17	0.4500	0.450	103.00	288.4	7.7	6.10	1.93	8.03	4.16	64.40	4.98	3.05
18	0.5000	0.500	100.00	280.0	8.6	5.87	1.87	7.74	4.14	64.80	4.81	2.93
19	0.5500	0.550	100.00	280.0	9.4	5.81	1.86	7.67	4.13	64.90	4.76	2.91
20	0.6000	0.600	99.00	277.2	10.3	5.70	1.84	7.55	4.09	65.00	4.69	2.85

Test Readings Data for Specimen No. 2

No.	Def. Dial Units	Def. in	Load Dial Units	Load lbs	Strain %	Deviator Stress ksf	Effective Stresses Minor ksf	Major ksf	1:3 Ratio	Pore Pres. psi	P ksf	Q ksf
21	0.6500	0.650	100.00	280.0	11.1	5.70	1.86	7.56	4.07	64.90	4.71	2.85
22	0.7000	0.700	102.00	285.6	12.0	5.76	1.87	7.63	4.08	64.80	4.75	2.88
23	0.7500	0.750	103.00	288.4	12.8	5.76	1.90	7.66	4.03	64.60	4.78	2.88
24	0.8000	0.800	102.00	285.6	13.7	5.65	1.90	7.55	3.97	64.60	4.73	2.83
25	0.8500	0.850	101.00	282.8	14.5	5.54	1.89	7.43	3.94	64.70	4.66	2.77
26	0.9000	0.900	100.00	280.0	15.4	5.43	1.87	7.30	3.90	64.80	4.59	2.72

Specimen Parameters for Specimen No. 3

Specimen Parameter	Initial	Saturated	Consolidated	Final
Wt. moist soil and tare:	1057.340			1031.060
Wt. dry soil and tare:	730.610			730.610
Wt. of tare:	0.000			0.000
Weight, gms:	1057.3			
Diameter, in:	2.867	2.875	2.849	
Area, in²:	6.456	6.492	6.377	
Height, in:	5.872	5.872	5.789	
Net decrease in height, in:		0.000	0.083	
Net decrease in water volume, cc:		-3.400	19.800	
% Moisture:	44.7	45.2	42.5	41.1
Wet density, pcf:	106.3	106.0	107.4	
Dry density, pcf:	73.4	73.0	75.4	
Void ratio:	1.1086	1.1206	1.0534	
% Saturation:	100.0	100.0	100.0	

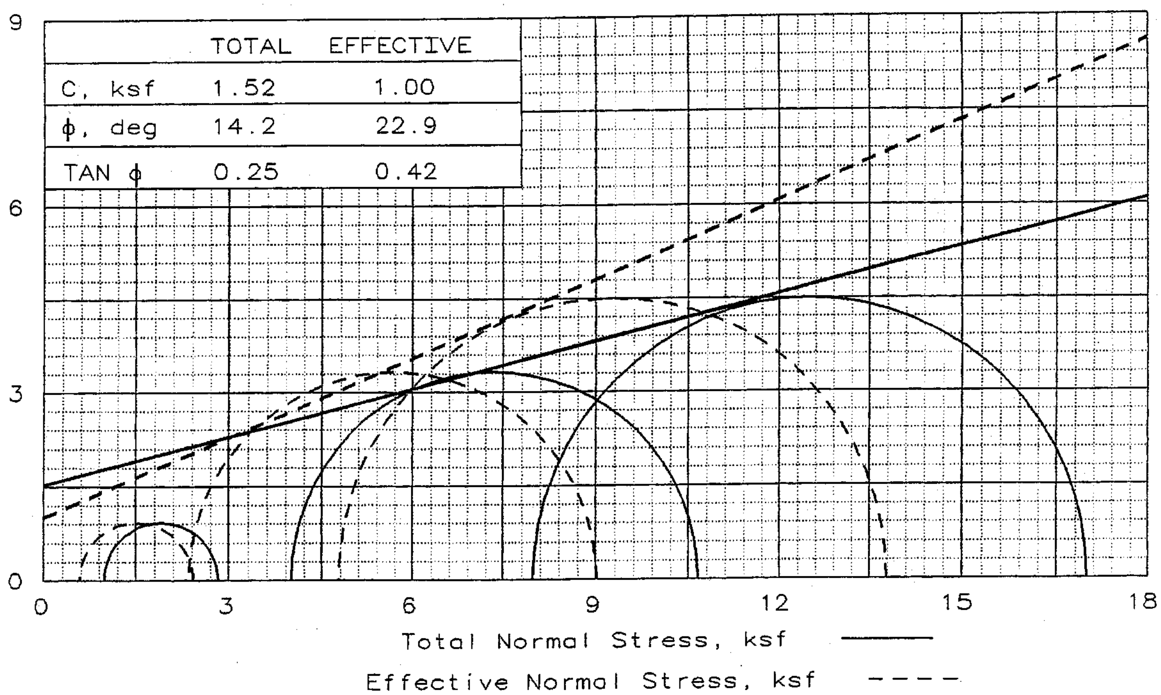
Test Readings Data for Specimen No. 3

Deformation dial constant= 1 in per input unit
Primary load ring constant= 2.8 lbs per input unit
Secondary load ring constant= 0 lbs per input unit
Crossover reading for secondary load ring= 0 input units
Membrane modulus = 0.14000 kN/cm²
Membrane thickness = 0.012 cm
Consolidation cell pressure = 105.50 psi = 15.19 ksf
Consolidation back pressure = 50.00 psi = 7.20 ksf
Consolidation effective confining stress = 7.99 ksf
Strain rate, %/min = 0.17
FAIL. STRESS = 12.30 ksf at reading no. 20
ULT. STRESS = not selected

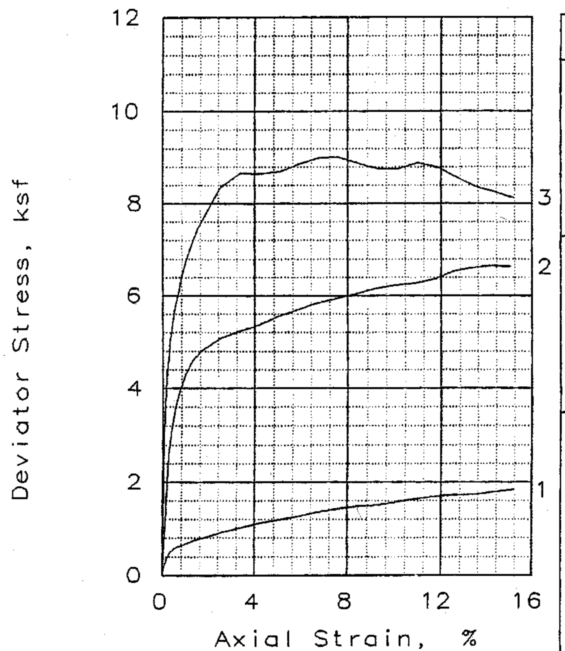
No.	Def. Dial Units	Def. in	Load Dial Units	Load lbs	Strain %	Deviator Stress ksf	Effective Stresses Minor ksf	Major ksf	1:3 Ratio	Pore Pres. psi	P ksf	Q ksf
0	0.0000	0.000	0.00	0.0	0.0	0.00	7.99	7.99	1.00	50.00	7.99	0.00
1	0.0100	0.010	43.00	120.4	0.2	2.71	5.72	8.43	1.47	65.80	7.07	1.36
2	0.0200	0.020	50.00	140.0	0.3	3.15	5.11	8.26	1.62	70.00	6.69	1.58
3	0.0300	0.030	58.00	162.4	0.5	3.65	4.51	8.16	1.81	74.20	6.33	1.82
4	0.0400	0.040	63.00	176.4	0.7	3.96	4.18	8.13	1.95	76.50	6.15	1.98
5	0.0500	0.050	67.00	187.6	0.9	4.20	3.95	8.15	2.06	78.10	6.05	2.10
6	0.0600	0.060	71.00	198.8	1.0	4.44	3.83	8.27	2.16	78.90	6.05	2.22
7	0.0700	0.070	75.00	210.0	1.2	4.68	3.70	8.39	2.27	79.80	6.04	2.34
8	0.0800	0.080	78.00	218.4	1.4	4.86	3.64	8.51	2.34	80.20	6.08	2.43
9	0.0900	0.090	83.00	232.4	1.6	5.17	3.61	8.78	2.43	80.40	6.20	2.58
10	0.1000	0.100	86.00	240.8	1.7	5.34	3.60	8.94	2.48	80.50	6.27	2.67
11	0.1500	0.150	103.00	288.4	2.6	6.34	3.67	10.02	2.73	80.00	6.84	3.17
12	0.2000	0.200	118.00	330.4	3.5	7.20	3.87	11.08	2.86	78.60	7.48	3.60
13	0.2500	0.250	132.00	369.6	4.3	7.99	4.09	12.08	2.95	77.10	8.08	3.99
14	0.3000	0.300	143.00	400.4	5.2	8.57	4.31	12.88	2.99	75.60	8.59	4.29
15	0.3500	0.350	160.00	448.0	6.0	9.51	4.68	14.19	3.03	73.00	9.43	4.75
16	0.4300	0.430	178.00	498.4	7.4	10.42	5.07	15.49	3.06	70.30	10.28	5.21
17	0.4500	0.450	183.00	512.4	7.8	10.67	5.16	15.83	3.07	69.70	10.49	5.34
18	0.5000	0.500	191.00	534.8	8.6	11.03	5.39	16.42	3.05	68.10	10.90	5.52
19	0.5500	0.550	201.00	562.8	9.5	11.50	5.70	17.20	3.02	65.90	11.45	5.75
20	0.6000	0.600	217.00	607.6	10.4	12.30	5.88	18.17	3.09	64.70	12.02	6.15

Test Readings Data for Specimen No. 3

No.	Def. Dial Units	Def. in	Load Dial Units	Load lbs	Strain %	Deviator Stress ksf	Effective Stresses Minor ksf	Effective Stresses Major ksf	Effective Stresses 1:3 Ratio	Pore Pres. psi	P ksf	Q ksf
21	0.6500	0.650	211.00	590.8	11.2	11.84	5.99	17.83	2.98	63.90	11.91	5.92
22	0.7000	0.700	217.00	607.6	12.1	12.06	6.19	18.25	2.95	62.50	12.22	6.03
23	0.7500	0.750	220.00	616.0	13.0	12.11	6.26	18.37	2.93	62.00	12.32	6.05
24	0.8000	0.800	222.00	621.6	13.8	12.10	6.32	18.42	2.91	61.60	12.37	6.05



	TOTAL	EFFECTIVE
C, ksf	1.52	1.00
ϕ, deg	14.2	22.9
TAN ϕ	0.25	0.42



SAMPLE NO.:		1	2	3
INITIAL	WATER CONTENT, %	25.9	23.7	28.7
	DRY DENSITY, pcf	100.4	103.8	96.5
	SATURATION, %	102.5	102.0	103.3
	VOID RATIO	0.685	0.629	0.753
	DIAMETER, in	2.85	2.84	2.82
	HEIGHT, in	6.00	6.04	6.01
AT TEST	WATER CONTENT, %	24.4	22.3	27.3
	DRY DENSITY, pcf	101.8	105.4	97.2
	SATURATION, %	100.0	100.0	100.0
	VOID RATIO	0.662	0.605	0.740
	DIAMETER, in	2.85	2.83	2.83
	HEIGHT, in	5.92	5.99	5.92
Strain rate, %/min		0.07	0.07	0.07
BACK PRESSURE, ksf		7.2	7.2	7.2
CELL PRESSURE, ksf		8.2	11.2	15.2
FAIL. STRESS, ksf		1.8	6.7	9.0
TOTAL PORE PR., ksf		7.6	8.8	10.4
ULT. STRESS, ksf				
TOTAL PORE PR., ksf				
$\bar{\sigma}_1$ FAILURE, ksf		2.4	9.0	13.8
$\bar{\sigma}_3$ FAILURE, ksf		0.6	2.4	4.8

TYPE OF TEST:
CU with Pore Pressures

SAMPLE TYPE: Shelby Tube

DESCRIPTION: Orange-Brown Silty Clay (CH)

LL= 51 PL= 20 PI= 31

SPECIFIC GRAVITY= 2.71

REMARKS: Specimen #1 different material from specimens 2 & 3 (grey and soft ash)

Fig. No.: ______ HR

CLIENT: TVA

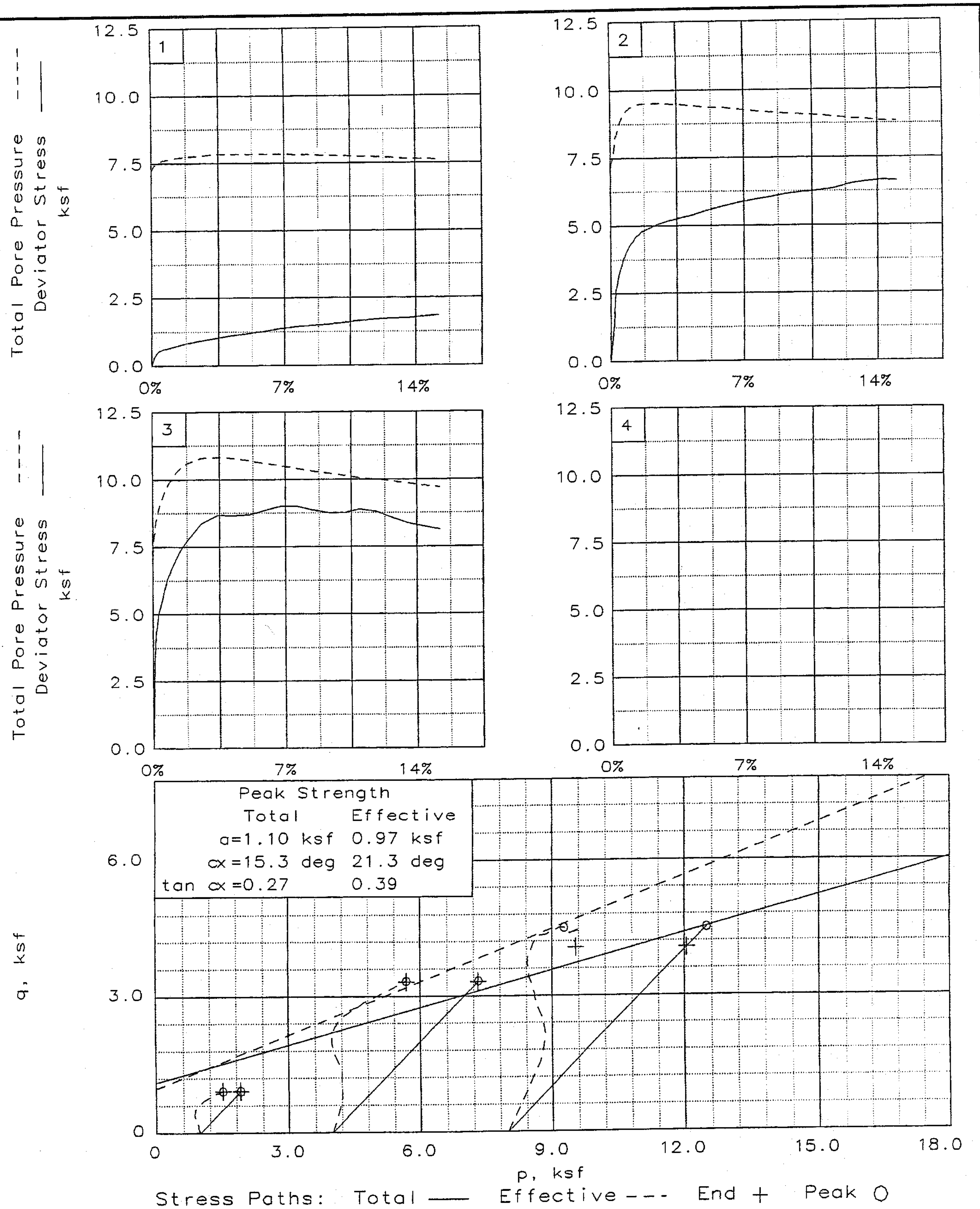
PROJECT: Ash Disposal Areas - TVA Gallatin Fossil Plant

SAMPLE LOCATION: B-8 UD @ 22'-23.5'

PROJ. NO.: 3043-04-1043 DATE: 09-22-04

TRIAXIAL SHEAR TEST REPORT

LAW ENGINEERING AND ENVIRONMENTAL SERVICES



Client: TVA

Project: Ash Disposal Areas - TVA Gallatin Fossil Plant

Location: B-8 UD @ 22'-23.5'

File: FOSSIL4 Project No.: 3043-04-1043 Fig. No.: _____

TRIAXIAL COMPRESSION TEST
CU with Pore Pressures

10-12-2004
5:09 pm

Project and Sample Data

Date: 09-22-04
Client: TVA
Project: Ash Disposal Areas - TVA Gallatin Fossil Plant
Sample location: B-8 UD @ 22'-23.5'
Sample description: Orange-Brown Silty Clay (CH)
Remarks: Specimen #1 different material from specimens 2 & 3
(grey and soft ash)
Fig no.: 2nd page Fig no. (if applicable):
Type of sample: Shelby Tube
Specific gravity= 2.71 LL= 51 PL= 20 PI= 31
Test method: Corps of Eng. - saturation assumed

Specimen Parameters for Specimen No. 1

Specimen Parameter	Initial	Saturated	Consolidated	Final
Wt. moist soil and tare:	1273.240			1246.880
Wt. dry soil and tare:	1011.280			1011.280
Wt. of tare:	0.000			0.000
Weight, gms:	1273.2			
Diameter, in:	2.854	2.873	2.854	
Area, in²:	6.397	6.482	6.398	
Height, in:	5.998	5.998	5.917	
Net decrease in height, in:		0.000	0.081	
Net decrease in water volume, cc:		-2.000	16.800	
% Moisture:	25.9	26.1	24.4	23.3
Wet density, pcf:	126.4	125.0	126.6	
Dry density, pcf:	100.4	99.1	101.8	
Void ratio:	0.6850	0.7074	0.6623	
% Saturation:	102.5	100.0	100.0	

Test Readings Data for Specimen No. 1

Deformation dial constant= 1 in per input unit
Primary load ring constant= 0.72 lbs per input unit
Secondary load ring constant= 0 lbs per input unit
Crossover reading for secondary load ring= 0 input units
Membrane modulus = 0.14000 kN/cm²
Membrane thickness = 0.012 cm
Consolidation cell pressure = 56.90 psi = 8.19 ksf
Consolidation back pressure = 50.00 psi = 7.20 ksf
Consolidation effective confining stress = 0.99 ksf
Strain rate, %/min = 0.07
FAIL. STRESS = 1.84 ksf at reading no. 36
ULT. STRESS = not selected

Test Readings Data for Specimen No. 3

No.	Def. Dial Units	Def. in	Load Dial Units	Load lbs	Strain %	Deviator Stress ksf	Effective Stresses Minor ksf	Effective Stresses Major ksf	1:3 Ratio	Pore Pres. psi	P ksf	Q ksf
21	0.1500	0.150	519.0	373.7	2.5	8.36	4.41	12.76	2.90	74.90	8.59	4.18
22	0.2000	0.200	543.0	391.0	3.4	8.67	4.36	13.03	2.99	75.20	8.70	4.33
23	0.2500	0.250	547.0	393.8	4.2	8.66	4.41	13.06	2.96	74.90	8.73	4.33
24	0.3000	0.300	554.0	398.9	5.1	8.69	4.49	13.18	2.93	74.30	8.84	4.34
25	0.3500	0.350	570.0	410.4	5.9	8.86	4.59	13.45	2.93	73.60	9.02	4.43
26	0.4000	0.400	584.0	420.5	6.8	9.00	4.68	13.68	2.92	73.00	9.18	4.50
27	0.4500	0.450	590.0	424.8	7.6	9.01	4.78	13.79	2.88	72.30	9.28	4.50
28	0.5000	0.500	587.0	422.6	8.4	8.88	4.88	13.76	2.82	71.60	9.32	4.44
29	0.5500	0.550	584.0	420.5	9.3	8.75	4.97	13.72	2.76	71.00	9.34	4.38
30	0.6000	0.600	590.0	424.8	10.1	8.76	5.04	13.80	2.74	70.50	9.42	4.38
31	0.6500	0.650	604.0	434.9	11.0	8.88	5.14	14.02	2.73	69.80	9.58	4.44
32	0.7000	0.700	604.0	434.9	11.8	8.80	5.20	14.00	2.69	69.40	9.60	4.40
33	0.7500	0.750	594.0	427.7	12.7	8.57	5.27	13.84	2.63	68.90	9.56	4.29
34	0.8000	0.800	586.0	421.9	13.5	8.37	5.34	13.72	2.57	68.40	9.53	4.19
35	0.8500	0.850	583.0	419.8	14.4	8.25	5.43	13.68	2.52	67.80	9.55	4.12
36	0.9000	0.900	580.0	417.6	15.2	8.13	5.49	13.61	2.48	67.40	9.55	4.06

Test Readings Data for Specimen No. 1

No.	Def. Dial Units	Def. in	Load Dial Units	Load lbs	Strain %	Deviator Stress ksf	Effective Stresses Minor ksf	Effective Stresses Major ksf	Effective Stresses 1:3 Ratio	Pore Pres. psi	P ksf	Q ksf
0	0.0000	0.000	0.0	0.0	0.0	0.00	0.99	0.99	1.00	50.00	0.99	0.00
1	0.0050	0.005	12.0	8.6	0.1	0.19	0.85	1.04	1.23	51.00	0.95	0.10
2	0.0100	0.010	21.0	15.1	0.2	0.34	0.78	1.12	1.44	51.50	0.95	0.17
3	0.0150	0.015	27.0	19.4	0.3	0.44	0.71	1.14	1.62	52.00	0.92	0.22
4	0.0200	0.020	31.0	22.3	0.3	0.50	0.68	1.18	1.74	52.20	0.93	0.25
5	0.0250	0.025	33.0	23.8	0.4	0.53	0.65	1.18	1.82	52.40	0.91	0.27
6	0.0300	0.030	35.0	25.2	0.5	0.56	0.62	1.18	1.91	52.60	0.90	0.28
7	0.0350	0.035	37.0	26.6	0.6	0.60	0.59	1.19	2.01	52.80	0.89	0.30
8	0.0400	0.040	38.0	27.4	0.7	0.61	0.59	1.20	2.04	52.80	0.90	0.31
9	0.0450	0.045	39.0	28.1	0.8	0.63	0.56	1.19	2.12	53.00	0.88	0.31
10	0.0500	0.050	40.0	28.8	0.8	0.64	0.56	1.20	2.14	53.00	0.88	0.32
11	0.0550	0.055	41.0	29.5	0.9	0.66	0.55	1.21	2.20	53.10	0.88	0.33
12	0.0600	0.060	42.0	30.2	1.0	0.67	0.53	1.21	2.26	53.20	0.87	0.34
13	0.0650	0.065	43.0	31.0	1.1	0.69	0.52	1.21	2.33	53.30	0.86	0.34
14	0.0700	0.070	44.0	31.7	1.2	0.70	0.52	1.22	2.36	53.30	0.87	0.35
15	0.0750	0.075	45.0	32.4	1.3	0.72	0.50	1.22	2.43	53.40	0.86	0.36
16	0.0800	0.080	46.0	33.1	1.4	0.74	0.50	1.24	2.46	53.40	0.87	0.37
17	0.0850	0.085	47.0	33.8	1.4	0.75	0.49	1.24	2.53	53.50	0.86	0.38
18	0.0900	0.090	48.0	34.6	1.5	0.77	0.48	1.24	2.61	53.60	0.86	0.38
19	0.0950	0.095	49.0	35.3	1.6	0.78	0.48	1.26	2.64	53.60	0.87	0.39
20	0.1000	0.100	50.0	36.0	1.7	0.80	0.46	1.26	2.73	53.70	0.86	0.40
21	0.1500	0.150	58.0	41.8	2.5	0.92	0.42	1.33	3.19	54.00	0.88	0.46
22	0.2000	0.200	65.0	46.8	3.4	1.02	0.37	1.39	3.72	54.30	0.88	0.51
23	0.2500	0.250	72.0	51.8	4.2	1.12	0.36	1.48	4.10	54.40	0.92	0.56
24	0.3000	0.300	77.0	55.4	5.1	1.18	0.36	1.54	4.29	54.40	0.95	0.59
25	0.3500	0.350	83.0	59.8	5.9	1.27	0.36	1.63	4.52	54.40	0.99	0.63
26	0.4000	0.400	90.0	64.8	6.8	1.36	0.36	1.72	4.78	54.40	1.04	0.68
27	0.4500	0.450	95.0	68.4	7.6	1.42	0.37	1.80	4.80	54.30	1.09	0.71
28	0.5000	0.500	100.0	72.0	8.5	1.48	0.39	1.87	4.82	54.20	1.13	0.74
29	0.5500	0.550	103.0	74.2	9.3	1.51	0.42	1.93	4.63	54.00	1.17	0.76
30	0.6000	0.600	108.0	77.8	10.1	1.57	0.43	2.00	4.64	53.90	1.22	0.79
31	0.6500	0.650	114.0	82.1	11.0	1.64	0.46	2.11	4.57	53.70	1.28	0.82
32	0.7000	0.700	119.0	85.7	11.8	1.70	0.48	2.18	4.58	53.60	1.33	0.85
33	0.7500	0.750	122.0	87.8	12.7	1.73	0.50	2.23	4.43	53.40	1.37	0.86
34	0.8000	0.800	124.0	89.3	13.5	1.74	0.55	2.29	4.18	53.10	1.42	0.87
35	0.8500	0.850	129.0	92.9	14.4	1.79	0.56	2.35	4.19	53.00	1.46	0.90
36	0.9000	0.900	134.0	96.5	15.2	1.84	0.59	2.43	4.12	52.80	1.51	0.92

Specimen Parameters for Specimen No. 2

Specimen Parameter	Initial	Saturated	Consolidated	Final
Wt. moist soil and tare:	1290.100			1276.030
Wt. dry soil and tare:	1042.940			1042.940
Wt. of tare:	0.000			0.000
Weight, gms:	1290.1			
Diameter, in:	2.840	2.855	2.831	
Area, in²:	6.335	6.401	6.295	
Height, in:	6.041	6.041	5.987	
Net decrease in height, in:		0.000	0.054	
Net decrease in water volume, cc:		-1.700	16.100	
% Moisture:	23.7	23.9	22.3	22.3
Wet density, pcf:	128.4	127.3	128.9	
Dry density, pcf:	103.8	102.7	105.4	
Void ratio:	0.6295	0.6466	0.6048	
% Saturation:	102.0	100.0	100.0	

Test Readings Data for Specimen No. 2

Deformation dial constant= 1 in per input unit
Primary load ring constant= 0.72 lbs per input unit
Secondary load ring constant= 0 lbs per input unit
Crossover reading for secondary load ring= 0 input units
Membrane modulus = 0.14000 kN/cm²
Membrane thickness = 0.012 cm
Consolidation cell pressure = 77.80 psi = 11.20 ksf
Consolidation back pressure = 50.00 psi = 7.20 ksf
Consolidation effective confining stress = 4.00 ksf
Strain rate, %/min = 0.07
FAIL. STRESS = 6.66 ksf at reading no. 34
ULT. STRESS = not selected

No.	Def. Dial Units	Def. in	Load Dial Units	Load lbs	Strain %	Deviator Stress ksf	Effective Stresses Minor ksf	Effective Stresses Major ksf	1:3 Ratio	Pore Pres. psi	P ksf	Q ksf
0	0.0000	0.000	0.0	0.0	0.0	0.00	4.00	4.00	1.00	50.00	4.00	0.00
1	0.0100	0.010	84.0	60.5	0.2	1.38	3.53	4.91	1.39	53.30	4.22	0.69
2	0.0150	0.015	158.0	113.8	0.3	2.60	2.92	5.52	1.89	57.50	4.22	1.30
3	0.0200	0.020	173.0	124.6	0.3	2.84	2.78	5.62	2.02	58.50	4.20	1.42
4	0.0250	0.025	193.0	139.0	0.4	3.17	2.53	5.70	2.25	60.20	4.12	1.58
5	0.0300	0.030	207.0	149.0	0.5	3.39	2.36	5.75	2.44	61.40	4.06	1.70
6	0.0350	0.035	220.0	158.4	0.6	3.60	2.22	5.82	2.62	62.40	4.02	1.80
7	0.0400	0.040	231.0	166.3	0.7	3.78	2.12	5.90	2.79	63.10	4.01	1.89
8	0.0450	0.045	240.0	172.8	0.8	3.92	2.03	5.95	2.93	63.70	3.99	1.96
9	0.0500	0.050	249.0	179.3	0.8	4.07	1.96	6.03	3.08	64.20	3.99	2.03
10	0.0550	0.055	256.0	184.3	0.9	4.18	1.90	6.08	3.20	64.60	3.99	2.09
11	0.0600	0.060	263.0	189.4	1.0	4.29	1.86	6.15	3.31	64.90	4.00	2.14
12	0.0650	0.065	268.0	193.0	1.1	4.37	1.83	6.19	3.39	65.10	4.01	2.18
13	0.0700	0.070	273.0	196.6	1.2	4.44	1.79	6.23	3.49	65.40	4.01	2.22
14	0.0750	0.075	279.0	200.9	1.3	4.54	1.77	6.31	3.56	65.50	4.04	2.27
15	0.0800	0.080	284.0	204.5	1.3	4.61	1.74	6.36	3.65	65.70	4.05	2.31
16	0.0850	0.085	287.0	206.6	1.4	4.66	1.73	6.39	3.70	65.80	4.06	2.33
17	0.0900	0.090	290.0	208.8	1.5	4.70	1.73	6.43	3.72	65.80	4.08	2.35
18	0.0950	0.095	294.0	211.7	1.6	4.77	1.71	6.48	3.78	65.90	4.10	2.38
19	0.1000	0.100	297.0	213.8	1.7	4.81	1.70	6.51	3.83	66.00	4.10	2.40
20	0.1500	0.150	316.0	227.5	2.5	5.07	1.68	6.76	4.01	66.10	4.22	2.54

Test Readings Data for Specimen No. 2

No.	Def. Dial Units	Def. in	Load Dial Units	Load lbs	Strain %	Deviator Stress ksf	Effective Stresses Minor ksf	Effective Stresses Major ksf	Effective Stresses 1:3 Ratio	Pore Pres. psi	P ksf	Q ksf
21	0.2000	0.200	329.0	236.9	3.3	5.24	1.73	6.97	4.03	65.80	4.35	2.62
22	0.2500	0.250	340.0	244.8	4.2	5.37	1.77	7.14	4.03	65.50	4.45	2.68
23	0.3000	0.300	355.0	255.6	5.0	5.55	1.83	7.38	4.04	65.10	4.61	2.78
24	0.3500	0.350	367.0	264.2	5.8	5.69	1.86	7.55	4.06	64.90	4.70	2.85
25	0.4000	0.400	380.0	273.6	6.7	5.84	1.92	7.76	4.05	64.50	4.84	2.92
26	0.4500	0.450	390.0	280.8	7.5	5.94	1.99	7.93	3.99	64.00	4.96	2.97
27	0.5000	0.500	400.0	288.0	8.4	6.04	2.03	8.07	3.97	63.70	5.05	3.02
28	0.5500	0.550	412.0	296.6	9.2	6.16	2.09	8.25	3.95	63.30	5.17	3.08
29	0.6000	0.600	420.0	302.4	10.0	6.22	2.12	8.34	3.94	63.10	5.23	3.11
30	0.6500	0.650	427.0	307.4	10.9	6.27	2.16	8.43	3.90	62.80	5.29	3.13
31	0.7000	0.700	437.0	314.6	11.7	6.36	2.20	8.56	3.88	62.50	5.38	3.18
32	0.7500	0.750	453.0	326.2	12.5	6.53	2.28	8.80	3.87	62.00	5.54	3.26
33	0.8000	0.800	463.0	333.4	13.4	6.61	2.30	8.91	3.87	61.80	5.61	3.30
34	0.8500	0.850	471.0	339.1	14.2	6.66	2.36	9.02	3.82	61.40	5.69	3.33
35	0.9000	0.900	474.0	341.3	15.0	6.63	2.38	9.01	3.79	61.30	5.69	3.32

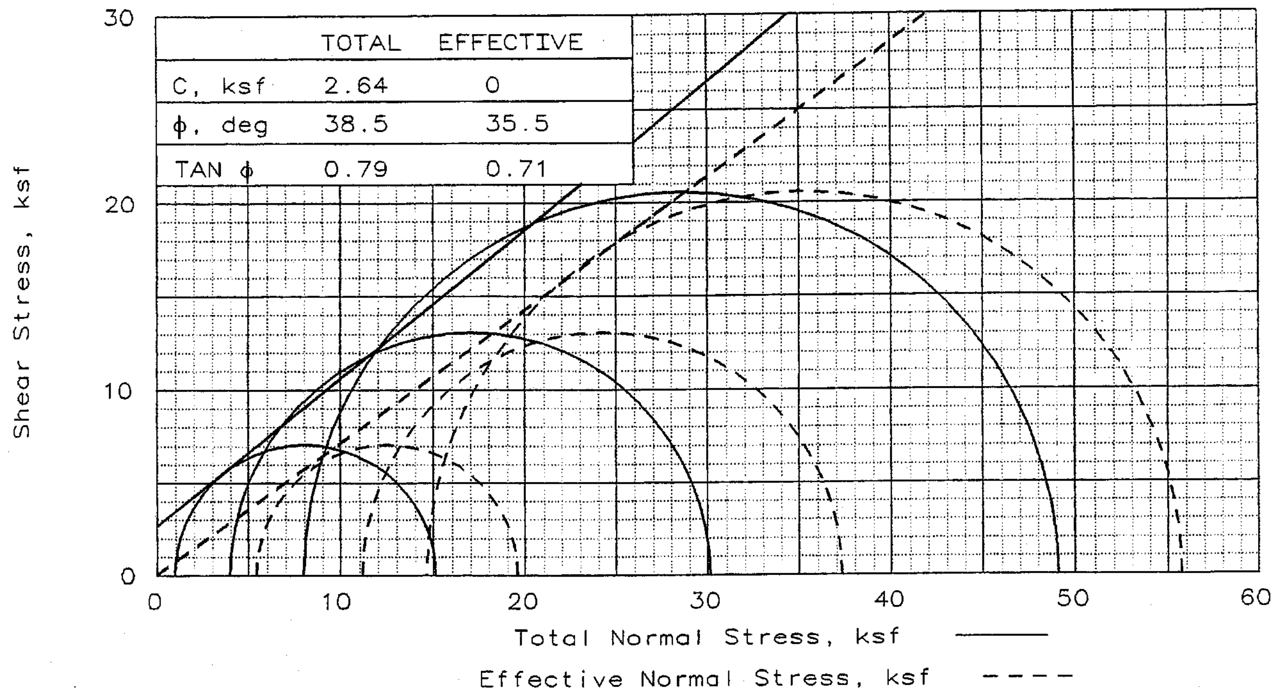
Specimen Parameters for Specimen No. 3

Specimen Parameter	Initial	Saturated	Consolidated	Final
Wt. moist soil and tare:	1220.640			1214.980
Wt. dry soil and tare:	948.460			948.460
Wt. of tare:	0.000			0.000
Weight, gms:	1220.6			
Diameter, in:	2.816	2.857	2.827	
Area, in²:	6.228	6.411	6.275	
Height, in:	6.011	6.011	5.922	
Net decrease in height, in:		0.000	0.089	
Net decrease in water volume, cc:		-9.300	22.500	
% Moisture:	28.7	29.7	27.3	28.1
Wet density, pcf:	124.2	121.6	123.8	
Dry density, pcf:	96.5	93.8	97.2	
Void ratio:	0.7529	0.8043	0.7400	
% Saturation:	103.3	100.0	100.0	

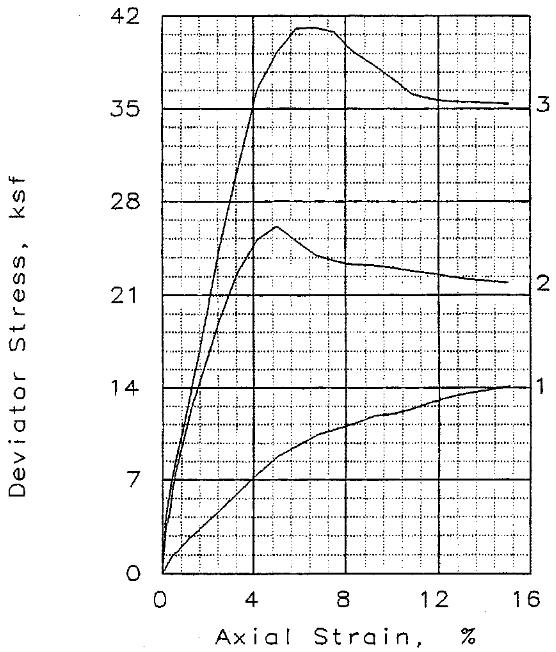
Test Readings Data for Specimen No. 3

Deformation dial constant= 1 in per input unit
Primary load ring constant= 0.72 lbs per input unit
Secondary load ring constant= 0 lbs per input unit
Crossover reading for secondary load ring= 0 input units
Membrane modulus = 0.14000 kN/cm²
Membrane thickness = 0.012 cm
Consolidation cell pressure = 105.50 psi = 15.19 ksf
Consolidation back pressure = 50.00 psi = 7.20 ksf
Consolidation effective confining stress = 7.99 ksf
Strain rate, %/min = 0.07
FAIL. STRESS = 9.01 ksf at reading no. 27
ULT. STRESS = not selected

No.	Def. Dial Units	Def. in	Load Dial Units	Load lbs	Strain %	Deviator Stress ksf	Effective Stresses Minor ksf	Effective Stresses Major ksf	1:3 Ratio	Pore Pres. psi	P ksf	Q ksf
0	0.0000	0.000	0.0	0.0	0.0	0.00	7.99	7.99	1.00	50.00	7.99	0.00
1	0.0050	0.005	188.0	135.4	0.1	3.10	7.19	10.29	1.43	55.60	8.74	1.55
2	0.0100	0.010	255.0	183.6	0.2	4.21	6.75	10.96	1.62	58.60	8.86	2.10
3	0.0180	0.018	299.0	215.3	0.3	4.93	6.34	11.26	1.78	61.50	8.80	2.46
4	0.0200	0.020	307.0	221.0	0.3	5.06	6.25	11.30	1.81	62.10	8.78	2.53
5	0.0250	0.025	324.0	233.3	0.4	5.33	6.05	11.38	1.88	63.50	8.71	2.67
6	0.0300	0.030	339.0	244.1	0.5	5.57	5.88	11.45	1.95	64.70	8.66	2.79
7	0.0350	0.035	354.0	254.9	0.6	5.81	5.72	11.53	2.02	65.80	8.62	2.91
8	0.0400	0.040	368.0	265.0	0.7	6.04	5.59	11.63	2.08	66.70	8.61	3.02
9	0.0450	0.045	384.0	276.5	0.8	6.30	5.43	11.73	2.16	67.80	8.58	3.15
10	0.0500	0.050	393.0	283.0	0.8	6.44	5.33	11.77	2.21	68.50	8.55	3.22
11	0.0550	0.055	403.0	290.2	0.9	6.60	5.23	11.82	2.26	69.20	8.53	3.30
12	0.0600	0.060	412.0	296.6	1.0	6.74	5.13	11.86	2.31	69.90	8.50	3.37
13	0.0650	0.065	420.0	302.4	1.1	6.86	5.03	11.89	2.37	70.60	8.46	3.43
14	0.0700	0.070	429.0	308.9	1.2	7.00	4.97	11.97	2.41	71.00	8.47	3.50
15	0.0750	0.075	436.0	313.9	1.3	7.11	4.90	12.01	2.45	71.50	8.45	3.56
16	0.0800	0.080	444.0	319.7	1.4	7.24	4.82	12.06	2.50	72.00	8.44	3.62
17	0.0850	0.085	451.0	324.7	1.4	7.34	4.78	12.13	2.54	72.30	8.45	3.67
18	0.0900	0.090	458.0	329.8	1.5	7.45	4.71	12.16	2.58	72.80	8.43	3.73
19	0.0950	0.095	464.0	334.1	1.6	7.54	4.68	12.22	2.61	73.00	8.45	3.77
20	0.1000	0.100	470.0	338.4	1.7	7.63	4.62	12.26	2.65	73.40	8.44	3.82



	TOTAL	EFFECTIVE
C, ksf	2.64	0
ϕ, deg	38.5	35.5
TAN ϕ	0.79	0.71



		1	2	3
SAMPLE NO.:		1	2	3
INITIAL	WATER CONTENT, %	34.4	34.8	32.1
	DRY DENSITY, pcf	78.2	77.8	80.4
	SATURATION, %	100.0	100.0	99.9
	VOID RATIO	0.756	0.766	0.707
	DIAMETER, in	2.87	2.88	2.86
	HEIGHT, in	5.96	6.01	5.99
AT TEST	WATER CONTENT, %	32.4	33.7	31.5
	DRY DENSITY, pcf	80.2	78.8	81.1
	SATURATION, %	100.0	100.0	100.0
	VOID RATIO	0.712	0.742	0.693
	DIAMETER, in	2.83	2.86	2.85
	HEIGHT, in	5.97	6.00	5.98
Strain rate, %/min		0.17	0.17	0.17
BACK PRESSURE, ksf		7.2	7.2	7.2
CELL PRESSURE, ksf		8.2	11.2	15.2
FAIL. STRESS, ksf		14.1	26.2	41.1
TOTAL PORE PR., ksf		2.8	0.0	0.6
ULT. STRESS, ksf				
TOTAL PORE PR., ksf				
$\bar{\sigma}_1$ FAILURE, ksf		19.6	37.3	55.8
$\bar{\sigma}_3$ FAILURE, ksf		5.4	11.2	14.6

TYPE OF TEST:
CU with Pore Pressures

SAMPLE TYPE: Shelby Tube

DESCRIPTION: Gray Ash Sand

SPECIFIC GRAVITY= 2.2

REMARKS:

Fig. No.: ______ HB

CLIENT: TVA

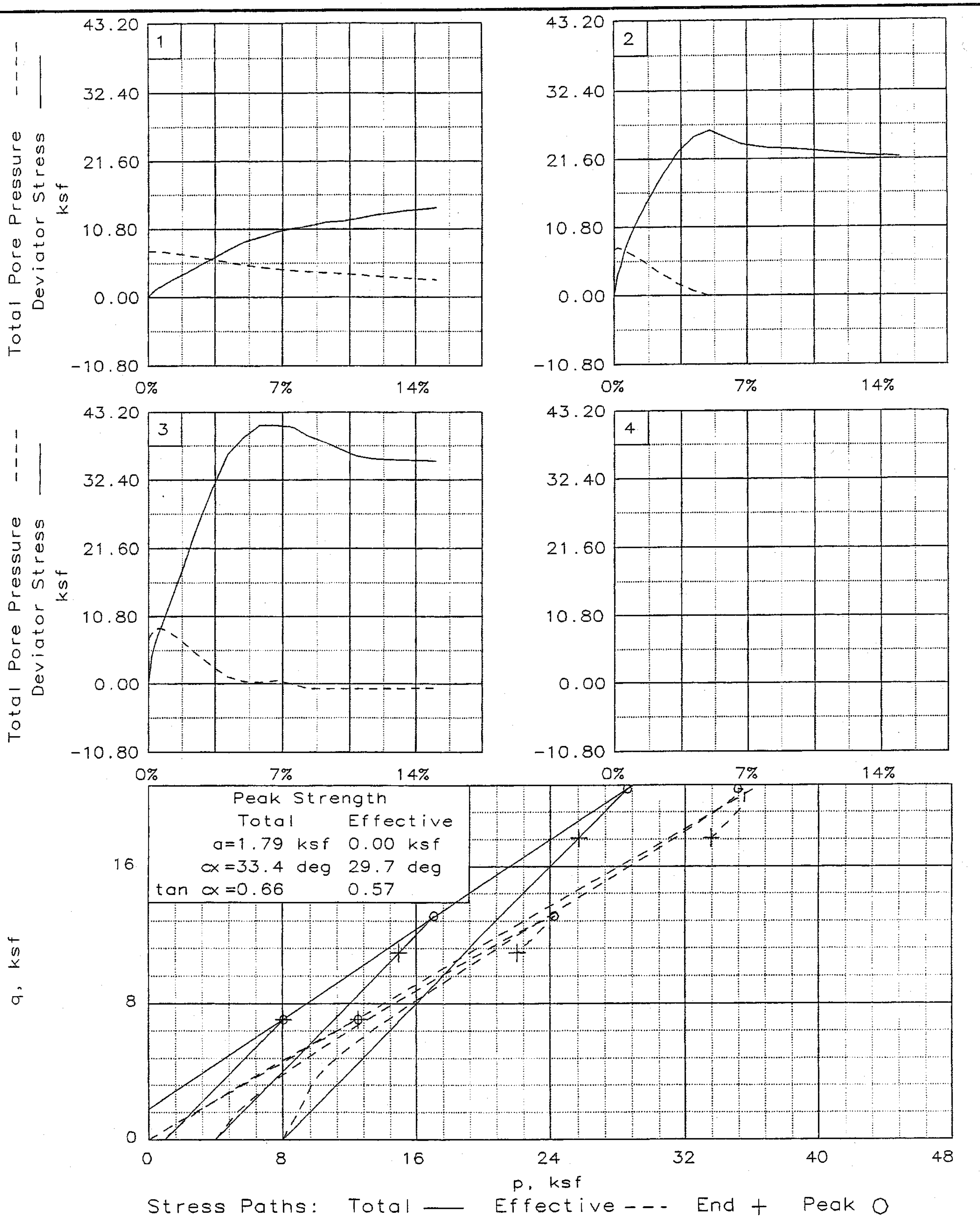
PROJECT: Ash Disposal Areas - TVA Gallatin Fossil Plant

SAMPLE LOCATION: B-13 UD @ 15'-17'

PROJ. NO.: 3043-04-1043 DATE: 09-22-04

TRIAXIAL SHEAR TEST REPORT

LAW ENGINEERING AND ENVIRONMENTAL SERVICES



Client: TVA

Project: Ash Disposal Areas - TVA Gallatin Fossil Plant

Location: B-13 UD @ 15'-17'

File: FOSSIL3 Project No.: 3043-04-1043 Fig. No.: ______

TRIAXIAL COMPRESSION TEST CU with Pore Pressures	10-12-2004 5:16 pm

Project and Sample Data

Date: 09-22-04
Client: TVA
Project: Ash Disposal Areas - TVA Gallatin Fossil Plant
Sample location: B-13 UD @ 15'-17'
Sample description: Gray Ash Sand
Remarks:

Fig no.: 2nd page Fig no. (if applicable):
Type of sample: Shelby Tube
Specific gravity= 2.20 LL= PL= PI=
Test method: Corps of Eng. - saturation assumed

Specimen Parameters for Specimen No. 1

Specimen Parameter	Initial	Saturated	Consolidated	Final
Wt. moist soil and tare:	1060.780			1034.490
Wt. dry soil and tare:	789.320			789.320
Wt. of tare:	0.000			0.000
Weight, gms:	1060.8			
Diameter, in:	2.866	2.853	2.829	
Area, in^2:	6.451	6.394	6.285	
Height, in:	5.961	5.961	5.965	
Net decrease in height, in:		0.000	-0.004	
Net decrease in water volume, cc:		5.700	10.200	
% Moisture:	34.4	33.7	32.4	31.1
Wet density, pcf:	105.1	105.5	106.2	
Dry density, pcf:	78.2	78.9	80.2	
Void ratio:	0.7564	0.7407	0.7123	
% Saturation:	100.0	100.0	100.0	

Test Readings Data for Specimen No. 1

Deformation dial constant= 1 in per input unit
Primary load ring constant= 0.72 lbs per input unit
Secondary load ring constant= 0 lbs per input unit
Crossover reading for secondary load ring= 0 input units
Membrane modulus = 0.14000 kN/cm^2
Membrane thickness = 0.012 cm
Consolidation cell pressure = 56.90 psi = 8.19 ksf
Consolidation back pressure = 50.00 psi = 7.20 ksf
Consolidation effective confining stress = 0.99 ksf
Strain rate, %/min = 0.17
FAIL. STRESS = 14.15 ksf at reading no. 26
ULT. STRESS = not selected

Test Readings Data for Specimen No. 1

No.	Def. Dial Units	Def. in	Load Dial Units	Load lbs	Strain %	Deviator Stress ksf	Effective Stresses Minor ksf	Major ksf	1:3 Ratio	Pore Pres. psi	P ksf	Q ksf
0	0.0000	0.000	0.0	0.0	0.0	0.00	0.99	0.99	1.00	50.00	0.99	0.00
1	0.0100	0.010	35.0	25.2	0.2	0.58	0.95	1.53	1.61	50.30	1.24	0.29
2	0.0200	0.020	64.0	46.1	0.3	1.05	0.96	2.02	2.09	50.20	1.49	0.53
3	0.0300	0.030	87.0	62.6	0.5	1.43	0.98	2.41	2.46	50.10	1.69	0.71
4	0.0400	0.040	102.0	73.4	0.7	1.67	1.01	2.68	2.66	49.90	1.84	0.84
5	0.0500	0.050	125.0	90.0	0.8	2.04	1.05	3.10	2.95	49.60	2.07	1.02
6	0.0600	0.060	142.0	102.2	1.0	2.32	1.09	3.41	3.12	49.30	2.25	1.16
7	0.0700	0.070	159.0	114.5	1.2	2.59	1.15	3.74	3.25	48.90	2.45	1.30
8	0.0800	0.080	175.0	126.0	1.3	2.85	1.21	4.06	3.35	48.50	2.63	1.42
9	0.0900	0.090	190.0	136.8	1.5	3.09	1.28	4.37	3.41	48.00	2.83	1.54
10	0.1000	0.100	209.0	150.5	1.7	3.39	1.37	4.76	3.48	47.40	3.06	1.70
11	0.1500	0.150	294.0	211.7	2.5	4.73	1.79	6.51	3.65	44.50	4.15	2.36
12	0.2000	0.200	384.0	276.5	3.4	6.12	2.22	8.34	3.76	41.50	5.28	3.06
13	0.2500	0.250	471.0	339.1	4.2	7.44	2.66	10.11	3.79	38.40	6.39	3.72
14	0.3000	0.300	558.0	401.8	5.0	8.74	3.11	11.85	3.81	35.30	7.48	4.37
15	0.3500	0.350	615.0	442.8	5.9	9.55	3.43	12.98	3.79	33.10	8.20	4.78
16	0.4000	0.400	673.0	484.6	6.7	10.36	3.74	14.10	3.77	30.90	8.92	5.18
17	0.4500	0.450	711.0	511.9	7.5	10.84	3.97	14.82	3.73	29.30	9.40	5.42
18	0.5000	0.500	749.0	539.3	8.4	11.32	4.15	15.47	3.73	28.10	9.81	5.66
19	0.5500	0.550	792.0	570.2	9.2	11.86	4.33	16.20	3.74	26.80	10.26	5.93
20	0.6000	0.600	810.0	583.2	10.1	12.02	4.48	16.50	3.68	25.80	10.49	6.01
21	0.6500	0.650	845.0	608.4	10.9	12.42	4.64	17.06	3.68	24.70	10.85	6.21
22	0.7000	0.700	888.0	639.4	11.7	12.93	4.84	17.77	3.67	23.30	11.30	6.47
23	0.7500	0.750	924.0	665.3	12.6	13.33	5.01	18.34	3.66	22.10	11.67	6.66
24	0.8000	0.800	955.0	687.6	13.4	13.64	5.18	18.83	3.63	20.90	12.00	6.82
25	0.8500	0.850	981.0	706.3	14.2	13.88	5.33	19.21	3.60	19.90	12.27	6.94
26	0.9000	0.900	1010.0	727.2	15.1	14.15	5.44	19.59	3.60	19.10	12.52	7.07

Specimen Parameters for Specimen No. 2

Specimen Parameter	Initial	Saturated	Consolidated	Final
Wt. moist soil and tare:	1077.610			1057.720
Wt. dry soil and tare:	799.470			799.470
Wt. of tare:	0.000			0.000
Weight, gms:	1077.6			
Diameter, in:	2.880	2.884	2.864	
Area, in^2:	6.514	6.531	6.444	
Height, in:	6.010	6.010	5.996	
Net decrease in height, in:		0.000	0.014	
Net decrease in water volume, cc:		-1.700	10.100	
% Moisture:	34.8	35.0	33.7	32.3
Wet density, pcf:	104.9	104.8	105.4	
Dry density, pcf:	77.8	77.6	78.8	
Void ratio:	0.7655	0.7701	0.7423	
% Saturation:	100.0	100.0	100.0	

Test Readings Data for Specimen No. 2

Deformation dial constant= 1 in per input unit
Primary load ring constant= 2.8 lbs per input unit
Secondary load ring constant= 0 lbs per input unit
Crossover reading for secondary load ring= 0 input units
Membrane modulus = 0.14000 kN/cm^2
Membrane thickness = 0.012 cm
Consolidation cell pressure = 77.80 psi = 11.20 ksf
Consolidation back pressure = 50.00 psi = 7.20 ksf
Consolidation effective confining stress = 4.00 ksf
Strain rate, %/min = 0.17
FAIL. STRESS = 26.15 ksf at reading no. 14
ULT. STRESS = not selected

No.	Def. Dial Units	Def. in	Load Dial Units	Load lbs	Strain %	Deviator Stress ksf	Effective Stresses Minor ksf	Major ksf	1:3 Ratio	Pore Pres. psi	P ksf	Q ksf
0	0.0000	0.000	0.00	0.0	0.0	0.00	4.00	4.00	1.00	50.00	4.00	0.00
1	0.0100	0.010	53.00	148.4	0.2	3.31	3.70	7.01	1.89	52.10	5.36	1.66
2	0.0200	0.020	76.00	212.8	0.3	4.74	3.80	8.54	2.25	51.40	6.17	2.37
3	0.0300	0.030	109.00	305.2	0.5	6.79	4.03	10.82	2.68	49.80	7.43	3.39
4	0.0400	0.040	132.00	369.6	0.7	8.20	4.31	12.51	2.91	47.90	8.41	4.10
5	0.0500	0.050	152.00	425.6	0.8	9.43	4.58	14.01	3.06	46.00	9.30	4.72
6	0.0600	0.060	171.00	478.8	1.0	10.59	4.90	15.49	3.16	43.80	10.19	5.30
7	0.0700	0.070	190.00	532.0	1.2	11.75	5.21	16.96	3.25	41.60	11.09	5.88
8	0.0800	0.080	208.00	582.4	1.3	12.84	5.57	18.41	3.30	39.10	11.99	6.42
9	0.0900	0.090	223.00	624.4	1.5	13.74	5.85	19.59	3.35	37.20	12.72	6.87
10	0.1000	0.100	239.00	669.2	1.7	14.71	6.18	20.88	3.38	34.90	13.53	7.35
11	0.1500	0.150	314.00	879.2	2.5	19.16	7.88	27.03	3.43	23.10	17.46	9.58
12	0.2000	0.200	377.00	1055.6	3.3	22.80	9.37	32.18	3.43	12.70	20.78	11.40
13	0.2500	0.250	420.00	1176.0	4.2	25.18	10.45	35.64	3.41	5.20	23.05	12.59
14	0.3000	0.300	440.00	1232.0	5.0	26.15	11.19	37.34	3.34	0.10	24.27	13.08
15	0.3500	0.350	426.00	1192.8	5.8	25.10	11.20	36.30	3.24	0.00	23.75	12.55
16	0.4000	0.400	411.00	1150.8	6.7	24.00	11.20	35.21	3.14	0.00	23.20	12.00
17	0.4500	0.450	407.00	1139.6	7.5	23.56	11.20	34.76	3.10	0.00	22.98	11.78
18	0.5000	0.500	406.00	1136.8	8.3	23.29	11.20	34.49	3.08	0.00	22.85	11.64
19	0.5500	0.550	409.00	1145.2	9.2	23.24	11.15	34.39	3.09	0.40	22.77	11.62
20	0.6000	0.600	409.00	1145.2	10.0	23.03	11.20	34.23	3.06	0.00	22.72	11.52

Test Readings Data for Specimen No. 2

No.	Def. Dial Units	Def. in	Load Dial Units	Load lbs	Strain %	Deviator Stress ksf	Effective Stresses Minor ksf	Effective Stresses Major ksf	Effective Stresses 1:3 Ratio	Pore Pres. psi	P ksf	Q ksf
21	0.6500	0.650	409.00	1145.2	10.8	22.82	11.20	34.02	3.04	0.00	22.61	11.41
22	0.7000	0.700	409.00	1145.2	11.7	22.60	11.10	33.71	3.04	0.70	22.40	11.30
23	0.7500	0.750	409.00	1145.2	12.5	22.39	11.10	33.49	3.02	0.70	22.30	11.20
24	0.8000	0.800	409.00	1145.2	13.3	22.18	11.10	33.28	3.00	0.70	22.19	11.09
25	0.8500	0.850	411.00	1150.8	14.2	22.07	11.10	33.17	2.99	0.70	22.14	11.04
26	0.9000	0.900	412.00	1153.6	15.0	21.91	11.10	33.01	2.97	0.70	22.06	10.96

Specimen Parameters for Specimen No. 3

Specimen Parameter	Initial	Saturated	Consolidated	Final
Wt. moist soil and tare:	1076.400			1073.780
Wt. dry soil and tare:	814.690			814.690
Wt. of tare:	0.000			0.000
Weight, gms:	1076.4			
Diameter, in:	2.864	2.870	2.853	
Area, in²:	6.442	6.470	6.394	
Height, in:	5.989	5.989	5.984	
Net decrease in height, in:		0.000	0.005	
Net decrease in water volume, cc:		-3.000	8.000	
% Moisture:	32.1	32.5	31.5	31.8
Wet density, pcf:	106.3	106.1	106.7	
Dry density, pcf:	80.4	80.1	81.1	
Void ratio:	0.7073	0.7148	0.6932	
% Saturation:	99.9	100.0	100.0	

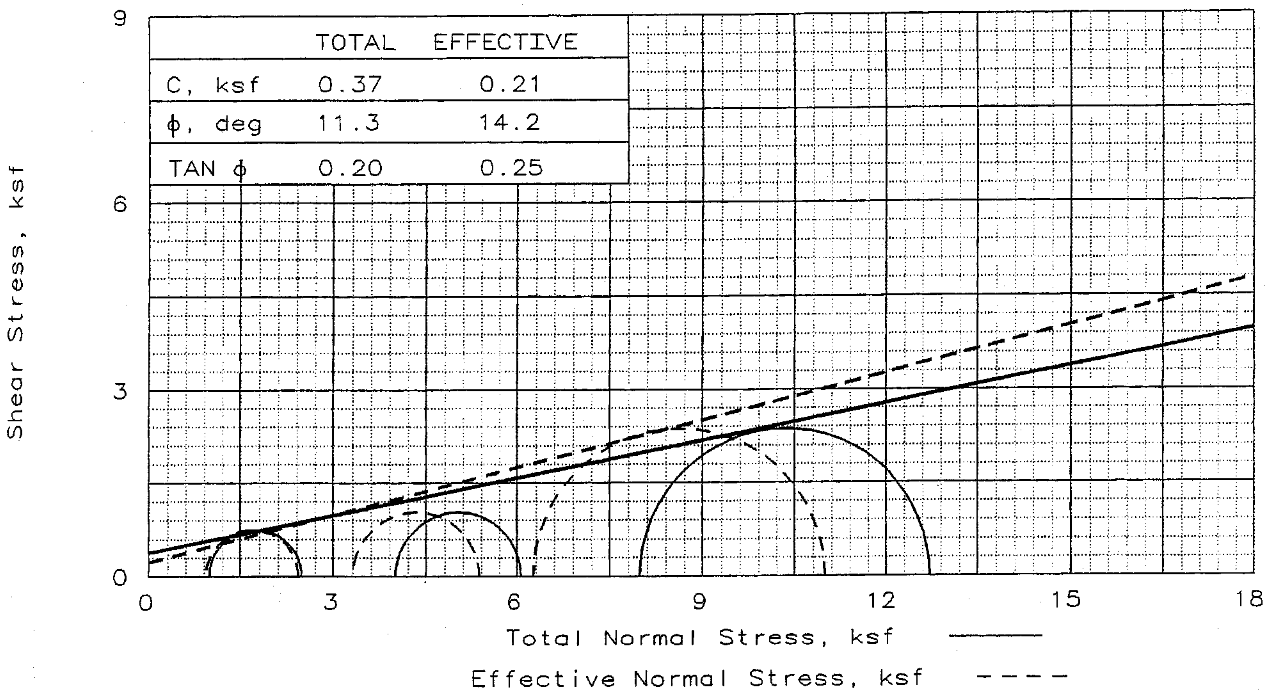
Test Readings Data for Specimen No. 3

Deformation dial constant= 1 in per input unit
Primary load ring constant= 2.8 lbs per input unit
Secondary load ring constant= 0 lbs per input unit
Crossover reading for secondary load ring= 0 input units
Membrane modulus = 0.14000 kN/cm²
Membrane thickness = 0.012 cm
Consolidation cell pressure = 105.50 psi = 15.19 ksf
Consolidation back pressure = 50.00 psi = 7.20 ksf
Consolidation effective confining stress = 7.99 ksf
Strain rate, %/min = 0.17
FAIL. STRESS = 41.13 ksf at reading no. 16
ULT. STRESS = not selected

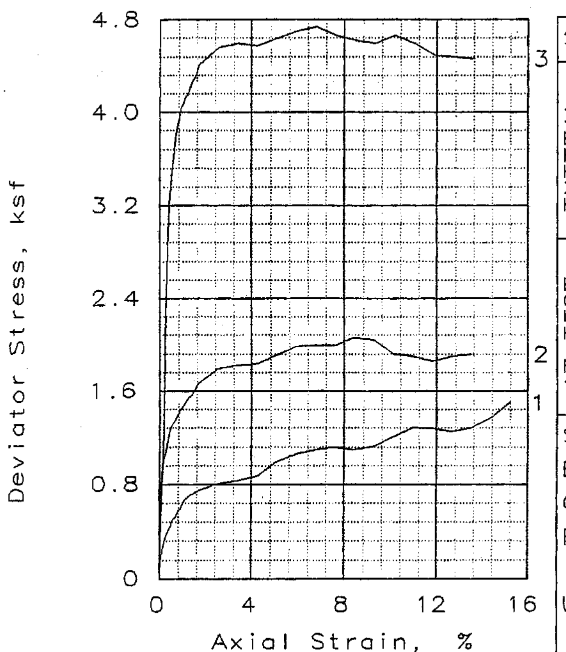
No.	Def. Dial Units	Def. in	Load Dial Units	Load lbs	Strain %	Deviator Stress ksf	Effective Stresses Minor ksf	Major ksf	1:3 Ratio	Pore Pres. psi	P ksf	Q ksf
0	0.0000	0.000	0.00	0.0	0.0	0.00	7.99	7.99	1.00	50.00	7.99	0.00
1	0.0100	0.010	68.00	190.4	0.2	4.28	7.07	11.35	1.61	56.40	9.21	2.14
2	0.0200	0.020	99.00	277.2	0.3	6.22	6.54	12.76	1.95	60.10	9.65	3.11
3	0.0300	0.030	123.00	344.4	0.5	7.72	6.32	14.04	2.22	61.60	10.18	3.86
4	0.0400	0.040	145.00	406.0	0.7	9.08	6.34	15.42	2.43	61.50	10.88	4.54
5	0.0500	0.050	167.00	467.6	0.8	10.44	6.47	16.91	2.62	60.60	11.69	5.22
6	0.0600	0.060	188.00	526.4	1.0	11.74	6.71	18.45	2.75	58.90	12.58	5.87
7	0.0700	0.070	210.00	588.0	1.2	13.09	6.96	20.04	2.88	57.20	13.50	6.54
8	0.0800	0.080	233.00	652.4	1.3	14.50	7.36	21.85	2.97	54.40	14.61	7.25
9	0.0900	0.090	255.00	714.0	1.5	15.84	7.66	23.50	3.07	52.30	15.58	7.92
10	0.1000	0.100	278.00	778.4	1.7	17.24	8.06	25.30	3.14	49.50	16.68	8.62
11	0.1500	0.150	398.00	1114.4	2.5	24.47	10.31	34.78	3.37	33.90	22.54	12.23
12	0.2000	0.200	506.00	1416.8	3.3	30.84	12.34	43.18	3.50	19.80	27.76	15.42
13	0.2500	0.250	605.00	1694.0	4.2	36.56	14.08	50.64	3.60	7.70	32.36	18.28
14	0.3000	0.300	655.00	1834.0	5.0	39.23	14.83	54.06	3.65	2.50	34.45	19.62
15	0.3500	0.350	692.00	1937.6	5.8	41.08	14.96	56.04	3.75	1.60	35.50	20.54
16	0.4000	0.400	699.00	1957.2	6.7	41.13	14.63	55.76	3.81	3.90	35.20	20.57
17	0.4500	0.450	700.00	1960.0	7.5	40.82	15.19	56.01	3.69	0.00	35.60	20.41
18	0.5000	0.500	680.00	1904.0	8.4	39.30	15.93	55.22	3.47	-5.10	35.57	19.65
19	0.5500	0.550	670.00	1876.0	9.2	38.36	15.96	54.32	3.40	-5.30	35.14	19.18
20	0.6000	0.600	657.00	1839.6	10.0	37.27	15.97	53.24	3.33	-5.40	34.61	18.64

Test Readings Data for Specimen No. 3

No.	Def. Dial Units	Def. in	Load Dial Units	Load lbs	Strain %	Deviator Stress ksf	Effective Stresses Minor ksf	Effective Stresses Major ksf	1:3 Ratio	Pore Pres. psi	P ksf	Q ksf
21	0.6500	0.650	643.00	1800.4	10.9	36.14	15.94	52.08	3.27	-5.20	34.01	18.07
22	0.7000	0.700	642.00	1797.6	11.7	35.75	15.94	51.69	3.24	-5.20	33.81	17.87
23	0.7500	0.750	645.00	1806.0	12.5	35.57	15.93	51.50	3.23	-5.10	33.71	17.79
24	0.8000	0.800	650.00	1820.0	13.4	35.51	15.91	51.42	3.23	-5.00	33.67	17.75
25	0.8500	0.850	656.00	1836.8	14.2	35.49	15.90	51.39	3.23	-4.90	33.64	17.74
26	0.9000	0.900	660.00	1848.0	15.0	35.36	15.90	51.26	3.22	-4.90	33.58	17.68



	TOTAL	EFFECTIVE
C, ksf	0.37	0.21
ϕ, deg	11.3	14.2
TAN ϕ	0.20	0.25



SAMPLE NO.:		1	2	3
INITIAL	WATER CONTENT, %	20.4	37.9	39.3
	DRY DENSITY, pcf	104.4	84.2	81.8
	SATURATION, %	92.4	104.1	101.9
	VOID RATIO	0.584	0.965	1.021
	DIAMETER, in	2.84	2.84	2.84
	HEIGHT, in	6.00	5.99	5.98
AT TEST	WATER CONTENT, %	19.6	37.8	38.4
	DRY DENSITY, pcf	108.8	82.6	81.9
	SATURATION, %	100.0	100.0	100.0
	VOID RATIO	0.521	1.002	1.019
	DIAMETER, in	2.80	2.88	2.86
	HEIGHT, in	5.92	5.93	5.89
Strain rate, %/min		0.07	0.07	0.07
BACK PRESSURE, ksf		7.2	7.2	7.2
CELL PRESSURE, ksf		8.2	11.2	15.2
FAIL. STRESS, ksf		1.5	2.1	4.7
TOTAL PORE PR., ksf		7.3	7.9	8.9
ULT. STRESS, ksf				
TOTAL PORE PR., ksf				
$\bar{\sigma}_1$ FAILURE, ksf		2.4	5.4	11.0
$\bar{\sigma}_3$ FAILURE, ksf		0.9	3.3	6.3

TYPE OF TEST:
CU with Pore Pressures

SAMPLE TYPE: Shelby Tube Sample

DESCRIPTION: Orange-Brown Silty Clay (CH)

LL= 78 PL= 30 PI= 48

SPECIFIC GRAVITY= 2.65

REMARKS:

Fig. No.: ______ HB

CLIENT: TVA

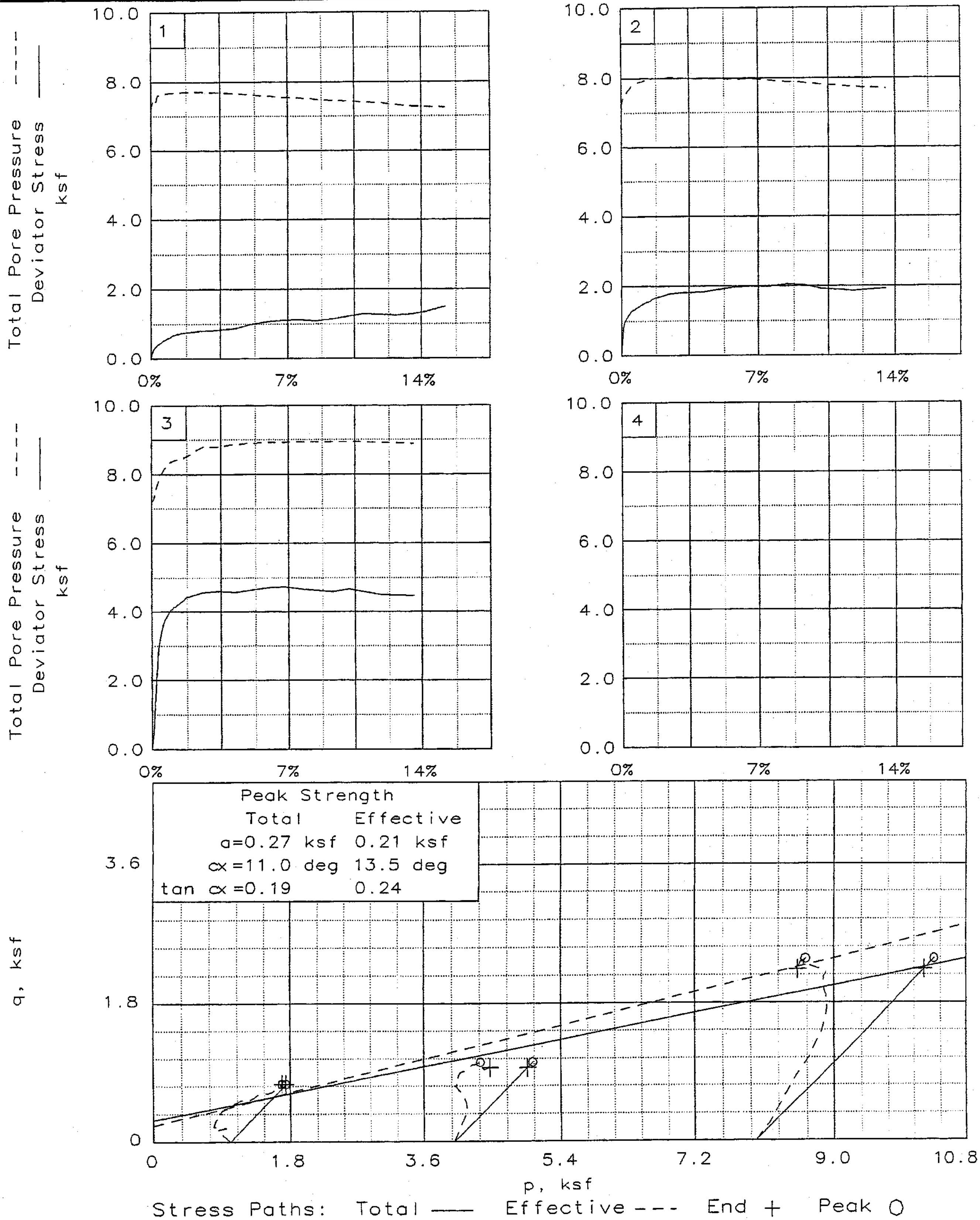
PROJECT: Ash Disposal Areas - TVA Gallatin Fossil Plant

SAMPLE LOCATION: B-13 UD @ 25'-27'

PROJ. NO.: 3043-04-1043 DATE: 09-30-04

TRIAXIAL SHEAR TEST REPORT

LAW ENGINEERING AND ENVIRONMENTAL SERVICES



Client: TVA

Project: Ash Disposal Areas – TVA Gallatin Fossil Plant

Location: B-13 UD @ 25'-27'

File: FOSSIL6 Project No.: 3043-04-1043 Fig. No.: _____

TRIAXIAL COMPRESSION TEST
CU with Pore Pressures

10-12-2004
5:08 pm

Project and Sample Data

Date: 09-30-04
Client: TVA
Project: Ash Disposal Areas - TVA Gallatin Fossil Plant
Sample location: B-13 UD @ 25'-27'
Sample description: Orange-Brown Silty Clay (CH)
Remarks:

Fig no.: 2nd page Fig no. (if applicable):
Type of sample: Shelby Tube Sample
Specific gravity= 2.65 LL= 78 PL= 30 PI= 48
Test method: Corps of Eng. - saturation assumed

Specimen Parameters for Specimen No. 1

Specimen Parameter	Initial	Saturated	Consolidated	Final
Wt. moist soil and tare:	1254.110			1247.330
Wt. dry soil and tare:	1041.870			1041.870
Wt. of tare:	0.000			0.000
Weight, gms:	1254.1			
Diameter, in:	2.839	2.802	2.801	
Area, in^2:	6.330	6.168	6.162	
Height, in:	6.004	6.004	5.920	
Net decrease in height, in:		0.000	0.084	
Net decrease in water volume, cc:		-1.500	9.100	
% Moisture:	20.4	20.5	19.6	19.7
Wet density, pcf:	125.7	129.2	130.2	
Dry density, pcf:	104.4	107.2	108.8	
Void ratio:	0.5841	0.5436	0.5205	
% Saturation:	92.4	100.0	100.0	

Test Readings Data for Specimen No. 1

Deformation dial constant= 1 in per input unit
Primary load ring constant= 0.72 lbs per input unit
Secondary load ring constant= 0 lbs per input unit
Crossover reading for secondary load ring= 0 input units
Membrane modulus = 0.14000 kN/cm^2
Membrane thickness = 0.012 cm
Consolidation cell pressure = 56.90 psi = 8.19 ksf
Consolidation back pressure = 50.00 psi = 7.20 ksf
Consolidation effective confining stress = 0.99 ksf
Strain rate, %/min = 0.07
FAIL. STRESS = 1.50 ksf at reading no. 36
ULT. STRESS = not selected

Test Readings Data for Specimen No. 1

No.	Def. Dial Units	Def. in	Load Dial Units	Load lbs	Strain %	Deviator Stress ksf	Effective Stresses Minor ksf	Effective Stresses Major ksf	1:3 Ratio	Pore Pres. psi	P ksf	Q ksf
0	0.0000	0.000	0.0	0.0	0.0	0.00	0.99	0.99	1.00	50.00	0.99	0.00
1	0.0050	0.005	12.0	8.6	0.1	0.20	0.78	0.98	1.26	51.50	0.88	0.10
2	0.0100	0.010	18.0	13.0	0.2	0.30	0.68	0.98	1.45	52.20	0.83	0.15
3	0.0150	0.015	21.0	15.1	0.3	0.35	0.76	1.12	1.46	51.60	0.94	0.18
4	0.0200	0.020	23.0	16.6	0.3	0.39	0.59	0.98	1.65	52.80	0.78	0.19
5	0.0250	0.025	25.0	18.0	0.4	0.42	0.58	0.99	1.73	52.90	0.79	0.21
6	0.0300	0.030	27.0	19.4	0.5	0.45	0.56	1.01	1.80	53.00	0.79	0.23
7	0.0350	0.035	30.0	21.6	0.6	0.50	0.55	1.05	1.92	53.10	0.80	0.25
8	0.0400	0.040	31.0	22.3	0.7	0.52	0.55	1.07	1.95	53.10	0.81	0.26
9	0.0450	0.045	33.0	23.8	0.8	0.55	0.53	1.08	2.03	53.20	0.81	0.28
10	0.0500	0.050	35.0	25.2	0.8	0.58	0.53	1.12	2.10	53.20	0.82	0.29
11	0.0550	0.055	36.0	25.9	0.9	0.60	0.52	1.12	2.16	53.30	0.82	0.30
12	0.0600	0.060	38.0	27.4	1.0	0.63	0.52	1.15	2.22	53.30	0.83	0.32
13	0.0650	0.065	40.0	28.8	1.1	0.67	0.52	1.18	2.28	53.30	0.85	0.33
14	0.0700	0.070	41.0	29.5	1.2	0.68	0.52	1.20	2.31	53.30	0.86	0.34
15	0.0750	0.075	42.0	30.2	1.3	0.70	0.50	1.20	2.38	53.40	0.85	0.35
16	0.0800	0.080	43.0	31.0	1.4	0.71	0.50	1.22	2.42	53.40	0.86	0.36
17	0.0850	0.085	43.0	31.0	1.4	0.71	0.50	1.22	2.41	53.40	0.86	0.36
18	0.0900	0.090	44.0	31.7	1.5	0.73	0.50	1.23	2.45	53.40	0.87	0.36
19	0.0950	0.095	44.0	31.7	1.6	0.73	0.49	1.22	2.49	53.50	0.85	0.36
20	0.1000	0.100	45.0	32.4	1.7	0.74	0.49	1.23	2.52	53.50	0.86	0.37
21	0.1500	0.150	49.0	35.3	2.5	0.80	0.49	1.29	2.64	53.50	0.89	0.40
22	0.2000	0.200	51.0	36.7	3.4	0.83	0.50	1.33	2.65	53.40	0.92	0.41
23	0.2500	0.250	54.0	38.9	4.2	0.87	0.53	1.40	2.63	53.20	0.97	0.44
24	0.3000	0.300	62.0	44.6	5.1	0.99	0.56	1.55	2.76	53.00	1.06	0.50
25	0.3500	0.350	67.0	48.2	5.9	1.06	0.60	1.67	2.75	52.70	1.14	0.53
26	0.4000	0.400	70.0	50.4	6.8	1.10	0.65	1.75	2.69	52.40	1.20	0.55
27	0.4500	0.450	72.0	51.8	7.6	1.12	0.66	1.78	2.69	52.30	1.22	0.56
28	0.5000	0.500	71.0	51.1	8.4	1.09	0.71	1.80	2.55	52.00	1.25	0.55
29	0.5500	0.550	74.0	53.3	9.3	1.13	0.73	1.86	2.54	51.80	1.30	0.56
30	0.6000	0.600	80.0	57.6	10.1	1.21	0.75	1.96	2.62	51.70	1.35	0.60
31	0.6500	0.650	86.0	61.9	11.0	1.29	0.79	2.08	2.63	51.40	1.44	0.64
32	0.7000	0.700	86.0	61.9	11.8	1.28	0.81	2.08	2.58	51.30	1.44	0.64
33	0.7500	0.750	85.0	61.2	12.7	1.25	0.86	2.11	2.45	50.90	1.49	0.62
34	0.8000	0.800	88.0	63.4	13.5	1.28	0.91	2.19	2.41	50.60	1.55	0.64
35	0.8500	0.850	95.0	68.4	14.4	1.37	0.92	2.29	2.49	50.50	1.61	0.68
36	0.9000	0.900	105.0	75.6	15.2	1.50	0.94	2.43	2.60	50.40	1.69	0.75

Specimen Parameters for Specimen No. 2

Specimen Parameter	Initial	Saturated	Consolidated	Final
Wt. moist soil and tare:	1153.080			1154.560
Wt. dry soil and tare:	836.090			836.090
Wt. of tare:	0.000			0.000
Weight, gms:	1153.1			
Diameter, in:	2.835	2.901	2.876	
Area, in²:	6.312	6.608	6.496	
Height, in:	5.994	5.994	5.934	
Net decrease in height, in:		0.000	0.060	
Net decrease in water volume, cc:		-16.600	17.400	
% Moisture:	37.9	39.9	37.8	38.1
Wet density, pcf:	116.1	112.5	113.9	
Dry density, pcf:	84.2	80.4	82.6	
Void ratio:	0.9652	1.0573	1.0022	
% Saturation:	104.1	100.0	100.0	

Test Readings Data for Specimen No. 2

Deformation dial constant= 1 in per input unit
Primary load ring constant= 0.72 lbs per input unit
Secondary load ring constant= 0 lbs per input unit
Crossover reading for secondary load ring= 0 input units
Membrane modulus = 0.14000 kN/cm²
Membrane thickness = 0.012 cm
Consolidation cell pressure = 77.80 psi = 11.20 ksf
Consolidation back pressure = 50.00 psi = 7.20 ksf
Consolidation effective confining stress = 4.00 ksf
Strain rate, %/min = 0.07
FAIL. STRESS = 2.06 ksf at reading no. 28
ULT. STRESS = not selected

No.	Def. Dial Units	Def. in	Load Dial Units	Load lbs	Strain %	Deviator Stress ksf	Effective Stresses Minor ksf	Effective Stresses Major ksf	1:3 Ratio	Pore Pres. psi	P ksf	Q ksf
0	0.0000	0.000	0.0	0.0	0.0	0.00	4.00	4.00	1.00	50.00	4.00	0.00
1	0.0050	0.005	50.0	36.0	0.1	0.80	3.77	4.57	1.21	51.60	4.17	0.40
2	0.0100	0.010	63.0	45.4	0.2	1.00	3.66	4.66	1.27	52.40	4.16	0.50
3	0.0150	0.015	67.0	48.2	0.3	1.07	3.61	4.68	1.30	52.70	4.15	0.53
4	0.0200	0.020	72.0	51.8	0.3	1.15	3.56	4.70	1.32	53.10	4.13	0.57
5	0.0250	0.025	77.0	55.4	0.4	1.22	3.50	4.72	1.35	53.50	4.11	0.61
6	0.0300	0.030	81.0	58.3	0.5	1.29	3.44	4.73	1.37	53.90	4.08	0.64
7	0.0350	0.035	83.0	59.8	0.6	1.32	3.41	4.73	1.39	54.10	4.07	0.66
8	0.0400	0.040	85.0	61.2	0.7	1.35	3.38	4.73	1.40	54.30	4.06	0.67
9	0.0450	0.045	87.0	62.6	0.8	1.38	3.36	4.73	1.41	54.50	4.04	0.69
10	0.0500	0.050	89.0	64.1	0.8	1.41	3.33	4.73	1.42	54.70	4.03	0.70
11	0.0550	0.055	91.0	65.5	0.9	1.44	3.30	4.74	1.44	54.90	4.02	0.72
12	0.0600	0.060	93.0	67.0	1.0	1.47	3.30	4.77	1.45	54.90	4.03	0.73
13	0.0650	0.065	94.0	67.7	1.1	1.48	3.28	4.77	1.45	55.00	4.03	0.74
14	0.0700	0.070	96.0	69.1	1.2	1.51	3.27	4.78	1.46	55.10	4.03	0.76
15	0.0750	0.075	98.0	70.6	1.3	1.54	3.27	4.81	1.47	55.10	4.04	0.77
16	0.0800	0.080	99.0	71.3	1.3	1.56	3.25	4.81	1.48	55.20	4.03	0.78
17	0.0850	0.085	100.0	72.0	1.4	1.57	3.24	4.81	1.49	55.30	4.03	0.79
18	0.0900	0.090	102.0	73.4	1.5	1.60	3.23	4.83	1.50	55.40	4.03	0.80
19	0.0950	0.095	104.0	74.9	1.6	1.63	3.21	4.84	1.51	55.50	4.03	0.82
20	0.1000	0.100	106.0	76.3	1.7	1.66	3.21	4.87	1.52	55.50	4.04	0.83

Test Readings Data for Specimen No. 2

No.	Def. Dial Units	Def. in	Load Dial Units	Load lbs	Strain %	Deviator Stress ksf	Effective Stresses Minor ksf	Effective Stresses Major ksf	1:3 Ratio	Pore Pres. psi	P ksf	Q ksf
21	0.1500	0.150	115.0	82.8	2.5	1.79	3.18	4.97	1.56	55.70	4.08	0.89
22	0.2000	0.200	118.0	85.0	3.4	1.82	3.21	5.03	1.57	55.50	4.12	0.91
23	0.2500	0.250	120.0	86.4	4.2	1.83	3.23	5.06	1.57	55.40	4.14	0.92
24	0.3000	0.300	126.0	90.7	5.1	1.91	3.23	5.13	1.59	55.40	4.18	0.95
25	0.3500	0.350	132.0	95.0	5.9	1.98	3.24	5.22	1.61	55.30	4.23	0.99
26	0.4000	0.400	134.0	96.5	6.7	1.99	3.24	5.23	1.62	55.30	4.24	1.00
27	0.4500	0.450	135.0	97.2	7.6	1.99	3.27	5.26	1.61	55.10	4.26	1.00
28	0.5000	0.500	141.0	101.5	8.4	2.06	3.31	5.37	1.62	54.80	4.34	1.03
29	0.5500	0.550	141.0	101.5	9.3	2.04	3.34	5.38	1.61	54.60	4.36	1.02
30	0.6000	0.600	134.0	96.5	10.1	1.92	3.40	5.32	1.57	54.20	4.36	0.96
31	0.6500	0.650	134.0	96.5	11.0	1.90	3.43	5.33	1.56	54.00	4.38	0.95
32	0.7000	0.700	132.0	95.0	11.8	1.86	3.47	5.33	1.54	53.70	4.40	0.93
33	0.7500	0.750	136.0	97.9	12.6	1.90	3.48	5.38	1.54	53.60	4.43	0.95
34	0.8000	0.800	139.0	100.1	13.5	1.92	3.51	5.43	1.55	53.40	4.47	0.96

Specimen Parameters for Specimen No. 3

Specimen Parameter	Initial	Saturated	Consolidated	Final
Wt. moist soil and tare:	1134.690			1131.310
Wt. dry soil and tare:	814.660			814.660
Wt. of tare:	0.000			0.000
Weight, gms:	1134.7			
Diameter, in:	2.842	2.905	2.861	
Area, in²:	6.344	6.630	6.428	
Height, in:	5.978	5.978	5.892	
Net decrease in height, in:		0.000	0.086	
Net decrease in water volume, cc:		-22.000	28.800	
% Moisture:	39.3	42.0	38.4	38.9
Wet density, pcf:	114.0	111.2	113.4	
Dry density, pcf:	81.8	78.3	81.9	
Void ratio:	1.0215	1.1126	1.0189	
% Saturation:	101.9	100.0	100.0	

Test Readings Data for Specimen No. 3

Deformation dial constant= 1 in per input unit
Primary load ring constant= 0.72 lbs per input unit
Secondary load ring constant= 0 lbs per input unit
Crossover reading for secondary load ring= 0 input units
Membrane modulus = 0.14000 kN/cm²
Membrane thickness = 0.012 cm
Consolidation cell pressure = 105.50 psi = 15.19 ksf
Consolidation back pressure = 50.00 psi = 7.20 ksf
Consolidation effective confining stress = 7.99 ksf
Strain rate, %/min = 0.07
FAIL. STRESS = 4.74 ksf at reading no. 26
ULT. STRESS = not selected

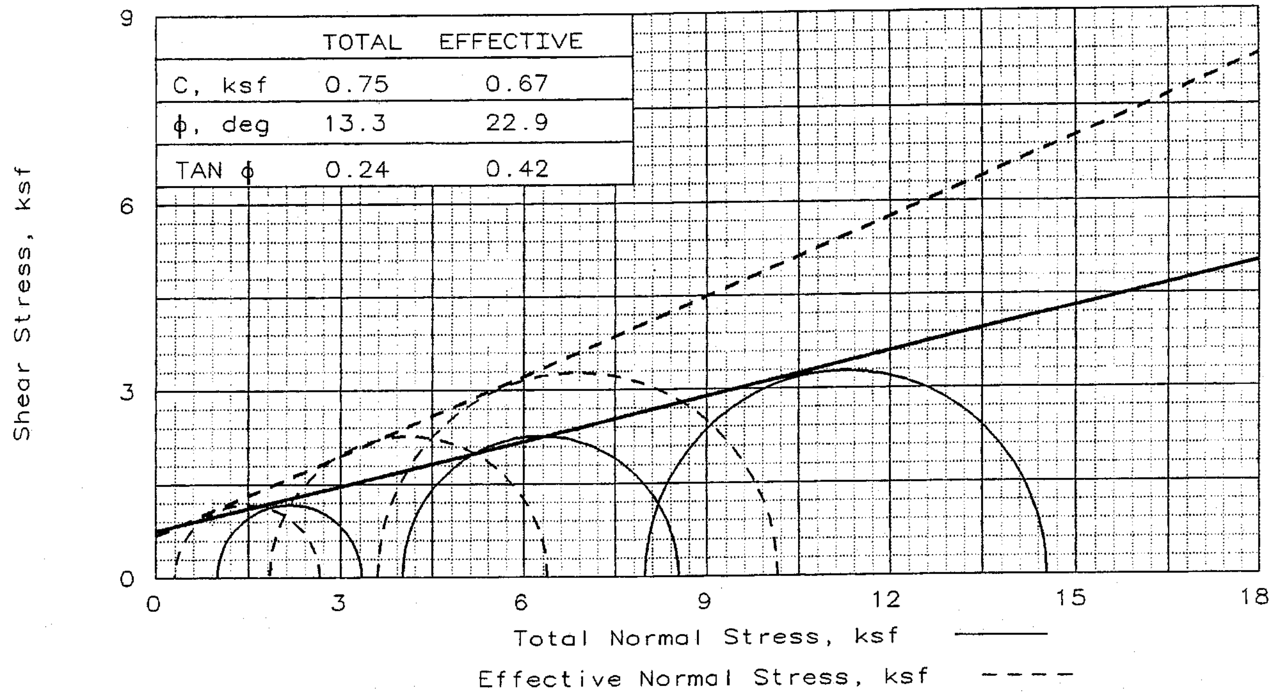
No.	Def. Dial Units	Def. in	Load Dial Units	Load lbs	Strain %	Deviator Stress ksf	Effective Stresses Minor ksf	Major ksf	1:3 Ratio	Pore Pres. psi	P ksf	Q ksf
0	0.0000	0.000	0.0	0.0	0.0	0.00	7.99	7.99	1.00	50.00	7.99	0.00
1	0.0050	0.005	30.0	21.6	0.1	0.48	7.93	8.42	1.06	50.40	8.18	0.24
2	0.0100	0.010	79.0	56.9	0.2	1.27	7.76	9.03	1.16	51.60	8.40	0.64
3	0.0150	0.015	138.0	99.4	0.3	2.22	7.57	9.79	1.29	52.90	8.68	1.11
4	0.0200	0.020	176.0	126.7	0.3	2.83	7.42	10.25	1.38	54.00	8.83	1.41
5	0.0250	0.025	200.0	144.0	0.4	3.21	7.29	10.50	1.44	54.90	8.89	1.61
6	0.0300	0.030	215.0	154.8	0.5	3.45	7.19	10.64	1.48	55.60	8.91	1.73
7	0.0350	0.035	226.0	162.7	0.6	3.62	7.08	10.71	1.51	56.30	8.90	1.81
8	0.0400	0.040	236.0	169.9	0.7	3.78	7.01	10.79	1.54	56.80	8.90	1.89
9	0.0450	0.045	242.0	174.2	0.8	3.87	6.94	10.81	1.56	57.30	8.88	1.94
10	0.0500	0.050	247.0	177.8	0.8	3.95	6.90	10.85	1.57	57.60	8.87	1.98
11	0.0550	0.055	253.0	182.2	0.9	4.04	6.84	10.88	1.59	58.00	8.86	2.02
12	0.0600	0.060	255.0	183.6	1.0	4.07	6.83	10.90	1.60	58.10	8.86	2.04
13	0.0650	0.065	259.0	186.5	1.1	4.13	6.80	10.93	1.61	58.30	8.86	2.07
14	0.0700	0.070	260.0	187.2	1.2	4.14	6.78	10.93	1.61	58.40	8.85	2.07
15	0.0750	0.075	263.0	189.4	1.3	4.19	6.77	10.96	1.62	58.50	8.86	2.09
16	0.0800	0.080	266.0	191.5	1.4	4.23	6.75	10.99	1.63	58.60	8.87	2.12
17	0.0850	0.085	269.0	193.7	1.4	4.28	6.72	11.00	1.64	58.80	8.86	2.14
18	0.0900	0.090	271.0	195.1	1.5	4.30	6.72	11.03	1.64	58.80	8.88	2.15
19	0.0950	0.095	273.0	196.6	1.6	4.33	6.72	11.06	1.64	58.80	8.89	2.17
20	0.1000	0.100	278.0	200.2	1.7	4.41	6.70	11.10	1.66	59.00	8.90	2.20

Test Readings Data for Specimen No. 3

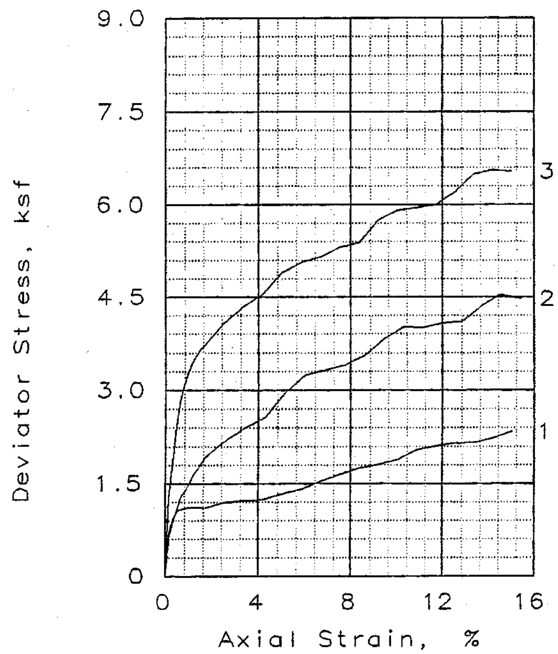
No.	Def. Dial Units	Def. in	Load Dial Units	Load lbs	Strain %	Deviator Stress ksf	Effective Stresses Minor ksf	Effective Stresses Major ksf	1:3 Ratio	Pore Pres. psi	P ksf	Q ksf
21	0.1500	0.150	290.0	208.8	2.5	4.56	6.41	10.97	1.71	61.00	8.69	2.28
22	0.2000	0.200	295.0	212.4	3.4	4.60	6.39	10.99	1.72	61.10	8.69	2.30
23	0.2500	0.250	296.0	213.1	4.2	4.57	6.32	10.89	1.72	61.60	8.61	2.29
24	0.3000	0.300	303.0	218.2	5.1	4.64	6.29	10.93	1.74	61.80	8.61	2.32
25	0.3500	0.350	310.0	223.2	5.9	4.70	6.26	10.97	1.75	62.00	8.62	2.35
26	0.4000	0.400	315.0	226.8	6.8	4.74	6.26	11.00	1.76	62.00	8.63	2.37
27	0.4500	0.450	313.0	225.4	7.6	4.66	6.25	10.91	1.75	62.10	8.58	2.33
28	0.5000	0.500	313.0	225.4	8.5	4.62	6.25	10.87	1.74	62.10	8.56	2.31
29	0.5500	0.550	314.0	226.1	9.3	4.59	6.25	10.84	1.73	62.10	8.55	2.30
30	0.6000	0.600	322.0	231.8	10.2	4.66	6.25	10.91	1.75	62.10	8.58	2.33
31	0.6500	0.650	320.0	230.4	11.0	4.59	6.26	10.86	1.73	62.00	8.56	2.30
32	0.7000	0.700	316.0	227.5	11.9	4.49	6.28	10.77	1.72	61.90	8.52	2.25
33	0.7500	0.750	318.0	229.0	12.7	4.48	6.29	10.77	1.71	61.80	8.53	2.24
34	0.8000	0.800	320.0	230.4	13.6	4.46	6.31	10.77	1.71	61.70	8.54	2.23

TRIAXIAL COMPRESSION TEST RESULTS

ON-SITE BORROW SAMPLES



	TOTAL	EFFECTIVE
C, ksf	0.75	0.67
ϕ, deg	13.3	22.9
TAN ϕ	0.24	0.42



SAMPLE NO.:		1	2	3
INITIAL	WATER CONTENT, %	19.0	19.0	19.0
	DRY DENSITY, pcf	99.8	98.6	99.3
	SATURATION, %	75.7	73.6	74.8
	VOID RATIO	0.670	0.690	0.678
	DIAMETER, in	2.84	2.85	2.84
	HEIGHT, in	6.00	6.00	6.00
AT TEST	WATER CONTENT, %	22.5	13.5	21.4
	DRY DENSITY, pcf	104.1	122.4	106.1
	SATURATION, %	100.0	100.0	100.0
	VOID RATIO	0.601	0.361	0.571
	DIAMETER, in	2.78	2.60	2.75
	HEIGHT, in	5.98	5.84	6.00
Strain rate, %/min		0.17	0.17	0.17
BACK PRESSURE, ksf		7.2	7.2	7.2
CELL PRESSURE, ksf		8.2	11.2	15.2
FAIL. STRESS, ksf		2.3	4.5	6.6
TOTAL PORE PR., ksf		7.9	9.4	11.6
ULT. STRESS, ksf				
TOTAL PORE PR., ksf				
$\bar{\sigma}_1$ FAILURE, ksf		2.6	6.4	10.2
$\bar{\sigma}_3$ FAILURE, ksf		0.3	1.8	3.6

TYPE OF TEST:
CU with Pore Pressures

SAMPLE TYPE: Remolded Sample

DESCRIPTION: Orange-Brown Silty Clay with Sand (CL)

LL= 47 PL= 17 PI= 30

SPECIFIC GRAVITY= 2.67

REMARKS: Remolded to 95% MDD @ Optimum Moisture Content of Standard Proctor

Fig. No.: ______ HB

CLIENT: TVA

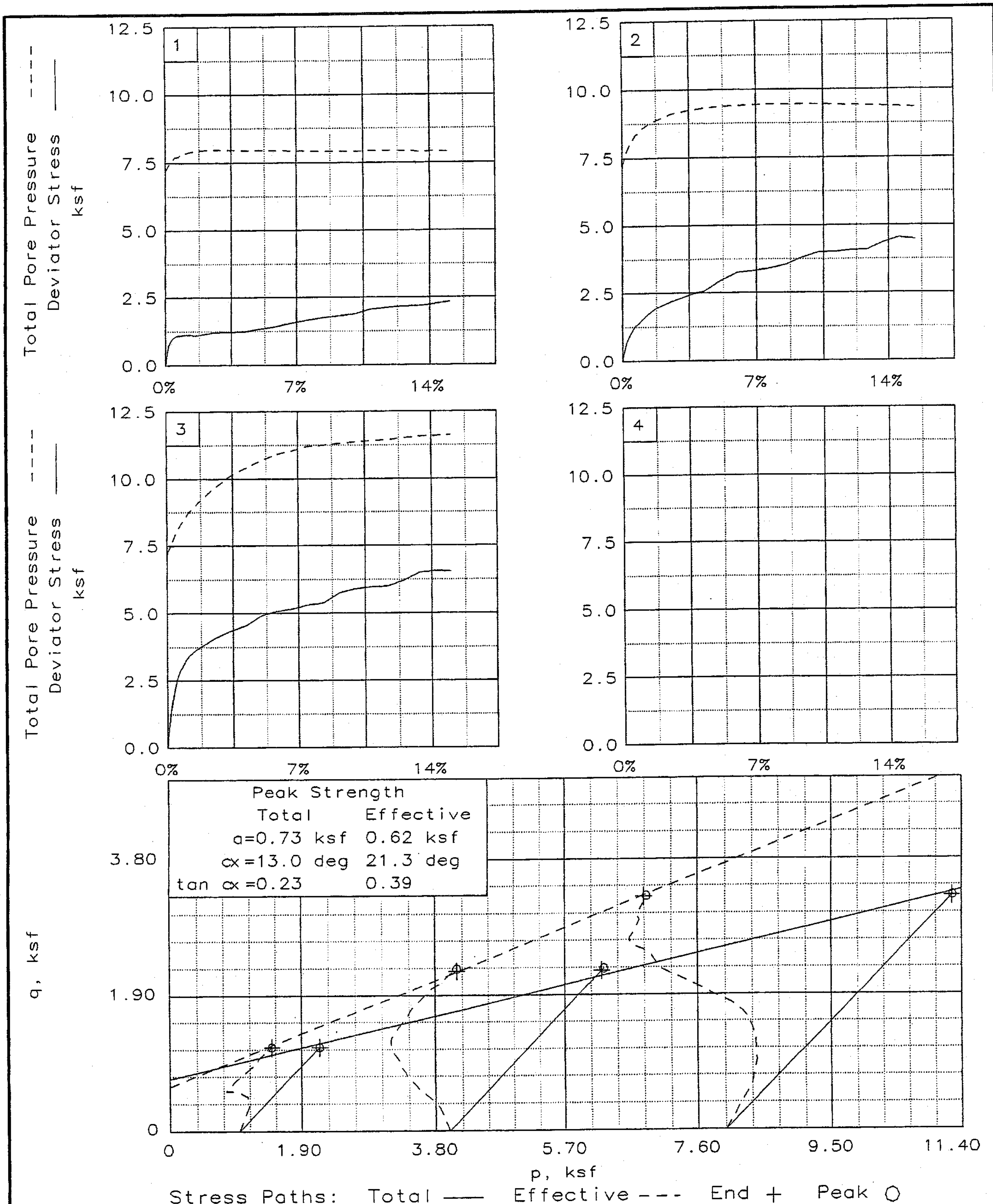
PROJECT: Ash Disposal Areas - TVA Gallatin Fossil Plant

SAMPLE LOCATION: A-2 Bulk @ 0'-20'

PROJ. NO.: 3043-04-1043 DATE: 10-07-04

TRIAXIAL SHEAR TEST REPORT

LAW ENGINEERING AND ENVIRONMENTAL SERVICES



Client: TVA

Project: Ash Disposal Areas - TVA Gallatin Fossil Plant

Location: A-2 Bulk @ 0'-20'

File: FOSSIL9 Project No.: 3043-04-1043 Fig. No.: ______

TRIAXIAL COMPRESSION TEST
CU with Pore Pressures

10-07-2004
9:45 am

Project and Sample Data

Date: 10-07-04
Client: TVA
Project: Ash Disposal Areas - TVA Gallatin Fossil Plant
Sample location: A-2 Bulk @ 0'-20'
Sample description: Orange-Brown Silty Clay with Sand (CL)
Remarks: Remolded to 95% MDD @ Optimum Moisture Content of Standard Proctor
Fig no.: 2nd page Fig no. (if applicable):
Type of sample: Remolded Sample
Specific gravity= 2.67 LL= 47 PL= 17 PI= 30
Test method: Corps of Eng. - saturation assumed

Specimen Parameters for Specimen No. 1

Specimen Parameter	Initial	Saturated	Consolidated	Final
Wt. moist soil and tare:	1185.030			1213.450
Wt. dry soil and tare:	995.820			995.820
Wt. of tare:	0.000			0.000
Weight, gms:	1185.0			
Diameter, in:	2.840	2.808	2.785	
Area, in²:	6.335	6.191	6.091	
Height, in:	6.000	6.000	5.983	
Net decrease in height, in:		0.000	0.017	
Net decrease in water volume, cc:		-46.500	11.500	
% Moisture:	19.0	23.7	22.5	21.9
Wet density, pcf:	118.8	126.3	127.5	
Dry density, pcf:	99.8	102.1	104.1	
Void ratio:	0.6700	0.6320	0.6012	
% Saturation:	75.7	100.0	100.0	

Test Readings Data for Specimen No. 1

Deformation dial constant= 1 in per input unit
Primary load ring constant= 0.72 lbs per input unit
Secondary load ring constant= 0 lbs per input unit
Crossover reading for secondary load ring= 0 input units
Membrane modulus = 0.14000 kN/cm²
Membrane thickness = 0.012 cm
Consolidation cell pressure = 56.90 psi = 8.19 ksf
Consolidation back pressure = 50.00 psi = 7.20 ksf
Consolidation effective confining stress = 0.99 ksf
Strain rate, %/min = 0.17
FAIL. STRESS = 2.34 ksf at reading no. 26
ULT. STRESS = not selected

Test Readings Data for Specimen No. 1

No.	Def. Dial Units	Def. in	Load Dial Units	Load lbs	Strain %	Deviator Stress ksf	Effective Stresses Minor ksf	Major ksf	1:3 Ratio	Pore Pres. psi	P ksf	Q ksf
0	0.0000	0.000	0.0	0.0	0.0	0.00	0.99	0.99	1.00	50.00	0.99	0.00
1	0.0100	0.010	41.0	29.5	0.2	0.70	0.79	1.49	1.88	51.40	1.14	0.35
2	0.0200	0.020	56.0	40.3	0.3	0.95	0.65	1.60	2.47	52.40	1.12	0.48
3	0.0300	0.030	62.0	44.6	0.5	1.05	0.50	1.55	3.08	53.40	1.03	0.53
4	0.0400	0.040	64.0	46.1	0.7	1.08	0.48	1.56	3.28	53.60	1.02	0.54
5	0.0500	0.050	65.0	46.8	0.8	1.10	0.35	1.44	4.17	54.50	0.89	0.55
6	0.0600	0.060	66.0	47.5	1.0	1.11	0.35	1.46	4.22	54.50	0.90	0.56
7	0.0700	0.070	66.0	47.5	1.2	1.11	0.33	1.44	4.35	54.60	0.89	0.56
8	0.0800	0.080	66.0	47.5	1.3	1.11	0.30	1.41	4.67	54.80	0.86	0.55
9	0.0900	0.090	66.0	47.5	1.5	1.11	0.27	1.38	5.04	55.00	0.83	0.55
10	0.1000	0.100	66.0	47.5	1.7	1.10	0.26	1.36	5.26	55.10	0.81	0.55
11	0.1500	0.150	72.0	51.8	2.5	1.19	0.23	1.43	6.19	55.30	0.83	0.60
12	0.2000	0.200	74.0	53.3	3.3	1.22	0.23	1.45	6.28	55.30	0.84	0.61
13	0.2500	0.250	76.0	54.7	4.2	1.24	0.24	1.48	6.06	55.20	0.86	0.62
14	0.3000	0.300	82.0	59.0	5.0	1.33	0.24	1.57	6.42	55.20	0.91	0.66
15	0.3500	0.350	88.0	63.4	5.8	1.41	0.24	1.66	6.76	55.20	0.95	0.71
16	0.4000	0.400	97.0	69.8	6.7	1.54	0.26	1.80	6.94	55.10	1.03	0.77
17	0.4500	0.450	105.0	75.6	7.5	1.65	0.27	1.93	7.04	55.00	1.10	0.83
18	0.5000	0.500	112.0	80.6	8.4	1.75	0.29	2.04	7.07	54.90	1.16	0.87
19	0.5500	0.550	117.0	84.2	9.2	1.81	0.29	2.10	7.28	54.90	1.19	0.90
20	0.6000	0.600	123.0	88.6	10.0	1.88	0.29	2.17	7.54	54.90	1.23	0.94
21	0.6500	0.650	135.0	97.2	10.9	2.05	0.27	2.32	8.49	55.00	1.30	1.02
22	0.7000	0.700	140.0	100.8	11.7	2.10	0.27	2.38	8.69	55.00	1.33	1.05
23	0.7500	0.750	145.0	104.4	12.5	2.16	0.27	2.43	8.89	55.00	1.35	1.08
24	0.8000	0.800	147.0	105.8	13.4	2.17	0.30	2.47	8.17	54.80	1.39	1.08
25	0.8500	0.850	153.0	110.2	14.2	2.23	0.29	2.52	8.76	54.90	1.41	1.12
26	0.9000	0.900	162.0	116.6	15.0	2.34	0.30	2.65	8.75	54.80	1.47	1.17

Specimen Parameters for Specimen No. 2

Specimen Parameter	Initial	Saturated	Consolidated	Final
Wt. moist soil and tare:	1181.910			1199.950
Wt. dry soil and tare:	993.200			993.200
Wt. of tare:	0.000			0.000
Weight, gms:	1181.9			
Diameter, in:	2.853	2.604	2.596	
Area, in²:	6.393	5.326	5.291	
Height, in:	6.000	6.000	5.840	
Net decrease in height, in:		0.000	0.160	
Net decrease in water volume, cc:		37.000	17.300	
% Moisture:	19.0	15.3	13.5	20.8
Wet density, pcf:	117.4	136.5	139.0	
Dry density, pcf:	98.6	118.4	122.4	
Void ratio:	0.6897	0.4078	0.3613	
% Saturation:	73.6	100.0	100.0	

Test Readings Data for Specimen No. 2

Deformation dial constant= 1 in per input unit
Primary load ring constant= 0.72 lbs per input unit
Secondary load ring constant= 0 lbs per input unit
Crossover reading for secondary load ring= 0 input units
Membrane modulus = 0.14000 kN/cm²
Membrane thickness = 0.012 cm
Consolidation cell pressure = 77.80 psi = 11.20 ksf
Consolidation back pressure = 50.00 psi = 7.20 ksf
Consolidation effective confining stress = 4.00 ksf
Strain rate, %/min = 0.17
FAIL. STRESS = 4.54 ksf at reading no. 25
ULT. STRESS = not selected

No.	Def. Dial Units	Def. in	Load Dial Units	Load lbs	Strain %	Deviator Stress ksf	Effective Stresses Minor ksf	Effective Stresses Major ksf	Effective Stresses 1:3 Ratio	Pore Pres. psi	P ksf	Q ksf
0	0.0000	0.000	0.0	0.0	0.0	0.00	4.00	4.00	1.00	50.00	4.00	0.00
1	0.0100	0.010	32.0	23.0	0.2	0.63	3.56	4.18	1.18	53.10	3.87	0.31
2	0.0200	0.020	46.0	33.1	0.3	0.90	3.28	4.18	1.27	55.00	3.73	0.45
3	0.0300	0.030	56.0	40.3	0.5	1.09	3.07	4.16	1.36	56.50	3.61	0.55
4	0.0400	0.040	67.0	48.2	0.7	1.30	2.87	4.17	1.45	57.90	3.52	0.65
5	0.0500	0.050	71.0	51.1	0.9	1.38	2.78	4.16	1.50	58.50	3.47	0.69
6	0.0600	0.060	78.0	56.2	1.0	1.51	2.65	4.16	1.57	59.40	3.41	0.76
7	0.0700	0.070	85.0	61.2	1.2	1.65	2.55	4.19	1.65	60.10	3.37	0.82
8	0.0800	0.080	90.0	64.8	1.4	1.74	2.46	4.20	1.71	60.70	3.33	0.87
9	0.0900	0.090	95.0	68.4	1.5	1.83	2.40	4.24	1.76	61.10	3.32	0.92
10	0.1000	0.100	100.0	72.0	1.7	1.93	2.35	4.27	1.82	61.50	3.31	0.96
11	0.1500	0.150	115.0	82.8	2.6	2.20	2.10	4.30	2.04	63.20	3.20	1.10
12	0.2000	0.200	127.0	91.4	3.4	2.40	1.97	4.38	2.22	64.10	3.17	1.20
13	0.2500	0.250	137.0	98.6	4.3	2.57	1.89	4.46	2.36	64.70	3.17	1.28
14	0.3000	0.300	159.0	114.5	5.1	2.96	1.83	4.78	2.62	65.10	3.31	1.48
15	0.3500	0.350	176.0	126.7	6.0	3.24	1.80	5.04	2.80	65.30	3.42	1.62
16	0.4000	0.400	182.0	131.0	6.8	3.32	1.77	5.09	2.88	65.50	3.43	1.66
17	0.4500	0.450	188.0	135.4	7.7	3.40	1.76	5.16	2.94	65.60	3.46	1.70
18	0.5000	0.500	198.0	142.6	8.6	3.55	1.76	5.30	3.02	65.60	3.53	1.77
19	0.5500	0.550	215.0	154.8	9.4	3.82	1.76	5.57	3.17	65.60	3.66	1.91
20	0.6000	0.600	228.0	164.2	10.3	4.01	1.76	5.77	3.28	65.60	3.76	2.00

Test Readings Data for Specimen No. 2

No.	Def. Dial Units	Def. in	Load Dial Units	Load lbs	Strain %	Deviator Stress ksf	Effective Stresses Minor ksf	Effective Stresses Major ksf	1:3 Ratio	Pore Pres. psi	P ksf	Q ksf
21	0.6500	0.650	230.0	165.6	11.1	4.01	1.77	5.78	3.26	65.50	3.77	2.00
22	0.7000	0.700	236.0	169.9	12.0	4.07	1.79	5.86	3.28	65.40	3.82	2.03
23	0.7500	0.750	240.0	172.8	12.8	4.10	1.80	5.90	3.28	65.30	3.85	2.05
24	0.8000	0.800	258.0	185.8	13.7	4.36	1.81	6.18	3.40	65.20	4.00	2.18
25	0.8500	0.850	271.0	195.1	14.6	4.54	1.84	6.38	3.46	65.00	4.11	2.27
26	0.9000	0.900	270.0	194.4	15.4	4.48	1.87	6.35	3.39	64.80	4.11	2.24

Specimen Parameters for Specimen No. 3

Specimen Parameter	Initial	Saturated	Consolidated	Final
Wt. moist soil and tare:	1179.420			1192.460
Wt. dry soil and tare:	991.110			991.110
Wt. of tare:	0.000			0.000
Weight, gms:	1179.4			
Diameter, in:	2.840	2.794	2.748	
Area, in²:	6.335	6.133	5.930	
Height, in:	6.000	6.000	6.000	
Net decrease in height, in:		0.000	0.000	
Net decrease in water volume, cc:		-43.500	20.000	
% Moisture:	19.0	23.4	21.4	20.3
Wet density, pcf:	118.2	126.6	128.8	
Dry density, pcf:	99.3	102.6	106.1	
Void ratio:	0.6779	0.6245	0.5706	
% Saturation:	74.8	100.0	100.0	

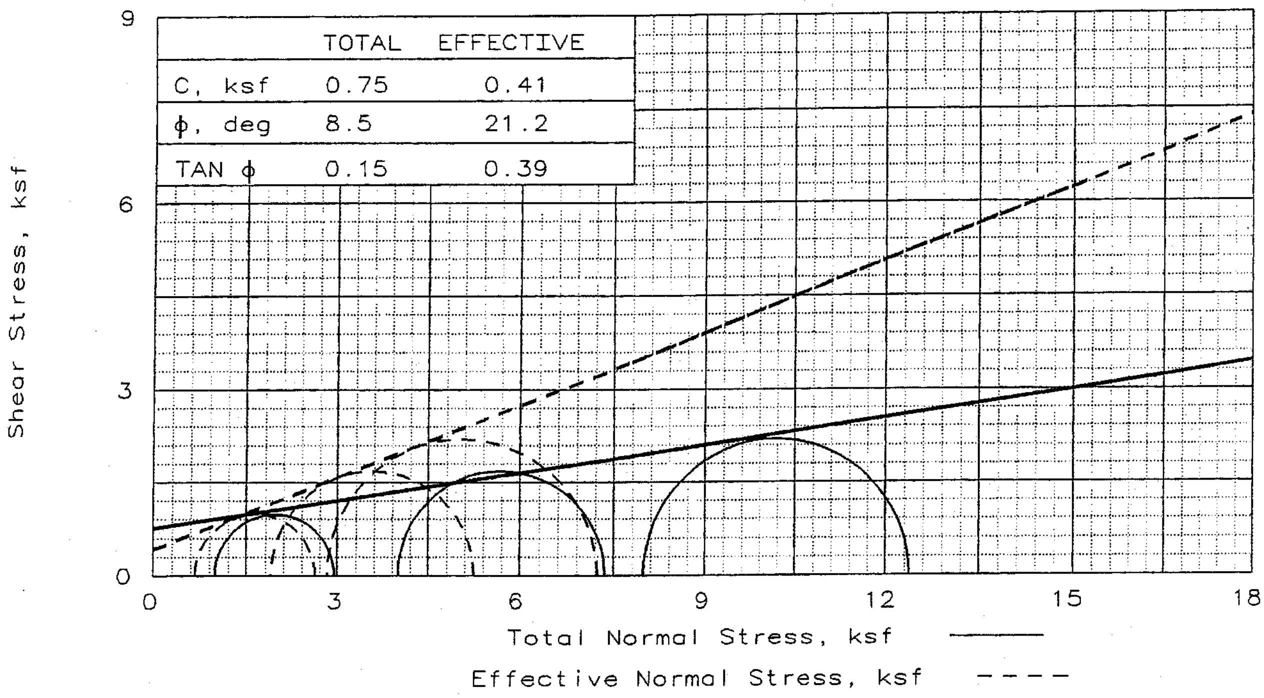
Test Readings Data for Specimen No. 3

Deformation dial constant= 1 in per input unit
Primary load ring constant= 0.72 lbs per input unit
Secondary load ring constant= 0 lbs per input unit
Crossover reading for secondary load ring= 0 input units
Membrane modulus = 0.14000 kN/cm²
Membrane thickness = 0.012 cm
Consolidation cell pressure = 105.50 psi = 15.19 ksf
Consolidation back pressure = 50.00 psi = 7.20 ksf
Consolidation effective confining stress = 7.99 ksf
Strain rate, %/min = 0.17
FAIL. STRESS = 6.56 ksf at reading no. 25
ULT. STRESS = not selected

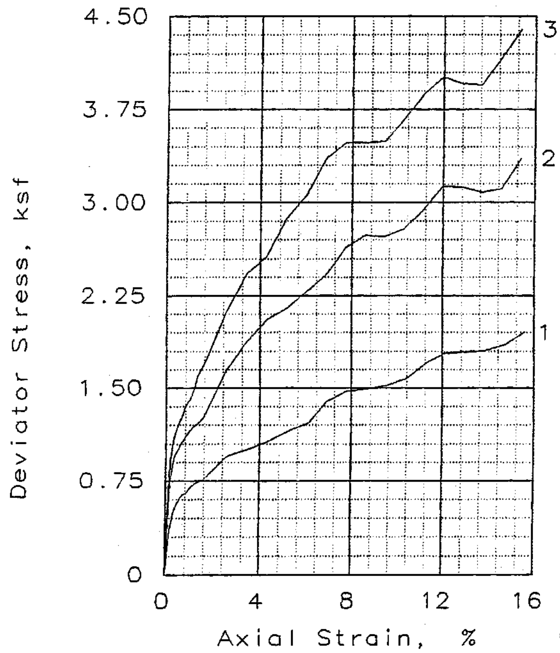
No.	Def. Dial Units	Def. in	Load Dial Units	Load lbs	Strain %	Deviator Stress ksf	Effective Stresses Minor ksf	Major ksf	1:3 Ratio	Pore Pres. psi	P ksf	Q ksf
0	0.0000	0.000	0.0	0.0	0.0	0.00	7.99	7.99	1.00	50.00	7.99	0.00
1	0.0100	0.010	72.0	51.8	0.2	1.26	7.73	8.99	1.16	51.80	8.36	0.63
2	0.0200	0.020	112.0	80.6	0.3	1.95	7.46	9.41	1.26	53.70	8.44	0.98
3	0.0300	0.030	145.0	104.4	0.5	2.52	7.16	9.68	1.35	55.80	8.42	1.26
4	0.0400	0.040	165.0	118.8	0.7	2.87	6.94	9.81	1.41	57.30	8.37	1.43
5	0.0500	0.050	178.0	128.2	0.8	3.09	6.78	9.87	1.46	58.40	8.33	1.54
6	0.0600	0.060	191.0	137.5	1.0	3.31	6.60	9.90	1.50	59.70	8.25	1.65
7	0.0700	0.070	200.0	144.0	1.2	3.46	6.42	9.88	1.54	60.90	8.15	1.73
8	0.0800	0.080	206.0	148.3	1.3	3.55	6.31	9.86	1.56	61.70	8.08	1.78
9	0.0900	0.090	212.0	152.6	1.5	3.65	6.16	9.81	1.59	62.70	7.99	1.83
10	0.1000	0.100	216.0	155.5	1.7	3.71	6.06	9.78	1.61	63.40	7.92	1.86
11	0.1500	0.150	239.0	172.1	2.5	4.07	5.53	9.60	1.74	67.10	7.57	2.04
12	0.2000	0.200	257.0	185.0	3.3	4.34	5.10	9.44	1.85	70.10	7.27	2.17
13	0.2500	0.250	271.0	195.1	4.2	4.54	4.80	9.34	1.95	72.20	7.07	2.27
14	0.3000	0.300	295.0	212.4	5.0	4.90	4.51	9.41	2.09	74.20	6.96	2.45
15	0.3500	0.350	308.0	221.8	5.8	5.07	4.29	9.36	2.18	75.70	6.83	2.54
16	0.4000	0.400	316.0	227.5	6.7	5.16	4.15	9.30	2.24	76.70	6.73	2.58
17	0.4500	0.450	328.0	236.2	7.5	5.31	3.99	9.29	2.33	77.80	6.64	2.65
18	0.5000	0.500	336.0	241.9	8.3	5.39	3.95	9.33	2.36	78.10	6.64	2.69
19	0.5500	0.550	362.0	260.6	9.2	5.75	3.87	9.62	2.48	78.60	6.75	2.87
20	0.6000	0.600	375.0	270.0	10.0	5.90	3.83	9.73	2.54	78.90	6.78	2.95

Test Readings Data for Specimen No. 3

No.	Def. Dial Units	Def. in	Load Dial Units	Load lbs	Strain %	Deviator Stress ksf	Effective Stresses Minor ksf	Effective Stresses Major ksf	1:3 Ratio	Pore Pres. psi	P ksf	Q ksf
21	0.6500	0.650	382.0	275.0	10.8	5.96	3.79	9.74	2.57	79.20	6.77	2.98
22	0.7000	0.700	388.0	279.4	11.7	5.99	3.76	9.75	2.59	79.40	6.75	3.00
23	0.7500	0.750	405.0	291.6	12.5	6.20	3.69	9.88	2.68	79.90	6.78	3.10
24	0.8000	0.800	428.0	308.2	13.3	6.49	3.63	10.11	2.79	80.30	6.87	3.24
25	0.8500	0.850	437.0	314.6	14.2	6.56	3.60	10.16	2.82	80.50	6.88	3.28
26	0.9000	0.900	440.0	316.8	15.0	6.54	3.57	10.11	2.83	80.70	6.84	3.27



	TOTAL	EFFECTIVE
C, ksf	0.75	0.41
ϕ, deg	8.5	21.2
TAN ϕ	0.15	0.39



SAMPLE NO.:		1	2	3
INITIAL	WATER CONTENT, %	19.2	19.2	19.2
	DRY DENSITY, pcf	100.9	100.1	100.3
	SATURATION, %	79.0	77.5	77.9
	VOID RATIO	0.646	0.659	0.656
	DIAMETER, in	2.84	2.84	2.85
	HEIGHT, in	6.00	6.00	6.00
AT TEST	WATER CONTENT, %	23.4	22.4	21.4
	DRY DENSITY, pcf	102.4	104.1	105.8
	SATURATION, %	100.0	100.0	100.0
	VOID RATIO	0.622	0.595	0.570
	DIAMETER, in	2.87	2.83	2.81
	HEIGHT, in	5.77	5.84	5.85
Strain rate, %/min		0.17	0.17	0.17
BACK PRESSURE, ksf		7.20	7.20	7.20
CELL PRESSURE, ksf		8.19	11.20	15.19
FAIL. STRESS, ksf		1.96	3.36	4.40
TOTAL PORE PR., ksf		7.52	9.30	12.36
ULT. STRESS, ksf				
TOTAL PORE PR., ksf				
$\bar{\sigma}_1$ FAILURE, ksf		2.63	5.26	7.23
$\bar{\sigma}_3$ FAILURE, ksf		0.68	1.90	2.84

TYPE OF TEST:
CU with Pore Pressures

SAMPLE TYPE: Remolded Sample

DESCRIPTION: Light-Brown Silty Clay (CL)

LL= 38 PL= 18 PI= 20

SPECIFIC GRAVITY= 2.66

REMARKS: Remolded to 95% MDD @ Optimum Moisture Content of Standard Proctor

Fig. No.: ______ HB

CLIENT: TVA

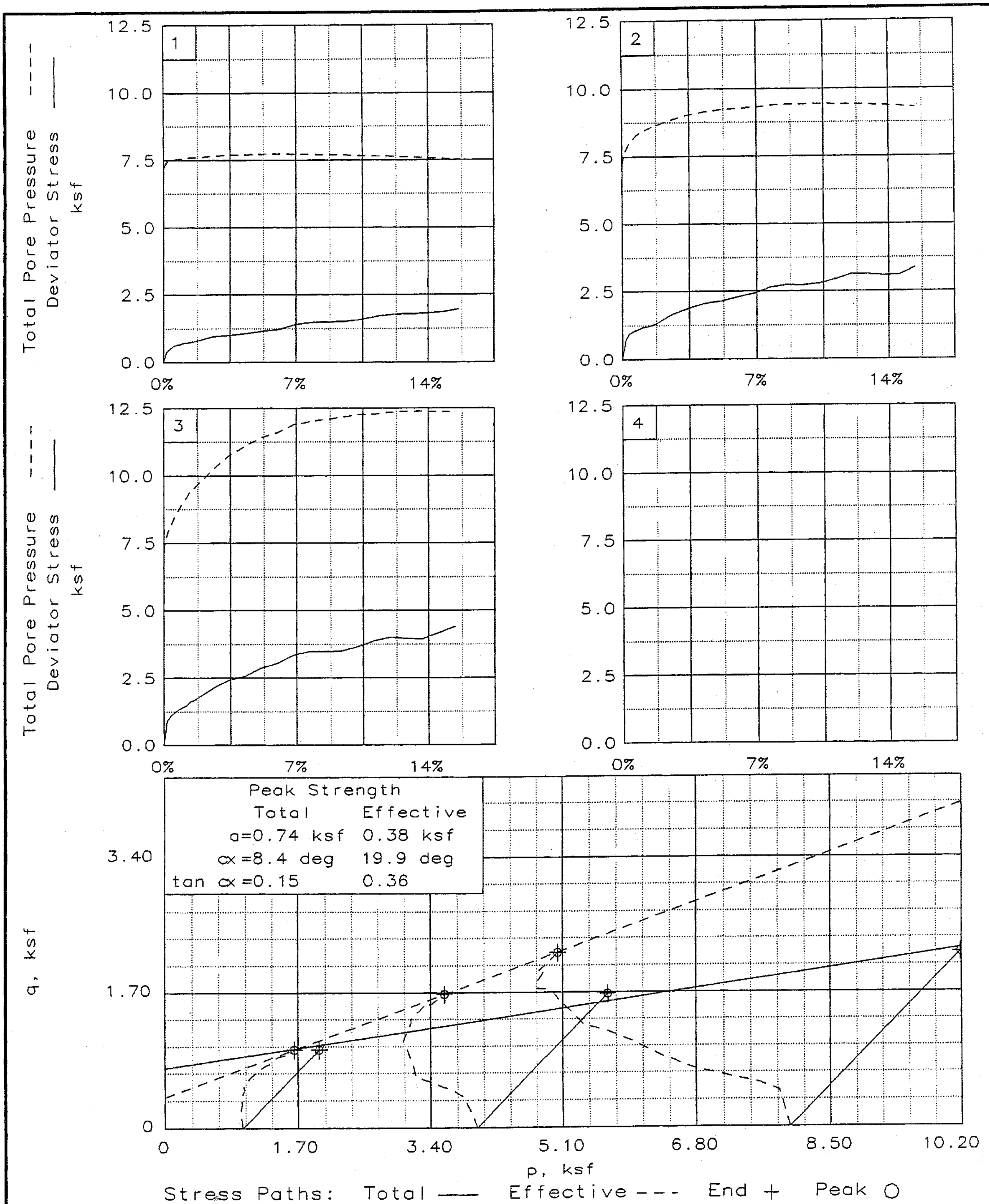
PROJECT: Ash Disposal Areas - TVA Gallatin Fossil Plant

SAMPLE LOCATION: A-9 Bulk @ 0'-15'

PROJ. NO.: 3043-04-1043 DATE: 10-08-04

TRIAXIAL SHEAR TEST REPORT

LAW ENGINEERING AND ENVIRONMENTAL SERVICES



Client: TVA

Project: Ash Disposal Areas - TVA Gallatin Fossil Plant

Location: A-9 Bulk @ 0'-15'

File: FOSSIL10 Project No.: 3043-04-1043 Fig. No.: ____

Project and Sample Data

Date: 10-08-04
Client: TVA
Project: Ash Disposal Areas - TVA Gallatin Fossil Plant
Sample location: A-9 Bulk @ 0'-15'
Sample description: Light-Brown Silty Clay (CL)
Remarks: Remolded to 95% MDD @ Optimum Moisture Content of Standard Proctor
Fig no.: 2nd page Fig no. (if applicable):
Type of sample: Remolded Sample
Specific gravity= 2.66 LL= 38 PL= 18 PI= 20
Test method: Corps of Eng. - saturation assumed

Specimen Parameters for Specimen No. 1

Specimen Parameter	Initial	Saturated	Consolidated	Final
Wt. moist soil and tare:	1199.520			1238.150
Wt. dry soil and tare:	1006.310			1006.310
Wt. of tare:	0.000			0.000
Weight, gms:	1199.5			
Diameter, in:	2.840	2.847	2.875	
Area, in^2:	6.335	6.367	6.490	
Height, in:	6.000	6.000	5.769	
Net decrease in height, in:		0.000	0.231	
Net decrease in water volume, cc:		-54.500	12.500	
% Moisture:	19.2	24.6	23.4	23.0
Wet density, pcf:	120.2	125.1	126.3	
Dry density, pcf:	100.9	100.4	102.4	
Void ratio:	0.6464	0.6548	0.6217	
% Saturation:	79.0	100.0	100.0	

Test Readings Data for Specimen No. 1

Deformation dial constant= 1 in per input unit
Primary load ring constant= 0.72 lbs per input unit
Secondary load ring constant= 0 lbs per input unit
Crossover reading for secondary load ring= 0 input units
Membrane modulus = 0.14000 kN/cm^2
Membrane thickness = 0.012 cm
Consolidation cell pressure = 56.90 psi = 8.19 ksf
Consolidation back pressure = 50.00 psi = 7.20 ksf
Consolidation effective confining stress = 0.99 ksf
Strain rate, %/min = 0.17
FAIL. STRESS = 1.96 ksf at reading no. 26
ULT. STRESS = not selected

Test Readings Data for Specimen No. 1

No.	Def. Dial Units	Def. in	Load Dial Units	Load lbs	Strain %	Deviator Stress ksf	Effective Stresses Minor ksf	Effective Stresses Major ksf	Effective Stresses 1:3 Ratio	Pore Pres. psi	P ksf	Q ksf
0	0.0000	0.000	0.0	0.0	0.0	0.00	0.99	0.99	1.00	50.00	0.99	0.00
1	0.0100	0.010	23.0	16.6	0.2	0.37	0.78	1.14	1.47	51.50	0.96	0.18
2	0.0200	0.020	32.0	23.0	0.3	0.51	0.72	1.23	1.71	51.90	0.97	0.25
3	0.0300	0.030	37.0	26.6	0.5	0.59	0.69	1.28	1.85	52.10	0.99	0.29
4	0.0400	0.040	40.0	28.8	0.7	0.63	0.66	1.30	1.96	52.30	0.98	0.32
5	0.0500	0.050	41.0	29.5	0.9	0.65	0.65	1.30	2.00	52.40	0.97	0.32
6	0.0600	0.060	44.0	31.7	1.0	0.70	0.65	1.34	2.07	52.40	1.00	0.35
7	0.0700	0.070	46.0	33.1	1.2	0.73	0.62	1.35	2.17	52.60	0.98	0.36
8	0.0800	0.080	47.0	33.8	1.4	0.74	0.60	1.35	2.22	52.70	0.98	0.37
9	0.0900	0.090	48.0	34.6	1.6	0.75	0.59	1.35	2.28	52.80	0.97	0.38
10	0.1000	0.100	50.0	36.0	1.7	0.78	0.59	1.38	2.33	52.80	0.98	0.39
11	0.1500	0.150	61.0	43.9	2.6	0.95	0.55	1.50	2.73	53.10	1.02	0.47
12	0.2000	0.200	65.0	46.8	3.5	1.00	0.50	1.51	2.99	53.40	1.01	0.50
13	0.2500	0.250	70.0	50.4	4.3	1.07	0.49	1.56	3.19	53.50	1.02	0.53
14	0.3000	0.300	76.0	54.7	5.2	1.15	0.48	1.63	3.42	53.60	1.05	0.58
15	0.3500	0.350	81.0	58.3	6.1	1.22	0.46	1.68	3.64	53.70	1.07	0.61
16	0.4000	0.400	94.0	67.7	6.9	1.40	0.48	1.87	3.94	53.60	1.17	0.70
17	0.4500	0.450	100.0	72.0	7.8	1.47	0.49	1.96	4.01	53.50	1.23	0.74
18	0.5000	0.500	102.0	73.4	8.7	1.49	0.49	1.98	4.04	53.50	1.23	0.74
19	0.5500	0.550	105.0	75.6	9.5	1.52	0.50	2.02	4.01	53.40	1.26	0.76
20	0.6000	0.600	110.0	79.2	10.4	1.57	0.53	2.11	3.96	53.20	1.32	0.79
21	0.6500	0.650	120.0	86.4	11.3	1.70	0.55	2.25	4.11	53.10	1.40	0.85
22	0.7000	0.700	127.0	91.4	12.1	1.78	0.56	2.34	4.17	53.00	1.45	0.89
23	0.7500	0.750	129.0	92.9	13.0	1.79	0.59	2.38	4.04	52.80	1.49	0.90
24	0.8000	0.800	131.0	94.3	13.9	1.80	0.62	2.42	3.91	52.60	1.52	0.90
25	0.8500	0.850	136.0	97.9	14.7	1.85	0.65	2.50	3.86	52.40	1.57	0.93
26	0.9000	0.900	145.0	104.4	15.6	1.96	0.68	2.63	3.89	52.20	1.65	0.98

Specimen Parameters for Specimen No. 2

Specimen Parameter	Initial	Saturated	Consolidated	Final
Wt. moist soil and tare:	1193.550			1220.320
Wt. dry soil and tare:	1001.300			1001.300
Wt. of tare:	0.000			0.000
Weight, gms:	1193.6			
Diameter, in:	2.844	2.822	2.826	
Area, in²:	6.353	6.257	6.271	
Height, in:	6.000	6.000	5.844	
Net decrease in height, in:		0.000	0.156	
Net decrease in water volume, cc:		-46.500	14.600	
% Moisture:	19.2	23.8	22.4	21.9
Wet density, pcf:	119.3	125.8	127.4	
Dry density, pcf:	100.1	101.6	104.1	
Void ratio:	0.6593	0.6343	0.5955	
% Saturation:	77.5	100.0	100.0	

Test Readings Data for Specimen No. 2

Deformation dial constant= 1 in per input unit
Primary load ring constant= 0.72 lbs per input unit
Secondary load ring constant= 0 lbs per input unit
Crossover reading for secondary load ring= 0 input units
Membrane modulus = 0.14000 kN/cm²
Membrane thickness = 0.012 cm
Consolidation cell pressure = 77.80 psi = 11.20 ksf
Consolidation back pressure = 50.00 psi = 7.20 ksf
Consolidation effective confining stress = 4.00 ksf
Strain rate, %/min = 0.17
FAIL. STRESS = 3.36 ksf at reading no. 26
ULT. STRESS = not selected

No.	Def. Dial Units	Def. in	Load Dial Units	Load lbs	Strain %	Deviator Stress ksf	Effective Stresses Minor ksf	Major ksf	1:3 Ratio	Pore Pres. psi	P ksf	Q ksf
0	0.0000	0.000	0.0	0.0	0.0	0.00	4.00	4.00	1.00	50.00	4.00	0.00
1	0.0100	0.010	45.0	32.4	0.2	0.74	3.47	4.21	1.21	53.70	3.84	0.37
2	0.0200	0.020	57.0	41.0	0.3	0.94	3.21	4.15	1.29	55.50	3.68	0.47
3	0.0300	0.030	61.0	43.9	0.5	1.00	3.07	4.07	1.33	56.50	3.57	0.50
4	0.0400	0.040	65.0	46.8	0.7	1.07	2.95	4.02	1.36	57.30	3.49	0.53
5	0.0500	0.050	68.0	49.0	0.9	1.11	2.85	3.97	1.39	58.00	3.41	0.56
6	0.0600	0.060	71.0	51.1	1.0	1.16	2.79	3.96	1.42	58.40	3.37	0.58
7	0.0700	0.070	73.0	52.6	1.2	1.19	2.72	3.91	1.44	58.90	3.32	0.60
8	0.0800	0.080	75.0	54.0	1.4	1.22	2.66	3.89	1.46	59.30	3.28	0.61
9	0.0900	0.090	77.0	55.4	1.5	1.25	2.61	3.86	1.48	59.70	3.23	0.63
10	0.1000	0.100	80.0	57.6	1.7	1.30	2.56	3.86	1.51	60.00	3.21	0.65
11	0.1500	0.150	102.0	73.4	2.6	1.64	2.35	3.99	1.70	61.50	3.17	0.82
12	0.2000	0.200	118.0	85.0	3.4	1.88	2.17	4.06	1.87	62.70	3.12	0.94
13	0.2500	0.250	130.0	93.6	4.3	2.06	2.06	4.12	2.00	63.50	3.09	1.03
14	0.3000	0.300	137.0	98.6	5.1	2.15	1.97	4.12	2.09	64.10	3.05	1.07
15	0.3500	0.350	147.0	105.8	6.0	2.28	1.93	4.21	2.18	64.40	3.07	1.14
16	0.4000	0.400	157.0	113.0	6.8	2.42	1.90	4.32	2.27	64.60	3.11	1.21
17	0.4500	0.450	173.0	124.6	7.7	2.64	1.83	4.47	2.44	65.10	3.15	1.32
18	0.5000	0.500	181.0	130.3	8.6	2.74	1.79	4.52	2.53	65.40	3.15	1.37
19	0.5500	0.550	182.0	131.0	9.4	2.73	1.79	4.51	2.53	65.40	3.15	1.36
20	0.6000	0.600	188.0	135.4	10.3	2.79	1.77	4.56	2.57	65.50	3.17	1.39

Test Readings Data for Specimen No. 2

No.	Def. Dial Units	Def. in	Load Dial Units	Load lbs	Strain %	Deviator Stress ksf	Effective Stresses Minor ksf	Major ksf	1:3 Ratio	Pore Pres. psi	P ksf	Q ksf
21	0.6500	0.650	200.0	144.0	11.1	2.94	1.79	4.72	2.65	65.40	3.25	1.47
22	0.7000	0.700	215.0	154.8	12.0	3.13	1.79	4.91	2.75	65.40	3.35	1.56
23	0.7500	0.750	217.0	156.2	12.8	3.13	1.80	4.93	2.74	65.30	3.36	1.56
24	0.8000	0.800	216.0	155.5	13.7	3.08	1.83	4.91	2.69	65.10	3.37	1.54
25	0.8500	0.850	220.0	158.4	14.5	3.11	1.86	4.97	2.67	64.90	3.41	1.55
26	0.9000	0.900	240.0	172.8	15.4	3.36	1.90	5.26	2.77	64.60	3.58	1.68

Specimen Parameters for Specimen No. 3

Specimen Parameter	Initial	Saturated	Consolidated	Final
Wt. moist soil and tare:	1197.860			1218.560
Wt. dry soil and tare:	1004.920			1004.920
Wt. of tare:	0.000			0.000
Weight, gms:	1197.9			
Diameter, in:	2.846	2.836	2.806	
Area, in²:	6.362	6.318	6.185	
Height, in:	6.000	6.000	5.853	
Net decrease in height, in:		0.000	0.147	
Net decrease in water volume, cc:		-50.500	28.000	
% Moisture:	19.2	24.2	21.4	21.3
Wet density, pcf:	119.6	125.5	128.4	
Dry density, pcf:	100.3	101.0	105.8	
Void ratio:	0.6556	0.6444	0.5703	
% Saturation:	77.9	100.0	100.0	

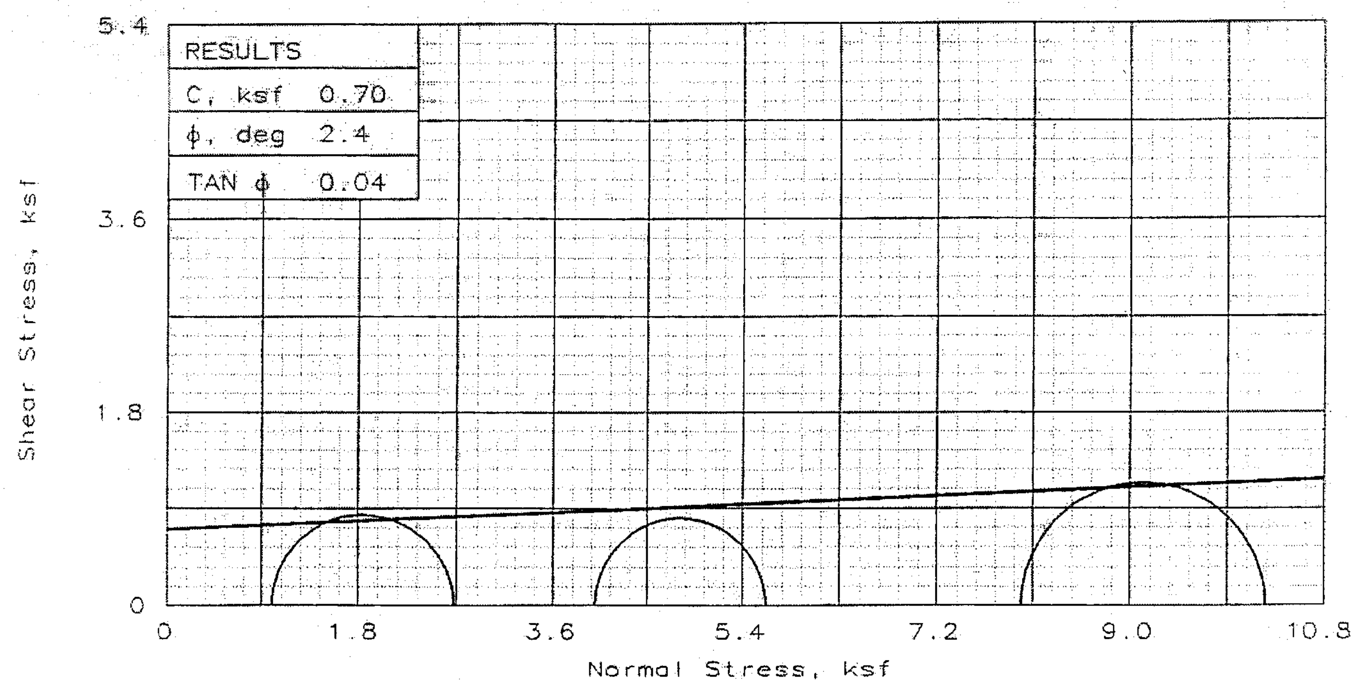
Test Readings Data for Specimen No. 3

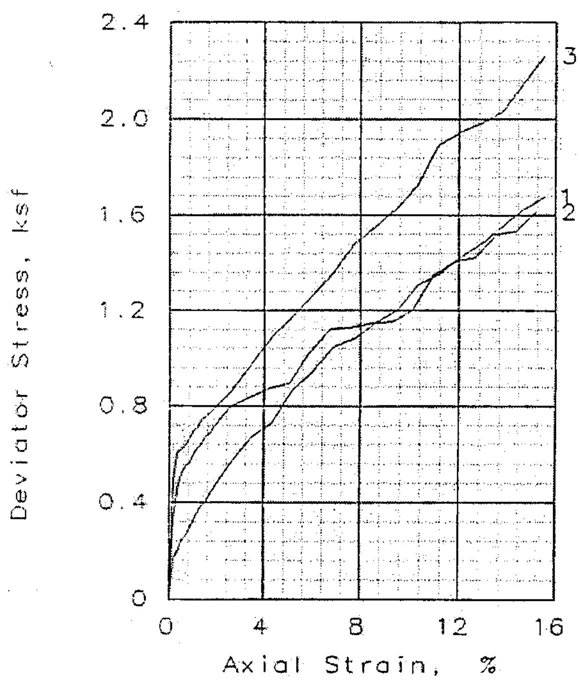
Deformation dial constant= 1 in per input unit
Primary load ring constant= 0.72 lbs per input unit
Secondary load ring constant= 0 lbs per input unit
Crossover reading for secondary load ring= 0 input units
Membrane modulus = 0.14000 kN/cm²
Membrane thickness = 0.012 cm
Consolidation cell pressure = 105.50 psi = 15.19 ksf
Consolidation back pressure = 50.00 psi = 7.20 ksf
Consolidation effective confining stress = 7.99 ksf
Strain rate, %/min = 0.17
FAIL. STRESS = 4.40 ksf at reading no. 26
ULT. STRESS = not selected

No.	Def. Dial Units	Def. in	Load Dial Units	Load lbs	Strain %	Deviator Stress ksf	Effective Stresses Minor ksf	Major ksf	1:3 Ratio	Pore Pres. psi	P ksf	Q ksf
0	0.0000	0.000	0.0	0.0	0.0	0.00	7.99	7.99	1.00	50.00	7.99	0.00
1	0.0100	0.010	54.0	38.9	0.2	0.90	7.40	8.31	1.12	54.10	7.85	0.45
2	0.0200	0.020	66.0	47.5	0.3	1.10	7.04	8.14	1.16	56.60	7.59	0.55
3	0.0300	0.030	72.0	51.8	0.5	1.20	6.78	7.98	1.18	58.40	7.38	0.60
4	0.0400	0.040	77.0	55.4	0.7	1.28	6.54	7.82	1.20	60.10	7.18	0.64
5	0.0500	0.050	82.0	59.0	0.9	1.36	6.35	7.71	1.21	61.40	7.03	0.68
6	0.0600	0.060	85.0	61.2	1.0	1.41	6.16	7.57	1.23	62.70	6.87	0.71
7	0.0700	0.070	90.0	64.8	1.2	1.49	6.00	7.50	1.25	63.80	6.75	0.75
8	0.0800	0.080	97.0	69.8	1.4	1.60	5.79	7.39	1.28	65.30	6.59	0.80
9	0.0900	0.090	101.0	72.7	1.5	1.67	5.70	7.37	1.29	65.90	6.54	0.83
10	0.1000	0.100	105.0	75.6	1.7	1.73	5.56	7.29	1.31	66.90	6.42	0.87
11	0.1500	0.150	130.0	93.6	2.6	2.12	4.97	7.09	1.43	71.00	6.03	1.06
12	0.2000	0.200	150.0	108.0	3.4	2.43	4.45	6.88	1.55	74.60	5.66	1.21
13	0.2500	0.250	160.0	115.2	4.3	2.57	4.09	6.66	1.63	77.10	5.37	1.28
14	0.3000	0.300	181.0	130.3	5.1	2.88	3.79	6.67	1.76	79.20	5.23	1.44
15	0.3500	0.350	194.0	139.7	6.0	3.06	3.60	6.66	1.85	80.50	5.13	1.53
16	0.4000	0.400	215.0	154.8	6.8	3.36	3.31	6.67	2.01	82.50	4.99	1.68
17	0.4500	0.450	225.0	162.0	7.7	3.48	3.20	6.68	2.09	83.30	4.94	1.74
18	0.5000	0.500	227.0	163.4	8.5	3.48	3.11	6.59	2.12	83.90	4.85	1.74
19	0.5500	0.550	230.0	165.6	9.4	3.49	3.02	6.52	2.16	84.50	4.77	1.75
20	0.6000	0.600	244.0	175.7	10.3	3.67	2.94	6.61	2.25	85.10	4.77	1.84

Test Readings Data for Specimen No. 3

No.	Def. Dial Units	Def. in	Load Dial Units	Load lbs	Strain %	Deviator Stress ksf	Effective Stresses Minor ksf	Effective Stresses Major ksf	1:3 Ratio	Pore Pres. psi	P ksf	Q ksf
21	0.6500	0.650	260.0	187.2	11.1	3.87	2.91	6.78	2.33	85.30	4.85	1.94
22	0.7000	0.700	272.0	195.8	12.0	4.01	2.85	6.87	2.41	85.70	4.86	2.01
23	0.7500	0.750	271.0	195.1	12.8	3.96	2.82	6.78	2.40	85.90	4.80	1.98
24	0.8000	0.800	273.0	196.6	13.7	3.95	2.82	6.77	2.40	85.90	4.80	1.98
25	0.8500	0.850	291.0	209.5	14.5	4.17	2.84	7.01	2.47	85.80	4.92	2.08
26	0.9000	0.900	310.0	223.2	15.4	4.40	2.84	7.23	2.55	85.80	5.04	2.20





SAMPLE NO.:		1	2	3
INITIAL	WATER CONTENT, %	21.0	21.0	21.0
	DRY DENSITY, pcf	102.8	100.8	102.7
	SATURATION, %	90.2	85.9	90.1
	VOID RATIO	0.622	0.653	0.623
	DIAMETER, in	2.85	2.85	2.85
	HEIGHT, in	5.80	5.92	5.80
AT TEST	WATER CONTENT, %	22.4	24.5	24.2
	DRY DENSITY, pcf	104.4	100.7	101.3
	SATURATION, %	100.0	100.0	100.0
	VOID RATIO	0.597	0.654	0.645
	DIAMETER, in	2.82	2.85	2.87
	HEIGHT, in	5.80	5.92	5.80
Strain rate, %/min		0.33	0.33	0.33
BACK PRESSURE, ksf		0.0	0.0	0.0
CELL PRESSURE, ksf		1.0	4.0	8.0
FAIL. STRESS, ksf		1.7	1.6	2.3
ULT. STRESS, ksf				
σ_1 FAILURE, ksf		2.7	5.6	10.3
σ_3 FAILURE, ksf		1.0	4.0	8.0

TYPE OF TEST:
Unconsolidated Undrained

SAMPLE TYPE: Remolded Sample

DESCRIPTION: Orange-Brown Silty Clay with Sand (CL)

LL= 47 PL= 17 PI= 30

SPECIFIC GRAVITY= 2.67

REMARKS: Remolded to 95% MDD @ 2.0% over Optimum Moisture Content of Standard Proctor (Saturated UU)

Fig. No.: ______

HB

CLIENT: TVA

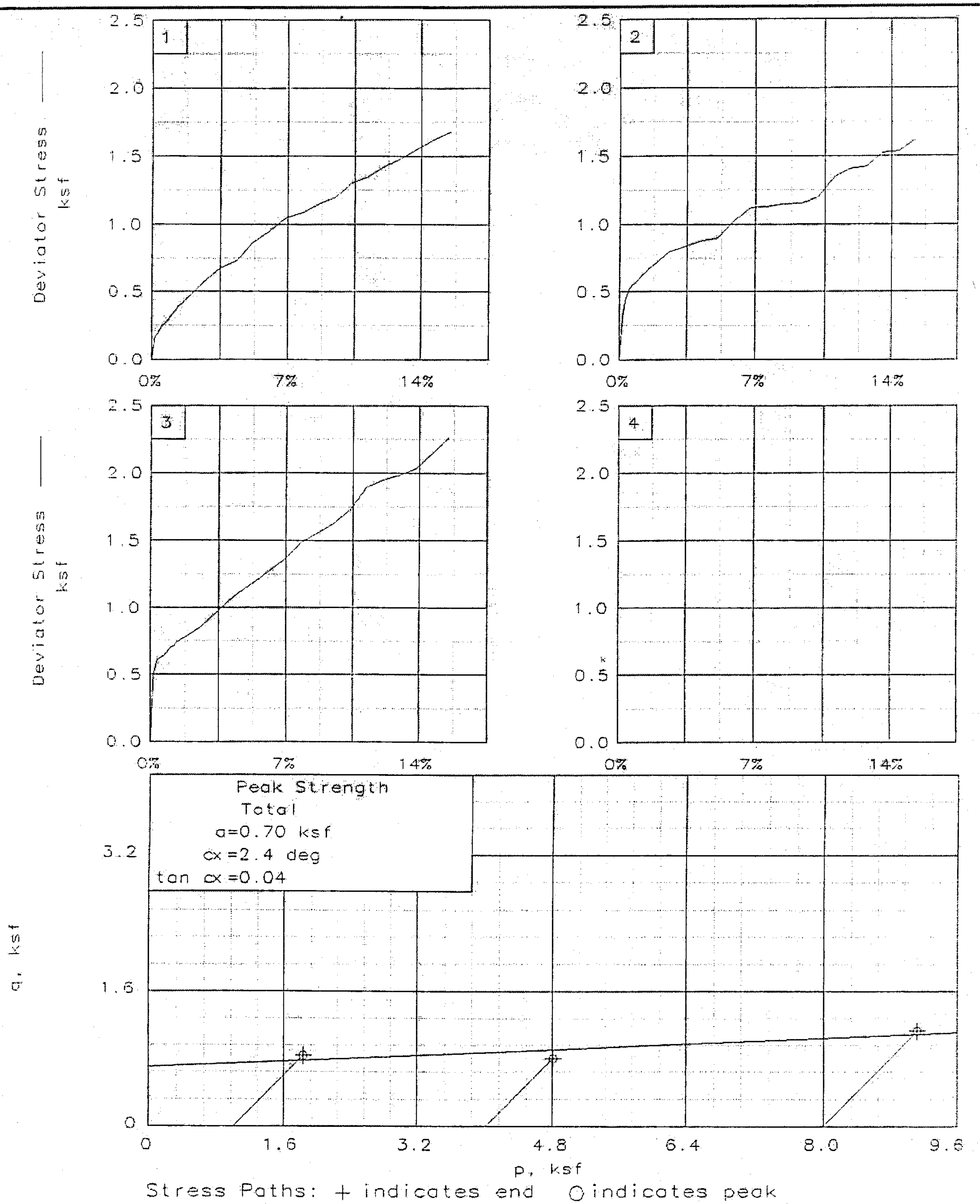
PROJECT: Ash Disposal Areas - TVA Gallatin Fossil Plant

SAMPLE LOCATION: A-2 Bulk @ 0'-20.0'

PROJ. NO.: 3043-04-1043 DATE: 10-04-04

TRIAXIAL SHEAR TEST REPORT

LAW ENGINEERING AND ENVIRONMENTAL SERVICES



Client: TVA

Project: Ash Disposal Areas - TVA Gallatin Fossil Plant

Location: A-2 Bulk @ 0'-20.0'

File: FOSSIL8 Project No.: 3043-04-1043 Fig. No.: _____

TRIAXIAL COMPRESSION TEST
Unconsolidated Undrained

10-04-2004
5:52 pm

Project and Sample Data

Date: 10-04-04
Client: TVA
Project: Ash Disposal Areas - TVA Gallatin Fossil Plant
Sample location: A-2 Bulk @ 0'-20.0'
Sample description: Orange-Brown Silty Clay with Sand (CL)
Remarks: Remolded to 95% MDD @ 2.0% over Optimum Moisture
Content of Standard Proctor (Saturated UU)
Fig no.: 2nd page Fig no. (if applicable):
Type of sample: Remolded Sample
Specific gravity= 2.67 LL= 47 PL= 17 PI= 30
Test method: Corps of Eng. - saturation assumed

Specimen Parameters for Specimen No. 1

Specimen Parameter	Initial	Saturated	Final
Wt. moist soil and tare:	1204.390		1229.130
Wt. dry soil and tare:	995.360		995.360
Wt. of tare:	0.000		0.000
Weight, gms:	1204.4		
Diameter, in:	2.846	2.824	
Area, in²:	6.362	6.264	
Height, in:	5.800	5.800	
Net decrease in height, in:		0.000	
% Moisture:	21.0	22.4	23.5
Wet density, pcf:	124.4	127.7	
Dry density, pcf:	102.8	104.4	
Void ratio:	0.6219	0.5969	
% Saturation:	90.2	100.0	

Test Readings Data for Specimen No. 1

Deformation dial constant= 1 in per input unit
Primary load ring constant= 0.72 lbs per input unit
Secondary load ring constant= 0 lbs per input unit
Crossover reading for secondary load ring= 0 input units
Membrane modulus = 0.14000 kN/cm²
Membrane thickness = 0.012 cm
Cell pressure = 6.94 psi = 1.00 ksf
Back pressure = 0.00 psi = 0.00 ksf
Effective confining stress = 1.00 ksf
Strain rate, %/min = 0.33
FAIL. STRESS = 1.68 ksf at reading no. 26
ULT. STRESS = not selected

Test Readings Data for Specimen No. 1

No.	Def. Dial Units	Def. in	Load Dial Units	Load lbs	Strain %	Deviator Stress ksf	Principal Stresses Minor ksf	Major ksf	1:3 Ratio	P ksf	Q ksf
0	0.0000	0.000	0.0	0.0	0.0	0.00	1.00	1.00	1.00	1.00	0.00
1	0.0100	0.010	10.0	7.2	0.2	0.17	1.00	1.16	1.17	1.08	0.08
2	0.0200	0.020	12.0	8.6	0.3	0.20	1.00	1.20	1.20	1.10	0.10
3	0.0300	0.030	15.0	10.8	0.5	0.25	1.00	1.25	1.25	1.12	0.12
4	0.0400	0.040	16.0	11.5	0.7	0.26	1.00	1.26	1.26	1.13	0.13
5	0.0500	0.050	18.0	13.0	0.9	0.30	1.00	1.29	1.30	1.15	0.15
6	0.0600	0.060	20.0	14.4	1.0	0.33	1.00	1.33	1.33	1.16	0.16
7	0.0700	0.070	22.0	15.8	1.2	0.36	1.00	1.36	1.36	1.18	0.18
8	0.0800	0.080	24.0	17.3	1.4	0.39	1.00	1.39	1.39	1.20	0.20
9	0.0900	0.090	25.0	18.0	1.6	0.41	1.00	1.41	1.41	1.20	0.20
10	0.1000	0.100	27.0	19.4	1.7	0.44	1.00	1.44	1.44	1.22	0.22
11	0.1500	0.150	35.0	25.2	2.6	0.56	1.00	1.56	1.56	1.28	0.28
12	0.2000	0.200	42.0	30.2	3.4	0.67	1.00	1.67	1.67	1.33	0.34
13	0.2500	0.250	46.0	33.1	4.3	0.73	1.00	1.73	1.73	1.36	0.36
14	0.3000	0.300	55.0	39.6	5.2	0.86	1.00	1.86	1.86	1.43	0.43
15	0.3500	0.350	61.0	43.9	6.0	0.95	1.00	1.95	1.95	1.47	0.47
16	0.4000	0.400	68.0	49.0	6.9	1.05	1.00	2.05	2.05	1.52	0.52
17	0.4500	0.450	71.0	51.1	7.8	1.08	1.00	2.08	2.08	1.54	0.54
18	0.5000	0.500	76.0	54.7	8.6	1.15	1.00	2.15	2.15	1.57	0.57
19	0.5500	0.550	80.0	57.6	9.5	1.20	1.00	2.20	2.20	1.60	0.60
20	0.6000	0.600	88.0	63.4	10.3	1.31	1.00	2.31	2.31	1.65	0.65
21	0.6500	0.650	92.0	66.2	11.2	1.35	1.00	2.35	2.35	1.68	0.68
22	0.7000	0.700	98.0	70.6	12.1	1.43	1.00	2.43	2.43	1.71	0.71
23	0.7500	0.750	103.0	74.2	12.9	1.48	1.00	2.48	2.49	1.74	0.74
24	0.8000	0.800	109.0	78.5	13.8	1.56	1.00	2.55	2.56	1.78	0.78
25	0.8500	0.850	115.0	82.8	14.7	1.62	1.00	2.62	2.63	1.81	0.81
26	0.9000	0.900	120.0	86.4	15.5	1.68	1.00	2.68	2.68	1.84	0.84

Specimen Parameters for Specimen No. 2

Specimen Parameter	Initial	Saturated	Final
Wt. moist soil and tare:	1206.160		1240.250
Wt. dry soil and tare:	996.830		996.830
Wt. of tare:	0.000		0.000
Weight, gms:	1206.2		
Diameter, in:	2.846	2.847	
Area, in²:	6.362	6.367	
Height, in:	5.920	5.920	
Net decrease in height, in:		0.000	
% Moisture:	21.0	24.5	24.4
Wet density, pcf:	122.0	125.4	
Dry density, pcf:	100.8	100.7	
Void ratio:	0.6530	0.6544	
% Saturation:	85.9	100.0	

Test Readings Data for Specimen No. 2

Deformation dial constant= 1 in per input unit
Primary load ring constant= 0.72 lbs per input unit
Secondary load ring constant= 0 lbs per input unit
Crossover reading for secondary load ring= 0 input units
Membrane modulus = 0.14000 kN/cm²
Membrane thickness = 0.012 cm
Cell pressure = 27.80 psi = 4.00 ksf
Back pressure = 0.00 psi = 0.00 ksf
Effective confining stress = 4.00 ksf
Strain rate, %/min = 0.33
FAIL. STRESS = 1.62 ksf at reading no. 26
ULT. STRESS = not selected

No.	Def. Dial Units	Def. in	Load Dial Units	Load lbs	Strain %	Deviator Stress ksf	Principal Stresses Minor ksf	Principal Stresses Major ksf	Principal Stresses 1:3 Ratio	P ksf	Q ksf
0	0.0000	0.000	0.0	0.0	0.0	0.00	4.00	4.00	1.00	4.00	0.00
1	0.0100	0.010	20.0	14.4	0.2	0.33	4.00	4.33	1.08	4.17	0.16
2	0.0200	0.020	28.0	20.2	0.3	0.45	4.00	4.46	1.11	4.23	0.23
3	0.0300	0.030	32.0	23.0	0.5	0.52	4.00	4.52	1.13	4.26	0.26
4	0.0400	0.040	34.0	24.5	0.7	0.55	4.00	4.55	1.14	4.28	0.27
5	0.0500	0.050	35.0	25.2	0.8	0.57	4.00	4.57	1.14	4.29	0.28
6	0.0600	0.060	37.0	26.6	1.0	0.60	4.00	4.60	1.15	4.30	0.30
7	0.0700	0.070	39.0	28.1	1.2	0.63	4.00	4.63	1.16	4.32	0.31
8	0.0800	0.080	40.0	28.8	1.4	0.64	4.00	4.65	1.16	4.32	0.32
9	0.0900	0.090	42.0	30.2	1.5	0.67	4.00	4.68	1.17	4.34	0.34
10	0.1000	0.100	43.0	31.0	1.7	0.69	4.00	4.69	1.17	4.35	0.34
11	0.1500	0.150	50.0	36.0	2.5	0.79	4.00	4.80	1.20	4.40	0.40
12	0.2000	0.200	53.0	38.2	3.4	0.83	4.00	4.84	1.21	4.42	0.42
13	0.2500	0.250	56.0	40.3	4.2	0.87	4.00	4.88	1.22	4.44	0.44
14	0.3000	0.300	58.0	41.8	5.1	0.90	4.00	4.90	1.22	4.45	0.45
15	0.3500	0.350	67.0	48.2	5.9	1.03	4.00	5.03	1.26	4.52	0.51
16	0.4000	0.400	74.0	53.3	6.8	1.12	4.00	5.13	1.28	4.56	0.56
17	0.4500	0.450	75.0	54.0	7.6	1.13	4.00	5.13	1.28	4.57	0.56
18	0.5000	0.500	77.0	55.4	8.4	1.15	4.00	5.15	1.29	4.58	0.57
19	0.5500	0.550	78.0	56.2	9.3	1.15	4.00	5.16	1.29	4.58	0.58
20	0.6000	0.600	82.0	59.0	10.1	1.20	4.00	5.20	1.30	4.60	0.60
21	0.6500	0.650	93.0	67.0	11.0	1.35	4.00	5.35	1.34	4.68	0.67

Test Readings Data for Specimen No. 2

No.	Def. Dial Units	Def. in	Load Dial Units	Load lbs	Strain %	Deviator Stress ksf	Principal Stresses Minor ksf	Principal Stresses Major ksf	1:3 Ratio	P ksf	Q ksf
22	0.7000	0.700	98.0	70.6	11.8	1.41	4.00	5.41	1.35	4.71	0.70
23	0.7500	0.750	100.0	72.0	12.7	1.42	4.00	5.43	1.36	4.71	0.71
24	0.8000	0.800	108.0	77.8	13.5	1.52	4.00	5.52	1.38	4.76	0.76
25	0.8500	0.850	110.0	79.2	14.4	1.53	4.00	5.54	1.38	4.77	0.77
26	0.9000	0.900	117.0	84.2	15.2	1.62	4.00	5.62	1.40	4.81	0.81

Specimen Parameters for Specimen No. 3

Specimen Parameter	Initial	Saturated	Final
Wt. moist soil and tare:	1206.450		1233.380
Wt. dry soil and tare:	997.070		997.070
Wt. of tare:	0.000		0.000
Weight, gms:	1206.5		
Diameter, in:	2.849	2.869	
Area, in²:	6.375	6.463	
Height, in:	5.800	5.800	
Net decrease in height, in:		0.000	
% Moisture:	21.0	24.2	23.7
Wet density, pcf:	124.3	125.8	
Dry density, pcf:	102.7	101.3	
Void ratio:	0.6225	0.6450	
% Saturation:	90.1	100.0	

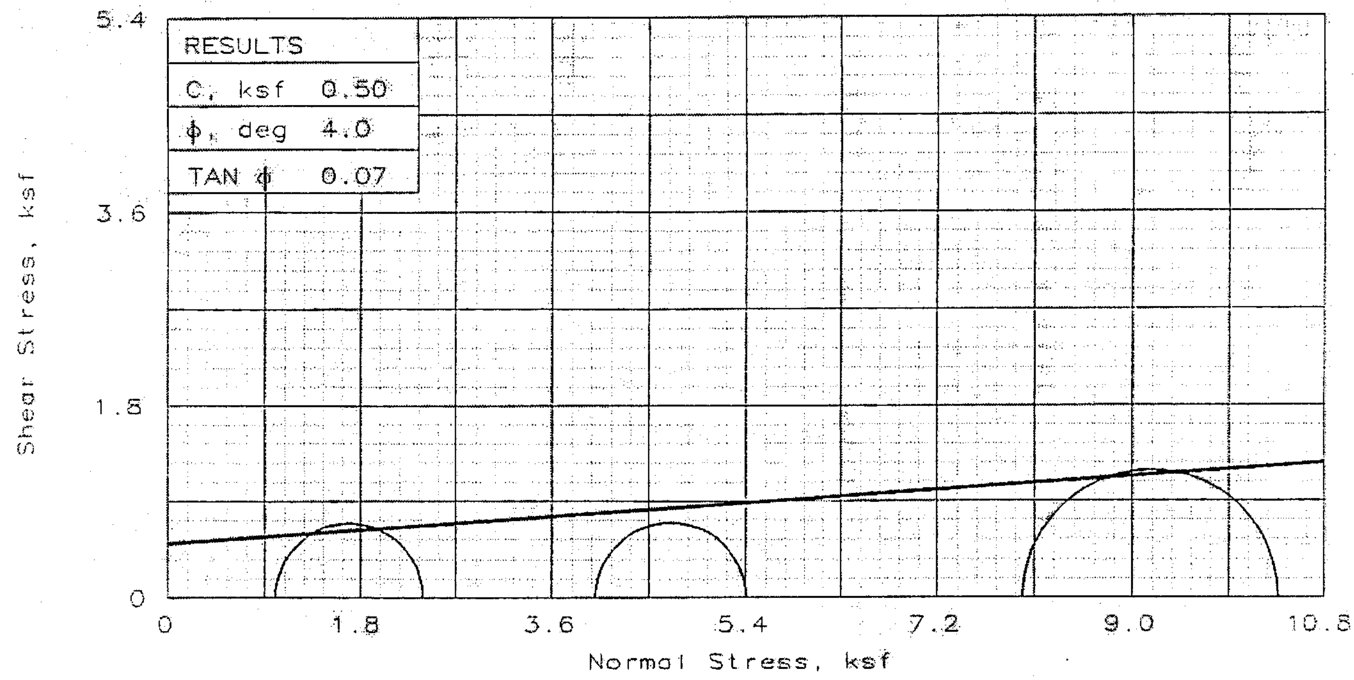
Test Readings Data for Specimen No. 3

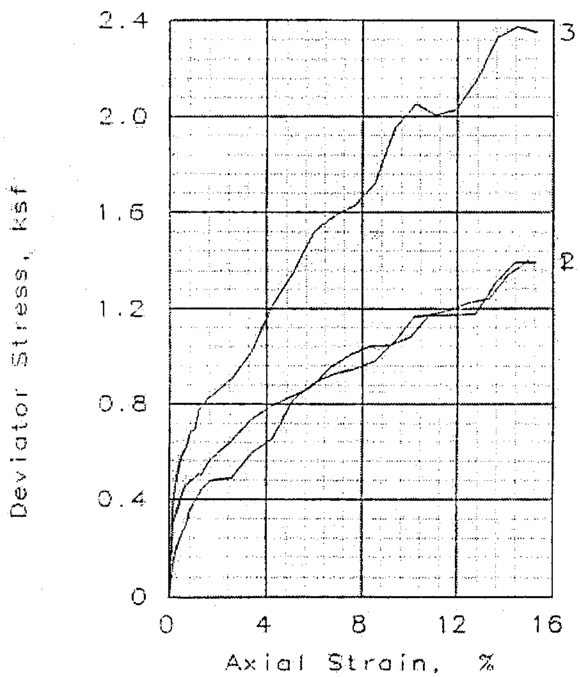
Deformation dial constant= 1 in per input unit
Primary load ring constant= 0.72 lbs per input unit
Secondary load ring constant= 0 lbs per input unit
Crossover reading for secondary load ring= 0 input units
Membrane modulus = 0.14000 kN/cm²
Membrane thickness = 0.012 cm
Cell pressure = 55.50 psi = 7.99 ksf
Back pressure = 0.00 psi = 0.00 ksf
Effective confining stress = 7.99 ksf
Strain rate, %/min = 0.33
FAIL. STRESS = 2.26 ksf at reading no. 26
ULT. STRESS = not selected

No.	Def. Dial Units	Def. in	Load Dial Units	Load lbs	Strain %	Deviator Stress ksf	Principal Stresses Minor ksf	Major ksf	1:3 Ratio	P ksf	Q ksf
0	0.0000	0.000	0.0	0.0	0.0	0.00	7.99	7.99	1.00	7.99	0.00
1	0.0100	0.010	31.0	22.3	0.2	0.50	7.99	8.49	1.06	8.24	0.25
2	0.0200	0.020	38.0	27.4	0.3	0.61	7.99	8.60	1.08	8.30	0.30
3	0.0300	0.030	39.0	28.1	0.5	0.62	7.99	8.61	1.08	8.30	0.31
4	0.0400	0.040	40.0	28.8	0.7	0.64	7.99	8.63	1.08	8.31	0.32
5	0.0500	0.050	42.0	30.2	0.9	0.67	7.99	8.66	1.08	8.33	0.33
6	0.0600	0.060	44.0	31.7	1.0	0.70	7.99	8.69	1.09	8.34	0.35
7	0.0700	0.070	45.0	32.4	1.2	0.71	7.99	8.71	1.09	8.35	0.36
8	0.0800	0.080	47.0	33.8	1.4	0.74	7.99	8.74	1.09	8.36	0.37
9	0.0900	0.090	48.0	34.6	1.6	0.76	7.99	8.75	1.09	8.37	0.38
10	0.1000	0.100	49.0	35.3	1.7	0.77	7.99	8.76	1.10	8.38	0.39
11	0.1500	0.150	55.0	39.6	2.6	0.86	7.99	8.85	1.11	8.42	0.43
12	0.2000	0.200	63.0	45.4	3.4	0.98	7.99	8.97	1.12	8.48	0.49
13	0.2500	0.250	71.0	51.1	4.3	1.09	7.99	9.08	1.14	8.54	0.54
14	0.3000	0.300	77.0	55.4	5.2	1.17	7.99	9.16	1.15	8.58	0.59
15	0.3500	0.350	84.0	60.5	6.0	1.27	7.99	9.26	1.16	8.63	0.63
16	0.4000	0.400	91.0	65.5	6.9	1.36	7.99	9.35	1.17	8.67	0.68
17	0.4500	0.450	100.0	72.0	7.8	1.48	7.99	9.47	1.19	8.73	0.74
18	0.5000	0.500	106.0	76.3	8.6	1.55	7.99	9.55	1.19	8.77	0.78
19	0.5500	0.550	112.0	80.6	9.5	1.63	7.99	9.62	1.20	8.81	0.81
20	0.6000	0.600	120.0	86.4	10.3	1.73	7.99	9.72	1.22	8.85	0.86
21	0.6500	0.650	133.0	95.8	11.2	1.89	7.99	9.89	1.24	8.94	0.95

Test Readings Data for Specimen No. 3

No.	Def. Dial Units	Def. in	Load Dial Units	Load lbs	Strain %	Deviator Stress ksf	Principal Stresses Minor ksf	Major ksf	1:3 Ratio	P ksf	Q ksf
22	0.7000	0.700	138.0	99.4	12.1	1.95	7.99	9.94	1.24	8.97	0.97
23	0.7500	0.750	142.0	102.2	12.9	1.98	7.99	9.98	1.25	8.98	0.99
24	0.8000	0.800	147.0	105.8	13.8	2.03	7.99	10.02	1.25	9.01	1.02
25	0.8500	0.850	157.0	113.0	14.7	2.15	7.99	10.14	1.27	9.07	1.07
26	0.9000	0.900	167.0	120.2	15.5	2.26	7.99	10.26	1.28	9.12	1.13





SAMPLE NO.:		1	2	3
INITIAL	WATER CONTENT, %	19.0	19.0	19.0
	DRY DENSITY, pcf	102.9	100.4	102.6
	SATURATION, %	82.3	77.3	81.6
	VOID RATIO	0.614	0.654	0.619
	DIAMETER, in	2.85	2.84	2.85
	HEIGHT, in	5.89	6.01	5.87
AT TEST	WATER CONTENT, %	23.3	24.1	23.2
	DRY DENSITY, pcf	102.5	101.2	102.7
	SATURATION, %	100.0	100.0	100.0
	VOID RATIO	0.621	0.640	0.617
	DIAMETER, in	2.85	2.83	2.84
	HEIGHT, in	5.89	6.01	5.87
Strain rate, %/min		0.33	0.33	0.33
BACK PRESSURE, ksf		0.0	0.0	0.0
CELL PRESSURE, ksf		1.0	4.0	8.0
FAIL. STRESS, ksf		1.4	1.4	2.4
ULT. STRESS, ksf				
σ_1 FAILURE, ksf		2.4	5.4	10.4
σ_3 FAILURE, ksf		1.0	4.0	8.0

TYPE OF TEST:
Unconsolidated Undrained

SAMPLE TYPE: Remolded Sample

DESCRIPTION: Light-Brown Silty Clay (CL)

LL= 38 PL= 18 PI= 20

SPECIFIC GRAVITY= 2.66

REMARKS: Remolded to 95% MDD @ Optimum Moisture Content of Standard Proctor (Saturated UU)

Fig. No.: ______ HB

CLIENT: TVA

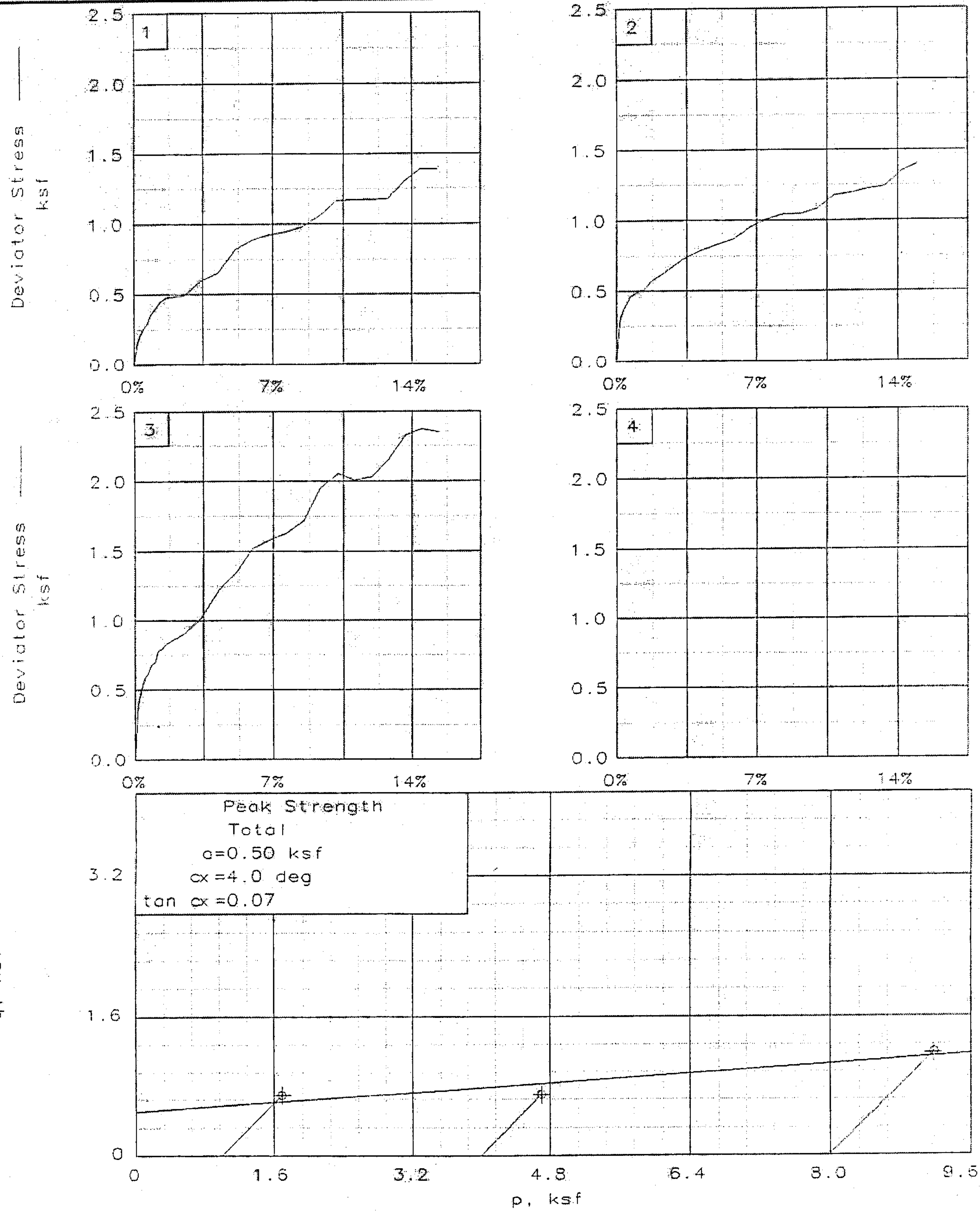
PROJECT: Ash Disposal Areas - TVA Gallatin Fossil Plant

SAMPLE LOCATION: A-9 Bulk @ 0'-15'

PROJ. NO.: 3043-04-1043 DATE: 10-01-04

TRIAXIAL SHEAR TEST REPORT

LAW ENGINEERING AND ENVIRONMENTAL SERVICES



Stress Paths: + indicates end ○ indicates peak

Client: TVA

Project: Ash Disposal Areas - TVA Gallatin Fossil Plant

Location: A-9 Bulk @ 0'-15'

File: FOSSIL7 Project No.: 3043-04-1043 Fig. No.: ____

TRIAXIAL COMPRESSION TEST
Unconsolidated Undrained

10-04-2004
5:50 pm

Project and Sample Data

Date: 10-01-04
Client: TVA
Project: Ash Disposal Areas - TVA Gallatin Fossil Plant
Sample location: A-9 Bulk @ 0'-15'
Sample description: Light-Brown Silty Clay (CL)
Remarks: Remolded to 95% MDD @ Optimum Moisture Content of Standard Proctor (Saturated UU)
Fig no.: 2nd page Fig no. (if applicable):
Type of sample: Remolded Sample
Specific gravity= 2.66 LL= 38 PL= 18 PI= 20
Test method: Corps of Eng. - saturation assumed

Specimen Parameters for Specimen No. 1

Specimen Parameter	Initial	Saturated	Final
Wt. moist soil and tare:	1203.370		1247.220
Wt. dry soil and tare:	1011.240		1011.240
Wt. of tare:	0.000		0.000
Weight, gms:	1203.4		
Diameter, in:	2.845	2.851	
Area, in^2:	6.357	6.383	
Height, in:	5.890	5.890	
Net decrease in height, in:		0.000	
% Moisture:	19.0	23.3	23.3
Wet density, pcf:	122.4	126.4	
Dry density, pcf:	102.9	102.5	
Void ratio:	0.6140	0.6206	
% Saturation:	82.3	100.0	

Test Readings Data for Specimen No. 1

Deformation dial constant= 1 in per input unit
Primary load ring constant= 0.72 lbs per input unit
Secondary load ring constant= 0 lbs per input unit
Crossover reading for secondary load ring= 0 input units
Membrane modulus = 0.14000 kN/cm^2
Membrane thickness = 0.012 cm
Cell pressure = 6.94 psi = 1.00 ksf
Back pressure = 0.00 psi = 0.00 ksf
Effective confining stress = 1.00 ksf
Strain rate, %/min = 0.33
FAIL. STRESS = 1.39 ksf at reading no. 25
ULT. STRESS = not selected

Test Readings Data for Specimen No. 1

No.	Def. Dial Units	Def. in	Load Dial Units	Load lbs	Strain %	Deviator Stress ksf	Principal Stresses Minor ksf	Principal Stresses Major ksf	1:3 Ratio	P ksf	Q ksf
0	0.0000	0.000	0.0	0.0	0.0	0.00	1.00	1.00	1.00	1.00	0.00
1	0.0100	0.010	9.0	6.5	0.2	0.15	1.00	1.15	1.15	1.07	0.07
2	0.0200	0.020	13.0	9.4	0.3	0.21	1.00	1.21	1.21	1.10	0.11
3	0.0300	0.030	16.0	11.5	0.5	0.26	1.00	1.26	1.26	1.13	0.13
4	0.0400	0.040	18.0	13.0	0.7	0.29	1.00	1.29	1.29	1.14	0.15
5	0.0500	0.050	22.0	15.8	0.8	0.35	1.00	1.35	1.35	1.18	0.18
6	0.0600	0.060	24.0	17.3	1.0	0.39	1.00	1.39	1.39	1.19	0.19
7	0.0700	0.070	26.0	18.7	1.2	0.42	1.00	1.42	1.42	1.21	0.21
8	0.0800	0.080	28.0	20.2	1.4	0.45	1.00	1.45	1.45	1.22	0.22
9	0.0900	0.090	29.0	20.9	1.5	0.46	1.00	1.46	1.46	1.23	0.23
10	0.1000	0.100	30.0	21.6	1.7	0.48	1.00	1.48	1.48	1.24	0.24
11	0.1500	0.150	31.0	22.3	2.5	0.49	1.00	1.49	1.49	1.24	0.25
12	0.2000	0.200	38.0	27.4	3.4	0.60	1.00	1.60	1.60	1.30	0.30
13	0.2500	0.250	42.0	30.2	4.2	0.65	1.00	1.65	1.65	1.33	0.33
14	0.3000	0.300	53.0	38.2	5.1	0.82	1.00	1.82	1.82	1.41	0.41
15	0.3500	0.350	58.0	41.8	5.9	0.89	1.00	1.89	1.89	1.44	0.44
16	0.4000	0.400	61.0	43.9	6.8	0.92	1.00	1.92	1.92	1.46	0.46
17	0.4500	0.450	63.0	45.4	7.6	0.95	1.00	1.94	1.95	1.47	0.47
18	0.5000	0.500	66.0	47.5	8.5	0.98	1.00	1.98	1.98	1.49	0.49
19	0.5500	0.550	72.0	51.8	9.3	1.06	1.00	2.06	2.06	1.53	0.53
20	0.6000	0.600	80.0	57.6	10.2	1.17	1.00	2.17	2.17	1.58	0.58
21	0.6500	0.650	81.0	58.3	11.0	1.17	1.00	2.17	2.17	1.58	0.59
22	0.7000	0.700	82.0	59.0	11.9	1.17	1.00	2.17	2.17	1.59	0.59
23	0.7500	0.750	83.0	59.8	12.7	1.18	1.00	2.18	2.18	1.59	0.59
24	0.8000	0.800	93.0	67.0	13.6	1.31	1.00	2.30	2.31	1.65	0.65
25	0.8500	0.850	100.0	72.0	14.4	1.39	1.00	2.39	2.39	1.69	0.69
26	0.9000	0.900	101.0	72.7	15.3	1.39	1.00	2.39	2.39	1.69	0.69

Specimen Parameters for Specimen No. 2

Specimen Parameter	Initial	Saturated	Final
Wt. moist soil and tare:	1196.320		1249.740
Wt. dry soil and tare:	1005.310		1005.310
Wt. of tare:	0.000		0.000
Weight, gms:	1196.3		
Diameter, in:	2.843	2.831	
Area, in²:	6.348	6.297	
Height, in:	6.008	6.008	
Net decrease in height, in:		0.000	
% Moisture:	19.0	24.1	24.3
Wet density, pcf:	119.5	125.6	
Dry density, pcf:	100.4	101.2	
Void ratio:	0.6537	0.6403	
% Saturation:	77.3	100.0	

Test Readings Data for Specimen No. 2

Deformation dial constant= 1 in per input unit
Primary load ring constant= 0.72 lbs per input unit
Secondary load ring constant= 0 lbs per input unit
Crossover reading for secondary load ring= 0 input units
Membrane modulus = 0.14000 kN/cm²
Membrane thickness = 0.012 cm
Cell pressure = 27.80 psi = 4.00 ksf
Back pressure = 0.00 psi = 0.00 ksf
Effective confining stress = 4.00 ksf
Strain rate, %/min = 0.33
FAIL. STRESS = 1.40 ksf at reading no. 26
ULT. STRESS = not selected

No.	Def. Dial Units	Def. in	Load Dial Units	Load lbs	Strain %	Deviator Stress ksf	Principal Stresses Minor ksf	Principal Stresses Major ksf	1:3 Ratio	P ksf	Q ksf
0	0.0000	0.000	0.0	0.0	0.0	0.00	4.00	4.00	1.00	4.00	0.00
1	0.0100	0.010	18.0	13.0	0.2	0.30	4.00	4.30	1.07	4.15	0.15
2	0.0200	0.020	22.0	15.8	0.3	0.36	4.00	4.36	1.09	4.18	0.18
3	0.0300	0.030	25.0	18.0	0.5	0.41	4.00	4.41	1.10	4.21	0.20
4	0.0400	0.040	28.0	20.2	0.7	0.46	4.00	4.46	1.11	4.23	0.23
5	0.0500	0.050	29.0	20.9	0.8	0.47	4.00	4.48	1.12	4.24	0.24
6	0.0600	0.060	30.0	21.6	1.0	0.49	4.00	4.49	1.12	4.25	0.24
7	0.0700	0.070	31.0	22.3	1.2	0.50	4.00	4.51	1.13	4.26	0.25
8	0.0800	0.080	31.0	22.3	1.3	0.50	4.00	4.51	1.13	4.26	0.25
9	0.0900	0.090	33.0	23.8	1.5	0.54	4.00	4.54	1.13	4.27	0.27
10	0.1000	0.100	35.0	25.2	1.7	0.57	4.00	4.57	1.14	4.29	0.28
11	0.1500	0.150	40.0	28.8	2.5	0.64	4.00	4.65	1.16	4.32	0.32
12	0.2000	0.200	46.0	33.1	3.3	0.73	4.00	4.74	1.18	4.37	0.37
13	0.2500	0.250	50.0	36.0	4.2	0.79	4.00	4.79	1.20	4.40	0.39
14	0.3000	0.300	53.0	38.2	5.0	0.83	4.00	4.83	1.21	4.42	0.41
15	0.3500	0.350	56.0	40.3	5.8	0.87	4.00	4.87	1.22	4.44	0.43
16	0.4000	0.400	62.0	44.6	6.7	0.95	4.00	4.96	1.24	4.48	0.48
17	0.4500	0.450	66.0	47.5	7.5	1.01	4.00	5.01	1.25	4.51	0.50
18	0.5000	0.500	69.0	49.7	8.3	1.04	4.00	5.04	1.26	4.52	0.52
19	0.5500	0.550	70.0	50.4	9.2	1.05	4.00	5.05	1.26	4.53	0.52
20	0.6000	0.600	73.0	52.6	10.0	1.08	4.00	5.09	1.27	4.54	0.54
21	0.6500	0.650	80.0	57.6	10.8	1.17	4.00	5.18	1.29	4.59	0.59

Test Readings Data for Specimen No. 2

No.	Def. Dial Units	Def. in	Load Dial Units	Load lbs	Strain %	Deviator Stress ksf	Principal Stresses Minor ksf	Major ksf	1:3 Ratio	P ksf	Q ksf
22	0.7000	0.700	82.0	59.0	11.7	1.19	4.00	5.20	1.30	4.60	0.60
23	0.7500	0.750	85.0	61.2	12.5	1.22	4.00	5.23	1.31	4.62	0.61
24	0.8000	0.800	87.0	62.6	13.3	1.24	4.00	5.24	1.31	4.62	0.62
25	0.8500	0.850	95.0	68.4	14.1	1.34	4.00	5.35	1.34	4.67	0.67
26	0.9000	0.900	100.0	72.0	15.0	1.40	4.00	5.40	1.35	4.70	0.70

Specimen Parameters for Specimen No. 3

Specimen Parameter	Initial	Saturated	Final
Wt. moist soil and tare:	1194.800		1236.870
Wt. dry soil and tare:	1004.030		1004.030
Wt. of tare:	0.000		0.000
Weight, gms:	1194.8		
Diameter, in:	2.845	2.843	
Area, in²:	6.357	6.347	
Height, in:	5.867	5.867	
Net decrease in height, in:		0.000	
% Moisture:	19.0	23.2	23.2
Wet density, pcf:	122.0	126.5	
Dry density, pcf:	102.6	102.7	
Void ratio:	0.6192	0.6167	
% Saturation:	81.6	100.0	

Test Readings Data for Specimen No. 3

Deformation dial constant= 1 in per input unit
Primary load ring constant= 0.72 lbs per input unit
Secondary load ring constant= 0 lbs per input unit
Crossover reading for secondary load ring= 0 input units
Membrane modulus = 0.14000 kN/cm²
Membrane thickness = 0.012 cm
Cell pressure = 55.50 psi = 7.99 ksf
Back pressure = 0.00 psi = 0.00 ksf
Effective confining stress = 7.99 ksf
Strain rate, %/min = 0.33
FAIL. STRESS = 2.37 ksf at reading no. 25
ULT. STRESS = not selected

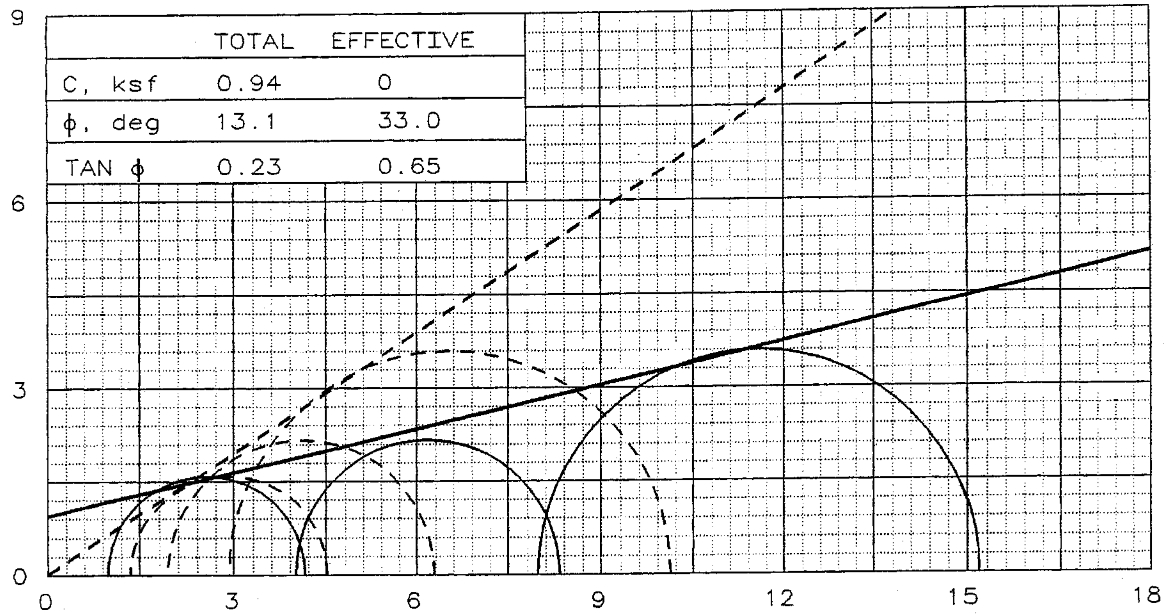
No.	Def. Dial Units	Def. in	Load Dial Units	Load lbs	Strain %	Deviator Stress ksf	Principal Stresses Minor ksf	Principal Stresses Major ksf	Principal Stresses 1:3 Ratio	P ksf	Q ksf
0	0.0000	0.000	0.0	0.0	0.0	0.00	7.99	7.99	1.00	7.99	0.00
1	0.0100	0.010	24.0	17.3	0.2	0.39	7.99	8.38	1.05	8.19	0.20
2	0.0200	0.020	31.0	22.3	0.3	0.50	7.99	8.50	1.06	8.24	0.25
3	0.0300	0.030	36.0	25.9	0.5	0.59	7.99	8.58	1.07	8.28	0.29
4	0.0400	0.040	38.0	27.4	0.7	0.62	7.99	8.61	1.08	8.30	0.31
5	0.0500	0.050	42.0	30.2	0.9	0.68	7.99	8.67	1.09	8.33	0.34
6	0.0600	0.060	43.0	31.0	1.0	0.70	7.99	8.69	1.09	8.34	0.35
7	0.0700	0.070	48.0	34.6	1.2	0.77	7.99	8.77	1.10	8.38	0.39
8	0.0800	0.080	49.0	35.3	1.4	0.79	7.99	8.78	1.10	8.39	0.39
9	0.0900	0.090	51.0	36.7	1.5	0.82	7.99	8.81	1.10	8.40	0.41
10	0.1000	0.100	52.0	37.4	1.7	0.83	7.99	8.83	1.10	8.41	0.42
11	0.1500	0.150	57.0	41.0	2.6	0.91	7.99	8.90	1.11	8.45	0.45
12	0.2000	0.200	65.0	46.8	3.4	1.03	7.99	9.02	1.13	8.50	0.51
13	0.2500	0.250	78.0	56.2	4.3	1.22	7.99	9.21	1.15	8.60	0.61
14	0.3000	0.300	87.0	62.6	5.1	1.35	7.99	9.34	1.17	8.67	0.67
15	0.3500	0.350	99.0	71.3	6.0	1.52	7.99	9.51	1.19	8.75	0.76
16	0.4000	0.400	104.0	74.9	6.8	1.58	7.99	9.58	1.20	8.78	0.79
17	0.4500	0.450	108.0	77.8	7.7	1.63	7.99	9.62	1.20	8.81	0.81
18	0.5000	0.500	115.0	82.8	8.5	1.72	7.99	9.71	1.22	8.85	0.86
19	0.5500	0.550	132.0	95.0	9.4	1.95	7.99	9.95	1.24	8.97	0.98
20	0.6000	0.600	140.0	100.8	10.2	2.05	7.99	10.05	1.26	9.02	1.03
21	0.6500	0.650	138.0	99.4	11.1	2.00	7.99	10.00	1.25	8.99	1.00

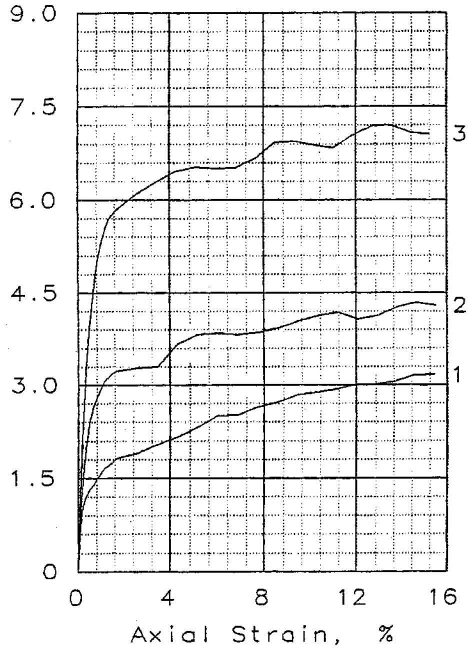
Test Readings Data for Specimen No. 3

No.	Def. Dial Units	Def. in	Load Dial Units	Load lbs	Strain %	Deviator Stress ksf	Principal Stresses Minor ksf	Major ksf	1:3 Ratio	P ksf	Q ksf
22	0.7000	0.700	141.0	101.5	11.9	2.03	7.99	10.02	1.25	9.01	1.01
23	0.7500	0.750	151.0	108.7	12.8	2.15	7.99	10.14	1.27	9.07	1.08
24	0.8000	0.800	165.0	118.8	13.6	2.33	7.99	10.32	1.29	9.16	1.16
25	0.8500	0.850	170.0	122.4	14.5	2.37	7.99	10.37	1.30	9.18	1.19
26	0.9000	0.900	170.0	122.4	15.3	2.35	7.99	10.34	1.29	9.17	1.18

TRIAXIAL COMPRESSION TEST RESULTS

OFF-SITE BORROW SAMPLES





SAMPLE NO.:		1	2	3
INITIAL	WATER CONTENT, %	19.4	19.4	19.4
	DRY DENSITY, pcf	99.7	99.3	99.6
	SATURATION, %	79.9	79.1	79.6
	VOID RATIO	0.634	0.640	0.636
	DIAMETER, in	2.84	2.84	2.84
	HEIGHT, in	5.93	5.91	5.90
AT TEST	WATER CONTENT, %	24.4	23.9	23.3
	DRY DENSITY, pcf	99.5	100.4	101.4
	SATURATION, %	100.0	100.0	100.0
	VOID RATIO	0.638	0.623	0.607
	DIAMETER, in	2.87	2.85	2.82
	HEIGHT, in	5.84	5.80	5.90
Strain rate, %/min		0.17	0.17	0.17
BACK PRESSURE, ksf		7.2	7.2	7.2
CELL PRESSURE, ksf		8.2	11.2	15.2
FAIL. STRESS, ksf		3.2	4.3	7.2
TOTAL PORE PR., ksf		6.8	9.3	12.3
ULT. STRESS, ksf				
TOTAL PORE PR., ksf				
$\bar{\sigma}_1$ FAILURE, ksf		4.5	6.3	10.1
$\bar{\sigma}_3$ FAILURE, ksf		1.4	1.9	2.9

TYPE OF TEST:
CU with Pore Pressures
SAMPLE TYPE: Remolded Sample
DESCRIPTION: Yellow-Brown Sandy Silty Clay (CL)
LL= 33 PL= 21 PI= 12
SPECIFIC GRAVITY= 2.61
REMARKS: Remolded to 95% MDD @ Optimum Moisture Content of Standard Proctor

Fig. No.: ______ HB

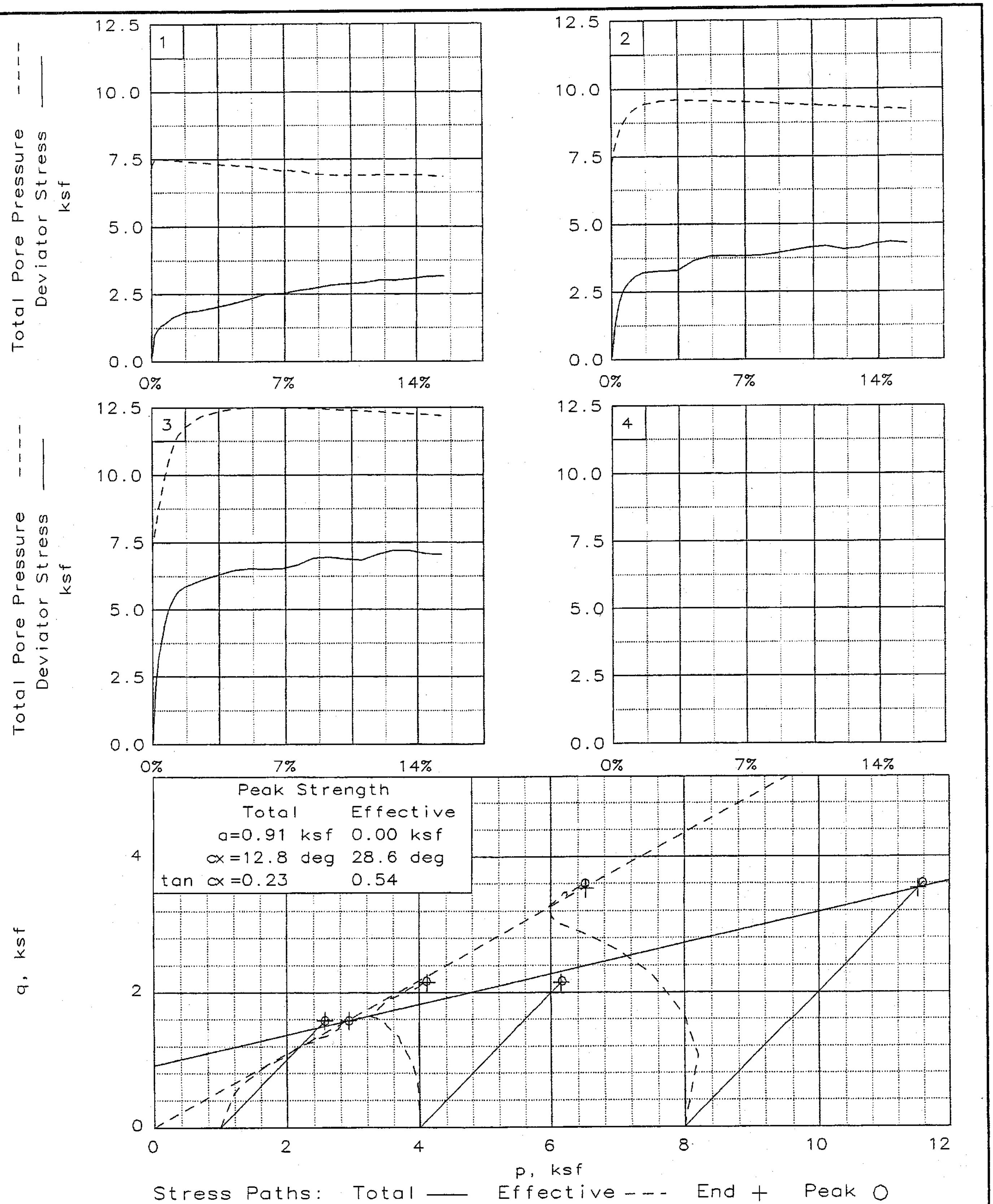
CLIENT: TVA

PROJECT: Ash Disposal Areas - TVA Gallatin Fossil Plant
SAMPLE LOCATION: Off Site Borrow Sample #2

PROJ. NO.: 3043-04-1043 DATE: 10-11-04

TRIAXIAL SHEAR TEST REPORT

LAW ENGINEERING AND ENVIRONMENTAL SERVICES



Client: TVA

Project: Ash Disposal Areas - TVA Gallatin Fossil Plant

Location: Off Site Borrow Sample #2

File: FOSSIL11 Project No.: 3043-04-1043 Fig. No.: _____

TRIAXIAL COMPRESSION TEST
CU with Pore Pressures

10-11-2004
10:22 am

Project and Sample Data

Date: 10-11-04
Client: TVA
Project: Ash Disposal Areas - TVA Gallatin Fossil Plant
Sample location: Off Site Borrow Sample #2
Sample description: Yellow-Brown Sandy Silty Clay (CL)
Remarks: Remolded to 95% MDD @ Optimum Moisture Content of Standard Proctor
Fig no.: 2nd page Fig no. (if applicable):
Type of sample: Remolded Sample
Specific gravity= 2.61 LL= 33 PL= 21 PI= 12
Test method: Corps of Eng. - saturation assumed

Specimen Parameters for Specimen No. 1

Specimen Parameter	Initial	Saturated	Consolidated	Final
Wt. moist soil and tare:	1174.650			1222.040
Wt. dry soil and tare:	983.790			983.790
Wt. of tare:	0.000			0.000
Weight, gms:	1174.7			
Diameter, in:	2.840	2.855	2.867	
Area, in^2:	6.335	6.401	6.455	
Height, in:	5.933	5.933	5.836	
Net decrease in height, in:		0.000	0.097	
Net decrease in water volume, cc:		-54.500	5.000	
% Moisture:	19.4	24.9	24.4	24.2
Wet density, pcf:	119.1	123.3	123.8	
Dry density, pcf:	99.7	98.7	99.5	
Void ratio:	0.6340	0.6509	0.6377	
% Saturation:	79.9	100.0	100.0	

Test Readings Data for Specimen No. 1

Deformation dial constant= 1 in per input unit
Primary load ring constant= 0.72 lbs per input unit
Secondary load ring constant= 0 lbs per input unit
Crossover reading for secondary load ring= 0 input units
Membrane modulus = 0.14000 kN/cm^2
Membrane thickness = 0.012 cm
Consolidation cell pressure = 56.90 psi = 8.19 ksf
Consolidation back pressure = 50.00 psi = 7.20 ksf
Consolidation effective confining stress = 0.99 ksf
Strain rate, %/min = 0.17
FAIL. STRESS = 3.17 ksf at reading no. 26
ULT. STRESS = not selected

Test Readings Data for Specimen No. 1

No.	Def. Dial Units	Def. in	Load Dial Units	Load lbs	Strain %	Deviator Stress ksf	Effective Stresses Minor ksf	Effective Stresses Major ksf	1:3 Ratio	Pore Pres. psi	P ksf	Q ksf
0	0.0000	0.000	0.0	0.0	0.0	0.00	0.99	0.99	1.00	50.00	0.99	0.00
1	0.0100	0.010	62.0	44.6	0.2	0.99	0.71	1.70	2.41	52.00	1.20	0.50
2	0.0200	0.020	75.0	54.0	0.3	1.20	0.68	1.88	2.77	52.20	1.28	0.60
3	0.0300	0.030	83.0	59.8	0.5	1.33	0.69	2.02	2.92	52.10	1.35	0.66
4	0.0400	0.040	88.0	63.4	0.7	1.40	0.71	2.11	2.99	52.00	1.41	0.70
5	0.0500	0.050	94.0	67.7	0.9	1.50	0.72	2.22	3.08	51.90	1.47	0.75
6	0.0600	0.060	100.0	72.0	1.0	1.59	0.73	2.32	3.16	51.80	1.53	0.79
7	0.0700	0.070	105.0	75.6	1.2	1.67	0.75	2.42	3.23	51.70	1.58	0.83
8	0.0800	0.080	108.0	77.8	1.4	1.71	0.75	2.46	3.29	51.70	1.60	0.86
9	0.0900	0.090	111.0	79.9	1.5	1.76	0.76	2.52	3.30	51.60	1.64	0.88
10	0.1000	0.100	115.0	82.8	1.7	1.82	0.78	2.59	3.33	51.50	1.69	0.91
11	0.1500	0.150	121.0	87.1	2.6	1.89	0.82	2.71	3.31	51.20	1.77	0.95
12	0.2000	0.200	131.0	94.3	3.4	2.03	0.89	2.92	3.28	50.70	1.91	1.02
13	0.2500	0.250	140.0	100.8	4.3	2.15	0.92	3.07	3.34	50.50	2.00	1.08
14	0.3000	0.300	152.0	109.4	5.1	2.32	0.96	3.28	3.40	50.20	2.12	1.16
15	0.3500	0.350	166.0	119.5	6.0	2.51	1.07	3.57	3.35	49.50	2.32	1.25
16	0.4000	0.400	168.0	121.0	6.9	2.51	1.12	3.64	3.24	49.10	2.38	1.26
17	0.4500	0.450	178.0	128.2	7.7	2.64	1.14	3.78	3.32	49.00	2.46	1.32
18	0.5000	0.500	185.0	133.2	8.6	2.72	1.25	3.97	3.17	48.20	2.61	1.36
19	0.5500	0.550	195.0	140.4	9.4	2.84	1.30	4.13	3.19	47.90	2.71	1.42
20	0.6000	0.600	200.0	144.0	10.3	2.88	1.31	4.19	3.20	47.80	2.75	1.44
21	0.6500	0.650	205.0	147.6	11.1	2.93	1.31	4.24	3.23	47.80	2.77	1.46
22	0.7000	0.700	213.0	153.4	12.0	3.01	1.30	4.31	3.32	47.90	2.80	1.51
23	0.7500	0.750	215.0	154.8	12.9	3.01	1.30	4.31	3.32	47.90	2.80	1.50
24	0.8000	0.800	221.0	159.1	13.7	3.06	1.30	4.36	3.36	47.90	2.83	1.53
25	0.8500	0.850	230.0	165.6	14.6	3.16	1.32	4.48	3.38	47.70	2.90	1.58
26	0.9000	0.900	233.0	167.8	15.4	3.17	1.35	4.52	3.34	47.50	2.94	1.58

Specimen Parameters for Specimen No. 2

Specimen Parameter	Initial	Saturated	Consolidated	Final
Wt. moist soil and tare:	1164.710			1208.950
Wt. dry soil and tare:	975.470			975.470
Wt. of tare:	0.000			0.000
Weight, gms:	1164.7			
Diameter, in:	2.840	2.836	2.851	
Area, in²:	6.335	6.318	6.382	
Height, in:	5.906	5.906	5.799	
Net decrease in height, in:		0.000	0.107	
Net decrease in water volume, cc:		-48.500	5.000	
% Moisture:	19.4	24.4	23.9	23.9
Wet density, pcf:	118.6	123.9	124.4	
Dry density, pcf:	99.3	99.6	100.4	
Void ratio:	0.6404	0.6361	0.6227	
% Saturation:	79.1	100.0	100.0	

Test Readings Data for Specimen No. 2

Deformation dial constant= 1 in per input unit
Primary load ring constant= 0.72 lbs per input unit
Secondary load ring constant= 0 lbs per input unit
Crossover reading for secondary load ring= 0 input units
Membrane modulus = 0.14000 kN/cm²
Membrane thickness = 0.012 cm
Consolidation cell pressure = 77.80 psi = 11.20 ksf
Consolidation back pressure = 50.00 psi = 7.20 ksf
Consolidation effective confining stress = 4.00 ksf
Strain rate, %/min = 0.17
FAIL. STRESS = 4.34 ksf at reading no. 25
ULT. STRESS = not selected

No.	Def. Dial Units	Def. in	Load Dial Units	Load lbs	Strain %	Deviator Stress ksf	Effective Stresses Minor ksf	Major ksf	1:3 Ratio	Pore Pres. psi	P ksf	Q ksf
0	0.0000	0.000	0.0	0.0	0.0	0.00	4.00	4.00	1.00	50.00	4.00	0.00
1	0.0100	0.010	82.0	59.0	0.2	1.33	3.31	4.64	1.40	54.80	3.98	0.66
2	0.0200	0.020	122.0	87.8	0.3	1.98	2.89	4.87	1.68	57.70	3.88	0.99
3	0.0300	0.030	151.0	108.7	0.5	2.44	2.52	4.96	1.97	60.30	3.74	1.22
4	0.0400	0.040	165.0	118.8	0.7	2.66	2.36	5.02	2.13	61.40	3.69	1.33
5	0.0500	0.050	176.0	126.7	0.9	2.83	2.19	5.02	2.30	62.60	3.61	1.42
6	0.0600	0.060	185.0	133.2	1.0	2.97	2.03	5.00	2.46	63.70	3.52	1.49
7	0.0700	0.070	192.0	138.2	1.2	3.08	1.94	5.03	2.59	64.30	3.48	1.54
8	0.0800	0.080	196.0	141.1	1.4	3.14	1.87	5.01	2.68	64.80	3.44	1.57
9	0.0900	0.090	200.0	144.0	1.6	3.20	1.81	5.01	2.76	65.20	3.41	1.60
10	0.1000	0.100	202.0	145.4	1.7	3.22	1.76	4.98	2.84	65.60	3.37	1.61
11	0.1500	0.150	207.0	149.0	2.6	3.28	1.64	4.92	3.00	66.40	3.28	1.64
12	0.2000	0.200	210.0	151.2	3.4	3.29	1.61	4.91	3.04	66.60	3.26	1.65
13	0.2500	0.250	236.0	169.9	4.3	3.67	1.63	5.30	3.25	66.50	3.46	1.83
14	0.3000	0.300	248.0	178.6	5.2	3.82	1.64	5.46	3.33	66.40	3.55	1.91
15	0.3500	0.350	252.0	181.4	6.0	3.85	1.66	5.50	3.32	66.30	3.58	1.92
16	0.4000	0.400	253.0	182.2	6.9	3.83	1.67	5.50	3.29	66.20	3.58	1.91
17	0.4500	0.450	257.0	185.0	7.8	3.85	1.70	5.55	3.27	66.00	3.62	1.93
18	0.5000	0.500	265.0	190.8	8.6	3.93	1.74	5.68	3.26	65.70	3.71	1.97
19	0.5500	0.550	275.0	198.0	9.5	4.04	1.77	5.81	3.28	65.50	3.79	2.02
20	0.6000	0.600	284.0	204.5	10.3	4.14	1.80	5.94	3.30	65.30	3.87	2.07

Test Readings Data for Specimen No. 2

No.	Def. Dial Units	Def. in	Load Dial Units	Load lbs	Strain %	Deviator Stress ksf	Effective Stresses Minor ksf	Major ksf	1:3 Ratio	Pore Pres. psi	P ksf	Q ksf
21	0.6500	0.650	290.0	208.8	11.2	4.18	1.83	6.01	3.29	65.10	3.92	2.09
22	0.7000	0.700	285.0	205.2	12.1	4.07	1.86	5.93	3.19	64.90	3.89	2.04
23	0.7500	0.750	292.0	210.2	12.9	4.13	1.89	6.02	3.19	64.70	3.95	2.07
24	0.8000	0.800	305.0	219.6	13.8	4.27	1.92	6.19	3.23	64.50	4.05	2.14
25	0.8500	0.850	313.0	225.4	14.7	4.34	1.94	6.28	3.23	64.30	4.11	2.17
26	0.9000	0.900	313.0	225.4	15.5	4.30	1.97	6.27	3.18	64.10	4.12	2.15

Specimen Parameters for Specimen No. 3

Specimen Parameter	Initial	Saturated	Consolidated	Final
Wt. moist soil and tare:	1167.620			1203.620
Wt. dry soil and tare:	977.910			977.910
Wt. of tare:	0.000			0.000
Weight, gms:	1167.6			
Diameter, in:	2.840	2.833	2.815	
Area, in²:	6.335	6.304	6.224	
Height, in:	5.904	5.904	5.904	
Net decrease in height, in:		0.000	0.000	
Net decrease in water volume, cc:		-45.500	7.700	
% Moisture:	19.4	24.1	23.3	23.1
Wet density, pcf:	118.9	124.2	125.0	
Dry density, pcf:	99.6	100.1	101.4	
Void ratio:	0.6357	0.6278	0.6072	
% Saturation:	79.6	100.0	100.0	

Test Readings Data for Specimen No. 3

Deformation dial constant= 1 in per input unit
Primary load ring constant= 0.72 lbs per input unit
Secondary load ring constant= 0 lbs per input unit
Crossover reading for secondary load ring= 0 input units
Membrane modulus = 0.14000 kN/cm²
Membrane thickness = 0.012 cm
Consolidation cell pressure = 105.50 psi = 15.19 ksf
Consolidation back pressure = 50.00 psi = 7.20 ksf
Consolidation effective confining stress = 7.99 ksf
Strain rate, %/min = 0.17
FAIL. STRESS = 7.20 ksf at reading no. 24
ULT. STRESS = not selected

No.	Def. Dial Units	Def. in	Load Dial Units	Load lbs	Strain %	Deviator Stress ksf	Effective Stresses Minor ksf	Major ksf	1:3 Ratio	Pore Pres. psi	P ksf	Q ksf
0	0.0000	0.000	0.0	0.0	0.0	0.00	7.99	7.99	1.00	50.00	7.99	0.00
1	0.0100	0.010	128.0	92.2	0.2	2.13	7.14	9.27	1.30	55.90	8.21	1.06
2	0.0200	0.020	195.0	140.4	0.3	3.24	6.39	9.63	1.51	61.10	8.01	1.62
3	0.0300	0.030	238.0	171.4	0.5	3.94	5.79	9.73	1.68	65.30	7.76	1.97
4	0.0400	0.040	275.0	198.0	0.7	4.55	5.23	9.78	1.87	69.20	7.50	2.27
5	0.0500	0.050	302.0	217.4	0.8	4.99	4.71	9.70	2.06	72.80	7.20	2.49
6	0.0600	0.060	320.0	230.4	1.0	5.28	4.35	9.63	2.21	75.30	6.99	2.64
7	0.0700	0.070	335.0	241.2	1.2	5.51	3.99	9.50	2.38	77.80	6.75	2.76
8	0.0800	0.080	346.0	249.1	1.4	5.69	3.73	9.42	2.52	79.60	6.57	2.84
9	0.0900	0.090	351.0	252.7	1.5	5.76	3.60	9.36	2.60	80.50	6.48	2.88
10	0.1000	0.100	357.0	257.0	1.7	5.85	3.44	9.29	2.70	81.60	6.36	2.92
11	0.1500	0.150	375.0	270.0	2.5	6.09	3.02	9.11	3.01	84.50	6.07	3.04
12	0.2000	0.200	390.0	280.8	3.4	6.28	2.87	9.14	3.19	85.60	6.00	3.14
13	0.2500	0.250	405.0	291.6	4.2	6.46	2.75	9.21	3.35	86.40	5.98	3.23
14	0.3000	0.300	413.0	297.4	5.1	6.53	2.71	9.24	3.41	86.70	5.97	3.27
15	0.3500	0.350	415.0	298.8	5.9	6.50	2.69	9.20	3.41	86.80	5.94	3.25
16	0.4000	0.400	420.0	302.4	6.8	6.52	2.71	9.23	3.41	86.70	5.97	3.26
17	0.4500	0.450	433.0	311.8	7.6	6.66	2.72	9.38	3.45	86.60	6.05	3.33
18	0.5000	0.500	454.0	326.9	8.5	6.92	2.74	9.66	3.53	86.50	6.20	3.46
19	0.5500	0.550	460.0	331.2	9.3	6.95	2.76	9.71	3.51	86.30	6.24	3.47
20	0.6000	0.600	460.0	331.2	10.2	6.88	2.81	9.69	3.45	86.00	6.25	3.44

Test Readings Data for Specimen No. 3

No.	Def. Dial Units	Def. in	Load Dial Units	Load lbs	Strain %	Deviator Stress ksf	Effective Stresses Minor ksf	Effective Stresses Major ksf	1:3 Ratio	Pore Pres. psi	P ksf	Q ksf
21	0.6500	0.650	461.0	331.9	11.0	6.83	2.82	9.66	3.42	85.90	6.24	3.42
22	0.7000	0.700	480.0	345.6	11.9	7.05	2.85	9.90	3.47	85.70	6.38	3.52
23	0.7500	0.750	495.0	356.4	12.7	7.20	2.89	10.09	3.49	85.40	6.49	3.60
24	0.8000	0.800	500.0	360.0	13.6	7.20	2.92	10.12	3.46	85.20	6.52	3.60
25	0.8500	0.850	497.0	357.8	14.4	7.09	2.95	10.04	3.40	85.00	6.50	3.54
26	0.9000	0.900	500.0	360.0	15.2	7.06	3.00	10.05	3.36	84.70	6.52	3.53

PERMEABILITY TEST RESULTS

BOTTOM ASH SAMPLES

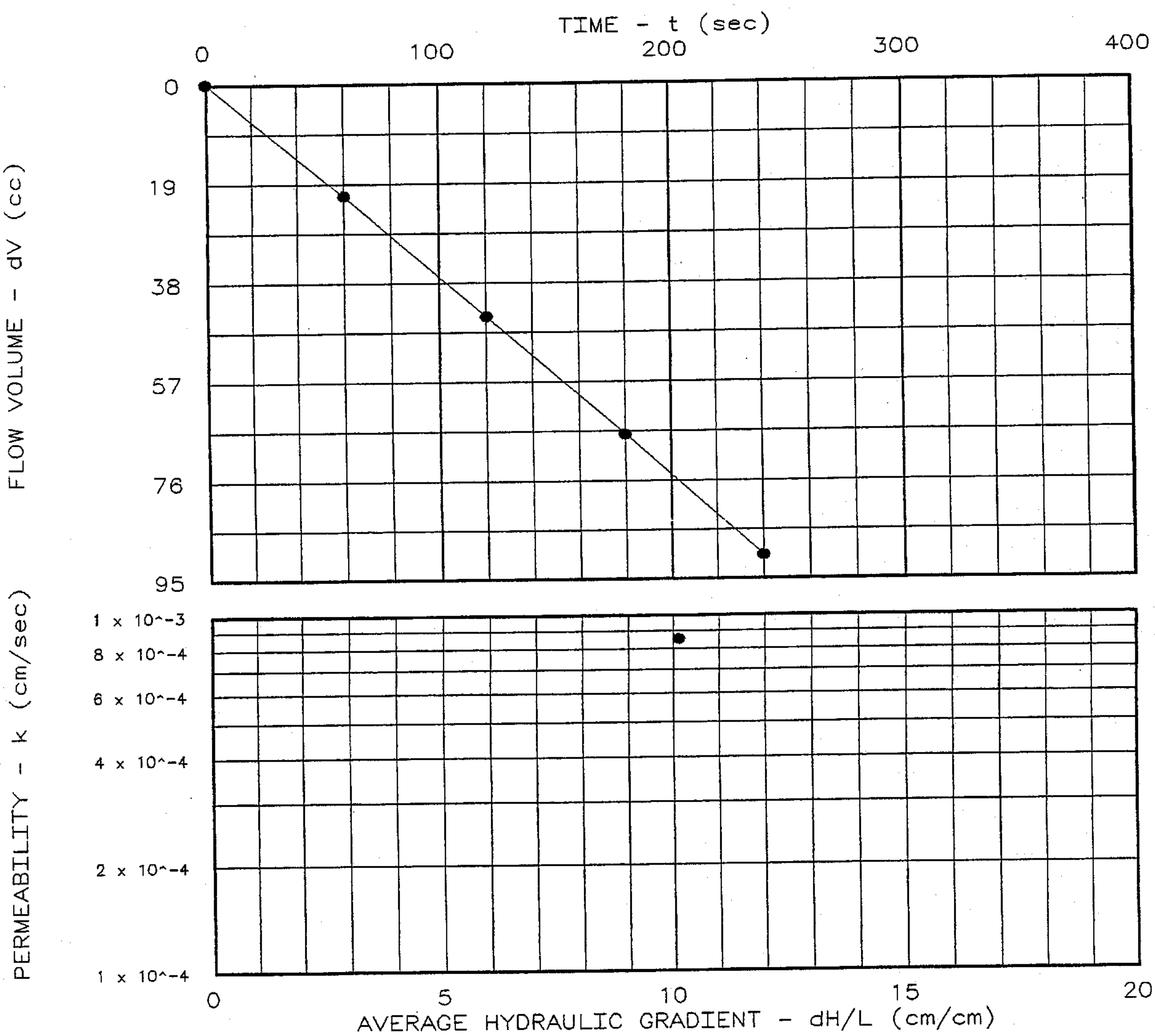
PERMEABILITY TEST REPORT

TEST DATA:
Specimen Height (cm): 5.08
Specimen Diameter (cm): 7.21
Dry Unit Weight (pcf): 95.9
Moisture Before Test (%): 15.7
Moisture After Test (%): 18.5
Run Number: 1 ● 2 ▲
Cell Pressure (psi): 57.0
Test Pressure(psi): 52.0
Back Pressure(psi): 51.3
Diff. Head (psi): 0.7
Flow Rate (cc/sec): 3.78 x 10^-1
Perm. (cm/sec): 8.55 x 10^-4

SAMPLE DATA:
Sample Identification: Old Bottom Ash

Visual Description: Gray Ash Sand

Remarks: Remolded to 92% MDD @ Optimum Moisture Content
Maximum Dry Density (pcf): 104.2
Optimum Moisture Content (%): 15.8
ASTM(D698)
Percent Compaction: 92.0%
Permeameter type: Flexible Wall
Sample type: Remolded



Project: Ash Disposal Areas
Location: TVA Gallatin Fossil Plant
Date: 10-11-04

PERMEABILITY TEST REPORT
MACTEC, INC. HB

Project No.: 3043041043
File No.: As# 2709
Lab No.: 6226
Tested by: MH
Checked by: CPT
Test: CH - Constant head

PERMEABILITY TEST DATA

PROJECT DATA

Project Name:	Ash Disposal Areas
File No.:	As# 2709
Project Location:	TVA Gallatin Fossil Plant
Project No.:	3043041043
Sample Identification:	Old Bottom Ash
Lab No.:	6226
Description:	Gray Ash Sand
Sample Type:	Remolded
Max. Dry Dens.:	104.2
Method (D1557/D698):	D698
Opt. Water Content:	15.8
Date:	10-11-04
Remarks:	Remolded to 92% MDD @ Optimum Moisture Content
Permeameter Type:	Flexible Wall
Tested by:	MH
Checked by:	CPT
Test type:	CH - Constant head

PERMEABILITY TEST SPECIMEN DATA

	Before test:			After test:		
Diameter:	1	2		1	2	
Top:	2.840 in	in		2.840 in	in	
Middle:	in	in		in	in	
Bottom:	in	in		in	in	
Average:	2.84 in	7.21 cm		2.84 in	7.21 cm	
Length:	1	2	3	1	2	3
	2.000 in	in	in	2.000 in	in	in
Average:	2.00 in	5.08 cm		2.00 in	5.08 cm	

Moisture, Density and Sample Parameters:

	Before test		After test
Specific Gravity:	2.64		
Wet Wt. & Tare:	368.90		377.75
Dry Wt. & Tare:	318.84		318.84
Tare Wt.:	0.00		0.00
Moisture Content:	15.7 %		18.5 %
Dry Unit Weight:	95.9 pcf	92.0 % of max	95.9 pcf
Porosity:	0.4183		0.4183
Saturation:	57.6 %		67.8 %

CONSTANT HEAD PERMEABILITY TEST CONDITIONS DATA

Cell No.: 2 Panel No.: 13 Positions: 1

Run Number:	1	2
Cell Pressure:	57.0 psi	0.0 psi
Saturation Pressure:	50.0 psi	0.0 psi
Inflow Corr. Factor:	1.00	1.00
Outflow Corr. Factor:	1.00	1.00
Test Temperature:	22.8 °C	0.0 °C

PERMEABILITY TEST READINGS DATA

CASE D X S R	DATE	TIME (24 hr)	ELAPSED TIME-sec	GAUGE PRESSURE-psi IN	OUT	BURET READING-cc IN	OUT	OUTFLOW/ INFLOW RATIO
S	9/ 9/ 4	10:17:00	0	52.0	50.0	100.00	100.00	0.00
	9/ 9/ 4	10:18:00	60	52.0	50.0	121.20	78.80	1.00
	9/ 9/ 4	10:19:00	120	52.0	50.0	144.40	55.60	1.00
	9/ 9/ 4	10:20:00	180	52.0	50.0	167.10	32.90	1.00
	9/ 9/ 4	10:21:00	240	52.0	50.0	190.40	9.60	1.00

Test Pressure = 52.0 psi Differential Head = 0.7 psi, 51.4 cm H2O
Gradient = 1.011E 01 Flow rate = 3.778E-01 cc/sec R squared = 0.99974
Permeability, K22.8° = 9.142E-04 cm/sec, K20° = 8.551E-04 cm/sec

PERMEABILITY TEST REPORT

TEST DATA:

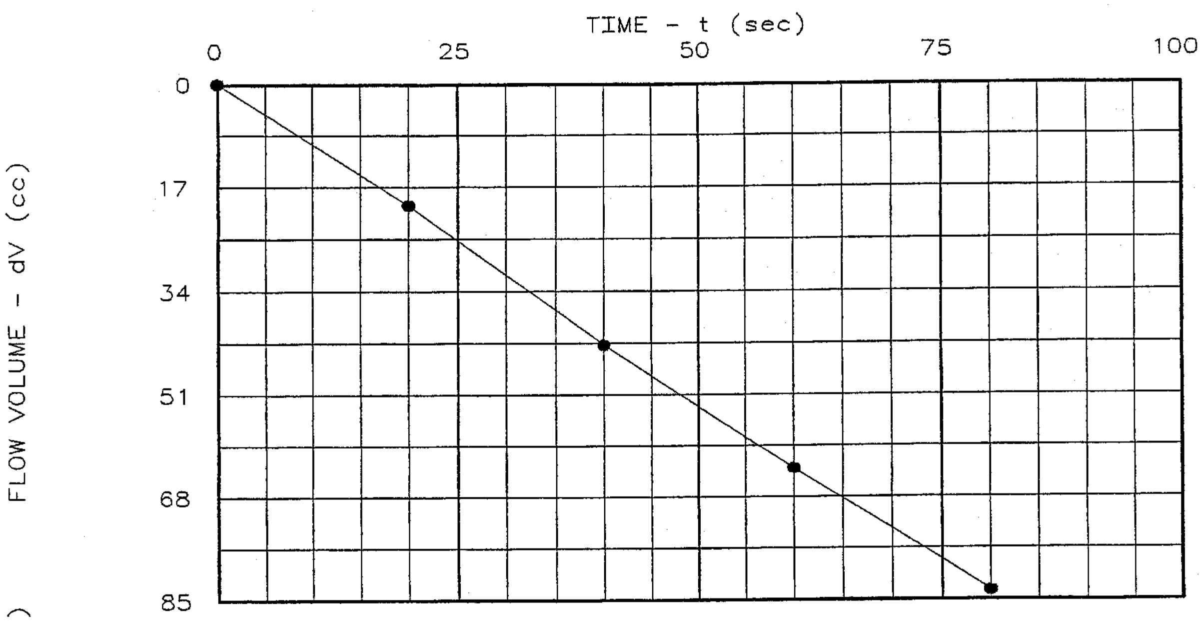
Specimen Height (cm): 5.08
Specimen Diameter (cm): 7.21
Dry Unit Weight (pcf): 73.1
Moisture Before Test (%): 29.2
Moisture After Test (%): 44.6
Run Number: 1 ● 2 ▲
Cell Pressure (psi): 57.0
Test Pressure(psi): 52.0
Back Pressure(psi): 51.2
Diff. Head (psi): 0.8
Flow Rate (cc/sec): 1.05 x 10^0
Perm. (cm/sec): 2.15 x 10^-3

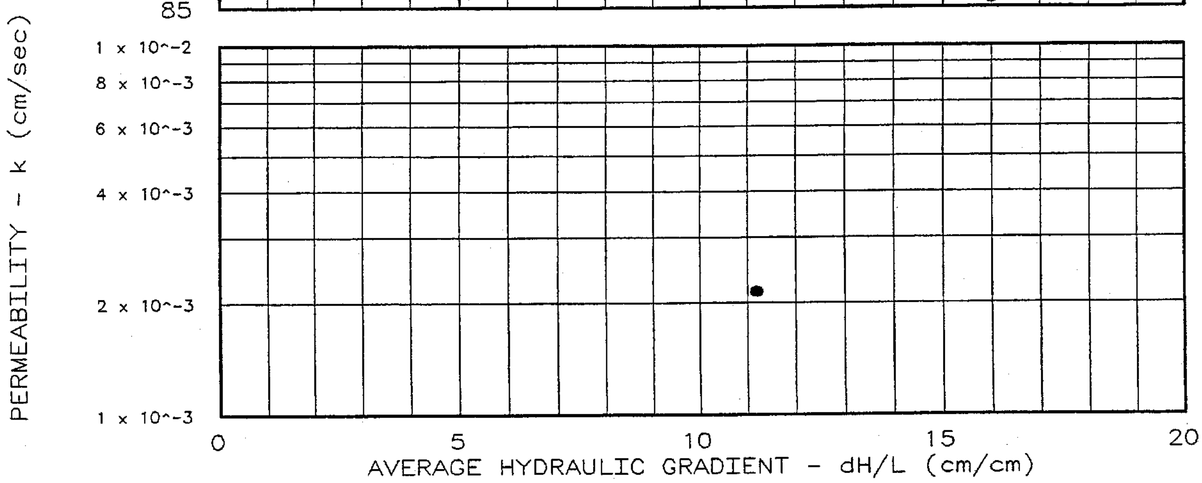
SAMPLE DATA:

Sample Identification: New Bottom Ash #2

Visual Description: Gray Ash Sand

Remarks: Remolded to 92% MDD @ Optimum Moisture Content
Maximum Dry Density (pcf): 79.4
Optimum Moisture Content (%): 29.2 ASTM(D698)
Percent Compaction: 92.0%
Permeameter type: Flexible Wall
Sample type: Remolded





Project: Ash Disposal Areas
Location: TVA Gallatin Fossil Plant
Date: 10-11-04

PERMEABILITY TEST REPORT

MACTEC, INC. HR

Project No.: 3043041043
File No.: As# 2709
Lab No.: 6226
Tested by: MH
Checked by: CPT
Test: CH - Constant head

PERMEABILITY TEST DATA

PROJECT DATA

Project Name:	Ash Disposal Areas
File No.:	As# 2709
Project Location:	TVA Gallatin Fossil Plant
Project No.:	3043041043
Sample Identification:	New Bottom Ash #2
Lab No.:	6226
Description:	Gray Ash Sand
Sample Type:	Remolded
Max. Dry Dens.:	79.4
Method (D1557/D698):	D698
Opt. Water Content:	29.2
Date:	10-11-04
Remarks:	Remolded to 92% MDD @ Optimum Moisture Content
Permeameter Type:	Flexible Wall
Tested by:	MH
Checked by:	CPT
Test type:	CH - Constant head

PERMEABILITY TEST SPECIMEN DATA

	Before test: 1	Before test: 2	Before test: 3	After test: 1	After test: 2	After test: 3
Diameter:						
Top:	2.840 in	in		2.840 in	in	
Middle:	in	in		in	in	
Bottom:	in	in		in	in	
Average:	2.84 in	7.21 cm		2.84 in	7.21 cm	
Length:	2.000 in	in	in	2.000 in	in	in
Average:	2.00 in	5.08 cm		2.00 in	5.08 cm	

Moisture, Density and Sample Parameters:

	Before test		After test
Specific Gravity:	2.49		
Wet Wt. & Tare:	313.90		351.21
Dry Wt. & Tare:	242.96		242.96
Tare Wt.:	0.00		0.00
Moisture Content:	29.2 %		44.6 %
Dry Unit Weight:	73.1 pcf	92.0 % of max	73.1 pcf
Porosity:	0.5300		0.5300
Saturation:	64.5 %		98.4 %

CONSTANT HEAD PERMEABILITY TEST CONDITIONS DATA

Cell No.: 3 Panel No.: 15 Positions: 1

Run Number:	1	2
Cell Pressure:	57.0 psi	0.0 psi
Saturation Pressure:	50.0 psi	0.0 psi
Inflow Corr. Factor:	1.00	1.00
Outflow Corr. Factor:	1.00	1.00
Test Temperature:	22.8 °C	0.0 °C

PERMEABILITY TEST READINGS DATA

CASE D X S R	DATE	TIME (24 hr)	ELAPSED TIME-sec	GAUGE PRESSURE-psi IN	OUT	BURET READING-cc IN	OUT	OUTFLOW/ INFLOW RATIO
S	9/ 9/ 4	10:55:00	0	52.0	50.0	100.00	100.00	0.00
	9/ 9/ 4	10:55:20	20	52.0	50.0	120.00	80.00	1.00
	9/ 9/ 4	10:55:40	40	52.0	50.0	142.80	57.20	1.00
	9/ 9/ 4	10:56:00	60	52.0	50.0	163.20	36.80	1.00
	9/ 9/ 4	10:56:20	80	52.0	50.0	183.40	16.60	1.00

Test Pressure = 52.0 psi Differential Head = 0.8 psi, 56.9 cm H2O
Gradient = 1.119E 01 Flow rate = 1.050E 00 cc/sec R squared = 0.99955
Permeability, K22.8° = 2.296E-03 cm/sec, K20° = 2.147E-03 cm/sec

PERMEABILITY TEST RESULTS

ASH POND SAMPLES

PERMEABILITY TEST REPORT

TEST DATA:

Specimen Height (cm): 7.99
Specimen Diameter (cm): 7.24
Dry Unit Weight (pcf): 78.1
Moisture Before Test (%): 34.5
Moisture After Test (%): 34.9
Run Number: 1 ● 2 ▲
Cell Pressure (psi): 57.0
Test Pressure(psi): 52.0
Back Pressure(psi): 50.1
Diff. Head (psi): 1.9
Flow Rate (cc/sec): 2.06 x 10^-2
Perm. (cm/sec): 2.78 x 10^-5

SAMPLE DATA:

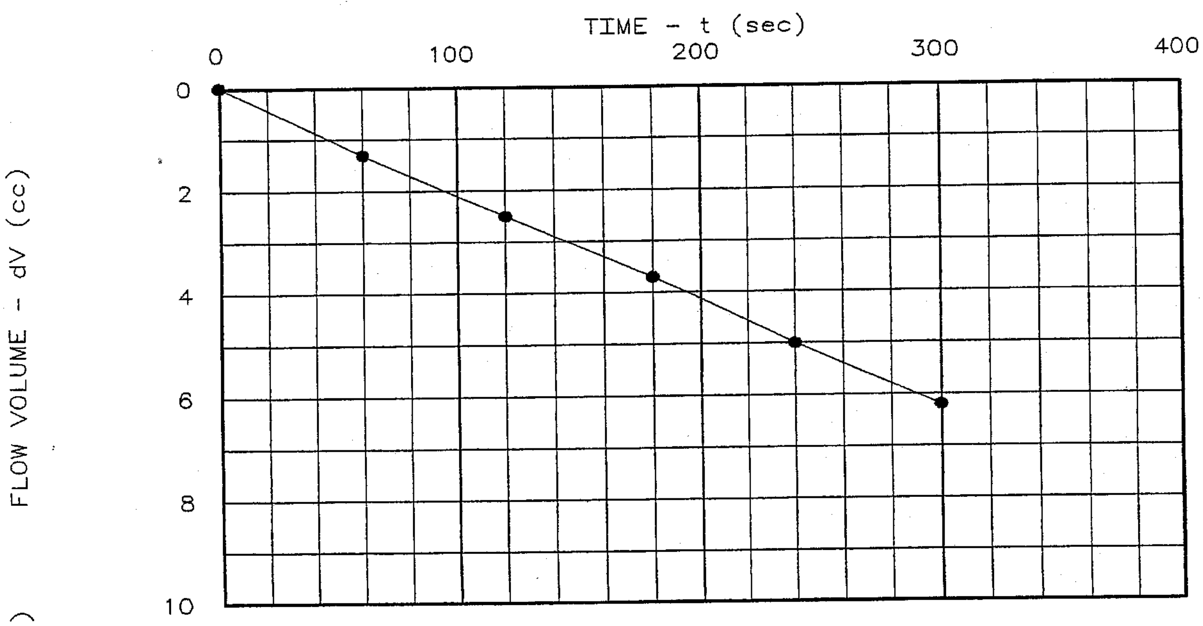
Sample Identification: B-13 UD @ 15'-17'

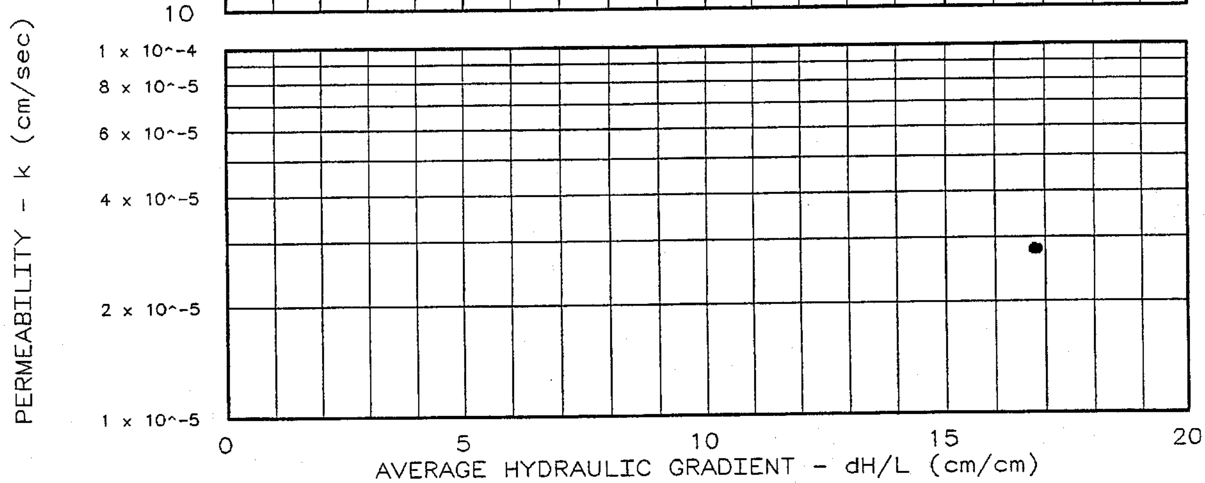
Visual Description: Gray Fly Ash

Remarks:

Maximum Dry Density (pcf):
Optimum Moisture Content (%):

Percent Compaction:
Permeameter type: Flexible Wall
Sample type: Shelby Tube





Project: Ash Disposal Areas
Location: TVA Gallatin Fossil Plant
Date: 10-11-04

PERMEABILITY TEST REPORT
MACTEC, INC. HB

Project No.: 3043041043
File No.: As# 2709
Lab No.: 6226
Tested by: MH
Checked by: CPT
Test: CH - Constant head

PERMEABILITY TEST DATA

PROJECT DATA

Project Name:	Ash Disposal Areas
File No.:	As# 2709
Project Location:	TVA Gallatin Fossil Plant
Project No.:	3043041043
Sample Identification:	B-13 UD @ 15'-17'
Lab No.:	6226
Description:	Gray Fly Ash
Sample Type:	Shelby Tube
Max. Dry Dens.:	
Method (D1557/D698):	
Opt. Water Content:	
Date:	10-11-04
Remarks:	
Permeameter Type:	Flexible Wall
Tested by:	MH
Checked by:	CPT
Test type:	CH - Constant head

PERMEABILITY TEST SPECIMEN DATA

	Before test: 1	Before test: 2	Before test: 3	After test: 1	After test: 2	After test: 3
Diameter:						
Top:	2.852 in	in		2.852 in	in	
Middle:	in	in		in	in	
Bottom:	in	in		in	in	
Average:	2.85 in	7.24 cm		2.85 in	7.24 cm	
Length:	3.144 in	in	in	3.144 in	in	in
Average:	3.14 in	7.99 cm		3.14 in	7.99 cm	

Moisture, Density and Sample Parameters:

	Before test	After test
Specific Gravity:	2.20	
Wet Wt. & Tare:	553.82	555.49
Dry Wt. & Tare:	411.76	411.76
Tare Wt.:	0.00	0.00
Moisture Content:	34.5 %	34.9 %
Dry Unit Weight:	78.1 pcf	78.1 pcf
Porosity:	0.4313	0.4313
Saturation:	100.1 %	101.2 %

CONSTANT HEAD PERMEABILITY TEST CONDITIONS DATA

Cell No.: 2-N   Panel No.: 15   Positions: 1

Run Number:	1	2
Cell Pressure:	57.0 psi	0.0 psi
Saturation Pressure:	50.0 psi	0.0 psi
Inflow Corr. Factor:	1.00	1.00
Outflow Corr. Factor:	1.00	1.00
Test Temperature:	22.8 °C	0.0 °C

PERMEABILITY TEST READINGS DATA

CASE D X S R	DATE	TIME (24 hr)	ELAPSED TIME-sec	GAUGE PRESSURE-psi IN	GAUGE PRESSURE-psi OUT	BURET READING-cc IN	BURET READING-cc OUT	OUTFLOW/ INFLOW RATIO
S	10/12/ 4	11:15:00	0	52.0	50.0	20.00	20.00	0.00
	10/12/ 4	11:16:00	60	52.0	50.0	21.30	18.70	1.00
	10/12/ 4	11:17:00	120	52.0	50.0	22.50	17.50	1.00
	10/12/ 4	11:18:00	180	52.0	50.0	23.70	16.30	1.00
	10/12/ 4	11:19:00	240	52.0	50.0	25.00	15.00	1.00
	10/12/ 4	11:20:00	300	52.0	50.0	26.20	13.80	1.00

Test Pressure = 52.0 psi Differential Head = 1.9 psi, 134.4 cm H2O
Gradient = 1.683E 01 Flow rate = 2.062E-02 cc/sec R squared = 0.99984
Permeability, K22.8° = 2.973E-05 cm/sec, K20° = 2.781E-05 cm/sec